Final report

Study on energy subsidies and other government interventions in the European Union

Written by Enerdata

Final Report

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Final report

Study on energy subsidies and other government interventions in the European Union

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1. Executive summary

Tasks 1, 2 and 3: Energy subsidy trends in the EU27

This section presents and analyses the recent developments on energy subsidies in the EU27. Our conclusions are below.

On the quality and transparency of reporting on energy subsidies:

- We find that transparency has improved over the past years although there is large room for improvement. Ireland, Italy and Germany are among the most transparent countries.
- Subsidies supporting the development of renewables are closely monitored and data are regularly updated. On the contrary, that on fossil fuels and nuclear are not easy to access in most of the Member States (MS).
- Improvement of reporting on fossil fuel subsidies (FFS) is needed in all MSs so that public opinion can take up this subject and call on public officials to move this topic forward. This will help respect past commitments to phase-out inefficient fossil fuel subsidies and align with the Paris Agreement requirements.
- A portion of the 2020 data is still missing at the date of writing this report (15th July 2021).

On the energy subsidies trends since 2015:

- The overall subsidy amount has slightly rose since 2015, reaching €176bn in 2019.
- Total fossil fuel subsidies in the EU27 are varying around €55bn since 2015. We expect a €2bn fall in 2020, mainly because of consumption decrease due to the COVID-19 pandemic.
- MS' State budgets provide no evidence that any comprehensive FFS phase-out plan is implemented. No such policy is yet in the MS's finance laws. Only few countries have voted to end several FFS and putting a term on FFS reveals a difficult operation for governments.
- The analysis of the MS' tax expenditures reports included in their State budgets reveals that only few countries have voted - as part of their finance laws – provisions to end one or several FFS. Putting a term on tax expenditure supporting fossil fuels seems like a difficult exercise for governments.
- Support to energy efficiency is on the rise since 2015, reaching €16bn in 2019, which remains far lower than FFS. Subsidies for renewables are still slightly increasing but the power generation from renewables is increasing at a faster pace since 2015, thus demonstrating an improved economic efficiency and higher maturity of these technologies.
- Tax expenditure is the most common subsidy instrument in the EU achieving €68bn in 2019 (39%), of which €42bn went to FFS. Income or price support tools captured the lions' share with a total of €85bn (49%), of which €67bn went to renewables through feed-in tariffs/premium, and renewable obligations. Direct transfers (€17bn, 10%) are principally devoted to energy efficiency measures (€10.5bn).
- The need for structural changes of the European power mix has triggered the emergence of new kind of subsidies such as payment for early closure of nuclear and coal/lignite-fired power plants.

Task 4: Preparing an analysis of the national interpretation of subsidies

We compared energy subsidies reported in the national energy and climate plans (NECPs) with those in the *Commission Study*[1] for all 27 MSs. We also collected information from country experts on how current governments view energy subsidies, with a focus on fossil fuel subsidies. Our conclusions are below.

On comparisons between fossil fuel subsidies reported in NECPs and the Commission Study:

- We find that that reporting on fossil fuel subsidies in NECPs is overall low to medium-low in quality based our assessment of comprehensiveness and level of detail. Germany, Italy, and Spain had the most comprehensive and detailed reporting.
- There were nine MS NECPs against which we were able to directly compare fossil fuel subsidy volumes (MEUR) to the *Commission Study*. In total across these nine countries the *Commission Study* found 59% more volume in subsidies paid than recounted in the NECPs.
- 15 MSs did not report fossil fuel subsidy data, or did so at a lower levels of comprehensiveness and detail.
- When comparing subsidy amounts found in the *Commission Study* to those in the NECPs, the Study team found five main of types of variance:
    - Variance in the types of subsidies reported
    - Variance in the number of subsidies reported
    - Variance in the amounts of subsidies reported
    - Variance in nomenclature and classification
    - Variance in years reported

On announcements by MS governments on fossil fuel phase-outs:

- 8 MSs have announced plans to phase-out fossil fuel subsidies or are already implementing plans to phase them out. But among these 8 there is little more than general commitments to subsidy phase-outs; most commitments lack specific plans and timelines.
- 8 MSs are considering subsidy phase-outs or are in the process of developing phase-out plans.
- 11 MSs have not announced plans to phase-out fossil fuel subsidies; this designation does not necessarily correspond with MSs announced plans or commitments to decarbonise energy systems.
- There is no clear relationship between a MS's status in announcing phase-outs and recent trends in subsidy payments. For example, some MSs who are implementing phase-out plans recently increased subsidy payments and some MSs without any plans recently decreased payments.

[1] «Energy costs, taxes and the impact of government interventions on investments», Trinomics, Enerdata, Cambridge Econometrics, LBST, October 2020. Available at https://op.europa.eu/en/publication-detail/-/publication/92ae71b0-173a-11eb-b57e-01aa75ed71a1/language-en

Task 5: Analysis on how COVID-19 related measures in MSs impact subsidies

The study team estimated the change in subsidies for fossil fuels and renewable energy in 2020 v. 2019, and documented energy-related COVID response measures in MS Recovery and Resilience Plans (RRPs). Our conclusions are below.

On changes in subsidy levels in 2020 v. 2019:

- Based on an analysis of subsidies for coal, gas, gasoline, diesel, and kerosene, volumes of fossil fuel subsidies were down -9% in the EU27 in 2020 versus 2019. Decreases in tax expenditures for kerosene accounted for 60% of the change in 2020; this is likely due to a drop in the use of domestic aviation.
    - The overall decrease in coal use (and therefore subsidies) in 2020 was partly due to increased renewable energy production combined with an overall drop in electricity use. While the extent to which this decline happened because of MS commitments to phase-out coal versus the impacts of COVID-19 is unclear, coal use trended down -9% between 2015 and 2018, but fell by two-thirds between 2018 and 2020.
- Based on an analysis of 70% of FiT and FiP policies in the EU27, FiT and FiP payments declined -4% in 2020 versus 2019 across the 15 MSs for whom the study team was able to develop 2020 estimates. Payments increased the most in countries with the biggest decreases in wholesale power prices.

The above conclusions were based on the data available at the time of the analysis. Many MSs had not published subsidy-related data at the time of this analysis; therefore the analysis is based partly on estimated subsidy amounts for 2020.

On MS COVID response measures:

- In their RRPs, MSs have overall put forward reform and investment measures that would increase the supply of and promote the uptake of renewable energy and reduce MS dependence on fossil fuels. The RRPs have a pivotal focus on investments and reforms that promote clean energy production and consumption in several sectors such as industry, households, transportation, and construction. In addition, there are a number of measures targeting the reduction of fossil fuel use, especially that of coal and oil, and their replacement with cleaner energy sources such as gas and renewables. Consequently, these measures strengthen MS support of renewable energy and decarbonisation of fossil fuel-dependent sectors. Note that under the RRF, MSs can only support measures that comport to the "do no significant harm" principle of the Taxonomy Regulation;[2] overall we believe that MSs' have done so, meaning that implementing RRP measures will contribute to MS phase-outs of fossil fuel subsidies, and help increase clean energy subsidies.
- The investments and reforms that are directly related to energy identified in RRPs submitted by MSs target either the promotion of the clean energy, or reduction of fossil fuels (mainly coal

[2] The six environmental areas that the measures should not do any significant harm, according to Article 17 of the Taxonomy Regulation, are climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, circular economy, pollution prevention and control and protection and restoration of biodiversity and ecosystems. (European Commission 2021, Technical guidance on the application of "do no significant harm" under the Recovery and Resilience Facility Regulation)

and oil) from the energy system, and their replacement with alternative sources, such as gas and renewables.

- A total of 520 green recovery measures were identified in the RRPs of 23 Member States.[3] These will contribute directly or indirectly to the MSs clean energy transitions. The total investment value of these 520 policies is €237bn, of which 80% of funding (€189bn) is expected to come from the RRF, which was set up by the EU to aid European countries in achieving a green and sustainable recovery post-COVID-19; this constitutes 28% of total Facility funds.

- A significant share of planned investments will contribute to decarbonising the transport sector, which includes upgrading rail infrastructure for both freight and passenger travel, and promoting the development of the hydrogen economy, including investing in research and infrastructure development for hydrogen. Other planned investments include measures to decarbonise building stock, facilitating the production and uptake of energy from renewable energy sources, such as construction of new renewable energy infrastructure, deployment of energy storage technology, promotion of renewable heat, promotion of energy communities etc.

- Hydrogen is one of the key energy carriers noted in RRPs. The planned investment value in hydrogen (€20.7bn) amounts to 8.7% of the total energy-related investments across the 520 measures.

- Italy, France, and Spain have the highest total amounts of planned investments for measures related to the clean energy transition.

- Croatia, Bulgaria, Italy and Romania have the largest levels of planned investments that are related to the clean energy transition, relative to GDP_{2020}.

[3] Research for this task ended in June 2021.

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2. Introduction

This report documents work completed for the Directorate General for Energy (DG ENER) of the European Commission (EC) on the **Study on energy subsidies and other government interventions in the EU (ENER/2020/OP/0030)**. The work was done by a two-member consortium: **Enerdata**, the project lead, and **Trinomics**. It is the latest in a series of DG ENER studies going back to 2014 documenting energy subsidies and related instruments. The last study was also conducted by Enerdata and Trinomics and covered taxes and subsidies for 2008-2018 in the EU27 and G20. This study adds EU27 subsidy data for 2019 and 2020. Tasks 1-3 of this study involved collecting, documenting, normalising, controlling, and analysing subsidy data from national and EU sources. Task 4 compared this data to subsidy data reported by MSs in their National Energy and Climate Plans (NECPs), and collecting information on country policy environments affecting energy subsidies. Task 5 looked at how subsidy volumes (amount of payments) changed 2020 relative to 2019, the assumption being that the change was largely due to the economic and social impacts of the COVID-19 pandemic; in this task we also documented MS policy response measures to the pandemic that impact the energy sector by cataloguing and analysing information from MS Recovery and Resilience Plans (RRPs).

The objectives of this study were:

- Tasks 1-3: Energy subsidy trends in the EU27
    - Collect, control, harmonise and analyse energy subsidies data trends in the EU27 from 2008 to 2019, 2020.
    - Map the MSs that have already put in place fossil fuel subsidies phase-out plans by looking at their State budget for the upcoming year(s) and, if possible, to quantify the ambition of the said plans developed.
- Task 4: Preparing an analysis of the national interpretation of subsidies
    - To show how MS reporting on energy subsidies in NECPs varies from subsidy data in the *Commission Study*. This includes variance in the types and amounts of subsidies reported as well as energy subsidy classifications, with a focus on fossil fuels.
    - A second goal is to capture how current MS governments view energy subsidies.
- Task 5: Analysis on how COVID-19 related measures in the MSs impact energy subsidies
    - For the Commission to better understand the impact of COVID-19 on the energy sector, and on energy subsidies in particular.

This report starts with a brief background on energy subsidies in the EU, then launches into documentation of the approaches, findings, and conclusions for each of the above tasks. Annexes include:

- Tasks 1-3: The subsidies database
- Task 4: Country fiches on MS policy environments
- Task5: MS COVID-19 response measure database

Background

Energy subsidies and government interventions refer to specific initiatives to keep prices for consumers below market levels (e.g. reduced tax rates on road transport fuels) or for producers above market levels (e.g. feed-in tariffs), or to reduce costs for consumers or producers by granting specific benefits. Energy subsidies may be made of direct cash transfers to producers or consumers, as well as indirect support mechanisms (e.g. tax exemptions and tax credits), or even market-based mechanisms providing cross-subsidies between economics actors (e.g. white certificate markets for energy efficiency, electricity capacity mechanisms…).

The most established and detailed categorization of government interventions related to the energy sector has been developed by the European Commission (EC) through the Study on energy costs, taxes, government interventions and their impact on energy investments[4] (*"Commission study")* using the concept developed by the World Trade Organization (WTO) Agreement on Subsidies and Countervailing Measures (ASCM)[5]. It led to the classification of subsidies and government interventions in four main categories, namely direct transfers, tax expenditures, income or price supports and RD&D budgets.

- **Direct transfers** are direct expenditures by governments to recipients, which could be either consumers or producers. Direct transfers include grants, low- interest or preferential loans.
- **Tax expenditures** are the amount of tax benefits, or preferences, received by taxpayers and forgone by governments. Tax expenditures are relative preferences within a country's tax system that are measured with reference to a benchmark tax treatment set by that country. The amounts of tax expenditures were estimated by governments with reference to a benchmark tax level. Five main different forms have been identified, namely: tax reductions, tax exemptions, tax refunds, tax credits and tax allowances. These instruments may apply to various types of energy-related taxes, such as excise duties, specific electricity taxes, fees financing certain types of technologies (i.e. renewables or cogeneration), carbon taxes, VAT, etc;
- **Income or price supports** encompass various types of economic mechanisms, most of them can be considered as cross-subsidies, i.e. consisting of transferring amounts of money from groups of people / technology / territory to another specific group. Most often, such measures are financed through final consumers' tariffs/prices. Twelve types of interventions have been identified: capacity payments electricity capacity mechanisms, biofuels blending mandates, renewable energy quotas with tradable certificates, differentiated grid connection charges, energy efficiency obligations, interruptible load schemes, contract for difference, feed-in premiums, feed-in tariffs, consumer price guarantees (cost support), consumer price guarantees (price regulation) and producer price guarantees (price regulation);
- **Research, Development and Demonstration (RD&D) budgets** cover various types of provisions of financial and/or other preferential mechanisms to support innovation.

The use of subsidies by government is often justified by the need to address market failures. However, within the previous study, for some intervention, the reason to explain their existence is to be found in the social and economic context of the 20th century. Indeed, the data gathered during the *Commission study* indicated that around 60% of the 350 individual FFS inventoried where enacted before 2000. This reveals a certain degree of inertia of the MSs economic policies.

However, the economic and political context has changed since the last decades. Science, through the Intergovernmental Panel on Climate Change (IPCC), has demonstrated the existence of an ongoing global climate change due to human activities - especially fossil-fuel combustion activities - and its

[4] Available at : https://ec.europa.eu/energy/studies_main/final_studies/study-energy-costs-taxes-and-impact-government-interventions-investments_en

[5] Available at : https://www.wto.org/english/tratop_e/scm_e/scm_e.htm

consequences that could materialize, among other things, by unprecedented increases in sea levels, biodiversity loss, and a higher frequency of extreme weather events such as floods and droughts. The EU, in its economy, social and environmental policy framework, has been progressively including the challenge of tackling climate change. Many measures are currently under development. Many more will take place in the months or years to come. Among them, addressing the subject to inefficient energy subsidies seems obvious and of high importance. Indeed, inefficient subsidy schemes are deemed to provide market distortions and send wrong signals to investors, thus hampering the development of new technologies such as renewables. Such observation applies for FFS since, in the exception of where subsidies serve to correct a pre-existing market failure[6], FFS distort costs and prices and thus generate market inefficiencies. In addition to these inefficiencies, FFS are deemed to have harmful environmental impacts, as the combustion of fossil fuels lead to consequent greenhouse-gas (GHG) emissions which have in-turn direct aftermath of climate change issues.

This is why several international initiatives to rationalise and phase-out of FFS have been announced such as the commitments[7] by the G20 and the Asia-Pacific Economic Cooperation (APEC)[8] in 2009, and those taken under the Paris Agreement at the 21st Conference of Parties (COP21) under the United Nations Framework Convention on Climate Change (UNFCCC) in November 2015. The European Commission has repeated its commitment in 2016 through the Clean Energy for all Europeans[9] package. The Regulation on the Governance of the Energy Union and Climate Action[10] materialises this commitment by requiring MS to report every year progress towards phasing out energy subsidies, in particular FFS. In addition, the broad EU approach toward ending the financing to fossil fuels further stepped up in November 2019 with the adoption by the European Investment Bank (EIB) of its new Climate Strategy and Energy Lending Policy[11] that aims to phase-out traditional fossil fuel energy projects by 2021.

Despite the many benefits of reforming inefficient subsidies, including FFS, efforts to implement such reforms have long been hampered by a crucial lack of information regarding the amount and type of support measures in place. To address this issue, as early as 2014, the EC has invested in studies to design the methodology for an upcoming reporting framework on energy subsidies and has developed an extensive database (here called "*EC inventory*") gathering a large set of information on all kinds of energy subsidies and government interventions. After a first approach in 2014, the EC reiterated its effort by realizing two studies in 2018 and 2020 to better map the existence of energy subsidies. The outcomes of the last one, the *Commission study*, revealed that although commitments to phase-out FFS were made, the amount of EU27 FFS have remained steady since 2008 at around €50bn (in EUR_{2018}). However, trends vary from one country to another with Germany and Italy registering FFS drops of €2.7bn and €1.2bn, respectively, over the 2008-2018 period, whereas MS like France (+€4.1bn) and Poland (+€1.3bn) registered significant rises. This study builds on the work of these previous studies by adding subsidy data for 2019 and 2020. In this study we found that from 2008 to 2020, overall energy-related subsidies in the EU27 MS increased by 75%, or (+€76bn) from €101bn to €177bn in real terms (€2020). However, this trend has slowed down since 2015 (+9%, +€14bn).

6 The OECD quotes for instance the «subsidies for the provision of public goods like national defence and earlywarning systems for natural disasters", OECD, OECD Companion to the Inventory of Support Measures for Fossil Fuels 2015.
7 Available at: https://www.oecd.org/g20/summits/pittsburgh/G20-Pittsburgh-Leaders-Declaration.pdf
8 Available at: https://www.apec.org/meeting-papers/leaders-declarations/2009/2009_aelm.aspx
9 Available at: https://ec.europa.eu/transparency/regdoc/rep/1/2016/EN/COM-2016-860-F1-EN-MAIN.PDF
10 Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L:2018:328:FULL&from=EN
11 Available at: https://www.eib.org/en/press/all/2019-313-eu-bank-launches-ambitious-new-climate-strategy-and-energy-lending-policy

3. Tasks 1, 2 & 3: Energy subsidy trends in the EU27

3.1. Objective

The aim of this task was to collect, control, harmonise and analyse energy subsidies data trends in the EU27 from 2008 to 2019, 2020 where possible. This has been done by updating the current energy subsidies inventory (later called *EC inventory*) inherited from the EC Study on energy costs, taxes, government interventions and their impact on energy investments of 2020 (later called "*Commission study*")[12].

The objective was also to map the MS that have already put in place fossil fuel subsidies phase-out plans by looking at their State budget for the upcoming year(s) and, if possible, to quantify the ambition of the said plans developed.

In a first step, we discuss on the methodological framework used throughout the study before addressing the various trends observed since 2015.

3.2. Theoretical framework addressing energy subsidy

Our analysis is based on the methodological framework used in the *Commission study*, which is inspired by the Agreement on Subsidies and Countervailing Measures (ASCM) framework stated by the World Trade Organization (WTO)[13]. No change has been made to this methodological framework. Accordingly, the subsidy definitions and classifications have remained that of the *Commission study*. As a reminder, the main axis of analysis, thus of classifications, being the following:

- Category
- Instruments
- Energy sources/carriers
- Purposes
- Source of financing
- Economic sectors

The methodology is presented in detail under the section *6.1 Annex 1: Theoretical framework*.

[12] « Energy costs, taxes and the impact of government interventions on investments », Trinomics, Enerdata, Cambridge Econometrics, LBST, October 2020. Available at https://op.europa.eu/en/publication-detail/-/publication/92ae71b0-173a-11eb-b57e-01aa75ed71a1/language-en

13 All documents related to WTO Agreement on Subsidies and Countervailing Measures are available at https://www.wto.org/english/tratop_e/scm_e/scm_e.htm

3.2.1. Energy subsidy data quality

Although many international institutions have repeatedly committed[14,15,16,17] and called to phase-out fossil fuel subsidies (FFS), reporting on the energy-related subsidies is a recent mater for most of the institutions and States. As a result, establishing a reporting on this topic is very challenging and requires many cross-controls. Indeed, as no reporting standard has yet imposed itself, each actor (international institutions, states, regions) release data accordingly to its own understanding, its data and its willingness to tackle -in detail or not- the issue of energy subsidies. The chapter below describes the hurdles our consortium has encountered to update our inventory. We have identified six main types of barriers in addition to the lack of common rules and scopes of reporting.

3.2.1.1. Accessibility and clarity

The first challenge we have met during this study was to identify the sources of information on energy subsidies. Indeed, in many countries, **the information is spread out between various institutions** and often no consolidated data is available. Although, data on energy/excise tax expenditures are usually well structured, not all the MS -through their Ministry of Finance or Tax administration- are currently publishing dedicated report on this form of subsidy. When it comes to direct transfers, the data on subsidies is spread all over the institutions -energy efficiency agency, building agency, funding organisations…- providing grants, soft loans or any other related subsidies. Similarly, dispersal of information across the institutions -regulator, competition agency, energy efficiency agency, market operators…- is also true for all the kinds of income or price support. Finally, the **data scattering makes very difficult to ensure the completeness of the amounts gathered**[18].

Another hurdle is the **continuous re-location of the information** due to numerous reorganisations of the websites of the many institutions providing data[19]. Consequently, we see these never-ending changes as a serious obstacle for the public to follow-up the energy subsidies developments even in their own countries.

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[14] The communiqué mentions the G20 members "To phase-out and rationalise over the medium term inefficient fossil fuel subsidies while providing targeted support for the poorest", G20 Pittsburgh Leaders Declaration, September 2009. Available at: https://www.oecd.org/g20/summits/pittsburgh/G20-Pittsburgh-Leaders-Declaration.pdf

[15] The Clean Energy For All Europeans mentions that "this package is also stepping up EU's action in removing inefficient fossil fuel subsidies in line with international commitments under G7 and G20 and in the Paris Agreement. The remaining but still significant public support for oil, coal and other carbon-intensive fuels continues to distort the energy market, creates economic inefficiency and inhibits investment in the clean energy transition and innovation."
European Commission, "Clean Energy for all Europeans" package, (COM(2016) 860), November 2016. Available at: https://ec.europa.eu/transparency/regdoc/rep/1/2016/EN/COM-2016-860-F1-EN-MAIN.PDF

[16] The G7 statement of 2016 stipulates the G7 members « remain committed to the elimination of inefficient fossil fuel subsidies and encourage all countries to do so by 2025 ». Available at: http://www.g8.utoronto.ca/summit/2016shima/ise-shima-declaration-en.html#climate

[17] The G7 statement of June 2021 stipulates the G7 members « we reaffirm our existing commitment to eliminating inefficient fossil fuel subsidies by 2025 ». Available at: https://www.g7uk.org/wp-content/uploads/2021/06/Carbis-Bay-G7-Summit-Communique-PDF-430KB-25-pages-3-1.pdf

[18] However, we have developed several processes to cope with this issue in order to ensure a good quality and completeness of the data provided. For more information, see section called *Data collect and control process* in the Annexes.

[19] This issue has been overcome in most of the case during the study thanks to our network of country experts, however collecting data on energy subsidies is far from being easy for non-experts.

Eventually, another major issue is the **interruption of provision of some documents** because they are no longer produced or no longer made public. For instance, we have noticed that several MSs[20] have stopped or interrupted issuing their annual tax expenditure reports that used to provide valuable information for our reporting on energy subsidies. Such a problem is quasi-insoluble as our analysis requires information held by the countries' administration.

Textbox 3-1 FFS repotting best practices: Italy and Ireland

While the energy subsidies reporting environment remains highly challenging, it is worth mentioning good practices lately implemented by several MSs, of which Ireland and Italy are promising examples.

Indeed, the **Italian Ministry of the Environment** has been releasing an Inventory of environmental subsidies (both favourable and unfavourable to the environment) each year from 2016 to 2019[21]. The document provides, among other, detailed descriptions, legislative references, dates, amounts provided over the last five years… in a single document. Although, this document is not fully complete -as we have been able to find additional subsidies according to the scope of our study- this reporting is bringing together a large volume of information from various national sources.

Works performed by the **Central Statistics Office (CSO) of Ireland** is also worth to be quoted for its effort for consolidation, transparency and consistency over the years. Indeed, since 2018 the CSO has been releasing two sets of data providing information on the "Environmental Subsidies and Similar Transfers" and the "Fossil Fuel Subsidies". Although the scope of the reporting is different from that of our study, the subsidy amounts are supplied in transparent manner (html and xlsx formats) since 2000, which facilitates the analysis over the years. In addition, most of the definitions and scopes are quite clearly defined and easily accessible to any citizen.

3.2.1.2. Transparency

Unsurprisingly, a serious obstacle that we have faced was the **lack of the transparency** of the data we have collected. Indeed, in addition to the data scattering issue mentioned above, the format of the **information is rarely presented in a user-friendly manner:** still, most of the documents scanned are provided as pdf, whereas they include quantitative data that would obviously require a spreadsheet-based format. **Data provided in a spreadsheet-based format are still very uncommon**, as well as the presence of subsidies data on government open-data platforms. This is a serious obstacle to compare the data over the years, then to detect new or ended subsidies.

3.2.1.3. Consistency

The consistency of the data collected in the reports on subsidies published by MS varied significantly from one country to another. Indeed, very few countries provide the metadata that are required to set up consistent reporting. Indeed, relevant reporting calls for the presence of the following metadata on each measure:

- title,
- objectives,
- description,
- energy carrier / product concerned,
- recipient(s),
- economic sectors,

[20] For more information, please refer to *6.2 Annex 2: Country data controls and observations*.
[21] The reports are available at : https://www.minambiente.it/pagina/catalogo-dei-sussidi-ambientalmente-dannosi-e-dei-sussidi-ambientalmente-favorevoli

- legal reference,
- exact scope covered,
- changes in scope,
- data collection methodology,
- methodology used for estimations,
- degree of confidence in the data,
- explanation on significant variations from one year to year,
- retroactive changes applied to several years in the case of significant changes,
- list of new/ended subsidies,
- start date,
- end date.

Indeed, without the above listed metadata, it is difficult to understand potential changes over the years and analyse trends with accuracy. Especially, very **few reports point out the list of subsidies that have been added** (new ones) **or removed** (subsidies phased-out or purely removed for legislative or technical reasons) of the documents **from year to year**. Such information would though be very useful to perform appropriate follow-up over a period and thus to provide insight on the trends followed by States.

3.2.1.4. Homogeneity and comparability

The homogeneity of the data is also an essential mater to perform consistent analysis. In fact, achieving relevant comparisons across years and across countries require the use of common methodologies. However, as acknowledge the UNEP and IISD[22], the "benchmarks are currently set on a country-by-country basis, and **as estimation methods applied by countries differ**, **the international comparability** of existing tax expenditure estimates **is limited in the absence of a uniform international framework**. Differences in the amount of subsidies reported can be due to a range of factors such as a higher tax benchmark, a stricter definition of the benchmark system, or a more complete set of tax-expenditure accounts." Although the UNEP and IISD focus on the issue related to tax expenditures, the same problem applies to many measures. This is the case, for instance, of the various electricity capacity mechanisms implemented lately. Although, the measure is quite recent, no common reporting method has been enforced across the MS. Therefore, the *EC inventory*, which is based on public information, includes amounts of subsidies whose content differs although the measures have the same name.

3.2.1.5. Granularity

The issue of the granularity of the data is also essential to better analyse the evolution of energy subsidies policies and benchmark countries between each other's. Indeed, the granularity of the data reported vary depending on the countries and hinders comparisons. For instance, where reporting exists, one single subsidy amount can cover all the technologies consolidated, several technologies grouped together or also only one single technology/carrier/product. This depends on the MS reporting rules. Similar remark also applies to tax expenditure reports. Overall, **the breakup of the subsidy amounts per energy carriers/products or by beneficiaries is still rare**. However, it is worth mentioning noticeable and appropriate breakup of amounts of fossil fuels subsidies by fuel in the French tax expenditure report of 2021. Since then, several subsidies previous reported as a whole are now broken up between oil, gas and coal, which improves transparency and allow for more accurate analysis.

[22] Measuring Fossil Fuel Subsidies in the Context of the Sustainable Development Goals, UNEP and IISD, June 2019. Available at https://www.unep.org/resources/report/measuring-fossil-fuel-subsidies-context-sustainable-development-goals

3.2.1.6. Timeliness and punctuality

The publication speed has also been an obstacle to this study as several sources of data were not yet published at the time of updating the *EC Inventory*. This observation holds true for data provided by many national institutions within the MSs but also for international organisations such as the OECD, CEER or DG COMP that have not yet provided data for 2020[23]. As a result, a portion of the data for the year 2020 couldn't be captured.

To address this issue, missing data for 2020 have been identified, quantified, and estimated to enable the comparison with previous years. In every graph presented in the report, if the subsidy scheme is still ongoing in 2020 and if no data for 2020 is presented in the inventory, it is assumed that the 2020 subsidy amount is equal to that of 2019. This conservative approach allows for visual comparison across years.

▨ To be confirmed : Amounts under such assumption are indicated with hatching and reported in a separate category named "To be confirmed".

Overall, the data availability by category of subsidy and by country is summarised in Table 1. In addition, the noticeable changes and qualitative observations in the subsidy data collected at country level are available in the 6.2 Annex 2: Country data controls and observations.

[23] At the time we write the report, i.e. 15th July 2021.

