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Foreword

This Survey is published on the responsibility of the Economic and Development Review Committee of the OECD, which is charged with the examination of the economic situation of member countries. The economic situation and policies of Estonia were reviewed by the Committee on 18 January 2022. The draft report was then revised in the light of the discussions and given final approval as the agreed report of the whole Committee on 11 February 2022.

The Secretariat's draft report was prepared for the Committee by Nicolas Ruiz and Srdan Tatomir under the supervision of Patrick Lenain. Statistical research assistance was provided by Damien Azzopardi, and editorial assistance by Stephanie Henry and Nathalie Bienvenu.

The previous Survey of Estonia was issued in December 2019. Information about the latest as well as previous Surveys and more information about how Surveys are prepared is available at https://www.oecd.org/eco/surveys/.

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Basic statistics of Estonia, 2021[1]

Numbers in parentheses refer to the OECD average[2]

LAND, PEOPLE AND ELECTORAL CYCLE					
Population (million, 2020)	1.3		Population density per km² (2020)	30.6	(38.7)
Under 15 (%, 2020)	16.5	(17.8)	Life expectancy at birth (years, 2020)	78.3	(79.7)
Over 65 (%, 2020)	20.4	(17.4)	Men (2020)	74.2	(77.0)
International migrant stock (% of population, 2019)	14.4	(13.2)	Women (2020)	82.7	(82.5)
Latest 5-year average growth (%)	0.2	(0.6)	Latest general election	August-2021	
ECONOMY					
Gross domestic product (GDP)			Value added shares (%, 2020)		
In current prices (billion USD)	36.2		Agriculture, forestry and fishing	2.5	(2.7)
In current prices (billion EUR)	30.6		Industry including construction	25.9	(26.2)
Latest 5-year average real growth (%)	3.8	(1.5)	Services	71.6	(71.1)
Per capita (000 USD PPP, 2020)	37.6	(46.2)			
GENERAL GOVERNMENT Per cent of GDP					
Expenditure (OECD)	42.4	(48.5)	Gross financial debt (OECD: 2020)	25.4	(133.5)
Revenue (OECD)	40.1	(38.1)	Net financial debt (OECD: 2020)	-13.2	(81.2)
EXTERNAL ACCOUNTS					
Exchange rate (EUR per USD)	0.85		Main exports (% of total merchandise exports, 2020)		
PPP exchange rate (USA = 1)	0.54		Machinery and transport equipment	31.2	
In per cent of GDP			Miscellaneous manufactured articles	15.6	
Exports of goods and services	80.5	(54.6)	Manufactured goods	14.4	
Imports of goods and services	80.4	(51.1)	Main imports (% of total merchandise imports, 2020)		
Current account balance	-1.6	(0.1)	Machinery and transport equipment	30.1	
Net international investment position	-11.7		Manufactured goods	14.8	
			Chemicals and related products, n.e.s.	12.5	
LABOUR MARKET, SKILLS AND INNOVATION					
Employment rate (aged 15 and over, %, OECD: 2020)	59.7	(55.1)	Unemployment rate, Labour Force Survey (aged 15 and over, %, OECD: 2020)	6.2	(7.1)
Men (OECD: 2020)	65.2	(63.0)	Youth (aged 15-24, %)	16.7	(12.8)
Women (OECD: 2020)	55.1	(47.7)	Long-term unemployed (1 year and over, %, 2020)	1.2	(1.3)
Participation rate (aged 15 and over, %, 2020)	63.7	(59.5)	Tertiary educational attainment (aged 25-64, %, 2020)	42.2	(39.0)
Average hours worked per year (2020)	1,654	(1,687)	Gross domestic expenditure on R&D (% of GDP, 2018)	1.4	(2.6)
ENVIRONMENT					
Total primary energy supply per capita (toe, 2020)	3.8	(3.7)	CO2 emissions from fuel combustion per capita (tonnes, 2019)	8.8	(8.3)
Renewables (%, 2020)	39.3	(11.9)	Water abstractions per capita (1 000 m³, 2020)	0.6	
Exposure to air pollution (more than 10 µg/m³ of PM 2.5, % of population, 2019)	0.0	(61.7)	Municipal waste per capita (tonnes, 2020)	0.4	(0.5)
SOCIETY					
Income inequality (Gini coefficient, 2019, OECD: latest available)	0.305	(0.317)	Education outcomes (PISA score, 2018)		
Relative poverty rate (%, 2019, OECD: 2018)	14.9	(11.7)	Reading	523	(485)
Median disposable household income (thousand USD PPP, 2019, OECD: 2018)	22.0	(25.4)	Mathematics	523	(487)
Public and private spending (% of GDP)			Science	530	(487)
Health care (2020, OECD: 2019)	8.1	(8.8)	Share of women in parliament (%)	25.7	(32.4)
Pensions (2017)	6.6	(8.6)	Net official development assistance (% of GNI, 2017)	0.2	(0.4)
Education (% of GNI, 2020)	4.6	(4.6)			

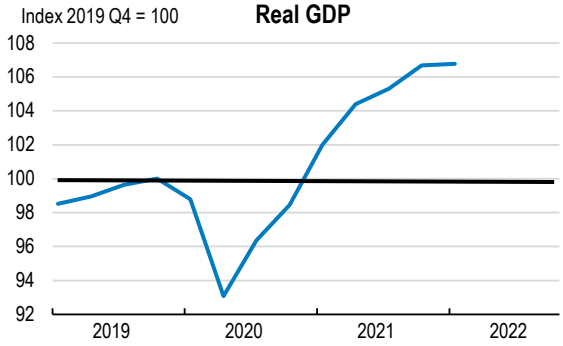
1. The year is indicated in parenthesis where data are not for 2021.
2. Where the OECD aggregate is not provided in the source database and data exist for at least 80% of member countries, a simple OECD average of latest available data is presented.
Source: Calculations based on data extracted from databases of the following organisations: OECD, International Energy Agency, International Labour Organisation, International Monetary Fund, United Nations, World Bank.

Executive Summary

A strong post-pandemic rebound initiated inflationary pressures even before the war

Estonia has withstood the pandemic shock better than its peers. Thanks to a large, timely and effective policy response to mitigate the COVID-19 shock, GDP contracted by only 2.7% in 2020, one of the softest contraction in Europe. An acute second wave at the beginning of 2021 did not put the recovery on hold, and GDP is now well above its pre-pandemic level (Figure 1).

Figure 1. GDP has surpassed its pre-crisis level



Source: OECD Analytical Database.

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OECD projections envisage this trend to slow, owing to the war in Ukraine. After an annual output growth of 8.2% in 2021, high inflation will hinder growth to 1.3% in 2022 and 1.8% in 2023 (Table 1). Private consumption will remain muted, as wages will grow less than inflation. The expected pick-up in EU fund absorption and future spending related to the EU Recovery and Resilience Facility will also underpin growth.

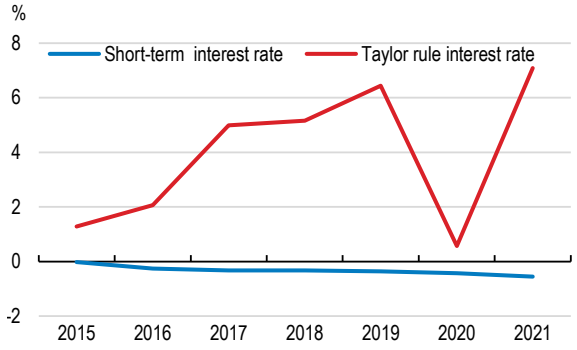
Inflation poses a risk to the outlook. Consumer price inflation has risen at double-digit rates since the end of 2021, and reached a record high of 19% year-on year in April. Upward price pressures came mainly from the cost of food and energy. Moreover, the stronger than anticipated recovery is also fuelled by the ECB accommodative monetary policy stance (Figure 2). Interest rates are too low to tame Estonia's high inflation, thus making it important to tightly target fiscal spending to refugees and the most vulnerable, building defence capacity and investing in energy infrastructures, to avoid stoking inflationary pressures further. Funding from the European Union not affecting the budget balance will stimulate investment and domestic demand, which warrants a normalization of current spending. Macro-prudential policy should be adjusted given the rapid increase in housing market prices.

Table 1. High inflation will hinder the recovery

Annual growth, unless specified	2020	2021	2022	2023
Gross domestic product (GDP)	-2.6	8.2	1.3	1.8
Unemployment rate (% labour force)	6.8	6.2	7.1	8.3
Headline inflation index	-0.6	4.5	14.5	10.9
Core inflation index	0.0	2.8	7.3	5.3
Fiscal deficit (% of GDP)	-5.6	-2.4	1.0	2.3
General government gross debt (% of GDP)	25.4	25.4	25.4	23.7

Source: OECD Economic Outlook database (June 2022).

Figure 2. Interest rates are lower than appropriate



Source: OECD Analytical Database.

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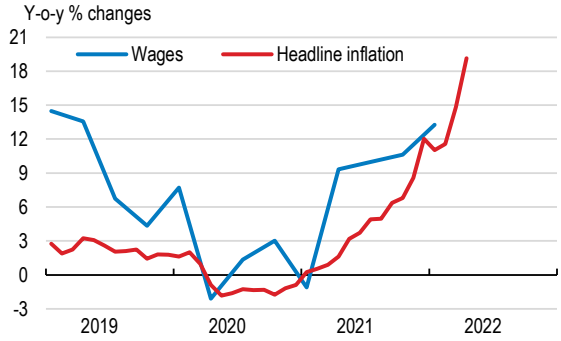
Labour shortages are rising, putting upward pressure on wages, inflation and competitiveness (Figure 3). The strong rebound in activity is amplifying the lack of suitable labour despite unemployment, underscoring entrenched skill mismatches. Pandemic-induced stricter border controls and administrative hurdles have also led to a lack of foreign workers to help filling the gap, notably in the digital and construction sectors.

Figure 3. Inflation and wages keep accelerating



Source: OECD Analytical Database.

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Strengthening up-skilling and re-skilling programmes, in line with employers' needs, will be key to address labour shortages and keep the economy on a strong path, while giving low-skilled and displaced workers the opportunity to benefit from the recovery. Better pathways from vocational education to higher levels of education would help to reduce the scarcity of skilled labour. The influx of refugees may also help, but it would be important to conduct a rapid assessment to identify the newly unemployed that could quickly join the labour market, and expand training and active labour market policies for the others.

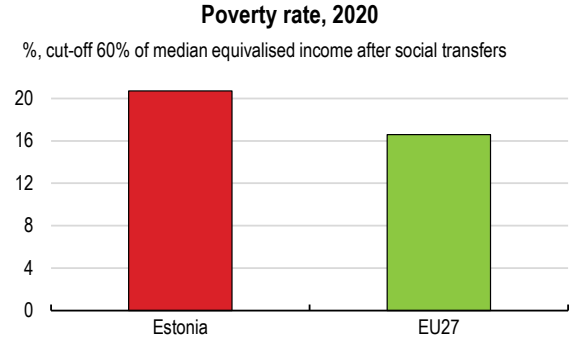
Post-crisis reforms should focus on rapid convergence for all

Poverty challenges have been made more acute by the pandemic and are now worsened by rising inflation. This highlights the importance of meeting the government´s goal of reducing relative poverty to 15% by 2023, from one of the highest levels in Europe (Figure 4).

Poverty is multi-faceted in Estonia. Several groups such as pensioners and single parents face a much higher risk of poverty than the general population. Moreover, one out of ten workers are living in a poor household. In the face of rapid developments in wages and inflation, minimum wage and basic pension are not keeping pace, and social partners should continue to discuss future increases.

There is room to make anti-poverty transfers more effective and better targeted. Introducing in-work benefits, which currently do not exist, could reduce poverty while making work pay more. Reducing employees' social security contributions for low wage earners would also reduce poverty by strengthening employment, notably for young workers. Digital technologies could be used more intensively to target persons in need of support.

Figure 4. Poverty is high



Source: Eurostat.

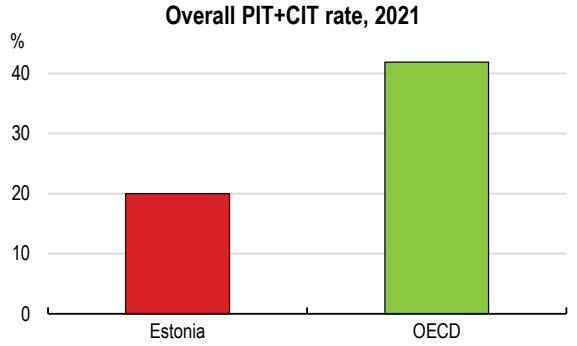
StatLink https://stat.link/ilpgm7

The gender pay gap is high. While Estonian women have high employment rates and outperform men in the education system, the gender pay gap remains one of the highest in the OECD, despite progress in recent years. The amendments reinforcing the implementation of the equal pay principle that were abolished in 2019 should be re-introduced.

To prepare for future challenges – notably climate change and ageing – tax reform options that do not jeopardize the efficiency of the tax mix could be discussed. In the long term, population ageing will increase health and pension spending. Reducing carbon emissions and adapting to climate change will require more public investment. One option is to review the taxation of corporate income, which is among the lowest in the OECD (Figure 5). In particular, Estonia could examine the benefits obtained from the preferential 14% corporate tax regime granted to companies that distribute dividends regularly. This new regime should be evaluated to assess its merits regarding investment and entrepreneurship, compared to its cost. Furthermore, Estonia could discuss whether the new land valuation, to be carried out in 2022, is an opportunity to also evaluate the stock of

housing and business properties and then expand the property tax base beyond land.

Figure 5. The taxation of dividends is low



Source: OECD Tax database Table II4.

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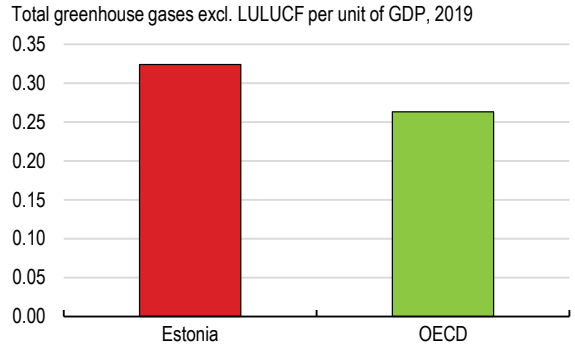
Public spending efficiency ensures the adequate use of tax revenue. In the healthcare sector, there is room to achieve better outcomes with similar expenditures. Pharmaceuticals fail to provide good value as the use of generic drugs remains lower than in other countries. Moreover, and despite Estonia being a front-runner in digital technologies, the secondary use of health data could be improved. Streamlining it to remodel services around patient needs could trigger sizeable efficiency gains.

Improving the selection, monitoring and decision-making of infrastructure projects will be key to deliver better value-for-money. Past projects funded by the European Union were too large to meet adequate cost-benefit objectives. The upcoming disbursement of large amounts of new EU funds makes it important to strengthen project selection , notably by systematically relying on cost-benefit analysis. Use of digital technologies and big data could help.

Reducing GHG emissions

Estonia's high GHG emissions have declined substantially, but further progress is required (Figure 6). Estonia has a relatively carbon intensive economy among OECD countries. Oil shale is prevalent in Estonia's energy supply although the share of renewable energy has been consistently rising. Highly concentrated in the north-eastern region of Estonia, the oil shale industry is being gradually phased out. This transformation will have a significant economic and social impact on the Ida-Viru region, which the government seeks to mitigate with good governance, targeted active labour market policies, income support and strengthened regional development policies.

Figure 6. Emissions intensity is high



Source: OECD Greenhouse Gas Emissions database.

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Estonia is aiming for net zero emissions by 2050 but the transition can have an adverse social impact. To achieve this will require a comprehensive and cost-effective approach. Decarbonisation will involve a large reallocation of capital and labour toward low-carbon activities, which will be disruptive for businesses, workers and consumers. Helping vulnerable groups will be essential in making these changes more acceptable and in avoiding resistance.

Emissions pricing is the most efficient climate policy. Carbon prices should be broad-based and equal across the economy and should be gradually increased in the medium-term. For example, transport emissions should be directly linked to carbon to encourage higher fuel efficiency while user-friendly and low carbon alternatives to private car use, such as public transport, should be developed further.

Innovation and investment will be key for transitioning to a low-carbon economy. Public investment in R&D, focused on more environment-related issues, should be increased and the deployment of innovative low-carbon technologies in the private sector should be supported. Providing a more certain regulatory and business environment for renewable energy would also stimulate investment. This should be accompanied by cost-effective investment in upgrading the energy infrastructure. To improve energy efficiency in buildings, more extensive support should be given for renovations.

MAIN FINDINGS	KEY RECOMMENDATIONS
Health policies	
Although Estonia has implemented a successful vaccination campaign, there is still a large share of unvaccinated people.	Continue efforts to accelerate vaccination.
Policies for a resilient and balanced recovery	
The fiscal response has been timely and effective in mitigating the COVID-19 shock. Now amidst high inflationary pressures, the return to a neutral fiscal stance should avoid the pro-cyclicality observed in the past. The counter-cyclical impact of automatic stabilizers could be enhanced.	Withdraw fiscal support gradually but maintain support for hard-hit sectors that do not benefit from the recovery. Allow the free play of automatic stabilisers. Reform unemployment benefits to increase their generosity during downturns and to lower it during upturns.
The strong recovery is exposing some entrenched imbalances in the labour market, amplifying labour shortages and putting pressure on wages, inflation and competitiveness.	Step-up the engagement of employers and trade unions in vocational education and training at both local and national levels. Promote pathways from vocational education and training into higher levels of education. Consider a temporary extension of the duration of short-term employment registration for migrants.
The tax system is efficient but does not generate enough revenue to finance adequate social protection. Ageing will increase health and pension spending in the long term.	Review whether the stocks of housing and business properties should be included in the land tax. Evaluate the costs and benefits of the recent lower corporate tax regime.
A large share of loan portfolios of banks is composed of loans to real estate and construction companies, while the large savings accumulated during the pandemic could lead to an overheating of the housing market.	Monitor the developments in the housing market and adjust standard macro-prudential instruments, such as debt-to-income and loan-to-value ratios, when necessary.
Progress on corruption and money laundering has been strong and continuous, but some legislative gaps remain while the awareness of companies on business corruption remains low.	Promote the adoption of specific ethical codes of conduct in the private sector and amend the legislation to meet the requirements of the OECD Anti-Bribery Convention.
Tackling poverty	
Relative poverty is high and multi-faceted. In-work poverty is the highest in the Baltics while inflation could leave lasting damage on the poorest sections of the population. The minimum wage and the average pension remain below the poverty line.	Tighten transfers targeting and use digital and data capacity to raise take-up. Create in-work benefits while making work pay. Social partners should continue to discuss minimum wage increases to phase out in-work poverty. Reduce employees' social security contributions for low wage earners. Consider support measures for pensioners to keep pace with rapid economic developments.
The gender pay-gap is high, contributing to a higher poverty risk for groups where women are overly represented.	Reintroduce and enhance the 2019 dropped amendments reinforcing the implementation of the equal pay principle to continue the progress on closing the gender pay-gap.
Raising spending efficiency	
The healthcare system has been put under significant stress during the second wave of the pandemic and spending pressures are mounting as a result of population ageing, calling for a more efficient use of available resources.	Promote the use of generics drugs and make them the standard for the reimbursement of every prescription. Implement a legal framework to streamline the secondary use of health data and encourage common approaches to data terminology and exchange standards.
As new EU-funds will be devoted to upgrading infrastructures, implementing an holistic strategy for infrastructures is essential.	Establish a central and systematic collection of data on the performance of infrastructure and select upcoming projects based on cost-benefits analysis.
Addressing climate change	
Estonia's pricing of greenhouse gas emissions has been incomplete and prices in some sectors have been too low to effectively discourage carbon-intensive economic activities.	Ensure comprehensive carbon pricing across sectors. Gradually increase effective carbon prices in the medium term while mitigating the impact on vulnerable groups.
Estonia has a relatively carbon intensive economy among OECD countries. The energy sector in Estonia accounts for a large share of the country's greenhouse gas emissions. Fossil fuels and oil shale, in particular, are prevalent in Estonia's energy production.	Reduce oil shale output over time as planned but mitigate the social impact on the Ida-Viru region through a funded comprehensive and long-term development plan.
Several restrictions have limited the growth of wind power as well as solar power.	Provide a more certain regulatory and business environment through clear and definitive spatial plans and permitting process.
Estonia's investment in R&D is low but technological innovation will be key to getting to net zero and transitioning to a low-carbon economy.	Further encourage low-carbon technology innovation by expanding public R&D investment and by increasing the share of funding on environment-

	related issues. Focus public research on environment-related issues. Support deployment of new technologies.
Transport emissions have increased since 2005. This has been driven by a rise in passenger car transport. The car stock is relatively old and fuel inefficient.	Provide and encourage the development of user-friendly and low carbon alternatives to private car use by making active mobility, public transport, low-carbon shared mobility more attractive and adapt land management in order to reduce the need for private car use.
The buildings sector accounts for a significant share of total energy demand in Estonia. Estonia's residential building stock is comparatively energy inefficient.	Provide more extensive financing and counselling support for renovations and retrofitting through KredEx. Focus on the least energy efficient buildings, where appropriate, while considering the impact on vulnerable households.

1 Key Policy Insights

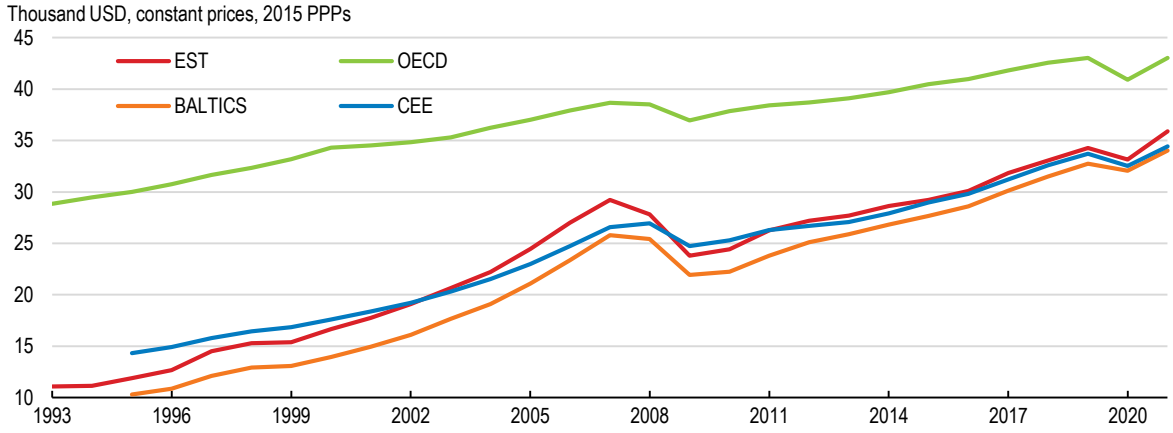
Nicolas Ruiz, OECD

Introduction

Since its independence, Estonia has made tremendous progress towards greater economic prosperity. Per capita income more than tripled over the past 30 years and the gap to the upper half of OECD countries has been continuously narrowed (Figure 1.1). Estonia enjoys solid institutions, political stability, a strong and credible fiscal policy, as well as a robust financial sector. Its major structural strengths are well recognized, including high educational outcomes, a flexible labour market and a business-friendly regulatory framework. Estonia is also a frontrunner in digital governance and innovation, with the highest number of native ICT unicorns per capita in the world. Stable and secure digital services are in fact one of the factors that have allowed Estonia to cushion better than others the sanitary and economic shock from the pandemic, as tools such as electronic health records, digital classrooms and a large range of seamless online services were already in place. A large and timely fiscal response also played a role in stabilising and preserving living standards, and Estonia achieved a solid recovery in 2021.

Figure 1.1. The income gap continues to narrow

GDP per capita



Source: OECD National accounts database.

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However, even before Russia's war against Ukraine, the buoyant recovery started to fuel inflation, reinforcing some pre-existing structural challenges. While Estonia's labour market has recovered following the peak in unemployment during the pandemic, mounting unmet demand for skilled labour could be a brake on sustainable growth and a driving force of core inflation. Poverty among old-age pensioners and low-paid workers remains a problem, which is likely to have been worsened by the pandemic-induced recession and could be further aggravated by current inflationary pressures. A country that emits large quantities of greenhouse gases per capita, Estonia faces also the challenge of embarking on a fast

transition towards low-carbon activities. These various challenges can be addressed with the help of tax reforms, but this should be done without undermining the existing efficiency of the tax mix, which is a key aspect of the country's attractiveness for both businesses and talent.

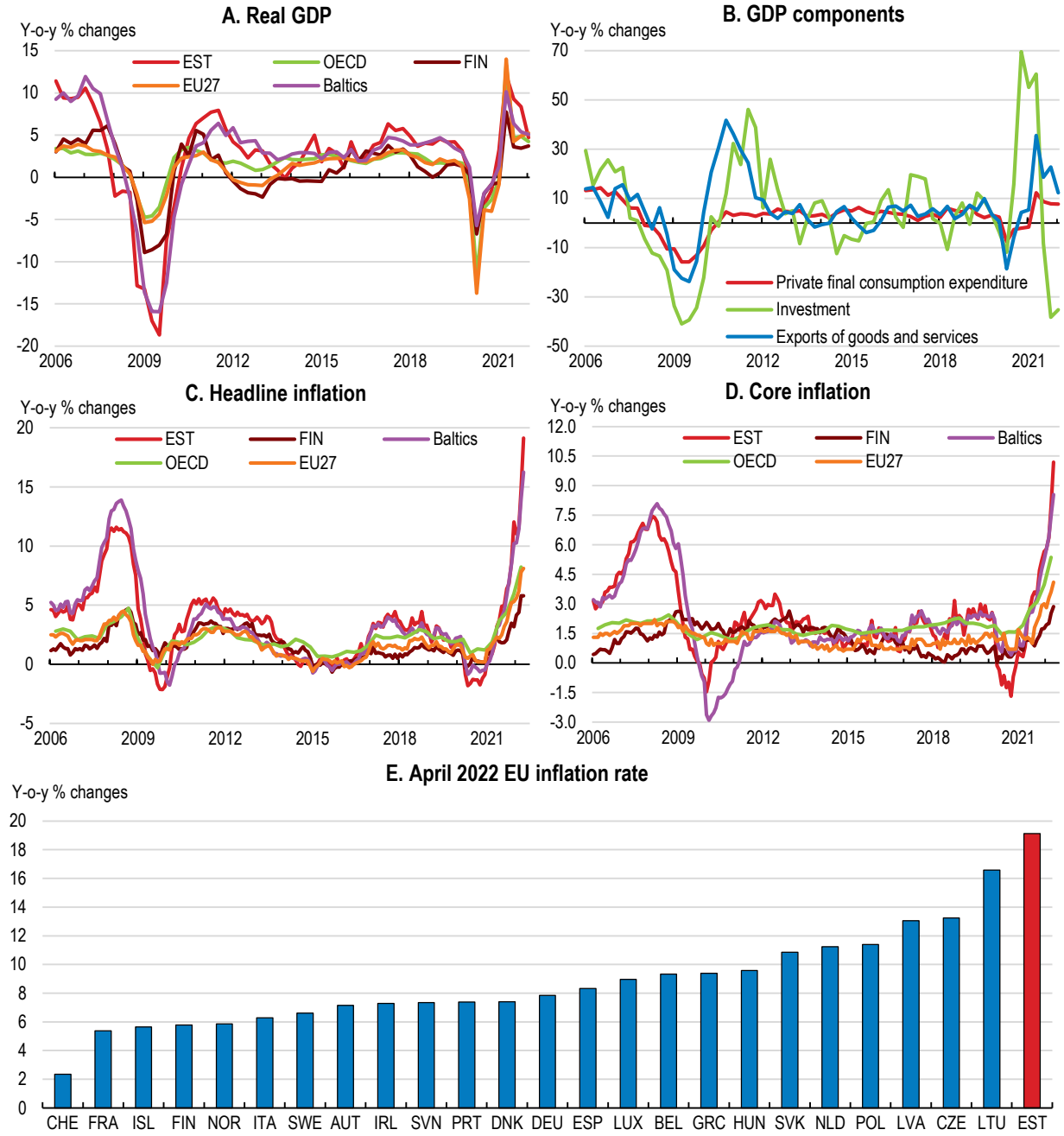
This survey charts the road ahead for Estonia to ensure a resilient and inclusive recovery and fostering the convergence process, with the following key messages:

- **Sustaining the economic recovery will require new reforms**. After the impressive short-term rebound and in a particularly uncertain context, a renewed focus on structural reforms will help Estonia remain on a path of rapid convergence. In particular, reforms should focus on addressing labour shortages and skills mismatches, which can also contribute to tame inflation, while protecting the existing flexibility of the labour market.
- **Achieving the government´s goal of reducing poverty requires further policy measures in the current context**. Social transfers could be better targeted towards people left behind, such as the elderly, while social partners should continue to make work pay better. Spending on health and infrastructure should be made more efficient to deliver better value-for-money.
- **Reducing carbon emissions will also entail significant policy changes.** Electricity generation will need to move further away from oil shale towards diversified sources of renewable energy. There is also scope to substantially reduce the use of fossil fuels in the transport sector and to increase the heating efficiency of buildings across Estonia. Achieving this will require a comprehensive approach that combines several policy tools such as carbon pricing, public investment and private-investment incentives. Attention needs to be paid to impacted consumers and workers.

The post-pandemic recovery was strong

In 2020, Estonia has withstood the pandemic shock better than its peers, with a contraction of GDP of 2.7%, one of the softest in Europe (Figure 1.2). While at the beginning of 2021 the fast escalation of infections forced the government to re-introduce containment measures, those were comparatively mild (Figure 1.3). Roughly, 75% of the economy were unaffected or affected only partially through supply chains. As a result, GDP grew by 8.2% in 2021, and activity surpassed its pre-pandemic level. At the beginning of 2022, despite a third wave of infections surpassing the peak of the second, no new significant containment measures were imposed and now contaminations are low. This can be partly traced back to a successful vaccination campaign, including the current booster shots programme. Still, a large share of unvaccinated people remain, warranting further efforts to accelerate vaccination.

Figure 1.2. The economy bounced back strongly before the war, pushing up inflation



Source: OECD Analytical Database.

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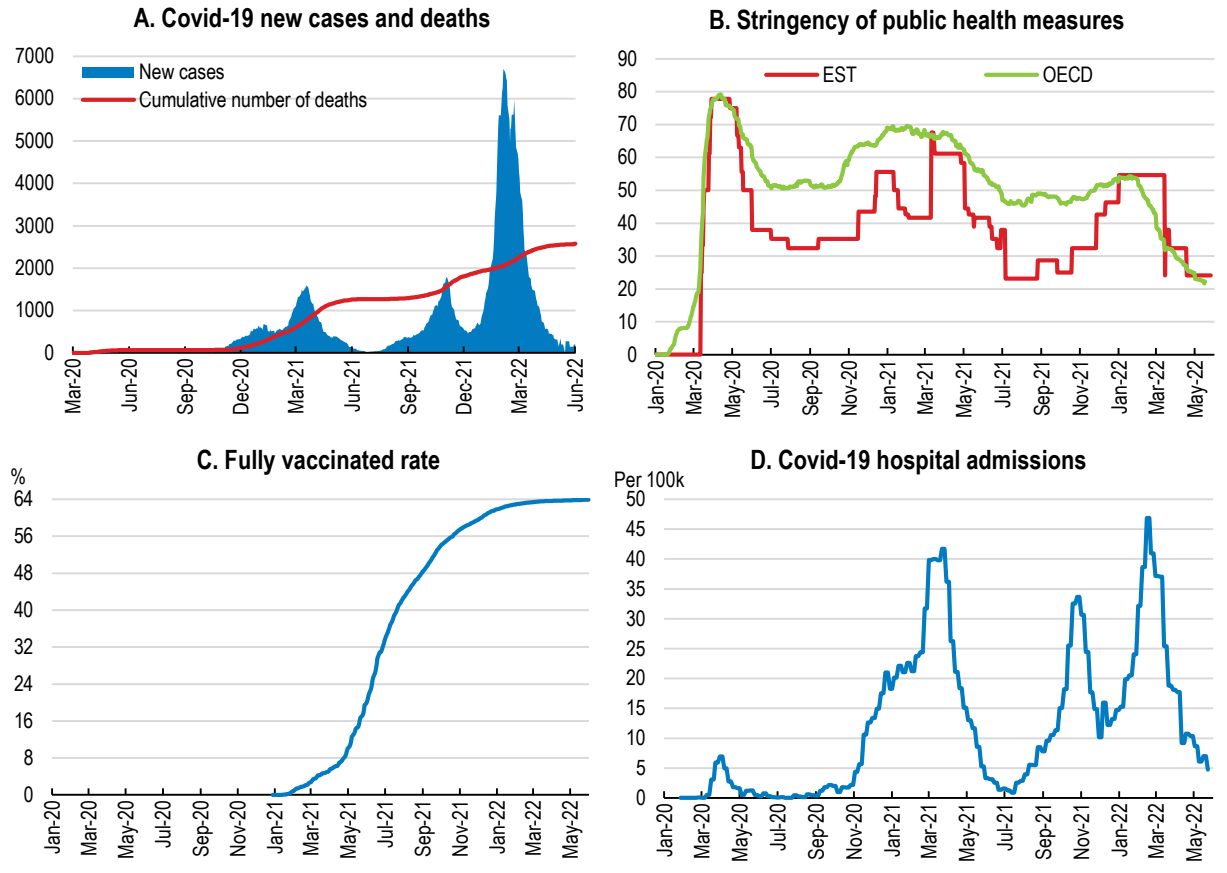
Investments also surged in 2021, but more than 80% of this came from a major car manufacturer's software investments in its new Estonian subsidiary, that by now have been withdrawn. While the impact of these specific investments on GDP is small, as they are also recorded as imports/exports of services, they have nonetheless amplified temporarily the current account deficit in a context where several factors were already depressing it. With tourists' spending still very low, the exports of services remain subdued, in particular passenger services. At the same time, the overall strength of Estonia's recovery compared to its

main partners has boosted imports, led notably by wood and mineral fuels, more than exports for the most part of 2021.

Still, the growth of goods' exports in value terms is robust, notably in the ICT sector, albeit this is partly explained by the acceleration of export prices. In the manufacturing industry, output has reached the record levels of early 2019. Household consumption remains solid based on growing wages, the drawing down of savings accumulated during the pandemic and the disbursement of funds following the reform of the second pillar of the pension system. However, extraordinarily high inflation will hamper consumption, as wages will grow less than prices. Still, households' deposit stock remains EUR 2 billion higher than before the pandemic, equal roughly to 14% of annual private consumption. Given how uneven the distribution of household deposits is, as households with large deposits before the pandemic tend to have increased their deposits more than less wealthy households, most of these savings may not further fuel growth through consumption.

Figure 1.3. COVID-19 cases are low



Source: Refinitiv and Oxford University.

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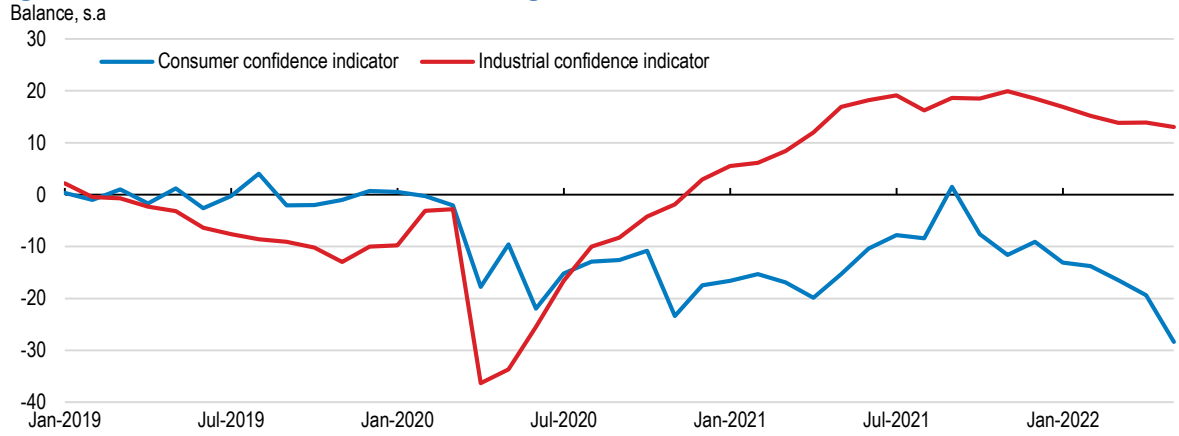
Owing to the war in Ukraine, economic sentiment has deteriorated recently, after continuous improvement through 2021 (Figure 1.4). Industrial enterprises' production and expectations for the services sector are still well above pre-pandemic levels but declining, while consumer confidence is now below pre-pandemic levels due to rapid inflation (Figure 1.2, Panel C), which reached almost 20% in April 2022, the fastest in the euro area at that time. Upward price pressures come mainly from the cost of food (14.6% vs 13.8% in March) and energy (38% vs 44% in March). Producer prices also rose by 31.8% over the year to April.

Figure 1.4. Economic sentiment is declining



Source: Eurostat, European Commission Business and consumer surveys.

