PART I

# *Chapter 3*

# Towards green growth

*Part of Iceland's response to the 2007-09 economic and financial crisis has been an increased emphasis on green growth. This chapter examines the use of taxes and other pricing instruments to pursue environmental objectives and to reduce the impact of production and consumption on the environment. The removal of environmentally harmful subsidies, such as to agriculture and fossil fuels, is also discussed. The chapter examines the public and private investment in environment-related infrastructure and services, as well as the promotion of "green" goods and services and eco-innovation. Finally, Iceland's efforts to mainstream the environment in development co-operation programmes are reviewed.*

## Assessment and recommendations

Part of Iceland's response to the economic and financial crisis has been an increased emphasis on green growth. A 2011 parliamentary report, The Strengthening of the Green Economy in Iceland, is a potentially important means of promoting the transition towards this goal. It contains 50 proposals and identifies the ministries responsible for following their implementation, along with related timetables. The Prime Minister's Office will oversee implementation of this programme and should use its authority to provide direction and support for the process.

Iceland has implemented a range of market-based instruments that provide incentives to reduce the environmental impact of production and consumption. It has introduced several environmentally related taxes, though it is difficult to compare the revenue they generate with that in other OECD countries, largely due to the volatility of revenue during the economic and financial crisis. Nevertheless, there is evidence that the revenue from taxing energy products is lower than in most OECD countries. Broadening the tax base, notably by including kerosene, natural gas and coal, would make the taxes more cost-effective in limiting greenhouse gas (GHG) emissions and other externalities. There is also scope to increase tax rates, particularly on petrol and diesel, which are lower than in most OECD countries. The excise tax rate on diesel should be aligned with that for petrol, to reflect the higher emissions of local air pollutants (particulates, $NO_x$) generated from diesel combustion.

In addition to excise taxes, Iceland has implemented a number of new policy instruments that help limit GHG emissions relatively cost-effectively. Iceland joined the European Union Emissions Trading System (EU ETS) in 2007. Its impact has been limited, as Iceland uses no fossil fuels in electricity generation and has few energy-intensive industry sectors. The aluminium industry and intra-European aviation were included in the system in 2013. A carbon tax on most fossil fuels was introduced in 2010, with a rate reflecting the price of emission allowances in the EU ETS at the time. Unlike in most countries, the carbon tax is applied to the fishing fleet.

In 2011, an excise tax on vehicle purchase and an annual tax on vehicle use were introduced, both linked to $CO_2$ emissions. This has promoted a shift in the composition of the vehicle fleet, from petrol towards diesel vehicles. However, diesel generates more local air pollutants, though the exposure of the population to these pollutants is less of a problem in Iceland than in most other OECD countries. There are reductions in the excise tax for some vehicle categories, e.g. rental cars; these reductions significantly reduce revenue and provide incentives for the affected companies to buy high-emission vehicles.

Iceland is among the OECD countries that tax a relatively large share of employee benefits from being allowed to use a company-owned car. However, while the tax system captures most of the capital component of these benefits, there are no provisions to capture benefits related to distance driven, so employees face little or no cost per extra kilometre driven. Recent OECD work suggests that including a distance-based component

could generate EUR 3 million in revenue, and that the social benefits in terms of reduced congestion, accidents and pollution would be even higher.

Like most OECD countries, Iceland applies environmentally motivated tax preferences, e.g. for buses fulfilling the Euro V emission standard. Substantial tax reductions are given to methane-fuelled vehicles without any guarantee that the vehicles will actually be run on methane from landfills, which is only available in a small part of the country. The report on the strengthening of the green economy proposed other tax preferences as well. Yet tax preferences are the preferred instrument only in cases where positive externalities are involved. When addressing negative externalities, such as pollution and environmental degradation, instruments such as environmentally related taxes that directly incorporate the cost of damage into market prices are likely to be more cost-effective, and avoid risks of windfall gains and technology lock-in.

Iceland uses other market-based instruments for environmental and natural resource management. An extended producer responsibility programme has helped reduce waste landfilling and increase recycling, though it would be instructive to evaluate its costs and benefits. Iceland also has an effective system for managing fish stocks, based on scientific estimates of total allowable catches and a system of individual transferable quotas among fishers. The fishing industry has been subject to a fishing fee since 2001; in 2012 an additional profit-based special fee was introduced to capture the resource rent. The system is currently under review, because the implementation has proven challenging and there are concerns over increased taxation and the way the fee is levied on different fishing sectors. A well-designed resource rent tax has several economic advantages; however, a large share of the resource rent has already been capitalised in the value of quotas that have been traded since 1984.

Unlike many countries, Iceland does not seem to use many environmentally harmful subsidies, with two notable exceptions: tax exemptions on some energy products, and support to agriculture. The latter is well above the OECD average and entails a greater share of environmentally harmful incentives than in many other OECD countries. Measures that help maintain large numbers of grazing animals are of particular concern as they exacerbate soil erosion, which is a major problem in Iceland. Subsidies to sheep farmers are only in part conditional on meeting environmental performance standards.

Since 2000, public environmental expenditure has fallen as a share of government expenditure and of GDP. The main source of public environmental expenditure shifted from municipal to central level, particularly after 2008, probably in relation to fiscal consolidation policies. In keeping with this trend, expenditure on waste management, one of the main items of public environmental expenditure, declined in real terms, while revenue from user charges increased. Other environmental expenditure reflects Iceland's environmental profile: biodiversity and landscape protection are more important than in many OECD countries, water and air pollution less so.

A new policy on green public procurement (adopted in April 2013) emphasises education and collaboration with stakeholders to reduce environmental impact, and promotes the competitiveness of Icelandic enterprises that offer eco-friendly options. There is evidence that the educational efforts have influenced the procurement practices of institutions involved. The policy aims to raise the proportion of green tenders to 50% by 2016 through measures such as framework agreements between the State Trading Centre, which public institutions are obliged to use, and potential suppliers.

Iceland has developed innovation programmes supported by institutions, public finance and tax incentives for the private sector. Gross domestic expenditure on research and development (R&D) was 2.4% of GDP in 2011, in line with the OECD average but above that for the EU28. The Iceland 2020 strategy targets eco-innovation as a main growth sector in the decade. Industry is the main funder of R&D in general, and of environment-related R&D in particular. However, while the share of the public R&D budget allocated to the environment was among the highest for OECD countries, the energy-related share was the lowest. This seems surprising, given the importance of the energy sector in the Icelandic economy and the country's potential comparative advantage in geothermal energy. While patenting activity in general has been on par with that in other OECD countries, there have been very few Icelandic patent claims in environmentally relevant sectors.

Although Iceland only became a member of the OECD Development Assistance Committee (DAC) in 2013, it has been providing official development assistance (ODA) for many years. The level of ODA as a share of gross national income is below the DAC average: it increased during the first part of the last decade, but fell sharply after 2008. The information available for 2012 suggests that the share of ODA targeting general environmental protection, water and sanitation, and renewable energy was less than among most other donors. An important part of environment-related ODA takes the form of training in Icelandic institutions. In recent years, some DAC members have questioned the cost-effectiveness of this approach and have concentrated capacity-building initiatives in institutions in partner countries.

**Recommendations**

- Clarify the main priorities and roles of ministries and other stakeholders in implementing the parliamentary report on the strengthening of the green economy in Iceland; develop detailed implementation plans that specify the means of achieving objectives, taking account of the costs and benefits; establish a robust, independent system to monitor progress and to propose policy adjustments needed to achieve objectives.
- Broaden the carbon tax to cover kerosene, natural gas and coal, as well as non-$CO_2$ greenhouse gases; increase the excise and carbon tax rates on fossil fuels, including petrol and diesel; scale back the preferences in vehicle taxes given to rental companies, taxis and driving schools; remove incentives to purchase emission-intensive vehicles; consider introducing a distance-based component in the taxation of company cars.
- Review environmentally motivated tax preferences with a view to removing or reforming those that do not provide clear environmental value added (e.g. methane-fuelled vehicles).
- Keep the fisheries resource rent tax under review with a view to striking a fair and transparent balance between society as a whole and the fisheries sector, while maintaining stocks within biologically sustainable levels.
- Reform subsidies to sheep farmers to reduce negative environmental impacts; make them conditional on meeting strengthened environmental performance criteria.
- Continue efforts to green public purchases by providing information and support to public institutions, engaging the State Trading Centre and co-operating with potential suppliers.

**Recommendations** *(cont.)*

- Assess the outcomes of policies intended to promote environment-related innovation (such as the number of patents); consider how these outcomes could be strengthened, particularly in areas where Iceland has a comparative advantage, such as geothermal energy.
- Further strengthen the environmental component of official development assistance, while progressively expanding total aid in line with international commitments; systematically apply environmental and strategic impact assessment procedures; assess the cost-effectiveness of capacity-building programmes in Icelandic institutions and consider implementing such activities in institutions in partner countries.

## 1. Introduction

Between 2000 and 2007, real GDP in Iceland grew on average 4.6% per year; this was one of the highest growth rates among all OECD countries. As Figure 3.1 illustrates, growth was particularly strong in relation to financial and insurance activities, and, to a lesser extent, construction. Fishing and manufacturing (mainly aluminium production) shrank as a share of value added between 2000 and 2007. Eventually, aggregate demand ran well ahead of output and an unsustainable current account deficit developed. The real exchange rate rose far above its equilibrium value, encouraging the transfer of resources from the traded to the non-traded sector.

Figure 3.1. **Value added by sector in 2000-11**


*Note:* Based on data expressed at 2005 prices.
*Source:* OECD (2014), *OECD National Accounts Statistics* (database).

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With the onset of the global financial turmoil and recession, Iceland was struck by a banking crisis of unprecedented proportions and the economy plunged into a deep recession. Faced with events having potentially dramatic economic and social consequences, the government sought the assistance of the international community in support of a medium-term adjustment programme to restore policy credibility and economic growth.

The programme worked relatively well and the Icelandic economy continues to recover, although growth weakened from 2.7% in 2011 to 1.4% in 2012 before increasing somewhat to an estimated 1.8% in 2013 (OECD, 2013a).

The turnaround in the current account reflects a greater increase in exports than in imports as a share of GDP. A major factor driving the increase in exports has been the coming on stream of production capacity in energy-intensive industries (Chapter 4). Service exports have grown faster than goods exports, reflecting their greater price elasticity. Transport and tourism services have grown particularly rapidly (Chapter 5).

While stimulating green growth was a policy priority for several years, it was assigned a higher priority in the aftermath of the severe economic crisis. Having pursued an unsustainable growth model that brought the country close to collapse, Iceland now wants to get on a more sustainable track that builds on its comparative advantages, notably green energy, and takes account of the need to manage key resources (e.g. fisheries) and fragile ecosystems (e.g. soil) sustainably. Secure long-term access to clean energy has attracted foreign investment (e.g. in aluminium) and strengthened the global marketing position of technology sectors, since the combination of advanced technology and clean energy appeals increasingly to customers worldwide.

The national focus on green growth is exemplified by the report of the Parliamentary Committee on the Strengthening of the Green Economy (Box 3.1). Released in September 2011, it contained 50 proposals for action and indicated the ministries responsible for following up on each of them, as well as a schedule for their implementation. The report was developed through a wide consultative process, and is a useful framework for further action. To give high priority to follow-up on these proposals, responsibility for strengthening the green economy was placed with the Prime Minister's Office. This office continues to oversee the process, but implementation is being negotiated among the relevant ministries.

The Parliamentary Committee report has the potential to serve as an important driver in the transition to a green economy. The oversight by the Prime Minister's Office could provide important support for a comprehensive and committed implementation phase. Among other things, this will require further clarification of the main priorities, taking account of potential costs and benefits. For example, the proposal to lower VAT for environmentally certified products may not provide much additional incentive to change behaviour and mainly result in a loss of revenue. Responsibilities should be clearly allocated and detailed implementation plans developed. As experience from other countries shows, an important means of facilitating implementation can be through the establishment of a monitoring system that provides an independent and robust assessment of progress as well as proposals for policy adjustment.

