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Preface

Slovenia enjoys extraordinarily rich biodiversity and landscapes due to its location at the junction of several ecological systems. However, pressures on these environmental resources have intensified as a result of rapid economic growth over most of the last decade. This OECD Environmental Performance Review, *the first since Slovenia became a member of the OECD in 2010, provides an opportunity to take stock of the country's progress in environmental management and identify remaining challenges.*

Overall, Slovenia has made good progress in reforming its environmental policies and enhancing the environmental quality of life of its people. However, major challenges remain and many of them stem from Slovenia's highly decentralised governance system combined with only limited controls on local development. For example, this configuration has fostered a relatively high use of road vehicles. This has helped to lock the transport system into a highly carbon-intensive pattern that will take many years to change, and contributed to the emergence of air pollution hot-spots in some urban centres. Small, fragmented local communities have also found it difficult to realise economies of scale for environment-related infrastructure, such as for waste and wastewater treatment.

The central economic policy challenge facing Slovenia is how to boost the productivity and competiveness of its economy. Meeting this challenge requires shifting to higher value-added forms of production, and developing and applying modern technologies, including the green technologies of the future.

This OECD Environmental Performance Review *aims to provide further support for Slovenia's environmental progress, with special emphasis on green growth, climate change, and waste management. Some of the Review's key recommendations are:*

- *Strengthen oversight by the Ministry of the Environment of local spatial planning, and provide financial incentives for municipalities to develop joint regional spatial plans.*
- *Urgently develop a comprehensive strategy to reduce energy use in, and related emissions from, the transport sector.*
- *Assess how capacity for eco-innovation could be enhanced in light of the conclusions and recommendations of recent OECD work in this area.*
- *Carry out an assessment of the value of ecosystem services and assess how greater use of market-based approaches could help to better integrate biodiversity and sectoral policies.*
- *Expedite the adoption and implementation of the Climate Change Act.*
- *Develop an overarching waste management strategy, balancing EU requirements and conditions in Slovenia.*

This Review is the result of a rich and co-operative policy dialogue between Slovenia and other members and observers of the OECD Working Party on Environmental Performance. We are confident that this collaborative effort will contribute to the policy debate on how to tackle the shared environmental challenges faced by OECD members and their partners.

Angel Gurría
OECD Secretary-General

Foreword

The principal aim of the OECD Environmental Performance Review programme is to help member and selected partner countries to improve their individual and collective performance in environmental management by:

- Helping individual governments to assess progress in achieving their environmental goals.
- Promoting continuous policy dialogue and peer learning.
- Stimulating greater accountability from governments towards each other and public opinion.

This report is the first OECD review of Slovenia's environmental performance since it joined the Organisation in 2010. Progress in achieving domestic objectives and international commitments provides the basis for assessing the country's environmental performance. Such objectives and commitments may be broad aims, qualitative goals, or quantitative targets. A distinction is made between intentions, actions, and results. Assessment of environmental performance is also placed within the context of Slovenia's historical environmental record, present state of the environment, physical endowment in natural resources, economic conditions, and demographic trends.

The OECD is indebted to the government of Slovenia for its co-operation in providing information for the organisation of the review mission to Ljubljana (6-12 March 2011), and for facilitating contacts both inside and outside governmental institutions.

Thanks are also due to all those who helped in the course of this review, to the representatives of member countries participating in the OECD Working Party on Environmental Performance, and especially to the examining countries: Italy and the Slovak Republic.

The team that prepared this review comprised experts from reviewing countries: Ms. Jana Durkošova (Slovak Republic) and Mr. Antonio Massarutto (Italy); members of the OECD Secretariat: Mr. Brendan Gillespie, Mr. Eugene Mazur, Mr. Krzysztof Michalak, Mr. Tappei Tsutsumi and Mr. Žiga Žarnič; and Mr. Eduard Goldberg, Mr. Dominic Hogg and Ms. Sara Moarif (consultants). Ms. Carla Bertuzzi and Mr. Shayne MacLachlan (OECD Secretariat) and Mr. John Smith (consultant) provided statistical and editorial support during the preparation of the report. Preparation of this report also benefited from comments provided by several members of the OECD Secretariat.

The OECD Working Party on Environmental Performance discussed the draft *OECD Environmental Performance Review of Slovenia* at its meeting on 18 January 2012 in Paris, and approved the assessment and recommendations.

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This book has...

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General Notes

Signs

The following signs are used in figures and tables:

. .: not available

–: nil or negligible

.: decimal point.

Country aggregates

OECD Europe: This zone includes all European member countries of the OECD, *i.e.* Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

OECD: This zone includes all member countries of the OECD, *i.e.* the countries of OECD Europe plus Australia, Canada, Chile, Israel, Japan, Korea, Mexico, New Zealand and the United States.

Country aggregates may include Secretariat estimates.

Currency

Monetary unit: Euro (EUR).

In 2010, EUR 1.00 = USD 0.751.

In 2011, EUR 1.00 = USD 0.716.

Cut-off date

This report is based on information and data available up to the end of January 2012.

Note about ministries

The Ministry of the Environment and Spatial Planning (MESP) ceased to exist in February 2012. The responsibility for environmental policy was allocated to the newly created Ministry of Agriculture and the Environment (formerly the Ministry of Agriculture, Forestry and Food, MAFF). Responsibility for spatial planning policy is now with the Ministry of Infrastructure and Spatial Planning (formerly the Ministry of Transport).

Executive Summary

Slovenia's environment is rich and diverse, but subject to growing pressures from economic development

Slovenia is the second smallest OECD country by size and the fourth smallest by population. It enjoys extraordinarily rich biodiversity and landscapes due to its location at the junction of several ecological systems. Slovenia's natural endowment has been enhanced by a tradition of close-to-natural forest management and by low-intensity farming, as well as close co-operation with neighbouring countries. Approximately 62% of the total land area is occupied by forests, about twice the OECD average.

Following independence in 1991, and membership of the EU in 2004, Slovenia experienced rapid economic growth. GDP per capita is converging with the OECD average. Relatively favourable business- and export-oriented macroeconomic policies, combined with structural reforms stimulated by EU accession, have been key factors driving growth. The main sectors driving growth have been credit and construction, as well as exports from cyclical industries such as manufacturing of automobile components.

Towards the end of the 2000s, environmental pressures were reduced due to the impact of the global economic and financial crisis on Slovenia's economic performance. GDP declined by nearly 8% in 2009, one of the sharpest falls among OECD countries. The general decline in economic activity was reinforced by a reduction in exports of labour-intensive products. However, exports rebounded and economic growth resumed by the end of 2010.

Further efforts are needed to promote green growth…

The central economic policy challenge facing Slovenia is to boost the productivity and competitiveness of its economy while consolidating its fiscal position. There are opportunities for integrating environment into the policy mix for this purpose.

Slovenia's Development Strategy (SDS) for 2005-13 has been the key mechanism for defining sustainable development goals and targets. Implementation of the SDS has been assessed on an annual basis. In addition to the SDS, an abundance of sectoral strategic documents have been prepared by different ministries. However, more could be done to strengthen inter-ministerial co-operation in order to exploit environment-related synergies and identify trade-offs.

Environment formed part of the Exit Strategy 2010-13, the fiscal stimulus implemented in response to the economic and financial crisis. The Exit Strategy included measures to: adjust the planning and permitting system for transport, energy and environmental infrastructure; modernise the railways; promote renewable energy; adapt to climate change; and increase the competitiveness of the agriculture and food processing industries while reducing environmental impacts and optimising forest management. Further in-depth assessment of the costs and benefits of implementing the SDS measures and the Exit Strategy would provide a good basis for preparing a new Development Strategy for 2013-20, and for integrating a green growth perspective into it.

… including green tax reform…

In 2009, revenue from environmentally related taxes reached 9% of total tax receipts and 3.5% of GDP, well above the OECD averages. As in most OECD countries, the bulk of this revenue was accounted for by taxes on energy carriers, motor fuels and vehicles. However, the environmentally related taxes do not fully internalise environmental externalities. Even though excise duties on petrol and diesel increased in 2009, the tax on diesel is about two-thirds of that on petrol, which is not justified from an environmental perspective. Important exemptions apply in the case of commercial use of fuels. Taxes applied to other fuels (such as heavy fuel oil, gas oil used for heating, and coal and coke products) could better reflect the environmental costs associated with emissions of greenhouse gases and traditional air pollutants. Substantial changes to vehicle taxation in 2010 reduced the number of exemptions and linked registration of motor vehicles to CO_2 and Euro emission standards.

The priority currently given to strengthening the overall tax system provides an opportunity for an in-depth review of the effectiveness and efficiency of environmentally related taxation, including environmental charges. This could pave the way for comprehensive green tax reform, which would contribute to fiscal consolidation while more effectively addressing environmental externalities.

… supported by better use of public and private finance…

Total expenditure on environmental protection increased from 1.5% to 2.1% of GDP in the period 2000-09. Public environmental expenditure remained broadly constant, at a level close to the OECD average of 0.8%. It focused on environmental infrastructure. Slovenia's absorption of EU funds is improving: it has the highest disbursement rate of committed funds (55%) among the ten new EU members, mainly due to simplification of financial management and control procedures. However, the absorption of funds for environment-related investments has been slow. At the halfway point in the 2007-13 implementation period, less than one-third of the available budget had been contracted and only 14% had been disbursed. Delays were particularly important in the waste and railway sectors.

Private environmental expenditure increased during the review period, mostly in the area of waste management. The Eco Fund has proven an effective mechanism to channel public finance for environmental projects. Opportunities to further promote public-private partnerships in the areas of waste and wastewater management should continue to be explored, building on the experience of the Slovenian Export and Development Bank.

This should be accompanied by the implementation of measures to ensure that quality of service is maintained at a reasonable price, including through increased use of benchmarking and performance evaluation.

… and more vigorous promotion of eco-innovation

Slovenia has increased its support for innovation. For example, gross expenditure on R&D for environmental purposes more than tripled in real terms during the review period. Its share in total R&D rose from 0.8% to 2.2%. Nevertheless, this share is smaller than in many other OECD countries. The outputs of Slovenia's environmental innovation system, measured in terms of number and growth of total patent applications, are weak compared to those in many other OECD countries. The public sector accounts for most of the research effort. Better incentives are needed to promote innovation in the private sector, but this will be a challenge given the predominance of small and medium-sized enterprises. The government could usefully draw on the analysis and recommendations in the 2011 OECD report *Fostering Innovation for Green Growth* to identify ways to strengthen its performance in promoting and disseminating environment-related innovation.

Environmental policies have been consolidated and strengthened…

Green growth also requires effective environmental policies. Over the last ten years, Slovenia has established a comprehensive framework of primary environmental legislation. It has successfully transposed most of the EU environmental directives into the 2004 Environmental Protection Act and other key national laws. It has also adopted new or revised environmental quality and emission standards, drawing on the experience of EU and other OECD countries. Slovenia has made substantial progress in creating a multi-tier system of environmental permitting. It has introduced risk-based planning of environmental inspections, which has helped the Inspectorate for the Environment and Spatial Planning to increase the effectiveness and efficiency of compliance monitoring and enforcement.

Slovenia ratified the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters in 2004. Subsequently, the provision of, and access to, information about the state of the environment, environmental pressures and policy responses have been strengthened. Environmental NGOs play an important watchdog role and participate actively in environmental policy making. Despite some initial uncertainties, the conditions under which NGOs have legal standing to initiate legal proceedings on environment-related issues have been clarified.

… but implementation challenges continue to hamper progress

Despite progress in reforming the environmental legal framework, Slovenia's secondary environmental legislation is complex, some areas are inadequately regulated, and there are overlaps and even contradictions between different decrees and ordinances. The environmental authorities could do more to promote better environmental performance by enterprises, particularly through providing them with information and guidance on how

best to comply with regulations. The system of administrative enforcement could be strengthened through increasing the levels and collection rates of environmental fines, and through making fines proportional to the financial gains of non-compliance.

The considerable autonomy enjoyed by municipalities, and the absence of a regional administrative level, have resulted in an important environmental governance gap between the national and local levels. While efforts are under way to develop common strategies to tackle priority issues such as local air pollution and waste management, national environmental authorities are often unaware of the environmental performance of the ever-growing number of municipalities (from 147 in 1995 to 211 at present). Neighbouring local authorities seldom co-ordinate their land use planning, and they sometimes compete for industrial and commercial development projects. Oversight by the national government to ensure consistency in the implementation of environmental requirements could be improved by establishing a regular forum for dialogue between the Ministry of the Environment and Spatial Planning and municipalities, possibly with active involvement of the Association of Municipalities and Towns of Slovenia. Such a forum should aim to better monitor and benchmark the environmental performance of local authorities, with a view to identifying and disseminating good practice. It should also facilitate better feedback from the local level for policy purposes.

Environmental performance is mixed

Despite significant strengthening of the environmental policy and institutional framework over the last decade, Slovenia's natural asset base and the health of its population are still subject to significant pressures. A variety of fauna and flora species have been affected by habitat loss and fragmentation due to urbanisation, transport infrastructure and intensive agriculture. Water quality in Slovenia's fast-flowing rivers is good, but it is less so in lakes and groundwater, where there are higher concentrations of nutrients and pesticides. Past mining of mercury and other minerals is still a source of surface and groundwater contamination despite remediation efforts.

Concentrations of air pollutants such as SO_2, NO_2 and CO in urban areas are below limit values. However, levels of seasonal exposure to particulate matter (PM) and ozone (O_3) were among the highest in the EU27 during most of the review period, exceeding daily and annual limit values throughout the country. Road transport in urban centres and the use of wood-burning stoves for heating in households, together with unfavourable temperature inversions, are major causes of urban pollution incidents. Some air pollution hot-spots still exist around lignite-fuelled power stations in central Slovenia.

Better waste management remains a priority

Although waste generation per capita remained well below OECD national averages, the amounts of waste continue to increase as incomes converge with the OECD and EU averages, posing a growing management challenge. Disposal by landfill remains relatively high, and rates of waste recovery are in the average to low range. In 2010, non-hazardous waste from production and services accounted for 85% of waste generated, with construction and demolition (C&D) waste accounting for a significant fraction. Municipal waste increased during the decade at a slower rate than GDP, accounting for 12% of waste in 2010. Hazardous waste accounted for 1.5% of the total, with a large share exported for treatment.

Accession to the EU provided a strong impetus to strengthen waste management policies and practices. It also provided finance for upgrading and constructing waste management infrastructure. Implementation of the EU environmental *acquis* was operationalised in a number of programmes for different waste streams.

Slovenia has reduced its reliance on landfilling and improved the environmental integrity of existing landfills. The landfill gate fee has been significantly increased to cover aftercare costs, and the landfill tax has been reformed although it remains low compared to other OECD countries. Recovery of municipal waste has also increased, particularly in the period 2009-10, to reach 35% of the total. Separate collection of individual waste streams (including waste packaging, organic waste, batteries, waste electrical and electronic equipment, end-of-life vehicles and tyres) has been important in this regard. However, further efforts are needed to improve separate collection to meet the national objective of recovering 55% of municipal waste. Further measures are also required to reduce the generation of C&D waste and to address problems related to old contaminated sites resulting from past industrial activities or from inadequate waste disposal and treatment. The need to transpose the revised 2008 EU Waste Directive, and to develop a new programming framework beyond 2012, provides an opportunity for Slovenia to develop a more systematic and consistent strategy for waste management that strikes a better balance between implementing EU policies and addressing Slovenian priorities, taking account of the costs and benefits of alternative ways of managing its waste.

Addressing climate change- and air pollution-related problems remains challenging

While significant structural changes to Slovenia's economy led to a notable drop in greenhouse gas (GHG) emissions in the 1990s, performance in this area since 2000 has been uneven. Emissions from the manufacturing, commercial and residential sectors have decreased, but not enough to offset the increase in emissions from the transport sector. The net result has been an increase in total emissions during much of the decade. CO_2 emissions (which account for the lion's share of GHG emissions) fell by over 10% in 2009 due to the global economic and financial crisis. This enabled Slovenia to come close to meeting its Kyoto Protocol target of reducing average annual GHG emissions in the period 2008-12 by 8% compared with its chosen base year of 1986. Sustainable forest management makes it possible for Slovenia to use its maximum carbon sink allowance under the Kyoto Protocol. The government estimates that Slovenia will achieve the Kyoto target with a small (0.4 Mt CO_2 eq) purchase of international carbon credits.

Slovenia has largely transposed the EU directives related to climate change mitigation and air pollution prevention and control. It has also developed a variety of strategies and plans related to energy use, and to GHG and traditional air pollutant emissions. They have been supported by extensive use of climate-related market-based instruments, including the CO_2 tax on energy carriers, motor vehicle registration fees linked to CO_2 and Euro emission standards, and the energy efficiency tax. These instruments have been used mainly to raise revenue, and there is potential to strengthen their incentive function.

Achieving policy objectives related to climate mitigation and air management requires a significant reduction of the environmental footprint of the transport sector. Transport policy has been geared to the expansion of road construction and promotion of the use of

road vehicles, for both freight and passengers. Lack of appropriate land use planning, insufficient public transport infrastructure, and a high rate of international transit road traffic have reinforced this trend. As a result, Slovenia is locked into a transport system that is highly carbon intensive and will take many years to change. A comprehensive strategy is needed to integrate transport, environmental and land use policies more effectively at the national level. These efforts should be accompanied by vigorous and well co-ordinated actions by municipalities.

Slovenia's renewable energy, energy efficiency and climate change policies have become increasingly complementary. Potential for new renewable capacity exists, but its development will require careful assessment of cumulative environmental impacts, *e.g.* the impacts of new hydropower installations on rivers, the impacts of using biomass from forests, and the impacts of wind power on biodiversity and landscapes. It is unlikely that Slovenia will meet its EU energy efficiency objective of a 9% reduction in end-use energy consumption by 2016 compared to 2008 unless it identifies and exploits low-cost options more effectively. The interactions of renewable energy and energy efficiency policies with the EU Emissions Trading System (ETS) should be kept under review to avoid unnecessary overlap and to ensure the overall cost-effectiveness of policy measures.

International co-operation should further build on and reinforce national efforts

Slovenia has actively engaged in a host of international environmental activities over the last decade. Even the heavy preparations for joining the European Union in 2004 did not crowd out priority international environmental dossiers. More than in most other countries, physiography and geography determine the priorities of Slovenia's international environmental relationships, notably with respect to water management and conservation of biodiversity. Bilateral co-operation between Slovenia and its neighbouring countries includes water management agreements with Croatia, Hungary and Italy and agreements with Austria on spatial planning in border regions, notably regarding the Drava and Mura rivers. Slovenia has continued to maintain many informal contacts at a professional/technical level with the countries of the western Balkans.

Slovenia's commitment to sustainable development on a regional and sub-regional scale is articulated through various co-operation agreements covering the Alps, the Danube and its tributaries, and the Mediterranean (including the Adriatic). The Dinaric Arc area is an emerging focus of co-operation. Beyond its immediate region, Slovenia has committed itself to all the relevant multilateral environmental agreements (MEAs) and most of the associated protocols. In 2004, Slovenia's status changed from recipient to donor of official development assistance (ODA). Its ODA in 2009 amounted to 0.15% of GNI, close to the 2010 EU target of 0.17%. Slovenia intends to increase the share of ODA going to the environment, particularly water projects.

PART I

Sustainable Development

PART I

Chapter 1

Towards Green Growth*

Slovenia experienced rapid economic growth throughout most of the 2000s, with GDP per capita converging with the OECD average. Relatively favourable business- and export-oriented macroeconomic policies, combined with structural reforms stimulated by EU accession, were key factors driving growth. Even though environmental pressures were reduced towards the end of the 2000s due to the impact of the global economic and financial crisis, Slovenia will face a number of pressing environmental challenges as economic growth resumes. This chapter examines Slovenia's framework for sustainable development and green growth. It analyses how the country has used investment, both public and private, supported by EU funds, to pursue environmental objectives. It also examines the use of economic instruments (i.e. energy and vehicle taxation), the removal of fiscal benefits, environmental fees and charges, and subsidies that encourage environmentally friendly activities or reduce environmentally harmful impacts. Included is an assessment of eco-innovation performance, as measured by environment-related R&D and patenting activity. This chapter also examines policies to encourage green corporate responsibility and investment, as well as green public procurement.

* This chapter reviews progress in the period 2000-11. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Assessment and recommendations

Slovenia's Development Strategy (SDS) for 2005-13 has been the key mechanism for defining sustainable development goals and targets. Implementation of the SDS has been assessed on an annual basis. Further in-depth assessment of the costs and benefits of implementing the Strategy's measures should provide a good basis for a new Development Strategy for 2013-20, which would integrate a green growth perspective. In addition to the SDS, an abundance of sectoral strategic documents have been produced by different ministries. However, inter-ministerial co-operation required to exploit synergies and identify trade-offs is lacking. Environment formed part of the Exit Strategy 2010-13, the fiscal stimulus implemented in response to the global economic and financial crisis. The Exit Strategy included measures to: adjust the planning and permitting system for transport, energy and environmental infrastructure; modernise the railways; promote renewable energy; adapt to climate change; and increase the competitiveness of the agriculture and food processing industries while reducing environmental impacts, and optimising forest management.

In 2009, revenue from environmentally related taxes reached 9% of total tax receipts and 3.5% of GDP, well above OECD averages. As in most OECD countries, the bulk of this revenue was accounted for by taxes on energy carriers, motor fuels and vehicles. Even though excise duties on petrol and diesel increased in 2009, the tax on diesel was about 90% of that on petrol in 2009-10, and decreased to 80% in 2011, which is not justified from an environmental perspective. Important refunds apply in the case of commercial use of diesel. Taxes applied to other fuels (such as for heavy fuel oil and gas oil used for heating, or coal and coke products) could better reflect the environmental costs associated with greenhouse gas and traditional air pollutant emissions. Substantial changes to vehicle taxation in 2009-10 linked a new one-off tax on new motor vehicles and annual taxes on trucks and buses to CO_2 and Euro emission standards. The priority currently being given to strengthening the overall tax system provides an opportunity for an in-depth review of the effectiveness and efficiency of environmentally related taxation. This could pave the way for comprehensive green tax reform, which would contribute to fiscal consolidation while more effectively addressing environmental externalities. This review should include existing environmental taxes (*e.g.* the landfill tax, wastewater tax, CO_2 tax, and taxes linked to Extended Producer Responsibility for various waste streams), as well as other economic instruments (*e.g.* user charges for waste collection, water abstraction, and wastewater collection and treatment).

After remaining unchanged for several years at 1.6% of GDP, the share of general government subsidies increased to 1.9% of GDP in 2009, but this increase was the result of a decline in GDP and an increase in subsidies. Information about the positive and negative environmental impacts of subsidies is patchy and the economic, social and environmental costs of such schemes have not been systematically assessed. The establishment of an inter-ministerial working group in 2010 to study existing subsidies (including their

environmental impacts) and the development of a register of subsidies are steps in the right direction. However, more rapid progress is needed, especially in the context of the needed fiscal consolidation.

Total expenditure on environmental protection increased from 1.5% to 2.1% of GDP in the period 2000-09. Public environmental expenditure remained broadly constant, at a level close to the OECD average of 0.8%. It focused on environmental infrastructure. Slovenia's absorption of EU funds is improving: it has the highest contracting rate for committed funds (55%) among the ten new EU members, mainly due to simplification of financial management and control procedures. However, the absorption of funds for environment-related investment has been slow. At the halfway point in the 2007-13 implementation period, less than one-third of the available budget had been contracted, and only 14% had been disbursed to beneficiaries. Delays were particularly important in the waste and railway sectors. Private environmental expenditure increased, mostly in the area of waste management. The Eco Fund has proven an effective mechanism for channeling public finance of environmental projects. Opportunities to further promote public-private partnerships in the areas of waste and wastewater management should continue to be explored, building on the experience of the Slovenian Export and Development Bank. This should be accompanied by the implementation of measures to ensure that quality of service is maintained at a reasonable price, including through increased use of benchmarking and performance evaluation.

Responsibility for financing of environmental infrastructure has gradually decentralised to local government, particularly for wastewater collection and treatment infrastructure, and accounted for more than two-thirds of central government expenditure in 2009. However, while public needs may be better identified at the local level, greater decentralisation has resulted in fragmentation of efforts and in insufficient capacity and resources at the local level. The absence of a regional tier of administration in Slovenia makes the issue of municipal fragmentation all the more challenging. The adoption of the Balanced Regional Development Act in 2000 encouraged good co-operation among Regional Development Agencies (RDAs), Councils of Regions and the associations of municipalities and towns of Slovenia. Greater co-operation among municipalities, and their co-operation with the Ministry of the Environment and Spatial Planning (MESP), is needed to strengthen the effectiveness and efficiency of environmental services and spatial planning policies.

Slovenia has increased its support for innovation. For example, gross expenditure on R&D for environmental purposes has more than tripled in real terms during the review period. Its share in total R&D has risen from 0.8% to 2.2%. Nevertheless, these shares are still smaller than those in many other OECD countries. Moreover, the outputs of Slovenia's environmental innovation system, measured in terms of number and growth of total patent applications, are weak compared to those in many other OECD countries. The public sector accounts for most of the research effort, and there is a need for greater promotion of innovative activity in the private sector. This will be a challenge given the predominance of small and medium-sized enterprises. The government could usefully draw on the OECD publication *Fostering Innovation for Green Growth* to identify ways to strengthen its performance in promoting and disseminating environment-related innovation.

Recommendations

- Include explicit environmental objectives in the 2013-20 Development Strategy and in other strategic documents, such as the regional development, transport and agriculture policies, taking account of their benefits and costs.
- Gradually equalise the tax rates for diesel and petrol; remove refunds for taxation of commercial uses of diesel fuel; and assess how a broader reform of environmentally related taxes and subsidies, and other economic instruments of environmental policies, could help meet the policy objectives of the 2013-20 Development Strategy and contribute to fiscal consolidation.
- Promote greater co-operation between municipalities through Regional Development Agencies, Councils of Regions, and the associations of municipalities and towns of Slovenia, in order to achieve economies of scale and scope for environmental infrastructure; promote greater participation by the private sector in environmental investment while maintaining the quality of service at a reasonable cost, including through transparent benchmarking and performance evaluation; further strengthen co-operation among institutional stakeholders in spatial planning.
- Assess how capacity for eco-innovation could be enhanced in light of the conclusions and recommendations of the OECD publication *Fostering Innovation for Green Growth*.

1. Socio-economic trends in the review period

1.1. *Economic growth*

Slovenia is a small, open economy which until recently has enjoyed dynamic growth and has steadily made progress towards the OECD average GDP per capita (Table 1.1). Relatively favourable business- and export-oriented macroeconomic policies, combined with structural reforms stimulated by its accession to the European Union in 2004, have contributed to rapid growth without creating major fiscal imbalances during most of the last ten years (Box 1.1). The 2002 social agreement to keep wage growth below growth in productivity has helped to keep inflation close to levels in the euro area. Along with public wage restraint since 2004, it has fostered competitiveness and prevented deterioration of the current account balance. However, a high growth rate has been heavily dependent on credit and construction activity, with exports reliant on cyclical industries such as automobile manufacturing.

Towards the end of the 2000s, the global economic and financial crisis impacted Slovenia's economic convergence with the EU and the OECD. GDP declined by 8% in 2009, the sharpest fall in any OECD country with the exception of Estonia. This was mainly due to a fall in construction activity and a decline in Slovenia's exports of labour-intensive products and some loss of cost-competitiveness, limiting productivity gains in the traded goods sector. Domestic demand has been held back significantly by the poor financial health of households and firms affected by reduced asset prices, incomes and credit availability. Economic growth resumed by the end of 2010, as exports rebounded. However, it has been further hampered by fiscal consolidation. Fiscal consolidation, export competitiveness and financial stability are the current economic policy challenges. A major long-term challenge for Slovenia is to boost growth in productivity so that living standards continue to converge with those of the OECD's best performers. The 2011 OECD Economic Survey of Slovenia suggested that structural reforms to boost productivity and

Table 1.1. **Socio-economic trends and environmental pressures**

	Slovenia 2000-10 (% change)	OECD 2000-10 (% change)
Selected economic trends		
GDP[a]	30.6	17.4
Private final consumption[a]	27.6	20.7
Agricultural production[b]	–5.1	. .
Industrial production[b, c]	11.3	–2.2
Road transport[b, d]		
Freight transport*	18.1	. .
Passenger, private cars**	23.9	. .
Vehicle stock***	21.4	13.1[e]
Energy		
Total primary energy supply	10.6	2.3
Total final consumption of energy[b]	4.8	–1.8
Energy intensity	–15.3	–12.7
Renewable energy supply	17.7	29.1
Selected social trends		
Population[b]	1.7	6.2
Life expectancy at birth[b]	4.6	. .
Ageing index	34.3	26.9
Standardised unemployment rates	7.4	36.5
Selected environmental pressures		
Pollution[b]		
CO_2 emissions from energy use[f]	7.5	–4.7
Emissions of SO_x	–87.5	–40.0
Emissions of NO_x	–8.9	–24.9
Resource use		
Water abstractions[b, g]	4.8	–1.2[e]
Municipal waste per capita[g]	3.6	–3.6
Material productivity[h]	10.9	19.0
Nitrogenous fertiliser use[b]	–19.6	–3.5
Pesticide use[i]	–17.0	. .

a) Based on values expressed in USD at 2005 prices and PPPs.
b) To 2009.
c) Mining and quarrying, manufacturing, and production of electricity, gas and water.
d) Based on values expressed in: * tonne-km; ** passenger-km; *** motor vehicles in use. Since 2001 for Slovenia.
e) To 2007.
f) Sectoral approach; excluding marine and aviation bunkers.
g) Since 2002 for Slovenia.
h) GDP per unit of domestic material consumption (DMC), where DMC is the sum of (domestic) raw material extraction used by an economy and its physical trade balance (imports minus exports of raw materials and manufactured products).
i) To 2008.
Source: OECD, Environment Directorate.

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competitiveness should concentrate on improving labour market flexibility, fostering innovation and higher education, and favouring foreign direct investment (FDI), notably by reducing the state's direct involvement in the economy.

Box 1.1. **Structure of the economy**

Slovenia experienced a rapid transition towards a market-based economy after it gained full independence from the Socialist Federal Republic of Yugoslavia in 1991. Structural changes increased the importance of the services sector, which has grown at an average annual rate of 1% since 2000. The services sector currently represents 67% of GDP, providing employment to about 58% of the workforce. Within this sector, tourism and transport have gained importance, together accounting for about 9% of GDP.

During the review period the share of industrial production (including manufacturing, construction and energy production) gradually decreased by 5%, reaching a current 31% of GDP and employing about 24% of the workforce. At the beginning of the review period the industrial sector specialised in labour-intensive industries, which matched capital-intensive industries in terms of value added. Relatively slow restructuring towards higher-end products left some of the largest Slovenian companies vulnerable to an economic downturn. Within the industrial sector, construction companies were hit hardest by the economic and financial crisis, with their share of GDP falling from 8.3% to 7.1% in the period 2008-10.

Gross value added in the transport sector represents 6.5% of GDP. It has increased at an average rate of 2% since 2000, except during the crisis. This sector currently employs about 5.3% of the workforce. Freight transport is dominated by road, which carried 85% of all freight in 2009 (a 12% increase compared with 2001). Since 2001, freight transport by rail has increased by only 2% while freight transport by road has increased by 110% and freight transport by sea by 57%. By contrast, the share of private vehicles in land passenger transport has increased by a mere 3% as the level was already relatively high in 2001 at 83%. Despite Slovenia's small size, it is crossed by some of Europe's major south-north transit routes, which carry a high volume of international road freight.

The contribution of agriculture, forestry and fishing to GDP has decreased by 25% since 2000. It currently represents about 2.1% of GDP and employs about 8.4% of the workforce. Some 25% (0.5 million ha) of Slovenia's territory is agricultural land,[a] of which about 36% is arable. Agricultural land is scattered among individual farms with an average size of 5 ha, concentrated in the fertile central and northeastern plains. Two-thirds of agricultural land lies in less accessible hilly and alpine regions. Slovenia's main crops are wheat, maize, sugar beet, barley and potato. There is also some viticulture. Livestock raising (pigs, cattle and sheep) is important. The livestock density of 750 head of sheep equivalent per km^2 of agricultural land is well above the OECD (190) and OECD Europe (429) averages.[b] Domestic fish catches provide only about one-quarter of the national fish supply. The remainder is imported. Forestry is an important industry. Forests cover about 62% of Slovenian territory. In recent years the volume of wood cut in Slovenian forests has averaged 3.7 million m^3 per year, or 70% of the possible volume and 40% of the annual increment; 74% of forest area is privately owned.

Before the 2008-09 crisis, exports of goods and services accounted for almost 6% of GDP growth. The Slovenian economy was therefore vulnerable to changes in international price competitiveness and economic conditions in trading partners. Following a sharp decline of about 18% as a result of the crisis, exports of goods and services rebounded in 2010. This was largely due to higher EU demand for technologically advanced products manufactured in Slovenia (*e.g.* chemical products, motor vehicles and electrical appliances). Apart from related transport services, however, exports of services remained subdued.

Primary energy supply has increased by almost 9% since 2000 despite a sharp decline due to the crisis (–10% in 2008-09). The share of primary energy supply increased by 26% (or an annual average of 2%) between 2000 and 2010. It currently contributes 2.9% of GDP and employs 0.8% of the workforce. Oil and solid fuels (57%) and nuclear energy (21%) represent the largest shares of total primary energy supply (TPES). While the share of natural gas in TPES has remained relatively stable since 1990 at 12%, the share of renewable energy increased from 9% to 13% between 1990 and 2009. Slovenia's energy import dependency (about 55%) is close to the EU average and consists mainly of imports of oil (two-thirds) and natural gas (one-quarter).

a) Agricultural land includes arable area, permanent crop land and permanent grassland.
b) Head of sheep equivalent is based on equivalent coefficients in terms of manure: 1 horse = 4.8 sheep; 1 pig = 1 goat = 1 sheep; 1 hen = 0.1 sheep; 1 cow = 6 sheep.

1.2. Social development

Slovenia's population was estimated at 2.02 million in 2010, a small increase of 1.7% since 2000. It is the fourth smallest OECD country by population, after Iceland (318 000), Luxemburg (493 000) and Estonia (1.34 million). Population density (101 per km^2) is close to the OECD average. Even Slovenia's most densely populated area, the Central Slovenia statistical region (198 per km^2), is not densely populated by OECD standards.[1] None of Slovenia's regions is predominantly urban. Four of them (in which 43% of the national population lives) are classified as intermediate and eight as predominantly rural. Among OECD countries, only in Finland and Ireland does a higher proportion of the population live in rural areas.

In 2009, life expectancy at birth was 75.8 years for men (3.9 years more than in 2000) and 82.3 years for women (3.2 years more than in 2000). In the same year, life expectancy in Slovenia was lower (on average by gender) than in most of the old EU member states (except Denmark) but higher than in the new ones (except Cyprus and Malta). Infant mortality has been falling for several years, from 4.5-5.5 per 1 000 live births in the second half of the 1990s to 2.4 in 2009, the lowest rate among EU countries. With a significant decrease in the working-age population (between 15 and 64 years) projected, the share of public pension expenditure in GDP is expected to increase from the currently estimated 11% of GDP.

In contrast to most other transition economies, Slovenia has succeeded in maintaining a low level of inequality during the accelerated structural reforms and the convergence of its economy with that of the EU. The Gini coefficient of about 0.24 in 2008 resembles that of the Scandinavian countries. It is below the EU average (0.3) and far below that of countries with similar income levels (*e.g.* Portugal, with 0.4). About 11% of the population was below the poverty line in 2009, a relatively small percentage compared with other OECD countries. The household debt servicing burden increased during the crisis, curbing domestic demand and consequently economic growth.

Until the economic and financial crisis, the unemployment rate was low (below its estimated natural rate). Improvements in the labour market, particularly labour tax reductions and more stringent eligibility criteria for unemployment benefits, have had much to do with economic growth and structural reforms. However, employment costs have remained high and, together with wage movements, have limited competitiveness. Following a significant increase in unemployment as a result of the crisis (from 4.4% to 7.2% in the period 2008-10), labour market conditions stabilised in 2011. However, participation in the job market by the elderly remains low compared to other OECD countries.

Slovenia's educational system performs relatively well. The country has one of the highest shares of the population aged 25 to 64 to have completed at least upper secondary education, and it ranks above the OECD average in international educational achievement tests in the Programme for International Student Assessment (PISA). Tertiary attainment rates and graduation rates are below the OECD average, limiting prospects for youth employment.

In the health sector, Slovenia has maintained universal coverage with relatively generous benefits. At around 8% of GDP (below the OECD average), total spending on health care as a share of GDP has not changed greatly since 2000. Public spending on health care is slightly below 6% of GDP – among the highest levels among the new EU member countries, but somewhat lower than the EU15 average. The level of spending per capita on health care is also relatively high if compared internationally. It increased more rapidly (by 4.8%) than the OECD average (4.0%) in the period 1998-2008.

According to Eurobarometer data, Slovenia ranked tenth among EU countries in terms of satisfaction with life in 2010, with 85% very satisfied or satisfied. The number of those very satisfied has been falling since 2004 while the number of those dissatisfied has been growing, particularly since 2008.

1.3. *Environmental context*

With a total land area of 20 105 km^2, Slovenia is one-fifth the average size of the OECD countries. Only Luxembourg covers a smaller area. Slovenia has four basic landscape types: Alpine, Dinaric, Pannonian and Mediterranean (Box 1.2). About 90% of the country lies at an altitude of more than 300 metres above sea level, and more than one-third is higher than 600 metres. The neighbouring countries are Italy to the west, Austria to the north, Hungary to the northeast, and Croatia to the south and east.

Box 1.2. **Physical context**

The Alps, including the Julian Alps with Slovenia's highest peak, Triglav (2 864 m), Lake Bled and the Soča Valley, dominate northern Slovenia along its borders with Austria and Italy. In the south are the Dinaric Alps, whose highest peak is Snežnik (1 796 m). On the Pannonian plain in the northeast, towards the Croatian and Hungarian borders, the landscape is essentially flat. The Mediterranean zone includes areas around the Gulf of Trieste in the west and southwest of the country, where it overlaps the Kras (Karst) Plateau, a geologic formation characterised by cenotes, sinkholes and dolines and more than 8 000 subterranean limestone caverns, including the Postojna and Škocjanske caverns, the latter classified as a UNESCO world heritage site.

At the junction of several ecological systems, Slovenia enjoys extraordinarily rich biodiversity. About 26 000 plant and animal species have been counted. As many as 850 are endemic species, many of which live in karstic caves. The country is also home to animals such as the white-tailed eagle, bear, wolf and lynx. Protected areas include national, regional and natural parks. The Triglav National Park is the largest natural park in Slovenia and one of the oldest in Europe. There are 286 Natura 2000 designated protected areas, covering 36% of the land area (the largest percentage among EU member states).

This natural endowment is enhanced by valuable semi-natural ecosystems resulting from a history of close-to-natural forest management and from low-intensity farming. The main trees in Slovenia's forests are beech, fir and oak. The approximately 62% of total land area occupied by forests is about twice the OECD average and comparable to this area in Japan and Sweden. Remnants of primeval forests are still found. The largest is in the Kočevje area south of Ljubljana. Forested area is expanding through the growing-over of abandoned farmland, primarily by meadow and pasture, in more remote parts of the countryside. Although they are found in many parts of the urban landscape, forests are yielding to the construction of infrastructure and housing. The shares of permanent grassland and arable land in total land area are 13.3% and 10%, respectively (Figure 1.1).

The greatest precipitation occurs where the Julian Alps are highest (upper Posočje in the northwestern part of the country) and in the Mount Snežnik area (in the southwest), where the annual amount can reach 3 500 mm. Precipitation declines in the northeast, to a level of 800 mm per year in the Prekmurje region on the border with Hungary. The total length of rivers is nearly 27 000 km. The river network is dense (1.33 km/km^2).

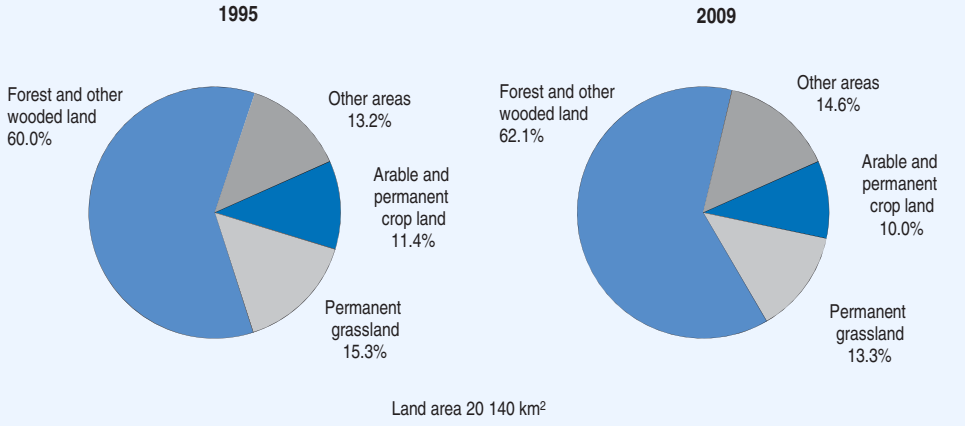
Box 1.2. **Physical context** *(cont.)*

Although Slovenia borders the Adriatic Sea (with 47 km of coastline), 81% of Slovenia's territory is in the Black Sea drainage area, which includes the major rivers passing through Slovenia: the Sava in the centre and the Drava and Mura in the northeast. The Adriatic catchment area includes the Soča River, flowing through Italy to the Gulf of Trieste, and several short coastal rivers.

Forests are among Slovenia's most valuable natural resources, with close to 300 million m^3 of growing wood. Hydropower accounts for about 6% of TPES and 29% of electricity production. Slovenia's only domestic fossil fuel deposits include lignite and brown coal extracted at two underground mines at Velenje in the north of the country and near Trbovlje in the centre. Other mineral resources include relatively small quantities of lead, zinc, mercury, uranium and silver.

The western and central parts of Slovenia lie in the earthquake-prone alpidic zone. The Ljubljana earthquake of 1895 caused considerable damage. More recently, the Posočje region was affected in 1998 (3 000 buildings damaged) and 2004 (1 800 buildings damaged). Floods present a threat to more than 300 000 ha or 15% of Slovenia's territory.

Figure 1.1. **Land use**



Source: FAO (2011), *FAOSTAT Database.*

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Rapid economic growth during most of the last ten years has exerted pressures on Slovenia's natural asset base and the health of the population:

- Although Slovenia enjoys an extraordinarily high level of biodiversity, 38% of mammal species, 27% of bird species, 47% of freshwater fish species and 11% of vascular plant species are threatened. The precarious situation of many species has been exacerbated by pressures such as loss of wet grasslands to urbanisation and intensive agriculture. Urban sprawl and transport infrastructure have caused habitat fragmentation, including the fragmentation of continuous forests. Aquatic habitats have been damaged by intensification of agriculture and the construction of dams and other engineering works, notably in Pannonia. The extent of flooded forests has been reduced in the floodplains of all the major rivers (Drava, Sava, Mura) (Chapter 2).

- Slovenian rivers are fast-flowing, which contributes to good oxygen conditions and low levels of nutrients and toxic chemical substances. However, the quality of lakes and groundwater is less satisfactory, especially in northeastern Slovenia, due to higher concentrations of nutrients and pesticides as a result of intensive farming. Since the year 2000, the trophic status of marine water has been gradually improving except in Koper Bay. Contaminated sites created by historical mining of mercury and other minerals are still a source of surface and groundwater contamination despite remediation efforts (Chapters 2 and 5).
- By ratifying the Kyoto Protocol, Slovenia committed to reduce greenhouse gas (GHG) emissions in the 2008-12 period by 8% on average compared with its baseline emissions in 1986. In 2008, its GHG emissions were 5.2% higher than in the base year, with transport increasingly contributing to these emissions. While the economic downturn contributed to a decrease, GHG emissions from the transport sector are expected to continue to increase beyond 2012. Slovenian authorities estimate that meeting the Kyoto Protocol target is within reach, but only when account is taken of forest sinks and the likely purchase of a small amount of carbon credits (Chapter 4).
- While concentrations of air pollutants such as SO_2, NO_2 and CO in urban areas were below limit values, levels of seasonal exposure of urban populations to particulate matter (PM) and ozone (O_3) were among the highest in the EU27 during most of the review period. Concentrations of these pollutants exceeded daily and annual limit values throughout Slovenia. Road transport in urban centres and the use of wood-burning stoves for heating in households, together with unfavourable temperature inversions, are major causes of urban pollution incidents. Some air pollution hot-spots still exist around industrial facilities and lignite-fuelled power stations in central Slovenia (Chapter 4).
- The concentration of jobs and of the population in urban centres, especially around Ljubljana, increases urban sprawl and the volume of motor vehicle transport. An unregulated real estate market and fragmented and incomplete spatial planning, combined with underdeveloped public transport infrastructure, is leading to increased emissions of greenhouse gases and traditional air pollutants. These factors also underlie external costs such as road congestion, accidents and habitat fragmentation (Chapters 2 and 4).
- The amount of waste generated in Slovenia increased by 34% between 2002-10 (in line with increases in GDP and final private consumption) to 6.6 million tonnes. In 2010, non-hazardous waste from production and services accounted for 85% of waste generated. Construction and demolition (C&D) waste accounted for a significant fraction, peaking at 37% of all waste generated in 2007. Municipal waste increased during the decade at a slower rate than GDP, accounting for 12% of waste in 2010. However, a large share of municipal waste (65%) is sent to final disposal in landfills. Hazardous waste accounted for 1.5% of the total, while a large share is exported for treatment. Although waste generation per capita remained well below OECD national averages during the review period, pressures to generate waste will increase as incomes converge with the OECD and EU averages (Chapter 5).

2. Strategic framework for sustainable development and green growth

2.1. Slovenian development policies

Slovenia's Development Strategy (SDS) for 2005-13 focuses primarily on economic development, but social and environmental issues are also extensively addressed. The SDS identifies the implementation of measures to achieve sustainable development as one of its five priorities. The 2008 National Development Programme (NDP) was designed to implement the SDS. The NDP lists renewable energy, energy efficiency and environmental infrastructure as key national sustainable development issues. Every year a *Development Report* presents a detailed account of progress in meeting the SDS objectives. In 2010, Slovenia's Statistical Office published a list of sustainable development indicators to complement the monitoring of SDS implementation.

The National Development Programme is supported by the National Strategic Reference Framework, an investment programme that sets priorities for domestic and EU development funding. The Operational Programme for Environmental and Transport Infrastructure Development (OPDETI) is an integral part of the reference framework. It has guided the allocation of funds for environment-related projects in 2007-13, including waste management, collection and treatment of urban wastewater, drinking water supply, energy efficiency and renewable energy.

There are several environment-related sectoral strategic documents, including: the National Environment Protection Programme 2005-12, which provides the aims and goals of national environmental policy; the Spatial Development Strategy (2004), which provides guidelines for sustainable spatial planning and development at the national and local levels; the Environment and Agriculture Programme (2008), which sets priorities with respect to sustainable agriculture; the National Action Plan on Energy Efficiency for 2008-16, which includes financial support for optimising energy use in the public sector; and the Rural Development Programme for 2007-13, which pays special attention to sustainable management of natural resources. A new National Energy Programme, under preparation since 2010, is expected to address issues related to climate change and air pollution while a new National Environment Protection Programme for the period until 2020 will be elaborated in 2012.

Despite the inclusion of environmental issues in these documents, implementation of the SDS and the NDP has not effectively integrated environmental considerations into economic development priorities. The main constraint has been compartmentalisation of planning and implementation within individual government agencies. The abundance of strategic documents produced by individual government agencies, and a lack of inter-ministerial co-operation, prevents the exploitation of synergies and the identification of trade-offs, including those related to environmental impacts. Although the Council for Sustainable Development was established in 2003, it has mainly served as a consultative body for government agencies and stakeholders. There are plans to increase its advisory role by making it an instrument for in-depth analysis of key development issues. The government intends to pursue greater integration of economic, environmental and social policies as it prepares a new Development Strategy for 2013-20, which is expected to be accompanied by a new set of sustainable development indicators.

2.2. Aftermath of the 2008 crisis

The 2008 economic and financial crisis revealed vulnerabilities in Slovenia's pattern of economic development and demonstrated the need for structural changes to enable recovery. The Slovenian Exit Strategy 2010-13, adopted in February 2010, contained short-term anti-crisis measures for the 2010-11 programming budget, in parallel with the formulation of key development priorities. These priorities included: strengthening entrepreneurship and skills for development; securing flexibility and social cohesion; and developing transport and energy infrastructure for effective and stable environmentally sustainable development. The Exit Strategy included a combination of economic policy measures (*e.g.* determining the scope of public spending through the fiscal rules and structure of public spending, based on national development priorities), structural changes (*e.g.* reform of the pension and health care systems) and institutional adjustments (*e.g.* improving the functioning of markets and public asset management).

In the environment-related part of the Exit Strategy, emphasis was placed on: adjusting the planning and permitting system for transport, energy and environmental infrastructure; modernising the railway system (infrastructure and logistics/services); promoting renewable energy sources; adapting to climate change; increasing the competitiveness of agriculture and the food processing industry, while reducing their environmental impacts; and optimising forest management. It will be important for the priorities of the Exit Strategy to be reflected in the 2013-20 Development Strategy, in order for it to constitute a "green growth strategy" that encourages greener behaviour by firms and consumers, facilitates smooth and just reallocation of jobs, capital and technology towards greener activities, and provides adequate incentives and supports green innovation so as to give rise to new sources of economic growth that are consistent with resilient ecosystems.

3. Integrating environmental and fiscal policies

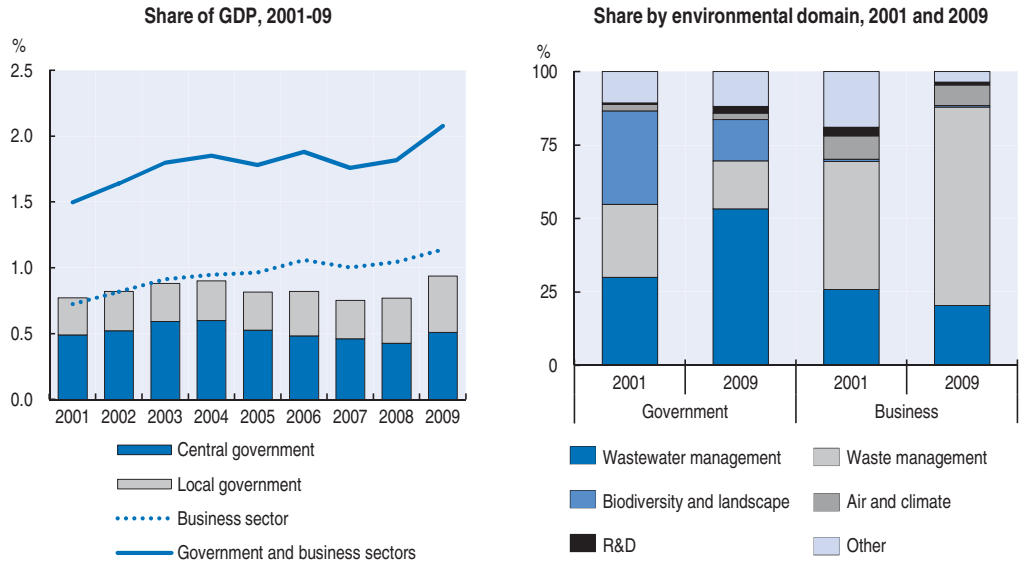
3.1. Budget and expenditure for environmental protection

Public and private environmental expenditure

Strengthening environmental requirements associated with Slovenia's accession to the EU stimulated an increase in total expenditure for environmental protection in the period 2001-09 (including operational costs and investment) from 1.5% to 2.1% of GDP. This expenditure also more than doubled in absolute terms, from EUR 322 million in 2001 to EUR 736 million in 2009. The trend was driven by the progressive growth of private expenditure, mostly in the area of waste management (Figure 1.2). Private and public environmental expenditure and investment have increased since 2001 and were resilient during the economic and financial crisis. This was due in part to investment and operational needs resulting from the tightening of environmental standards following transposition of the EU requirements, and in part to the leveraging effects of additional EU funding available before and after Slovenia's EU accession.

Public expenditure has increased steadily in real terms, but has remained at a rather stable level of 0.8% of GDP (around the OECD average). The increase in absolute terms has mostly been due to higher investment and operational costs related to water and wastewater infrastructure. Public environmental expenditure has been progressively implemented by local governments, particularly for the development of wastewater collection and treatment infrastructure. It accounted for more than two-thirds of central government expenditure

Figure 1.2. **Public[a] and private environmental expenditure**



a) Government expenditure according to the COFOG classification.
Source: SORS (2011), *SI-STAT Data Portal.*

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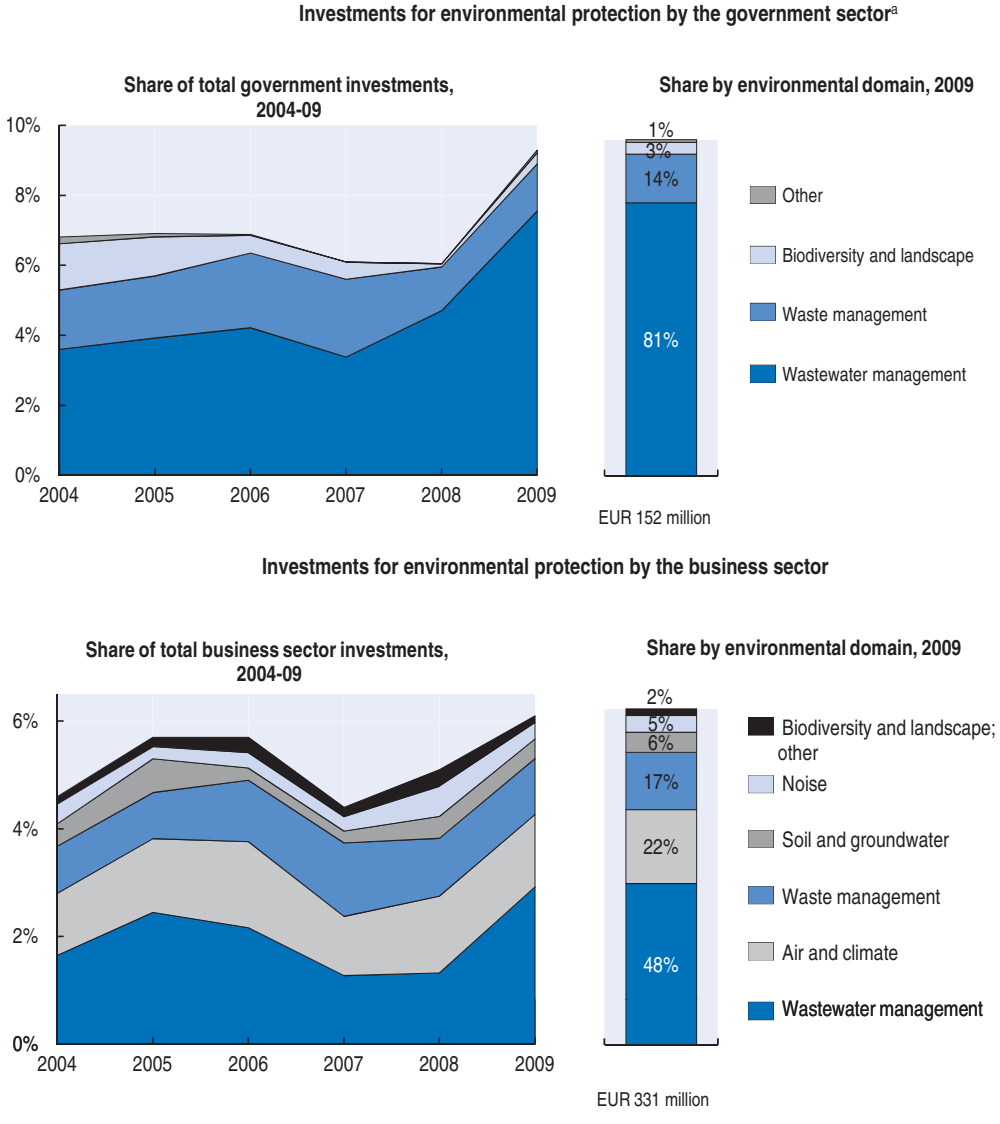
in 2009. However, decentralisation of infrastructure development has generated some policy bottlenecks: while public needs are better identified and addressed more rapidly at the local level, greater decentralisation poses problems with respect to addressing cross-regional externalities and hampers the achievement of overall objectives. Many municipalities are now too small to provide public services efficiently. Slovenia's municipalities range in size from 7 to 500 km^2 (around two-thirds are smaller than 100 km^2).[2] Experience with addressing the treatment of residual waste, wastewater collection and treatment, and the impacts of recent flooding indicates that further progress is needed to strengthen co-ordination between the central and local governments and consolidate efforts to fully utilise economies of scale and scope.

In 2009, waste and wastewater management accounted for 70% of public environmental expenditure. This partly reflects efforts to improve the ability of municipalities with poor sewerage and sewage treatment to meet the requirements of the EU Directive on urban wastewater treatment (91/271/EEC). More recently, higher priority has been given to flood prevention. Air pollution control (now including climate change mitigation) has traditionally accounted for a minor share (2%) of public environmental expenditure.

Private environmental expenditure has increased in real terms and relative to GDP, reaching 1.1% of GDP in 2009. Private environmental expenditure grew from the equivalent of two-thirds of public environmental expenditure in 2001 to surpassing it by one-half in 2008. Consistent with the Polluter Pays Principle, the private sector spends significantly more than the government on both operations and investment for waste management (68%) and air and climate protection (7%). The need to comply with EU standards has been a major driver of this investment effort.