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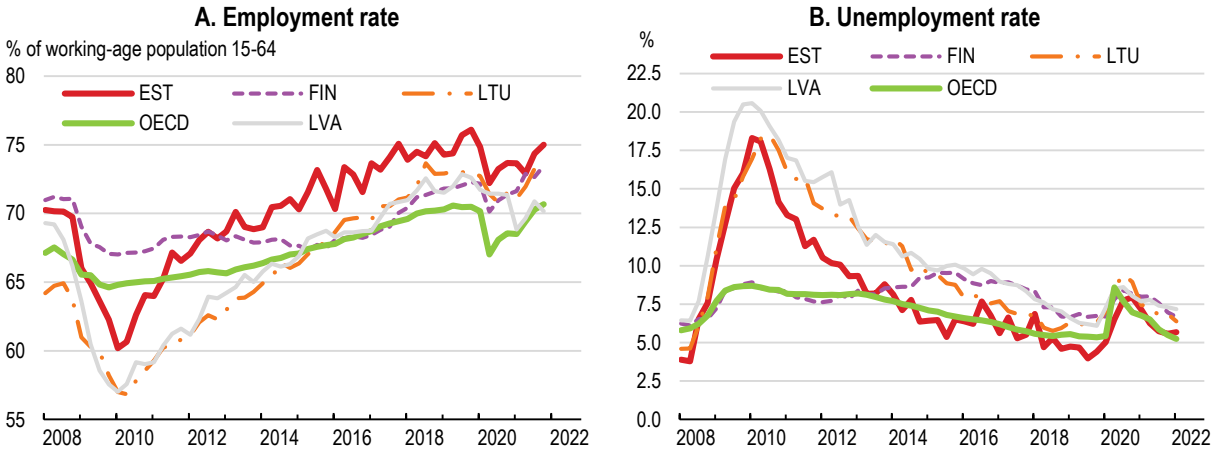
Nonetheless, the labour market remains solid, after a sharp downturn during the pandemic (Figure 1.5). With a very flexible labour market, employment dropped markedly in 2020 while the rise in unemployment, peaking at almost 9% at the end of 2020, has been among the highest in the EU, despite the job retention scheme put in place with generous eligibility conditions. Unemployment is now continuously declining and the employment rate is also recovering but is still below its pre-crisis level. Given the integration in the labour market of many low- skilled workers in recent years, the crisis could leave permanent scars on vulnerable groups. For instance, many workers who lost their jobs in the tourism sector have not yet re-integrated the labour market. Demand for new employees has increased significantly in recent months in both industry and services, but supply has not kept pace and almost one third of entrepreneurs are seeing labour shortage as their biggest obstacle to development (Swedbank, 2021).

Figure 1.5. The labour market is recovering from a marked drop



Source: OECD Labour Force Statistics.

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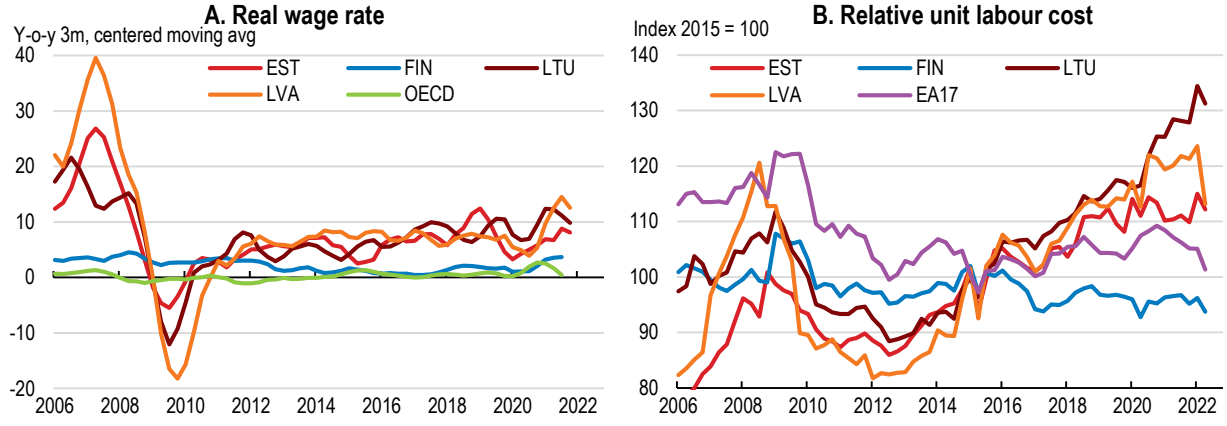
The recovery is thus exposing some imbalances already characterized in previous Surveys (OECD, 2019c and 2017c). The lack of suitable labour despite the unemployment rate being substantially higher than before the pandemic underscores skill mismatches as well as changing demographics, while pandemic-

induced stricter border controls and administrative hurdles have led to a lack of foreign workers to help filling the gap. Going forward, strengthening up-skilling and re-skilling programmes in line with employers' needs will be key to address labour shortages, while allowing low-skilled and displaced workers to strengthen their links with the labour market and benefit from the recovery.

Moreover, as currently envisaged by the government work immigration programmes should be made temporarily less restrictive, notably for non-EU immigration, for instance by temporarily extending short-term employment registration above one year. The influx of refugees from Ukraine may help in that regard. So far, Estonia has received 30,000 refugees from Ukraine, two thirds of whom are adults, and 10,000 of whom are expected to join the labour market. While this will increase unemployment in the short term, in the medium-term it will help fill gaps in various sectors such as construction and transportation, if the war is prolonged and not all of the refugees are able to return home. While immigration may influence relative wages for individual categories of workers, at the aggregate level OECD evidence tends to show that pressures on real wages are limited and vanish after a few years, and thus will not have a significant impact on Estonia's convergence in living standards (Jean et al., 2010).

Labour shortages are putting more upward pressure on wages (Figure 1.6, Panel A). In 2020, with the help of the job retention and wage compensation schemes put in place, wage growth eased to 1%. However, in 2021 average nominal wages grew by 7.1%, a pace faster than the pre-crisis trend level. With Estonian incomes lower than the OECD average, higher wages in real terms will be a welcome development once inflation stabilizes. In 2021, part of wage growth was driven by improved productivity, as companies recruited fewer workers than expected despite accelerating growth, signalling also a shift towards higher value-added activities, especially the IT sector, which could in return durably sustain inflation but also increase the quality of exports. On the other hand, the aforementioned labour market imbalances could make wages grow faster than productivity, reducing cost competitiveness and hampering exporting industries in the long run. Compared to its peers, Estonia's cost competitiveness was decreasing before the pandemic (Figure 1.6, Panel B).

Figure 1.6. Rapid wage growth could re-apply pressure on competitiveness



Source: OECD Analytical Database.

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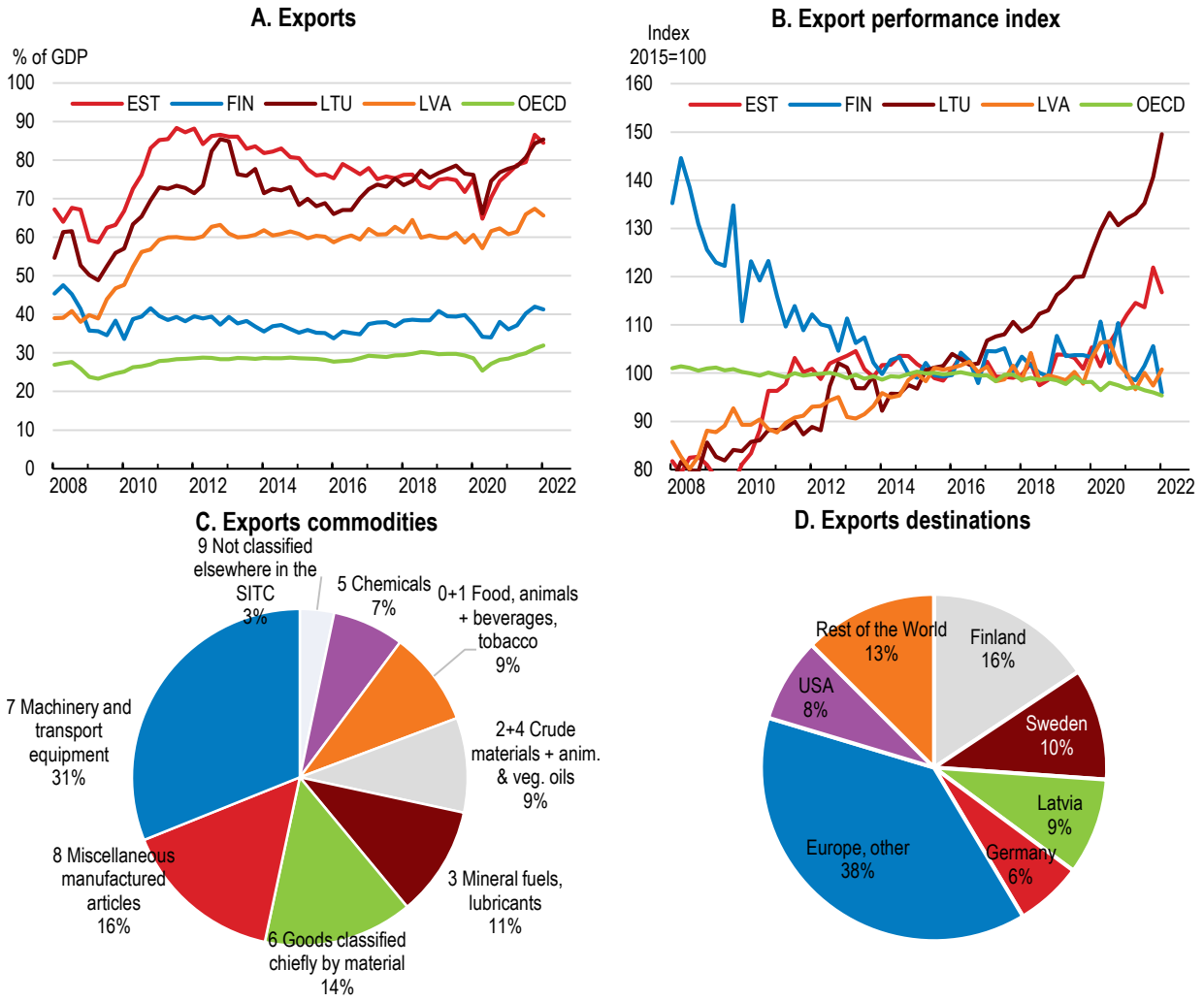
Despite declining export competitiveness, the pandemic and the war in Ukraine, export performance is holding up well (Figure 1.7). This can be partly traced back to the fact that Estonia's main trading partners, Latvia, Sweden and Finland, suffered mild contractions of roughly the same magnitude as Estonia during the pandemic. Moreover, economic links with Russia have weakened considerably since 2014, and Russia's share in Estonian exports is now below 2%. Nonetheless, the trade deficit widened in 2020 after years of surplus. With restrictions on mobility and economic activity less severe than elsewhere, the hit to

domestic demand was smaller than to exports. However, as the Baltics and the Northern parts of Europe remain the core-trading region for Estonia, accounting notably for half of its exports, the war in Ukraine could represent a long-lasting source of uncertainty for a small and open economy like Estonia. However, the constant gains of market share in exports of high-quality and complex services could contribute to lowering this risk by diversifying trade.

Figure 1.7. Export performance remains robust



Source: OECD Analytical Database; UN Comtrade; and Stat.ee.

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Looking forward, growth is expected to slow in 2022, as inflation will far surpass nominal wage growth, hampering household purchasing power. In 2023, as price pressures on energy will remain elevated, notably due to the recently announced embargo on Russian oil imports, nominal wage growth will still remain below inflation and GDP is projected to grow at 1.8% (Table 1.1). Export opportunities are expected to shrink, which, together with reduced confidence, will weaken investment. Unemployment is also expected to increase, as a large number of refugees are entering the country and not all of them are likely to find jobs immediately. However, the use of savings accumulated during the pandemic and in individual pension funds will keep private consumption afloat. Moreover, an expected pick-up in EU fund absorption will underpin activity, with rising spending as the previous 2014-2020 financing cycle approaches its end

in 2023 and through the EU Recovery and Resilience Facility. Those funds will have a sizeable impact on the growth potential of Estonia and its resilience, by consolidating and deepening further digitalisation, and initiating investments to accelerate the green transition. The implementation of these funds is also expected to pervade across all sectors of the economy.

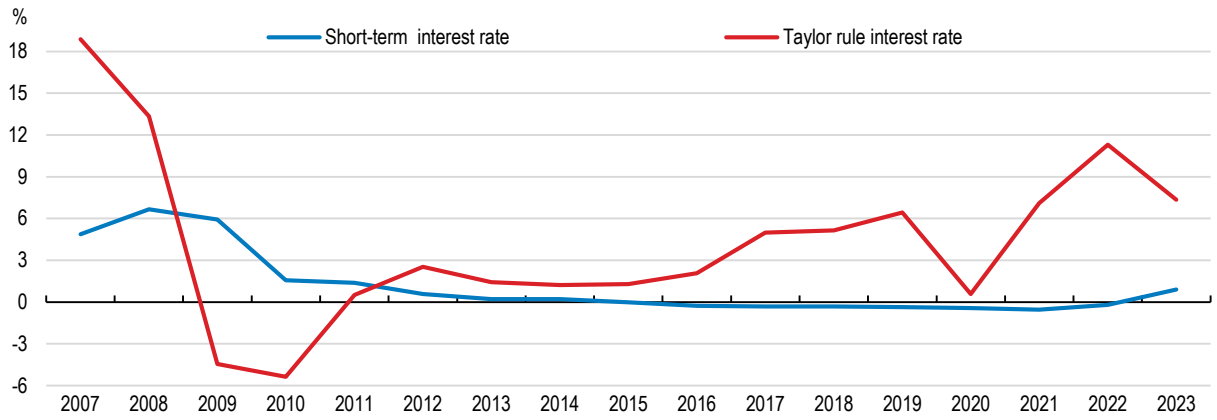
Diverging economic conditions between Estonia and the Euro area, and the resulting accommodative monetary policy conducted by the European Central Bank, could lead to lower-than-appropriate interest rates given inflation and Estonia's growth potential (Figure 1.8). To mitigate inflationary pressures, public spending should be focused only on assistance to refugees, defence and infrastructure developments that increase energy security. Support for low-income households to mitigate the negative impact of inflation on essential consumption needs should also remain narrowly targeted. The tightening of macro prudential policies could also be considered.

Table 1.1. Macroeconomic indicators and projections

	2018	2019	2020	2021	2022	2023
Estonia	Current prices EUR billion	Percentage changes, volume (2015 prices)				
GDP at market prices	25.8	4.0	-2.6	8.2	1.3	1.8
Private consumption	12.9	3.9	-2.5	6.5	4.4	2.6
Government consumption	5.0	3.1	3.1	4.0	1.4	0.6
Gross fixed capital formation	6.4	6.0	17.0	7.3	-21.8	3.7
Final domestic demand	24.2	4.4	4.1	6.8	-4.1	2.5
Stockbuilding[1]	0.8	-1.2	-0.8	2.3	-2.2	0.0
Total domestic demand	25.1	3.0	2.5	8.4	-6.4	2.4
Exports of goods and services	19.2	6.4	-4.9	19.9	14.1	6.3
Imports of goods and services	18.5	3.9	0.6	20.9	3.4	7.3
Net exports[1]	0.7	2.0	-4.1	-0.6	8.6	-0.5
Memorandum items						
GDP deflator	_	3.3	-0.6	5.4	6.5	2.8
Harmonised index of consumer prices	_	2.3	-0.6	4.5	14.5	10.9
Harmonised index of core inflation[2]	_	2.4	0.0	2.8	7.3	5.3
Unemployment rate (% of labour force)	_	4.4	6.8	6.2	7.1	8.3
Household saving ratio, net (% of disposable income)	_	8.7	11.9	6.2	0.4	-2.9
General government financial balance (% of GDP)	_	0.1	-5.6	-2.4	1.0	2.3
General government gross debt (% of GDP)	_	13.5	25.4	25.4	25.4	23.7
General government debt, Maastricht definition[3] (% of GDP)	_	8.6	19.0	18.1	19.8	21.9
Current account balance (% of GDP)	_	2.5	-0.2	-1.6	3.9	3.5

1. Contributions to changes in real GDP, actual amount in the first column.
2. Harmonised index of consumer prices excluding food, energy, alcohol and tobacco.
3. The Maastricht definition of general government debt includes only loans, debt securities, and currency and deposits, with debt at face value rather than market value.
Source: OECD Economic Outlook database (June 2022).

Figure 1.8. Interest rates are lower than appropriate given inflationary pressures



Note: The Taylor rule interest rate is calculated as: i = annual real potential GDP growth + core inflation + 0.5 × output gap + 0.5 × (core inflation – 2).
Source: OECD, Economic Outlook.

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The projections are subject to risks skewed to the downside. Additional disruptions to supply chains, more persistent inflation or prolonged weakness in major trading partner growth could all further weaken the outlook. Moreover, the structural scars of the pandemic remain uncertain in scale and could, in fact, be amplified by the current inflation pace. An increase in poverty, from an already high level, could generate social discontent and present adverse effects. The economy could also face further unforeseen shocks not factored in the projections (Table 1.2).

Table 1.2. Large-scale shocks with a negative impact on the outlook

Shocks	Possible outcomes
Continued outbreaks of the pandemic due to the emergence of new variants	Resumption of lockdown, mobility restriction, factory shutdowns, and additional disruptions in supply chains would put the economic recovery at risk.
Ramping up of trade tensions	As a small, open economy, Estonia is exposed to weaknesses in world trade, notably against the backdrop of falling cost competitiveness.

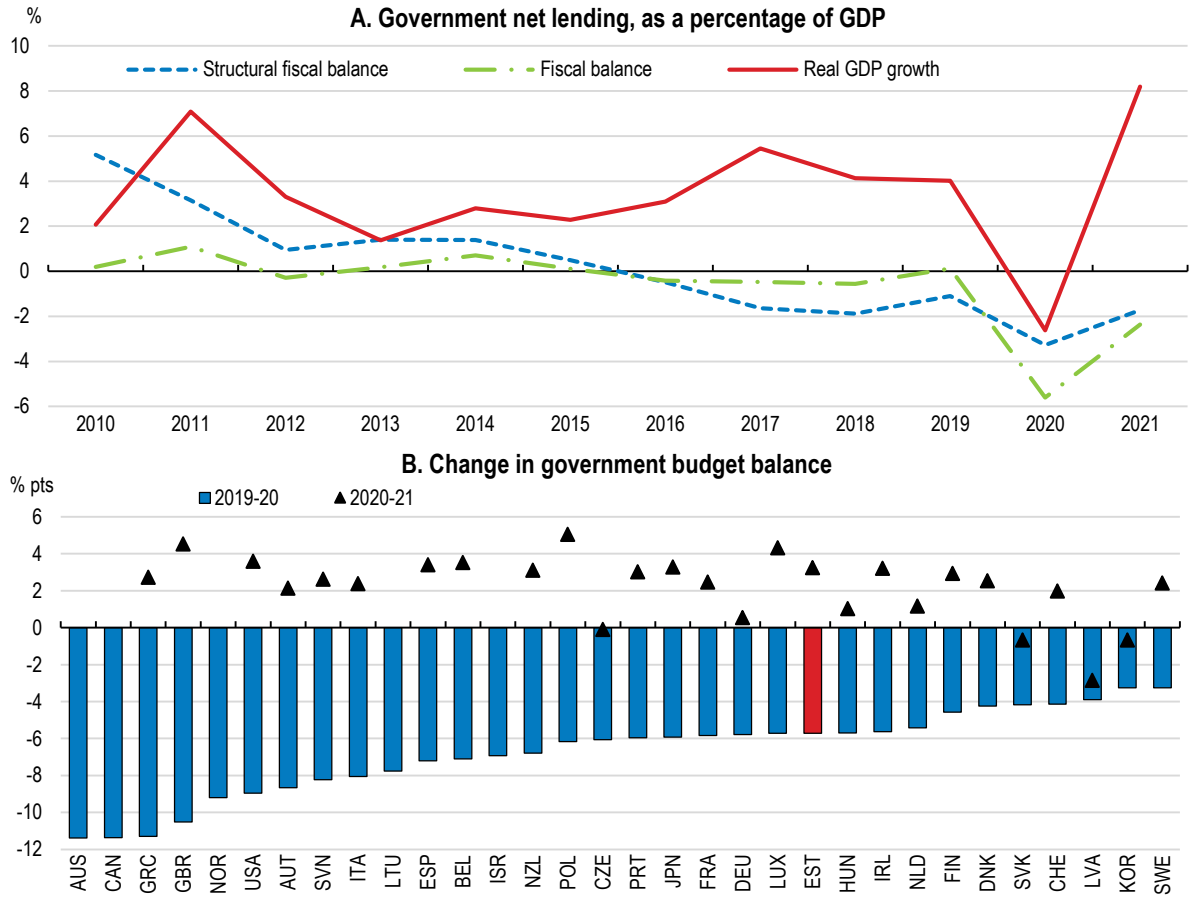
The macroeconomic policy framework remains solid

Public finances are robust

Estonia entered the pandemic with the lowest general government debt ratio of the OECD, at just 8.6% of GDP in 2019, fully matched by fiscal reserves, meaning that net debt was zero. In 2020, the appropriate force of the policy response, which has greatly mitigated the COVID-19 shock, pushed the 2020 fiscal deficit to 5.6% of GDP (Figure 1.9). This was better than the one originally budgeted (6.6%), as the impact of higher spending was partially offset by a lower-than-anticipated decline in overall revenues. In light of the second pandemic wave at the beginning of the year, the government appropriately carried-over and even amplified the support measures introduced in 2020. The 2021 fiscal package, of 6.5% of GDP, supported the economy recovery. The fiscal deficit declined to around 3.3% in 2021, thanks to strong growth and wage increases that occurred during the year. During the first half of 2022, a supplementary budget, of around 3% of GDP, was passed to cope with the effects of the war in Ukraine, notably for covering initial expenses related to integrating refugees, as well as for strengthening energy security,

notably establishing gas reserves and investing in liquefied natural gas capacity and strengthening defence.

Figure 1.9. The largest deficit on record helped to cushion the pandemic



Source: OECD Economic Outlook (January 2021).

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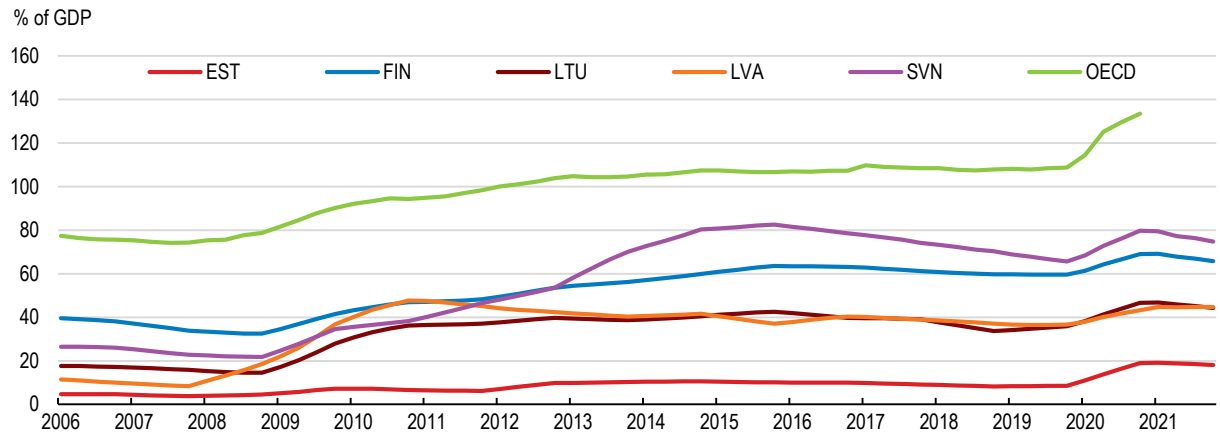
The COVID-19 crisis thus led to a significant increase in Estonia's gross public debt by around 9.8 percentage points in 2020, albeit from a very low level. Nonetheless, it remains comparatively very low as a share of GDP (Figure 1.10). From 2024 on, the authorities wish to restore a prudent fiscal stance and reduce the level of debt to its pre-pandemic level. After having triggered the national escape clauses from fiscal rules for 2020–21, in line with EU guidelines, the 2022-25 State Budget Strategy reaffirms the objective of a structural budget deficit of the general government of 0.5 percent of GDP in the medium term. More precisely, the State budgets will be prepared such that the structural budgetary position of the general government is balanced or in surplus, while annual structural deficit up to 0.5% of GDP can be allowed only if potential cumulative structural surplus have been generated during previous fiscal years. Regarding the short-term transition to this stance, the budgetary deficit will start to be reduced from 2022 onwards, with a deficit that must not exceed 2.2% of GDP that year, and then must be reduced by 0.5% of GDP each year. However, if economic growth remains strong, with tax revenues exceeding expectations, the windfall gains should be used to reduce further the fiscal deficit.

Figure 1.10. Gross public debt has increased but remains very low



Note: Using the general government debt Maastricht criterion, with the exception of the OECD average.
Source: OECD EO database.

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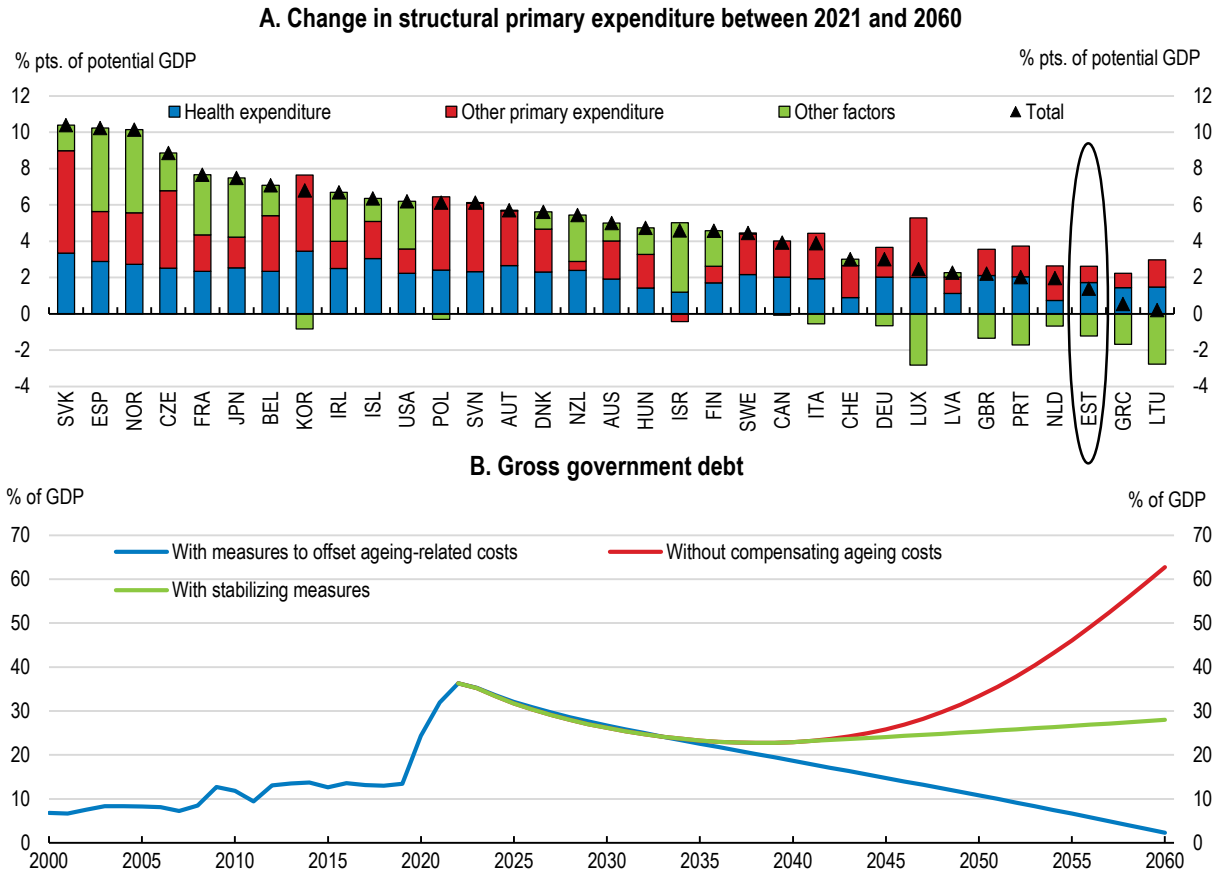
In the long run, this fiscal strategy must be framed in the context of future budgetary pressures to cope with an ageing population. With comparatively favourable demographics for the forthcoming decade, the fiscal impact of ageing is less pronounced than in other countries. The OECD Long-term Model estimates that the ratio of structural primary revenue to GDP in Estonia would need to rise by 2% between 2022 and 2060 to stabilise the gross debt-to-GDP ratio at 30% (Figure 1.11). A similar reduction of spending, or a combination of revenue increases and spending cuts would likewise stabilise debt as a share of GDP. Broadening the tax base and increasing the efficiency of the health sector could contribute to alleviate those spending pressures.

Figure 1.11. Ageing costs will add to fiscal pressures



Note: In Panel A, "Other primary expenditure" is projected based on the assumption that governments will seek to provide a constant level of public spending per capita in real terms. Under some reasonable assumptions, the evolution of this expenditure category relative to GDP becomes an inverse function of the projected evolution of the population-to-employment ratio, as expenditure (numerator) follows population whereas GDP (denominator) follows employment. The "other factors" component captures anything that affects debt dynamics other than the explicit expenditure components (it mostly reflects the correction of any disequilibrium between the initial structural primary balance and the one that would stabilise the debt ratio). In Panel B, underlying projected growth rates, interest rates, etc., are from the baseline long-term scenario (for further details, see Guillemette, 2021). The debt path in the "With measures to offset ageing-related costs" scenario assumes the primary budget converges to balance in 2030 and then stays at that level. Interest receipts are assumed to remain at 1% of GDP after 2030. The debt path in the "With stabilizing measures" scenario assumes a rise of 2% of the ratio of structural primary revenue to GDP.
Source: OECD Long-term model.

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While Estonia's fiscal framework is designed to conduct neutral fiscal policy, the latter has often been pro-cyclical in recent years (Figure 1.9). Attempts to achieve balanced budget can lead to pro- cyclicality, as it tends to exaggerate growth through higher-than-necessary public expenditures during economic expansion, while expenditure cuts to balance the budget amplify downturns. As highlighted in previous Surveys (OECD, 2019c), fiscal expansion appeared to have fuelled growth in 2018-19, as windfall revenues were spent instead of creating surplus for future deficits. Eelarvenoukogu ("Estonia's Fiscal Council") pointed out that recurrent disagreements occurred on the estimation of Estonia's cyclical position, leading the government to plan the budget on a worst-case scenario basis based on the recurrent assumption of a negative output gap, while a broader set of indicators than GDP led to think otherwise regarding the health of the Estonian economy (Eelarvenoukogu, 2017). Also pointed out by Eelarvenoukogu, such pro-cyclicality is in fact breaching the fiscal rule, which requires planning surpluses after reaching a balanced budget to offset past deficits. Enhancing the statistical apparatus beyond

the single GDP basis used to estimate Estonia's cyclical position, for example by considering a broad set of labour market indicators or incorporating indicators of tax revenues, would help to get a more accurate picture of Estonia's cyclical position for the drafting of budget plans.

Moreover, and as already pointed out in recent OECD publication (OECD, 2021b), automatic stabilisers lack size and traction, and the government has limited fiscal tools to smooth cyclical fluctuations beyond escape clauses. Such issue is particularly vivid for unemployment insurance, where contributions exhibit pro-cyclicality (Figure 1.12). This pro-cyclicality is partly due to the setting of contributions based on the needs of the state budget balance rather than labour market needs. This implies that the total tax burden on labour is higher during worse economic conditions and lower during better times. As a result, the system may not accumulate reserves to face longer economic downturns. New principles for setting unemployment insurance contributions could be formulated by introducing counter-cyclicality, for example by incorporating the current reserves, and their forecast, of the unemployment insurance funds. As currently discussed, automatic triggers for higher generosity could also be introduced, such as in the United States (Box 1.1).

Figure 1.12. Unemployment insurance contributions are pro-cyclical

Unemployment rate and unemployment insurance (UI) premium, 2002-2019

Source: OECD (2021b) and Government decrees on unemployment insurance premium in 2002-2019.

StatLink https://stat.link/91bztr

Box 1.1. Normal and extended unemployment benefits in the United States

In the United States, normal unemployment benefits are normally available for 26 weeks in the United States under the joint federal state Unemployment Compensation (UC) program. Those can be periodically supplemented and extended during episodes of economic distress, through a combination of permanent and temporary legislation:

- The federal Extended Benefits (EB) program, permanently authorized, provides up to 20 weeks of additional unemployment compensation for unemployed individuals who lost jobs in states where the level and change in the state unemployment rate is above a specified threshold. The thresholds or triggers are state specific but most commonly are based on an overall unemployment rate of 6.5 percent (for a 13-week extension) or 8.0 percent (for 20 weeks).
- Congressional intervention can also temporarily establish, as in 2008 and 2021, temporary programmes of extended UC benefits when a recession is officially declared by the National Bureau of Economic Research (Cahsel, 2008). These programmes extend the time an individual can claim UC, typically ranging from an additional 6 weeks to 63 week, and have expiration dates. Historically, temporary programmes started operating after the recession had officially ended (albeit this was not the case in 2021 with the UC program as part of the CARES act). One of the main reason is that the exact date of the recession is not known until months after that recession has started, and the National Bureau of Economic Research NBER often announces a recession has begun three or more months after what is later determined to be its official start.

Permanent and temporarily extended UC programmes play an important role for macroeconomic stabilization in the United States. During the Great Recession, it is estimated that they closed about two-fifths of the real GDP shortfall caused by the recession (Nicholson and Needels, 2011). In terms of financing, they allow to collect sufficient reserves when the economy grows, as UC programmes revenues rise through increased tax revenues while UC program spending falls because fewer workers are unemployed and receive benefits, preparing for any economic downturn. In addition, evidence tend to demonstrate that extended UC programmes during the Great Recession may have helped promote labour force attachment among recipients (Rothstein, 2011; Farber and Valletta, 2015).

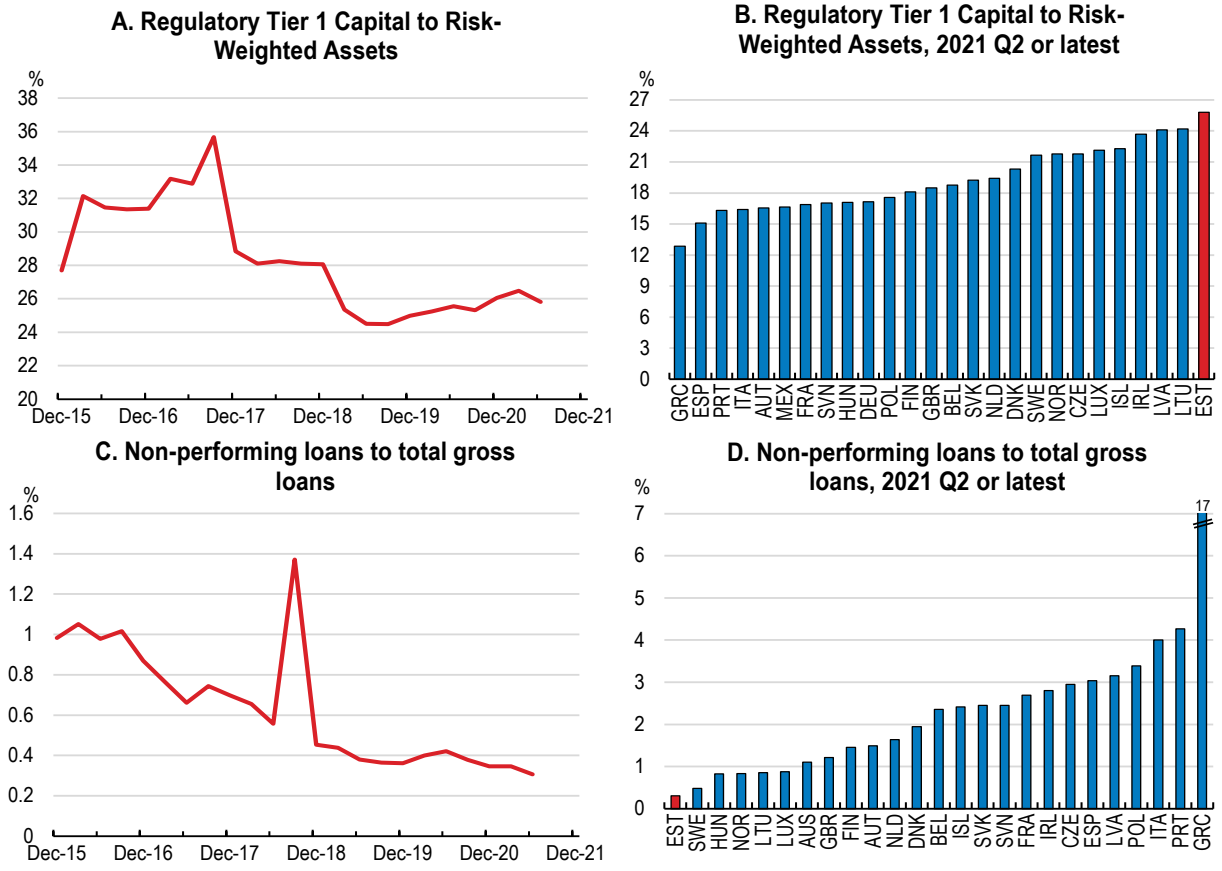
Table 1.3. Past OECD recommendations on macroeconomic conditions

Recommendations in past *Surveys*	Actions taken since the previous *Survey* (December 2019)
Avoid pro-cyclical fiscal policy and allow the free play of automatic stabilizers. In case of a strong downturn, fully use the exemption clause built in the existing fiscal rule.	During the COVID-19 crisis in 2020-2021, Estonia has used the exemption clause for covering virus-related expenditure and for cushioning the negative economic impacts of containment measures.
Increase spending on measures boosting the long-term growth potential and inclusiveness such as infrastructure connectivity, innovation and education.	Spending has been increased in most of the areas recommended. For infrastructure, Rail Baltic, railroad electrification, road construction, new electricity links, support to building up high-speed internet and television network with optical cable net are all-underway. For innovation, since 2020 Enterprise Estonia offers both consulting and financial support for conducting applied research. The hiring of development consultants with a scientific background in the branch associations of companies is also supported. The Ministry of Education and Research has also initiated sectoral research programmes based on the needs of entrepreneurs.
Do not allow withdrawal from the second pillar of the pension system before retirement. Assess the impacts of potential changes to the pension system, including on pension adequacy and macroeconomic stability.	No progress made. An in-depth analysis of the sustainability of the pension system will be completed by the end of 2022
Introduce a recurrent tax on the ownership of residential real estate. Reduce labour and consumption taxes.	Excise duty rates on important energy products have been temporarily reduced for a two-year period (between mid-2020 to mid-2022).