## 2. Greening the tax system

A number of environmentally related taxes are used in Iceland on a range of tax bases. The revenue from these taxes has been quite volatile over the last decade, both as measured against GDP (Figure 3.2) and in terms of total revenue. In several ways, this volatility is linked to the economic crisis. For example, over 2003-06, one-off and recurrent taxes on motor vehicles, on average, raised revenue equal to 1.6% of GDP. The crisis drastically reduced sales of new vehicles, and for 2009-11 taxes on motor vehicles raised an amount equal to 0.6% of GDP, on average – a revenue reduction equal to 1% of GDP.

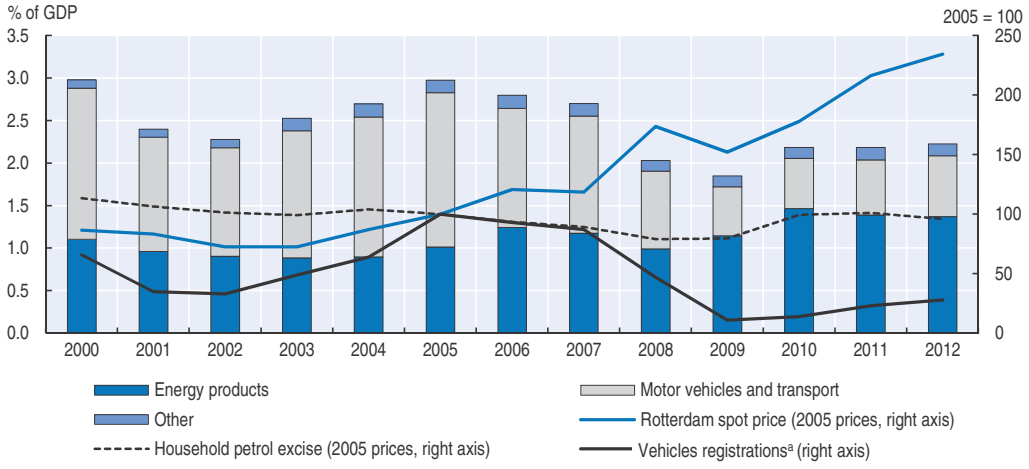
### Box 3.1. **Recommendations of the Parliamentary Committee on the Strengthening of the Green Economy**

The report of the Parliamentary Committee on the Strengthening of the Green Economy in September 2011 contained 50 proposals for action. They varied from broad statements on future policy focus (e.g. regarding the use of cost-benefit analyses of all major policy areas, and a revision of waste policies aiming to stimulate recycling) to detailed specifications of actions in various areas (e.g. in relation to taxation, public procurement and energy audits of public buildings). The proposals included the following (along with the ministries responsible and schedule for implementation):

- The strengthening of the green economy shall be a priority in the government's employment policy. Responsibility: Alþingi/the National Government. Timing: 2012.
- The task of strengthening the green economy in Iceland shall be the responsibility of the Prime Minister's Office. The Prime Minister's Office shall be responsible for co-ordinating the implementation of an action plan based on the proposals presented in this document, with the participation of all the ministries of the cabinet. Responsibility: Alþingi/the Prime Minister's Office. Timing: From the adoption of the proposal by the Alþingi.
- The legislation pertaining to public institutions and their tasks shall be subject to a comprehensive review, in order to integrate the concepts of sustainable development and the green economy into the statutory roles/purposes of the respective institutions. Responsibility: Alþingi/the Prime Minister's Office. Timing: 2012.
- Provisions on cost benefit analysis shall be added to Act No. 105/2006 on Strategic Environmental Assessment and Act No. 106/2000 on Environmental Impact Assessment in order to ensure that the environmental cost is always assessed before construction is initiated. Responsibility: Alþingi/Ministry for the Environment. Timing: 2012.
- All ministries and public institutions… shall implement green procurement practices in accordance with the national policy on green public procurement. Responsibility: All ministries. Timing: Before end of 2012.
- A fund shall be established called the Green Competitive Fund as a department of the Technology Development Fund. Its purpose will be to fund projects in the field of environmental innovation… Responsibility: Alþingi/the Technology Development Fund. Timing: 2012.
- The Ministry of Finance shall develop pollution fees in accordance with the polluter-pays principle, taking into account lessons from the other Nordic countries. The pollution fees shall go to a green fund, which will finance reimbursements of costs related to pollution prevention in respective industries. Responsibility: The Ministry of Finance. Timing: 2012.
- Act No. 50/1988 on Value Added Tax shall be amended so that goods and services that are environmentally and/or organically certified will carry a lower VAT rate than comparable goods and services. Responsibility: Alþingi/the Ministry of Finance. Timing: At the next revision of the legislation.

*Source:* Alþingi (2011), "The strengthening of the green economy in Iceland".

Figure 3.2. **Revenue from environmentally related taxes as percentage of GDP in 2000-12**




*a)* Includes the new registrations of used vehicles; data cover passenger cars, buses, vans and lorries.
*Source:* OECD/EEA (2014), *OECD/EEA Database on Instruments Used for Environmental Policy and Natural Resources Management.*

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The economic crisis also led to a major depreciation of the Icelandic króna, which, combined with international fuel price increases, has contributed to a large increase in the real price of motor vehicle fuels in Iceland. In isolation, an increase in the relative price of motor fuels will contribute to substitution away from fuel use towards other expenditures, and since motor fuels are among the most heavily taxed products in the economy, this will tend to reduce revenue from environmentally related taxes as a share of GDP. Up to 2008, this tendency was augmented by a gradual decrease in the real tax rate on petrol in particular, but since then, tax rates have increased in real terms, which has contributed to a recovery of tax revenue from energy products.

A comparison with other countries regarding the amount of revenue raised through environmentally related taxes is complicated by the high volatility of the Icelandic revenue. However, in 2012, when the revenue in percentage of GDP (2.2%) was significantly lower than it was before the economic crisis (2.7% on average for 2000-07), the revenue share in Iceland was lower that the arithmetic average of OECD countries (2.3%), but higher than the weighted average (1.6%). The revenue raised on energy products as a percentage of GDP (1.4%) was clearly lower than in most OECD countries, partly for the reasons explained above, but also because the tax rates per litre of petrol and diesel are among the lowest in the OECD.[1]

### *2.1. Taxes on energy products*

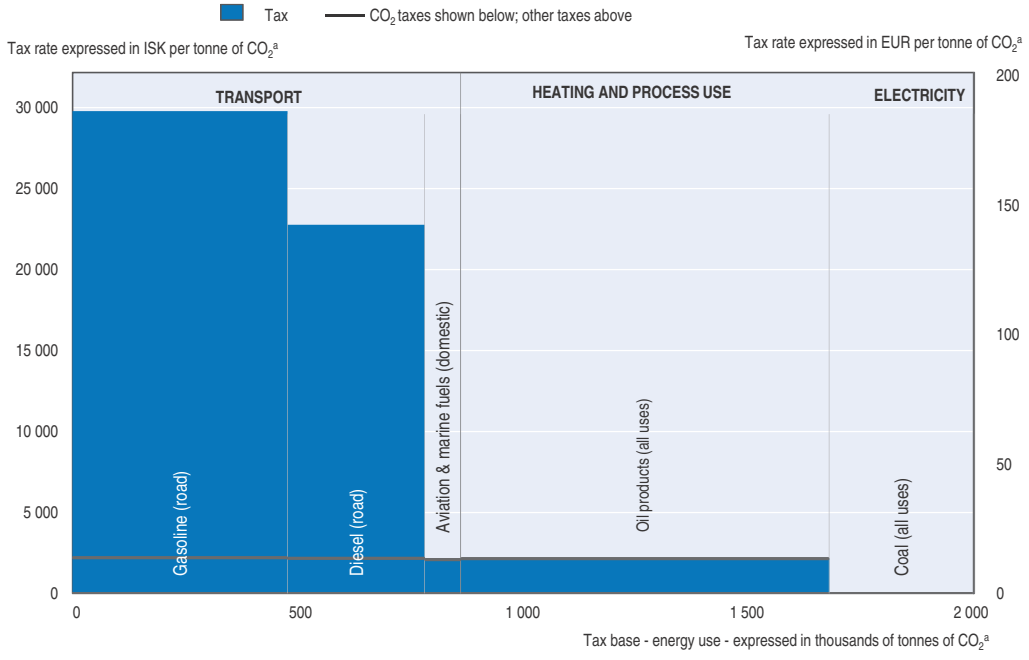
Iceland has an excise tax covering motor vehicle fuels. Up to 2005, diesel use was not taxed directly in Iceland. Instead, diesel vehicles were subject to a separate annual tax, differentiated according to the weight of the vehicle and the distance driven. While such a system could address some of the externalities linked to vehicle use, it did not offer any incentive to reduce fuel consumption per kilometre driven. The introduction of an excise tax on diesel from 2005 was a helpful step in this direction.

Iceland also introduced a carbon tax on most fossil fuels in 2010, with a rate reflecting the price of emission allowances in the EU Emissions Trading System (EU ETS) at the time,

i.e. about EUR 14 per tonne of $CO_2$. It is laudable that the fishing fleet is also covered by the full tax rate of ISK 7.30 per litre of fuel. In many countries, fuels used in the fishing sector are hardly taxed at all.[2]

Figure 3.3 illustrates total taxes on energy use in Iceland on a carbon content basis, calculated on the basis of 2009 energy data and tax rate as of April 2012. As Chapter 4 explains, the energy generation sector in Iceland is characterised by the almost exclusive use of renewable sources that do not cause carbon emissions. For that reason, electricity generation does not appear among the tax bases in the graph. In 2009, the transport category represented about 6% of total energy use, but accounted for about 40% of total $CO_2$ emissions from energy use. Petrol accounted for more than 50% of energy use in transport and was taxed at the highest rate (OECD, 2013b).[3] Diesel (which represented about 40% of energy use in the transport sector) was taxed at a significantly lower rate in carbon terms.[4] The $CO_2$ tax components of both rates are also shown. Only the carbon tax was levied on aviation and marine fuels, which, as a result, were taxed at a much lower rate than road fuels.[5]

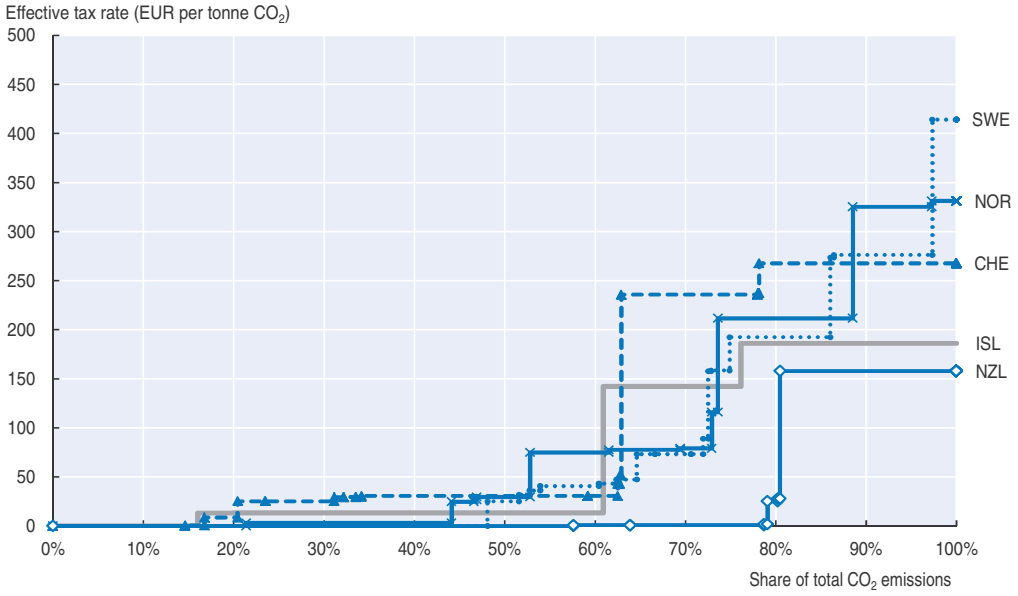
Figure 3.3. **Taxation of energy in Iceland on a carbon content basis**




*a)* Tax rates are as of 1 April 2012; energy use is based on IEA data for 2009.
*Source:* OECD (2013), *Taxing Energy Use: A Graphical Analysis.*

Figure 3.4 compares the taxation of energy products on a carbon basis in selected countries where electricity generation to a large extent is based on non-fossil fuels. The graph shows that a larger share of total carbon emissions is taxed at a rate above EUR 100 per tonne of $CO_2$ in Iceland than in the other selected countries. This is chiefly because motor vehicle fuels, which generally are taxed at a much higher rate than most other energy products, account for a larger share of total $CO_2$ emissions in Iceland. Some of the remaining emissions are taxed at lower rates than in Switzerland, Norway and Sweden. These countries also apply much higher tax rates on petrol and diesel than Iceland.