Table 1: Energy subsidy database update situation on 15th July 2021

Country	Subsidy category	Subsidy instrument	2018	2019	2020	2021	2022	2023
Austria	Direct transfers		Actual	Actual	Estim.	Budget	No	No
	Tax expenditures		Actual	Actual	No	No	No	No
	Income/price supports	FiTs / FiPs	Actual	Actual	No	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Belgium	Direct transfers		Actual	Actual	Actual	No	No	No
	Tax expenditures		Actual	Actual	No	No	No	No
	Income/price supports	Capacity payments	Actual	Actual	Actual	No	No	No
		RO	Actual	Actual	No	No	No	No
		Others	Actual	Actual	No	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Bulgaria	Direct transfers		Actual	Actual	Actual	No	No	No
	Tax expenditures		Actual	Actual	No	No	No	No
	Income/price supports	FiTs / FiPs / RO	Estim.	Estim.	Estim.	No	No	No
		EE obligations	Estim.	Estim.	Estim.	No	No	No
	RD&D budget		No	No	No	No	No	No
Croatia	Direct transfers		Actual	Actual	No	No	No	No
	Tax expenditures		Actual	Actual	Actual	No	No	No
	Income/price supports	FiTs / FiPs	Actual	Actual	Actual	No	No	No
	RD&D budget		No	No	No	No	No	No
Cyprus	Direct transfers		Actual	Actual	Actual	Budget	Budget	Budget
	Tax expenditures		Estim.	Estim.	Estim.	No	No	No
	Income/price supports	FiTs / FiPs	Actual	Actual	Actual	Estim.	Estim.	Estim.
	RD&D budget		No	No	No	No	No	No
Czechia	Direct transfers		Actual	Actual	Budget	No	No	No
	Tax expenditures		Actual	Actual	Actual	No	No	No
	Income/price supports	FiTs / FiPs	Actual	Actual	Actual	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Denmark	Direct transfers		Actual	Actual	Budget	Budget	Budget	Budget
	Tax expenditures		Estim.	Estim.	Estim.	Estim.	Estim.	Estim.
	Income/price supports	EE obligations	Actual	Actual	No	No	No	No
		FiTs / FiPs	Actual	Actual	Actual	Budget	Budget	Budget
	RD&D budget		Actual	Actual	Actual	No	No	No
Estonia	Direct transfers		Actual	Actual	Actual	Budget	Budget	No
	Tax expenditures		Actual	Actual	Actual	Budget	Budget	No
	Income/price supports	FiTs / FiPs	Actual	Actual	Actual	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Finland	Direct transfers		Actual	Actual	Actual	Budget	No	No
	Tax expenditures		Actual	Actual	Actual	Budget	No	No
	Income/price supports	Capacity payments	Actual	Actual	Actual	No	No	No
		Feed-in tariffs	Actual	Actual	Actual	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
France	Direct transfers		Actual	Actual	Actual	Budget	No	No

Country	Subsidy category	Subsidy instrument	2018	2019	2020	2021	2022	2023
	Tax expenditures		Actual	Actual	Actual	Budget	No	No
	Income/price supports	Capacity payments	Estim.	Estim.	Estim.	Estim.	Estim.	No
		EE obligations	Estim.	Estim.	Estim.	No	No	No
		FiTs / FiPs	Actual	Actual	Budget	Budget	No	No
		Inter. load scheme	Actual	Actual	Actual	Budget	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Germany	Direct transfers		Actual	Budget	Budget	No	No	No
	Tax expenditures		Actual	Budget	Budget	Budget	No	No
	Income/price supports	Capacity payments	Actual	Actual	Actual	Estim.	Estim.	Estim.
		Interruptible loads	Actual	Actual	No	No	No	No
		FiTs / FiPs / RO	Actual	Actual	Budget	Budget	No	No
		Others	Actual	Budget	Budget	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Greece	Direct transfers		Actual	Actual	Actual	No	No	No
	Tax expenditures		Actual	Actual	Actual	No	No	No
	Income/price supports	Capacity payments	Actual	Actual	Actual	No	No	No
		FiTs / FiPs	Estim.	Estim.	Estim.	No	No	No
		Inter. load scheme	Actual	Actual	No	No	No	No
	RD&D budget		No	No	No	No	No	No
Hungary	Direct transfers		Estim.	Estim.	No	No	No	No
	Tax expenditures		Actual	Actual	Actual	No	No	No
	Income/price supports	FiTs / FiPs	Actual	Actual	No	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Ireland	Direct transfers		Actual	Actual	No	No	No	No
	Tax expenditures		Actual	Actual	No	No	No	No
	Income/price supports	Capacity payments	Estim.	No	No	No	No	No
		FiTs / FiPs	Actual	Budget	Budget	No	No	No
		Others	Actual	Actual	No	No	No	No
	RD&D budget		Actual	Actual	No	No	No	No
Italy	Direct transfers		Actual	Actual	Actual	No	No	No
	Tax expenditures		Actual	Actual	Actual	Budget	Budget	Budget
	Income/price supports	Capacity payments	N/A	N/A	N/A	N/A	Budget	Budget
		EE obligations	Actual	Actual	No	No	No	No
		FiTs / FiPs / RO	Actual	Actual	Actual	No	No	No
		Inter. load scheme	Actual	Actual	No	No	No	No
		Others	Actual	Actual	Actual	No	No	No
	RD&D budget		Actual	No	No	No	No	No
Latvia	Direct transfers		Actual	Actual	Actual	No	No	No
	Tax expenditures		Actual	Actual	No	No	No	No
	Income/price supports	Capacity payments	Actual	Actual	Actual	Budget	Budget	Budget
		FiTs / FiPs	Actual	Actual	Actual	Budget	Budget	Budget
	RD&D budget		No	No	No	No	No	No
Lithuania	Direct transfers		Actual	Actual	Actual	Budget	Budget	Budget

Country	Subsidy category	Subsidy instrument	2018	2019	2020	2021	2022	2023
	Tax expenditures		Actual	Actual	Actual	Budget	No	No
	Income/price supports	Capacity payments	Actual	No	No	No	No	No
		FiTs / FiPs	Actual	Actual	Actual	No	No	No
		Others	Actual	Actual	Actual	No	No	No
	RD&D budget		No	Actual	Actual	No	No	No
Luxembourg	Direct transfers		Actual	Actual	Budget	Budget	No	No
	Tax expenditures		Actual	Actual	Estim.	No	No	No
	Income/price supports	FiTs / FiPs	Actual	Actual	No	No	No	No
	RD&D budget		No	No	No	No	No	No
Malta	Direct transfers		Actual	Actual	Actual	No	No	No
	Tax expenditures		Actual	Actual	Actual	No	No	No
	Income/price supports	FiTs / FiPs	Actual	Actual	Actual	No	No	No
	RD&D budget		No	No	No	No	No	No
Netherlands	Direct transfers		Actual	Budget	Budget	Budget	Budget	Budget
	Tax expenditures		Actual	Budget	Budget	Budget	No	No
	Income/price supports	FiTs / FiPs	Actual	Actual	Actual	Budget	Budget	Budget
	RD&D budget		Actual	Actual	Actual	No	No	No
Poland	Direct transfers		Actual	Actual	No	No	No	No
	Tax expenditures		Estim.	Estim.	Estim.	No	No	No
	Income/price supports	RES obligations	Actual	Actual	Actual	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Portugal	Direct transfers		Actual	Actual	Budget	Budget	No	No
	Tax expenditures		Actual	Actual	Estim.	No	No	No
	Income/price supports	Capacity payments	Actual	Actual	No	No	No	No
		Inter. load scheme	Actual	Actual	Actual	No	No	No
		FiTs / FiPs	Estim.	Estim.	Estim.	No	No	No
		Others	Actual	Actual	No	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Romania	Direct transfers		Actual	Actual	Actual	No	No	No
	Tax expenditures		Actual	Actual	Actual	No	No	No
	Income/price supports	RES obligations	Actual	Actual	Actual	No	No	No
	RD&D budget		No	No	No	No	No	No
Slovakia	Direct transfers		Actual	Actual	Actual	Budget	Budget	Budget
	Tax expenditures		Actual	Actual	Estim.	No	No	No
	Income/price supports	FiTs / FiPs	Actual	Actual	Actual	Budget	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Slovenia	Direct transfers		Actual	Actual	No	No	No	No
	Tax expenditures		Actual	Actual	Actual	No	No	No
	Income/price supports	FiTs / FiPs	Actual	Actual	Actual	No	No	No
	RD&D budget		No	No	No	No	No	No
Spain	Direct transfers		Actual	Actual	No	No	No	No
	Tax expenditures		Budget	Budget	Estim.	Budget	No	No
	Income/price supports	Capacity payments	Actual	Actual	Actual	Actual	No	No

Country	Subsidy category	Subsidy instrument	2018	2019	2020	2021	2022	2023
		Inter. load scheme	Actual	Actual	Actual	No	No	No
		FiTs / FiPs	Actual	Actual	Actual	No	No	No
		Others	Actual	Actual	Actual	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No
Sweden	Direct transfers		Actual	Actual	Actual	No	No	No
	Tax expenditures		Actual	Actual	Actual	Budget	Budget	Budget
	Income/price supports	Capacity payments	Actual	Actual	Actual	No	No	No
		RO	Actual	Actual	Actual	No	No	No
	RD&D budget		Actual	Actual	Actual	No	No	No

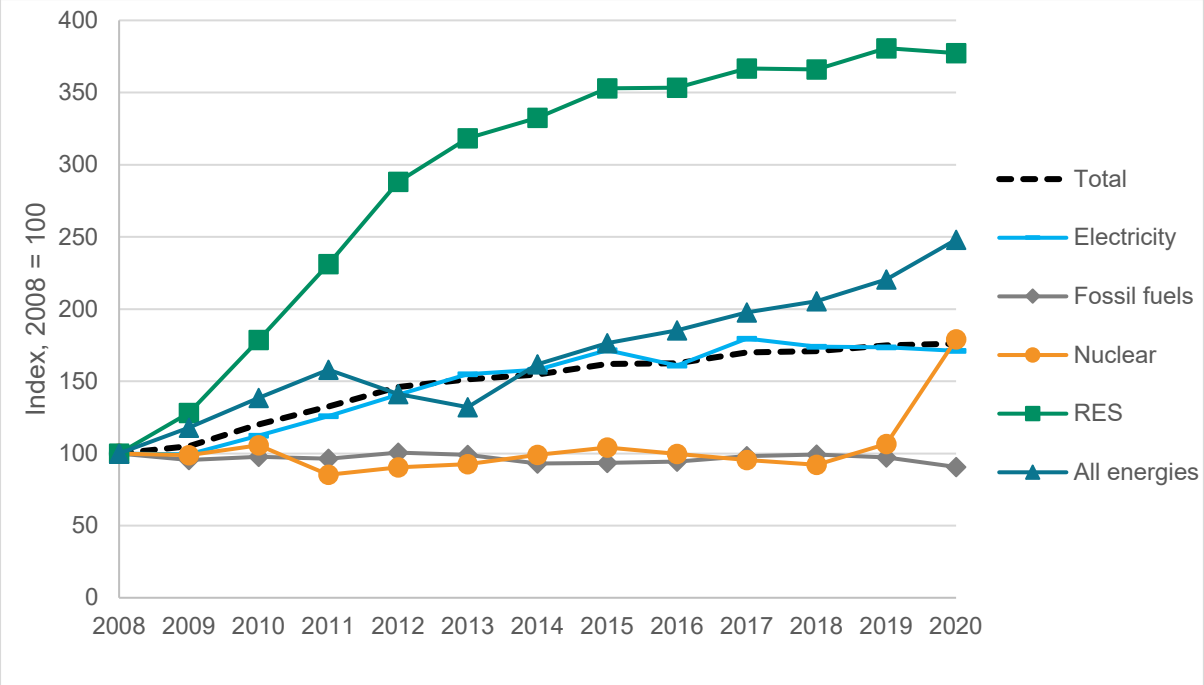
3.3. EU trend of energy subsidies per technology group

The forthcoming part of the report analyses the energy subsidies trend in the EU27 MS. Although data are available since 2008, we have chosen to mainly focus on the timeframe starting in 2015 in order to investigate progress made since the Paris Agreement. Because of our report was written based on data collected up until 15th July 2021, some subsidy amounts were still not available for the year 2020. Conversely, from some countries, data have been collected, controlled, and harmonised for 2020 and subsequent years, based on data included in MS' State budgets. All values (unless otherwise indicated) are in euros of 2020 (real values). Most of the data presented in billions of euros are in real terms, noted €2020bn.

From 2008 to 2020, the overall energy-related subsidies in the EU27 MS increased by 75%, (or +€76bn) from €101bn to €177bn in real terms (€2020). However, this trend has slowed down since 2015 (+9%, +€14bn).

This upward trend was mostly driven by spending to support the development of renewable energy sources, which has more than tripled between 2008 and 2015 (Figure 1). Since 2015, the total subsidy amounts paid has grown at a much slower rate than in the previous period, driven by increasing subsidies for energy efficiency (indicated "All energies"). Eventually, the boom recorded for nuclear in 2020 correspond mostly to exceptional subsidies (more details under the section 3.4.3 Nuclear. Meanwhile, subsidies to electricity have grown at a moderate pace, while fossil fuel subsidies have remained relatively stable.

Figure 1: Energy subsidies trend by technology (2008-2020; indexed with base = 2008)



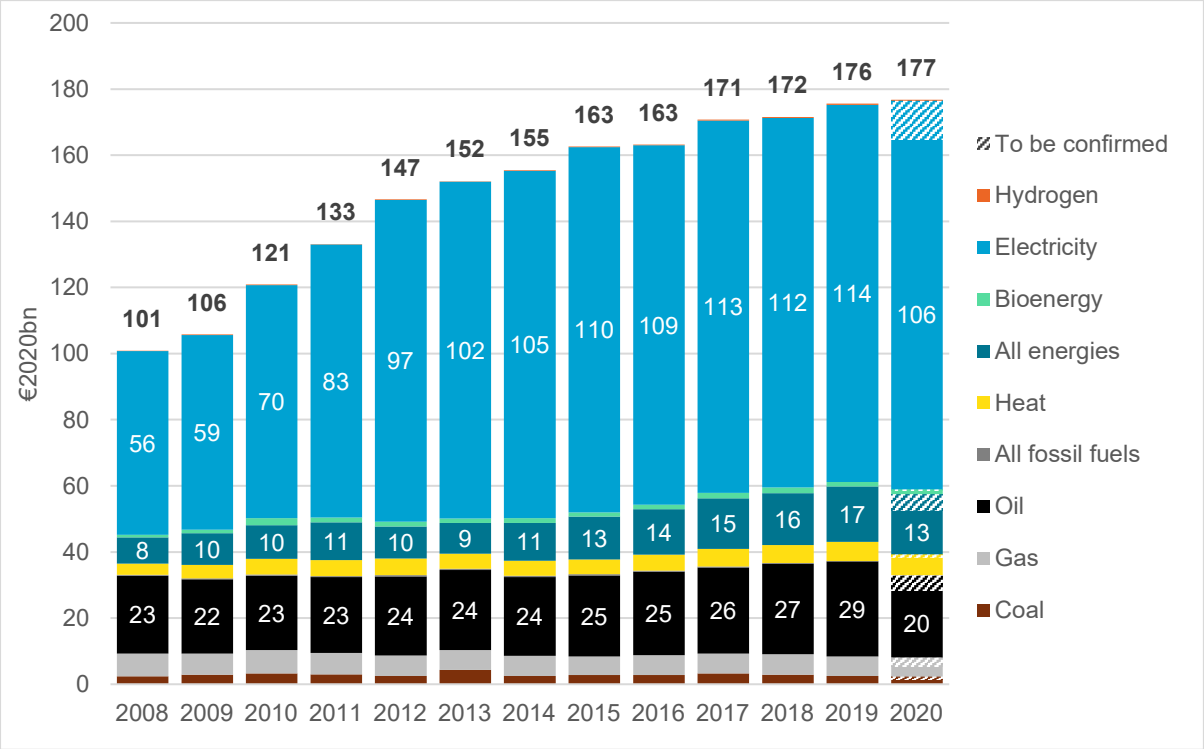
Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

3.4. Subsidies by energy carrier

The trend observed in 2019 and 2020 are in line with that recorded since 2008 with electricity remaining the most supported energy product in the EU, capturing 65% of the total subsidies in 2019. However, Figure 2 shows that subsidies provided in absolute terms have been quite stable (though slightly increasing) since 2015, fluctuating around €110bn (€114bn in 2019).

Subsidies to petroleum products represent 16% of the total in 2019 (€29bn) and have been slightly on the rise since 2015 (+€4.2bn), while that to directed to 'All energies' posted a 28% increase between 2015 and 2019 (+€3.7bn).

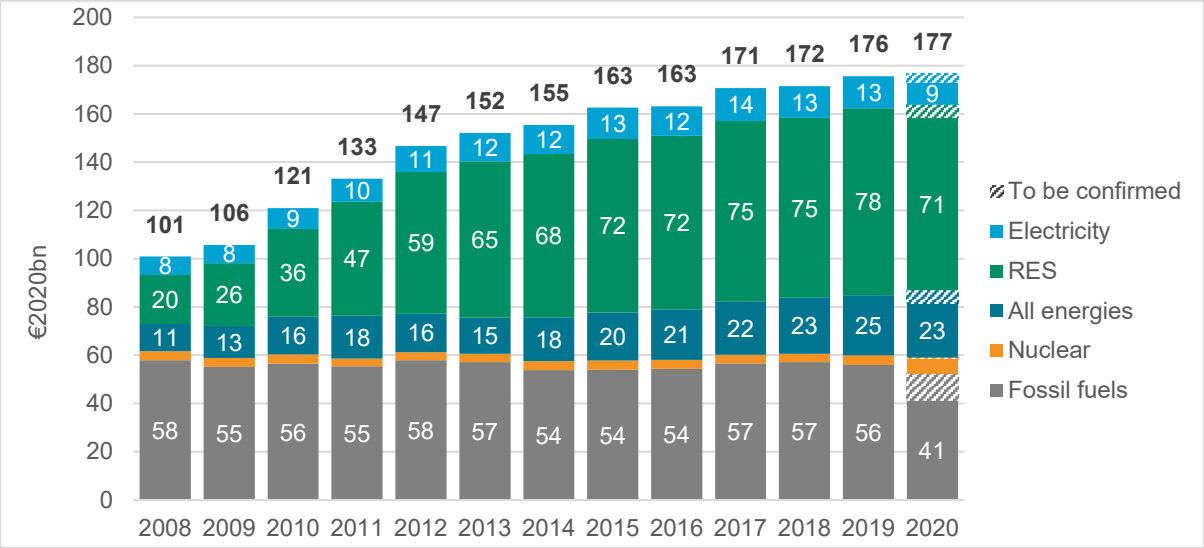
Figure 2: Energy subsidies by main fuels and carriers in the EU27 (2008-2020; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

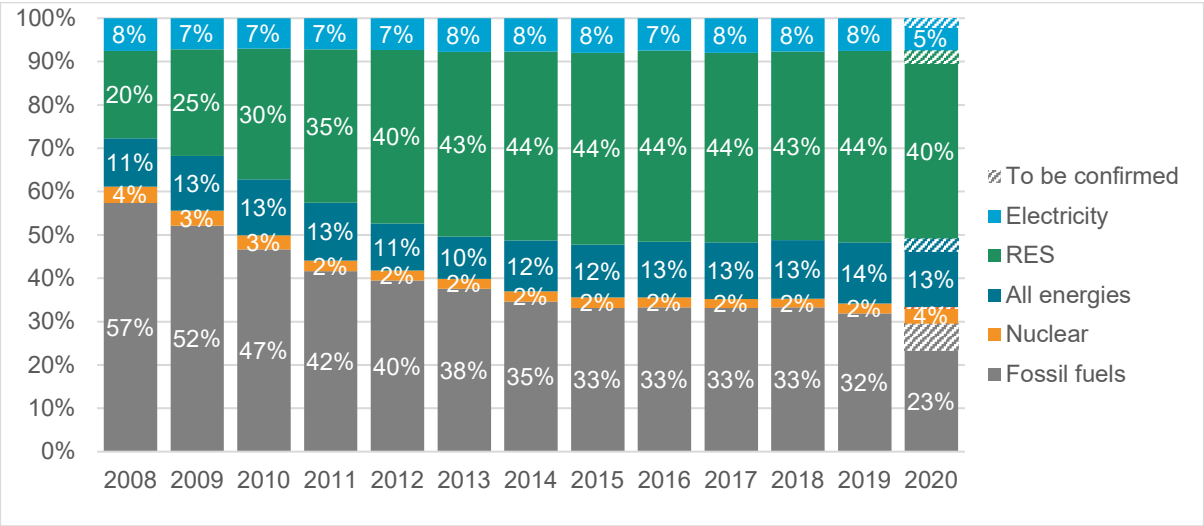
Figure 3 below shows the allocation of the financial support by energy carrier. The amounts corresponding to heat and electricity have been re-allocated to their energy source based on the national energy balances[24]. Figure 3 and Figure 4 show that, overall, the subsidies distribution between the main energy carriers has almost not changed since 2015, although the 'All energies' category is slightly gaining share, driven by supports to energy efficiency. Fossil fuel subsidies (FFS) remained stable at around €55bn (reaching €56bn in 2019) and no inflection to this trend is foreseen in our figures, while support to renewables has slightly increased at reach €78bn (2019).

Figure 3: Subsidies by main energy carriers in the EU27 (2008-2020; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

Figure 4: Share of subsidies by main energy carriers in the EU27 (2008-2020; %)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

[24] The remaining amounts corresponding to "All energies" and to "Electricity" correspond to the tax expenditures directed to electricity that could not be re-allocated to specific energy sources.

3.4.1. Fossil fuel subsidies (FFS)

3.4.1.1. Current status of the data collected

The following analyse on fossil fuels subsidies is based on the *EC Inventory* that we have updated for this study. At the cut-off date of our study, it includes close to 600 FFS of which nearly 500 still active in 2020. Since the *EC inventory* conducted in 2020, 28 'new' subsidies have been identified and added while 34 subsidies have ended. These changes are inventoried at the end of this section and listed in country notes in *6.2 Annex 2: Country data controls and observations*.

The total amount of subsidies collected are split into 60% of actual costs (€34bn, around 400 measures) and 40% of estimated costs (€22bn, around 200 measures) for 2019[25]. The missing data for year 2020, due to the lack of availability of the data in MS official documents, were worth €11bn in 2019.

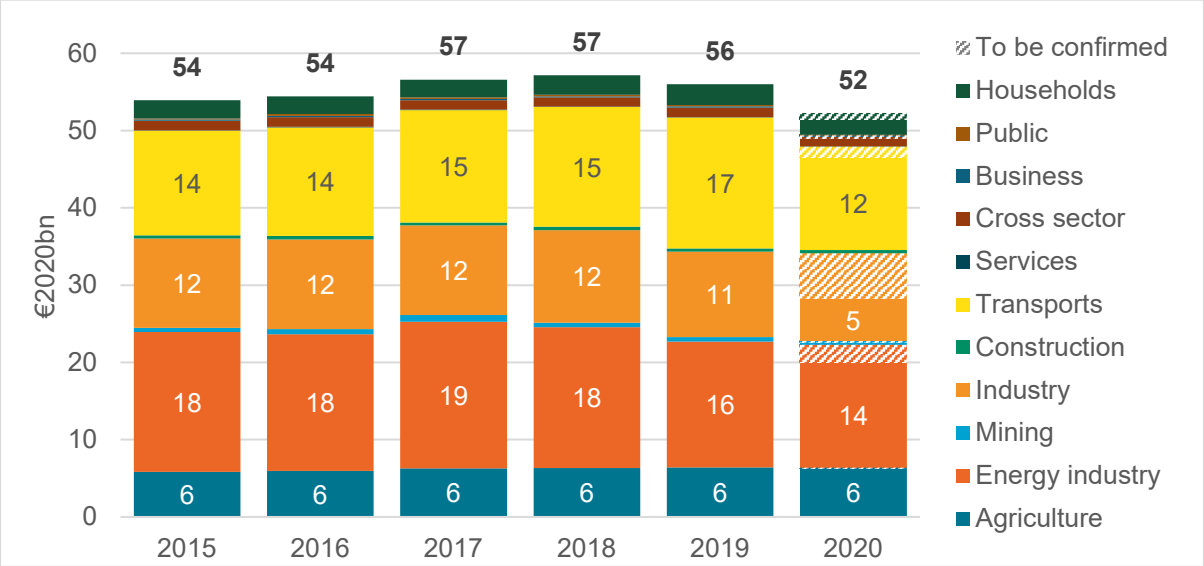
3.4.1.2. Analysis

Fossil fuel subsidies cover support to all fossil primary energies and includes support to electricity generated by burning fossil fuels when this level of detail is made available. In some cases, multi-energy subsidies are not reflected into the fossil fuel category, but rather into "All Energies" category (see section 6.1.5 Subsidy amount allocations, page 95). Despite this specificity, the subsidy amounts are considered as representative of fossil fuel support across the EU27.

In 2019, after the peak in the previous year, overall FFS slightly declined to reach €56bn; they are expected to record a new decrease in 2020 (Figure 5), although substantial subsidy amounts are yet to be published. We expect the FFS to drop in the transport sector due to decrease in fuel consumption caused by the COVID-19 pandemic. Indeed, some subsidies such as the reduction or exemption of excise duty in road freight, aviation and water navigation recorded important reductions from 2019 to 2020. The evolution varies depending on the economic sectors as shows Figure 5. FFS in the energy industry rose until 2017 and started contracting as from 2018, whereas FFS in the transport grew regularly from €14bn in 2015 to €17bn in 2019. The partly estimated decrease (-€3.6bn) observed for 2020 in Figure 5 in transport is not due to the phase-out of subsidies (structural effect) but rather to the diminution of reported amounts compared to 2019 (economic cycle effect). FFS remains quite stable in the industry sector (around €11bn) and the agriculture (around €6bn, including fishing activities).

[25] Refer to section *Data collection process* (page 45) for more details on the nature of the data collected.

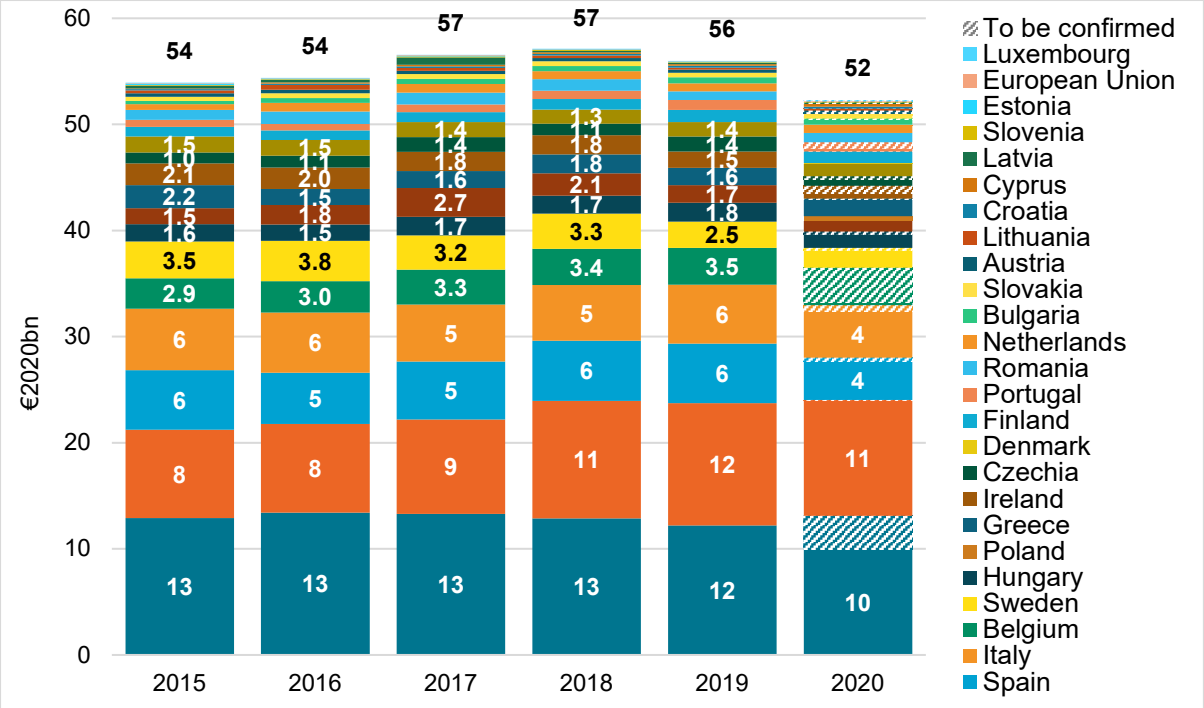
Figure 5: Fossil fuel subsidies in the EU27 by economic sector (2015-2020; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

The four largest economies, namely Germany, France, Italy, and Spain, account for most of total FFS in the EU27. Germany has historically been the largest FFS provider until 2019 (€12bn, -€0.7bn between 2015 and 2019) when France caught up with Germany. Indeed, France recorded a constant increase of its FFS during the period 2015-2019 (+€3.2bn) (Figure 6). This increase is mainly explained by growing tax reduction on off-road gasoil and exemption of excise duties on petroleum products for its overseas departments and territories (isolated islands). In 2019, FFS in Spain (€5.6bn in 2019) have slightly outpaced that of Italy (€5.5bn), while FFS in Belgium (€3.5bn) exceeded that Sweden (€2.5bn). Data in Poland must be taken with caution because of the poor quality of the data available and are therefore collected and estimated (cf. *6.2 Annex 2: Country data controls and observations*, Poland, page 107).

Figure 6: Fossil fuel subsidies evolution by Member State (2015-2020; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

Oil and petroleum products were the most supported fossil fuels in 2019 and represented slightly more than half of the EU total amount in absolute value (€30bn, 53%). Figure 8 shows the breakdown of each MS contribution.

France is by far the largest contributor to oil and petroleum products support through fuel consumption support mechanisms to road transportation, mainly for business purpose[26]. Part of the growth observed in France is due to the rise of the carbon tax rates until 2019 that have increased the tax expenditures (the difference between the reduced tax rates -that remained stable- and the standard rates -that have increased).

Germany remains a large provider to subsidies for coal; indirectly through the support to power generation since its power mix is still dominated by this fuel; directly through the support to industry and old coal miners. Germany also provides a large amount of subsidies (€5bn in 2019) to natural gas, mainly indirectly through concession fee reductions and exemptions to the production, distribution and consumption of electricity produced using natural gas.

In **Belgium**, €3bn were dedicated in 2019 to finance reduced excise duty and tax refund for gasoil used as fuel to support professional end-users, freight, taxi drivers, but also industrial and commercial uses.

FFS in **Italy** mainly result from tax exemption on diesel, kerosene, and petroleum products to support activities such as freight, passenger transport, agriculture, navigation and fisheries or air traffic (€3.6bn in 2019).

In 2019, **Spain** spent €2.6bn supporting feed-in tariffs and feed-in premiums for CHP burning fossil fuels. The others main subsidies are tax exemption on kerosene for domestic air traffic (€1.3bn in 2019) and tax reduction on gasoil for agriculture and off-road vehicles (€0.5bn in 2019).

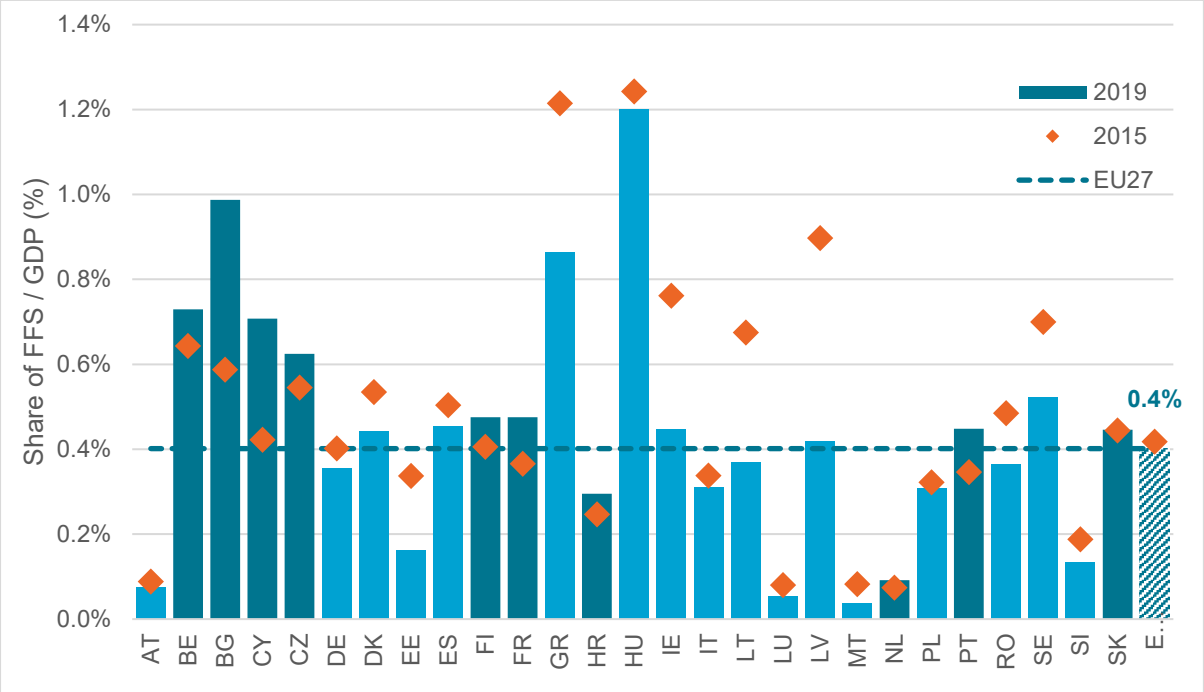
As mentioned above, the analysis of Poland's FFS amount (very low on that graph) is not complete and a greater implication of the country to improve data transparency would be beneficial to this analysis.

[26] 5 majors subsidies totalling €5.6bn in 2019 are:
- Exclusion of the Overseas Departments from the scope of the internal fuel consumption tax applicable to fuels
- Reduced rate of domestic consumption (refund) for road diesel used in freight transport vehicles (TIPCE)
- Reduced rate of domestic consumption (refund) for off-road diesel, heavy fuel and liquefied petroleum gas products used by farmers (TICPE)
- Excise tax exemption on kerosene consumed in domestic air traffic
- Excise tax exemption on petroleum products consumed in inland water navigation

The importance that each Member State gives to supporting fossil fuels can be assessed by analysing the subsidy amounts in relation to its GDP, also called the *FFS intensity*. Figure 7 presents the evolution of the *FFS intensity* between 2015 (orange diamonds) and 2019 (blue bars). The gap between the top of the bars and the orange diamond presents the FFS intensity variation between 2015 and 2019.

On average, FFS represented 0.4% of the total EU27 GDP in 2019, which is stable since 2015. However, the trend followed by MS over the 2015-2019 varied as shows Figure 7. Indeed, countries in light blue bars have registered a reduction of the FFS intensity, while those in dark blue bars have taken the opposite path.

