

Assessment and recommendations

The Assessment and Recommendations present the main findings of the OECD Environmental Performance Review of Luxembourg. They identify 40 recommendations to help the country make further progress towards its environmental objectives and international commitments. The OECD Working Party for Environmental Performance reviewed and discussed the Assessment and Recommendations on 25 February 2020 and approved them on 27 October 2020.

1. Key environmental trends

Due to its geographical location and size, Luxembourg is characterised by strong international and regional interdependence. Its economy is closely integrated with that of neighbouring countries and is a pole of attraction in the Greater Region.¹ With few exploitable natural resources other than forests, Luxembourg depends on external markets for its energy and raw material supplies. Until the health crisis due to COVID-19, economic growth has been sustained, driven by the financial sector. Services generate 87% of value added, compared to 73% on average in OECD countries (OECD, 2020). Luxembourg is also very densely populated compared with the OECD average. The population has grown significantly since 2005 (+28%) and is expected to continue growing in the coming years. In addition, there are more than 200 000 cross-border workers in the Grand Duchy, representing 44% of the country's labour force.

These characteristics influence levels and patterns of production and consumption (energy, transport, water, land, materials, consumer goods) and housing and infrastructure needs. The resulting pressures on the environment are numerous and strong; some present a challenge, but also represent opportunities for government action. Urban sprawl, landscape fragmentation and the importance of cross-border road traffic entail major social costs, particularly in terms of greenhouse gas (GHG) emissions, air and noise pollution, traffic congestion and ecosystem degradation.

Since 2010, progress has been made in decoupling several environmental pressures from economic growth (e.g. GHG and air pollutant emissions; waste generation; energy consumption; water abstractions) and in wastewater treatment. However, progress remains insufficient to restore a natural environment conducive to biodiversity conservation and to alleviate the growing pressures of demographic development and urbanisation. The economic and institutional context is conducive to further environmental advances and should enable Luxembourg to adopt a greener and more inclusive economic model.

Transition to a low-carbon and energy-efficient economy

Climate and energy policies are closely linked. They are supported by many projects and initiatives in line with European Union (EU) policies, financial aid and information campaigns. The targets are ambitious and progress has been made since the 2010 OECD Environmental Performance Review (EPR) (OECD, 2010). To enable municipalities to play an active role in the fight against climate change and to optimise their energy use in return for financial support and technical assistance, the government has put a Climate Pact in place. An Integrated National Energy and Climate Plan was submitted to the European Commission (EC) in early 2019. The final plan, integrating the EC's comments, was to be submitted with a slight delay in April 2020. To strengthen the governance and effectiveness of national climate policy, Luxembourg is also preparing a framework law on climate change. This law, whose draft was adopted by the Government Council at the end of November 2019, provides an opportunity to enshrine in legislation GHG mitigation targets and other Paris Agreement commitments, as well as related obligations arising from European climate legislation.

Luxembourg is on track to meet its 2020 energy efficiency targets, but will need to redouble its efforts to meet the 2030 targets

The reduction in energy consumption, particularly in transport and industry following the financial crisis of 2008, puts the country on track to meet its energy efficiency targets under the Europe 2020 strategy. Consumption has fallen by 11% since 2005, much more than the OECD average, and energy intensity has improved (Figure 1). The policies put in place have made it possible to reduce household consumption despite the country's population growth. Transport remains the largest energy consumer, due to the importance of fuel sales to non-residents (cross-border workers, inhabitants of border regions, goods vehicles and private cars in transit). Energy consumption started to rise again in 2016, particularly in transport (IEA, 2020). This shows that current efforts must be maintained and even strengthened to meet

the 2030 energy efficiency targets in a context of sustained economic growth and low energy prices, combined with high purchasing power.

The energy mix is still dominated by fossil fuels

Fossil fuels, mainly oil and natural gas, continue to dominate (78%) the *energy mix*. Their share, which was 91% in 2005, has however decreased in favour of electricity imports and renewable energies. Measures in place to promote renewables have stimulated biogas production from biomass and waste, which has doubled between 2010 and 2018. However, the share of renewables in gross final consumption remains relatively low (9.1% in 2018) compared to the country's 2020 target of 11% (IEA, 2020). To meet the 2020 target, the country uses the co-operation agreements provided in the EU's Renewable Energy Directive. These "statistical transfers"² allow countries that have already reached their target to transfer any accounting "surplus" of renewable energy to other countries with a deficit. Luxembourg is also still far from the target of 10% renewables in transport by 2020 (6.5% in 2018), which calls for targeted measures in this sector (Section 4).

National targets to reduce the country's high carbon intensity are ambitious

GHG emissions decreased between 2005 and 2017, due to a shift in the energy mix towards less emitting fuels, and to lower fuel sales to non-residents. However, the carbon intensity of Luxembourg's economy remains high and emissions are rising again. Luxembourg is the fourth largest per capita emitter of GHGs in the OECD; the transport sector is responsible for more than half of these emissions, particularly due to the high share of diesel (78%) in road fuels. The residential sector remains an important source of emissions due to continued population growth and the share of fossil fuels, especially oil for heating. The commercial sector is increasing the most due to the development of services and economic growth (Figure 1).

To achieve its GHG emission reduction target for 2008-12 (-28% compared to 1990), Luxembourg had to make use of the flexibility mechanisms provided for in the Kyoto Protocol, despite an important drop in emissions in the 1990s. Projections indicate that in the absence of strengthened policies and measures, these mechanisms may again be needed to meet current and future targets for emissions not covered by the EU Emissions Trading System (EU ETS)³: a 20% reduction in 2020 compared with 2005, and a 40% reduction in 2030 compared with 2005. As part of the draft Integrated National Energy and Climate Plan for the 2021-30 period, Luxembourg has set an even more ambitious target, namely a 50-55% reduction of non-EU ETS emissions in 2030 compared to 2005. By 2050, the aim is to achieve climate neutrality. The high level of these ambitions demonstrates a strong political will that must be translated into equally strong concrete measures, without losing sight of the objectives in the fields of energy, air quality and mobility. As the EU ETS covers only 15% of Luxembourg's emissions, efforts must rely mainly on domestic policies in transport, the residential and commercial sector, and agriculture (AIE, 2020).

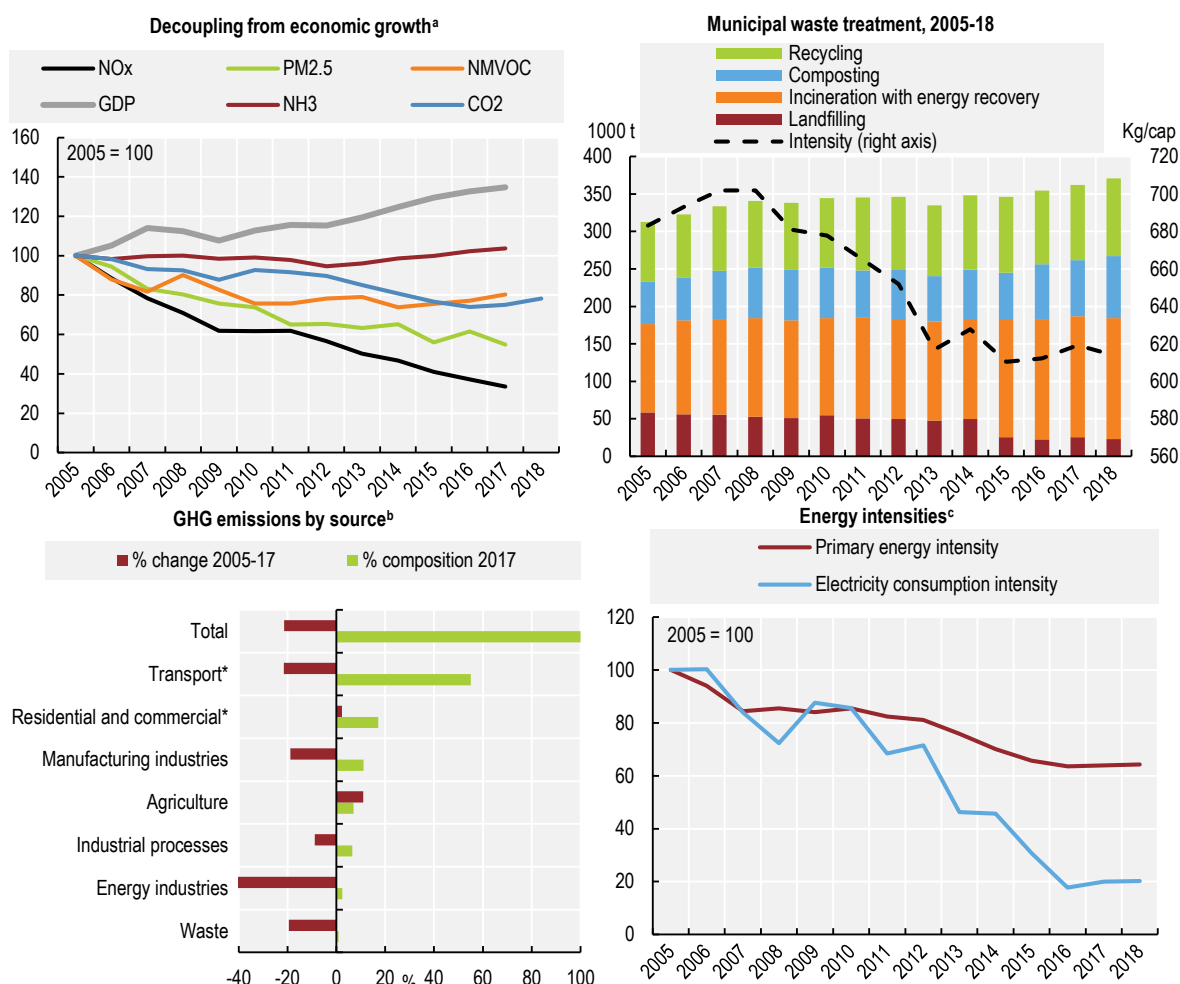
The implementation of climate change adaptation measures should be systematically monitored

Luxembourg is experiencing the impact of climate change, with higher average annual temperatures and more frequent extreme weather events. Flash floods caused a lot of damage and important economic impacts in 2016 and 2018; in August 2019, a tornado damaged the southwestern part of the country and temperatures reached 40.8°C. Scientific forecasts indicate that this trend will intensify. The National Climate Change Adaptation Strategy was revised and expanded in 2018. It identifies the sectors affected by climate change and presents priority actions. The strategy needs to be complemented by a monitoring framework to oversee implementation of adaptation measures. It has also to be noted that despite a highly developed financial sector, insurance instruments do not take adaptation into account as an incentive to invest in risk prevention.

A good decoupling of air pollutant emissions from economic growth, but efforts are needed to meet the 2030 reduction targets

Luxembourg has succeeded in decoupling emissions of the main air pollutants from economic growth: carbon monoxide (CO), sulphur oxides (SO_x), nitrogen oxides (NO_x), fine particulate matter (PM_{2.5}), non-methane volatile organic compounds (NMVOC) (Figure 1). Emission reductions are mainly due to the economic crisis of 2008, but also to stricter standards and more efficient technologies in road transport. To comply with the emission ceilings established at European level for 2020 and 2030, Luxembourg will however have to step up its efforts; projections indicate emissions of NO_x, NMVOC, PM_{2.5} and ammonia (NH₃) higher than the ceilings granted. Measures to reduce NH₃ emissions will have to focus on agriculture, which generates 96% of emissions and determines emission trends, on the rise since 2012.

Figure 1. Selected environmental performance indicators



a) CO₂: emissions from fuel combustion. GDP expressed at 2010 prices and purchasing power parities.

b) Total excludes emissions from land use, land use change and forestry. It includes emissions from non-residents. The category "Residential and commercial" also includes fugitive emissions.

c) Primary energy intensity refers to total primary energy supply excluding electricity trade.

Source: OECD (2019), "Air and climate: Air emissions by source", *OECD Environment Statistics* (database); IEA (2019), "Detailed CO₂ estimates", *IEA CO₂ Emissions from Fuel Combustion Statistics* (database); IEA (2019), "World energy statistics", *IEA World Energy Statistics and Balances* (database); OECD (2019), "Waste: Municipal waste", *OECD Environment Statistics* (database); OECD (2019), "Air and climate: Greenhouse gas emissions by source", *OECD Environment Statistics* (database); OECD (2019), "Aggregate National Accounts, 2008 (or SNA 1993): Gross Domestic Product", *OECD National Accounts Statistics* (database).