Figure 3.4. **Taxation of energy on a carbon content basis in selected OECD countries**




*Note:* The horizontal axis shows the proportion of $CO_2$ emissions from energy use. The vertical axis shows the corresponding effective tax rate on carbon. Tax rates as of 1 April 2012; energy use is based on IEA data for 2009.
*Source:* Based on OECD (2013), *Taxing Energy Use: A Graphical Analysis.*

Figure 3.5 illustrates all taxes on fossil fuels for six northern European countries. Each of these countries applies taxes that are explicitly labelled as "carbon taxes", and these taxes are shown as the bottom parts of the vertical bars for each fuel in question, with significant variations within and among most of the countries.[6]

In most cases, countries also apply other sorts of taxes on the same fuels, and the distinction between the "carbon" element and the "other" elements in the total taxes levied on a given fuel cannot be clearly made. In Figure 3.5, these other taxes are shown by the upper parts of most of the vertical bars.

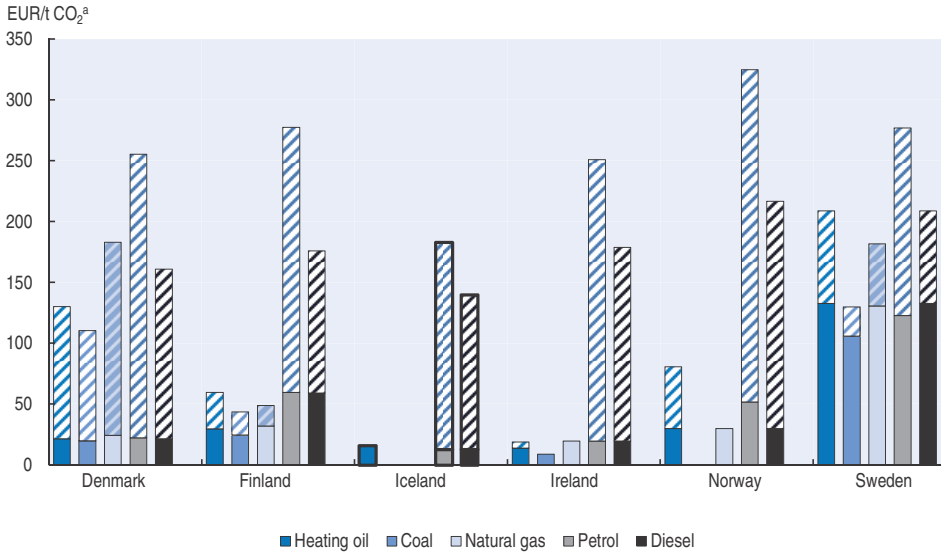
The figure makes it clear that, compared to the other northern European countries with explicit carbon taxes, the total tax rates applied on the selected energy products are relatively low in Iceland. Hence there is scope for increasing some of the tax rates concerned, and for broadening the coverage of energy taxes to include natural gas and coal. There is no use of natural gas in Iceland at present, but including it in the tax could avert tax-motivated use of it in the future. Regarding coal, it should be kept in mind that it is almost exclusively used in sectors covered by the EU ETS (Section 3.1). Taxing coal use in Iceland would not affect greenhouse gas (GHG) emissions for the EU ETS as a whole.

### *2.2. Taxes on motor vehicles*

A $CO_2$-related differentiation of excise tax rates on vehicle purchases was introduced on 1 January 2011, as was a $CO_2$-differentiated annual tax on vehicle use.

The first tax is *ad valorem*, with rates that increase with emissions of $CO_2$ per kilometre driven. Vehicles with emissions below 80 grammes of $CO_2$/km are exempted. For vehicles emitting more than 80 g $CO_2$/km, the tax rate rises from 10% up to 65% of the taxable value; the highest value applies to vehicles emitting more than 250 g $CO_2$/km.

Figure 3.5. **Carbon taxes and fuel taxes in Nordic countries in 2012**




*a)* For each bar, the solid fill at the bottom of the bar corresponds to the carbon tax component; the shaded fill at the top of the bar corresponds to the other excise duties applied to the fuel.

*Source:* OECD/EEA (2014), *OECD/EEA Database on Instruments Used for Environmental Policy and Natural Resources Management;* OECD calculations.

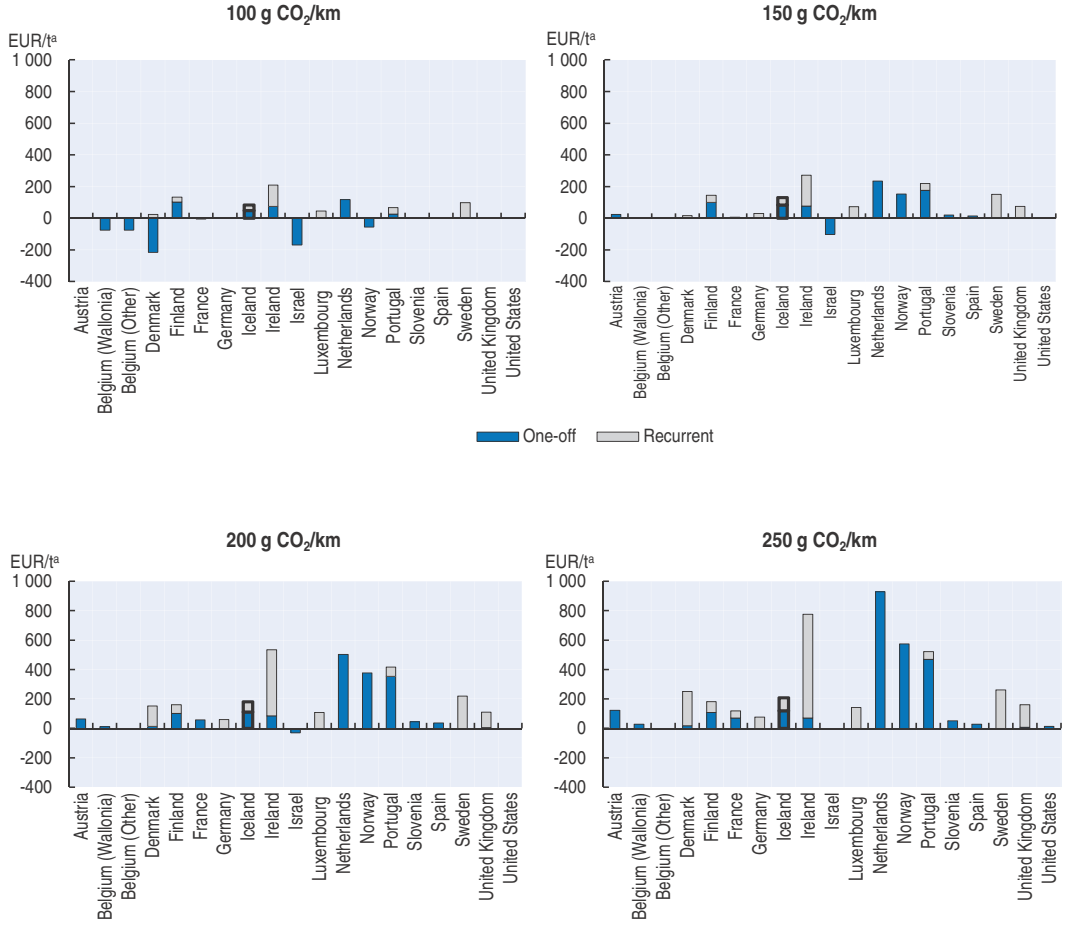
The rate of the road tax on vehicles weighing 3 500 kg or less is ISK 10 860 per year for emissions up to 121 grammes of registered $CO_2$ emissions per kilometre, plus ISK 260 per gramme of $CO_2$ emitted per kilometre beyond that level.

Figure 3.6 compares the $CO_2$ abatement incentives provided via one-off and recurrent taxes on diesel vehicles[7] across the OECD countries that apply $CO_2$-related differentiation in their vehicle tax rates. It indicates that some countries tax $CO_2$ emissions from vehicles with high per-kilometre emissions very heavily when measured per tonne of $CO_2$ emitted over the vehicle lifetime – well over EUR 500 per tonne of $CO_2$ in some cases. In this connection it should be kept in mind that a given tonne emitted from a vehicle with high emissions does exactly the same environmental damage as a tonne emitted from a low-emission vehicle.[8] Iceland is not among the countries with the highest tax rates – but a rate of about EUR 200 per tonne of the $CO_2$ that a vehicle is likely to emit over its lifetime is still very high compared to the abatement incentives the country provides to other parts of the economy.

As in most countries with such systems, the $CO_2$-differentiated vehicle taxes in Iceland tend to promote a shift in the composition of the vehicle fleet, from petrol towards diesel vehicles, since the latter normally cause lower $CO_2$ emissions per kilometre driven.[9] The disadvantage is that diesel vehicles cause more local air pollution than petrol vehicles. The share of diesel vehicles in all new vehicles sold has increased in recent years and exceeded 50% in 2012. Given the sparse population and windy conditions, however, the contribution to local air pollution from diesel vehicles may be less of a problem in Iceland than in most other OECD countries, since air pollution is not a major problem in Iceland (Chapter 1).[10]

The excise tax rates described above do not apply to all motor vehicles. In particular, rental companies, taxi companies and driving schools pay much lower taxes on the vehicles they buy (Table 3.1), and have the right to resell them after 18 to 24 months, on certain conditions. Thus, these sectors capture a significant part of the forgone taxes in the

Figure 3.6. **$CO_2$ abatement incentives in motor vehicle taxes in selected countries as of 2013**




*a)* EUR per tonne of $CO_2$ emitted by diesel vehicles over the lifetime of the vehicles, for selected emission levels per kilometre driven; 2013 or latest available year.

*Source*: OECD/EEA (2014), *OECD/EEA Database on Instruments Used for Environmental Policy and Natural Resources Management;* OECD calculations.

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Table 3.1. **Rates of excise tax on motor vehicle purchases as of 2013**

| Vehicle $CO_2$ emission level per km driven | Normal rate | Reduced rate |
|---|---|---|
| | % of taxable value | |
| < 80 g | 0 | 0 |
| 81-100 g | 10 | 0 |
| 101-120 g | 15 | 0 |
| 121-140 g | 20 | 0 |
| 141-160 g | 25 | 5 |
| 161-180 g | 35 | 10 |
| 181-200 g | 45 | 15 |
| 201-225 g | 55 | 20 |
| 226-250 g | 60 | 25 |
| > 250 g | 65 | 30 |

*Source:* OECD/EEA (2014), *OECD/EEA Database on Instruments Used for Environmental Policy and Natural Resources Management.*

prices they obtain in the second-hand market. The economic crisis has led to these companies representing a very large share of total vehicle purchases, so the revenue loss due to these tax preferences is sizeable, as Figure 3.2 showed. Moreover, the design of the exemption is such that the companies have an incentive to buy vehicles with as large $CO_2$ emissions as possible, because that maximises their relative tax advantage. There are, however, some limits on how large a tax reduction the companies can achieve: ISK 1.25 million for taxis and driving-school vehicles, and ISK 0.75 million for rental cars (the latter limit was lowered from ISK 1.25 million at the beginning of 2013).