The financial sector is sound but the housing sector should be monitored

The financial sector cushioned the shock well. Benefiting from higher precautionary savings, banks did not show any sign of deteriorating solvency or liquidity. Banks' capital-to-asset-ratios remain among the highest in the OECD, while the share of non-performing loans is at an all-time low (Figure 1.13). Some of the measures taken during the first wave of the pandemic to ease financing conditions, such as lowering the systemic risk buffer, are also gradually withdrawn in light of the recovery. A recent Central Bank's stress test confirmed banks' low exposure to sectors severely impacted by the pandemic. The exercise suggests that even in the case of an adverse scenario, non-performing loans would rise by a much smaller magnitude than during the global financial crisis.

Figure 1.13. The banking sector displays healthy ratios



Source: IMF, Financial Soundness Indicators database.

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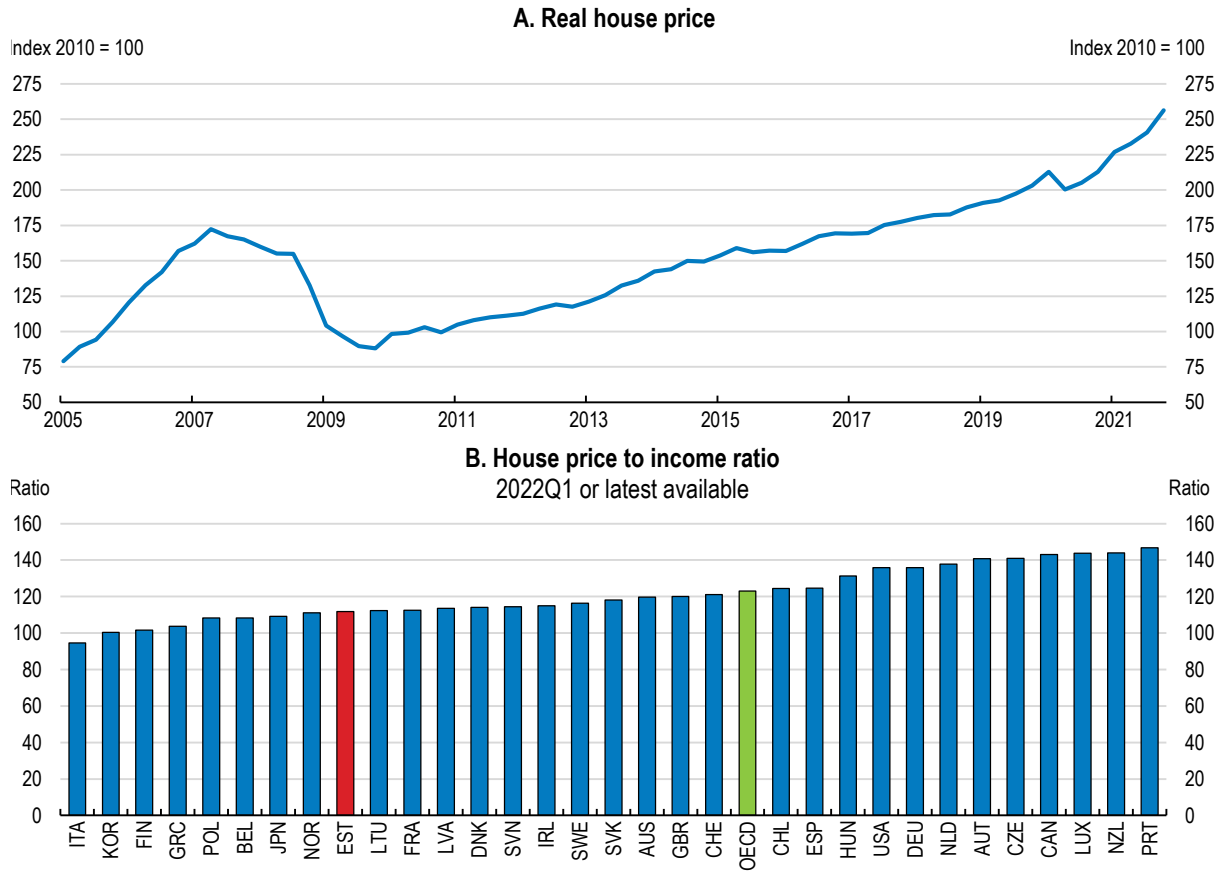
However, a large share of the loan portfolios of the banks operating in Estonia is composed of loans to real estate and construction companies. These were significantly affected by the crisis in 2020 but have since recovered and the real estate market, while remaining affordable, is now accelerating again (Figure 1.14). While the Russian invasion of Ukraine initially made households in Estonia cautious about borrowing, demand for loans recovered quite quickly. However, there is no sign of overheating according to the authorities, and the Central Bank considers price dynamics to be in line with fundamentals. That being said, the expected gradual withdrawal of accumulated deposits, particularly by wealthy households, matched with overall easy financing conditions, could pose a risk. Developments in the housing market should be carefully monitored and standard macro-prudential instruments, e.g. loan-to-value and debt-to-

income ratios, should be promptly adjusted should overheating signs increase. In that regard, the planned clarification and tightening of eligibility criteria for housing loans backed by state guarantees are welcome.

Figure 1.14. House prices have regained momentum but affordability remains



Source: OECD Analytical house prices indicators database; and Statistics Estonia.

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Box 1.2. Quantifying the fiscal impact of selected reforms

The following estimates quantify the fiscal impact of selected medium-term reforms. They are taken from a variety of sources, including costs observed in other countries, and hence serve only an illustrative purpose. Some of the measures involve one-off (e.g. the rollout of broadband), while others involve continuous disbursement of public funds (e.g. VET spending). The negative second-round effects of these reforms on GDP in the case of tax increases is not considered.

Table .Box 1.2. Illustrative fiscal impact of selected reforms

Policy	Additional annual fiscal cost (+)/revenue (-), percentage points of GDP
Fast internet broadband rollout (two-years costs for connection of all rural areas)[1]	+1.9
Increase VET spending to the level of the OECD upper half	+0.6
Abolish the reduced tax rate on distributed dividends[2]	-0.3
Introduce a third income tax bracket[3]	-0.3
Introduce a recurrent tax on owning real estate[4]	-1.0

1 Assuming that rollout costs are proportionate with the size of the area and based on EUR 14 billion estimated costs for rural area coverage.
2 Based on the assumption of 700M submitted to the 14% rate in 2021.
3 Based on calculations from the Ministry of Finance of Estonia.
4 Based on the assumption that the real estate tax will be in the same magnitude (as a ratio to GDP) as the average OECD country.
Source: OECD calculations

Box 1.3. Quantifying selected structural reforms

The following estimates roughly quantify the cumulative GDP impact of reform scenarios after 10 years and are illustrative. The estimates, subjects to data availability and statistical significance, are based on empirical modelling of the relationship between the reform measure and total factor productivity, capital deepening and the employment rate.

Table Box.1.3. Illustrative GDP impact of selected recommendations

Policy	10-year GDP Impact
Increase active labour market spending to the average of the OECD upper half	+1%
Lower the labour tax wedge for low earners (by 5% points)	+1.1
Tilt the tax structure toward property tax to the average of the OECD upper half	+0.6%

Source: OECD calculations based on Égert (2018).

Structural challenges to get the recovery right

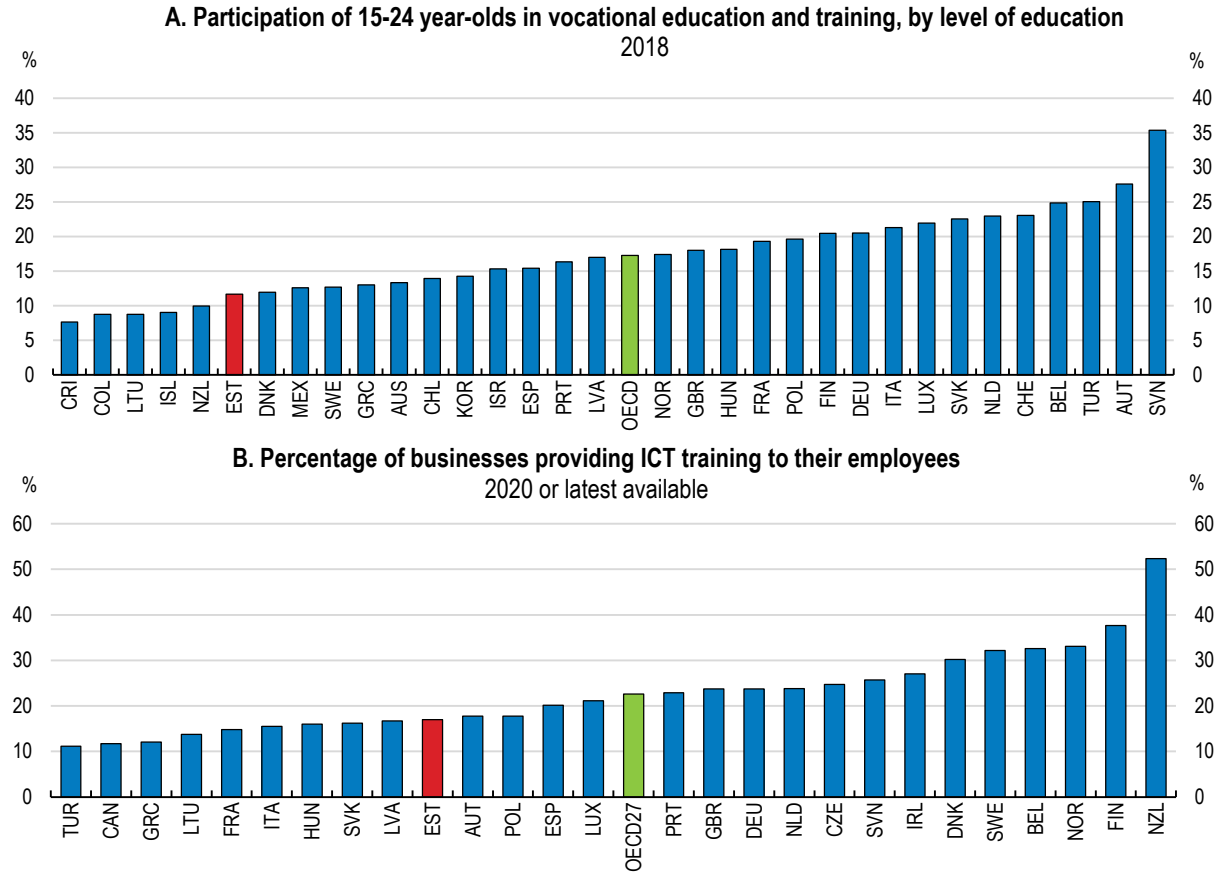
Moving from job retention to job creation and reallocation

As most countries, in response to the COVID-19 crisis Estonia took active measures to preserve jobs and support incomes. It introduced a job retention scheme, covering 70% of usual wages for firms experiencing a temporary decline in business activity under broad eligibility conditions. This welcome scheme was in place intermittently up to May 2021, when it was discontinued. Preliminary evidence on the effectiveness of such schemes during the first six months of the COVID-19 crisis suggests that their role was significant in limiting job losses and averting a surge in unemployment, albeit there are large uncertainties by how much, while evidence about how these schemes could have potentially hampered job creation by locking workers into firms with structural difficulties is more limited (OECD, 2021a). After the pandemic, policies conducive to job creation and reallocation will be central to a strong recovery and to address the long-standing issue of skilled labour scarcity. Moreover, the pandemic has also demonstrated the need for swift labour reallocation while in parallel, the acceleration of structural changes in labour markets, including the green transition (see Chapter 2), requires effective reskilling policies to help businesses, start-ups and workers to create opportunities and facilitate transition to occupations and sectors with higher growth potential.

Strengthen engagement in vocational education and training

Prior to the pandemic, evidence demonstrated that high-performing VET systems provide a very effective means of integrating learners into the labour market and opening pathways for further learning and personal growth (OECD, 2020b). During lockdown measures, the reliance on vital services such as healthcare, many of which relying on vocational education, has shown the importance of vocational education and training (VET). In Estonia, students are little involved in VET, as well as businesses, even when it comes to ICT training (Figure 1.15).

Figure 1.15. Students and businesses are little involved in VET



Note: Panel B data refer to businesses with 10 or more employees that provided any type of training to develop the ICT related skills of their employees within the last 12 months.
Source: OECD Education at a glance 2020; and OECD ICT Access and Usage by Businesses Database.

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Increasing the participation of employers and trade unions, at both local and national levels, and combining school-based with work-based programmes, would make VET more attractive to students. This would give students the opportunity to assimilate relevant skills while being in the workplace, in contrast to existing practices that involve little exposure to the workplace (Figure 1.16). It is also crucial that VET programmes provide students with the skills needed for tomorrow. Occupations involving routine tasks are being transformed, restructured or are disappearing entirely due to increasing levels of automation. Hence, VET will need to focus more on those occupations demanding higher levels of autonomy, planning, teamwork, communication and customer service skills that are more able to resist automation.

Figure 1.16. Work experience during vocational education lacks availability

Distribution of 25-34 year-olds with vocational upper secondary or post-secondary non-tertiary education without work experience while studying, 2016

Source: OECD Education at a glance 2020.

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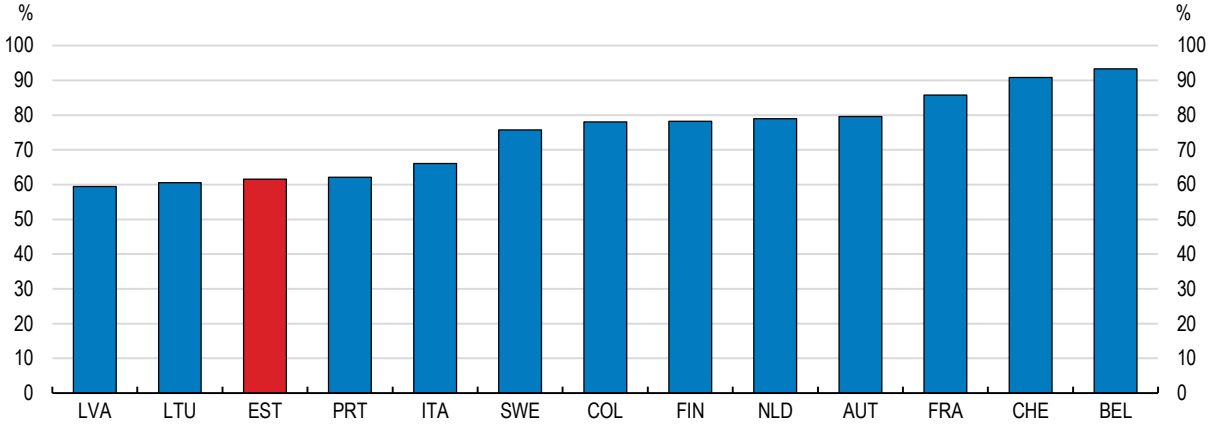
Promoting pathways from VET to higher levels of education would also be important to support students in developing skills that provide value in the workplace. Estonian students tend to be relatively less inclined to engage in programmes that can lead to tertiary education (Figure 1.17). Moving between programme types, including into higher education, would signal that VET programmes can open the door to further learning and self-development. Providing prospects for higher education would also encourage vocational students to complete their education. Although the completion rates of students in vocational upper secondary programmes, tend to be lower than in general ones, vocational students are more likely to complete their qualification when the programme provides access to tertiary education than when it does not (OECD, 2020b).

Figure 1.17. The engagement in vocational programmes leading to tertiary education could be improved

Completion rate of vocational programme with access to tertiary education, 2020



Source: OECD EAG 2020.

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Advance the use of artificial intelligence to connect people with jobs

Estonia is already equipped with tools to analyse labour market trends, thanks to its jobs and skills forecasting system (*Tööjõu-ja oskuste vajaduse seire-ja prognoosisüsteem*, OSKA) and through its Unemployment Insurance Fund (*Töötukassa*), which provide recommendations to stakeholders in education, training and support measures (CEDEFOP, 2020). However, such tools could be further improved (OECD, 2021a). Additional use of Artificial intelligence (AI) can help to connect people with jobs, taking into account the skills of jobseekers. Learning algorithms can also spot emerging patterns and speed up the reabsorption of displaced workers into industries requiring similar skillsets. AI can process large pools of jobseekers more quickly than workers in public employment services.

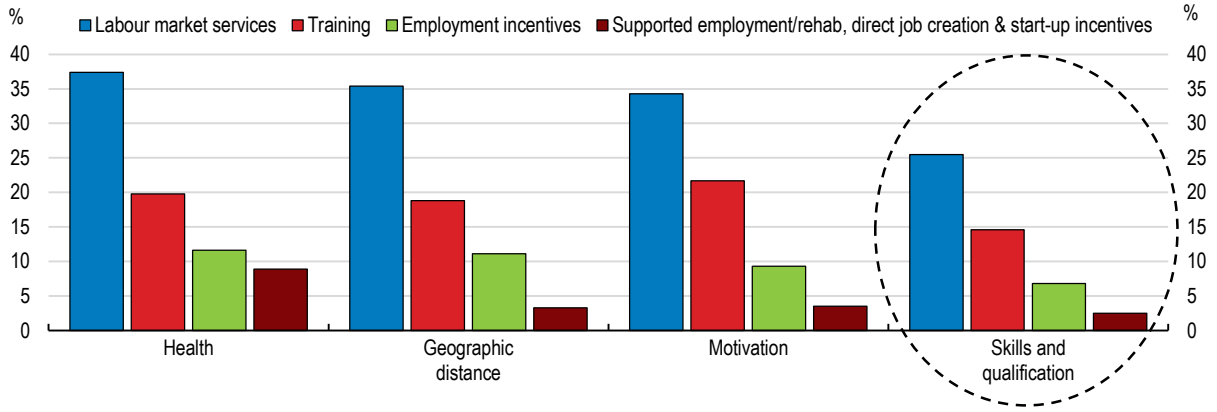
The tailoring of active labour market policies (ALMPs) could also be improved with AI. The pandemic has increased the number of job seekers in Estonia, and preliminary evidence suggest that their composition has changed, as some groups have been more affected than others (OECD, 2021a). As a result, ALMPs' traditional profiling tools, either digital or through human assessment, can become less accurate. AI algorithms can allow for rapid and consistent adjustment of individual profiling, meaning that services can be adapted swiftly and with higher accuracy. The planned incorporation of the new 2021 population census in OSKA offers an opportunity to revise and upgrade the algorithms based on a set of fresh data to improve recommendations. Scenario buildings could also be developed to understand and anticipate better structural changes. For example, the transportation and logistics sector in OSKA could take further into account, and elaborate different scenarios on, the impact of driverless cars and smart transportation systems for skill demand.

Improve the match between ALMPs and people with skills obstacles

While participation in active labour market policy programme is high among persons with health obstacles, thanks to past reforms, it is comparatively lower for those with low skills (OECD, 2021b and Figure 1.18). Further efforts should be made to refer and convince the low-skilled to participate in training measures, not least because the potential positive effects of their participation are likely to be higher than for the high-skilled (Leetmaa and al., 2015).

Figure 1.18. ALMPs participation is comparatively low for those with skill obstacles

Share of working-age people with weak attachment to the labour market in Estonia receiving ALMPs by their labour market obstacles, 2017-2019



Source: OECD (2021b).

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While Estonia public employment services (EUIF) already use guidelines to detect training needs and encourage low-skilled persons to enrol in training, more can be done to fully implement these guidelines (OECD, 2021b). In addition, training programmes could be adapted to fit better the needs of the low-skilled, minimising discouraging aspects and preventing dropping out. The latter could be done by providing counselling and mentoring during participation in training programme, discussing the challenges met and trying to address them. Furthermore, the outreach strategy to low skilled people should be revised to promote up- and re-skilling directly and personally, as raising general awareness might not be sufficient. Specific training programmes for this group could also be created, as has been done successfully in Germany (Box 1.4).

Box 1.4. Specific training programmes for the low-skilled in Germany.

In 2016, the German Ministry of Employment and Social Affairs and the social partners in the public employment supervisory board jointly initiated the second chance initiative *Zukunftsstarter* ("future starter"), which aims at increasing qualification levels among young people. In particular, it targets 25- 35 year-olds who have no vocational degree (which is a requirement for working in many jobs, including in many technical, administrative and service occupations), or have been working in a job that does not require such a degree for at least four years. The programme is open to employed people as well as people who do not work and sponsors training, usually for two years, permitting to obtain a vocational degree.

The objective of *Zukunftsstarter* was to provide training to 120 000 unskilled young adults between 2016 and 2020. Ultimately, this will contribute to alleviating shortages of skilled labour, improving people's employment prospects and lowering unemployment. A similar second change initiative, *Spätzünder gesucht* ("late starters wanted"), ran between 2013 and 2015 as *Zukunftsstarter*'s predecessor. The results of *Spätzünder gesucht* are encouraging, pointing to the high potential of this type of initiative. Following the start of the programme in 2013, entries into degree-oriented training programmes increased markedly, in total by 19%.

Source: from OECD (2021b)

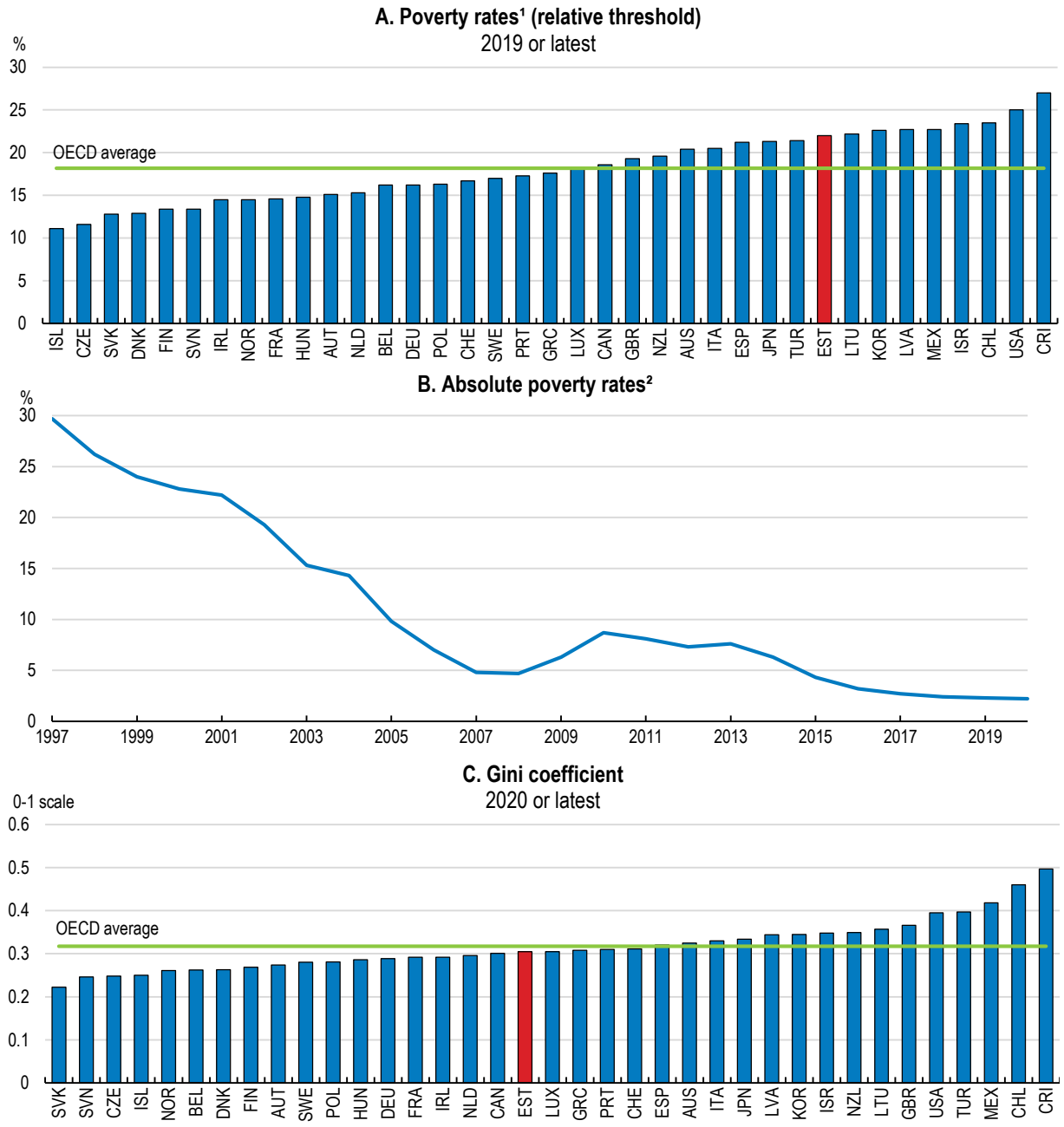
Table 1.4. Past OECD recommendations on VET and ALMPs

Recommendations in past *Surveys*	Actions taken since the previous *Survey* (December 2019)
Strengthen cooperation between the public sector, labour unions and employers to boost their engagement in skill supply, including vocational education and training and continuous learning.	Progress on the system of labour market monitoring and future skills forecasting (OSKA) is ongoing. Each year, the need for labour and skills is analysed and recommendations for training requirements are prepared in five OSKA sectors. The sectors to be analysed are approved by the OSKA Coordination Council. All economic sectors are analysed once every 5 or 6 years. In the intervening years, the relevant sectoral expert panels keep an eye on the implementation of the recommendations made on the basis of the conclusions of the survey. An OSKA general report on changes in labour requirements, labour market developments and the dominant trends over the next 10 years is prepared annually.
Implement a programme to improve managerial practices and organisational performance of firms with a strong element of network-building to disseminate good practice and mutual learning.	Improvement of managerial practices and organizational performance of firms is one of the action targeted throughout Estonian Research and Development, Innovation and Entrepreneurship Development Plan 2021-2035. Programmes and activities targeted to disseminate good practice and mutual learning will be continued and developed. Relevant programmes will be implemented by Enterprise Estonia as well as County Development Agencies.
Strengthen the quality and relevance of teachers' training and professional development in teaching digital skills.	A new digital competence frameworks for learners and teachers developed under the Education and Youth Board of Estonia's leadership is one-step closer to creating a common basis for analysing and developing digital competences in education. The digital competences of most teachers proved to be sufficient during the distance-learning period because relevant trainings have been carried out for years. Preparing for the next academic year, the preparedness of teachers and e-learning services to carry out distance learning even more effectively will be further improved.
Continue to scale up and improve access to active labour market policies, notably up-skilling activities for the unemployed, the disabled and those in high risk of unemployment.	In 2020 additional financing were added to ALMPs to provide ALMPs for wider group of people whose labour market situation has been affected by COVID-19. Part of it was increasing the national funding of ALMPs and using the Unemployment Insurance Fund funds raised in previous years, but also additional the European Social Fund (ESF) finances were used for training and retraining opportunities of vulnerable groups at risk of losing their jobs.

Tackling a persistent poverty challenge

Despite important progress over the last two decades, poverty remains a challenge in Estonia. While overall inequality is below the OECD average and absolute poverty is on the path of complete eradication after years of sustained reduction, relative poverty remains high by OECD and EU standards (Figure 1.19). It is also particularly acute for some specific populations and regions (Figure 1.20). With significant inflationary pressures, this challenge could become more acute. While 2020 figures show a slight decrease by 0.1 points of the relative poverty rate compared to 2019, still one fifth of Estonians are living at risk of poverty, making the government´s goal of reducing this risk to 15% by 2023 (in terms of 60% of median income) particularly important.

Figure 1.19. Severe material deprivation has been continuously reduced but relative poverty stays high



1. Data refer to the total population and are based on equivalised household disposable income, i.e. income after taxes and transfers adjusted for household size. The poverty threshold is set at 60% of median disposable income in each country. The income-based poverty rates exclude lump-sum payments, which are frequent in the retirement schemes of some countries (e.g. Australia, Switzerland).
2. The absolute poverty rate is the share of persons with an equivalised annual disposable income lower than the national definition of the absolute poverty threshold.
Source: OECD Income Distribution Database (IDD), http://stats.oecd.org/Index.aspx?DataSetCode=IDD; and Statistics Estonia.

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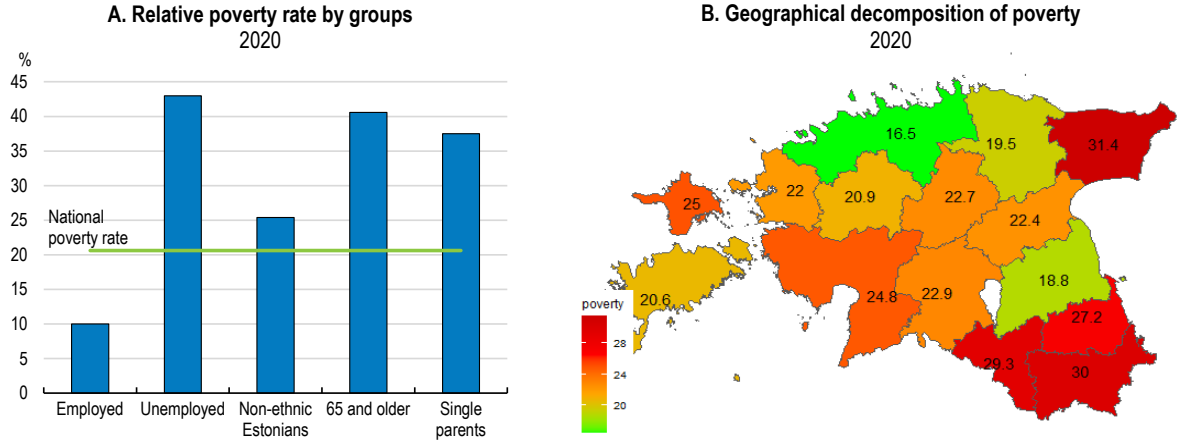
Figure 1.20. Poverty prevalence is especially high for some populations and regions



Source : Statistics Estonia, Estonian Social Survey (EU SILC) 2021.

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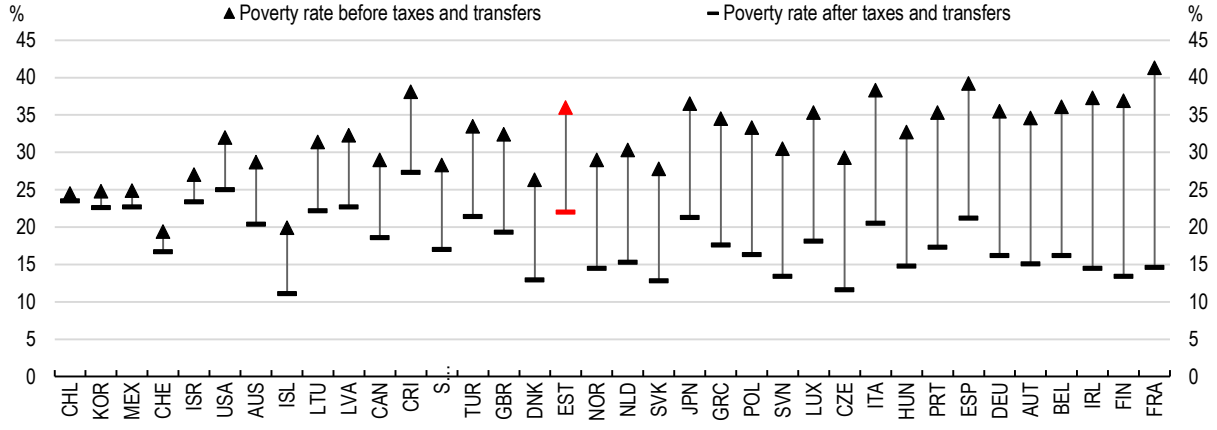
Transfer targeting and in-work benefits

The transfer system could be made more effective in reducing poverty (Figure 1.21). In particular, social transfers could be better targeted towards people living in poverty. Before the pandemic, almost similar amounts of cash transfers were received by the 20% richest individuals and by the 20% poorest (Figure 1.22, Panel A). Moreover, guaranteed minimum-income benefits (including housing assistance) cover only half of the relative poverty threshold (Figure 1.22, Panel B). This coverage is the highest among Baltic states, but is lagging behind some Nordic countries such as Finland. Increasing further the rate of subsistence benefits would thus help to reduce poverty. Estonia could also make better use of its advance in digital technology to increase the take-up of benefits (Võrk and al., 2016). This could involve, for example, creating a unique identifier linked to a financial account to supplement the normal social program registers.

Figure 1.21. There is room to increase the effectiveness of the transfers system for the poorest

Reduction in relative poverty by the transfers system
Percentage points reduction in relative poverty at 60% of median income, 2020 or latest



Source: OECD Income Distribution Database.

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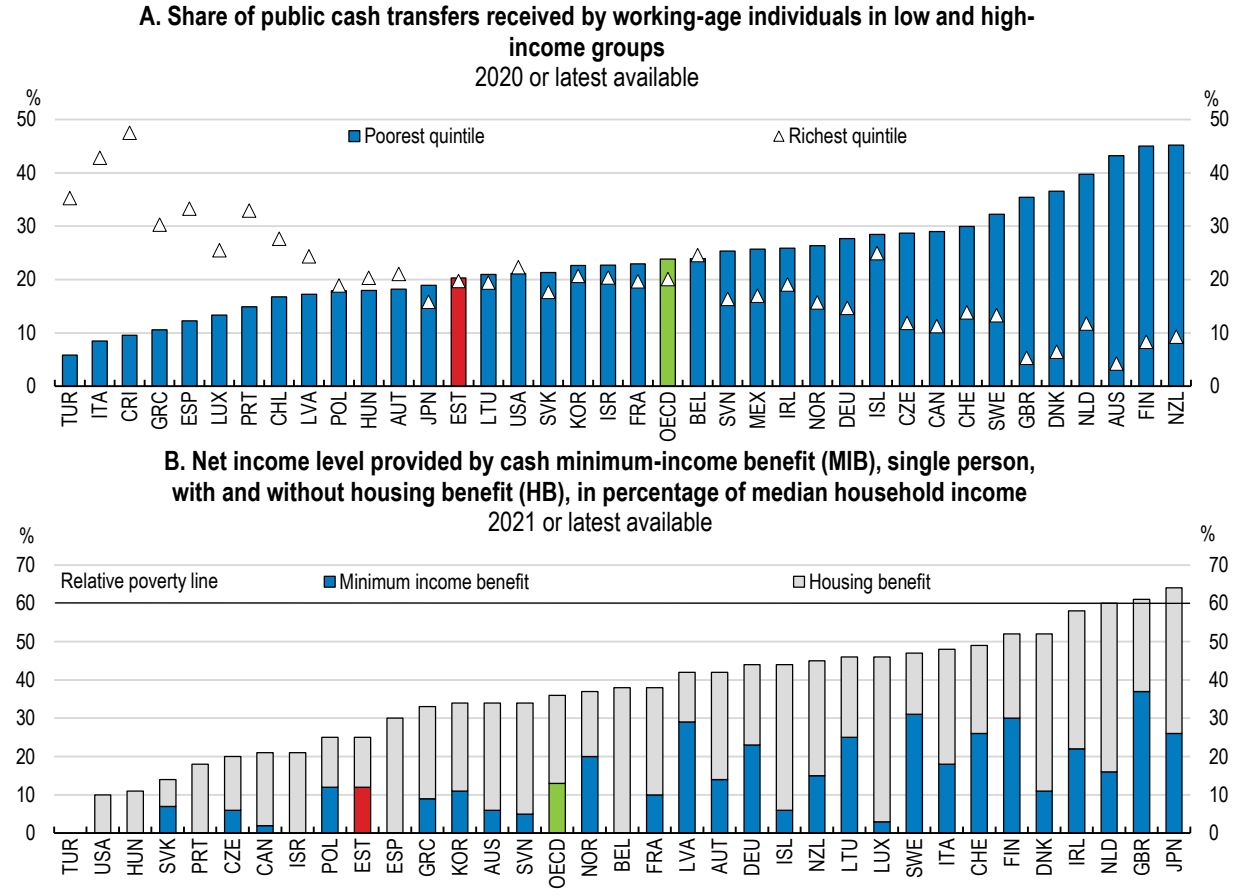
Figure 1.22. Cash transfers are not tightly targeted and lack coverage



Source: Calculations based on OECD Income Distribution Database; and OECD Tax-Benefit Models, via http://www.oecd.org/els/soc/benefits-and-wages.htm

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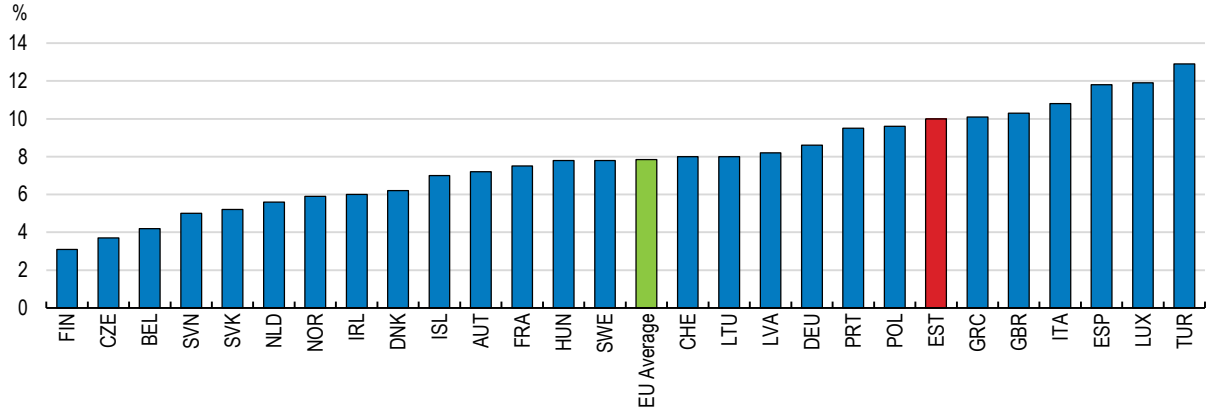
Increasing benefit generosity might lower work incentives of low-wage earners. Social reforms should therefore seek to encourage the labour-market reintegration of beneficiaries. Moreover, in the current context of labour shortages, in-work benefits would tend to increase labour supply (OECD, 2005). To do so, in-work benefits, which currently do not exist in Estonia, could be introduced. Making work pay more would be particularly important in Estonia, where working does not necessarily generate above-poverty income. One out of ten persons in employment (waged or self-employed people) lives in a household whose total equivalised disposable income is under the poverty line, a rate higher than the EU average and the highest in the Baltics (Figure 1.23).

