

# Australia's Green Economic Potential



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## About the Centre for Policy Development

The Centre for Policy Development (CPD) is a public interest research institute dedicated to putting creative, viable ideas and innovative research at the heart of Australia's policy debates. You can find all our work online at <http://cpd.org.au>

From the global economic downturn to the looming climate crisis, the costs of short-term thinking in public policy are becoming increasingly clear. Many economic policies bear the label of sustainability, but aren't designed to go the distance in a world of increasing demographic and resource pressures. We need comprehensive action to realign economic activity within environmental limits. CPD's **Sustainable Economy Research Program** is developing and promoting options for Australia to tip the economic playing field in favour of businesses that are sustainable over the long term, and looking at how to base public policy on better measures of progress.

## About the Author

Ben Eltham studied neuroscience and philosophy at the University of Queensland before being shortlisted for New Scientist's Ian Anderson Internship in science journalism and embarking on a career as a journalist and political commentator. From 2007-2010 he was the National Affairs Correspondent for NewMatilda.com, where he reported on Australian public policy with a particular focus on climate change and environmental economics, and he currently writes about Australian politics and public affairs for the ABC's website The Drum/Unleashed. He is completing a PhD at the University of Western Sydney's Centre for Cultural Research. Ben is a Fellow of the Centre for Policy Development.

## About 'Australia's Green Economic Potential'

This briefing paper puts some of the issues covered in the United Nations Environment Program's Green Economy Report in an Australian context and provides a primer to the challenges involved in transforming our economy to operate within environmental limits. It also presents a snapshot of the opportunities of embracing sustainable economic policy solutions in **four** areas: water, energy, cities and urban transport, and waste management and recycling. This paper takes its inspiration from the Green Economy Report but is independently produced and is not connected with or endorsed by UNEP or the Green Economy Initiative.

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## About the Green Economy Initiative - <http://www.unep.org/greeneconomy/>

*The United Nations Environment Program launched the Green Economy Initiative in 2008, at the height of the global financial crisis, with a compelling case for targeting stimulus spending toward environmental investments. The Initiative now “assists governments in ‘greening’ their economies by reshaping and refocusing policies towards a range of sectors, such as clean technologies, renewable energies, water services, green transportation, waste management, green buildings and sustainable agriculture and forests”.*

*The Initiative addresses some of the fundamental questions on “the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities”.*

*One of the Initiative’s main publications is the Green Economy Report, which sets out the core principles and concepts underlying a green economy and makes the case for the more sustainable use of natural, human and economic capital, focusing on 11 sectors: agriculture, buildings, cities, energy, fisheries, forests, manufacturing, tourism, transport, waste and water. A preview of three sections of the report was released earlier this year.*

**This Centre for Policy Development briefing paper looks at the issues raised in the Green Economy Report from an Australian perspective and provides a primer to the challenges involved in transforming our economy to operate within environmental limits. It also examines the opportunities of embracing sustainable economic policy solutions in four areas: water, energy, cities and urban transport, and waste management and recycling.**

### **Why we need a green economy - not just a low-carbon economy**

While climate change may be the most dangerous way in which humans are reshaping the natural world, it is not the only one. The breakneck growth of global economic activity is causing us to come up against multiple environmental limits at once. In the roughly two centuries since the industrial revolution, humans have profoundly changed the planet on which we live, including the continent of Australia.<sup>1</sup> The Global Footprint Network’s Living Planet Report found that by 2005, humanity’s ecological footprint, ‘the sum of all the cropland, grazing land forest and fishing grounds required to produce the food, fibre and timber it consumes, to absorb the wastes emitted when it uses energy, and to provide space for its infrastructure’, was 31 per cent larger than the planet’s capacity to support it.<sup>2</sup> On current trends, humanity will require roughly two planet’s worth of ecological resources by the 2030s.

Australia's ecological footprint is nearly three times the average global footprint, and approximately 3.5 times the level of what the planet can regenerate on an annual basis.<sup>3</sup>



Australia's  
ecological  
footprint



Global  
average  
footprint



Sustainable  
global  
footprint

## Globally, under business-as-usual scenarios, it is estimated that by 2050:

- 11% of the natural areas remaining in 2000 could be lost, chiefly as a result of conversion for agriculture, the expansion of infrastructure, and climate change;
- almost 40% of the land currently under low-impact forms of agriculture could be converted to intensive agricultural use, with further biodiversity losses;
- 60% of coral reefs could be lost – even by 2030 – through fishing, pollution, diseases, invasive alien species and coral bleaching due to climate change.<sup>4</sup>

The Earth is currently experiencing the sixth major extinction event in the history of life on this planet. More than 17,000 of the world's 47,000 assessed species are threatened with extinction (36 percent).<sup>5</sup> Australia's record in terms of extinct and threatened species is particularly poor.<sup>6</sup> A recent, authoritative study by the University of New South Wales' Richard Kingsford and others found that agriculture has altered or destroyed half of all Australian woodland and forests, and that of this remnant forest, 70% has been damaged by logging.<sup>7</sup> Many marine fisheries globally are facing collapse<sup>8</sup> – in Australia, 1 in 6 of our own fisheries are overfished, and almost half of them aren't even being tracked sufficiently well for us to know how healthy they are.<sup>9</sup>

“...in a little more than two centuries of industrial settlement, [Australians have] plundered to extinction some 115 species of native flora and fauna, including 23 birds, 4 frogs, 4 reptiles and 27 mammals ... there are another 1,700 Australian species presently considered by the Australian government to be threatened by human activity”

Ken Henry<sup>10</sup>

Australia is one of eight countries that contain half of the world's biocapacity. But we are also one of the countries depleting that capacity most rapidly.

Climate change is affecting Australia.<sup>11</sup> As a result of human-caused emissions of atmospheric greenhouse gases, the world is warming,<sup>12</sup> and Australia is especially vulnerable to the impacts of this change. Australian average temperatures have increased, particularly since 1950, which has increased drought severity.<sup>13</sup> Climate change is contributing to many changes in Australia's ecology, causing more intense bushfires and heatwaves and more prolonged and severe droughts and floods, reducing rainfall in many parts of the continent, and reducing streamflows and water levels in rivers.<sup>14</sup> Globally, these changes in the physical environment are leading to species extinctions due to habitat disruption such as the bleaching of coral reefs and the melting of alpine snow and ice caps.<sup>15</sup>

Despite the clear and present dangers posed by these environmental problems, the world's economic system continues to largely ignore the environmental, economic and social costs associated with unsustainable growth. Although the leaders of the world's governments continue to negotiate internationally to reach an agreement on mitigating greenhouse gas emissions, through fora such as the G20 and the United Nations Framework Convention on Climate Change, global greenhouse gas emissions continue to rise. Atmospheric greenhouse gas concentrations and world temperatures are rising with them.

## Putting nature on the balance sheet

A factor in the continued destruction of ecosystems and the environment is the failure of our economic system to adequately price or account for the services the biosphere provides: services such as clean water and air, arable land and marine fisheries, and a global climate conducive to human development and flourishing.<sup>16</sup> Many thinkers have drawn attention to this issue: the most well-known being Sir Nicholas Stern, who has called climate change “the greatest and widest-ranging market failure ever seen.”<sup>17</sup> Accounting for and valuing the natural environment poses thorny challenges, as the The Economics of Ecosystems and Biodiversity (TEEB) project led by Pavan Sukhdev observes in its Interim Report<sup>18</sup>:

“The size of the challenge of market failure should not be underestimated: for some services (e.g. scenic beauty, hydrological functions and nutrient cycling) it is difficult even to obtain a profile of demand and supply. There is an element of information failure here which leads to market failure.”