Public and private investments in the environmental sector increased overall during most of the review period in real terms. They remained stable as a percentage of total government investment except in 2008-09 when their share increased, partly due to decreasing investment in other areas. Public investment remained stable as a percentage of total government investment (at 7%) for most of the review period, but increased to 9% in 2009. Similarly, private investment in environmental protection remained stable as a share of total investment in the period 2004-09, averaging around 5%. Private investment increased to 6.1% in 2009 despite the economic and financial crisis (Figure 1.3). In real terms, environmental investment fell by 4% in 2009 (to EUR 333 million) in the aftermath of the 2008 crisis. However, this decline was considerably less than the 18% decrease in total business investment during that period. Waste and wastewater management constituted most of the investment portfolio (65%).

Figure 1.3. **Public and private gross investment for environmental protection**



a) Gross capital formation according to the COFOG classification.
Source: SORS (2011), *SI-STAT Data Portal.*

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Since demand for waste management (which includes recovery and recycling) is relatively linked to business cycle movements, private environmental investment in this sector fluctuated. Across the manufacturing and the mining and quarrying industries, investment amounts were relatively equally distributed between end-of-pipe investments in environmental protection (58%) and investments in integrated technologies (42%).

Environmental finance and EU funds

EU funding has provided an important contribution to Slovenia's public environmental investment. Before EU accession, Slovenia benefited from various EU instruments, particularly through the PHARE and ISPA pre-adhesion programmes. Between 1999 and 2001, EUR 3.4 million was disbursed under the PHARE programme to support an environmental credit scheme managed by the Slovenian Environmental Public Fund (Eko Sklad, or Eco Fund) (Box 1.3) and EUR 2.5 million was disbursed to support investment in wastewater management. Slovenia also secured EUR 22 million in ISPA funding for environmental and transport projects in the period 2000-03, representing 38% of the country's total ISPA funding.

Box 1.3. **The Eko Sklad (Slovenian Eco Fund)**

The Eko Sklad was established in the early 1990s to support environmental investment. The main sources of financing originally included earmarked asset funds (of which 8.5% from privatisation process contributions from the state budget) and donations. Environmental taxes have not been part of Eko Sklad income. By the end of review period, the Eko Sklad had become more financially self-sustaining, with its own resources constituting nearly 64% of its total assets of EUR 181 million in 2010. The remaining assets were acquired through obligations, donations, and debt raised with national and international institutions, including EU PHARE grants (EUR 5 million) and long-term loans from the European Investment Bank (EBI) and the Slovenian Export and Development Bank (EUR 46.6 million). Between 1995 and 2010, the Eko Sklad granted 14 800 loans worth EUR 375 million for environmental investment.

The fund strengthened the environmental evaluation of projects according to the recommendations of an OECD review carried out in 2000. Priority has been given to climate change and projects on energy efficiency and renewable energy; these represented EUR 19.6 million (90% of all commitments) in 2010. A relatively minor share of loans was devoted to waste management and efficient use of water. Beneficiaries include private companies, municipalities and utilities. Although the value of loans increased by 51% between 2001 and 2009, they fell by 22% to EUR 21.2 million in 2010. This was mostly due to a reduction of the credit worthiness of potential business clients during the economic and financial crisis.

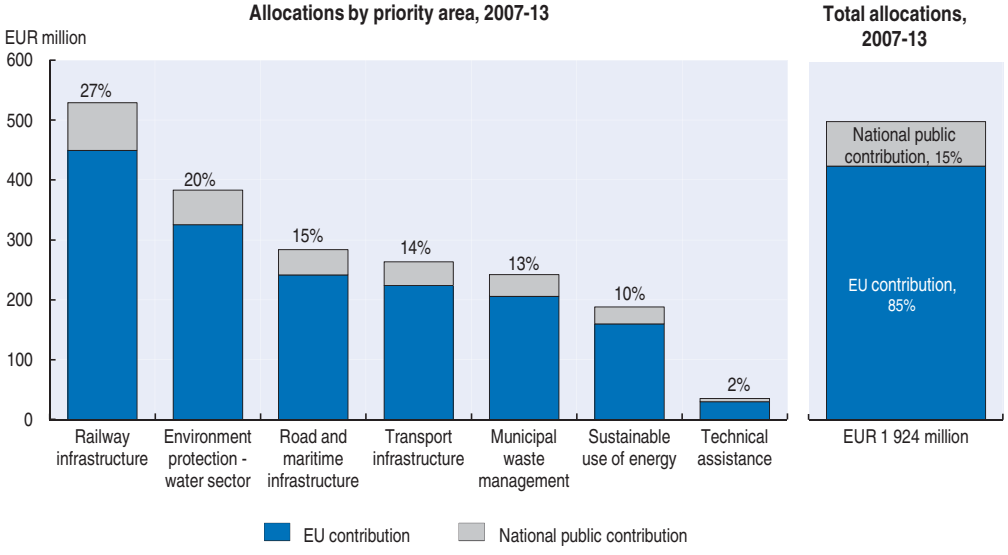
In 2008 the fund started a grant programme to support the National Action Plan for Energy Efficiency adopted for 2008-16. EUR 11.5 million was made available to promote the installation of solar heating systems, energy-efficient renovation of existing residential buildings, and construction of low-energy and passive houses. Part of these subsidies was allocated to road transport operators to purchase freight vehicles in compliance with stricter environmental standards. The programme continued in 2010 with three public calls for grant applications for an additional EUR 18 million. The Eko Sklad's projects are estimated to have helped avoid nearly 7 kt of CO_2 emissions, save 56 GWh of energy and generate 12 GWh of electricity from renewable sources per year, as well as creating around 500 jobs in 2008-09.

Source: Eko Sklad (2011).

During the first programming period following EU accession (2004-06) the Cohesion Fund, which incorporated ISPA projects, provided EUR 209 million for environment-related expenditure. This was nearly half the total amount allocated to Slovenia from the Structural and Cohesion Funds. A large part was allocated for improvement of wastewater management. However, the use of funding from the Structural and Cohesion Funds for environment was low, at around 20% in 2007. Other sources of finance included commercial lending from the European Bank for Reconstruction and Development (EBRD) and the EIB, which contributed to the development of wastewater treatment plants in large cities such as Maribor.

In the 2007-13 programming period, Slovenia was more effective in tapping EU resources for environmental investments, as the environment-related budget reached around 2 billion out of 4.1 billion allocated to Slovenia from the Structural and Cohesion Funds. Of the resources available for the environment and transport infrastructure, nearly 30% was available for the development of railway infrastructure, 20% for water-related infrastructure and 15% for road and maritime infrastructure (Figure 1.4). In 2008 EU funds equalled around 40% of Slovenia's total environmental investment expenditure.

Figure 1.4. **EU funds for environment-related investments**



Source: EC (2010).

StatLink http://dx.doi.org/10.1787/888932595263

The overall absorption of EU funds by Slovenia started slowly, but has improved due to the simplification of financial management and control procedures. By December 2010, projects worth EUR 2.3 billion in grants were contracted by the beneficiaries of the Operational Programmes of the Slovenian National Development Plan. Based on a 55% contracted ratio, Slovenia was at an average level at the halfway point of the programming period. Of the contracted grants, EUR 1.3 billion has been disbursed, accounting for 56% of the total.

The absorption of funds under the OPDETI has progressed quite slowly compared to other areas. At the halfway point in the implementation period, less than one-third of the available budget had been contracted and only 14% had been disbursed to the beneficiaries. Delays were particularly important in the waste and railway sectors. In the waste sector, for example, EUR 205 million from the Cohesion Fund was foreseen for ten projects in the field of municipal waste management under the 2007-13 OPDETI, but only EUR 10.8 million had been approved by the end of 2010 for two regional waste management centres in Ljubljana and Koroška. In the transport sector, EUR 450 million was intended for railway infrastructure, but no project had been approved by the end of 2009 and only some progress was made in 2010 (when EUR 68 million was approved for modernising the existing Divača-Koper line). At the same time, out of the EUR 220.9 million foreseen for road and maritime infrastructure, projects amounting to EUR 156 million had been approved by the end of 2010.

A part of EU financial resources was channeled through the Eko Sklad. In addition to increasing its resources, this arrangement improved its credit worthiness, stability and timeframe, enabling it to attract funds from other sources (Box 1.3).

3.2. Taxation policy and the environment

The overall tax burden in Slovenia has been relatively high, at 38% of GDP compared to an OECD average of 35% in the period 2000-08. This was mainly due to high taxation of labour and consumption, which represented over 70% of total tax revenues. In terms of total tax revenues, taxes on goods and services, including energy and transport, are considerably higher (at 36%) than the OECD average of 32%. By contrast, property taxes (0.6% of GDP), including an immovable property tax (0.4% of GDP), are lower than the OECD average. On average, other OECD countries collected about three times more revenues from related property taxation.

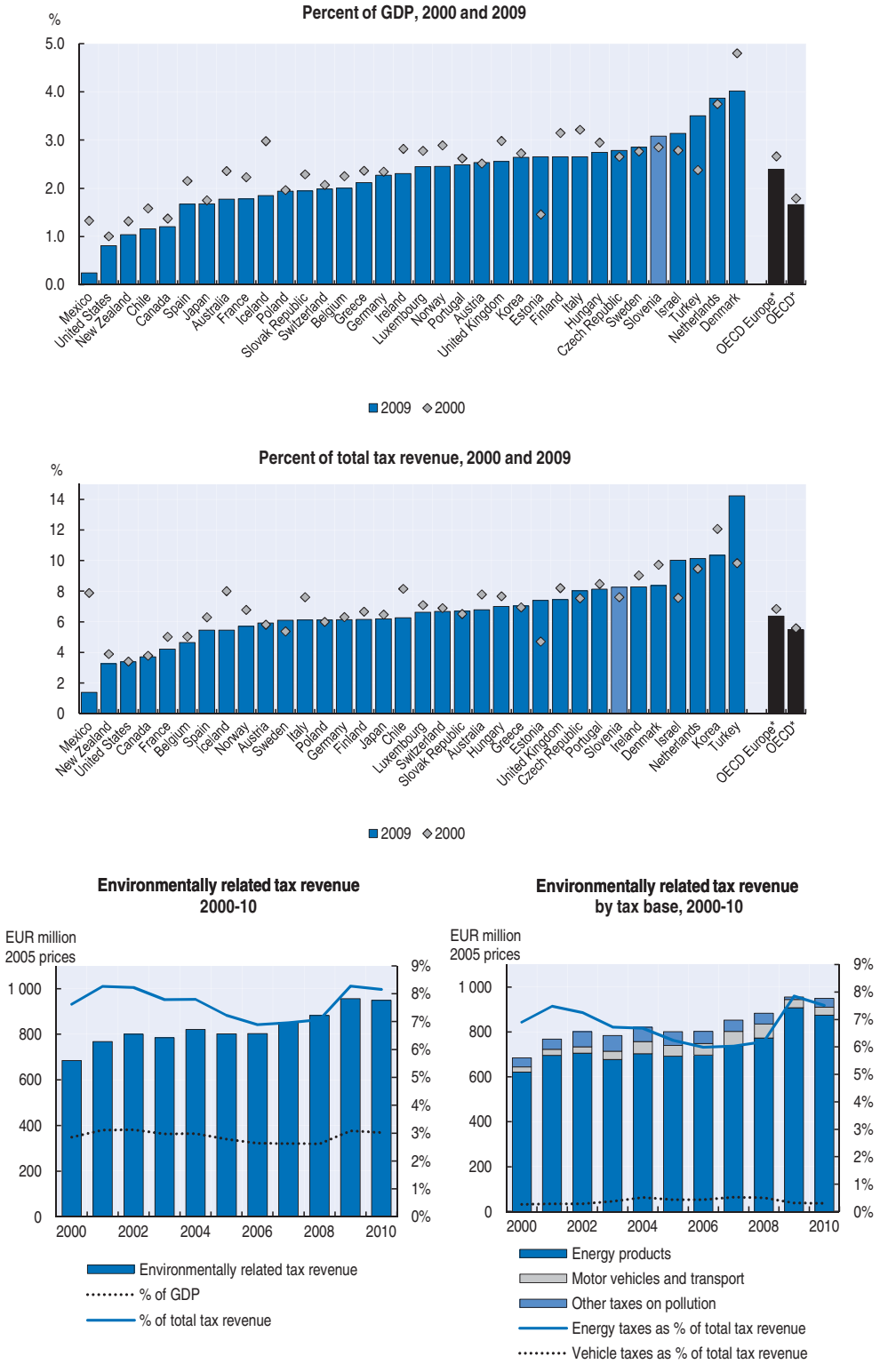
The share of environmentally related taxes in GDP and in total tax revenues was 3.1% and 8.3%, respectively, in 2009, which was high by OECD standards (Figure 1.5). It was higher only in Denmark, Israel, Korea, the Netherlands and Turkey. Over time, the share of environmental taxes in both GDP and total tax revenues declined in the period 2000-06 but then increased progressively.[3] This trend was driven mainly by hikes in excise duties.

Taxes on energy products

Taxes on energy products accounted for 92% of Slovenia's environmentally related tax revenue in 2010, significantly above the OECD average of 71% (Figure 1.5). Transport fuel taxation accounted for more than three-quarters of energy-related tax revenues.

In contrast to many other European countries, excise duties on energy products have remained close to minimum levels during periods of economic growth (Table 1.2). This is not uncommon in the new EU member states, which were granted temporary exemptions or considerably reduced rates from the minimum excise duty for energy taxes and use this instrument to buffer the inflationary effect of oil price increases. Despite such relatively low duties being levied on transport fuels until the end of 2008, the related tax revenues increased. This was mainly due to strong growth in fuel consumption, partly associated with higher international transit freight transport but also with daily passenger car commuting in the absence of developed public transport. Excise duties increased substantially in 2009, in line with the situation in many other OECD countries, with the aim of securing fiscal revenues during a period of lower global oil prices. Excise duties on petrol

Figure 1.5. **Environmentally related tax revenues**



* Data refer to weighted averages.

Source: OECD/EEA (2011), *OECD/EEA Database on instruments used for environmental policy and natural resources management*; OECD (2010), *OECD Economic Outlook No.88.*

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Table 1.2. **Excise duties on energy products and electricity,[a] December 2010**

Energy product	Slovenia	EU minimum	% difference	Emission factor[b] (t CO_2/TJ)
Transport fuel				
Unleaded petrol, EUR/litre	0.478	0.359	33	69
Gas oil, EUR/litre	0.420	0.330	27	74
Kerosene, EUR/litre	0.330	0.330	–	72
LPG, EUR/kg	0.125	0.125	–	63
Natural gas, EUR/GJ	1.228	2.600	–53	56
Heating fuel				
Gas oil, EUR/litre	0.071	0.021	236	74
Kerosene, EUR/litre	0.021	–	. .	72
Heavy fuel oil, EUR/litre	0.015	0.015	–	77
LPG, EUR/kg	–	–	–	63
Natural gas, EUR/GJ	1.228	0.150	719	56
Coal and coke, EUR/GJ	0.290	0.150	93	95
Electricity				
Business use, EUR/MWh	3.050	0.500	510	. .
Non-business use, EUR/MWh	3.050	1.000	205	. .

a) As defined in the EU Council Directive 2003/96/EC.
b) Emission factor in accordance with the Commission Decision 2007/589/EC.
Source: MESP.

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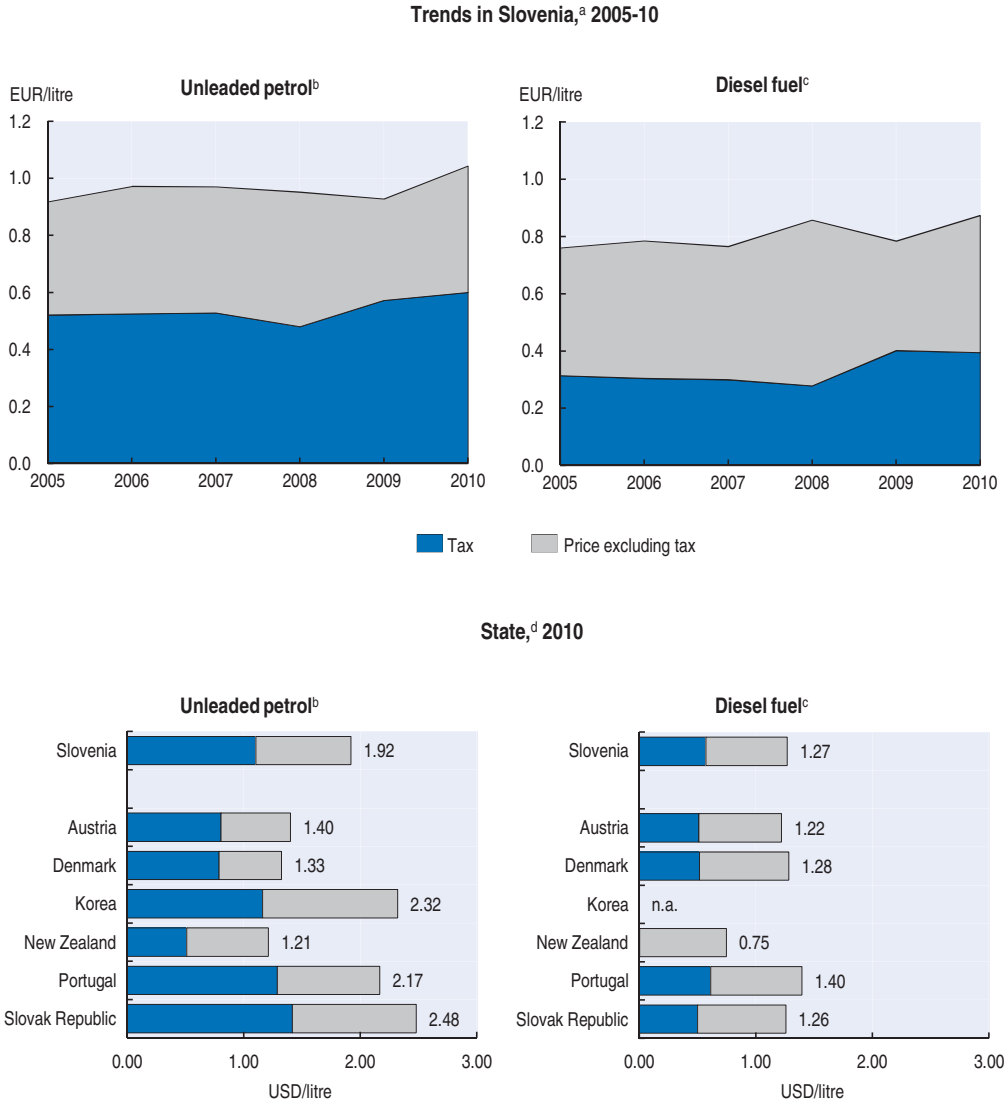
and diesel jumped to 30% and 43% above the minimum level in that year, increasing the associated revenues by about 20%. In 2010, excise duties remained at around their 2009 levels (EUR 0.43 per litre of diesel and EUR 0.49 per litre of petrol), with a slight (1%) increase in associated revenues, but they decreased again in 2011 (to EUR 0.36 per litre of diesel and EUR 0.44 per litre of petrol). In August 2010, Slovenia also increased the electricity tax for household and commercial use, mainly to raise revenues. Even with this increase, the rate is still lower than in some other OECD countries. Overall, the 2009-10 increases led to higher implicit taxation of energy consumption, from EUR 121.7 per tonne of oil equivalent (toe) in 2008 (slightly below the EU average) to about EUR 163.2/toe in 2009.

Tax rates have varied substantially with respect to the different purposes of energy use, but in general they have not been aligned with environmental impacts. Excise taxation rates for diesel fuel, including for commercial uses, were 60% of those for petrol in the period 2009-10, increasing to only 68% as part of excise duty hikes (Figure 1.6).[4] There is no environmental justification for a lower tax on diesel. Diesel consumption in transport generally has a greater environmental impact than consumption of unleaded petrol due to higher NO_x and PM emissions per kilometre driven. Tax rates are still very low on heavy fuel oil and gas used for heating. Coal and coke products are taxed at about one-quarter the rate of gas used for heating, although they contribute more GHG emissions per unit of energy.

Vehicle taxation

Motor vehicle- and (non-fuel) transport-related taxes are relatively low in Slovenia. They account for 0.85% of total tax revenues, below the OECD average (0.93%). While the revenues from motor vehicle- and transport-related taxes progressively increased from 3.4% to 7.5% of environmentally related taxes in the period 2000-07, their share declined

Figure 1.6. **Road fuel prices and taxes**



a) At constant 2005 prices.
b) Unleaded premium (RON 95).
c) Automotive diesel for commercial uses.
d) Unleaded petrol: at current prices and purchasing power parities. Diesel fuel: at current prices and exchange rates.
Source: OECD-IEA (2011), *Energy Prices and Taxes,* 3rd quarter 2011.

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sharply to 3.7% in 2010. This accounted for a much lower share than the 27% OECD average. About half of revenues from these taxes come from registration fees on vehicles paid by individuals, and slightly less from revenues from taxes on sales of new motor vehicles.

An annual vehicle circulation tax has long been differentiated across categories of vehicles based on engine size for passenger vehicles and motorcycles, and on maximum permissible weight for vehicles. In addition, since July 2008 an annual vignette has been required for all vehicles up to 3.5 tonnes that use Slovenian motorways and expressways. Heavier vehicles must use existing tollgates.

Substantial changes to the vehicle registration taxes were made in March 2010. Amendments of the Motor Vehicle Tax Act linked registration tax of motor vehicles to CO_2 and Euro emission standards and reduced the number of exemptions (Box 1.4). However, this tax is still not levied on commercial transport vehicles while a generous refund of excise duty guarantees minimum EU tax rates for commercial diesel.

Box 1.4. **Incentives to reduce environmental impacts of car ownership**

The motor vehicle tax (MVT) is a one-off payment, which is required at the time of registration of a new passenger vehicle in addition to the annual circulation tax. The sale of motor vehicles has been subject to the value added tax since 1999. The use of motorways by motor vehicles requires the purchase of a vignette.

In the period 2000-09, MVT rates were determined on a progressive scale at 1%-13%, differentiated according to the purchase price and fixed at 5% of the purchase price in the case of used vehicles. Until the end of 2009, vehicles emitting less than 110 grams of CO_2 per kilometre were exempted from the registration tax.

In March 2010, the system of one-off vehicle registration taxation was modernised, taking account of environmental criteria. The MVT is now differentiated on the basis of CO_2 and Euro emission standards, with a slightly wider range for diesel vehicles (1%-31%) than for petrol, hybrid and electric ones (0.5%-28%). PM emissions are also taken into account in taxing diesel vehicles. The amendments to corporate and personal income taxation included the possibility to deduct from corporate and personal income taxes the amounts invested in hybrid or electric cars, buses and trucks that meet the EURO V and EURO VI emission requirements, as well as in buses that meet the EURO IV requirements.

The changes in taxation also extended regulation to motorcycles and mopeds, prevented double taxation by eliminating taxation of used vehicles, and made possible a rebate when the vehicle is exported.

Other environmentally related taxes, charges and fees

Slovenia has used environmental taxes and charges in sectors other than energy and transport. They include: taxes on water abstraction and wastewater discharges (Chapter 2) and on CO_2 and F-gas emissions (Chapter 4); an energy efficiency tax (Chapter 4); and a tax on waste landfilling and a number of taxes and charges on various waste streams, such as waste electronic and electrical equipment, end-of-life vehicles, end-of-life tyres, waste packaging and lubricating oils (Chapter 5).

The revenues from such taxes and charges accounted for only a small share of total revenues from environmentally related taxes during the review period, fluctuating between 5% and 10%. Revenues from the taxes on wastewater and on CO_2 emissions contributed the largest share to environmental taxation, accounting for about EUR 35 and EUR 30 million, respectively, in 2010, while the landfill tax generated EUR 7 million in that year. More significant revenues have been generated by the water abstraction charge (around EUR 22 million in 2010) and payments for water rights (around EUR 10 million in 2010). Revenues from waste- and emission-related charges (*e.g.* on F-gas emissions, end-of-life vehicles and end-of life tyres, lubricating oils and liquids, electric and electronic equipment, packaging waste) have been very small, not exceeding EUR 0.5 million per year for each stream.

Most of these taxes and charges are earmarked and contribute to financing the implementation measures identified in the National Environmental Action Programme (NEAP). For example, most funds collected from taxing water effluents and water abstraction have been used for the rehabilitation of water resources and mitigation of environmental pollution. The landfill tax has been an important source of funds to meet the objectives of safe waste disposal regulations; the revenues from taxes on the use of lubricating oils have been used for rehabilitation or clean-up projects, particularly in the case of tar pits; and revenues from taxes on end-of-life vehicles have been used to initiate a public service for dismantling such vehicles. Taxes on packaging waste, electrical and electronic equipment or F-gases have mainly been applied for statistical purposes to track the sources of pollution and calculate quantities.

Assessment

The overall tax burden in Slovenia has been relatively high by international standards and the potential for a tax increase seems limited. Similarly, the high share of environmentally related taxes in total tax revenues, and the recent sharp increases in excise duties on motor fuels and the tax on electricity, may create political obstacles for further increases. There is, however, scope for adjusting taxes to take better account of environmental impacts, for example in relation to low taxes on heavy fuel oil and gas used for heating, coal and coke products. Similarly, reimbursements of excise duties (up to their minimum EU levels) paid on diesel for commercial purposes should be removed. An attempt made in 2010 to replace a portion of the excise duty on motor fuels by a CO_2 tax (with no reimbursements for commercial diesel foreseen with respect to this tax) was a step in the right direction. Efforts to introduce such a change should continue.

Slovenia should consider shifting the composition of environmentally related taxes further towards taxes on vehicle use in order to approach the OECD average of 22%. The increase in taxation on road transport could be reinforced by introducing other economic instruments related to the use of vehicles, such as congestion charges.

There is also scope for strengthening the incentive effects of environmental taxes in the areas of waste and water management. For example, increasing the landfill tax and simplifying the way it is calculated could provide a better incentive to divert waste from landfills. Taxes and charges associated with different waste streams could be increased to better reflect their environmental externalities.

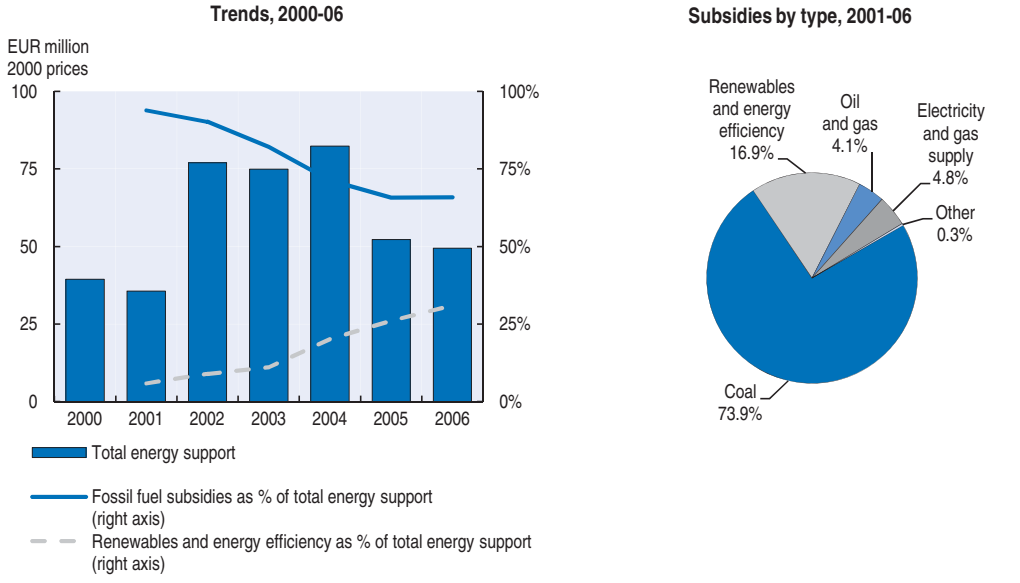
In view of the large number of environmental taxes, their environmental effectiveness and economic efficiency should be assessed, distinguishing those that serve a statistical or a revenue raising purpose from those intended to provide incentives to reduce pollution. This could pave the way for a comprehensive green tax reform, which would contribute to fiscal consolidation while more effectively addressing environmental externalities.

3.3. Environment-related subsidies

After remaining unchanged for several years at 1.6% of GDP, the share of general government subsidies increased to 1.9% of GDP in 2009. This increase may have been the result of a decline in GDP, with the subsidies remaining constant or increasing. According to the most recent internationally comparable data (for 2008), subsidies were much higher in Slovenia than the EU average (1.1% of GDP).

A more detailed analysis of subsidies is lacking. For example, the most recent data available on subsidies in Slovenia's energy sector were compiled in 2006. They suggest that subsidies exceeded EUR 400 million in the period 2000-06 (Figure 1.7). This analysis showed that in 2006 on-budget subsidies accounted for one-third and off-budget subsidies for the remainder of energy sector support,[5] and that the bulk of off-budget support (93%) was allocated to electricity production, especially to brown coal-powered thermal units. Tax exemptions and subsidised interest rates accounted for the rest, which included exempting all sectors from payment of the excise duty for electricity until 2007 (afterwards set at the EU minimum level).

Figure 1.7. **Energy sector support**



Source: MoF; MESP.

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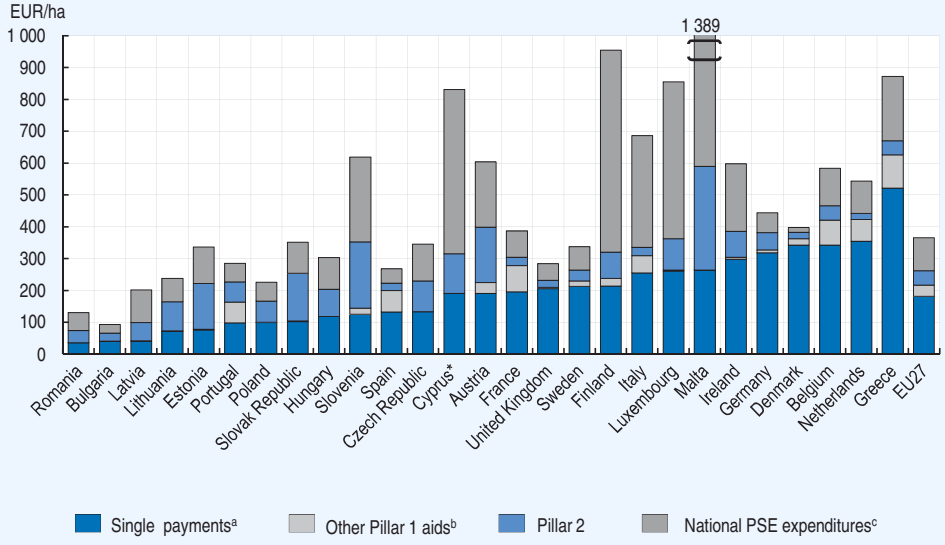
Information about the positive and negative environmental impacts of subsidies is patchy. Agriculture is one area where some information is available (Box 1.5). Little analysis is available on the environmental impacts of subsidies in Slovenia's energy or transport sectors, even in the case of the introduction of large subsidisation or tax exemption schemes. For example, a scheme to reimburse the difference between the excise duties paid on fuel for commercial purposes and the minimum EU level of excise duties was introduced in 2009, with the aim of compensating commercial freight haulers for increased costs incurred due to new tolls and inducing them to refuel in Slovenia. These refunds, amounting to about EUR 26 million in 2009, stimulated both internal transport and greater transit traffic through Slovenia. The scheme's environmental impacts have not been assessed. Neither have there been assessments of the environmental impacts of some other schemes, such as a 50% refund of the excise duty paid for fuel used in agriculture and forestry.

Box 1.5. **Slovenian agriculture and the EU Common Agricultural Policy**

Following Slovenia's accession to the EU in 2004, the agricultural sector adapted to the requirements and measures of the EU Common Agricultural Policy (CAP). Slovenia has been part of the Single Payment Scheme (SPS), which is also used in the EU15 and in Malta. Slovenia opted for the regional scheme, a uniform payment per hectare within a region which, in Slovenia's case, covers the whole country.

The overall level of support to agriculture in Slovenia can be assessed using percentage producer support equivalent (% PSE) only for the EU, where the CAP applies. This support fell from 30% in 2005 to 24% in 2009. The decrease was mostly due to a reduction of market price support, which is potentially the most production- and trade-distorting measure and one that contributes to environmental pressures. Slovenia's level of SPS is low compared to that in the "old" EU member states, but it is one of the highest among the new members (Figure 1.8). However, full granting of all EU direct payments is linked to adherence to environmental standards ("cross-compliance") as well as to standards for food safety, animal and plant health, and animal welfare.

Figure 1.8. **Payments per hectare in EU member states, 2009**



a) Single Payment Scheme and Single Area Payments Scheme.
b) Including market measures, commodity-specific payments and funds from modulation not applying to the first EUR 5 000 per farm.
c) National payments to producers including Complementary National Direct Payments (CNDPs) and national co-financing of RDP measures.
* *Note by Turkey:*
The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
Note by all the European Union Member States of the OECD and the European Commission:
The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.
Source: OECD (2011), *Evaluation of Agricultural Policy Reforms in the European Union.*

StatLink http://dx.doi.org/10.1787/888932595339

EU co-financing instruments have facilitated the introduction of a more comprehensive agri-environmental policy package. Slovenia has chosen to devote half its Rural Development Programme to improving the environment and countryside (part of Pillar 2 of the CAP), a large share compared with other EU countries (Figure 1.8). This programme, which involves EUR 600 million during the period 2007-13, includes agri-environmental and animal welfare payments, payments to farmers in areas with "handicaps", payments for afforestation, payments for protecting biodiversity in specific sites, and support to non-productive investments.

Box 1.5. **Slovenian agriculture and the EU Common Agricultural Policy** *(cont.)*

Since 2005 the government has provided income tax exemptions for environmentally friendly agricultural programmes. This policy has resulted in an increase in the share of agricultural land with at least one agri-environmental measure in place (from 0.6% in 1999 to 50.2% in 2008). This share increased along with the number of measures in place. The largest increase concerned areas with measures (*e.g.* integrated production, greening of arable land, crop rotation) aimed at reducing negative impacts on soil and water quality and increasing the area under organic farming. The increase in the area with measures in place to preserve the landscape, habitats and biodiversity was rather modest, although this area still represents the largest share of the overall area subject to agri-environmental measures (50% in 2008).

Several environmentally motivated subsidies have been introduced in Slovenia, such as corporate and income tax breaks for both households and businesses that invest in energy efficiency and environmental effectiveness. They amounted to EUR 110 million in 2009. Again, the economic, social and environmental costs of such schemes have not been systematically assessed. The establishment of an inter-ministerial working group in 2010 to study existing subsidies (including their environmental impacts) and the development of a register of subsidies are steps in the right direction. However, more rapid progress is required, especially in the context of the needed fiscal consolidation. A better assessment of environmentally harmful subsidies should increase the positive impacts of the proposed comprehensive green tax reform.

4. Promoting environmental technologies, goods and services

4.1. *Eco-innovation*

Innovation policy and institutional setting

The 2007-13 Programme of Measures for Promoting Entrepreneurship and Competitiveness, prepared by the Ministry of Economy, aligned Slovenia's innovation policy with the EU's renewed Lisbon Strategy and the 2007-13 EU Competitiveness and Innovation Framework Programme. The 2006-10 National Research and Development Programme (NRDP) has been the other key innovation policy document. Noting that the economy was too dependent on low-technology activities, these documents proposed strengthening efforts to build a "knowledge society", with competitive business and a strong partnership between research institutions and the private sector.

Overall R&D expenditure in Slovenia increased from 1.4% to 1.9% in the period 2000-08. It was below the OECD average of 2.3%, but similar to or higher than the percentage in countries with similar or even higher levels of GDP per capita (*e.g.* the Czech Republic, Greece, Italy, Luxembourg, New Zealand, Norway, Portugal and Spain) and significantly higher than in Central and Eastern European countries. Although Slovenia has been performing well on the innovation input side (R&D expenditure as a percentage of GDP, number of researchers per million inhabitants, number of scientific papers), weak innovation output indicators (movements in innovative activities, proxies by the number of innovations, high-growth firms and high-technology exports) show important weaknesses in the innovation system. A few large firms are responsible for the bulk of business R&D spending, while the public sector employs a high share of researchers. Poor innovation outcomes have been linked to three major constraints: barriers to firm creation and firm expansion; lack of entrepreneurial dynamism; and a complex and opaque National Innovation System, which lacks policy co-ordination and suffers from combined policy planning and policy implementation deficits.

Aware of the innovation system's deficiencies, Slovenia has made several attempts to shift the emphasis of innovation policy measures away from freely funded public R&D (supply-driven innovation efforts) to targeted, business-inspired innovation activity (demand-driven R&D activity). New initiatives to enhance the efficiency of the national innovation system have included changes in the funding mechanism of public R&D to reduce the spending autonomy of Slovenia's powerful research institutions, as well as improved screening and evaluation procedures for research and innovation projects. These efforts are supported by a new Council of Science, Technology and Innovation, created in 2011.[6]

Environment-related innovation and entrepreneurship was not explicitly addressed in any of the four pillars of the 2007-13 Programme.[7] Some environment-related horizontal projects were implemented under the NRDP, linked mostly to the energy sector. For example, 10 of 13 topics under the NRDP, co-financed with around EUR 23 million from the EU European Regional Development Fund, concerned the development of renewable energy technologies and the energy efficiency of housing. Since the mid-2000s, horizontal public tenders have included environment-related criteria. An example is a public tender for support of the R&D activities of SMEs (EUR 21.3 million) published by the Ministry of Higher Education, Science and Technology (MHEST), in which 12.5% of the project evaluation was based on environmental technology and ecology-related criteria.

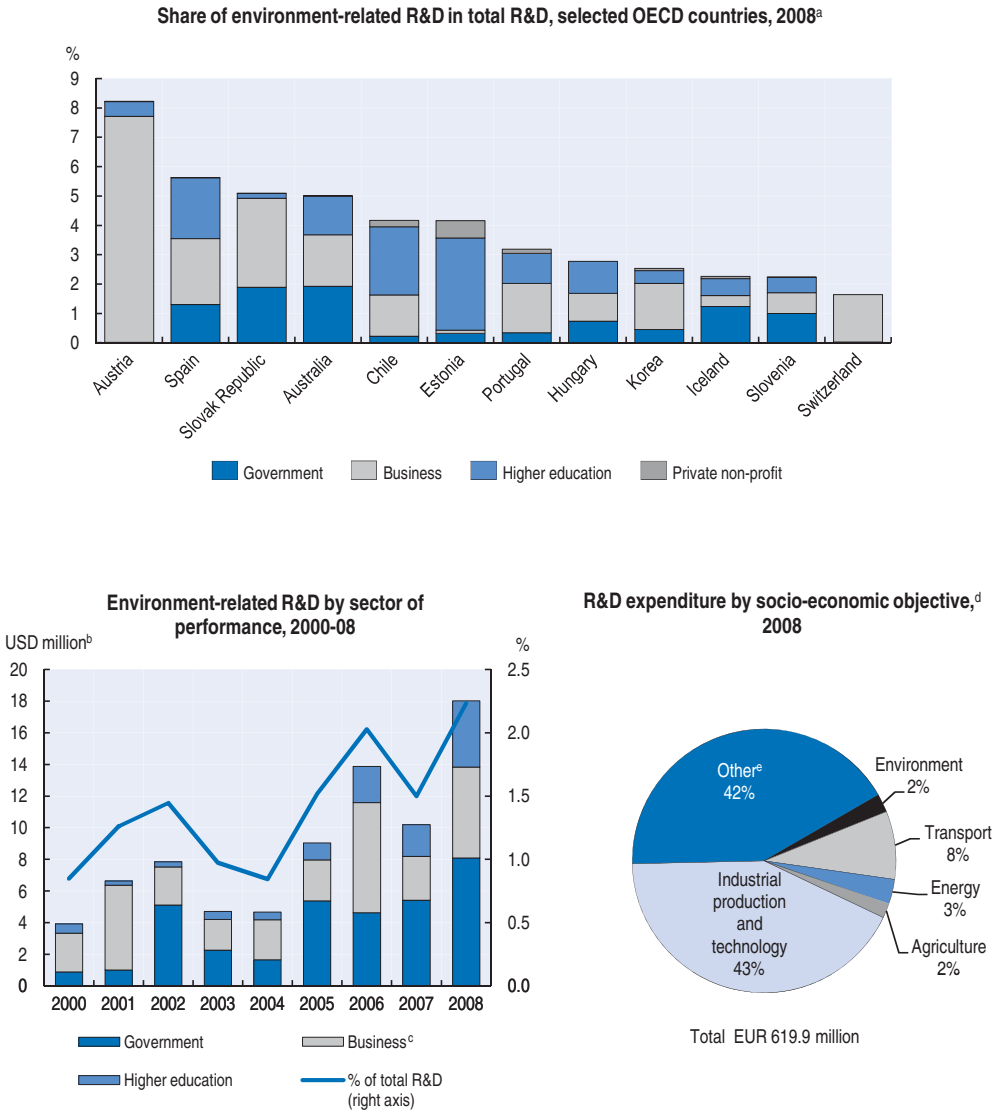
More recently, the largest and most concentrated public investment in R&D in Slovenia, with EUR 350 million available for 2010-14, was in the development of Centres of Excellence (CoE) that concentrate knowledge in priority technological areas and in Centres of Competence (CoC) managed by partners from the industrial sector that aim to deliver market-oriented results. Two CoEs focus on sustainable energy: the CoE for Low-Carbon Technologies has included work on the use of lithium and hydrogen technologies for stationary and mobile applications, while the CoE for Polymer Materials and Technologies has worked on developing materials for advanced applications in energy and renewable resources. Out of seven Centres of Competence, one focused on efficient energy use (the Competence Centre for Advanced Systems for Efficient Use of Electrical Energy, with a budget of EUR 6.4 million) and one on environmentally sustainable buildings (the Competence Centre for Sustainable and Innovative Construction, with a similar budget). Financial support for 17 Centres reached EUR 426 million in 2011.

Driven by cost-efficiency and market gaining motives, green entrepreneurship is emerging in large established firms as well as new SMEs. It is spreading beyond an initial focus on renewable energy and waste management to such areas as systemic environmental solutions in aviation, water and energy-efficient domestic appliances and components, sustainable housing and insulation, intelligent lighting systems, and resource-efficient mechanical equipment for timber processing.

Environment-related R&D

Gross expenditure on R&D for environmental purposes more than tripled in real terms in the period 2000-08. Its share of total R&D increased by almost as much, from 0.8% to 2.2%. Nevertheless, these shares are smaller than those in many other OECD countries (Figure 1.9).

Figure 1.9. **Gross domestic expenditure on environment-related R&D**



a) Or latest available year.
b) At constant 2000 prices and PPPs.
c) Break in time series in 2008.
d) According to the NABS 2007 classification.
e) Including general advancement of knowledge (23%) and health (14%).
Source: OECD (2011), *OECD Science, Technology and R&D Statistics Database.*

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Environment-related R&D has been funded for the most part by the government, particularly in the case of research carried out by academic institutions or governmental bodies. The government's R&D budget for the environment was 4.1% of the total government R&D budget in 2009, well above the OECD average of 1.7%.[8] In absolute terms, however, Slovenia accounts for a relatively small share (0.1%) of total OECD budget appropriations for energy and environment-related R&D. Business R&D expenditures have been financed almost entirely by their own sources (around 90%), while attracting little funding from abroad (around 4%) compared with the situation in some other OECD countries (*e.g.* 13% in the Slovak Republic).

Patents in environmental technologies

Slovenia's overall innovation performance, measured in terms of the number and growth of total patent applications, is weak compared to that in other OECD countries. This is the case in most areas of environment-related innovation, except for total patent applications in the fields of energy efficiency and electric and hybrid vehicles, where Slovenia performs at the OECD average (Figure 1.10). Patents in pollution abatement and waste management technologies are low compared to other OECD countries and their number is declining. However, patents are not a perfect indicator of innovation. There is some anecdotal evidence that some Slovenian firms have preferred not to patent their inventions for fear they would be appropriated and further developed by larger firms.

Assessment

Slovenia has created a strong foundation for fundamental R&D through the participation of academic institutions, including in the field of environment-related sciences. This is necessary since funding of basic research by the government minimises the risk involved in picking winners and locking in inappropriate technologies. However, Slovenia's current approach to innovation, evolving through stages of basic research, elaborated research, applied research to development and final commercialisation of products, should shift towards stimulating much closer interaction between public and private partners at every stage, from invention though to diffusion.

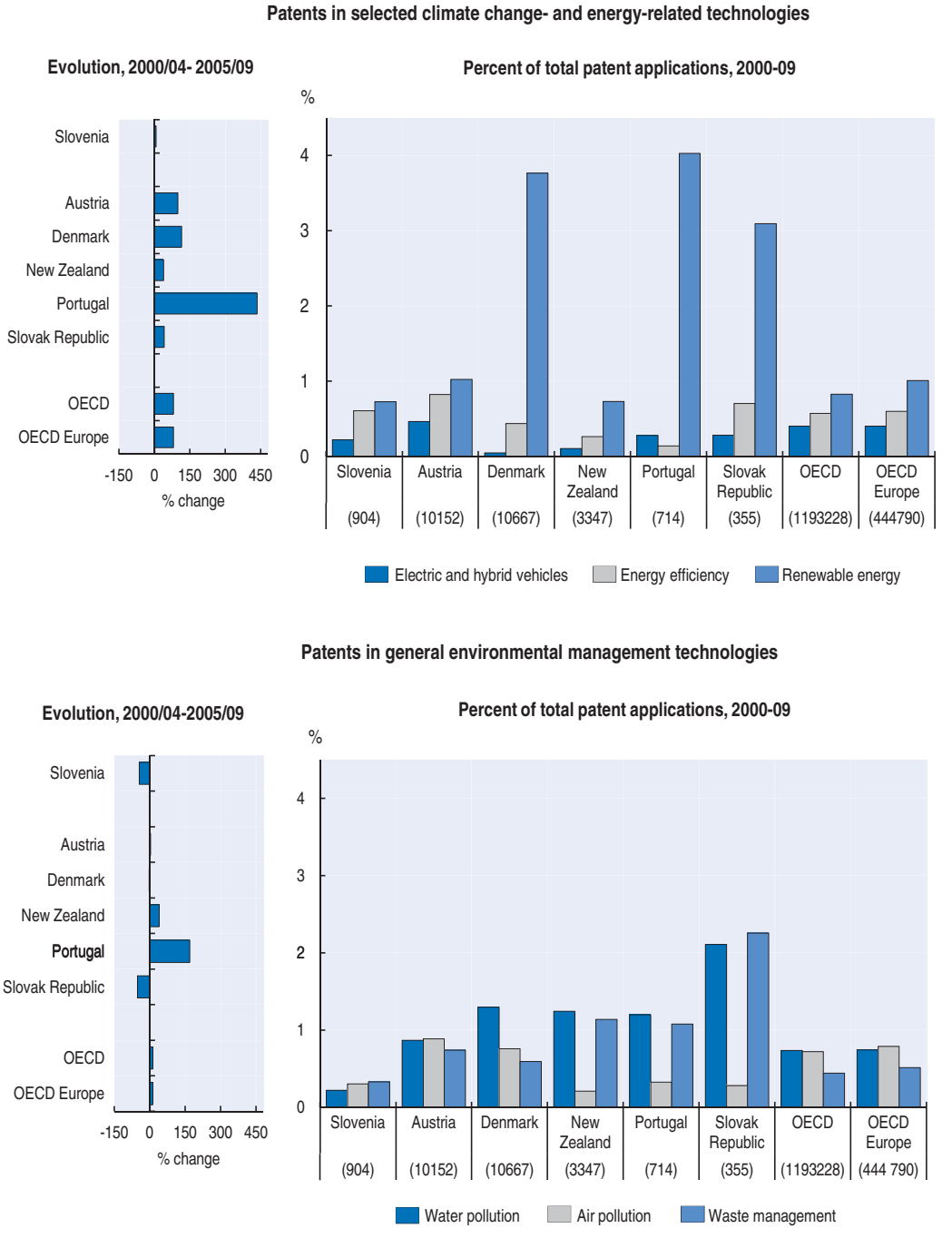
Taking account of increasing global demand for environmental technologies and services to respond to rising material and energy prices, growing public awareness and the introduction of more stringent environmental standards, government and industry leaders should consider the "clean tech" sector to be an important growth engine. Slovenia's Research and Innovation Strategy for 2011-20, adopted in 2011, included stronger provisions for promoting eco-innovation. The recent OECD report *Fostering Innovation for Green Growth* discusses some of the best practices and challenges in this regard. Much of the advice in this report would be helpful to Slovenia. In particular, Slovenia needs to improve its overall capacity for innovation in order to boost its productivity and competitiveness. This should include promoting more R&D in the private sector, possibly through the provision of appropriate incentives.

Since domestic firms are generally small, mechanisms to disseminate information about markets and stimulate awareness of business opportunities, particularly in Europe, should be promoted. Government R&D should be focused in areas where Slovenia appears to have the best comparative advantage. Large, long-term public procurement projects would help create demand for innovative, environmentally friendly products, as would implementation of an ambitious environmental agenda. Further efforts to stimulate dialogue and co-operation among the main players in the innovation system, including the financial sector and actors outside Slovenia, should be encouraged. All these efforts should also be supported by putting a price on pollution and environmentally harmful subsidies (through environmentally related taxes or emission trading systems), which should stimulate demand for eco-innovation.

4.2. Corporate environmental responsibility and trade

A commitment to corporate environmental responsibility by Slovenian companies has been expanding over the last 20 years. Large companies in the manufacturing, telecoms and energy sectors develop corporate environmental strategies and provide regular sustainability reports. The introduction of voluntary environmental standards has been growing, with

Figure 1.10. **Patents in selected technologies**[a, b]



a) Patent counts are based on the priority data and the inventor's country of residence, and use fractional counts of filings under the Patent Co-operation Treaty (PCT) at the international phase (European Patent Office designations).
b) Data in brackets indicate the total number of PCT patent applications filed in 2000-09.
Source: OECD (2011), *OECD Patent Statistics Database.*

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more than 700 Slovenian companies certified for ISO 14001 (environmental management) as of 2010. However, the results of a 2010 survey of 153 Slovenian manufacturing companies show that the majority of companies seem to be environmentally responsible primarily because of the personal commitment of their top management, and that public concern and regulations play a limited role in developing companies' environmental strategies. The results of the study also confirm a general trend for large companies to develop and implement environmental strategies to a much greater extent than SMEs.

Environmental bodies (the MESP and the State Environmental Inspectorate) have been co-operating with the Chamber of Commerce and Industry, the Chamber of Crafts (representing SMEs) and industry branch associations to facilitate compliance with environmental requirements, mainly through clarifying requirements under new environmental legislation. The efficiency of these efforts should be strengthened through the provision of compliance guidance to the regulated community and through offering regulatory incentives to operators that have reliably demonstrated good environmental behaviour (*e.g.* by adopting an environmental management system or having a good compliance record). These efforts should also be associated with greater use of economic instruments, including environmental taxes, which would provide stronger incentives to internalise the costs of pollution.

In the transitional period, financial support can be provided (especially to SMEs) for environmental improvements. There are already several examples of such opportunities, including funding available from the Slovenian Environmental Fund. An important contribution has recently been made by the Slovenian Export and Development Bank (SID Bank), whose mission is to develop and provide long-term financial services designed to supplement financial markets for sustainable development in Slovenia.[9] In 2010 the SID Bank provided loans worth EUR 160 million to support environment-related projects. More recently, it started a Promotional and Development Platform, in co-operation with government ministries, to support access to finance with favourable conditions for projects to support the transition to an environmentally friendly, knowledge-based society. This mechanism is expected to evolve from providing grants to non-grant support for enterprises (*e.g.* loans, guarantees, seed capital) with promotional elements (*e.g.* lower interest rates, longer terms), and deeper involvement of the bank in raising new capital in international markets.

Internal financing is complemented by support to environmental projects promoting Slovenian know-how abroad under bilateral ODA. This includes the Centre for International Co-operation and Development (CMSR), which operates within the SID Bank Group. In line with Slovenian development co-operation priorities, the CMSR pays special attention to projects in the field of energy and environmental protection in the Western Balkans. In the period 2007-10, the CMSR provided EUR 6.7 million, which included EUR 2.5 million in grants to ten projects in the field of environmental protection. In 2009, international support was provided for electric and electronic waste management in Bosnia and Herzegovina, The Former Yugoslav Republic of Macedonia, and Serbia; air quality measurement in Kosovo; and wastewater treatment in The Former Yugoslav Republic of Macedonia.

Increasing demand for environmental products and technologies should also stimulate the growth of the environmental goods and services (EGSs) industry. The size and extent of operations of the EGSs industry has not been well researched. Some studies carried out in the late 1990s suggested that this market was still relatively new,

as both regulations and enterprises had only been established after 1990. The total annual turnover of the surveyed enterprises was USD 87 million in 1998. The share of employment in selected "green" industries represented about 1.5% of total employment in 2007, a small increase from 1.4% in 2002. In 2004, the Institute of Economic Research, in co-operation with the Chamber of Commerce and Industry, developed a catalogue of EGSs companies that aimed to help companies looking for suppliers of such goods and services to obtain rapid access to the desired information. However, the catalogue is not complete or regularly updated. Progress has been hampered by lack of appropriate methodology, despite research carried out by the Statistical Office of Slovenia in 2005-07 to establish a proper classification that could serve to collect data on the EGSs industry. Due to unsatisfactory coverage by NACE classification, a different classification of environmental domains and lack of quality administrative data, results are expected only in 2012.

4.3. Green public procurement

The share of public procurement in national budget expenditures grew from 24% in 2001 to 47% in 2007 (reaching 13% of GDP in that year). Although green procurement was encouraged by the government in several top level strategic documents (*e.g.* the 2005 National Development Strategy, the 2005 National Environmental Action Protection Plan, the 2008 National Energy Efficiency Action Plan), no environmental criteria were introduced in the comprehensive Public Procurement Act of 2000 or its amendments of 2004. The preferred approach continued to be based on a traditional lowest-cost selection criterion.

Harmonisation of Slovenian legislation following EU accession resulted in the adoption of a new Public Procurement Act in 2006 supplemented by the Public Procurement in Water Management, Energy, Transport and Postal Services Area Act, which, for the first time, explicitly referred to environmental criteria in public procurement. It was expected that both Acts would stimulate the inclusion of environmental factors within technical specifications and selection criteria in the tender documents, although they were not made obligatory but were referred to as factors which may be included in tendering procedures. The changes followed the development of a National Action Plan for Green Public Procurement (GPP) adopted in 2009, which set specific targets including the establishment of an operational system of green public procurement, according to which 50% of all public tenders would result in the purchase of greener products and services by 2012.[10] Subsequently, a Decree on Green Public Procurement was adopted at the end of 2011 in line with the EU requirements. The Decree includes mandatory environmental criteria and recommendations for 11 product groups (electricity, food and catering services, copying paper and paper tissue and towels, office IT equipment, audio-video equipment, refrigerators, freezers and their combinations, washing and drying machines, dishwashers, construction, furniture, cleaning products and cleaning and laundry services, road vehicles and transport services, and tyres).

Since the adoption of the Action Plan, the Ministry of Public Administration (MPA) has made several centralised purchases, including low CO_2 emission vehicles, Forest Stewardship Council (FSC) certified and recycled paper, and more energy-efficient IT equipment. In purchasing electricity, the MPA selected the offer of a supplier that would provide 60% from renewable energy sources. According to the Ministry of Finance, 138 tenders with a total value of EUR 70 million took into consideration at least one environmental element in 2008.[11] This represented 3.5% of all tenders. In 2009, the number of such tenders increased to 415, representing 8.9% of all tenders and a value of EUR 246 million.

Experience shows that there are no formal obstacles to the introduction of regular green procurement practices. National legislation (the amended Public Procurement Act) and accompanying legislative documents constitute the legal framework for "green" public procurement. The National Action Plan and the most recent Decree on GPP in 2011 contain detailed requirements, *i.e.* mandatory (core) and recommended (comprehensive) GPP criteria, as well as guidelines for practical implementation. An obstacle to more rapid adoption of GPP is lack of expertise and skills on the part of public procurers. There should be a focus in the next period on training programmes and systematic work with procurers and potential suppliers of environmentally less harmful products. This should be supported by the new Public Procurement Agency, which was established in 2010. One of this agency's responsibilities is the implementation of green public procurement. In the new 2011-20 Research and Innovation Strategy of Slovenia, GPP is expected to be one of the key elements stimulating eco-innovation. The strategy's practical success depends on practical application of mandatory green procurement requirements, extension of accompanying activities (especially promotion, qualification and training), and wide dissemination of good practices.

Notes

1. Seven OECD countries have a higher average density than the capital region.
2. At the end of 2009 only seven municipalities covered an area larger than 300 km^2.
3. In Slovenia, the share of GDP has fluctuated narrowly around 3%, which is above the OECD average (1.7% of GDP in 2009) and slightly below the share in GDP in Denmark and the Netherlands, which are at the top end.
4. If the use of fuels for commercial purposes is not considered, the tax on diesel was about 90% of that on petrol in 2009-10 and decreased to 80% in 2011.
5. On-budget subsidies are cash transfers or soft loans to industrial producers, consumers and other related bodies. They appear on national balance sheets as government expenditure. Off-budget subsidies are typically transfers to energy producers and consumers that do not appear in national accounts as government expenditure. They may include tax exemptions, credits, deferrals, rebates, and other forms of preferential tax treatment. They may also include market access restrictions, regulatory support mechanisms such as feed-in tariffs, border measures, external costs, preferential planning consent, and access to natural resources.
6. A Competitiveness Council was established in early 2008 to create, improve and streamline collaborative linkages among government agencies, knowledge institutions and the business community. It ceased to exist in mid-2009. The new Council of Science, Technology and Innovation, jointly run by the Ministry of Economy and the Ministry of Higher Education, Science and Technology, aims to make the awarding of public R&D funds more responsive to business needs.
7. The programme's four pillars are: promotion of entrepreneurship and an entrepreneur-friendly environment; knowledge for business; R&D and innovations in companies; and promotion of SMEs through equity and debt instruments.
8. Excluding energy.
9. The SID Bank was established in 1992 as an export-credit bank, and as an authorised Slovene export credit agency providing non-marketable insurance and an Interest Rate Equalisation Programme on behalf of and for the account of the Republic of Slovenia. At the end of 2006 the company acquired a license as the Bank of Slovenia and was transformed into a specialised bank for promotion of export and development. In the environmental field the SID Bank focuses on environmental protection and waste disposal projects, as well as power supply and renewable energy resources projects. It refinances credits of banks and other financial institutions, co-finances transactions and investments, or finances directly.