While the cost of renting a car at a given destination can have some impact on tourists' choice of destination, it seems unlikely that this impact is strong; many other factors are likely to be of much greater significance. The cost of renting a car constitutes a limited part of the total cost of a journey in any case, and the strong depreciation of the króna due to the economic crisis has greatly improved the cost-competitiveness of the tourism sector (Chapter 5). Hence, the justification of the tax preference given to the car rental sector seems weak.

While diesel vehicles weighing more than 10 000 kg now pay a tax on diesel use (like other diesel vehicles), a distance- and weight-differentiated tax is also in place for heavy goods vehicles. It would, however, be possible to link the rates of this tax more closely to vehicles' wear and tear on roads. And if an electronic road-pricing system were introduced, the rates could be varied according to the place and time of driving, as well as according to vehicle environmental standards. As there are few foreign vehicles on the roads, Iceland would largely avoid having to deal with such vehicles not having installed the equipment necessary to be covered by a charging system. For other countries and local areas that apply road pricing systems, administering the use of the roads by such vehicles represents a major share of total operating costs.

### *2.3. Company car taxation*

In most OECD countries, the benefits reaped by individuals who can use a company-owned car are taxed more leniently than other income. Recent OECD studies suggest that the forgone revenue is very substantial (Harding, 2014), and that the cost to society is significantly more than the estimated revenue loss, primarily due to increased traffic accidents and congestion, but also increased air emissions (OECD, 2013c).

In Iceland, two systems for taxing such benefits are in place. Limited use of a company car, for example from home to work and back, is priced at ISK 99 per kilometre driven. That is considered income and taxed as such. For employees who are allowed unlimited use of the vehicle, a share of the car's market value is considered income and taxed as such, regardless of actual use. For cars taken into use in the previous three years, the share is 26%; for cars taken into use in the three years prior to that, it is 21%; and for older cars, it is 18% (Harding, 2014).

Compared to other countries covered by Harding (2014), Iceland's taxation of the capital component at 26% is relatively high; a share of around 18% is more common. However, it is the same as the OECD estimate of the annual cost over the useful life of a vehiclee. This suggests that Iceland is capturing almost the entire benchmark capital component of the benefit. It is among the top five OECD countries as regards the share of taxable benefit captured by the tax system.

However, there is no distance-based component in the Icelandic taxation of company cars. Hence, if employers are paying for the fuel and other operational expenses

(maintenance, insurance, etc.), this distance-based component of the benefit would be entirely untaxed. Taking account of the distance-based component, Iceland taxes around 80% of the total benchmark benefit of company cars, one of the highest shares among the countries examined by Harding (2014). This study estimates that including a distance-based component in Iceland's taxation of company cars could generate additional revenue of up to the equivalent of EUR 3 million per year. In addition, the OECD (2013c) demonstrates that the cost to society of undertaxation of the distance component is particularly large.

### *2.4. Other environmentally related taxes, fees and charges*

A tax on accommodation or lodging, at a rate of ISK 100 per night per room or per tent, has been introduced (Chapter 5). Increasing generation of electricity from geothermal sources contributes to hydrogen sulphide pollution, causing occasional bad smells in some parts of the country, e.g. Reykjavík. Ongoing efforts to address this problem could be stimulated by the introduction of a tax on such emissions (Chapter 4). A tax on air passengers was proposed to the Parliament in 2011, with rates varying by flight distance. The proposal was not adopted, at least partly because of concerns with respect to conformity with the European Economic Area agreement. While it should have been possible to find a solution to that issue, inclusion of intra-European aviation under the EU ETS has since weakened the case for a separate tax on air passengers, and aviation is now exempt from the carbon tax, to which it previously was subject.

### *2.5. Environmentally motivated tax preferences*

Rather than taxing environmental "bads", many countries attempt to adjust relative prices and influence producer and consumer behaviour by providing tax preferences for environmental "goods". Such measures, however, are the preferred instrument only in those cases where positive externalities are involved. For issues involving negative externalities, including pollution and environmental degradation, policies that directly incorporate the cost of damage into market prices, such as environmentally related taxes, are likely to be more cost-effective because they leave actors flexibility in deciding how to best reduce their emissions or other impacts.[11]

Iceland has a number of environmentally motivated tax preferences. There is a discount of ISK 1.25 million (about EUR 7 800) in the excise tax for vehicles that can run on methane. Such cars also incur the minimum rate of the annual vehicle tax (ISK 10 000). Methane is only available as a vehicle fuel in the Reykjavík area, but people from all over the country buy such vehicles and run them on other fuel most of the time. The tax preference thus provides very limited environmental benefits, but entails a certain revenue loss.

There is a VAT exemption for vehicles running on electricity or hydrogen, and for plug-in hybrids emitting less than 50 g $CO_2$/km. The tax reduction is capped at ISK 1.53 million for electric and hydrogen vehicles, and ISK 1.02 million for plug-in hybrids.

Buses with capacity of 18 persons or more fulfilling the Euro V emission standard can get a refund of two-thirds of the VAT due. Against some opposition, the environmental quality requirement was recently changed: previously buses had to comply with the Euro III standard. As Euro III came into force as early as 2000, and Euro V became compulsory in 2008, the strengthening of the requirement seems reasonable. It is unclear, however, what the argument is for a tax preference for the purchase of a bus that meets a compulsory standard.

As Box 3.1 notes, the Parliamentary Committee on the Strengthening of the Green Economy proposed introducing additional tax preferences on environmental grounds. For example, it proposed reducing the VAT on goods and services that are environmentally and/or organically certified, cancelling customs fees on bicycles and associated products, and exempting renewables used in transport until their share reaches 20% of total energy use in the sector. As pointed out in Section 1, at least for some product categories, the proposals could entail a revenue loss, without much environmental impact.

## 3. Extending the use of other market-based incentives for environmental policy

### *3.1. The EU ETS*

One of the key market-based instruments applied in Iceland, in addition to environmentally related taxes, fees and charges, is the EU Emissions Trading System for greenhouse gases, which Iceland joined in 2007. The structure of the Icelandic economy, however – for example, zero $CO_2$ emissions related to electricity generation and no oil refineries – and the fact that the aluminium sector was not covered until 2013 mean that the impact of EU ETS participation so far has been limited.[12] Fishmeal factories are, however, quite energy intensive and they are covered by the EU ETS.

As of February 2014, emission allowance prices were low: around EUR 5 per tonne of $CO_2$ equivalent, despite a modest increase in response to EU measures to postpone auctioning a number of allowances. There are discussions under way within the EU on how provide a better, more stable incentive for GHG emission reduction within the EU ETS. Once EU countries come out of recession, demand for allowances is likely to increase, and the EU ETS will then be able to provide more important abatement signals in the few sectors concerned, primarily aluminium, the fishmeal sector and intra-European aviation.

### *3.2. Deposits on beverage containers for recycling*

Iceland was the first country in the world to set up a national deposit system for a wide range of containers. The collection company has about 60 return facilities across the country where people can get their deposit of ISK 14 per container paid back. Very good return ratios have been achieved in recent years: 87% in 2011 and 2012, ranging from 82% for glass to 87% for plastic bottles and about 90% for aluminium (Endurvinnslan, 2014).

### *3.3. Recycling fees on selected products*

Fees are also applied to finance recycling programmes for other products. Recycling fees are meant to cover the cost of collecting a given type of waste, transporting it to reception or disposal facilities and recycling or disposing of it. The amount paid is proportional to the volume of the waste. The board of the Recycling Fund, a state-owned fund established by the 2002 Recycling Act (No. 162/2002), is responsible for estimating the cost and proposing fee adjustments to the environment minister. Several fee revisions were made during the review period. All manufacturers and importers of the products subject to the Recycling Act have to pay the fees. The Recycling Fund reimburses facilities which transport, accumulate, recycle or dispose of the products. No cross-funding is allowed.

The Recycling Fund places heavy emphasis on reducing waste generation. For the waste that is generated, it aims to ensure that as much as possible is reused or, as a second option, enters into recovery, with as little as possible landfilled. To this end, it creates economic conditions making materials recovery cheaper than landfilling.

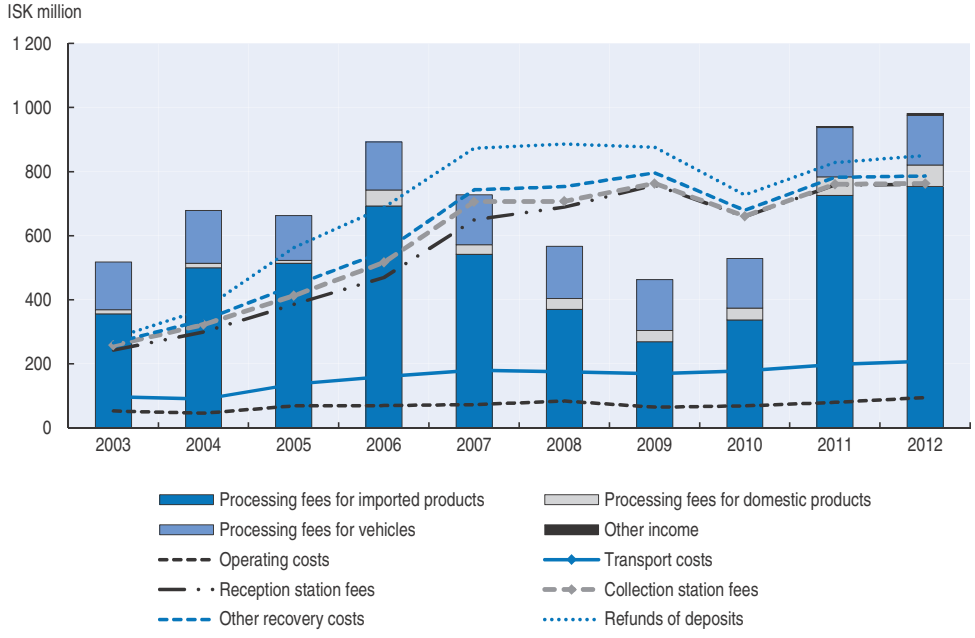
The products covered include cardboard, paper and plastic packaging; plastic hay bale wrap; tyres; fishing gear made of synthetics; and a number of products containing hazardous substances, among them refrigerants, chlorinated compounds, mercury products, organic solvents, photographic materials, paints, pigments, petroleum products and motor vehicles, as well as car batteries and other batteries.

Figure 3.7 illustrates developments in costs and revenue for the Recycling Fund. From 2003 to 2006, revenue was markedly higher than costs. As a result, some recycling fees were reduced as from 1 March 2007, in some cases quite significantly (e.g. by 70% for plastic packaging). The reductions, combined with the economic crisis, which led to lower sales of the products on which the fees are levied, caused significant deficits over 2007-10. In turn, this triggered significant fee increases from 1 July 2010 and again from 1 January 2011.[13] Hence, in 2011 and 2012, the fund showed relatively large surpluses.

Efforts to stimulate and facilitate recycling have had a major impact on the treatment of end-of-life products. In 1995, 79% of all waste was landfilled; by 2011, the share had decreased to 31%, although half the municipal waste generated still went to landfills in 2012 (Chapter 1). The present review is unable to assess in detail whether the benefits to society of these changes in waste treatment are larger than the social costs involved, including those incurred by households in sorting waste and taking it to recycling centres.

In principle, depending on the fee structure used, recycling fees can give producers and importers an incentive to make products easier to recycle. However, as in most extended producer responsibility regimes, the fees that a given producer or importer faces in Iceland are apparently based on average treatment cost rather than the cost of treating a particular product. If this is indeed the case, the incentives for eco-innovation are small.

Figure 3.7. **Costs and revenue of the Recycling Fund in 2003-12**




*Source*: Úrvinnslusjóður (2014), *Ársskýrslur* [Annual Reports], website.

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### *3.4. Pricing of water and waste services*

Water is not really a scarce resource in Iceland, so the costs of introducing a metering system for cold water supply would most likely be larger than the potential benefits. Instead, each household pays a fee for the use of water that depends on the size of the home, not on the amount used.

Hot water supply, by contrast, is metered, with volumetric fees varying by location. In Reykjavík, the fee is about ISK 130 (EUR 0.80) per cubic metre of hot water for those living in the urban area and about ISK 170 (EUR 1.00) for those in rural areas, where the cost of supplying the water is higher.