The TEEB project aims to bring together and communicate the best available scientific and economic analysis on the economics of ecosystems and biodiversity. Its goal is to help policy-makers, administrators, businesses and citizens to respond to the losses of natural capital we see all around us, such as the extinction of species and the destruction of forests and coral reefs. These actions collectively have the power to halt and reverse the losses of natural capital and to improve well-being for humanity, especially the poor – whom TEEB shows are particularly vulnerable to these losses.

In Australia, there is currently no legal price for carbon emissions or penalty for carbon pollution, and there is no established accounting framework for valuing the costs and benefits of Australia's ecosystems and biodiversity. As a result, Australian businesses and consumers continue to pollute the atmosphere without penalty.

Despite the failure of policy-makers and businesses to value non-market assets or manage the collateral damage caused by market transactions, many businesses and corporations are now realising the economic costs – as well as the potential opportunities – associated with climate change, biodiversity loss and ecosystem degradation.


## For instance:

- 27% of global CEOs surveyed by PwC in 2009 expressed concern about the impacts of biodiversity loss on their business growth prospects.<sup>21</sup>
- Global sales of organic food and drink amounted to US\$46 billion in 2007, a threefold increase since 1998. US organic food sales alone accounted for 3.5% of the nation's food market and increased by 15.8% in 2008, more than triple the growth rate of the food sector as a whole in the same year.<sup>22</sup>
- Sales of certified “sustainable” forest products quadrupled between 2005 and 2007.<sup>23</sup>
- Between April 2008 and March 2009, the global market for eco-labelled fish products grew by over 50%, attaining a retail value of US\$1.5 billion.<sup>24</sup>
- 2008 was the first year that investment in new power generation capacity sourced from renewable energy technologies (approximately \$US140 billion including large hydro) was more than the investment in fossil-fueled technologies (approximately \$US110 billion).<sup>25</sup>
- According to a 2008 report by Cambiar, six sectors of the Australian green economy currently valued at \$US15.5 billion and employing 112,000 people could grow by 2030 to a value of \$243 billion and 847,000 jobs.<sup>26</sup>

In Australia, businesses, citizens and policy-makers are also beginning to wake up to the potential of the green economy. There is growing awareness of the truth of the OECD's Environmental Innovation and Green Markets Report, which observes that “Well-designed environmental policies that spur innovation, and government measures that contribute to creating and consolidating domestic markets for environmental technologies constitute a basis for success in global markets.”<sup>27</sup>

They also recognise that because the environment provides uncoded services to every human on the planet, any serious strategy for our economy and society must address the environmental challenges facing our planet. They understand that if we are serious about a living planet for our grandchildren, then one day soon the “green economy” will simply mean the economy itself.





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This briefing paper will provide a short overview of the costs of inaction and the benefits of green economic transformation in four sectors of the Australian “green economy”: water, energy, cities and urban transport, and waste management and recycling.

## What is the “green economy” and how big is it?

The United Nations Environment Program’s Green Economy Report gives this definition:

“A Green Economy can be defined as an economy that results in improved human well-being and reduced inequalities over the long term, while not exposing future generations to significant environmental risks and ecological scarcities.”<sup>28</sup>

While this definition is a good start, it’s not always easy to define in detail what the “green economy” is.<sup>29</sup> Some activities are obvious candidates: recycling, renewable energy, energy efficiency, environmental consulting, waste minimisation and resource recovery, low-emissions transport and sustainable fishing and forestry practices. Some activities are clearly a long way from “green”: for instance, coal mining, oil drilling, steel manufacturing, aluminium smelting and many other carbon-intensive and polluting industries.

The Total Environment Centre points out that:

... there is an ‘old green economy’ in areas like water and waste water treatment, air pollution control and waste management; with the ‘new green economy’ growing rapidly in areas like renewable energy, energy efficiency, carbon strategy and management, environmental markets, the smart electricity grid, clean industrial processes and re-manufacturing, and ecological restoration.

Unfortunately, because of the cachet that consumers give to environmentalism, some industries have sought to present their dirty and polluting activities as “green” or “sustainable”, with marketing ploys like the use of words like “clean”, “green” or “eco-something”, and other types of “greenwashing”.<sup>31</sup>

While it may not be possible to define exactly what activities are and are not part of the green economy, we can certainly point to a growing cluster of industries within the global economy that are focused on ‘doing well by doing good’; delivering green products and services such as renewable energy, low-carbon transport, energy-efficient buildings, clean technologies, turning waste into a resource, improved freshwater provision, sustainable agriculture and forest management and sustainable fisheries.

# Australia's Green Economic Potential

**\$16–20bn**

The size of the Australian "environmental protection industries" in 2004/2005.<sup>[i]</sup>

**\$5bn | 32k jobs**

The revenue and employment figures for the Australian environmental science services industry in 2009.<sup>[ii]</sup>

**\$9bn | 13k jobs**

420 clean-tech companies had a combined revenue of \$9.2 billion, employed over 13,000 people and raised \$2.3 billion in new funds during 2009.<sup>[viii]</sup>

**\$8bn | 33k jobs**

The revenue and employment figures for the Australian waste disposal services industry in 2009.<sup>[iii]</sup>

**↑7x in 4yrs**

In 2009, there were around 984,000 Green Power customers in Australia, up from 138,879 customers in 2005.<sup>[vii]</sup>

**\$11bn | 27k jobs**

What the Australian recycling sector contributed to the economy and employment in 2006.<sup>[iv]</sup>

**\$12bn | \$20bn**

Spending by domestic eco-tourists who took part in nature activities was around \$12 billion in 2008. Two-thirds of the 3.36 million international visitors to Australia in 2008 took part in nature activities. These visitors spent \$20.2 billion.<sup>[v]</sup>

**↑2x in 13yrs**

The proportion of households with water conservation devices doubled from 1994 to 2007.<sup>[vi]</sup>



[i] Paul Perkins. 2006. "The environment management services industry". Paper prepared for the 2006 Australian State of the Environment Committee. Canberra: Department of the Environment and Heritage. Available at: <http://www.environment.gov.au/soe/2006/publications/emerging/industry/index.html> Accessed 17th July 2010.

[ii] IBISWorld. 2010. "Environmental Science Services in Australia" Available at: <http://www.ibisworld.com.au/industry/default.aspx?indid=553> Accessed 17th July 2010.

[iii] IBISWorld. 2010. "Waste disposal services in Australia." Available at: <http://www.ibisworld.com.au/industry/default.aspx?indid=690> Accessed 17th July 2010.

[iv] Australian Council of Recyclers. 2008. Australian recycling values: a net benefits assessment, cited in Queensland Department of Employment, Economic Development and Innovation. 2010. Queensland Cleantech Industry Development Strategy Issues Paper, Brisbane: Queensland Government, p. 11.

[v] Australian Bureau of Statistics. 2010. Australia's Environment: Issues and Trends. Cat. no. 4613.0. Canberra: Australian Bureau of Statistics.

[vi] Australian Bureau of Statistics. 2010. Australia's Environment: Issues and Trends. Cat. no. 4613.0. Canberra: Australian Bureau of Statistics.

[vii] Queensland Department of Employment, Economic Development and Innovation. 2010. Queensland Cleantech Industry Development Strategy Issues Paper, Brisbane: Queensland Government, p. 12.

[viii] Australian CleanTech. 2010. Australian CleanTech Review, 2010: Industry Status and Forecast Trends. Goodwood, SA: Australian CleanTech. Available at: <http://www.auscleantech.com.au/PDF/other/reports/Australian-CleanTech-Review-2010-EXEC%20SUMMARY.pdf> Accessed 17th July 2010.