10. The Plan also defined the share (in monetary terms) of goods and services to be procured on the basis of green criteria for eight priority groups (construction and buildings, cleaning, office IT, vehicles, electricity supply and use, furniture, paper, and catering). The Action Plan listed 14 implementation measures (*e.g.* training and educational activities), a green procurement web platform, and dialogue with the commercial sector to develop a green market.
11. Tenders with a value higher than EUR 40 000 for goods or EUR 80 000 for services were taken into account.

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PART I

Chapter 2

Implementation of Environmental Policies*

Over the last ten years, Slovenia has established a comprehensive framework of environmental policies and strengthened its environmental institutions. It has also successfully transposed most of the EU environmental directives into key national laws. This chapter examines Slovenia's environmental governance, including horizontal and vertical co-ordination, as well as the coherence of the design and implementation of environmental and land use policies. Also analysed are the drivers of improved compliance with environmental requirements and the effectiveness of environmental permitting, enforcement and liability systems. Progress in promoting environmental democracy (through open access to information, improved public participation, education and access to justice) is discussed. In addition, this chapter evaluates environmental performance in two selected policy areas: nature protection and biodiversity conservation; and surface and groundwater management.

* This chapter reviews progress in the period 2000-11. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Assessment and recommendations

Over the last ten years, Slovenia has established a comprehensive framework of primary environmental legislation. It has successfully transposed most of the EU environmental directives into the 2004 Environmental Protection Act and other key national laws. It has also adopted new or revised environmental quality and emission standards, drawing on European legislation and the experience of other OECD countries. Slovenia has made substantial progress in creating a multi-tier system of environmental permitting. However, its secondary environmental legislation is complex, some areas are inadequately regulated, and there are overlaps and even contradictions between different decrees and ordinances.

Slovenia has introduced risk-based planning of environmental inspections, which helps the Inspectorate for the Environment and Spatial Planning to increase the effectiveness and efficiency of compliance monitoring. However, the environmental authorities could do more to promote better environmental performance by enterprises, particularly through providing them with information and guidance on how to best comply with regulations. The system of administrative enforcement could be strengthened through increasing the collection rates of environmental fines, and by making fines proportional to the financial gains of non-compliance.

The extent of municipalities' autonomy and the absence of a regional administrative level have led to an important environmental governance gap between the national and local levels. While efforts are under way to develop common strategies to tackle priority issues such as local air pollution and waste management, national environmental authorities are often unaware of the environmental performance of the ever-growing number of municipalities. Oversight by the national government to ensure consistency in the implementation of environmental requirements could be improved by establishing a regular forum for dialogue between the Ministry of the Environment and Spatial Planning (MESP) and municipalities, possibly with active involvement of the associations of municipalities and towns of Slovenia. Such a forum should aim to better monitor and benchmark the environmental performance of local authorities, with a view to identifying and disseminating good practice. It should also facilitate better feedback from the local level for policy purposes.

Municipal fragmentation and insufficient oversight at the national level have impeded the balancing, in spatial planning, of the development needs of local communities and the protection and rational use of natural resources. This has contributed to growing urban sprawl, fragmentation of habitats, and longer commuting using private cars in the absence of public transport alternatives. Neighbouring local authorities seldom co-ordinate their land use plans, and they sometimes compete for industrial and commercial development projects. Lack of co-operation at the local level is reinforced by a lack of co-ordination between relevant ministries at the national level. Environmental impact assessment procedures should provide adequate safeguards and provisions for public participation,

particularly when assessments are conducted after a project has been included in a spatial plan. Developers are increasingly seeking ways to avoid public participation in planning decisions.

Slovenia ratified the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters in 2004. Provisions for access to information have been effective. Environmental NGOs play an important watchdog role and participate actively in environmental policy making. Despite some initial uncertainties, the conditions under which NGOs can gain legal standing in environment-related court cases have been clarified. However, citizens cannot take governmental authorities to court for failure to execute their duties, for instance with respect to environmental enforcement.

Recommendations

- Streamline and ensure the coherence of the existing body of environmental law; identify ways in which the administrative burden on the regulated community can be reduced without compromising environmental objectives, in line with government policy in this area; systematically conduct regulatory impact assessment for new environmental laws and regulations.
- Improve the efficiency of compliance assurance efforts by offering regulatory incentives (*e.g.* less frequent inspections, reduced reporting requirements, reduced permit fees) to operators that have reliably demonstrated good environmental behaviour; and by improving the provision of compliance guidance (through websites and publications), especially to small and medium-sized enterprises.
- Develop a transparent enforcement policy and strengthen the effectiveness of environmental enforcement by making the size of administrative fines at least equal to the financial gains of non-compliance, and improving collection rates; eliminate "discounts" for early payment environmental fines; and work with the Customs Administration to improve the collection of environmental fines.
- Strengthen co-operation between the MESP, the Councils of Regions, and the associations of municipalities and towns of Slovenia to better co-ordinate development and implementation of environmental policies at the local level, and to provide feedback on results achieved and remaining challenges.
- Improve the co-ordination and coherence of local spatial plans by strengthening their scrutiny by the MESP and the provision of financial incentives for municipalities to develop joint regional spatial plans; and systematically require environmental assessment, and encourage full participation by the public, before spatial planning decisions are made at the local level.

Biodiversity and nature protection

Slovenia enjoys extraordinarily rich biodiversity due to its location at the junction of several ecological regions. It hosts an abundance of species, including 850 endemic ones. Traditions of close-to-nature forest management – 60% of the land area is forest – and low-intensity farming have helped to conserve much of this natural wealth. There is high public support for biodiversity protection, and NGOs contribute positively to policy developments; 35.5% of the territory is designated as part of the Natura 2000 network, the

largest share among EU members. Protected areas appear to be well managed. Marine protected areas extend up to approximately 200 metres of coastal water as an integral part of the coastal protected areas. However, the size of strictly protected areas is less than the OECD average. Only 4% of the territory satisfies the strict criteria of IUCN Categories I-II, and only 44% of all habitats and 20% of species of European Community Interest have a favourable conservation status. Freshwater, peatland and grassland habitats require better protection, as do mammals, amphibians, fish and non-vascular plants.

The 2005-15 National Nature Conservation Plan provides a good framework for strengthening biodiversity conservation and should be used, together with relevant EU directives, to guide priority-setting. The Operational Programme for the management of Natura 2000 sites has supported the integration of biodiversity into policies in sectors such as tourism, agriculture and forestry. These efforts should be strengthened. Opportunities to extend private sector participation in biodiversity conservation should be explored. Like many other countries, Slovenia would benefit from an economic analysis of ecosystem services which, among other benefits, could help identify how more use might be made of market-based approaches to biodiversity conservation.

Water management

An abundance of water resources and a system of water rights and payments underpin Slovenia's low water use intensity and low levels of water abstraction. Electricity and power generation account for nearly 80% of water demand. Water use by the manufacturing, household and agriculture sectors declined during the review period. Groundwater provides 97% of drinking water. The entire territory of Slovenia has been designated a nitrate vulnerable zone. Discharges of nutrients, chemical substances and other pollutants have been reduced due to expansion of the sewerage network and increasing wastewater treatment capacity, better agricultural practices, and measures to reduce discharges from industry. EU funding before and after Slovenia's accession was instrumental in the expansion of water infrastructure.

Despite the implementation of regulatory and economic instruments, there is still a risk that water quality will not meet the requirements of the EU Water Framework Directive for good ecological, chemical and quantitative status by 2015, especially in the case of lakes and groundwater. Improving and extending water supply and wastewater infrastructure is a particular challenge, as only 53% of the population is connected to wastewater treatment plants with the remainder using cesspools. This was partly related to the dispersion of the settlements and the higher cost of connecting to networks but also to poor spatial planning and low priority attached to wastewater collection and treatment. Further efforts are needed to meet the 2015 government objective of connecting 70% of the population to wastewater treatment plants, improving treatment efficiency, and ensuring the safe operation of individual wastewater collection systems to prevent groundwater contamination. Consideration should be given to reforming water utilities, including through greater co-operation among utilities to achieve economies of scale, improving their managerial capabilities and their establishment as autonomous institutions operating on a financially sustainable basis. Establishing an independent body to regulate prices and to benchmark utility performance, similarly to arrangements in the energy sector, would create a stable and transparent regulatory and incentive framework. The possible benefits of greater private sector participation should also be assessed.

Slovenia should act more decisively to implement integrated water resources management. River basin management plans were adopted in July 2011, exceeding deadlines established by the EU Water Framework Directive. However, the economic and financial analysis of measures for better water management should be strengthened with a view to enhancing their effectiveness and efficiency. This is all the more important in light of budgetary pressures and of reduced EU resources in the long term. Reforming the current system of abstraction and wastewater charges, and making the use of these charges more effectively should help in this regard. In preparing the river management plans, more emphasis should also be placed on better integration of policies for sustainable use of water in the main water-consuming sectors. Greater efforts are needed to reduce the environmental impacts of agricultural policies, including for manure management and expanding the use of water for electricity generation. The latter requires special attention as plans are extensive for adding new, and increasing the capacity of existing large-scale hydropower units, as part of the government's renewable energy strategy.

Recommendations

Biodiversity and nature protection

- Complete the designation of a comprehensive and representative network of legally protected areas; implement plans for the protection of priority habitats and species in the framework of Natura 2000.
- On the basis of an interim assessment of the implementation of the National Nature Conservation Plan 2005-15, establish priority objectives for the next phase of the Plan, and identify measures to achieve these objectives.
- Continue to strengthen scientific understanding of ecosystems and biodiversity; carry out an assessment of the economic value of ecosystem services in Slovenia; assess how greater use of market-based approaches could help to better integrate biodiversity and sectoral policies.

Water management

- Expedite the completion of river management plans, taking full account of synergies and trade-offs with other sectors and policies (energy, water supply and sanitation, agriculture, flood prevention, nature conservation and climate change adaptation); strengthen the economic and financial analysis of policy development and implementation.
- Redouble efforts to extend the wastewater treatment capacity to cover all large settlements; consider a comprehensive reform of water utilities, including greater co-operation to achieve economies of scale, establishment of utilities as autonomous institutions operating on a financially sustainable basis, and creation of an independent body to regulate prices and benchmark utility performance.
- Ensure that cumulative environmental impacts of the planned extension of hydropower capacity are fully assessed and appropriate measures to limit these impacts are integrated into the design and operations of hydropower installations; ensure the broadest possible public participation in environmental impact assessment procedures.
- Strengthen measures to reduce agricultural pollution of water resources, including by extending drinking water protection areas and by making greater use of economic instruments to reduce pollution from manure usage and storage.
- Strengthen the water monitoring system, including ambient monitoring of the ecological and chemical status of surface water and the chemical and quantitative status of groundwater, in order to fully comply with the requirements of the EU Water Framework Directive.

1. Environmental policy and institutional framework

1.1. *National environmental policy objectives*

Slovenia's environmental policy framework for the last ten years was formulated in the National Environmental Action Programmes (NEAPs) for 1999-2004 and 2005-12. The first of these focused on reducing pollution and improving environmental performance (*e.g.* with respect to air, water, waste management, and nature protection/biodiversity conservation). The second sets goals and priorities (and defined time-specific measures) in four areas: climate change; nature and biodiversity; quality of life; and waste and industrial pollution.[1] The NEAPs outlined the responsibilities of various stakeholders, as well as implementation instruments and priority tasks in the context of international co-operation. They also emphasised the importance of provision of environmental information, public participation in environmental decision-making, and education.

While detailed implementation measures were mainly defined for the period 2005-08, a large number of specific operational programmes were adopted by the government within the NEAP framework. The principal role of the operational programmes has been to ensure timely transposition of the EU environmental *acquis* and subsequent implementation of the corresponding obligations. These programmes generally suffer from fragmentation of funding, primarily due to the lack of a coherent set of priorities. Provisions for monitoring and evaluating the programmes' implementation are also weak. A stakeholder committee whose purpose would have been to evaluate the NEAPs' effectiveness was proposed, but it was never established.

1.2. *Institutional framework for environmental management*

The Ministry of the Environment and Spatial Planning (MESP) is Slovenia's principal environmental authority. It is divided into three directorates. The MESP's Environment Directorate addresses environmental policy development, nature protection, strategic environmental assessment, water management and biotechnology issues. It drafts legislation within its scope of work, develops strategic policy documents and implementation instruments, and ensures co-ordination with other competent authorities on environment-related issues. The Spatial Planning Directorate is responsible for spatial management at the national and municipal levels, as well as construction, housing and real estate transactions. The Public Services and Investment Directorate is responsible for the preparation and management of environmental investments for which public funding is provided, co-ordination of the Ministry's relations with public environmental protection services, and management of public procurement procedures.

The Environment Agency (ARSO) and the Inspectorate for the Environment and Spatial Planning (IESP) are the two principal environmental bodies under the MESP.[2] The ARSO performs a range of environment-related expert, analytical, regulatory and administrative tasks. It issues environmental permits, monitors environmental pollution, and ensures the quality of public environmental data. The ARSO has approximately 400 staff at its headquarters and in 27 local offices. The IESP is responsible for ensuring compliance with environmental, spatial planning and housing laws and regulations.[3] The Chief Inspector of the IESP is directly responsible to the Minister of the Environment and Spatial Planning. In 2011, the Environment and Nature Inspection Service had 56 inspectors at its head office and eight regional units of different sizes. Besides the IESP, other inspectorates (including those for chemicals, agriculture, forestry, hunting, fishing, construction and health) oversee environment-related activities under other ministries.

The Environmental Protection Act (EPA) of 1993 established the Slovenian Environmental Public Fund (Eco Fund), a legal public entity that promotes sustainable development through investment financing. The Eco Fund's main function is to provide soft loans or guarantees to companies, municipalities and other legal entities (as well as to individuals) for environmental investment projects in line with national and EU environmental strategies and policies (Box 1.3).

In the absence of a regional administrative level, municipalities are responsible for environmental management at the sub-national level. Local authorities may develop their own environmental protection programmes (12 of Slovenia's larger cities have a legal obligation to do so), which can address air quality, water quality, water consumption, energy consumption, greenhouse gas emissions, waste management and noise control. Local authorities also provide public environmental services, such as drinking water supply; collection and treatment of municipal wastewater; collection, treatment and disposal of municipal waste; and cleaning of public areas. The Local Self-Government Act authorises the creation of inter-municipal inspectorates to monitor compliance with municipal ordinances concerned with these environmental services. However, since 2004 municipalities no longer have the power to establish more stringent environmental requirements than those stipulated by national laws.

The high degree of municipalities' autonomy and the absence of a regional administrative level have led to an important environmental governance gap between the national and local levels. While efforts are under way to develop common strategies to tackle priority issues such as local air pollution, national environmental authorities are often unaware of the state of environmental management in the ever-growing number of municipalities (from 147 in 1995 to 211 at present). The adoption of the Balanced Regional Development Act in 2000 encouraged better co-operation among Regional Development Agencies (RDAs), Councils of Regions, and associations of municipalities and towns. However, oversight by the national government is still insufficient to ensure that environmental requirements are implemented consistently.

2. Environmental legislation

A comprehensive framework of primary environmental legislation was created during the review period. Slovenia's accession to the European Union in 2004 was the main driver of this process: it has successfully transposed all relevant EU environmental directives into domestic legislation.

Slovenia's environmental legal framework includes relatively few (15) laws, supported by more than 400 regulations. The main element is the Environmental Protection Act, which serves as a framework law but also contains general requirements in a broad range of regulatory areas. The first EPA of 1993 established the fundamental legal principles of environmental protection (*e.g.* the Polluter Pays Principle, the precautionary principle, principles related to environmental liability) and its basic instruments, such as environmental impact assessment, strategic environmental assessment, permitting, environmental monitoring and enforcement, and economic instruments. A new EPA was adopted in 2004 in order to fully harmonise the country's environmental laws with EU environmental directives. The EPA is amended periodically to incorporate changes in EU environmental legislation. Slovenia's other major environmental legislation includes: the Nature Conservation Act (1999, last amended in 2004); the Water Act (2002, last amended in 2008); the Management of Genetically Modified Organisms Act (2002); the Cave Protection Act (2004); and the Act on Protection against Ionising Radiation and Nuclear Safety (2002, last amended in 2010).

While most environmental lawmaking in the last ten years has been linked to the need to transpose the EU environmental *acquis* into Slovenian legislation, in some cases transposition has not been accompanied by the introduction of necessary implementation arrangements. In this sense, Slovenia has been on the receiving end of environmental policy making. At the same time, the body of secondary environmental legislation is quite complex, as many regulations have been designed to address very specific issues. Thus, along with some insufficiently regulated areas such as waste management, and slow implementation of some EU directives (*e.g.* the Water Framework Directive), there are overlaps and even contradictions between different decrees or ordinances.

The Ministry of Public Administration recently set a target of reducing the administrative burden of all government regulations by 25%. The MESP plans to reduce the number of environmental regulations and to simplify reporting requirements under many of them (*e.g.* through introducing electronic reporting). Conducting regulatory impact analysis for new draft legislation would also be useful with respect to making regulations internally coherent and reducing unnecessary regulatory burdens, in line with the overall government policy.

3. Establishment of environmental requirements

3.1. Environmental standards and permitting

Ambient environmental quality standards for air, fresh surface water, groundwater and seawater, soil, noise and electromagnetic radiation, together with related monitoring provisions, have been established in a range of regulations. Most have been adopted or revised within the last ten years, in the context of harmonisation with the EU regulatory framework.

Slovenia did not have specific environmental permitting requirements before the EPA was adopted in 2004. Since then, it has made substantial progress in creating a multi-tier system of environmental permitting. Pursuant to the EPA, the 2004 decree on Categories of Industrial Activities and Installations Able to Cause Large-scale Pollution specified the administrative procedures and conditions for granting environmental permits. These permits are issued by the ARSO.

Integrated permits are required for installations falling within the scope of the EU IPPC Directive (96/61/EC, superseded by the Industrial Emissions Directive, 2010/75/EU). IPPC permits are issued based on sector-specific regulations that set emission and effluent limit values. These regulations were developed on the basis of German standards, as the result of an extensive inter-governmental twinning project whose purpose was to help Slovenia comply with the IPPC Directive. They reflect emission limit values and technical measures defined in EU reference documents on best available techniques (BAT). The ARSO completed the process of issuing permits to all existing IPPC installations (156) in 2010, rather than in 2007 as required by the Directive. Due to the challenges of implementing BAT in existing industrial facilities, some existing installations were granted transitional periods.

A separate permit is required for installations posing the risk of an industrial accident (*i.e.* those regulated under the EU Seveso II Directive, 2003/105/EC). According to such a permit, an operator is required to design and implement a Major Accident Prevention Policy, an internal safety management system, and other preventive and protective measures of a technical and organisational nature. As of 2011, 55 Seveso installations are registered in Slovenia, all of which hold the required permits. The permit is part of Slovenia's national regime for preventing major accidents involving hazardous substances and limiting the consequences of such accidents if they occur.

Single-medium environmental permits have been issued to around 760 installations with significant potential releases of regulated air and water pollutants, or to those that are involved in waste management activities but fall outside the scope of the IPPC and Seveso Directives.

An environmental permit is also needed before a building permit can be issued (where applicable), or otherwise before the installation or establishment begins operations.[4] Information about environmental permits issued is available to the public upon request, but is not posted on line. However, the ARSO plans to create an interactive register of IPPC permits on its website. All environmental permits are subject to a one-time administrative processing fee, ranging from EUR 17 for a single-medium permit to EUR 500 for an IPPC permit, with revenues going to the general budget.

Facilities with low environmental impacts (*i.e.* with potential emissions and effluents below the defined limit values) do not require an environmental permit, but they must comply with general emission and effluent standards set in general regulations applicable to all industrial activities.

In addition to the EPA, several other laws (the Water Act and the Nature Conservation Act) prescribe environment-related permits or licences. For example, the ARSO has issued over 33 000 permits to use water for technological, energy-related, agricultural and other purposes. This large number of permits represents a heavy administrative burden.

3.2. Land use planning

Spatial planning has a long history in Slovenia. It has been associated with environmental management since 1984. The 2007 Spatial Planning Act defined spatial planning as an activity for: the protection and rational use of natural resources; the development of different spatial activities; and land use co-ordination.

Under the Local Self-Government Act, most spatial development planning is carried out by municipalities. Plans are long- and medium-term. The public may influence the content of spatial planning documents by participating in hearings and providing written comments. The national government provides guidance and facilitates inter-agency co-operation. Municipal spatial plans are approved by the Minister of the Environment and Spatial Planning based on the opinions of all local stakeholders. Spatial planning of national importance (*e.g.* concerning highways or power plants) is carried out by means of national spatial plans. They are developed through a procedure co-ordinated by the MESP and involving relevant line ministries such as economy and transport.

The fragmentation of local communities and the absence of a regional planning level are major obstacles in spatial planning. Many municipalities do not have a strategic development framework, and smaller ones find such planning to be a major financial burden. Neighbouring local authorities seldom co-ordinate their land use plans, and they often compete for industrial and commercial development projects. Although several municipalities can agree to prepare a regional spatial plan, this is rarely done.

There are several sources of tension with respect to land use in Slovenia. Many infrastructure investment schemes (particularly for roads) were hastily designed and implemented under pressure to spend available EU Structural Funds, without adequate consideration of environmental and efficiency aspects. With mountains and nature protection areas covering most of Slovenia's territory, there is constant encroachment by development on agricultural land (which accounts for only 8% of the total area). This is facilitated by the agricultural land's relatively low price. To counter this trend, draft soil

protection legislation envisages the introduction of a premium fee for acquisition of arable land (the revenue from which would go to a special soil rehabilitation fund), as well as a requirement that developers demonstrate that there are no alternative locations.

Some land use planning conflicts stem from a lack of co-ordination between national government agencies, especially in regard to infrastructure development. There is also a very strong (and growing) public sentiment against local development projects, motivating many developers to limit public participation in spatial planning, which in turn has negative consequences for the quality of decisions.

3.3. Environmental assessment

Environmental impact assessment (EIA) has been implemented in Slovenia since 1993.[5] An application for an environmental consent must include a project plan with relevant supporting documentation, as well as an environmental impact report prepared according to a defined procedure and audited by a certified expert. Based on these documents, the ARSO carries out an environmental impact assessment in consultation with other stakeholders. The ARSO subsequently grants or refuses an environmental consent, taking account of expert opinion from other institutions such as the Institute for Nature Conservation. It may stipulate certain conditions, limitations or instructions for mitigating negative environmental impacts. The number of consent applications increased from 77 in 2000 to 120 in 2003, but fell to 10 in 2010 due to fewer projects being developed in the post-crisis period, with 5 applications rejected by the ARSO in that year.

In practice, there are a number of problems with EIA implementation. Most commonly, the EIA procedure is carried out after a project has been included in a spatial plan. At this stage it is hard to stop the project regardless of its environmental impact. Moreover, developers try to limit public participation by claiming that the area affected by the project is negligible (the lack of corresponding rules is an example of a regulatory loophole).

Strategic environmental assessment (SEA) is obligatory for spatial and land use plans, as well as energy, industry, transport, tourism, water and waste management, agriculture and forestry plans and programmes at the local and national levels that meet screening criteria for significant environmental impact.

SEA has already been implemented at the national level in the case of operational programmes for rural development, regional development, fisheries and cross-border co-operation. At the local level, lack of public participation leads to a situation in which an SEA almost always results in a positive decision. Local authorities respect the letter, but often not the spirit of the law. In 2010, 244 plans and programmes were screened to determine whether an SEA should be conducted; 36 were actually assessed, and only one proposal was rejected for reasons of biodiversity conservation. The MESP needs to do more to enforce SEA requirements at the local level and encourage the engagement of the public in this process.

3.4. Non-regulatory instruments

Voluntary environmental standards have been widely adopted in Slovenia, primarily due to market pressure. More than 700 Slovenian companies have been certified for ISO 14001 (environmental management systems). This suggests that most large and many medium-sized companies actively carry out environmental management. At the same

time, there have been far fewer certifications under the EU's Eco-Management and Audit Scheme (EMAS), with only four companies registered. This trend is similar to that in other EU countries, except Germany.

Eco-labelling in Slovenia is governed by Article 31 of the EPA. Product groups and product-specific conditions for obtaining an eco-label are described in EU regulations on the Community eco-label award scheme. To obtain an eco-label for a product, the producer or importer must submit to the MESP an application containing evidence that the product meets the prescribed conditions and pay a fee. The MESP may withdraw an eco-label if a product no longer meets the prescribed conditions. Only four companies currently hold eco-labels in Slovenia. Slovenian industry would like to see the government promote eco-labelling through information campaigns and public procurement.

A number of environmental awards have been established by the daily newspaper *Finance* (*www.finance.si*) in co-operation with the Chamber of Commerce and Industry of Slovenia. These awards recognise the energy efficiency and environmental performance of businesses or products.

4. Environmental compliance assurance

4.1. *Compliance promotion*

The MESP and the IESP work with the Chamber of Commerce and Industry, the Chamber of Crafts (representing small and medium-sized enterprises), and industry branch associations to clarify requirements under new environmental legislation. The current use of workshops to explain the regulatory requirements should be complemented by the provision of compliance guidance to the regulated community via a website and sector-specific publications. The IESP could also improve the efficiency of its compliance assurance efforts by offering regulatory incentives to operators that have reliably demonstrated good environmental behaviour (*e.g.* by adopting an EMS or having a good compliance record). A range of incentives could easily be applied, such as less frequent inspections, reduced reporting requirements and reduced permit fees.

4.2. *Compliance monitoring*

Inspection planning has significantly improved in recent years (Box 2.1). Environmental inspections are cross-media and are usually conducted by one inspector. Planned inspections account for about 55% to 60% of the overall number (3 217 out of 5 196 in 2010). However, risk-based priorities guide only half of all planned site visits. The other half are part of inspection campaigns that check the implementation of specific legal requirements across the country. The IESP conducts several such campaigns per year. For example, in 2009 these campaigns focused, among others, on separate collection and transport of municipal waste fractions, cross-border shipments of waste, use of organic solvents in dry cleaning, and protected areas.

Unplanned inspections account for a relatively large share of all inspections. They are usually triggered by complaints or accidents. In 2009, the IESP received 3 684 environment-related complaints. The number has been growing in recent years, with a large share of complaints related to disposal of construction waste and end-of-life vehicles. As a top priority, the Inspectorate reacts to cases in which there is a potential threat to public health or public order, and to complaints concerning Category 1 installations, as well as to indications from NGOs.

Box 2.1. **Risk-based planning of environmental inspections**

The IESP has classified 5 500 regulated industrial installations under its jurisdiction into three categories based on their size and environmental risk:

- Category 1 (high impact) facilities include IPPC and Seveso installations, water and wastewater treatment plants, activities involving hazardous waste, and solid waste landfills. Routine inspections of these facilities take place at least once a year.
- Category 2 (medium impact) facilities are all other installations that require a single-medium environmental permit. They are inspected every two years.
- Category 3 (low impact) facilities are those that do not require an environmental permit. The inspection frequency for such regulated entities is once in three to five years.

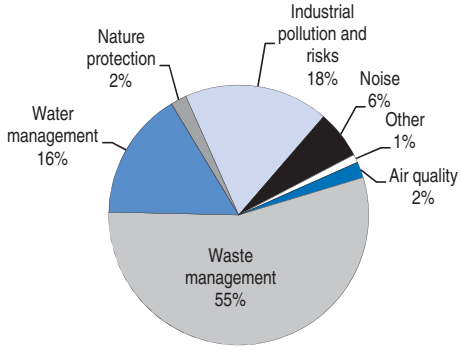
Annual inspection planning is performed using the PLAN software application developed in 2008. PLAN considers an installation's risk category and the date of the last inspection. However, it does not account for the time required to inspect different types of facilities. Inspections of Seveso installations are generally planned and conducted separately from other site visits. The IESP has also developed a comprehensive database of regulated installations, showing each installation with its record of inspections, detected violations and the corrective actions taken, as well as imposed sanctions. This database is not available to the public.

Source: IESP.

All operators are required to conduct self-monitoring under conditions established in their environmental permits. Inspectors do not take samples during site visits. Measurements and analyses are carried out by laboratories authorised by the ARSO and are paid for by operators. Operators submit their self-monitoring reports to the ARSO, which shares the information with the IESP. However, the transfer of self-monitoring data is not regular enough, which complicates the Inspectorate's compliance monitoring and enforcement work.

The prevalence of waste-related inspections (Figure 2.1) reflects not only the importance of waste issues, but also the amount of time inspectors spend on problems related to municipal waste landfills and to the illegal disposal of construction and demolition waste.

Figure 2.1. **Distribution of compliance monitoring activities by regulatory field, 2010**



Source: IESP (2011).

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Staff shortage is one of the main challenges facing the IESP. The very wide range of work that has to be performed by inspectors, despite their partial specialisation, is a growing problem, particularly in regional units with relatively few inspectors. The scope of the IESP's activities has increased dramatically in recent years without a corresponding increase in staff numbers. Responsibility for inspecting waste management activities has been transferred from the Health Inspectorate, and the IESP has acquired powers in such areas as genetically modified organisms, greenhouse gas emissions, nature protection and electromagnetic radiation. Overall, the number of regulations enforced by the IESP has quadrupled since 2000. The Inspectorate's budget has not increased in proportion: it was EUR 6 million in 2002 and EUR 7.6 million in 2011.

The IESP co-operates with the customs service and police on cross-border shipments of waste through information exchange and joint inspections. It also conducts joint inspections with the Chemical Inspectorate of the Ministry of Health (which is responsible for the storage and handling of chemicals) in cases where the chemicals concerned are part of hazardous waste. The IESP works with the Administration for Civil Protection and Disaster Relief in reacting to, and following up on, industrial accidents. It also collaborates with the Inspectorate for Agriculture, Forestry and Food, mostly on illegal waste disposal in forests and on agricultural land.

The challenges of inter-agency collaboration in compliance monitoring have been addressed through the Inspection Council, a permanent working body for co-ordination of various inspection services established under the provisions of the Inspection Act. The Inspection Council addresses common professional and organisational issues associated with the operation of particular inspection services. It determines and monitors indicators of the efficiency and quality of the inspection services' work, and provides a common information system which allows all the inspection services to exchange data. Regional co-ordination groups of inspectors have been established to improve operational collaboration on the ground.

At the local level, inter-municipal inspectorates monitor compliance with municipal ordinances on waste management, wastewater treatment, maintenance of green areas, road safety, and a range of non-environmental issues such as municipal taxes and advertising. For example, the IESP inspects public providers of environmental services, while municipal inspectors check producers of waste and dischargers into public sewers. Contrary to the good level of collaboration between inspectorates at the national level, there is currently no co-ordination between local and IESP inspectors.

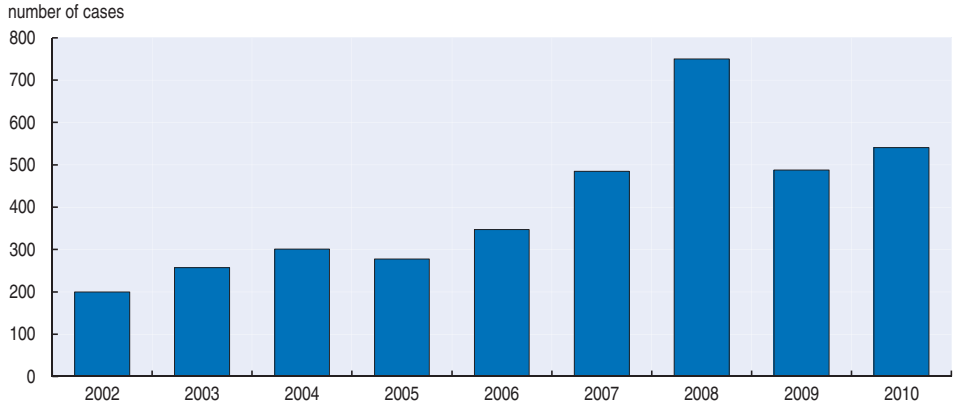
The communication "feedback loop" from the Inspectorate to policy makers engaged in legal drafting at the MESP could also be improved. For the Ministry to succeed in streamlining the country's environmental regulatory framework, it should be more attentive to lessons learned in enforcing specific regulations, where difficulties often stem from ambiguities and inconsistencies in existing requirements.

4.3. Enforcement

The enforcement authority of the environmental inspectors is determined by the Inspection Act, which stipulates a range of enforcement powers including: ordering measures to correct non-compliance within a specific time limit; applying administrative sanctions in accordance with the 2005 General Offences Act; and reporting a criminal offence to a public prosecutor.

The number of enforcement cases has markedly increased in the last nine years (Figure 2.2). The most common response to a violation is a written order indicating necessary corrective actions, as well as measures needed to monitor relevant environmental impacts. In the case of minor irregularities, a warning note may be sufficient. By issuing a compliance order, the inspector can close the facility and/or order the operator to stop using specific substances, equipment, processes or means of transportation, or prescribe any other measure to bring the facility back into compliance. Alternatively the inspector can propose that the ARSO withdraw the violator's environmental permit. In 2010, the IESP ordered compliance measures in nearly half of its inspections.

Figure 2.2. **Number of enforcement cases, 2010**



Source: IESP (2011).

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Depending on the nature of the violation (*e.g.* degree of harm, intentionality), the inspector can directly impose an administrative fine based on the General Offences Act and the relevant environmental law, or initiate criminal proceedings against the facility and/or the responsible physical person. The General Offences Act simplified the procedure allowing inspectors to impose sanctions directly rather than having them approved by Slovenia's Administrative Court. However, the sanction can still be contested in court.

A monetary penalty can be imposed on a company, its responsible officials, and individuals. Maximum administrative fines are EUR 125 000 for legal entities, EUR 4 100 for responsible officials (a fine can be tripled if the violation has led to significant environmental damage) and EUR 1 200 for individuals. There is a different scale of fines for industrial safety violations: between EUR 10 000 and 20 000 for legal entities, and between EUR 1 000 and 1 500 for responsible officials. In addition, inspectors can impose a EUR 10 000 fine for non-respect of measures prescribed in a compliance order.

The IESP does not have a formal enforcement policy with respect to the application of administrative sanctions. Inspectors generally apply the minimum fine set in the law, but in specific cases (*e.g.* repeated violations, significant damage to the environment) the amount may be higher. In 2010, the Inspectorate imposed over EUR 1.3 million in fines, with an average fine of around EUR 2 500. This was a dramatic increase compared with the total of EUR 266 953 imposed in 2006, when the average fine was around EUR 1 000 (Table 2.1).

Table 2.1. **Application of administrative fines for environmental offences in Slovenia, 2006-10**

	2006	2007	2008	2009	2010
Number of offences subject to fines	262	372	499	473	522
Amount of fines imposed, EUR	266 953	591 939	863 914	896 239	1 339 706
Amount of fines collected, EUR	171 612	350 732	407 086	471 798	705 470
Collection rate, %	*64*	*59*	*47*	*52*	*53*

Source: IESP (2011).

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Only about half of the imposed fines are collected (Table 2.1). This is partly explained by the fact that operators can pay only half the fine if they submit the payment within eight days, thereby reducing the deterrence effect. Moreover, about 10% of fines are appealed, which can result in the fine being reduced or rescinded entirely. In cases of non-payment, collection is transferred to the Customs Administration (although this procedure is long and involves a lot of paperwork). Revenues from the fines are channelled to the general budget.

Environmental fines in Slovenia do not currently reflect the economic benefit that offenders obtain through non-compliance. In general, monetary sanctions are ineffective as long as violating the requirements continues to pay. The MESP and the Inspectorate should work together to develop methods for assessing the economic benefit of non-compliance (similar to those used by the United States Environmental Protection Agency since the mid-1980s) and propose corresponding amendments to Slovenia's General Offences Act.

IESP inspectors submit weekly and monthly activity reports to the Chief Inspector, using a few output (activity) indicators such as the number of inspections and the sanctions imposed. The IESP plans to design performance indicators to characterise the effectiveness and efficiency of its activities. These efforts should be pursued, and a new performance management system should be developed in the framework of results-oriented planning and budgeting.

4.4. *Environmental liability*

Since the adoption of the EPA, Slovenia's environmental liability regime has required the operator of an industrial installation to bear the costs of all measures related to preventing accidents and limiting their consequences when they occur. In cases of accidental pollution that causes environmental damage, the responsible party is liable for the costs of appropriate measures. The EPA was amended in 2008 to strengthen the environmental liability regulation with respect to prevention and remediation of environmental damage, in accordance with the EU's Environmental Liability Directive (2004/35/EC). It establishes strict liability (*i.e.* irrespective of compliance with relevant permits) for damage to water and land.

The EPA also requires persons "imposing a burden on the environment" to have liability insurance for environmental damage that may be caused by their activities. However, a minimum amount of insurance is not prescribed, nor are those "imposing a burden on the environment" explicitly defined. The EPA also stipulates that a financial guarantee may be imposed on the operator at the time of issuing an environmental permit. In principle, these instruments are mutually exclusive, but neither currently works due to the weakness of the liability regime itself.

Slovenian environmental authorities should reinforce the system of environmental liability for damage to natural resources by expanding the use of administrative remediation orders, and by strengthening and applying legislative provisions for the recovery of remediation costs from responsible parties. The existing regulatory provisions for financial security of operators of hazardous industrial activities need to be streamlined and implemented.

Liability based on private law is independent of damages or other sanctions that may be imposed under the environmental liability provisions of public law: private parties that have suffered damages may file individual claims regardless of damage to the environment. Compensation is generally awarded for damage caused intentionally or through negligence, but in the case of hazardous activities, strict liability applies. An injured party may also request prohibition of the damage-causing activity or removal of the polluting installation. Despite the existence of these provisions, very few environmental damage cases have been tried in Slovenian courts.

5. Promoting environmental democracy

5.1. *Environmental information*

The NEAPs of 1999-2004 and 2005-12 emphasised that the provision of environmental information was one of the most important elements of Slovenia's environmental policy. Public access to environmental information in Slovenia has been regulated since 2003 by the Act on the Access to Information of Public Character. This act specifies procedures for providing free access to information of public character held by state agencies, local government, and public service contractors. In 2004, Slovenia ratified the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters. The 2004 EPA provided further definitions of environmental information, confidentiality restrictions, the preparation and dissemination of state of the environment reports, and data that must be published on line.

The regulations concerning access to information have proved effective. If the public body declines access to information, or does not answer within the 20-day time limit, an appeal can be made to the Information Commissioner.[6] If the appeal is refused, the appellant can file a lawsuit against this decision. In 2006, the Commissioner received 15 appeals that had been filed against the MESP, of which 12 were withdrawn because the Ministry disclosed the information immediately after the appeal was submitted.

Slovenia's Reports on the Environment analyse environmental quality data, evaluate the implementation of the NEAPs and the impact of economic sectors on the environment, and evaluate the degree of incorporation of environmental protection requirements in sectoral development policies. State of the environment reports are published at least every four years, and updates of the Environmental Indicators of Slovenia (with over 120 indicators) are issued every second year by the ARSO. These documents, along with the Atlas of the Environment, are accessible on the EIONET-SI portal, as well as the web pages of the MESP and the ARSO. National air emissions data are also available on line. Agreements between state institutions have been concluded to ensure better use and compatibility of data collected, including co-operation in establishing environmental accounts.

Certain categories of environmental information regarding individual facilities and activities are also publicly available. They include applications for building permits for the construction of new facilities and environmental impact assessment reports and permits (accessible upon request), but not operators' compliance data.

5.2. Public participation in environmental decision-making

Non-governmental organisations

In 2003, the Slovenian government adopted a Strategy for Co-operation with Non-governmental organisations, which promotes different means of such co-operation in the process of adoption and implementation of public policy. In accordance with the EPA, the web pages of the MESP and local authorities publish drafts of regulations and invitations for NGOs and the public to provide their comments. Similarly, in the area of spatial planning, the respective national and local authorities must enable participation of interested individuals and associations in the processes of preparing and adopting spatial planning decisions.[7]

There are currently 226 registered NGOs (around 30 of which are actively involved in developing environmental legislation), although their membership is fairly limited. In 2007, the MESP and five leading national environmental NGOs[8] created an Environmental Centre in Ljubljana to provide information support for the environmental NGO community, promote its influence on environmental decision making, and raise public environmental awareness. There is also an NGO Legal Information Centre.

Environmental NGOs receive some (very limited) financial support from the government. As a positive example, the MESP, in co-operation with the Governmental Communication Office, co-funded NGO-run information and communication projects in 2008-09. The MESP and the Ministry of Education also contribute to NGO initiatives on environmental education. However, the government could do more to encourage a closer relationship with the environmental NGO community based on a joint commitment to address priority environmental issues.

Environmental NGOs play an important "watchdog" role regarding government activities. In 2010, six NGOs led by Umanotera prepared a report, *Mirror to the Government: Green NGO Monitor*, which assessed the national government's performance in 14 environmental areas using 39 indicators. The report concluded that Slovenia's greatest environmental challenge was the lack of implementation of environmental policies and legislation. A 2007 *Mirror to the Government* report pointed out a generally low level of public participation in decision making, and rated government ministries according to their openness to public participation.

Access to justice

The EPA contains a provision allowing members of the public to initiate legal action, even in cases where they are not directly affected by violations of environmental law. This provision goes further than Article 9.3 of the Aarhus Convention. However, there are very few cases of citizens initiating court actions against environmental offenders, despite the fact that the costs of judiciary procedures are not prohibitive.[9]

In the judicial procedure a plaintiff can demand at any time (before, during or after a judicial procedure) that the court issue temporary injunctive relief to prevent imminent harm or damage until the judicial process is completed and the court's decision has been implemented. Injunctive relief can be granted if the plaintiff shows that irreparable harm may otherwise occur, or that implementation of the judicial decision will otherwise be prevented or hindered. However, there are no provisions for class action suits in Slovenian legislation. Neither can citizens take governmental authorities to court for failure to execute their duties, for example with respect to environmental enforcement.

Conditions under which NGOs can gain legal standing in environment-related administrative court cases (status of accessory participant) are strict. This is particularly the case under the EPA, which allows NGOs standing only in the procedure of issuing an environmental consent for a planned activity, or an environmental permit for operation of an installation that may cause large-scale environmental pollution. Conditions for standing are less strict under the Nature Conservation Act, which allows participation in all administrative and judicial proceedings affecting nature conservation. However, in both cases standing is granted by the MESP upon the NGO's application. The inconsistencies between the two laws have led to different interpretations of NGOs' legal standing rights and extensive court cases (Box 2.2).

Box 2.2. **Legal standing of NGOs in environmental permitting: The case of the Volovja reber plateau**

The Volovja reber plateau, near the town of Ilirska Bistrica in southwestern Slovenia, is an area known for a range of nature and biodiversity values. The Eurasian lynx and brown bear are found there, as well as migratory birds and the nesting sites of the golden eagle. Although the area met the criteria for inclusion in the Natura 2000 network, it was removed from the list in 2004 due to the planned construction of Slovenia's first wind farm. In 2006, the Elektro Primorska public electricity distribution company applied for an environmental permit to build 43 wind turbines with a capacity of 28.05 MW.

Immediately after the permit was requested, a Slovenian NGO for the protection of birds (Drustvo za Opazovanje in Proucevanje Ptic Slovenije, DOPPS) applied for the status of party in the permitting procedure. This application was denied because the DOPPS had the status of an NGO acting in a public interest under the Nature Conservation Act, but not under the Environmental Protection Act (EPA). In June 2006, the Administrative Court ruled in favour of the DOPPS's request and ordered the Environment Agency (administrative body in the first instance) to reconsider granting legal standing to the DOPPS. However, granting of the requested status was once again denied. In September 2007, following an appeal, the MESP granted the DOPPS the status of party in this procedure.

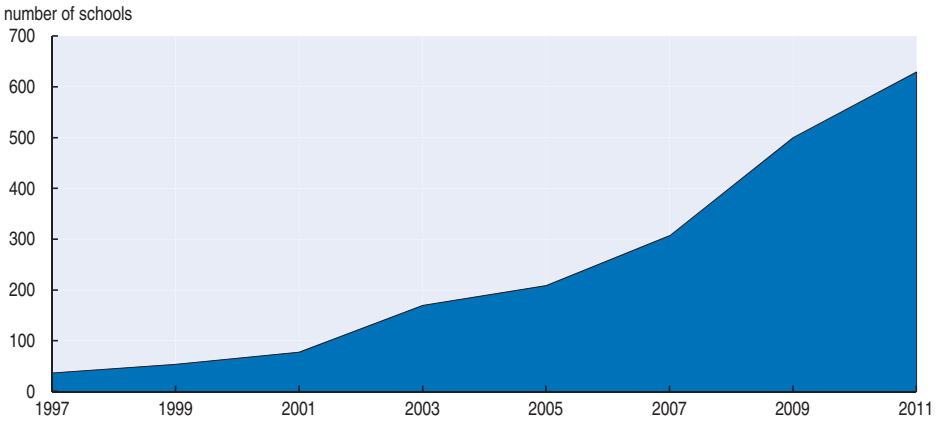
Despite an expert opinion issued by Slovenia's Institute for Nature Conservation that the wind farm would have an unacceptably large impact on nature, the Environment Agency issued environmental consent in June 2006 and the project was granted a building permit in 2007. However, due to numerous complaints and civil society-initiated litigation, construction did not begin. The environmental permit was revoked in 2011.

5.3. *Environmental education*

Slovenia has made rapid progress in the field of environmental education. More than 600 schools and kindergartens are taking an active part in the European Eco-Schools programme (created in Denmark in the early 1990s), which encourages systematic and comprehensive environmental education. This non-governmental programme addresses environmental management of public schools with respect to water, waste and energy use, and aims to expand its scope to make school curricula more environmentally oriented.

The Eco-Schools programme has expanded very rapidly since its establishment in 1996 (Figure 2.3). The Slovenian network of Eco-Schools currently covers 32% of kindergartens, 42% of primary schools and 21% of secondary schools. In the 2009-10 school year alone, participating schools submitted 2 107 reports on the implementation of projects involving more than 14 000 teachers and over 150 000 pupils.

Figure 2.3. **Registered Eco-Schools in Slovenia, 1997-2011**



Source: DOVES, Slovenian Foundation for Environmental Education in Europe, 2007.

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The Eco-Schools programme is mainly financed by annual fees paid by the participating institutions and by sponsors (mostly from the business sector). It is partly supported by the MESP and the Ministry of Education in accordance with a co-operation memorandum signed in 2005.

A similar programme, U4Energy, carried out by European SchoolNet on behalf of the European Commission, is also active in Slovenia. It promotes energy awareness in schools using educational programmes in human, social and physical sciences.

6. Environmental management at the local level

The competences and tasks of local authorities are determined by the Local Self-Government Act. Municipalities have regulatory and management functions with respect to provision of environmental services (*e.g.* water supply and sanitation, waste collection and disposal, protection against noise). Municipal communities may also adopt their own environmental protection programmes, while larger urban communities are obliged to do so.

The 2002 and 2005 amendments to the Local Self-Government Act allowed local communities to co-operate with each other voluntarily on matters of local governance and management. They may jointly manage their funds and set up joint municipal administration bodies, public companies and institutions. According to the 2005 Financing of Municipalities Act, municipalities that jointly perform local administration functions are eligible for grants from the national budget and EU subsidies. This is a major incentive for local authorities to pool their resources in issue-specific municipal associations (*e.g.* for water or waste management), which increase their common professional competence and reduce administration costs.

As of 2010, Slovenia had 35 inter-municipal inspectorates responsible for controlling waste management, green areas, traffic and other activities. For example, the municipality of Vrhnika (with a population of 16 000) had an eight-person inspectorate shared with six other communities, with no specialisation of inspectors' duties. Although half the funding for inter-municipal inspectorates comes from the national government, the inspectorates'

resources are clearly insufficient to effectively address the wide range of issues under their jurisdiction. Co-ordination between municipal inspectorates and the IESP also needs to be improved, particularly with respect to waste management issues.

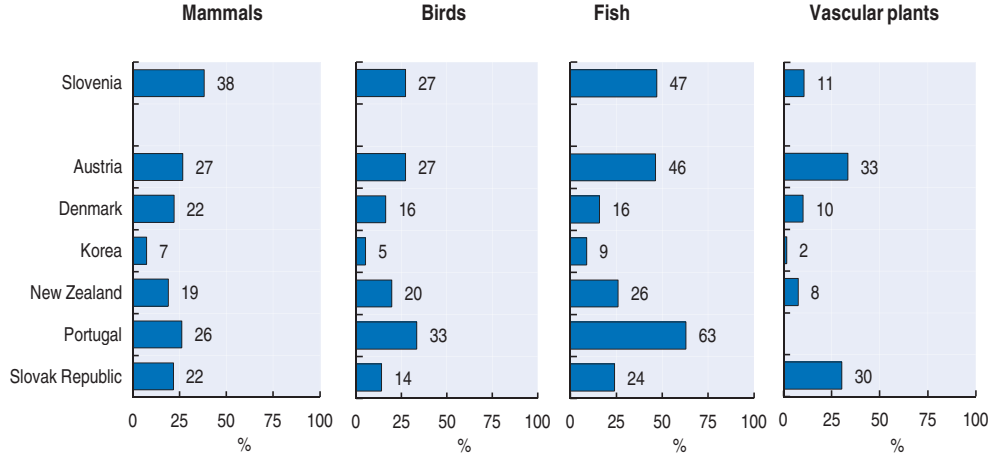
7. Biodiversity and nature protection

7.1. *Situation and trends*

Thanks to Slovenia's position at the junction of several ecological systems[10] and a variety of landscape types, the country has a high level of biodiversity. This natural endowment is further enhanced by valuable semi-natural ecosystems resulting from a history of near-natural forest management and from low-intensity agriculture. The main forest species are beech, fir and oak – constituting the country's emblematic landscape, which occupied 62.0% of total land area in 2009.

Among the EU countries with which it shares the Continental and Alpine bio-geographical regions, Slovenia has the greatest number of species for which Natura 2000 sites have been defined. About 26 000 animal and plant species have been identified. As many as 850 species are endemic, and most of them live underground in karstic cave habitats.[11] Slovenia is also home to animals such as the white-tailed eagle, bear, wolf and lynx. Since the lynx was re-introduced in 1973, it has spread to a large part of Slovenia and to neighbouring countries. Bounties on wolves were abolished in 1973. Nevertheless, 38% of mammal species, 27% of bird species, 47% of freshwater fish species and 11% of vascular plant species are threatened (Figure 2.4). Among these species are at least nine breeds of traditional ("heritage") farm animals. The most endangered habitat types are coastal, marine and inland waters, marshes and wetlands, humid and wet grasslands, and subterranean habitats.

Figure 2.4. **Threatened species of fauna and flora, late 2000s**



a) IUCN categories "critically endangered", "endangered" and "vulnerable" in % of known species.
Source: OECD, Environment Directorate.

StatLink http://dx.doi.org/10.1787/888932595453

The precarious situation of many species is exacerbated by pressures such as loss of wet grasslands to urbanisation and to intensive agriculture. Urban sprawl and transport infrastructure have resulted in the fragmentation of habitats, including continuous forests. Dry grasslands of mostly anthropogenic origin are reverting to scrub and forest due to abandonment, particularly in remote areas. Aquatic habitats have been damaged by

intensification of agriculture and by the construction of dams and other engineering works, notably in Pannonia. The extent of flooded forests has been reduced in the floodplains of all the major rivers (Drava, Sava, Mura). Alpine and sub-alpine grasslands, rocky areas and screes, on the other hand, are faring better and the distribution of species in these areas has not changed much.

Slovenia has the institutions it needs to protect and restore its natural wealth. The nature protection section of the MESP employs about 10 staff responsible for policy and legislation. Some 15 staff in the ARSO work on implementation of nature policies (*e.g.* through CITES permitting, or compensation payments for damage caused by protected animals). About 100 people are involved in managing national, regional and landscape parks, while nearly 70 full-time employees of the Institute of the Republic of Slovenia for Nature Conservation (IRSNC) are engaged in research, monitoring, and provision of expert advice to relevant branches of government. The scope of activities of the Inspectorate for the Environment and Spatial Planning (IESP) includes those that are nature-related, such as compliance with development restrictions in Natura 2000 areas and use of off-road vehicles in protected areas. The Slovenian Forest Service (SFS) has responsibilities for, and expertise in, wildlife management and overseeing of hunting. It carries out research and monitoring and maintains databases, notably on the state of large carnivores. Of about 600 staff, some 100 are carrying out these tasks.

Slovenia's principal nature law, the Nature Conservation Act, is closely in line with EU legislation and various international commitments (Chapter 4). Separate legislation covers the protection of caves and designation of parks. Although the Biodiversity Conservation Strategy of Slovenia was adopted in 2001, the main policy document during the review period was the National Nature Conservation Programme 2005-15 (NNCP), an integral part of the National Environmental Action Plan 2005-12 (NEAP), which sets out specific outputs and outcomes together with the dates by which they should be achieved (Table 2.2). NNCP objectives are worked out in detail in various Operational Programmes (OPs), such as those on Natura 2000 site management or the management of populations of large carnivores.

Opinion polls show that Slovenia has a large constituency for nature conservation compared to other European countries. The 2010 Flash Eurobarometer survey (commissioned by the European Commission) confirmed earlier findings: 87% of respondents indicated that they were making personal efforts to protect biodiversity. However, there is no NGO focused on all biodiversity issues with a large membership. The Society for the Study of Birds of Slovenia (DOPPS) has about 1 000 members. It collects data on the distribution and population size of Slovenia's bird species, monitors bird populations, and is actively involved in raising public awareness of birds' importance. Smaller active nature NGOs include associations focused on large carnivors, bats, amphibians and marine mammals.

7.2. Protecting habitats and species

Slovenia has long shown an awareness of its responsibility to safeguard its natural heritage. Even before the EU Habitats Directive (92/43/EEC) came into effect, almost half its territory was classified as "ecologically important areas" under national legislation. Two-thirds of these areas (35.5% of the total land area) are now included in the Natura 2000 network, the largest share of any EU member state. In total, 260 Special Areas of Conservation (with a total area of 6 397 km^2) have been designated under the Habitats Directive, and 26 Special Protection Areas (4 618 km^2) under the EU Birds Directive (2009/147/EC); due to overlapping designations, the 286 sites have a total area of 7 203 km^2. Despite the size of these areas, Slovenia's

Table 2.2. **Progress in implementing selected objectives of the National Nature Conservation Programme 2005-15**

Objective	Assessment
Establish a comprehensive nature conservation system and implement it in an effective manner by 2008.	Substantially achieved.
Preserve the high level of biodiversity and halt the decline in biodiversity by 2010.	Second part of objective has probably not been achieved, but much work has been carried out that is likely to yield results in the longer term; nevertheless, efforts will need to be increased.
Maintain or achieve a favourable status for endangered species and habitat types.	Changes in the conservation status of endangered species and habitat types during the period 2005-11 have not been assessed.
Establish a management system for Natura 2000 areas including adoption of management plans, and appoint managers for agricultural and forest areas, by 2006.	Management approach established, involving appropriate forest, hunting, fisheries and protected area management plans and the appointment of managing institutions.
Consolidate laws creating protected areas by 2008.	Not yet achieved.
Establish a central management unit for protected areas by 2008.	Not yet achieved.
Increase percentage of land covered by protected areas by 5% by 2008, and by 10% by 2014.	Total protected area gradually extended in the past ten years, but 2008 target has not been achieved. The 2014 target is unlikely to be achieved.
Increase amount of land subject to appropriate agri-environmental measures to up to one-third of unforested agricultural land in areas of ecological importance by 2008.	Broadly, 200 000 ha out of 480 000 ha of agricultural land is subject to appropriate agri-environmental measures.
Preserve a favourable conservation status for large carnivores and reduce conflicts by 2008.	The 400-475 brown bears observed in Slovenia are actively monitored and the species' conservation status appears to be favourable.
Improve system for preventing damage (and paying compensation for damage) caused by protected animals to reduce the number of cases of compensation and the amount of compensation paid; payment of compensation should be prompt.	Amendment to the Nature Conservation Act in preparation as of March 2011.
Designate four additional wetlands as Ramsar sites by 2008.	Not yet achieved.

Source: OECD, Environment Directorate.

Natura 2000 network is not yet considered extensive enough to achieve favourable conservation status for the species and habitats listed in the Habitat Directive: the network's sufficiency ratio[12] is estimated at 72.6%, towards the lower end among EU countries. The respective shares of forest and agricultural land in the network broadly reflect their share of the Slovenian landscape (Table 2.3).

The relatively large size of Slovenia's Natura 2000 network, determined mainly on ecological criteria, is a logical consequence of its rich biodiversity. However, there has been some resistance to the network in Slovenia, notably at the local level, where it is feared that Natura 2000 will hamper economic development. While business-as-usual is not an option in Natura 2000 areas, stakeholders might find this designation less alarming if there were better awareness of practical ways to create opportunities for alternative forms of development that support ecosystem maintenance.

The conservation status of the species and habitats in the Natura 2000 network is a cause for concern. Although Slovenia compares well in some respects with nearby countries, only 20% of species and 44% of habitats of European Community interest have a favourable conservation status. Types of habitats with a favourable status include forests, rocky habitats, heaths and scrubland. However, freshwater habitats, peatlands and grasslands require better protection. Among the various species groups, only vascular plants have a significant share of species with favourable status (almost 50%), while amphibians, fish and non-vascular plant groups do not have a favourable status.

Table 2.3. **Land use and distribution in the Slovenian Natura 2000 network, 2010**

	Extent of Slovenian Natura 2000 network (ha)	Share of Slovenian Natura 2000 network *(%)*	Slovenian Natura sites as a share of national territory (%)
Forest	508 300	*70.6*	*25.1*
Agricultural land (used and unused)	159 100	*22.1*	*7.9*
Open land (*e.g.* mountains above tree line)	33 400	*4.6*	*1.6*
Other land uses	19 490	*2.7*	*1.0*
Total	**720 290**	***100.0***	***35.6***

Source: MESP.