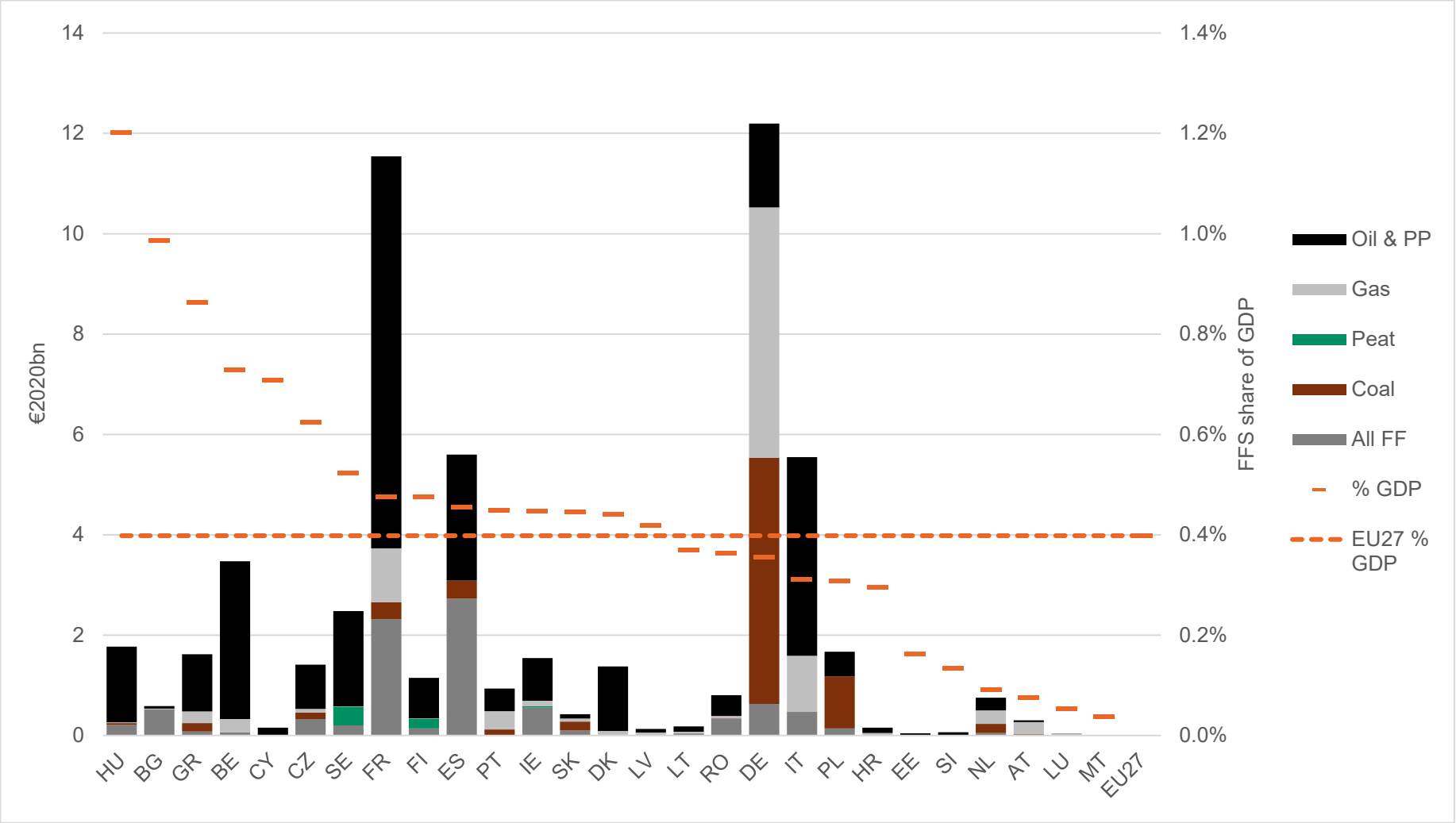
Figure 7: Fossil fuel subsidies compared to GDP (2015 and 2019; %)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

Figure 8 exhibits that the MS are equally distributed on one side and the other of the EU average *FFS intensity*. Indeed, 14 countries have a higher *FFS intensity* than the EU average and 13 have a lower one. Among the large countries, France (0.48%) and Spain (0.45%) display a slightly higher *FFS intensity* than the EU average, while Germany (0.36%) and Italy (0.31%) stand slightly that landmark.

Figure 8: Share of FFS by technology by Member State vs GDP (2019; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

Textbox 3-2 State budgets: a key tool to map the future MS' energy subsidy policies

Each year, the MS' finance law, proposed by the governments and voted by the parliaments, provides for, and authorises all the resources and expenditures of the State budget for the subsequent year(s). As output of the finance law, the MS' budgets are official documents encompassing, among other things, subsidy amounts provided in the past (one or more years) and subsidy amounts that are expected in the near future (one or more years). Therefore, State budgets are key documents to observe the countries' plans and policies for the forthcoming years, particularly that dealing with FFS phasing-out. Hereafter, we spot several changes that we have identified in MS' budgets that illustrate the evolution of the energy subsidy policies, focusing on fossil fuels.

Germany has implemented new environmental-friendly compensation payments for decommissioning lignite-fired power plants and rehabilitating mining pits, with yearly €290m expenses planned from 2021 onward. Meanwhile, a new -environmentally harmful- energy tax relief for own consumption of companies in extraction of O&G and industry started in 2018 with a budget of €93m in 2019.

In **France**, the phase-out of the reduced excise tax on non-road diesel (GNR), which was scheduled for 1st July 2021, has been postponed to 1st January 2023. This delay represents additional costs of €300m for 2021 and €870m for 2021-2022. Support to the demand of fossil fuel remains high although it can be noticed some commitment to reduce it.

Italy can be considered as a leading country in terms of transparency as it has already budgeted and published 60% of its FFS until 2023. On this perimeter, the planned expenditure for 2021-2023 is steady and, overall, at a level close to that of 2015. According to the budget documents available, a significant reduction in the support to natural gas is foreseen for the years from 2020 to 2023, with the temporary suspension of the thresholds for exemption from payment of product rates for liquid and gaseous hydrocarbons extracted from land and sea. These royalties should generate additional revenue estimated at €40m/year. Moreover, the budget related to the excise tax reduction on natural gas for industrial uses has been reduced by €30m/year in comparison with historical level before 2019.

Sweden should save about €60m of subsidies with multiple subsidies phased out in 2021 concerning energy tax reductions, namely industrial district heating supply plus heating fuels in industry and agriculture sectors. In parallel budget for energy tax exemption for heating is planned to slightly rise by €6m/year. Overall a decrease in FFS is assumed for the next 3 years.

Finland has set up a new subsidy for replacing the fuel oil used in heating since June 2020 (€45m in 2020).

Based on the MS's budgets available and providing forecast of one or more years, we couldn't identify any clear plan aiming at phasing-out FFS that was already voted in finance law. Although announcements and commitments[27] have been made, State budgets still fail to reflect these statements.

[27] Refer to Task 4 for more details.

3.4.2. Renewable energy sources (RES)

3.4.2.1. Current status of the data collected

Our inventory comprises close to 500 RES subsidies, of which more than 90% are actual data -that are still ongoing- indicating that these data are closely monitored by these organisations which leads to good data quality and reliable analysis. The changes compared to the previous inventory are listed in country notes in *6.2 Annex 2: Country data controls and observations*.

The missing data for year 2020, due to the lack of availability of the data in MS official documents, were worth €5.4bn in 2019, i.e. 7% of the total RES subsidies captured for 2019.

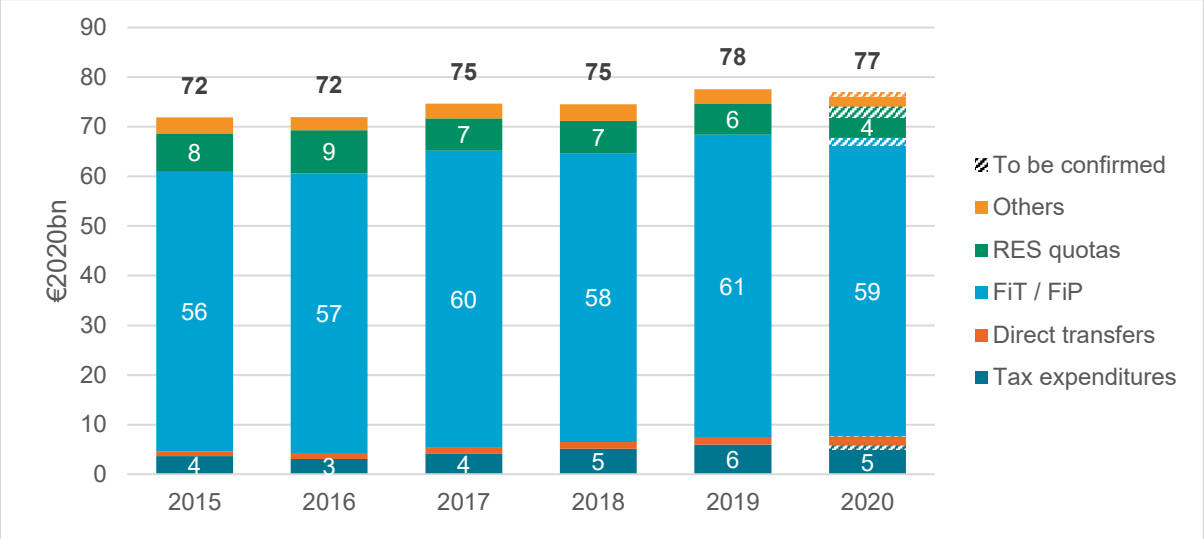
3.4.2.2. Analysis

In line with anticipations in the *Commission Study*, the financial aid to renewables in the EU27 is increasing at a low pace since 2015 to reach €78bn in 2019. Our preliminary estimations show a slight reduction in 2020 to around €77bn.

Among the 14 identified subsidy instruments, the feed-in-tariff and feed-in premium schemes remain by far the MS preferred tools to promote RES technologies. They represented 79% of the total RES subsidies, i.e. €61bn in 2019 (Figure 9). As for the total RES subsidies, our preliminary estimates show that FiT/FiP payments in 2020 should be lower than those of 2019, although the drop of the electricity wholesale prices observed in Europe in 2020 should have increased the financial aid because of the raising gap between wholesale electricity prices (downwards) and FiT/FiP rates (fixed) during the past year. Even if the 2020 figures should be confirmed, and further investigations should be performed to better understand this evolution, we assume that this anticipated slight drop is mainly due to lower power generation from installations under FiT/FiP contracts. However, the trend seeing FiT/FiP payments going downward is expected to gain momentum as from 2021 with the upcoming end of first contracts signed in early 2000's, while significant fall of payments should be registered as from 2025, i.e. 20 years after the start of the FiT/FiP boom.

Renewable obligations with green certificates are the second largest instrument with 8% of the total RES support (€6bn in 2019), closely followed by various tax reductions and exemptions (€6bn) supporting both investments in RES technologies and production.

Figure 9: Renewable energy subsidies by financial instrument (2015-2020; €2020bn)

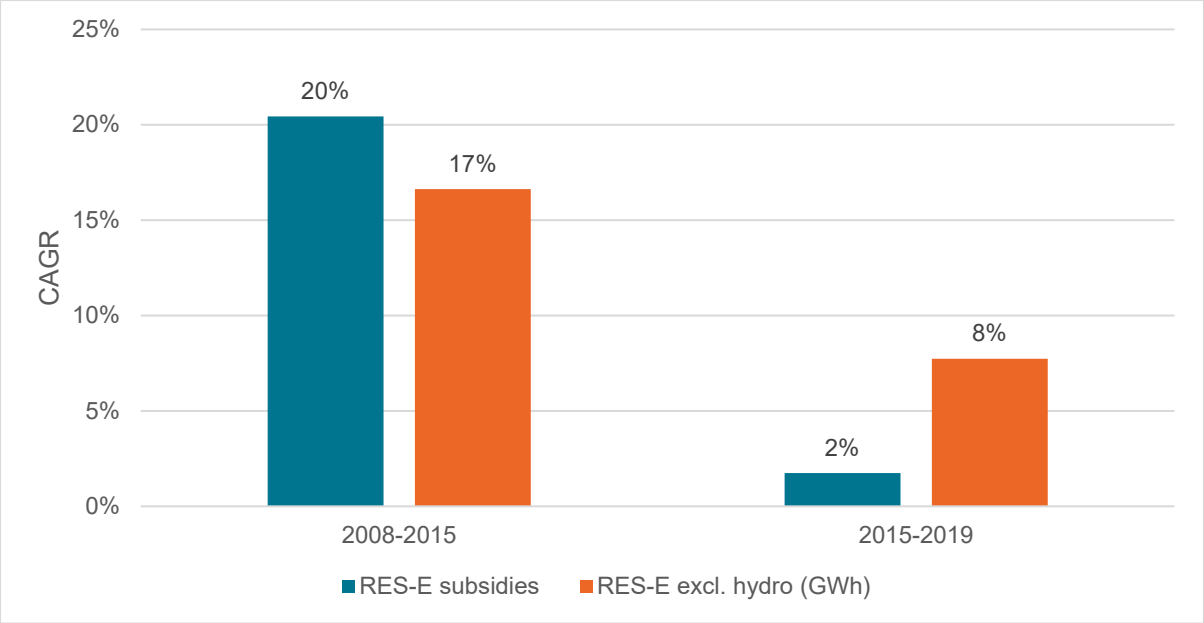


Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

As FiT/FiP schemes provide the largest part of subsidies, mainly through electricity as an energy carrier, it is worth focusing on subsidies from renewables for electricity production (RES-E) and their impact on the development of renewables. To analyse the relationship between the subsidies and the renewable power generation, we have compared the evolution of the RES-E subsidies (in €2020bn) and RES-E production[28] (in GWh) broken down in two periods, from 2008 to 2015, and since then. We use Compound Annual Growth Rate (CAGR) to present average annual evolutions over several years.

Figure 10 that during the first period (until 2015), RES subsidies rose by 20%/year, on average, while the non-hydro renewable power generation increased at slightly slower rate (17%/year, on average). The trend has taken the opposite path since 2015 with the power generation growing at a faster pace than subsidies. We assume that this trend reversal is due to a combination of factors such as the continuous decline in costs of renewable technologies driven by the economy of scale, the increasing capacity factor of newly installed systems, the substitution of administrative FiT schemes by reverse-auction based mechanisms for accessing FiP, and the recent development of subsidy-free projects.

Figure 10: Evolution of RES-E subsidies and RES-E power generation (2008-2019, CARG in %)



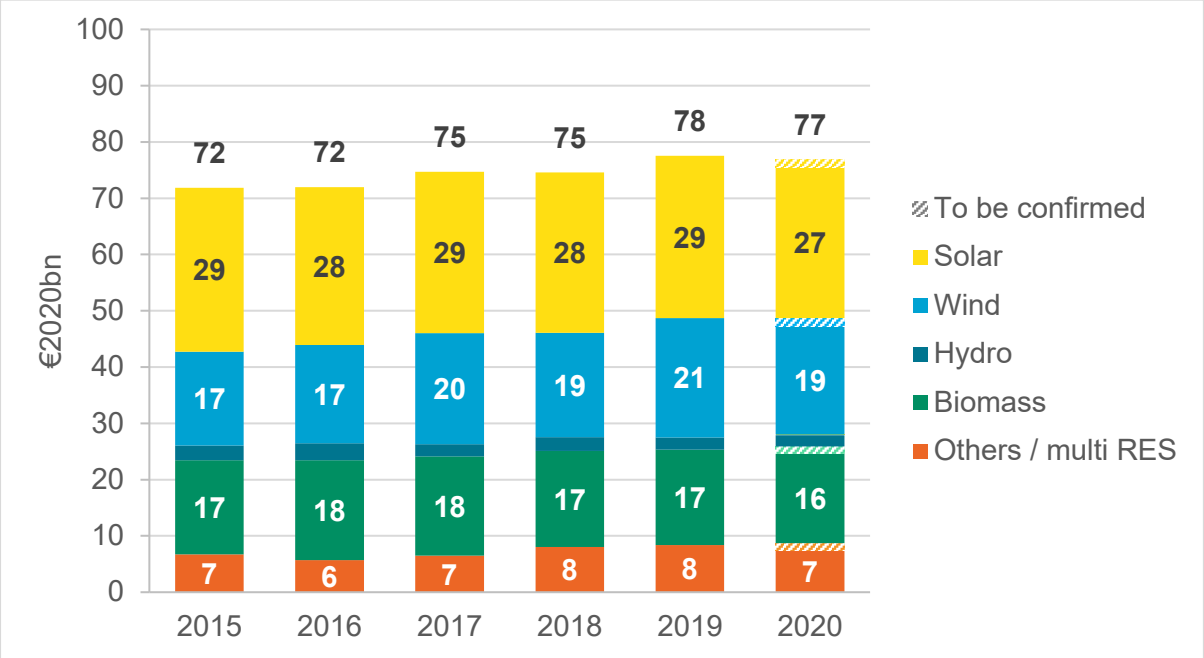
Source: Authors' elaboration based on data from Enerdata, Trinomics, country experts and Eurostat

[28] We have excluded the hydropower generation from the analysis because these technologies receive low FiT/FiP amounts and because most of the hydropower generation comes from installations built decades ago.

Figure 11 reveals that since 2015, most of RES subsidies go to solar (€29bn in 2019) followed by wind (€21bn) and biomass (€17bn). The dominance of the solar technology is directly inherited from the strong financial aid provided to this energy by several MSs (Germany, Italy, Spain) up until 2013 through generous FiT/FiP rates. Since 2015, wind has posted the fastest growing subsidy amounts, thus reflecting investments made over the past years, especially in the offshore sector.

Solar and wind technologies are quasi-exclusively supported through FiT/FiP schemes, while biomass also secure financing from tax expenditures (€1.6bn) and grants (€0.6bn) to generate both electricity and heat.

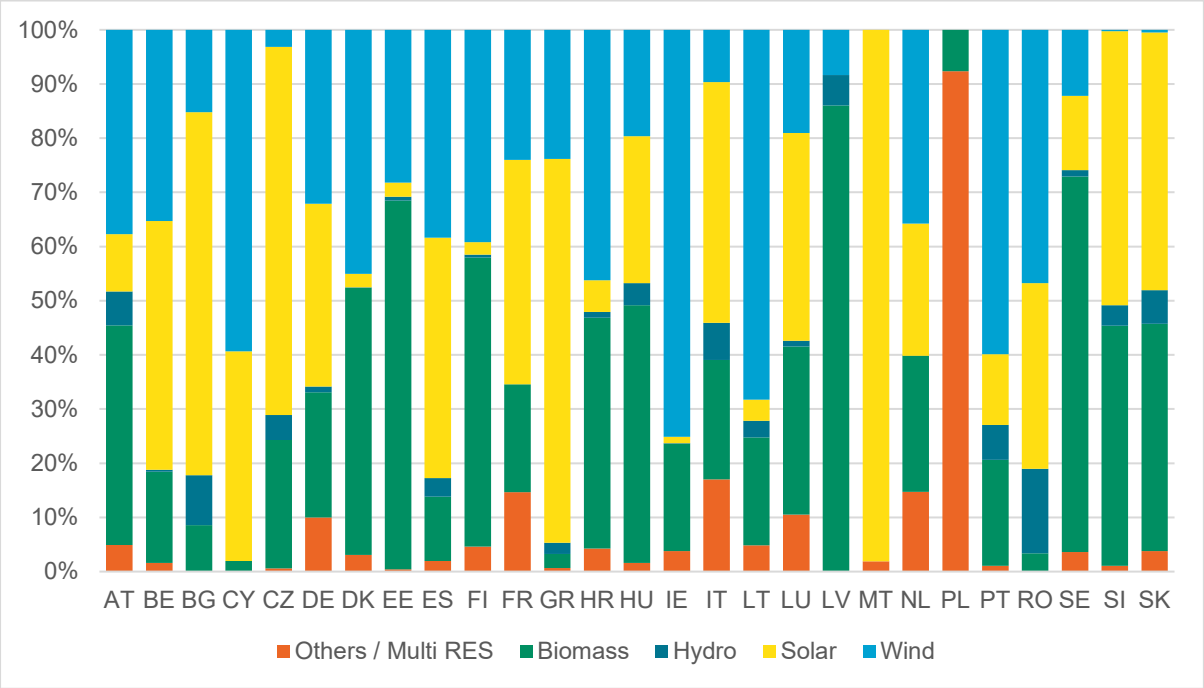
Figure 11: RES subsidies by technology (2015-2020; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

The approach by technology and by country (Figure 12) shows a very heterogeneous situation across countries that partly relates weather to conditions in the EU. In most of the cases, countries have opted for technologies with the higher local potential such as highly solar irradiation in countries like Cyprus, Greece, Italy, Malta, Spain, or woody and colder countries like Austria, Estonia, Finland, Latvia, Sweden. The three largest countries (Germany, France, Italy) present quite balanced spending across technologies reflecting both their large and various territories, and their ambition to promote a mix of solutions.

Figure 12: Share of RES subsidies by technology by Member State (2019; €2020bn)

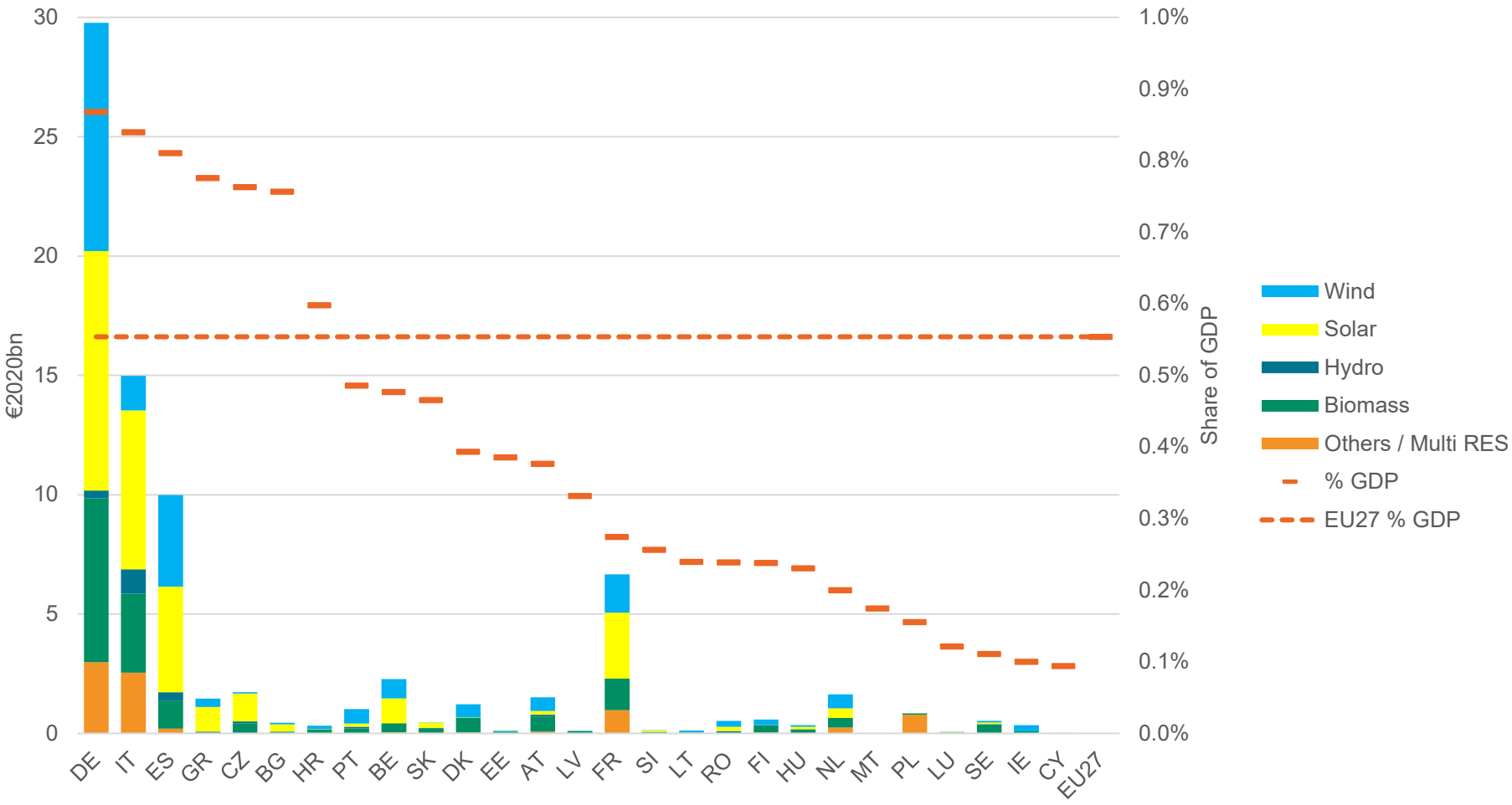


Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

Figure 13 compares the volume of RES subsidies by technology and by MS with MS' GPD in 2019. This indicator allows to measure the 'effort' dedicated by each country to support the development of the renewables. In 2019, the RES subsidies represented 0.55% of the total EU27 GDP, slightly shrinking from 0.57% in 2015.

The benchmark between MS (Figure 13) reveals extensive differences in RES support. Unsurprisingly, Germany leads the race with the highest spending in absolute value (€30bn) in 2019 and share of GDP (0.87%), followed by Italy (€15bn, 0.84%) and Spain (€10bn, 0.81%), three countries that have long been supporting the renewables. Greece (0.78%), Czechia and Bulgaria (0.76% each) are also among the countries betting on renewables with a ratio of RES subsides on GDP above the EU average. Conversely, 20 countries have a ratio below that of the EU average, of which 12 having a ratio twice lower that of the zone. France's share is just half of the EU average with 0.27% (€6.7bn).

Figure 13: Share of RES subsidies by technology by Member State vs GDP (2019; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

3.4.3. Nuclear

3.4.3.1. Current status of the data collected

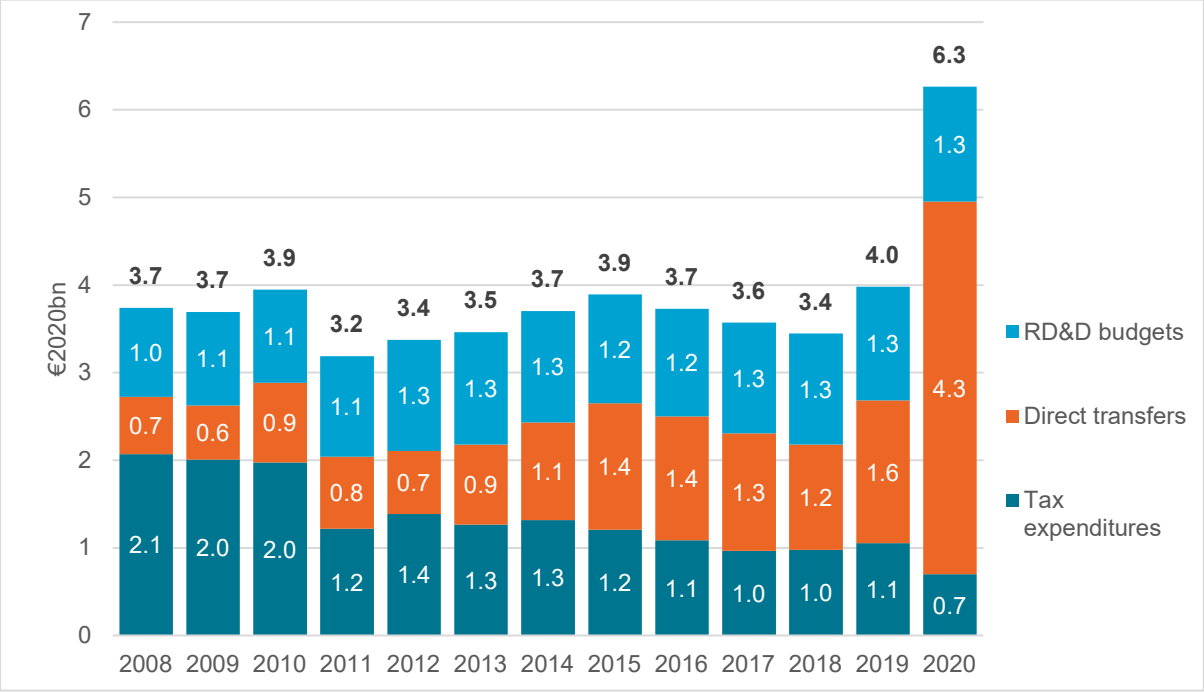
Identified subsidies to nuclear are much lesser than those for fossil fuels and renewables. Indeed, our inventory encompasses 40 subsidies, of which 32 are actual amounts and 8 are estimates.

3.4.3.2. Analysis

Subsidies to nuclear had varied between €3.2bn and €4bn between 2008 and 2019 but surged to (€6.3bn) in 2020 due to payments for early closures of nuclear power plants. Consequently, the introduction of this new form of subsidy has considerably impacted the amounts provided to this technology. As for 2020, two compensations (in France and in Germany, see box below) weight for more than the half of the total subsidies to nuclear energy identified within the EU27.

Except the one-off payments for early closure in Germany and France, the upward trend is pulled up by Italy where decommissioning costs have been re-evaluated due to governance inefficiencies that have led to delays and the necessity to re-plan decommissioning costs (twice as high as initially estimated in 2001). Consequently, the related subsidy has raised from €120m in 2018 to €440m in 2020. Additional financial sources will be required to complete the decommissioning targets.

Figure 14: Energy subsidies to nuclear in the EU27 (2015-2019; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

Textbox 3-3 New subsidies: earlier closures of nuclear power plants

In France and in Germany, the implementation of national legislations which include limited or complete end of the use of power from nuclear energy, has led to substantial subsidies to utilities operating nuclear power plants for early closures of their assets.

In 2015, France decided to cap nuclear energy production capacity to diversify its power generation mix. The public utility EDF was forced to close its Fessenheim plant; the damage linked to the cap was covered by a compensatory protocol between the State and the operator. The protocol provides for several mechanisms for adjusting the amount of compensation: the fixed part, amounting to €370m, was paid in full in December 2020; the amount of the variable part, determined by parameters set in the protocol, are to be paid later (SA.61116)[29].

In Germany, the accelerated nuclear phase-out was enacted in 2011. As of end 2011, 8 nuclear power plants were closed, with the remaining 9 due to close by the end of 2022 at the latest. The 4 main utilities operating nuclear power plants (EnBW, Eon, RWE and Vattenfall) sued the German federal government, claiming for a compensation for the early closure of their plants. An agreement was reached in Autumn 2020, granting a €2.4bn compensation to the utilities for lost electricity volumes and stranded investments as followed: €1.425bn is to be paid to Vattenfall (32% of its 2020 preliminary EBITDA), €880m to RWE AG (27% of 2020 preliminary EBITDA), €80m to EnBW and €42.5 m to E.ON[30]. The amounts granted to Vattenfall and RWE relate mostly to lost electricity volumes, whereas amounts for EnBW and E.ON are for stranded investments.

[29] State Aid SA.61116, available at https://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_61116 and https://ec.europa.eu/france/news/20210323/autorisation_indemnisation_edf_fermeture_fessenheim_fr

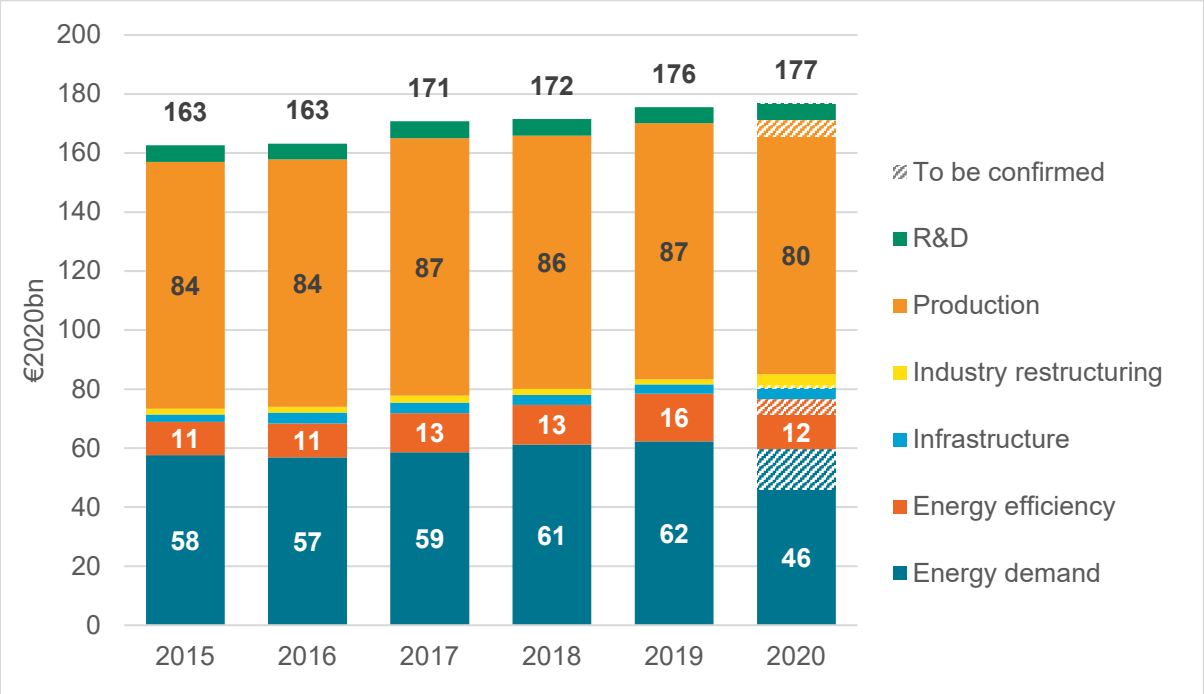
[30] German government press release, available at https://www.bmwi.de/Redaktion/DE/Pressemitteilungen/2021/03/20210305-bundesregierung-und-energieversorger-verstaendigen-sich-auf-finanziellen-ausgleich-und-beilegung-aller-rechtsstreitigkeiten-zum-atomausstieg.html

3.5. Subsidies by purpose

Looking at the distribution of subsidies by purpose, 2019 appears to be a continuation of trend already observed in the past years (Figure 15). Indeed, subsidies that support energy production (noted as *Production* in the figure below) capture the bulk of overall amount in 2019 (€87bn or 49%) and have increased by €3bn (+4%) compared to 2015. After a surge of 12%/year between 2008 and 2015, the growth of subsidy for production purpose has slowed down.