Each property pays a waste collection fee that varies with the size and number of its trash bins, as well as frequency of collection. For apartment buildings, the fee is split between apartment owners. Each municipality decides on, and collects, its own fees. In Reykjavík, the fee is ISK 18 600 (about EUR 115) for a 240-litre trash container that is emptied every 10 days, and ISK 9 300 for a 240-litre trash container that is emptied every 20 days. If the container has to be moved 15 metres or more to be emptied, an extra fee of ISK 4 500 per container is due. The fact that these fees vary, at least to some extent, according to the marginal cost of waste collection should help promote an economically efficient collection system.

In addition, each home in Reykjavík is obliged to pay ISK 6 300 (about EUR 40) per year to cover the cost of waste management stations.

### *3.5. Individual transferable quotas in the fisheries sector*

The Icelandic economy is heavily reliant on the fishing industry. Marine products represented more than 25% of total exports of goods and services in 2012 (measured in value), down from around 40% in 2000. This reduction in share was due to, among other factors, a relatively large increase in aluminium production. With a total catch of about 1.5 million tonnes in 2012, Iceland is a major fishing country. The total tonnage has, however, decreased significantly since 2000 (Chapter 1).

The decrease in total fish production is partly linked to Iceland's sustainable and profitable way of managing its fisheries sector. The foundation of this success is the setting of total allowable catches (TACs) based on scientific recommendations of what is biologically sustainable, as well as an individual transferable quota (ITQ) system, which gives each quota holder the right to catch a certain share of the TAC in various species (OECD, 2011). In practice, this means quota owners have a clear incentive to ensure that the TACs are not set too high, as that would undermine the value of the quotas they own. This contrasts with the situation in most other countries, where every fisher has a short-term incentive to argue for the highest possible total quotas.

Originally, ITQs were allocated for free, based on historic fishing activity levels. This and subsequent increased ITQ values linked to improved management of fish stocks have contributed to creating significant income disparity. While several approaches to reduce this problem have been considered, there is nothing the government can do now to undo the initial allocation, which favoured established fishers (OECD, 2011).

Nevertheless, a resource rent tax on extra profits of the fisheries sector was introduced in 2012, in addition to the fishing fee introduced in 2001. The general fishing fee is collected to finance the cost to the government of running the fisheries management system. The rate is ISK 9.5 per cod-equivalent kg, with a minimum of ISK 5 000. Davidsson (2013)

estimates that this fee will raise ISK 4.5 billion per year (0.3% of GDP). The resource rent tax is a special fee meant to capture part of the natural resource rent in fisheries, defined as the difference between the sales value of the output and its extraction and production costs, including a fair rate of return on capital. Once the resource rent is determined in cod-equivalent, the tax rate is set at 65% of that amount, according to the original formulation of the law. Davidsson (2013) estimated that this special fee would raise ISK 9 billion in 2013, or 0.5% of GDP.

The system is currently under review, because the implementation has proven challenging and there are concerns over increased taxation and the way the fee is levied on different fishing sectors. In practice, it proved difficult to calculate the resource rent in 2013, and the government introduced a temporary per-kilogramme proxy for the special fee. It also took several measures that temporarily limited the tax payments, and formed a task force to revise the tax structure. At the beginning of 2014, the special fee was reduced from the 2013 rate of ISK 23.2 to ISK 7.38 per cod-equivalent kg for demersal fisheries, and it was increased from ISK 27.5 to ISK 38.25 per cod-equivalent kg for pelagic fisheries. In this context, it should be kept in mind that a well-designed fisheries resource rent tax has several economic advantages and is likely to be more efficient than most other taxes. However, its level should not be so high as to damage the fisheries management system. Also, a large share of the resource rent has already been capitalised in the increased value of quotas that have been traded since 1984.

## 4. Removing environmentally harmful subsidies

### 4.1. *Agricultural support*

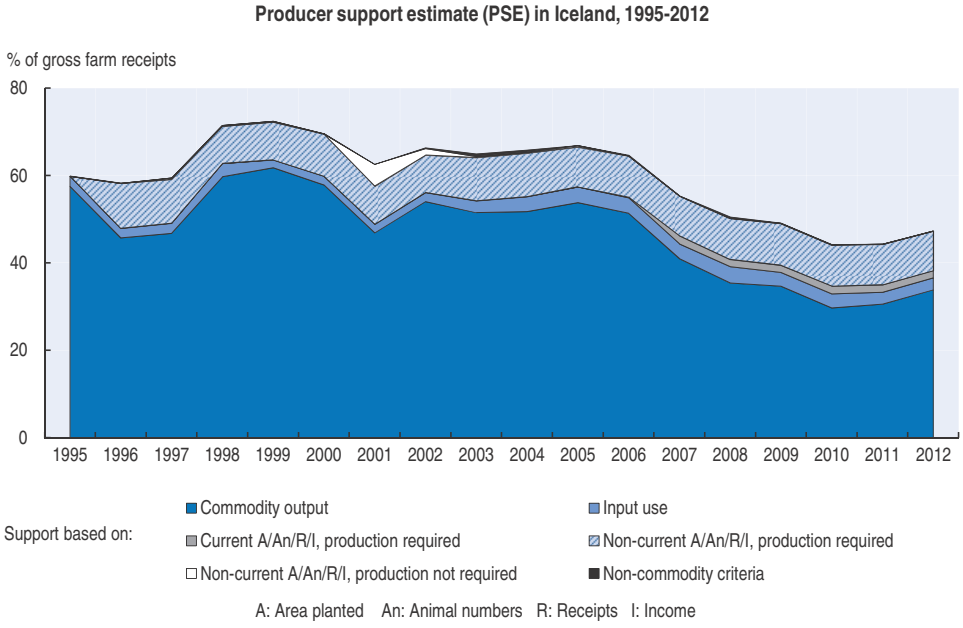
One of the most worrying environmental problems in Iceland is soil erosion and desertification. These are due both to natural causes (volcanic eruptions, strong winds, etc.) and to human activities such as deforestation, grazing and tourism (Box 3.2).[14] The previous *OECD Environmental Performance Review of Iceland* (2001) argued for reducing agricultural subsidies in general and recommended that Iceland "regulate livestock density based on the carrying capacity of soils, as defined by the Soil Conservation Service, for both sheep and horses".

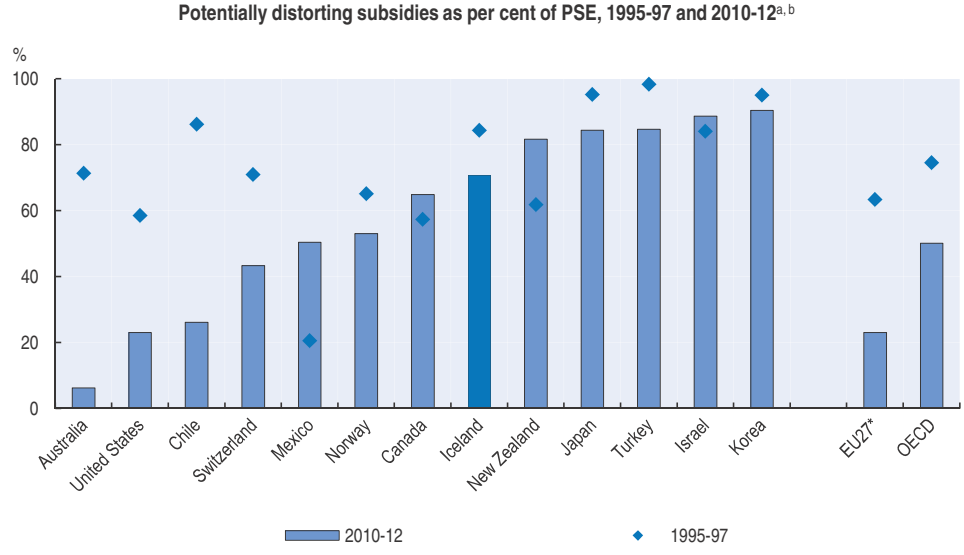
Agriculture in Iceland receives support well above the OECD average, despite a significant decline between 2006 and 2010, as the upper panel of Figure 3.8 shows. The lower panel shows that agricultural policies in Iceland are dominated by production- and trade-distorting measures, even if there has been some shift towards more decoupled forms of support in the sheep meat sector, where payments based on historical animal numbers have replaced output-based payments since 1996. Reception of these payments is, however, conditional on keeping a minimum number of winter-fed sheep on the farm (OECD, 2013d). Payments are only in part tied to environmental cross-compliance requirements, including acceptable rangeland conditions, sustainable grazing management, livestock welfare obligations and sheep flock record keeping (Box 3.2). The support, therefore, is an incentive to maintain a large number of grazing animals, which can have a negative environmental impact, e.g. contributing to soil erosion.

The negative impact of grazing on erosion is to some extent limited by Farmers Heal the Land, a programme of the Soil Conservation Service. This organisation covers 85% of

the cost of seeds and fertilisers if farmers use their machinery, time and skills on land improvement projects. More than 30% of the sheep farmers in Iceland participate, along with many other farmers, according to Arnalds and Thorsson (2012) – but this still means that the large majority of the sheep farmers do not take part.

Figure 3.8. **Agricultural support**




* EU27 for 2010-12 and EU15 for 1995-97.
*a)* Unweighted averages.
*b)* Payments based on commodity output and variable input use.
*Source*: OECD (2013), *Producer and Consumer Support Estimates* (database).

StatLink http://dx.doi.org/10.1787/888933087629

Box 3.2. **Soil erosion**

In 1997 the Soil Conservation Service and the Agricultural Research Institute published a national assessment of soil erosion in Iceland. According to the report, considerable or severe erosion affects about 40% of the country's area (Arnalds et al., 2001). However, this assessment has not been followed up, and monitoring data on land degradation and soil erosions are lacking.

Most rangelands are open to sheep grazing, and horse grazing is common in lowland areas. Current grazing practices, especially in the highlands, are hampering the natural regeneration of degraded ecosystems. The grazing period has been reduced over the past 50 years, from one year to about six months or less in the highlands. Most farmers continue to apply traditional rangeland management practices such as free-range grazing on common land.

A recent voluntary agreement between sheep farmers and the government ties a part of the agricultural production subsidies to quality management requirements, including sustainable land use. However, the criteria are not stringent. Exemptions are granted if land improvement plans are made, although that land often remains unfit for grazing. The lack of monitoring and sustainability indicators weakens policy implementation and enforcement. In turn, this discourages farmers from changing land management practices.

### *4.2. Support to energy products*

Most OECD countries have support mechanisms promoting the production or use of fossil fuels (OECD, 2013e). In Iceland, however, there are few such mechanisms, partly due to the relatively low share of fossil fuels in the energy supply (Chapter 4). Iceland reported only one energy-related tax expenditure to the OECD (2013e): a reduced VAT rate, at 7%, on hot water, electricity and oil used for space heating and swimming pools. Most other goods and services are subject to the standard 25.5% rate.

The full exemption of coal, kerosene and natural gas from excise and carbon taxes could, however, be considered support to fossil fuels. The use of coal – almost all in the iron and steel sector (for ferro-silicon production) – accounts for well over 10% of all $CO_2$ emissions in the country (Figure 3.3), so removing this exemption could significantly affect Icelandic GHG emissions. However, as ferro-silicon production has been part of the EU ETS since 2013, taxing coal use in this sector would not affect GHG emissions for the EU ETS as a whole.

In addition, there are subsidies for electric heating in parts of the country without geothermal power (Chapter 4). Electricity supplied to greenhouse farmers is also subsidised. Phasing out these subsidies could benefit the environment, though the impact on overall GHG emissions and local air pollution would likely be small.