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Table 2.4. **Conservation status of sites of European Community importance, by biogeographical region**

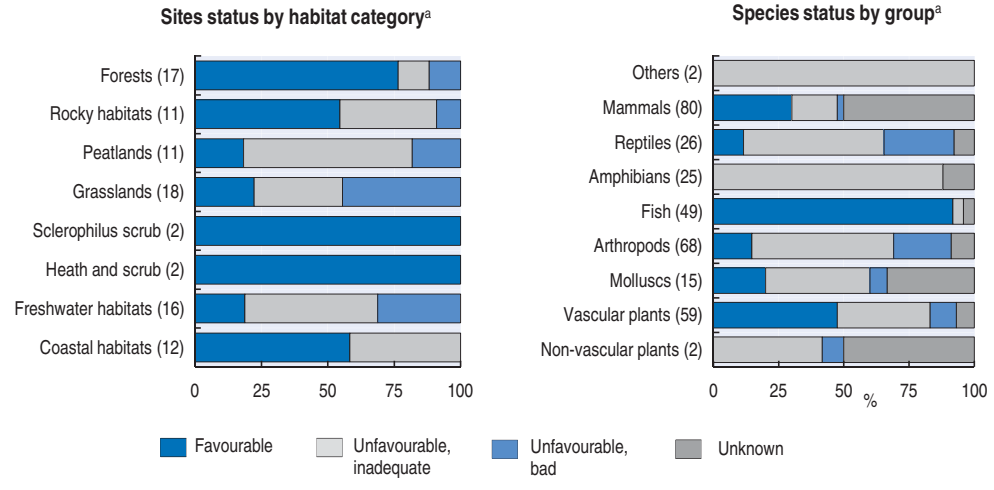
%

Region	Habitats			Species			
	FV	U1	U2	FV	U1	U2	XX
Alpine	53	29	18	23	47	8	22
Continental	34	42	24	17	52	12	19
Marine Mediterranean	33	67	–	50	50	–	–
Slovenia	44	36	20	20	50	10	20

Note: The highest values are highlighted.
FV = favourable; U1 = unfavourable, inadequate; U2 = unfavourable, bad; XX = unknown.
Source: EC, National reporting under Article 17 of the EU Habitat Directive (92/43/EEC), 2001-06.

The OP for the Management of Nature 2000 Sites contains detailed conservation objectives for each site. To achieve these objectives, Slovenia has taken a sectoral management approach. Nature conservation measures are incorporated in forest management and hunting plans, agri-environmental policies, fishery plans and river basin plans. This approach can be seen as an example of the integration of biodiversity and economic policies. A good basis has

Figure 2.5. **Conservation status of sites and species of European Community importance, 2000s**



a) Data in brackets indicate the number of occurences for each category/group.
Source: EC, National reporting under article 17 of the EU Habitat Directive (92/43/EEC), 2001-06.

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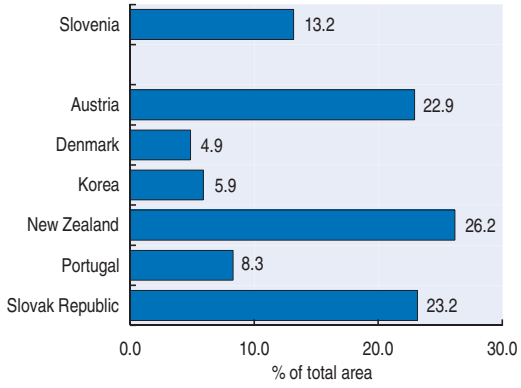
been established in forest and game management, as existing practices in these sectors already incorporate biodiversity considerations. Whether agri-environmental measures will be sufficient to protect Natura 2000 sites on agricultural land is less certain, particularly if EU funding for these measures is reduced in the future. Monitoring of the effectiveness of agri-environmental measures should track this issue closely. Other policy instruments used to protect Natura 2000 sites include land use plans, environmental impact assessment (EIA) and strategic environmental assessment (SEA).

Just over 12% of the national territory is covered by national or locally declared protected areas, all of which form part of the Natura 2000 network (Figure 2.6). Most protected areas have a relatively low level of protection in terms of the IUCN classification: only 4% of the country is considered to be in Classes I-IV. Among large protected areas, there are: 1 national park (Triglav, IUCN II/V); 3 regional parks (V/II); and 44 landscape parks (V). The large parks are complemented by: 1 strict nature reserve (I); 58 small nature reserves (IV); and 1 185 natural monuments. The management of two protected areas has been contracted out to third parties. The Sečovlje Salina Landscape Park, at the southern end of the coast, is managed by a private company (Box 2.3), while the DOPPS was granted a licence to manage the nearby Škocjanski Zatok Nature Reserve.

During the last 15 years, Slovenia has gradually increased the number of its regional and landscape parks. Another five were under preparation as of March 2011. Nevertheless, the NNCP objective of increasing the protected area by 10% by 2015 is unlikely to be achieved. A recent analysis of the adequacy of protected areas in the important Dinaric Arc eco-region in the southwest of the country is a reminder that expanding the network remains a priority: out of 85 species and habitat types identified in the Slovenian part of the eco-region, only 15 are adequately covered by protected areas. Moreover, there are no connecting corridors between the Dinaric Arc eco-region and the Alps, impeding the conservation of migratory species, notably the brown bear. Slovenia currently has three Ramsar sites and several other wetlands with outstanding levels of biodiversity (*e.g.* the Mura floodplain, the Ljubljana marshes). However, the NEAP objective of designating a further four wetlands as Ramsar sites by 2008 was not achieved. Some of Slovenia's protected areas are located on its short (less than 50 km) coastline (*e.g.* Sečovlje Salina, Strunjan),

Figure 2.6. **Terrestrial protected areas, 2010**



a) Designated terrestrial protected areas. Includes different level of protection ranging from IUCN categories I to VI. National classifications may differ.
Source: UN (2011), *Millennium Development Goals Indicators Database.*
StatLink http://dx.doi.org/10.1787/888932595491

Box 2.3. **Public-private partnership for preserving natural and cultural heritage**

Sečovlje Salina is a well-known natural and cultural heritage site that has been designated as a landscape park, Ramsar site, Natura 2000 area, and cultural monument of national importance. Covering about 650 ha along the Croatian border, in the extreme southwestern part of Slovenia, it is one of the two last remaining salt works on the Adriatic coast.

The special character of Sečovlje Salina's fauna and flora is due to conditions created by the salt industry active in the area from the 14th century until the 1960s. The main objectives of the protected area are conservation of its wetland ecological character and its economic and cultural values. These objectives are implemented by maintaining the saline ecosystem and its diverse habitats (*e.g.* mud flats, salt meadows, salt pools) and preserving cultural heritage (*e.g.* levees with stone walls, steps and sluice gates, as well as traditional salt-making techniques).

The Sečovlje Salina Landscape Park is the first state-designated protected area in Slovenia for which a private company (Soline) has been given management responsibility. Soline is owned by the country's largest mobile phone company, Mobitel. A government decree specifies the conditions under which Soline, which was created for the purpose, must operate the concession, including preparation of an annual management and financial plan requiring government approval. Ownership of the protected area remains with the government, including responsibility for all investments in the park's infrastructure made during the 20-year period of the concession. The government contributes about 20% of the protected area's annual operating cost. Soline and Mobitel also contribute, while income generated by the park itself in the form of entrance fees and the sale of salt and related products will be a further source of funds. Two of the park's conservation projects have received EU LIFE funding.

For the government, these arrangements have the advantage of low management costs for one of its protected areas. Moreover, the park has increased local employment opportunities: the number of employees in the company alone grew from fewer than 15 to 86 during 2002-11. This arrangement allows the company to project a positive image of environmental responsibility. Overall, public awareness of the significance of protecting the Sečovlje Salina Landscape Park has increased. Although problems exist (*e.g.* ownership issues), there is continuing dialogue between the government and the company in order to address them.

but marine protected areas are limited to the 200 metre coastal belt as an integral part of coastal protected areas. Since one of only two known populations of the bottlenose dolphin in the Adriatic is found in Slovenian waters (more than 70 of these dolphins are regularly observed), consideration should be given to a marine protected area, as called for under one of the protocols of the Barcelona Convention (Chapter 4).

Some of Slovenia's protected areas have been internationally recognised, for example by the European Diploma of Protected Areas awarded by the Council of Europe in 2004. An assessment commissioned by the MESP and WWF of the effectiveness of management of Slovenian protected areas found that most of these areas had adequate infrastructure, that co-operation with local communities was good, and that conservation goals were well represented in the management approach. Among the weaknesses identified was a lack of multi-year management planning. Only two multi-year plans have been adopted in the past five years, but seven were under preparation as of early 2011. Other shortcomings identified were weak legal security, and insufficient staff and financial resources.

As a number of Natura 2000 sites are subject to conservation efforts for a number of endangered species, additional individual conservation efforts are directed at emblematic species (*e.g.* the corncrake) and at the ecological needs of other species with similar needs (*e.g.* a number of meadow plant, bird and insect species) and of a small number of other species. The white-tailed eagle, the corncrake and the endemic marble trout have benefited from targeted measures. Of the large carnivores, a brown bear protection plan helps to safeguard this species' favourable conservation status. Slovenia, jointly with Croatia, has initiated a plan for the wolf, while efforts to protect the lynx are still at the discussion stage. Many other species are in need of targeted measures in addition to habitat protection. The cormorant is being managed because its abundance is causing a depletion of fish stocks.

7.3. Integration of biodiversity in sectoral policies

Slovenia has a long history of managing its forests in a near-natural way (*e.g.* controlled felling, natural regeneration, choice of tree species). The Slovenian Forest Service operates a ten-year rolling programme of forest planning that covers all forests (11 700 km^2 or more than 60% of the land area), whether they are in public ownership (25% of forest land) or private. For the 5 100 km^2 of forests that are also Natura 2000 sites, forest plans include additional conservation measures formulated in consultation with the Institute for Nature Conservation (IRSNC).

Agri-environmental support measures under the Slovenian Rural Development Programme (RDP) 2007-13 are the main policy instrument used for nature protection in the agricultural landscape. Land abandonment and agricultural intensification are the two main issues, each requiring targeted measures. At higher altitude grasslands, where farming conditions are difficult, the aim is to maintain traditional agricultural use of the land and the associated biodiversity. At lower levels, policy is directed at retaining pastoral uses of land and reducing the intensity of agricultural practices. A total of 23 biodiversity protection measures eligible for financial support have been defined under the RDP. For the Natura 2000 sites on agricultural land (1 590 km^2), targeted agri-environmental measures have been developed (*e.g.* for threatened bird species in humid grassland habitats, steep meadow mowing and conservation of meadow orchards) and adopted as a part of the RDP. The Operational Programme (OP) for Natura 2000 site management, adopted by the Government in 2007, set targets for surfaces under these measures at each relevant Natura 2000 site for the years 2010 and 2013. Educational activities provided by the advisory service of the Ministry of Agriculture, Forestry and Food (MAFF) and the IRSNC are encouraging farmers to take up these measures.

Other sectoral approaches include long-term and annual wildlife management plans for the country's 15 hunting areas and 12 special purpose State Hunting Grounds designated by the Slovenian Forest Service. These plans regulate the hunting and culling of animals to maintain a sustainable balance of wild species and human activities. Slovenian brown bears have been translocated to Austria, France and Italy to assist with their reintroduction in those countries. The Fisheries Research Institute formulates and implements Fishery Management Plans for the country's 26 fishery territories. Measures to protect aquatic habitats and species are being incorporated in river basin management plans under the EU Water Framework Directive.

Effective integration of biodiversity objectives in tourism policies is of vital importance to nature protection in Slovenia, given that the country's natural heritage is one of the sector's main selling points.[13] Sustainable development is presented as a fundamental principle in the Promotion of Tourism Development Act 2004 and the Tourism Development

Plan 2007-11. The Plan recognises that sound spatial planning practices must underpin the sustainability of the tourism sector; it also aims to create conditions for the development of tourism in protected areas by, *inter alia*, "bringing protection in line with development". Before the next version of the Plan is drawn up, a review of experience with the 2007-11 version is essential: how have inevitable disputes about specific projects (*e.g.* ski resort development, holiday homes) been resolved, and what have been the outcomes for nature and tourism? The OP on management of Natura 2000 sites proposes considerable investment in visitor amenities (*e.g.* information centres, trails and bicycle paths) to encourage development in line with protection.

7.4. Expenditure and financing

Total public and private expenditure on biodiversity and landscape protection grew from about EUR 4.5 million in 2001 to about EUR 13.6 million (at current prices) per year in 2008. Investment in Natura 2000 sites and protected areas represented the largest part of total expenditure (Table 2.5). The share of the MESP budget allocated to protection of nature was about EUR 8 million in 2011. In addition, the SFS has a budget of about EUR 1 million per year for game species management. Comparisons with other countries are difficult, but as a rough guide the government's budget for biodiversity is relatively low per capita compared to other OECD countries. A study of the economic value of ecosystem services to Slovenia would help provide a better sense of an appropriate level of spending. It would be desirable for such a study to be based on ecosystem boundaries, and hence to be conducted in co-operation with neighbouring countries.

Table 2.5. **Public and private expenditure on biodiversity and landscape protection, 2001-08**[a]

	Total environmental investment and current expenditure EUR (000)	Expenditure on biodiversity and landscape protection			
		Investment EUR (000)	Current EUR (000)	Total EUR (000)	Share of total environmental expenditure (%)
2001	322 341	3 405	1 123	4 528	1.4
2002	401 402	3 188	956	4 144	1.0
2003	478 443	3 180	1 089	4 269	0.9
2004	448 406	4 185	3 192	7 377	1.6
2005	529 490	4 098	643	4 741	0.9
2006	620 777	8 221	1 210	9 431	1.5
2007	617 426	4 486	1 641	6 127	1.0
2008	736 190	12 033	1 587	13 620	1.9

a) In current prices.
Source: SORS.

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Since Slovenia joined the European Union in 2004, through the LIFE programme it has leveraged biodiversity projects with a total cost of EUR 21.3 million (with an EU contribution of EUR 11.7 million). These projects have mostly entailed the conservation or restoration of endangered habitats (*e.g.* peatlands) and species (*e.g.* the brown bear and corncrake). The projects have involved a range of partners, including park managers, a university, a local authority, a development agency and an NGO. The average duration of projects has been 36 months.

Biodiversity-related expenditure through the Rural Development Programme (RDP) 2007-13 is of approximately the same order as this expenditure funded through the nature conservation budget. The RDP is administered by the MAFF and largely financed through the European Agricultural Fund for Rural Development (EAFRD). Funding for all agri-environmental measures amounts to about EUR 38-39 million per year and around EUR 10 million of this amount is spent on biodiversity conservation. About 30% of the latter figure (EUR 3 million) is directed to the implementation of half a dozen or so sub-measures on the roughly 160 000 ha of Natura 2000 sites located in agricultural areas.[14]

Slovenia has created a financial instrument to compensate farmers from damage[15] caused by wild animals, not only the brown bear and wolf but also the raven, ferret and lynx. The agricultural sectors most at risk include sheep and goat farming, fruit growing, forage production and beekeeping. Although the proportions vary from one year to the next, wolves were the reason for almost half of all payments in 2008 while bears accounted for 30%. The amount of compensation paid more than doubled in the second half of the last decade: it rose from about EUR 260 000 in 2005 to almost EUR 580 000 in 2008. A change in legislation that would amend the compensation scheme to make it more cost-effective was under consideration as of March 2011.

The role of the private sector in funding biodiversity objectives has been limited to date. In addition to the Sečovlje Salina project described above, a Slovenian energy company has sponsored a project to raise fishermen's awareness of the need to protect sea turtles.

8. Water management

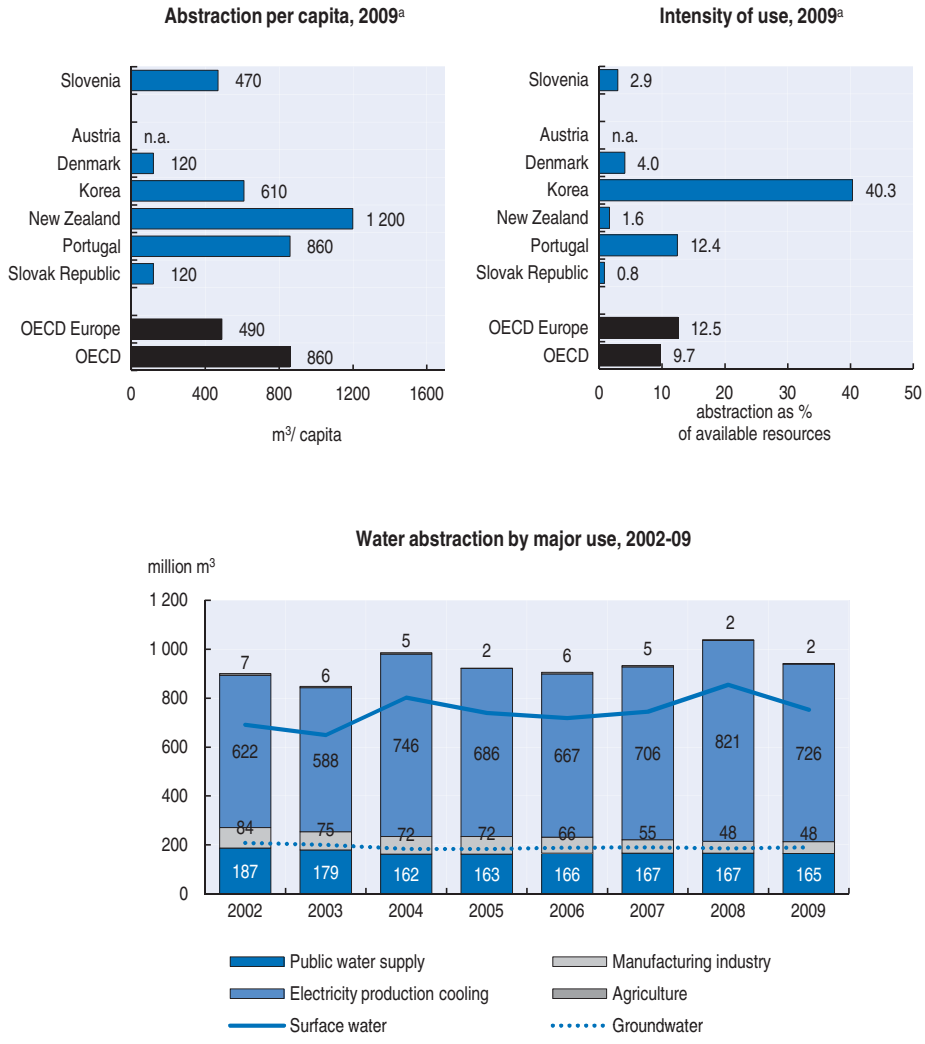
8.1. Water availability and use

High average annual precipitation (1 500 mm), abundant flow of water from upstream countries and a low rate of abstraction (3%) of its total available resources have made Slovenia water-rich (Figure 2.7). Most of its rivers are short (only 22% are longer than 25 km) and there is a dense river network. Groundwater is the main source (97%) of drinking water. However, groundwater reserves are unequally distributed: almost two-thirds in the Sava Basin, with much less in the northeast (Mura Basin) and in the southwestern coastal area. Data from monitoring stations in the northeast show that groundwater levels have been dropping. These regions experience some drinking water shortages during dry seasons.

While total water abstraction increased between 2002 and 2009, Slovenia's per capita abstraction is still below the OECD and OECD Europe averages (Figure 2.7). The electricity and power production sectors are the largest water users (77% of the total). The volume of water abstracted for cooling purposes in thermal power plants and electricity generation has fluctuated from year to year, but it increased overall by 16% in the period 2002-09. During the same period, there was a significant decrease in abstraction (–40%) in manufacturing industry, which accounts for 5% of the total. Water abstraction for use in households (20% of the total) decreased by a smaller margin (–12%). There was also an important decrease in abstraction in agriculture, but this sector's share in total water use is less than 1%.

Slovenia has introduced a system for monitoring and managing water abstraction through the issuance of water use permits (water rights) for direct use of water for drinking purposes (private or provided by a public service), production (*e.g.* hydropower and heat generation, manufacturing, irrigation, commercial fish farming, bottled water production) and leisure activities (*e.g.* public swimming pools, natural spas). A water right, issued by the MESP on the basis of an application from the water user, is subject to a fee that depends

Figure 2.7. **Freshwater use**



a) Or latest available year.
Source: OECD, Environment Directorate.

StatLink http://dx.doi.org/10.1787/888932595510

on water or production volume (per kWh for hydroelectricity generation, per kg for fish production). Annual revenues from water right fees increased from EUR 5 million in 2003 to nearly EUR 17 million in 2007, but decreased to about EUR 10 million in 2009 and in 2010 as the number of new users fell. Abstraction for public water supply has required a water right, but not the payment of a water right fee. However, current reform of the system envisages the introduction of a water right fee for public water supply.

All owners of water rights, including for public water supply, pay a volume – area or production – based water abstraction charge (EUR 0.06 per m^3 of water abstracted for drinking water supply, EUR 0.02 per m^3 of water used for commercial fish farms in ponds, EUR 1.50 per MWh for water abstracted for electricity production in hydropower plants above 10 MW). Revenues from the water use fee, collected in the Water Fund along with payments for water use rights, increased steadily from EUR 8 million in 2000 to EUR 22 million in 2010, partly due to increases in charges but mostly to greater water use for energy generation.

The main objective of the water abstraction charge has been to prevent excessive water use, although the revenues are used to fund water-related infrastructure. The water rights system has been extended and improved over time. An assessment carried out by the Slovenian Court of Auditors in 2009 pointed out the weaknesses of this system, such as delays in issuing water rights and lack of a methodology to determine ecologically acceptable water flows. Several recommendations from the audit are being implemented to improve the functioning of the system.

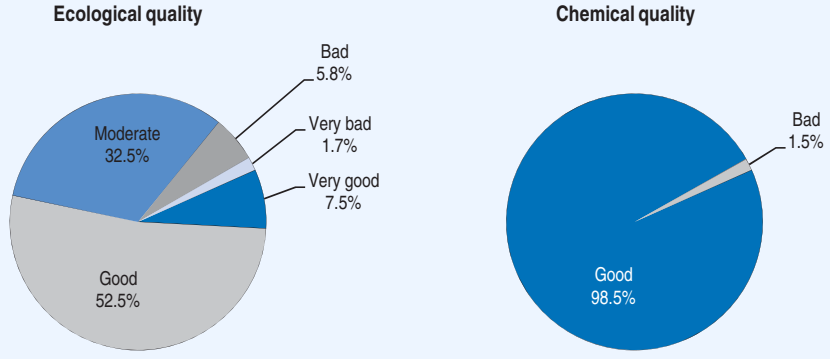
8.2. Surface and groundwater quality

Slovenia's rivers are fast-flowing. This contributes to their good oxygen conditions and the low levels of nutrients and toxic substances found in them. The quality of lakes and groundwater is less good, especially in northeastern Slovenia, due to higher concentrations of nutrients and contamination by pesticides from intensive farming. Since 2000, the trophic status of marine water has gradually improved except in Koper Bay. The quality of coastal and inland bathing waters has improved since 2004, when quality reporting began (Box 2.4).

Box 2.4. **Quality of Slovenian waters**

Average concentrations of nitrates are below 10 mg NO_3/l in most of the rivers of western and central Slovenia. Higher levels are recorded in northeastern Slovenia, where agricultural activities are concentrated. However, for the most part nitrate pollution does not exceed the limit of 40 mg NO_3/l. According to the most recent survey (2006-08), only 7.5% of rivers are classified as having a "bad" or "very bad" ecological status (Figure 2.8).

Figure 2.8. **Ecological and chemical quality of Slovenian water bodies, 2006-08**



Source: EEA (2010), *The European Environment – State and Outlook 2010.*

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In the 1980s and 1990s, the chemical conditions of Slovenian water bodies were far from satisfactory due to excessive amounts of absorbable organic halogen compounds (AOX), herbicides (*e.g.* metolachlor), pesticides (*e.g.* atrazine), anion-active detergents, mineral oils, boron and zinc. Steps were taken to reduce the pollution burden, such as closing down a pulp production plant in 2006 (which reduced AOX below the limit value of 20 µg/l) and increasing wastewater treatment capacity (which reduced chemical contamination). The most recent assessment (2006-08) indicated that only two bodies of inland water had not achieved good quality, owing to excessive concentrations of mercury and tributyltin compounds (Figure 2.8).

Box 2.4. **Quality of Slovenian waters** *(cont.)*

Until 2002, national monitoring of lake water quality was carried out only for Slovenia's natural lakes (Bled, Bohinj, Cerknica). Since 2003, in conformance with the requirements of the EU Water Framework Directive, water quality monitoring has also included artificial lakes, reservoirs and river accumulations with an area greater than 0.5 km^2. Lake Bohinj has been classified as in very good and Lake Cerknica as in good ecological condition. The reason for the moderate water quality of Lake Bled is an excessive nutrient burden, but this situation has improved over the last decade, mostly due to an increase in the number of connections to the sewerage system. The ecological conditions of artificial retention basins in central and northeast Slovenia are less good. Average nutrient concentrations are much higher due to pollution from intensive farming. In some cases total phosphorus concentrations have reached 100 µl/l, a level characteristic of hypereutrophic water bodies.

Before 2000, groundwater bodies were affected by pesticides (mainly atrazine and its metabolite diethyl-atrazine) and nitrates. The most affected aquifers were in northeastern Slovenia, which suffered from high pollution loads due to livestock waste. More recent long-term measurements of nitrates in groundwater show a decreasing trend. However, poor chemical conditions are still recorded in the Savinja, Drava and Mura Basins and the eastern Slovenske Gorice area. Concerning pesticides, allowable atrazine concentrations are commonly exceeded although these concentrations show decreasing trends. In the karstic and fissure watercourses of southern Slovenia, which account for around 50% of groundwater reserves, the groundwater is less contaminated by pesticides and nitrates due to less intensive settlement and agriculture. These groundwater bodies have been assessed (with a high or average level of reliability) as having good chemical quality.

The Slovenian coastal rivers (Dragonja, Badaševica, Drnica, Rižana) and the Soča, which flows through Italy, deposit large amounts of suspended particles and nutrients in the coastal areas of the Gulf of Trieste. Analyses of metals in water and sediment, as well as of priority and indicative parameters, have shown concentrations of priority substances and indicative parameters in water to be below the limit values specified by the Decree of Chemical Status. Chemical quality, based on analyses in the years 2003-06, was good at all monitoring sites in Slovenian marine water. The trophic status of marine water has been gradually improving since the year 2000. However, the status of water in the Koper Bay is less good due to pollution from households and from services and manufacturing industries.

In 2010, all coastal bathing waters met both the mandatory water quality and more stringent guideline values. Full compliance was reached with mandatory values in 2006 and with guideline values in 2009 and 2010. All inland bathing waters met mandatory water quality values in 2010. The rate of compliance with guideline values increased from 36% in 2004 to 56% in 2010.

8.3. Water supply and sanitation

Rough topography and dispersed settlements (of which around 200 have fewer than 2 000 residents) have had a large impact on the development of urban infrastructure and of water supply and treatment services.

Groundwater is the main source of drinking water in Slovenia. The rate of connection to the public water supply network was around 80% during most of the review period. The lowest rates (in some places as low as 25%) are in the less populated northeast. Although the drinking water connection rate was relatively high in the early 2000s, water supply data

indicated high losses along the supply network, in some cases as high as 50%. Leakage was recently reduced to 25-30%, but losses remain high due to aging systems and lack of maintenance in the mains and distribution network.

Overall drinking water quality is adequate, but atrazine, lead and nitrate concentrations occasionally exceed limit values even in large drinking water supply systems. The small share of the population living in small towns or villages not connected to public water supply is served by small public systems (up to 1 000 people) or individual wells. These are often not managed properly, with inadequate maintenance of equipment and no specific water protection zones. Since small systems are not controlled regularly, quality data are sparse. Where information is available, it shows that these systems have frequently been affected by faecal contamination, particularly in western and southern Slovenia (*i.e.* Koper, Nova Gorica and Novo Mesto). This situation has not improved appreciably over the years (Table 2.6).

Table 2.6. **Share of samples not meeting drinking water quality standards in water supply systems due to faecal contamination (*E. coli*), 2004-07**

%

	2004	2005	2006	2007
Small (50-1 000 population)	29.0	28.0	24.1	24.5
Medium (1 001-10 000 population)	6.7	5.8	4.6	5.3
Large (< 10 000 population)	2.6	1.7	0.4	2.1

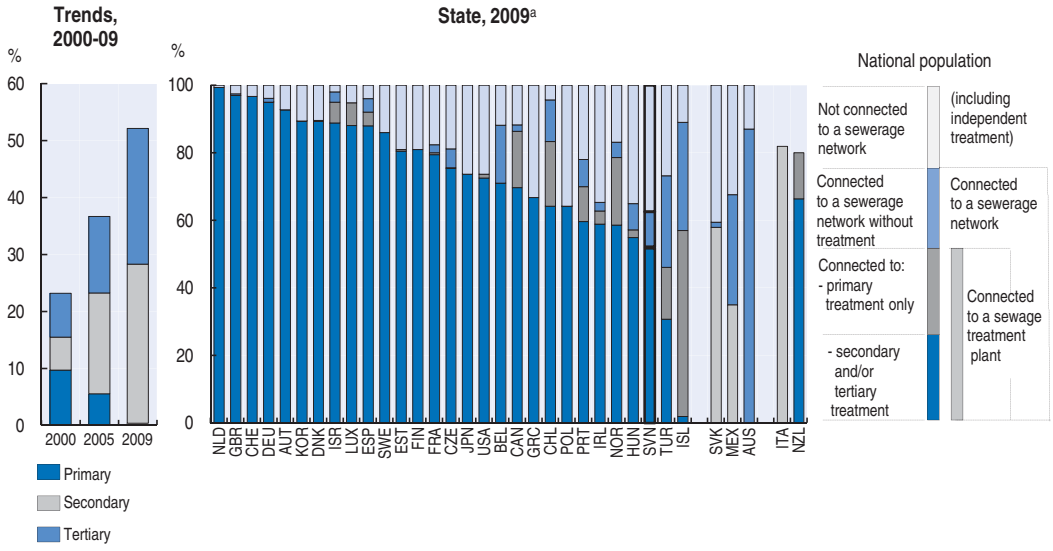
Source: ARSO.

The 2002 Water Act, which defined water as a public natural asset, transferred responsibility for the protection of water for drinking purposes from local authorities to the national government. A uniform methodology for defining water protection areas was also adopted. However, the first water protection area, covering the Ljubljansko polje aquifer, was established only in 2004. Protection areas for other aquifers followed, although progress was slow due to opposition by local communities. The land replacement and compensation schemes offered to farmers in order to reduce the impacts of agriculture on reservoirs helped to extend the protection areas. The ARSO established a database of existing water resources, which now includes 880 water protection areas. They account for just over half of all protected areas and cover nearly 500 000 ha (almost one-quarter of the country).

At the beginning of the review period, wastewater collection and treatment coverage was much lower than in many other OECD Europe countries. In the early 2000s, only 23% of the population was connected to wastewater treatment plants (of which nearly 50% provided only primary treatment). Around 50% of the population used cesspools. The situation improved in 2006, when the construction of large wastewater treatment plants was completed for the main cities (Maribor, Ljubljana, Celje, Koper, Izola), increasing the connection rate to 52% (Figure 2.9). This rate, which remained constant between 2006 and 2009, was well below the OECD and OECD Europe averages (Figure 2.9).

Progress has been made in improving treatment efficiency. In 2005, around three-quarters of plants provided at least secondary treatment. Additional investments led to an increase in secondary and, especially, tertiary treatment; 24% of the population was connected (nearly 50% of the total capacity) in 2009. Since that year, almost all wastewater supplied to treatment plants has been treated at the secondary or tertiary level. Improvement in treatment efficiency was accompanied by an extension of the total length of the sewerage system by 50%

Figure 2.9. **Population connected to public wastewater treatment plants**



a) Or latest available year.
Source: OECD, Environment Directorate.

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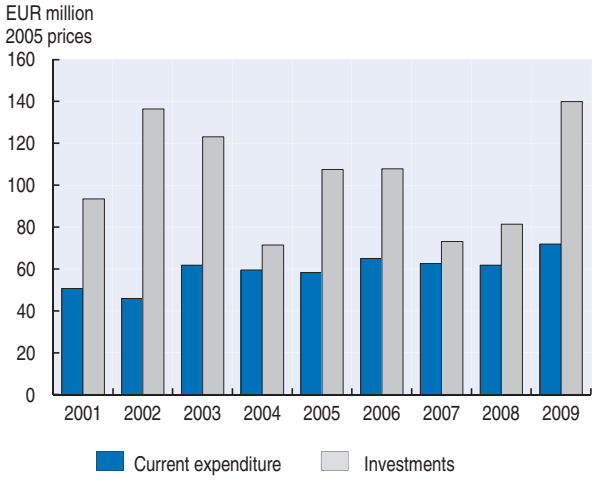
between 2002 and 2009, with a significant increase in separate collection of wastewater and rainwater. In 2009, the share of the population connected to wastewater collection systems (with or without treatment) was 63%. The rest of the population used cesspools.

By constructing large capacity water treatment plants in Ljubljana and Maribor, Slovenia met (with some delay) the 2005 target of the EU Urban Wastewater Directive (91/271/EEC) to connect areas with more than 100 000 population equivalent (pe) to wastewater treatment. The other targets (*e.g.* provision of treatment in areas with 15 000-100 000 pe by the end of 2010, and in areas with 2 000-15 000 pe by 2015) remain a challenge although total public and private expenditure on wastewater management was between EUR 110 million and 170 million (current prices) per year between 2001 and 2008 (Figure 2.10).

Substantial assistance was provided by EU funding. Following accession, most financing under the Slovenia 2004-06 Cohesion Fund was devoted to wastewater management. A notable increase in national public and private investment in 2009 (EUR 242 million in 2009), and an additional EUR 300 million allocated from the 2007-13 programming period under the Operational Programme for Environmental and Transport Infrastructure Development (OPDETI), should provide an important boost to develop further wastewater collection and treatment capacity and to meet the government's objective of 70% of the population connected to wastewater treatment by 2015. Equal importance should be attached to ensuring proper operation of individual cesspools and appropriate collection and treatment of residues. Further progress could be made with the use of artificial wetlands to treat domestic sewage and industrial wastewater, as an alternative to connection to wastewater treatment plants (taking into account that some know-how is already available in Slovenian companies).

The wastewater tax, introduced in 1996, has made an important contribution to financing wastewater infrastructure. It is levied on industrial and communal wastewater at a rate of EUR 26 per unit of pollution, calculated on the basis of a formula determined by the MESP. In 1995, the charge was based on the chemical oxygen demand (COD) of discharges.

Figure 2.10. **Current and investment expenditure for wastewater treatment, 2001-09**



Source: SORS (2011), *SI-STAT Data Portal.*
StatLink http://dx.doi.org/10.1787/888932595567

Substances such as heavy metals, organic halogen compounds, phosphorus and nitrogen were subsequently included in the calculation formula. However, the effects of the charge on both pollution reduction and the provision of revenues have not been optimal. Payments have been required only above certain limits, and on the basis of self-reporting by wastewater generators. In addition, polluters that could prove they were spending an equivalent amount on pollution control have been exempted from paying the charge. Following accession to the EU, some limits were introduced on the amount of the charge that could be retained by industry. Revenues from the charge increased from EUR 30 million in 2000 to EUR 50 million in 2003, but decreased steadily in subsequent years. This was due to reduced discharges, but also to exemptions granted by the authorities. The charge could be redesigned to provide better incentives to reduce production of wastewater.

As in other transition economies, there are differences in the water supply and wastewater collection tariffs of different consumer groups. Prices for water supply have been lowest for households and highest for business consumers. Price gaps have been narrowed through the application of a strict price-setting methodology by the national authorities. In 2004, in an attempt to reform price-setting, benchmarking was proposed as a way to help improve the performance of public utilities. This objective was not achieved due to a lack of appropriate and reliable data at the national level (water utilities operate under the responsibility of local communities) and lack of a national-level regulatory oversight system. Neither was agreement reached on the benchmarking methodology. With minor changes each year, a restrictive water price-setting policy was in place until 2009 when price control by the government was abandoned and price-setting again became solely the responsibility of local communities. Although the average charge for water supply was EUR 0.54/m^3, EUR 0.29/m^3 for wastewater collection and EUR 0.91/m^3 for wastewater treatment in 2007 (around the OECD average), the level of cost-recovery has been below 80% for both water supply and sewage collection while it appears to be close to 100% for sewage treatment.

Nevertheless, there are large differences among municipalities. For some services there is cost-recovery of around 50%, suggesting that in some municipalities a significant part of the cost is still covered by grants from municipal government.

A recent analysis suggests that the transfer of pricing responsibilities to local communities (in the absence of an appropriate pricing methodology and an independent regulatory body) would eventually lead to substantial price increases, with no incentive to reduce costs or improve efficiency. Local communities do not have enough skilled professional staff to stimulate efficient operation of water utilities or to set up adequate price regulation schemes. New regulations on the pricing methodology, prepared by the MESP in 2011, contain provisions on reporting requirements that will enable indicator-based comparison between the utilities aiming at improving cost-efficient services and quality assurance.

The organisation of the water and sanitation sector requires a fundamental review. Better co-operation among municipal water utilities should be promoted to achieve economies of scale. Opportunities to associate smaller and poorer communities in such arrangements should be sought. Utilities should be separated from municipalities and operated as commercially autonomous bodies, with the objective of achieving full cost-recovery for the supply of water services. This should be accompanied by the creation of an autonomous and professional regulatory agency to regulate water prices and to benchmark utilities' performance. Reviewing the experience of the water and energy sectors in other EU countries could provide helpful lessons for the development of a new approach to the organisation of Slovenia's water sector. The advantages and disadvantages of greater private sector participation should also be assessed. The OECD's *Private Sector Participation in Water Infrastructure: Checklist for Public Action* could be useful in this regard.

8.4. Towards integrated water management

The 2002 Water Act transposed many of the provisions of the EU Water Framework Directive (WFD). Two administrative river basin management units were designated in 2003: the Danube River Basin District, which included sub-basins of the Mura, Drava and Sava Rivers; and the Adriatic River Basin District, which included the basins of the Soča River and all rivers along the Adriatic coast. To facilitate management, every sub-basin is divided into smaller units called "water bodies" (155 surface water and 21 groundwater bodies).

A new monitoring approach, which should include an evaluation of the ecological status required by the WFD, is being developed. As a result, the analysis of water quality is, in many cases, still based on information on effluents, land use, and the use of agricultural inputs. The ARSO's 2009 assessment concluded that the performance of the existing operational water monitoring networks was not satisfactory. Some of the existing monitoring network stations were not optimally located, most existing stations were operating with obsolete equipment, and monitoring of the Northern Adriatic was very limited. Under the project "Upgrade of the System for Monitoring and Analysing the Water Environment in Slovenia" (partly financed by EU Cohesion Fund), the system's main weaknesses are expected to be addressed by 2015.

In conformance with the WFD, the development of river basin management plans was launched. This included the Water Management Plan for the Danube River Basin and the Water Management Plan for the Adriatic Sea. However, their development started late,

with insufficient economic and financial analysis and limited consultations with stakeholders. The draft plans have been under public consultation since early 2011, but the process had not been completed as of early 2012 (the WFD established a 2010 deadline).

The development and implementation of integrated River Basin Management Plans face four major challenges: the need to further extend wastewater treatment infrastructure, particularly to treat discharges from households; management of the use of rivers for electricity generation; addressing flood risks; and reducing the environmental impacts of agriculture.

Slovenia utilises only 40% of its technically feasible hydropower potential, from which almost 30% of its electricity is generated (950 MW in 2009). Most power plants are located on the Drava River (the major source of hydroelectric power, with 98% of its potential being utilised) and the Sava River (18% is being utilised). Only 22% of the potential of the other rivers is being utilised. Refurbishing existing small-scale hydropower units and increasing the capacity of large-scale units are part of the government's renewable energy strategy. Plans include the development of another five hydro sites along the lower Sava River, which could add about 200 MW of new hydro capacity. Approximately 230 MW of capacity is currently under construction throughout Slovenia; another 520 MW of capacity is planned. As the construction of such installations creates additional pressures on watercourses, efforts are needed to create an effective regulatory framework aimed at reducing the impact on their ecological status. This would include a more precise definition of minimum flows, and requirements for fish passages, river continuity and morphology. The programme and projects should be subject to rigorous strategic environmental assessment and individual environmental impact assessment procedures, with full public participation.

Floods are a threat to more than 300 000 ha, or 15% of Slovenia's territory. More than half (54%) of the flood-prone area is located in the Sava River Basin in central Slovenia, 42% in the Drava River Basin in the east, and 4% in the Soča River Basin and rivers directly flowing to the Adriatic Sea in the west. About 30 extensive flood-prone areas (approximately 237 000 ha) lie in the broad areas of alluvial plains, which in many places have been converted to cultivation and in some places housing. Torrential floods, which occur mostly in the mountains or hilly areas, are short in duration but violent. The area affected by tidal floods and karst floods is less extensive (approximately 70 500 ha). Although flood prevention measures were implemented in 1990s and 2000s, the 2007 EU Directive on the evaluation and management of flood risks (2007/60/EC) was a new impetus for reinforcement of flood protection measures. Most provisions of the Directive were transposed into national legislation in 2010, and EUR 185 million was set aside under the 2007-13 OPDETI for measures to control flood plains and build flood protection infrastructure for urban areas. However, implementation details are still to be developed, including preliminary flood risk assessments, preparation of flood hazard and risk targets, and measures to reduce flood risks in urban and economically significant areas. Better co-ordination of flood protection and hydro energy development policies is needed to ensure that water storage capacity for energy purposes and flood prevention are well co-ordinated. This can also contribute to better climate change adaptation measures.

Despite the small share of agricultural land in Slovenia, and progress in reducing pollution from agriculture, further integration of agricultural policies and water management is needed. Slovenia's entire territory has been designated a nitrate vulnerable zone. Surplus nitrogen exceeded 80 kg N/ha per year in the 1990s, but declined to 20 kg N/ha

per year more recently. Several regulatory measures have been introduced to reduce and prevent water pollution by nitrates. They have focused on: periods in which land application of nitrogen is prohibited; rules for fertiliser application on steeply sloping ground and on water-saturated, flooded, frozen or snow-covered ground; and rules for fertiliser application in the vicinity of watercourses. However, implementation of the requirements is still inadequate and further efforts are needed, especially to better manage the application of nitrogen, phosphorus and potassium fertilisers and reduce uncontrolled applications of livestock manure on soil. There is also a need for increased capacity for safe storage of livestock manure that will prevent leaching. These efforts should be complemented by greater use of economic instruments, such as a nitrogen quota system like that applied in Denmark.

Notes

1. The key objectives of the NEAP 2005-12 are: "… *i)* to emphasise climate change as an important challenge in the coming years and to reduce emissions of greenhouse gases; *ii)* to protect and preserve natural systems, habitats, wild animal and plant species in order to halt the loss of biodiversity and to stop soil degradation; *iii)* to increase the quality of life and social welfare by preventing damage to human health and the environment, particularly by promoting sustainable urban development and sustainable water management (ensuring good status of all waters and reduction of flood risks); and *iv)* to ensure sustainable waste management, use of renewable and non-renewable natural resources, and energy consumption" (NEAP, 2005).
2. Two other agencies are under the MESP: the Slovenian Nuclear Safety Administration and the Land Survey Service.
3. The IESP is divided into three Inspection Services: Environment and Nature; Spatial Planning; and Housing.
4. Environmental permit conditions can be incorporated as conditions into a building permit.
5. The purpose of the EIA procedure is to determine whether a project proponent will be granted an environmental consent, which is required before a building or mining permit can be issued. The categories of projects for which EIA is mandatory are prescribed in a 2004 government decree.
6. The Information Commissioner is an independent state body established in 2005 following promulgation of the Information Act. This body supervises both the protection of personal data and access to public information. The Office of the Information Commissioner can decide on appeal against the decisions by which another body has refused or dismissed an applicant's request for access, or violated the right to access or reuse public information.
7. As mentioned above, many municipalities try to avoid this obligation.
8. They included: the Slovenian Foundation for Sustainable Development (Umanotera) (*www.umanotera.org*); the Institute for Sustainable Development; Focus – Association for Sustainable Development; the Slovenian Energy Forum; and CIPRA – Association for the Protection of the Alps.
9. For example, the cost of launching an administrative procedure is around EUR 3.5 for the request and EUR 14 for the decision, while it is EUR 143 to appeal or to file a lawsuit in an administrative dispute. Free legal aid is provided in judicial procedures if an applicant's income does not exceed the financial census (minimum monthly salary per family member). If the request for free legal aid is granted, the client has a right to a free lawyer and exemption from payment of the costs of procedures (*e.g.* judicial fee, costs for witnesses and expert witnesses, and translations).
10. Julian Alps (30% of the land area), Dinaric Mountains (30%), Mediterranean Basin (10%), Pannonian Plains (30%).
11. The Karst Biosphere Reserve has as its core area the Škocjan caves, which are designated both as a World Heritage site and a Ramsar Wetland of International Importance. The Biosphere Reserve seeks to integrate and co-ordinate sustainable agricultural practices with the preservation of caves and local hydrological processes, controlling pollution of surface and ground waters from fertilisers and wastewater.

12. The measure used by the European Commission to judge coverage relative to what is needed to achieve a favourable conservation status for species and habitats listed in the Habitats Directive, Annexes I and II.
13. Slovenia's natural beauty is a drawing card for two-thirds of foreign visitors. About one-third of Slovenes regularly visit nature areas.
14. Overall, broadly 200 000 out of 480 000 ha of agricultural land (both grassland and arable land) benefits from agri-environmental support measures.
15. The Slovenian Forest Service is responsible for damage assessment.

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PART I

Chapter 3

International Co-operation*

The main focus of Slovenia's international environmental co-operation has been on co-operative activities with neighbouring countries, particularly those in the Balkan region with which it shares ecosystems and water catchments. Slovenia has also taken several important initiatives under the Danube and Alpine conventions and in the Dinaric Arc area. It has a good record of honouring its commitments under the multilateral environmental agreements to which it is a party. This chapter reviews initiatives to promote sustainable development undertaken by Slovenia in bilateral, regional and multilateral contexts and evaluates their results. It also presents Slovenia's progress in fulfilling international commitments made in trade and environment-related agreements. Finally, the environmental dimensions of the country's newly established official development assistance programme are addressed.

* This chapter reviews progress in the period 2000-11. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Assessment and recommendations

Slovenia has actively engaged in a host of international environmental activities over the last decade. Even the heavy preparations for joining the European Union in 2004 did not crowd out priority international environmental dossiers. More than for most other countries, physiography and geography determine the priorities of Slovenia's international environmental relationships, notably with respect to water management and conservation of biodiversity. Bilateral co-operation between Slovenia and its neighbouring countries includes water management agreements with Italy, Hungary and Croatia, and agreements with Austria on spatial planning in border regions, notably regarding the Drava and Mura rivers.

Slovenia's commitment to sustainable development on a regional and sub-regional scale is articulated through various co-operation agreements covering the Alps, the Danube and its tributaries, and the Mediterranean (including the Adriatic). The Dinaric Arc area is an emerging focus of co-operation. During the past half-decade, Slovenia played an important leadership role. It launched several initiatives during its terms as president of the Barcelona Convention in 2006-07, the European Union in the first semester of 2008, the Alpine Convention in 2009-11 and the Danube Commission in 2010. Less visible than its presidential roles, but no less important, are the many informal contacts Slovenia continues to maintain at a professional/technical level with the countries of the western Balkans.

Slovenia is a party to the UNEP Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean. It has ratified five of this Convention's seven protocols, the most recent of which was the 2008 protocol on integrated coastal zone management. It has signed, but not ratified, the 1994 Offshore protocol (pollution from exploration and exploitation), and it has not signed the 1996 Hazardous Wastes protocol. As in the case of the Danube Convention, the locus of Slovenia's activities under the Barcelona Convention lies close to home, by way of a joint Slovenian-Italian-Croatian-Montenegrin Commission for the Protection of the Waters of the Adriatic Sea and Coastal Waters against Pollution.

Slovenia is also a party to the Alpine Convention. Its National Assembly ratified all eight of this Convention's implementing protocols in 2003. Slovenia's main priorities in the Alps are implementing the Alpine Convention at the local level, stimulating regional co-operation, and promoting the Action Plan on Climate Change in the Alps. It wishes to use experience with the Alpine Convention to establish greater international co-operation in the Dinaric Arc area, so as to promote economic development based on the area's natural and cultural wealth.

Beyond its immediate region, Slovenia has committed itself to all the relevant multilateral environmental agreements (MEAs) and most of the associated protocols. Slovenia actively fulfils its responsibilities to submit national reports to conferences of parties and national implementation plans required by MEAs. For example, under the Stockholm Convention it is actively developing a National Implementation Plan with long list of measures, such as replacing or decontaminating all installations containing PCBs

by 2010. Slovenia is a party to the Basel Convention and implements the 1995 "Basel ban" amendment. As of March 2011, it was preparing to ratify the Basel Convention's 1999 liability and compensation protocol.

Slovenia expects to fulfil all of its 2010 obligations under the Convention for Long-range Transboundary Air Pollution (emission inventories will be prepared in 2012), although emissions of nitrogen oxides are likely to become a problem once the economy recovers. It is a party to the 1992 Helsinki Conventions on the Transboundary Effects of Industrial Accidents, and on the Protection and Use of Transboundary Watercourses and International Lakes. In 2011, Slovenia was preparing to ratify the latter's 1999 Protocol on Water and Health but was still considering whether to ratify its Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters. Slovenia ratified the Bonn Convention on Migratory Species (CMS) and is a party to the EUROBATS, ACCOBAMS and AEWA agreements. Under the Ramsar Convention on Wetlands, it has so far designated three wetlands, but progress on a further half dozen is behind the schedule set out in the NEAP 2005-12. Under CITES, Slovenia has built up a working regime to stop illegal trade in wild fauna and flora.

In 2004, Slovenia's status changed from recipient to donor of official development assistance (ODA). It adopted the International Development Co-operation Act in 2006, and two years later the National Assembly defined the geographical and thematic priorities for development co-operation. Slovenian foreign and ODA policy are mostly targeted at the same parts of the world, that is, the Western Balkan countries and Eastern Europe. In 2009, ODA amounted to 0.15% of GNI, close to the 2010 EU target of 0.17%. Of the total of EUR 51.3 million, 64% was allocated as international development co-operation and 28% as bilateral aid. The environmental component of Slovenian ODA amounted to about EUR 3.5 million, or almost 7% of the total, in 2009. It included projects on electric and electronic waste management, air quality measurement and wastewater treatment. From 2000, Slovenia contributed about SDR 1 million per year to the GEF. For the period 2011-14, it pledged SDR 4.3 million, or 0.21% of total contributions, well above its basic contribution share of 0.03%. Slovenia intends to increase the share of ODA going towards environmental proposals, particularly water projects.

Recommendations

- Further explore and facilitate ways in which local governments and civil society can participate in the implementation of regional and sub-regional international environmental co-operation agreements.
- Further pursue the idea of formal international co-operation agreement in the Dinaric Arc area.
- Implement outstanding international commitments, including establishing an operational emergency response system for the Adriatic Sea and designating further wetlands under the Ramsar Convention.
- Gradually increase official development assistance and its environmental components, in line with EU and international obligations; consider giving greater emphasis to projects promoting biodiversity conservation.
- Review the overall coherence and effectiveness of Slovenia's international environmental engagement.

1. Environmental dimension of foreign policy

Slovenia is a small country that occupies part of two great mountain ranges, each of which extends over several countries. It also straddles the watersheds of two large international water basins. Consequently, physiography and geography determine the priorities of Slovenia's international environmental relationships to a greater extent than in many other countries. The best way for Slovenia to pursue sustainable development is together with the other countries that share its ecosystems and river basins. It has designated the promotion of sustainable development regionally as the overarching theme of its international environmental activities, notably with respect to water management and biodiversity conservation.

Slovenia's commitment to regional and sub-regional sustainable development is mainly articulated through co-operation agreements covering the Alps, the Danube and its tributaries, and the Mediterranean (including the Adriatic). The Dinaric Arc area is emerging as a focus of international co-operation. In the past five years, Slovenia has served as president of the Barcelona Convention (2006-07), the European Union (first semester of 2008), the Alpine Convention (2009-11) and the International Commission for the Protection of the Danube River (ICPDR) (2010). In this role, it has taken initiatives on some issues and played a leading part with respect to others. Many informal relationships are maintained at a professional/technical level with the other countries of the western Balkans.

Since the 1990s, environmental co-operation with other countries has principally been the responsibility of the Ministry of the Environment and Spatial Planning (MESP). In recent years the Ministry of Foreign Affairs (MFA) has begun to play a more active role in integrating an environmental dimension into foreign policy. The MFA established a dedicated environmental unit, the Global Challenges Department, in 2009 and appointed environmental attachés in five embassies (Argentina, China, Denmark, The Former Yugoslav Republic of Macedonia, and the United Kingdom) to promote environmental co-operation with Slovenia. The MFA has also assumed a greater role regarding official development assistance (ODA), half of which is now under its control.

In 2009, Slovenia initiated a Green Group of six small countries (with Cape Verde, Costa Rica, Iceland, Singapore, and the United Arab Emirates) which aim to raise the profile of environmental issues in international relations.[1] The Group focuses on climate change, water management, and renewable resources. Since 2009, foreign ministers of the Green Group have published joint articles prior to every UNFCCC COP. They have focused on climate change and security (2009), climate change and water (2010), and the green economy (2011). By joining with other small countries to address specific issues, Slovenia hopes to strengthen its influence and broaden the scope of its international activities. Since resources are scarce, however, it identifies synergies with its other international environmental activities to ensure that these resources are used cost-effectively.

2. Regional and bilateral co-operation

Co-operation in the Danube Basin

Although the Danube River does not flow through Slovenia, 81% of the country's territory lies in its catchment. Most of its rivers are tributaries of the Danube.[2] The Sava River has its source in the Slovenian part of the Julian Alps. It is Danube's largest tributary in terms of discharge and the second largest in terms of catchment area. All of Slovenia's main rivers are transboundary watercourses and define the country's borders in several places: the Kolpa

and Drava Rivers form part of the border with Croatia; the Mura River part of the borders with Austria and Croatia; and the Ledava River part of the border with Hungary.

Slovenia was one of the founding countries of the 1994 Convention on Co-operation for the Protection and Sustainable Use of the Danube River (Danube Convention). During its presidency of the ICPDR in 2010, Slovenia led a successful effort to make the Danube River Basin Management Plan (DRBMP) an environmental pillar of the development-oriented 2011 EU Strategy for the Danube Region.[3] Slovenia was asked to take up, and has accepted, the role of lead country in the implementation of the DRBMP with respect to sustainable use of hydropower, an area in which it has experience in the context of the Alpine Convention. In March 2011, Slovenia (with Austria, Croatia, Hungary and Serbia) agreed to establish the world's first five-country cross-border UNESCO Man and the Biosphere reserve along parts of the Drava, Mura and Danube Rivers in an area known as "Europe's Amazon" because of its high level of biodiversity.

The Sava River has been at the heart of Slovenian activities in the Danube Basin. In 2002, Slovenia was instrumental in securing a Framework Agreement on the Sava River Basin (FASRB) as part of the Stability Pact for South Eastern Europe; it is the depository country for this agreement. Joint management of the Sava River Basin by Slovenia, an EU member state, and by countries that do not belong to the EU (Croatia, Bosnia and Herzegovina, Serbia) follows the model established in the EU Water Framework Directive (2000/60/EC).[4] Slovenia considers the Sava agreement to represent the sub-regional, multi-purpose and bottom-up approach to transboundary co-operation it wishes to promote in other contexts. In addition to implementation of the Water Framework Directive, anticipated areas of co-operation include implementation of the EU Floods Directive,[5] rehabilitation and development of the Sava River waterway, development of nautical tourism, development of hydropower, equitable use of water for productive purposes, and protection of ecosystems. The 2008 declaration to the ICPDR (by representatives of Austria, Croatia, Hungary, Italy and Slovenia) concerning common approaches to water management, flood protection, use of hydropower, and nature protection and biodiversity conservation in the Drava River Basin promises to become another model for international co-operation on integrated water resource management at the sub-regional/sub-basin level.

Bilateral co-operation in the Danube Basin includes a treaty with Croatia (1998) and an agreement with Hungary. Each established a joint commission for water management between the partner countries.[6] Slovenia has also signed an agreement with Austria on co-operation in the field of spatial planning. Two joint Slovene-Austrian commissions for the Drava and Mura Rivers are the current incarnation of a series of co-operation mechanisms dating back decades. An example of results-oriented co-operation is the Drava-Mura Crossborder Water Management Initiative, involving Slovenia and the Austrian *Länder* of Carinthia and Styria. The main goal is implementation of the EU Water Framework Directive and Floods Directive. Hydropower exploitation and conservation of biodiversity in river basins are also on the agenda. Work is being carried out to restore the rivers to a more natural state (*e.g.* riverbed widening, connection with side channels, improvement of sediment transport).