Air quality has generally improved over the past decade. Average population exposure to PM_{2.5} has decreased by 17% since 2005; it is below the limit value set by EU legislation, but still slightly above 10 micrograms per cubic metre (µg/m³), the maximum value recommended by the World Health Organization (WHO) for long-term exposure. The annual average concentrations of particulate matter (PM₁₀) and NO₂ have decreased and are below the daily limit values set by the EU (EEA, 2018). NO₂ concentrations, however, still exceed the annual limit value at critical locations with heavy traffic (City of Luxembourg and surrounding areas). The target values and long-term objectives for ozone (O₃) concentrations are exceeded in rural Luxembourg. This calls for additional efforts to combat pollution in co-ordination with actions in favour of sustainable mobility and increased energy efficiency (Section 4).

Transition to efficient materials and waste management

Luxembourg has few natural resources and largely depends on external markets for its supply of materials. Only 15% of the materials consumed in the country come from the country's natural resources. The relatively high standard of living, the sustained growth of the economy with the daily presence in the country of many cross-border workers and the development of infrastructure generate relatively high consumption of materials and production of waste.

Material consumption is high and generates large amounts of waste

Contrary to the OECD average, domestic material consumption (DMC) has been increasing since 2012. It consists mainly of construction materials, fossil fuels and biomass. Material productivity is among the highest among OECD countries. For 1 tonne of materials consumed, Luxembourg generates approximately USD 3 800 or EUR 3 400 of economic wealth in terms of gross domestic product (GDP) compared with an average of EUR 2 000 in the EU or USD 2 600 in the OECD. Material intensity per capita is high, in particular because of material consumption in Luxembourg by cross-border workers who are not accounted for in national population statistics. A person living in Luxembourg consumes on average 24 tonnes of materials per year. This occurs either in the form of consumer goods or in the form of raw or manufactured materials used in industry or in other sectors of the economy, such as construction or energy production. This level of consumption is well above the OECD average (15 tonnes per capita) and is the source of significant amounts of waste. In 2016, waste generated in the country accounted for almost 75% of materials consumed, with a higher per unit of GDP rate than in most OECD countries.

Luxembourg pursues an active waste and materials management policy

Optimising the use of resources available on the national territory and establishing a circular economy are therefore essential for the country's development. For many years, Luxembourg has pursued *an active waste and materials management policy* focused on prevention, recovery of high-quality materials and the use of secondary raw materials in the economy. It has a comprehensive regulatory framework and a detailed and ambitious Waste and Resource Management Plan (PNGDR) (the latter was adopted in 2018). This will be complemented by a zero waste strategy and a circular economy strategy. The WRMP includes ambitious targets for waste prevention, reuse and recycling, and for reducing landfilling (MDDI, 2018). It brings the targets of the EU directives for 2025, 2030 and 2035 down to 2022 [recycling rate of municipal waste (55%), recycling rate of packaging waste (at least 70%), landfilling of municipal waste (reduced to 10%)]. This is complemented by training, individual consultancy advice and certification programmes for companies within the framework of the SuperDrecksKëscht© and by numerous information and awareness-raising actions. A first extended producer responsibility system was introduced in 2003. It has gradually been extended and now covers end-of-life vehicles, batteries and accumulators, waste electrical and electronic equipment, and packaging.

Additional efforts are required to maintain a high performance and establish a circular economy

Luxembourg has continued to make progress in implementing its waste management policies and has achieved almost half of its waste management targets (recycling and recovery rates for packaging waste, end-of-life vehicles, and waste electrical and electronic equipment). Other advances include the establishment of areas dedicated to separate collection in residential buildings and supermarkets and on construction sites, and the implementation of food and plastic waste prevention measures (Ecobox, Eco-Sac [Eco Bag]). There has, however, been a slowdown in progress since the last OECD review. Not all measures recommended in the 2010 Waste Management Plan have been implemented; some targets have not been met (the reduction of bulky and infectious waste). Little progress has been made in applying the polluter-pays principle, partly due to the reluctance of some inter-municipal associations and municipalities to establish harmonised cost-recovery systems that take into account the amount of waste for disposal (pay-as-you-throw). The level of recovery of municipal waste (recycling and composting), which had increased in the 2000s, has stagnated at around 50% since 2012 (Figure 1). This reveals an untapped recovery potential. This is especially the case for organic waste, plastics, paper and cardboard, which still account for two-thirds of the mixed waste collected for disposal.

Further efforts are therefore necessary to maintain a high performance and to succeed in the transition to a circular economy. This will need to include measures to encourage municipalities to better co-ordinate their actions, measures to better exploit the stock of materials still contained in mixed household waste, and economic incentives for residents to use the separate collection systems available to them. This is essential to achieve the recycling rate target of 55% of municipal waste by 2022. The application of extended producer responsibility could also be further exploited by extending it to other types of waste such as tyres, furniture or coffee capsules. The implementation of a circular economy will need to encompass measures further upstream of the material value chain. It will also need to draw on synergies with other measures, particularly those concerning the development of environmental technologies and green public procurement. Finally, it must be accompanied by corresponding investment choices. It could be supported by a platform for businesses, banks and other stakeholders to meet and co-operate more widely. The "circular economy" component recently added to the Climate Pact could be used to encourage municipalities to develop initiatives in this area in line with waste objectives and the other components of the pact.

Transition to efficient management of natural resources

A good quantitative management of water resources

Trends show good quantitative management of water resources. Luxembourg has a lower level of renewable fresh water per capita than most OECD countries, but it is not under water stress. Per capita water abstractions are relatively low, but these are projected to increase as a result of population growth, continued economic growth and an expected increase in irrigation. This could be critical during periods of high consumption. This is all the more important as natural groundwater recharge has been largely deficient in the years 2016, 2017 and 2018, resulting in relatively low aquifer levels. The country is also prone to flooding. To ensure the security of drinking water supply, the government is launching water conservation projects for major infrastructure projects. It also intends to strengthen the protection of resources and catchment points, and to assess the potential for using surface water in combination with groundwater.

Insufficient progress in water quality management

With regards to water quality management, Luxembourg has made up for the backlog in wastewater treatment. It completed the infringement procedure launched by the EC to the European Court of Justice for failure to comply with the requirements of the corresponding European directive. Major investments in

the modernisation and extension of the network of treatment plants have been made since 2014. Today all residents are connected; 77% benefit from advanced wastewater treatment. It is further planned to equip the country's main wastewater treatment plants with a fourth level of treatment by 2023, allowing the treatment of micro-pollutants and the elimination of micro-plastics. The wastewater discharge tax is relatively low and does not provide sufficient incentives to reduce the pollution load of discharged water.

Assessments show that the ecological quality of surface waters has improved on average since 2009, but falls short of the results obtained in other countries. This is due particularly to poor hydro-morphological quality, which renaturation efforts aim to restore (Section 5). In 2015, only 3% of natural surface water bodies were classified as being in a "good ecological state" (compared to more than 35% on average in the EU). None of the surface water bodies assessed were in a good chemical state, mainly due to ubiquitous substances. Achievement of the quality objectives set in the EU Water Framework Directive for 2015 has been postponed to 2027. These results can be explained by delays in the implementation of measures foreseen in the water management plans, as well as a lack of coherence between water and agricultural policies. Nutrient surpluses (nitrogen and phosphorus) and pesticides from agricultural sources indicate a risk of soil, water and air pollution (Section 5). Despite declining phosphorus surpluses, stable nitrogen surpluses and a general improvement in nitrate pollution, the latter remains a problem in areas with intensive livestock and dairy farming (EC, 2018). To make farmers more accountable for managing inputs, water and biodiversity, Luxembourg should review the environmental effectiveness of the different economic instruments that apply to agriculture and prepare guides to help farmers adopt more sustainable practices.

Strong pressures on land and biodiversity

Both built-up areas and those occupied by infrastructure have increased in response to demographic and economic growth. This development inhibits the natural functions of soils, contributes to the fragmentation and degradation of natural habitats, and intensifies pressure on biodiversity, which has been in decline for over 40 years (Section 5). The National Plan for Nature Protection (2007-11 and 2017-21) defines national priorities and establishes collaboration between the government and municipalities in certain sectors. The mixed results of the first plan led the government to adapt the national strategy and to adopt more targeted and assessable measures, in line with budgetary and human resources, and to strengthen interdepartmental co-operation.

Progress has been made in identifying areas belonging to the Natura 2000 network, which has paved the way for the creation of specific management plans. However, efforts have not been sufficient to improve the conservation status of habitats and species. One in four known species is threatened. Plants associated with agricultural environments are most at risk of extinction (Section 5).

Box 1. Recommendations on the management of emissions (air and climate), waste and water

Climate and energy

- Adopt the climate framework law as soon as possible; ensure that it includes binding GHG reduction targets and adequate institutional review systems and stakeholder consultation mechanisms; consider incorporating the commitments of the Paris Agreement on financial flows, as well as carbon pricing, into the law.
- Develop scenarios for achieving the 2030 renewable energy and energy efficiency targets, bearing in mind air quality and climate objectives; specify the contribution of each sector to

these objectives, in particular the contribution of current and planned transport measures to reducing road fuel consumption.

- Develop a framework for monitoring the implementation of the Climate Change Adaptation Strategy; ensure that climate change impacts and resilience are duly taken into account in environmental impact assessment (EIA) and strategic environmental assessment (SEA) procedures; include climate risks in insurance products.

Waste and materials management

- Continue implementing the national WRMP; step up efforts to increase the recycling rate of organic, plastic, paper and cardboard waste and to better exploit the stocks of materials in mixed municipal waste; expand the types of products covered by extended producer responsibility: tyres, coffee capsules, furniture, etc.
- Step up efforts to introduce harmonised pricing for municipal waste management throughout the country, taking into account the actual amounts of waste to be disposed of, and encourage municipalities to better co-operate and co-ordinate their actions.
- Adopt a circular economy strategy that sets out the responsibility of each ministry and stakeholder and establishes an implementation roadmap; seek synergies with the development of environmental technologies and green public procurement (GPP); establish a platform for businesses, banks and other stakeholders to meet and co-ordinate their actions.

Water management and agricultural inputs

- Accelerate the implementation of measures to preserve and improve water quality and continue to provide adequate financial and human resources; revise the wastewater discharge tax to strengthen its incentive function; secure the supply of drinking water by applying a more rigorous preventive approach, for example by banning phytopharmaceuticals in sensitive areas.
- Improve the coherence and integration of environmental and agricultural policies; assess the economic and environmental effectiveness of agricultural subsidies; consider introducing taxes or bans on fertilisers and pesticides to help reduce their impact on water and soil quality, biodiversity and human health; encourage the adoption of sustainable agricultural practices by updating the guide on good agricultural practices.

2. Environmental governance and management

Luxembourg has made progress in implementing environmental management recommendations of the 2010 EPR. It has improved co-ordination between the central and local governments and significantly strengthened environmental education. However, more remains to be done with regard to access to environmental information, implementation of SEA and policy evaluation.

Strong environmental authorities need more coherence with other ministries and communes

Three administrations (Environment, Water Management, and Nature and Forest) under the Ministry of Environment, Climate and Sustainable Development (MECDD) perform regulatory and monitoring functions. They have a modern, task-based organisational structure, which increases their efficiency. An issue-specific interagency co-ordination committee oversees implementation of each major environmental law. However, an effective whole-of-government approach to sustainable development could be reinforced, as sectoral interests impede better inter-ministerial collaboration.

Local governments (communes) enjoy substantial autonomy in land-use planning and delivery of environmental services, leading to different practices across the country. Many communes are members of water and/or waste management associations, which are key interlocutors for the central government on local environmental matters. Co-ordination between the central government and communes is challenging, but improving. In addition to routine consultations on draft regulations and strategic plans, the environment ministry has published guidance for communes on several topics to promote good practices. The government also supports local initiatives such as the Climate Pact.

Environmental assessment of policies, spatial plans and regulations requires improvement

Luxembourg's environmental legislation is fully aligned with EU directives and has continued to evolve in such important domains as waste management and nature protection. However, regulatory impact assessment of draft non-environmental laws and regulations does not consider environmental impacts and benefits. The "sustainability check" developed as a tool for such analysis has not yet been implemented. Cost-benefit analysis is not used to evaluate environmental policies, plans and programmes. SEA is undertaken for multiple land use and sectoral plans, but is often superficial and not followed up during their implementation. Ex post evaluation is not consistently used as a management tool.