## Water

Water illustrates one of the most common paradoxes of economic value. Despite Australia's status as the driest inhabited continent, water for farmers, businesses and towns and suburbs remains surprisingly cheap. In 2008-09 the total value of turnover of entitlements (including, but not limited to water access entitlements) was estimated to be \$2.2 billion for the 2008-09 water year—a 162% increase on 2007-08. Cumulatively, the National Water Commission estimates the value of Australia's water markets at \$2.8 billion in 2008-09.<sup>32</sup>

Agriculture dominates the use of water in this country. In 2006-07, Australian farmers used 7,636 gigalitres (GL) of water for irrigation.<sup>33</sup> In 2004-05, the most recent year in which comprehensive Australia water accounts are available, water consumption in Australia was 18,767 gigalitres, a decrease of 14% from 2000-01, in which it was 21,703 GL. Of this total, the agriculture industry had the highest water use in 2004-05 (12,191 GL, or 65% of total water consumption), households accounted for 2,108 GL or 11.2%, and industry accounted for a combined total of 4,466 GL or 23%.<sup>34</sup>

Urban water was priced at a rather higher level, despite the fact that Australian cities use less water than agriculture. In 2008-09, the total volume of water supplied to the five largest capital cities plus Canberra totalled 893 gigalitres, a reduction of 12% since 2003-04.<sup>35</sup> In 2007, Marsden Jacob Associates modelled the costs of typical urban water supply options such as dams, recycling or desalination plants at between \$3 and \$3.50 per kilolitre,<sup>36</sup> giving a total cost of urban water supply in Australia in 2008-09 of between \$2.69 billion and \$3.125 billion. This is almost certainly an underestimate because of the considerable cost of water infrastructure such as new dams and desalination plants: the cost of the Kurnell desalination plant in New South Wales is expected to exceed \$1.9 billion,<sup>37</sup> while the Victorian plant at Wonthaggi is expected to cost more than \$3 billion and perhaps as much as \$4 billion;<sup>38</sup> all up, more than \$9 billion worth of investment in desalination plants has been committed to by state governments in the past few years, for a total expected annual capacity of 482 GL.<sup>39</sup> This prices urban water in Australia at \$19/KL, or closer to \$17 billion. As a result, water utility bills for ordinary citizens are likely to rise steeply.

### Major new desalination plants in Australia

City	Expected capacity (GL/year)	Proportion of total water supply	Capital cost (\$b)	Completion date
Sydney	91	15	1.9	2009-10
Melbourne	150	35	3.	end 2011
Adelaide	100	30	1.8	2012
Perth (1)	45	17	0.4	In service
Perth (2)	50	-	0.95	2011
Gold Coast	46	15	1.2	End 2008

Desalination plants raise another hidden cost of urban water: the carbon emissions associated with water infrastructure. Desalination plants require a lot of electricity, and where that electricity is sourced from Australia's predominantly fossil-fuel powered grid, desal plants can be said to "burn coal to make water."<sup>40</sup>

The most effective strategy for urban water use in Australia might be simply to try using less of it. When the Queensland Government tried this in the mid-2000s in the midst of a prolonged drought, water consumption plummeted. As urban planner Peter Spearitt observed:

"The phenomenal success of the Queensland Water Commission in its 'Target 140' campaign, with Brisbane now boasting the lowest per-capita use of any major Australian urban area, shows just how much consumption can be reduced with media support and a degree of bi-partisan consensus."<sup>41</sup>

If the supply of water in Australia is costly now, it is almost certainly underpriced. Environmental flows in rivers, for instance, are a fraction of what is required for the long-term health of key river basins such as the Murray-Darling and Snowy.<sup>42</sup> The Wentworth Group of Concerned Scientists has undertaken a major study of the environmental health of the Murray-Darling Basin and concludes that "the best-available science suggests there is a substantial risk that a working river will not be in a healthy state when key system level attributes of the flow regime are reduced below two-thirds of their natural level."<sup>43</sup> This means that environmental flows of water down the basin will have to be increased to 4,400 GL, and that non-environmental uses of Murray-Darling water will have to be capped to achieve this. Current water allocations in the Murray-Darling Basin cannot possibly achieve this, and hence drastic changes in Murray-Darling water policy are required.

## Fixing water over-allocation quickly

Professor Mike Young is one of Australia's foremost water policy experts. He argues that water over-allocation in Australian river basins needs to be fixed quickly:

"Australia and the irrigation industry as a whole will be better off if and when all water users are required to pay the full cost of providing access to water supply infrastructure and of delivering water ... The quicker the process, the greater the regional benefits. Every Basin community would be stimulated by the rapid injection of cash into their economy and able to plan for their future with greater confidence. There would be an end to policy uncertainty. Importantly, the water market would be returned to one that is about the value of future opportunities to profit from using water and improving businesses."<sup>44</sup>

The Wentworth Group recommends that \$8.9 billion of funds currently budgeted by the Australian Government for water policies in the Murray-Darling be combined and used to purchase the additional 3,200 GL of water rights required to reach sustainable levels. A portion of this money could be used “to fund investments in public infrastructure to assist communities adjust to the impacts of reduced diversions” (e.g. reduced irrigation).<sup>45</sup>

## Water policies for Australia

- encourage demand management policies like south-east Queensland's “Target 140” campaign
- prioritise investment in recycling and other smart water infrastructure projects over desalination plants
- remove economic distortions in water markets, like over-allocated irrigation entitlements, water trading caps and below-cost water pricing
- water over-allocation in river basins like the Murray-Darling should be removed as soon as possible : not only are the river systems desperately unhealthy, but the quicker the allocation problem is solved, the greater the regional benefits
- set targets for water use in river basins and cities based on the best available science