Subsidies supporting the energy consumption (*Energy demand*) have reached with €62bn in 2019, representing an 8% increase compared to 2015. Overall, the distribution of subsidy amounts by purpose is steady over time, with the exception of a 43% growth (+€5bn) since 2015 for subsidies to energy efficiency, although total amount (€16bn) remains marginal (9% of the €176bn). Section *Energy efficiency* below analyses more in-depth this topic.

Figure 15: Energy subsidies by purpose (2008-2020; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

3.5.1. Energy efficiency

3.5.1.1. Current status of the data collected

Energy efficiency subsidies cover supports aiming at reducing energy consumption through higher efficiency. By convention, we have established that this kind of subsidy targets all types of energy, including renewables, fossil fuels, electricity, and heat, whatever their origin. Around two thirds of the identified measures are multi-energies subsidies classified under the "All energies" category.

Due to the cross-energy and cross-sector nature of energy efficiency subsidies, the subsidy amounts collected correspond to a broad type of measures which are often consolidated under a single subsidy instrument, i.e. an 'energy fund' covers various actions while they are all reported under one single instrument (i.e. *Grant*).

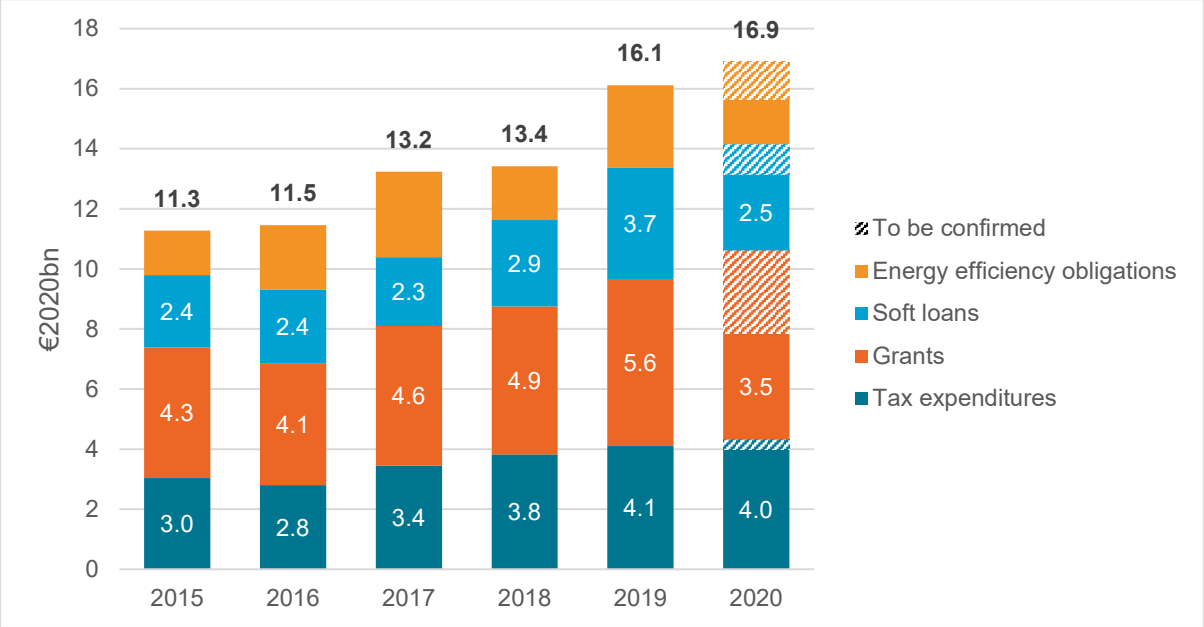
At the date of this report, there are still missing data for year 2020. The missing 2020 data for the concerned subsidies worth €5.4bn in 2019, which represents approximately 30% of total energy efficiency subsidies.

3.5.1.2. Analysis

Within the EU27, support to energy efficiency achieved €16bn in 2019, which represents a substantial upward trend (+9%/year, on average) since 2015 (Figure 16) but remains much lower than support for fossil fuels (more than €56bn as of 2019).

As of 2019, nearly 57% of the identified subsidies occurred through direct transfers (mainly grants with about 35%), followed by tax expenditures (25%) and income/price supports (17%).

Figure 16: Energy subsidies for support to energy efficiency by instrument (2015-2020; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

Support to energy efficiency is very concentrated: in 2019, 6 implemented measures represented around two-thirds of the total identified within the EU-27.

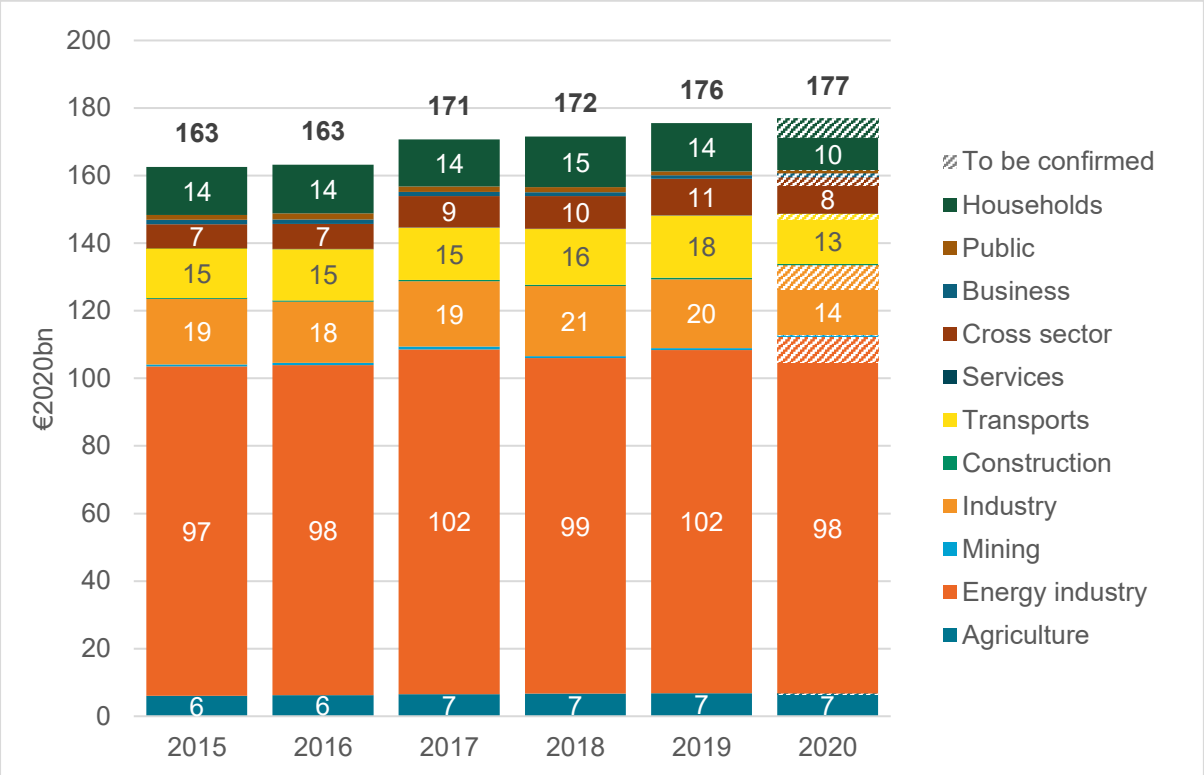
In **Germany**, energy efficiency is mainly subsidised through soft loans with the *CO_2 building restoration programme and incentive programme for energy efficiency* (€2.4bn in 2019, €2.3bn in 2020). The **Spanish** *National Energy Efficiency Fund* (FNEE) granted a €0.9bn support in 2019 under the form of soft loans to companies.

The *energy efficiency obligations with tradable white certificates* instrument are broadly used in **Italy** and **France** (around €1.1bn and €1.3bn respectively in 2019). Since 2018, the Italian white certificate scheme evolved towards a unified methodology, without any distinction by energy type. 2020 amounts are still missing.

3.6. Subsidies by economic sector

The most subsidised economic sector is by far the energy sector, with €102bn representing around 60% of the identified subsidies in 2019 (Figure 17), of which €72bn of FiT/FiP and RES obligations (i.e. more than 40% of the total)[31]. The second and third largest sector are the industry (€20bn, 12%, excl. mining and construction sectors) and transports (€18.5bn, 11%).

Figure 17: Energy subsidies by economic sector in the EU27 (2008-2020; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

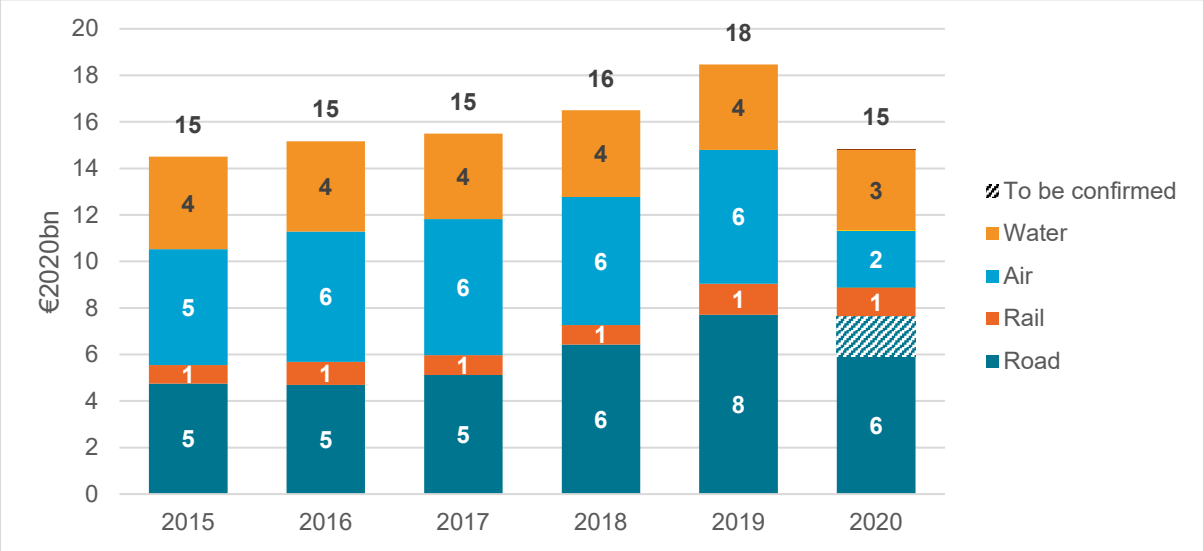
3.6.1. Transport

Subsidies to the transport sector have continuously increased over 2015-2019 (+6%/ year, on average), reaching more than €18.5bn in 2019. In 2019, 42% of the identified subsidies went to road transport, 31% to air traffic (through the full tax exemption on kerosene), 20% to domestic navigation (through the full tax exemption on fuels used in maritime transport, excluding fishing activities), and 7% to rail transport (Figure 18). Due to the Covid-19 pandemic, we estimate that subsidies to transport could have dropped by 20% in 2020, i.e. by around €3.5bn[32]. The bulk of the subsidies to transport supports the consumption of petroleum products.

[31] FiT, FiP and RES obligations are included by convention in the energy industry, while such payments benefit not only to companies involved in this economic sector

[32] The estimation methodology is explained in Annex under the title *Subsidies homogenously estimated for all the MS*, page 47.

Figure 18: Energy subsidies by transport mode (2015-2019; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

The transport sector is mainly subsidised through tax expenditures. Four of them exceed €1bn in 2019, namely: in France, the *Exclusion of the Overseas Departments from the scope of the internal fuel consumption tax applicable to fuels* (€1.8bn) and the *Reduced rate of domestic consumption (refund) for road diesel used in freight transport* (€1.4bn); in Italy, the *Reduction of excise duty on diesel used in freight and other categories of passenger transport* (€1.4bn); and in Spain, *The excise tax exemption on kerosene consumed in domestic air traffic* (€1.1bn).

3.7. Subsidies by category

The Table 2 below, which summarises the distribution of energy subsidies in 2019, highlights that the bulk of the financial aid is paid through income/price supports (49%) and tax expenditures (39%). They are mainly captured by renewables (44%) and fossil fuels (32%).

Table 2: Subsidy amounts distribution by category and instrument (2019, %)

Subsidy category	All energies	Electricity	Fossil fuels	Nuclear	RES	Total
Direct transfers	6%	0%	2%	1%	1%	**10%**
Tax expenditures	5%	6%	24%	1%	3%	**39%**
Income or price supports	2%	2%	6%	0%	39%	**49%**
RD&D budgets	2%	0%	0%	1%	1%	**3%**
Total	**14%**	**8%**	**32%**	**2%**	**44%**	**100%**

3.7.1. Tax expenditures

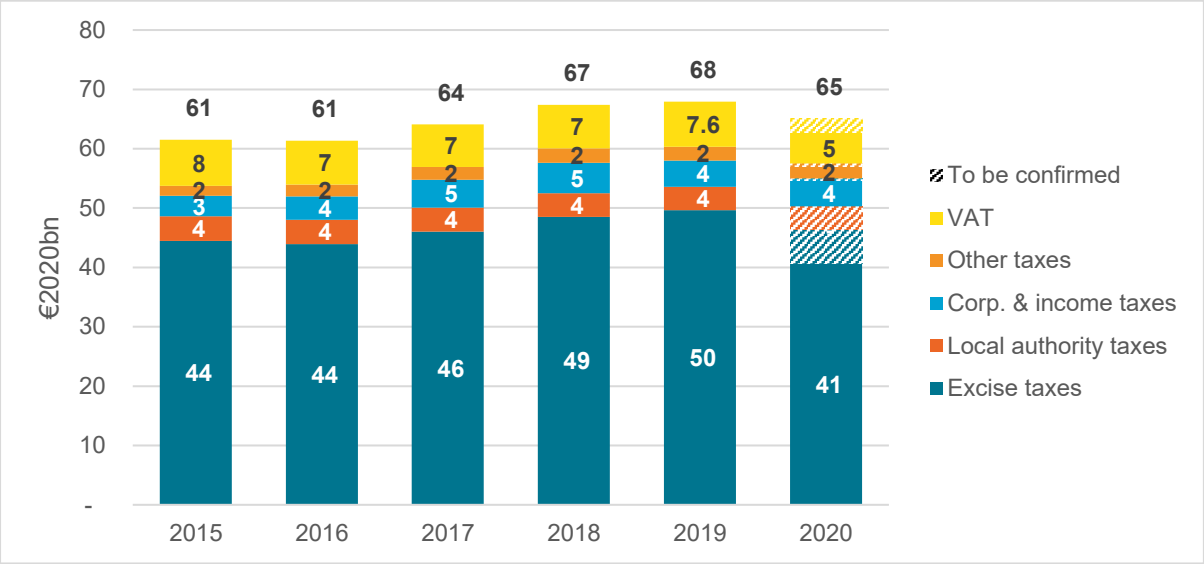
After the income/price mechanisms -mostly dedicated to RES support-, tax expenditure is the second largest tool used to subsidise energy. In 2019, the total tax revenues forgone by the EU27 reached €68bn, representing a 11% rise (+€6.5bn) compared to 2015. Based on available data at the date of this report, we estimate that total tax expenditure in 2020 is about €2bn below 2019 level.

Of the €68bn of tax expenditures in 2019, €40bn were revenue waivers from excise taxes (including carbon taxes and energy taxes) mostly on petroleum products, and €9.5bn from tax on electricity (Figure 19) totalling close to €50bn of revenue foregone. This type of revenue forgone increased by 12%

(+€5bn) between 2015 and 2019, which is mainly explained by the growing gap between increasing standard rates and reduced rates that were kept stable.

Exemption on VAT represent the second largest source of tax revenue expenses with €7.6bn, i.e. 11% of the total. Corporate and incomes tax expenditures were quasi exclusively directed towards energy efficiency measures. Figure 19 underlines that the distribution of revenue forgone by type of tax has remained quite steady over the period.

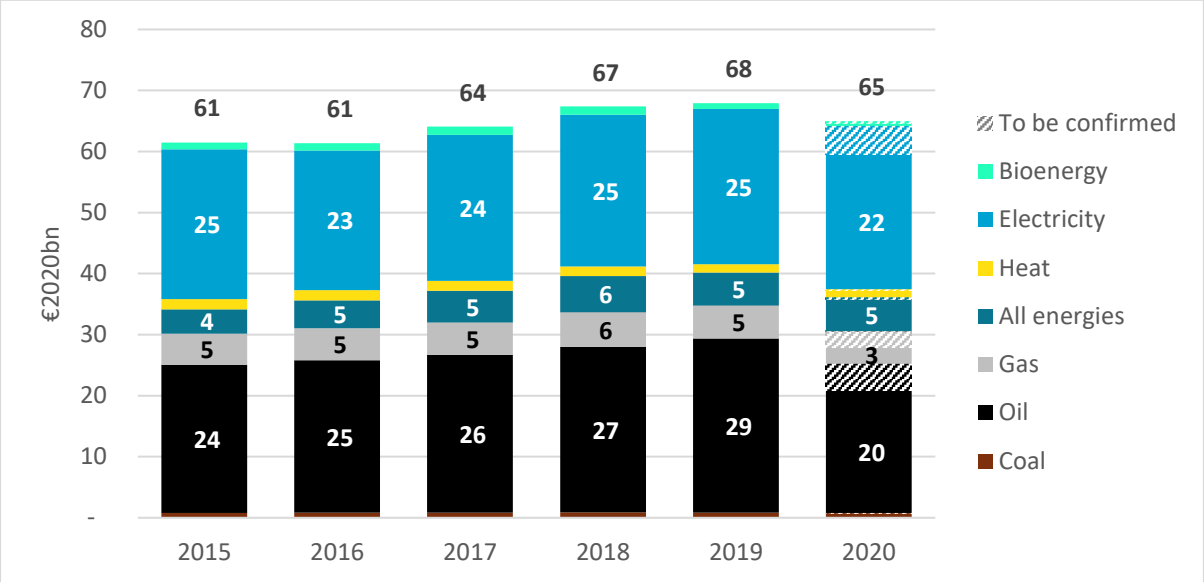
Figure 19: Tax expenditure in the EU27 by type of tax (2015-2020; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

In 2019, tax expenditures directly benefitted to both petroleum products and electricity (€29bn and €25bn, respectively), followed by natural gas and 'All energies' at €5bn each (Figure 20). Tax revenues forgone on petroleum products increased by 18% between 2015 and 2019 (+€4bn) and by 4% on electricity (+€1bn).

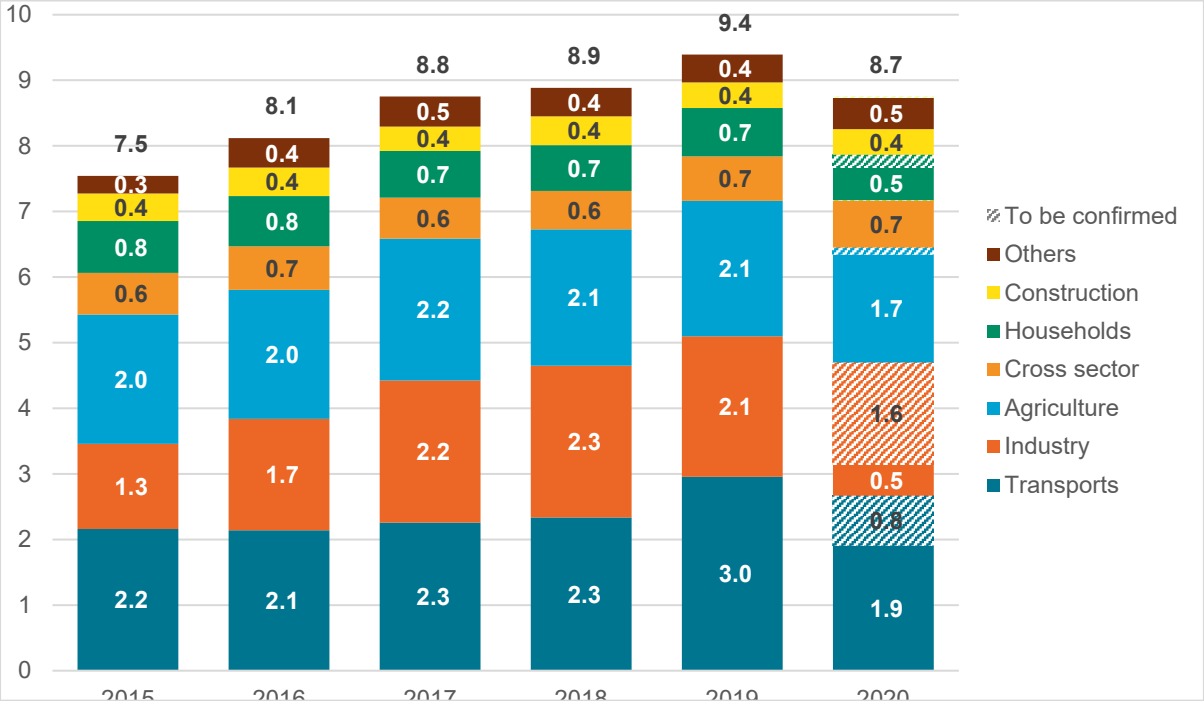
Figure 20: Tax expenditures in the EU27 by energy sources and carriers (2015-2020; €2020bn)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

Marked gasoil (also called coloured gasoil), which is used for off-road uses in agriculture, construction, industry, rail transport, public administration and for heating purposes in residential and services, benefited from €9.4bn of subsidies in 2019, up by €2bn since 2015. Figure 21 underlines that the transport (€3bn in 2019, +€0.8bn since 2015) and industry (€2.1bn in 2019, +€0.8bn) sectors benefit from most the tax revenues forgone on marked gasoil in absolute value as well as in annual growth (+37% and +65% respectively). Meantime, this subsidy to agriculture (including fishing activities) has increased by 5% (+€0.1bn) to reach €2.1bn in 2019.

Figure 21: Tax expenditures on marked gasoil by economic sector in the EU27 (2015-2020; €2020bn)

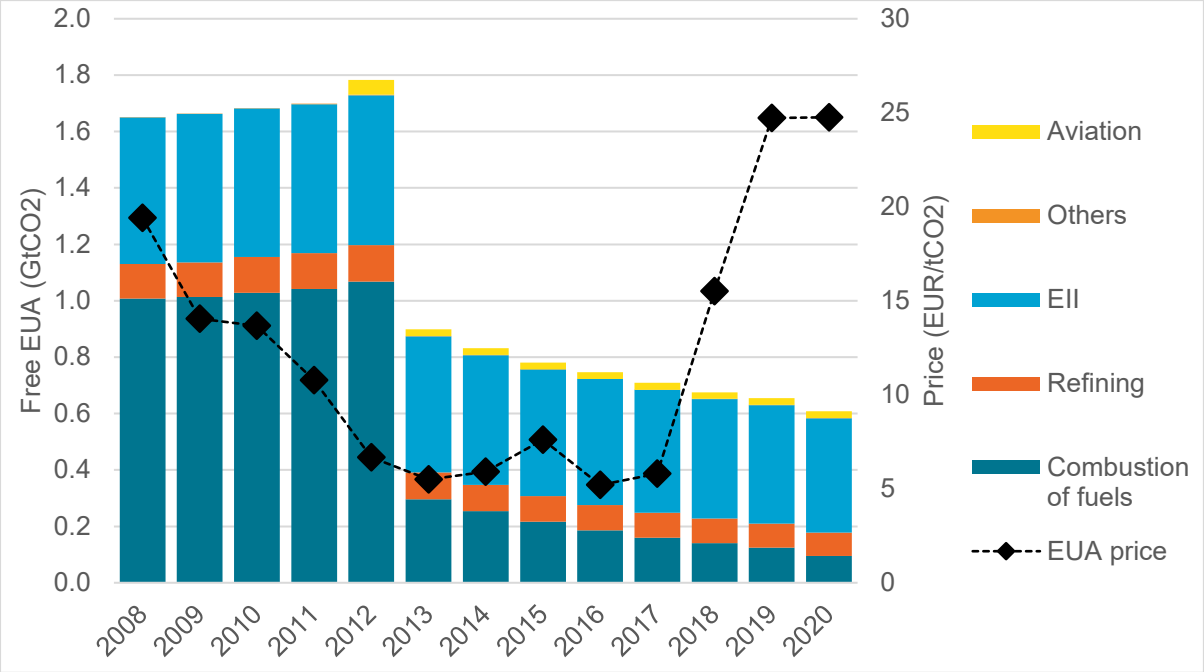


Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

3.8. Other financial supports

The EU launched the world's first international emissions trading system (ETS) in 2005. In its first phase (2005-2007) almost all allowances were given to businesses for free. Under the second period (2008-2012) the proportion of free allocation was slightly reduced to around 90%[33]. Since the beginning of the third period (2013-2020), the EU ETS auctioning has become the default allocation method and the power generation sector is obliged to buy all its allowances and no longer receives free allowances, except for eight countries that have made use of a derogation under Article 10c of the EU ETS Directive[34]. In sectors other than power generation, the transition to auctioning is taking place progressively. The below chart shows that although free allowances have dramatically reduced between 2012 and 2013, 0.6 $GtCO_2$ of allowances remained allocated freely in 2020, of which 24 $MtCO_2$ to the aviation sector. In the meantime, the average annual price of EU ETS allowances (EUA) had surged since 2017 from €5.8/tCO_2 to €24.8/tCO_2 in 2020.

Figure 22: Free EUA and average annual EAU price in the EU ETS (2008-2020)



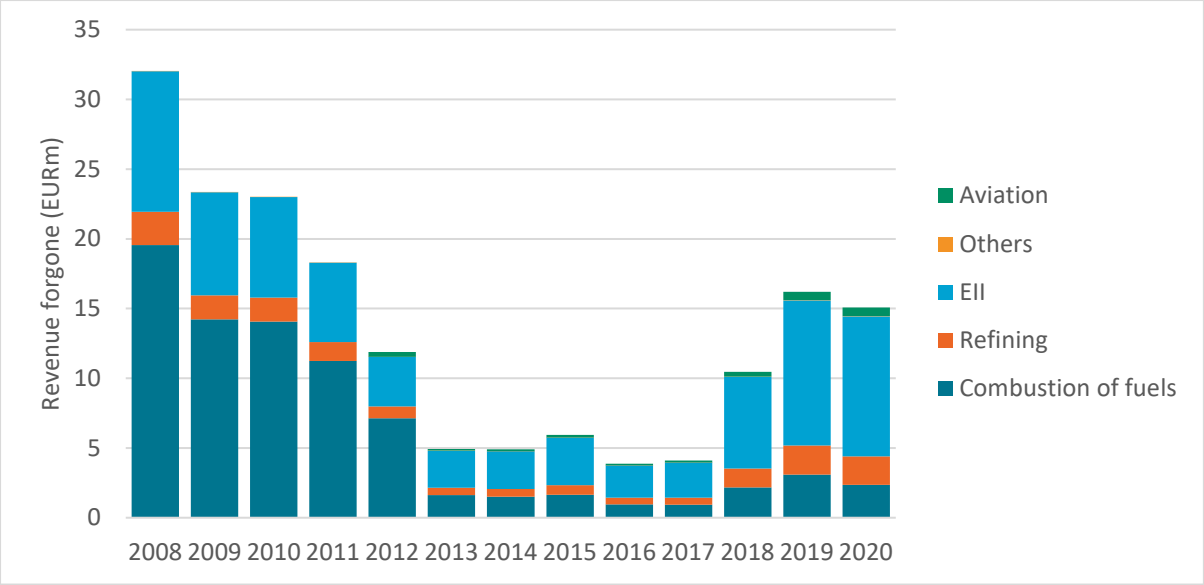
Source: Authors' elaboration based on data from the EEA and ICAP

[33] DG Climate Action, EU ETS Phases 1 and 2 (2005-2012), available at: https://ec.europa.eu/clima/policies/ets/pre2013_en

[34] The eight MS are: Bulgaria, Cyprus, Czechia, Estonia, Hungary, Lithuania, Poland and Romania. DG Climate Action, Transitional free allocation to electricity generators, available at: https://ec.europa.eu/clima/policies/ets/allowances/electricity_en

Figure 23 shows the revenue forgone derived from the combination of the free EUA allocations and the average annual price. Driven by the surge of the EUA price, the revenue forgone grew substantially since 2017 to reach €15bn in 2020, of which €10bn for the Energy-intensive industries (EII), €2.4bn for installations burning fuels, €2.1bn for refineries, and €0.6bn for aviation.

Figure 23: Revenue forgone from free EUA allocations in the EU ETS (2008-2020)



Source: Authors' elaboration based on data from Enerdata, Trinomics and country experts

3.9. Conclusions

On the quality and transparency of reporting on energy subsidies:

- We find that transparency has improved over the past years although there is large room for improvement. Ireland, Italy and Germany are among the most transparent countries.
- Subsidies supporting the development of renewables are closely monitored and data are regularly updated. On the contrary, that on fossil fuels and nuclear are not easy to access in most of the Member States (MS).
- Improvement of reporting on fossil fuel subsidies (FFS) is needed in all MSs so that public opinion can take up this subject and call on public officials to move this topic forward. This will help respect past commitments to phase-out inefficient fossil fuel subsidies and align with the Paris Agreement requirements.
- A portion of the 2020 data is still missing at the date of writing this report (15th July 2021).

On the energy subsidies trends since 2015:

- The overall subsidy amount has slightly rose since 2015, reaching €176bn in 2019.
- Total fossil fuel subsidies in the EU27 are varying around €55bn since 2015. We expect a €2bn fall in 2020, mainly because of consumption decrease due to the COVID-19 pandemic.
- MS' State budgets provide no evidence that any comprehensive FFS phase-out plan is implemented. No such policy is yet in the MS's finance laws. Only few countries have voted to end several FFS and putting a term on FFS reveals a difficult operation for governments.
- The analysis of the MS' tax expenditures reports included in their State budgets reveals that only few countries have voted - as part of their finance laws – provisions to end one or several FFS. Putting a term on tax expenditure supporting fossil fuels seems like a difficult exercise for governments.
- Support to energy efficiency is on the rise since 2015, reaching €16bn in 2019, which remains far lower than FFS. Subsidies for renewables are still slightly increasing but the power generation from renewables is increasing at a faster pace since 2015, thus demonstrating an improved economic efficiency and higher maturity of these technologies.
- Tax expenditure is the most common subsidy instrument in the EU achieving €68bn in 2019 (39%), of which €42bn went to FFS. Income or price support tools captured the lions' share with a total of €85bn (49%), of which €67bn went to renewables through feed-in tariffs/premium, and renewable obligations. Direct transfers (€17bn, 10%) are principally devoted to energy efficiency measures (€10.5bn).
- The need for structural changes of the European power mix has triggered the emergence of new kind of subsidies such as payment for early closure of nuclear and coal/lignite-fired power plants.

4. Task 4: Preparing an analysis of the national interpretation of subsidies

Objectives	• Understand how fossil fuel subsidies are reported by MS in their NECPs • Understand how this reporting varies from that the Commission study • To capture current policy environments around energy subsidies in MSs
Sub-tasks	• Task 4.1: NECP v. Commission study comparison • Task 4.2: Policy environment

4.1. Objective

The goal of this task is to show how MS reporting on energy subsidies in National Energy and Climate Plans (NECPs) varies from subsidy data in the Commission Study. This includes variance in the types and amounts of subsidies reported as well as energy subsidy classifications, with a focus on fossil fuels. A second goal is to capture how current MS governments view energy subsidies.

4.2. Summary

We performed two sub-tasks. Task 4.1 involved comparing fossil fuel subsidies in the *Commission Study* and the NECPs and Task 4.2 required country experts to research information on the policy environments of MSs and related views on energy subsidies. The information gathered in both tasks was documented in country fiches for each MS. Below we outline our approach and summarise our findings.

4.3. Approach

Task 4.1 involved comparing fossil fuel subsidies documented in the *Commission Study* to those reported in NECPs. For each MS we first tried to match subsidy names in their NECP with those in the Commission Study. Where matches were found, subsidy volumes (in millions of euros) were compared for the years accounted for in the NECP. We also tallied the number of subsidies (policies), and the categories (tax expenditures, direct transfers, etc.) found in each source, where possible. In most cases this showed which subsides were included in the *Commission Study* but not the NECP. Where a fossil fuel subsidy was included in a NECP and not the *Commission Study*, we found such subsidies to be out of scope for the *Commission Study*; for example, those that account for differences between tax rates for diesel and gasoline. Analysis of these comparisons is reported for each MS in the country fiches, with a summary (EU-level) analysis below.