The system of spatial planning at the national and communal levels is quite complex. It combines strategic, sectoral and locality-specific national plans, as well as two categories of communal land-use plans. Communal plans are not always aligned with national ones and do not sufficiently integrate environmental considerations – they are seldom subject to SEA in their entirety.

Compliance promotion and monitoring are insufficient

Few instances of serious environmental non-compliance are detected. However, few inspections are conducted as a result of the low resources that the government dedicates to compliance monitoring. This means that compliance by classified establishments may be overestimated. Better balance is needed between reaction to complaints (the main trigger for inspections) and proactive risk-based inspection planning. In addition, collaboration in compliance monitoring between the administrations responsible for environment, water and nature protection could be improved. There are some voluntary business initiatives and small incentives for environmental management certification, but more needs to be done to promote compliance and green practices.

In line with a global trend, Luxembourg has recently introduced administrative fines for less serious environmental infringements. However, their use remains minimal. Expanded availability of administrative fines would allow inspectors to use monetary penalties more without resorting to criminal enforcement. In addition, the rates of both administrative and criminal penalties are too low to have a deterrent impact.

There is strict liability for damage to the environment, but financial guarantees against such damage are systematically required only for installations covered by the Industrial Emissions Directive, those treating waste and those storing large amounts of hazardous substances. As part of the implementation of the liability regime, the much-needed new law on soil protection and management of contaminated sites would require the government to develop a remediation programme, a move recommended by the 2010 EPR, but still lacking. Adoption of the law, however, has been delayed.

Environmental information should be more accessible

The country is quite advanced in matters of environmental democracy. Public participation is part of EIA and permitting processes, as well as of the development of sectoral strategic plans, which is a good practice. The administrative justice system is also accessible. Significant efforts have been made in the last decade to improve environmental and sustainable development education.

Access to environmental information is legally guaranteed, but information is not always easily available or user-friendly. Luxembourg has not published a state of the environment report since 2003.

Box 2. Recommendations on environmental governance and management

Strengthening the institutional and regulatory framework

- Reinforce institutional co-ordination to achieve coherent sustainable development policies across the central government and harmonised implementation practices at the local level.
- Introduce environmental aspects into the assessment of draft laws and regulations, including via the “sustainability check”; apply cost-benefit analysis in *ex ante* evaluation of environmental policies and legislation; expand the use of their *ex post* evaluation.
- Ensure consistent application of SEA to all communal land-use plans and their better alignment with national sustainable development policies through increased co-ordination between the ministries responsible for the environment, spatial planning and local government.

Improving compliance assurance

- Enhance resources dedicated to compliance promotion and monitoring; increase the number of proactive risk-based inspections; reinforce collaboration between the three environmental administrations through an integrated compliance assurance strategy.
- Expand the use of administrative fines, while ensuring their proportionality to the gravity of infringements; review the levels of administrative and criminal fines to increase their deterrent impact; provide guidance to inspectors on imposition of sanctions.
- Adopt the draft law on soil protection and management of contaminated sites; establish a programme for remediating contaminated sites, including abandoned ones.

Enhancing environmental democracy

- Improve the user-friendliness of environmental information and its full accessibility for the public, including regular publication of a state of the environment report and related indicators, as well as inspection reports; ensure that sufficient resources are available for dissemination of environmental information.

3. Green growth

Luxembourg is one of the most dynamic economies in the OECD and its growing population enjoys a high quality of life. However, the country’s economic model has started to show its environmental and social limits. Luxembourg needs to accelerate its ongoing efforts to diversify its economy towards a greener and more inclusive model that puts people’s well-being and the respect for the natural environment at the heart of policy making. The 2016 strategic study “Third Industrial Revolution” is a good basis to continue on the path towards economic diversification. It provides a foundation for exploiting the synergies between environment and innovation, digitalisation, circular economy, renewables and energy efficiency, as recommended by the 2010 EPR. This is all the more necessary to ensure an environmentally and socially sustainable recovery from the economic impact of the COVID-19 pandemic. To this end, Luxembourg should convey strong and consistent price signals, remove potentially harmful incentives (especially in the transport sector) and further promote innovation.

Luxembourg has a comprehensive framework for sustainable development

Luxembourg has a sound legal and institutional framework to co-ordinate the national policy on sustainable development and monitor its implementation. In 2017, it presented the voluntary review of the implementation of the Sustainable Development Goals (SDGs) to the United Nations (UN) High-level Political Forum on Sustainable Development. In December 2019, the government adopted the third National Plan for Sustainable Development (PNDD), which was developed through a broad participatory process. The plan is inspired by the UN Agenda 2030 and encompasses the SDGs. However, as in all OECD member countries, ensuring policy coherence and effective integration of environmental considerations into sectoral policies remains a challenge. Insufficient policy co-ordination is more evident in the transport, housing and agriculture sectors and fiscal policy. Systematic and thorough implementation of the “sustainability check” of proposed legislation and regulations (Section 2), as foreseen by the PNDD, could help improve policy coherence.

There is scope to green the tax system and remove harmful incentives

Road fuel sales to non-residents are the main source of environmentally related tax revenue

Luxembourg has made little use of its tax system to achieve environmental objectives. Environmentally related taxes are levied on energy products, vehicles and water abstractions and polluting discharges. Taxes on energy products, mostly road fuels, make up more than 90% of environmentally related tax revenue. They have traditionally represented an important source of revenue in Luxembourg. This reflects the large amounts of fuel exports to heavy-duty vehicles in transit, daily cross-border commuters and, to a lesser extent, fuel tourists induced by lower tax rates than in neighbouring countries. When considering fiscal revenue, employment and income generated by petrol stations and related services, estimated economic benefits of fuel sales amount to EUR 2 billion per year. However, the estimated environmental and health costs are much higher. They are put at EUR 3.5 billion per year, three-quarters of which are from fuel exports (Ewringmann, 2016).

Declining world oil prices in 2012-16 partly eroded Luxembourg’s fuel price advantage and the incentive to travel the extra time and distance just to refuel in the country. This, together with some tax adjustments in neighbouring countries, resulted in decreasing fuel exports and associated tax revenue in the same period (Ewringmann, 2016). Fuel sales and related tax revenue have increased again since 2017. Nevertheless, revenue from environmentally related taxes declined to 4.5% of tax revenue in 2018, below the 6.3% average of OECD Europe countries. This is a marked drop from the second half of the 2000s. At that time, revenue from these taxes accounted for a larger share of tax revenue than in most OECD Europe countries.

Experience shows that tax revenue from fuel exports is not stable, as well as being environmentally questionable. Gradually increasing fuel tax rates to bring them closer to those of neighbouring countries is necessary. This would bring benefits in terms of reduced fuel consumption, GHG emissions, air pollution and congestion, although it could result in substantial revenue losses. Luxembourg’s resilience to declining fuel tax revenue in 2012-16 suggests that such losses could be relatively easily addressed. As indicated in the 2010 EPR, Luxembourg would benefit from a broader tax reform to make its tax and benefit system more coherent with the sustainable development ambition of the country. Such reform should coherently consider energy taxes and carbon pricing, taxation of vehicles and road use (Section 4) and levies directly aimed at reducing air, water and soil pollution (Section 1).

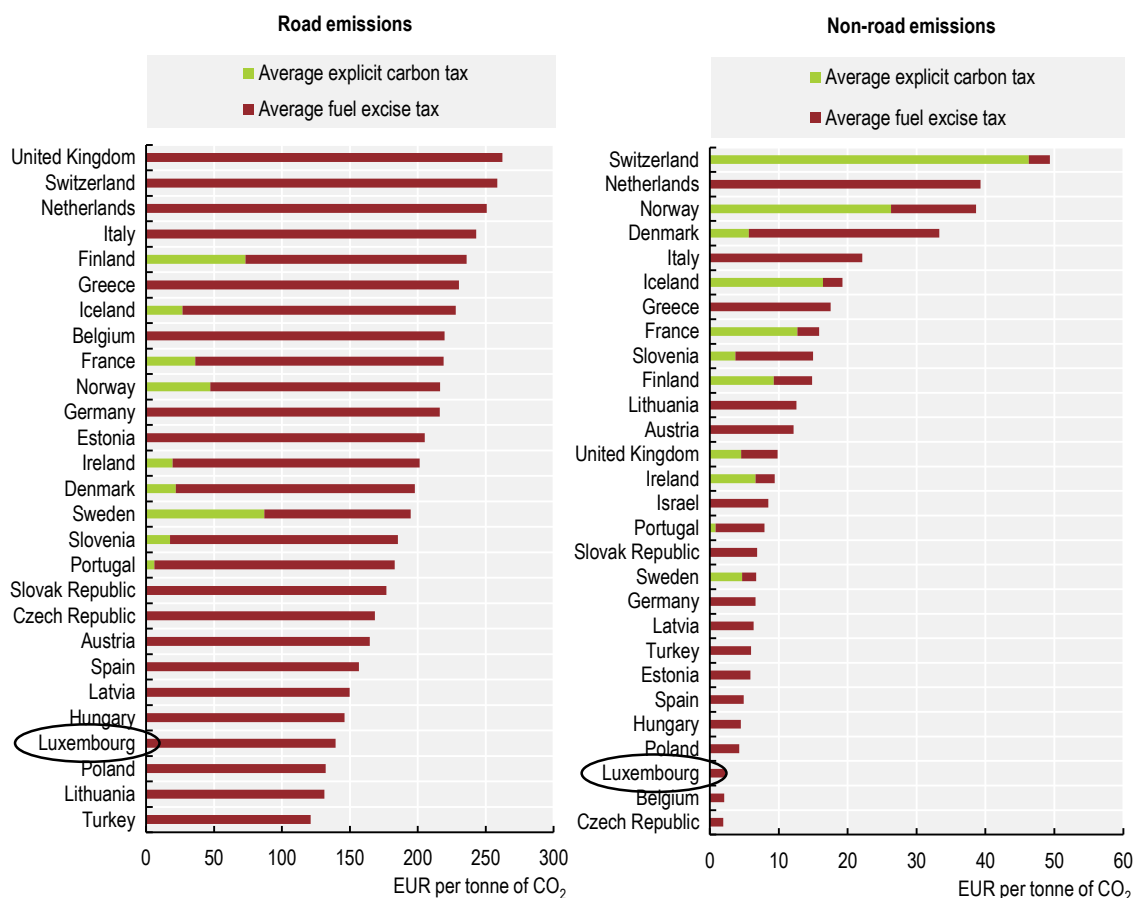
The carbon price signal is weak

Luxembourg puts a price on GHG emissions via energy taxes and participation in the EU Emissions Trading System (EU ETS). The EU ETS covers only about 15% of domestic emissions, due to the country’s

service-based economy, largely imported electricity and major share of emissions from transport (Section 1). Most CO₂ emissions are priced via energy taxes, which are low and subject to several exemptions (see below). Effective tax rates on energy-related CO₂ emissions are among the lowest in OECD Europe (Figure 2; OECD, 2019a). In addition, the average tax rate on CO₂ emissions from fuels used in sectors other than road transport is just above EUR 2 per tonne of CO₂. This rate is well below EUR 30 per tonne of CO₂, the low-end benchmark of the climate costs of CO₂ emissions, which is not sufficient to meet the objectives of the Paris Agreement (OECD, 2019a). The 2019 National Energy and Climate Plan foresees the introduction of specific carbon pricing as from 2021. The initial price of EUR 20 per tonne of CO₂ would be gradually increased. This is a welcome announcement.

Figure 2. Effective carbon tax rates are among the lowest in OECD Europe

Effective tax rates on CO₂ emissions from energy use in the road and non-road sectors, OECD Europe, 2018



Note: 2018 tax rates as applicable on 1 July 2018.

Source: OECD (2019), *Taxing Energy Use 2019: Using Taxes for Climate Action*.