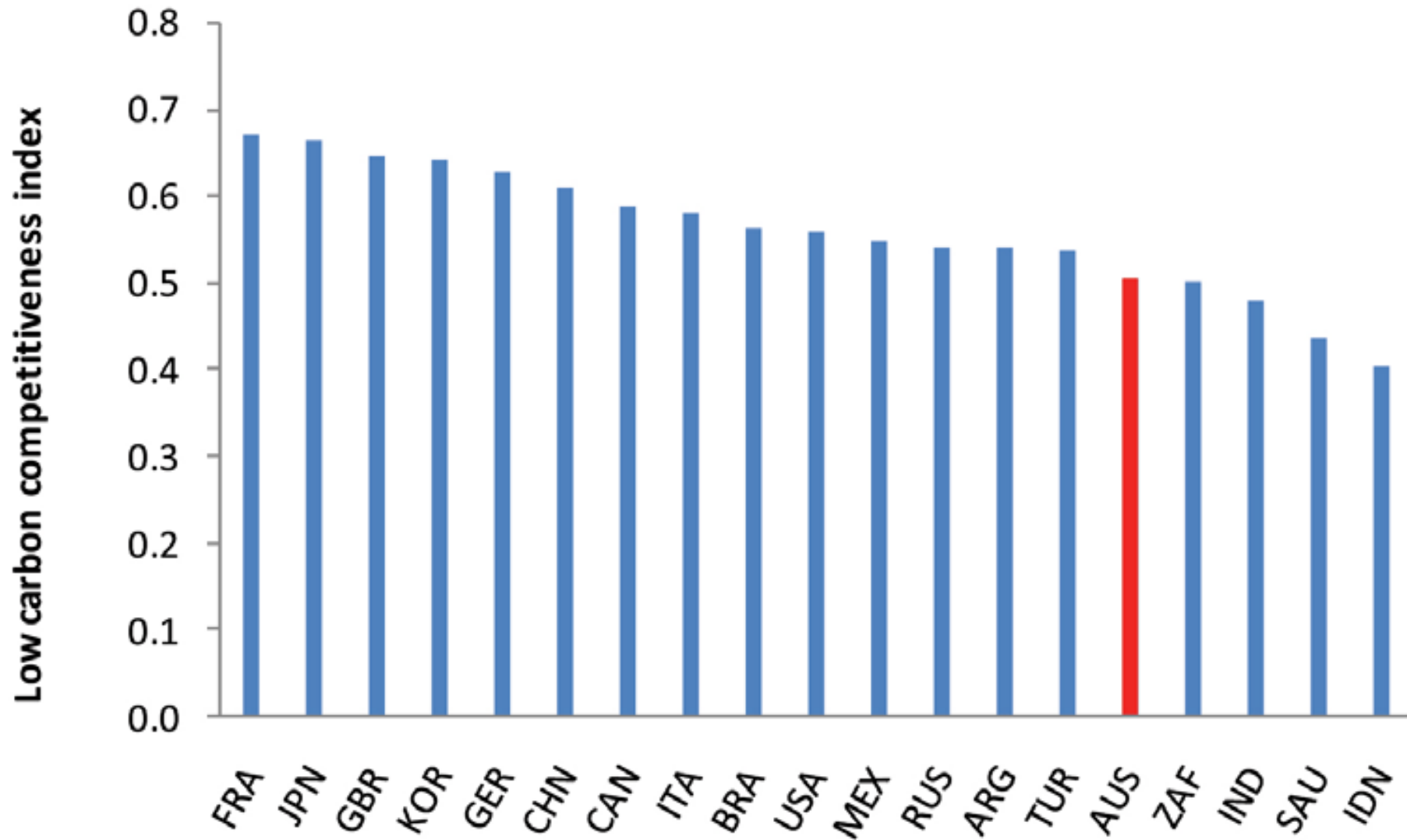
## Energy

Australian energy is dominated by fossil fuels. According to a recent report by the Climate Institute, Australia ranks fourth-last in the G20 for carbon competitiveness, owing to our carbon intensive exports, coal-powered electricity generation and high levels of car ownership.<sup>46</sup>

- Australia's economy is one of the most carbon-intensive in the entire world<sup>47</sup>
- Australia's per capita emissions are nearly twice the OECD average and more than four times the world average. In 2006, only five countries in the world ranked higher—Bahrain, Bolivia, Brunei, Kuwait and Qatar.<sup>48</sup>
- 95% of Australian transport fuels are derived from oil<sup>49</sup>
- There is currently no direct substitute for oil, and indirect substitution has significant resource and infrastructure implications for Australia.<sup>50</sup>
- 75%-82% of Australian electricity is generated by burning coal<sup>51</sup>
- Australia ranks 15th out of 19 large industrialised economies in terms of carbon competitiveness<sup>52</sup>
- the annual health costs of coal-fired power generation in Australia are estimated at \$2.6 billion<sup>53</sup>
- Coupled with costs from traffic pollution (a 2003 estimate put annual health costs at \$3.3 billion), the health costs to the Australian community from burning fossil fuels are around \$6 billion annually
- around \$10 billion annually is being provided in public subsidies to the fossil fuel industries in Australia via a range of state, territory and federal programs<sup>54</sup>
- Up to twelve new coal-fired electricity plants are planned in Australia

Australia's love affair with coal and other fossil fuels has many costs. One of the most important is the opportunity cost of not investing in the growing global market for clean tech and renewable energy products and services.<sup>56</sup> As a result, Australia ranks near the bottom of the table when it comes to our economic competitiveness in the coming low-carbon world.

## Australia's Carbon Competitiveness



Australia ranks 15th of 19 industrialised countries for carbon competitiveness. Source: E3G and The Climate Institute.<sup>57</sup>

However, Australia enjoys a highly-educated workforce, world-class renewable energy resources such as abundant sunlight, wind and wave energy, and a small but growing domestic renewable energy and clean tech sector.<sup>58</sup> There are therefore huge opportunities for this sector in the short- and medium-term future – if we get the policy settings right. Despite the inertia from government policy-makers and hostility from the fossil-fuel industries, investment in renewable energy continues apace. According to the Global Wind Report, by the end of 2008, there were 50 wind power farms in Australia generating more than 1.3 GW of electricity.<sup>59</sup>

### The renewable energy sector in Australia - where it's at:

- In 2008 there were 50 Australian wind power farms generating more than 1.3GW of electricity<sup>60</sup>
- In April 2009, renewable electricity projects represented 16% of capacity of all electricity generation projects at an advanced stage of development, and 41% of projects at a less-advanced stage of development<sup>61</sup>
- The passage of Renewable Energy Target (RET) legislation in June 2010 mandates that 41TWh of electricity must come from large-scale renewable sources by 2020
- Access Economics and the Clean Energy Council predict \$20 billion of renewable energy investment to 2020<sup>62</sup>

### Economic opportunities:

- Under the RET, economic modellers MMA predict renewable energy investment of \$20-\$25 billion across 505 renewable energy projects, potentially creating 26,300 jobs<sup>63</sup>
- 770,000 extra jobs could be created by 2030 across Australia if a suite of strong policy measures to reduce emissions is implemented<sup>64</sup>
- Economic modelling suggests that Australian GDP growth will be higher if strong action on climate change is taken, compared to weak action.<sup>65</sup>

## Planning for peak oil

Like climate change, peak oil is a fast-approaching problem predicted by many global experts. Unfortunately, Australian policy-makers have largely preferred to pretend peak oil isn't happening. This won't help us when the price of petrol jumps up to \$8 by 2018 - one of the scenarios that the CSIRO has anticipated.<sup>66</sup> Australia's petroleum trade deficit was \$10.85 billion in 2007-08; with an assumed price of oil at US\$100 per barrel, by 2020 our petroleum trade deficit will have risen to over \$40 billion per annum.<sup>67</sup>

The current availability of reasonably cheap oil and gas represents a vanishing opportunity to use these "master resources" to build a more sustainable future.<sup>68</sup> Instead, we're mainly using oil and gas to drive to and from work, warming the planet while we're at it. Planning for peak oil needs to be an integral part of Australia's climate change policies. We need to start investing now in renewable energy, world-class public transport and high-speed rail.



**“... the Renewable Energy Target was not intended to achieve Australia’s emissions reduction targets on its own. Rather, it was designed to work in tandem with an early stage carbon price”**