Figure 1.23. In-work poverty is high

In-work poverty rates for employed persons aged 18 or above (2020 or latest year available)



Source: Eurostat.

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Tackling old-age poverty

Estonia has a three-pillar pension system: a mandatory state pension as the first pillar, mandatory private accounts as the second pillar and voluntary savings accounts as the third pillar. The levels of pensions are indexed annually to consumer prices (with a weight of 20%) and to the increase of the pension part of the social tax revenues (with a weight of 80%). Additionally, the Pension Insurance Act requires the government to evaluate the impact of pension increases on financial and social sustainability, and propose changes to the indexation if necessary. Under this functioning, the pension system is sustainable. However, and as highlighted in previous Surveys (OECD, 2019c), old age poverty remains particularly acute in Estonia, questioning pension adequacy. In 2020, 40% of the persons aged 65 or over were at risk of poverty. While annual increases are guaranteed, wages and salaries grew faster, leading to a continuous increase in the poverty rate among the elderly over the last decade: in 2011, one-fourth of pensioners were at risk of poverty.

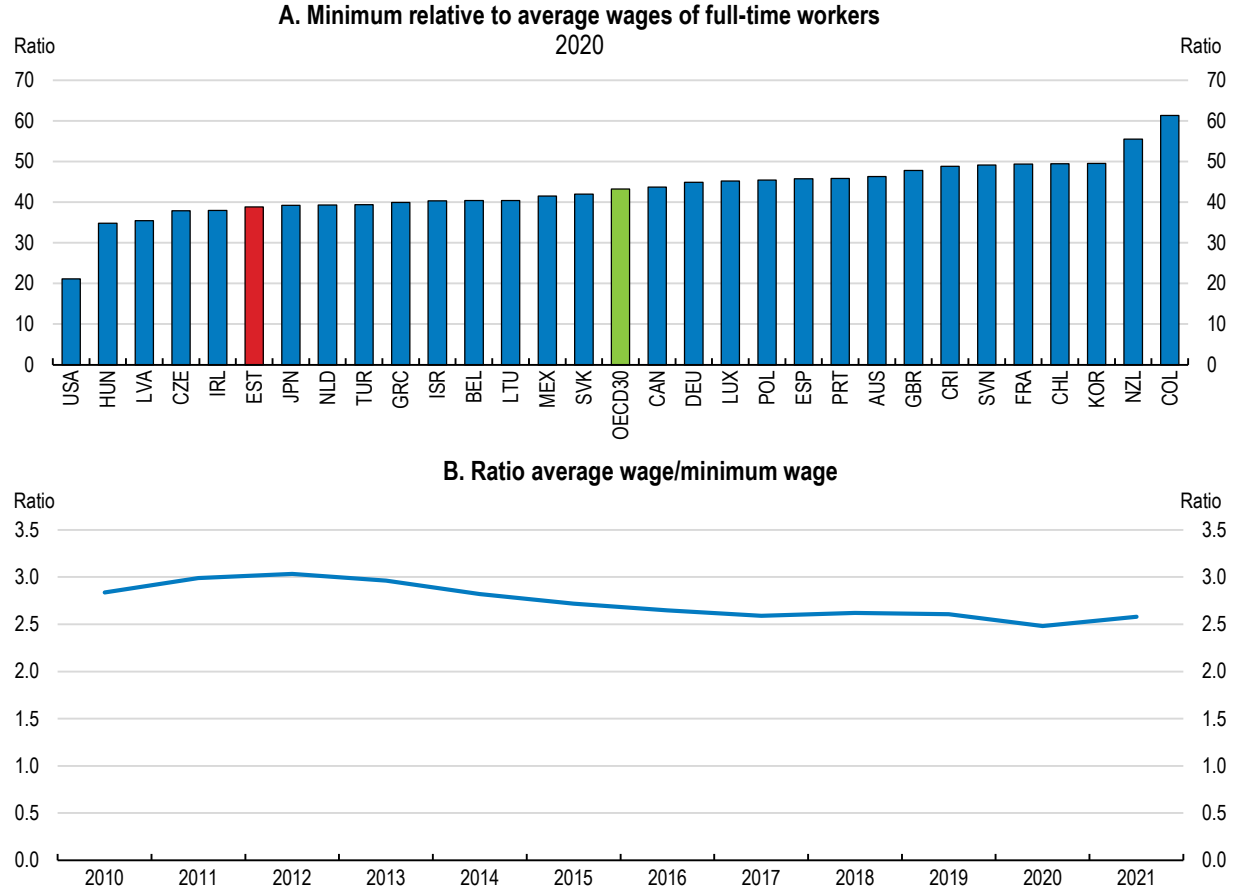
The recent reform, allowing the withdrawal of funds from the second pension pillar, is likely to aggravate this trend, by diminishing further pension adequacy. The foreseen basic pension increase in 2023, which is expected to reduce old age poverty by 1.6 points according to the authorities, is welcome in this regard. However, by establishing the average pension at 654 euros in 2023, and given the rapid wage growth in the economy envisaged over the next two years, old age poverty will remain problematic. Increasing basic pension further, at a pace closer to curent economic developments, would contribute to put old age poverty on a downward trend.

Further discussion about the minimum wage among social partners

In the past, Estonia has tended to favour wage-setting policy, with the emphasis on minimum wages, to tackle poverty. With a low coverage of collective bargaining (3.9% of companies and 19% of employees were covered in 2015), and where only two sectors (healthcare and transports) have minimum wage agreements in place, the main wage-setting policy in Estonia is the statutory national-level minimum wage, which is agreed by the social partners and enforced by government decree. According to the authorities, the labour market has managed to absorb increases in the minimum wage for many years and low wage employees were mostly able to find employment. Recent empirical evidence also shows that minimum wage appears to be effective in lowering wage inequality and poverty in Estonia (Ferraro and al., 2016).

With the minimum wage at 584 euros in 2020 and with almost 16% of all workers receiving it or less, social partners can play a key role to keep all workers out of poverty. The recent agreement between unions and the Employers' Confederations to raise the minimum wage by 12% in 2022, to 654 euros, is welcome in this regard after last year during which it has not been re-evaluated. Social partners should continue discussions to keep minimum wage increases at least in line with national average wage growth, and eventually raise it above the poverty line, as it currently remains 10% lower (Figure 1.24).

Figure 1.24. The minimum wage is lower than in other countries



Source: OECD Employment and Labour Market Statistics; and Statistics Estonia.

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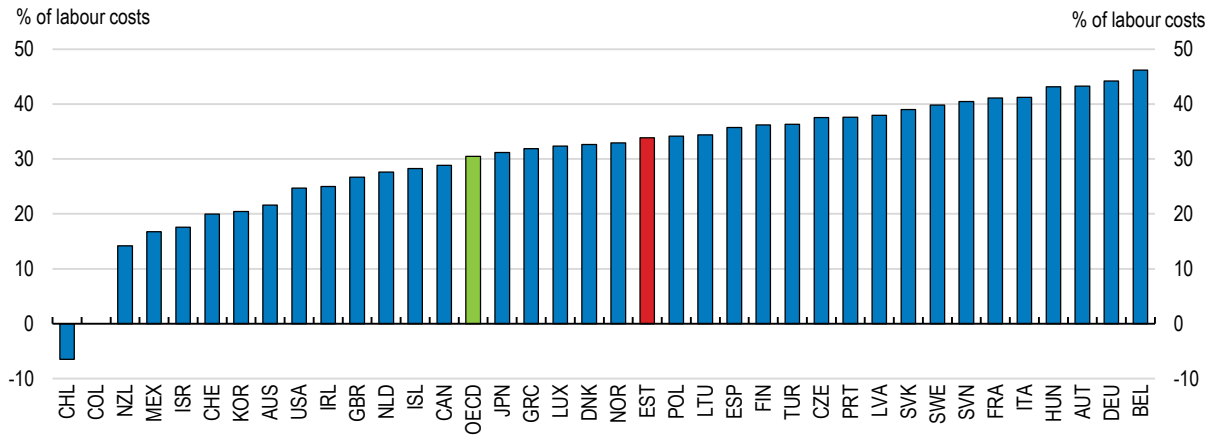
Raising the minimum wage further would also entail the additional advantages of strengthening mechanically social protection, as in Estonia the minimum wage is linked to different social transfer payments. For example, the minimum wage is the basis for: the minimum sum of unemployment insurance (50% of the minimum wage in the previous year); the rate of parental benefit when there are no earnings from the previous year (100% of the minimum wage in the previous year); the minimum sum of parental benefit when previous earnings are lower than the national minimum wage; and the minimum sum of sickness or care benefit. However, the minimum wage enters into the calculation of the minimum social tax contributions paid by employers, and thus a raise in the former could lead to an increase in the latter, while the labour tax wedge is already high in international standards for workers with low earnings (Figure 1.25). The 2018 reform has been effective at lowering its level but kept it nonetheless above the OECD average. Reducing the social security contributions of low wage earners while keeping their level of benefits entitlement, especially employees' contributions which account for most of the wedge, would

contribute to reduce poverty by strengthening employment and support take-home pay directly, notably for young workers.

Figure 1.25. The tax wedge for low wage earners could be further reduced

Labour tax wedge, % of total labour compensation, single person at 67% of average earnings without children, 2021



Source: OECD Taxing Wages - Comparative tables.

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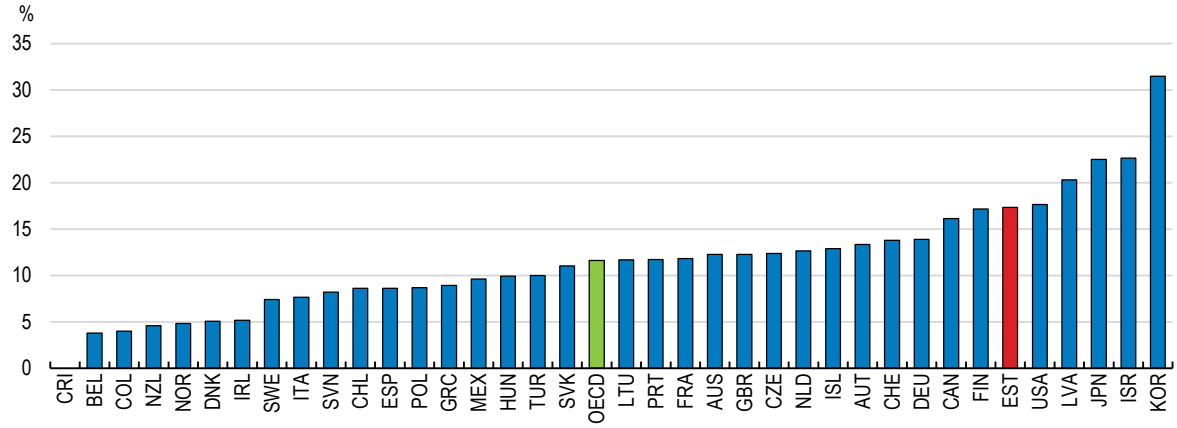
It must be noted that introducing in-work benefits and raising the minimum wage further are two policy instruments that are not substitutes but that could in fact complement each other. For instance, an in-work benefit that would top up wages in such a way as to make net wages equal to the minimum wage is not feasible, as it could be partially captured by the employers to reduce their labour costs and delivering less than otherwise expected gains for the employees. However, the financing of these income gains for the poorest differs between the two scenarios. Introducing in-work benefits could be financed by strengthening the tax base (see below).

Close the gender pay-gap

Another wage-setting mechanism to tackle poverty and promote fairness is equal pay regulation. In Estonia, the basis for ensuring equal pay for different groups are the Gender Equality Act and the Equal Treatment Act, in force respectively since 2004 and 2009. However, some pay differences remain and women are particularly affected. While Estonian women have high employment rates and outperform men in the education system (OECD, 2017d), the gender pay gap is high (Figure 1.26). Progress was made in recent years, with the gender wage gap declining from 21% in 2017 to 15% in 2021 (preliminary data), Nonetheless, Estonia's wage gap remains one of the highest in the OECD. Pay differences is directly related to poverty (McKnight and al., 2016), and the gender pay gap has consequences for some specific groups such as one-parent families, a group often at higher risk of poverty and where women are overly represented (Rense, 2020).

Figure 1.26. The gender pay-gap remains high

2020 or latest available



Note: The gender wage gap is defined as the difference between male and female median wages divided by the male median wage.
Source: OECD Employment and Labour Market Statistics.

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Closing the gender pay gap is a priority in the Government`s Action Plan for 2021-2023. This includes new amendments to the Gender Equality Act, to be presented in early 2022, after the ones proposed in 2019 were dropped due to the expiry of the Parliament's mandate. The reform intended to provide the Labour Inspectorate with a right to exercise administrative and state supervision over the implementation of equal pay for women and men in the public sector organisations. It also sought to specify some already existing requirements regarding data collection and the information provided to employees or their representatives.

Those were steps in the right direction that should be reintroduced and enhanced. For instance, in those past amendments private sector companies would have been inspected only by volunteering. Involving employee representatives in the private sector would help in preventing pay discrimination. In Lithuania for example, at the request of employee representatives employers with more than 20 employees are required since 2017 to provide average wages by professional groups and gender at least once a year. Providing average wages would not conflict with the rule of wage confidentiality in the private sector, which is important in Estonia. More generally, the combination of legislative, administrative and awareness-raising measures is crucial in continuing to tackling persistent discrimination against women in wage setting, and reducing poverty.

Enhancing the labour-market integration of ethnic non-Estonians through targeted language support

Other groups in Estonia are also facing labour market challenges, and in particular ethnic non-Estonians. Their integration is still lagging behind, both in terms of employment and wages. These differences lead to a higher prevalence of poverty among ethnic non-Estonians: 25.3% versus 20.7% for the whole population in 2020. As many of the ethnic non-Estonians reside in the north eastern region dominated by large industrial enterprises, higher unemployment and poverty rates partly reflect weaknesses in regional economic policy. Language skills are also a key factor. As the preservation of the Estonian language, spoken by only one million individuals in the world, is of critical importance, efforts should be pursued in the availability of language training availability for all residents, but also in fostering the engagement of ethnic non-Estonians in training, in particular to facilitate the integration of Ukrainian refugees into the labour market.

Table 1.5. Past OECD recommendations on poverty and inclusiveness

Recommendations in past *Surveys*	Actions taken since the previous *Survey* (December 2019)
Require the reporting of the gender wage gap and action plans to reduce it, including in the private sector. Hold companies accountable for their action by for instance, requiring explanation for slow progress.	The current Government clearly recognizes the need to decrease gender pay gap in Estonia. It is confirmed both in the Coalition Agreement and in the Government`s Action Plan for 2021-2023. The Action Plan also includes a task for the Minister of Social Protection to present to the Government amendments to the Gender Equality Act aimed at reducing the gender pay gap by February 2022. The amendments are expected to focus on further increasing pay transparency.
Tailor ICT classes and voluntary ICT hobby activities to better match the interests of both girls and boys from the early stages of compulsory school and in early childhood education and care.	The new Education 2035 strategy foresees development of digital competence, content and platforms that help improve the accessibility, diversity and efficiency of education. The strategy will soon be accompanied by detailed implementation plans.
Extend health insurance coverage for the entire population. Encourage the inactive non-recipients to obtain health insurance.	Estonia has expanded services that are accessible for the uninsured population. Starting from 2021, uninsured population groups are entitled to be enrolled in national screening programmes. In addition, during the COVID-19 pandemic legislative changes were made to provide COVID-19 testing, vaccinations and health care services needed to detect or to treat COVID-19 cases for the uninsured population without additional charges.
Relax eligibility conditions for unemployment insurance.	In 2020, the Ministry of Social Affairs focused on two main changes in the unemployment benefit system: 1. Increasing replacement rates of unemployment benefits: i. From 1st August 2020 the replacement rate of the unemployment insurance benefit increased from 50% to 60% of previous earnings during the first 100 days of the unemployment spell. ii. From 1st January 2021 the unemployment allowance (flat rate benefit) for a month may not be less than 50% (until the end of 2020 this rate was 35%) of the minimum monthly wage. 2. From 1st September 2020, the unemployed are able to work temporarily during registered unemployment: i. It is allowed to work temporarily for up to five days per calendar month while registered as unemployed. ii. The pay for temporary work in one calendar month may not exceed 40 percent of the minimum wage. iii. Unemployment benefits will not be reduced. Prior to the change, it was not possible to work as an unemployed person, and upon becoming employed, registration as unemployed and payment of unemployment benefits was terminated.

Modernizing the tax system without sacrificing efficiency

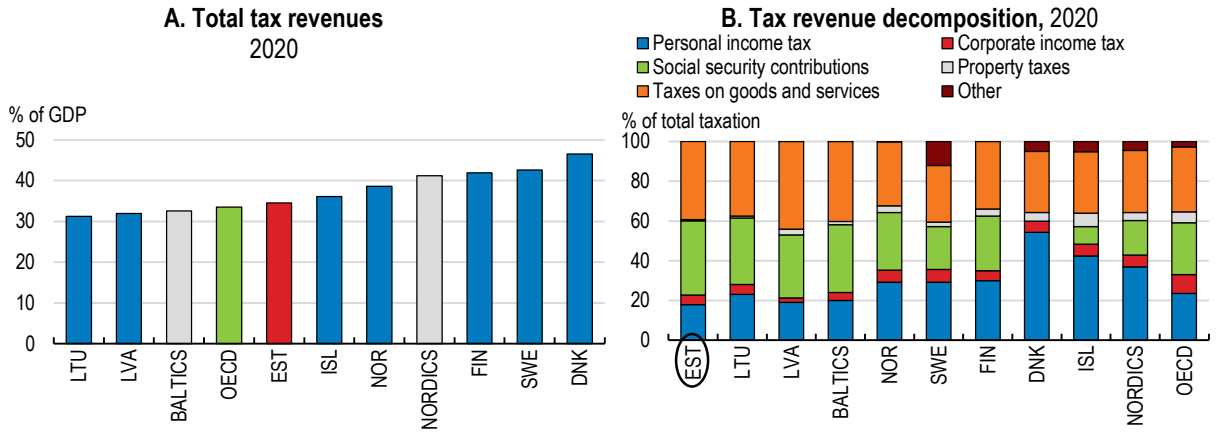
Estonia's tax system has many strengths, including easy compliance and simple administration. Both business and individual taxpayers widely use the possibility to declare taxes on-line via the e-Tax Board. A simple tax code makes it easy to state the taxable income: corporate profits are taxed only when they are distributed as dividends, and personal income is taxed at a flat single rate aligned with the corporate income tax rate, thus pre-empting the possibility of arbitrage.

Options for tax reform

Total tax revenue is close to the OECD average (Figure 1.27, Panel A). Estonia collects almost half of its total tax revenues from goods and services (Figure 1.27, Panel B), the highest share in the OECD after Chile. By contrast, income taxes (personal + corporate) are among the lowest in the OECD, both as a share of GDP and as a share of total revenues. This reflects the minimal progressivity of the personal income tax and the taxation of corporate income only when it is distributed (Box 1.5). Property taxes contribute very little to revenues, as only land (not buildings) is taxed. This section discusses various options for tax reform, which either could have a neutral impact on government revenue (i.e. limited to changes in the tax mix) or increase total government revenue. Tax reform should wait until the sanitary situation is fully restored and the economic situation has normalized, but analysis and debate can proceed immediately.

One goal of such tax reform could be to repay the public debt accumulated during the pandemic to finance health measures and protect workers and businesses, rather than leave this debt to future generations. Tax reform could also help the country deal with future challenges, such as financing the large investments required to mitigate climate change, prepare for demographic ageing, reduce poverty and make economic growth more inclusive. In the post-pandemic context, a more than proportional contribution of high-income taxpayers to these various objectives could be well justified.

Figure 1.27. Tax revenues are tilted toward indirect taxation



Source: OECD Tax revenues statistics.

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Box 1.5. Specificities of Estonia's corporate tax system

In 2000, Estonia established a unique system, later adopted by Latvia, of corporate taxation, by abolishing its conventional corporate income tax and replacing it by a tax on corporate distributions. This distribution tax is levied on dividends and on certain other corporate expenses, which could be seen as hidden dividends (e.g. fringe benefits not subject to personal income tax, loans to participators). The distribution tax is payable by all Estonian resident companies and by Estonian permanent establishments of foreign companies. The main tax rate on distributions is currently 20% of the gross distribution. In addition, in 2018 a lower rate of 14% has been introduced, with the goal of rewarding companies with a more regular dividend distribution and to establish a countermeasure to prevent one of the most common indirect outflows of profits from the company, i.e. lending to the parent company or another company in the group.

The Estonian distribution tax comes close to a source-based cash flow tax, which is the most optimal corporate tax setting according to the economic theory literature (Meade, 1978). In fact, and if the Estonian distribution tax had allowed a deduction for the firm's revenue from new share issues, making it a tax on net distributions, it would be optimal in the sense that it would not induce distortions regarding the firm's investment and financing distribution. Stated otherwise, the debt-equity choice becomes unrelated to the tax environment. For mature corporations, which can satisfy all of their need for equity through retained earnings, a dividend tax like the Estonian distribution tax is optimal.

However, having a zero corporate tax rate on retained profits does not make Estonia, which has joined at the end of 2021 the OECD-G20 two-pillar solution to address the tax challenges of the digital economy, a low-tax jurisdiction. In fact, while such system reduces the cost of capital when investment is financed out of retained profits, a distribution tax does increase the entry cost of capital when foreign direct investors consider establishing themselves in Estonia. According to some estimates, the marginal cost of capital for direct investment into Estonia appears in fact to be roughly at the same level as the cost of capital for domestic investment in Finland, which has a more traditional corporate tax system (Kari and Ylä-Liedenpohja, 2005). However, because it exempts retained earnings, the base of the Estonian distribution tax is narrower than that of a conventional corporate income tax.

Property taxation

Property taxation is deemed the least distortionary among all fiscal revenues (Arnold et al., 2011). As recommended in previous Surveys (OECD, 2019c and 2017c), increasing property taxes would not only bring additional, non-distortive revenues, but would also remove existing inefficiencies, as it contributed to the previous housing boom, and would also help to ease the current mounting tension on the housing market. The additional revenues generated could also contribute to the renovation and insulation of buildings, where the needs are significant in Estonia (see Chapter 2). The new land evaluation, to be carried out in 2022, represents an opportunity to also evaluate the housing stocks and business properties and then expand the property tax base beyond land.

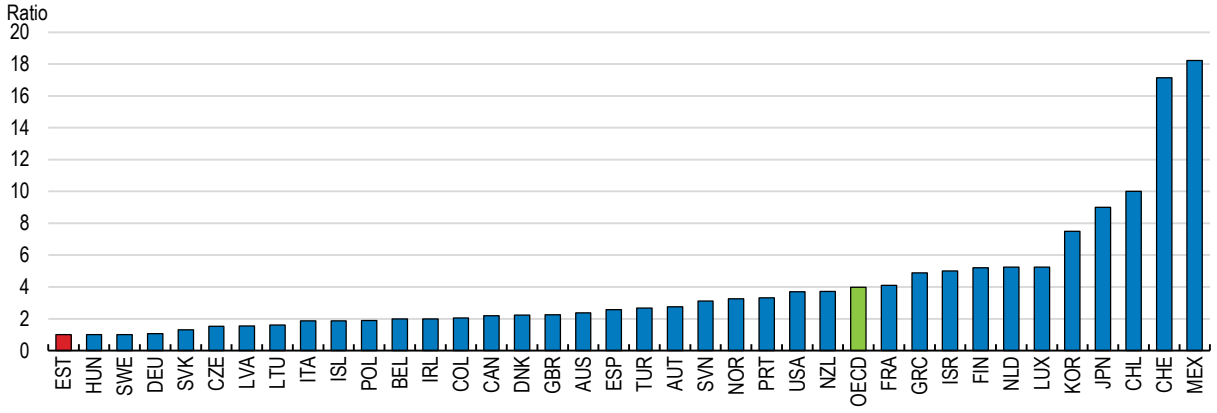
Personal income tax progressivity

Personal income tax in Estonia is often viewed as being a flat tax but, due to basic exemptions and allowances, it exhibits a progressive schedule, with two tax brackets at 0% and 20%. In fact, the 2018 reform, which increased the basic income tax allowance from EUR 170 to 500 per month, and the abolition for 2022 of the income tax exemption for mortgage payments interests, both amplified the progressivity of the income tax. Nonetheless, progressivity remains very low by international standards (Figure 1.28).

Moreover, progressivity is hampered by a specific provision of the personal income tax code, the so-called "sliding scale", which makes the basic income tax allowance decreasing linearly in the 1200-2100 euros income range. This rule triggers local regressivity of the personal income tax, where incomes in this range are marginally taxed at a rate above 20% while income above this range are taxed at the 20% flat rate. The sliding scale should instead be maintained fixed as income increases, as is the case in other countries such as France and Spain, to fully align the aim of the tax schedule with effective marginal rates and restoring progressivity along the income scale.

Figure 1.28. Income tax progressivity is low

Ratio between the top marginal tax rates and the first non-zero rate, 2021



Source: OECD Tax database.

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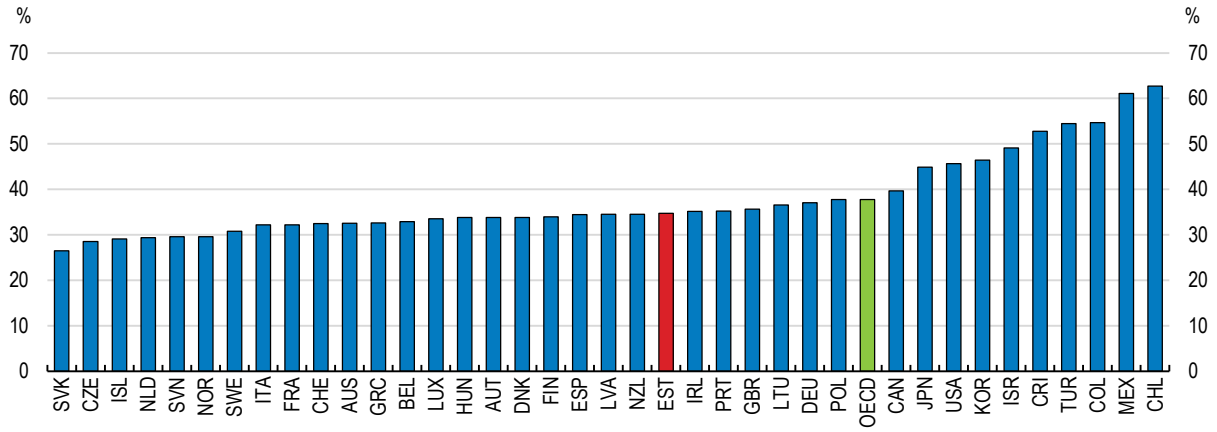
The personal income tax schedule in Estonia has undoubtedly played a role in propelling the Estonian economy after the independence with its simplicity, which reduced tax evasion and improved economic efficiency through lower tax distortions (Barrios and al., 2020), and the degree of progressivity of a personal income tax, and thus of redistribution, remains first and foremost a question of social preferences (Limberg, 2020). However, the introduction of a third tax bracket for top incomes would have the potential to generate large tax revenues – for instance with a tax rate of 25% slightly above the flat rate of 20% (Box 1.2). Albeit income concentration at the top is relatively contained in Estonia, the richest 10% of households own 35% of the national income before taxes (Figure 1.29). The creation of a third tax bracket would make richer earners contribute somewhat more to the various challenges faced by the country. In terms of efficiency, recent evidence shows that progressivity tends to induce small efficiency costs (Gerber and al., 2018). Moreover, it could strengthen the counter-cyclicality of fiscal policy, providing a buffer against output volatility: by moving taxpayers into lower income brackets and reducing their average tax rate during recession, while doing the reverse during expansions, disposable income is made more stable and thus consumption and investment less volatile (Alessandrini, 2021).

Figure 1.29. Income concentration at the top is contained

Pre-tax national income share held by the richest 10% of the population, 2020



Source: World Inequality Database, https://wid.world/fr/country/estonie/.

StatLink https://stat.link/cji4yr

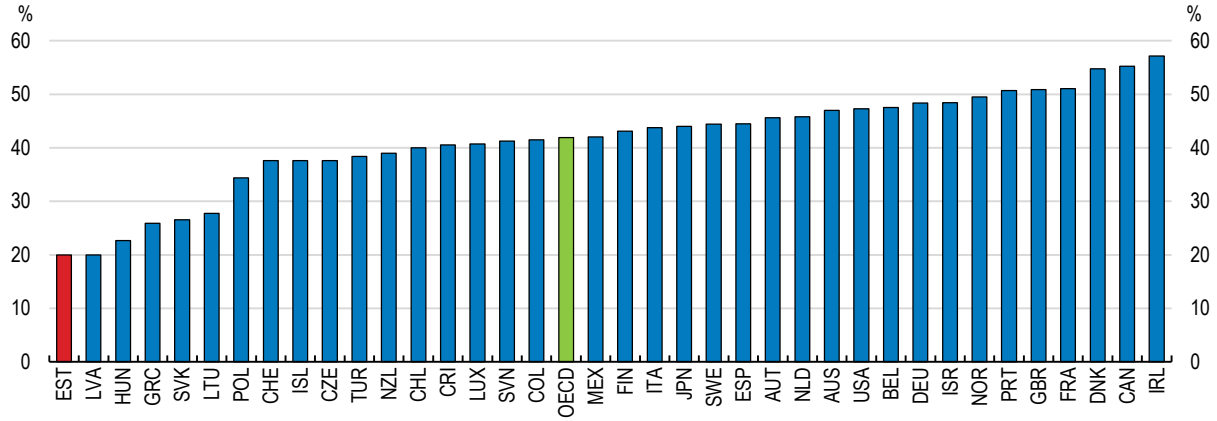
Evaluate and monitor the recent corporate tax reform

The corporate income tax rate cut of 2018 from 20% to 14% for companies that pay dividends for three consecutive years has, as anticipated, increased revenue in the short-term, by encouraging the companies to distribute profits. Two years after the reform, dividends under the 14% regime have soared by 77% in 2020 and 40% during the first half of 2021 (for all companies excluding banks and state-owned companies). However, by freeing-up past retained profits such boost will be temporary by nature, and in the long-run corporate tax revenues will decrease below their pre-reform level. With an already favourable system for investment and entrepreneurship, and comparatively low corporate tax-revenues, the cost and benefits of the lower tax rate should be evaluated and monitored. In particular, according to the authorities this new tax regime has added complexity to an otherwise simple and efficient system. Moreover, this lower tax rate conflicts with the OECD-G20 two-pillar solution, as it includes a 15% global minimum corporate income tax rate to which 340 foreign subsidiaries and four multinational Estonian firms are foreseen to be subjected to by the tax authorities.

Moreover, because the corporate tax in Estonia is paid at the point of distribution and is therefore similar to a final withholding tax, no further tax is payable at the shareholder level on distributed income, except in the case of private shareholders where an additional 7% income tax is applied. This new lower tax regime could thus potentially widen an already large gap on overall dividends taxation, where Estonia stands at almost 22 percentage points below the OECD average (Figure 1.31).

Figure 1.30. The taxation of dividends is very low

Overall tax rate on dividends (personal plus corporate income taxes), 2022



Source: OECD Tax database Table II4.

StatLink https://stat.link/p14r7v

The alignment of the personal income tax rate with the corporate income tax avoids arbitrage, discarding the possibility for individuals to requalify their labour income into capital income and vice versa. That being said, strengthening the progressivity of the personal income tax may induce some distortions for individuals eligible to a new top personal income tax bracket. For example, after the 1993 Finnish tax reform, which established a dual income tax with a lower rate on capital income, there were significant shifts of labour income to capital income among the self-employed (Pirttilä and Selin, 2011). However, in Finland the taxation of dividends and the top income tax rate remain far apart, with Finland having one of the highest top personal income tax rate in the world (Kaisa and Matikka, 2017). Thus, those insights may not be directly applicable to Estonia. Moreover, the shift from personal to corporate income tax in the presence of differential in rates can be mitigated by limiting the opportunities for tax shifting if the costs of combatting it are not too high (Piketty and al., 2014), notably by creating a strict nomenclature that distinguishes between capital and labour income.

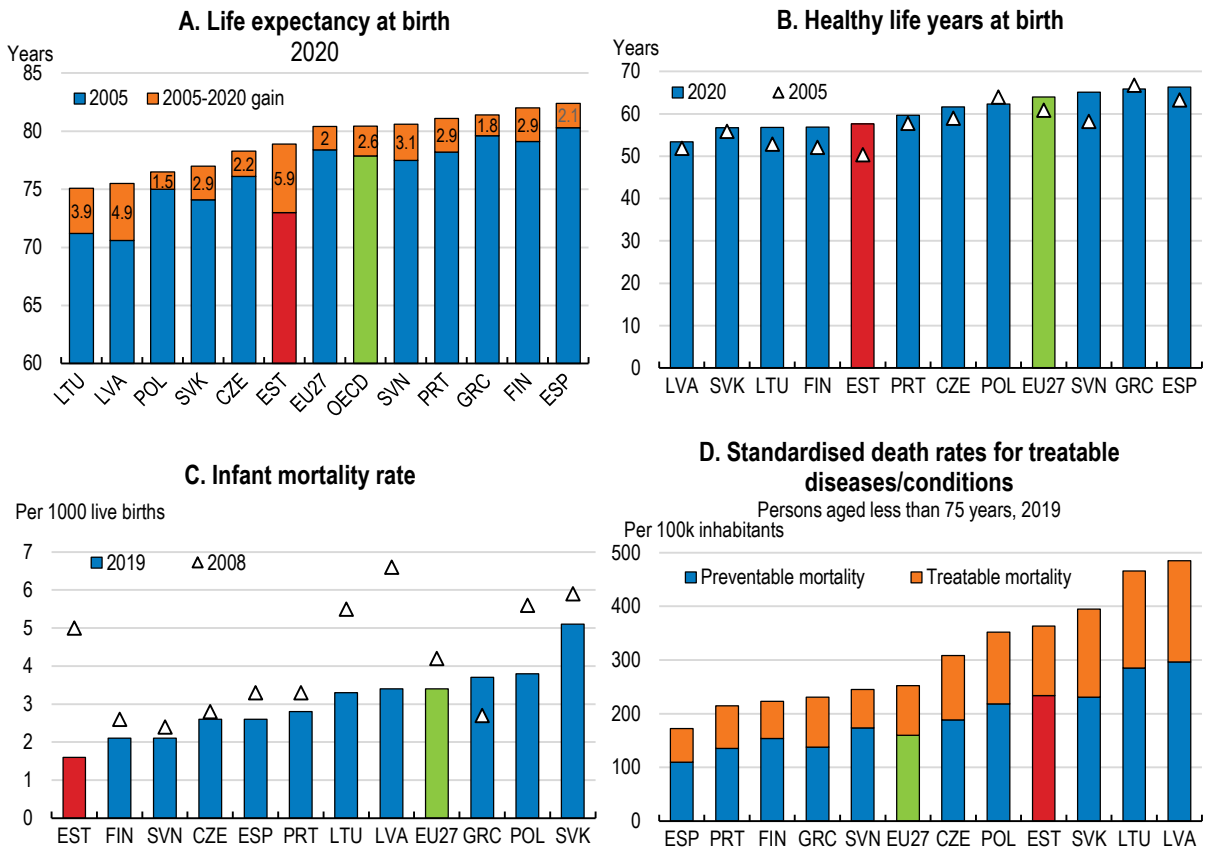
Raising health spending efficiency

Despite its strong fiscal position, Estonia needs nonetheless to conduct a prudent budget policy to be ready for future challenges. Spending pressures are mounting because of population ageing, putting additional stress on a healthcare system already stretched by the pandemic. Raising the efficiency of the health system is therefore crucial.