Co-operation in the Mediterranean Basin, including the Adriatic

Slovenia is a party to the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean. It has ratified five of the Convention's seven protocols, most recently the 2008 protocol on integrated coastal zone

management.[7] Slovenia has signed, but not ratified, the 1994 offshore protocol (pollution from exploration and exploitation); it has not signed the 1996 hazardous wastes protocol.[8] Since some commitments under the Convention and its protocols are covered by EU legislation that is often more demanding, compliance with the latter will satisfy obligations under the Convention. For instance, implementation of Slovenia's National Action Plan under the land-based sources and activities protocol is carried out as part of implementation of EU water legislation. Specially protected areas provide another example of overlapping obligations.[9]

Environmental co-operation in the Adriatic began in 1974 with an agreement among Slovenia, Croatia and Italy on protection of the Adriatic.[10] Montenegro more recently joined what is now a quadrilateral Commission for the Protection of the Waters of the Adriatic Sea and Coastal Waters against Pollution. Slovenia proposed a pollution incident contingency plan for the northern Adriatic in 2005 (as required under the Barcelona Convention's 2002 prevention and emergency protocol). Croatia, Italy and Montenegro have accepted the plan, but the resources made available so far have been insufficient for full implementation (*e.g.* modern communication and navigation systems are still lacking). Emergency planning and an integrated coast guard system are also subject to discussions under the Adriatic-Ionian Initiative, but they are unlikely to be realised soon.

Other topics pursued by the Adriatic commission include Integrated Coastal Zone Management (ICZM) and ballast water management. ICZM has been discussed under the Adriatic agenda since 2000; under the UNEP Mediterranean Action Plan (MAP) for the Barcelona Convention, Slovenia carried out a pilot study of ICZM in its northern Adriatic coastal region during 2004-06, followed by a SHAPE project (Shaping an Holistic Approach to Protect the Adriatic Environment: between coast and sea) launched in 2011 by the Notranjsko-kraška region together with the MESP. Some of the study's conclusions were incorporated into the Regional Development Programme for this coastal region for 2007-13. Slovenia and Italy, which are eager to pursue a Strategy for the Adriatic, are seeking the support of the other two members of the commission.

Co-operation in the Alps and Dinaric Arc area

Slovenia is a party to the Alpine Convention. Its National Assembly ratified all eight of this Convention's implementing protocols in 2003. Implementation at the local and regional levels, and stimulation of regional co-operation, were the main priorities during Slovenia's presidency of the Convention in 2009-11 (Box 3.1). To make the Convention better known to the public, Slovenia organised an Alpine Convention Day in 2010. The initiative was so successful that it will become an annual event. The Alpine Convention Secretariat is encouraging other countries to follow Slovenia's example. Slovenia is also one of three countries (along with Italy and Switzerland) that will lead the effort to declare a European macro-region in the Alps.

Slovenia considers the Alpine Convention to be a model for its efforts to increase international co-operation in the Dinaric Arc area, so as to promote economic development based on this area's natural and cultural wealth. These efforts seem likely to produce positive results in the near future. In 2008, Slovenia joined forces with Albania, Bosnia and Herzegovina, Croatia, Kosovo, The Former Yugoslav Republic of Macedonia and Montenegro to propose an effective network of protected areas. At the first Dinaric Alps Conference in March 2011, the same group called for sustainable development of the region through strengthening, *inter alia*, co-operation in nature conservation, agriculture

Box 3.1. **Implementation of the Alpine Convention at the local level**

Slovenia considers the application by municipalities of good practices in various areas covered by the Alpine Convention (*e.g.* mountain agriculture and forestry, transport, tourism) as a key to the Convention's implementation. Among recent initiatives are the Alliance in the Alps network of municipalities (to which three Slovenian municipalities belong) and the Alpine Protected Areas network, which includes Triglav National Park and the Škocjanske Jame Regional Park. Other projects involve Triglav National Park, the Slovene Mountaineering Association and the Slovenian Alpine Museum in Mojstrana, and others. Slovenia aims to make such engagements a lasting feature of the Convention's implementation, thus giving local activities a wider ecosystem perspective.

Climate change adaptation and mitigation was given high priority during Slovenia's presidency of the Alpine Convention in 2009-11. This included promoting the 2009 Action Plan on Climate Change in the Alps, *e.g.* by organising thematic seminars to demonstrate examples of good practice. In 2010, the Convention Secretariat published a relevant guide in Slovenian specifically adapted to the country's situation in order to assist local authorities. The Convention's Action Plan also provides concrete examples of how Slovenia can apply climate change adaptation measures at the local level. At the close of its presidency, Slovenia produced another publication on the same topic.

and rural development, mountain forestry, cultural identity, tourism, transport and energy. It also advocated signing an international agreement and creating a secretariat, possibly to be hosted by Slovenia. One of Slovenia's ambitions in the Dinaric Arc ecoregion is the creation of a UNESCO World Heritage site.

3. Multilateral environmental agreements

Beyond its immediate region, Slovenia has committed itself to all relevant multilateral environmental agreements (MEAs), including most of the associated protocols. Once it has become a party to an MEA, Slovenia actively fulfils it responsibilities for preparing national reports to conferences of parties and national implementation plans.

MEAs concerning chemicals: The Stockholm and Rotterdam Conventions

The Ministry of Health takes the lead in implementing the Stockholm Convention on Persistent Organic Pollutants (POPs), which Slovenia ratified in 2004. Slovenia implements EU law concerning the Convention (*i.e.* EC Regulation 850/04). It has also included the provisions of the EU Directive on the disposal of polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs) (96/59/EC) in its national legislation. The manufacture and use of organochlorinated pesticides containing POPs ceased in Slovenia in 1988, but some old supplies of plant protection products containing mainly DDT and endrin are still held by merchants and farmers.

The National Implementation Plan for the Stockholm Convention lists detailed measures to be carried out by various ministries (health, environment, agriculture) and agencies, such as the Environment Agency and the National Chemicals Office. The most recent national report to the Convention Secretariat indicates that this plan is being actively implemented. For instance, one proposed action involves the detection, collection, removal and safe destruction of old stocks of plant protection products containing POPs. Slovenia committed itself to close and decontaminate all installations where there were

PCBs by 2010. As of March 2011, the necessary information was not yet available to confirm whether this target had been met. However, the Ministry of Health expected that most of these installations had been closed and decontaminated.

Slovenia ratified the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade in 1999. It was a member of the Chemical Review Committee in the period 2006-10, chairing that Committee in 2009. Slovenia implements EC Regulation 689/2008, which lists all the chemicals covered by the Rotterdam Convention and sets out the prior informed consent (PIC) procedure to be followed.

MEAs concerning transboundary effects

Slovenia has ratified the UNECE Convention on Long-range Transboundary Air Pollution and six of its protocols.[11] It did better than required with respect to the 2005 target of the second sulphur protocol (emission reduction of 60% compared to 1980), with an 82% reduction. Under the nitrogen oxides (NO_x) protocol, it was restricted to an emissions ceiling of 45 thousand tonnes (kt) by 2010; in 2008 its NO_x emissions stood at 47.14 kt, but the inventories to be released in 2012 are expected to show that Slovenia has fulfilled its obligation even if it may be difficult to stay below this ceiling once the economy recovers. By 2008, emissions of non-methane volatile organic compounds (NMVOCs) and ammonia (NH_3) were well below the ceilings set for them. Slovenia will also have met its obligations concerning emissions of lead, cadmium, mercury, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/PCDFs), and hexachlorobenzene (HCB), all of which have remained well below the ceilings established by the relevant protocols.

Slovenia has been a party to the 1991 Convention on Environmental Impact Assessment in a Transboundary Context (the Espoo Convention) since 1998; it ratified the 2003 Kiev Protocol on Strategic Environmental Assessment in 2010. The sections of the 2004 Environmental Protection Act dealing with integrated (strategic) environmental assessment of plans and programmes, and with environmental impact assessment (EIA) of projects, both contain articles (*i.e.* Articles 44 and 59) stipulating how potential transboundary effects are to be considered. The Espoo Convention was invoked seven times during the 2006-09 reporting period. Transboundary EIA procedures were used in the case of projects for two liquid natural gas terminals, two natural gas pipelines, an ore smelter, a dam for a hydropower project, and a waste disposal installation. The neighbouring countries involved were Austria, Croatia and Italy.

Slovenia is a party to the two 1992 Helsinki Conventions on the Transboundary Effects of Industrial Accidents, and the Protection and Use of Transboundary Watercourses and International Lakes. The Environment Agency carries out water quality monitoring of surface water bodies, as required by these Conventions. Under the latter, Slovenia was preparing to ratify the 1999 Protocol on Water and Health in 2011 but was still considering whether to ratify the Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters (which is a protocol to both the Helsinki Conventions).

MEAs concerning biodiversity

Since Slovenia ratified the Convention on Biological Diversity (CBD) in 1997, it has established an institutional and legal framework enabling it to implement all relevant

nature- and biodiversity-related MEAs. It adopted a Biodiversity Conservation Strategy, recommended under the CBD, in 2001. This strategy is mainly implemented through the Operational Programme on Natura 2000 Site Management 2007-13. Sustainable use of biodiversity components are integrated into the legislation, programmes and strategies of several economic sectors, notably forestry.

Slovenia ratified the Bonn Convention on Migratory Species (CMS) in 1998. It is a party to the CMS agreements on the conservation of populations of European bats (EUROBATS), the conservation of cetaceans in the Mediterranean Sea, Black Sea and contiguous Atlantic Area (ACCOBAMS), and the African-Eurasian Waterbird Agreement (AEWA). Several threatened migratory bird species listed in CMS Appendix I are at risk in Slovenia. For example, the white-tailed (or sea) eagle is subject to disturbances of its nesting sites. Regular checking of known nests during the breeding season, and nest control, have had some success in enabling the fledging of white-tailed eagle chicks. Lack of human and financial resources, however, prevents interventions on behalf of other species such as the Lesser Kestrel, which suffers from habitat destruction and pollution of its breeding grounds. This is also true of the Ferruginous Duck, for which there is a lack of appropriate nest site management.

Slovenian nature conservation authorities are co-operating with fishermen to reduce the accidental by-catch of loggerhead sea turtles, also listed in CMS Appendix I. Turtles caught in nets are brought to the Marine Biology Station in Piran for rehabilitation: once the animals have recovered, they are tagged and released back to the sea. A Slovenian energy company has sponsored the publication of a sea turtle handling guide for fishermen. Raising public awareness by disseminating brochures and organising exhibitions is another part of the efforts being made to protect sea turtles.

Slovenian nature NGOs play an active role in implementing nature-related MEAs. Efforts under the EUROBATS umbrella on behalf of bat species[12] that are common throughout, or in parts of, the country include conservation measures, population monitoring and awareness raising carried out by the Association for Bat Research and Conservation (SDPVN) and the Centre for Cartography of Fauna and Flora (CKFF). Concerning the protection of cetaceans under the CMS ACCOBAMS Agreement, only the bottle-nosed dolphin is found in Slovenian waters. More than 70 of these dolphins are regularly observed and appear to be breeding locally. The Society for the Study and Protection of Marine Mammals raises public awareness on the importance of marine mammals in Slovenian waters, performs research on bottle-nosed dolphins, and engages in activities and initiatives related to the conservation of marine mammals.

Slovenia became a party to the Bern Convention on the Conservation of European Wildlife and Natural Habitats in 1999. Slovenia is required to adopt adequate legal and administrative measures for the protection of animal and plant species listed in the Convention's appendices. Many species protected under the Bern Convention are also covered by the Bonn and CITES Conventions. Implementation of the Bern Convention is largely carried out within the framework of the EU Birds and Habitats Directives (79/409/EEC and 92/43/EEC) through the CITES Convention.

Under the Ramsar Convention on Wetlands, Slovenia designated two small wetlands, Sečovlje Saltpans (650 ha) and Škocjan Caves (305 ha), in 1993 and 1999, respectively. The addition in 2006 of Lake Cerknica, the largest intermittent lake in Europe, with its surroundings (part of the Notranjska Regional Park) brought the total area covered by the

Ramsar Convention to 8 205 ha. Slovenia is home to other wetlands with outstanding levels of biodiversity (*e.g.* the Mura floodplain, the Drava River from Maribor to Središče, the Ljubljana marshes), but progress in designating at least four more wetlands by 2008 is behind the schedule set out in the National Environmental Action Plan (NEAP) for 2005-12. Slovenia also created a national Ramsar website during the review period. The Sečovlje Saltpans (managed by Soline) (Box 2.3) and the nearby brackish wetland of Škocjanski Zatok Nature Reserve[13] (managed by DOPPS-Birdlife Slovenia) are part of an informal network (called "Adriawet") of nine coastal wetlands in the northern Adriatic (the other seven are in Italy); the network has worked since 2002 to improve wetland management through information sharing and joint marketing.

4. Trade and environment

Slovenia ratified the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal in 1993. It has submitted national reports to the Convention Secretariat every year. It also implements the 1995 "Basel ban" amendment, which bans exports to non-OECD countries of any hazardous waste intended for recovery, recycling or final disposal. As of March 2011, Slovenia was preparing to ratify the 1999 protocol providing for liability and prompt compensation for damage resulting from transboundary movements of hazardous waste and "other" waste and its disposal, including illegal traffic. As an EU member state, it implements the EC regulations on shipments of waste, thereby also implementing the Basel rules and the OECD Council Decision concerning the Control of Transboundary Movements of Wastes Destined for Recovery Operations [C(2001)107/Final]. Within the framework of the EU enforcement network IMPEL, the Inspectorate for the Environment and Spatial Planning co-operates with the inspectorates of nearby countries to prevent illegal transport of waste.

Hazardous waste imports have remained more or less stable since the mid-1990s, fluctuating between 20 000 and 27 000 tonnes per year (Chapter 4). The annual volume of imports represents the volume collected within the country by a single recovery enterprise. Most imports (lead accumulators and lead ash) come from Croatia, Bosnia and Herzegovina, and Hungary. Some also come from Germany, Italy and The Former Yugoslav Republic of Macedonia. There is no disposal of imported hazardous waste. Export volumes have risen sharply in recent years, climbing from about 25 000 tonnes in 2005 to 100 000 tonnes in 2008 (the latest year for which figures are available). In 2008, about 70% was exported for recovery and 30% for disposal. Sludge from urban wastewater treatment plants constituted about one-third, followed by one-quarter mixed waste in which at least one component was designated as hazardous; smaller fractions included solid waste from waste gas treatment and mother liquors. Austria, Germany and Hungary were the main destination countries. Slovenia aims to be self-sufficient in the recovery and disposal of waste, but it has not yet found a satisfactory solution to the increasing volumes of contaminated and uncontaminated sewage sludge produced by the growing number of wastewater treatment stations.

Trade in endangered species

Slovenia is mainly an importing country for species subject to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This trade does not present a serious threat to the country's native fauna and flora. However, Slovenia is one of the larger exporters of live reptiles bred in captivity, particularly tortoises, making it an importing and then re-exporting country for these animals; about 200 permits and

certificates for import and (re-)export are issued annually. When the CITES Convention entered into force in Slovenia in 2000, the country was not well prepared to implement it due to lack of qualified staff, adequate legislation, and a clear understanding of the responsibilities of the bodies involved (*e.g.* customs, scientific institutions). In 2004, Slovenia[14] initiated inclusion of the date mussel in Appendix II of the Convention. This Mediterranean bivalve species was already protected under the Bern and Barcelona Conventions and the EU Habitats Directive, but better control of illegal sales (notably to restaurants) under CITES was an additional way to encourage its survival. The date mussel is now a major focus of Slovenian CITES activities (Box 3.2).

Box 3.2. **Enforcement of CITES rules**

The date mussel (*Lithophaga lithophaga*) is a protected species that lives 100 years or more. It grows very slowly, requiring 20-25 years to reach 50 mm in length. It cannot be cultivated. The date mussel lives inside tunnels bored in rocks. It is harvested by breaking up the rocks, sometimes with the help of explosives. Harvesting not only destroys the mussel's habitat, but also that of other marine species.

In the latter half of 2010, a joint Slovenian-Croatian operation uncovered an international criminal group taking Croatian date mussels to Slovenia by boat. The mussels were then transported by car to final destinations in Slovenia and Italy. During a period of several months the group had smuggled about 2 300 kg of mussels with a street value of at least EUR 143 000. Several prosecutions were under way as of March 2011, and the Slovenian Veterinary Administration and Hunting and Fishing Inspectorate had already imposed fines ranging from EUR 2 000 to EUR 10 000. The date mussel is also the focus of an awareness raising campaign to reduce the public's demand for it.

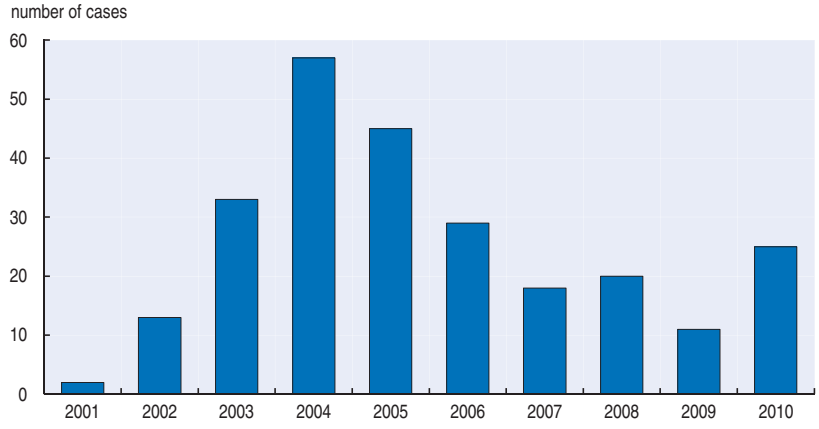
In 2010, Slovenia was one of 51 countries participating in an INTERPOL exercise (Operation RAMP) targeting illegal trade in reptiles and amphibians. Investigations were carried out at the borders (Ljubljana airport and the port of Koper), as well as in the country's interior (police inspected a tortoise breeding farm at Ljubljana). No illegal activities relating to trade or possession of endangered reptiles were detected in the Slovenian part of the operation.

A working CITES regime was established during the review period. Implementation is co-ordinated through a permanent intersectoral Committee for the Prevention of Illegal Wildlife Trade, consisting of the police (INTERPOL), customs agents, the Environmental Inspectorate and the Environment Agency. The committee meets at least once every six months. Slovenia enacted several decrees on protected wild animal species, including one that prohibits the possession or sale of any species of owls (Strigiformes) or raptors (Falconiformes) and is therefore more restrictive than the provisions of the EU Wildlife Trade Regulations. Moreover, the Wild Game and Hunting Act bans falconry. Fines were the most severe penalties for CITES-related offences until 2008, when the Penal Code was changed so that such offences may now result in a prison sentence of up to three and a half years.

Slovenia actively enforces the CITES Convention and co-operates with other countries as needed. The number of permits and certificates for import, export and re-export issued under the Convention rules each year increased significantly during 2001-10, but fluctuated between 150 and 200 in the period from 2006-10. The number of certificates issued for trade within the EU[15] increased significantly, from about 100 in 2004 to a little over 2 000 in 2009, but remained just below that figure in the following year. In Slovenia's report to the CITES

Secretariat covering the second half of 2010, the number of reported seizures (*i.e.* discovered attempts of illegal trade) reached a peak of about 55 in 2004 but has subsequently declined. About 24 discoveries were made in 2010, mostly involving live (*e.g.* seahorses, loggerhead sea turtles, European eels) or dead (*e.g.* date mussels) animals. Both warnings and prosecutions have resulted. In general, Slovenian authorities believe the decline in discoveries of violations of CITES rules since around 2005 can be attributed to greater public awareness and to actions by enforcement agencies (Figure 3.1).

Figure 3.1. **Number of breaches of CITES rules found by customs authorities and police, 2001-10**



Source: MESP (2011).

5. Official development assistance

In 2004, Slovenia's status changed from a recipient to a donor of official development assistance (ODA). It adopted the International Development Co-operation Act in 2006. The National Assembly defined the geographical and thematic priorities for development co-operation two years later. Slovenia is committed to providing international development assistance in accordance with the UN recommendations. Where appropriate, it carries out environmental assessments of development assistance projects and programmes. Slovenian foreign and ODA policies are targeted at the same parts of the world, notably Western Balkan countries and Eastern Europe. Thematic priorities include good governance, protecting the environment, and gender equality.

In 2009, Slovenia's ODA amounted to 0.15% of GNI, close to the 2010 EU target of 0.17%. Of the total of EUR 51.3 million, 64% (EUR 33.1 million) was allocated as international development co-operation and 28% (EUR 14.4 million) as bilateral aid.[16] A major share of the latter (EUR 11.3 million) was earmarked for Western Balkan countries.

The environmental component of Slovenian ODA amounted to almost 7% of the total in 2009. It focused on promoting good practices in waste management and activities related to sustainable production and consumption, including energy conservation and use of renewable energy sources.[17] From 2000, Slovenia contributed about SDR 1 million per year to the Global Environment Facility (GEF); it ceased being a recipient country in 2004.[18] During the period 2011-14, it pledged SDR 4.3 million, or 0.21% of total contributions – well above its basic contribution share of 0.03%. The MFA intends to increase the share of ODA to environmental projects, particularly projects concerned with water.

Environmental projects financed in 2009 under the bilateral ODA programme included: electric and electronic waste management in Bosnia and Herzegovina, the Former Yugoslav Republic of Macedonia, and Serbia; air quality measurement in Kosovo; and wastewater treatment in the Former Yugoslav Republic of Macedonia. In the case of a small aid programme, of course it is not advisable to dilute resources too much. However, given Slovenia's expertise and the priority given to biodiversity conservation in its international environmental policy (*e.g.* its initiative in the Dinaric Arc area and the international priority assigned to biodiversity), it may be well placed to contribute to broader international efforts in this area through its ODA programme.

The state is the main owner of the statutory Slovene Export and Development Bank (SID Bank), with smaller shares in the hands of banks, insurance companies and others. The bank began to apply the OECD's environmental common approaches for export credits in 2003. Since then, most approved projects have been in the construction sector and classified as Category C (*i.e.* minimal environmental impact). A few projects have been in Category B, with none in Category A (highest impact). The SID Bank has made its environmental policy and procedural guidelines available on its website.

In 2009, Slovenia established a National Contact Point for the OECD Guidelines for Multinational Enterprises in the Directorate for Foreign Economic Relations of the Ministry of Economy. The guidelines have been translated into Slovenian and a brochure promoting them has been published. As of mid-2011, the Contact Point had not received any inquiries concerning Slovenian enterprises.

Notes

1. In September 2011, the six small countries forming the Green Group issued joint calls to draw attention to the impact of climate change, focusing primarily on the issue of water management. The ministers and their representatives exchanged views about joint activities prior to the Rio + 20 meeting and the COP17 Conference in Durban. State representatives supported the idea of organising special events in co-operation with the private sector, alongside the 5th World Future Energy Summit taking place on 16-19 January 2012 in Abu Dhabi and the 6th World Water Council to be held on 12-17 March 2012 in Marseille, France.
2. The major exception is the Soča River in northeastern Slovenia, which flows into the Adriatic.
3. Member states endorsed the EU Strategy for the Danube Region at the General Affairs Council on 13 April 2011. Under the EU Strategy for the Danube Region, Slovenia has a lead role in two priority areas: improving mobility and intermodality, and increasing institutional capacity and co-operation.
4. The International Sava River Basin Commission (Sava Commission), established in 2005, co-ordinates implementation of the FASRB.
5. Directive 2007/60/EC on the assessment and management of flood risks entered into force on 26 November 2007. This Directive requires member states to assess all water courses and coast lines to determine whether they are at risk from flooding, to map the flood extent and assets and humans at risk in these areas, and to take adequate and co-ordinated measures to reduce this flood risk. The Directive also reinforces the rights of the public to access this information and to have a say in the planning process.
6. Outside the Danube Basin, a similar commission exists to address joint Slovenian-Italian water management issues.
7. The five ratified protocols are: 1976 and 1995 Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft (ratified 1994, 2004); 1976 and 2002 Protocol Concerning Co-operation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea (ratified 1994, 2004); 1980 and 1996 Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities

(ratified 1994, 2003); 1982 and 1995 Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (ratified 1994, 2003); 2008 Protocol on Integrated Coastal Zone Management (ratified 2009).

8. The 1994 offshore protocol (Protocol for the Protection of the Mediterranean Sea Against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed) is not yet in force. The Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal has been in force since January 2008.
9. The Union for the Mediterranean (UfM), formerly the Euro-Mediterranean Partnership or EUROMED, is another regional co-operation mechanism for the European Union and 16 riparian states. The UfM agenda includes an environmental component (*e.g.* cleaning up the Mediterranean Sea and coastal and marine protected areas). Slovenia has a particular interest in the UfM Long-term Strategy for Water in the Mediterranean.
10. This tripartite co-operation predates the 1976 Barcelona Convention.
11. Slovenia did not sign and ratify the 1985 Sulphur Protocol or the 1991 Protocol on Volatile Organic Compounds.
12. For example, the Greater, Lesser and Mediterranean Horseshoe Bats, Bechstein's Bat, Lesser Mouse-eared Bat.
13. The Škocjanski Zatok Nature Reserve benefited from a large restoration project in the period 2001-07, partly funded through an EU LIFE project.
14. In conjunction with Italy, and on behalf of the European Union.
15. Trade in Annex A (most endangered) species under Regulation (EC) 338/97.
16. The remaining 8% or EUR 3.8 million was administrative costs.
17. In 2009, Slovenia counted its annual payments to some MEA secretariats and other international organisations (*e.g.* UN-HABITAT, UNCCD, UNFCC, CITES, the IUCN, the Red Cross) as ODA under DAC Code 410, to a total amount of around EUR 100 000.
18. A special drawing right (SDR) is a monetary unit (supplementary foreign exchange reserve asset) defined and maintained by the International Monetary Fund.

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PART II

Selected Environmental Objectives

PART II

Chapter 4

Climate Change and Air Pollution*

*Slovenia has reduced its emissions of virtually all traditional air pollutants, including SO_x, NO_x, NMVOCs, CO and NH_3, as well as those of particulate matter and heavy metals. While significant structural changes to Slovenia's economy led to a notable drop in GHG emissions in the 1990s, performance in this area since 2000 has been uneven. Emissions from the manufacturing, commercial and residential sectors have decreased, but not enough to offset an increase from the transport sector. This chapter reviews policy initiatives implemented during the review period to reduce local and transboundary air pollution, institutional and strategic frameworks, and mechanisms in place to monitor implementation. It assesses progress in using market-based instruments (*e.g. *energy and vehicle taxes) and analyses the effectiveness of measures implemented in the energy and transport sectors, including those promoting renewable and energy efficiency. Interactions between different policy instruments are also considered.*

* This chapter reviews progress in the period 2000-11. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Assessment and recommendations

While significant structural changes to Slovenia's economy led to a notable drop in GHG emissions in the 1990s, performance in this area since 2000 has been uneven. Emissions from the manufacturing, commercial and residential sectors have decreased, but not enough to offset an increase from the transport sector. The net result has been an increase in total emissions during much of the decade. In 2009, CO_2 emissions (which account for the lion's share of GHG emissions) fell by over 10% due to the global economic and financial crisis. This enabled Slovenia to come close to meeting its Kyoto Protocol target of reducing average annual GHG emissions in the period 2008-12 by 8% compared with its chosen base year of 1986. Sustainable forest management enables Slovenia to use its maximum carbon sink allowance under the Kyoto Protocol. The government estimates that Slovenia will achieve the Kyoto target with a small (0.4 Mt CO_2 eq) purchase of international carbon credits.

Slovenia reduced its emissions of virtually all traditional air pollutants during the review period, including those of SO_x, NO_x, NMVOCs, CO and NH_3 as well as particulate matter and heavy metals. These emissions have been decoupled from economic growth and fossil fuel supply in absolute terms. This achievement was largely due to effective reductions from large pollution sources such as power plants and industrial installations. In 2009, Slovenia was on track to achieve international commitments under the EU National Emission Ceilings (NEC) Directive and the UNECE Gothenburg Protocol for most pollutants, except for not meeting the NO_x emission ceiling target. While concentrations of air pollutants such as SO_2, NO_2 and CO were below limit values, the levels of exposure of the urban population to PM and ozone were among the highest in any of the EU27 countries for most of the review period. Levels of these pollutants above national daily and annual limit values are observed throughout the country. Road transport in urban centres, the use of wood stoves for heating in households, and unfavourable temperature inversions are the major contributing factors. A few air pollution "hot spots" still exist around industrial facilities and power plants, where traditional air pollutant concentrations negatively affect human health. Attention to climate change should not be at the expense of effective air management, and the co-benefits of air management and climate mitigation policies should be fully exploited. Sectors not covered by the EU ETS (transport, enterprises that are not energy-intensive, and individual wood-based household heating) accounted for about 60% of GHG emissions in 2009 and should be targeted in this regard.

Slovenia has largely transposed EU directives related to climate change mitigation and air pollution prevention and control. It has also developed a variety of strategies and plans related to energy use, and to GHG and air emissions. The result is a patchwork of provisions that lacks coherence and consistency. The creation of the Office of Climate Change in 2009 was an important step in the right direction. So was work on the Strategy for the transition of Slovenia to a low carbon society by 2050 and the Climate Change Act. Both documents should be expeditiously put into effect and implemented. The development of more

consistent and coherent policies requires a correspondingly coherent and consistent analytical base. That base is currently lacking, together with a consistent approach to carbon pricing. Among other effects, this results in failure to identify and exploit the most cost-effective approaches to reducing emissions and energy use. Policy implementation is hindered by unclear responsibilities between the national and sub-national levels, and by lack of guidance at the municipal level.

Slovenia has extensive experience with the use of climate-related market-based instruments, including the CO_2 tax on energy carriers, motor vehicle registration fees linked to CO_2 and Euro emission standards, and the energy efficiency tax. These instruments have been used mainly to raise revenue, whereas there is potential to use them more widely. In 2010, legislation was passed to replace a portion of the excise duty on motor fuels by a CO_2 tax, but the tax has not yet been implemented. Although duties on diesel and petrol were significantly increased in 2009, the excise duty refund scheme on diesel fuel used for commercial purposes was introduced due to the difficult economic situation. Environmentally related taxation and other relevant economic instruments should be reviewed to ensure consistency with EU legislation, in order to reduce the overall costs of climate policies to the economy.

Achieving policy objectives related to climate mitigation and air management requires a significant reduction of the environmental footprint of the transport sector. Transport policy has been geared to the expansion of road construction and promotion of the use of road vehicles, for both freight and passengers. Lack of appropriate land use planning, insufficient public transport infrastructure, and a high rate of international transit road traffic have reinforced this trend. As a result, Slovenia is locked into a transport system that is highly carbon intensive and will take many years to change. A comprehensive strategy is needed to more effectively integrate transport, environmental and land use policies at the national level. These efforts should be accompanied by vigorous and well co-ordinated actions by municipalities.

Slovenia's renewable energy and energy efficiency policies have become increasingly complementary. The ambitious 39.3% target of renewable energy in final electricity consumption will not be met without reducing total electricity consumption. Potential for new renewable capacity exists, but its development requires careful assessment of cumulative environmental impacts, *e.g.* the impacts of new hydropower installations on rivers, the impacts of using biomass from forests, and the impacts of wind power on biodiversity and landscapes. Feed-in tariffs and feed-in premium support schemes for renewable electricity and high-efficiency co-generation have been in place since 2002. They will need to be adjusted to changing circumstances, as was done in 2009 when more transparency and stability were introduced with respect to feed-in tariff and premium levels. It is unlikely that Slovenia will meet its EU energy efficiency objective of a 9% reduction in end-use energy consumption by 2016 compared to 2008 unless it more effectively identifies and exploits low cost options. The interactions of renewable energy and energy efficiency policies with the EU ETS should be kept under review to avoid unnecessary overlap, and to ensure the overall cost-effectiveness of policy measures. Slovenia is unlikely to meet the target of 10% renewable energy in final consumption in the transport sector.

Recommendations

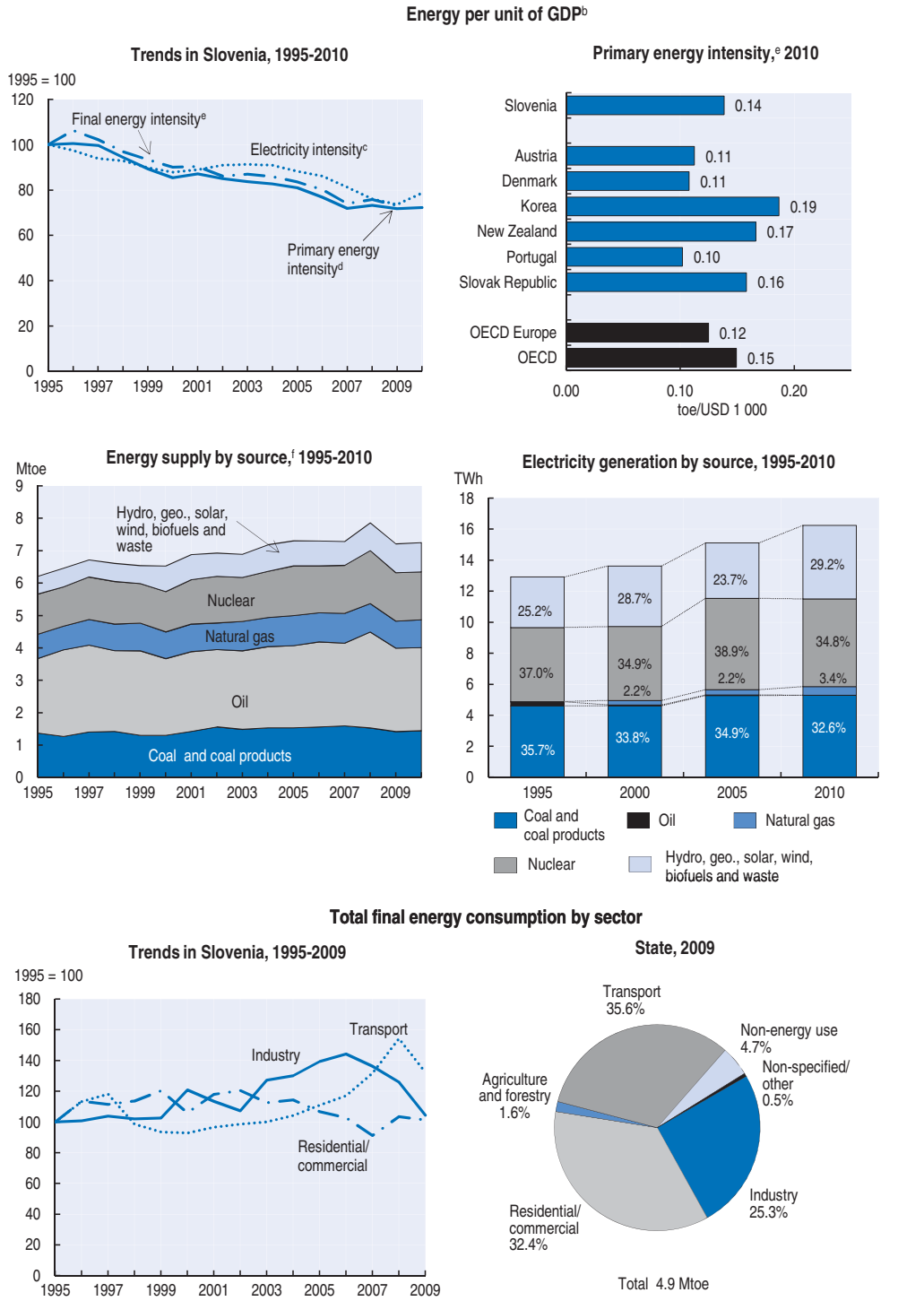
- Expedite the adoption and implementation of the Climate Change Act, including provisions for: legally-binding targets for reducing GHGs; a system of rolling "carbon budgets" that caps emissions over specific periods, harmonised with the timing of international and EU processes; an independent body to advise on carbon budgets and to assess progress; a system of reporting to Parliament, including on climate change adaptation policies.
- Promote more coherent and consistent climate- and energy-related policies by better co-ordinating, and reinforcing capacity for, analysis of their economic aspects, and by regularly reviewing the cost-effectiveness and linkages among policy measures; establish a strong, stable shadow price for carbon in the evaluation of public investments; include greenhouse gas emissions from consumption of imported products in the analysis of climate-related policies.
- Urgently develop a comprehensive strategy to reduce energy use in, and related emissions from, the transport sector; ensure coherence of this strategy with policies for managing air pollution; ensure that funding allocated for planned investment in public transportation and rail under the 2007-13 EU Operational Programme for Environmental and Transport Infrastructure is fully used for these purposes; and comprehensively review the tax regime that applies to the purchase and use of private and commercial vehicles, including refunds of excise duty on diesel fuel used for commercial purposes, with a view to optimising environmental and economic benefits.
- More systematically identify and exploit low-cost opportunities to reduce energy consumption in sectors outside the EU ETS.
- Develop comprehensive strategies to achieve air quality objectives in urban centres, including through accelerated renovation and replacement of small-scale wood burning stoves, promotion of cleaner modes of transport in urban areas, and better integration of land use planning, transport and environmental policies; assess the feasibility of pollution and congestion charges for car use in urban centres.
- Clarify the roles of municipal governments in air pollution reduction policies and measures, and establish a framework, in co-operation with the associations of municipalities and towns of Slovenia, that enables them to become pro-active partners in these policy areas; establish clear policy targets and guidelines for policy implementation at the local level.
- Undertake vulnerability and impact assessments with a view to elaborating a strategy for adaptation to climate change covering affected sectors and regions.

1. Greenhouse gas emissions and trends

1.1. *Trends by type of greenhouse gas*

Carbon dioxide (CO_2) emissions account for the largest share of total greenhouse gas (GHG) emissions in Slovenia (82.9% in 2009). The remaining shares include methane (CH_4) at 10.4%, nitrous oxide (N_2O) at 5.9%, and fluorinated greenhouse gases (F-gases) at 0.7%. Energy generation, including fossil fuel combustion for transport, accounts for 95% of CO_2 emissions. Oil burning accounted for 50% of CO_2 emissions from fossil fuel combustion in 2008. The energy supply structure has not changed significantly since 2000 (Figure 4.1, Box 4.1).

Figure 4.1. **Energy structure and intensity**[a]



a) Excludes international marine and aviation bunkers.
b) GDP at 2005 prices and purchasing power parities.
c) Electricity consumption per unit of GDP.
d) Total final consumption of energy per unit of GDP.
e) Total primary energy supply per unit of GDP.
f) Breakdown excludes electricity trade.
Source: OECD-IEA (2011), *Energy Balances of OECD Countries*; OECD (2010), *OECD Economic Outlook No. 88.*

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Box 4.1. **Energy structure and trends**

Energy use and intensities

Coal's share of total primary energy supply (TPES) has decreased since 2000, reaching approximately 20% of TPES in 2009, while the share of oil has increased, reaching 35.9% in the same year. With Slovenia's accession to the EU and an increase in transit traffic, demand for oil products has grown significantly, by approximately 20% between 2004 and 2009. Other energy sources include nuclear (21.4%), natural gas (11%), hydro (6%), and other renewable sources including biomass and waste (7%) (Figure 4.1).*

Between 2000 and 2008, Slovenia's total final energy consumption (TFC) increased at the same rate as TPES (close to 20%). As a result of the global economic and financial crisis, Slovenia experienced a significant drop in both energy supply (by 9.8%) and energy consumption (by 11.4%) between 2008 and 2009. Consumption of solid fuels for manufacturing and construction fell by 34%, while electricity consumption decreased by 12%.

Final energy consumption in the residential and tertiary sectors has fallen since 2000, although their shares of TFC have remained relatively stable. Consumption in the manufacturing sector increased by over 20% between 2000 and 2006 and then declined, decreasing by 5-7% per year to 2008. While final energy consumption in the transport sector fell by 13% between 2008 and 2009, it is still 42% higher than in 2000. Transport accounted for nearly 38% of TFC in 2009 (Figure 4.1). It has been the largest energy-consuming sector since 2007, ahead of manufacturing. Over half of the road fuel consumed is diesel. Over 95% of energy consumption in the transport sector is by road transport.

Overall, Slovenia's energy intensity (TPES per unit of GDP) decreased by 14.2% from 2000 to 2009, reaching the OECD average of 0.14 toe/USD 1 000 although still above the OECD Europe average of 0.12 toe/1 000 USD (Figure 4.1). The greatest improvements in energy intensity occurred in the second half of the 1990s, when Slovenia's economy underwent significant structural changes. Intensity has continued to decline since 2000, but more slowly. Some energy-intensive facilities were closed down in 2006 and 2007, contributing to a decrease in overall energy intensity. However, greater energy use in transport has slowed energy intensity reductions. The share of services as a percentage of GDP has steadily increased, from less than 50% in 1991 to 67% in 2010. Industry's share fell from 35% in 2001 to 31% in 2010.

Electricity

Electricity generation increased by 20% between 2000 and 2009, but the shares of different sources did not dramatically change. In 2009, these sources were nuclear (35%), coal (31%), hydro (29%), natural gas (4%), and other renewables (1%) (Figure 4.1). Use of oil to generate electricity was phased out in the mid-1990s, while use of non-hydro renewable sources has steadily increased since 2000 but at the same rate as increases in nuclear and coal. Electricity generation from solar, wind, geothermal and various biomass sources increased by nearly 90% between 2002 and 2009 (from 101 to 192 GWh), but their share in total electricity generation was only around 1% in 2009 (compared with 0.6% in 2002).

Electricity consumption decreased by 12% between 2000 and 2008, largely driven by a 21% drop in manufacturing and construction. Residential electricity use declined by only 1% during this period.

In 2009, nine major power producers (with a capacity of over 10 MW) were active in the electricity market. There were four hydropower plants, three thermal plants, one combined heat and power (CHP) plant and one nuclear power plant. There are plans to replace old thermal units at the Šoštanj plant with 600 MW of new thermal capacity using lignite. Two new 200 MW hydropower plants are also planned. In January 2010, an application to build a second reactor at the Krško nuclear power plant was submitted to the Ministry of Economy.

* Since January 2005 all natural gas in Slovenia has been imported and supplied by the state-owned transmission system operator, Geoplin. Eighteen distribution companies were active in 2009, consisting of public companies established by local authorities and concessions awarded to companies by local authorities.

Emissions of CO_2 have steadily increased. They rose by nearly 18% between 2000 and 2008. Increases since 2004 have primarily been driven by growth in emissions from the transport sector. CO_2 emissions from industry and waste have also increased, but at a slower rate. Following the economic and financial crisis of 2008 and a notable drop in energy supply, CO_2 emissions decreased by over 10% between 2008 and 2009, reaching 19.35 million tonnes of CO_2 equivalent (Mt CO_2 eq) in 2009.

Emissions of the other greenhouse gases have shown stable or declining trends. CH_4 emissions have remained relatively steady since 2000, although they decreased by more than 5% between 2007 and 2008. The most significant reductions in CH_4 emissions have been due to an increase in fugitive emissions in the energy sector, while emissions from waste and agriculture have increased slightly. N_2O emissions have fallen overall since 2000, primarily due to significant decreases in emissions from agriculture, their major source. Emissions from waste have remained steady since 2000, while those from fossil fuel combustion increased by 6% between 2000 and 2008, primarily due to emissions from transport. The share of N_2O emissions from road traffic grew from 2.7% in 1986 to 7.2% in 2009. Emissions of hydrofluorocarbons (HFCs) have also increased during the review period.

1.2. Trends by sector

Fuel combustion for energy generation accounted for 82% of all GHG emissions in 2009. A further 10% of GHG emissions came from agriculture and most of the remainder from industrial processes (4.4%) and waste (3%) (Table 4.1).

Table 4.1. **Total GHG emissions**[a]

Mt CO_2 eq

	1986	2000	2008	2009
Energy production	16.07	14.95	17.47	15.89
Industrial processes	1.29	1.00	1.20	0.84
Solvent and other product use	0.08	0.04	0.03	0.03
Agriculture	2.22	2.14	1.96	1.99
Waste	0.57	0.68	0.62	0.58
Total	**20.23**	**18.81**	**21.28**	**19.33**

a) Excluding land use, land-use change and forestry (LULUCF).
Source: ARSO (2011).

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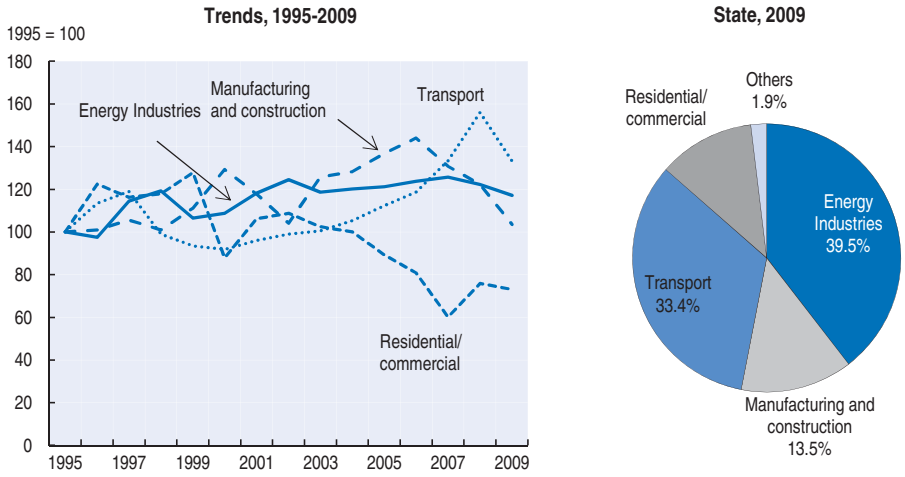
Emissions from the energy sector increased steadily between 2000 and 2009 (by nearly 17%), with the increases occurring primarily in the energy industries (*e.g.* electricity and heat production) and in transport. Emissions from the energy industries and transport increased by 16% and 64%, respectively, between 2000 and 2008. Growth in consumption of fuel and electricity for transport is a major reason for the continued growth of GHG emissions from the energy sector. Transport accounted for 27% of total GHG emissions in 2009, despite a 13% decline in total emissions from this source between 2008 and 2009. Road transport accounts for over 99% of total transport emissions. Slovenia has been successful in controlling emissions from other energy-consuming sectors; emissions from manufacturing and construction have remained steady since 2000 (after decreasing by more than 50% between 1986 and 2000); they have decreased by nearly 26% in 2009 in the commercial and residential sectors (Figure 4.2).

Figure 4.2. **CO_2 emissions by sector**[a]



a) Emissions from energy use only; excludes international marine and aviation bunkers; sectoral approach.
Source: OECD-IEA (2011), *CO_2 Emissions from Fuel Combustion.*

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GHG emissions from industrial processes increased by 18% between 2000 and 2008. They declined, however, between 2008 and 2009 due to the economic and financial crisis (Table 4.1). The primary contributor to industrial process emissions are the mineral industries (*e.g.* cement and lime production, use of limestone and dolomite), with cement production accounting for 51.5% of GHG emissions from industrial processes.[1] Metal production is the second largest source, accounting for 10% of GHG emissions from industrial processes. Emissions from the mineral industries, driven by cement and clinker production, have grown steadily since 1993 and sharply since 2002. Emissions from metal production were below the 2000 level in 2008 despite increased steel production. This is due to technological changes in aluminium production and to reduced ferroalloy production. In line with wider economic changes, emissions from both the mineral industries and metal production dropped sharply between 2008 and 2009. Emissions of F-gases from aluminium production have also decreased significantly due to technological and operational improvements.

Slovenia has one of the highest proportions of forest coverage of any OECD country (62%). The extent of forested areas has steadily increased since 1995. Forests continued to represent a net carbon sink in 2009.[2] The absorption of 10.9 Mt CO_2 eq by forests has counterbalanced a steady increase in emissions from cropland and grasslands since 2000.

Emissions from agriculture decreased by 6.6% between 2000 and 2008. The largest decrease was in emissions from agricultural soils (8.7%), while improved manure management resulted in a 7.9% decrease. Use of mineral fertilisers has fallen significantly, particularly since the beginning of the review period. Decreasing emissions from agriculture are also due, in part, to changes in its level of activity and economic importance. Agriculture's share of GDP fell from 5.9% in 1992 to 2.4% in 2008. Between 2002 and 2007, Slovenia experienced a 22.5% increase in area of urban land; 65.2% had previously been farmland.

1.3. *Kyoto target*

Under the Kyoto Protocol, which it ratified in 2002 (and which came into force in 2005), Slovenia is committed to reduce GHG emissions by 8% in the period 2008-12 compared with 1986 levels.[3] This translates into a maximum annual GHG emission allowance of 18.7 Mt CO_2 eq. Allowing for the use of carbon sinks (1.32 Mt CO_2 eq per year), Slovenia needs to reduce its average annual GHG emissions to approximately 20 Mt CO_2 eq during the Protocol's first commitment period.

Slovenia's CO_2 emissions increased by about 10% between 1986 and 2008, but a dramatic decrease in these emissions in 2009 led to an overall reduction of 1.7% compared with the base year. Emissions of all other Kyoto greenhouse gases have fallen since 1986. Even allowing for additional GHG mitigation measures, Slovenia currently estimates that it will slightly miss the target, with average annual emissions reaching 21.1 Mt CO_2 eq (Table 4.2). According to more recent projections, which include estimations of lower emissions in 2009 due to the global economic and financial crisis, average annual emissions may reach 20.4 Mt CO_2 eq with the use of sinks (Table 4.2). Economic uncertainty is one reason Slovenia has not arranged to purchase carbon credits to make up for its potential Kyoto shortfall, which could be smaller than projected earlier due to the impact of the economic and financial crisis.

Table 4.2. **Kyoto target, projections and gap**

Mt CO_2 eq

	5th National Communication to the UNFCCC	Report on implementation of operational programme for reducing GHG emissions[a]
Projected emissions with existing measures[b] 2008-12 (annual)	21.2	20.4
Projected emissions with additional measures[c] 2008-12 (annual)	21.1	
Sequestration in sinks	1.3	1.3
Total projected emissions with sequestration	19.8	19.1
Assigned amount under Kyoto Protocol (per year, for the period 2008-12)	18.7	18.7
Distance to Kyoto Protocol target	*1.1*	*0.4*

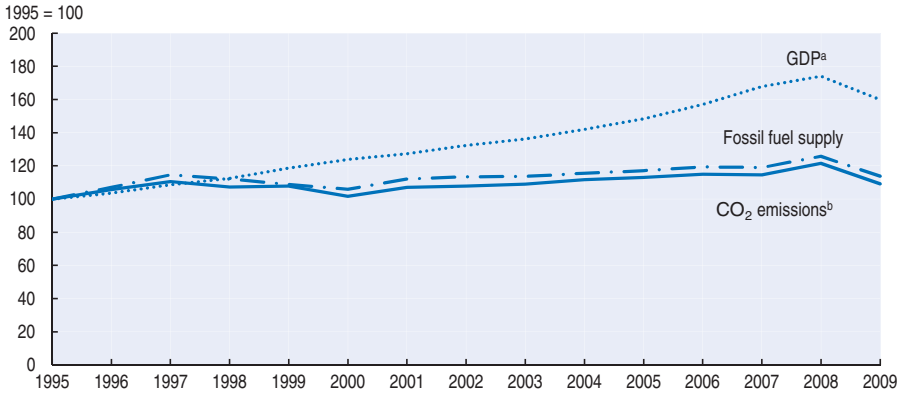
a) Accounting for estimated 2009 emissions.
b) Implemented or adopted by 2008.
c) Greater implementation of measures, more reductions in industry; reduced CO_2 emissions.
Source: MESP (2010).

1.4. *CO_2 and GHG emission intensities*

Given that Slovenia's GHG emissions are dominated by CO_2 and are primarily due to energy use, these emissions tend to closely follow fossil fuel supply (Figure 4.3). Growth of CO_2 emissions and energy use has been slower than that of GDP. While it is below the OECD average of 0.33 tonnes of CO_2 per unit of GDP, Slovenia's CO_2 intensity of 0.30 t CO_2 per unit of GDP is above the OECD Europe average of 0.26 t CO_2 per unit of GDP (Figure 4.4).

The CO_2 intensity of the Slovenian economy in 2008 was 20% lower compared with 1990, reflecting structural changes away from energy-intensive industry and towards services. This decrease was sharpest between 1995 and 2000 (14%). It has steadily continued, with CO_2 emissions per GDP declining by nearly 17% between 2000 and 2009 (Figure 4.4).

Figure 4.3. **CO_2 emissions, fossil fuel supply and GDP trends, 1995-2009**



a) GDP at 2005 prices and PPPs.
b) Emissions from energy use only; excludes international marine and aviation bunkers; sectoral approach.
Source: OECD, Environment Directorate; OECD-IEA (2011), *CO_2 Emissions from Fuel Combustion*; OECD-IEA (2011), *Energy Balances of OECD Countries;* OECD (2010), *OECD Economic Outlook No. 88.*

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The GHG intensity of Slovenia's TPES has also fallen, although it remained relatively stable from 2005 to 2007 at around 2.17 t CO_2 per Mtoe and declined by 1.1% between 2000 and 2009 (Figure 4.4).[4] It fell by 13% between 1986 and 2009, reflecting a large decline in emissions from coal burning, particularly between 1986 and 1990. Emissions from coal burning continued to decline until the mid-1990s, but have since slightly increased. Oil burning accounted for 50% of CO_2 emissions from fossil fuel combustion in 2009. Slovenia's CO_2 per TPES remains below both the OECD and OECD Europe average.

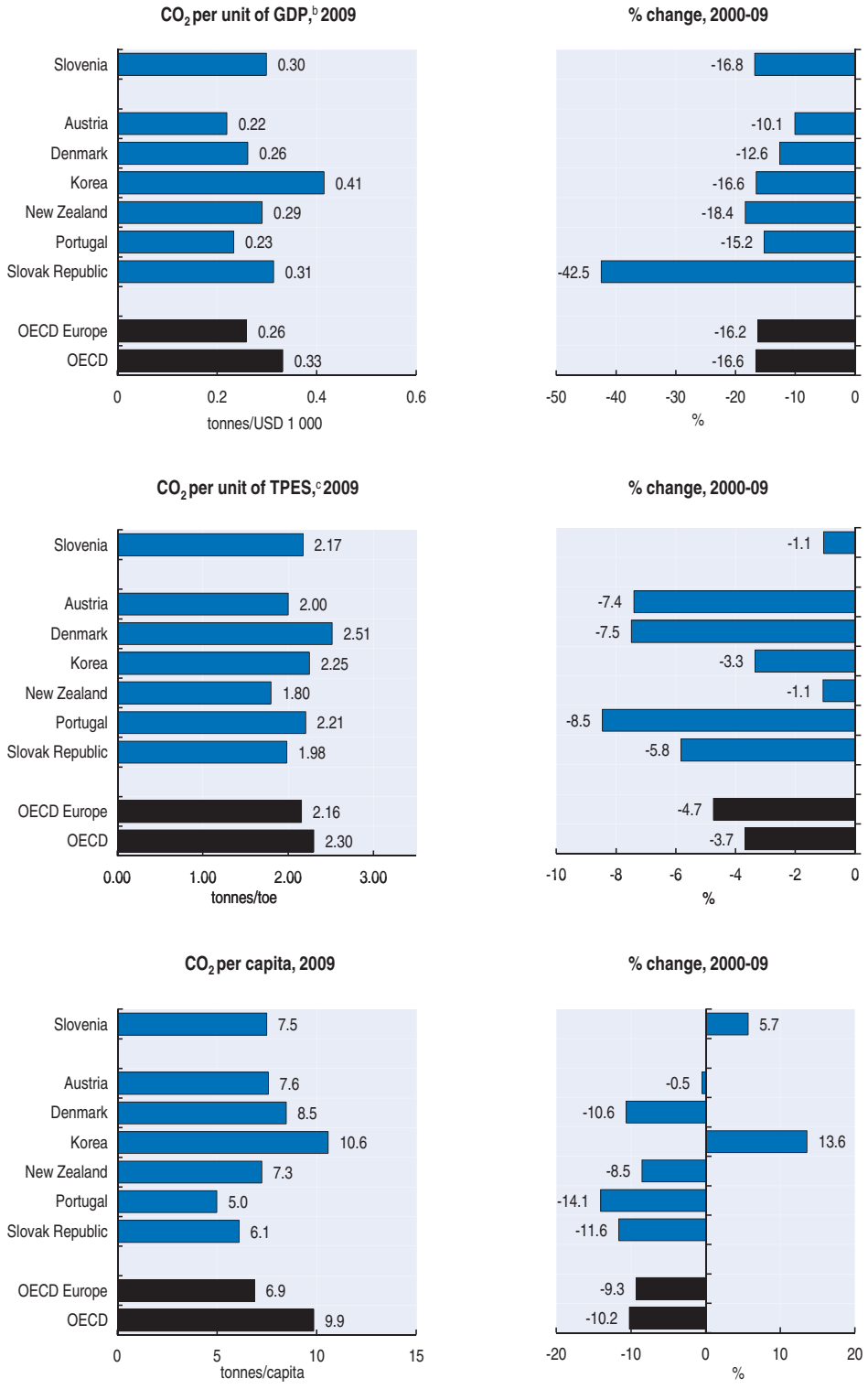
Slovenia's per capita CO_2 emissions increased by 17% in the period 2000-09; they reached 8.3 t CO_2 per capita in 2008 and 7.5 t CO_2 per capita in 2009, significantly higher than the OECD Europe average of 7.4 and 6.9, respectively (Figure 4.4). Broken down by sector, per capita emissions from transport are significantly (63%) higher than the OECD Europe average, while those from energy and heat production are 18% higher. In contrast, per capita emissions from the residential and commercial sectors are 27% lower than the OECD Europe average.

2. Air emissions and air quality

2.1. Trends in air pollutant emissions

Emissions of virtually all air pollutants were reduced during the review period. These emissions have been decoupled from economic growth and fossil fuel supply (Figure 4.5). This reflects reductions from large pollution sources, such as power plants and industrial installations. For emissions of most pollutants except nitrogen oxides (NO_x), Slovenia is on track to achieve its commitments under the EU National Emission Ceilings (NEC) Directive (2001/81/EC) and the Gothenburg Protocol to the UNECE Convention on Long-range Transport of Air Pollution.[5] PM emissions from wood-burning stoves in households and from road traffic have been reduced, although they are still of concern in urban areas. The intensity of emissions has decreased, especially those of sulphur oxides (SO_x); in 2009 it was about half the OECD Europe average at 0.2 kg per USD 1 000. Less progress has been made with respect to the intensity of NO_x emissions, which remained at the OECD and OECD Europe average of 0.8 kg per USD 1 000.