Bloomberg New Energy Finance<sup>69</sup>





## A Zero-Carbon Electricity Grid by 2020

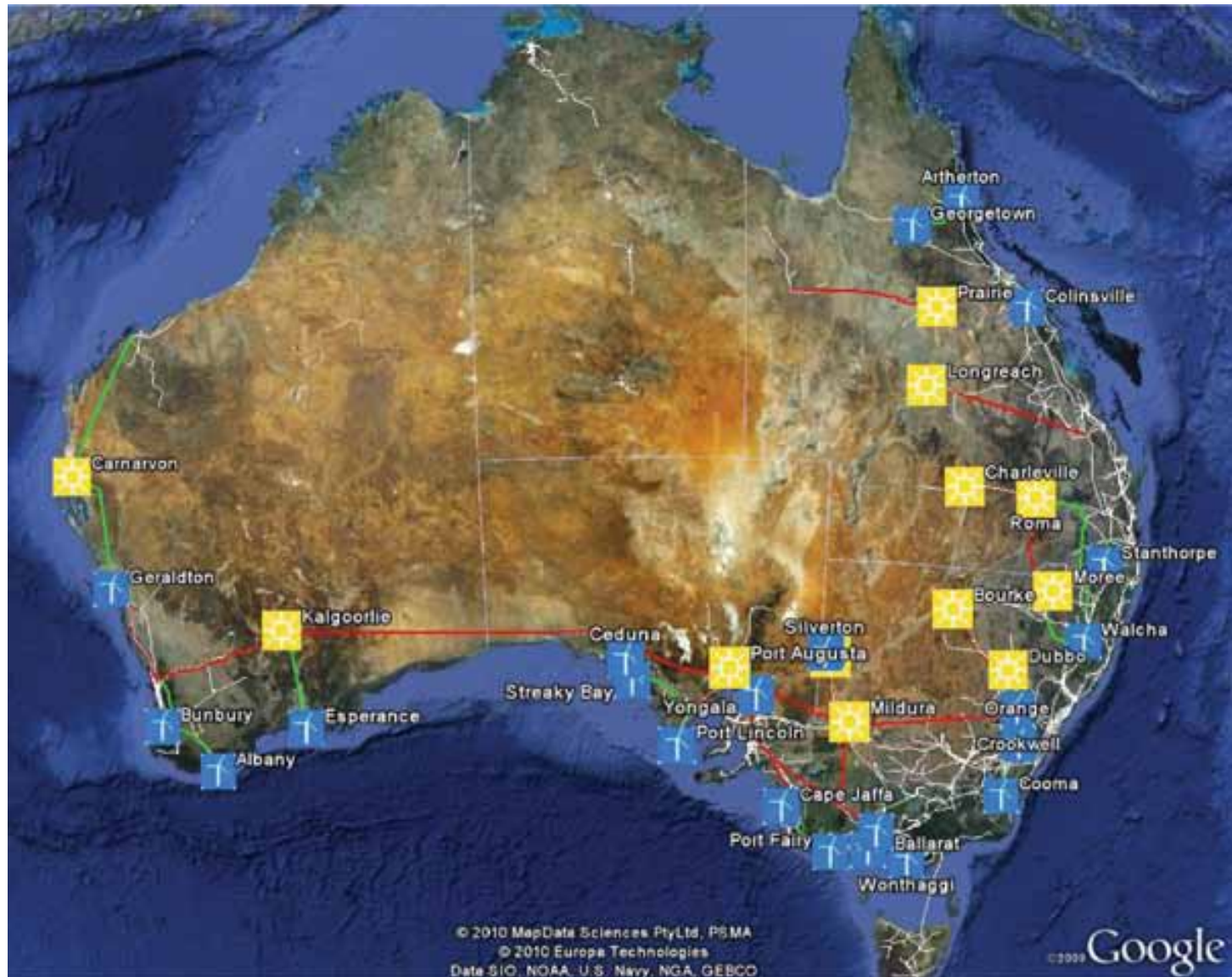
Beyond Zero Emissions and the Melbourne Energy Institute have recently published an ambitious new plan which would see Australia transition to an electricity grid with nearly zero carbon emissions by 2020.

The plan sounds impossibly buoyant: in fact it is based on conservative assumptions and proven technologies like wind turbines and solar-thermal electricity plants. Base load energy would be fed to consumers and industry through a renewable energy grid linking massive new infrastructure roll-outs of wind turbines and collecting solar thermal power plants, making Australia's base load electricity generation essentially 100% renewable.

The price-tag is large: around \$370 billion in up-front investment, spread across a decade. But the outcome would include huge job creation (75,000 new jobs) and R+D spin-offs, as well as future-proofing Australia for the coming low-carbon world.<sup>70</sup>

## Zero Carbon proposed renewable energy grid

Beyond Zero Emissions and the Melbourne Energy Institute have proposed an ambitious but achievable plan to take Australian base load energy renewable by 2020. The image above shows their proposal for an Australian renewable electricity grid, linking 35 wind and solar thermal plants around the continent through high-voltage transmission lines.



## Policies for Australian energy

- introduce a price for carbon pollution of at least \$20/tonne, rising quickly towards \$50-\$60/tonne by 2020
- create a strategic petroleum reserve to ensure essential defence, transport and emergency services have access to petrol in a future oil crunch scenario
- legislate to prohibit the commissioning of new coal-fired electricity generation
- create tax incentives to foster clean tech and renewable energy investments<sup>71</sup>
- mandate stringent energy efficiency standards, fuel consumption standards and greenhouse gas emissions standards that encourage significant reductions in energy use (of fossil fuels in particular) and create disincentives for inefficient energy use in building, transport, and appliance technologies
- invest in 21st century electricity infrastructure such as long-range high-voltage transmission lines and smart grid
- remove perverse incentives such as the current subsidies to fossil fuel industries
- legislate to create gross feed-in tariffs for renewable electricity generation, at both small-scale and household levels, and at large-scale, commercial levels using multi-year power-purchasing agreements.

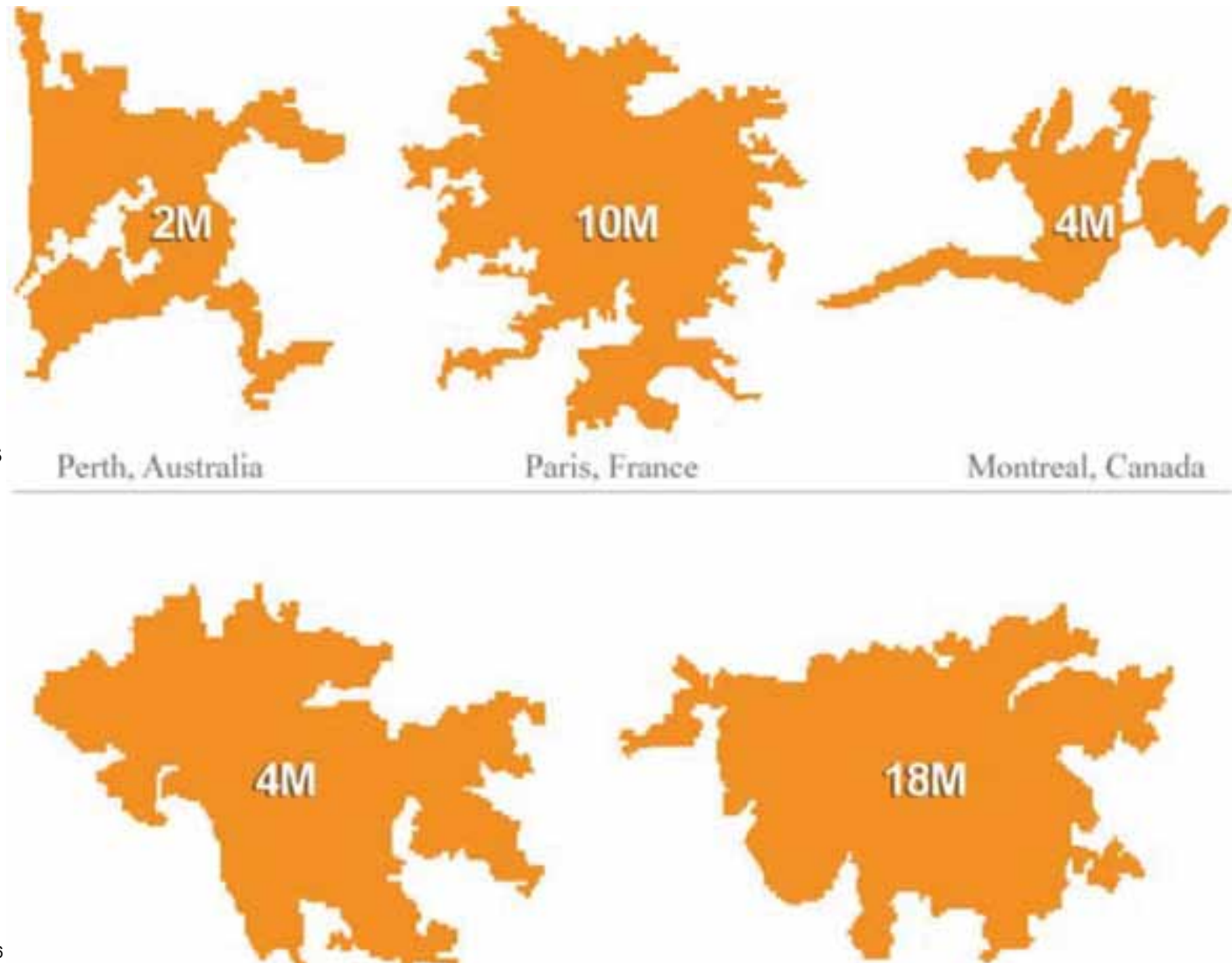
## Cities

Australia's cities are relatively sparsely settled, and ordinary citizens depend heavily on road transport and private car use to get around. This urban sprawl imposes many costs on communities, especially in comparison with denser and more walkable cities.<sup>72</sup> For instance, car reliance is associated with considerable health costs in the community, by creating an environment where physical activity is minimised.<sup>73</sup>