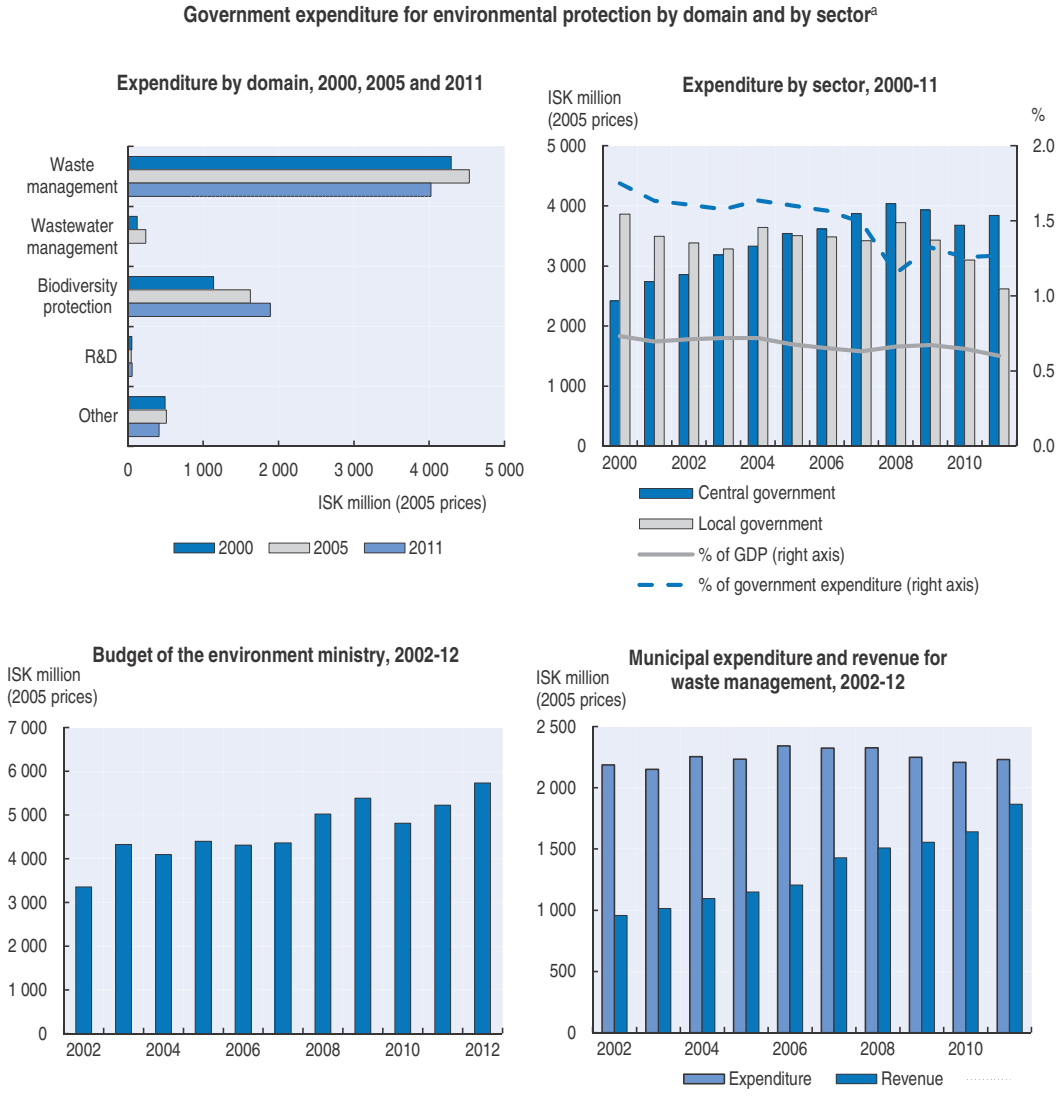
## 5. The environmental goods and services sector

### *5.1. The public sector*

Since 2000, public environmental expenditure has fallen as a share both of government expenditure and of GDP. The main source of public environmental expenditure shifted from municipal to central government, particularly after 2008

(Figure 3.9). This was probably linked to fiscal consolidation policies, which may have affected the ability of municipalities to meet their responsibility for delivering a wide range of environment-related issues within their boundaries. Despite the economic crisis, the environment ministry budget has tended to increase since 2002, measured in constant prices – except for a marked decrease from 2009 to 2010.

Figure 3.9. **Public expenditure for environmental protection**




*a)* General government expenditure according to the COFOG classification.
*Source:* Country submission; OECD (2014), *OECD National Accounts* (database); OECD (2013), *OECD Economic Outlook No. 93* (database).

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Waste management and biodiversity protection are the two main sectors supported by public environmental expenditure. Between 2000 and 2011, expenditure on waste management decreased in real terms. Public expenditure on protection of biodiversity and landscape (for example, management of natural parks), on the other hand, increased in the same period, probably linked to the increase in the tourism activity over the decade

(Chapter 5). Expenditure related to biodiversity and landscape represented almost 30% of total public expenditure on environmental protection in 2011. Only Denmark and Italy devoted as much of public environmental protection expenditure to these activities; in many other OECD countries, the share is well below 10% (OECD, 2014b). These allocations are consistent with Iceland's environmental profile, with biodiversity and landscape protection relatively more important than in many OECD countries, and water and air pollution less so.

### 5.2. *Green public procurement*

The annual volume of public procurement is estimated at ISK 150 billion (Government of Iceland, 2013). The state thus has considerable influence on the type of products and services that are purchased in the country, including their environmental impact. A new policy on green public procurement and green government was adopted in April 2013. It built on the 2009 Government Policy for Ecological Procurement, which emphasised preparing the ground, readying tools and information, and offering all institutions the option of an introductory presentation and a workshop on green procurement. The policy also aimed to promote the competitiveness of Icelandic enterprises that offer eco-friendly options. A survey of government institutions on green procurement in February 2012 indicated that roughly a third of those surveyed were looking into greening their operations. The survey also indicated that the institutions found tools and education on green procurement and green government useful. Institutions which had received a presentation on green procurement and related tools appeared to have advanced further in this regard than those that had not received such training (Government of Iceland, 2013). By early 2013, more than 140 public institutions (including some secondary schools) had been invited to introductory presentations; 85 had attended one, and more than 50 had attended a workshop.

One goal in the policy is to raise the proportion of green tenders – i.e. tenders with environmental criteria, tenders taking note of life-cycle costs, and tenders otherwise suited to reducing environmental impacts – to 50% by 2016. The means used to achieve this goal include establishing framework agreements between the State Trading Centre, which public institutions are obliged to use when purchasing certain products, and potential suppliers. In many cases, the institutions can choose among several suppliers that have signed such agreements.

### 5.3. *The private environment-related sector*

Know-how and technology for harnessing geothermal energy represent the basis for several private firms working in what can be considered the environmental goods and services sector. Electricity generation from geothermal plants has increased significantly over the last decade (Chapter 4). There has been significant exporting of know-how in this field, especially as regards harnessing low-temperature geothermal sources for space heating and central heating systems.[15]

Many of the eco-innovating firms mentioned in the next section also belong to the environmental goods and services sector.

## 6. Eco-innovation

### 6.1. *Policy framework*

Environmental policies can – to varying degrees, intentionally and unintentionally – stimulate innovations that can benefit the environment and at the same time create market

opportunities for the innovating firms. For example, the OECD (2010) has shown that environmentally related taxes can have a strong impact on innovation activity, compared with many other policy instruments, inducing innovation through more channels.

Like a number of other countries, Iceland provides tax preferences for firms involved in innovation. Positive spillovers to others parts of the economy can provide an economic rationale for such support measures. A firm that carries out research and/or development projects and is certified by the Icelandic Centre for Research (Rannís) has the right to a 20% credit against assessed income tax. The share of the total cost of an R&D project that is covered by the credit decreases with the size of the firm. For enterprises with fewer than 50 employees, the eligible cost may not exceed 70% of the total cost of the project; for enterprises with more than 250 employees, the eligible cost may not exceed 50% of the total cost. There is also a cost ceiling: the credit per enterprise may not exceed ISK 100 million per year.

Innovation in general and eco-innovation in particular can also be stimulated by budgetary expenditure programmes. The key government body in charge of R&D policy is the Science and Technology Policy Council of Iceland (STPC). Chaired by the prime minister, it has 14 members, who represent the science and technology community and the social partners, as well as five ministries.[16]

Rannís and Innovation Centre Iceland (ICI) are the key R&D funding agencies. A key function of Rannís is to operate a competitive public support system for research and technological development. This includes the Research Fund and the Fund for Research Equipment under the Ministry of Education, as well as the Technology Development Fund[17] under the Ministry of Industries and Innovation. Rannís also provides the STPC with information on scientific research and technology developments as a basis for policy making. In addition it monitors R&D resource allocation and performance, evaluates the results of scientific research, technical development and innovation, and participates in international benchmarking of the results.[18]

In December 2007, the STPC selected certain fields in which it considered that Iceland had the potential of achieving international success, and where there were good opportunities for co-operation among businesses, universities, research institutions, public parties and various society groups. In this context, Rannís issued a call for proposals for ideas for centres of excellence or research clusters. One centre selected was the Geothermal Research Group at the University of Iceland, which seeks to create a critical mass of joint resources and efforts to break through scientific and technical barriers to innovation, as well as increasing significantly the number of qualified experts in geothermal research, engineering, design and technical exploitation of the resource.[19]

The ICI aims to advocate and pioneer new ideas in chosen fields of research, development and science; create an infrastructure characterised by simple processes, customer service and a stronger ICI staff; be the first choice for start-up companies looking for a support service and assistance in financing; be a leader in transnational co-operation in R&D projects which create a competitive advantage for participating parties; and take a leadership role in the support and development of creative industries.[20]

Since the economic crisis, the national innovation strategy has been refocused. The New Science and Innovation Strategy 2010-20 places greater emphasis on aspects such as competitive and performance-based funding and better quality assessment. The Iceland 2020 strategy targets eco-innovation as a main growth sector in the next decade (OECD, 2012).

### 6.2. Innovation performance

Iceland's gross domestic expenditure on R&D (GERD) was 2.4% of GDP in 2011. While this number is not directly comparable to somewhat higher Icelandic figures available for earlier years, it indicates an R&D expenditure level similar to the OECD average, but markedly higher than the EU28 average. Industry is the main funder of GERD, financing nearly half of the total in 2011. This was above the median value across the 30 OECD countries for which 2011 data are available. The government's share in total R&D expenditure (40% in 2011) was relatively high compared to the OECD average (about 30%). Government expenditure on R&D was a bit over 1% of GDP in 2011, the highest among all the OECD countries for which information is available (OECD, 2014c). Overseas funding accounted for 8.2% of total GERD in 2011. In 2001, the share was 18.3%.

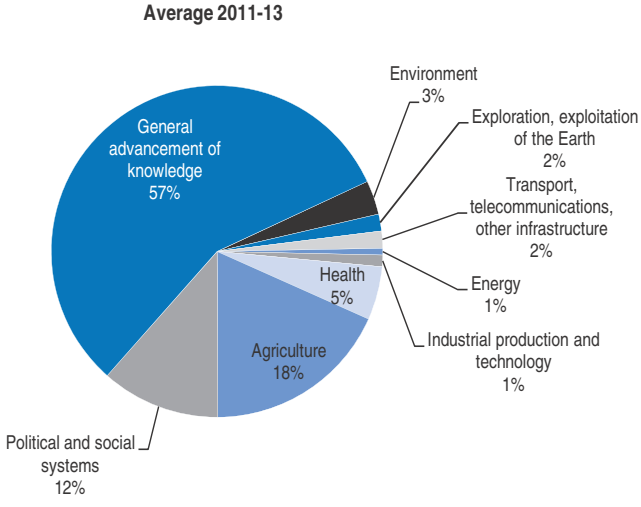
Direct government funding of businesses' R&D in Iceland is the second lowest across OECD countries, and the share decreased from about 1.4% in 2001 to about 1.1% in 2011 (OECD, 2013g). These figures include grants and payments for R&D contracts for procurement, but not R&D tax incentives (which Iceland does apply, as the previous section indicates), repayable loans or equity investments.

Research outputs in total, in terms of patents claimed, are close to the OECD median, and Iceland's performance in terms of non-technological innovation is good, as reflected in trademark counts and strong international publication record (OECD, 2012).