Task 4.2 on the policy environment required country experts to collect information on how current governments view energy subsidies, particularly fossil fuel subsidies, but also renewables and nuclear subsidies. Plans for subsidy phase-outs were gathered along with lists of the most relevant legislation, key ministries, and publications. This contextual information was added to country fiche templates, as were fossil fuel subsidy comparisons.

4.4. Data collection

NECPs for all 27 MSs were reviewed for fossil fuel subsidy data. Country fiches where also completed for 27 MSs.[35]

4.5. Analysis

4.5.1. Task 4.1: Comparison of subsidies in NECPs and the Commission study

We find that reporting on fossil fuel subsidies in NECPs is overall low to medium-low in quality based on our assessment of comprehensiveness and level of detail, where "comprehensiveness" indicates the count of subsidies an MS reported relative to what was found in the *Commission Study*, and "level of detail" reflects the amount of subsidy information documented. Some countries, such as Spain, recounted detailed information about most subsidies, but subsidy data was not comparable to the *Commission Study* because Spain reported subsidies per energy unit instead of amounts. In such cases we did not penalise the country for the level of detail they put into reporting. On the opposite end of the spectrum, some MSs reported no subsidies, even though they report them in national documents found by the *Commission Study* team. Many MSs report a fraction of subsidies paid, often due to differences in the definition of "energy subsidy" compared to the *Commission Study*. Sometimes subsidy data is reported but in a non-transparent way, for example, by aggregating subsidy volumes or by reference to third party studies. MSs with higher quality reports include Finland, Germany, Italy, Spain, and Sweden. Table 3 shows our qualitative assessment by MS.

[35] The fiche on Slovenia is limited to comparison of fossil fuel subsidies reported in the NECP versus the *Commission Study*.

Table 3: Qualitative assessment of MS reporting on fossil fuel subsidies in NECPs

Country	Comprehensiveness	Level of detail	Overall Score	Overall Assessment
Austria	1	1	**2**	
Belgium	1	1	**2**	
Bulgaria	1	1	**2**	
Croatia	1	1	**2**	
Cyprus	1	1	**2**	
Czechia	1	1	**2**	
Denmark	2	2	**4**	
Estonia	3	2	**5**	
Finland	3	3	**6**	
France	2	3	**5**	
Germany	3	3	**6**	
Greece	1	1	**2**	
Hungary	1	1	**2**	
Ireland	2	2	**4**	
Italy	3	3	**6**	
Latvia	2	2	**4**	
Lithuania	2	2	**4**	
Luxembourg	1	1	**2**	
Malta	1	1	**2**	
Netherlands	1	1	**2**	
Poland	2	3	**5**	
Portugal	2	3	**5**	
Romania	1	2	**3**	
Slovakia	2	2	**4**	
Slovenia	1	1	**2**	
Spain	3	3	**6**	
Sweden	3	3	**6**	

Key:

Score	Comprehensiveness	Level of detail	Overall: Comprehensivess & Level of detail compared to other MSs	
1	Low			Low
2	Medium			
3	High			Medium-low
4	NA			Medium
5				Medium
6				High

Source: Authors' analysis of MS NECPs

There are nine MSs whose reporting on fossil fuel subsidies in their NECPs is directly comparable to the *Commission Study* (Table 3). This means that, at a minimum, subsidy names and volumes were clearly identifiable in these NECPs, although comprehensiveness and classifications highly varied. Across these nine MS comparisons we found subsidy volumes in the *Commission Study* are 59% higher than in NECPs. Some MS accountings in their NECPs very closely compared to the *Commission Study* (Estonia, Germany, Italy, and Sweden). There were only minor discrepancies in these cases between what countries showed in their NECPs versus what was found in the *Commission Study*. France's accounting of tax expenditures for fossil fuels in their NECP was less than half of the volume found in the *Commission Study*; further, France excluded direct transfers and income and prices supports from their NECP reporting. Ireland counted four fossil fuel subsidies among its "environmentally damaging subsidies" whereas the *Commission Study* found 14.

Table 4: Fossil fuel subsidy volumes in the Commission Study v. NECPs for those countries where subsidy data was published in the NECP and directly comparable to the Commission Study (N=8)

Country	Last year of subsidy data in NECP	(€2018bn)		
		Commission Study	NECP	Comm. Study Vol. as % of NECP Vol.
Estonia	2016	38	37	104%
Finland	2018	545	243	224%
France	2018	11.069	3.926	282%
Germany	2018	12.883	9.587	134%
Ireland	2016	1.419	367	387%
Italy	2017	3.468	3.205	108%
Portugal	2017	643	435	148%
Sweden	2018	3.081	3.022	102%
Total		**33.147**	**20.822**	**159%**

Source: MS NECPS; Commission Study

There are three MSs with whose documentation of fossil fuel subsidies in their NECPs was overall good in quality, but whose data we could not directly compare to the *Commission Study* for the reasons noted below.

Table 5: MSs who provided detailed fossil fuel subsidy information in NECPs but whose data was not comparable to the Commission Study (N=3)

Country	Reason for lack of comparability
Denmark	In NECP Denmark reported average values for 2008-16 from *Commission Study*
Spain	In NECP Spain reported subsidy rates not volumes
Poland	In NECP Poland reported total subsidy volumes across past, present, and future

Source: Authors' analysis of MS NECPs

The remaining 16 MSs did not report fossil fuel subsidy data or did so at lower levels of comprehensiveness and detail; for example "reporting" was sometimes done by copying-and-pasting a chart from another study showing total unlabelled subsidy amounts alongside those of other countries, or by referring to subsidies reported in other studies (and data from these studies was high-level or outdated). Below we document how these 15 MSs reported subsidy information.

Table 6: MSs with lower levels of comprehensiveness and level of detail on fossil fuel subsidies in their NECPs (N=16)

Information reported by MS in NECP on fossil fuel subsidies	Country	Further information from NECP	Subsidy volumes documented in Commission Study (MEUR)	
			2018	2019
Does not report fossil fuel subsidy names or volumes in NECP	Austria	NA	306	304
	Bulgaria	In its NECP, Bulgaria states: "Bulgaria does not provide energy subsidies, including for fossil fuels."	489	588
	Cyprus	In its NECP Cyprus states, "As far as it concerns the subsidies in oil prices a short summary was provided during the Finance public consultations from Ministry" but no subsidy descriptions or amounts are reported."	160	154
	Greece	NA	1771	1538
	Hungary	In its NECP, Hungary says, "fossil fuels do not receive direct subsidies in Hungary", but indirect support is given to certain products and services in specific sectors "justified by interest of the society as a whole".	1573	1656
	Luxembourg	NA	34	33
	Malta	NA	8	5
	Netherlands	In its NECP, the Netherlands says, "There are no direct subsidies for fossil fuels in the Netherlands, in the sense that resources are made available to stimulate the use of fossil fuels. In the Netherlands, fossil fuels are on the contrary heavily taxed by means of, for example, excise duties. However, facilities such as exemptions and differentiated tariffs, for example in energy taxes, lead to missed government revenues that are related to the use of fossil fuels. Such measures could also be viewed as a subsidy if a broad definition of fossil fuel subsidies is applied."	742	673
	Slovenia	NA	77	64
Reports subsidy names but not volumes	Czechia	Czechia lists eight fossil fuel subsidies in its NECP (see below table). The Commission Study includes these, plus three more. Czechia did not include subsidy estimates in its NECP, and stated, "the Czech Republic does not have primary data [on energy subsidies]".	1105	1198
	Latvia	The Latvian NECP includes descriptions of energy subsidies accounting for a range of subsidy types, a classification that appears to be based on the Commission Study. Subsidy volumes are not documented, though differences in excise duty rates for fossil rules are specified.	133	129
	Lithuania	Classification of fossil fuels subsidies provided in the NECP corresponds to the list of data gathered from national government sources. The NECP does not provide amounts of subsidies, only lists of subsidised fossil fuels and expected dates for reduction and phased out of subsidies for particular fuels.	230	142

Information reported by MS in NECP on fossil fuel subsidies	Country	Further information from NECP	Subsidy volumes documented in Commission Study (MEUR)	
			2018	2019
	Slovakia	In its NECP Slovakia documents its energy subsidies, relevant enabling legislation, and timelines but does not provide subsidy volumes.	439	329
Refers to third party studies for subsidy volumes; reporting in said studies not comparable to NECP	Belgium	Part B of the NECP refers to a 2014 document and a 2017 report as reflecting "current" fossil fuel subsidy levels. The 2014 document includes subsidy amounts for Belgium for 2012 reported at a high level of abstraction and the 2017 document only has a country level total.	3424	3411
	Croatia	NA	150	159
Other	Romania	In its NECP Romania describes subsidies for reduction of energy poverty and for heat, and reports on the number of people receiving home heating aid. State aid for closure of coal mines is also described, with total values for 2011-2024 reported. There are five important subsidies missing from the NECP that were also captured in the Commission Study.	1075	804

Source: Authors' analysis of MS NECPs; Commission Study

To summarise, when comparing subsidy amounts found in the *Commission Study* to those in the NECPs, the Study team found five main of types of variance:

1. **Variance in the types of subsidies reported**. The *Commission Study* generally includes a wider range of carriers, sectors, and categories (support to demand, support to production), than is reported in NECPs.
2. **Variance in the number of subsidies reported.** Similarly, the *Commission Study* includes a greater number of subsidies. For example, the *Commission Study* reports on all ongoing subsidies regardless of whether payments were made in recent years, whereas in NECPs, Member States tend to not mention subsidies if payments were not recently made. This is important, especially for fossil fuel subsidies, because payments can still be made if the policy is in force.
3. **Variance in the amounts of subsidies reported**. That is, the volume (€) of subsidies for a given year reported for a particular subsidy is sometimes different in the NECP from what was found in official Member State reports.
4. **Variance in nomenclature and classification.** The name of a policy or subsidy in an NECP can vary from what is in reported by ministries, making it difficult or impossible to compare.
5. **Variance in years reported.** Some Member States report the most recently verified and reported subsidy data. In current NECPs this is typically 2018. For later years (2019-20) budgets are sometimes used. However, some Member States use older data or do not specify reporting years at all.

Nearly all fossil fuel subsidies reported in NECPs are tax expenditures, which typically result from reductions or exemptions in excise tax rates. While these account for most subsidy payments, limiting reporting to tax expenditures excludes direct transfers and income and price supports.

4.5.2. Task 4.2: Policy environment

Country experts researched MS policy environments influencing energy subsidies and documented information on the following:

- The opinion of the current national government on energy subsidies
  - Fossil fuel subsidies
  - Renewables
  - Subsidies for the nuclear power industry
- Recent energy policies announced or implemented by the national government that support fossil fuel use
- Recent energy policies announced or implemented by the national government that support renewable energy production
- Key enabling legislation on energy subsidies, for both fossil fuels and renewable energy
- Key ministries and publications who implement, manage, or report on energy subsidies, as well as the key publications on subsidies they produce
- How fossil fuel subsidy amounts and classification compare in the NECP versus in the data gathered from national government sources (in Tasks 1-3 of this project)

A country fiche with this information is available for each MS in the Annex.

Based on this research and using *Commission Study* data on fossil fuel subsidy volumes before and after 2015 we assessed the current status of fossil fuel subsidy phase-outs in each MS (Table 7). We found that:

- 8 MSs have announced plans to phase-out fossil fuel subsidies or are already implementing plans to phase them out; this designation does not ascribe the extent of the planned phase-outs (number of subsidies, carriers of sectors covered).
- 8 MSs are considering subsidy phase-outs or are in the process of developing phase-out plans.
- 11 MSs have no announced plans to phase-out fossil fuel subsidies; this designation does not necessarily correspond with MSs announced plans or commitments to decarbonise energy systems.

Note these categorisations are based on the professional judgement of the Commission study team, including the core team and country experts but do not necessarily constitute the official stances of current governments.

To put these political announcements in context, we also looked at how much fossil fuel subsidy volumes changed before and after 2015. The colour scales in Table 8 indicate how low (green) or high (red) growth in subsidies were relative to other MSs for the period.

- Dark green denotes the lowest value (minimum)
- Yellow marks the midpoint (median)
- Red represents the highest value (maximum)

Subsidy volumes were down slightly over the 2010-14 period but remained flat between 2015-20. There is no clear relationship between a MS's status in announcing phase-outs and recent trends in subsidy payments, as shown below.

Table 7: Distribution of growth in fossil fuel subsidy volumes by phase-out status

Status	N	CAGR fossil fuel subsidy volume (2015-2019)		
		Minimum	Median	Maximum
Announced or in progress	8	-11%	-1%	14%
Being considered or under development	8	-15%	-4%	5%
No plans	11	-27%	3%	19%
All MSs	**27**	**-27%**	**-2%**	**19%**

Source: Authors' analysis of MS NECPs; Commission Study

Table 8: Status of MS commitments to phase-out fossil fuel subsidies, and change in (CAGR) in subsidy volumes for 2010-2015 and 2015-2019

Status	Country	CAGR fossil fuel subsidy volume (2010-2014)	CAGR fossil fuel subsidy volume (2015-2019)
Announced or in progress	Finland	9%	14%
	France	3%	8%
	Germany	-2%	-1%
	Ireland	5%	-7%
	Lithuania	28%	-11%
	Luxembourg	4%	-7%
	Portugal	10%	7%
	Spain	-7%	0%
Being considered or under development	Austria	-13%	-2%
	Belgium	-3%	5%
	Denmark	-3%	-2%
	Greece	1%	-7%
	Italy	-3%	-3%
	Latvia	11%	-15%
	Slovenia	-14%	-5%
	Sweden	4%	-8%
No plans	Bulgaria	-2%	18%
	Croatia	0%	8%
	Cyprus	6%	19%
	Czechia	-8%	8%
	Estonia	-10%	-13%
	Hungary	8%	2%
	Malta	-2%	-13%
	Netherlands	-6%	9%
	Poland	-3%	-27%
	Romania	-10%	-4%
	Slovakia	4%	3%
EU27		-1%	0%

Source: Authors' analysis; MS NECPs; Commission Study

Country experts researched MS policy environments influencing energy subsidies. Experts reported the following on current politics around fossil fuel subsidies in their MSs. The overall tenor of these notes is that few governments have made more than general commitments to subsidy phase-outs; most of these lack specific plans and timelines. And most phase-out plans start with fuels such as peat (Ireland) or for fossil fuels used in space heating (Luxembourg). Some MSs have identified specific subsidies they want to phase-out and plans to do so (Austria, Belgium). Lithuania appears to have the most detailed phase-out commitment with multiple carriers and target sectors, as well as target dates, specified.

In **Austria,** the government has identified counterproductive incentives and subsidies for climate protection and is still working on ways to eliminate them. Concrete steps have not yet been announced. On the phase-out for oil and coal in space heating: A federal law regulates the phase-out of oil and coal in the building sector in a phased plan. To avoid social hardship, all measures are flanked by a long-term, degressive and socially graduated subsidy: for new buildings (from 2020); for heating system replacement (from 2021); mandatory replacement of boilers older than 25 years (from 2025); Replacement of all oil and coal boilers no later than 2035. Analogous to the phased plan for oil and coal in space heating, the legal basis for the replacement of gas heating systems will be created: In new buildings, no more gas boilers/new connections will be permitted from 2025 onward; Replacement of all gas boilers no later than 2040; No further expansion of gas networks for space heating, except for densification within existing networks.

In **Belgium**, subsidies for fossil fuels have mainly been introduced to support the international competitiveness of specific economic sectors (industry, heavy duty road transport, agriculture). To support decarbonisation, the authorities are now considering to gradually phase-out these subsidies. Belgium will draw up by 2021 an action plan to gradually phase-out subsidies for fossil fuels, taking into account among others, the need to guarantee the country's security of energy supply.

In its NECP, **Bulgaria** states: Bulgaria does not provide energy subsidies, including for fossil fuels.

In its NECP, **Croatia** reports it support for fossil fuels for transport and agriculture and that there are no plans to phase these out.

Czechia did not include subsidy estimates in its NECP, and stated, "the Czech Republic does not have primary data [on energy subsidies]". The main area where the government aims to support fossil fuels is co-financing the transformation of heat cogeneration units (for district heating) from coal to natural gas.

As a part to achieve the overall climate agreement, decreasing the use of fossil fuels has been a part of the political agenda in **Denmark** for many years, and especially since the climate summit in Copenhagen in 2009. The overall goal is to be free from fossil fuels in 2050. Energy and heating consumption should be free from using fossil fuels by 2035.

In **Estonia,** the lower rate of excise duty is applied to diesel fuel used in agriculture, and support is also granted for generating electricity from peat or oil shale processing retort gas in efficient cogeneration mode. Estonia does not plan to amend these two measures, since the lower rate of excise duty for diesel fuels supports the competitiveness of the agricultural sector, and the Estonian government does not intend to promote the launching of additional cogeneration stations using fossil fuels.

Finland's Government Programme states: "We will phase-out the energy use of coal in line with existing decisions by May 2029 at the latest. We will support energy companies in transitioning away from coal by 2025 by providing incentives for investments to replace coal." Regarding peat it states: "We will decrease the use of peat for energy by at least half by 2030. As part of the overhaul of energy taxation, we will assess the necessary changes to the taxation of peat so that we can achieve our 2030 peat targets." Further on oil use: "We will phase-out the use of fossil fuel oil in heating by the start of the

2030s." The implementation of these objectives appears to imply against fossil fuel subsidies. The NECP says "There is no established view in Finland on which energy subsidies are considered fossil fuel subsidies."

There is no clear plan in **France** to phase-out the fossil fuel subsidies. The government has announced reductions of tax expenditures for fossil fuels, however, it has not yet been implemented as shows the cancellation of the planned reduction of the tax expenditure for off-road gasoil (June 2021). The finance law 2020 (budget 2021) has introduced a dedicated fund to support the closure of coal-fired power plants (Cordemais, Gardanne, Le Havre and Saint-Avold) and social support for the closure of these plants.

Germany has a federal law in place that dictates the final date for a complete coal exit (Kohleausstiegsgesetz), initiated by the current government (via the "Kommission Wachstum, Strukturwandel und Beschäftigung (KWSB)"). The government sees a large responsibility to support the closures with financial means (direct payments from budget) to avoid grid imbalances and adverse effects to local/regional development (due to loss of employment). It furthermore sees natural gas as an important bridge technology, hence explaining its continued support for the expansion of its gas infrastructure and supply systems (most prominently NordStream).

In **Greece**, the intention of phasing out fossil fuels, and especially lignite, is expressed mainly at a high-level, while at the same time the report provides a brief description of the policies and measures that still supports the fossil fuels production and consumption. Some of the measures that favour fossil fuels aim at combating energy poverty, therefore they occur under the context of the country's social policy.

Hungary states in its NECP that "fossil fuels do not receive direct subsidies in Hungary", but the reality is that fossil energy receives several hundred billion forints a year in direct and indirect support.

In **Ireland**, there seems to be a general push towards abolishing subsidies for fossil fuels. For example, the Public Service Obligation levy, formerly used to also support domestic energy generation from peat, is now entirely dedicated to renewable energy support.

Italy's government has stressed on several occasions its commitment to a national strategy for climate adaptation. In this context, the government has put forward its intentions for a reform of the fiscal system driven by environmental motives. This foresees, as a crucial aspect, the phasing out of environmentally harmful subsidies ("sussidi ambientali dannosi").

Latvia does not have target date for phasing out fossil fuels. The current energy mix of Latvia still has a high proportion of fossil fuels (natural gas accounted for 23.5 % of gross energy consumption in 2019 and oil products for 40%), and thus, Latvia's dependence on energy imports is still substantial. The production of heat and electricity in Latvia is also mainly based on fossil fuel, especially natural gas (which accounted for 55.6 % of the energy consumption for transformation in 2019). Sector-wise, transport (31.0 %), households (28.4 %) and industry (21.9 %) accounted for the largest shares of total final energy consumption in 2019.

Lithuania will aim to reduce polluting and wasteful energy consumption by 2025, as well as tax incentives for fossil fuels that lead to market distortions. Based on the NECP, a share of subsidies for fossil fuels are planned to be phased out, especially those the origin of which is the Law on Excise Duty. In detail, by 2025 the quota and concession of marked diesel used in agriculture will be gradually reduced; from 2022 the reduced rate of excise duty on heating gas oil will be phased out; from 2024 the reduced rate of excise duty for coal will be phased out too and a year later the subsidy for natural gas used as heating fuel for business purposes will be removed too. The discussions about the removal of subsidy in a form of reduced VAT for heating residential spaces time from time appears in the policy arena, but it is not supported by the public, therefore, have not been phased out yet.

In **Luxembourg** premiums are provided for the replacement of heating systems powered by fossil fuels (fossil phasing out programme). The supported technologies are heat pumps and wood fuel boilers. In addition, Luxembourg is committed to stop any kind of support to fossil fuels, though specific target dates are not mentioned.

Malta has no plans to phase-out any energy subsidies at this juncture, while remaining committed to, inter alia, encourage the adoption of technologies that can help reduce greenhouse gas emissions.

The Netherlands still has some financial benefits for fossil fuel use in energy intensive industries in place, including some energy tax exemptions and rebates. On top of that the energy tax scheme has a degressive structure, meaning that larger consumers pay relatively much less taxes than smaller consumers. A recent policy evaluation of the Dutch Energy Tax has recommended to adapt this regressive structure so that energy savings are incentivised more. Furthermore, the evaluation recommended to phase-out energy tax benefits for CHP installation as the climate benefits of CHP installations might decline in a power system with increasing renewable energy shares. In its NECP, the Netherlands says, "There are no direct subsidies for fossil fuels in the Netherlands, in the sense that resources are made available to stimulate the use of fossil fuels."

Portugal has tax exemptions on coal, which are expected to be removed by 2030, according to the State Budget Law 2018. Gas will continue to play an important role in Portugal's energy mix to ensure security and flexibility at least until 2040. The support for fossil fuels consumption in agriculture and fishing activities will likely continue.

The stance of **Sweden's** government is that fossil should be faced out and renewables promoted. This is however not always the case. The Swedish Society for Nature Conservation published a report in 2018 which stated that the tax reduction for fossil fuels were SEK12.4bn. The topic of stopping subsidies for fossil fuels and decarbonizing is (as in every country) tricky and Sweden have a lot of internal challenges. For example Sweden have vast geographical areas that are sparsely populated and where dependency on the car is strong. Finding a balance of how to move from fossil fuels to renewables while taking as many perspectives as possible into account is therefore a complex political challenge. There is however a decline in fossil fuel subsidies and looking at Sweden's long-term climate strategy there is little room for any fossil fuels.

4.6. Conclusions

On comparisons between fossil fuel subsidies reported in NECPs and the Commission Study:

- We find that reporting on fossil fuel subsidies in NECPs is overall low to medium-low in quality based our assessment of comprehensiveness and level of detail. Germany, Italy, Spain and Spain had the most comprehensive and detailed reporting.
- There were nine MS NECPs against which we were able to directly compare fossil fuel subsidy volumes (MEUR) to the Commission Study. In total across these nine countries the Commission Study found 59% more volume in subsidies paid than recounted in the NECPs.
- 16 MSs did not report fossil fuel subsidy data, or did so at a lower levels of comprehensiveness and detail.
- When comparing subsidy amounts found in the Commission Study to those in the NECPs, the Study team found five main of types of variance:
    - Variance in the types of subsidies reported
    - Variance in the number of subsidies reported
    - Variance in the amounts of subsidies reported
    - Variance in nomenclature and classification
    - Variance in years reported

On announcements by MS governments on fossil fuel phase-outs:

- 8 MSs have announced plans to phase-out fossil fuel subsidies or are already implementing plans to phase them out. But among these 8 there is little more than general commitments to subsidy phase-outs; most commitments lack specific plans and timelines.
- 8 MSs are considering subsidy phase-outs or are in the process of developing phase-out plans.
- 11 MSs have not announced plans to phase-out fossil fuel subsidies; this designation does not necessarily correspond with MSs announced plans or commitments to decarbonise energy systems.
- There is no clear relationship between a MS's status in announcing phase-outs and recent trends in subsidy payments. For example, some MSs who are implementing phase-out plans recently increased subsidy payments and some MSs without any plans recently decreased payments.

5. Task 5: Analysis on how COVID-19 related measures in the Member States impact energy subsidies

Objective	Estimate the impact of COVID-19 on energy subsidies in 2020 Develop a high-level analysis of how the different types of COVID-19 response measures proposed by MSs may impact sectors in the short- and long-term
Sub-tasks	5.1 Quantitative analysis 5.2 Qualitative analysis

5.1. Objective

The goal of this task is for the Commission to better understand the impact of COVID-19 on the energy sector, and on energy subsidies in particular.

5.2. Summary

During 2020, the COVID-19 pandemic impacted the amount of energy subsidies paid by MSs and also resulted in policy responses by countries to assist in economic recovery and to build economic resilience. In this task, we estimated the change in energy subsidies paid in 2020 versus 2019 (Task 5.1) and documented MSs COVID-19 response measures in Recovery and Resilience Plans (RRPs) that impact the energy sector (Task 5.2).

Note that work on this study was completed before the European Commission had time to approve RRPs of some MSs.[36] Final RRPs may contain different information than is analysed for this task. Further, the subsidy classification used in this study generally does not correspond with measures taken from the RRPs (sectorial coverage, definition of subsidies, etc.). That is, not all RRF measures are subsidies in the scope of this study.

5.3. Task 5.1: Quantitative analysis

Below we report on estimated changes to fossil fuel and renewable energy subsidies in 2020 versus 2019. Changes are assumed to largely be due to the economic and social impacts of the COVID-19 pandemic, though we did not conduct an analysis of attribution.

5.3.1. Fossil fuel subsidies

5.3.1.1. Approach

Actual subsidy amounts for 2020 were documented during Tasks 1-3 of this study for 76% (151) of the subsidies included in this analysis; these are tax expenditures for coal, gas, gasoline, diesel, and kerosene (198 subsidies total). For the remaining 24% (47 subsidies), 2020 volumes were estimated as the product of the change in fuel use in 2020 relative to 2019; any change in applicable MS tax rate on the fuel; and 2019 tax expenditures:

[36] Research on this project stopped by the end of June 2021.

$$Tax\_expenditures_{2020}(MEUR) = \frac{Fuel\ use_{2020}}{Fuel\ use_{2019}} \times \frac{TaxRate_{2020}}{TaxRate_{2019}} \times Tax\_expenditures\ (MEUR)_{2019}$$

The change in fuel use was estimated using annual EUROSTAT consumption data for coal, gas, and road diesel, and monthly consumption data for non-road diesel.[37] Kerosene consumption data was not available by applicable sector, however estimates of the change in kerosene subsidy volumes were based largely on subsidy data for which the study team was able to document data for 2019 and 2020 during Tasks 1-3 for 28 of 33 kerosene subsidies. For the remaining five kerosene subsidies the study team assumed 2020 volumes equalled 2019 volumes. These included subsidies for domestic aviation in Cyprus and Estonia, subsidies for industry in Belgium, and subsidies for households in Ireland.

Changes in tax rates were derived from an EC database developed by Trinomics in 2020 for DG ENER. This data was used by the study team with permission from the Commission.[38] The main sources of tax rate data in this database are the excise duty tables published by DG TAXUD.

2019 tax expenditures were documented by the Study team in Tasks 1-3.

5.3.1.2. Analysis

Volumes of fossil fuel subsidies were down by -9% in the EU27 in 2020 versus 2019 (Table 9). This accounts for tax expenditures paid for coal, gas, gasoline, diesel, gas, and kerosene.

Table 9: Tax expenditures for fossil fuel subsidies for major carriers[39] in 2019 v. 2020 in EU MSs (€2020bn)

Country	2019	2020	2020-2019	% Change in 2020
Austria	0,28	0,26	-0,02	-8%
Belgium	2,34	2,08	-0,26	-11%
Bulgaria	0,04	0,27	0,23	648%
Croatia	0,01	0,01	0,00	1%
Cyprus	0,14	0,27	0,13	90%
Czechia	0,03	0,02	-0,02	-51%
Denmark	0,03	0,02	-0,01	-32%
Estonia	0,04	0,03	-0,01	-20%
Finland	0,19	0,15	-0,04	-21%
France	4,82	4,55	-0,26	-5%
Germany	9,14	8,63	-0,51	-6%
Greece	0,58	0,49	-0,09	-16%
Hungary	0,00	0,00	0,00	-46%
Ireland	0,44	0,41	-0,04	-8%
Italy	2,65	2,13	-0,52	-20%
Latvia	0,05	0,05	0,00	-3%
Lithuania	0,13	0,12	-0,01	-6%
Luxembourg	0,01	0,01	0,00	0%
Malta	0,00	0,00	0,00	0%
Netherlands	0,37	0,35	-0,02	-5%

[37] https://ec.europa.eu/eurostat/web/energy/data/database. Annual data for 2020 were labelled as provisional by EUROSTAT at the time of this analysis.

[38] Data and information on fiscal and non-fiscal charges (produced under contract ENER/A4/SER/2019-557/SI2.831246 - LOT 1)

[39] Coal, gas, gasoline, diesel, and kerosene

Country	2019	2020	2020-2019	% Change in 2020
Poland	0,02	0,01	-0,01	-60%
Portugal	0,53	0,39	-0,13	-25%
Romania	0,07	0,04	-0,04	-51%
Slovakia	0,12	0,11	-0,01	-10%
Slovenia	0,03	0,03	0,00	-5%
Spain	2,14	1,54	-0,61	-28%
Sweden	0,10	0,05	-0,05	-53%
EU27	**24,30**	**22,00**	**-2,30**	**-9%**

Source: Authors' analysis of Commission Study data

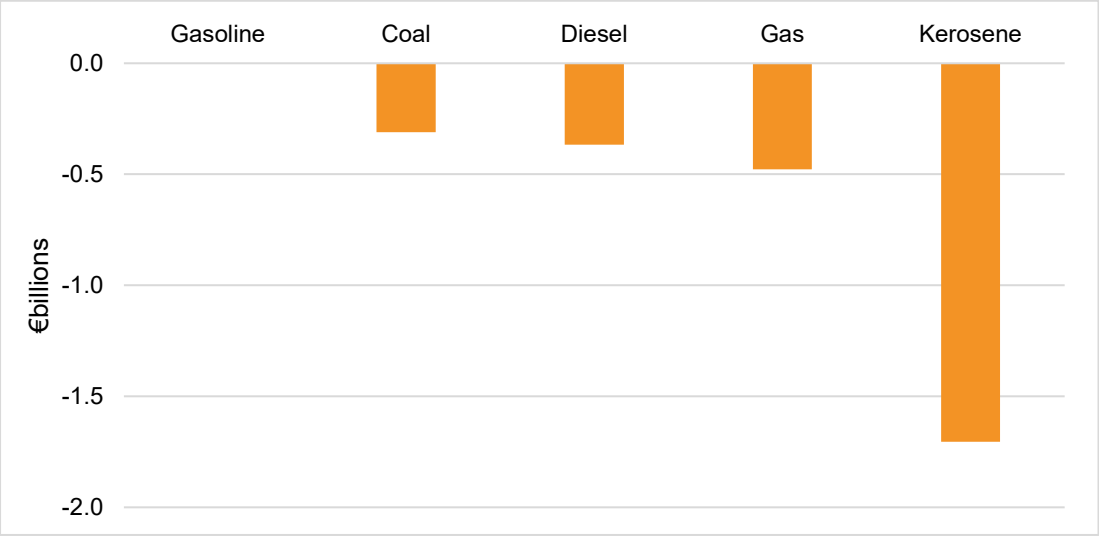
Decreases in tax expenditures for kerosene accounted for 60% of the change in 2020; gas 17%; diesel 13%, and coal 11% (Figure 24). The main reason for the decrease in kerosene subsidies was a drop in the use of domestic aviation (and therefore a decrease in excise payments avoided). The primary reason for the drop in diesel subsidies was also a decline in fuel consumption; road-diesel consumption fell -8% in 2020 relative to 2019).[40]

The overall decrease in coal use (and therefore subsidies) in 2020 was partly due to increased renewable energy production (see FiT and FiP analysis below), combined with an overall drop in electricity use.[41] While the extent to which this decline happened because of MS commitments to phase-out coal versus the impacts of COVID-19 is unclear, coal use trended down -9% between 2015 and 2018, but fell by two-thirds between 2018 and 2020 (*Source: Authors' elaboration of Commission Study data*

Figure 25).[42]

The decline in gas subsidies is also likely due in part to increased renewable energy production and the overall drop in electricity use, though gas use declined just 3% in 2020 relative to 2019.