## Scale map of global cities

Australian cities are sparsely settled by world standards, even when compared to other first-world cities with high standards of living and urban amenity. The sparseness imposes big costs on our society, through increased transport costs, traffic congestion, air pollution and car accidents.<sup>74</sup>

State and municipal governments that have planned extensive and expensive road and freeway systems have under-invested in public transport, particularly at the outer fringes of our capital cities. Between 1970 and 2010, in Australia's five major capital cities, only 36 new railways stations were built more than 15km out from the CBD – less than one a year. Sydney built just three outer suburban train stations. Melbourne built none.<sup>75</sup> Our cities have been allowed to spread out for hundreds of kilometres, and as a result, Australians are now extremely vulnerable to a future in which petrol will be significantly more expensive.<sup>76</sup>



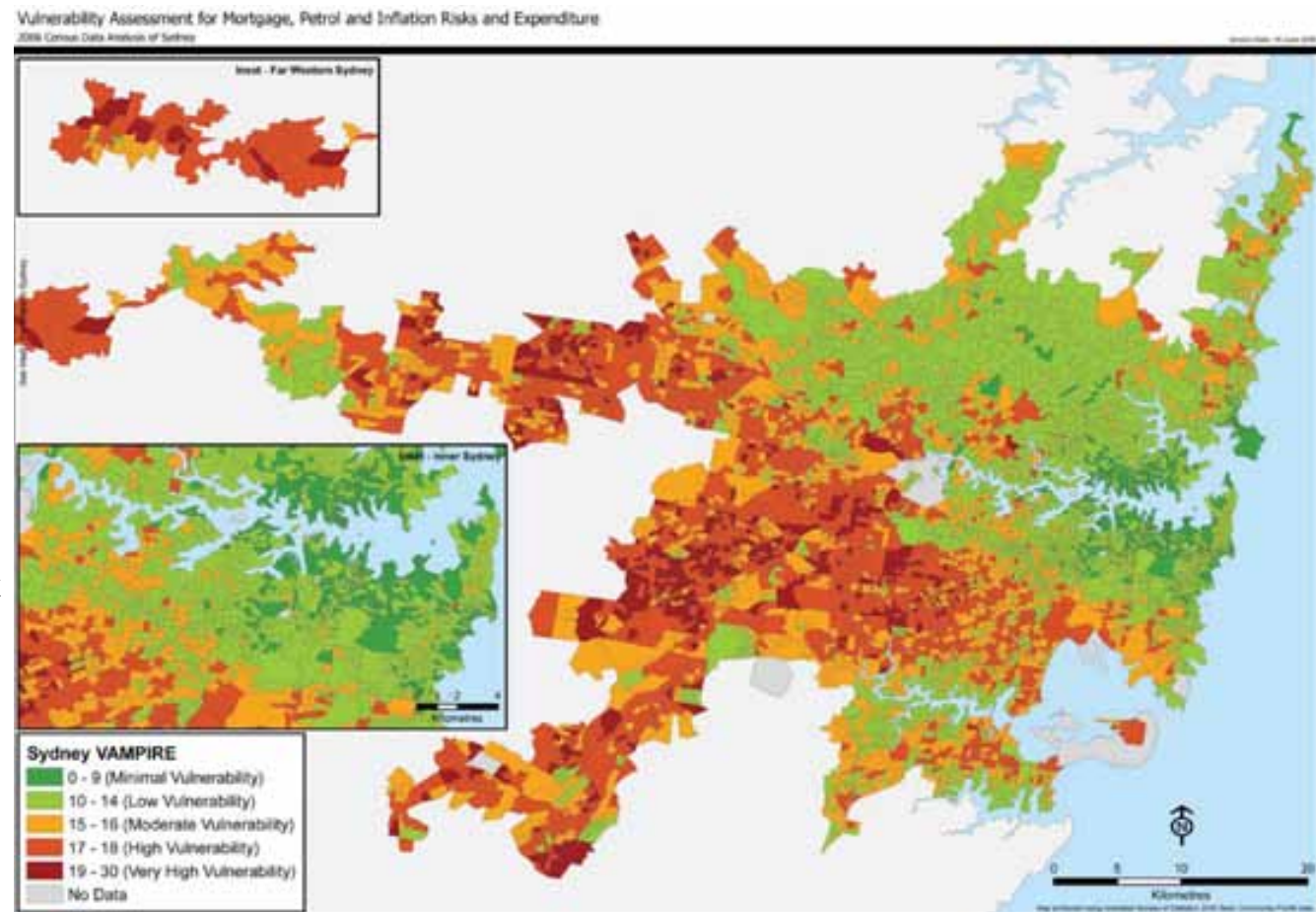
Cities are also a key source of fossil-fuel emissions: between 40 and 70% of global greenhouse gas emissions are associated with cities and their roads and buildings.<sup>77</sup> Because of this, cities must be an integral part of any attempt to create a more sustainable economy.<sup>78</sup>



“Well-designed cities have great potential to combine resource efficiency with economic and social opportunity through proximity of urban functions, model shifts in transportation, and increased efficiency in provision of infrastructure, utilities and energy.”

UNEP Green Economy Report: A Preview<sup>79</sup>

Jago Dodgson and Neil Sipe's VAMPIRE Index for Sydney in 2006. The VAMPIRE Index measures the combined vulnerability of Australian households to mortgage stress and rising petrol prices. The VAMPIRE Index vividly shows how Australians living on the fringes of our cities are particularly vulnerable to the combination of mortgage debts and oil-dependent private car use.





## How Australians travel to work

Main form of transport used on usual trip to work or full-time study, March 2009

<b>Private motor vehicle</b>	<b>79.6%</b>
<b>Public transport</b>	<b>14.0%</b>
<b>Bicycle</b>	<b>1.5%</b>
<b>Walk</b>	<b>4.0%</b>
<b>Other</b>	<b>0.9%</b>

Source: Australian Bureau of Statistics.<sup>80</sup>

## Why Australians don't use public transport

<b>No service available / No service available at right time / Service too far from home:</b>	<b>57%</b>
<b>Convenience / comfort / privacy of own vehicle:</b>	<b>22%</b>
<b>Travel time too long:</b>	<b>18%</b>
<b>Own vehicle needed before/during/after hours:</b>	<b>10%</b>
<b>Carry equipment/tools/passengers:</b>	<b>6%</b>
<b>Vehicle needed during work/study hours:</b>	<b>6%</b>
<b>Prefer to walk/cycle:</b>	<b>4%</b>

Source: Australian Bureau of Statistics<sup>81</sup> (Figures add up to more than 100% as more than one reason may be specified.)

- More than 80% of Australians and over half of the world's population now live in cities
- In 2029 over 90% of the infrastructure of Australian cities would have been built prior to 2010
- Most of our old building stock has an effective zero star energy efficiency rating. For example, in 2008 the Australian Bureau of Statistics found that about 40% of Australian homes have no ceiling insulation<sup>82</sup>
- For every 1000 dwellings, the costs for infill and fringe developments are \$309 million and \$653 million respectively<sup>83</sup>
- For Melbourne this equates to \$110 billion over the next 50 years.<sup>84</sup>

## The costs of Australia's sprawling cities.

- In 2001, roads cost Australia \$19 billion more than they benefited us<sup>85</sup>
- Total vehicle kilometres driven doubled between 1972 and 1999<sup>86</sup>
- Between 1976 and 2001, cars and other private vehicles grew from 51.5% of all commutes to 71.8%, at the expense of public transport<sup>87</sup>
- Since 1945, more Australians have died on the roads than in all of the Second World War<sup>88</sup>
- Urban air pollution, largely caused by road transport, is estimated to cause 1,200 deaths, 2,400 hospital cases and 21,000 days of asthma attacks a year<sup>89</sup>

"In Australian cities, the aim should be to maximize development along new and future road based trunk public transport corridors"

Rob Adams<sup>90</sup>

“Transport disadvantage is a critical issue in Australia’s cities.” Jago Dodson and Neil Sipe<sup>91</sup>

## Road pricing

Road pricing may be unpopular with commuters, but it works. Making drivers pay for all their peak-hour road use reduces congestion, improves bus and taxi times and lowers pollution, as the London experience has shown.<sup>92</sup> The revenue brought in by road pricing can be used to compensate low-income drivers and invest in public transport.