### 6.3. Environment-related innovation

Industry is the main funder of environment-related R&D activities, in particular energy research. However, in 2011-13, while 3% of the government R&D budget was allocated to environment-related R&D (including research on the control of pollution and on developing monitoring facilities to measure, eliminate and prevent pollution), only 1% was allocated to energy-related R&D, including geothermal energy (Figure 3.10). In 2012, the share of the public R&D budget allocated to the environment was among the highest

Figure 3.10. **Public R&D spending by sector**




*Note:* Government budget appropriations or outlays for R&D, breakdown according to the NABS 2007 classification.
*Source:* OECD (2014), *OECD Science, Technology and R&D Statistics* (database).

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for OECD countries, but the energy-related share was the lowest (OECD, 2013g). This seems surprising, given the importance of the energy sector in the Icelandic economy and the potential comparative advantage the country may have in the field of geothermal energy.

Even if patenting activity in general has been on par with what is found in other OECD countries, there were very few Icelandic patent claims in relation to environmentally relevant sectors over 1999-2011. Patent counts are not a perfect indicator of the return on investment in relation to R&D, but it would seem useful to analyse further the reasons for the low patenting activity in this field. It is possible that additional efforts ought to be made to secure property rights to Icelandic innovations in this area.

Nevertheless, a number of Icelandic firms and institutions are innovative in sectors of environmental significance. Box 3.3 provides examples of such firms and projects. In certain cases, firms' innovation activities have been stimulated significantly by policies to promote eco-innovation while in other cases such policies have played less of a role.

### Box 3.3. **Examples of environment-related innovation in Iceland**

One Icelandic firm has developed software for fuel management for ships, which has been exported to many cruise liner companies. The firm has received funding from Rannís, and benefited from the R&D tax credit. International Maritime Organization regulations on emission control in shipping have also been important drivers for the innovation activity of the firm.*

Other examples include a firm that has developed sensors that allow the electrical usage and load across circuit breakers in buildings to be measured (ReMake Electric, 2014); a firm that has developed a pilot plant for methanol production from geothermal $CO_2$ (Carbon Recycling International, 2014); a project led by ICI in co-operation with the Marine Research Institute and a fisheries company that aims at developing a fishing trawl that does not need trawl doors and does not touch the sea bottom, reducing friction and increasing energy savings; and a company that is developing technology for the production of a single-cell protein utilising hydrogen- and sulphur-oxidising bacteria (Prokatin, 2014). This last project aims to use hydrogen, hydrogen sulphide and $CO_2$ from geothermal power plants as an energy and carbon source. The technology makes it possible to produce protein-rich meal for use in animal and fish feed. The technology can also be used to reduce emissions to the atmosphere.

The Iceland Deep Drilling Project (IDDP) was founded in 2000 by a consortium of three Icelandic energy companies. Its main purpose is to find out if it is economically feasible to derive energy and chemicals from hydrothermal systems at supercritical conditions. IDDP is a long-term R&D project, expected to take a decade or two to conclude. Among the potential benefits are increased power output per geothermal well and production of higher-value, high-pressure, high-temperature steam; development of an environmentally benign, high-enthalpy energy source below currently producing geothermal fields; and extended lifetimes for exploited geothermal reservoirs and power generation facilities (IDDP, 2014).

The 2001-05 Ecological City Transport System project, known as ECTOS, aimed to demonstrate and evaluate a hydrogen-based infrastructure for public transport vehicles. Three hydrogen fuel cell buses were operated in public service in Reykjavík and a fuelling station was established for production and distribution of hydrogen. The buses were originally to be tested for two years, but due to a positive outcome, the test period was extended. The ECTOS project was succeeded by the HyFLEET:CUTE project, with the intent of developing a new generation of buses. The economic turmoil in 2008, however, made this impossible (INE, 2014).

Box 3.3. **Examples of environment-related innovation in Iceland** *(cont.)*

The experience of operating the fuelling station was positive and there was a wish to test hydrogen in passenger vehicles as well. To this end, and to test hydrogen and fuel cells in marine applications, the SMART-H2 project started in 2007, with 35 vehicles from various producers being tested. One aim was to connect the R&D part of the hydrogen work with the potential serial production of fuel cell electric vehicles (FCEVs). However, in 2009, it became clear that serial production of FCEVs could not start for a number of years and it was decided to stop the test period in 2012. One reason was that the vehicles being tested were already three to six years old, which was considered too old for the new technology (INE, 2014).

The Icelandic Biofuels project aims at investigating the possibility of producing fuels from biomass available as waste material from households and industry. Assessment will also be made of the possibility of using energy plants for biofuel production (Icelandic Biofuels, 2014).

* Iceland has not yet signed Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL) of the International Maritime Organization. This annex sets limits on $SO_x$ and $NO_x$ emissions from ship exhaust and prohibits deliberate emissions of ozone depleting substances; designated emission control areas set more stringent standards for $SO_x$, $NO_x$ and particulate matter. One proposal of the Parliamentary Committee on the Strengthening of the Green Economy was to expedite acceptance of the annex.

## 7. Environment, trade and development

### *7.1. Official development assistance*

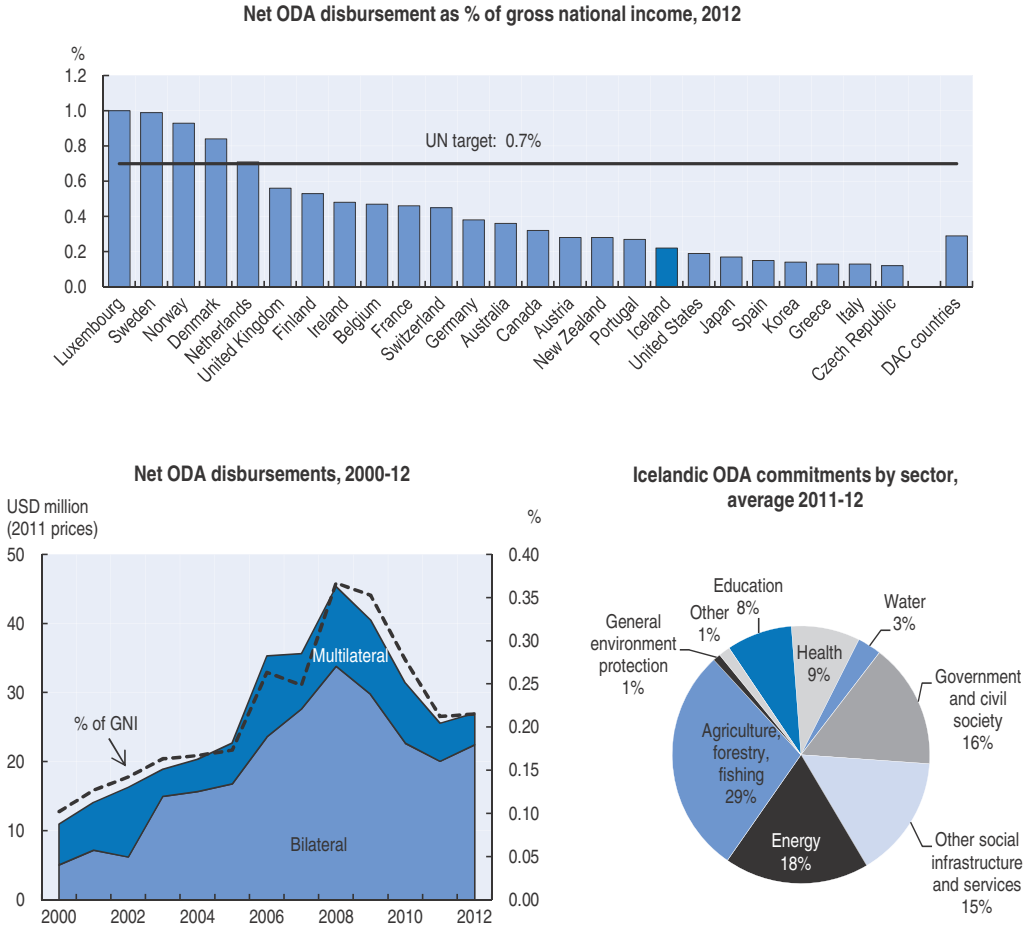
Iceland joined the OECD Development Assistance Committee (DAC) in March 2013, but prior to that it had taken steps to develop its aid policy, for example by endorsing the 2005 Paris Declaration on Aid Effectiveness. Figure 3.11 shows that Iceland provided less official development assistance (ODA) as a share of gross national income (GNI) than the OECD-DAC average in 2012.[21] While the agreed UN target is ODA equivalent to 0.7% of GNI, the OECD-DAC average was 0.29% and Icelandic ODA represented 0.22%. Iceland's priority partner countries – Uganda, Malawi and Mozambique – were the top three recipients in 2010 and 2011, accounting for 38% of Iceland's bilateral aid.

Although the level of Iceland's ODA is low compared to other OECD countries, there was a relatively steady and significant increase – particularly as regards bilateral aid – from 2000 to 2008, when the financial and economic crisis set in (Figure 3.11). The crisis made it very difficult for Iceland to maintain its ODA level, and the share in GNI dropped by more than half from 2008 to 2011 before a minor increase took place from 2011 to 2012.

Only 1% of Iceland's bilateral ODA commitments in 2011-12 went to general environmental protection (Figure 3.11), but several of its ODA activities nevertheless have clear environmental dimensions, drawing on the country's comparative advantages and experiences.

Figure 3.12 shows the share of total ODA going to general environmental protection, water and renewable energy, according to a classification by sector, with Iceland having a lower share than most other OECD countries. In 2012, Iceland began providing information on aid to the OECD Creditor Reporting System, though information on "policy markers" was incomplete. Nevertheless, the available data show that in 2012, for about 37% of the total sector-allocable aid, environment protection was the principal objective, and for more than 40%, it was a significant objective (OECD, 2014d).

Figure 3.11. **Official development assistance of Iceland and OECD-DAC countries**



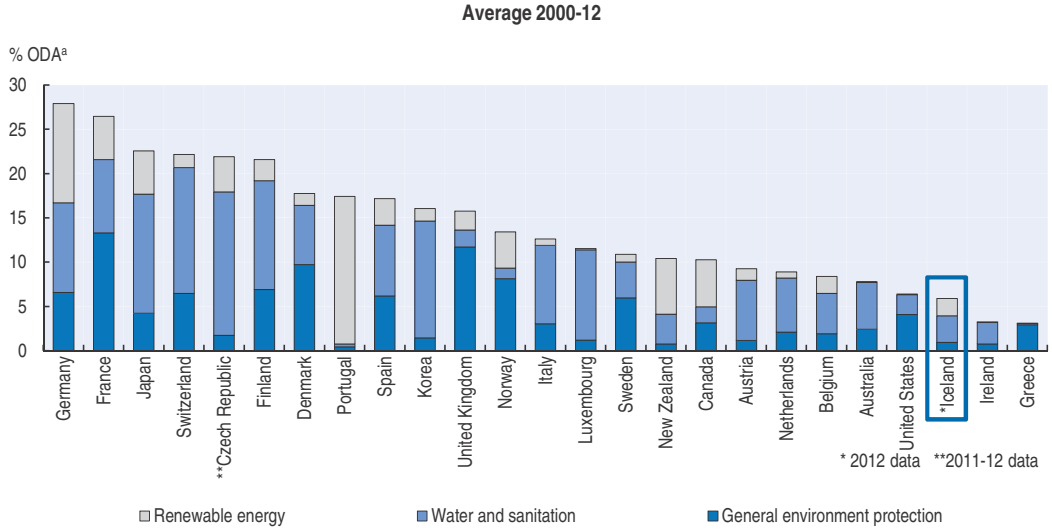

*Source:* OECD (2014), *OECD International Development Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933087686

One aid project based on Iceland's comparative advantages is the Geothermal Training Programme of United Nations University (UNU), hosted by the National Energy Authority (Orkustofnun). This is a postgraduate training programme, aiming at assisting developing countries in capacity building within geothermal exploration and development. The programme provides training for six months to professionals from developing and transitional countries with significant geothermal potential, primarily countries where geothermal development is under way.[22]

Another project drawing on Iceland's comparative advantages is the UNU Land Restoration Training Programme.[23] It provides postgraduate training for specialists from developing countries as regards restoration of degraded land and sustainable land management, and aims at assisting developing countries in capacity development in this field. It was founded in 2007 by the Icelandic Ministry for Foreign Affairs, in partnership with the Agricultural University of Iceland and the Soil Conservation Service of Iceland. Its main activity is six months of training in Iceland on land restoration and sustainable land management. The first half of the training focuses on course work, practical training and field trips. In the second half, each student works on an individual project which provides specialisation related to the needs of the individual.