StatLink  <https://doi.org/10.1787/888934168702>

Tax discounts for fuel use run counter to energy savings objectives

The low cost of energy provides little incentive to invest in renewables and energy efficiency (IEA, 2020), and to move towards sustainable mobility. The government committed to increase tax rates on road fuels. After nearly seven years of stable tax rates, excise rates on road fuels increased in May 2019. New hikes were announced as from the first half of 2020, with a higher increase for diesel than for petrol. This is a step in the right direction, although such increases do not appear sufficient to discourage non-residents,

and primarily heavy-duty vehicles in transit, to refuel in Luxembourg. Energy taxes should be increased further. In particular, Luxembourg should consider raising the diesel excise rate to match the petrol rate. More broadly, Luxembourg should review the mix of taxes and charges in the transport sector (fuel taxes, vehicle taxes and subsidies, taxation of company cars and commuting allowances, and road charges), to make it consistent with the objective of sustainable mobility (Section 4).

Little progress has been made to follow up on the OECD recommendation to identify and remove environmentally harmful subsidies and tax provisions (OECD, 2010). Energy products used in sectors such as farming, electricity generation and heating still benefit from total or partial exemptions from excise duties, as well as a reduced rate of the value added tax (VAT). This further undermines the carbon price signal and the government's efforts to improve energy efficiency and reduce CO₂ emissions across the economy.

The government commissioned a study to identify and quantify environmentally harmful subsidies. The 2018 study identified seven types of such subsidies in Luxembourg. These included reduced excise and VAT rates on energy products, the tax disparity between diesel and petrol, and the favourable tax treatment of company cars and commuting expenses. Overall, the annual cost of these subsidies is estimated to vary between EUR 750 million and EUR 1 billion (Ewringmann and Deloitte Tax & Consulting, 2018). Luxembourg should build on this study to establish a process for the systematic review and screening of potentially environmentally harmful subsidies.

Promoting eco-innovation is, and should remain, a priority

Increased policy focus and investment in eco-innovation have yielded results

The 2016 Third Industrial Revolution study and the 2017 Research and Innovation Smart Specialisation Strategy identify clean technology and the circular economy among key policy priorities on the path towards the country's economic diversification. Eco-innovation and the circular economy are integrated into innovation promotion programmes, such as the Fit4Circularity programme.

With increased public funding for research and development (R&D), Luxembourg has acquired a specialisation in environmental technology in recent years. It spends 3.6% of the government R&D budget on environment-related R&D, putting it among the top ten OECD member countries. Patent applications for environment-related technology reached 12% of all patent applications in 2014-16. The clean technology sector is relatively small, however. Its contribution to the future of Luxembourg's economy is difficult to assess (ODC, 2018). While Luxembourg should continue to support environment-related R&D, it should systematically evaluate the efficiency and environmental effectiveness of its support programmes.

Higher demand is needed to expand the markets for cleaner goods and services

Compared to the EU average, slightly more small and medium-sized enterprises (SMEs) design and produce greener products in Luxembourg. However, the country's SMEs have a lower propensity to invest in improving their environmental performance than on average in the EU, with the exception of investment in recycling and renewables. The environmental goods and services sector remains small. It accounted for about 2% of gross added value in 2008-16.

The small domestic market and still low demand for cleaner technology, products and services are the main barrier to eco-innovation. Measures such as the subsidies for electric cars and bicycles (Section 4) and the nearly zero-energy building standard for new buildings help stimulate demand for cleaner transport and building solutions. The campaign and label "Clever akafen" (Smart shopping) is a good practice to encourage environment-friendly consumer choices. However, more efforts are needed on the demand side, primarily to ensure that prices of energy and of water and waste services adequately reflect the environmental and social costs of resource use and pollution. A clearer GPP policy would also help. While

the public procurement law encourages contracting authorities to look at environmental criteria, these are not mandatory and there are no GPP targets (EC, 2019).

Effectiveness of support for environment-related investment could be enhanced

Luxembourg provides various forms of financial support to environment-related investment by local governments, companies and individuals. Some State aid has been increased as part of the fiscal stimulus to help the economy recover from the consequences of the COVID-19 pandemic. The MECDD manages three investment funds for climate and energy, environmental protection and water management. However, the environmental effectiveness of projects financed by these funds is not evaluated *ex post*. There is a risk of using public funds to finance projects that provide few, if any, additional environmental benefits.

Luxembourg's policy focus on climate change mitigation has led to increasing subsidies to renewables and energy efficiency investment. Feed-in tariffs, premium tariffs and investment subsidies have contributed to the growth of renewable electricity generation (Section 1). In 2015-19, about EUR 20 million was disbursed to finance energy efficiency renovation of residential buildings under the flagship PRIME House grant programme. In 2017, Luxembourg launched the KlimaBank (Climate Bank) programme, which provides zero- or low-interest loans to households and companies for energy efficiency renovations. All municipalities have signed the Climate Pact, a co-operative agreement through which local governments commit to implement certain environment- and climate-related measures out of a catalogue of 79. In return, they receive government financial and technical assistance, as well as an environmental certification.

It is not clear whether this public financial assistance is delivering energy savings and environmental benefits to the desired extent. The building renovation rate in Luxembourg is low, less than 1% in 2017 (IEA, 2020). There is a lack of interest in energy renovation, mainly due to the high cost of these projects, the overall pressure on the housing market, the complexity of administrative procedures and the nuisance caused by renovation works. Energy prices are too low to encourage renovation investment, especially when considering the high average income of households. Further efforts are needed to increase public awareness about support programmes, as well as to facilitate access to them.

Luxembourg is a green finance hub

The financial sector is a pillar of Luxembourg's economy. Since the first-ever green bond was listed on the Luxembourg Stock Exchange in 2007, the country has grown as a green finance centre. It established the Luxembourg Green Exchange in 2016, which lists nearly EUR 200 billion in green, sustainable and social bonds, or half of the world market. LuxFLAG, the Luxembourg labelling agency, launched the Climate Finance Label in 2016 and the Green Bond Label in 2017. These labels aim to improve the transparency of climate and green investment instruments and ensure investor confidence in this market. In 2018, Luxembourg adopted a legal framework for a renewable energy covered bond. The budget law for 2020 provides the legal basis for the issuance of government sustainable bonds.

The government committed to implement the recommendations of the 2018 Luxembourg Sustainable Finance Roadmap, drafted in partnership with the UN Environment Programme. Under the joint leadership of the environment and finance ministers, it established the Luxembourg Sustainable Finance Initiative to develop a national green finance strategy. Ultimately, the strategy aims to provide a framework to accelerate the development of green and sustainable finance to help meet the goals of the Paris Agreement and, more broadly, the SDGs. This would provide a coherent umbrella to the multiplicity of initiatives.

Luxembourg has adopted a multi-stakeholder approach to green finance, with a strong focus on public-private green finance initiatives and partnerships. The vast majority of initiatives focus on investment to mitigate climate change. Examples include the Forestry and Climate Change Fund, the International

Climate Finance Accelerator and the joint Luxembourg-European Investment Bank Climate Finance Platform. Other environmental issues, including biodiversity conservation, water, pollution and circular economy, deserve more attention. In addition, Luxembourg could further exploit the synergies between financial technology (FinTech) and green finance.

It is difficult to measure the actual environmental impact of the investment funded through green finance instruments. There is a lack of indicators and monitoring measures that would ensure the credibility of financial products, measure their environmental impact and avoid “greenwashing”. There is also a need to develop a legal framework for considering environmental risks and impact in investment decisions. Asset managers and institutional investors are not required to disclose their exposure to climate risks. The financial and insurance market regulators do not have a mandate to assess the effects of climate change risks on financial stability, or to take actions to mitigate them.

The climate framework law (under discussion at the time of writing) offers an opportunity to enshrine in legislation the commitment under the Paris Agreement of “making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development” (Article 2.1c). In line with this commitment, the central and local governments could lead by example. For instance, they could pledge to measure, report and reduce the environmental and social impact of public investments, sovereign wealth funds and public pensions.

Luxembourg is a generous donor, but could reinforce the environmental component of its development co-operation

Luxembourg devotes 1% of its gross national income (GNI) to official development assistance (ODA), one of the few members of the OECD Development Assistance Committee to exceed the UN target of 0.7% of GNI. Helping developing countries mitigate and adapt to climate change is a priority, which translates to a high level of financial commitment. Luxembourg pledged EUR 120 million in 2014-20 and EUR 200 million in 2020-25 to support developing countries’ climate actions. These funds come on top of ODA. Excluding international climate finance, about one-third of bilateral aid has environmental protection as a primary or significant objective, which is relatively low compared to other donors. Luxembourg launched a revision of its aid database to better assess the allocation of bilateral aid for environmental protection and make more accurate comparisons between countries. There is also scope to further harness the potential of Luxembourg’s strong financial centre to leverage private finance for development (OECD, 2017).

The 2018 Development Co-operation Strategy is in line with the SDGs. In 2012, the Luxembourg Development Co-operation Agency developed guidance to consider environmental sustainability, together with the other cross-cutting dimensions (human rights and gender equality), in its development activities. Environmental issues are systematically assessed once projects have been identified. However, environmental opportunities and threats are not strategically considered during the elaboration of country-specific development programmes, and guidance for implementation is not sufficient (OECD, 2017). The agency plans to complement its guidance with environmental and social safeguards. There is also a need to strengthen capacity of authorities to mainstream the environmental and other cross-cutting dimensions into development activities.

Box 3. Recommendations on green growth

Greening the system of taxes and subsidies

- Progressively raise tax rates on energy products to ensure they reflect the environmental and other social costs of energy use in the framework of a broader reform of the tax and benefits system; in particular, raise the diesel excise rate to match the petrol rate, and continue to gradually reduce the tax gap with neighbouring countries.
- Follow through on the plan to introduce carbon pricing in sectors not covered by the EU ETS; ensure systematic monitoring of the effect of carbon pricing on energy use and GHG emissions and adjust prices as appropriate.
- Systematically monitor and assess subsidies and tax provisions to identify and remove those that are not justified on economic, social and environmental grounds.

Promoting eco-innovation and environment-friendly investment

- Continue to support environment-related R&D, with a focus on SMEs; systematically evaluate the efficiency and environmental effectiveness of R&D support programmes.
- Develop and implement a clear policy on GPP by integrating mandatory environmental criteria and targets into public procurement regulations.
- Streamline and better target public financial assistance for environment- and climate-related investment; ensure that financed projects are the most cost-effective and provide additional environmental benefits; conduct systematic ex post evaluation of the environmental impact of the financed projects, and assess their contribution to environmental, climate and energy targets.

Greening financial markets

- Develop a legal framework for taking environmental risks and impact into account in investment decisions, for example by extending the fiduciary duty of asset managers and institutional investors and requiring the financial and insurance market regulators to assess exposure to climate change risks and take actions to mitigate them.
- Consider integrating the commitment under Article 2.1c of the Paris Agreement into the climate framework law.
- Extend the focus of green finance initiatives “beyond climate” (e.g. to water, biodiversity and circular economy) and develop measures to fully exploit the potential of financial technology in greening financial flows.
- Develop official statistics and indicators for green and sustainable finance, with a view to monitoring the environmental impact of green finance products.

Mainstreaming environment into development co-operation

- Maintain the commitment to international climate finance and further increase environment-focused aid; strengthen guidance and capacity for the environmental mainstreaming of development co-operation activities; continue to explore opportunities for leveraging private funds for development.

4. Air quality and sustainable mobility

Luxembourg's economic attractiveness and geographical location represent a challenge

For several years now, Luxembourg has been facing constant increases in national, cross-border and international road traffic, problems of saturation of the road network and a growing need for mobility for professional and private purposes. Due to its geographical location, Luxembourg is a crossroads for goods traffic and a pole of attraction for employment in the Greater Region. More than 44% of jobs are held by cross-border commuters who live in neighbouring countries and commute daily. Added to this is an energy tax system that keeps road fuel prices below those of neighbouring countries and is the source of significant fuel exports (Section 3). About 70% of road fuels are sold for vehicles not registered in Luxembourg. Per capita fuel sales are thus several times higher than in other OECD countries. In the coming years, Luxembourg will continue to attract cross-border residents and workers, which risks further exacerbating problems of urban sprawl and congestion, and the environmental costs associated with them.

These developments represent a particular challenge for the government, which has been working for many years to reduce air emissions and improve public transit. Public transport in the City of Luxembourg is cheap compared with those in cities of a similar size in other countries, and for several years now it has been free on certain weekends. Significant investments have been made in the development of rail infrastructure, the creation of park-and-ride facilities and multimodal platforms, as well as the purchase of low-emission buses. Despite this, the vast majority of personal trips are made by car – 67% compared to only 17% by public transport. The car ownership rate is the highest in Europe (over 600 registered private cars per 1 000 inhabitants). The car fleet is relatively young, but with an average engine capacity higher than in other countries.