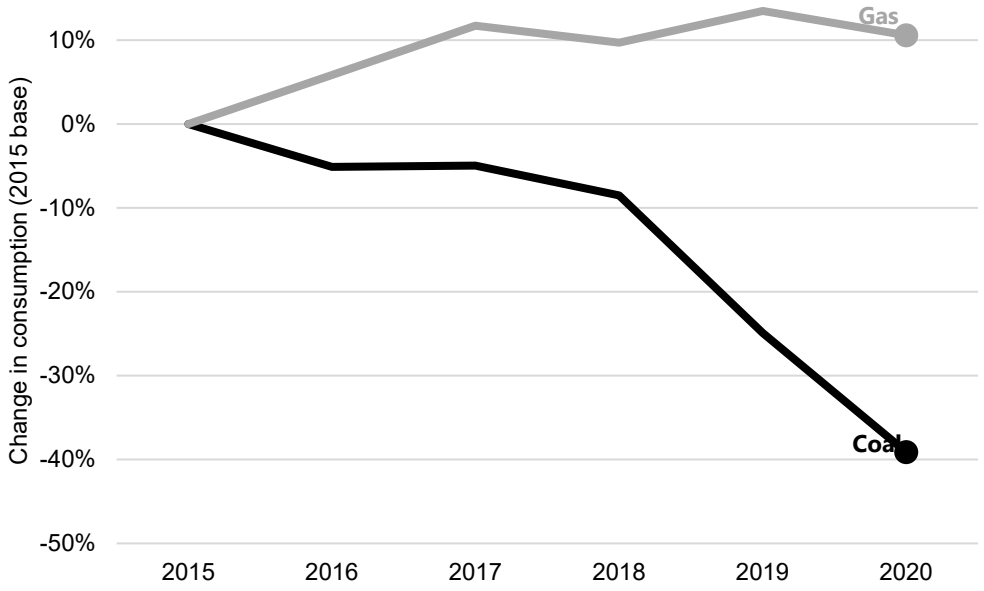
Figure 24: Change in tax expenditures for key fossil fuels in 2020 v. 2019 in the EU27 (€2020bn)



[40] Based on annual data for 2019 and monthly data for 2020 (https://ec.europa.eu/eurostat/web/energy/data/database)
[41] Electricity consumption decreased 1% in the EU27 in 2019 relative to 2018, and 4% in 2020 relative to 2019 (https://ec.europa.eu/eurostat/web/energy/data/database).
[42] Based on provisional estimates of solid-fuel consumption available from EUROSTAT on 24 June 2021.

Source: Authors' elaboration of Commission Study data

Figure 25: Change in coal and gas consumption (2015 base) in the EU27



Source: Authors' elaboration of EUROSTAT (https://ec.europa.eu/eurostat/web/energy/data/database)

The Commission Study team also documented fossil fuel subsidies in the other categories: RD&D budgets, direct transfers, and income or price supports. 2020 data was sourced from national documents or estimated by the Commission Study team for 76% of direct transfer subsidies, 89% of income and price supports and 95% of RD&D budgets. RD&D budgets increased by about a quarter, direct transfers by 31%, while income and price supports slightly decreased.

Table 10: Change in other fossil fuel subsidy category amounts in the EU27 (€bn 2020)

Subsidy category	2019	2020	2020-2019	% Change in 2020
RD&D budgets	0,07	0,08	0,02	24%
Direct transfers	1,13	1,47	0,35	31%
Income or price supports	9,41	9,34	-0,07	-1%

Source: Commission Study

5.3.2. FiT and FiP for renewables

5.3.2.1. Approach

Actual Feed-in-Tariff (FiT) and Feed-in-Premium (FiP) data was documented by the Study team during Tasks 1-3 for 105 of 151 (70% of FiT and FiP policies) such subsidies for solar, wind, geothermal, hydro, and solid and liquid biofuels. For the remaining 46 subsidies 2020 volumes were estimated as the product of the change in production in 2020 relative to 2019, the change in wholesale price and 2019 subsidy volumes. Note that our analysis was limited to FiT and FiP for which we could match the above carriers to EUROSTAT production data and wholesale price data for 2019 and 2020. Total subsidies for FiT and FiP for all renewable carriers, countries, and sectors was €61bn in 2019.

$$FiT\&FiP_{2020}(MEUR) = \frac{REN\ production_{2020}(MWh)}{REN\ production_{2019}(MWh)} \times \frac{WholesalePrice_{2020}(\frac{€}{MWh})}{WholesalePrice_{2019}(\frac{€}{MWh})} \times FiT\&FiP(MEUR)_{2019}$$

Monthly renewable production data was sourced from EUROSTAT[43], wholesale price data was provided by from Enerdata Global Energy & CO_2 Data, and 2019 volumes were documented by the Study team during Tasks 1-3.

5.3.2.2. Analysis

FiT and FiP payments declined -4% across the 15 MSs for whom the Study team was able to develop 2020 estimates (Table 12). Wholesale power prices across the EU fell in 2020 (ranging from -23% for Poland to -55% for Sweden) while renewable production was up for most carriers in most MSs (Source: *Authors' analysis of Commission Study data*

Table 13Table 11). The correlation coefficient between changes in wholesale electricity prices and changes in FiT and FiP payments (

[43] https://ec.europa.eu/eurostat/web/energy/data/database

Figure 26) is 0.7; in MSs such as Finland and the Netherlands, where spot (wholesale) prices fell the most, FiT and FiP amounts increased the most, whereas in countries such as Austria and Czechia, spot prices fell less and FiT and FiP also decreased. The general trend is what we expect – that support to renewables increases as spot prices fall – because the principle behind FiT and FiP is that renewables couldn't economically compete with fossil-driven wholesale prices, and thus subsidising them is justified. Further analysis would be required to determine why FiT and FiP payments actually decreased in some countries where spot prices fell.

Table 11: Change in renewable energy production 2020 v. 2019 (MWh)

Statistic	Combustible fuels - renewable	Geothermal	Hydro	Solar	Wind
# MSs	13	5	15	13	15
Minimum	81%	90%	62%	98%	0%
Median	104%	99%	109%	123%	101%
Maximum	153%	106%	202%	173%	134%

Source: EUROSTAT (https://ec.europa.eu/eurostat/web/energy/data/database)

Table 12: FiT and FiP in 2019 and 2020 by MS (€bn 2020)

Country	2019	2020	2020-2019	% Change in 2020
Austria	1.10	0.63	-0.47	-43%
Belgium	0.47	0.40	-0.07	-15%
Croatia	0.33	0.36	0.04	11%
Czechia	1.73	1.22	-0.51	-30%
Denmark	0.92	1.02	0.10	11%
Estonia	0.10	0.11	0.01	8%
Finland	0.23	0.35	0.12	51%
France	4.52	5.10	0.58	13%
Hungary	0.34	0.32	-0.02	-6%
Italy	0.75	0.76	0.02	2%
Lithuania	0.11	0.09	-0.02	-18%
Netherlands	1.20	1.63	0.43	36%
Portugal	0.99	1.20	0.21	21%
Slovakia	0.36	0.36	0.00	-1%
Spain	9.83	8.49	-1.34	-14%
Total	**22.99**	**22.04**	**-0.95**	**-4%**

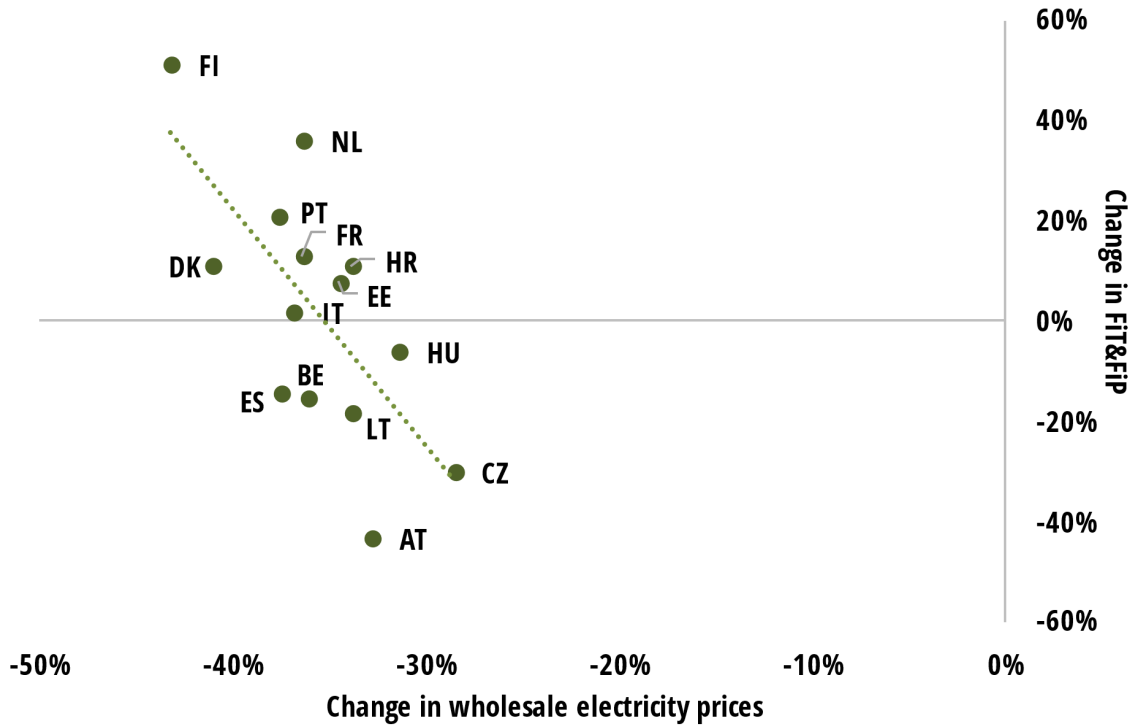
Source: Authors' analysis of Commission Study data

Table 13: FiT and FiP in 2019 and 2020 by carrier (€bn 2020)

Carrier	2019	2020	2020-2019	% Change in 2020
Biogas	1.06	1.15	0.09	9%
Biomass & biogas	0.41	0.32	-0.09	-22%
Biomass (solid)	2.20	2.38	0.18	8%
Geothermal	0.08	0.09	0.01	13%
Hydro	0.79	0.73	-0.06	-8%
Liquid biofuels	0.00	0.00	0.00	-26%
Solar	9.25	8.79	-0.45	-5%
Wind (onshore and offshore)	0.59	0.68	0.09	15%
Wind offshore	0.84	0.79	-0.05	-6%
Wind onshore	7.77	7.11	-0.66	-8%
Total	**22.99**	**22.04**	**-0.95**	**-4%**

Source: Authors' analysis of Commission Study data

Figure 26: Change in wholesale electricity prices v. change in FiT and FiP payments (2020 relative to 2019) (n=14 MSs)[44]



Source: Authors' analysis of Enerdata Global Energy & CO_2 Data; Commission Study

5.4. Conclusions

- Based on an analysis of subsidies for coal, gas, gasoline, diesel, and kerosene, volumes of fossil fuel subsidies were down -9% in the EU27 in 2020 versus 2019. Decreases in tax expenditures for kerosene accounted for 60% of the change in 2020; this is likely due to a drop in the use of domestic aviation.
    - The overall decrease in coal use (and therefore subsidies) in 2020 was partly due to increased renewable energy production (see FiT and FiP analysis below), combined with an overall drop in electricity use. While the extent to which this decline happened because of MS commitments to phase-out coal versus the impacts of COVID-19 is unclear, coal use trended down -9% between 2015 and 2018, but fell by two-thirds between 2018 and 2020.
- Based on an analysis of 70% of FiT and FIP policies in the EU27, FiT and FiP payments declined -4% in 2020 versus 2019 across the 15 MSs for whom the study team was able to develop 2020 estimates. Payments increased the most in countries with the biggest decreases in wholesale power prices.

[44] Does not include Slovakia because wholesale power prices were not available for this country.

5.5. Task 5.2: Qualitative analysis

5.5.1. Summary of approach

The analysis for Task 5.2 is of COVID-19 response measures documented in the Recovery and Resilience Plans (RRPs) of MSs, which are available on the Recovery and Resilience Facility webpage[45]. These plans detail the reforms and investments that will be taken per MS to prepare for a sustainable socio-economic recovery post COVID-19.

Textbox 5-1 Definition of reform and investment according to the European Commission[46]

A **reform** is an action or process of making changes and improvements with significant impact and long-lasting effects on the functioning of a market or policy, the functioning or structures of an institution or administration, or on progress to relevant policy objectives, such as growth and jobs, resilience and the twin (green and digital) transitions.

An **investment** is an expenditure on an activity, project, or other action within the scope of the Regulation that is expected to bring beneficial results to society, the economy and/or the environment.

To support these reforms and investments, the EU Recovery and Resilience Facility (RRF), which entered into force on 19 February 2021, will avail €672.5bn in loans and grants to MSs. The RRF is the centrepiece of NextGenerationEU, a temporary recovery instrument that allows the Commission to raise funds to help repair the socio-economic damage brought about by the pandemic and facilitate a sustainable and inclusive recovery in the long-term, promoting green and digital transitions.

Each available RRP was downloaded and the plans which were not written in English were translated to English using publicly available on-line translation tools. Next, each RRP was scanned for information on policies that may impact the energy sector. We then catalogued each policy in an Excel database, which includes the variables/fields noted below. There was large variance in terminology used by MSs to characterise policies, therefore we spent considerable time working to normalise descriptive terms where possible – on target sectors for example – to create a common lexicon for analytical purposes.

5.5.2. Data collection

5.5.2.1. Data collection process

At the time of the execution of this task, the RRPs for 23 out of the 27 EU MSs were available for analysis. The MSs with unpublished RRPs at the time of the execution of this study are Estonia, Latvia, Malta and The Netherlands. Only RRPs that were available on the Recovery and Resilience Facility webpage by Friday, 2nd July 2021, were considered in this analysis, in order to provide sufficient time to carry out the analysis.

Published RRPs are sometimes available for direct download from the Commission's website on the Recovery and Resilience Facility. In other instances, they are linked to national websites. Following translation to the English language, all reforms and investments related to energy were extracted and consolidated in an Excel database, which is available to the Commission as an Annex to this report.

[45] See https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

[46] European Commission 2021. Guidance to Member States-Reform and Resilience Plans

The data collection includes reforms and investments that are *directly* related to energy, such as investments in renewables, and those that are *indirectly* related, such as measures promoting modal shifts in transport use, improvement of water infrastructure to reduce water loss, and efficient agriculture practices.

For measures that are indirectly related to energy, the decision to include or to exclude them was made on a case-by-case basis. The main reasoning behind the inclusion of each indirect measure is whether they impact energy use and/or if they promote the use of clean energy. For example, the improvements and extensions to rail networks, helps promote the use of rail transport for passengers and freight. This can help to reduce the volume of road transport and hence reduce consumption of fossil-fuels. Investments to improve water infrastructure and water use efficiency also indirectly helps to reduce energy use due to reduction in energy use as the supply of clean water consumes energy in the treatment and pumping of water.

5.5.2.2. Type of data collected

The data dictionary presented below details the type of information collected from the RRPs.

Figure 27: Overview of data fields collected in Task 5.2 database

Field name	Description	Remarks (where applicable)
Country name	Name of MS	
Country 2-letter code	Code name of MS	
Category of measure (Component)	Broad theme addressed by MS	Each MS has different names for these categories. For the purpose of analysis, the variety of names are standardised with the following names: • Energy system/RES; • Sustainable mobility; • Sustainable buildings / Green renovations • Energy infrastructure; • Climate neutrality/decarbonisation; • Water and waste management.
Instrument name-EN	Name of reform or investment in the English language	
Instrument name-native language	Name of reform or investment in the native language	
Type of measure	To identify whether it is a reform and/or investment	
Target area	Beneficiaries of the reform or investment	This information is not provided by all countries. In such cases, the project team has filled in this information based on the measure description, where possible.
Carrier(s)	To identify whether the reform/investment targets any specific energy technologies	The field is included by the project team to help identify any patterns regarding energy subsidies for any particular energy technology, for example: • Energy storage; • Carbon Capture and Storage; • Electricity; • Electric vehicles / Fuel cells; • Fossil fuels; • Hydrogen; • Renewable energy sources;

Field name	Description	Remarks (where applicable)
		• Smart grids.
RRF contribution	Funding amount (€) from the EU RRF	Some of the reforms/investments are not solely focused on energy, but do include elements of energy subsidies. Therefore, the funding amounts captured in these fields refers to the total funding for the programme, which are inclusive of non-energy related elements. Due to the lack of data, the analysis on the value of investments is unable to distinguish and extract the value of energy-related investments from the non-energy related investments that is nested within a broader measure. Some measures also do not include funding amounts as the breakdown within a broader group of measures is not available. In addition, it is sometimes unclear in the RRPs if the financial investments required are coming solely from RRF, or if they include other sources of funding. In such cases, the reported amounts are assumed to be RRF contributions.
Funding from other EU programmes	Funding amount (€) from other EU programmes/facilities	
MS contribution	Funding amount (€) from MS	
Measure description	Details on the reform and/or investment	
Start/End date	Start and end date of reform and/or investment	
Long-term goal	Key intended outcome of the reform and/or investment in the long term	Based on interpretation by study team of information in RRPs
Policy area	The policy area(s) which the reform and/or investment covers	For the purpose of analysis, the variety of names for the same policy area were consolidated. For example, climate, climate adaptation, climate change, climate change adaptation, climate protection etc. are consolidated into the policy area of "Climate policy". The broad categories of policy areas are: ✓ Agriculture; ✓ Biodiversity and air quality; ✓ Buildings and construction; ✓ Clean mobility and transport; ✓ Circular economy; ✓ Climate change and adaptation; ✓ Decarbonisation; ✓ Digitalisation; ✓ Energy policy; ✓ Economic policy; ✓ Environmental policy; ✓ Green transition; ✓ Industrial policy; ✓ Research and innovation policy; ✓ Smart grids and infrastructure;

Field name	Description	Remarks (where applicable)
		✓ Waste management; ✓ Water management.
Flagship initiative	The EU flagship area that the MS reform or investment corresponds to: • Power up: Clean technologies and renewables • Renovate: Energy efficiency of buildings • Recharge and refuel: Sustainable transport and charging stations • Connect: Roll-out of rapid broadband services • Modernise: Digitalisation of public administration • Scale-up: Data cloud capacities and sustainable processors • Reskill and Upskill: Education and training to support digital skills	Some reforms and/or investments do not fit into any of the 7 flagship areas and are left blank. In some instances where the information is missing from the RRP, the project team filled in this information based on the description of the measure. Moreover, often more than one flagship initiative is applicable to each reform/investment.

Source: Authors' analysis of MS RRPs

5.5.3. Analysis

The following section presents our analysis of the COVID-19 response measures of 23 MSs that would have a direct or indirect impact on the energy sector, based on the RRPs that was published and available at the time that the Study was being conducted. The MSs analysed in this study are: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Textbox 5-2 Summary of key results of analysis for Task 5.2

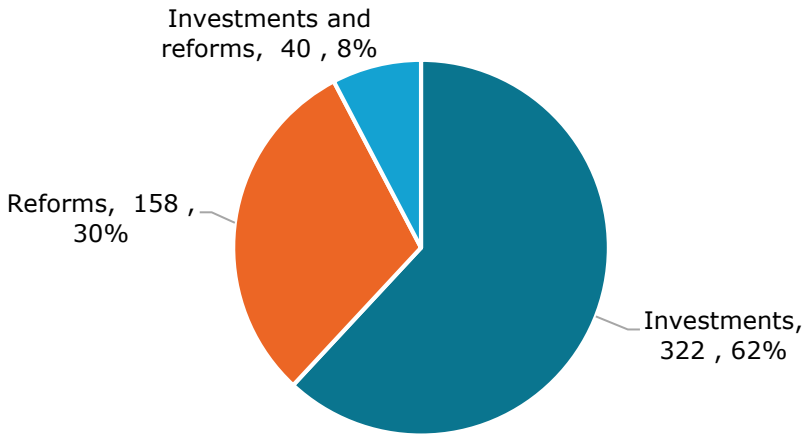
Key results for Task 5.2 – Analysis of COVID-19 response measures related to the clean energy transition

- Analysis was conducted for **23 out of 27 Member States**, who had published their Recovery and Resilience Plans at the time of the Study;
- **From the 23 RRPs that were evaluated, 520 measures were identified as promoting and facilitating the clean energy transition;**
- Out of these 520 measures, **62% of these measures are investments, 30% are reforms, and 8% are a combination of investments and reforms;**
- Italy, France, and Spain are the top three Member States with the highest total estimated investment amounts;
- The investment values of measures submitted by **Croatia, Bulgaria and Romania** have the highest percentage share of their Gross Domestic Product (GDP) in 2020;
- Within the measures relevant to the clean energy transition, the key policies addressed by the measures are in the areas of **Energy, Clean Mobility and Transportation, Climate Change and Adaptation, and Building and Construction**;
- The measures that are identified as relevant to the clean energy transition mainly correspond to the EU flagship areas of **Recharge and Refuel, Power Up, and Renovate**;
- The two key energy technologies in focus are **RES (which also includes energy efficiency in buildings), and hydrogen.**

5.5.3.1. Type and funding of measures in the RRPs

The total number of measures catalogued relating directly or indirectly to energy subsidies is 520. **To be clear, the measures that are discussed further in this section refer to this selection only, i.e. a subset containing all energy-related measures, and does not refer to all the measures included in the RRPs.** RRPs consist of both reform and investment measures. The majority of measures are investments, accounting for 62% of the total number measures, while reform measures account for 30%. Out of the 23 MSs, only Germany has measures that are a combination of investment and reform, while Romania did not distinguish between reform and investment measures and all Romanian measures were considered as a combination of both. The combined measures of the two categories of measures make up 8% of the total number of measures.

Figure 28: Types of COVID-19 response measures promulgated by MSs (n=520 in 23 countries)



Source: Authors' elaboration of information in MS RRPs

The distribution of measure types for each country is presented in the below table.

The total estimated spending on COVID-19 response measures impacting the energy sector is €236.96bn. The MSs with the highest total estimated investment amounts are Italy (€72.98bn), France (€40.75bn), Spain (€26.41bn), Germany (€22.34bn), and Poland (€18.94bn).

The funding sources for energy-related COVID-19 response measures come from several sources, including the RRF, other EU funding sources, for instance the Integrated Regional Operational Programme for Czechia, or the European Structural and Investment Funds (ESIF), from Member States, as well as from private investors. It is also important to highlight that there are many inconsistencies in reporting across MSs on these key three sources, i.e. RRF, other EU funding sources, and from MSs. Some MSs document how much money comes from each source, while others do not. In addition, we found inconsistencies in some of the reports, e.g., where the total value of contributions to be across the RRF, other EU sources, and the MSs do not add up to the total expected investment value that was reported in the RRP.

Figure 29: Distribution of COVID-19 response measures by MS (n=23)

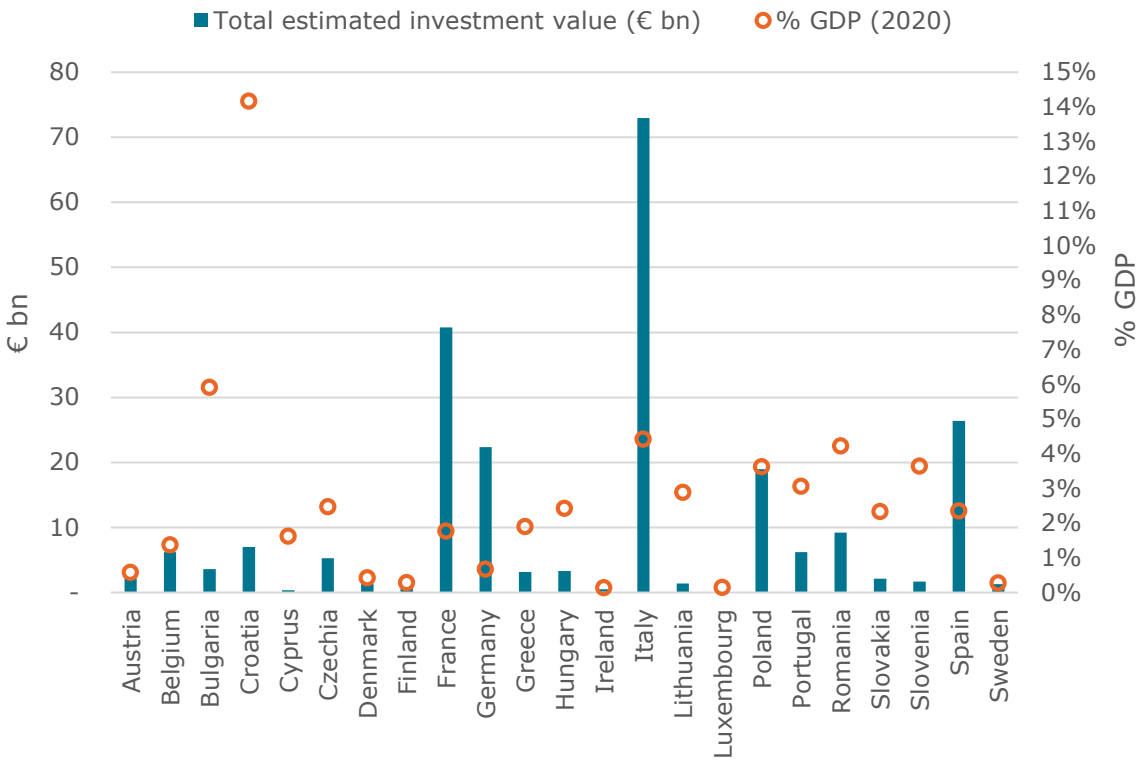
Country	Total # of investments	Total # of reforms	Total # of investments & reforms	Total # of measures (All investments and reforms)	Total RRF contribution (€ bn)	Total Other Sources contribution (€ bn)	Total MS contribution (€ bn)	Total contribution (RRF+Other Sources+MS) (€ bn)	Total value of investment (€ bn)
Austria	5	4	0	9	1.11	-	1.06	2.17	2.17
Belgium	41	11	0	52	2.92	-	1.19	4.11	6.20
Bulgaria	14	8	0	22	0.75	-	-	0.75	3.59
Croatia	32	14	0	46	1.45	-	-	1.45	6.98
Cyprus	12	7	0	19	0.34	-	-	0.34	0.34
Czechia	19	6	0	25	2.49	1.23	1.55	5.27	5.27
Denmark	9	3	0	12	0.56	-	0.76	1.32	1.32
Estonia	no data; RPP not published								
Finland	8	7	0	15	0.67	-	-	0.67	0.67
France	11	8	0	19	25.03	-	15.72	40.75	40.75
Germany	10	1	3	14	10.95	-	11.39	22.34	22.34
Greece	10	6	0	16	3.15	-	-	3.15	3.15
Hungary	8	0	0	8	2.79	-	-	2.79	3.30
Ireland	8	2	0	10	0.50	-	-	0.50	0.50
Italy	44	15	0	59	72.98	-	-	72.98	72.98
Latvia	no data; RPP not published								
Lithuania	0	0	3	3	0.81	0.17	0.11	1.08	1.41
Luxembourg	2	1	0	3	0.05	-	0.04	0.09	0.09
Malta	no data; RPP not published								
Netherlands	no data; RPP not published								
Poland	20	11	0	31	18.86	-	-	18.86	18.94
Portugal	23	8	0	31	6.20	-	-	6.20	6.20
Romania	0	0	34	34	9.22	-	-	9.22	9.22
Slovakia	10	12	0	22	0.23	-	-	0.23	2.14
Slovenia	12	11	0	23	0.71	-	-	0.71	1.69
Spain	20	19	0	39	26.41	-	-	26.41	26.41
Sweden	4	4	0	8	1.31	-	-	1.31	1.31
Total	322	158	40	520	189.48	1.40	31.82	222.69	236.96

* Romania did not make any distinction between reform and investment measures in the RRPs, therefore all their measures are considered as both investments and reforms in this analysis.

Source: Authors' analysis of information in MS RRPs

Total investments reported are compared against the GDP of MSs and is depicted in Figure 30 below, to illustrate the volume of new investments that have been planned as part of the post-COVID-19 recovery. It is important to highlight here that the investment values used in this analysis are the total values that are to be spent across several years for the period of 2021 to 2026. As the duration of each measure also differs per measure and/or per MS, and due to missing data on the start and end date of some of these measures, the lump sum value, i.e. the total, is used in this analysis. Croatia has the highest percentage of proposed investment as a percentage of GDP (2020), of about 14%, followed by Bulgaria, of about 6%, and then by both Italy, and Romania, of about 4.5%.

Figure 30: Total estimated investment value and the estimated investment level as % of GDP



Source: Authors' elaboration of information in MS RRPs; EUROSTAT (https://ec.europa.eu/eurostat/web/products-datasets/-/SDG_08_10)

Across the MSs, there were inconsistencies in the reporting of the funding sources for the measures described in the RRPs. Most MSs naturally focussed on reporting the funding that is required from the RRF in the RRPs. Information regarding the funding sources for the total estimated investment value of the measures is not always provided in the RRPs published at the time of the Study.

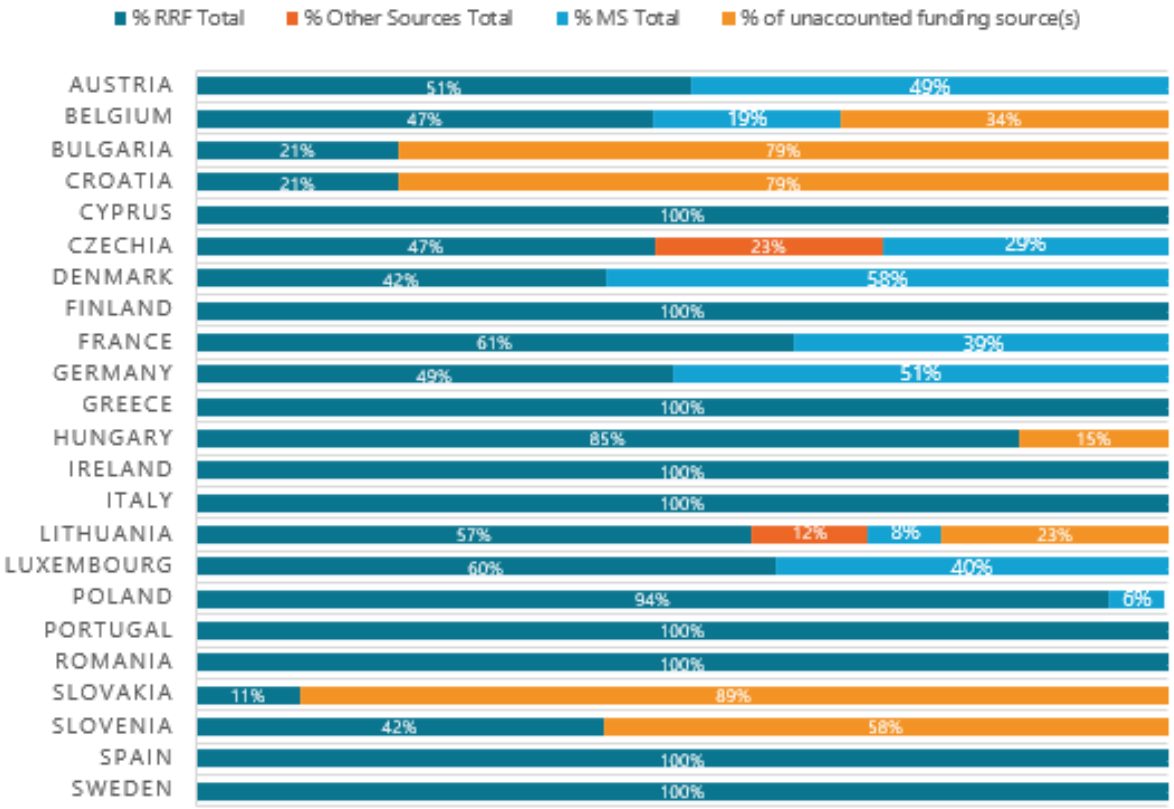
Out of the 23 MSs, Austria, Belgium, Czechia, Denmark, France, Germany, Ireland, Lithuania and Luxembourg, provided more information on funding sources other than the RRF. However, there were also inconsistencies in the reporting of the funding sources across these nine MSs. For example, the values provided by Belgium did not add up to the estimated investment value required to implement their measures; Ireland provided a lump sum value for MS contribution for a group of measures that included measures that were not relevant to the energy sector; Countries such as Bulgaria, Cyprus, Slovakia and Slovenia provided the values for RRF funding and the total investment value, but did not provide further information on other funding sources.

Textbox 5-3 Assumptions for the values used in the analysis

Where lump sum values were provided for a group of measures, which contains many other measures that are not relevant for analysis, i.e. not related to the energy sector, the values were excluded entirely, i.e. a zero value is used. In addition, in cases where other funding sources were not mentioned in the report, and only one set of values were provided, i.e. either the RRF or the total estimated investment value, then it was assumed that the same value is the total estimated investment value of the measures, and the funding from RRF respectively, i.e. RRF equals to the total estimated investment value, and vice versa.