Better health outcomes can be achieved with similar expenditures

Overall, the health status of Estonians is converging to the OECD average. Although there is room for improvement, many health outcomes have improved significantly over the last decades. Gains in life expectancy have been almost twice the OECD average over the last fifteen years while infant mortality has been cut by more than half over the same period (Figure 1.31, Panel A and C). Healthy life years, which indicate the share of remaining years free of disability, have also increased, leading Estonians to live longer but also healthier (Figure 1.31, Panel B). However, Estonia is still lagging behind in amenable mortality (Figure 1.31, Panel D).

Figure 1.31. Health outcomes continue to improve



Source: Worldbank WDI database; and Eurostat.

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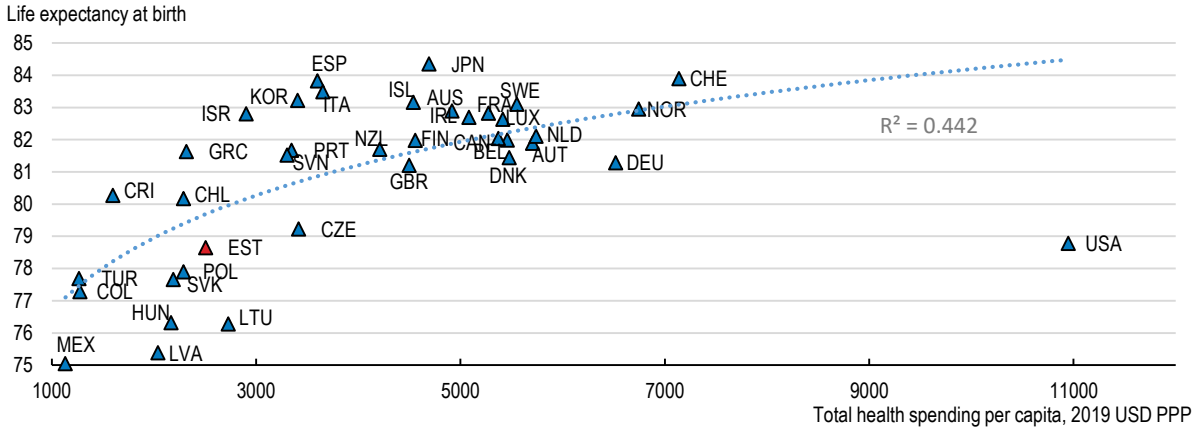
Although Estonia's spending on health per capita is relatively low in international comparison, it is among the highest compared to the Baltic and CEE economies. However, this does not necessarily translate into significantly better health outcomes (Figure 1.32). Some OECD countries such as Turkey, Costa Rica, Greece or Chile exhibit higher life expectancy than Estonia, despite similar or lower health spending per capita. While such figures do not control for additional differences in life-style and social factors, which undoubtedly play an important role (Giorno and Londáková, 2017), this suggests nonetheless that at current spending levels, Estonia health care system has room to increase efficiency. OECD evidence suggests that there is no single best health system: each model has its strengths and weaknesses (Joumard and al., 2010). Estonia's model is characterized by a mandatory public system of healthcare, with almost universal coverage and a single insurer. When reforming the system after independence in the 1990's, a multi-insurer model was ruled out on the grounds that given Estonia's small population, effective competition between insurers would be impossible. General health insurance covers about 95% of the population, 45% of whom are non-contributors (i.e. not working). The state makes contributions on behalf of some of them, notably the unemployed and parents on parental leave. Overall, the Estonian system performs well on most efficiency metrics (Habicht and al., 2018), but some pockets of inefficiency remain.

Figure 1.32. There is room to improve efficiency in health care



Source: OECD Health expenditure and financing database; and Worldbank WDI database.

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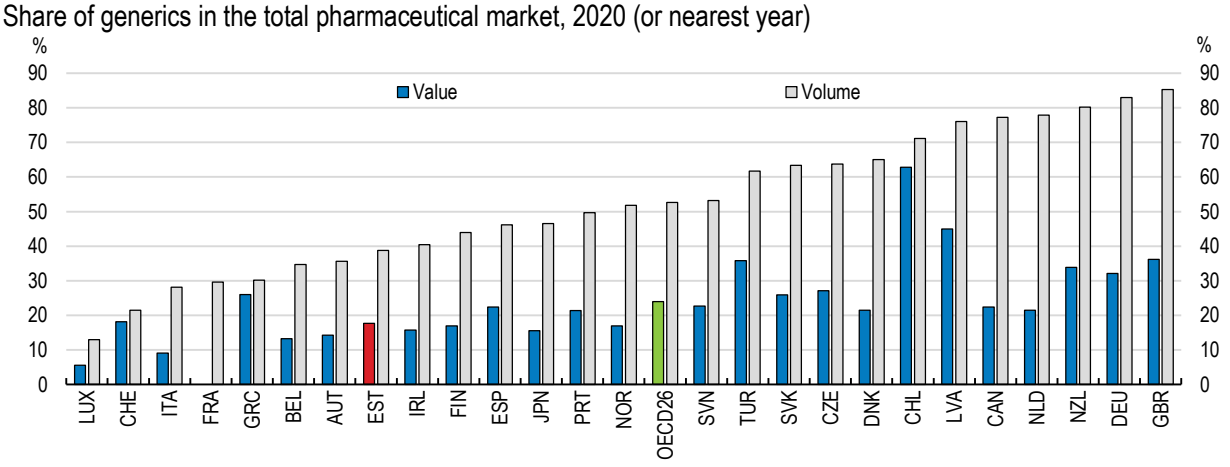
Promote the use of generic drugs and biosimilars

Pharmaceuticals currently fail to provide good value as the penetration of generic drugs remains low (Figure 1.33). There is no mandatory generic substitution in pharmacies in Estonia. The regulations stipulate that doctors prescribe pharmaceuticals by their International Non-proprietary Name (INN). If prescribing by brand name, the doctor has to justify this in the patient's medical record (e.g. the patient refuses generic, or the cheapest option is not available). Customer awareness on generic drugs needs to be strengthened, to further encourage their take-up, notably by providing better information regarding the equal quality of the original product and the substitute. Generics should also be made the standard for reimbursement of every prescription, with their substitution mandatory. Moreover, while recent the promotion of biosimilar treatments could be explored, as significant savings for the health care system could be achieved (Box 1.6).

Figure 1.33. The share of generics in the total pharmaceutical market is low

Share of generics in the total pharmaceutical market, 2020 (or nearest year)



Source: OECD Health statistics.

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Box 1.6. Current and future savings from the use of biosimilars

In parallel with generic drugs, biosimilar treatments, which are biologic treatments designed to work in almost the same way as treatments already approved by sanitary authorities, could realise significant savings for health care systems. For example, between 2016 and 2020 eight key biologics have lost patent protection. Analysis of data available for five European countries (France, Germany, Italy, Spain and the United Kingdom) and the United States suggests that a 20% reduction in price per treatment-day across these eight products could result in cumulative savings exceeding EUR 50 billion in 2020 (IMS Institute for Healthcare Informatics, 2016). In 2015, following the introduction of biosimilar competition in one of the most often used classes of biologics – erythropoietins (EPOs) – the observed price reduction varied from 39% in France to 55% in Germany (IMS Institute for Healthcare Informatics, 2016).

The European Union approved the first biosimilar in 2006 and is the leader in the number of approved products, with 79 as of 2021. Yet biosimilars' use shows wide variation in the European Union. Even the first biosimilar still has little or no uptake in some countries (e.g. Greece, Ireland and the Slovak Republic), while in Poland it is used in almost all relevant therapies (Ekman and Cornes, 2016). The United States adopted the legislative framework for licensing biosimilars in 2010, but the first biosimilar was approved only in March 2015 (Belloni et al., 2016).

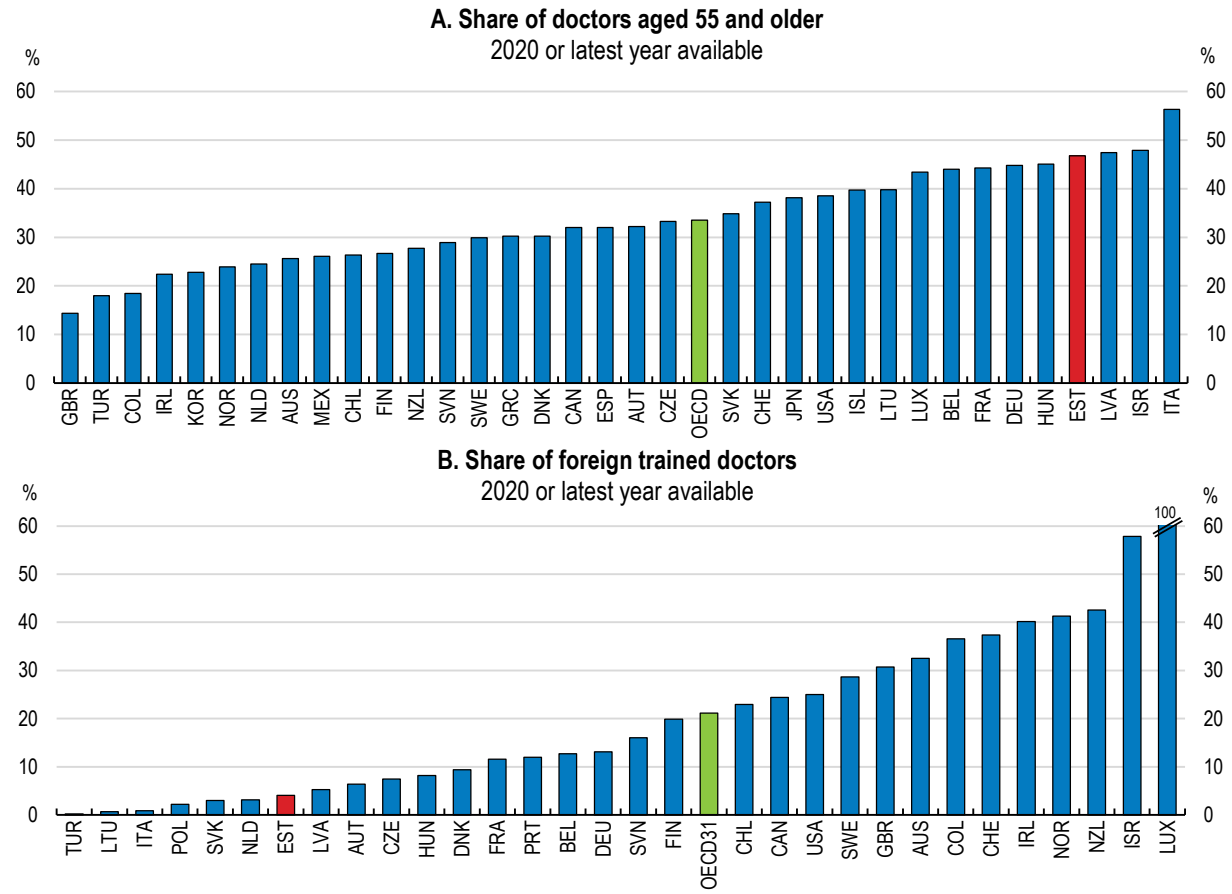
Policies to increase uptake of generics can also be applied to biosimilars. For example, physicians and patients often worry that biosimilars will compromise quality of treatment (IMS Institute for Healthcare Informatics, 2016). Thus, regulators should communicate their knowledge more actively and, most importantly, strive to take clear positions on interchangeability between biologics and biosimilars. In Norway and Denmark, where physicians are at the heart of decision making, uptake of biosimilars was rapid and sustained. Similarly, biosimilar competition is strong in Germany, where insurance funds invested in communication with physicians on the subject and subsequently introduced prescribing quotas for biosimilars (IMS Institute for Healthcare Informatics, 2016).

Source: OECD (2017), Tackling Wasteful Spending on Health.

Expand the number of generalists

In terms of human resources, pressure is mounting on the health workforce, with consequences on the quality and efficiency of care provided (OECD, 2018a). As in other Baltics countries, Estonian health workers are ageing: almost 50% of doctors are older than 55 years (Figure 1.34, Panel A), and among family doctors this share is close to 60% (NIHD, 2018). Furthermore, in 2015, 24% of physicians and 16% of nurses working in health institutions were older than 65 years, i.e. past retirement age (NIHD, 2018). Moreover, the lack of foreign trained doctors is also affecting the number of practitioners (Figure 1.34, Panel B). Combined with the unbalanced mix of doctors providing basic and special primary care, with significantly fewer generalists than specialists (23% of doctors are generalists in Estonia compared with 30% in the OECD on average, (OECD, 2019)), ageing is creating barriers to the performance of the health system.

Figure 1.34. The health workforce is under ageing pressure



Source: OECD Health statistics.

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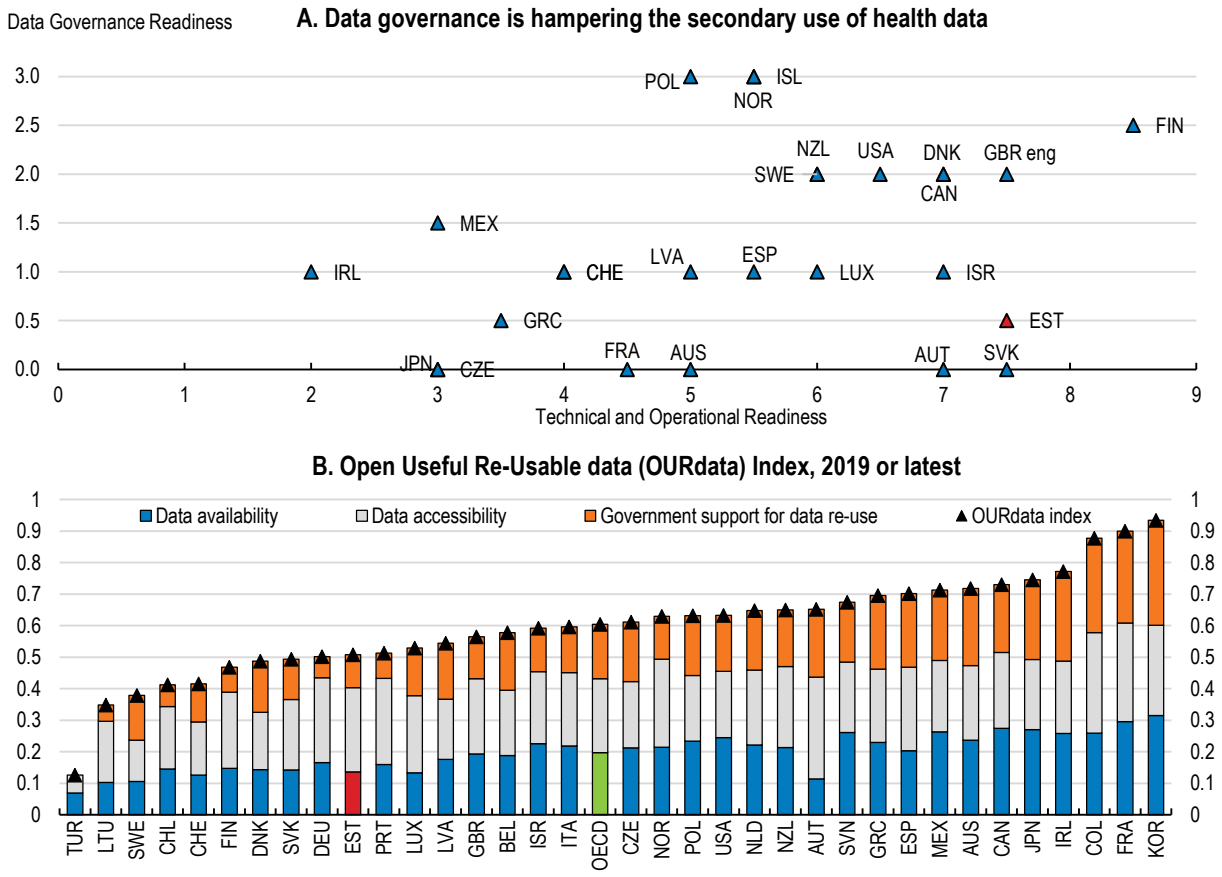
Generalists plays a key role for a well-performing health system. The ageing of general practitioners from an already low share can be an issue for life-long training and the skill mix. As older general practitioners are less likely to undertake retraining to update their practices, they are less trusted to play a gate-keeping role, which will bear on efficiency (Moore and al., 2009). Albeit few specialist organizations (e.g. the professional associations of family medicine, cardiologists and surgeons) have instituted systems for regular recertification, for which the health care professionals must undergo continuous medical education and present proof of professional activities performed, there is no statutory relicensing or reaccreditation for general practitioners in Estonia, as is required by medical regulation in the United States and which turns effective in maintaining clinical knowledge (Vandergrift and al., 2017). This should be implemented. There is also a need to retain doctors as well as to create incentives to attract more Estonian students to enrol in health faculties, and also doctors from abroad, to ensure sufficient supply in the medium to long-term. Additionally, although the admission quota to the medical faculty has been gradually increased, from 100 in 2000 to 185 in 2018, it still falls below the level that would cover the estimated future needs, which the Ministry of Social Affairs estimates at 200 admissions (Habicht and al., 2018), and should then be adjusted consequently.

Streamline the secondary use of health data

As a front-runner in digital technologies, Estonia has advanced in digital innovation in health and provides many health tools and services online. These include electronic health records, national image archiving,

ePrescriptions, eReferrals, eAmbulance and eConsultations. Most recently, Estonia has introduced a central system for booking appointments, beginning in specialist ambulatory care but with plans to expand to GPs and dental care. The current data exchange system allows linkages between various eServices in both the public and private sectors, and more than 96 % of Estonians hold an ID card that allows for digital authentication and access to eServices via the Internet. Additionally, Estonia has used electronic billing data since the late 1990s, ahead of many other EU Member States. However, and despite those remarkable achievements, Estonia reports as lagging behind in term of preparedness for secondary use of health data (Figure 1.35, Panel A). Technical readiness is high but there are needs in data governance and capacity to put data to work (Figure 1.35, Panel B).

Figure 1.35. Data governance is hampering the secondary use of health data



Source: Oderkirk, J. (2017), "Readiness of electronic health record systems to contribute to national health information and research", OECD Health Working Papers, No. 99, OECD Publishing, Paris, https://doi.org/10.1787/9e296bf3-en; and THE OECD 2019 OPEN USEFUL REUSABLE DATA (OURDATA) INDEX.

StatLink https://stat.link/d58t3l

Secondary use of health data has the potential to remodel services around patient needs, which could be conducive to sizeable gains for the productivity of the health care system and health outcomes in general (Meystre and al., 2017). Secondary use is generally cheap, so greater use of existing data to generate knowledge and improve services will often turn to be a highly cost-effective way of improving health outcomes (OECD, 2019b). This may not necessarily imply cost savings for any country, as the use of data and ICT can, for example, uncover unmet need and make new models of care delivery and digital services more accessible, increasing demand and thus aggregate expenditure. However, in the case of Estonia this

is unlikely to be the case given its already advanced capacity in digital services. As a result, secondary use of data should be stepped-up, by implementing a legal framework that enables these data to be securely extracted and used for secondary purposes, while tackling technical challenges by encouraging common approaches to data terminology and exchange standards, as implemented recently in Sweden (Box 1.7). Some recent and on-going initiatives, such as the New Generation Health Information System Project, which aims at implementing new principles of health data governance and processing, go in the right direction and should be pursued further.

Box 1.7. Recent advances on health data interoperability in Sweden

In Sweden, successive digital health strategies have been in place since 2006 (Swedish Ministry of Health and Social Affairs, SALAR, 2016). The latest strategy was jointly developed by the national government and the Swedish Association of Local Authorities and Regions (SALAR), and was endorsed in 2016 to guide the digital transformation through to 2025. The goal of the strategy is to "make it easier for people to achieve good and equal health and welfare, and to develop and strengthen their own resources for increased independence and participation in the life of society" (SALAR, 2016). The Swedish strategy comprises three pillars:

- Increasing digital information exchange, both between different public authorities and with citizens, while safeguarding privacy and data security
- Advancing semantic interoperability of data in the health system
- Ensuring technical interoperability of ICT systems.

This new strategy emphasizes the use of standards for health data to ensure that codes, concepts, terms and structures used are valid and usable in the work of responsible entities to enable the exchange of information that is needed to guarantee quality and security. The goal is to structure data in such a way that the services can analyse and draw conclusions about the outcomes of actions over time, comparing different actors and different processes and forms of treatment. The Government also works to provide the responsible entities with national support. Municipalities and county councils cooperate among themselves and with relevant central government actors in implementing common concepts, terms and classifications or structures in their services.

Currently, Sweden reports near-universal use of electronic medical records in primary care and hospitals, the second highest rate of availability and linkage of key health datasets for secondary use and the use of routine data for monitoring medicine use and expenditure (OECD, 2019b).

Promote healthy lifestyles

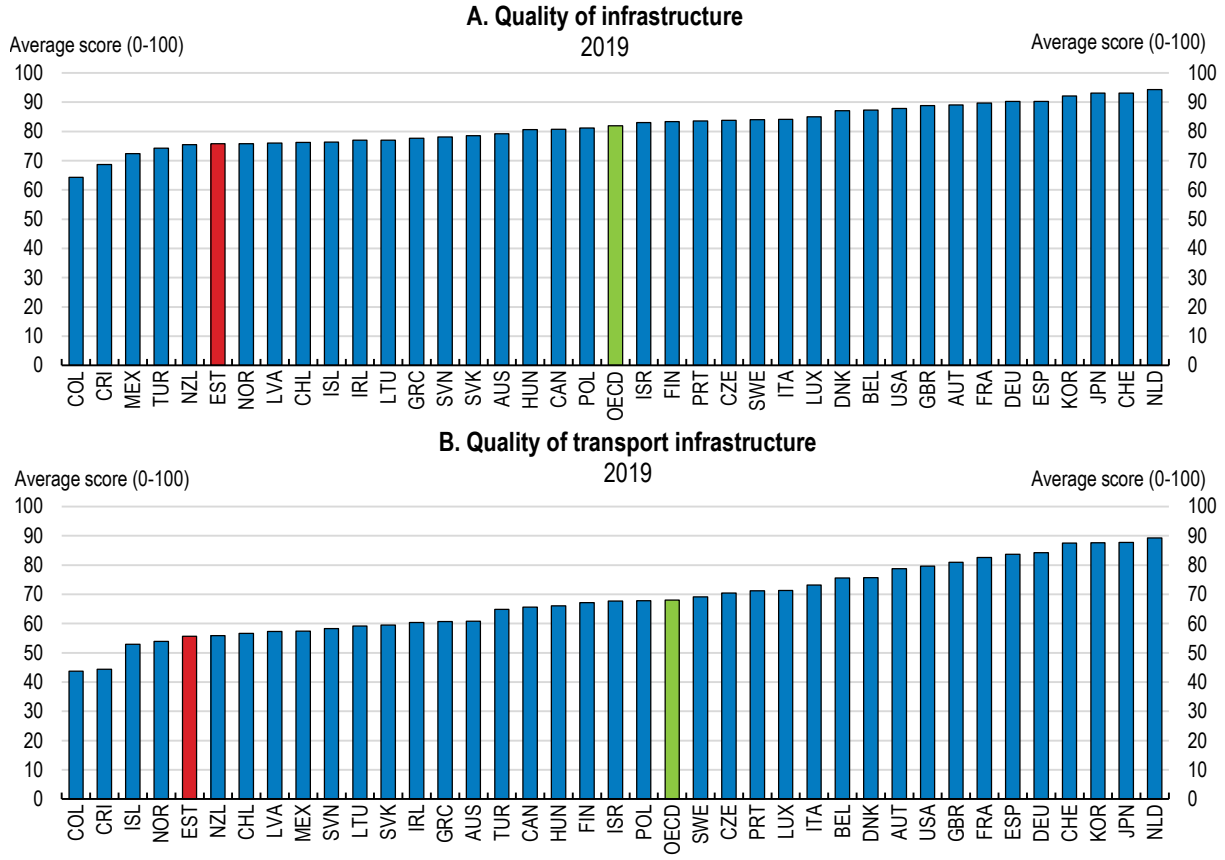
Finally, health promotion and disease prevention have a major role to play in reducing avoidable health care costs while delivering better health outcomes. Estimates show that almost half of all deaths in Estonia (above the EU average of 39 %), can be attributed to behavioural risk factors, including dietary risks, tobacco smoking, alcohol consumption and low physical activity (OECD/European Observatory on Health Systems and Policies, 2019). Estonia has implemented several policies to reduce smoking, contributing to a decline in the prevalence of this risky behaviour. In addition to increased taxes on cigarettes, Estonia has adopted advertising bans for tobacco and alcohol products, including banning advertisements at point of sale. Prevention programmes and investment in treatments and counselling services were also stepped-up. Reducing alcohol consumption has been a public priority over the last decade, albeit the former government reduced excise taxes on alcohol from July 2019. Moreover, despite climbing overweight and obesity rates, no significant action has been taken on the issue (OECD/European Observatory on Health

Systems and Policies, 2019). The renewal of the Public health Act, planned for 2022, offers an opportunity to strengthen the legal basis for health promotion and protection, while existing services should be complemented and made further available.

Delivering on physical and digital infrastructures

For a small and open economy like Estonia, high-quality infrastructures are a key factor underpinning long-term growth. Infrastructures have been upgraded significantly over the last two decades, benefiting from large amounts of public investment and EU funds. However, the World Economic Forum Global Competitiveness Index shows that the quality of infrastructure is perceived as low, across CEE and OECD countries (Figure 1.36, Panel A). This can be partly explained by road and railroad quality (Figure 1.36, Panel B and OECD, 2019c).

Figure 1.36. The perceived quality of infrastructure remains low



Source: Worldbank Global competitiveness index 4.0 dataset.

StatLink https://stat.link/3bpa8h

In the past, evidence have shown that some EU-funded projects have been designed too large and have not fully delivered (National Audit Office of Estonia, 2013). Now, in the wake of the recovery, and as a substantial part of the new EU-funds will be devoted to continuing upgrading infrastructures, improving the selection, monitoring and decision making on how infrastructure projects are selected, as well as establishing tools to assess the value-for-money and socio-economic impacts of planned investment (e.g. on regional development, environment and safety), will be key.

Raise the efficiency of infrastructure selection and management

Currently, Estonia lacks a formal policy to ensure project selection and an assessment of the performance of each project (OECD, 2017c). Implementing such policy, based on systematic cost-benefit analysis, would help to ensure efficient selection, value-for-money, and to manage risks throughout the operational phase of the projects. Similar shortfalls have been identified recently by the International Monetary Fund, specifically on project selection, which has rated the effectiveness of the selection in Estonia as low (IMF, 2019). Two of the concerns it identifies are: i) the lack of a "comprehensive pipeline" from which projects can be selected, based on consistent, published criteria; and ii) the lack of review of nationally funded projects by an independent agency. The IMF rated these as high priority areas for reform, together with the need to adopt a standard appraisal methodology. Moreover, in contrast to European Union-funded projects, appraisals of nationally funded projects are not published, impeding scrutiny by stakeholders and thus reducing accountability.

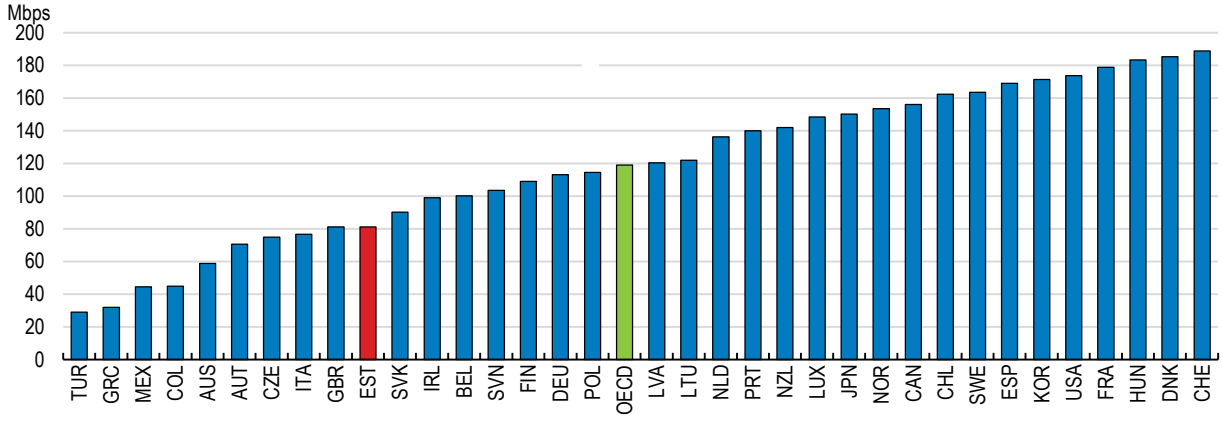
Expand data-driven decision-making and go digital on infrastructures

Sound infrastructure policy should be based on data. Putting in place systems that ensure a systematic collection of relevant data and institutional responsibility for analysis, which are currently lacking in Estonia (OECD, 2017c), could contribute to evaluate and monitor the projects' performance and to base future decision and delivery modalities and contracts on comparable data and information. Establishing a central, systematic and formal collection of information on financial and non-financial performance of infrastructure, that makes it possible to compare various forms of infrastructure delivery models, would contribute to deliver value-for-money for the forthcoming infrastructure projects in Estonia and support the recommendation-making process of an independent infrastructure agency. The information collected should also be disclosed to the public in an accessible format and in a timely fashion, to raise transparency and confidence among the stakeholders.

Beyond physical infrastructures, digital infrastructures are now an essential pillar of any comprehensive infrastructure strategy, a requirement that the pandemic has exacerbated. Estonia has solid and stable digital infrastructures, notably physical access to high-speed broadband. Final deployment are currently completed for middle-mile network of fibre-optic cables, to cover 98% of all residential buildings, companies and public buildings, as well as last-mile network for 100 000 additional addresses. However, those coverage efforts should be complemented by the strengthening of broadband speed, currently lagging behind (Figure 1.37). While the broadband network weathered well the pandemic, coping with higher-than-usual demand without important degradation in performance, the need for high-speed connection has turned crucial. Investment should be increased on broadband speed, with the goal of reaching the EU target of the gigabit society, where at least 100 Mbps speed should be made available to all Estonians. Along the same line, after some delays the awards of 5G bands should be expedited to meet the country's ambitious goal to deploy 5G in major cities by 2023 and along transport corridors by 2025.

Figure 1.37. The download speed of fixed broadband is lagging behind

Speedtest, 2021



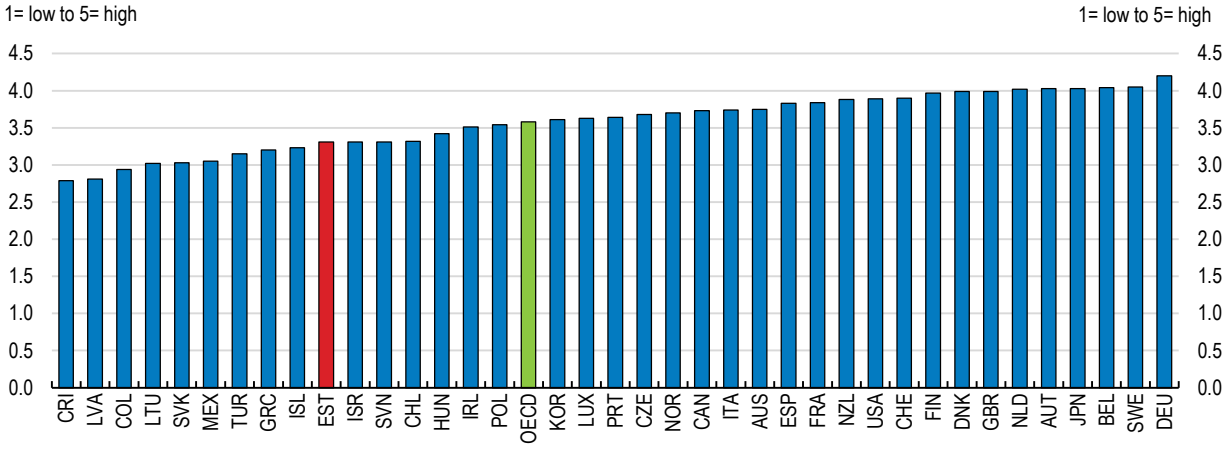
Sources: Speedtest (Ookla), https://www.speedtest.net/global-index.

StatLink https://stat.link/q0nuvo

The future success of service delivery and value-for-money from infrastructures depends on physical ones becoming increasingly interlinked with and operated using digital technologies. The ability to interlink such systems offers opportunities for improving existing services and creating completely new types of services. For example, the integration of physical–digital systems shows the ways that smart cities of the future will make use of advanced technologies within and between their various component systems to improve their effectiveness and efficiency (OECD, 2020a). For logistics, where the perceived quality is low in Estonia (Figure 1.38), the recent experiment conducted jointly by Estonia, Latvia, Lithuania and Poland on electronic consignment notes (e-CMR), a digital technology to ease logistics, is a case in point on digital technologies becoming part of a physical process, and shows how some weaknesses in the latter can be solved by the former (Box 1.8).

Figure 1.38. The quality of logistics infrastructure is lagging behind

Overall logistics performance index, 2018



Source: World Bank WDI.

StatLink https://stat.link/xa968g

Box 1.8. The 2020 Baltics/Poland electronic consignment notes (e-CMR) experiment

Between the Baltics and Poland, thousands of shipments are made daily, accompanied by information, documentation, licenses, and other information relevant to both cargo owners, transport companies as well as public authorities. Rules for such documentation are covered by various regulations and among the most important ones, bound to the CMR Convention (the United Nations Convention for the carriage of goods). The CMR document deriving from that Convention is mandatory for international shipments and holds key information about the goods, the transporting and receiving parties. Until recently, the CMR notes were only used in a form of paper, making it time-consuming as well as costly to process them. Moreover, during the pandemic CMR notes were implying unnecessary human contacts in cargo collections and delivery activities.

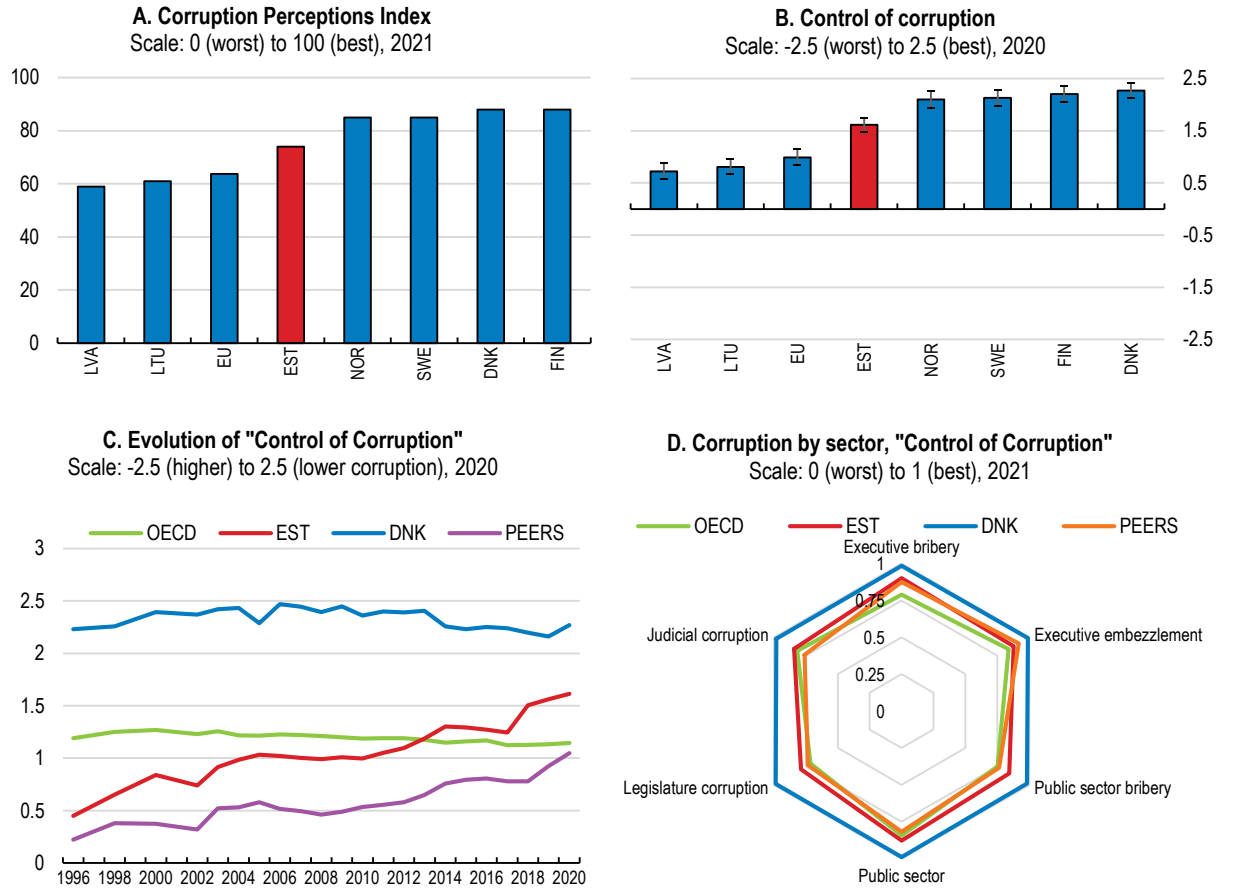
In 2020 Estonia, together with Latvia, Lithuania and Poland, tested an electronic consignment note (e- CMR) prototype in order to achieve cross-border exchange of e-CMR information by setting up an indexing scheme between countries. The countries used real-time freight information to reduce paperwork in the road transport sector and unjustified downtime during the roadside checks. With the prototype, it was no longer necessary to stop the vehicle, as the load can be controlled by just entering the truck and trailer registration number to the system. Tests were successful and the idea of the e-CMR indexing scheme proved its benefits to all parties in the supply chain. Estonia plans to go further together with neighbouring countries by creating a Pan-European interoperable system for the exchange of electronic freight information, a step towards an EU Digital Single Market.