Progress on air pollution remains insufficient

Despite significant declines, the transport sector remains a major source of air pollution

Since 2010, Luxembourg has made progress in reducing emissions of air pollutants. However, it will have to redouble its efforts so as to meet the reduction targets set by European directives. Road transport emissions have fallen more sharply between 2005 and 2017 than emissions from other sources (by 76% for NO_x; by 71% for PM_{2.5}). These decreases are mainly due to reductions in emissions from fuel combustion. They can be explained partly by the effects of the economic crisis in 2008, which had repercussions on freight traffic and by the renewal of the car fleet with vehicles meeting stricter emission standards, and partly by the fall in international oil prices and a slight increase in taxes on road fuels, which led to a drop in fuel sales to non-residents (Section 3). That said, the share of emissions from non-residents remains high compared to other countries. Rising international oil prices have led to a further increase in export sales in 2017, which will in turn drive emissions upwards (Figure 3). Road transport remains the largest source of NO_x emissions (58%) and a major source of PM_{2.5} (32%), PM₁₀ (34%) and CO emissions (38%).

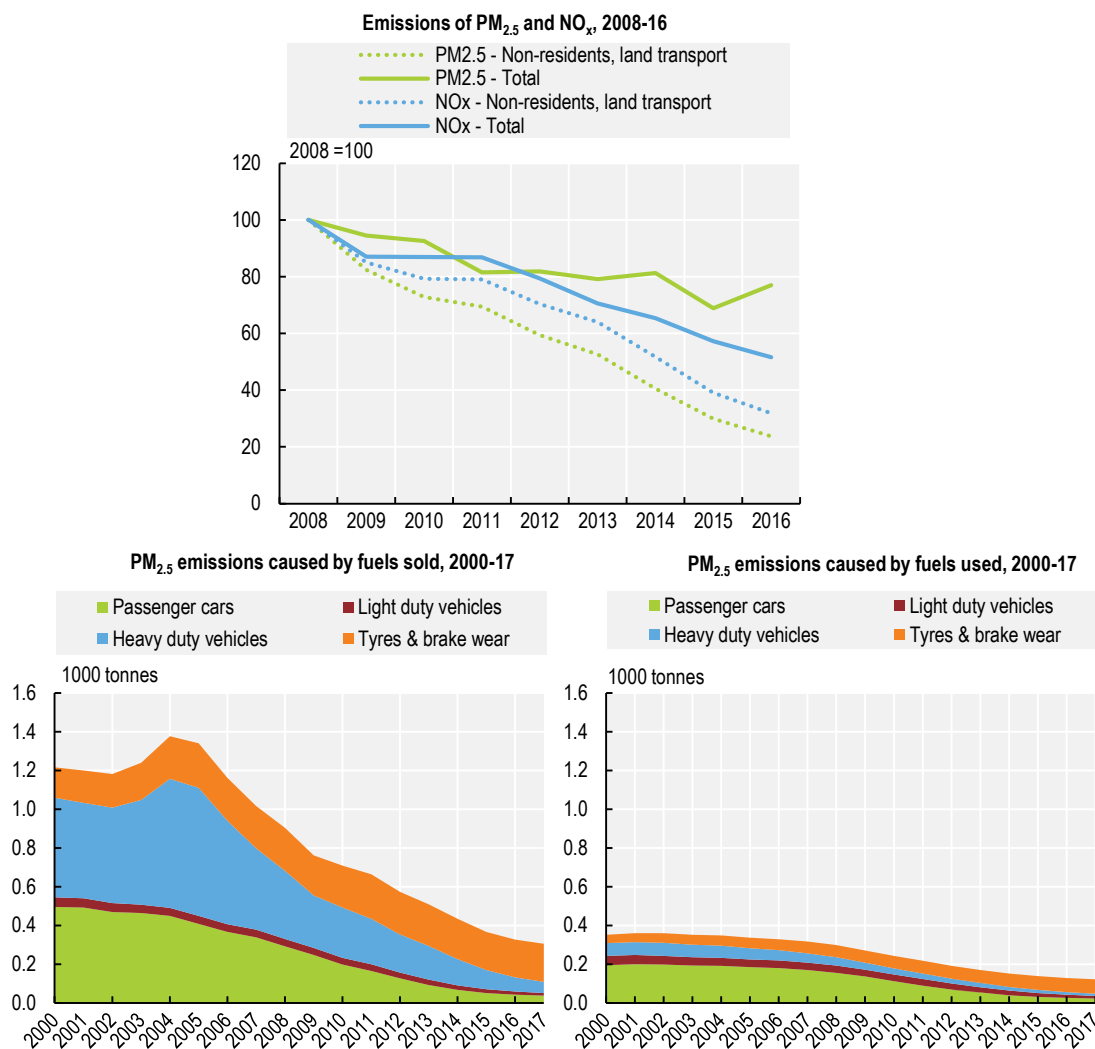
Emissions of PM_{2.5} due to tyre wear and road surfaces deserve special attention. In contrast to combustion emissions, they are increasing. They may increase still further as the car fleet includes more hybrid and electric vehicles, some of which are heavier than others.

The housing sector is a major contributor to fine particle emissions

For CO and PM, the share of road transport is now lower than that of all stationary emission sources as a whole. To achieve the objectives of reducing emissions of these pollutants, more attention will have to be paid to measures concerning stationary sources. One source that should not be neglected is the housing sector, which also plays an important role in achieving energy efficiency and renewable energy targets (Section 1). Like other countries, Luxembourg has for several years been promoting the use of biomass

as a renewable energy source for individual heating and to reduce GHG emissions. However, the combustion of biomass for residential heating currently accounts for almost 40% of PM_{2.5} emissions. There is therefore a trade-off between promoting biomass to meet renewable energy and GHG emission targets and the objective of reducing PM_{2.5} emissions. Biomass would be better used in large cogeneration plants where emissions can be controlled and reduced at lower cost.

Figure 3. Emissions from non-residents are major contributors to transport emissions



Note: Fuel combustion by passenger cars and light and heavy duty vehicles, as well as by tyres and brake wear from all vehicle categories.

Source: OECD (2019), "Air and climate: Air and greenhouse gas emissions by industry", *OECD Environment Statistics* (database);

Administration de l'Environnement (2019), Luxembourg's Informative Inventory Report 1990-2017.

StatLink  <https://doi.org/10.1787/888934168816>

Air quality is improving, but black spots persist

Declining emissions have been accompanied by a general improvement in air quality, but black spots of concern persist. Annual average concentrations of PM₁₀ and NO₂ have fallen and are below the daily limit values set by EU legislation. Average population exposure to PM_{2.5} has diminished since 2005. 73% of the population is still exposed to concentrations above 10 µg/m³, the maximum value recommended by the WHO. However, no one is exposed to concentrations greater than 15 µg/m³ (OECD, 2019b). The mortality

rate due to exposure to fine particles is estimated to be relatively low in international comparison, but still accounts for nearly 150 premature deaths each year (OECD, 2019b). The estimated social costs of air pollution are high, partly due to the high average income in the country. NO₂ concentrations continue to exceed the limit value in Luxembourg City in areas with heavy traffic. The decrease in pollution levels following the introduction of low-emission buses has not been sufficient to eliminate these black spots ("hot spots"). Further efforts will be necessary.

Luxembourg has adopted an ambitious plan to meet mobility challenges

Measures taken to reduce emissions and improve air quality include both energy efficiency and renewable energy measures (building renovation and construction; heating systems; insulation; industrial processes), and measures related to mobility and transport. Significant efforts are underway to improve mobility within the country and the Greater Region, rebalance the modal split and encourage soft modes of transport (walking, cycling) as part of an ambitious sustainable mobility plan (Modu). The current plan adopted in 2018 (Modu 2.0) defines the objectives for 2025 and proposes a wide range of measures to achieve them. Luxembourg has some catching up to do, especially outside Luxembourg City, in connections between villages and small rural towns and between Luxembourg and its neighbouring countries.

Major investments continue to be made in transport infrastructure and public transport, with the construction of several tramlines in Luxembourg City and a gradual improvement in the rail service by 2023, or even 2028. This is accompanied by a car-sharing scheme that is available to the inhabitants of the Greater Region, as well as by an increase in park-and-ride facilities in the country and its border regions. Efforts are also being made to integrate cycling as a mode of transport into all transport infrastructures and offers, and to set up a national cycling network.

The promotion of public transport also involves the introduction of free public transport on Luxembourg territory from March 2020 (only first class travel will be charged). This measure concerns transport services financed by the state and Luxembourg City and will also benefit cross-border commuters. Full free public transport raises questions as to the economic and environmental relevance of this measure, which is intended to be a strong signal and a catalyst to induce changes in the choice of transport modes. It will be accompanied by strong measures to improve the quality of service and parking space management, the main factors in the choice between private cars and public transport. It will also have to be followed up by an *ex-post* evaluation of the real effects of the package of measures, including free public transport, on the modal split, air quality and the quality of life of residents. Although the sale of public transport tickets now covers only 10% of the costs, full free public transport will increase operating costs and represent a loss of revenue of about EUR 40-45 million per year for the state.

Luxembourg has also launched an e-mobility initiative with the aim of electrifying the transport sector and thus reducing emissions of GHGs and air pollutants. By 2030, the public transport bus fleet is planned to be fully electric. A network of electric recharging stations is being installed and the use of electric and plug-in hybrid vehicles is being encouraged. Starting in 2017, the government has financially encouraged the purchase and use of low- or zero-emission vehicles through income tax reductions for the purchase of electric or hybrid vehicles and through the tax treatment of company vehicles. However, these incentives were too small to have a real impact on the choice of vehicle type. Since January 2019, a new system of incentives has been in place. Luxembourg now directly subsidises the purchase of new electric vehicles by individuals and companies in the form of a bonus. It varies according to the type of vehicle (EUR 5 000 for 100% electric vehicles; EUR 2 500 for plug-in hybrid vehicles; up to EUR 500 for electric motorcycles and up to EUR 300 for regular and electric bicycles).

Greater coherence of measures and a stronger commitment of all actors are indispensable

The measures proposed and the objectives that Luxembourg has set itself are ambitious. Their achievement will depend on the level of commitment of all players (state, municipalities, employers, citizens, cross-border workers); co-ordination between the national and local levels; and co-operation with neighbouring countries within the Greater Region. Policy coherence and Luxembourg's ability to exploit synergies between measures concerning transport and mobility, housing (construction, heating), spatial planning, air quality, climate and energy efficiency will be crucial.

The involvement of municipalities and companies should be encouraged

The transition to sustainable mobility will have to be based on good co-ordination with municipalities and businesses, particularly as regards the necessary reassessment of car parking space requirements, the introduction of car-sharing systems or the organisation of working hours. The commitment of municipalities is particularly important to integrate mobility and air quality issues into local development plans, and to ensure coherence with other spatial planning tools (spatial planning master plan, sectoral master plans) and with climate and energy efficiency measures. This can be supported by the Climate Pact, which includes mobility-related measures and, since 2017, an "air quality" component, and rewards the action of municipalities in these areas.

The effectiveness of the economic instruments that apply to transport needs to be reviewed

The combination of the different financial incentives in place in the transport sector is still not conducive to sustainable mobility and to the internalisation of external environmental costs. Despite the increase in excise duty rates in 2019, petrol and diesel prices remain too low to reduce emissions from fuel sales to non-residents and encourage a shift away from cars to other modes of transport. Fuel taxes, in particular on diesel, should therefore be further increased (Section 3).

The annual vehicle tax does not provide a strong incentive to influence the choice of vehicle type and to encourage the purchase of electric or low-emission vehicles. The tax treatment of company vehicles favours petrol-powered vehicles, but the use of a company vehicle remains a source of fiscal advantages for employees. This encourages car use at the expense of public transport and active modes of travel (cycling, walking), especially at peak times when congestion levels are highest. These benefits could be taxed more heavily with differentiation according to the distance travelled. In addition, the possibility of deducting commuting expenses from taxable income provides an incentive to live farther away from the workplace and thus creates a demand for additional mobility.