Figure 31 presents an overview of the share of reported contributions from the different funding sources, based on available information provided in the RRPs published at the time of the study.

Figure 31: Share of reported investment contributions per MS (n=23)



Source: Authors' elaboration of information in MS RRPs

5.5.3.2. Key policy areas addressed in RRPs

Policy areas addressed by the measures are noted in MS RRPs. As mentioned in Figure 27, different MSs have different ways of naming the policy areas. Therefore, for the purpose of analysis, the variety of names for the same group of policy was consolidated and labelled under the same category. Within the measures that were identified as promoting or facilitating the clean energy transition, they were associated with key policy areas as follows:

- ✓ **Energy policy**: Includes measures that promote the implementation and deployment of renewable energy technologies, and on energy efficiency;
- ✓ **Clean mobility and transport**: Includes measures that promotes the decarbonisation of the transport sector;
- ✓ **Climate change and adaptation**: Includes measures such as regulations, bills etc., and financial incentives that promotes the transition to a green economy;
- ✓ **Buildings and construction**: Includes measures that promotes the decarbonisation of the building stock.

The 520 measures that have been extracted from the RRPs and assessed as relevant to the energy sector cuts across some 19 policy areas. More than 830 policy areas are tagged to the measures. The number of policy areas is larger than the total number of measures as most of these measures addresses multiple policy areas. Figure 32 provides an overview of the number of times that the respective policy areas were tagged to the measures. The corresponding amounts of the measures tagged to each of the policy area is also provided in this table, although it is important to note that the figure here is overestimated since many of the measures are tagged to multiple policy areas and the corresponding amount for implementation of the reform and/or investment is recorded in full, in each of the various policy areas. For example, if a measure is tagged in both policy areas of 'Energy policy' and 'Clean mobility and transport', then the full amount is also recorded twice in the table, under the respective policy areas.

Figure 32: Count of policy areas covered by measures from 23 MSs

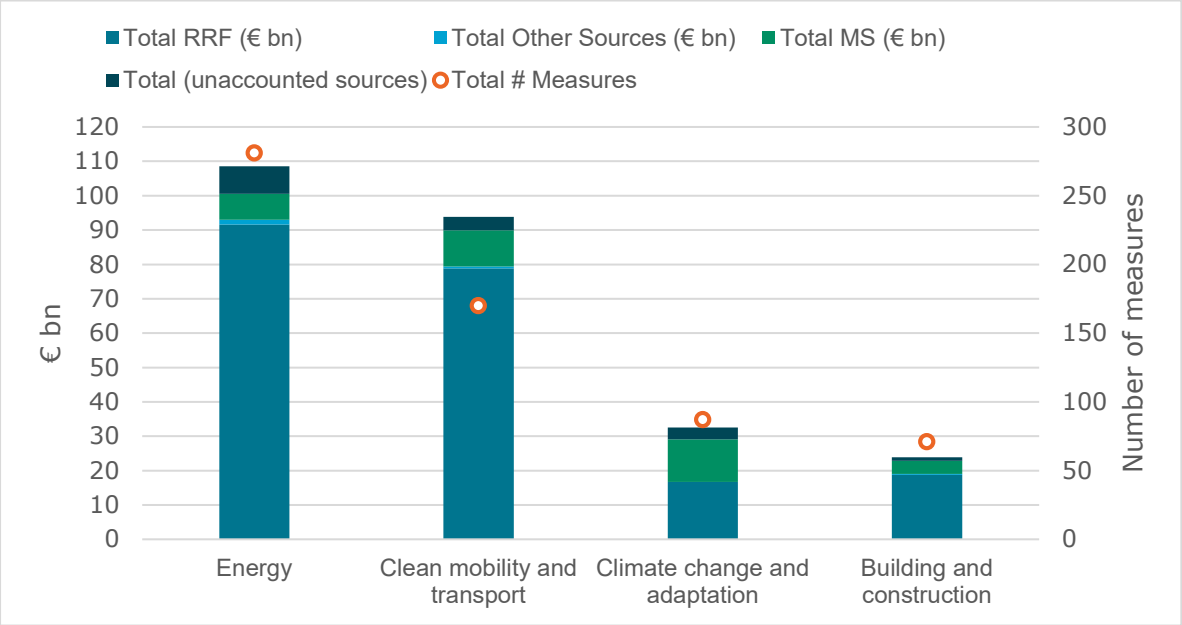
Policy Area	Count	Amount (Million €)
Energy policy	281	108,593.40
Clean mobility and transport	170	93,803.46
Climate change and adaptation	87	32,564.83
Buildings and construction	71	23,909.49
Industrial policy	34	23,305.43
Environmental policy	24	24,033.12
Biodiversity and air quality	22	7,305.94
Decarbonisation	19	3,891.28
Social policy	16	5,911.53
Economic policy	14	4,325.20
Circular economy	13	4,224.81
Digitalisation	11	3,451.97
Research and innovation policy	9	14,896.96
Water management	9	4,096.00
Smart grids and infrastructure	7	532.00
Agriculture	6	4,003.21
Green transition	3	1,066.14
Waste management and infrastructure	3	511.17
Not specified	34	9,220.00
Grand Total	**833**	

Source: Authors' analysis of information in MS RRPs

Across the 23 MSs, the key policy areas addressed are energy, clean mobility and transport, climate change and adaptation, and sustainable buildings and construction. Figure 33 provides an overview of the total investments for each of these four policy areas, which also distinguishes between the various funding sources, i.e. contributions from the RRF, other sources, and MSs. It is also important to highlight that the values indicated in the graph do not reflect the exact investments for each policy area as the policy areas covered by the measures can be overlapping. For example, measures to promote alternative

fuels, or to enhance rail transport, can be categorised both as energy policy and clean mobility and transport policy. In addition, in some cases, the investments for energy-related activities are a subset of a broader range of activities covered by the measures. For example, the purchase of green waste collection vehicles is included as part of a broader waste management improvement programme which may include the building of waste sorting and waste treatment facilities. The breakdown of these subsets was often unavailable from the RRPs available for analysis at the time of the study.

Figure 33: Overview of the investments and corresponding number of measures for each of the key energy-related policy areas identified for the 23 MSs



Source: Authors' elaboration of information in MS RRPs

The RRF is an opportunity to create investments and reforms with tangible benefits for the economy and citizens across the EU. The Commission has strongly encouraged MSs to put forward plans for investments and reforms in seven flagship areas (see Textbox 5-4).

Textbox 5-4 Flagship areas for investments and reforms under the Recovery and Resilience Facility[47]

- **POWER UP**: Developing clean technologies and increasing the share of renewables in the EU energy mix;
- **RENOVATE**: Decarbonising the building stock, by increasing energy efficiency of buildings;
- **RECHARGE AND REFUEL**: Developing sustainable transport and charging stations;
- **CONNECT**: Rolling out rapid broadband services;
- **MODERNISE**: Digitalisation of public administration;
- **SCALE-UP**: Data cloud capacities and sustainable processors;
- **RESKILL AND UPSKILL**: Education and training to support digital skills.

[47] European Commission. (n.d.). Recovery and Resilience Facility. https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

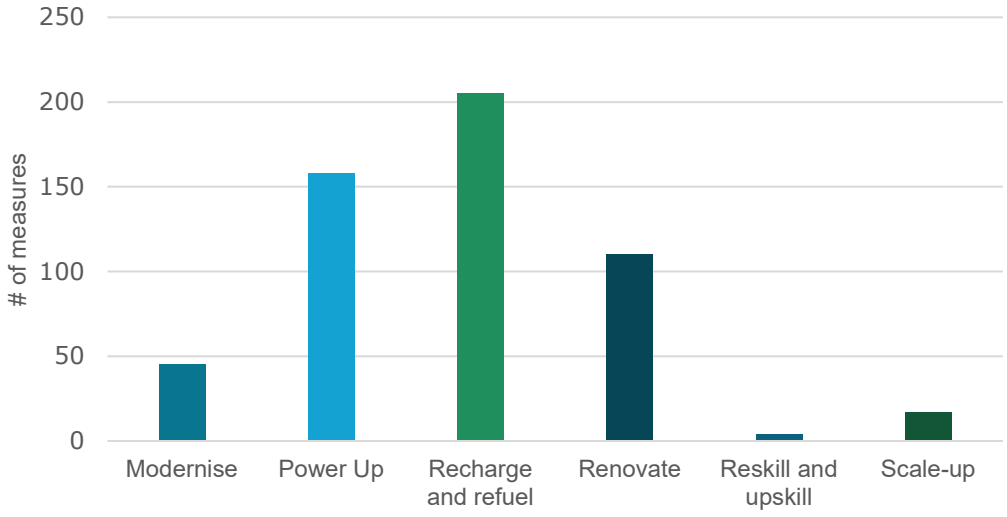
Out of the 520 measures, a total of 539 flagship areas have been documented. The number of 'flagship areas' are more than the number of measures, as in some cases, the measures correspond to more than one flagship initiative. The reform and investment measures that are put forward by the 23 MSs mainly correspond to the flagship areas of:

- "Recharge and Refuel" (205 measures);
- "Power up" (158 measures); and
- "Renovate" (110 measures).

These results correspond with the earlier analysis on the key policy areas covered by the measures—Energy policy to "Power up"; Clean mobility and transport to "Recharge and Refuel"; Buildings and construction to "Renovate".

Figure 34 presents an overview of measures that correspond to the respective flagship areas. More than 130 measures were either not classified and/or do not fit into any of the seven EU flagship areas.

Figure 34: Overview of the flagship areas of measures identified from the 23 MSs



Source: Authors' elaboration of information in MS RRPs

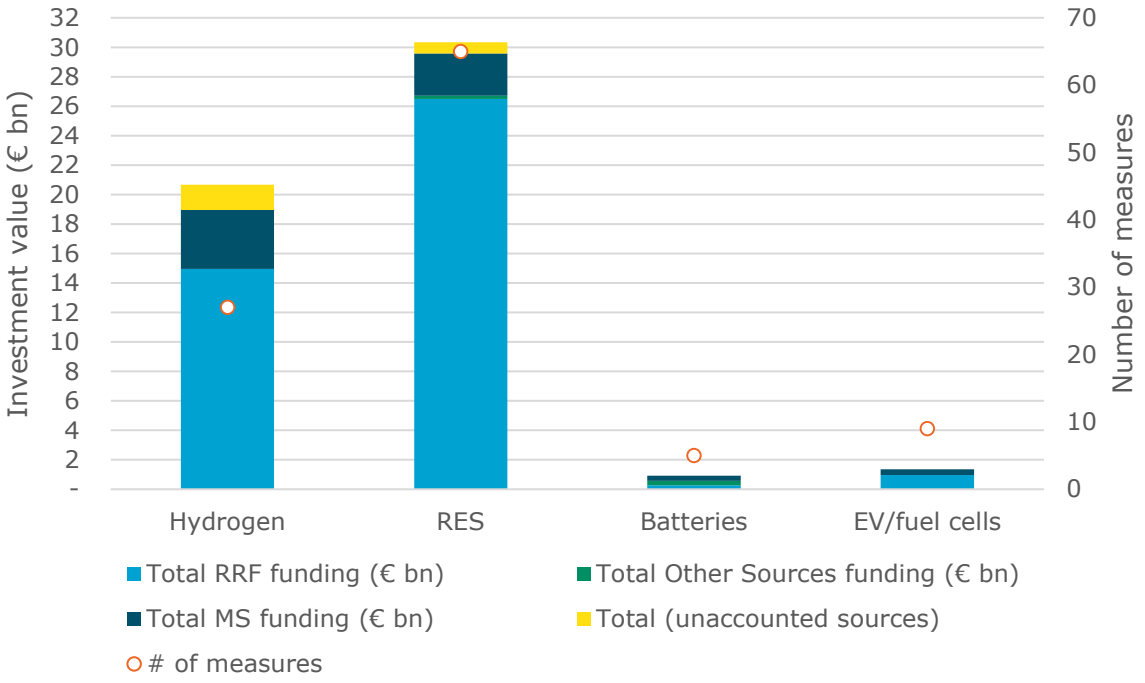
5.5.4. Key carriers areas addressed in RRPs

Figure 35 presents the key energy technologies and carriers addressed by measures in the 23 RRPs analysed in this study:

- RES with 65 measures amounting to a total estimated investment value of €30.33bn;
- Hydrogen, with 27 measures amounting to €20.67bn;
- Electric vehicles (EVs) and fuel cells, with 9 measures amounting to a total investment value of €1.35bn;
- Batteries with 5 measures amounting to a total investment value of €0.91bn

Respectively, these technologies account for about 12.8%, 8.7%, 0.6% and 0.4% of the total estimated investment value reported across all 23 MSs. Altogether, these four key energy technologies and carriers account for 22.5% of the total investment value of the 520 measures reported in the 23 MSs RRPs analysed in this study.

Figure 35: Investment by energy technology/carrier by the 23 MSs



Source: Authors' elaboration of information in MS RRPs

5.6. Conclusions

In their RRPs, MSs[48] have overall put forward reform and investment measures that would increase the supply of and promote the uptake of renewable energy, and reduce MS dependence on fossil fuels. The RRPs have a pivotal focus on investments and reforms that promote clean energy production and consumption in several sectors such as industry, households, transportation, and construction. In addition, there are a number of measures targeting the reduction of fossil fuel use, especially that of coal and oil, and their replacement with cleaner energy sources such as gas and renewables. Consequently, these measures strengthen MS support of renewable energy and decarbonisation of fossil fuel-dependent sectors. Note that under the RRF, MSs can only support measures that comport to the "do no significant harm" principle of the Taxonomy Regulation;[49] overall we believe that MSs' have done so, meaning that implementing RRP measures will contribute to MS phase-outs of fossil fuel subsidies, and help increase clean energy subsidies.

The key outcomes of the analysis of the RRPs of the 23 MSs are:

- A total of 520 green recovery measures were identified in the Recovery and Resilience Plans (RRPs) of 23 MSs. These will contribute directly or indirectly to the MSs clean energy transitions. The total investment value of these 520 policies is €237bn, of which 80% of funding (€189bn) is expected to come from the Recovery and Resilience Facility, which has been set up to aid European countries in achieving a green and sustainable recovery post-COVID-19; This constitutes 28% of the total Facility funds.

- A significant share of planned investments will contribute to decarbonising the transport sector, which includes upgrading rail infrastructure for both freight and passenger travel, and promoting the development of the hydrogen economy, including investing in research and infrastructure development for hydrogen. Other planned investments include measures to decarbonise building stock, facilitating the production and uptake of energy from renewable energy sources, such as construction of new RES infrastructure, deployment of energy storage technology, promotion of renewable heat, promotion of energy communities etc.

- Hydrogen is one of the key energy carriers noted in RRPs. The planned investment value in hydrogen (€20.7bn) amounts to 8.7% of the total energy-related investments across the 520 measures.

- Italy, France, and Spain have the highest total amounts of planned investments for measures related to the clean energy transition.

- Croatia, Bulgaria, Italy and Romania have the largest levels of planned investments that are related to the clean energy transition, relative to GDP_{2020}.

[48] As mentioned earlier, RRPs for Estonia, Latvia, Malta and The Netherlands were not available when the analysis was carried out.

[49] The six environmental areas that the measures should not do any significant harm, according to Article 17 of the Taxonomy Regulation, are climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, circular economy, pollution prevention and control and protection and restoration of biodiversity and ecosystems. (European Commission 2021, Technical guidance on the application of "do no significant harm" under the Recovery and Resilience Facility Regulation)

6. Annexes :

Annex 1: Theoretical framework
Annex 2: Country data controls and observations
Annex 3: Member State Energy Subsidy Fiches
Annex 4: MS energy-related COVID response measures in RRPs

6.1. Annex 1: Theoretical framework

6.1.1. Classifications

To be consistent with the *Commission study*, we have kept the subsidy definitions and classifications which are based on the Agreement on Subsidies and Countervailing Measures (ASCM) framework stated by the World Trade Organization (WTO)[50]. The said ASCM classifies the subsidies in four main categories (see Textbox below).

Textbox 6-1: Definition of a subsidy within the Agreement on Subsidies and Countervailing Measures (ASCM) of the World Trade Organization (WTO)

Article 1: Definition of a Subsidy

1.1 For the purpose of this Agreement, a subsidy shall be deemed to exist if:

(a)(1) **there is a financial contribution by a government or any public body** within the territory of a Member (referred to in this Agreement as "government"), i.e. where:

(i) a government practice involves a **direct transfer of funds** (e.g. grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g. loan guarantees);

(ii) **government revenue** that is otherwise due is **foregone or not collected** (e.g. fiscal incentives such as tax credits);

(iii) a government provides goods or services other than general infrastructure, or purchases goods;

(iv) a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments;

or

(a)(2) there is any form of **income or price support** in the sense of Article XVI of GATT 1994;

and

(b) a benefit is thereby conferred.

The WTO typology is now commonly used by several international institutions such the OECD, the IRENA and NGOs such as IISD as shows Table 14 which summarises the adaptation by these organisations to the WTO framework.

50 All documents related to WTO Agreement on Subsidies and Countervailing Measures are available at https://www.wto.org/english/docs_e/legal_e/24-scm_01_e.htm

Table 14: Table Energy subsidy classifications by major international institutions (classification updated from *Commission study*)

WTO[51] (1994)	EC (2020)	IRENA (2020)	UNEP - IISD - OECD (2019)	OECD (2013)
Agreement on Subsidies and Countervailing Measures	Study on energy costs, taxes, government interventions and their impact on energy investments	Energy subsidies, Evolution in the Global Energy Transformation to 2050	Measuring Fossil Fuel Subsidies in the Context of the Sustainable Development Goals	Inventory of Estimate Budgetary Support and Tax Expenditures for Fossil Fuels
A **government** practise involves a **direct transfer of funds**, potential direct transfers of funds or liabilities.	Direct transfers	Direct financial transfer	Direct transfer of government funds Transfer of risk to government (Indirect)	Direct transfer of funds Transfer of risk to government (Indirect)
Government revenue that is otherwise due is **foregone** or not collected	Tax expenditures	Preferential tax treatment	Tax expenditures, government revenue foregone	Tax revenue and other government revenue foregone
Government provides goods or services other than general infrastructure, or purchases goods	Under-pricing of goods/services	Energy-related services provided by government at less than full cost	Under-pricing of other goods and services	
There is any form of **income or price support**	Income or price supports	Regulation of the energy sector	Induced transfers (price support)	Induced transfers

51 The WTO proposes a fifth type of subsidy called « Government makes payment to a funding mechanism, or entrusts or directs a private body to carry out the function(s) which would normally be vested in the government and the practise doesn't differ from practises normally followed by governments » that is excluded from the table because no other study cover this type of subsidy.

In line with the Commission study, we kept the previously defined set of classifications covering the typology of subsides by category and instruments (Table 15), energy sources/carriers (Table 16), purpose (Table 17), source of financing (Table 18) and economic sectors (Table 19).

Subsidy instruments inventoried in Table 15 can be considered as the "positive list", i.e. the list of instruments covered by our study.

Table 15: Classification of subsidy category and instruments

Subsidy category	Subsidy instrument
Direct transfers	Soft loans
	Grants
	Others
Tax expenditures	Tax reduction
	Tax exemption
	Tax refund
	Tax credits
	Tax allowance
	Others
Under-pricing of goods/services	Under-pricing of government-owned resources or land
	Under-pricing of government-owned infrastructure
	Under-pricing of other government-provided goods or services
Income or price supports	Capacity payments (electricity capacity mechanisms)
	Biofuels blending mandate
	RES quotas with tradable certificates
	Differentiated grid connection charges
	Energy efficiency obligations
	Interruptible load schemes
	Contract for Difference (CfD)
	Feed-in premiums
	Feed-in tariffs
	Consumer price guarantees (cost support)
	Consumer price guarantees (price regulation)
	Producer price guarantees (price regulation)
	Others
RD&D	RD&D

Table 16: Classification of energy sources/carriers

Main energy sources	Main fuels and carriers	Products and carriers
All energies	All energies	All energies
Heat	Heat	Heat
Electricity	Electricity	Electricity
Nuclear	Nuclear	Nuclear
Fossil fuels	FF-All / several	FF-All fossil fuels
	FF-All / several	FF-Several fossil fuels
	FF-Coal / Lignite	FF-Coal / Lignite
	FF-Natural Gas	FF-Natural gas
		FF-Mine gas
		FF-Shale gas
	FF-Oil	FF-Crude oil & NGL
		FF-Oil & Gas
		FF-Petroleum products
		FF-PP-Gasoil
		FF-PP-Blended gasoil
		FF-PP-Gasoline
		FF-PP-Leaded Gasoline
		FF-PP-Unleaded Gasoline
		FF-PP-Blended gasoline
		FF-PP-LPG
		FF-PP-Kerosene
		FF-PP-Fossil-based marine fuels
		FF-PP-Heavy fuel oil (HFO)
	FF-Peat	FF-Peat
	Hydrogen	FF-All fossil fuels
Bioenergy		RES-Biogas
	RES-Biomass	RES-Biogas
		RES-Biomass & biogas
		RES-Biomass (solid)
		RES-Biomass MSW
		RES-Liquid biofuels
		RES-Liquid biofuels-Biodiesel
		RES-Liquid biofuels-Bioethanol
RES	RES-All / several / others	RES-All
	RES-All / several / others	RES-Several
	RES-Geothermal	RES-Geothermal
	RES-Heat	RES-Heat
	RES-Hydro	RES-Hydro
	RES-Marine energy	RES-Marine energy
	RES-Solar	RES-Solar
	RES-Wind	RES-Wind
		RES-Wind offshore
		RES-Wind onshore

Table 17: Classification of subsidy purpose

Subsidy by purpose
Support to energy demand
Support to energy efficiency
Support to industry restructuring
Support to infrastructure
Support to production
Support to R&D

Table 18: Classification of source of financing

Source of financing
Supra-national institutions (EU)
Government/public bodies
Sub-national public bodies (region)
End-users

Table 19: Classification of economic sectors

Economic sectors	Sub-sectors
Energy sector	Energy sector
	-ENER-Fossil fuel extraction
	-ENER-Energy crops
	-ENER-Conversion
	-ENER-Conversion-Refining
	-ENER-Conversion-LNG
	-ENER-Conversion-CHP
	-ENER-Conversion-Electricity production
	-ENER-Conversion-Heating & Cooling
	-ENER-Conversion-Liquid biofuels
	-ENER-Conversion-Biogas production
	-ENER-Conversion-Hydrogen production
	-ENER-Infrastructure
	-ENER-Infra-Transmission
	-ENER-Infra-Distribution
	-ENER-Infra-T&D
	-ENER-Infra-Storage
	-ENER-Assets decommissioning
	-ENER-Waste management
	-ENER-Retail
Agriculture	Agriculture
	-AGRI-Crop, animal production, hunting
	-AGRI-Forestry and logging
	-AGRI-Fishing and aquaculture
Construction	Construction
Mining	Mining
Industry	Industry
	-INDU-Energy-intensive industry
	-INDU-Non energy intensive-industry
Transport	Transport
	-TRANS-Air transport

Economic sectors	Sub-sectors
	-TRANS-Rail transport
	-TRANS-Road transport
	-TRANS-Water transport
	-TRANS-Public transport
Services (tertiary sector)	Services (tertiary sector)
Business	Business
Households	Households
	-HH-Low income
Public	Public
Cross sectors	Cross sectors
Economic sectors	Sub-sectors

6.1.2. Negative list: data not collected by country experts

To be consistent with the *Commission study*, these subsidy types that are not covered are listed below:

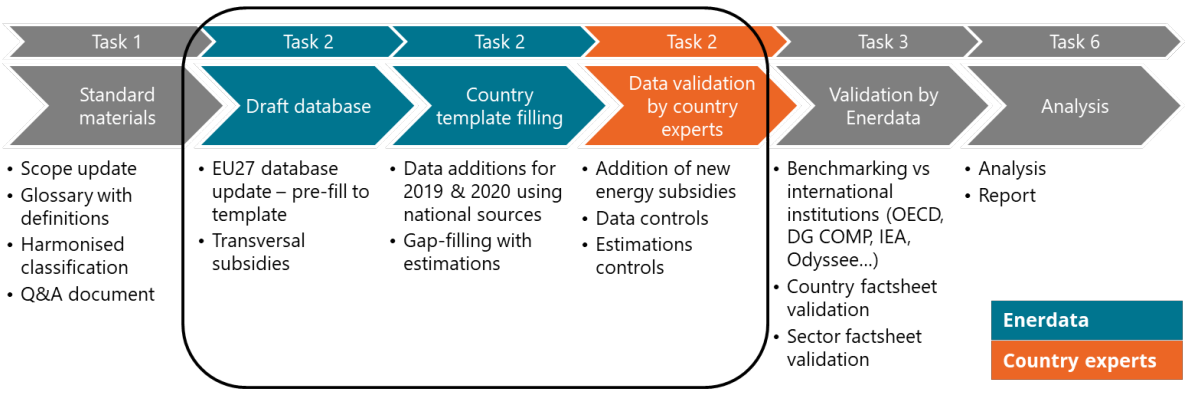
- Transport is restricted to fuel tax reductions/exemptions and domestic transport (i.e. extra-EU27 international transport is not covered). The study also does not cover:
  - Reductions/exemptions of distance-based road charges;
  - Reductions/exemptions or non-existence of potential urban road pricing schemes;
  - Reductions/exemptions of infrastructure charges, including rail, ports, airports.
- Support to nuclear plants decommissioning through:
  - The European Bank for Reconstruction and Development (EBRD), though the International Decommissioning Support Fund (IDSF) in Kozloduy (Bulgaria), Bohunice V1 (Slovakia) and Ignalina (Lithuania)
  - The Central Project Management Agency (CPMA) in Ignalina (Lithuania)
  - The Slovak Innovation and Energy Agency (SIEA) in Bohunice V1 (Slovakia)
- Financial support related to cost of integration of intermittent RES;
- Government ownership (of all or a significant part) in energy companies;
- Government equity infusions in private firms.

6.1.3. Data collect and control process

6.1.3.1. Data collection process

The data collection process was performed in the three steps described below.

Figure 36: Data collection process



6.1.3.2. Data hierarchy

The subsidy data are made of two main types of information:

Actual data gather the amounts directly taken from official documents. They can be either amounts effectively paid (in previous years) or budget amounts estimated by official institutions.

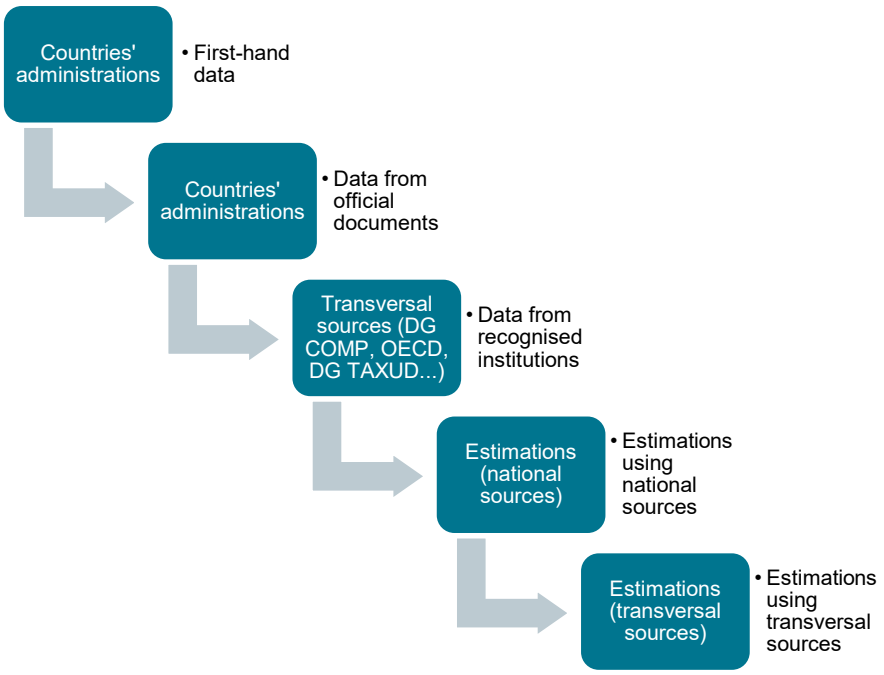
Estimated data are subsidy amounts that have been estimated by either the core team or the country experts. Such estimations are cross-controlled within the consortium and are based on information (energy consumption, tax rates…) taken from official -national or international- institutions.

All along the data collection process, we have used a default data hierarchy that organises and qualifies the data as follows:

1. Data taken from official documents (from ministries, government agencies, energy regulators, statistical offices, Court of Auditors…) will be preferred over estimations:
    - Where we have already established direct contact with key employees in Ministries of Finance, we asked them to provide again first-hand information. If they deliver the required information, they will be used as the preferred data.
    - Amounts collected in official documents (from ministries, government agencies, energy regulators, statistical offices, Court of Auditors…) from national sources have been preferred over amounts from transversal sources;
    - When no official data was available, data from official transversal sources (OECD, DG COMP State Aid Cases database, MURE….) we have retained rather than country experts' estimations.
2. When official data were not available, the core team performed estimations that have later been controlled by country experts:
    - Estimations used national statistics (for energy data) and national data from fiscal/custom/ministry administration;
    - When national data were not available for estimations, we have used transversal sources (i.e. Eurostat for energy data, CIRCABC and TAXUD data for fiscal data).

The data hierarchy we suggest deploying during for this study is summarised below in Figure 37.

Figure 37: Data hierarchy chart



6.1.3.3. Data collection principles

The data collection exercise for each task followed principles built on international best practices[52] comprising:

- **Relevance**
  - Developed data templates according to task needs and following the scope defined in the inception phase with the DG ENER;
  - Address data gaps of previous DG ENER studies;
  - Focus completion of any gaps left after data collection according to the feedback from DG ENER on the most important issues.
- **Traceability**
  - Include the raw data sources and a link or reference to the source;
  - Indicate the methodology used in estimations;
  - Use a colour code system to reflect the updates made in comparison to versions from previous DG ENER studies.
- **Simplicity & functionality**
  - Do not duplicate data – where this is needed, link the cells to ensure that changes are reflected;
  - Where calculations are made, this should be done linking the used cells;
  - Consolidate and simplify the databases in the end of each task;
  - Build upon tools from previous DG ENER studies.
- **Coherence and comparability**
  - Use defined concepts for data collection across countries;
  - Where possible, use the same source for as many items as available;
  - Cover as large a period as possible, with attention to the most recent year available;
  - If a data series is updated using a different source, validate that the data for previous years is aligned with the previous source and – if it is – update the whole data series (if applicable).
- **Accessibility and clarity**
  - Present the data and metadata for each task in a coherent and clear format, improving on best practices from previous projects;
  - Provide databases, reports and supporting documentation in formats agreed with DG ENER in the shared document management and storage system;
  - Use common database structures across tasks when possible;
  - Indicate the confidentiality level for each dataset and resulting analysis.

[52] United Nations (2018) International Recommendations for Energy Statistics (IRES)

6.1.4. Data validation through comparison against other institutions studies

Given the nature of the data collected, which is not well structured nor well transparent across countries, a key issue was to find means to control quality and to ensure the comparability of the data across countries ultimately leading to consistent and relevant analysis. To achieve good data quality, we have implemented several controls by benchmarking our data with that of existing external databases.

Our initial plan was to compare our data against the sources listed below. However, as of mid-July 2021 not all of them have are updated. At date, we were able to collect data at the following transversal sources:

- ☹ **DG Competition State Aid Cases**: amounts provided cover years until 2019. As a result, 2020 amounts are not available. Consequently, we couldn't control the subsidy amounts for 2020.
- ☹ **OECD fossil fuels inventory:** amounts arranged by the OECD are covering a period ending at the latest in 2019, depending on the country, i.e. 2020 amounts are not available. In addition, five MS, namely Bulgaria, Croatia, Cyprus, Malta and Romania are not covered by this publication. Consequently, therefore the comparison remain that executed in *Commission Study* considering the year 2018.
- ☺ The CEER **Status Review of Renewable Support Schemes in Europe** covering 2018 and 2019 was published at the very end of June 2021, which enable us to carry out the comparison for these two years.
- ☺ **Odyssee-MURE** database for energy efficiency measures has been reshuffled in 2020. Subsidies tagged as "Financial", "Fiscal" and "Market-based Instruments" have been covered in the EC inventory, when consistent.

6.1.5. Subsidy amount allocations

In line with the methodology used in the *Commission study*, when relevant and feasible, we have allocated the subsidy amounts related to multi-sectors and multi-energy subsidies based on MS' energy balances. Subsidy amounts have been allocated according to the two following approaches:

6.1.5.1. Multi-energy subsidy

Amounts reported for multi-energy subsidies were allocated according to their respective shares in the energy mix. For instance, a subsidy amount covering, as a whole, feed-in tariffs for electricity production from CHP burning fossil fuels was apportioned to each fossil fuel depending on their respective shares within the power generation mix.