This type of solution has the potential to significantly improve the performance and efficiency of the transport sector and infrastructures. As border handling remains a significant bottleneck for import and export processing times in several countries (World Bank, 2020), digital solutions like e-CMR eliminates middlemen and middleware and paves new ways of handling tangibles commodities and managing physical infrastructures.

Continuing the progress on corruption and money laundering

Corruption harms the business climate, distorts competition and diverts public resources, and generates mistrust in institutions and corrodes the social fabric. Estonia ranks the highest in the Baltics in the Transparency International's Corruption Perceptions Index (Figure 1.39, Panel A and Transparency International, 2020), and the effective control of corruption (Figure 1.39, Panel B). In fact, Estonia has improved its ranking considerably since the early 2000s (Figure 1.39, Panel C), and scores at or above the OECD average for each sector-based sub-components (Figure 1.39, Panel D). Estonia is also fully compliant with the standards set by the Global Forum on Transparency and Exchange of Information for Tax Purposes (OECD, 2018b).

Figure 1.39. Perceived corruption is declining



Note: Panel B shows the point estimate and the margin of error. Panel D shows sector-based subcomponents of the "Control of Corruption" indicator by the Varieties of Democracy Project.
Source: Panel A: Transparency International; Panels B & C: World Bank, Worldwide Governance Indicators; Panel D: Varieties of Democracy Project, V-Dem Dataset v11.

StatLink https://stat.link/907krm

In 2013, Estonia set an objective in its 2013-2020 anti-corruption strategy to reach the group of countries with the lowest perceived levels of corruption in the Transparency International's Corruption Perceptions Index (the value of the index must be higher than 64 points). This objective was achieved and in 2020 Estonia adopted a new anti-corruption plan until 2025. The goals of the previous anti-corruption strategy were to promote awareness of corruption, increase the transparency of decision-making and activities, develop the investigative capacity of investigative bodies, and prevent corruption that threatens security. The objectives of the new plan remain broadly similar, but with now a specific focus on short-term activities for tackling these objectives, including raising the awareness of companies on business corruption, which is currently low and where efforts need to be deployed. Currently, more than half of managers in Estonia have encountered at least one corruption practice within their own business sector, while 48% believe bribes are justified when competitors bribe (Johannsen and al., 2016). Raising awareness and motivating the fair conduct of business should then be a priority, with the State playing a more active role in explaining the nature of private corruption and conflicts of interest on the business environment, and promoting the adoption of specific ethical codes of conduct.

Close some remaining legislative gaps

Estonia has also made further progress on strengthening its anti-money laundering and counter-terrorism financing framework. Those steps were necessary in light of the Danske Bank money laundering scandal and Versobank's regulatory breaches. Estonia has transposed the fifth anti-money laundering EU directive into national law in 2020. In 2021, an institutional reform established the Financial Inspections Unit (FIU) as an autonomous institution with its own budget, expanded to strengthen its strategic analytical abilities. The FIU also now partakes in the anti-money laundering Baltic Working Group and seeks to enhance its cooperation with Baltic and Nordic colleagues. Overall, all those steps to fight corruption and money-laundering goes in the right direction. However, some of the gaps identified in the previous Survey remain (OECD, 2019c). Estonia's legislative framework could be improved further, including in clarifying corruption-related offences in the Criminal Code, allowing surveillance activities to counter corruption and adopting legislation guaranteeing confidentiality to private sector whistle-blowers, which is currently not regulated. Also, to meet the requirements of the OECD Anti-Bribery Convention, Estonia should amend its legislation to waive the statute of limitations following a mutual legal assistance request, expand the scope of its false accounting offences and increase the corresponding sanctions.

Use data linkages to automatize inspection

Taking seize of Estonia's digital capacities, fostering the availability and interoperability of data could make the handling of corruption and money laundering activities more efficient. For example, by linking together data available in different state information systems, while maintaining compliance with privacy regulation, it would be possible to identify dubious transactions (e.g. by linking together data from the Public Procurement Register, the Commercial Register, and the balance record information system to increase the transparency of transactions). In the healthcare sector, the Covid-19 pandemic has created, as in many countries, the opportunity for corruption to flourish as massive resources have been rushed to address the health crisis, while procurement oversight and enforcement efforts have diminished by the constraints of the crisis. Increasing inspection activities in the health sector through new digital tools, such as machine learning, would help to expose corruption. More generally, and given its already existing digital infrastructure, Estonia has the capacity at few costs to develop further digital effective system of auditing and accountability. Such avenues to achieve a more effective grasp on corruption are envisaged in the new anti-corruption plan and should be implemented.

Table 1.6. Past OECD recommendations on money laundering

Recommendations in past *Surveys*	Actions taken since the previous *Survey* (December 2019)
Continue strengthening regulations and allow the freezing of assets by the regulator in the case of suspected money laundering and increase fines to deterring levels. Continue to strengthen Baltic-Nordic coordination in the fields of financial sector supervision and anti-money laundering.	The possible sanctions for infringements of the Money Laundering and Terrorist Financing Prevention Act (MLTFPA) have been increased in 2017, and regarding remaining misdemeanours in MLTFPA, they have been brought in 2020 to the maximum level foreseen in Estonia, 400 000 euros. The freezing of assets by the FIU of Estonia has also been amended to encompass all possible forms of property and to be applied to the burden of proof regarding the frozen property to the owner to provide evidence on the frozen property to be of a legitimate origin. Baltic-Nordic coordination in the fields of financial sector supervision and anti-money laundering has been strengthened.

MAIN FINDINGS	RECOMMENDATIONS (Key recommendations in bold)
Health policies	
Although Estonia has implemented a successful vaccination campaign, there is still a large share of unvaccinated people	**Continue efforts to accelerate vaccination.**
Policies for a resilient and balanced recovery	
The fiscal response has been timely and effective in mitigating the COVID-19 shock. Now with the strong recovery well underway and high inflationary pressures, the return to a neutral fiscal stance should avoid the pro-cyclicality observed in the past. The counter-cyclical impact of automatic stabilizers could be enhanced.	**Withdraw fiscal support gradually but maintain support for hard-hit sectors that do not benefit from the recovery. Allow the free play of automatic stabilisers.** **Reform unemployment benefits to increase their generosity during downturns and lower it during upturns.** Enhance the statistical capabilities for the estimation of Estonia's cyclical position used in the drafting of budget plans.
The strong recovery is exposing some entrenched imbalances in the labour market, amplifying labour shortages and putting pressure on wages, inflation and competitiveness.	**Step-up the engagement of employers and trade unions in vocational education and training at both local and national levels.** **Promote pathways from vocational education and training into higher levels of education.** Advance the use of artificial intelligence to facilitate better matching of individuals to vacancies and to tailor ALMPs needs. **Consider a temporary extension of the duration of short-term employment registration for migrants.**
The tax system is efficient but does not generate enough revenue to finance adequate social protection. Ageing will increase health and pension spending in the long term.	**Review whether the stocks of housing and business properties should be included in the land tax**. **Evaluate the costs and benefits of the recent lower corporate tax regime.** Review the basic income tax allowance rule to restore progressivity in the personal income tax schedule.
A large share of loan portfolios of banks is composed of loans to real estate and construction companies, while the large savings accumulated during the pandemic could lead to an overheating of the housing market.	**Monitor the developments in the housing market and adjust standard macro-prudential instruments, such as debt-to-income and loan-to-value ratios, when necessary.**
Progress on corruption and money laundering has been strong and continuous, but some legislative gaps remain while the awareness of companies on business corruption remains low.	**Promote the adoption of specific ethical codes of conduct in the private sector and amend the legislation to meet the requirements of the OECD Anti-Bribery Convention.** Subject to privacy regulation, link together data available in different state information systems and use machine learning to identify dubious transactions.
Tackling poverty	
Relative poverty is high and multi-faceted. In-work poverty is the highest in the Baltics while inflation could leave lasting damage on the poorest sections of the population. The minimum wage and the average pension remain below the poverty line.	**Tighten transfers targeting and use digital and data capacity to raise take-up.** **Create in-work benefits while making work pay.** **Social partners should continue to discuss minimum wage increases to phase out in-work poverty.** **Reduce employees' social security contributions for low wage earners.** **Consider support measures for pensioners to keep pace with rapid economic developments.**
The gender pay-gap is high, contributing to a higher poverty risk for groups where women are overly represented.	**Reintroduce and enhance the 2019 dropped amendments reinforcing the implementation of the equal pay principle to continue the progress on closing the gender pay-gap.** Publish average wages by professional groups and gender. Involve employee representatives in the private sector to help in preventing pay discrimination.
ALMPs and training participation is comparatively low for people with skill obstacles.	Adapt training to fit better the needs of the low-skilled and create specific programmes. Revise the outreach strategy to the low skilled to promote up- and re-skilling directly and personally.
The labour market integration of ethnic non-Estonians is lagging behind, leading to a higher poverty prevalence for this group.	Enhance language training availability for all residents and foster the engagement of ethnic non-Estonians in training.
Raising spending efficiency	
The healthcare system has been put under significant stress during the second wave of the pandemic and spending pressures are mounting as	**Promote the use of generics drugs and make them the standard for the reimbursement of every prescription.**

a result of population ageing, calling for a more efficient use of available resources.	**Implement a legal framework to streamline the secondary use of health data and encourage common approaches to data terminology and exchange standards.** Raise the admission quota to the medical faculty and implement statutory relicensing or reaccreditation for general practitioners. Promote the use of biosimilars.
As new EU-funds will be devoted to upgrading infrastructures, implementing an holistic strategy for infrastructures is essential.	**Establish a central and systematic collection of data on the performance of infrastructure and select upcoming projects based on cost-benefits analysis.** Pursue further the integration of physical–digital systems. Expedite the awards of 5G bands. Increase investment on broadband speed with the goal of reaching the EU target of the gigabit society.

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2 Estonia's climate policy: challenges and opportunities

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Estonia has a relatively carbon-intensive economy among OECD countries. The government has committed to reducing greenhouse gas emissions by 70% in 2030 relative to their 1990 levels and is aiming to achieve climate neutrality by 2050. Considerable progress has already been made and almost one third of Estonia's energy is now produced from renewable sources. However, a deeper transformation will be needed. Estonia has committed to phase out oil shale and will need to diversify its sources of renewable energy. There is scope to substantially reduce the use of fossil fuels in the transport sector and to increase the energy efficiency of buildings across Estonia. To achieve this will require a comprehensive approach that significantly expands carbon pricing, public investment and private-sector incentives. Adopting an inclusive approach will be essential to secure the support of consumers and workers.

This chapter focuses on Estonia's transition towards a low-carbon economy. It discusses how the three sectors responsible for most of Estonia's greenhouse gas (GHG) emissions -- energy, transport and buildings -- could reduce their emissions by adopting new technologies and increasing their investment. The decarbonisation of other sectors such as agriculture and industry will also be important. Across these sectors, achieving rapid decarbonisation will require transformative policies in both the short and medium term. Moreover, climate adaptation measures will be necessary to manage a warmer and more volatile climate. While Estonia is expected to be less directly affected than many other countries, as a small open economy it remains exposed to countries that are more affected by climate change. Adopting an approach that focuses on cost-effectiveness will be essential to contain the transition costs. The approach should also be inclusive and limit the negative impact on vulnerable consumers and workers.

Moving towards a low-carbon economy

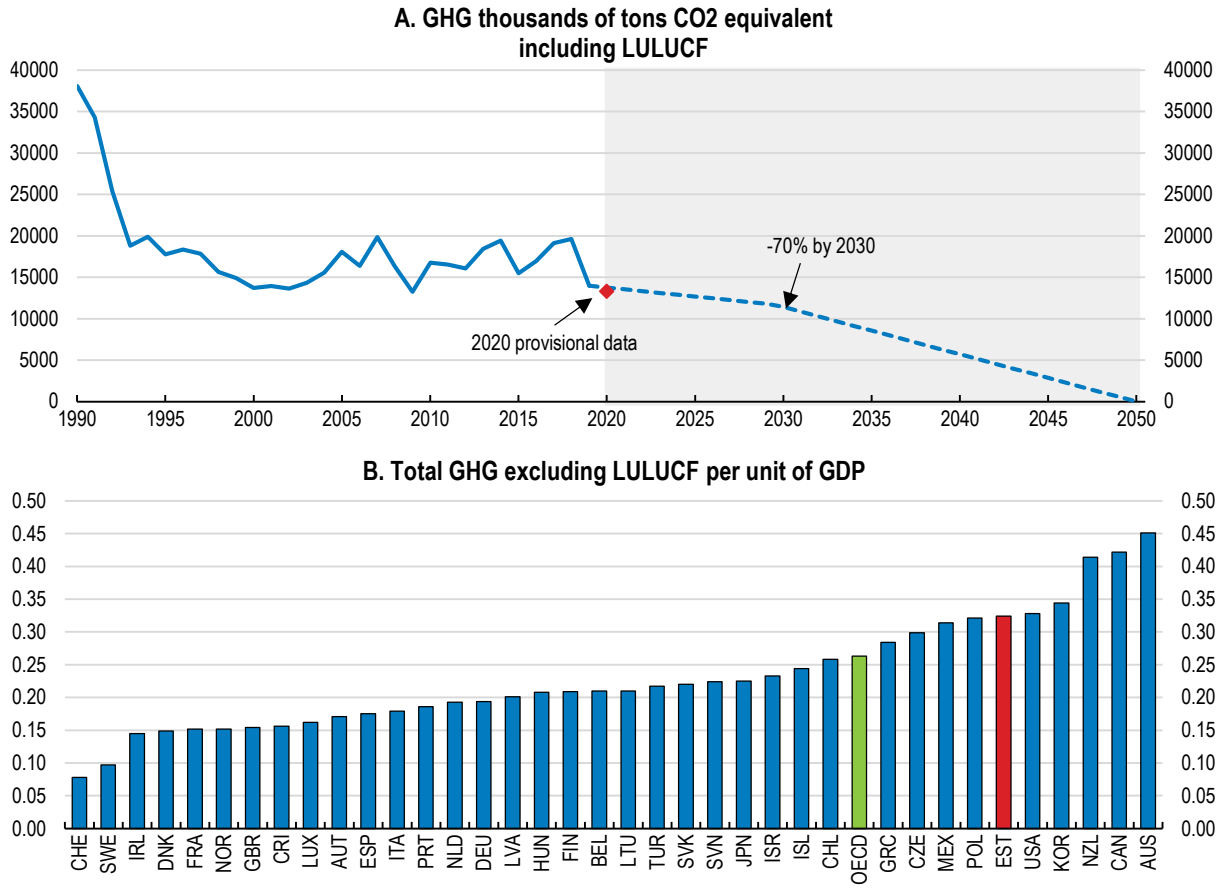
Estonia has a relatively carbon intensive economy among OECD countries. One of the reasons for this high level of emissions is the role of oil shale, an energy-rich sedimentary rock similar to coal, in meeting Estonia's energy needs. Oil shale has historically played a significant role in Estonia's economy. After its establishment in 1918, the oil shale industry became prominent during the 1950s in the generation of electricity for use in Estonia and parts of the Soviet Union. The output of the oil shale industry has decreased since Estonia's independence in 1991 partly as a result of an economic contraction but also due to structural change in the economy. However, oil shale has continued to provide a large share of Estonia's electricity in recent years and has underpinned its energy independence. The burning of oil shale releases large quantities of carbon dioxide (Figure 2.1). But transport emissions have also increased and contributed to Estonia's Greenhouse Gas (GHG) emissions (Figure 2.2). Furthermore, Estonia's buildings, of which more than two thirds were built before independence from the Soviet Union are relatively energy inefficient and contribute to GHG emissions.

Estonia has a multi-level approach to the environment and the climate. As a member of the European Union (EU), Estonia's climate policy is guided by the EU 2020 climate and energy package and 2030 climate framework. EU directives such as the Energy Efficiency Directive and the Renewable Energy Directives have been transposed into national law. Furthermore, Estonia has developed a national climate strategy consistent with the EU framework. In 2017, the Estonian Parliament approved the 'General Principles of Climate Policy until 2050' that outline Estonia's transition to a low carbon economy. A more detailed policy approach is set out in Estonia's 2030 National Energy and Climate Plan (NECP), which is supported by specific plans such as those for energy, climate change adaption, transport, forestry, waste management, and rural affairs. More recently, Strategy Estonia 2035 was adopted in 2021 with an aim to reach climate neutrality by 2050. A new NECP will be developed by 2024 and the 'General Principles of Climate Policy until 2050' are in the process of being updated.

Responsibilities for implementing environmental policies are spread across different central government ministries and agencies. The Ministry of the Environment organises and co-ordinates environmental and climate policy while the Ministry of Economic Affairs and Communications drafts and implements Estonia's energy policy. Eesti Energia, the largest power company, is majority state-owned. The Competition Authority is the regulator for gas and electricity network tariffs and district heating prices while Elering is the energy transmission system service operator. The Ministry of Economic Affairs and Communications is responsible for fuel issues and manages commercial and residential buildings policy. The Ministry of Finance is responsible for state budgets and tax policies related to environmental matters. Local governments and municipalities are key players in energy and climate policy as they voluntarily compile local energy and climate plans. Different agencies such as KredEx, Elering, the State Shared Service Centre, the Environmental Investment Centre, and the Agricultural Registers and Information Board also play a role financing and supporting environmental and climate projects. For example, the Environment Agency is responsible for collecting and disseminating environmental data and houses the weather

service. On research, the Research and Development Council plays a crucial role in implementing Estonia's research and development (R&D) strategy and innovation policy.

Figure 2.1. Greenhouse gas emissions have decreased substantially but should be reduced further



Note: Latest data is for 2019. (*) denotes preliminary data for 2020 and estimates LULUCF emissions based on 2019 data. LULUCF stands for land use, land use change and forestry. The targets in Panel A represent a 70% GHG emission reduction by 2030 relative to 1990 (Paris Agreement) and a climate neutrality goal by 2050 (Strategy Estonia 2035), shown here as zero emissions in 2050.
Source: OECD, Environment database on greenhouse gas emissions.

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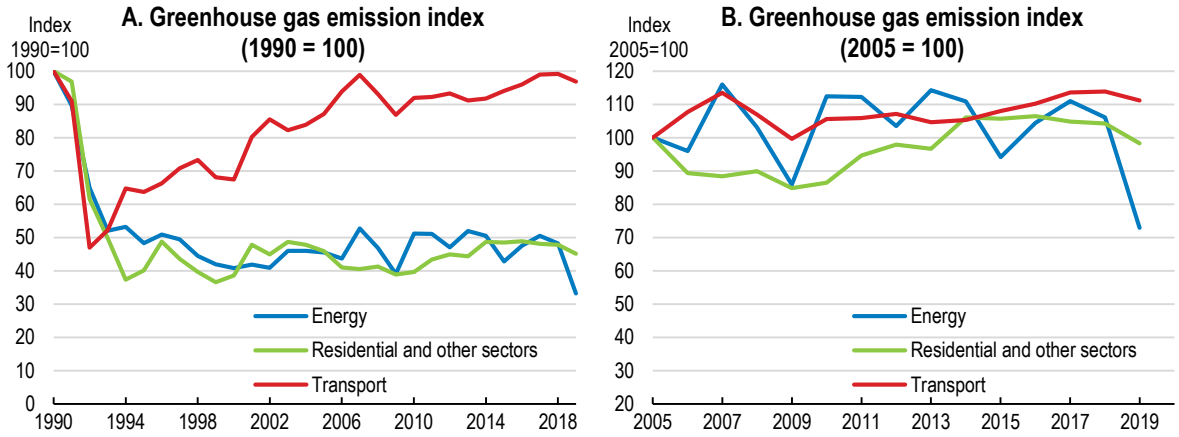
Estonia is committed to reducing its GHG emissions and to contributing to global efforts to mitigate climate change. It has ratified the Paris agreement in 2015 and participates in EU climate efforts. Estonia has made international commitments to reduce GHG emissions by 70% in 2030 and 80% in 2050, relative to 1990 levels. The latest national strategy goes further than this and aims for Estonia to become carbon-neutral by 2050. As part of that, the government has also committed to phasing out oil shale in the energy sector entirely by 2040. Estonia has already made considerable progress towards its objectives (Figure 2.1) and preliminary data for 2020 suggests GHG emissions, excluding land use, land use change and forestry (LULUCF), were already around 72% lower than in 1990. Most of the reduction occurred in the 1990s as low oil prices made oil shale production less economically attractive and the modernisation of industry reduced Estonia's energy intensity. GHG emissions, excluding LULUCF, also declined since 2005 by 40% even though some of the fall in 2020 is likely to have been a temporary effect due to the pandemic. It is important for Estonia to continue on this path and accelerate the progress towards net zero emissions. The latest annual report by the Inter-governmental Panel on Climate Change confirms that limiting global warming will require sharp reductions in GHG emissions (IPCC, 2021) but even if all the

countries' announced pledges to achieve net zero are achieved fully and on time, global temperatures would still rise by around 2.1°C by 2100 (IEA, 2021). New net zero announcements made at the COP26 summit in Glasgow in November 2021 are consistent with a lower rise of 1.8°C by 2100 (Climate Action Tracker, 2021). Halving global GHG emissions by 2030 will be a key milestone in the journey to net zero by 2050. It is within this context that the EU Green Deal, a more ambitious and comprehensive framework to accelerate the green transition, has been developed. Estonia has supported this process. The EU Climate Law passed in 2021 and upcoming EU climate legislation will strongly influence its national climate policies.

Figure 2.2. GHG emissions in transport have risen since the early 1990s



Note: The data is the total GHG emissions within each sector. Latest data is for 2019.
Source: OECD, Environment database on greenhouse gas emissions

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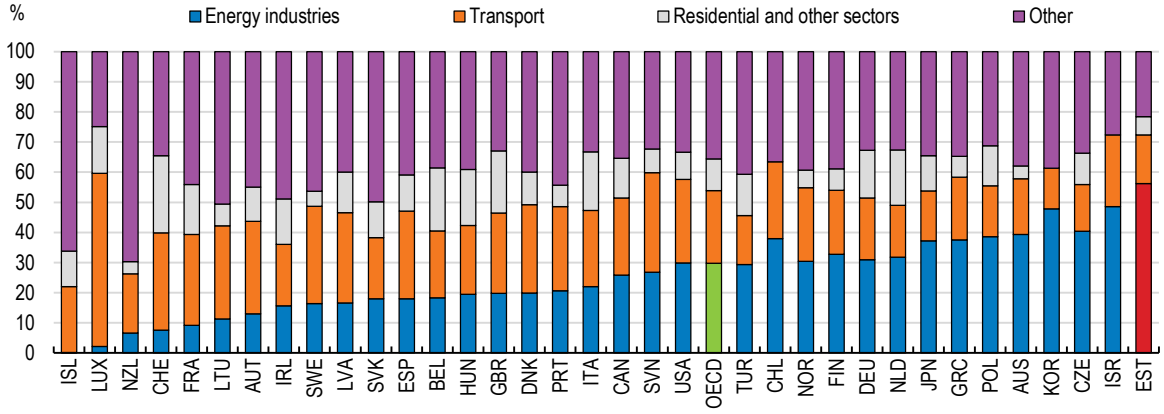
Figure 2.3. Energy industries account for most of the GHG emissions

2019 or latest year available



Note: 'Other' refers to fugitive emissions from fuels, manufacturing industries and construction, industrial processes and product use, agriculture, waste, and other category.
Source: OECD, Environment database on greenhouse gas emissions.

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Decarbonisation of three sectors is essential to achieve Estonia's GHG targets. These sectors are energy, transport and, to a lesser extent, buildings. Together they account for almost 80% of Estonia's GHG

emissions. The energy industry represented over half of GHG emissions in 2019, the highest share in national emissions among OECD countries (Figure 2.3). GHG emissions from transport made up another 16% with emissions from buildings accounting for 6%. Reducing GHG emissions in other sectors is also important to transitioning to a low-carbon economy, but reductions in three aforementioned sectors will make the largest impact on Estonia's GHG emissions.

Climate adaption strategies will be important in helping countries manage and alleviate the effects of climate change. Estonia's climate already experiences a range of 60°C between summer and winter. The coastal parts are accustomed to frequent rains and strong winds (ENFRA, 2015). However, under an extreme scenario of a rise in annual temperatures by 4.3°C by 2100, average annual precipitation will increase by 19%, wind speed will increase by 3-18%, there will be no permanent snow cover and the sea level on Estonian coasts will rise by 40-60cm. Coastal cities and settlements as well as areas inside the country near low-lying riverbeds might be more subject to flooding and infrastructure might be more costly to maintain due to more volatile and extreme weather. This will require specific adaptation measures to alleviate the consequences of climate change.

Estonia has a comprehensive climate adaptation strategy that provides a roadmap to building climate resilience. The main objective of the plan is to increase the readiness and capacity of the state to adapt to the effects of climate change at the regional and local levels. It is based on four in-depth scientific studies that helped Estonia to identify sectoral climate change impacts and vulnerabilities, and to determine adaptation measures for both the short term, up to 2030, and the long term, up to 2050 and 2100 (IEA, 2022). The strategy focuses on health and rescue capabilities, land use and planning, the natural environment, bioeconomy, economy, society, awareness and cooperation, infrastructure and buildings, and energy and security of supply (Government of Estonia, 2017). However, this is not likely to directly impose major costs on society and on the economy. The overall costs of climate change adaptation over 2017-30 are estimated around 0.6% of 2020 GDP, lower than costs faced by many other countries, although this is subject to large uncertainty (Government of Estonia, 2017). There may also be indirect costs as Estonia's open economy is likely to be affected through trade and financial links with countries more affected by climate change.

Environmental taxation and subsidies are important tools in accelerating the transition to a low-carbon economy but the coverage of such taxes and subsidies is limited in Estonia. Estonia's tax system is generally considered transparent and efficient but it only provides limited support to Estonia's climate goals. The EU Emission Trading System (ETS) covers a large share of Estonia's CO_2 emissions as it includes energy industries and energy-intensive manufacturing, and effectively acts as a carbon tax. But in non-ETS sectors, there is little additional taxation related to emissions and pollution (Figure 2.4 Panel A). Within energy, there is a small carbon tax and it is applied to a narrow tax base. The carbon tax of EUR 2 per tonne of CO_2 is implemented as a surcharge on CO_2 emissions but major electricity producers are exempt if they invest in retrofitting (IEA, 2019). Electricity is taxed at a flat rate. Within transport, taxes are not directly linked to carbon emissions. There are excise duties on transport fuels, which are relatively high compared to average Estonian income levels, and this partly encourages energy efficiency. There is a vehicle registration fee but no annual road tax. However, heavy goods transport vehicles are liable to pay road tax in line with the minimum level of tax rates applied in the EU. Overall, transport taxes and charges are not directly linked to transport use and vehicle carbon emissions. Emissions from buildings are also not subject to carbon taxes. That said, Estonia has used selective policies in the past to encourage renewable electricity through feed-in tariffs, subsidies for electric vehicles and public transport, and subsidies for energy efficiency improvements in buildings. Nonetheless, to effectively support Estonia's low-carbon transition a uniform broad based carbon price should be introduced to price CO_2 emissions in areas of the economy where they are not currently priced.

The overall level of carbon-related prices in Estonia is too low. To meet the climate commitments of the Paris Agreement and to reduce GHG emissions, countries should price CO_2 at roughly around EUR60 per tonne of CO_2 by 2030 and several studies suggest this could be higher (OECD, 2021b). OECD data on

effective carbon rates suggests that Estonia is far behind on this measure (Figure 2.4 Panel B). Based on 2018 data, Estonia priced only 30% of its GHG emissions at least EUR60 per tonne of CO_2, lower than most OECD countries. Since 2018, carbon prices in ETS sectors have varied between EUR20 and EUR30 per tonne of CO_2 during 2019-2020 but have increased sharply in 2021, partly due to higher global energy prices. In the medium-term, to cut GHG emissions and meet its targets, Estonia could further reduce its particularly high GHG energy intensity by reducing the use of oil shale. Nonetheless, higher carbon pricing in Estonia is a necessary step to achieving meaningful progress towards further reducing GHG emissions. Estonia is currently in the process of reviewing its climate-related taxes and charges with the aim to better harmonising them across ETS and non-ETS sectors. To help with the review, Estonia could set up a technical climate change commission similar to the ones in the United Kingdom or in Denmark (see Box 2.1).The review is to expected to be completed by 2024 and should be consistent with EU climate legislation.

Box 2.1. The role of national expert climate change committees

Expert committees on climate change can help support national governments in planning and implementing climate change policies. Their role is to bring together various experts with scientific, technical, and policy experience in order to provide evidence-based and non-partisan multidisciplinary support to guide governments' climate change efforts. Their expert advice can help individual ministries benefit from a range of expertise when designing public policies and it can ensure ministers have the best available evidence for making political decisions. The United Kingdom and Demark provide good examples of expert climate committees. A similar expert committee on climate change could support Estonia's climate change policy now and for the coming decades.

In the United Kingdom, the Climate Change Committee (CCC) was established under the Climate Change Act in 2008 to advise UK government and the devolved administrations on climate policy objectives and monitor their progress. The CCC consists of the Mitigation Committee and the Adaptation Committee, with the chairperson sitting on both. More specifically, the CCC's objectives are to advise the government on appropriate GHG emissions targets in each five-year budget period, to monitor and report progress towards those targets, and recommend actions to keep the targets on track. The CCC provides advice on climate change risk assessments and the national adaptation programme. It acts as a national centre of expertise by conducting independent analysis into climate change science, economics and policy, by responding to requests for advice from government departments, and by engaging with various stakeholders more widely (UK CCC, 2021).

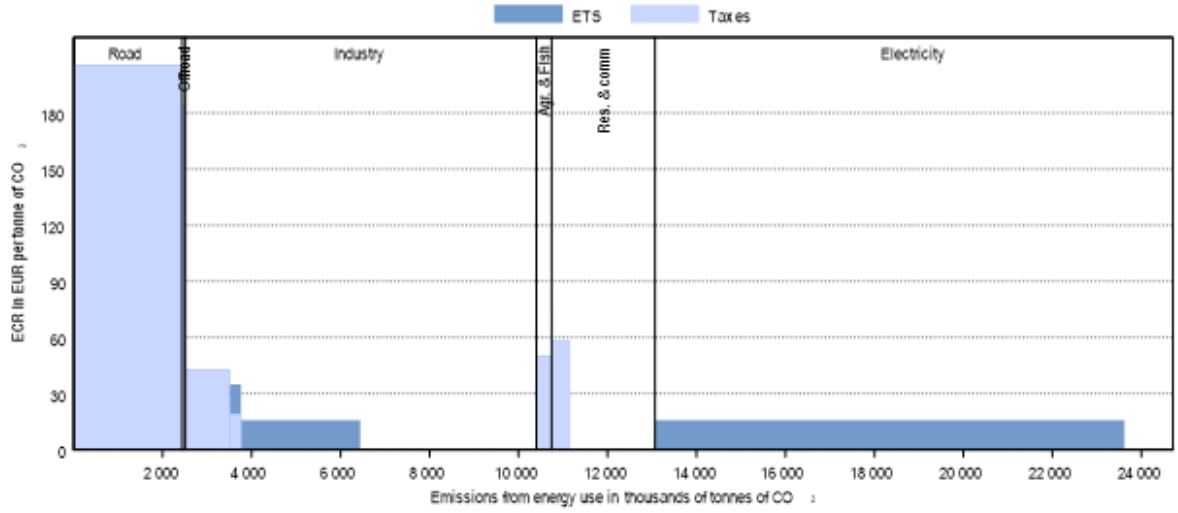
In Denmark, the Danish Climate Act in 2015 established the Danish Council on Climate Change. This is an independent body consisting of members with wide-ranging expertise on energy, buildings, transport, agriculture, environment, nature and the economy. The Council's tasks are to evaluate Denmark's progress in implementing national climate objectives and international climate commitments. Furthermore, the Council analyses possible transition pathways to a low-carbon society by 2050, identifies appropriate measures and makes recommendations to shape the government's climate policy. Lastly, it seeks to contribute to public debate and engage with other stakeholders (Klimaraadet, 2021).

Higher carbon prices might not necessarily result in lower output and employment. Theoretical models have previously suggested that higher carbon prices should lead to a contraction in output but empirical evidence is mixed. While some studies found negative effects on output, the temporary and negative effects on employment could be mitigated through a redistribution of environment-related tax revenues

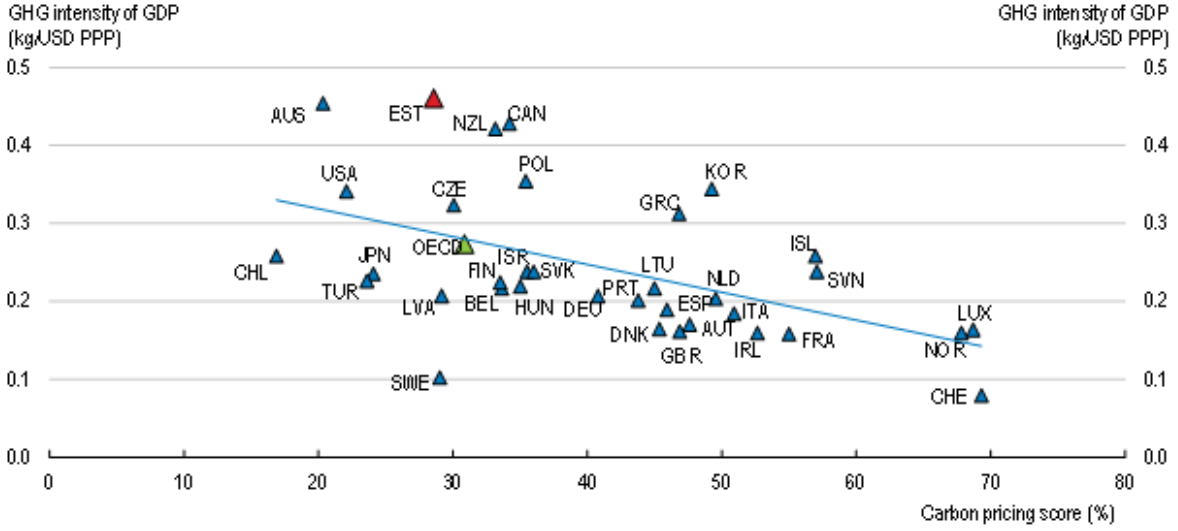
(see Box 2.2). Managing the size and speed of the transition to a low-carbon economy, which is likely to be large and fast, will be more relevant for Estonia. But Estonia is well placed to manage this successfully. By introducing widespread carbon pricing, Estonia can provide clear signals to firms and consumers, helping its dynamic economy reallocate capital from high-carbon to low-carbon activity. Through increased education, training and active labour market policies (Chapter 1), Estonia can also help facilitate labour reallocation towards less carbon-intensive activities.

Figure 2.4. Effective carbon prices are low and apply to a narrow range of economic activity

A. Average effective carbon rates in Estonia by sector and component in 2018



B. Emission intensity and carbon pricing coverage in 2018



Note: The GHG emissions include non-CO_2 emissions such as methane and nitrous oxide but exclude LULUCF. The effective carbon rate is the sum of taxes and tradeable permits that put a price on carbon emissions. The carbon pricing score answers the question how close countries are to price carbon in line with carbon costs. In this chart, the carbon pricing score refers to the EUR 60 per tonne of CO_2.
Source: OECD, Environment database and Effective Carbon Rates (ECR) database.