Figure 3.12. **Official development assistance for environment, water and renewables**




*a)* Bilateral ODA commitments expressed in constant 2011 prices as percentage of total sector-allocable ODA.
*Source:* OECD (2014), *OECD International Development Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933087705

A third example is the UNU Fisheries Training Programme,[24] again offering six months of postgraduate training in various areas of the fisheries sector for practicing professionals from developing countries. The programme draws expertise from several Icelandic universities and the fishing industry in order to provide participants with a broad perspective on fisheries in their home countries.

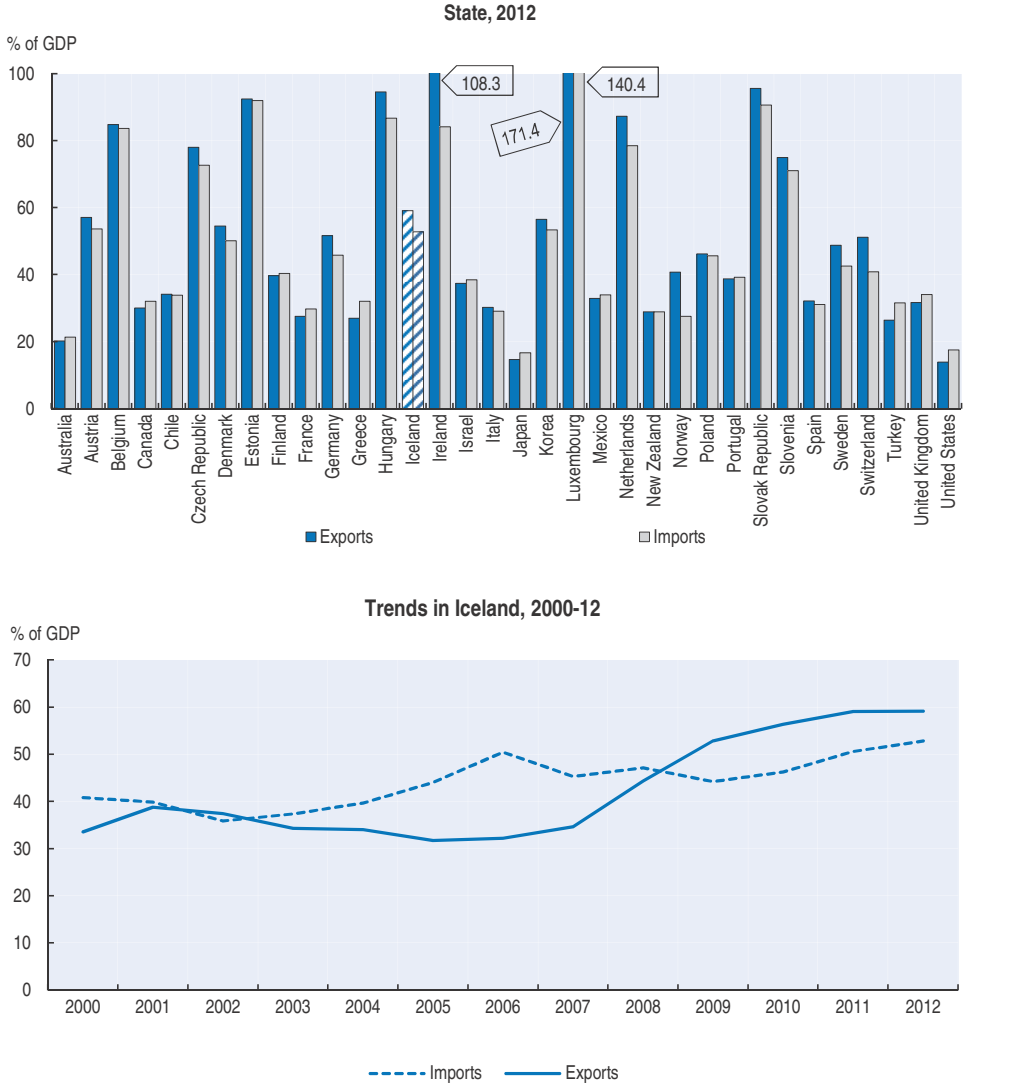
Since 1979 some 730 developing country professionals have attended UNU training programmes in Iceland on international scholarships funded by Iceland's ODA. It cost USD 40 000 in 2011 for a student to undertake one of the programmes. This is a sizeable investment in human capacity development, especially relative to other elements of Iceland's development co-operation. While internal evaluations of the UNU programmes in fisheries and geothermal energy reveal positive effects on students, there has been no external evaluation of the overall impact of the programmes in the countries that have benefited from the training. Nor are there mechanisms to independently ensure the quality of the programmes or to validate them against similar programmes being run by other institutions (OECD, 2013h).

In recent years several DAC members have found their international scholarships not to be cost-effective capacity building. In recognition of this, some DAC members have significantly downsized or abolished such scholarships, focusing instead on in-country training and strengthening the capacity of training institutions in partner countries. Indeed, the current UNU delivery model established by the institution's headquarters promotes a switch to providing training in partner countries, as opposed to international scholarships, and supporting capacity building of developing countries' universities and research institutes through twinning arrangements. Iceland's UNU fisheries and geothermal programmes have begun to provide in-country training in recent years, in addition to the training provided in Iceland, but there are no plans yet to adapt fully to the new UNU model (OECD, 2013h).

### *7.2. Trade and environment*

As Iceland is a small country with a relatively specialised economy, one could assume that it would have higher export and import ratios compared to GDP than most other OECD countries. The upper panel of Figure 3.13 indicates that this in fact was the case in 2012, when imports equalled 52.9% and exports 59.2% of GDP, compared to OECD averages of 29.1% and 28.5%. In European OECD countries, the respective averages were 41.6% and 43.9% of GDP.

Figure 3.13. **Export and import of goods and services in OECD countries and in Iceland**




*Source:* OECD (2013), *OECD Economic Outlook No. 93* (database).

StatLink http://dx.doi.org/10.1787/888933087724

However, the lower panel of Figure 3.13 indicates that foreign trade shares exceeding 50% of GDP is a relatively recent phenomenon for Iceland, as shares were around 40% in the first years of this century. The figure also highlights the large trade imbalances that developed in the middle of the decade, with a trade deficit equal to 18% of GDP in 2006.

Iceland has concluded 26 free trade agreements (FTAs) with a total of 35 partner countries outside the European Union. For example, in April 2013, it signed an FTA with China, with which trade had increased rapidly in the preceding years.[25] This was the first FTA signed between China and a European country. The aim of the agreement is to promote trade by abolishing tariffs on imports and to further enhance economic ties between the two countries. The agreement is similar to earlier FTAs that Iceland, as a member of European Free Trade Association (EFTA), has concluded.[26] It covers trade in goods and services, rules of origin, trade facilitation, intellectual property rights, competition and investment. It also indicates that the two countries should enhance their co-operation in a number of areas, including the environment, with the parties acknowledging that economic development and environmental protection are interdependent and mutually reinforcing components of sustainable development (Ministry for Foreign Affairs and External Trade, 2013). Compared to the environmental provisions included in some other recent regional trade agreements, the provisions in this agreement do not seem very strong (George, 2013a; 2013b). The agreement will enter into force when legal procedures of acceptance in both countries have been concluded.

### *Notes*

1. As of 1 January 2012, only Poland had a lower tax rate on petrol than Iceland, among the European OECD countries.
2. However, the Icelandic fishing fleet does not pay any other fuel taxes.
3. ISK 25.20 per litre in general excise, ISK 40.70 per litre in special excise and ISK 5.15 per litre in carbon tax; in all, ISK 71.05 per litre as of 1 January 2014.
4. The tax rates per litre as of 1 January 2014 were ISK 40.70 in special excise and ISK 5.90 in carbon tax, for a total of ISK 46.60 per litre.
5. Aviation fuel was subject to the carbon tax in May 2012, the date reflected in Figure 3.3, but such fuel has been exempt from the carbon tax since 1 January 2013. The inclusion of intra-European aviation in the EU ETS weakens the environmental arguments for taxing aviation fuel.
6. The graph shows the main tax rates applied to the different fuels, but in several countries there are (normally) lower rates for products used in certain sectors. The rates shown regarding heating oils are those that apply to the household sector.
7. Taxes for diesel vehicles are used as an example. For Iceland, the tax rates for petrol and diesel vehicles are the same, but in some of the countries shown, the tax rates differ for the two vehicle types.
8. Note that the $CO_2$ abatement incentive provided via the motor vehicle taxes comes on top of the more direct and effective abatement incentives provided via the taxes on petrol and diesel.
9. Drivers benefit directly from this advantage with respect to $CO_2$ emissions due to the higher energy efficiency of diesel engines compared to petrol engines. There is thus no argument for providing a tax stimulus to promote the purchase of diesel vehicles.
10. According to the OECD (2014a), only Norway, Australia and New Zealand have lower per capita mortality from ambient air pollution, from all sources. The same report estimates the annual social cost of air pollution in Iceland at USD 115 million.
11. For example, the OECD (2013f) demonstrates that emission trading systems and taxes that place an explicit or implicit price on carbon emissions are much more cost-effective than other policy instruments, including various tax preferences and other subsidies, in combating climate change.

12. Also, perfluorocarbons (PFCs) stemming from aluminium production are now covered by the EU ETS, in addition to the related $CO_2$ emissions (European Commission, 2014).
13. For example, the rate for plastic packaging as from 1 January 2011 is 20% higher than what it was prior to the rate reductions of 1 March 2007. The minimum rate for vehicle tyres was ISK 30 000 from 1 January 2005, ISK 20 000 from 1 January 2006 and ISK 15 000 from 1 March 2007, but increased to ISK 40 000 (about EUR 250) as from 1 January 2011 (Recycling Fund, 2013).
14. It has been estimated that when the first settlers arrived in Iceland in the 9th century, some 25% of the island was covered by birch woodland. The share stands today at about 1% (Croft, 2011).
15. See *www.nea.is/the-national-energy-authority/export-of-know-how* for more information.
16. See *www.m-era.net/iceland* for further information.
17. The fund supports emerging technologies in geothermal research, genetics, artificial intelligence and eco-technologies (OECD, 2012).
18. See *www.m-era.net/iceland* for further information.
19. See *http://georg.hi.is/efni/georg_geothermal_research_group* for further information.
20. See *www.nmi.is/about-us/policy-and-organization-chart/* for further information.
21. The average is calculated across the countries taking part in the OECD Development Assistance Committee.
22. See *www.unugtp.is* for further information.
23. See *www.unulrt.is/en/home* for further information.
24. See *www.unuftp.is/en/home* for further information.
25. Iceland's exports to China (mostly seafood) reached ISK 7.65 billion (USD 61.2 million) in 2012, up 41% from 2011. Its imports from China reached ISK 42.6 billion (USD 340.8 million), up 21% from 2011 (Ministry for Foreign Affairs and External Trade, 2013).
26. For example, the FTA between EFTA and Canada, which entered into force in July 2009, included the following wording in its preamble: "RECOGNISING the need for mutually supportive trade and environmental policies in order to achieve the objective of sustainable development". It also included a reference to the environment among the exceptions to obligations under the agreement, stating: "The Parties understand that the measures referred to in Article XX(b) of the GATT 1994 include environmental measures necessary to protect human, animal or plant life or health, and that Article XX(g) of the GATT 1994 applies to measures relating to the conservation of living and non-living exhaustible natural resources" (Gallagher and Serret, 2010).

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