Figure 4.4. CO_2 trends and intensity[a]



a) Includes CO_2 emissions from energy use only; excludes international marine and aviation bunkers; sectoral approach.
b) At 2005 prices and purchasing power parities.
c) Total primary energy supply.
Source: OECD-IEA (2011), *CO_2 Emissions from Fuel Combustion*; OECD (2010), *OECD Economic Outlook No. 88*; OECD-IEA (2011), *Energy Balances of OECD Countries*.

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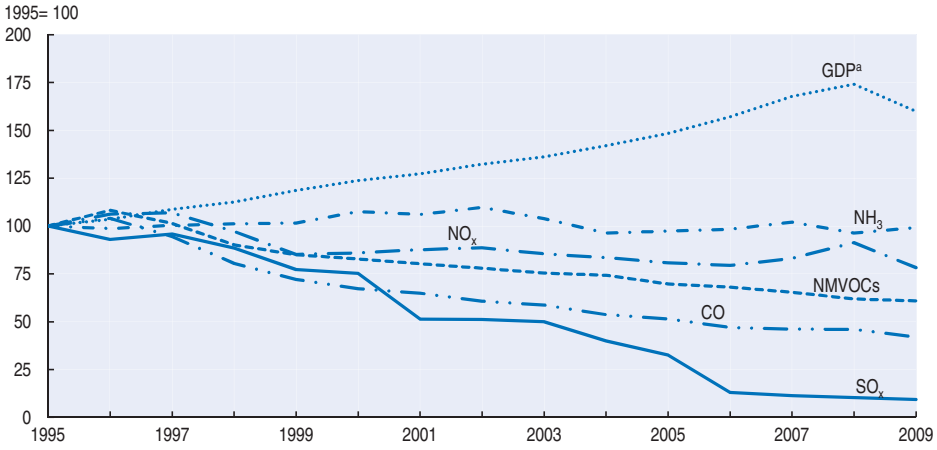
Figure 4.5. **Trends in atmospheric emissions, 1995-2009**



a) At 2005 prices and PPPs.
Source: OECD, Environment Directorate.

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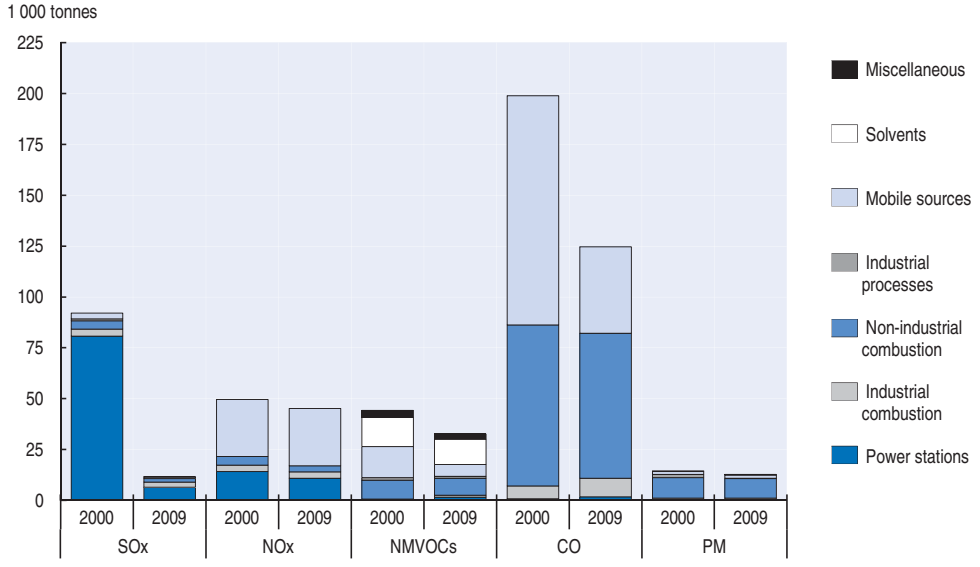
Between 2000 and 2009, SO_x emissions fell by an impressive 86% (Figure 4.6). Most reductions were achieved in the power generation sector through pollution reduction measures, including the introduction of desulphurisation equipment in power plants (*e.g.* Šoštanj in 2001, Trbovlje in 2005),[6] switching to low-sulphur coal and gas, and closing some production lines (*e.g.* at the Krško paper mill). Implementation of legal requirements, *e.g.* under the Pollutants from Large Combustion Plants Directive (2001/80/EC) in 2002 and the Integrated Pollution Prevention and Control Directive (96/61/EC) in 2004, has played an important role. Slovenia met the 2010 NEC emission reduction target of 27 kt of SO_x in 2006, ahead of schedule; a reduction to 11.5 kt in 2009 was less than half the total needed to meet the 2010 target.

Figure 4.6. **Atmospheric emissions by source, 2000 and 2009**



Source: OECD, Environment Directorate.

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Emissions of non-methane volatile organic compounds (NMVOCs) declined by 26%, mostly due to use of catalytic converters in cars and the control of emissions from petrol stations and from non-industrial combustion. In 2008, Slovenia's emissions of NMVOCs were already lower than the 2010 NEC target (40 kt), and this reduction trend continued in the following year. Major emission sources are solvent use, road transport, and non-industrial combustion (Figure 4.6).

Emissions of carbon monoxide (CO) decreased by around 9%. Emissions from transport fell by 45%, mostly due to the use of catalytic converters. However, a significant increase of more than 70% in emissions from non-industrial combustion largely offset emission reductions in transport (Figure 4.6).

Emissions of NO_x decreased by only about 4%. Mobile sources accounted for the largest share of emissions (more than 50%), followed by power plants (26%). The installation of afterburners at the Šoštanj thermal power plant and reconstruction of the fuel boiler system at the Ljubljana thermal power plant contributed to these emission reductions. Emissions from mobile sources, particularly road traffic, decreased due to the use of catalytic converters, but recently increased as a result of growth in transit freight traffic. NO_x emissions stood at 45.2 kt in 2009, but the inventories to be released in 2012 are expected to show that Slovenia has fulfilled its obligation even if it may be difficult to stay below this ceiling once the economy recovers.

Emissions of ammonia (NH_3) remained stable during the review period. A decrease in the number of cattle accounted for a slight NH_3 emission reduction in recent years. With emissions of 17.7 kt in 2009, Slovenia was in a good position to achieve the NEC target of 20 kt in 2010.

Emissions of particulate matter (PM) were reduced by nearly 8%, mostly due to flue gas desulphurisation and cogeneration systems in power plants (Figure 4.6). Small-scale combustion (*e.g.* use of wood-burning stoves) is the most important source of PM emissions, accounting for slightly over 60%. These stoves are used in one-quarter of households. Many are old, highly polluting and energy inefficient. Partly because of the rise in oil and gas prices, this method of alternative heating is still widespread. While PM emissions from road transport have increased (largely reflecting greater use of diesel, including in transit transport), they represent only a small share (12%) of total particulate emissions.

Emissions of heavy metals (lead, mercury, arsenic, cadmium, nickel) were well below the national limit values during the last ten years. Lead emissions had already decreased considerably around 1995-96, following the implementation of the EU Directive on the quality of liquid fuels (93/12/EEC, amended by 98/70/EC). They were further reduced after 2001, the year leaded petrol was phased out. Emissions of mercury and cadmium were below limit values, despite a slight increase since 2006 due to the growing volume of road transport and production processes. Emissions of polycyclic aromatic hydrocarbons (PAHs) have decreased significantly since 2000 and have remained at a low level.

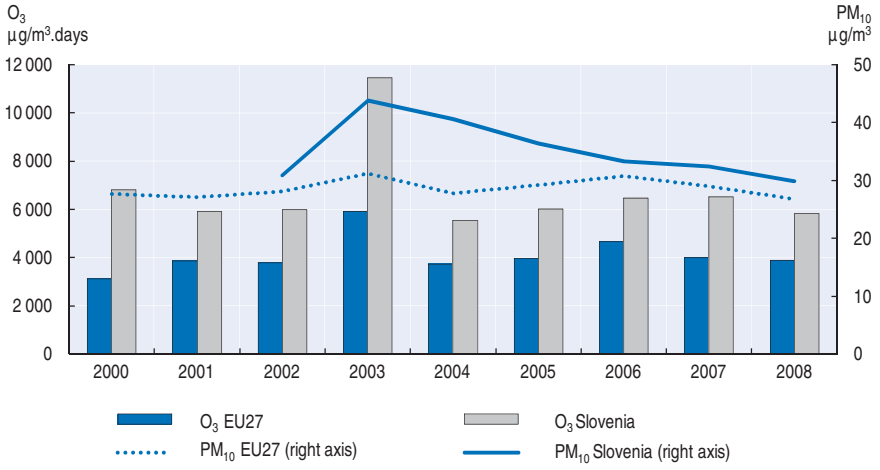
2.2. Ambient air quality

Air quality continues to be a major environmental and health issue in Slovenia. Automatic measurements of air pollution are conducted in 12 national networks and three complementary networks are maintained by municipal and other operators. The Ministry

of the Environment and Spatial Planning (MESP) has an air quality database system (AIRNET-SI) that provides integrated data on air quality derived from monitoring of ambient air quality. Monitoring results are publicly available on the MESP website.

Concentrations of air pollutants such as SO_2, NO_2, CO and heavy metals in urban areas were below daily and annual limit values during the review period. Despite generally decreasing trends in concentrations of PM_{10}, the levels of exposure of urban populations to PM and ozone (O_3) were among the highest in the EU27 during most of this period (Figure 4.7). Concentrations of PM and O_3 exceeding daily and annual limit values are still observed throughout Slovenia. Benzene concentrations were also above the upper assessment threshold in the period 2007-09 at urban sites in Ljubljana and Maribor. Road transport in urban centres such as the Ljubljana Basin, and use of wood stoves for heating in households, together with unfavourable temperature inversions, have been responsible for exceedances in winter. Transboundary pollution from the Po Valley in Italy also contributes to occasional high concentrations of ground-level ozone in summer. A study on the health impacts of long-term exposure to $PM_{2.5}$ in 23 European cities concluded that life expectancy in Ljubljana would be increased by more than half a year if annual mean $PM_{2.5}$ levels did not exceed 15 µg/m^3.

Figure 4.7. **Urban exposure to air pollution by O_3[a] and PM_{10},[b] 2000-08**



a) Population weighted yearly sum of maximum daily 8-hour mean ozone concentrations greater than 70 µg/m³ at urban background stations.
b) Population weighted annual mean concentrations of particulate matter at urban background stations.
Source: Eurostat (2011), *Eurostat Statistics Database, Environment and energy.*

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Some air pollution hot-spots still exist in Slovenia. They are associated with old mining and metal processing areas, manufacturing, and lignite-fuelled power stations. Despite soil rehabilitation efforts, slightly higher concentrations of lead were recorded in some locations such as the upper Mežica Valley, where extraction and processing of lead and zinc ores was carried out for more than five centuries until it ended in 1994. Active implementation of measures for the improvement of environmental quality needs to continue, together with the monitoring of blood lead levels in children. This is even more relevant considering that secondary lead processing (a car battery production plant), and the excavation of lead-containing sand as a construction material, continue in the

Upper Meža River. Comparative health studies carried out in the Zasavje region have confirmed a higher number of cases of chronic and common acute respiratory disease among children living in medium – to heavily – polluted areas of Zasavje, compared to areas of this region which are not or slightly polluted. The population living close to the glassworks and chemical plants in Hrastnik, a cement factory, and a thermal power plant in Trbovlje shows a higher number of cancer cases than the rest of the population of the Zasavje region.

3. Policy and institutional framework for addressing climate change and air pollution

3.1. *Environmental policy framework*

Slovenia's Environmental Protection Act (EPA), enacted in 1993, provides the legal basis for environmental protection measures including climate change mitigation and air pollution reduction. Revised in 2004 and amended in 2006 and 2008, the EPA envisages the implementation of various financial instruments such as a CO_2 tax and provides a framework for the implementation of EU legislation, including the EU Emissions Trading System (EU ETS). The 2004 EPA established the legal framework for air pollution reduction measures, such as emission limit values, a permitting system for large emission sources, and best available technologies (BAT) requirements, in line with the EU requirements. Building on the EPA, the National Environmental Action Programme (NEAP) sets strategic environmental objectives for the period 2005-12, including for energy efficiency and renewable energy. The NEAP emphasises the importance of meeting the long-term goal of stabilising GHG emissions. It also introduces the use of economic instruments and environmental taxes.

Within the framework of the EU climate and energy package that established various targets for 2020, Slovenia has accepted the following commitments, all with a 2005 base year: reducing emissions from sectors covered under the EU ETS by 21%; and limiting increases of emissions from sectors not covered by the ETS (*e.g.* in the residential, commercial, public and transport sectors) to 4%, the highest level of increases in GHG emissions permitted for the 12 new EU member states.

In 2006, Slovenia adopted the Operational Programme for Reducing Greenhouse Gas Emissions by 2012 (OP TGP). It was further revised in 2009 (as OP TGP-1) and the measures required to meet the Kyoto Protocol target were redefined. This programme introduced new measures, including promoting highly efficient CHP generation, along with the production of renewable energy and changing fiscal measures to encourage greater energy efficiency in the public sector and industry. OP TGP-1 also addresses Slovenia's use of sinks to meet its Kyoto target and various plans for use of the Kyoto flexible mechanisms. OP TGP-1 defines policy areas in which progress on implementation is to be monitored annually. Concerning other air pollutants, the Operational Programme for Attainment of the National Emissions Ceilings (OP NEC) was completed in 2005 and the Operational Programme for Air Protection from PM_{10} Pollution (OP for PM_{10}) in 2009.

Drafting of a Climate Change Act that aims to establish long-term mitigation and adaptation policy priorities to 2050 was launched in 2010. It will establish the goal of becoming carbon neutral by 2050, with an annual CO_2 emission reduction target of 4 Mt. The draft Act, which focuses on sectors not covered by the EU ETS, includes medium-term operational programmes and long-term strategic targets in line with Slovenia's international commitments. The draft has been subject to public consultation since June 2010. It has not been adopted due to extensive discussions between stakeholders. In September 2011, a

long-term Low Carbon Strategy was prepared in order to: establish a broader framework for GHG emission reductions; set out the responsibilities for planning, implementation and monitoring of climate action; and provide the basis, capacity and resources to participate in the development, transposition and implementation of European legislation on climate change. The Climate Change Act is to be presented to the Parliament, together with the Strategy, in the spring of 2012.

Although the development of a Climate Change Act is a step in the right direction, its impact could be increased by establishing sufficient, and approximately similar, abatement incentives in all sectors (outside the ETS) in order to let the market determine the cheapest ways to reduce emissions. This could be followed by the introduction of carbon budget targets allocated by sector, with responsibility for implementation assigned to relevant ministries. The Act should also require that climate change-related targets and a mandatory "carbon budget" calculation or payment be introduced into strategies, programmes, and any activities and investments that have environmental impacts. In practice, this would set quantitative limits and timeframes and provide a "shadow" carbon price applicable to all public sector investment decisions. The Act should also establish a stronger legal basis for adaptation activities by requiring vulnerabilities and risks associated with climate change-related human and environmental impacts throughout Slovenia to be communicated to the public. In addition, it should require adaptation measures to be taken in specific areas, *e.g.* with respect to spatial planning, public infrastructure, buildings, water and coastal zone management, agriculture, forestry, and protected natural areas.

3.2. Economic and energy-related policy frameworks

Slovenia's economic development policy documents integrate climate change and air pollution concerns. They include the 2005 National Development Strategy and its 2008 implementing document, the National Development Programme (NDP). The NDP includes projects and programmes supported by 2007-13 EU funding, notably the Operational Programme for Environmental and Transport Infrastructure Development (OPDETI) , under which more than EUR 1.6 billion is available for measures encouraging sustainable use of energy (including development of renewable energy sources, for which 9.8% of this funding is allocated). The bulk of these resources will be devoted to developing the railway network (27.5%) and to road, airport and maritime infrastructure projects (14.8%).

Several policies concerning energy use play a key role in Slovenia's GHG mitigation policies. In 1996, the Resolution on the Strategy of Use and Supply of Energy in Slovenia (ReSROE) set explicit objectives for the improvement of energy efficiency and the development of renewable energy sources. The Energy Act, adopted in 1999 and amended several times since, officially established preferential treatment for energy production from renewable sources; introduced the basis for minimum energy performance standards applicable to appliances, equipment and buildings; and assigned responsibility for assessing the effectiveness of energy efficiency and renewable energy policies to the ministry responsible for energy. Similarly, the 2004 Resolution on a National Energy Programme (ReNEP) outlined long-term goals for the development of energy supply and the means of stimulating renewable energy sources and energy efficiency improvements. The ReNEP also included quantified targets for efficiency improvements in various sectors, to be met in 2010. Moreover, targets to be met in 2010 were established for: electricity production from CHP; the share of renewable energy sources in energy supply, as well as specific targets for shares of heat supply and electricity generation; and the share of biofuels in transport fuels. Slovenia's

renewable energy and energy efficiency targets under the EU package include a 25% share of renewable energy sources in total final consumption by 2020, broken down into electricity (39.3%), heating and cooling (30.8%) and transport (10%), and a 9% reduction in end-use energy consumption between 2008 and 2016 (non-binding target).

Given the range of strategies, all of which affect climate change policy, developing an overarching Climate Change Act and co-ordinating the activities of all ministries will be of critical importance to ensure the overall coherence of current efforts. While an analysis of potential benefits has been carried out in some areas (*e.g.* the potential for energy saving in the public sector, the technical potential of certain renewable energy sources, the GHG emission abatement potential of certain technologies), in general most strategic documents are not based on a technical and economic analysis of GHG emission abatement potentials. The three strategic documents currently under development (a revision of the 2005 National Development Strategy, a new National Energy Plan, and a Climate Change Strategy) do not share the same analytical basis. The development of a model that provides a realistic description of the Slovenian economy, and that allows assessing the costs and benefits of a broad spectrum of policy scenarios, should be expedited in order to allow better linking of the existing analytical framework to the National Energy Plan.

3.3. Institutional framework

Government institutions active in the formulation of climate change policy correspond closely to those involved in environmental policy more generally. The MESP has been the ministry with primary responsibility for the development and implementation of strategic documents and legislation related to climate change. It was in charge of energy efficiency and renewable energy policy until the end of 2009, when this responsibility was transferred to the Ministry of Economy.[7] The MESP houses the Environment Agency (ARSO), which monitors Slovenia's GHG and air emissions and is responsible for the country's national GHG inventory and its ETS registry. The Slovenian Environmental Public Fund (Eco Fund), which provides financing for, *inter alia*, renewable energy projects, also falls under the responsibility of the MESP (Box 4.2).

Other ministries engaged in developing and implementing climate-related sectoral strategies and policies include the Ministry of Agriculture, Forestry and Food (MAFF), which is responsible for sustainable agriculture and forest management policies; the Ministry of Finance, responsible for budget matters and some environmentally related taxation (*e.g.* excise duties); the Ministry of Economy, responsible for energy, energy efficiency, and renewable energy; the Ministry of Transport, responsible for road and rail transport; the Ministry of Higher Education, Science and Technology (MHEST); and the Slovenian Technology Agency, responsible for research, development and demonstration (RD&D) activities.

Electricity transmission and distribution in Slovenia are carried out by state-owned companies. Elektro-Slovenija (ELES) is the transmission system operator and SODO is the distribution system operator, managing leases to the five regional distribution companies. ELES and SODO are involved in planning decisions that impact the electricity sector. A ten-year strategic plan concerns future decisions regarding renewable energy development, as well as smart grids and smart metering.

An important step in speeding up and co-ordinating climate change mitigation and adaptation measures across all relevant ministries was taken in 2009, when the Government Office of Climate Change was established under the Prime Minister. The Office of Climate Change is now leading development of the Climate Change Act and a

Box 4.2. **The Eco Fund's role in promoting renewable energy and energy efficiency**

Since 1995, Slovenia's Environmental Public Fund (Eko Sklad, or Eco Fund) has provided soft loans and grants to private and municipal companies, municipalities and households for energy efficiency and renewable energy investment projects.

Between 2004 and 2010, more than EUR 130 million in soft loans was granted to municipalities and to municipal and private companies. The majority of loans in 2009 and 2010 were for investments in renewable energy sources. Over EUR 75 million in soft loans was offered to households during the same period, primarily for investments in energy efficiency.

In 2010, EUR 20 million was available for loans to private and public corporate bodies, covering 80% to 90% of eligible investment costs up to a maximum of EUR 2 million per project. EUR 12 million in loans was available for loans to households, covering up to 100% of eligible costs, to a maximum of EUR 20 000 or EUR 40 000 depending on the type of project.

It is estimated that household and corporate loans in 2008 and 2009 brought about the abatement of 7 533 tonnes of CO_2 emissions, reduced energy consumption by 23 562 MWh, and supported the generation of 25 229 MWh of energy from renewable energy sources. The types of investments eligible for support by the Eco Fund are determined in line with national environmental policy documents; for example, in 2008 a household subsidy scheme was established to implement elements of the National Action Plan for Energy Efficiency.

The Eco Fund's household grant scheme started in 2008. It supports measures including: installation of low-carbon and efficient energy sources (*e.g.* solar heating systems, high-efficiency wood biomass boilers, high-efficiency heat pumps, a central heating system for connecting to district heating using a renewable energy source); purchase or construction of low-energy or passive energy class housing units; complete thermal renovation; thermal insulation of the building envelope; and replacement of external doors and windows.

The Eco Fund's soft loan scheme for households has operated in parallel, offering loans for the same energy efficiency and renewable energy measures as well as the installation of condensing boilers, the purchase of household appliances of energy class A or higher, and the purchase of electric or hybrid vehicles. In 2008 and 2009, the subsidy scheme disbursed EUR 11.5 million.

The Eco Fund estimates that these measures abated 5 658 tonnes of CO_2 emissions, generated 37 000 MWh of renewable energy and avoided 31 000 MWh of energy consumption. In addition, operation of the grant scheme over two years is estimated to have created 480 new jobs, 40% of which were related to construction of low-energy and passive (ultra low) energy houses and over 30% to thermal insulation and window replacement, while installation of solar heating systems led to the creation of 100 new jobs.* The Eco Fund's support for certain higher-cost measures – *e.g.* low-energy and passive energy houses (EUR 43.3/MWh saved) as opposed to building envelope insulation (EUR 3.7/MWh saved) – is a conscious market creation mechanism designed to encourage innovation in these key sectors.

* However, this is a partial job creation figure which generally disregards "general equilibrium impacts", i.e. feedbacks on total employment via labour market adjustments.

long-term Low Carbon Strategy in co-operation with relevant stakeholders, including government agencies, industry and the public. It also represents Slovenia in international climate change negotiations.

In the area of climate change and air pollution, municipal governments are essential partners due to their role in urban planning and infrastructure development, which has an impact on buildings, transport and industrial activities. Under the Energy Act, municipalities are required to develop Local Energy Plans (LEPs). The LEPs should be consistent with national policy documents on sustainable energy consumption and production. They span ten years, and municipalities report annually to the Ministry of Economy on implementation and results. Despite the LEPs' potential to promote sustainable energy development, as demonstrated by the Alpine municipality of Idrija (which identified the potential of shafts in an old silver mine to provide 8 million m^3 of water at 16 °C to heat buildings), their use in strategically considering the development of energy supply has been limited in practice.

The EPA (Article 38) requires each city municipality (11 out of 211 municipalities) to adopt an environmental action programme. Most municipalities with poor air quality (*e.g.* Ljubljana, Maribor and Tribovlje) have adopted such programmes, including measures to improve air quality. However, the planned measures are not adequate to bring about compliance with air quality limit values. Furthermore, since the EPA and the Air Quality Decree explicitly require the government to prepare an Air Quality Plan, municipalities do not consider themselves responsible for achieving air quality limit values. A clearer definition of roles and better co-ordination of efforts between the national and municipal levels are needed to ensure that there are ambitious targets under the national overall emission "cap" and effective implementation of measures addressing both GHG emissions and emissions of other air pollutants.

4. Cross-sectoral policies and measures

4.1. *Taxation*

Slovenia was one of the countries that pioneered the use of a CO_2 tax. Introduced in 1997, this tax applied to different types of fuel according to "environmental burden" unit (*e.g.* coal, lignite, liquefied petroleum gas, waste) or volume (*e.g.* natural gas, commercial fuel oils). At a rate of EUR 0.04 per kg or litre, the tax was implemented primarily to generate revenue rather than to internalise the cost of pollution. With the introduction of the ETS in 2005, installations covered by that scheme were exempted from paying the CO_2 tax, which was a right decision to avoid applying an instrument overlapping with the ETS.

Legislation was passed in 2010 to extend the CO_2 tax to motor fuels. Under this reform, overall tax rates on these fuels are not anticipated to change; rather, a portion of the excise duty is to be replaced by a CO_2 tax. While this may not change the overall price for all consumers, it would do so for those that currently benefit from partial or full reimbursement of the excise duty since the CO_2 tax would not be subject to such exemptions. Despite envisaged neutrality and additional incentive effects, the reform has not yet been implemented.

There have been excise duties on a number of energy products in Slovenia since 1999. Duties on electricity were introduced in 2007. Although they were initially set at EUR 0.5 per MWh for commercial and EUR 1 per MWh for non-commercial use, in early 2010 the latter rate was applied to all consumers. In August 2010, the rate was increased to EUR 3.05 per MWh. However, the tax on electricity fully overlaps with the ETS, so that there is no additional CO_2 abatement at the EU-wide level. Duties on transport fuels were significantly increased in 2009, reaching EUR 0.43 per litre for diesel and EUR 0.48 per litre for petrol. In 2011, excise duties decreased again, reaching EUR 0.36 per litre of diesel and EUR 0.44 per

litre of petrol. Prices were consequently between 3.4% and 5.4% higher than in neighbouring Austria and Hungary (Figure 1.6). It is estimated that this increase in the fuel excise duty contributed to the reduction in GHG emissions observed in 2009. However, due to the economic situation in 2009, an excise duty payment refund system was introduced in the case of fuel used for commercial purposes, dramatically reducing the impact of the fuel tax increase. In 2010, Slovenia introduced an energy efficiency levy, applied on top of the excise levy, on road fuels (EUR 0.4/l for petrol and EUR 0.2/l for diesel), heating oil (EUR 2.2/l) and industrial low-sulphur fuel, as well as on electricity (EUR 0.5/MWh) and gas (EUR 0.5/m^3).

A tax on F-gases has been in effect since 2008. Companies that market air conditioning or other equipment that uses F-gases, or that maintain such equipment, are subject to this tax. The tax is calculated on the basis of pollution units, which refer to CO_2 equivalents, at the level of EUR 0.0125 per pollution unit. The first filling of pre-charged equipment and stationary equipment is taxed at 5%, while F-gas quantities used for servicing and maintenance of equipment are taxed 100%. The aim of the tax is to encourage appropriate management of F-gases from air conditioning equipment. Since it is set at a low rate, the tax primarily plays an "administrative" role: its main purpose is to obtain better information on F-gas production and use. Information on quantities of F-gas is required for the preparation of Slovenia's GHG inventory. Current problems with the scheme relate to the fact that F-gases can be purchased at lower prices outside Slovenia, where a tax does not apply, and that tax rebates for recovered F-gases for reclamation and destruction are not part of the scheme. Amendments of the existing regulation are being discussed in order to improve the effectiveness of the tax scheme.

4.2. Emission trading

Slovenia has participated in the ETS since the launch of the system in 2005, adopting a National Allocation Plan for the 2005-07 pilot phase in March 2004. It budgeted its free allocation of emission permits for the 98 installations in the system based on emissions during a 1999-2002 base period, along with forecasts of power generation and best available techniques (BAT) benchmarking. Emissions from ETS participants accounted for 60% of the country's GHG emissions in 2002. In projections for the period 2005-07, it was considered likely that this share would remain constant. However, ETS participants accounted for 44% of GHG emissions in 2007, a share that was further reduced to 41.6% in 2008 and 40.3% in 2009.

Except in 2005, when the allocated allowances exceeded verified emissions, Slovenian emissions from ETS installations were too high during the scheme's first phase. By 2007, verified emissions were 9.7% higher than the annual allowances. Emissions by ETS participants continued to increase during the first phase until 2008, when they began to decline. The more stringent cap during the current phase has reduced the gap between verified and allocated emissions; the former were about 8% higher than the latter in 2008.

The economic and financial crisis led to a sharp decline of more than 11% in emissions from ETS installations between 2008 and 2009. Installations in many other EU countries had a surplus of allowances in 2009 and 2010. This was also the case in Slovenia, where 2009 was the first year since 2005 in which verified emissions were below allocated allowances (although by less than 2%) (Table 4.3).

In general, Slovenia has been successful in implementing the ETS. It was one of very few countries whose National Allocation Plan for 2008-12 was approved by the European Commission with only minor changes.[8] The ETS raised awareness among operators about carbon emissions and, in particular, stimulated investments in CHP. However, little analysis has been carried out on interactions between a cap-and-trade system and other

Table 4.3. **Slovenian ETS installations: Allocated and verified emissions, 2005-10**

t CO_2

	2005	2006	2007	2008	2009	2010
Allocated allowances	9 138 064	8 691 991	8 245 914	8 214 360	8 216 051	8 211 775
Verified emissions	8 720 548	8 842 181	9 048 633	8 860 105	8 067 023	8 129 855
Difference (%)	*4.57*	*–1.73*	*–9.73*	*–7.86*	*1.81*	*1.00*

Source: EU Community Independent Transaction Log (CITL).

policy instruments that address the same types of emissions from the same sources. When a cap is binding, it determines the environmental outcome of the instrument mix directly as long as it remains unchanged. Under these circumstances, adding other policy instruments does not cause further emission reductions, but instead creates room for other sources covered by the cap to increase their emissions. However, other policy instruments may be intended to achieve other policy objectives or to address specific market failures. Thus, any overlap in policy instruments requires careful analysis to ensure the overall cost-effectiveness of policy measures.

Slovenia is actively preparing for the third phase of the ETS starting in 2013. It will see a tightening of the emissions cap, a much higher number of auctioned allowances (all in the power generation sector), and expansion of the scheme to include N_2O and perfluorocarbon emissions from certain processes, as well as from the aluminium and aviation sectors. Operators have assessed the indirect impact of the ETS on decisions to invest in GHG emission reductions thus far, given that allowances have been allocated at no cost. However, more stringent caps, less-free allocation, and other air pollutant regulations have given operators under the scheme greater incentive to improve their efficiency and switch to less polluting fuel sources.

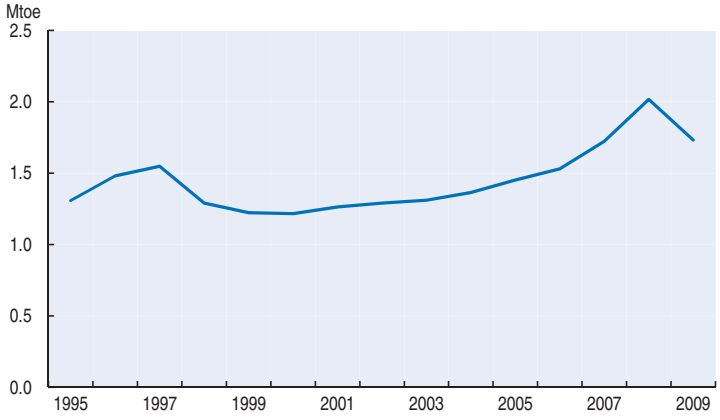
In the third phase, countries will be able to "opt out" installations with emissions of less than 25 000 t CO_2 per year and a capacity of less than 35 MW. These installations must be subject to "equivalent measures". Since ETS installations have been exempt from paying the CO_2 tax up to now, Slovenia is considering changes to the tax to ensure that such installations can be opted out of the ETS and still be covered by another CO_2 control measure.

5. Policies and measures in the transport sector

Slovenia's transport policy, which has focused on the implementation of motorway and road infrastructure projects during the last five years, has contributed to rapid increases in energy use and in the share of GHG emissions generated by the transport sector (Figures 4.2 and 4.9). These GHG emissions have increased on average by 1.3% per year since 2000.

Since 2000-02, domestic road traffic and international transit have increased considerably, particularly with respect to freight. Road transport accounted for 99% of final energy consumption by the transport sector in 2008. In 2009, 84.7% of all freight was transported by road while 86.5% of all inland passenger transport was by passenger vehicles; this compares with 2003 levels of approximately 70% and 83.5%, respectively. At 53 vehicles per 100 persons in 2009, Slovenia's level of private car ownership was higher than the OECD and OECD Europe averages (50 and 44 vehicles per 100 persons, respectively). In the same period, the number of passengers using municipal public transport fell by approximately 40% and public bus service declined by nearly 50% in passenger-kilometres (Figure 4.9).

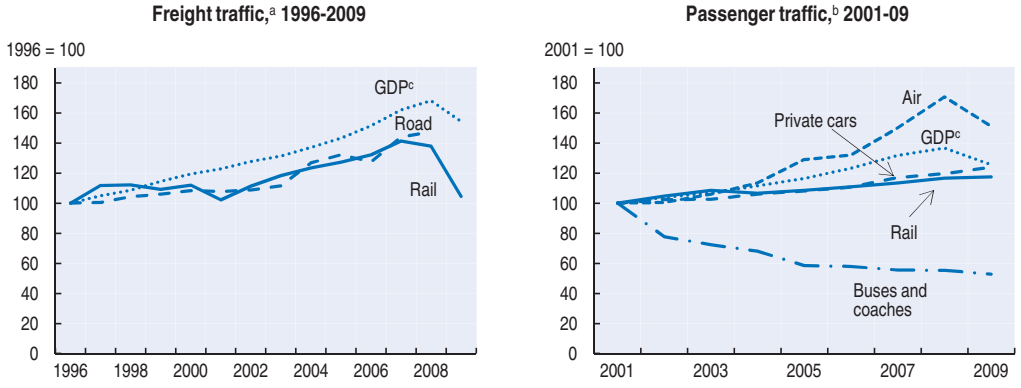
Figure 4.8. **Total final energy consumption by the transport sector, 1995-2009**



Source: OECD-IEA (2011), *Energy Balances of OECD Countries.*

StatLink http://dx.doi.org/10.1787/888932595719

Figure 4.9. **Freight traffic and passenger traffic**



a) Index of relative change since 1996 based on values expressed in tonne-kilometre. Break in time series in 2001.
b) Index of relative change since 2001 based on values expressed in passenger-kilometre.
c) GDP at 2005 prices and purchasing power parities.
Source: OECD, Environment Directorate.

StatLink http://dx.doi.org/10.1787/888932595738

Passenger-kilometres for rail transport have steadily increased since 1992 (by over 16% between 2000 and 2007). Rail's share of overall passenger transport has remained steady at a low level of about 6%, despite an increased share of public infrastructure investments intended for Slovenian railways (14% in 2008 compared with 5% in 2000). Responding to widespread public criticism, the government plans to increase investments in the neglected railway networks. However, these projects have not yet been financed and are not under way due to the slow design of specific projects and lengthy permitting procedures. Improvements to the railways are needed to provide an alternative to transport of freight by road, particularly in view of Slovenia's importance as a transit country for freight transport.

Several municipalities are redeveloping their public transport systems, which were well developed in many areas prior to 1990. In Ljubljana, 24 bus lines cover 97% of the municipality, providing most citizens with the nearest stop within less than 500 metres. Ljubljana's public transport company has also tested the use of hybrid engine busses. The Ljubljana Urban Region is developing a system of high-mobility public transport corridors

that connect the northern and southern part of the city and carry passengers towards neighbouring municipalities. The system includes separate bicycle paths, special lanes for buses, and park-and-ride facilities.[9] The region also seeks to implement an Integrated Public Passenger Transport (IJJP) system that would allow use of a single ticket for rail and both intra-city and inter-city public buses. The pilot project, to be implemented through 2015, will aim to serve as an example for other municipalities. However, many commuters use cars as longer distance public transport (especially rail) is less developed.

While initiatives are beginning to be taken to address the lack of alternative transport systems for passenger and freight transport, shorter-term measures to improve the efficiency of road transport and limit GHG emissions are already being carried out. A major step was taken in March 2010, when a reform of the motor vehicle tax linked the tax rate to vehicles' CO_2 emissions instead of to their sale price, as had been the case between 2000 and 2009.[10] The CO_2 tax applies to the pre-tax price of vehicles, starting at emissions of 110 g CO_2/km. It ranges from 0.5% to 28% for petrol vehicles, with the highest rate applied to those emitting over 250 g CO_2/km, and from 1% to 31% for diesel vehicles. Hybrid and all-electric vehicles are subject to the same rates as petrol powered ones, placing them at the bottom of tax rate scale. The highest CO_2 tax rate is applied to any vehicle on which CO_2 data are lacking. The reform also addresses other environmental criteria, according to European emission standards.[11] Tax rates for passenger vehicles, motorcycles and camper vans are increased by 10% for vehicles below the Euro 3 standard, and by 2% for those above Euro 4. The rate is increased by 5% for diesel vehicles whose PM emissions are more than 0.005 g/km. While consumers can easily determine CO_2 levels and fuel efficiency due to labelling requirements, information on PM emissions is not communicated as clearly.

Transport fuels are also subject to high levels of taxation, including an excise duty and the energy efficiency levy. Taxes make up over 60% of the final price of petrol (Figure 1.6), but they represent just below 60% of the price of diesel. Diesel is therefore 4-6% cheaper than petrol despite the greater environmental externalities of the former (Chapter 1).

Looking forward, the Government Office for Climate Change has supported the development of pilot infrastructure for the use of electric vehicles. With a moderate initial investment of EUR 16 million, implementation of this programme should be facilitated by Slovenia's strong expertise in the automotive industry (which is an important export industry). Slovenia currently manufactures approximately 50% of the parts needed for electric vehicles. The programme includes provision of subsidies for the purchase of new electric vehicles through the Eco Fund; introduction of public charging facilities in parking areas, in partnership with electricity providers; and skills training and capacity building for the planning, production and servicing of electric vehicles and their associated infrastructure. The costs and benefits of this scheme should be kept under review, and the level of subsidy adjusted in line with the objectives of reducing both CO_2 emissions and local air pollutants cost-effectively and creating a level playing field for no/low polluting alternatives to vehicles powered by fossil fuels.

6. Agriculture and forestry

Slovenia estimates that its forests store three to four times more CO_2 than can be used to meet its GHG emission reduction obligation under the Kyoto Protocol, as current felling rates are far below annual growth rates. The increase of wood stocks in existing forests is

one of the main reasons Slovenia's LULUCF GHG inventory sector's net sequestration of CO_2 has been growing.

While forests in Slovenia are subject to a number of different ownership regimes (public and private), the Forest Service has jurisdiction over forest management plans, as well as authorisation to fell and carry out other activities. The 1996 National Forest Development Programme was updated in 2007 under the Resolution on the National Forest Programme, which designated sustainable forest development and management as a fundamental objective. Forest management plans with a validity of ten years (current plans are in effect from 2011 to 2020) stipulate maximum felling rates. The previous maximum rate was 4 million m^3/year, although this level is set to be increased. Sound forest management could allow Slovenia both to increase felling rates and to ensure sufficient carbon sink capacity to meet its Kyoto commitment. This is planned under the 2007 National Forest Programme. Plans to increase managed felling in forests, currently estimated at only 68% of what could be felled sustainably, are a key instrument to increase use of biomass for energy production.

Slovenia has successfully reduced emissions from agriculture using various means. Fertiliser use has been reduced, limits have been imposed on the number of cattle on a given area of land, and requirements are in effect for manure storage and use. Several of these requirements are the result of a regulation on water pollution by nitrates from agricultural sources. Efforts in the agricultural sector currently target livestock breeding, with the aim of reducing the level of GHG emissions per unit of milk and meat production. An interactive web-based application launched by the MAFF allows dairy farmers to track their GHG emissions. By the end of 2009, this tool covered 78% of dairy cows. Data on the efficiency of beef production are also available, and a tool to be used in GHG emissions tracking for cattle is currently under development.

Instruments to subsidise the construction of biogas facilities using livestock manure are in place to reduce methane emissions while promoting renewable energy production. Slovenia should further promote integrated farming that more effectively uses nitrogen from livestock production for crop fertilisation, as well as increasing the number of grazing cattle. These two measures have been identified by the government as having potential to reduce GHG emissions from agriculture. However, their implementation has been hindered by the fragmented nature of farming in Slovenia, which is characterised by small, dispersed holdings.

7. Renewable energy and energy efficiency policies

Slovenia's renewable energy and energy efficiency policies have become increasingly complementary as it aims to reach the 2020 renewable energy targets outlined in its National Renewable Energy Action Plan of 2010, under the EU Directive on promoting the use of energy from renewable sources (2009/28/EC). The framework for energy efficiency is provided by the 2008-16 National Energy Efficiency Action Plan. The Ministry of Economy has administrative responsibilities for both policy areas.

Slovenia recognises that meeting its ambitious 39.3% target for renewable energy in final electricity consumption will be challenging. Given that it intends to primarily develop the use of biomass, stringent requirements for PM_{10} emissions from biomass equipment are in place for related subsidy schemes; these requirements are essential due to air pollution concerns. In the building sector, increasingly stringent efficiency requirements for buildings and measures to promote low-energy, passive and positive-energy buildings

will complement and promote the use of small-scale renewable energy sources for heating, cooling and power. Measures have also been taken to encourage improvement of the existing building stock, including soft loans to households. Slovenia's feed-in tariff and feed-in premium support scheme for electricity production applies to both renewable energy sources and high-efficiency CHP. The scheme covers approximately 600 power plants with a total installed capacity of about 210 MW, not counting biomass co-firing facilities. They are mainly hydro and solar photovoltaic (PV). Under the ETS, further emission reductions are unlikely to be obtained by applying additional policy instruments to the same emissions from the same sources, as long as the cap is unchanged. If an additional instrument in practice contributes to reducing the costs of complying with the cap, it could, however, contribute to a stricter cap being set in the future on the assumption that such considerations are taken into account when future caps are set.

7.1. Renewable energy

Slovenia has promoted the use of renewable energy since the early 1990s, when the Eco Fund began to support the purchase of solar collectors and biomass boilers. Such financial support has continued, with the Eco Fund granting soft loans to municipalities, municipal and private companies, and households for investments in renewable energy, as well as loans and grants to households for solar heating equipment and biomass boilers. The Agency for Energy Efficiency and Renewable Energy (AEERE) also provides subsidies for such investments to municipalities and private companies. In addition, a price support mechanism has been in place since 2002 to support production of electricity from renewable energy sources (Box 4.2).

The share of renewable energy in final energy consumption has been decreasing since 2000. It was 14.3% in 2009.[12] This trend largely reflects a significant increase in energy consumption, which has not been matched by corresponding increases in renewable energy generation; between 2002 and 2008 gross final energy consumption increased 2.4 percentage points faster than final energy consumption from renewable energy sources. From 2008, the share of the latter would need to increase by 0.9% per year for Slovenia to meet its target of achieving a 25% share for renewable energy in total final energy consumption by 2020. One of the renewable energy challenges the country faces is how to ensure that measures are compatible with meeting other obligations, *e.g.* under Natura 2000 (Chapter 2) or for end-of-life-cycle waste management.

Meeting the target of 10% renewable energy sources in final consumption in the transport sector is particularly challenging for Slovenia, given that it started with a very low share in the 2005 reference year (0.27%) while energy consumption in this sector has grown sharply.

Electricity

Slovenia's target was to achieve a 33.6% share of renewable energy sources in electricity generation by 2010 under the ReNEP. The actual share has fluctuated significantly since 2000, largely due to the variability of hydropower and increases in electricity demand. It was 31.7% in 2000, decreased to 22.1% in 2007, and increased again to 29.1% in 2008. Favourable hydropower conditions and lower electricity demand due to the economic and financial crisis led to a 36.8% share of renewable sources in 2009 and 34.4% in 2010. The government expects that in 2011 this share will have decreased once again, to just below 30%.

A feed-in tariff and feed-in premium support scheme for renewable electricity and high-efficiency co-generation have been in place since 2002, providing qualified producers of renewable electricity with the option of choosing between a feed-in tariff (a higher standard annual price) or an annual premium paid on top of the electricity price received on the market, also called "operating support".[13]

Since January 2009, the Centre for RES/CHP Support of the Slovenian power provider Borzen has been responsible for operating support schemes for renewable energy and high-efficiency CHP. Renewable electricity support schemes were revised in November 2009, increasing the length of contracts to 15 years and the size of projects eligible for operating support to 125 MW; stipulating that technology costs are to be reviewed every five years; and generally providing more transparency and stability to feed-in tariff and premium levels.

Under the feed-in tariff or "guaranteed purchase" scheme, Borzen must purchase electricity from renewable sources from system operators that are qualified producers, and from systems whose capacity does not exceed 10 MW. Reference costs for specific technologies are made up of fixed costs (set every five years) and a variable portion of the costs, adjusted each year where changes in the costs of inputs and the reference market price of electricity are relevant. Various types of technologies are supported (wind, solar, biomass, biogas, geothermal and hydro), although biomass co-firing facilities are only eligible for operational support. Hydro facilities are eligible as long as they do not disrupt river flow. Feed-in tariffs are paid on a contractual basis for a period of up to 15 years; only solar PV is subject to price adjustments, as reference costs will decrease by 7% per year in the period 2010-13 compared with the 2009 baseline level. However, changes in regulations led to a 2011 reference price for solar PV that was 20% below the one for 2009 rather than 14%. Higher feed-in prices for building integrated solar PV were set to end at the end of 2011. Interactions between such instruments and the ETS and their impacts on the overall CO_2 reduction are not well understood. Part of the rationale given for their use in conjunction with cap-and-trade schemes is that they could make it possible to set a stricter cap in the future. In the short to medium term, such instruments will reduce emissions from some of the capped sources and free up emission allowances, causing allowance prices to decrease and emissions to increase elsewhere within the capped system. The reduced allowance prices will (marginally) reduce the incentives for all other sources to develop new abatement technologies, and the profitability of devoting time and resources to develop such technologies will (marginally) be reduced.

Plants larger than 10 MW are only eligible for operating support; such plants have individual contracts on the electricity market and separately receive a premium from the Centre for RES/CHP Support, representing the difference between the market price and the "guaranteed purchase" price. The level is determined *ex ante* on an annual basis, according to the technology.

Transport

Slovenia has several policies to encourage the use of biofuels and to meet targets agreed under the EU Directive on the promotion of energy from renewable sources (2009/28/EC). Since 2007, pure biofuels are exempt from excise duty payments and biofuel blends are exempt, commensurate with the proportion of blended biofuel (not to exceed 5%). In addition, targets have been imposed on fuel distributors to ensure the annual average biofuel content of all transport fuels placed on the market. Initial target levels have been reduced, however, due to large price fluctuations for biofuels and the mineral fuels with which they

are blended, making the target more expensive to meet than expected. The target for 2009 was decreased from 4% to 2%. Over 90% of biofuels in Slovenia are imported. The government plans to increase the supply of domestically produced biofuels, particularly biodiesel, between 2010 and 2015.

Slovenia plans to encourage the use of biofuel powered vehicles, along with measures to promote the use of such vehicles in public transport and the public sector.

Heating

The use of renewable energy sources for heating and cooling is considered to have the greatest potential for increase in Slovenia, partly because of the availability of wood biomass, the country's largest renewable energy source. The Eco Fund supports the purchase and installation of high-efficiency and low-polluting wood biomass boilers since outdated and inefficient biomass heating facilities contribute to PM emissions. Standards for biomass boilers supported by public subsidies aim to modernise existing biomass heating for residential buildings and district heating systems. Using renewable energy sources for heat will also benefit from more stringent building regulations requiring that 25% of energy supply in new and significantly renovated buildings be provided from renewable energy sources.

The planned increase in the use of biomass for co-firing in district heating systems will require the upgrading of existing district heating networks, as well as possible further development. Slovenia is also actively exploring the potential of geothermal energy use. In addition, the Ministry of Economy is working on rules to ensure that municipal Local Energy Plans incorporate objectives relating to the use of renewable energy sources for heating and cooling.

7.2. Energy efficiency

As outlined in the 2008-16 National Energy Efficiency Action Plan (NEEAP), Slovenia aims to achieve cumulative savings of 9% in energy consumption in the period 2008-16 compared with the 2001-05 base period, or 4 261 GWh. While energy efficiency policies have been in place since the mid-1990s, the Action Plan will only count savings achieved through measures implemented before 2007 should the target under the EU Directive on energy end-use efficiency and energy services (2006/32/EC) not be met.

The NEEAP is a comprehensive document that demonstrates the range of policy measures which have been implemented across all sectors, but delays in implementation risk eroding its energy-saving potential. Funding for implementation of the NEEAP, while clearly indicated, became available primarily from 2010 onwards. Various measures outlined have not yet been developed, or are in the very early stages of implementation.

Slovenia has followed EU legislation requiring standards in the area of energy efficiency that are regularly revised and strengthened, including for appliances, building codes and vehicles. Complementing regulatory measures, it has made use of economic instruments including taxation, loans and subsidies to promote greater uptake of energy-efficient appliances, equipment and building components.

Such measures appear to have been successful in reducing energy consumption in the residential sector during the past five years. In the building sector, increasingly stringent building codes in line with the EU Energy Performance of Buildings Directive (EPBD) (2009/91/EC) may have played an important role since consumption has decreased while construction in the residential sector steadily increased up to 2008, along with the average

floor space of residential buildings. Regulations have been combined with Eco Fund subsidy schemes for efficient building components and have generated growth in new markets, notably high-efficiency windows and external insulation. Full implementation of energy performance certificates for buildings, consistent with the EPBD, should further facilitate and strengthen the market transformation potential of support policies.

Starting in 2008, Slovenia implemented changes to its loan and subsidy scheme through the Eco Fund to target energy efficiency improvements in the residential sector, which is estimated to deliver the largest share of savings in the NEEAP (Box 4.2).

Borzen also operates a support scheme for high-efficiency combined heat and power (CHP) generation, in parallel with that for renewable energy sources. The scheme operates in a similar manner, with a guaranteed price and operating support, except that only small CHP facilities can choose among support types; a plant larger than 1 MW is only eligible to receive operating support. In addition, contracts for high-efficiency CHP plants run for 10 rather than 15 years. Operating support levels favour smaller plants (with annual operating hours below or at 4 000), as well as those using wood biomass rather than fossil fuels.[14]

In early 2010, under the Energy Act, Slovenia implemented a so-called "energy efficiency levy", applied on top of the excise levy, on road fuels (EUR 0.4/l for petrol and EUR 0.2/l for diesel), heating oil (EUR 2.2/l) and industrial low-sulphur fuel, as well as on electricity (EUR 0.5/MWh) and gas (EUR 0.5/m^3). In practice, this levy is not more energy efficiency-related than the other excise taxes on these fuels. The "energy efficiency" linkage stems from the fact that the revenue (approximately EUR 26 million in 2010) is used for energy efficiency investments. In 2010, half the revenue was used to support the Eco Fund's household subsidy scheme. This was expected to support efforts by large energy suppliers to implement demand side management schemes, which were to be approved by the Eco Fund in 2011.

Under the 2009 regulation on energy savings ensured to end-users, large suppliers of electricity and heat are required to achieve 1% annual energy savings by supporting demand-reducing investments among non-residential end-users, namely private companies and primarily small and medium-sized enterprises (SMEs). Defined according to total energy sales of more than 300 GWh/year of electricity and 75 GWh/year of heat, this regulation affects approximately 12 suppliers. Upon approval of their energy-saving plans by the Eco Fund, suppliers will have access to the energy efficiency levy from their electricity and heat sales to implement their programmes. However, in the long run the availability of funds will be reduced as the more they contribute to reduced consumption, the less revenue the levy will generate. Targeting SMEs under the supplier scheme would effectively fill a policy gap in the area of energy efficiency, where such companies are not well covered. Although energy does not typically represent a large cost component for enterprises of this size, given their prevalence in Slovenia[15] and specific barriers faced by such companies in implementing energy efficiency measures, a targeted scheme could collectively have a positive impact on energy use.

From 2005 to 2008, companies not covered by the ETS were exempt from payment of the CO_2 tax if they implemented energy-saving programmes and reduced emissions by 2.5% by the end of 2008 compared with a given base year. This scheme is no longer in place. While the tax would be the best option, it appears that its reintroduction is politically difficult. In current discussions on tax reform a similar scheme is being considered, with exemption from payment of the tax to require taking energy-saving measures. However, it may be more efficient and effective for these companies to be required to pay the CO_2 tax.

The 2009 Green Public Procurement Action Plan sets specific targets and measures to achieve environmental and energy efficiency in public procurement. The Plan aims for 50% of public procurement to include specific "green" criteria by 2012. This target is broken down according to eight product groups under sub-categories including construction (30%), transport (40%) and electricity (100%). Essential measures to achieve these targets are the adoption of mandatory green criteria, training the procurers, and establishing a dialogue between procurers and suppliers. To this end, a Decree on Green Public Procurement was adopted in December 2011. It requires that green criteria be included in technical specifications, selection and award criteria, and contractual clauses. For a transitional period up to 1 January 2013, most procurers are obligated to include green criteria solely as an award criterion, while public authorities and self-governing local communities must include green criteria both as an award criterion and as a condition (technical specification, selection criteria and contractual clauses). In order to gradually prepare the market for the introduction of green criteria in public procurement and to develop cases of good practices which may be communicated and transferred to other procurers, several centralised procurement purchases carried out in 2009 and 2010 included low-emission personal and light-duty vehicles, high-efficiency IT equipment (rated according to Energy Star standards), and an offer for 60% of electricity supply to come from renewable energy sources.

Some successful public sector initiatives in school buildings have been under way to introduce "energy bookkeeping" in schools, including audits and use of energy management systems. Such initiatives have been led by the School Centre Velenje, one of Slovenia's largest public education centres. It implemented an energy management programme, starting in 2000, and reduced its annual CO_2 emissions by over 40% between 1998 and 2009. It has since shared its experience in energy management and is involved in training programmes for energy management in other educational institutions.

Slovenia's Energy Advisory Network (EnSvet) offers consumers information on both renewable energy and energy efficiency investments.[16] In 2000, EnSvet had 24 energy advisory offices and five subsidiaries established by municipalities; in 2010 it had 36 offices covering all of Slovenia at a maximum distance of 20 km from each other. In 2008, EnSvet provided consumers with over 6 000 written consultations and 10 000 brief advisory services. For a 2008 budget of EUR 605 500, EnSvet estimates that the advice offered resulted in annual fuel savings of 30 3000 MWh and CO_2 reductions of 7.9 Mt. Funded annually by the Ministry of Economy, EnSvet is set to increase its activities up to 2016 in order to meet energy-saving targets.

As part of measures aimed at improving the efficiency of energy supply and demand, and to create favourable conditions for greater use of renewable energy, Slovenia's transmission and distribution system operators have included goals for "smart" metering and network development in their ten-year development plan. Smart metering has been introduced in all distribution networks (approximately 6% of customers are equipped with such meters). It is expected that these meters will be provided during the next five to six years for electricity, gas and water use, at an estimated cost of EUR 200 million. More than 30 R&D projects are currently under way, involving smart grids and networks including transmission and demand-side management. However, the net impacts of these efforts on CO_2 emissions are not well analysed as, in addition to potential overlaps with the ETS, there are indications that such meters may lead to less gross energy savings that expected.

8. Climate change impacts and adaptation

Strategies and measures related to adaptation to climate change are largely under development, as in most other OECD countries. An assessment of potential impacts and the vulnerability of natural and social systems to such impacts is currently lacking, which makes strategic policy planning difficult.

Climatic and hydrological data indicate increases in the mean annual temperature. The principal impacts determined thus far are on precipitation levels. Although annual rainfall remains close to the long-term average, some regions are experiencing higher incidences of flooding while others are experiencing higher incidences of drought. River flow regimes are also impacted by higher than average temperatures, variable rainfall, and a shorter duration of snow cover. Two small glaciers in Slovenia lie at low altitudes and are particularly vulnerable to climate change. River flows could also be affected by glacier melt elsewhere in their watersheds, notably in the Central Alps of Austria where Slovenia's two major rivers, the Drava and the Mura, originate. Further studies are required to project the potential impacts of climate change to the end of the century, particularly as they relate to water supply.

An adaptation action plan has been developed for the agricultural sector and measures are being taken to protect against floods in coastal areas, including strengthening ports and protecting urban areas and drinking water supply systems. While no comprehensive risk and vulnerability assessment has been carried out, the sectors considered most vulnerable to impacts (where measures are to be prioritised) include: spatial planning, building construction and renovation, construction and management of public infrastructure, water management, coastal zone management, agriculture, forest management, and protected natural areas. The planned Climate Change Act should initiate risk assessments of impacts and vulnerability for all regions of the country.

Notes

1. This refers to CO_2 emitted from the calcination reaction during cement production, which generally accounts for about half of total cement sector emissions. Most of the remainder is from fuel combustion, which (following IPCC guidelines) is categorised under emissions from energy and not under industrial processes.
2. In other words, they absorbed more CO_2 than they emitted.
3. The Kyoto Protocol base year is usually 1990. Countries undergoing the process of transition to a market economy may use a different year (Article 3, paragraph 5). In Slovenia's case the base year for CO_2, CH_4 and N_2O emissions is 1986, and that for emissions of F-gases is 1995. Base year GHG emissions were approximately 20.2 Mt CO_2 eq.
4. Total primary energy supply (TPES) has grown steadily since the early 1990s, with significant increases in oil products until 2008. Hydro and nuclear power made up over 20% of TPES in 2008.
5. The emission ceilings in the Protocol (agreed in 1999) are equal to those in the NEC Directive.
6. The landmark feature of the Trbovlje power plant is its 360 metre high smoke stack, constructed in 1977 and considered the tallest chimney in Europe. It ensures that emissions from coal burning are dispersed away from the deep, narrow river valley where the power plant is located.
7. The Ministry of Economy has been responsible for energy policies since 2005.
8. Slovenia was requested to provide more information on how new entrants would be treated. It was also required to limit the use of Kyoto Protocol flexible mechanisms for compliance to 15.7% of total allocated allowances.