6.1.5.2. Multi-sector subsidy

Similarly, multi-sector subsidies were allocated to each sector depending on their contribution to the said measure based on energy records in the national energy balance. For instance, a tax reduction on marked diesel (off-road consumption), reported as a whole, was broken down between the various consuming sectors (agriculture, construction, industry…) of off-road diesel according to their individual shares in the total consumption.

6.1.6. Transversal energy subsidies sources

Several types of energy subsidies were incorporated for all the MS using a unique source of information to ensure homogeneous treatment across country.

6.1.6.1. Subsidies homogenously estimated for all the MS

To cope with the heterogenous reporting methods across MS for air and maritime transport tax expenditures and, in line with the *Commission study*, we estimated these two subsidies using the following formulas:

Tax expenditure on fuel consumption in air transport

Air transport tax expenditure = kerosene consumption for domestic aviation (1,000 litres) x countries' standard excise tax rate for kerosene (in €/1,000 litres)

Tax expenditure on fuel consumption in maritime transport

Water transport tax expenditure = gasoline, diesel and fuel oil consumption for domestic navigation (in toe) x countries' standard excise tax rates for gasoline, diesel and fuel oil (in €/toe)

Energy consumption data are taken from Eurostat[53] and excise tax rates are extracted from TAXUD semester reporting on Excise duties on energy[54].

This year, the challenge was to estimate the subsidy amount for the year 2020 as Eurostat doesn't' yet provide annual data for this year and because monthly data were deemed not appropriate due to quality issues.

Regarding **air transport**, we have chosen to estimate the energy consumption using the annual variation of air flights between 2019 and 2020, using data from Eurocontrol[55], taking as assumption a perfect correlation between the number of flights and the energy consumption. As Finland and Hungary were

[53] Available at https://ec.europa.eu/eurostat/data/database

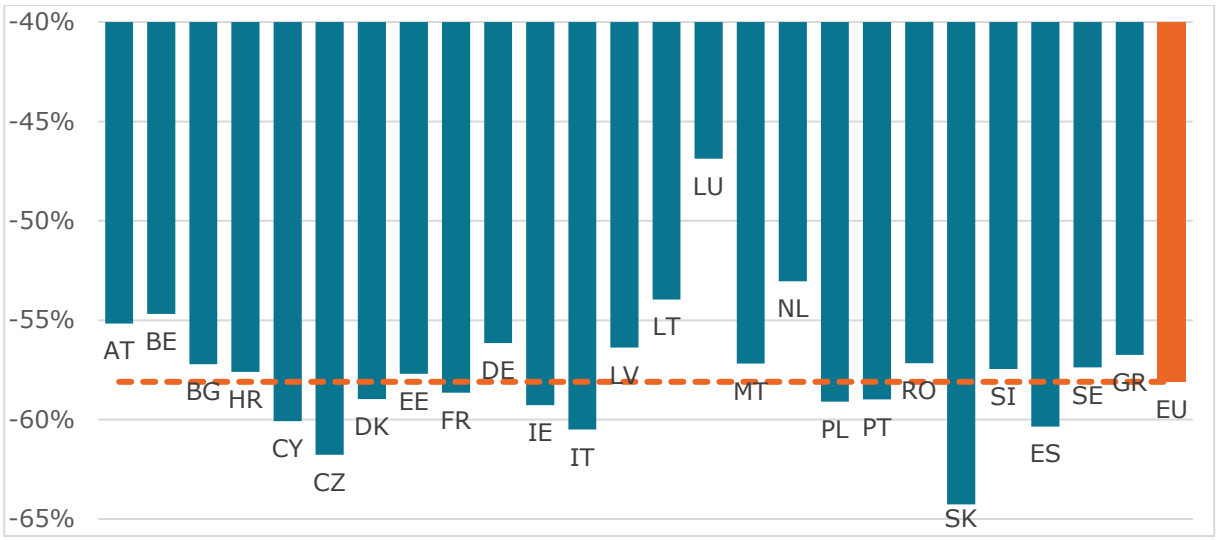
[54] Available at https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-energy_en

[55] Data are available at https://ansperformance.eu/data/

not included in the Eurocontrol dataset, we have used the average variation of the other 25 MS for these two countries. The excise tax rates were updated for the year 2020 using TAXUD data.

As Figure 38 shows, the lowest number of flights reduction between 2019 and 2020 was recorded in Luxembourg with -47%, the largest in Slovakia with -64%, while the EU average stood at -58%.

Figure 38: Variation of flights between 2019 and 2020 in the EU



Source: Enerdata from Eurocontrol

Regarding **maritime transport**, we have estimated the energy consumption using the annual variation of "Goods transport by inland waterways" between 2019 and 2020, using data from Eurostat[56], assuming a perfect correlation between the variation of tonnes transported and the energy consumption. Only 11 MS reported data in 2020, therefore, we have used the average variation of these 11 countries (-4.6%) and applied it to the other 14 MS. The excise tax rates were updated for the year 2020 using TAXUD data.

The current inventory also comprises a "new" subsidy corresponding to the tax expenditure on oil products for **fishing** purposes. This subsidy was estimated as the multiplication of the energy products supplied for use as fuel for fishing purpose with the excise tax rates used for navigation in the calculation above. The variation of the energy consumption for fishing purpose between 2019 and 2020 was aligned with that of the maritime transport sector.

Tax expenditure on fuel consumption for fishing

Fishing tax expenditure = gasoline, diesel and fuel oil consumption for fishing (in toe) x countries' standard excise tax rates for gasoline, diesel and fuel oil (in €/toe)

[56] Eurostat, Goods transport by inland waterways [TTR00007], available at https://ec.europa.eu/eurostat/databrowser/view/ttr00007/default/table?lang=en

6.1.7. Other financial supports

Textbox 6-2: Allocation of free Allowances from the European Union Emission Trading System (EU ETS)

In consistence with the *Commission Study*, the allocation of free allowances from the EU ETS are not considered as an energy subsidy but they are monetized using the methodology outlined below:

EUA ETS support in € = $\sum tCO_2$ of free allowances/year x EUA average annual prices in €/tCO_2.

The corresponding amounts will be allocated to the five following economic sectors:

- Aviation (code 10 Aviation);
- Power plants (code 20 Combustion of fuels);
- Refineries (code 21 Refining of mineral oil);
- Energy-intensive industries (codes 22 to 44);
- Others (codes 45, 46 and 99).

Data EUA ETS volumes and average annual prices will be taken on the European Environment Agency (EEA).

6.1.8. Subsidies incorporated directly from external sources

In consistence with the previous *Commission Study*, the estimated amounts of total public energy research, development and demonstration (RD&D) budgets of the 19 MS covered by the IEA were incorporated directly into the *Inventory*, with treatment.

6.2. Annex 2: Country data controls and observations

Situation on 15th July 2021.

Austria

General observation

☹ Many 2020 data are still missing at the date of publication of this report. ☺ However, we notice improvement of transparency thanks to the Transparenz Portal.

Situation vs previous inventory

- Energy tax refund: the breakdown by energy sources is now based on Eurostat data.
- Housing support (private and business): for 2021-2022, a global budget of €650m has been allocated to thermal renovation of buildings ("*Sanierungsoffensive*") and to the replacement of old oil and gas heating systems ("*Raus aus Öl*"), of which €400m will be dedicated to heating systems' replacement.
- Investment grants hydropower: grants are now reported separately for small and medium hydro power plants (previously consolidated).
- Investment grants for photovoltaic systems and power storage facilities: when possible, the amounts have been split between PV and power storage.

Belgium

General observation

☹ Data are spread among many institutions due to the country's institutional organisations (federal and regional levels).

☹ Tax expenditures for 2020 are not yet available. ☺ However, transparency has undoubtedly improved over the past years. Data are now provided in user-friendly spreadsheets with historical values from 2005.

☺ Transparency is good for RES-CHP green certificate schemes although data for 2020 are not yet available.

Situation vs previous inventory

Subsidy amounts for green certificates are now represented per region (Flanders, Wallonia, Brussels), while they previously were consolidated at federal level.

The following 'new' subsidies have been added to the inventory:

- Reduced energy excise duty for kerosene used as fuel for industrial and commercial uses (€3m in 2019)
- Reduced energy excise duty for gasoil used as a fuel for industrial and commercial uses (€363m in 2019)
- Reduced VAT on electricity (valid between 2014 and 2016 only).

'Partial tax refunds of excise duty on diesel for taxi drivers and freight' has significantly increased between 2018 and 2019 (+€290m).

In 2019 and 2020 no contract has been signed for 'strategic reserve'.

Bulgaria

General observation

☹ The tax expenditures report 2020 is not yet available.

☹ The cost of the renewable energy support schemes is estimated because of the lack of transparency (no report / data covering this topic).

Situation vs previous inventory

Only one new subsidy has been added, namely the Reduced contribution to finance the support for electricity from renewable sources for energy-intensive users (EIUs) (€52m in 2020).

Croatia

General observation

☺ Transparency is good for tax expenditures and RES-CHP FiT/FiP schemes although reports gathering grants are not yet available.

Situation vs previous inventory

Only one new subsidy has been added, namely the Feed in tariff for the support of geothermal energy production

The programme to increase the efficiency of centralised heating systems has ended in 2020.

Cyprus

General observation

☹ Data source and information are generally (very) difficult to identify and ☹ provided in non-user-friendly format (sometimes published in poor quality documents).

Situation vs previous inventory

One new subsidy has been identified and added, with budget for years 2021:

- Sponsorship plan for the installation or expansion of photovoltaic systems or charging points and smart meters in homes, for charging an electric or hybrid plug-in vehicle (€1m in 2021)

Three subsidies (with no data) from the previous inventory have been deleted:

- ✗ Low-Interest Loans Provided by the Cyprus Cooperative Bank
- ✗ Reduced VAT for energy renovations in the residential sector
- ✗ Reduced VAT for vulnerable families

Feed in premium subsidies amounts for solar, wind and biogas have been estimated by expert for 2019 and 2020 due to missing data.

Czechia

General observation

☺ Transparency is good for tax expenditures and RES-CHP FiT/FiP schemes although ☹ reports gathering grants are hardly accessible and in non-user-friendly format.

Situation vs previous inventory

The following 'new' subsidies have been identified and added to the inventory:

- Excise tax refund for degraded mineral oils and mineral oil used as production feedstock (€29 m in 2020).
- Exempt from tax on power - own consumption of generators (no quantified amounts so far)
- Exempt from tax on power - covering network losses (no quantified amounts so far)

Denmark

General observation

Information on subsidies is spread among many institutions and documents which impedes easy and comprehensive reporting without a risk of data overlap. Some subsidies have not been included due to a of risk of double count / overlap.

No significant changes have been observed compared to the previous inventory.

Situation vs previous inventory

The following 'new' subsidies have been identified and added to the inventory:

- Investment aid for the conversion of a CHP plant in Denmark (€58m in 2017)
- Pool for scrapping premium for oil burner (€5m budgeted in 2021)
- Low tax on electricity for commercial charging of electric vehicles (€6m in 2020)
- Pool for the promotion of advanced biofuels (€5m budgeted in 2021)
- Subsidies for energy savings (€67m budgeted in 2023)
- Pool for managing stranded costs (€12.5m in 2020).
- Screening and preliminary studies for supply of offshore wind (€3m in 2020)
- Tax exemption for renewable energy from biomass (€158m in 2020)
- Market-based subsidy pool for capture and storage of CO_2 (€26m budgeted in 2024)

Estonia

General observation

☺ Overall transparency is good for most of the subsidies.

Situation vs previous inventory

The following 'new' subsidies have been identified and added to the inventory:

- Reduced excise duty rate for gas-intensive production (€1m in 2020)
- Reduced excise duty rate for electricity-intensive production (€1m in 2020)
- Promotion of energy from biomethane in small scale installations (€5m in 2020)
- Support for the effective renovation of apartment buildings (€16.5m budgeted in 2021)

The Excise duty exemption for fuel used in mineralogical processes has been reshaped in the inventory. It now includes gas and diesel on a single row.

Germany

General observation

The government releases a report on potentially environmental harmful subsidies ("*Umweltschädliche Subventionen in Deutschland*"), however with an irregular frequency. A report on federal subsidies is also published on an annual basis. However, the said document does not report all the subsidies. Some subsidies are still not regularly estimated (especially those related to EEG exemptions/reductions). In addition, the Ministry of Finance usually published its annual report on tax expenditure ('*Subventionsbericht des Bundes*') covering the three past year but, unfortunately, the said report has not yet been released publicly.

Since January 2021, two new regulations are in force in Germany: the EEG 2021 and the KWKG 2020. These changes will have an impact on coming paid subsidies as several changes were introduced. Among others, the legal framework will be adapted for renewable energy plants for which the twenty-year remuneration period expires from 2021 (post-support plants).

Situation vs previous inventory

The following 'new' subsidies have been identified and added to the current inventory:

- Capacity payments to coal- and lignite-fired power plants (SA.53625)
- Energy tax relief for own consumption of companies in extraction of crude petroleum and natural gas, manufacturing of coke and refined petroleum products and manufacture of chemicals and chemical products (€93 m in 2019)
- Compensation for nuclear phase-out: the government will pay €2.4 bn in compensation to nuclear power plant operators for lost electricity volumes and stranded investments.
- Tax exemption for electricity from small power plants (≤ 2 MW) (from 2019, €500m/year announced in federal budget for 2020-2021).
- National Innovation Programme Hydrogen- and Fuel-Cell Technology 2016-2026 (€86 m in 2019)
- Redispatch (€227m in 2020)
- Countertrading (€64m in 2020)
- Feed-in management (EinsMan) (€710m in 2020)

Estimations:

The 2020 and 2021 amounts corresponding to feed-in tariffs for CHP, interruptible loads and Offshore levy have been estimated using trends from budgets.

Greece

General observation

☺ Transparency is good although some document remained in non-user-friendly format.

Situation vs previous inventory

The following 'new' subsidies have been identified and added to the current inventory:

- Excise tax reduction on LPG and methane used as heating fuels (as from 2018, €127m in 2020).
- Excise tax reduction on LPG and methane used for industrial, craft and commercial uses (as from 2018, €0.5m in 2020).
- Excise tax reduction on natural gas used as a heating fuel for domestic use (as from 2018, €23m in 2020).

Greece has phased-out the following subsidies:

- Excise Tax Reduction for Fuels Used in Agriculture in 2016 (last amount of €84m)

- Excise tax refund for fuels used in Agriculture in 2020 (last amount of €3m)

The status of several -small- subsidies are still unclear as the data are not yet published for 2020.

The subsidies "Services of general interest (SGI)" used to be misleadingly classified as Electricity generated from all energy sources, while the concerned electricity is produced from oil-fired power plants. Accordingly, the classification of these subsidies has been updated to oil-fired power generation, thus, the subsidies fall under the FFS.

Finland

General observation

☺ Transparency is good although some document remained in non-user-friendly format.

Situation vs previous inventory

The following 'new' subsidies have been identified and added to the current inventory:

- Reduced excise tax on the use of light fuel oil in working machines
- Subsidy for replacement of fossil oil used in heating started in June 2020.
- Support to energy renovations for real estate for individuals and blocks of flats started in January 2020.
- A Tax reduction on paraffinic diesel started in August 2019 and is planned to be phased out in 2021-2023.
- Two Subsidies for public and private distribution infrastructure of electricity and gas in transport started in 2018 and 2019 respectively

Since 2020, the Government considers the 'Tax reduction on fuel used for diesel engines in rail transport' (€104m in 2020) and the 'Tax exemption on peat up to 5 MWh/year' (€16m in 2020) as tax expenditures, therefore as subsidies.

France

General observation

☺ The amount of subsidies for the recent years are well documented, often with actual numbers and otherwise with budget figures.

Situation vs previous inventory

The regulator has changed its reporting methodology for the contribution to the public electricity service (CSPE, i.e. PSO fee) tax. As a consequence, subsidies to renewable energy sources (e.g. FiT and FiP) now include cost of the compensation supplement. The subsidy amount allocation across the various subsidies financed by the PSO has changed and was retroactively adjusted.

Until the end of 2019, the main form of financial assistance for home energy saving was a tax credit called the *Crédit d'Impôt de la Transition Énergétique* (CITE). As this tax credit was being phased out as from 2019, it has been replaced by a grants system called *MaPrimeRénov* since January 2020. One of the major changes is that the grant is paid at the end of the works, and not following the submission of the income tax return. It is also possible to obtain interim progress payments. Until January 2021, the new grants system sat alongside the tax credit system. Since January 2021, it has fully replaced the former system.

In 2015, France decided to cap nuclear energy production capacity to diversify its energy sources. EDF was forced to close the Fessenheim plant, and the damage linked to the cap was covered by a compensatory protocol between the State and the operator. The protocol provides several mechanisms for adjusting the amount of compensation: the fixed part, amounting to €370.2m, was fully-paid on

14 December 2020; the amount of the variable part, determined by parameters set in the protocol, will be paid later.

A review of internal consumption taxes was carried out in 2020. Following the review, the taxes were distinguished according to the nature of the taxed product. This new division will allow a better monitoring of tax expenditures costs according to the tax to which they relate to. Two new taxes were integrated: the TICGN (natural gas) and the TICC (coals).

New reduced rate for electricity consumed by data centres: €12m per year since 2019.

The Reduced tax tariff for Liquefied Petroleum Gas (Butane, Propane) used as non-road fuel has recorded a significant decrease (-55%) from 2019 onwards relatively to its level prior to 2018.

Energy saving certificates: estimations has been updated and a have recorded a sharp increase from €500m in 2018 to €1,300m in 2019 (+150%).

The following tax expenses have been downgraded and are not considered any longer as subsidies, and thus removed in the State Budget 2021 as well as from the inventory:

- ✗ Exemption from domestic consumption tax for self-consumption of petroleum products in refineries;
- ✗ Exemption from domestic consumption tax for energy products used for the extraction and production of natural gas;
- ✗ Reduced tariff of rate of domestic consumption for butanes and propane used as a off-road fuel;
- ✗ Domestic consumption tax reduction on gaseous natural gas for use as fuel;
- ✗ Reduced domestic consumption tax on LPG;
- ✗ Reduced domestic consumption tax for gaseous natural gas used as a fuel;
- ✗ Reduced domestic consumption tax on natural gas used in road vehicles (NGV);
- ✗ Reduced domestic consumption tax in favour of farmers on gasoil used as fuel for motors or vehicles used for forestry or farming work; and
- ✗ Domestic consumption tax exemption for final electricity consumption (TICFE) produced on boats.

The capacity market amounts have been updated based on information provided directly by the regulator. It should be noted that the French regulator reduces the amounts by about 40% compared to the estimate of the European regulator (ACER) as the regulator adjusts the amount to the price linked to the ARENH mechanism.

Hungary

General observation

The identification of the annual tax expenditure report ☺ has improved the completeness of the inventory and allowed several tax expenditures to be included. However, ☹ none of the reports gathering grants nor FiT/FiP data for 2020 are available yet. OECD database has been used as a reference for the year 2019.

Situation vs previous inventory

The following 'new' subsidies have been identified and added to the current inventory:

- Energy tax exemption (€49m as of 2020)
- Utility tax exemption (€5m as of 2020)
- Corporate tax exemption on energy efficiency investment (€11m as of 2020)
- Energy suppliers income tax exemption – Development tax credit/ Mining royalty/ Energy efficiency investment/ (around (€16m in total as of 2020)

The subsidy called "Feed-in tariff (KAT) coal/biomass co-firing" has been removed from inventory because it was a double count.

Italy

General observation

☺ Italy has put strong effort on transparency although ☹ reports are still provided in non-user-friendly format.

Situation vs previous inventory

White certificates: since November 2017, there is only on type of certificate (called "unified"). It is therefore allocated to "All energies". In the inventories prior to 2017, there were several certificate types. The scheme was broken down between the various type of certificates, namely: Type I was allocated to electricity; Type II was allocated to 'several fossil fuels'; Type II-CAR was allocated to natural gas, and Type III was allocated to petroleum products. For consistency purpose, the subsidy amounts from 2008 to 2017 have retroactively been allocated to "All energies". The retroactive re-allocation has consequences on the subsidy amounts for the four fuels concerned: reduced amounts for electricity, natural gas, petroleum products, and 'several fossil fuels'; and, increased amounts for "All energies".

Capacity market: TERNA (Italian transmission system operator (TSO)) has allocated a subsidy of €1.3bn for 2022 and €1.5bn for 2023.

Significant increase of the two following subsidies: 'Consumption Tax Exemption for Lubricating Oils Used in the Petrochemical Sector', 'Fuel Tax Reduction for Rail Transport', while a significant reduction is planned for the 'Excise tax reduction on natural gas for industrial uses'.

The 'Reduced duty on emulsion on diesel / fuel oil in water' has ended in 2019.

- ✗ Subsidy "Discounts for companies with high electricity consumption" has been removed because it was a double count.

Ireland

General observation

☺ The Central Statistics Office (CSO)'s published two very relevant inventories "Environmental Subsidies and Similar Transfers" and "Fossil Fuel Subsidies". However, their scopes have changed since previous years and the 2021 spring publication includes data until 2019 only. The subsidies formerly included in the "Potentially Environmentally Damaging Subsidies" tab of the CSO report are unfortunately no longer reported by the CSO, which had led us to make some assumptions.

Situation vs previous inventory

Subsidies removed from the previous inventory as out of scope:

- ✗ Afforestation Grant and Premium Scheme (no amount);
- ✗ Pig and Poultry Investment Scheme (PPIS) (no amount);
- ✗ Young Farmer Capital Investment Scheme (YFCIS) (no amount).

Subsidies deleted from the previous inventory because they were double counts:

- ✗ Mineral Oil Tax Repayment for Commercial Sea Navigation (€76m in 2016);
- ✗ Marine Diesel tax relief (Repayment of VAT on Hydrocarbon Oil used in Sea Fishing Vessels) (€0.1m in 2016).

The Capacity Payment Mechanism (CPM) has been replaced with a Capacity Remuneration Mechanism (CRM) in which offerings for generating reserve capacity is auctioned. The auction mechanism has

resulted in a significant reduction in subsidies. Capacities have been auctioned for the years 2019 to 2023. Before 2019 the subsidy budget was at least €500m, while with the auction mechanism it has decreased to around €350m for 2019 until 2023.

Latvia

General observation

☹ Tax expenditures for 2020 are not yet available. ☺ Transparency is good for RES schemes.

Situation vs previous inventory

An extensive buildings energy efficiency improvement program was implemented in 2018. A National Energy and Climate Plan 2021-2030 will also support energy efficiency improvement and has been added to the inventory.

The 'Capacity payment for CHP using natural gas' has significantly reduced since 2018.

Lithuania

General observation

☺ Transparency is good.

Support for Klaipėda LNG terminal: a one-off €448m grant has been reported in 2014. This partly distorts the analysis across years. A stabilized amount of around €25m/y is budgeted for the period 2020-2024.

Situation vs previous inventory

No new subsidy nor ended subsidy have been identified.

Luxembourg

General observation

☹ No tax expenditure report is provided by Ministry of Finance or Treasury. ☹ Data of RES scheme are not yet available for 2020.

Situation vs previous inventory

Two new instruments have been identified related to "Zero interest climate loan". They have been included in the database, though they concerns non-significant amounts (<€1m).

Malta

General observation

No significant changes in figures have been observed.

Situation vs previous inventory

The following subsidies have been removed because they were out of scope (total investments by government, instead of subsidies) for energy technology installations. Their total amount remains low though. The subsidies removed from the last inventory are listed below:

- ✗ 2016 Photovoltaic System - ERDF (total investment)
- ✗ 2011 Solar Water Heater - National Funds (total investment)
- ✗ 2018 Solar Water Heater - National funds (total investment)
- ✗ 2018 roof insulation and double glazing - National Funds (total investment)
- ✗ 2018 Heat Pumps - National Funds (total investment)
- ✗ 2019 Photovoltaic System (total investment)

Several new instruments have been added to the database:

- Energy grant sport organizations
- PV communal farms
- Grant for electric vehicles
- Grant for Electric Bicycles and Motorcycles
- Energy efficiency support

Netherlands

General observations

☺ Transparency is good although data are spread over several institutions/documents.

At first sight, the increase of 'Reduction of energy taxes for households – electricity' seems significant (i.e., €2.1 bn in 2019 to €3.5 bn in 2020). However, following the gas-free policy of the Dutch government the tax on gas has been increasing in recent years. Because gas consumption is still a large share in the total energy consumption, it has led to significant increase of household energy bills, and thus a reduction of purchasing power (e.g. energy). To partially compensate for this the Reduction of tax on electricity has been increased. But on an aggregate level, it does not constitute an increase in the support for fossil fuels.

Situation vs previous inventory

The following 'new' subsidies have been identified and added to the current inventory:

- Early closure of Hemweg coal-fired power plant (one-off payment of €52m in 2019)
- Demonstration instrument energy innovation (€45m in 2020)
- Mission driven research and development (€47m in 2020)
- Stimulation program natural gas free neighbourhoods - rental houses (€49m budgeted in 2021)
- 'Exemption for coal tax for the use of coal for purposes other than energy' (estimated at €37m in 2019).

The following subsidies have been removed from the inventory because they were either double counts or overlaps with other subsidies:

- ✗ Net metering for PV solar energy (€199m in 2018).
- ✗ Exemption from coal taxes for iron and steel industry (€65m in 2018).
- ✗ Renewable heat for households and housing corporations (no amount).

✗ Green Project Instrument (€58m in 2018).

Data for the 'Feed in Premium for Renewable energy (MEP/SDE/SDE+)' has been regrouped. Previously onshore wind and offshore wind were presented separately. Currently, data is only available for onshore and offshore combined. The same holds for solar thermal and solar PV. The inventory has been updated retroactively.

Energy tax rebate for religious institutions and Energy tax rebate for non-profit organisations data is no longer available apart. As from now they're combined as Energy tax rebate for religious institutions and for non-profit organisations. The database has been updated accordingly and retroactively for all years since 2008.

The instrument 'Stimulation subsidies for energy efficiency in the private home rental sector' was succeeded by 'Landlord Levy Reduction Scheme Conservation'.

Poland

General observations

☹ The lack of information is a strong obstacle to build a reporting on energy subsidies.

☹ No tax expenditure report is available since 2015 (covering data up until 2013). Accordingly, the amounts reported since then equal that of 2014, which very probably does not represent the current situation.

☹ Overall, the few information available is difficult to identify and provided in non-user-friendly format.

Consequently, most of the data are estimates

Portugal

General observations

☹ Tax expenditures for 2020 are not yet available. ☺ However, transparency is overall good for most of the documents used.

Situation vs previous inventory

The following 'new' subsidies have been identified and added to the inventory:

- More Sustainable Buildings Support Program
- Adaptation Fund to Climate Change
- Incentive for the Introduction to the Consumption of Low Emission Vehicles
- Encouragement of the acquisition and installation of fast charging stations for electric vehicles
- Support program for electric mobility in public administration
- Support for the replacement of urban environmental services vehicles by electric vehicles intended for the same function
- Action Plan for the Circular Economics (PAEC)

For the first time in 2020, feed-in tariff for offshore wind were paid.

The subsidy "Regulated last resort tariffs for natural gas" is negative for the years 2019, 2020 and 2021. The scheme's purpose is to protect customers from potential disruptions due to high prices by proposing a beneficial price. The distributor is compensated for the difference thanks to the market price. Based on an official document from the energy regulator these negative values are understood as follows. In the case of negative subsidies, it means that the market price for gas was lower than the so-called beneficial price and as such the distributor had to reimburse the government for too much received revenues from customers.

Romania

General observations

☹ Data source and information are generally difficult to identify and ☹ provided in a non-user-friendly format.

Situation vs previous inventory

No significant changes in figures have been observed.

Spain

General observation

☹ No centralised information or report on subsidies were found.

☹ Spain has not released its "Special tax hydrocarbon" report ("*Memoria de beneficios fiscales*") as part of the State budget process for the year 2020, though the one for 2021 is available. Consequently, the tax expenditure amounts for 2020 have been estimated as the average of the 2019 and 2021 amounts.

☺ Transparency is good for RES-CHP FiT/FiP schemes.

Situation vs previous inventory

'Subsidies for the restructuring of the coal sector': in previous years the total amount was broken down in several categories. For 2019 and 2020, the break down is no longer available, but the correspondent subsidy amount is consolidated in one single item. It concerns the following schemes that have now been regrouped in "Restructuring of the coal industry and alternative development of mining regions":

- Plan for alternative development of coal mining districts - Aid to coal companies
- Plan for alternative development of coal mining districts --> Institute for coal restructuring
- Plan for alternative development of coal mining districts - Reactivation of coal mining districts (investment aid)
- Plan for alternative development of coal mining districts --> Infra in coal mining districts
- Aid to HUNOSA
- Environmental incentive for coal-fired power plants

'Interruptibility service': As per a new decree signed on 15th of December of 2020 by the Government, this subsidy scheme has been replaced with "Electro-intensive Consumer Statute". The recipients of this aid will be obliged to make commitments related to amongst others energy efficiency, replacing polluting energy sources and invest in RD&I, employment.

Slovakia

General observation

☹ The lack of information is a strong obstacle to build a reporting on energy subsidies. ☹ No tax expenditure report on excise duties has been identified. Consequently, most of the data are estimates.

☹ Overall, the information available is difficult to identify and provided in a non-user-friendly format.

Transparency and continuity in reported data have deteriorated, especially due to some administrative changes (see paragraph above). Especially, TPS & TSS reduced tariffs are not presented in a transparent way.

New changes in legislation have occurred, amending among others the existing Excise duty on electricity, coal and natural gas, and on mineral oil. The amendment entered into force on 1st January 2020 and will have impact to the future tax expenditures effects.

Situation vs previous inventory

The following 'new' subsidies have been identified and added to the inventory:

- Compensation for entrepreneurs (€40m in 2019)
- Tax exemption for biofuels used in pilot projects (€1.5m in 2018)

Two subsidies have been removed from the inventory because they were out of scope:

✗ Soft loans to insulate buildings of social services centres (€0mn in 2019)
✗ OP Quality of environment, priority 1.1 - waste management (EU Structural funds 2014 - 2020) (€66mn in 2018)

Soft loans to insulate multi-flat and family houses, the reported amounts cover a larger scope as amounts loans are provided for broader range of activities than energy efficiency, including modernisation (upgrades for energy infrastructure, communal areas or lifts); a detailed breakdown only for energy efficiency purposes is not available. Therefore, this subsidy is expected to be overestimated.

Responsibilities for the administration of the renewables and CHP FiTs scheme have been shifted to a different entity since January 2020 (from URSO to OKTE). Data are therefore provided under another desegregation level with a more detailed representation by energy type as from 2019; historical data are however not provided under this format.

Slovenia

General observation

☺ Transparency is good for tax expenditures and RES-CHP FiT/FiP schemes although reports gathering grants are not yet available for 2020.

☹ The national reports on State Aids for the years 2019 and 2020 have not been published, which impedes the completion of the inventory for the years 2019 and 2020.

Situation vs previous inventory

The scope of the reporting as not evolved. No new subsidy has been added, and no subsidy has been removed.

Sweden

General observation

☺ Transparency is good. Documents are published regularly, and using is a similar format. However, the data is spread over many institutions / documents.

Situation vs previous inventory

One new subsidy has been identified and added to the inventory:

- State aid under the Swedish Rural Development Programme for investments in biogas plants

The following subsidy has been removed due to double count:

✗ Investment support for photovoltaic cells

Several fossil fuel subsidies have been phased out in the last years, notably the following ones:

- Reduced carbon dioxide tax on heating fuels in industry outside the EU ETS (ended 2017)
- CO_2 tax reduction on heating in the agriculture sector (ended 2017)
- Energy and CO_2 tax reduction on diesel fuel in mining industry activities (ended 2019)
- Carbon tax reduction for industrial district heating supply (ended 2019)
- Energy tax reduction on fuels in CHP (ended 2019)
- Energy tax reduction for industrial district heating supply (will end 2021)
- Reduced energy tax on heating fuels in industry (will end 2021)
- Energy tax reduction on heating fuels in the agriculture sector (will end 2021)

Investment support for solar comes with further detail with new break down into heat and photovoltaic technologies.

'Tax reductions for fuel used in installations covered by EU ETS': the national tax expenditure report does not include this tax expenditure, while DG COMP considers it as a State Aid (SA.36295), reaching to SEK2,128m (~€200m) in 2019. The former State Aid (N22/2008) was phased-out at end-2017 and was previously reported in Swedish tax expenditure report. We found no reason why the 'new' State Aid (SA.36295) should not be included in the current tax expenditure report.

6.3. Annex 3: Member State Energy Subsidy Fiches

Please refer to Word file attached separately with the report.

6.4. Annex 4: MS energy-related COVID response measures in RRPs

Please refer to Excel file attached separately with the report.

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