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The transition towards a low-carbon economy will require large investments. The energy sector will need substantial investment to shift towards renewable sources, and major changes in consumer behaviour and

price signals will be required in the use of transport and housing. The transition will require a large integrated and comprehensive effort from the government and private sector. While the cost of these transitions cannot be estimated precisely, it is likely to be high. So far, other studies have estimated that an additional public investment worth 0.2-0.3% of GDP per year and an extra private investment worth 1% of GDP per year in the period 2021-30 would be required to considerably reduce GHG emissions and reach net zero by 2050 (IEA, 2021). Gross investment will need to be even higher as some assets are divested and the total estimates might represent a conservative value (Pisani-Ferry, 2021). These are global figures but Estonia-specific estimates are similar in magnitude. A report by the Stockholm Environment Institute (SEI) indicated that reducing GHG emissions by 70% by 2030 and reaching net zero emissions by 2050, a total of EUR 17.3 billion will be required, representing annual investment of around 2% of Estonia's GDP, over the next three decades (SEI, 2019). An additional challenge is that the investment will need to be frontloaded in 2021-30. The SEI suggests that total investment in Estonia would need to rise by 4% of GDP in 2021-30 before gradually falling to an additional 1% by 2050.

This will be a significant challenge for Estonia's society and economy. In 2019, Estonia's total investment relative to GDP, both private and public, was around 25%. As a result, a 4 percentage point rise is large in magnitude but not out of reach by historical standards. However, the required investment will be concentrated in a few sectors such as energy or transport. For example, in the energy sector the direct total investment in 2019 was 1.6% relative to GDP. Even a 1.5 percentage point increase would represent a near doubling of investment in that sector. While a large increase in investment is likely to boost overall GDP, given the necessary shift of capital and labour away from polluting toward greener activity, the aggregate impact on GDP remains uncertain.

Box 2.2. The economic consequences of climate policy

Climate change is highly likely to negatively affect economic output. Temperatures will gradually increase, accompanied by a rise in seasonal rainfall and sea levels as well as the higher frequency and severity of extreme weather events (Batten *et al*, 2020). This will adversely affect the economy's level of output as productivity falls. On the supply side, rising temperatures could diminish effective labour supply as extreme heat makes it more difficult to work. Extreme weather is likely to affect existing capital such as housing or infrastructure and will become more costly to maintain. Volatile weather will also affect land productivity and agriculture. Moreover, the rate of technological progress may slow to the extent that more resources are diverted to climate adaptation and away from R&D. Higher investment in repair and replacement rather than investment in new technology may also limit 'learning by doing' effects (Batten *et al*, 2020).

On the demand side, higher uncertainty might lead to lower business investment and higher savings while lower wealth should decrease consumption. Climate change might not just affect the level of economic output but could also lead to lower and more volatile growth (Alessandri and Mumtaz, 2021). A comprehensive modelling exercise suggested that, based on the actions taken by 2015, global temperatures could rise by 1.5-4°C, decreasing the level of global real GDP by 1.0-3.3% by 2060 and by 2-10% by the end of the century (OECD, 2015). There is considerable uncertainty around these estimates since they do not necessarily take into account all aspects of climate change. The risks to the OECD projections are also likely to lie on the downside since there may be significant non-linear effects on the global climate. The probability of passing tipping points increases with rising temperatures and there is serious risk of major irreversible change (Stern, 2007).

Policy can reduce the negative impact of climate change on the economy through climate mitigation and climate adaptation policies. To mitigate the total impact of rising global temperatures, policies can promote a decoupling of GHG emissions from economic growth and support a transition to a low-carbon economy. Such policies can be composed of market and non-market based instruments such as carbon pricing, environment-related taxation, subsidies and regulation, public investment, as well as the provision of climate finance. Policies that develop low-carbon technologies such as renewable energy or promote energy efficiency can be complementary. Climate adaptation policies can help economies adjust to changing climate conditions through investment in more resilient infrastructure such as sea and flood defences, building design, and newer crop varieties (Ciccarelli and Marotta, 2020).

Policies have been shown to effectively reduce GHG emissions and this can mitigate the impact of rising temperatures. A range of market and non-market based policies can reduce emissions although each policy has its own advantages and disadvantages in terms of efficiency and political acceptability (Metcalf, 2019). Carbon prices are a particularly effective decarbonisation policy. They can be implemented as carbon taxes or determined through permit issuance in a cap-and-trade system. They reduce emissions as they make carbon-intensive activities more expensive relative to low or zero-carbon alternatives. This not only shifts demand away from polluting activities but a strong commitment to pricing carbon can create certainty for investors to use and develop low-carbon technology. An increase in the effective carbon rate by EUR 1 per tonne of CO_2 leads to, on average, a 0.73% reduction in emissions over time (Sen and Vollebergh, 2018). Such estimates can vary, though, and their effectiveness can be lowered by carbon leakage and carbon offsets. Carbon leakage occurs when carbon-intensive activities shift jurisdiction or countries, particularly when capital is mobile, in response to higher carbon prices or to other climate policies. Carbon offsets have similar effects as they allow firms to continue emitting by offsetting those emissions elsewhere. This is why it is important to complement carbon pricing with other policies to ensure a global reduction in emissions and a lasting

shift towards low-carbon activity. In that respect, there is evidence to suggest that expanding climate legislation, which encompasses all climate policies, has led to a reduction of 15% in global CO_2 emissions between 1999 and 2016 (Eskander and Fankhauser, 2020).

Although the benefits of policy action should outweigh the cost of policy inaction in the long-term, the effect of emission-reducing policies on the economy, however, might be negative in short to medium term. Micro evidence from firm-level and industry-level data, however, suggests that the relationship between stricter environmental policies and productivity is ambiguous. There is some evidence that environment-related innovation rises following stricter environmental policy but this may just reflect a shift in R&D rather than an expansion of total R&D (Kozluk and Zipperer, 2014). Perhaps unsurprisingly, there are limited effects on competitiveness as negative effects on carbon intensive firms are likely to be offset by higher exports from low-carbon intensive firms (Kozluk and Timiliotis, 2016; Naegele and Zaklan, 2019; Dechezleprêtre and Sato, 2017). Macro evidence based on theoretical large-scale computable general equilibrium models suggests higher carbon prices lead to a contraction in GDP (OECD 2015; McKibbin, Morris, and Wilcoxen, 2014; McKibbin et al., 2017; Goulder and Hafstead, 2018). Empirical research, however, is more mixed. Studies focused on the macroeconomic effects of the carbon tax in British Columbia in Canada, did not find significant impacts on GDP perhaps because carbon tax revenues were redistributed (Metcalf, 2019; Bernard, Kichian and Islam, 2018). One limitation, though, is that many empirical studies were carried during periods when carbon prices were low, making it more difficult to identify a robust link between carbon prices and macro outcomes. More recently, in European countries, Metcalf and Stock (2020) found that higher carbon prices were not significantly linked to either higher or lower GDP or employment although Kaenzig (2021) finds higher carbon prices in the EU ETS had a negative but temporary impact on GDP in the euro area. Using the OECD environmental policy stringency index (EPSI), Ciccarelli and Marotta (2020) estimate that stricter environmental policies are associated with more environment-related technological innovation and a contractionary but temporary effect on industrial production. The study also finds that stricter environmental policies can lead to lower employment but that this can be cushioned through the redistribution of higher environment-related tax revenues. Both Ciccarelli and Marotta (2020) and Kaenzig (2020) find stricter environmental policies, that is, higher carbon prices can lead to more environment-related innovation.

The private sector will be key in financing the investment required to transition to a low-carbon economy. Assuming that firms and households will make 80% of the investment (IEA, 2021), this implies additional private financing needs of 3.2% of GDP and public financing worth 0.8% of GDP. Estonia's historical growth since the mid-1990s has been around 4% so much of the investment could be financed out of current profits. In addition, Estonia has a well-capitalised banking system and should be able to finance low-carbon investments. At its disposal, the central bank has macro prudential and the Financial Supervisory Authority has micro prudential policy tools, which should also consider climate risks to support the low-carbon transition. Moreover, the Nordic Investment Bank, a regional development bank, is well placed to finance private investment. Finally, Estonian companies can also raise capital in international corporate bond markets.

Public investment should support private investment. The role of the public sector is to invest in infrastructure, R&D, skills and to help finance low-carbon projects insufficiently financed by the private sector. Better infrastructure, basic R&D and adequate skills will enable firms to compete and develop new and more environmentally friendly goods and services. At the same time, helping ensure widespread access to 'green' finance among firms and households will be important for a comprehensive transition. Assuming that 20% of the investment will be made by the public sector (IEA, 2021), this implies an additional 0.8% increase in public investment. The additional financing required between 2021 and 2025 should be more than covered by EU funds. As part of the Next Generation EU Funds, Estonia will receive

financing from: i) the Recovery and Resilience Facility (RRF); (ii) the Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU); (iii) The Just Transition Fund; and (iv) the Agricultural Fund for Rural Development. In addition, the new 2021-2027 Multiannual Financial Framework (MFF) will be complemented by the unused share of EU MFF 2014-20 Fund. Altogether, the EU funds can provide financing between 4-5% of GDP in 2021-25 even though not all funds are directly related to low-carbon growth and some 2014-20 MFF funds might remain unused to the extent there is a lower rate of absorption.

In addition to boosting investment, in the medium-term policy should rely on comprehensive environmental taxation, regulation and subsidies to facilitate the low-carbon transition. Carbon pricing can provide a powerful price signal to markets and this helps firms invest. In this regard, economy-wide carbon-based prices can move consumption towards a path consistent with a transition to a low-carbon economy. Carbon-based prices also provide correct price signals to companies and direct investment in the right direction. Carbon prices can take the form of carbon-based taxes as well as other policies such as subsidies and regulatory standards in order to achieve desired shifts to low-carbon activity in an efficient manner.

The introduction of widespread carbon-based prices without appropriate redistributive mechanisms is likely to be regressive. While higher taxes should lead to less GHG-intense consumption, some households will be affected more than others. For example, taxes on energy-inefficient vehicles and energy-inefficient buildings might affect poorer households more and they might not be able to afford to upgrade to newer but more expensive transport and accommodation. Carbon pricing could also create a divide between rural and urban areas as those living in rural areas rely more on private transport. In addition, workers employed in energy industries might face difficulties in reallocating and be at risk of poverty due to job loss.

Progressive taxation and income redistribution should be used to mitigate the negative impact on poorer households. This will be important from a fairness perspective. There is a range of tools that Estonia might consider. Targeted lump-sum cash transfers to affected households and firms can help cope with increases in energy costs. An alternative to lump-sum transfers could be targeted reductions in personal income or corporate tax. Social policies such as unemployment benefits and labour market training policies could be tailored to those affected by stricter environment-related policies. Local authorities in areas most affected by environment-related policies could receive extended support as well. For example, in British Columbia, the implementation of a comprehensive carbon tax in 2008 was complemented by reductions in personal income and corporate taxes as well as lump-sum transfers to low-income households (Yamazaki, 2017). The carbon tax in British Columbia was designed to be revenue neutral. The recycling of tax revenues can ensure that there is no additional tax burden on the aggregate economy and can mitigate some of the negative consequences of stricter environment-related policies. This will be essential for building support and avoiding creating resistance to the low-carbon transition.

Estonia has the potential to meet these challenges. Since its independence in 1991, Estonia has successfully managed the transition from a centrally planned to a market-based economy. The transition to a low-carbon economy brings several opportunities and Estonia's fast growing, dynamic and entrepreneurial economy is well placed to meet those challenges.

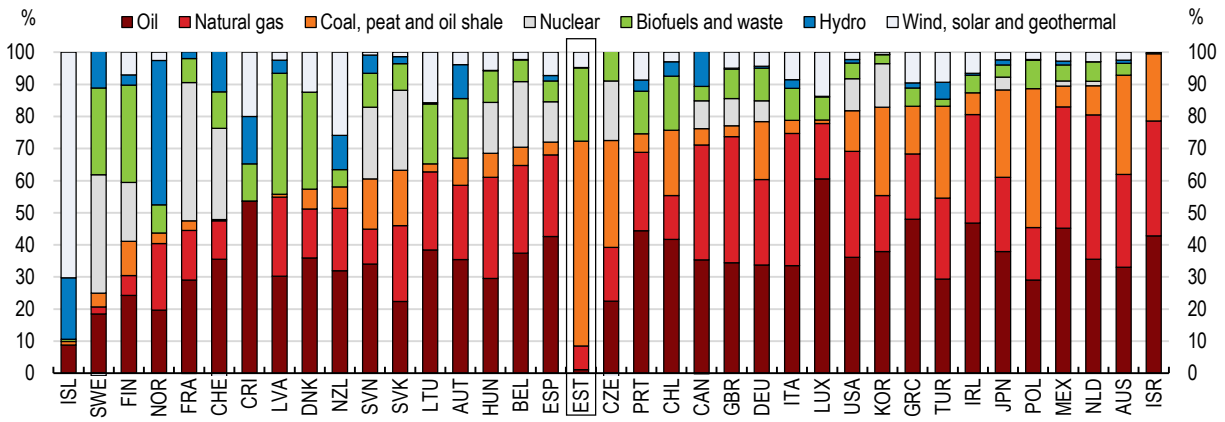
Managing the decarbonisation of Estonia's energy sector

The supply of energy in Estonia is still dominated by fossil fuels and oil shale in particular. However, this has been changing over time. Renewable resources such as woody biomass have become progressively more important and there is further potential for renewables to expand, especially for wind and solar energy. The use of different types of energy, however, is not equally distributed across sectors. This implies that the decarbonisation challenges and the type of policy actions required will differ.

Oil shale plays a significant role in the production and use of energy in Estonia

As mentioned, Estonia stands out among OECD countries due to a high reliance on oil shale in its energy supply (Figure 2.5). Oil shale is a type of non-conventional oil. It is an energy-rich sedimentary rock that contains kerogen, a waxy hydrocarbon rich material, and can be either used in a power plant or processed to produce shale oil (IEA, 2019). It has slightly higher energy density than lignite coal and, like coal, is a heavily polluting source of energy (see Box 2.3). In 2019, oil shale accounted for about 64% of Estonia's total primary energy supply. However, renewable energy such as biofuels and waste, mostly woody biomass in practice, accounted for almost a quarter of all primary energy with Estonia reporting the fifth highest share of renewable energy in the OECD after Latvia, Finland, Denmark and Sweden. Renewable energy, excluding biofuels and waste, wind, solar and geothermal energy accounted for only about 5% of overall energy supply, slightly above the OECD median and similar to the UK and Germany. This highlights the potential for higher and more diversified renewable energy production. Indeed, more recent data suggests that the use of renewable energy has grown. In 2020, electricity production from wind expanded by 20% while solar production more than doubled.

Figure 2.5. Oil shale accounts for most of Estonia's total primary energy supply



Note: The data is for 2019 or latest available.
Source: IEA World Energy Balance database.

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Total primary energy supply (TPES) is greater than total final consumption (TFC) within Estonia. TPES in 2019 was around six mega tonnes of oil equivalent (Mtoe) but the energy consumed domestically within Estonia was much smaller at around three Mtoe. This is partly due to trade. Estonia exports primary solid biofuels, electricity and shale oil produced from oil shale. At the same time, Estonia imports almost all of its refined oil such as gasoline and diesel and natural gas. Domestically, energy use is relatively evenly distributed across the transport, residential, commercial and industry sectors (Figure 2.6). These sectors consume a combination of oil, bioenergy, electricity and heat.

Box 2.3. A short explanation of oil shale and shale oil

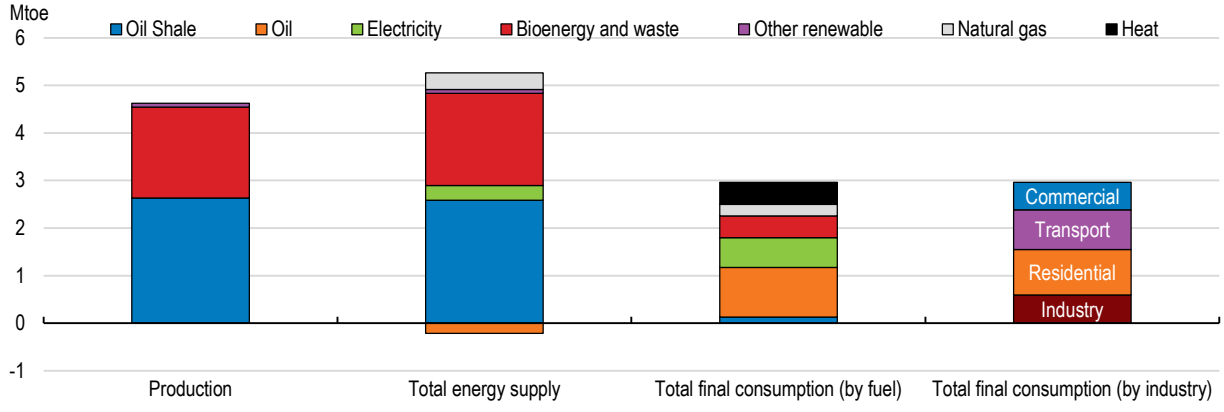
Oil shale is a type of non-conventional oil. It is an energy-rich sedimentary rock that contains organic matter called kerogen, a waxy hydrocarbon-rich material. It can vary by genesis, composition, calorific value and oil yield. In most cases, the organic matter content is between 5% and 25% but in Estonian Kukersites, a specific variety of oil shale, the organic matter content can be as high as 50% (EASAC, 2007).

There are several uses of oil shale. Once extracted from the ground, oil shale can be used directly in a power plant (pulverised or in a fluidised bed boiler). In terms of its energy value, it is comparable to brown coal at best and can contain less than half of the energy in average bituminous coal. Oil shale can also be processed by pyrolysis, hydrogenation or thermal dissolution to produce shale oil (also known as kerogen oil or oil-shale oil). Shale oil can be used as a fuel in maritime transport or can be upgraded in refineries to remove impurities so that it may be used like crude oil (IEA, 2019). In addition, oil shale can be used to produce chemicals.

Deposits of oil shale can be found all over the world. Total estimated oil shale reserves amount to 3.2 trillion US barrels (EASAC, 2007). This is around three times larger than conventional oil reserves. Two thirds of all reserves are in North America and the single largest oil shale deposit is the Green River Formation in Colorado, Utah and Wyoming. Europe makes up 12% of all deposits with two thirds located in Russia and only 5% located in Estonia. However, most of the reserves are low to moderate grade making their use uneconomical. Furthermore, oil shale mining causes significant environmental pollution to land and underground water. Considerable quantities of oil shale are mined in Estonia, Russia, China, Brazil, Australia and Germany. Estonia holds less than 1% of the world's reserves of oil shale but currently accounts for most of global oil shale mining, making it a global leader in the oil shale industry (World Energy Council, 2016).

Note that oil shale and the shale oil produced from it is not the same as light tight oil, which is sometimes also referred to as shale oil. Light tight oil is produced from shale formations, often in combination with shale gas in hydraulic fracturing. This is not done in Estonia (IEA, 2019).

Figure 2.6. Domestic production of energy is much larger than consumption



Note: Latest data is for 2020 (Production and total energy supply) and 2019 (Total final consumption).
Source: IEA World Energy Balances database.

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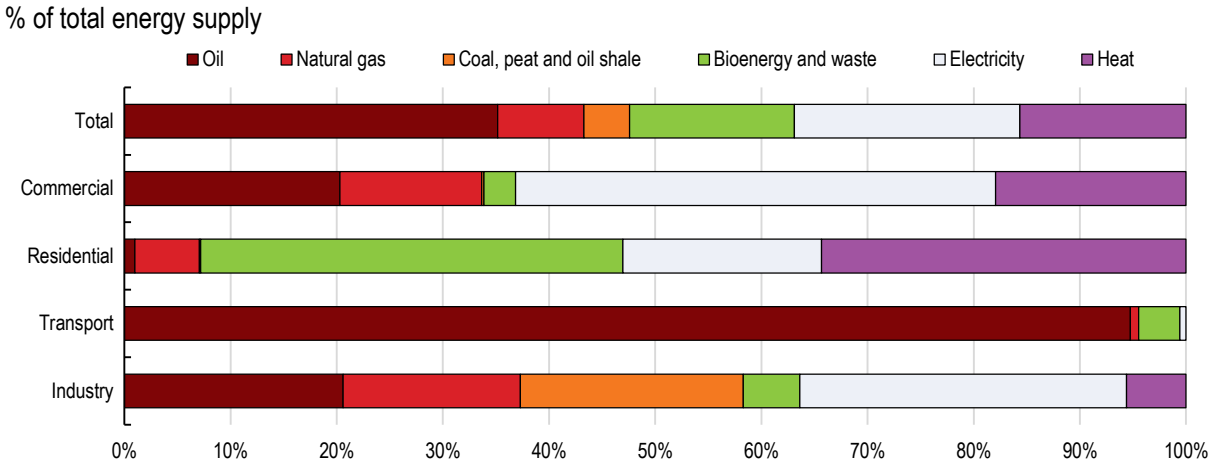
Different sectors have a different energy composition. Across sectors, oil shale plays the biggest role in the commercial and industry sectors. In those sectors, energy from electricity and heating account for 40-50% of overall energy consumption, most of which is generated through oil shale (Figure 2.7). In contrast, in the residential sector, oil shale only accounts for around a fifth of total energy consumption with most of it coming from bioenergy, that is, woody biomass. The transport sector is entirely reliant on oil. While Estonia exports shale oil, it imports all of its refined oil products.

Figure 2.7. The composition of energy use can vary widely across sectors



Note: 'Industry' includes non-energy consumption. 'Commercial' includes commercial and public services, agriculture and forestry. Latest data is for 2019.
Source: IEA World Energy Balances database.

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Oil shale use is declining and the transition will need to be managed

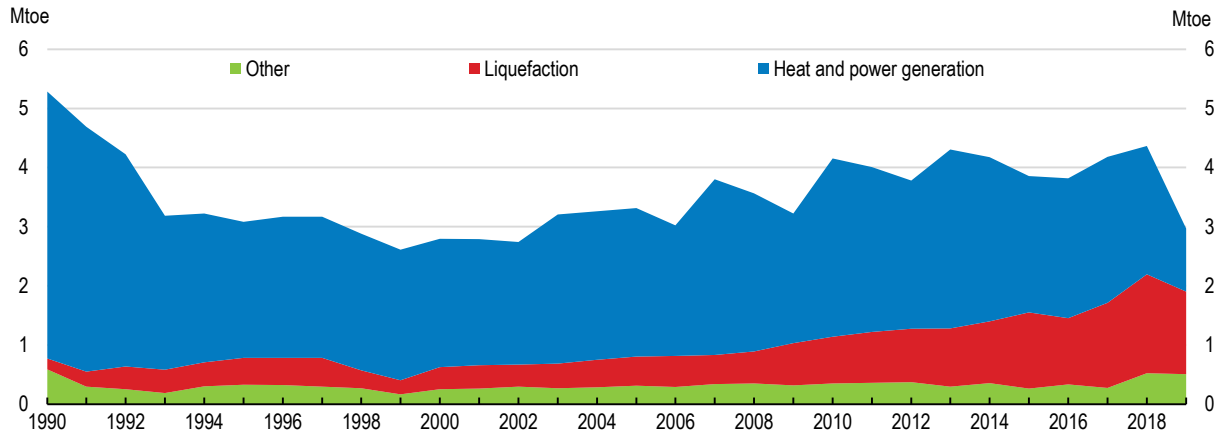
Oil shale continues to play a central role in Estonia's energy supply. There are four companies that hold oil shale mining permits with state-owned Eesti Energia holding roughly ¾ of total allowances by volume while Viru Keemia Group, Kiviõli Keemiatööstuse OÜ and AS Kunda Nordic Tsement make up the rest. Oil shale is mined and burned in several power plants to produce around ½ of Estonia's electricity and is, to a much smaller extent, used in heating.

The industry also produces shale oil, which is a type of fuel used in maritime transport. Over time, liquefaction of oil shale into shale oil fuel has become more prevalent while the share of oil shale used for heat and power generation has declined (Figure 2.8). The oil shale industry is highly concentrated in the eastern region of Estonia, the Ida-Viru region, where also most of the deposits are located. It employs 5,800 workers in Ida-Viru (Praxis, 2020) and, in aggregate, directly contributes 4-5% to Estonian GDP (World Energy Council, 2016).

The EU ETS market is important for Estonia's energy sector. The ETS is a cap-and-trade system for large power and heat plants (at least 20 thermal megawatts) and heavy industry. It covers around 45% of the EU's total emissions. By law, the ETS sector across the EU must reduce emissions by 21% below 2005 levels until 2020 and by 43% from 2005 to 2030 (EC, 2018). The ETS sector emissions are mainly subject to the EU policy framework. The non-ETS sector includes transport, residential and commercial sectors, non-ETS industry, agriculture, and waste management. They are covered under the EU Effort Sharing Decision (ESD). The EU-level targets for GHG reductions in the non-ETS sectors are a decrease of 10% by 2020 and 30% by 2030, compared with 2005 levels. While the EU ETS target applies for the EU as a

whole, the EU-level target for the non-ETS sector is translated into binding targets for each member country.

Figure 2.8. Oil shale is increasingly used to produce liquid fuel



Note: The data is for 2019.
Source: IEA World Energy Balance database.

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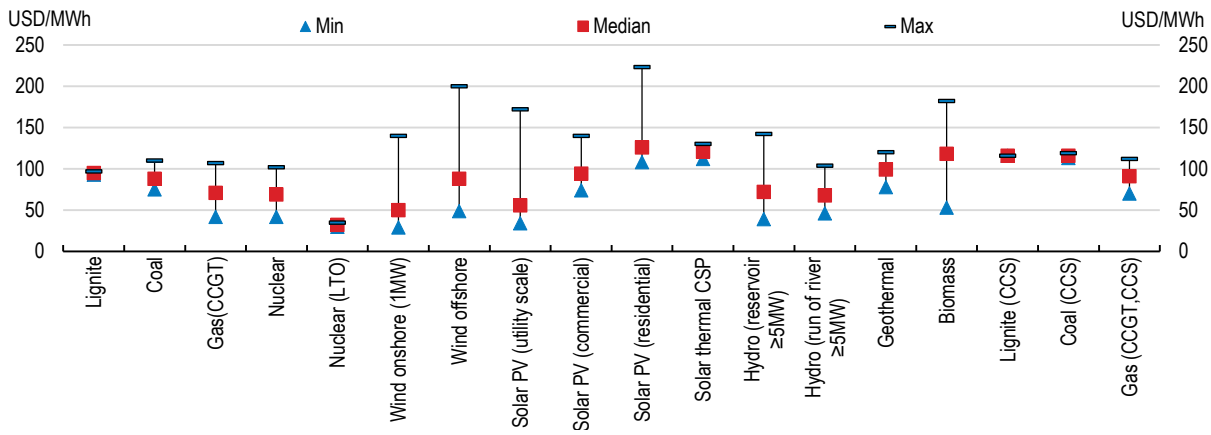
Emissions allowed under the EU ETS are set to decrease steadily. Phase III of the EU-ETS for the period 2013-20 has set a single, EU-wide limit on emissions. The number of CO_2 allowances for power stations and other fixed installations is reduced by 1.74% annually. Under Phase IV of the ETS (2021-30), the rate of decline is higher, at 2.2% annually. However, Estonia falls under the scope of Article 10c of the EU-ETS Directive (2009/29EC), which was introduced under Phase III of the ETS (2013-19), and provides a derogation from the requirement to auction all CO_2 allowances for power plants. Instead, Estonia has been given 18 million of transitional free CO_2 allowances for power plants under the ETS for the period 2013-19. The free allowances are deducted from the quantity that the respective Member State would otherwise auction. The objective of the derogation is to encourage investments in the modernisation of the electricity sector, diversification of the fuel mix, and to achieve carbon reductions by allowing more time for existing infrastructure to make the necessary changes. The EU-ETS price increased significantly in 2018 to around EUR 20 per tonne of CO_2, up from an average price of about EUR 7 per tonne of CO_2 between 2012 and 2017. With the new rules for Phase IV of the ETS, prices were expected to reach over EUR30 per tonne of CO_2 by early 2020 and traded prices were already exceeding EUR60 per tonne of CO_2 in 2021.

Using oil shale for heat and power generation has generally become less attractive over time. The EU ETS limits emissions from power, manufacturing and airline industries and covers around two thirds of Estonia's emissions (IEA, 2019). Oil shale releases a relatively high amount of CO_2 when burned which makes it particularly susceptible to ETS CO_2 prices. As those prices increased, the production of heat and power from oil shale became more expensive and consequently decreased (Figure 2.8). However, rising ETS CO_2 prices made liquefaction of oil shale a financially more attractive option as exports of shale oil are not covered by the EU ETS and can be exported.

Oil shale is also facing competition from other energy sources. Recent IEA estimates suggest that many low carbon technologies can be cheaper than fossil fuel technologies (IEA, 2020). Oil shale is similar to lignite coal but low-carbon technologies such as wind, solar and nuclear can be a cheaper way to generate electricity (Figure 2.9). Previous Estonia-specific estimates showed that woody biomass could be cheaper to use for heating than oil shale. When considering the total cost of producing energy most woody biomass and wind were cheaper than fossil fuels (Ea Energy Analyses, 2013). Since then, renewables have become more competitive relative to oil shale because carbon prices have risen sharply. With further research and

development the cost of renewable technologies is expected to decline. Moreover, the cost of electricity generated from oil shale, even with an additional carbon price, does not fully reflect the wider environmental pollution it causes. Oil shale mining affects underground water quantity while oil shale combustion and processing contributes to waste generation in Estonia. Air quality issues can be locally acute in the Ida-Viru region (OECD, 2017b).

Figure 2.9. Low-carbon electricity can be cheaper than fossil fuels



Note: The levelised cost of electricity shown above assumes a 7% discount rate, a carbon price of 30 USD/tonne, and heating prices of 37.06 USD/MWh. CCGT is combined cycle gas turbine LTO stands for long-term operation by lifetime extension of nuclear power plants. PV is photovoltaic. CSP is concentrating solar power. CCS means carbon capture and storage.
Source: IEA 2020.

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As part of Estonia's climate commitments, the government will be phasing out the oil shale industry. The government has committed to ceasing oil shale electricity production by 2035. In practice, the production of heat and power from oil shale is likely to decline further as the price of CO_2 emissions in the EU ETS rises and alternative energy sources become cheaper. The government has also announced it will be phasing out shale oil in the energy sector completely by 2040 and has promised no additional fossil fuel investment. Public perceptions of climate risks have risen over time and the Estonian public seem to accept that action needs to be taken to transition to a more green and climate-friendly economy (SEI, 2021).

Part of the oil shale power generating capacity will be reduced even earlier due to old age. The total power generation capacity in the Eesti, Balti, Sillamae and Auvere oil shale power plants is around 2GW. But some of the installed capacity will be retired as it no longer conforms to current environmental requirements. These older power generating blocks will be gradually decommissioned from 2016 to 2023 reducing capacity by 501 MW with the remaining blocks set to be closed by 2031. Overall, this will leave two power generating blocks based on the more modern fluid bed technology and the newer Auvere power plant with the total capacity of 700MW. This is an effective reduction of around two thirds over a period of 15 years.

The impact on the Ida-Viru region and its workers is likely to be negative without policy support. The social and economic impact of a decline in oil shale production will be concentrated in the energy sector and, given the geographic concentration of the oil shale industry, it will be felt acutely in the Ida-Viru region. The oil shale sector employs 4,737 people in Ida-Viru of which around 3,500 employees work for Eesti Energia. The oil shale workers belong to households in which almost 16,000 people live, which is slightly more than ten percent of the region's population. It is estimated that around 8,000 people are at risk of poverty if the oil shale sector were to rapidly shut down (Praxis, 2020). Most of the workers employed in the oil shale sector tend be older, are male and earn above-average salaries in the region. Half are skilled workers,

craftsmen or machine operators (Praxis, 2020). Furthermore, the region's economy is heavily exposed to oil shale as 40% of the largest firms in Ida-Viru operate in the oil shale sector and around 20% of Ida-Viru's income tax comes from oil shale employees. Ida-Viru has consistently higher unemployment rates than the Estonian national average. Its labour market might be less integrated with the rest of the country given a large share of its population is non-ethnic Estonian and language might pose a barrier to labour mobility.

The speed of transition will be key in determining the impact on the energy industry and on its workers. An immediate transition away from oil shale would result in stranded assets and unemployed workers. This would be costly for the economy in terms of both creating direct losses for the energy sector as well as causing long-term damage in the labour market as some workers do not find alternative employment and withdraw from the labour force. Moreover, the decline in the supply of oil shale energy should be coordinated with the rise of renewable energy supply to avoid disruptive shortages. Therefore, the speed and manner in which the energy transition is handled will be crucial for its success. Reducing the use of oil shale should be gradual and managed while taking into account the need for reducing GHG emissions. Strong and long-lasting support to the affected regions, complemented by EU funds, will be key to ensuring success. In this respect, it might be warranted to maintain public ownership of Eesti Energia in order to flexibly repurpose or wind down existing capital assets and effectively reduce employment in oil shale-related activities.

Box 2.4. Key insights from previous and current industrial transitions

In Germany, the Ruhr and Saarland regions experienced a 50-year-long decline of their coal industries. Since 1960, there were many different structural and societal policy measures both at the national and state levels that aimed to regulate the transition. While the transitions eventually concluded in both regions, some policies such as public subsidies for the coal industry protected employment but prolonged the transition. Other policies insufficiently supported new and more sustainable industries. Oei, Brauers and Herpich (2020) offer a few key lessons that can help contribute to successful industrial transitions in other regions and that might be relevant to Estonia. These lessons are:

- Refrain from subsidising and supporting the declining industry as formal and informal political influence can slow the transition process.
- Take into account long-term effects and impacts beyond the local communities in decision-making. It is important to consider the directly affected workers but also the wider region, as there are indirect effects from a particular group's loss of income.
- Listen to external independent advice in addition to the incumbent industry regime. This will help facilitate the transition.
- Diversification can minimise the risk but no 'silver bullet' exists. Attracting and predicting the success of new industries can prove to be difficult. In Germany, Saarland was more successful earlier on in attracting the automotive industry although it then became too reliant on exports and on one particular industry. In contrast, the Ruhr economy transformed more slowly but is now more diversified.
- Participation enables locally adapted solutions and higher acceptance. Involving local stakeholders is important to effectively adjust, develop, and implement local strategies.
- A comprehensive across-the-board approach should be taken. An effective strategy should involve appropriate levels of government and a range of relevant stakeholders to deliver an integrated and coherent policy mix.

In the United Kingdom, the oil and gas industry has been going through a contraction due to the decline in global oil prices in recent years. Consequently, the workforce has been reduced (an estimated 120,000 jobs were lost between 2014 and 2017) while development projects have been mothballed. Furthermore, the prospects for workers have also been dimmed by a projected 5% annual decline in domestic oil and gas production after 2022.

The case of the UK oil and gas industry is relevant for the low-carbon transition (i.e. oil and gas extraction), and because it provides valuable insights on innovative web-based tools to support displaced workers to find new jobs. More specifically, the Oil & Gas Workforce Plan, prepared by UK government with the aim of supporting displaced workers and of retaining sectoral expertise, underlines how the skills of Oil and Gas workers can be applied in numerous other industries. For example, systems engineers or signal designers can be employed in the railway sector while the growing oil and gas decommissioning industry can offer opportunities to workers with expertise in mechanics. "Skills connect" is among the various web-based tools that the UK government is planning to deploy. This platform should help displaced workers to identify occupations in other sectors that require similar set of competencies and relevant technical trainings. Furthermore, an additional dedicated online platform will allow companies interested in recruiting former oil and gas industry employees to have direct access to individual profiles (Botta, 2018).

In Canada, the Government of Alberta announced in 2015 an accelerated phasing-out of coal-fired power generators and the introduction of a carbon price. This phasing-out appears to be particularly

ambitious since coal-fired utilities account for almost 55% of total provincial electricity generation employing than 3,000 people employed in the sector (OECD, 2018).

In particular, the case of Alberta represents one of the first "low-carbon just transition" strategies in place. Several initiatives accompany this structural adjustment. The revenues of the carbon levies represent the bulk of a fund to promote innovation and economic diversification. In addition, a dedicated Advisory Panel on Coal Communities has been established in order to ensure that the concerns of local communities and workers are considered. Building also on the recommendations elaborated by the Panel, numerous initiatives have been designed to support workers during the transition. These include top-ups to the employment insurance benefit, relocation grants to support geographic mobility and on-site career counselling (OECD, 2018).

Existing oil shale assets should be partly refocused on shale oil production. Oil shale has been increasingly used for liquefaction, which is not covered by the EU ETS. Liquid shale oil is essentially a synthetic crude oil, with a lower viscosity and lower sulphur content than heavy fuel oil derived from refining of conventional crudes. It is primarily used as a blending component in heating or bunker fuel oil to lower sulphur content, and as refinery feedstock. Shale oil can be exported. Producing liquid shale oil releases more than two times less CO_2 than burning oil shale for electricity. Thus, liquefaction can reduce the carbon intensity of Estonia's oil shale sector although it still creates GHG emissions when the fuel is ultimately burned. In the short to medium term, the liquefaction of oil shale can be used to gradually wind down the oil shale industry allowing its assets and workforce to adjust and to be redeployed.