9. One park-and-ride (P + R) facility started operations in the northern part of the corridor in October 2010. It has 1 280 parking places at the price of EUR 2, which includes daily parking and two bus tips. A second P+R facility is planned in the southern part of the city.
10. The CO_2 tax applies to passenger vehicles. Revisions of the motor vehicle tax have also been applied to motorcycles and camper vans based on engine size.
11. European standards introduce limits for a range of pollutant emissions according to vehicle type, covering CO, NO_x, PM, hydrocarbons (for petrol, liquefied petroleum gas and natural gas vehicles) and combined hydrocarbon and NO_x emissions (for diesel vehicles). The highest standard is currently Euro 5. The Euro 6 standard will come into force in 2014. Most vehicles in Slovenia meet the Euro 5 standard.
12. Final consumption from renewable energy sources in 2008 was primarily for heating and cooling (52%), followed by electricity (46%) and transport (2%). The share of renewable energy sources in heating and cooling was lower than for electricity, at 20% in 2008, while that for transport reached 1.22%.
13. Qualified producers must submit annual applications for the extension of their status and report annually on the amount of electricity generated and consumed. The feed-in tariff and premium scheme is based on the submission of guarantees of origin certificates proving renewable energy production.
14. Brozen's method of determining reference costs of electricity for the support scheme factors in both operating hours and electrical efficiency. For fossil fuel CHP, the reference cost is that of natural gas. For other fossil fuels, CO_2 emissions of less than 600 kg CO_2/MWh(el) must be achieved.
15. In 2007, 93.5% of businesses in Slovenia were micro-enterprises (up to 10 employees), 5.1% were small (10-49 employees) and 1.2% were medium (50-249 employees).
16. It has been operational since 1993, after starting as a programme funded by both the Slovenian Ministry of Economy and the Austrian Styrian Energy Agency.

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PART II

Chapter 5

Waste Management*

Slovenia's accession to the EU provided a strong impetus to strengthen the country's waste management policies and practices. It also provided finance for upgrading and constructing waste management infrastructure. This chapter reviews overall use of materials by the Slovenian economy and changes in resource productivity. It also presents trends in the generation and treatment of municipal and manufacturing waste, including hazardous, as well as waste from construction and demolition activities. The chapter takes stock of policy initiatives and legal reforms, including those that aim to reduce waste generation, encourage recycling, and ensure safe disposal of various waste streams. It discusses the environmental and economic implications of recently implemented measures such as Extended Producer Responsibility and a landfill levy, as well as the reform of waste collection charges. Progress in remediating contaminated land is also examined.

* This chapter reviews progress in the period 2000-11. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Assessment and recommendations

At the beginning of the decade, waste management was considered one of the most poorly regulated areas of environmental protection in Slovenia. Close to 100% of waste was disposed in landfills, which did not always meet the highest standards, and the waste recovery rate was low. Illegal disposal of waste, especially in karstic areas, was common.

Accession to the EU provided a strong impetus to strengthen waste management policies and practices. It also provided finance for upgrading and constructing waste management infrastructure. Implementation of the EU environmental *acquis* was operationalised in a number of programmes, including two National Environmental Action Programmes (2000-05 and 2005-12) and several operational programmes for different waste streams. Policy has largely been driven by compliance with EU directives rather than by the situation in Slovenia. The need to transpose the revised 2008 EU Waste Directive, and to develop a new programming framework beyond 2012, provides an opportunity for Slovenia to develop a more systematic and consistent strategy for waste management that strikes a better balance between implementing EU policies and addressing Slovenian priorities, taking account of the costs and benefits of alternative ways of managing its waste. Given that implementing the requirements of the EU Landfill Directive to pre-treat waste sent to landfill will be difficult because the definition in the Directive is unclear, Slovenia should establish a less stringent pre-treatment target, and one not based on total organic carbon as this restricts the forms of pre-treatment which can be used.

The overall use of materials by the Slovenian economy increased by one-quarter during the review period, but remained around half of the OECD and OECD Europe averages on a per capita basis. Material productivity (*i.e.* economic output generated for each unit of abiotic primary material consumed) decreased by 4% in the 2000-07 period, which compares poorly with the OECD average of a 12% increase during the same period. However, these trends have been strongly influenced by the increased share of construction materials in domestic material consumption. Material productivity increased for the first time in the decade in 2008.

The system of data collection for material flows and waste is still developing, and some classifications have changed in recent years. This complicates performance assessment. Nevertheless, available information suggests that the amount of waste generated in Slovenia increased by over 40% from 2000 to 2007, falling back somewhat thereafter due to the impacts of the economic crisis of 2008-09. In 2010, non-hazardous waste from production and services accounted for 85% of waste generated. Of this, construction demolition waste accounted for a significant fraction, peaking at 37% of the waste generated in 2007. Municipal solid waste (MSW) has increased since 2000 at a slower rate than GDP and private final consumption. It accounted for 12% of total waste in 2010. Hazardous waste accounted for 1.5% of the total in the same year. During the second half of the decade, the amount of waste imported for recycling increased six times. This provides important business opportunities, but also requires careful monitoring and oversight to ensure appropriate treatment

standards. On a per capita basis, waste generation remained well below the OECD average relative to Slovenia's lower GDP per capita. This suggests that there will be further pressures to generate waste as incomes converge with the OECD and EU averages.

Slovenia has reduced its reliance on landfilling and improved the environmental integrity of existing landfills. The landfill gate fee increased significantly to cover aftercare costs. Recovery of municipal waste also increased, particularly in the period 2009-10, to 35% of the total. Separate collection of individual waste streams (including waste packaging, organic waste, batteries, waste electrical and electronic equipment, end-of-life vehicles and tyres) was important in this regard. However, further efforts are needed to improve separate collection to meet the national objective of recovering 55% of municipal waste. Producers should bear the costs of collection and recycling schemes, either directly or by fully reimbursing local authorities for providing these services. The government should set clear targets for recovery and recycling and specify related performance standards. These steps should be accompanied by vigorous efforts to prevent the generation of waste at source in industry and households.

Since the amount of biodegradable waste that goes to landfills is well in excess of the 2012 target of 28%, strengthened efforts are needed to establish effective systems for separate collection of kitchen and garden waste. This will require parallel development of adequate treatment capacity for the collected material, and of quality assurance schemes designed to develop confidence in the market for composts.

The landfill tax, in place since 2000, was an important factor in improving the operation and performance of landfills. However, this was mainly due to reinvestment of the revenues generated. The tax design appears to have had only a limited incentive effect on producers of waste in the production and service sectors, and to have provided perverse incentives for municipalities to continue landfilling. Some adjustments to the design of the tax, and the use of revenue, made in 2010 should improve its overall effectiveness. However, the current tax rate is low compared to the rates in many other European countries. Increasing it would provide greater incentives to reduce waste disposal in landfills.

The proportion of the population covered by regular municipal waste collection increased from 76% in 1995 to 96% in 2010. However, coverage varies significantly between municipalities. Waste management services are largely provided by a large number of relatively small public authorities. The level of recovery through charges for collection and treatment costs is low in some municipalities. There is no coherence or consistency between prices across regions/municipalities (*e.g.* either per capita, per tonne or per m^3), which makes the assessment of performance of different systems difficult. The transfer of pricing responsibility to local communities in 2009 (in the absence of an appropriate pricing methodology and an independent regulatory body) led to a substantial price increase, with no incentive to reduce costs or improve efficiency. A new methodology under preparation should encourage a more appropriate level of cost-recovery for operations, impose greater market discipline on service operators in setting prices, and provide better incentives for waste separation. These steps should be supported by widening kerbside/door-to-door systems for collection of recyclables, as well as increasing the number of the larger collection centres where the range of separately collected items is wider. Operators' performance should be benchmarked. The consolidation of service provision in larger units could help to reduce costs by realising economies of scale. Public concerns about locating waste facilities should be addressed through early and open consultation procedures.

Further measures are needed to reduce the generation of construction and demolition (C&D) waste. While recycling has increased, it is less than half of the total generated, well short of the EU target of 70%. To address this challenge, consideration should be given to the application of economic instruments, such as taxes on primary aggregates or refundable compliance bonds, as well as to ensuring that collection centres make provisions for receiving C&D waste. Better monitoring and tracking of the fate of wastes generated by C&D activities is also needed, including "auditing" of the mass flows of waste from C&D sites. Strengthening licensing and requirements for better registration of C&D deposits with the Environmental Inspectorate could help both to reduce the extent of illegal disposal and to increase the rate of recycling of C&D wastes. Better information is needed about the presence of asbestos in Slovenian buildings; about one-quarter of buildings still have asbestos-cement coverings. The improved information should be used to set up appropriate infrastructure to manage asbestos waste in an environmentally sound manner and mobilise adequate financial resources for such a programme.

Several contaminated sites exist in Slovenia, resulting from past industrial activities or from inadequate waste disposal and treatment. Several measures have been taken to limit water and air contamination and reclaim contaminated soil. However, progress has been slow due to the high costs and technical complexities of decontaminating the affected sites. In the short term, more detailed programmes should be developed for each site and adequate resources provided, using risks to human health and the environment as criteria to prioritise actions.

Recommendations

- Develop an overarching waste management strategy that takes account of EU requirements, Slovenia's specific conditions, and the costs and benefits of alternative ways of managing waste.
- Strengthen the information system for the generation, collection and treatment of different waste streams to allow better analysis of waste sources and trends, and of the performance of waste management operators, and to develop more effective policies for waste prevention, higher rates of recovery and recycling, and safe disposal.
- Review Extended Producer Responsibility schemes with a view to ensuring that producers bear the full costs of collection and recycling of their products.
- Clarify the definition of "pre-treatment" to be used in the implementation of the EU Landfill Directive without restricting the forms of pre-treatment that can be used; introduce quality assurance schemes for outputs of biowaste treatment in order to develop confidence in the market for compost products.
- Increase the tax on landfill with a view to capturing the full benefits of avoided disposal and providing better incentives for redirecting waste from landfills; promote co-operation between municipalities for the treatment of residual waste.
- Improve the recycling, re-use and recovery of construction and demolition (C&D) waste, for instance through improved licensing, reporting and registration of C&D deposits, auditing of the mass flows of waste from C&D sites, and greater use of economic instruments, such as a tax on primary aggregates and refundable compliance bonds.
- Conduct a survey of existing buildings containing asbestos, with a view to establishing a programme to manage asbestos-containing waste in an environmentally sound manner and mobilising adequate financial resources for such a programme.

1. Objectives, policies and institutions

1.1. *Legal and policy framework*

Slovenia's 1993 Environmental Protection Act (EPA), significantly modified in 2004, and the 2008 Decree on Waste Management are the basic legal instruments for waste management. They introduced the principle of environmentally sound management of waste, established the waste hierarchy, and set out detailed administrative procedures, including reporting, permitting and compliance control. The EPA also sets out the services to be provided by public utilities in the field of waste management, including collection, transport and disposal of municipal waste and its residues.

To support implementation of the legal framework set out by the EPA and the 2008 Decree, about 40 other decrees have been issued to address the management of specific waste streams. They include regulations on: waste landfilling, incineration and biowaste treatment; management of different waste streams (*e.g.* packaging, batteries, waste electrical and electronic equipment, used oils, end-of life vehicles, end-of-life tyres, waste plant protection products that contain hazardous substances); and monitoring emissions from waste treatment.

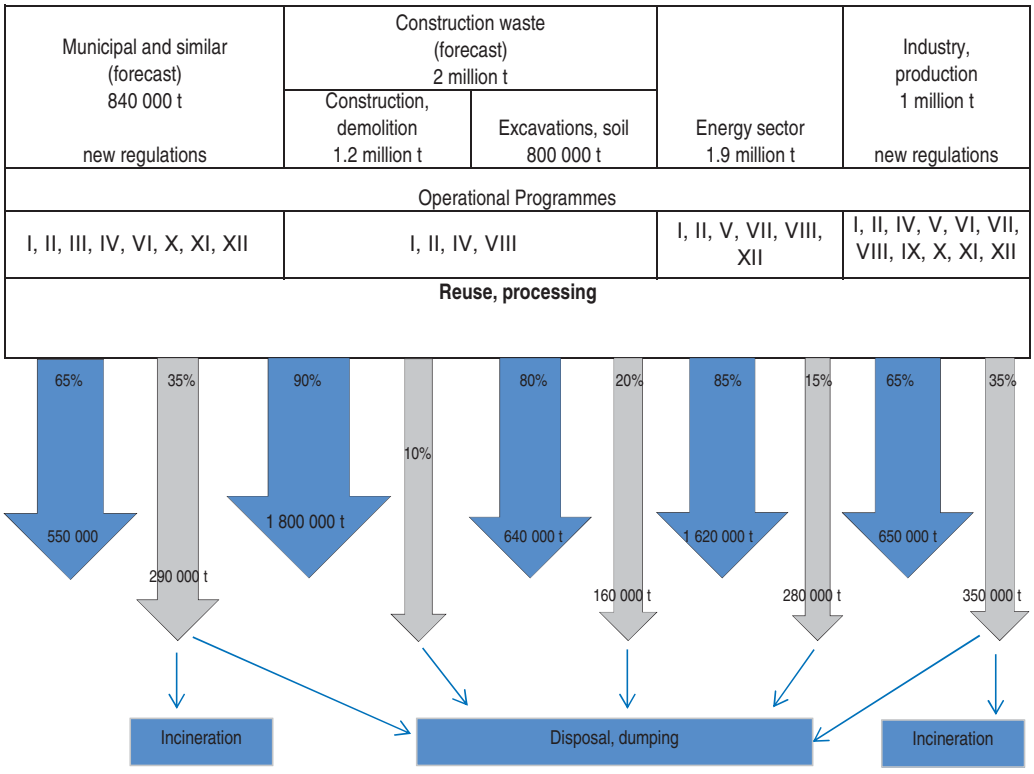
All major EU legislation on waste, including the Landfill Directive (1993/31/EC), the Waste Incineration Directive (2000/76/EC) and the Waste Shipment Regulation (1013/2006/EC), was transposed into Slovenian legislation in the run-up to, and following, accession to the EU in 2004. The legal requirements also cover, in substance, most of the provisions of OECD Council Acts on waste, particularly those in Recommendation C(76)155 on a Comprehensive Waste Management Policy. However, the 2008 EU Waste Framework Directive (2008/98/EC) established new concepts of waste management at the EU level, while allowing member states to specify the national measures and procedures they would use to achieve its objectives. Slovenia transposed the provisions of the new directive in its legal framework by the adoption of the Regulation on Waste in 2011.

The EPA gave rise to two National Environment Action Programmes (NEAPs) that set out objectives for different environmental themes, including waste management. The first NEAP (NEAP1 for 2000-05) established four objectives regarding waste management: to reduce waste generation and related risks at source; to increase material and energy utilisation of waste and reduce greenhouse gas emissions; to set up an effective waste management system; and to gradually eliminate "old" pollution sources. NEAP1 also noted that: "… waste management is one of the most poorly regulated fields of environmental protection in Slovenia." It acknowledged a lack of vertical and horizontal administrative and technical co-ordination and organisation; a lack of legal regulations and economic measures; and the NIMBY ("not in my backyard") and NIMET ("not in my election time") attitudes that were becoming more widespread in Slovenia. With respect to forward projections and ambitions, NEAP1 anticipated that the total volume of waste arising would decrease from 2000, mainly due to a decline in construction and demolition waste, with this decline somewhat offset by an increase in municipal waste. It also suggested that volumes sent to landfill would fall substantially, with more than 40% of waste thermally treated (with utilisation of the energy recovered) by 2010.

Ensuring environmentally sound waste management was one of the four main objectives of the second NEAP (NEAP2 for 2005-12), which aimed: "… to ensure that waste management and the use of renewable and non-renewable natural resources, which facilitates sustainable production and consumption, contributes to reducing environmental

pollution and energy consumption in such a way that an excessive burden is not placed on the environment." The ambitions expressed in the new programme represented a significant shift in emphasis. The emphasis on thermal treatment was much reduced, and the ambition to process (recycle) and reuse materials was correspondingly enhanced. NEAP2 established new recovery, recycling and reuse targets for separate waste streams, to be achieved by 2012 (Figure 5.1). Another difference between the two NEAPs was the increased emphasis on sustainable production and consumption. NEAP2 included a commitment to produce a "Sustainable Consumption Manual" to assist in promoting sustainable consumption. It proposed outlining how individuals could reduce or eliminate the negative environmental effects of their everyday behaviour.

Figure 5.1. **Projections for waste management under NEAP2 (2005-12)**



Source: Government of Slovenia, *Resolution on the National Environmental Action Programme 2005-12*, adopted 24 November 2005.

NEAP2 also set out a number of indicators for monitoring performance and established a special group made up of civil society representatives to monitor implementation. Once a year this group was expected to draft a report and present it to the Minister of the Environment and Spatial Planning, which would provide a basis for taking necessary measures to bring the situation into line with any new conditions.

Further implementation of waste policies was operationalised in seven Operational Programmes that address the management of some waste streams of concern.[1] The Operational Programmes included specific targets for each waste stream and implementation measures.

Assessment

The extent to which EU legislation has shaped (and continues to shape) Slovenian waste legislation has been profound, in that there are no targets in Slovenian waste legislation which do not relate directly to those found in EU directives. Consideration is currently being given to the need to re-shape national waste policy. This is motivated partly by insufficient progress in meeting the targets under Article 5 of the EU Landfill Directive, but also by the revision of the EU Waste Framework Directive. Another strong reason for revising existing policy and legislation is the gap emerging between observed performance and the targets set out in Operational Programmes under NEAP2, as in the case of the level of municipal waste recovery, recovery and recycling of specific waste streams or treatment of construction and demolition waste. However, there are few interim targets under the Operational Programmes and any performance gap emerging could yet be closed.

In seeking to improve its waste management policy, a clear challenge for Slovenia will be to develop its own distinctive approach to appropriate treatment and safe disposal of waste and to more sustainable materials management. The current approach requires changes whenever there are changes in EU policy. It would be desirable to have a policy in place that goes beyond a "just comply" mentality and initiates a future proof trajectory for waste management. For this to happen, the emphasis may need to shift from specific pieces of legislation designed to meet the targets laid down in EU directives, towards ensuring full implementation of measures to meet the targets in Operational Programmes. These targets appear to have been given too little weight in recent years, perhaps understandably since Slovenia has sought to implement, in earnest, the range of waste-related legislation included in the EU environmental *acquis*. An attempt to go in this direction was made in 2011 in a draft Operational Programme for Municipal Waste Management, but further work is needed to finalise it and expand this approach to other waste streams and look for synergies and trade-offs in their treatment and final disposal.

1.2. Institutional framework

The Ministry of the Environment and Spatial Planning (MESP) is the key institution responsible for establishing a regulatory framework and policies with respect to Slovenian waste and materials policy. Two people within the MESP's Department of Pollution Prevention are responsible for the development and co-ordination of waste policies, issuing the relevant legislation and developing Operational Programmes.

The Environment Agency (ARSO), which has 13 people working on waste, is the enforcement body for waste legislation. It issues permits, certificates, and authorisations on the basis of waste regulations. It also collects and manages data on waste management and maintains various registers (*e.g.* on operators providing waste collection, transport and recovery, dealers and brokers involved in waste management, suppliers of products linked with waste streams). The ARSO is the competent authority for implementation of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and of the EU Waste Shipment Regulation (1013/2006/EC).

Until 2004, specific environmental permits were not required for many activities, including waste management. The 2004 revisions to the EPA introduced such requirements according to the IPPC Directive (96/61/EC), and permits also became obligatory for the operation of waste management facilities. This enabled the Inspectorate for the Environment

and Spatial Planning (IESP) to carry out inspections of conditions as set out by the permit. The IESP also responds to complaints regarding environmental performance and identifies and responds to illegal waste disposal. In carrying out its functions, the IESP works through eight regional offices and co-operates with other bodies such as the Health Inspectorate and the Customs Service. The Customs Service is the key agency responsible for waste shipment control. Waste management is currently the activity that is subject to the greatest share of inspections (49% of the total). Many of these inspections are non-routine and are carried out in response to complaints about waste management. A considerable share of interventions is associated with lack of appropriate permits or illegitimate activities, rather than transgressions at permitted facilities.

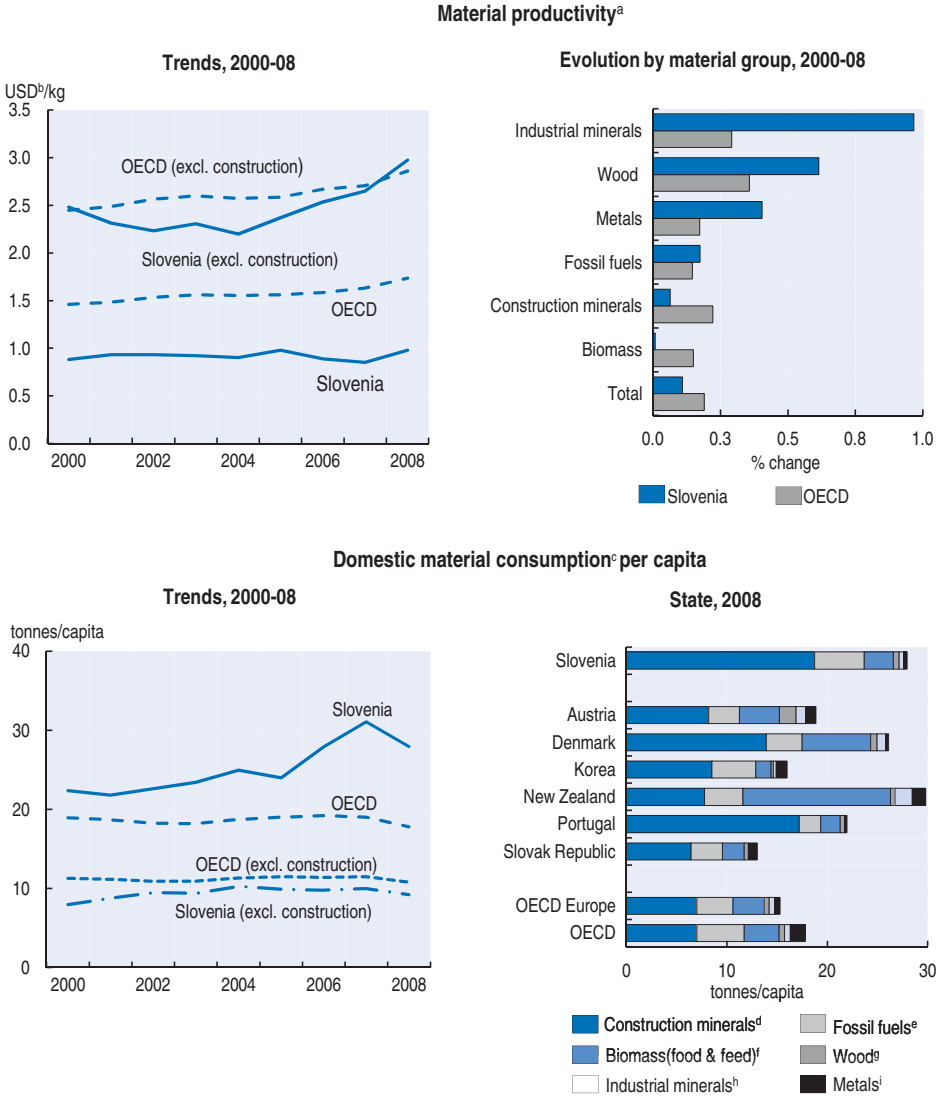
Waste collection and transport to waste management and disposal sites are the responsibility of the 211 municipalities, more than 100 of which have fewer than 5 000 inhabitants and 25 of which have fewer than 2 000. There is general recognition that this large number of small municipalities is not necessarily conducive to addressing waste management problems. The desirability of developing "regions for waste management" has been pointed out at various times during the last ten years. Although the Local Self-government Act allows the establishment of the inter-municipal tier of administration, plans to introduce such an intermediary sub-national level have not been made despite extensive discussions.

2. Resource productivity

Use of materials by the Slovenian economy increased by one-quarter between 2000 and 2008 (Figure 5.2). Domestic material consumption per capita was 28 tonnes in 2008, around half the OECD or OECD Europe averages. Trends in material consumption cannot be completely attributed to cost-efficiency gains and technological advances, as they also reflect increased substitution of domestic production by imports. Accounting for these hidden flows, total material consumption reached twice the level of domestic material consumption (55 tonnes per person) in 2008 while the OECD average was 40 tonnes per person in the same year.

The use of materials has not been accompanied by an increase in GDP: material productivity decreased by 4% in the 2000-07 period, which compared poorly with other OECD countries where it increased by 12% during the same period (Figure 5.2). Relative decoupling of use of materials from economic growth occurred only recently, as reflected by an increase in productivity of materials in 2008. It is difficult to allocate sectoral contributions of material use to GDP, given the differences in production technology across sectors. Nevertheless, infrastructure provision supporting Slovenia's economic growth until 2008 was closely linked to the use of construction minerals, which accounted for the largest share (60%) of direct material consumption in Slovenia and thus exceeded the respective OECD average (40%) in 2008. Therefore, productivity trends have been very much influenced by the important share of construction materials in domestic material consumption. If the contribution of construction materials is not taken into account, productivity gains were more rapid between 2004 and 2008, and overall material productivity increased by about 11% between 2000 and 2008 and has been twice as high as with the construction materials included. Material productivity increased by 41% in the 2007-10 period, mainly due to a high decrease in the use of construction minerals in the aftermath of economic decline.

Figure 5.2. **Material productivity and domestic material consumption**



a) Material productivity designates the amount of GDP generated per unit of materials used. It refers to the ratio of GDP to domestic material consumption (DMC). A decline in material intensity is equivalent to a rise in material productivity (i.e. GDP/DMC).
b) GDP at 2005 prices and purchasing power parities.
c) DMC is the sum of domestic (raw materials) extraction used by an economy and its physical trade balance (imports minus exports of raw materials and manufactured products).
d) Domestic extraction and trade of minerals used in construction (e.g. sand, gravel, stones).
e) Coal, crude oil, natural gas, peat and traded derived products (e.g. plastic and rubber).
f) Domestic production from agriculture and fisheries, plus trade of raw and processed products from these sectors.
g) Domestic production from forestry, plus trade of raw and processed products from this sector.
h) Domestic extraction and trade of minerals used in industry (e.g. salts, potash, phosphate rocks).
i) Domestic extraction of metal ores, plus trade of metal ores (e.g. bauxite), metal concentrates (e.g. nickel matte), refined metals (e.g. steel, aluminium, copper), products mainly made of metals (e.g. vehicles, machinery, electronics and electrical equipments), and scrap.
Source: OECD (2011), *OECD Pilot Material Flow Database.*

StatLink http://dx.doi.org/10.1787/888932595757

The weakest productivity gains were in biomass and construction minerals, where domestic consumption remained strongly linked to economic growth. By contrast, in industrial minerals, timber and metals productivity gains were double the OECD average prior to economic slowdown.

The Slovenian system for calculating domestic material input and consumption is still being developed and the sources of physical exchange and material flows are dispersed and incomplete. Further efforts should be made to develop a robust methodology for calculating material flows and resource productivity and to refine related indicators. Revisions of indicators and targets should better reflect unused extraction that has no economic value, but which nevertheless exert pressure on the environment. Better assessment of environmental impacts associated with material use is also needed.

3. Waste generation

3.1. Waste reporting

Slovenia's legislation requires waste producers to report on quantities of waste generated if they handle more than 10 tonnes of non-hazardous waste, or more than 5 kg of hazardous waste, per year. All those handling waste (*i.e.* collecting, treating and disposing of it), including the public waste services of the municipalities and private operators involved in managing waste from production and services, are required to report on quantities handled and their fate irrespective of the amounts handled. In practice, there has been an excellent reporting response (close to 100%) from public waste services (59 collection service providers and 67 landfill operators reporting), while there has been a 90% response from industrial waste producers (7 443 reporting units), waste collectors (320 reporting units) and waste treatment services (215 reporting units).

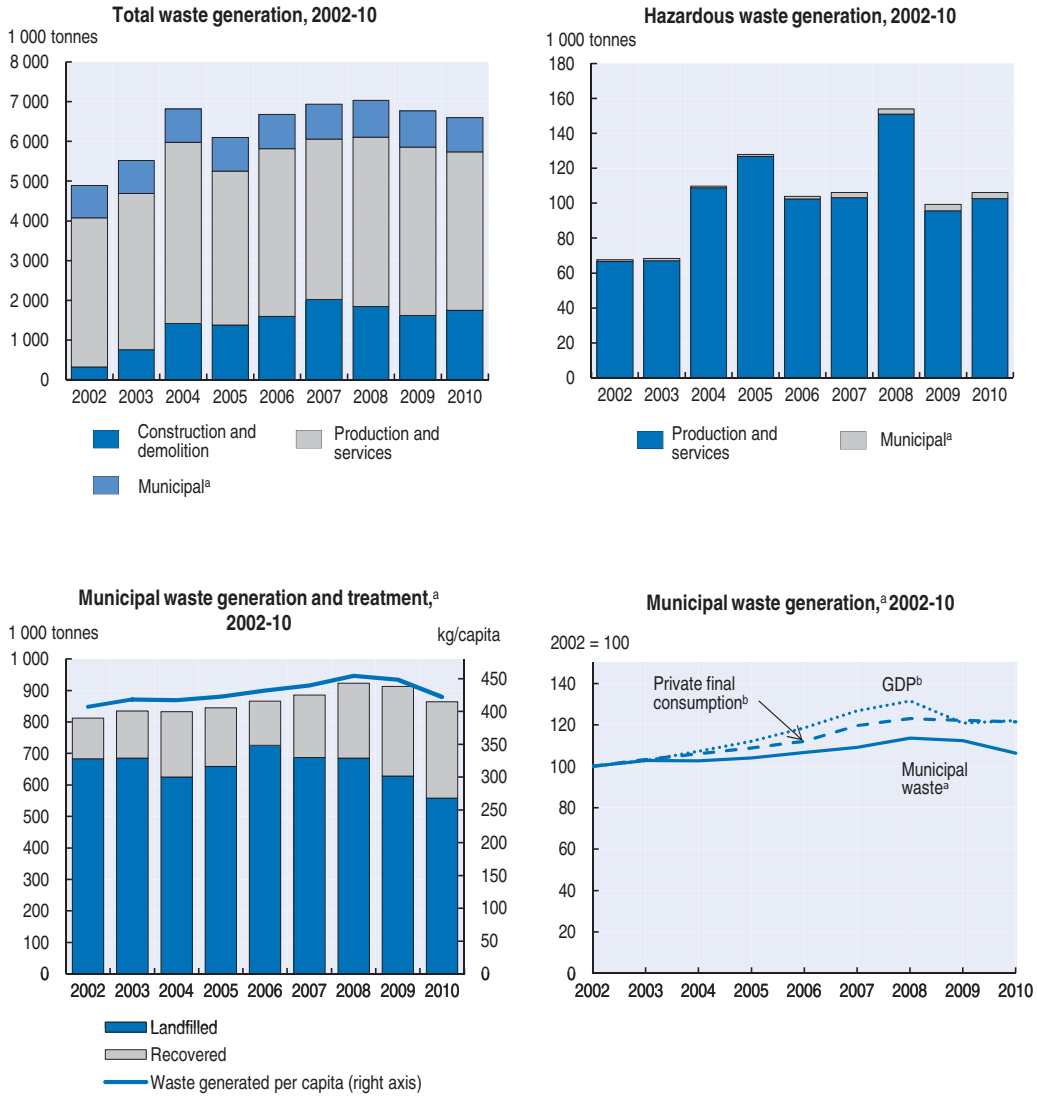
However, reporting is not without its problems, which include avoidance of reporting obligations by waste producers and incorrect classification of waste (especially as mixed municipal waste) by public bodies, businesses and service providers. Hence, doubts remain about the quality of the available statistics. To ensure internal consistency, these data would benefit from detailed cross-checking of the amounts of waste generated against management data. Furthermore, the handling of statistics has been carried out jointly by the Statistical Office and the Environment Agency since signing a co-operation agreement in 2002. Nevertheless, these two organisations have often arrived at different figures as a result of their different approaches to aggregating the underlying data. Since 2008, the Environment Agency used the same data aggregation as the Statistical Office. A pilot web-based waste management database being developed by the MESP is a step in the right direction. However, it will take time and resources to develop a robust system of integrated electronic reporting on waste flows.

3.2. Waste generation trends

Total waste generation

Slovenia generated about 6.6 million tonnes of waste in 2010. Non-hazardous waste from production and services accounted for the majority (85%), with municipal waste accounting for 12% and hazardous waste (mostly from production) for 1.5% (Figure 5.3). In the period 2002-08, the quantity of waste generated increased by 43%, with an increase in the amount of each of the key waste streams (production and services, municipal and hazardous waste). This reflected growth in the Slovenian economy and, in the case of the general category of waste from production and services, a massive increase in the generation of construction and demolition waste. The annual total amount of waste, as well as the levels of each of the key waste streams, decreased in 2009 and this trend continued in 2010. These reductions were due to the economic slowdown which followed the economic and financial crisis of 2008 (Chapter 1). The decrease in waste generation

Figure 5.3. **Waste generation**



a) Waste collected by or for municipalities, waste directly delivered and separate collection for recycling by the private sector. It includes household, bulky and commercial waste, and similar waste handled at the same facilities.
b) At 2005 prices and purchasing power parities.
Source: OECD, Environment Directorate; OECD (2010), *OECD Economic Outlook No.88;* SORS (2011), *SI-STAT Data Portal.*
StatLink http://dx.doi.org/10.1787/888932595776

provides an opportunity to strengthen waste monitoring and establish new targets and more effective policy measures. These are needed to avoid a rebound in waste generation once economic growth resumes at a higher rate.

Municipal solid waste

In the early 2000s, the quantity of municipal solid waste (MSW) generated in Slovenia was around 820 kt a year (Figure 5.3). Since 2004, this amount has increased, reaching 923 kt in 2008, 60 kt above the 2012 target set by NEAP2. However, the total amount of waste subject to treatment in Slovenia was higher, reaching nearly 1 million tonnes each year between 2004 and 2008, due to increasing imports of MSW into Slovenia, which included

paper and paperboard, scrap metal and plastics. Net imports continued to increase since 2004, reaching nearly 100 kt in 2009. Following the impacts of economic slowdown after 2008, MSW generation in Slovenia started to decrease, reaching 864 kt in 2010.

Although the average quantity of municipal waste generated per capita and per year increased to 450 kg in 2008 and then dropped to 420 kg, levels have been much lower than the OECD average of 550 kg. The rate of increase in the amount of Slovenian MSW has been slower than the rate of increase in GDP, but it has followed the GDP and final consumption trends (Figure 5.3).

Waste from production and services

In Slovenia, waste not collected by public utility services is classified as waste from production and service activities. This waste stream grew considerably between 2002 and 2004, but growth has slowed since then (Figure 5.3). The aggregated data mask some significant differences across waste streams and industrial sectors. Most significantly, the share of construction and demolition (C&D) waste rose from 8% in 2002 (316 kt) to 33% in 2007 (2 million tonnes) before falling back somewhat in 2009 (1.6 million tonnes) as the construction industry felt the effects of the economic slowdown. However, the amount of C&D waste increased by 130 kt in 2010.

The other most significant waste generating sectors are manufacturing, thermal processes (electricity, gas, steam and air conditioning supply) and wood processing and paper production. When considered in absolute terms, the quantity of manufacturing waste increased notably, from 1.6 million tonnes in 2002 to 2.3 million tonnes in 2008, but dropped to 1.5 million tonnes in 2010 due to the economic slowdown. Waste from thermal processes and from wood processing and paper production remained broadly constant, at a level of 1.5 million tonnes and 600 kt, respectively. However, waste from wood processing and paper production spiked at 1 million in the period 2005-06. Compared with the 2005 projections, C&D waste has been broadly in line with NEAP2 assumptions, but the amount of industrial waste appears to be more than double what was expected. The amount of waste from the energy sector is below what was projected.

Although the bulk of the change in waste quantities from production and services can be explained by looking at these three sectors, other sectors have shown significant changes in waste generation over time even though the amounts of such waste were relatively small. Some of the changes could also be associated with changes in definitions and statistical methodologies. A significant increase in waste was experienced regarding: waste from human and animal healthcare (+1 110% between 2002 and 2009); waste oils (+123%); waste from chemical treatment of metals (+110%); waste from inorganic chemical processes (+24%); and waste from agriculture and forestry (+43%). At the same time, there have been significant reductions in mineral waste (–74%), waste from the leather and textile industry (–61%), waste from the photographic industry (–87%), and waste from manufacturing, formulation, supply and use of coatings (–29%).

Hazardous waste

The majority of hazardous waste comes from organic chemical processes, thermal processes, waste oil, and waste from human and animal healthcare. There was an increase in quantities of hazardous waste generated between 2002 and 2010. Periodically, however, large amounts are reported from waste management facilities, from construction and demolition activities or as a consequence of the ongoing work to clean up older industrial

sites; this means the quantities vary significantly from one year to the next (Figure 5.3). The target set in NEAP2 was to continue to reduce hazardous waste generation by between 5% and 10% per year. This objective has not been met and might continue to be missed, ironically, perhaps, due to the clean-up of old dump sites (which results in significant periodic "generation" of hazardous waste).

4. Patterns and performance in environmentally sound management of waste

4.1. *Municipal solid waste*

Municipal waste service provisions

Slovenia's 211 municipalities are currently served by 60 operators for municipal waste collection and transport, and by 49 operators for treatment and disposal. This includes waste from businesses producing waste similar to household waste, as well as waste from households (in line with EU definitions).

The share of the population covered by regular municipal waste collection increased from 76% in 1995 to 96% in 2010. It should be noted that the national average of 96% coverage masks significant variation at the municipality level, with the lowest level of coverage at 7%. The lowest waste collection coverage is found in the least densely populated municipalities in northeastern Slovenia.

The Public Utility Act envisages four different forms of the obligatory municipal environmental protection public services: a "service unit" in the case of smaller service requirements; a public utility organisation; a public company; and a private company operating through a concession. However, only in four municipalities is a service unit part of their administration, and most service providers take the form of a public utility organisation/company. In some cases, the operator also provides other services (such as wastewater treatment) or, as in Ljubljana, is part of a large holding that also supplies heat, gas and water and ensures wastewater collection and treatment. All municipal landfills are operated by public sector operators. In accordance with the EPA, the MESP is obliged to establish and maintain a register of all operators of municipal environmental protection public services (including data on modes, types, scopes and areas of operation). This register has not yet been fully established, which is an obstacle to in-depth analysis of the operators' structure and performance.

Landfilling and recovery trends

In the early 2000s, the majority of MSW (86% or 700 kt) was finally disposed of in municipal landfills. This share remained stable until 2008. The amount of municipal solid waste (MSW) sent to landfill dropped to 620 kt in 2009 and 560 kt in 2010, accounting for 69% and 65%, respectively, of total MSW generated in those years (Figure 5.3). At the same time, Slovenia's net imports of municipal waste amounted to 170 kt so even though 913 kt and 863 kt of MSW was collected in 2009 and 2010 respectively, installations treated over 1 million tonnes each year. Preliminary data for 2010 suggest that net imports continue to increase.

A high landfilling rate, combined with strict EU management, hygienic and safety requirements for landfills, have prompted efforts to improve landfill quality. Official records of the ARSO show that there were 60 public landfills in 2010, of which 8 met the requirements of stringent waste landfilling legislation, 28 were being upgraded and 24 were subject to closure (deactivation) procedures; 15 currently operating landfills have received an Integrated Pollution Prevention and Control (IPPC) permit for their operations to ensure

proper environmental management. More intensive measures are applied to upgrade the management and technical skills of landfill operators in order to improve management performance. For example, the MESP and the Chamber of Commerce and Industry carry out training courses for landfill operators concerning legal and technical requirements.

NEAP2 envisaged that only 13 municipal landfills would be operational by the end of 2009, one in each statistical region. However, waste is still landfilled at 44 sites, including landfills in the process of adaptation or closing. Around 20% of waste landfilled at public infrastructure sites has been non-municipal, and has included inert industrial waste and C&D waste. This share decreased to around 10% in 2010.

Non-municipal waste is also deposited in landfills operated by private legal entities or sole proprietors. These operators are responsible for active or inactive landfills or underground storage sites, which they manage in compliance with regulations. Privately operated landfills do not receive municipal waste.

Efforts to improve landfill standards have been accompanied by efforts to increase the MSW recovery rate, which at 14%-22% in the period 2002-06 was relatively low compared to the EU average of 50%. An important step was the establishment of a system of eco-points (collection points for dry recyclables: paper, glass and packaging), stimulated by the requirements of the 2001 Order on the Management of Separately Collected Fractions in the Public Service of Urban Waste Management. Initially, the creation of one eco-point per 500 inhabitants was required, but recent evidence suggests that the number of collection points had increased to about 12 100, or one per 167 inhabitants. Expansion of the eco-points network contributed to increasing MSW recovery to about 35% in 2010, taking Slovenia closer to the 2012 target of recovering 55% of municipal waste (Figure 5.3).

Although progress has been significant in the last few years in reducing the amount of waste generated (helped by the economic slowdown) and reducing waste landfilling, further efforts are needed to achieve the NEAP2 target of 55% of MSW materials recovery and re-use. There is little experience in achieving this type of target through use of recycling schemes which are based around a "bring" concept,[2] so greater resort to kerbside/door-to-door systems for separate collection will be required, as well as an increase in the number of the larger collection centres where the range of separately collected items is wider (*e.g.* bulk waste items, such as furniture, wood waste, textiles, hazardous material, household construction waste, garden waste). In 2010, 105 such collection centres were operating (one per 19 000 inhabitants), while NEAP2 envisaged collection centres in each local community and in every densely populated area with more than 8 000 residents, as well as one collection point per 80 000 residents in larger agglomerations. Some major cities such as Ljubljana have found it difficult to locate collection centres, so that their current provision is not adequate.

The other challenge is to reduce the amount of biodegradable waste that goes to landfill. The 2006 decree on landfilling of waste specified the permitted quantity of biodegradable components in municipal waste that may be landfilled, but the targets are some distance from being met. For example, the proportion of biodegradable material in municipal waste is well above the 2012 target of 28%. Based upon data supplied by the MESP, it appears that more than 860 kt of biodegradable municipal waste was landfilled in 2009.[3] Therefore, the limit of 200 kt of biodegradable municipal waste landfilled by 2012 is likely to be exceeded by a large margin.

One of the key elements of the strategy to reduce biodegradable waste is separate collection and treatment of kitchen and garden waste. NEAP2 established a target of 100% recovery and biological processing of kitchen and garden waste. A decree on the management of organic/biodegradable kitchen waste, enacted in 2008, requires local providers of the municipal waste service to establish separate collection of organic kitchen waste by mid-2011, encourage home composting, and ensure that the collected organic kitchen waste is delivered to recovery facilities. The regulations have had some impact, as the quantity of collected kitchen and garden waste increased from 18.5 kt in 2004 to 58.6 kt in 2010. However, effective collection systems have not yet been established and the capacity for treatment is not yet adequate although nearly half of collected organic waste was treated anaerobically in 2009. At the same time, some waste is clearly being composted at unlicensed facilities. When effective collection systems have been established, adequate treatment capacity will be needed for the collected material. The establishment of a quality assurance organisation could provide guidance to operators to ensure that processes are well managed. Typically, the systems in the EU that have worked well have used statutory standards for environmental protection linked to quality assurance schemes designed to develop confidence in the market for composts (Box 5.1). Failure to do this may jeopardise the development of markets for compost and digestate, thereby compromising the good work being done to develop separate collection of biowaste.

Box 5.1. **Quality assurance systems for compost/digestate**

Quality assurance systems (QASs) have played a key role in improving the status of compost and digestate, as perceived by end-users in a number of EU member states. QASs seek to make the link between compost/digestate production and markets for their application.

As outlined in a report from the United Kingdom's Waste and Resources Action Programme (WRAP), QASs start where statutory standards following the precautionary principle normally end. It is rare for statutory standards to address issues related to specific markets for compost/digestate application. QASs focus on meeting the demands of end-users. In this sense, where statutory standards are in place, they are complemented by QASs. In countries where no (or only very limited) statutory standards exist, QASs are important in the recovery of organic waste because they can seek to control quality at all stages of the treatment of organic residues, such as:

- *Separate collection/quality of feedstock*. Quality assurance may require that inspections on the quality of feedstock are carried out frequently to ensure that end products are of the desired quality and have the desired characteristics. They may also assist with traceability of batches.
- *Plant engineering*. Errors in plant engineering can be quickly identified via quality controls. Regarding the issue of hygiene, quality assurance also serves to guarantee worker protection.
- *Compost production*. Only regular or continuous process monitoring and recording, as well as constant quality and product checks, can ensure that errors in compost production are avoided.
- *Marketing*. End-users, including farmers, are likely to seek a standardised quality compost/digestate. Typically, this is guaranteed by the quality assurance system. An associated quality symbol can support any marketing efforts of the compost/digestate producer.

Box 5.1. **Quality assurance systems for compost/digestate** *(cont.)*

- *Public relations work*. To improve the public perception of compost/digestate, some public relations activity is important. A positive image for compost/digestate can be developed on the basis of assured quality, and through use of a quality symbol for the compost product.
- *Application*. Under QASs, it is typical to require the characteristics of a given compost/digestate to be declared so that end-users can understand the appropriateness, or otherwise, of a given compost/digestate for their purposes. Hence, analytical tests are carried out, the results of which form the basis for this declaration and associated recommendations for use.
- *Product range*. In an ideal case, QASs develop a range of products with specific characteristics, more or less tailored to specific end-use markets. They can do this to the extent that, as a result of analytical testing, the properties of the compost/digestate are understood, as well as the extent of their fluctuation in well-operated plants.
- *Policy/regulation*. Through statistical evaluation of the test results, legislators are made familiar with the current standard of compost/digestate and the "performance frontier" of composting/digestion plants. Such data can be used to inform the development of policies and regulations that are appropriate for the current practical situation.
- *Certification*. A quality assurance system is a precondition for the certification (*e.g.* ISO 9000 or ISO 14000) of composting plants.

Participation in full quality assurance schemes is voluntary in all countries in which they are operated (except Belgium). However, if QASs establish a quality standard, composting and digestion plants come under pressure to furnish proof of quality to the extent that the market begins to demand these qualities.

Illegal waste disposal

Illegal dumping of municipal waste, especially in karst caves, was widespread in the 1990s and early 2000s. However, with the expansion of the collection system, better enforcement, and awareness raising campaigns, this no longer occurs on a large scale. Some cases of fly-tipping are linked to waste from small companies or from construction and demolition. The question of illegal waste disposal was raised recently by NGOs, which organised a large voluntary action ("Let's clean Slovenia in one day") in April 2010. This activity mobilised 200 000 volunteers and combined clean-up of illegal waste dumps with education and awareness raising among the general public. It prompted the MESP to call for the preparation of a strategic plan to address illegal waste disposal and to form an inter-ministerial group to examine the existing legal framework and enforcement of waste legislation.

4.2. Separate collection of selected waste streams and Extended Producer Responsibility

Separate collection of some waste streams has a long tradition in Slovenia. Initially limited to paper and cardboard packaging waste, the system was expanded to other packaging streams, such as plastic, metal, wood and glass, in 2000. In 2003 and 2004, end-of-life vehicles (ELVs) and end-of-life-tyres (ELTs) were covered by producer responsibility. The systems have been financed partially through surcharges on beverage containers, as well as charges for producers in the case of vehicles, and end-users in the case of tyres (a charge was introduced for tyre producers in 2006). However, the charges levied were small, not covering all the costs of the system. Subsequently, collection has expanded

to include waste electric and electronic equipment (WEEE), waste batteries and accumulators, waste oils, waste hazardous plant protection products, graveside lamps and waste medicines.

These systems were originally operated by public waste management services, mainly as a transitional solution until producers were able to organise their own collection and recycling systems. Fully-fledged Extended Producer Responsibility (EPR) schemes, in which producers are responsible for collection and safe treatment, were introduced for WEEE and waste oils in 2007, for waste batteries and accumulators in 2009, and for ELTs and graveside lamps in 2010. Introduction of EPR for ELVs is foreseen in 2013. However, these systems do not require producers to cover all the costs of managing the waste concerned. Experience with implementation of some collection systems is presented in the following sections.

Packaging waste

The quantity of packaging waste has also grown. In 2007, 212 kt of waste packaging was generated (or 105 kg per person), 31% more than in 2004. In the case of paper, cardboard, plastic and glass material, packaging quantities have risen over time while levels of metal and other packaging have been stable. Levels decreased for wood packaging.

The system for collection of packaging waste was established in 2000. It includes a system of collection points and, in some local MSW public services, a "door to door" system. There are 31 companies registered for collection of paper and glass and 30 for collection of plastic and metal.

As a new EU member, Slovenia was authorised to meet the targets of the EU Packaging and Packaging Waste Directive (94/62/EC) by 2012 rather than 2007. Although separate collection of packaging waste at source and its reuse, recycling or recovery are increasing, the growing amount of packaging waste makes meeting these targets challenging. The relevant figures for recycling and recovery of packaging waste in 2007 were 47% and 53%, respectively, some distance from the specified minimum recycling and recovery rates of 55% and 60%. Regarding the 2012 targets for recycling of individual packaging material, performance in 2007 fell short for glass (42% recycled by weight *versus* the 60% target) and metals (21% *versus* the 50% target). The issue appears less pressing with respect to paper and cardboard (69% *versus* the 55% target), plastics (51% *versus* the 21% target) and wood (36% *versus* the 15% target).[4]

Whether Slovenia meets these targets is likely to depend on the extent to which infrastructure evolves to provide more convenient services to households and businesses. The current system is heavily dependent on consumers bringing waste to collection points. While increased provision of eco-points has been an important step in developing recycling services, the performance of the network, based on its status in 2007, might not be sufficient to meet the EU targets even in 2012. An increasing quantity of material has been exported for recycling in recent years, in particular reflecting strong demand from Asia and the low costs of backhauling material (notably paper, card, plastics and metals) to these markets.

To address these challenges, amendments to the decree on the management of packaging and packaging waste were being developed in 2011, particularly to improve the efficiency of the system for collection and recycling of waste packaging.

End-of-life vehicles (ELVs)

The number of registered private vehicles increased from about 850 000 in 2000 to 1 million in 2010. At 53 vehicles per 100 persons in 2009, Slovenia's level of private car ownership was higher than the OECD and OECD Europe averages (50 and 44 vehicles per 100 persons, respectively). Of these vehicles, around 25% are older than 12 years. The number of ELVs is increasing, in line with the increase in the number of new first-time-registered vehicles (around 60 000 per year). The ELV management system was established in 2004 as a public service operated by four concessionaires. ELV vehicles are collected at collection points in four concession areas. They are then transported to treatment centres for dismantling.

The system collected significantly fewer ELVs than expected, mainly due to the abuse of "temporary de-registrations" which in practice have been permanent, leading to a loss of control on ELVs in the system. Also responsible for fewer recoveries were illegal disposals and illegal scrap yards. However, the system stimulated the collection of "old burden" ELVs (*i.e.* abandoned vehicles whose last owner was not identifiable). A payment for the disposal of ELVs was introduced in 2005 for the last owner, but this resulted in a significant decrease of collected ELVs. Surveillance of illegal scrap yards has intensified, and they have gradually been integrated into the recovery system. Since December 2005, delivery for appropriate end-of-life treatment is free for the end-user. As a result, the number of collected ELVs increased in 2006, before falling back in 2007 and 2008, perhaps reflecting ELVs being delivered for appropriate treatment which were being "stored" until the fee was eliminated. Now about 7 000 per year are collected and treated. However, the targets of 80% reuse and recycling and 85% reuse and recovery have not been achieved. New legislation is being prepared which will include the responsibility of producers to organise collection and treatment. It will also include financial instruments to prevent abuses of the "certificate of destruction" and to ensure meeting the 2012 target of collecting 100% of ELVs.

End-of-life tyres (ELTs)

The quantity of end-of-life tyres (ELTs) has been growing in proportion to the increase in the number of registered motor vehicles. The system for managing ELTs was established in 2003 as a public service operated by three concessionaires. NEAP2 called for establishing a country-wide, unified system of collecting ELT's, preventing their unauthorised disposal, and ensuring various recovery options by 2012.

Until August 2006, the public utility service was financed by users (vehicle owners), who paid a charge on the delivery of used tyres for disposal. The concessionaires collected around 5 000 tyres per year (2.5 kg per capita), significantly fewer than expected. To make the system for ELTs management more efficient, an environmental tax paid by the producers was introduced in the second half of 2006. The quantity of ELTs collected for recovery increased significantly, from 8 250 tonnes in the last four months of 2006 to 16 kt in 2007 and 19 kt in 2008 and 2009, exceeding the original estimations of 14 kt per year. ELTs are either recycled or incinerated with energy recovery, while a small quantity are returned for reuse or retreading. In 2007, 55% were recycled and 43% were incinerated in cement kilns, while in 2008 the share incinerated in cement kilns reached 50%. In addition to recovery in Slovenia, ELTs are sent for recovery to Austria, Hungary and Croatia.

In 2010, a fully-fledged EPR for the management of ELTs was implemented. The economic entities that first place the tyres on the market are obliged to organise and finance the management of ELTs in accordance with the requirements of the decree.

Waste batteries and accumulators

Following the transposition of the EU Directive on batteries and accumulators and waste batteries and accumulators (2006/66/EC), landfilling and incineration of these products was banned in 2008. The collection systems became operational at the end of 2009.[5] The management system is based on an EPR scheme that requires importers and retailers of batteries and accumulators (including those incorporated into appliances or vehicles) to establish and finance collection and treatment systems. They may fulfil their obligations either by taking part in a collective system or individually. There are 28 companies registered for the collection of batteries and accumulators. The system enables end-users to discard waste portable batteries and accumulators free of charge at collection points, retail stores, or collection centres of the public service providers, and/or to give them to waste collectors. For all portable batteries and accumulators, a tax is added to the price. As the system has been established only recently and is not fully operational, no data are available that could help to assess the system's performance. Collection of more information on the quantities of batteries and accumulators placed on the market would help to better calculate the collection rates.

Waste electrical and electronic equipment (WEEE)

In 2004, only about 2 kt of WEEE was collected in Slovenia, including around 300 tonnes collected as a separate fraction of hazardous waste within MSW collection. National WEEE legislation was prepared in 2004, and amended in 2005 and 2006, in line with the requirements of the EU WEEE Directive (2002/96/EC). Subsequently, pre-registration of producers and sellers of electric and electronic equipment was launched, which was associated with an environmental tax being paid by retailers and importers of WEEE. The first collective compliance scheme become fully operational in 2007, and 5 300 tonnes of WEEE was collected that year and nearly 7 000 tonnes in 2008. Of this amount, 45% of WEEE was collected at municipal waste collection centres, 40% through take-back at producers' collection points and 15% at retailers and distributors. Some dismantling and manual removal of hazardous substances is performed in Slovenia, but most further treatment of WEEE takes place outside the country.

While quantities of separately collected WEEE increased after the establishment of the management system, they are still below what was planned. The main reason has been low consumer awareness. An evaluation of the WEEE collection system carried out in 2011 by the Court of Audit also pointed out deficiencies in clearly defining the purpose of introducing an environmental tax for WEEE importers and retailers and discrepancies in the registers of persons liable for the tax maintained by the Customs Administration and the MESP. The Court of Audit asked the MESP and the Customs Administration to implement corrective measures and submission of a response report.

Assessment

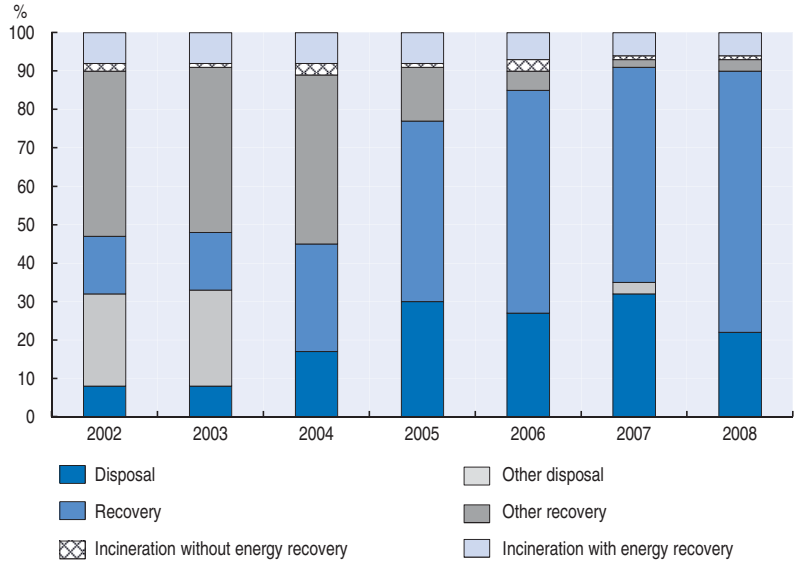
Separate collection of such specific waste streams has been a step in the right direction, stimulated by EU legislation. However, recovery costs have not been fully allocated to producers where the collection systems have been under producer responsibility. Currently, for example, the costs of packaging collection are borne by local authorities which must recover these costs through the charges they levy on households. In principle, it should be possible to set ambitious targets for those with obligations under EPR schemes and require them either to provide themselves, or through one or more contractors (which could include

public service utilities), a service of a stated quality to all households (and businesses, as appropriate); or to fully reimburse the costs of local authority provision of the required collection, sorting and reprocessing infrastructure to achieve the stated recycling rates. The required financial contribution could be estimated on the basis of an agreed methodology, revised on a periodic basis. The net effect would be to shift the burden of costs from taxpayers to producers, and ultimately to consumers (to the extent that producers can pass on costs to consumers). A further effect is that producers would have a greater incentive, at the margin, to reduce waste generation in the first place since a larger share of the financial burden falls on them.[6]

4.3. *Waste from production and services*

The unreliability of data on waste from production and services makes it difficult to assess whether its management has improved over time. This is partly due to a change in the classification system in 2007.[7] While the data are imperfect, they show that although recovery of waste from production and services has been at the relatively high level of 65%, in line with the NEAP2 target, the proportion of waste being landfilled has not changed since 2002 (Figure 5.4). This is somewhat disappointing, given that the shift in the pattern of generation has been in favour of sectors – notably construction and demolition – which have potential for high rates of recycling and recovery. At the same time, the target outlined in NEAP2, to attain a target level of 65% reuse and "processing", appears to have been met, though the data do not clearly indicate the precise meaning of "recovery" processes.