In general, Luxembourg will have to continue its efforts to internalise external environmental costs and review the costs and benefits of the various financial aids (premiums, subsidies), taxes (on fuel, cars, service vehicles) and other financial incentives to ensure they contribute to the sustainable mobility objectives set by the government. It should reinforce the pricing policy of parking spaces, so as to relieve congestion of the road network and encourage car-pooling. It could also consider introducing a road toll system.

The impacts of the measures put in place should be monitored and evaluated

In the coming years, it will be important to monitor the evolution of mobility needs and to assess the impacts in terms of costs and benefits of the various measures introduced, including free public transport. This will have to be based on a solid and reliable information base with accurate, complete and up-to-date data, including data on activity levels in the different modes of transport. In the past, such information has been lacking. However, efforts are being made to develop new assessment tools to guide the choices still to be made in terms of sustainable mobility. This will have to be accompanied by sufficient resources to ensure regular monitoring, notably by the mobility observatory that is being established.

Box 4. Recommendations on air quality and sustainable mobility

Air pollution management

- Take the most cost-effective measures across all sources and sectors to achieve the 2030 emission reduction objectives of major air pollutants; assess the social cost and benefits of measures to reduce emissions of local air pollutants caused by stationary sources.
- Limit the use of wood biomass to installations where air pollutant emissions can be controlled effectively and at reasonable costs per unit of heat energy generated (e.g. large heat-generation installations with electrical co-production).
- Carry out *ex post* assessments of various new means of public transport expected to cause low amounts of air pollution to verify these vehicles also have low emissions under real-world operating conditions.

Promotion of sustainable mobility

- Promote increased institutional co-ordination on spatial planning to advance sustainable mobility policies and measures and fully use the synergies with policies and measures concerning energy, climate and air quality.
- Evaluate within two-three years the experiences gained from measures that encourage the use of public transport, car-pooling and active mobility, including the introduction of free public transport; ensure proper investments to improve the quality of public transport (more frequent departures, more comfortable equipment, etc.).
- Review the environmental and economic effectiveness of the mix of economic instruments that apply to transport and mobility; increase vehicle taxation and revise the rates to take account of emissions of both CO₂ and local air pollutants; consider reducing the fiscal benefits accruing to employees when using a company-owned vehicle for private purposes and introducing a differentiation by distance driven; reinforce the pricing policy of parking spaces; and evaluate the possibility of creating road tolls.
- Invest sufficient resources in developing systems necessary for obtaining accurate, comprehensive and up-to-date data for sustainable mobility planning, including data on activity levels in different transport modes.

5. Biodiversity

Luxembourg pursues an active nature protection and conservation policy and has made progress in implementing the recommendations of the latest OECD review. However, despite an appropriate institutional, legislative, financial and strategic framework, progress has been slow. There have been delays in the concrete implementation of action plans on the ground or in the restoration of ecosystems.

Strong pressures and ambitious objectives

The state of Luxembourg's biodiversity is determined on the one hand by a rapidly expanding population and economy, and on the other by environmental pressures from neighbouring regions. These regions are the most populated and most developed on the continent. Pressures on biodiversity are high, with high degrees of soil artificialisation and habitat fragmentation. The conservation status of species is mostly

unfavourable. There has also been continuous degradation over the past four decades of biodiversity-rich habitats such as wetlands, dry grasslands and extensively used orchards. The observed decline follows the trend towards homogenisation of landscapes due to intensification of agricultural practices, urban development and sprawl, and increased density of transport infrastructure (MDDI, 2017). Luxembourg is the most fragmented country in Europe; the built-up area has doubled between 1960 and today.

The objective of the National Plan for the Protection of Nature for 2007-11 (PNPN1) to halt the decline in biodiversity was ambitious; it has not been achieved. Considering current trends, the final assessment of the second national plan (PNPN2, 2017-21) should yield the same result. It is important to point out the six-year delay between the end of the PNPN1 and the adoption and implementation of the PNPN2. As a result of this delay, several actions included in the second plan were delayed. The PNPN2 is more comprehensive than the first plan; it demonstrates a better knowledge of the issues at stake and possible solutions, and includes more precise indicators to measure results (MDDI, 2017).

When faced with a decline that has been sustained for four decades, no time must be lost. Luxembourg needs to accelerate the implementation of interventions at a faster rate than the decline; any delay makes it even more difficult to stabilise, let alone improve, the status of biodiversity. Added to this are new issues: climate change and the appearance of invasive alien species that lead to a loss of natural capital and a reduction in its dividends – ecosystem services essential to the quality of human life. Recognising the need to accelerate efforts, the government strengthened the legislative framework in 2018 and increased budgetary resources for the implementation of the PNPN2.

Advances in the protection of specific sites

Luxembourg has refreshed its strategic framework for biodiversity with the drafting and adoption of the PNPN2. Since the last OECD review, it has made remarkable advances. The Natura 2000 network has been completed with 66 sites covering 27% of the territory. Its management plans are almost finalised, and will include specific measures for the species and habitats concerned. They will thus contribute to the re-establishment of a natural environment favourable to biodiversity conservation. A mixed approach has been adopted. It includes a contractual approach to compensate owners for their participation in the programme, an administrative approach to purchase or manage land of high ecological value, and a regulatory approach to designate certain Natura 2000 areas.

Advances in the observation and restoration of ecosystems

In addition to the conservation of specific sites, advances are being made in the establishment and restoration of ecological corridors. These make it easier for fauna and flora species to migrate and increase the value of individual protected areas. In addition, progress has been made in the restoration of certain degraded terrestrial and aquatic ecosystems so as to increase their contribution to safeguarding biodiversity.

Progress is also noted in the monitoring and reporting of data by the Luxembourg Institute of Science and Technology and by the Natural Environment Observatory. This is essential for assessing conservation measures and preparing national reports on the implementation of European directives.

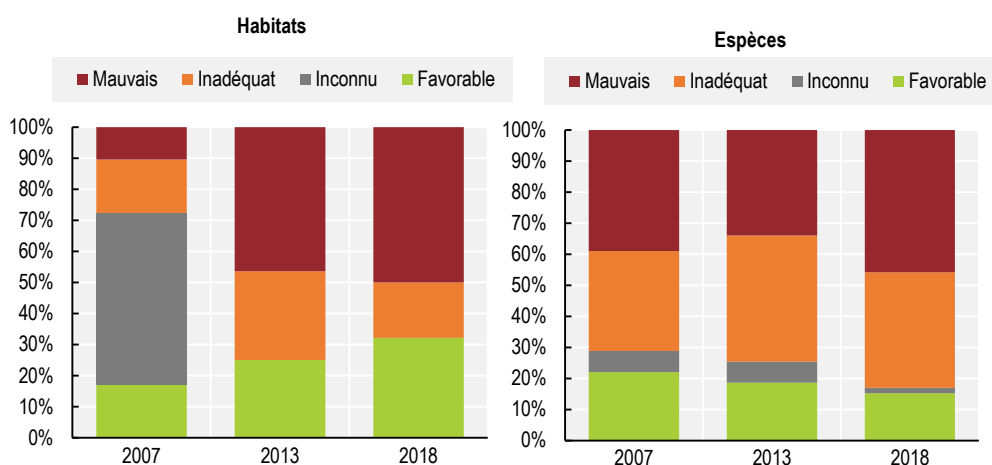
To promote good practice and ensure that conservation measures are put into effect, steering committees consisting of representatives of various public and municipal institutions and non-governmental and private organisations are being set up, as are biological stations in which the municipalities play a part. The implementation of a "Biodiversity Pact" rewarding municipalities for their action in favour of biodiversity and natural habitats, inspired by the "Climate Pact", is envisaged. Other interesting initiatives include biodiversity contracts with farmers and other private landowners; however, these contracts need to be modified and strengthened, as their effectiveness in terms of biodiversity is insufficient. A more recent measure is the introduction of a system of quantification and compensation for habitat destruction during

the implementation of infrastructure and housing projects, based on ecopoints. This system allows more targeted upstream compensation in line with the objectives of the PNP2 via compensation pools.

The state of biodiversity conservation remains unfavourable and calls for accelerated public action

Despite these advances, the state of biodiversity conservation remains unfavourable (Figure 4). In the coming years, pressures on biodiversity are likely to increase further with the expected increase in the number of inhabitants and cross-border workers and the continued development of transport and housing infrastructure. The delay in finalising the Natura 2000 network, the network of ecological corridors, but above all in the practical implementation of the action plans on the ground or for the restoration of ecosystems, means that the positive returns from these investments are slow to materialise. The challenge of reversing the trend towards biodiversity decline is exacerbated by climate change with the arrival of invasive alien species (which may threaten the survival of native species) and by the ever-increasing intensification of agriculture.

Figure 4. The conservation status of habitats and species is of concern



Note : Ces chiffres montrent le pourcentage d'évaluations biogéographiques dans chaque catégorie d'état de conservation pour les espèces.

Source : AEE (2019), "Conservation status and trends", *State of Nature in the EU: Article 17 national summary dashboards*.

StatLink  <https://doi.org/10.1787/888934168569>

To meet this challenge, Luxembourg will need to move forward on three key areas. It must accelerate the implementation of the PNP2. It must complete implementation of the management plans for Natura 2000 sites and threatened species. Finally, it must make the steering committees function effectively and provide them with adequate resources before the end of the PNP2.

The preparation of the third PNP for 2022-27 should also be initiated without delay. This third plan should be based on the evaluations of the nature directives submitted to the EC in 2019 and on prospective scenarios of the impact of climate change and biodiversity decline on ecosystem services. It will also be necessary to ensure that biodiversity issues are fully integrated into agricultural, land-use planning and other sectoral policies (climate, housing, transport, etc.) with a good co-ordination between the national and local levels and a strong commitment from the municipalities. This will have to go hand in hand with a review of the costs and benefits of the different economic instruments used in biodiversity management and in sectoral activities that have an impact on biodiversity (biodiversity contracts, ecopoints, support to agriculture and forestry, etc.).

Box 5. Recommendations on biodiversity

Accelerate the implementation of biodiversity conservation and natural habitat protection policies

- Promptly initiate the preparation of the National Plan for Nature Conservation for 2022-27 (PNPN3):
 - Maintain the objective of halting biodiversity decline, while specifying the indicators for species, habitat and ecosystem services.
 - For each objective, present targets that are measurable in real time, the necessary financial and human resources, and the timetable of steps and actions to be taken; make this information permanently accessible on the Internet page of the MECDD.
 - Ensure the effective collaboration of the ministries in charge of agriculture, infrastructure and transport, and stakeholder consultation.
- Set up a programme to improve the standing and appreciation of ecosystem services among the population, the farming and forestry sector, and the ministries concerned:
 - Ascertain the socio-economic motivations of the population with respect to ecosystem services, and evaluate the economic costs of the degradation of those services.
 - Include initiatives to raise awareness in urban and rural areas of the importance of easily perceptible ecosystem services such as preventing heat islands through green spaces, protecting water quality, pollination by insects, carbon dioxide fixation by forests, and reducing the scale of floods through marshes and natural aquatic environments in good ecological state.
 - Set up a “Biodiversity – Ecosystem Services Pact” modelled on the “Climate Pact” and include that measure, if appropriate, in the PNPN3.
 - Introduce a premium for ecosystem services provided by forest environments in favour of private forest owners.
- Complete implementation of the management plans for Natura 2000 sites and threatened species, and assign specific and measurable objectives to them:
 - Indicate what conservation measures or measures to rehabilitate degraded sites are required and prioritise interventions to increase biodiversity.
 - Increase the portion of Natura 2000 areas that are state-owned and develop long-term (25 years +) agreements with landowners or assign conservation easements; consider levying a “Biodiversity – Ecosystem Services” tax on land transactions and associate corporate sponsorship to finance these acquisitions and consider in exchange exemption from the payment of the property tax in Natura 2000 zones.
 - Prioritise new ecological connectivity corridors to be put in place and complete the corridors of primary importance before the end of the PNPN2.
- Increase the human and financial resources budget for implementing the PNPN2, developing the PNPN3 and, in particular, for accelerating implementation on the ground of the actions foreseen in these plans so as to balance strategic planning efforts with concrete achievements.

Integration of biodiversity issues into sectoral policies

- Limit urban sprawl and habitat fragmentation by ensuring that land-use planning takes into account biodiversity, ecosystem services and the quality of life of citizens.