## Melbourne Transport Oriented Development

The image to the right is from a 2009 City of Melbourne discussion paper on transport-oriented development by Rob Adams. The Activity Centre shown in dotted lines is Coburn. The discussion paper describes how appropriate planning policies can densify Australian cities along public transport corridors while retaining the amenity and open space of the surrounding suburbs.



## Policies for Australian cities

- Create whole-of-region planning policies that include federal, state and local levels of government - particularly the Commonwealth, which has had relatively little involvement in urban policy for much of Australia's recent history
- Densify Australian cities along transport corridors; plan future housing development around public transport trunks and nodes
- Invest in public and human-scale transport infrastructure, such as heavy rail, trams, buses, bikeways and walkways
- Constrain housing growth on the outer fringes
- Invest in regional cities, not just our capitals
- Introduce road and congestion pricing, and use the revenue to compensate low-income drivers and invest in public transport
- Green investment in urban transport can include hybrid and low-emissions vehicles, and it should also include communications infrastructure to enable tele-commuting and other flexible work practices
- All new development should be required to meet high environmental standards, including integrated energy/water/sewerage systems
- Mandate a national seven star energy standard for all new houses by 2015, and a national nine star energy rating for houses constructed after 2020.

## Waste and Recycling: A Country that Remakes Things

“Waste generates economic, social, and health-related costs and liabilities around the world. Solid waste services consume up to 2% of GDP in developing countries and up to 50% of cities’ administrative budgets. By turning waste into a resource and encouraging the reduction, reuse and recycling of waste, significant gains can be achieved in decoupling waste production from economic growth.”

UNEP Green Economy Report: A Preview<sup>93</sup>


One of the industry sectors that demonstrates the greatest opportunities for sustainable growth is the recycling, waste minimisation and resource recovery sector.

In 2006–07, 43.7 million tonnes of waste were generated in Australia. The amount of waste generated has grown by 31 per cent between 2002–03 and 2006–07. Construction and demolition contributed 38 per cent, followed by the commercial and industrial waste at 33 per cent, with municipal solid waste accounting for 29 per cent.

This waste is, literally, buried treasure. By forcing industry and consumers to take more responsibility for the waste they create, we can reduce many costs currently borne by taxpayers, society and the environment, while also creating new jobs in clean tech sectors and fostering innovative waste management and recycling techniques.

In the late nineties John White, the founder of waste-management company Global Renewables, was amazed to discover that four fifths of all tradable goods go to landfill within six months: “I realized that all of this material is incredibly intensive to dig up, to make, to distribute, to warehouse to shelve...It consumes an enormous amount of energy, and all that embodied energy in that material gets thrown out when it’s put into landfill.”



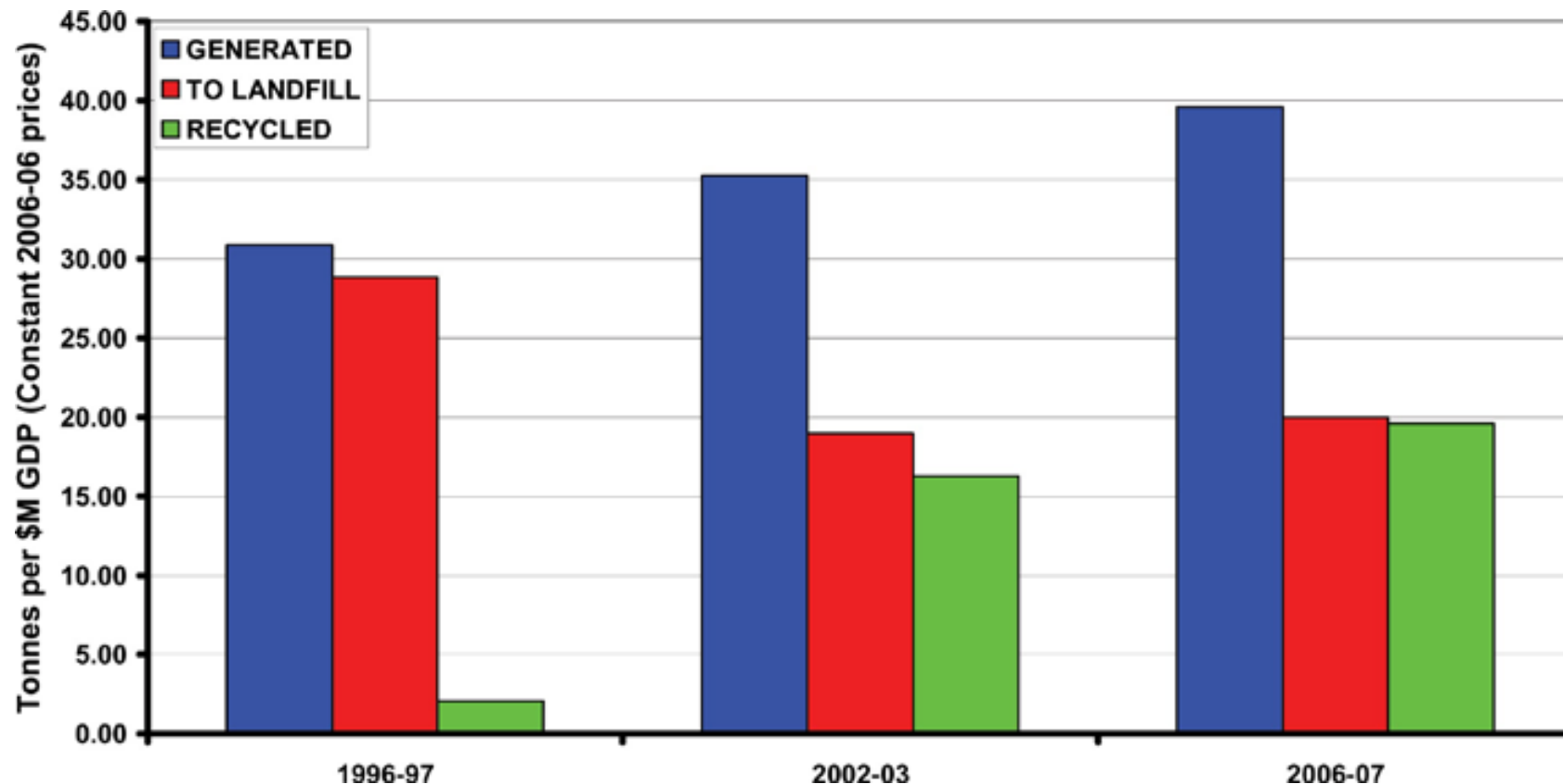


“I realized that all of this material is incredibly intensive to dig up, to make, to distribute, to warehouse to shelve...It consumes an enormous amount of energy, and all that embodied energy in that material gets thrown out when it’s put into landfill.”