Figure 5.4. **Management of waste from production and services in Slovenia, 2002-08**



Source: ARSO (2009), *Waste Management Database.*

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In 2008, there were 17 registered operating landfills for waste from production and services, but waste was actually deposited only at 14 of them. The remaining sites were subject to deactivation work.

Construction and demolition waste

The management of construction and demolition (C&D) waste was first defined in the 2004 Rules on the Management of Construction Waste, which stipulated obligatory management of waste from construction, reconstruction, alteration, renovation or removal of buildings.[8] The regulations were important in light of a sharp increase in C&D waste generation since 2002, following expansion of the construction sector in the areas of transport and other infrastructure and housing development.

Data on C&D waste treatment show inconsistency in reporting in the period before and after 2007. Up until 2007, landfilling was increasing both in absolute terms and with respect to the proportion of waste being managed by this means (39% in 2007 compared with 32% in 2002). Although more recent data are obscured by the classification of a large share of C&D waste as "delivered to others", the share of waste subject to recycling increased but was still less than half of total C&D waste. The remaining amount ends up at landfills for non-hazardous waste or as filling material. Despite the lack of clarity concerning other management routes, more efforts are needed to meet the new target in the Waste Framework Directive of 70% recycling, re-use and recovery of C&D waste. The NEAP2 targets were more challenging still, aiming for 90% reuse and processing from construction and demolition, and 80% reuse and processing from excavations.

Inconsistencies regarding data might not be of such concern were it not for the fact that the total amount of C&D waste increased significantly between 2002 and 2009, and that the Environment and Nature Inspection Service clearly considers the management of this material to be insufficient. This relates in particular to illegal treatment of construction waste, especially excavated soils, that originates from construction sites of motorways and other public infrastructural facilities and dredging spoil. In such cases, the project documentation for their construction often contains incorrect quantity calculations. Moreover, dredging spoil has often been deposited on agricultural land without an appropriate environmental licence, on the pretext that agricultural amelioration or improvement of the ecological status of land was involved.

One reason for illegal disposal of this type of waste has been insufficient landfilling and treatment capacity. Only one landfill for inert waste exists in Slovenia, and there are only two locations for collecting construction waste. Use of mobile units for recovery was an attempt to address the issue of construction waste management, but it has been insufficient. As a temporary solution, local communities might designate serviced locations for provisional storage of construction waste, including excavated soils and dredging spoil.

To address problems related to low rates of recycling of C&D waste, consideration should be given to the application of economic instruments such as a tax on primary aggregates, as applied in Denmark and the United Kingdom. The UK aggregates levy has had the effect (along with the landfill tax) of stimulating an increase in the use of C&D waste as recycled aggregates. The UK now has the highest share of recycled aggregates as a percentage of total aggregate use in construction in the EU. In addition, the Slovenian order on the management of separately collected fractions in the public service of urban waste management, enacted in 2001, could be amended and better enforced to ensure that all collection centres make provisions for receiving C&D waste. This might help to provide a readily available service in some areas for the drop-off of C&D waste, especially by smaller operators.

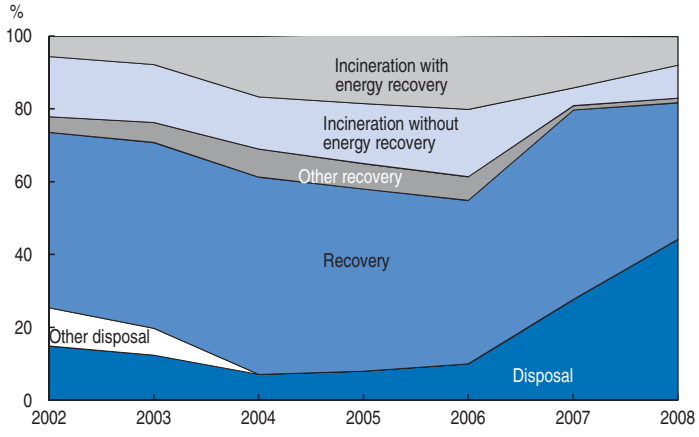
For larger projects, it may be worth considering introducing a system of refundable compliance bonds for construction and demolition waste.[9] This approach is used in some states in the United States. It could be implemented and monitored at the local level by local authorities, as it is closely linked to planning decisions. It might also be linked to a system of accreditation of sorting facilities, where contractors deliver mixed waste to be sorted at C&D sorting facilities/transfer stations. Accreditation would aim to establish, broadly, typical performance (in terms of recovery) by facilities receiving mixed loads of waste. Establishing high recycling rates for publicly funded projects against which bonds are placed could also be considered.

Finally, urgent steps need to be taken to enhance monitoring and tracking of the fate of waste generated by C&D activities. The strengthening of licensing and requirements to achieve better registration of C&D deposits with the Environmental Inspectorate could help in this regard. The Court of Auditors has suggested "auditing" the mass flows of waste from C&D sites. This measure ought to have the capacity both to reduce the extent of illegal disposal and to increase the rate of recycling of C&D waste.

4.4. *Hazardous waste*

As in the case of waste from production and services, the classification of hazardous waste has also changed, making the assessment of management performance difficult. The most recent data collected by the ARSO show that the share of hazardous waste finally disposed in landfills has increased in recent years (Figure 5.5). In Slovenia, there is currently only one landfill for hazardous waste in operation (NOMO Mežica).[10] Some hazardous waste is dealt with at small industrial incinerators with a capacity of less than 10 000 tonnes/year, which treat phytopharmaceutical, chemical and other types. Two cement kilns in Slovenia have permits for co-incineration of waste oils, tyres and some other types of hazardous waste. However, one of these permits is currently in the process of being revoked for procedural reasons.

Figure 5.5. **Management of hazardous waste, 2002-08**



Source: ARSO (2009), *Waste Management Database.*

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Some progress in increasing the capacity for treating hazardous waste was made with the opening in 2009 of a new state-of-the-art facility in the vicinity of the Vrhnika municipality, close to Ljubljana, with the capacity to sort, repackage, store and process hazardous waste. The investment amounted to EUR 6.8 million. This facility was financed by Gorenje, one of the largest private sector companies in Slovenia.

Even with this increase of domestic capacity, hazardous waste exports increased seven-fold in the period 2002-07 (Table 5.1). These exports, which are carried out in accordance with the EU regulation on shipments of waste (1013/2006), are mainly sewage sludge from urban wastewater treatment plants (31%) and mixed waste in which at least one type of waste was designated as hazardous (24%). They are sent to mostly to Austria (42%) and Germany (37%) for incineration.

Table 5.1. **Generation, export and import of hazardous waste, 2002-10**

1 000 tonnes

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Generated (a)	67.6	68.3	109.8	127.8	103.9	106.1	153.9	99.2	106.1
Imported (b)	20.9	23.2	25.6	23.1	22.9	27.4	21.0	. .	. .
Exported (c)	10.7	14.7	18.4	24.9	39.8	69.7	103.0	. .	. .
To be treated in Slovenia (a + b – c)	77.8	76.8	117.0	126.0	87.0	63.8	71.9	. .	. .

Source: ARSO; SORS.

StatLink http://dx.doi.org/10.1787/888932596004

Imports of hazardous waste to Slovenia have been stable in recent years. They have mainly provided for the needs of a recovery facility processing waste lead accumulators. In the past years, several acidic and alkaline solutions were imported in order to be recovered by a chemical processing company, Cinkarna Celje.

Slovenia faces an unresolved problem concerning the treatment of C&D waste containing asbestos cement waste. A large quantity of such waste may have been hidden in mixed construction waste, as this type of waste was categorised as non-hazardous until 2003. By changing the categorisation, and due to public information campaigns, the quantity increased significantly from around 140 tonnes recorded in 2001 to about 3 800 tonnes in 2002. Data indicate that approximately one-quarter of buildings in Slovenia are still covered by asbestos-cement coverings, especially in the Podravje region. Some products containing asbestos are also permanently built into buildings, such as built-in asbestos cement pipes, splashed plaster, insulation, glues and insulation coatings. There is no information on the number of buildings in which there is more than 1 kt of materials containing loosely-bound asbestos, although the managers or owners of these buildings are legally bound to report on such installations. Since about 530 kt of asbestos-cement products was placed on the market in the 1980s and 1990s, and only 40% has been removed and disposed so far, about 320 kt of these waste materials may still be in use.

5. Improving waste management infrastructure and cost-recovery

Improving recycling and capacity for managing residual waste

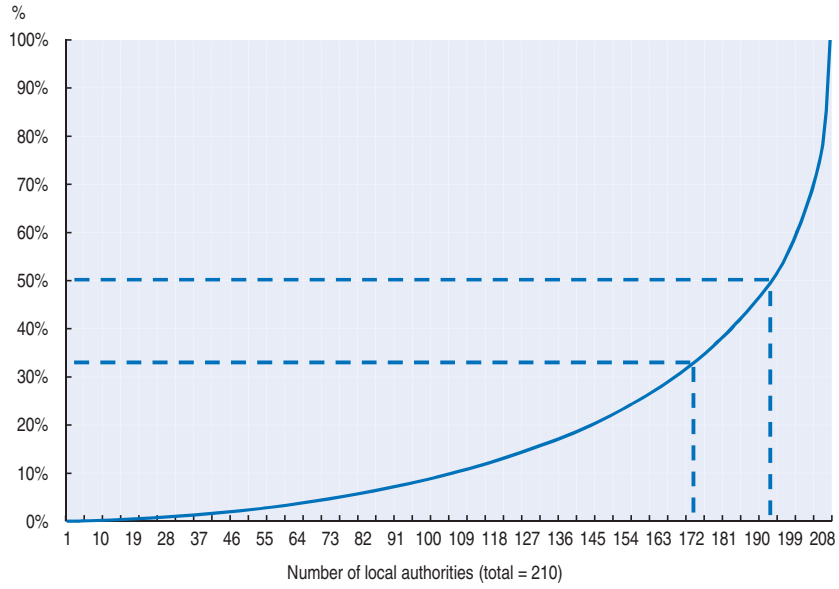
Although progress has been made with waste recovery, Slovenia's performance in recycling waste from production and services is mixed, and its performance in recycling municipal waste is moderate. This is reflected in its failure to meet the objectives of NEAP2 in respect of recycling, especially the target recycling rates for packaging under the relevant EU directive, but also with regard to all municipal waste, and waste from construction, demolition and excavation. Moreover, as the requirements of the revised Waste Framework Directive are more ambitious for recycling both household and C&D waste, the implementation gap is widening. Thus, there is a need for Slovenia to improve recycling performance.

In the case of municipal waste, the typical collection system provided to households consists of refuse collection, mostly from the property concerned, as well as a network of collection sites for recycling. However, to be effective such systems require local authorities to establish dense, easily accessible networks of eco-points and larger collection centres and to communicate effectively with residents about their availability and modes of operation. Use of collection sites for organic waste increases the likelihood that the collected waste stream will contain untargeted waste (it will be contaminated). This may present problems with respect to waste treatment and the quality of the end product derived from the treatment process. Further efforts are needed by public service providers to expand the system for collecting separated fractions directly from households. Where businesses are concerned, similar considerations should apply.

The other key problem relates to inadequate capacity to manage residual waste using means other than landfill. NEAP2 envisaged developing a network of residual waste treatment facilities to serve the country. Initially, 15 regional waste management centres were planned but the number was subsequently reduced to 10. Of these, only one centre is fully operational, a small MBT plant and incinerator facility serving the area around Celje. Another facility in the vicinity of Ljubljana is under construction, but treatment infrastructure for residual municipal waste in Slovenia is insufficient.[11] Although there is considerable opportunity to export material to recovery facilities in the rest of Europe in the short and medium term (due to over-capacity in other countries), it would still be appropriate, and in line with the Waste Framework Directive, to develop an adequate network of such facilities in Slovenia.

A plot of the cumulative proportion of municipal waste collected against the number of local authorities indicates that more than half of all collected municipal waste in Slovenia is managed by 10% of the country's 211 authorities. These municipalities are also the largest in terms of population; 20% of the largest municipalities are responsible for 68% of all municipal waste collection (Figure 5.6). This means that apart from the few largest cities in Slovenia, municipalities could only address the issue of residual waste management through co-operation to establish treatment facilities with sufficient economies of scale. Local authorities would need to make a contractual commitment to supply their waste either to the company contracting to treat waste, or to the lead authority, which would negotiate a contract with the service delivery company. The alternative of establishing some form of regional governance arrangement has been discussed many times in different contexts, but it does not seem to be a viable option in the foreseeable future.

Figure 5.6. **Percentage of municipal waste (cumulative) collected by municipalities, 2010**



Source: SORS (2011), *SI-STAT Data Portal.*

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Another way of overcoming the logjam, and giving greater incentives to the provision of merchant facilities, would be to increase the tax on landfilling (Box 5.2). It seems likely that this would need to increase significantly from its current level in order to overcome the current inertia in the market. Furthermore, if this became the implied policy, it would also be necessary to ensure that investors were confident that their developments would not subsequently be "replaced" by infrastructure procured through municipalities.

Hosting such facilities may be impeded by local opposition. The larger population centres are the most likely locations. Municipalities may be able to offer other services at reduced costs to residents in exchange for hosting the facility. In any attempt to identify sites for facilities, it would be important for communities that could become hosts of such facilities to be involved in the decision-making processes at an early stage. Experience with community involvement in such decisions is currently weak in Slovenia.

Clarifying the definition of "pre-treatment"

Under the EU Landfill Directive, all waste landfilled should be subject to pre-treatment. Different European member states define "pre-treatment" in different ways. In NEAP2, it was envisaged that residual waste would be processed so that total organic carbon (TOC) does not exceed 5% (implying a thermal pre-treatment of waste). However, there have been ongoing discussions within the MESP around the definition of pre-treatment which should be used. Evidently, the requirement of the Landfill Directive to pre-treat waste sent to landfill cannot easily be met where the definition is unclear to those who are tasked with doing this. For Slovenia, it would seem sensible to establish a less challenging pre-treatment target than one set around total organic carbon, which also restricts the forms of pre-treatment which can be used (since not all are capable of achieving the TOC standard).

Box 5.2. **Evolution in the design of the landfill tax**

The landfill tax has long been based on a formula related to the degree of waste hazard, biodegradability, and the potential of the waste to generate methane (Table 5.2). Landfill operators were provided with the option of obtaining a reduction in the tax rate when gas was collected for the purpose of generating electricity.

Table 5.2. **Environmental tax for different types of waste landfilled, 2007**

	EUR/tonne
Inert	2.2
Non-hazardous (proportion of biodegradable waste = 0.00)	4.4
Non-hazardous (proportion of biodegradable waste = 0.47)	19.1
Hazardous (proportion of biodegradable waste = 0.00)	22.0
Hazardous (proportion of biodegradable waste = 0.47)	36.7

In 2010, the tax design was revised. It no longer takes into account the potential of waste to generate methane. Instead, it assigns a number of "units of environmental burden" to the categories of inert, non-hazardous and hazardous waste (units of 1, 5 and 10, respectively), and multiplies this figure by a tax rate per unit of environmental burden of EUR 0.022. Thus, for a tonne of non-hazardous waste the tax rate is now EUR 11 per tonne.

Landfill operators can no longer reduce the tax they pay in line with the energy they generate. Since July 2009, all landfill operators have to fulfil all the requirements of the EU Landfill Directive (and the Slovenian decree on the landfill of waste), which makes the collection of landfill gas a mandatory requirement. Reduction of the tax rate is not possible.

Up to 2004, both public and private sector landfills could make use of tax revenue to improve infrastructure. This allowed operators to claim that a significant proportion of tax revenues was being used to fund improvements, and that only a limited amount of revenues was returned to the state budget. In the period 2002 to 2005, about EUR 12 million was invested in public services infrastructure, representing 95%-99% of the entire taxable amount for disposal at non-hazardous waste landfills. At privately operated industrial sites, investments at the end of 2004 accounted for only 28%-38% of the taxable amount. From 2004, private operators were no longer permitted to use revenues in this way, whereas public service companies could continue to use them for infrastructure improvements.

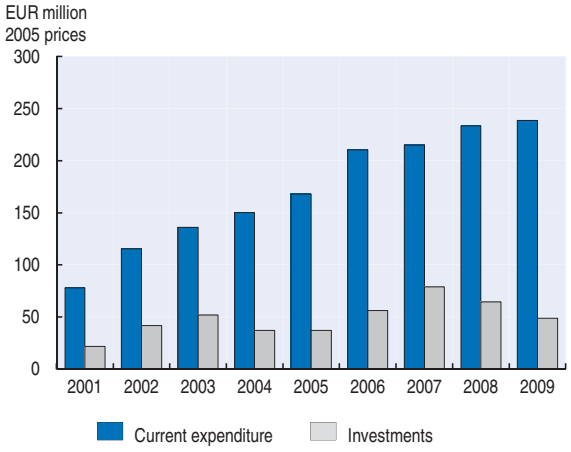
This system created perverse incentives for municipalities to continue landfilling. Since most revenue was used to invest in infrastructure, the "tax" had a much diminished (or perhaps no) incentive effect, especially where landfills were owned and operated by companies related to the local authority. In addition, the tax could become a source of revenues for municipalities owning landfills, notably where deposits were made by municipalities which were not themselves the owners of the landfill. If the auditing of expenditure on improvements to the landfill was not carried out rigorously, the revenues could be used for other purposes than those for which they had been intended (*i.e.* in areas unrelated to the improvement of landfill infrastructure).

Reforming municipal waste charging

The MESP is responsible for prescribing the methodology for setting waste management charges.[12] However, as the system for municipal waste management is strongly oriented towards public provision, there appears to be a low level of cost-recovery

and some of the costs of municipal waste service provision are provided by municipal funds and at the national level, which includes EU funding available for waste management. The transfer of pricing responsibility to local communities in 2009 (in the absence of an appropriate pricing methodology and an independent regulatory body) led to a substantial price increase, with no incentive to reduce costs or improve efficiency. There is no coherence or consistency between prices across regions/municipalities (*e.g.* either per capita, per tonne or per m^3), which makes comparisons of performance impossible. An appropriate calculation of the costs of waste management is becoming more important, as operational expenditure on waste management in Slovenia has been increasing rapidly since 2001 while investment expenditure has increased only moderately (Figure 5.7).

Figure 5.7. **Public and private expenditure on waste management, 2001-09**



Source: SORS (2011), *SI-STAT Data Portal.*

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A new methodology being prepared by the MESP should encourage a more appropriate level of cost-recovery for operations, impose greater market discipline on service operators in setting prices, and provide better incentives for waste separation.[13] It should also introduce some form of benchmarking of performance of the waste service operators and market testing of the service. At the same time, the consolidation of service provision into larger units is likely to provide savings with respect to depot operation and management overheads.

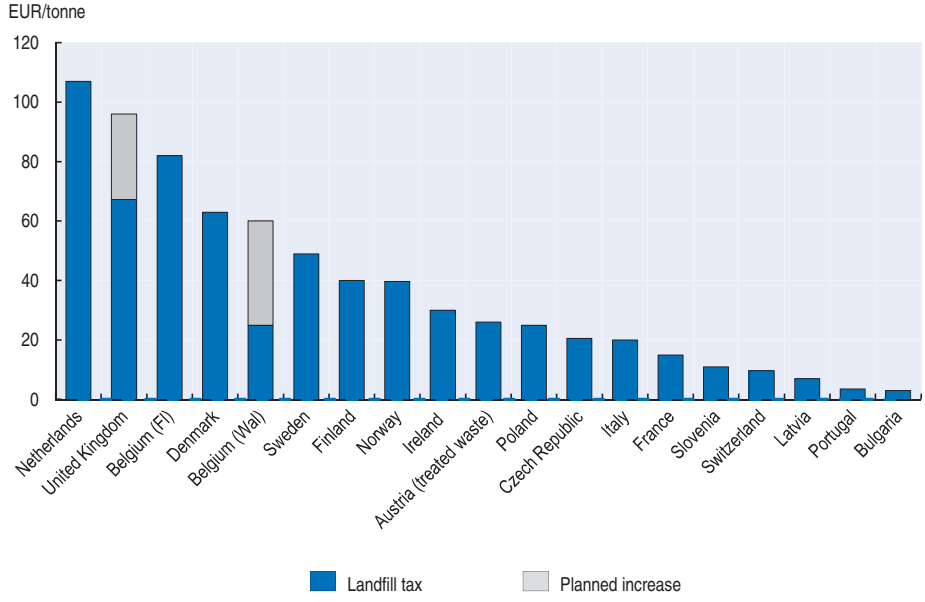
Strengthening the role of the landfill tax

Landfilling of waste has been subject to a landfill tax since 2001. The rate of the tax levied on non-hazardous waste currently is EUR 11 per tonne, and EUR 2.2 for inert waste. In the past, the tax design had only a limited incentive effect and it was revised in 2010 (Box 5.2).

The changes to the environmental tax in 2010 simplified the landfill tax. At the same time, a new approach was implemented for recycling of revenues to improve the incentive which the landfill tax generates and to make the refunding mechanism revenue neutral. In essence, authorities which landfill less than the average will benefit, while those who landfill more than the average will be financially worse off.

The change in the refunding mechanism is an improvement, but it still makes it difficult for the tax to act as a strong incentive for behavioural change, not least because the amount of the tax itself is still limited. The tax on a tonne of municipal waste is EUR 11 per tonne under the changes made in 2010. Given the desire to move more waste away from landfill, both in the municipal and production waste sectors, it would seem sensible to increase the tax, which is not high by European standards (Figure 5.8).

Figure 5.8. **Municipal landfill taxes in selected European countries, 2010**



Source: Eunomia.

StatLink http://dx.doi.org/10.1787/888932595871

Any tax increases should be announced well in advance (at least four years), as some waste management infrastructure takes time to plan, build and commission. This type of lead time would, on one hand, send the right signal and, on the other, give the market time to respond. Nevertheless, a limit should be placed on the period during which any refunding mechanism would apply. This might be five years or so after the changes are made, so that the refunding mechanism stimulates the desired change in behaviour in municipalities without entrenching revenue refunding once a relative "steady state" is reached. With this approach, increasing the tax rate would have a better prospect of stimulating recycling in all sectors; provide further impetus to waste prevention, especially in industry, where possibilities are likely to be greatest; and enable, at the margin, some shift in taxes from "bads" to "goods", especially once the term of any refunding mechanism has been exceeded.

6. Remediation of contaminated sites

NEAP1 called for gradual rehabilitation of sites contaminated by historical and more recent industrial activities. This included five large sites with high levels of heavy metal pollution accumulated through centuries of operation of mines and/or metal foundries and a series of waste landfills resulting from the disposal of industrial waste between 1950 and 1990.

The first group of sites included: the waste disposal site of the lead and zinc mine at Mežica; the waste disposal site and tailings of the mercury mine at Idrija; the tailings disposal site of the uranium mine at Žirovski vrh; and the waste disposal site of the Jesenice ironworks. These sites had long been unregulated and unprotected, which led to soil, air and water contamination. A site of particular concern has been the mercury mine at Idrija, one of the largest in Europe but now closed. It contributes to mercury contamination of the Soča River and of the Adriatic from tailings disposal. Most of these sites have been subject to remediation measures since 1980, including filling of mine galleries and shafts, transformation and stabilisation of tailings slopes, covering of surfaces to reduce erosion, and collection and cleaning of leachates before release to water bodies. Remediation has been carried out relatively satisfactorily at the uranium mine at Žirovski vrh and at the waste disposal site of the Jesenice ironworks. Although remediation of disposal sites in the area of heavy metals mines, *i.e.* at Mežica (lead and zinc) and Idrija (mercury), has been ongoing for a number of years, progress there has been slower. All sites are now monitored and are subject to maintenance to protect further contamination.

Apart from the historical contaminated sites, there is a series of industrial waste disposal sites that include: acid tar disposal sites at Pesnica, Studenci and Bohova near Maribor; the disposal site for industrial waste organic acids at Globovnik, near Ilirska Bistrica; the disposal site for red mud and ashes from the aluminium processing plant at Kidričevo; the disposal site for waste casting sand at Črnomelj; and the area contaminated with PCBs in the surroundings of Semič. The greatest progress has been made with remediation of the Pesnica site, where 18 kt of acid tar was excavated and treated in 2008. Slow progress has been made with remediation of the waste disposal site of the aluminium processing plant at Kidričevo and the industrial waste organic acids landfill at Globovnik. The report by the Court of Auditors in 2010 pointed to long delays with the remediation work and made a number of recommendations to the MEPS and the IESP to speed up progress in landfill remediation by drawing up detailed rehabilitation and monitoring plans and allocating adequate resources for remediation from public sources, as the state assumed the liability for this past pollution.

Notes

1. Twelve Operational Programmes were originally envisaged. As of 2010, seven had been put in place: reducing the quantity of biodegradable waste, managing waste electrical and electronic equipment, managing waste arising from construction work, managing waste batteries and accumulators, managing waste oils, packaging and packaging waste, and disposal of PCBs.
2. The examples come from low density rural areas, such as in Upper Austria.
3. Based on the composition of municipal waste landfilled, as provided by the MESP. Out of a total of 1.255 million tonnes of municipal waste landfilled in 2009, 607 kt was biodegradable and there was 573 kt of mixed municipal waste. Assuming that 40% of mixed municipal waste was biodegradable (a relatively low figure given the small quantity of biowaste being separately collected), this would imply a figure of 860 kt, or around 69% of landfilled waste.
4. It should be noted that the provenance of this data would benefit from closer scrutiny since the reported recycling rates should measure both the recycled amounts (*i.e.* not simply amounts collected for recycling) and the quantity of packaging waste arising. The basis for the latter figure is not clear. This indicates much greater progress with respect to some materials than others.
5. Only residues of any batteries and accumulators that have undergone recycling may be landfilled or incinerated. The Directive does allow the possibility to dispose of portable batteries containing cadmium or lead in landfills or underground storage as part of a national strategy to phase out heavy

metals. Impact assessment shows that landfilling or underground storage is a better option than recycling, or if no viable end market for these metals is available. This is not the case in Slovenia. Therefore, both treatment and recycling must be ensured for all collected batteries and accumulators.

6. In essence, the degree to which producers can simply pass on costs to consumers will depend upon the market they are in and the slope of the supply and demand curves for the goods concerned.
7. Where waste was delivered to other entities, the data were used to highlight whether the recipient intended to recover or dispose of the waste. Since 2007, this split is not so readily visible.
8. This included waste belonging to the group under Class 17 in the European Waste Catalogue ["Construction and Demolition Waste (including excavated soil from contaminated sites)"]. The provisions of these rules do not apply to excavation if it is carried out according to the decree on burdening of soil with waste spreading (the significance of this will become clear below). For all kinds of treatment of construction waste that are not specifically governed by these rules, the regulations on waste management apply.
9. Under such a system, projects of varying sizes are required to put up a bond related to project size (the bond should include an administrative element designed to cover the costs of the relevant inspections). The bond is offered in lieu of a guarantee that the waste generated will be managed in line with the prevailing law, and in order to achieve a specified recycling/recovery rate; the contractor is required to provide evidence from waste hauliers/contractors (in the form of waste handling identification forms) of the way waste has been handled; and if the waste is managed in the manner anticipated by the bond, the bond is refunded in full except the administrative cost. If the desired outcome is only partially achieved, a partial refund would be offered.
10. No hazardous waste is disposed on the non-hazardous waste disposal sites, in conformance with the requirements of the EU Landfill Directive.
11. In addition to these facilities, there are some small-scale hazardous waste incinerators intended for the treatment of waste from specific processes (pharmaceuticals, contaminated sludge, pesticide packaging, solvents, etc.) with a total capacity of less than 10 kt; industrial furnaces used for production waste from wood processing (as much as 500 kt capacity); municipal power plants using clean biomass as a fuel supplement; two cement kilns that use alternative fuels such as used tyres, dried sludge and a range of liquid fuels (approximately 70 kt capacity); and a solid recovered fuels (SRF) preparation plant in Maribor which collects and treats some 20 kt of high calorific production waste. Their wastes are being exported for incineration (some are hazardous waste), usually to Austria and Germany.
12. The estimated cost of waste management includes (if involving more than 200 000 citizens in the system): separate collection of municipal waste (about EUR 6/capita/year), waste transport (about EUR 25/c/y), residual municipal waste disposal to regional landfill areas (about EUR 43/c/y) and an environmental tax (about EUR 6/c/y). Together with the cost of thermal treatment (EUR 20/c/y), the total waste management cost is estimated at EUR 100/capita/year, which is likely to be at the lower bound of actual costs.
13. When municipalities seek to change their prices for service delivery, approval by the MESP is necessary. In accordance with the rules, operators are obliged to inform the MESP about any price changes within 15 days of the first use of the new prices.

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References

I.A: SELECTED ENVIRONMENTAL DATA (1)

		AUS	AUT	BEL	CAN	CHL	CZE	DNK	EST	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ISR	ITA	JPN	KOR	LUX	MEX	NLD	NZL	NOR	POL	PRT	SVK	**SVN**	ESP	SWE	CHE	TUR	GBR*	USA	OECD*
LAND																																				
Total area (1000 km^2)		7741	84	31	9985	756	79	43	45	338	549	357	132	93	103	70	22	301	378	100	3	1964	42	268	324	313	92	49	**20**	505	450	41	784	244	9832	36138
Nitrogenous fertiliser use (t/km^2 of agricultural land)		0.2	2.5	9.8	2.1	2.4	8.0	7.1	2.9	7.5	6.5	9.3	1.7	4.8	0.5	8.7	6.5	4.4	9.4	20.8	12.8	1.0	11.8	2.1	9.6	8.9	2.6	6.5	**6.0**	2.8	4.6	3.3	3.6	5.9	2.7	2.2
Pesticide use (t/km^2 of agricultural land)		-	0.11	0.51	0.05	..	0.11	0.12	..	0.07	0.24	0.19	0.13	0.17	-	0.07	..	0.59	1.29	1.29	-	0.04	0.56	0.04	0.07	0.09	0.44	0.20	**0.26**	0.15	0.07	0.09	0.04	0.15	0.08	0.07
Livestock densities (head of sheep eq./km^2 of agr. land)		61	528	1724	154	218	279	879	215	333	505	692	242	191	59	1141	1082	450	1165	1840	991	281	2298	815	874	358	462	253	**806**	339	396	818	283	617	201	216
FOREST																																				
Forest area (% of land area)		19.6	47.1	22.4	34.1	1.7	34.4	12.8	52.5	72.9	29.0	31.8	30.0	22.3	0.3	10.6	7.1	30.8	68.5	64.1	33.5	33.4	10.8	31.4	32.7	30.6	37.7	40.2	**62.1**	36.1	68.7	30.9	14.6	11.9	33.2	30.1
Use of forest resources (harvest/growth)		..	0.6	0.8	..	..	..	..	..	0.7	..	1.0	..	..	..	0.9	..	..	0.2	1.0	..	..	..	0.7	0.4	0.5	..	..	**..**	..	..	..	..	0.5	..	..
Tropical wood imports (USD/cap.)	*2*	9.1	0.9	28.1	3.2	-	0.9	7.7	-	5.8	9.8	3.7	5.0	0.1	8.0	7.1	-	7.4	7.9	5.0	0.7	0.9	33.2	5.3	4.0	1.4	14.1	1.8	**-**	6.1	1.5	0.6	2.1	3.0	2.8	4.9
THREATENED SPECIES																																				
Mammals (% of species known)		24.4	26.7	27.7	20.3	54.7	20.0	22.0	2.9	10.8	19.0	34.4	25.2	37.8	-	1.8	56.2	40.7	23.3	7.4	51.6	31.8	25.0	19.0	18.2	12.4	26.2	21.7	**38.2**	13.3	18.3	32.9	14.3	*7.9*	16.8	..
Birds (% of species known)		13.2	27.3	22.6	9.8	17.1	50.0	16.3	10.3	13.3	19.2	35.6	14.1	14.5	44.0	24.1	18.6	18.4	13.1	5.2	34.8	16.2	20.7	19.6	14.5	7.6	33.3	14.0	**27.1**	26.9	17.5	35.7	3.7	*2.4*	11.7	..
Fish (% of species known)		0.9	46.4	60.0	29.6	68.3	41.5	15.8	12.2	11.8	36.1	30.1	31.8	43.2	-	33.3	18.8	35.1	36.0	8.9	27.9	27.6	60.0	25.9	-	28.6	62.9	24.1	**47.1**	51.4	10.9	43.6	11.1	*11.1*	31.7	..
WATER																																				
Water withdrawal (% of gross annual availability)		3.6	..	31.2	1.1	3.7	12.2	4.0	11.2	2.1	17.0	17.2	13.2	4.9	0.1	..	..	..	20.1	40.3	2.9	17.8	11.8	1.6	0.8	18.3	12.4	0.8	**2.9**	29.2	1.4	5.0	17.3	12.0	19.5	9.7
Public waste water treatment (% of population served)		..	93	69	86	83	76	90	80	80	80	94	67	57	57	63	95	82	74	89	95	40	99	80	79	64	70	58	**52**	92	86	97	46	97	68	75
Fish catches (% of world catches)		0.2	-	-	1.1	4.0	-	0.8	0.1	0.2	0.5	0.3	0.1	-	1.4	0.3	-	0.3	4.6	2.1	-	1.7	0.5	0.5	2.7	0.2	0.3	-	**-**	1.0	0.3	-	0.6	0.7	5.0	29.5
AIR																																				
Emissions of sulphur oxides (kg/cap.)		118.7	2.5	7.0	43.9	51.1	16.5	2.7	40.9	11.0	4.8	5.5	37.9	8.0	239.9	7.3	24.6	3.9	6.0	8.3	6.3	..	2.3	17.0	3.3	22.6	7.7	11.8	**5.7**	9.4	3.2	1.7	11.2	6.5	27.8	16.1
(kg/1000 USD GDP)	*3*	3.4	0.1	0.2	1.3	3.8	0.7	0.1	2.5	0.4	0.2	0.2	1.5	0.5	7.1	0.2	1.0	0.1	0.2	0.3	0.1	..	0.1	0.7	0.1	1.4	0.4	0.6	**0.2**	0.3	0.1	-	1.0	0.2	0.7	0.5
% change (2000-2009)		11	-35	-56	-36	-34	-34	-50	-44	-27	-52	-32	-14	-84	119	-77	-35	-69	-17	-18	..	..	-48	5	-42	-43	-73	-50	**-87**	-71	-28	-27	-44	-68	-42	-40
Emissions of nitrogen oxides (kg/cap.)		76.8	22.3	19.2	60.1	23.9	23.9	23.8	21.6	28.9	17.8	16.7	33.3	16.6	74.6	19.6	26.3	16.5	14.0	24.5	38.5	..	15.6	35.0	37.4	21.5	23.8	15.5	**22.3**	23.2	16.2	10.7	19.8	17.8	43.3	25.6
(kg/1000 USD GDP)	*3*	2.2	0.6	0.6	1.7	1.8	1.1	0.7	1.3	0.9	0.6	0.5	1.3	1.0	2.2	0.5	1.0	0.6	0.5	1.0	0.5	..	0.4	1.4	0.8	1.3	1.1	0.8	**0.9**	0.9	0.5	0.3	1.7	0.5	1.0	0.9
% change (2000-2009)		10	-9	-37	-19	24	-22	-34	-21	-27	-29	-28	3	-10	-12	-35	-17	-31	-16	6	16	..	-31	14	-15	-2	-19	-21	**-9**	-23	-29	-23	38	-39	-35	-25
Emissions of carbon dioxide (t/cap.)	*4*	18.0	7.6	9.3	15.4	3.8	10.5	8.5	10.9	10.3	5.7	9.2	8.0	4.8	6.3	8.8	8.6	6.5	8.6	10.6	20.2	3.7	10.7	7.3	7.7	7.5	5.0	6.1	**7.5**	6.2	4.5	5.5	3.6	7.6	16.9	9.9
(t/1000 USD GDP)	*5*	0.51	0.22	0.29	0.45	0.29	0.47	0.26	0.68	0.34	0.19	0.28	0.31	0.29	0.19	0.25	0.34	0.24	0.29	0.41	0.29	0.30	0.29	0.29	0.16	0.45	0.23	0.31	**0.30**	0.23	0.14	0.15	0.31	0.24	0.40	0.33
% change (2000-2009)		17	3	-15	-2	24	-10	-8	0	2	-6	-9	3	-11	-7	-3	18	-9	-8	18	24	14	2	2	11	-1	-11	-11	**8**	0	-21	0	28	-11	-9	-5
WASTE GENERATED																																				
Industrial waste (kg/1000 USD GDP)	*3, 5*	10	..	40	..	..	30	10	..	100	50	20	..	30	-	30	..	20	40	30	20	..	30	10	20	90	40	80	**..**	20	100	-	20	20	..	40
Municipal waste (kg/cap.)	*6*	600	580	490	390	380	310	830	350	480	530	590	480	430	550	660	610	540	380	390	710	360	610	580	470	320	520	300	**400**	560	480	710	390	540	720	540
Nuclear waste (t/Mtoe of TPES)	*7*	-	-	2.2	6.2	-	1.9	-	-	2.0	4.3	0.9	-	1.9	-	-	-	-	1.4	2.9	-	0.1	0.1	-	-	-	-	3.4	**-**	0.8	4.7	2.3	-	1.8	0.9	1.4

.. not available. - nil or negligible.

1) Data refer to the latest available year. They include provisional figures and Secretariat estimates. Partial totals are underlined. Varying definitions can limit comparability across countries.

2) Total imports of cork and wood from non-OECD tropical countries.

3) GDP at 2005 prices and purchasing power parities.

Source: OECD Environmental Data Compendium.

4) CO_2 from energy use only; sectoral approach; international marine and aviation bunkers are excluded.

5) Waste from manufacturing industries.

6) CAN, NZL: household waste only.

7) Waste from spent fuel arising in nuclear power plants, in tonnes of heavy metal, per million tonnes of oil equivalent of total primary energy supply.

GBR: pesticides and threatened species: Great Britain only; water withdrawal and public waste water treatment plants: England and Wales only.

I.B: SELECTED ECONOMIC DATA (1)

OECD EPR / THIRD CYCLE

		AUS	AUT	BEL	CAN	CHL	CZE	DNK	EST	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ISR	ITA	JPN	KOR	LUX	MEX	NLD	NZL	NOR	POL	PRT	SVK	**SVN**	ESP	SWE	CHE	TUR	GBR	USA	OECD
GROSS DOMESTIC PRODUCT																																				
GDP, 2009 (billion USD au 2005 prices and PPPs)		773	288	349	1166	222	232	179	22	164	1909	2639	294	168	11	159	190	1600	3804	1243	35	1334	603	108	228	637	227	106	**51**	1243	301	286	837	1976	12880	36262
% change (2000-09)		30.8	14.1	12.0	16.8	37.2	33.8	5.7	41.5	16.1	10.8	5.1	31.4	19.1	28.7	29.3	30.2	1.3	4.8	41.1	30.4	10.9	12.3	25.4	16.4	40.9	5.4	54.3	**29.2**	22.9	16.2	14.6	33.8	13.4	14.7	14.3
per capita, 2009 (1000 USD/cap.)		35.2	34.5	32.4	34.6	13.1	22.1	32.4	16.1	30.7	30.5	32.2	26.1	16.7	33.9	35.7	25.3	26.8	29.8	25.5	70.4	12.4	36.5	25.0	47.2	16.7	21.4	19.5	**25.1**	27.1	32.4	36.9	11.6	32.4	42.0	29.7
Exports, 2009 (% of GDP)		19.9	51.2	73.0	28.7	..	69.2	47.2	64.7	37.3	23.0	40.8	19.1	77.4	53.0	90.7	34.7	23.9	12.5	49.9	167.6	27.8	69.2	28.5	42.4	39.5	27.9	70.1	**58.1**	23.4	48.5	51.7	23.2	27.7	11.2	24.2
INDUSTRY	*2*																																			
Value added in industry (% of GDP)		27.1	29.2	21.7	31.5	43.4	37.7	22.5	26.5	28.2	18.8	26.5	17.9	29.4	27.3	31.9	22.0	25.1	28.5	36.7	13.1	34.4	23.9	25.0	40.4	31.8	22.9	35.1	**31.1**	26.1	24.7	26.8	25.6	21.2	21.3	26.6
Industrial production: % change (2000-09)		13	21	-3	-16	26	36	-11	35	4	-12	0	-8	28	142	35	19	-20	-17	61	-4	0	3	1	-11	58	-15	54	**11**	-15	-7	11	27	-16	-5	-2
AGRICULTURE																																				
Value added in agriculture (% of GDP)	*3*	2.6	1.5	0.7	1.7	3.4	2.3	0.9	2.6	2.7	1.7	0.8	3.2	3.3	6.4	1.0	2.1	1.8	1.5	2.6	0.3	3.7	1.7	5.6	1.2	3.6	2.3	3.9	**2.4**	2.6	1.8	1.2	9.3	0.7	1.2	2.3
Agricultural production: % change (2000-09)		-6	-2	-8	16	21	-	9	37	2	-5	3	-21	7	9	-12	20	-2	-6	4	-8	13	6	11	4	13	-2	3	**-5**	4	-	2	12	-2	14	..
Livestock population, 2009 (million head of sheep eq.)		250.2	16.7	23.5	104.1	34.3	11.8	23.1	2.0	7.7	147.9	116.8	19.9	11.0	1.3	47.8	5.7	62.6	53.7	34.1	1.3	289.0	44.1	93.7	8.9	57.8	17.0	4.9	**3.8**	93.9	12.2	12.5	110.2	106.9	812.2	2642.5
ENERGY																																				
Total supply, 2010 (Mtoe)		126	33	57	255	31	42	20	5	36	264	332	27	25	5	15	22	170	495	247	4	170	83	18	31	102	24	17	**7**	128	51	26	105	204	2235	5413
% change (2000-10)		16.4	15.7	-2.9	1.5	26.5	3.3	5.6	16.1	10.4	4.9	-1.7	-0.3	1.8	72.8	9.0	20.1	-0.8	-4.6	31.1	28.2	17.0	13.8	8.9	19.6	14.1	-4.7	-2.7	**10.6**	5.1	6.8	5.2	37.3	-8.4	-1.7	2.3
Energy intensity, 2010 (toe/1000 USD GDP)		0.16	0.11	0.16	0.21	0.13	0.18	0.11	0.25	0.21	0.14	0.12	0.10	0.15	0.51	0.09	0.11	0.11	0.13	0.19	0.12	0.12	0.14	0.17	0.13	0.15	0.10	0.16	**0.14**	0.10	0.16	0.09	0.12	0.10	0.17	0.15
% change (2000-10)		-13.8	-0.5	-15.2	-15.6	-12.3	-24.6	-2.2	-19.9	-7.4	-6.8	-9.6	-21.0	-15.4	39.3	-15.4	-11.3	-3.1	-10.6	-12.6	-4.9	0.5	-0.3	-15.0	2.2	-21.7	-10.9	-39.4	**-15.3**	-14.3	-12.0	-10.6	-5.2	-20.6	-16.6	-12.8
Structure of energy supply, 2010 (%)	*4*																																			
Solid fuels		42.0	9.6	3.4	8.9	13.3	39.3	19.4	68.2	19.4	4.5	23.0	27.6	10.8	1.4	14.1	32.1	8.4	23.4	29.4	1.9	5.0	9.5	8.6	2.8	55.1	7.1	20.0	**19.9**	6.3	5.0	0.6	31.8	15.0	23.0	20.2
Oil		32.0	37.6	38.4	35.6	49.9	19.8	37.8	8.4	26.4	29.3	31.7	52.8	25.8	13.3	49.4	43.5	39.8	40.9	38.2	63.3	54.6	37.5	33.3	40.6	24.8	49.0	20.8	**35.2**	45.5	28.4	39.5	27.3	32.0	36.2	36.3
Gas		20.7	25.0	30.9	29.9	14.1	17.5	22.1	9.8	11.0	16.1	23.9	12.1	39.0	-	32.4	19.6	40.8	17.4	15.2	31.0	29.2	47.2	19.5	18.1	12.6	19.1	29.7	**11.9**	24.2	3.0	11.5	29.9	41.5	25.3	24.5
Nuclear		-	-	22.0	9.1	-	16.8	-	-	17.1	41.9	11.0	-	16.5	-	-	-	-	15.2	15.7	-	0.9	1.2	-	-	-	-	22.5	**20.3**	12.5	29.8	26.6	-	7.9	9.8	11.0
Hydro, etc.		5.2	27.8	5.4	16.4	22.8	6.6	20.6	13.7	26.0	8.3	10.4	7.6	8.0	85.3	4.1	4.8	10.9	3.2	1.5	3.7	10.3	4.5	38.6	38.6	7.6	24.8	6.9	**12.7**	11.5	33.9	21.8	11.0	3.5	5.8	8.0
ROAD TRANSPORT	*5*																																			
Road traffic volumes per capita, 2007 (1000 veh.-km/cap.)		10.1	10.3	9.2	10.1	..	4.6	8.2	..	10.1	8.5	7.0	10.1	2.3	9.6	10.1	..	9.4	6.8	4.7	8.8	0.7	8.4	13.7	8.2	4.2	8.9	2.9	**-**	5.2	8.6	8.3	1.0	8.4	16.3	8.7
Road vehicle stock, 2007 (10 000 vehicles)		1417	513	575	1883	..	483	262	..	299	3665	4922	608	349	24	226	235	4021	7413	1590	36	2569	822	273	269	1702	573	166	**114**	2696	478	430	946	3316	24795	67323
% change (2000-07)		19	4	10	7	..	30	16	..	21	8	8	42	27	34	46	34	11	5	32	21	68	12	17	17	41	21	16	**22**	26	9	12	59	17	12	15
per capita (veh./100 inh.)		67	62	54	57	..	47	48	..	56	59	60	54	35	78	52	31	68	58	33	75	24	50	65	57	45	54	31	**57**	60	52	57	13	55	82	57

.. not available. - nil or negligible.

1) Data may include provisional figures and Secretariat estimates. Partial totals are underlined.

2) Value added: includes mining and quarrying, manufacturing, gas, electricity and water and construction; production: excludes construction.

3) Agriculture, forestry, hunting, fishery, etc.

4) Breakdown excludes electricity trade.

5) Refers to motor vehicles with four or more wheels, except for Italy, which include three-wheeled goods vehicles.

Source: OECD Environmental Data Compendium.

I.C: SELECTED SOCIAL DATA (1)

		AUS	AUT	BEL	CAN	CHL	CZE	DNK	EST	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ISR	ITA	JPN	KOR	LUX	MEX	NLD	NZL	NOR	POL	PRT	SVK	**SVN**	ESP	SWE	CHE	TUR	GBR	USA	OECD
POPULATION																																				
Total population, 2009 (100 000 inh.)		220	84	108	337	169	105	55	13	53	626	819	113	100	3	45	75	598	1275	487	5	1076	165	43	48	382	106	54	**20**	459	93	77	719	609	3070	12214
% change (2000-09)		14.6	3.1	5.2	10.0	9.9	2.3	3.4	-2.2	3.1	6.0	-0.3	3.3	-1.9	13.5	17.6	19.0	4.5	0.5	3.7	13.1	9.3	3.8	11.9	7.5	-0.3	4.0	0.4	**1.7**	14.1	4.8	7.8	11.9	3.5	8.8	6.2
Population density, 2009 (inh./km^2)		2.8	99.7	353.4	3.4	22.4	133.2	128.1	29.6	15.8	114.0	229.3	85.5	107.7	3.1	63.5	339.2	198.3	337.4	488.0	190.5	54.8	397.9	16.1	14.9	122.0	115.5	110.6	**99.7**	90.9	20.7	187.6	91.8	250.1	31.2	33.8
Ageing index, 2009 (over 64/under 15)		72.4	116.4	107.5	87.1	41.5	113.0	93.9	111.0	104.6	91.4	149.7	133.5	112.6	59.6	56.7	34.7	146.8	178.5	67.7	82.0	21.0	88.5	65.2	81.1	92.1	118.5	86.3	**118.4**	116.8	112.4	114.3	30.0	95.0	64.5	80.0
HEALTH																																				
Women life expectancy at birth, 2009 (years)		83.9	83.2	82.8	83.0	80.9	80.5	81.1	80.1	83.5	84.4	82.8	82.7	77.9	83.3	82.5	83.5	84.5	86.4	83.8	83.3	77.6	82.7	82.7	83.2	80.0	82.6	78.7	**82.3**	84.9	83.4	84.6	76.1	82.5	80.6	..
Infant mortality, 2009 (deaths /1 000 live births)		4.3	3.8	3.4	5.1	7.9	2.9	3.1	3.6	2.6	3.7	3.5	3.1	5.1	2.2	3.2	3.8	3.7	2.4	3.5	2.5	14.7	3.8	4.7	3.1	5.6	3.6	5.7	**2.4**	3.3	2.5	4.3	13.1	4.6	6.5	..
Expenditure, 2009 (% of GDP)		8.7	11.0	10.9	11.4	8.4	8.2	11.5	7.0	9.2	11.8	11.6	9.6	7.4	9.7	9.5	7.9	9.5	8.5	6.9	7.8	6.4	12.0	10.3	9.6	7.4	10.1	9.1	**9.3**	9.5	10.0	11.4	6.1	9.8	17.4	..
INCOME AND POVERTY																																				
GDP per capita, 2009 (1000 USD/cap.)		35.2	34.5	32.4	34.6	13.1	22.1	32.4	16.1	30.7	30.5	32.2	26.1	16.7	33.9	35.7	25.3	26.8	29.8	25.5	70.4	12.4	36.5	25.0	47.2	16.7	21.4	19.5	**25.1**	27.1	32.4	36.9	11.6	32.4	42.0	29.7
Poverty (% pop. < 50% median income)		14.6	7.9	9.4	12.0	18.4	5.5	6.1	12.5	8.0	7.2	8.9	10.8	6.4	6.4	9.1	19.9	11.4	15.7	15.0	8.5	21.0	7.2	11.0	7.8	11.2	12.0	7.2	**8.0**	14.0	8.4	9.3	17.0	11.0	17.3	11.1
Inequality (Gini levels)	*2*	33.6	26.1	25.9	32.4	49.4	25.6	24.8	31.5	25.9	29.3	29.5	30.7	27.2	30.1	29.3	37.1	33.7	32.9	31.5	28.8	47.6	29.4	33.0	25.0	30.5	35.3	25.7	**23.6**	31.7	25.9	30.3	40.9	34.5	37.8	31.4
Minimum to median wages, 2009	*3*	54.4	x	50.8	42.6	x	36.0	x	41.3	x	60.1	x	48.2	47.8	x	51.1	x	x	36.2	40.7	43.0	19.0	47.2	59.4	x	44.9	53.7	45.4	**49.0**	44.1	x	x	71.3	46.1	37.1	..
EMPLOYMENT																																				
Unemployment rate, 2009 (% of civilian labour force)	*4*	5.6	4.8	7.9	8.3	10.8	6.7	6.0	13.8	8.2	9.5	7.5	9.5	10.0	7.2	11.9	7.5	7.8	5.1	3.6	5.2	5.5	3.7	6.1	3.1	8.2	9.6	12.0	**5.9**	18.0	8.3	4.1	12.5	7.6	9.3	8.3
Labour force participation rate, 2009 (% 15-64 years)		78.5	75.8	68.9	80.1	..	71.0	83.9	76.2	75.2	69.5	80.5	69.0	60.5	84.1	71.7	65.4	63.4	81.2	69.0	68.8	59.9	80.3	68.3	80.9	63.5	77.8	68.6	**73.7**	74.5	70.6	85.6	52.2	76.7	65.4	72.2
Employment in agriculture, 2009 (%)	*5*	3.3	5.5	1.8	2.3	11.2	3.3	2.5	4.0	4.6	2.6	2.3	11.7	4.7	1.7	5.3	1.7	3.8	4.2	7.0	1.5	12.9	2.5	6.7	2.7	13.3	11.2	3.6	**9.1**	4.2	2.2	3.7	24.7	1.1	1.5	5.1
EDUCATION																																				
Education, 2009 (% 25-64 years)	*6*	71.0	81.9	70.6	87.6	69.0	91.4	76.3	88.9	82.0	70.0	85.5	61.2	80.6	65.9	71.5	81.8	54.3	..	79.9	77.3	35.2	73.4	72.2	80.7	88.0	29.9	90.9	**83.3**	51.8	85.8	86.9	31.1	73.7	88.6	73.3
Expenditure, 2009 (% of GDP)	*7*	5.2	5.4	6.6	6.0	7.1	4.5	7.1	5.8	5.9	6.0	4.8	..	4.8	7.9	5.6	7.3	4.8	4.9	7.6	2.9	5.8	5.6	6.6	7.3	5.7	5.2	4.0	**5.4**	5.1	6.3	5.8	..	5.7	7.2	5.9
OFFICIAL DEVELOPMENT ASSISTANCE	*8*																																			
ODA, 2009 (% of GNI)		0.29	0.30	0.55	0.30	x	x	0.88	x	0.54	0.47	0.35	0.19	x	x	0.54	x	0.16	0.18	0.10	1.04	x	0.82	0.28	1.06	x	0.23	x	**x**	0.46	1.12	0.45	x	0.52	0.21	0.31
ODA, 2009 (USD/cap.)		126	137	242	119	x	x	509	x	242	201	147	54	x	x	225	x	55	74	17	840	x	389	72	846	x	48	x	**x**	143	489	298	x	189	94	109

.. not available. - nil or negligible. x not applicable.

1) Data may include provisional figures and Secretariat estimates. Partial totals are underlined.

2) Ranging from 0 (equal) to 100 (inequal) income distribution; figures relate to total disposable income (including all incomes, taxes and benefits) for the entire population.

3) Minimum wage as a percentage of median earnings including overtime pay and bonuses.

4) Harmonised unemployment rates.

Source: OECD.

5) Civil employment in agriculture, forestry and fishing.

6) Upper secondary or higher education; OECD: average of rates.

7) Public and private expenditure on educational institutions; OECD: average of rates.

8) Official Development Assistance by Member countries of the OECD Development Assistance Committee.

REFERENCE II

Abbreviations

ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
AEERE	Agency for Energy Efficiency and Renewable Energy
AEWA	African-Eurasian Waterbird Agreement
ARSO	Slovenian Environment Agency
ASFS	Association of Slovenian Forest Societies
BAT	Best available techniques
C&D	Construction and demolition waste
CARS	Court of Audit of the Republic of Slovenia
CBD	Convention on Biological Diversity
CHP	Combined heat and power
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COFOG	Classification of the Functions of Governments
DAC	Development Assistance Committee, OECD
DMC	Domestic material consumption
DOPPS	Society for the Study of Birds of Slovenia
DRBMP	Danube River Basin Management Plan
EARS	Energy Agency of the Republic of Slovenia
EBRD	European Bank for Reconstruction and Development
EEA	European Environment Agency
EGS	Environmental goods and services
EIA	Environmental impact assessment
EIB	European Investment Bank
ELTs	End-of-life-tyres
ELVs	End-of-life vehicles
EMAS	EU Eco-Management and Audit Scheme
EnSvet	Slovenia's Energy Advisory Network
EPA	Environmental Protection Act
EPR	Extended Producer Responsibility
ETS	Emissions Trading System
EU	European Union
EUR	Euro
EUROBATS	The Agreement on the Conservation of European Bats
FASRB	Framework Agreement on the Sava River Basin

FDI	Foreign direct investment
GDP	Gross domestic product
GEF	Global Environment Facility
GHGs	Greenhouse gases
GLG	Global Legal Group
GNI	Gross national income
GPP	Green Public Procurement
GPS	Global Positioning System
HCB	Hexachlorobenzene
ICPDR	International Commission for the Protection of the Danube River
ICZM	Integrated Coastal Zone Management
IEA	International Energy Agency
IER	Institute for Economic Research
IESP	Inspectorate for the Environment and Spatial Planning
IMAD	Institute for Macroeconomic Analysis and Development
IMPEL	European Union Network for the Implementation and Enforcement of Environmental Law
INC	Institute of the Republic of Slovenia for Nature Conservation
IPPC	Integrated Pollution Prevention and Control
ISO	International Organization for Standardization
IUCN	World Conservation Union (International Union for Conservation of Nature)
LEPs	Local Energy Plans
LULUCF	Land use, land-use change and forestry
MAFF	Ministry of Agriculture, Forestry and Food
MAP	UNEP Mediterranean Action Plan
MBT	Mechanical biological treatment
MEA	Multilateral environmental agreement
MESP	Ministry of the Environment and Spatial Planning
MFA	Ministry of Foreign Affairs
MHEST	Ministry of Higher Education, Science and Technology
MoEco	Ministry of the Economy
MoF	Ministry of Finance
MSW	Municipal solid waste
MVT	Motor vehicle tax
NDP	National Development Programme
NEAP	National Environmental Action Programme
NEC	National Emission Ceilings
NEEAP	National Energy Efficiency Action Plan
NGO	Non-governmental organisation
NIMBY	“Not in my backyard”
NIMET	“Not in my election time”
NNCP	National Nature Conservation Programme
NRDP	National Research and Development Programme
ODA	Official development assistance
OPDETI	Operational Programme for Environmental and Transport Infrastructure Development
PE	Population equivalent

PIC	Prior informed consent
PISA	Programme for International Student Assessment, OECD
PV	Solar photovoltaic
QASs	Quality assurance systems
R&D	Research and development
RDP	Slovenian Rural Development Programme
RES	Renewable energy sources
SDS	Slovenia Development Strategy
SEA	Strategic environmental assessment
SFS	Slovenian Forest Service
SID Bank	Slovenian Export and Development Bank
SMEs	Small and medium-sized enterprises
SORS	Statistical Office of the Republic of Slovenia
TFC	Total final energy consumption
TOC	Total organic carbon
TPES	Total primary energy supply
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
USD	United States dollar
VAT	Value added tax
WEEE	Waste electrical and electronic equipment
WFD	EU Water Framework Directive
WHO	World Health Organization
WWF	World Wide Fund for Nature

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