- Actively support the transition to organic farming and agroecology:
 - Value the products and behaviours of organic farmers, and establish a system of financial support for the production of ecosystem services, for the use of mechanical pest control to replace pesticide use and for crop rotation.
 - Continue the measures accompanying farmers in this transition (eco-counsellors).
 - Promote the establishment of organic farms near cities to reduce the harmful effect of pesticides on the population and increase accessibility to organic farming products.

Contribution to the protection of regional and international biodiversity

- Increase Luxembourg's contribution to the protection of biodiversity at international level:
 - Co-operate with neighbouring countries and promote the application of an ecological compensation model in other countries.
 - Contribute to the protection of wintering habitats of bird species nesting in Luxembourg, which migrate to other countries for part of the year.
 - Further integrate the biodiversity component into development co-operation and make it a strategic focus.

Notes

¹ The Greater Region (Grande Région) is the geographical area comprising Luxembourg, the Walloon Region in Belgium, Lorraine in France and two German states (Saarland and Rhineland-Palatinate).

² The EU's Renewable Energy Directive allows member states with an abundant and profitable supply of renewable energy to help other countries meet their targets. These agreements stipulate that Estonia and Lithuania will each transfer a certain amount of surplus renewable energy between 2018 and 2020.

³ As the EU ETS covers only 15% of Luxembourg's emissions, efforts to reduce emissions must rely mainly on domestic policies in the transport sector, the residential and commercial sector, and in agriculture.

References

- Département des Transports (2018), *Modu 2.0 – Stratégie pour une mobilité durable (Modu 2.0 – Strategy for a sustainable mobility)*, Département des Transports, Luxembourg, www.modu2.lu.
- EEA (2018), *Air quality in Europe-2018 report*, No. 12/2018, <https://www.eea.europa.eu/publications/air-quality-in-europe-2018>.
- EC (2019), The EU Environmental Implementation Review 2019, Country Report – Luxembourg, *Commission Staff Working Document*, SWD (2019) 126 final, European Commission, Brussels, 4 April 2019, http://ec.europa.eu/environment/eir/pdf/report_lu_en.pdf.
- Ewringmann, D. (2016), *Ermittlung und Bewertung der positiven und negativen Wirkungen des Treibstoffverkaufs unter besonderer Berücksichtigung negativer externer Umwelt- und Gesundheitseffekte – Status quo 2012 und maßnahmeninduzierte Veränderungen*, [Determination and evaluation of the positive and negative effects of fuel sales with special consideration of negative external environmental and health effects – Status quo 2012 and measure-induced changes], Report for the Ministry of Sustainable Development and Infrastructure of the Grand Duchy of Luxembourg, Königswinter.
- Ewringmann, D. and Deloitte Tax & Consulting (2018), *Auswirkungen von Subventionen und Steuervergünstigungen auf die nachhaltige Entwicklung. Umweltschädliche Subventionen in Luxemburg* [Effects of subsidies and tax concessions on sustainable development, Environmentally harmful subsidies in Luxembourg], Report for the Ministry of Sustainable Development and Infrastructure of the Grand Duchy of Luxembourg, Königswinter.
- IEA (2020), *Luxembourg 2020 Energy Policy Review*, OECD Publishing, Paris, <https://doi.org/10.1787/54355dd7-en>.
- MDDI (2018), *Plan national de gestion des déchets et des ressources - PNGDR (National Waste and Resource Management Plan)*, Ministry of Sustainable Development and Infrastructure, Environment Department, Luxembourg, <https://environnement.public.lu/fr/offall-ressourcen/principes-gestion-dechets/Plan-national-de-gestion-des-dechets-PNGD.html>.
- MDDI (2017), *Plan national concernant la protection de la nature 2017-2021 (National Plan for Nature Conservation 2017-2021)*, Ministry of Sustainable Development and Infrastructure, Environment Department, Luxembourg, <https://environnement.public.lu/dam-assets/documents/natur/general/pnnp2.pdf>.
- ODC (2018), “Competitiveness Report 2018: Holding up in a turbulent time”, *Perspectives de politique économique*, No. 34, November 2018, Observatory for Competitiveness, Luxembourg.
- OECD (2020), *OECD Economic Outlook, Volume 2020 Issue 1*, OECD Publishing, Paris, <https://doi.org/10.1787/0d1d1e2e-en>.
- OECD (2019a), *Taxing Energy Use 2019: Using Taxes for Climate Action*, OECD Publishing, Paris, <https://doi.org/10.1787/058ca239-en>.
- OECD (2019b), “Air quality”, in *Environment at a Glance Indicators*, OECD Publishing, Paris, <https://doi.org/10.1787/80661e2d-en>.
- OECD (2017), *OECD Development Co-operation Peer Reviews: Luxembourg 2017*, OECD Development Co-operation Peer Reviews, OECD Publishing, Paris, <https://doi.org/10.1787/9789264284364-en>.
- OECD (2010), *OECD Environmental Performance Reviews: Luxembourg 2010*, OECD Environmental Performance Reviews, OECD Publishing, Paris, <https://doi.org/10.1787/9789264077287-en>.

Annex 1.A. Actions taken to implement selected recommendations of the 2010 Environmental Performance Review of Luxembourg

Recommendations	Actions taken
Chapter 1. Environmental performance: trends and recent developments	
Speed up and reinforce implementation of the measures adopted for achieving the Kyoto target; prepare for post-Kyoto by integrating climate change objectives into energy, construction and transport policies (for example, energy efficiency, energy charges and taxes, transport charges and taxes).	<p>The second climate action plan adopted in May 2013 includes more than 50 measures designed to meet the emission reduction targets under the second commitment period of the Kyoto Protocol.</p> <p>The National Integrated Energy and Climate Plan (NECP) will be submitted to the European Commission (EC) in the first quarter of 2020. This plan contains targets and measures for renewable energy, energy efficiency and greenhouse gas emissions reduction by 2030. The NECP also provides for a carbon pricing system starting in 2021.</p>
Establish harmonised and differentiated pricing for municipal waste management across the country, based on the polluter pays principle and cost recovery.	<p>The 2012 law on waste management reaffirmed the obligation for municipalities to implement waste tariffs in line with the polluter-pays principle. In 2016, 25 municipalities applied waste taxes based on the volume and/or weight of residual waste produced; 16 municipalities applied taxes that did not comply with the polluter-pays principle for bulky waste. About 70 municipalities have committed to apply waste taxes that respect the polluter-pays principle by 2020.</p>
Implement the General Waste Management Plan with more efficient measures for achieving the principal objectives, and with the necessary financial and other means.	<p>In 2018, the government launched the project Eco-Box to reduce food waste; 66 restaurants and several canteen caterers participate. A ban on the free distribution of plastic bags (with the exemptions of those needed to ensure food hygiene) was introduced in 2019 (Law of 21 March 2017 on packaging and packaging waste). Nearly 300 shops and retailers participate in the awareness and labelling campaign Clever Akafen (Buy Smart).</p> <p>Of the 110 measures in the General Waste Management Plan, 58 have been implemented, 35 have been partially implemented and 17 have not been carried out.</p>
Achieve economies of scale by encouraging communes to co-operate more effectively and co-ordinate their actions (collection methods, selective sorting, recycling programmes).	<p>The 2012 law on waste management stipulates that the disposal and recovery of municipal waste must be carried out through an integrated and adequate network of facilities taking into account the best available techniques.</p> <p>In 2013, the intermunicipal associations (<i>syndicats</i>) SIDEC, SIGRE and SIDOR signed a cooperation agreement for the joint use of certain infrastructures for the disposal and recovery of municipal waste (effective since January 2015). Part of the municipal waste, which was landfilled until that date, has since been subjected to an energy recovery operation in the SIDOR incineration plant.</p>
Establish a database in support of a policy to enhance resource productivity and identify the best measures for achieving it (e.g. use of new technologies and innovation).	<p>A "circular economy" component including waste management has been integrated into the "Climate Pact" with the municipalities. All Luxembourg municipalities are engaged into the "Climate Pact".</p> <p>The EcolInnovation Cluster initiative has created a market for circular urban development projects. The identification of current and future green neighbourhood projects and the products and services offered by construction and building companies is expected to encourage companies to adapt to future needs. The "Fit4Circularity" programme supports companies to develop circular products, services and business models; development of a methodology for circular economic activity zones.</p>
Implement the new Water Law; in particular, promote river basin management through the Water Management Administration and the water district management plans.	<p>The law of 19 December 2008 has been applied since its entry into force. The 2nd river basin management plan was published in December 2015.</p>
Apply the "user pays" and "polluter pays" principles to water pricing for households, industry and agriculture; ensure financing for tertiary-level waste water treatment plants required by the EU Urban Waste Water Directive.	<p>According to the harmonised price method, introduced in 2011, water tariffs consider the costs incurred by water utilities to provide drinking water and sanitation services. Reduced tariffs apply to the agriculture sector. The 2008 water legislation introduced a water abstraction tax and a water pollution tax. The latter does not apply to agriculture.</p> <p>The Water Management Fund finances a wide range of investments in the water sector, including for wastewater treatment plants. Expenditure of the fund increased</p>

	from EUR 50 million in 2011 to EUR 92 million in 2018.
Consider the establishment, on a voluntary basis, of sustainable management plans at the farm level, in order to make farmers more accountable for managing inputs, water and biodiversity.	Each Grand-Ducal regulation creating protection zones around a water catchment used for human consumption requires the supplier of drinking water to put in place agricultural extension measures. The programme of measures must necessarily include measures in the agricultural field. A pilot project has been carried out since 2015 around Lake Haute-Sûre. The first programmes of measures are currently being set up. Biodiversity contracts (with a budget of EUR 10 500 000 for the period 2017-21) aim at the conservation and ecological management of land in agricultural areas hosting species or habitats of particular ecological interest. These contracts apply to almost 9 out of 10 lands (about 5 000 ha).
Strengthen control of drinking water quality; delineate drinking water protection areas around aquifers and protect them.	The monitoring of the quality of drinking water is carried out in accordance with the provisions of Directive 98/83/EC, which was transposed into Luxembourg law by the amended Grand-Ducal Regulation of 7 October 2002. The demarcation of groundwater protection zones is in progress. At the end of 2018, Grand-Ducal regulations for 90% of groundwater catchments were either in force or under public procedure.

Chapter 2. Environmental governance and management

Ensure better co-ordination of central and local government efforts to implement environmental and land use policies, including European directives (for example, classified facilities, water management, space and species management).	Direct contacts between the central government and communes have increased with the 2015 abolition of district commissariats, which used to serve as intermediaries between the two levels of government. Communes are routinely consulted on draft regulations that concern them, e.g. on nature protection or water protection zones, as well as on all strategic plans.
Continue to implement the law on strategic environmental assessments.	All national spatial plans and sectoral strategic plans undergo mandatory strategic environmental assessment (SEA). SEA covers only parts of municipal land-use plans.
Establish a multiyear clean-up and rehabilitation plan for contaminated sites, including orphan sites, and specify how they will be funded.	Luxembourg has a cadastre of about 12 000 potentially contaminated sites. Their actual remediation relies on voluntary efforts and financing by responsible parties. There is no programme or financing for remediation of abandoned sites.
Improve the production and dissemination of environmental information for timely compliance with national obligations and international commitments; seek synergies among the different players.	Luxembourg has a national environmental portal containing most of the relevant information such as legislation, data and other documents. The government uses new platforms such as Digital Luxembourg to disseminate environmental information. Many environment-related government web pages are outdated due to a lack of resources to maintain them.
Analyse the interactions of environmental policy with the economy (for example, expenditure data); develop environmental accounting and material flow accounts.	The development of a national system of environmental accounts was initiated in 2010 in accordance with European regulations in this area. The statistical office (STATEC) also produces a dashboard containing the main indicators of the environmental accounts (on the themes of green jobs, green activities, green taxation, support for the green economy, sustainable consumption, environmental damage), and a table integrating economic and environmental statistics that makes it possible to analyse economic-environmental interactions by branch of activity
Pursue local initiatives for implementing the Action 21 Programme.	Communes have recently adopted a voluntary "climate pact" which encourages them to implement measures in six different domains (including land-use planning, construction and mobility) and achieve several levels of certification.
Develop environmental education, particularly in secondary and higher education, as part of the new National Plan for Sustainable Development.	Sustainable development education has been one the horizontal themes of the Ministry of National Education, Childhood and Youth since 2012. The environment ministry created a platform for education on the environment and sustainable development in 2012 and reactivated an inter-ministerial committee for education on sustainable development in 2017.