(Source:James Bradfield Moody and Bianca Nogrady, The Sixth Wave<sup>94</sup>)

Waste and recycling as a sector suffers from perverse incentives and policy failures. Where throwing resource-intensive products away is cheaper than reusing them, the cost is eventually borne by future generations, both through environmental pollution and the depletion of finite resources. However, where governments have got the policy settings right, for instance by setting and maintaining high enough prices for recycling and landfill, rapid progress has been made in resource recovery rates. For instance, the volume of waste being recycled has increased in the past decade, while the volume of waste sent to landfill has been cut.

## Economic value of waste generated, sent to landfill and recycled in Australia, 1996-2007



Above: Value of waste generated, sent to landfill, and recycled in Australia, 1996-97 - 2006-07. Australian waste management policies have been very successful in increasing the volume of waste material recycled and, initially, in reducing the volume of waste being disposed in landfill sites. However, these policies have not reduced the amount of waste we generate, counteracting the success in recycling. Source: Engineers Australia.<sup>95</sup>



“We are on the cusp of a revolution that will see our world transformed from one heavily addicted to the consumption of resources, to a world in which resource-efficiency is the name of the game. In this next wave of innovation, resource scarcity and massive inefficiencies will be the big market opportunity. Waste will be the source of this opportunity and nature will be our source of inspiration and competitive advantage.”

James Bradfield Moody<sup>96</sup>

## Waste and recycling figures:

- There are 20 million tonnes of waste dumped into landfill every year in Australia. Each tonne diverted to Australian reprocessing is worth \$775. That's \$15.5 billion annually in lost economic activity.<sup>97</sup>
- The waste disposal services industry in Australia has revenues of \$8.5 billion and employs 33,170 people
- The Australian recycling sector is estimated to have contributed \$11.5 billion to the economy in 2006 or 1.2% of Australia's GDP and directly and indirectly employed 27,700 people<sup>98</sup>
- Direct and indirect jobs created through the waste industry is 53,246
- Australians spent \$10.5 billion on goods and services that they never or hardly ever used with food consumption amounting to the largest waste category<sup>99</sup>
- Australians threw away \$5.3 billion worth of all forms of food in 2004 (thirteen times the amount donated by Australian households to overseas aid agencies in 2003, or more than it costs to run the Australian army).<sup>100</sup>
- The greenhouse gas emissions associated with this household food waste was conservatively estimated at a level similar to the total emissions involved in the manufacture and supply of iron and steel in Australia<sup>100</sup>
- Hazardous waste generated in Australia doubled between 2002 and 2006, to around 1.19 million tonnes per annum<sup>102</sup>
- Modelling for the South Australian government by MMA found a net benefit to the state of more stringent waste and recycling policies of \$176 million to 2030, rising to \$407 million if carbon prices reach \$30/tonne.<sup>103</sup>
- Eighty per cent of employees would like to see more recycling in the workplace

## Extended Producer Responsibility

If a company knew that nothing it produced could be thrown away and everything would eventually return, how would it change the way it designed its products?

Waste is a classic “negative externality” – a social and environment cost of economic activity which is not fully priced into products or reflected in producers’ bottom lines. Many companies escape the full cost of the safe disposal and recycling of their products once they are sold, pushing the costs onto municipal governments, society and the environment. Extended Producer Responsibility policies aim to combat this. By placing responsibility for a product’s end-of-life environmental impacts on producers, Extended Producer Responsibility policies also create an incentive for them to redesign their products with resource efficiency and the environment in mind. Such change, while reducing waste management costs, should also reduce materials use and enhance product reusability and recyclability. Extended Producer Responsibility policies are most effective where they exploit all the possible avenues for waste reduction – i.e., source reduction, recycling, material substitution, and product design changes.<sup>104</sup>



A photograph of a dense tropical forest. In the foreground, a wooden boardwalk with railings leads through the undergrowth. The forest is filled with various types of trees and plants, including large-leafed tropical plants and ferns. Sunlight filters through the canopy, creating a dappled light effect. The text is overlaid on the left side of the image.

**“By far the most obvious market barrier to innovation in waste management is the low cost of landfilling”**

GHD, Waste Technology and Innovation Study<sup>105</sup>



## Policies for waste and recycling

- remove perverse incentives, like underpriced landfill
- fund investment in recycling and waste diversion infrastructure
- strengthen regulations and design standards to improve the through-life and end-of-life value of industrial and consumer products - for instance, Germany has much higher standards than Australia
- promote extended producer responsibility: By placing responsibility for a product's end-of-life environmental impacts on producers, extended producer responsibility policies are also expected to push them to redesign their products for environment. Such change, while reducing waste management costs, should also reduce materials use and enhance product reusability and recyclability.

## Conclusion

The Australian economy has enormous potential for sustainable development. It is currently being stifled by economic and social policies that reward vested interests and a business-as-usual approach, at the expense of all Australians' environment, quality of life and long-term economic security.

"Achieving a transition to a Green Economy will only be possible through the collective vision, creativity, action and support from a broad cross-section of society, including governments, the private sector and consumers."

UNEP Green Economy Initiative, Green Economy Report Preview<sup>106</sup>

If companies, consumers, financiers and governments are prepared to work together to build a new green economy, Australians can enjoy a sustainable future with an improved standard of living. As we have seen above, even seemingly impossible tasks like transitioning to a completely renewable electricity grid are possible in this country by 2020, if we have the political and social will.

## Investing in ecosystems

Australia's natural environment is a bit like a maxxed-out credit card: there's been a lot of spending of our natural resources, but precious little investment or saving.

A recent Department of Climate Change report by a team of authors led by Will Steffen has established the need for this investment in considerable detail. Intended as a "strategic assessment" of the threat for policy makers, the report urges Australian policy-makers to "invest in our life support system":

"We are pushing the limits of our natural life support systems. Our environment has suffered low levels of capital investment for decades. We must renew public and private investment in this capital ... In particular, significant new funding strongly focused towards on-ground biodiversity conservation work – carried out within an active adaptive management framework – is essential to enhance our adaptive capacity during a time of climate change."<sup>107</sup>

The Steffen report highlights the urgent need in Australia to invest in building the resilience of Australian ecosystems to help them survive the unavoidable impacts of climate change. Timely and strategic investments by governments, particularly the Commonwealth, can help to address this. We need to start thinking of environmental preservation as a real, tangible investment - building up national reserves of healthy water and soil that we can draw on later. Otherwise it won't be long before there's a run on the land bank. Australia already spends billions a year paying back past ecological debts. Environment Business Australia points to estimates by the CSIRO's Land and Water Division: "dryland salinity, acidification and soil erosion costs \$1.7 billion a year, and two-thirds of land managers report that they will suffer reductions in property values of up to 25 percent over the next three to five years from resource degradation."<sup>108</sup>

"The treatment of climate change by the Stern Review surfaced an issue which had been widely recognized but not tackled squarely: how to assess a roll of the dice, when one of the outcomes is the end of civilization as we know it?"

The Economics of Ecosystems and Biodiversity: An Interim Report<sup>109</sup>

In order to realise the green economic potential of the industry sectors covered in this report, we will need to begin by transforming the policies and economic systems that are currently making our problems worse. We will need to end perverse incentives: the subsidies, tax breaks and underpriced access to natural resources which encourage businesses and consumers to waste and pollute. We will need to

seriously account for the opportunity cost of propping up unsustainable economic activity. We will need to treat emerging technologies and start-up industries with the same respect we currently reserve for very large corporations in established sectors like the mining and fossil fuel industries, and to give the needs of ordinary citizens as much attention as the views of industry lobby groups.

Part of the adjustment required will be to see the opportunities available to us, as well as the costs of inaction. The issue is as much moral as economic. Ultimately, creating a new green economy will require an enhanced ethical commitment by citizens, businesspeople, policy-makers, scientists and investors. If we can fight the understandable inertia, disenchantment and despair that enormous problems like climate change and environmental destruction can create, we may be able to envision a new and better way to organise the economic activity of our society. And if we can envision it, we can make it happen.

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