Chapter 3. Towards green growth

Develop a "green package" as part of efforts to sustain economic activity and to emerge from the crisis, with a proactive and long-term environmental vision. Promote synergies between the environment and R&D, technology, exports, energy savings and resource productivity in the context of diversifying the national economy.	In 2016, the government presented the strategic study "The Third Industrial Revolution in Luxembourg" (TIR), which provides a long-term vision for the country's development and economic diversification. The TIR focuses on six sectors (energy, mobility, buildings, food, industry and finance) and three horizontal axes (smart economy, circular economy, and the prosumers and social model).
Adopt and implement the National Plan for Sustainable Development.	The third National Plan for Sustainable Development was adopted in 2019.
Encourage more sustainable modes of consumption through regulatory and economic measures, and	Waste: In 2018, the government launched the project Eco-Box, to which 66 restaurants and several canteen caterers participate. A ban on the free distribution of

appropriate demand management (for example, in the areas of solid waste, mobility, public and private buildings, land use).	<p>plastic bags (with the exemptions of those needed to ensure food hygiene) was introduced in 2019. Nearly 300 shops and retailers participate in the awareness and labelling campaign Clever Akafen (Buy Smart).</p> <p>Mobility: In 2017, Luxembourg introduced income tax credits to promote the purchase of electric or hybrid vehicles: EUR 5 000 for fully electric vehicles; EUR 2 500 for plug-in hybrid vehicles; up to EUR 500 for electric motorcycles and up to EUR 300 for electric bicycles. In 2019, the system was replaced by direct subsidies of the same amount.</p> <p>Buildings: Luxembourg enacted regulations requiring all new residential buildings to meet the nearly zero-energy building standard and launched a voluntary national sustainability certification system for new housing construction (LENOZ). The PRIME House grant programme and Climate Bank programmes support investment in energy efficiency renovation of buildings.</p>
Reinforce the internalisation of external environmental damage; enforce the “polluter pays” and “user pays” principles more effectively (for example in the management of waste, sewage, energy and transport). Make environmental policies more effective and efficient through the use of economic instruments and closer monitoring of the results of environmental actions.	<p>Waste: The 2012 law on waste management reaffirmed the obligation for municipalities to implement waste tariffs in line with the polluter-pays principle. In 2016, 25 municipalities applied waste taxes based on the volume or weight of residual waste produced; 16 municipalities applied taxes that did not comply with the polluter-pays principle for bulky waste. About 70 municipalities have committed to apply waste taxes that respect the polluter-pays principle by 2020.</p> <p>Water: The legislation requires the costs of water-related services, including environmental and resource costs, be included in water fees and borne by users taking into account user-pay and polluter-pays principles. According to the harmonised price method, introduced in 2011, the Water Management Administration sets water tariffs taking into account the costs incurred by water utilities to provide drinking water and sanitation services.</p> <p>Energy and transport: in May 2019, excise duty on transport fuels increased by EUR 0.01 per litre of petrol and EUR 0.02 per litre of diesel. In December 2019, the government announced additional increases of between EUR 0.01-0.03 per litre of petrol and between EUR 0.03-0.05 per litre of diesel to take effect in February-April 2020. The 2019 National Energy and Climate Plan foresees the introduction of carbon pricing as from 2021, at an initial price of EUR 20 per tonne of CO₂, to be gradually increased.</p>
Review, revise and increase, when necessary, environmental taxes and charges, in particular on transportation and energy, perhaps in the context of a broader tax reform.	<p>In May 2019, excise duty on transport fuels increased by EUR 0.01 per litre of petrol and EUR 0.02 per litre of diesel. In December 2019, the government announced additional increases of between EUR 0.01-0.03 per litre of petrol and between EUR 0.03-0.05 per litre of diesel to take effect in February-April 2020. The 2019 National Energy and Climate Plan foresees the introduction of carbon pricing as from 2021, at an initial price of EUR 20 per tonne of CO₂, to be gradually increased.</p>
Identify and eliminate subsidies and tax provisions that are potentially damaging to the environment.	<p>The government commissioned a study to identify and quantify environmentally harmful subsidies. The 2018 study identified seven types of such subsidies in Luxembourg.</p>
Review subsidies for energy savings and renewable energy and assess their economic efficiency and environmental effectiveness.	<p>The aid scheme for the promotion of energy saving and renewable energy in the housing sector has been revised twice since 2010: to strengthen the renovation component of existing buildings and to extend the aid to the sustainable construction and renovation component. On average over the last five years, about EUR 20 million has been granted under the various PRIME House programmes.</p>
Continue to strengthen the environmental dimension of official development assistance (environmental projects, environmental impact assessments of other projects, climate change adaptation).	<p>Environment and climate change are among the cross-cutting themes of Luxembourg's development co-operation strategy. In 2012, Luxembourg Development Cooperation Agency developed a guidance for the consideration of environmental sustainability in its development activities. The agency plans to complement its guidance with environmental and social safeguards.</p>

Chapter 4. Air quality and mobility

Take more effective steps to reduce NO _x emissions and meet the targets of the EU Emission Ceilings Directive (NEC), including action on energy and transportation pricing.	<p>The "Air quality plan for the City of Luxembourg and its surroundings" adopted in 2010 (Directive 2008/50/EC) was updated in 2011 for the period from 2010 to 2020. In 2017, it was supplemented by the "national air quality programme", which provides a framework for policy objectives in terms of air quality and guides the implementation of targeted actions to reduce ambient air pollution by nitrogen dioxide (NO₂) and fine particles (PM₁₀). The measures primarily aim at better regulating the volume of individual motorised traffic and at reducing the impact of diesel passenger cars. A national programme to combat air pollution is under development (EU Directive 2016/2284, which repealed the NEC Directive). It sets reduction targets by 2030 compared to 2005.</p> <p>Other measures concern industry (installation of selective catalytic reduction systems),</p>
--	--

	the transport sector (promotion of public transport, active and shared mobility, and electromobility; investment in transport infrastructure; strategy for sustainable mobility – Modu 2.0), and road fuel pricing. The Transport Sector Master Plan provides the regulatory framework for the Modu. This is supported by the Climate Pact, which since 2017 includes an air quality component and since 2018 a mobility component and rewards the actions of municipalities in these areas.
Strengthen the benefits of climate change policy for emissions of conventional air pollutants.	Existing climate change measures and those planned in the National Energy and Climate Plan for 2021-30 (NECP) have co-benefits on some traditional air pollutants, such as NO _x . The "Climate Package" adopted in 2011 identifies 35 priority measures aimed at spatial planning and the construction sector, mobility, energy and environmental technologies, biodiversity, forests, water and agriculture. The Climate Pact gives municipalities the opportunity to optimise their energy consumption in return for financial and technical support from the government. Luxembourg also enacted regulations requiring all new residential buildings to meet the nearly zero-energy building standard. The PRIME House grant programme and Climate Bank programmes support investment in energy efficiency renovation of buildings. Taxes on road fuels are gradually being raised. The 2019 National Energy and Climate Plan foresees the introduction of carbon pricing as from 2021
Pursue efforts to develop public transport, so as to achieve the 2020 objective that it covers 25% of home-work commutes.	Various measures have been taken to promote public transport with a view to making mobility more sustainable: investment in rail infrastructure, construction of a tramway line, new information systems for users, creation of park-and-ride facilities, purchase of low-emission buses; reorganisation of bus lines and free public transport (from March 2020). In 2017, the share of public transport in home-to-work journeys was 20%. Additional measures are planned as part of the sustainable mobility strategy (Modu 2.0) with major investments in public transport (service, infrastructure) and the opening of additional bus and tram lines.
Fulfil obligations and reinforce co-operation regarding air pollution in Europe (European directives, Gothenburg and Aarhus protocols); promote and contribute to the implementation of a regional plan for ground-level ozone.	The air emission reduction obligations under Directive (2001/81/EC) for 2010 have been met for all air pollutants, except NO _x . Annual average concentrations of PM ₁₀ and NO ₂ have decreased and are below the daily limit values set by EU legislation (Directive 2008/50/EC on ambient air quality and cleaner air for Europe). NO ₂ concentrations still exceed the limit value at several critical locations with heavy traffic. Target values and long-term objectives for ozone concentrations are exceeded in rural Luxembourg. Luxembourg has defined a pre-information threshold of 160 µg/m ³ as an hourly average for ground-level ozone. When this threshold is exceeded, the maximum authorised speed of motor vehicles is limited to 90 km/h on motorways. The number of days on which the European information threshold (180 µg/m ³ as an hourly average) is exceeded per year for tropospheric ozone has remained below 5 days since 2007. Luxembourg participates in the Benelux Working Group "Air Quality, which is working on the cross-border networking of air quality measurements and on putting these measurements online on the geoportal of the Greater Region.

Chapter 5. Biodiversity

Establish two strong conservation areas of sufficient size (for example IUCN categories I to III), one in a forest zone and one in a farming area, to serve as biodiversity reservoirs.	The number and extent of protected areas has increased; the country has 66 "Natura 2000" sites covering more than 27% of the national territory; the national area declared as "protected areas of national interest" has increased to more than 8,000 ha. The sites have been evaluated and prioritized taking into account several criteria, including the rarity of the habitat and/or species present; the conservation status of the area; the current pressures and potential threats; the geographical location in the context of the Natura 2000 network and ecological connectivity; the ecosystem function of the area, etc..
Develop and implement management plans, enhance biological productivity in the protected areas (protected zones, Natura 2000 zones, natural parks, Ramsar zones); establish biological corridors linking the Natura 2000 zones in order to facilitate migration of fauna and flora.	Management plans: Steering committees (COPIL) have been set up to ensure the implementation of the "Natura 2000" management plans (Nature Protection Act of 18 July 2018). Four COPILs have been created; four more are planned. Ecological connectivity: seven priority "wildlife crossings" are planned between now and 2021 under the supervision of an interdepartmental group made up of the Public Works, Transport and Environment Departments; 52 priority developments have been identified by the management plan for the parts of the international Rhine and Meuse river basin districts located on Luxembourg territory (period 2015-2021).
Pursue partnerships between the central government and the communes on joint conservation and habitat rehabilitation projects.	A network of biological stations is being set up throughout the country. Their mission is to inventory species and habitats, plan and implement the nature protection measures of the National Plan for Nature Protection, and communicate and raise awareness on issues related to nature and environmental protection. Municipalities are also directly involved in the COPILs.

<p>Make greater use of economic instruments to encourage landowners to adopt sustainable farming and forestry practices that will favour biodiversity; develop programmes to pay for the economic services that ecosystems provide, particularly aquatic and forest ecosystems.</p>	<p>Biodiversity contracts (with a budget of EUR 10 500 000 for the period 2017-21) are aimed at the conservation and ecological management of land in agricultural areas hosting species or habitats of particular ecological interest. These contracts apply to almost 9 out of 10 lands (about 5,000 ha) and buffer and core zones have been defined.</p> <p>The 2018 nature protection law introduces a system of ecopoints that give ecological values a monetary value. Municipalities, private persons or property developers will have to compensate financially for any damage that their real estate projects may cause to biotopes. An ecopoint is worth EUR .1 and is calculated according to the biotope of the land. The builder has to compensate financially for the loss of ecological value (counted in ecopoints) in order to allow the State to compensate, in the same ecological zone, the points lost in the biotope.</p>
<p>Establish forest management programmes to rejuvenate the forest so that it can supply biomass for energy production and to enhance its capacity to sequester CO₂.</p>	<p>A new legislative text was tabled in 2018 with the aim of revising forest sector laws and regulations in order to develop a new forestry code. This project aims to modernize partly very old legal provisions in order to meet the new challenges faced by all actors in the forest sector (currently in the legislative process).</p>

Source: OECD Secretariat based on country submission.



From:
**OECD Environmental Performance Reviews:
Luxembourg 2020**

Access the complete publication at:

<https://doi.org/10.1787/fd9f43e6-en>

Please cite this chapter as:

OECD (2021), "Assessment and recommendations", in *OECD Environmental Performance Reviews: Luxembourg 2020*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/1ea946c9-en>

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area. Extracts from publications may be subject to additional disclaimers, which are set out in the complete version of the publication, available at the link provided.

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.