Oil shale heat and power generation should also be repurposed to use renewable or fossil fuels. Existing oil shale industry infrastructure could be adapted to generate energy from renewables. The newer Auvere power plant is able to co-burn oil shale with woody biomass. Existing power plants already burn 10-20% woody biomass and could burn a higher share of woody biomass instead of oil shale to generate electricity. Alternatively, some of the oil shale power plants could be repurposed to use natural gas to generate heat or electricity, where appropriate. Natural gas is twice as efficient as oil shale and it emits less CO_2 although methane leakages can be an issue. Repurposing existing oil shale infrastructure could both increase energy efficiency and lower Estonia's GHG emissions.

The effects of the oil shale transition in Ida-Viru should be mitigated. Recent examples show that a transition away from carbon-intensive industries in countries like Germany, the UK and Canada can be successful (see Box 2.4). City, regional and national government should also be involved to coordinate a planned strategy to diversify the region's economy by attracting new companies as well as boosting the region's attractiveness by investing in education, cultural and recreational capacities. Active and passive labour market policies should financially support affected workers, re-train them and assist with finding alternative employment.

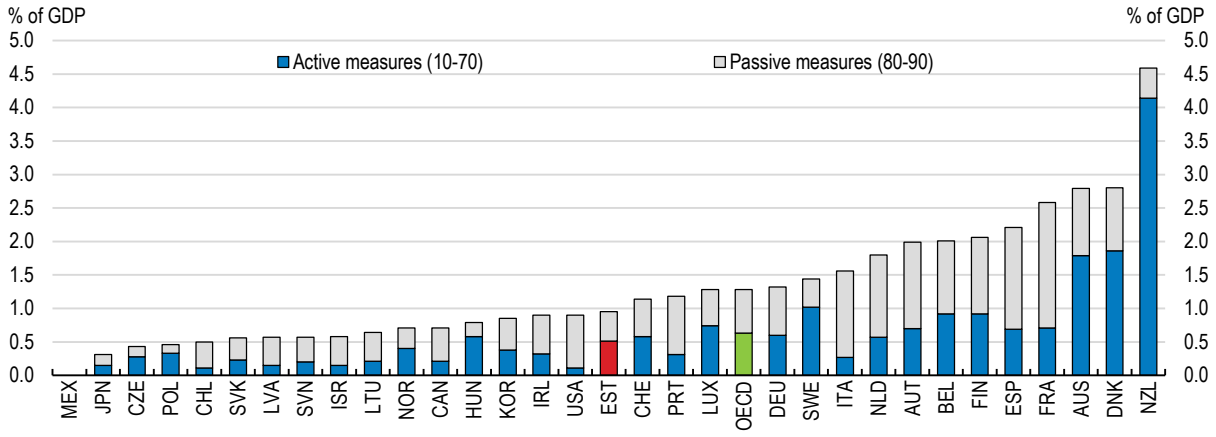
Current policies and development plans aim to support the Ida-Viru region. Estonia has an active strategy to support the affected region. At the regional level, the local government is involved with firms, business associations, educational establishments and non-governmental associations. The aim is to attract new business and investment, develop the local tourism industry, boost local green initiatives and support education in the region. At the national level, the Ministry of Finance is supporting the Ida-Viru region through the Just Transition Mechanism, which will be financed by EU funding. This is likely to alleviate some of the negative impact of the decline of the oil shale sector. However, it be will be important to ensure there is adequate capacity at the local level to withdraw and use the allocated EU funding for Just Transition projects. Furthermore, development plans should also be made beyond the current 2021-2027 EU budgeting period to show commitment to the transition in the region, particularly as experience from other countries has shown transitions can take longer than a decade.

Labour market interventions in the Ida-Viru region might need to be more extensive and supportive than current national policies. Ida-Viru's unemployment rate has been persistently higher than the national average and the economy is dominated by oil shale. Moreover, many Ida-Viru residents speak Russian and have limited knowledge of Estonian language. Half of the workers in the oil shale sector in Ida-Viru will need some form of retraining (Praxis, 2020). The decline of activity in the oil shale sector is therefore likely to result in a higher need for training and extended support. With the help of Just Transition funds, Estonia intends to offer additional support to oil shale workers with extended job-to-job support schemes. A planned pilot programme will aim to facilitate a quick return to employment following a dismissal in the oil shale sector. The support entails temporary unemployment benefits amounting to 30% of their previous monthly salary, dependent on their length of previous employment, and additional counselling and training is provided for transitioning to a new job in a new sector. Such active labour market programmes will be essential in supporting the transition in the Ida-Viru region and should be long lasting and well-funded in order to provide sufficient support.

Estonia's labour market policies, as a share of total public expenditure, are around the OECD average but this could be expanded for oil shale workers (Figure 2.10). Moreover, there remains a significant share whose skills are highly industry specific and thus not redeployable, and which then may need to be offered early retirement. Particular attention will need to be paid to income support. Finding a job might take more time than usual in the Ida-Viru region, given the large change in the region's economy, and policy should provide adequate income support. Estonia offers unemployment benefits of around 20% after 2 years, among the lowest in the OECD (Figure 2.11). However, around a third of oil shale employees are in households with one income earner suggesting there is a real risk of poverty (Praxis, 2020).

Figure 2.10. Spending on active and passive labour market policies is average

2019



Note: the latest data is for 2019.
Source: OECD Labour Market Programmes database.

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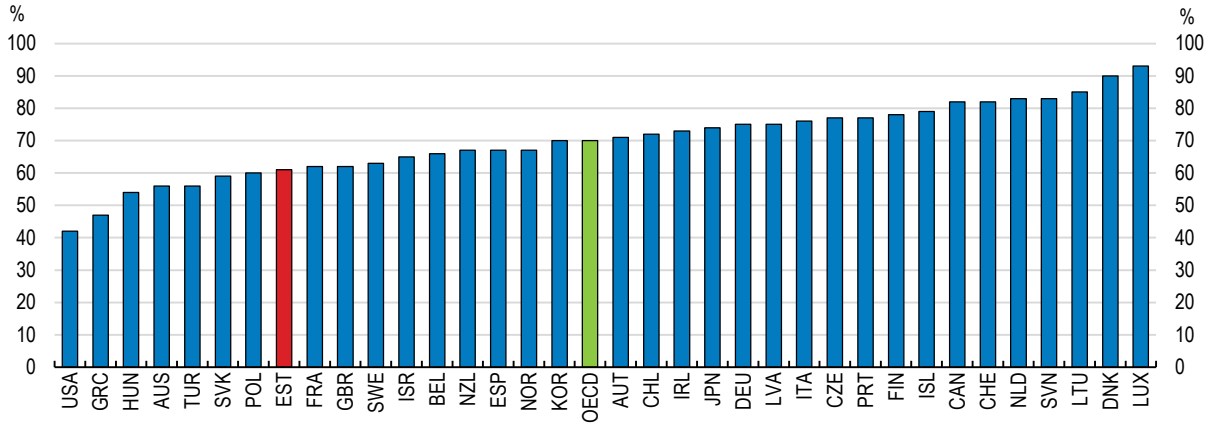
Figure 2.11. The generosity of long-term unemployment benefits could be expanded for the affected workers in the oil shale industry



Note: Data for the unemployment benefit net replacement rate is for 2020 or the latest available year. Calculation is for a couple (one earner at average wage, partner is out of work) with 2 children. Social assistance and housing benefits are included.
Source: OECD Tax-Benefit Models, www.oecd.org/els/social/workincentives.

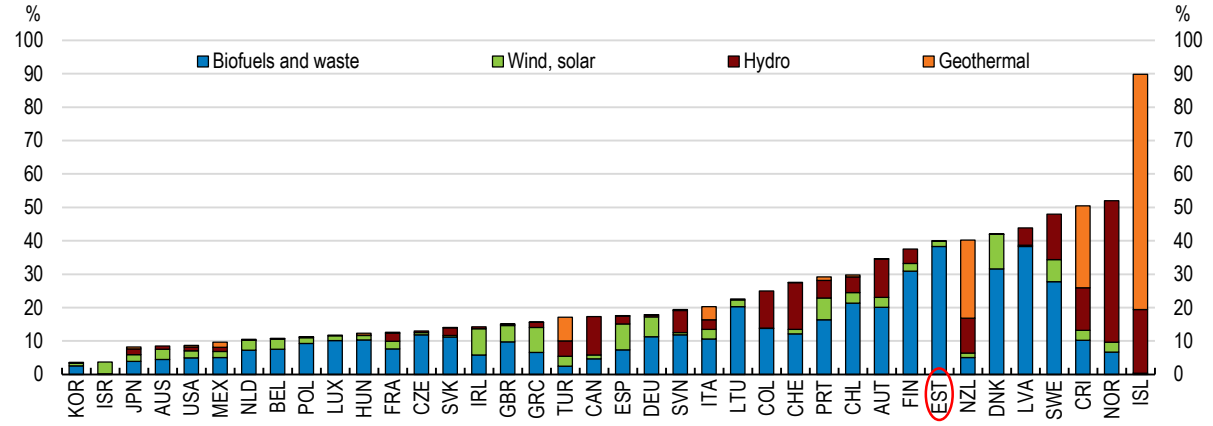
StatLink https://stat.link/si5xrl

Renewable sources of energy should be diversified and expanded further

Renewable energy in Estonia has significantly risen as a share of the energy supply and there is considerable potential for it to increase further. By 2020, the share of low-carbon energy in Estonia accounted for around 40% of all primary energy production and was the fifth highest in the OECD. This was predominantly due to the use of woody biomass. The share of wind and solar energy is low but expanding quickly (Figure 2.12). The potential for an increase in the use of woody biomass in Estonia might be limited but there is significant room for wind and solar energy to expand. Nuclear energy could also be potentially considered (see Box 2.5). This will need to be accompanied by cost effective network investment that can cope with a more variable energy supply as well as increased demand from increasing electrification. A boost to R&D will be required to support the development of necessary future decarbonisation technologies to reach net zero emissions by 2050.

Figure 2.12. Renewables account for a relatively high share of energy but are not diversified

% of total energy supply



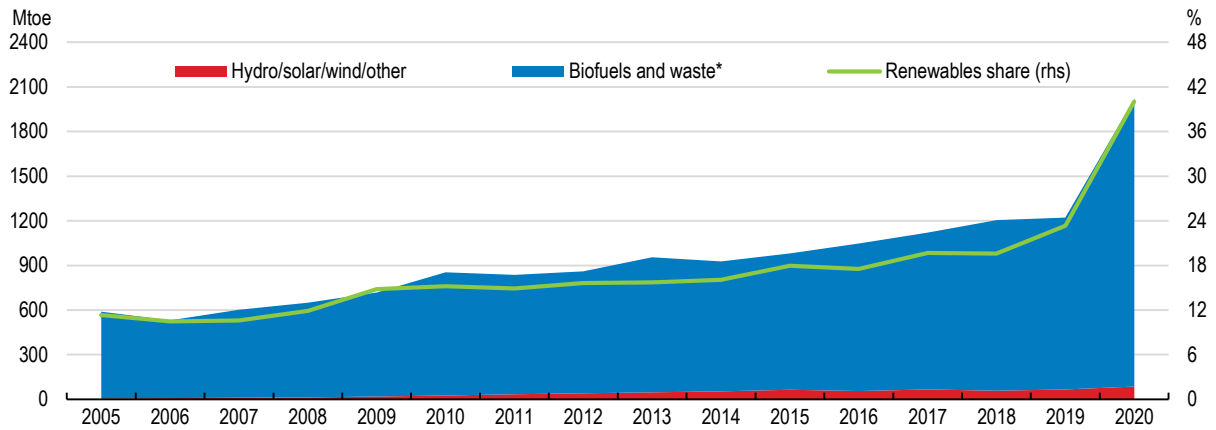
Note: Bioenergy includes solid biofuels, renewable waste, liquid biofuels and biogases. Hydro includes hydropower (excluding pumped storage), and tidal, wave and ocean energy. Data is for 2020 or latest year available.
Source: IEA World Energy Balance database.

StatLink https://stat.link/3ubjhd

Woody biomass is an important part of Estonia's energy mix

Estonia's forests represent a large resource of woody biomass. Around half of Estonia's land surface is covered in woodland amounting to 2.45 million hectares. A social agreement embedded in Estonia's forest development plans prescribes the allowed cut volumes over a ten-year period. In a moderate scenario, the sustainable volumes were estimated at 12-15 m^3 per year (Government of Estonia, 2019). Actual cut volumes in 2019 were below that at 11.25 m^3. Woody biomass can be produced from wood industry residues, from logging residues that result from regeneration and maintenance felling or directly from felling.

Figure 2.13. Bioenergy accounts for almost all the renewables in energy production



Notes: Data is for 2020. Mtoe = million tonnes of oil-equivalent.* Bioenergy includes solid primary biofuels, liquid biofuels biogases and renewable municipal waste. Total primary energy supply (TPES) includes conversion losses for bioenergy fuels in heat and power generation, which is not the case for hydro, wind, or solar.
Source: IEA World Energy Balance database.

StatLink https://stat.link/31kr47

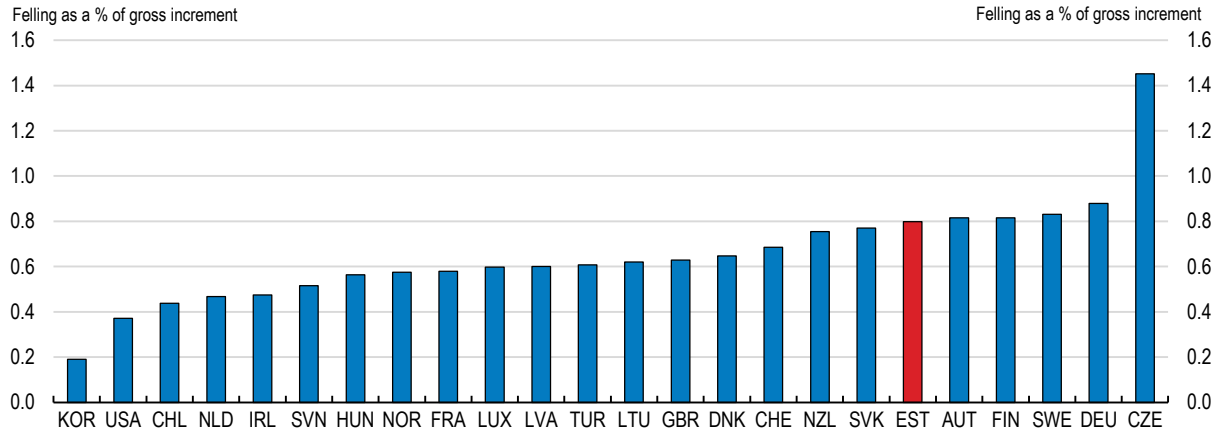
Woody biomass plays a large role in Estonia's renewable energy supply. In 2005, biomass accounted for 10% of TPES but this grew to around 40% in 2020 and accounted for a large share of renewable energy (Figure 2.13). In 2020, Estonia produced almost two Mtoe of woody biomass, most of which was exported. Domestically, biomass is mostly used for heating. For example, in 2017, 58% was used to produce heat and electricity but almost all of this was used in district heating. 37% of the total biomass supply was burned in smaller residential systems that provide heat to smaller consumers not served by district heating. Only 2.9% of biomass was used in co-firing with oil shale to directly produce electricity (IEA, 2019). Woody biomass accounts for around 40-50% of all district heating and represents a stable domestic energy source that helps ensure energy security. Estonia plans to continue using woody biomass as a renewable energy source although it envisions limited further growth in its use (Government of Estonia, 2019).

Forest resources are actively used but are managed in a sustainable framework. Estonia's forestry management is governed by Estonia's 2006 Forest Act that seeks to ensure the protection and sustainable management of the forest as an ecosystem, and forestry management is guided by national forestry development plans as well as European directives. Estonian felling rates are higher than in most OECD countries (Figure 2.14). However, they are deemed sustainable as actual cut volumes in 2019 were below the estimated sustainable range. The largest forest owners own sustainable forestry certificates. Moreover, around a quarter of total woodland has economic constraints and 14% of forests are strictly protected. Thus, the management of forestry resources and the production of woody biomass follows environmental sustainability and biodiversity conservation standards. Given the importance of woody biomass, effective

monitoring of forest use and effective data collection is important to ensure compliance with sustainability standards and to estimate accurately Estonia's forests' carbon absorption.

Figure 2.14. Forest felling rates are relatively high but are deemed sustainable

2019



Note: Latest data is for 2019.
Source: OECD, Environment database.

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Woody biomass is a renewable source of energy that helps reduce Estonia's GHG emissions. As a fuel, woody biomass can substitute fossil fuels in heating and electricity generation. The overall emissions of using woody biomass should amount to zero since they are offset by forest growth. However, the production of woodchips, briquettes and pellets causes some GHG emissions. Assuming woody biomass substitutes fossil fuels and is produced with no net-carbon emissions from land-use change, they can typically reduce GHG emissions by 52-95% in heating and by 32-93% in electricity depending on the type of fuel, its sources and processing technologies (EU, 2018). Although the lifecycle GHG emissions from biomass use are not zero, they can substantially lower emissions when they replace fossil fuels. That said, other renewables sources of energy such as wind and solar rely on zero emission fuel and can produce even lower GHG emissions over their lifecycle when compared to biomass (NREL, 2021). Furthermore, to be sustainable, the use of biomass requires careful accounting of GHG emissions from land use change. In Estonia, changes in net GHG emissions are captured in the accounting of Land Use, Land Use Change and Forestry (LULUCF) GHG emissions as per IPCC guidelines. However, these emissions have to be estimated and there are uncertainties in these calculations (JRC, 2021). Good data collection and monitoring as well as prudent use of forestry resources are essential to effective LULUCF regulation and ensuring that the use of forestry resources does not result in positive aggregate net emissions.

As the use of renewable energy grows, the composition of renewable energy should be further diversified. Woody biomass has reduced GHG emissions where it has replaced fossil fuels and, for more than a decade, it has driven Estonia's growing use of renewables (Figure 2.13). Looking ahead, there might be limits to further growth considering maximum sustainable forest cutting volumes and other economic uses of forest resources including the demand for biomass exports. To an extent, this is foreseen in Estonia's 2030 National Energy and Climate Plan. Moreover, renewable sources of energy such as wind and solar rely on zero carbon fuel and can achieve lower lifecycle GHG emissions. This will be important in helping Estonia reach net zero by 2050 and, to this end, the renewable energy mix should be diversified. In the medium-term, to lower GHG emissions further, electricity generated by wind and solar could even replace

biomass in heating, where appropriate. Small or large-scale heat pumps could be used to provide heating to households where this is practical and appropriate. Some of these changes are already underway in Estonia. Households have increasingly been purchasing heat pumps and in 2018 there were 28.4 heat pumps per 100 households, one of the highest rates in Europe (EHPA, 2021). District heating that relies on biomass could be replaced in the medium-term with large capacity electric heat pumps, where appropriate. These heat pumps can act both as a store of energy and be a flexible source of electricity demand (Heat Pump Centre, 2019). In Sweden, district heating already relies on large capacity heat pumps to a significant extent and heat pumps also provide electricity, making up almost ¾ of total energy consumed by households (SEI, 2017).

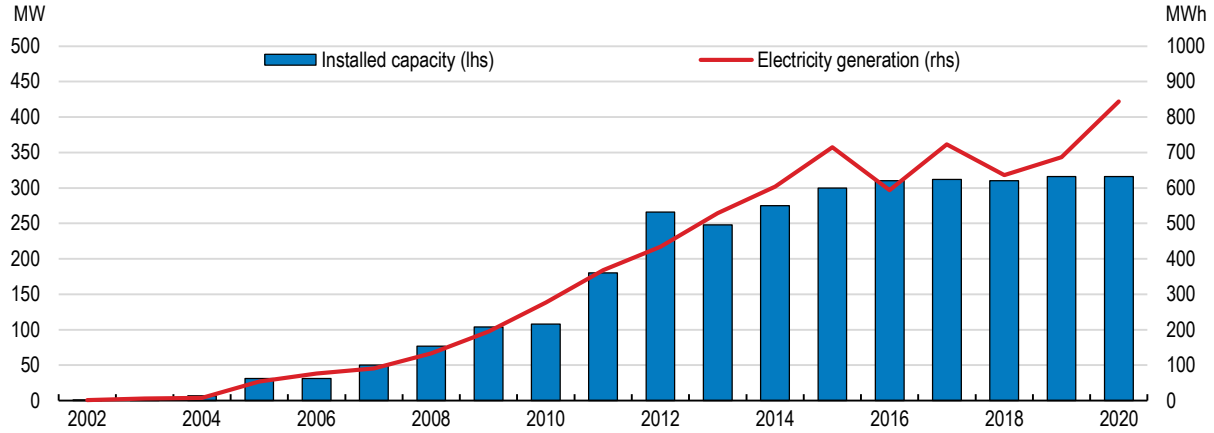
There is considerable potential for wind energy to grow

So far, wind energy has accounted for a small share of Estonia's renewable energy but it has considerable potential to grow. In 2019, the combined share of wind in Estonia's TPES was around 5% although its share in electricity production has risen from 9% in 2019 to 15% in 2020. The Baltic Sea has a large potential for wind generation up to an estimated 93GW. That could provide around a third of all electricity in Estonia (Elering, 2020). More specifically, Estonia has an estimated potential of 7GW of offshore wind and additional onshore capacity, there is plenty of scope to increase the power generated from wind. There are specific plans for projects representing total capacity of 2.5GW with more in the pipeline (Invest in Estonia, 2021a). Estonia has also signed a memorandum of understanding with Latvia to cooperate on a 1GW project in the Gulf of Riga. Another memorandum of understanding has been signed between stated owned Enefit and the Danish wind developer Ørsted, which should facilitate the development of the wind industry in Estonia (Invest in Estonia, 2021b).

The previous feed-in premium support scheme helped drive growth in wind power in the past, which reached 17% of electricity generation in 2020 but new capacity has stalled around 2015 levels. Furthermore, Estonia's transition away from a time-limited feed-in subsidy to competitive auctions should have encouraged greater private sector investment and accelerated wind power deployment as wind power is already one of the lowest cost technologies and the cost of both onshore and offshore wind projects continue to decline (IEA, 2018b). Nonetheless, wind power deployment in Estonia has slowed significantly with capacity in 2020 similar to 2015 levels (Figure 2.15).

Several restrictions have limited the growth of wind power. National security concerns have led the Ministry of Defence to object to new installations since wind turbines can affect the ability of radar to detect and track airplanes (IEA, 2019). For example, since 2008 the Ministry of Defence have objected to over 500MW of planned or permitted wind projects (EWPA, 2019) and defence considerations may partly explain the limited growth in new capacity since 2016 (EWPA, 2018a and 2018b). National defence concerns are now been addressed through investment in additional radars but possible environmental and spatial concerns can still hamper wind power development. Estonia has been developing a marine spatial development plan since 2017 to address such concerns and to engage with stakeholders and to better define offshore areas for wind power development. The plan is currently being finalised (EU MSP Platform, 2021).

Figure 2.15. Wind generation has increased although wind capacity has stalled since 2015



Note: MWh = Megawatt hour.
Source: IEA Renewable Information database and IRENA (International Renewable Energy Agency). Latest data is for 2020.

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Estonia should provide a more certain regulatory environment to stimulate wind power development. To this end, the Environment Agency has developed a highly detailed ecological map of Estonia that will facilitate the planning of on-shore wind parks to minimise their impact on the environment such as possible effects on birds' migratory patterns. Permits based on such maps should help alleviate any local concerns and provide more certainty for investors. For offshore wind, where there is greater potential, the maritime spatial plan is still being developed and should be expedited in order to encourage investment. It will be important that the finalised plans minimise potential obstacles to wind power development as well as incentivise local communities through sharing some of the benefits of new wind parks.

Solar energy can be complementary to wind energy and should also be expanded

Solar energy accounts for a small share of Estonia's renewable energy mix but it has been rapidly growing. There is room to expand it further. In 2016, there was little electricity generation from solar energy but by 2019, solar energy accounted for 1% of all electricity generation and amounted to 73.5GWh. In 2020, solar energy production expanded threefold to 245GWh and its share in electricity production more than doubled. Solar energy is complementary to wind energy and would be a useful part of the energy mix. While Estonia's ambitions in this field are relatively small and its 2020 national targets have already been exceeded, there is potential for solar energy to grow and expand further (IEA, 2019).

Estonia should encourage a wider take up of residential solar energy while attracting more investment in large-scale solar power plants. Previous policies seem to have been successful in encouraging the installation of new solar energy capacity. The feed-in premium scheme for larger systems (51kW to 1MW) that ended in 2018 and the scheme for smaller systems (<50kW) that ended in 2020 have driven a lot of the growth in solar energy production. This should be continued. Residential solar energy investment should continue to be supported by a guaranteed feed-in premium for smaller systems. This would also make financing easier to obtain and encourage other companies to enter the market. Companies like Eesti Energia are planning to increase their activity in this area by offering installation services and financing support. This would make it particularly attractive to households and firms located in more remote regions where there are fewer energy options. Most of Estonia's landmass is conducive to capturing solar energy so large-scale solar PV parks are also possible. Larger installations should participate in energy auctions. Unfortunately, the siting and permitting process can be slowed by environmental and local concerns, similar to many of issues faced by wind parks, so implementing a spatial plan to facilitate the installation of solar PV panels could be useful.

The energy infrastructure will need to be flexible and robust in a low-carbon economy

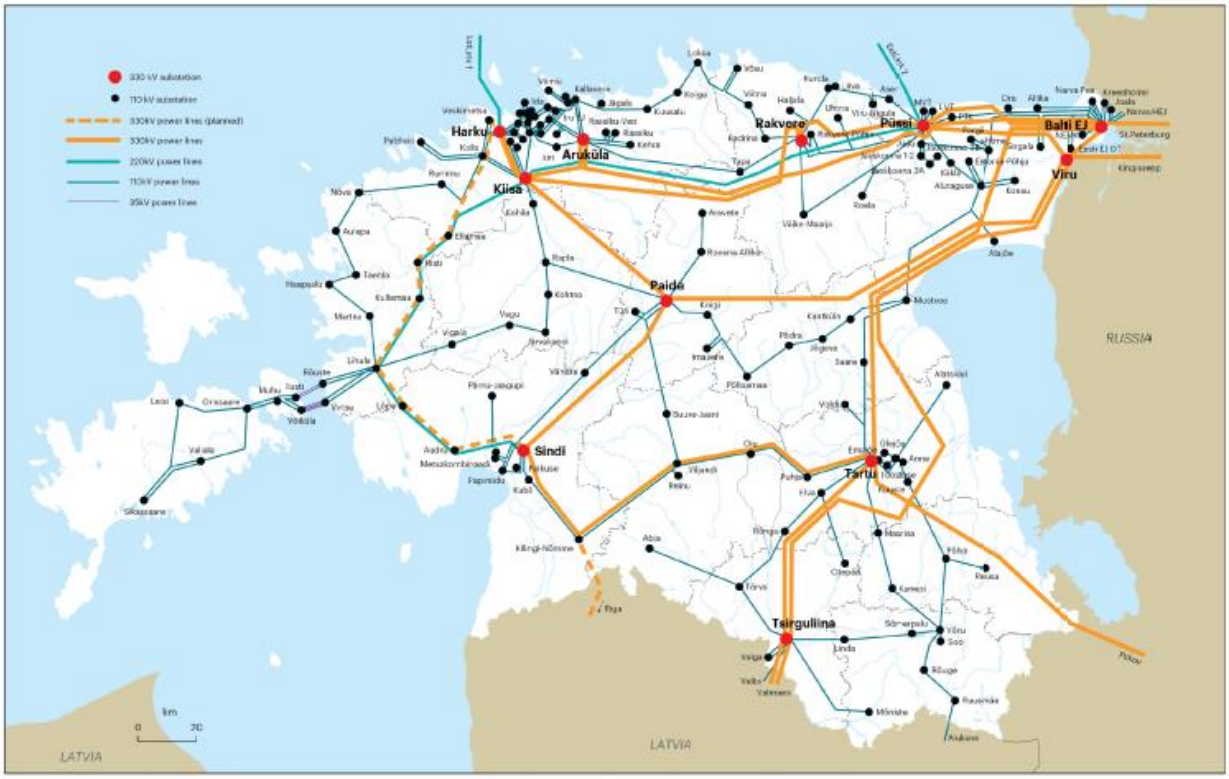
The energy infrastructure and network will be crucial to ensuring a successful transition towards electrification of energy demand. This is because to move to a low-carbon economy, based on current technologies, Estonia will need to electrify as much as possible to take advantage of renewable energy such as wind and solar energy. This means its electricity network will become larger and more prominent in the economy. The future energy network will need to be flexible and robust to support a more variable and diverse energy mix as well as a more electrified economy. It will need to be transparent and encourage competition among companies but it will also need to be resilient to cyber threats.

Estonia's electricity and gas grids are well connected and flexible. Estonia's electricity network is connected to Finland through two undersea cables in the Gulf of Finland, Estlink 1 and 2, together accounting for around 1000MW of capacity. Estonia is also connected to Latvia and it completed a third interconnecting line at the end of 2020. Currently, Estonia's electricity grid is synchronised with Russia although Estonia plans to switch to the continental European grid from 2025 onwards. Estonia regularly trades electricity, mostly by importing from Finland and exporting to Latvia. Its electricity grid is highly regionally integrated with an interconnection level of 63%, substantially higher than the 10% 2020 EU target (EC, 2017). The Baltic electricity system is integrated with the Nordic countries' power exchange, Nord Pool. Its natural gas network is connected to Latvia and Russia as well as to Finland through the Balticonnector. Estonia has access to the natural gas storage facilities in Latvia as well as the LNG terminal in Klaipeda, Lithuania. As such, its gas grid is also well connected and flexible.

The shift away from fossil fuels will result in an increase in electrification that can take advantage of the renewable energy produced. Developing offshore and onshore wind parks as well as solar energy will also require additional infrastructure as well as strengthening the electricity grid. For example, all offshore wind parks will require an undersea cable connection to the main grid, which will need to be built. Furthermore, the Estonian electricity grid will need to be upgraded in the western regions to deal with increased electricity production (Figure 2.16). In this regard, cost effective investment plans by Elering, the transmission service operator (TSO), and participation in the Baltic Sea Network and the Baltic Offshore Grid Initiative, will be key to upgrading the energy network for the low-carbon transition.

Balancing power and regional cooperation will also become increasingly important. Balancing power exists in the electricity network to provide a buffer for temporary and small but unexpected increases in demand. In Estonia, the 250MW Kiisa emergency power plant provides emergency power in case of a shortfall. However, in an energy system dominated by renewables, energy production will be more variable and less predictable. This might require greater grid stabilisation and balancing power. In 2018, the three Baltic TSOs launched a common Baltic balancing market for Estonia, Latvia and Lithuania. All three Baltic TSOs are also members of the Manually Activated Reserves Initiative (MARI), an initiative by 19 European TSOs to create a European platform for the exchange of balancing energy as soon as possible (ENTSO-E, 2019). Regional cooperation to ensure sufficient electricity generation and to avoid volatility in the network will be paramount in ensuring a stable and secure energy supply.

Figure 2.16. Electricity infrastructure is less developed in western Estonia



This map is 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.

Source: IEA Estonia 2019 Review.

Box 2.5. A case for nuclear energy?

In a low-carbon world, there will still be demand for stable power generation. Nuclear energy can provide stable and zero-carbon electricity as fossil fuel based power plants retire and renewables take over. Estonia does not necessarily need to build a nuclear power plant since it can import nuclear-powered electricity from Finland. But, to the extent that energy independence is important to Estonia, developing its own nuclear power capacity could provide a possible and cost-competitive path to a low-carbon economy either during the transition or as part of the final energy mix. Given that two thirds of oil shale capacity will be retiring by 2030 it might be an opportune time to consider developing nuclear power capacity.

Nuclear technology now allows for small modular reactors (SMRs). There are advantages to these reactors as they are deemed to be safer, can be installed in smaller capacities and so might fit smaller countries well, and can be installed closer to cities. The disadvantages are that the technology is still experimental and, although they are supposed to be cheaper, previous construction of nuclear power plants has often exceeded estimated costs. Furthermore, the long-term safe storage of nuclear waste is an important environmental consideration. Nonetheless, SMRs continue to attract interest in both established nuclear countries, such as Canada and the United States, and in newcomer countries in Europe, the Middle East, Africa and Southeast Asia. R&D and investment in SMRs and other advanced reactors is being encouraged through public-private partnerships (IEA, 2021).

Neighbouring Finland has been investing in nuclear energy as part of its net zero strategy. In mid-2019, the Finnish government announced that it will be supporting operating lifetime extensions for its existing reactors and that it will be commissioning two nuclear power reactors to increase electricity generation. Finland is exploring the potential use of SMRs for both district heating and electricity generation. Finland has also secured deep underground disposal sites for additional nuclear waste.

Estonia is considering the use of nuclear energy. A working group on nuclear energy, consisting of different government ministries and led by the environment minister, has been formed in 2020 to analyse the possibility of nuclear energy in Estonia and how it can support the country's energy security and climate neutrality goals. The working group is expected to present its conclusions and report by September 2022 at the latest. In the private sector, Estonia is already planning to have its first nuclear reactor, an SMR, ready within about ten years. It is set to be located some 100 kilometres east of Tallinn (Vanttinen, 2021). Estonian Fermi Energia is in charge of the project while Fortum, a Finnish state-owned energy company, is consulting on the project. Fermi Energia has plans to develop up to four reactors delivering between 600-1200MW of capacity. This would largely replace the retired oil shale power plants. Nonetheless, the SMR technology will only be ready for deployment by the late 2020s and could start generating electricity from 2035 onwards.

Regional cooperation in the Baltic or Nordic countries to further develop nuclear capacity could be an alternative option. Estonia could potentially collaborate with Finland. Still, any new projects would take a long time to develop and are also likely to only start generating power from the mid-2030s.

It is worth emphasising that nuclear power is a source of zero-carbon electricity but it is not a sustainable and environmentally neutral source of energy. Given current available technology, it can play a role in a country's energy mix by providing a stable source of energy. It cannot, however, be used to smooth out fluctuations in energy production as nuclear energy production is not easily adjustable. As large-scale cost-effective energy storage is developed, the need for nuclear power may be obviated in the future. In the meantime, though, it could help in the transition to a low-carbon economy.

Research and development will be key to developing better low-carbon technologies

Technological innovation will be key to reducing GHG emissions. The current set of available technologies can effectively be used to reduce GHG emissions and meet climate targets by 2030. But getting to net zero by 2050 will require technologies that are either nascent or do not yet exist (IEA, 2021). For example, zero carbon technologies such as solar and wind power can technically replace fossil fuel based heat and power generation. But their intermittency and the inability to store large amounts of energy makes it difficult to completely reduce the economy's reliance on fossil fuels. Technologies to reduce emissions not just through energy supply but also through energy demand, such as energy efficiency in transport or buildings, will be also important. Expanding research and development (R&D) to explore solutions to these problems, for example, and supporting the deployment of new technologies will be essential to successfully transitioning to a low-carbon economy.

Estonia is committed to a knowledge-based economy. R&D in Estonia has been guided by the Estonian Research and Development and Innovation Strategy 2014-20, the Estonian Entrepreneurship Growth Strategy 2014-20 and, to a smaller extent, the Estonian Smart Specialisation Strategy. In 2021, these elements have been merged into a new joint development plan for research and development, innovation and entrepreneurship for 2021-2035. Some of the key institutions driving innovation in Estonia are higher education and research institutions and the Estonian Research Council, which as part of the Ministry of Education and Research, fund the public research and public collaboration projects with the private sector. The European Commission also supports Estonian research by financing projects on climate-related issues. Estonia provides financing to the Baltic-Nordic energy research programme. Within the Ministry of Economic Affairs and Communication, Enterprise Estonia supports foreign direct investment, company start-ups and innovation while KredEx provides finance to companies to support innovation. The Research and Development Council, chaired by the Prime Minister and composed of several ministries and non-government experts, advises the government on research and development strategy. Of course, Estonia's private sector also contributes to innovation through its dynamic start-up scene and through R&D investment by existing firms.

Estonia's public R&D investment on environment-related issues, however, is relatively low and should be substantially increased. Total R&D spending in Estonia was around 1% of GDP in 2019, slightly below the OECD average. Within that, public spending on R&D amounted to 0.17% of GDP (Figure 2.17). Furthermore, the composition of public R&D spending shows that only a third went to environmental issues such as energy efficiency and renewable sources (Figure 2.18). This was in the lower quartile of OECD countries and below the top performing countries such as Finland or Denmark that spend 70-80% of public funds on environment-related R&D. Other indicators also suggest R&D on environment-related issues might be too low. The number R&D personnel and researchers and the amount of eco-innovation related academic publications is below the EU average. Estonia's science output is, on average, high quality and there are more areas of scientific excellence than might be expected given Estonia's size. However, the research strategy has previously shown a lack of clarity on the relative importance of priorities and coordination at the thematic level could be improved (EC, 2020b). To support the transition to a low-carbon economy, Estonia should further develop its innovation capacity by increasing overall public R&D funding and also by boosting the amount from national research funding to complement EU funds. Estonia should also shift the focus of its funding and, more broadly, innovation efforts towards environment-related issues. This will help underpin a low-carbon technology innovation.

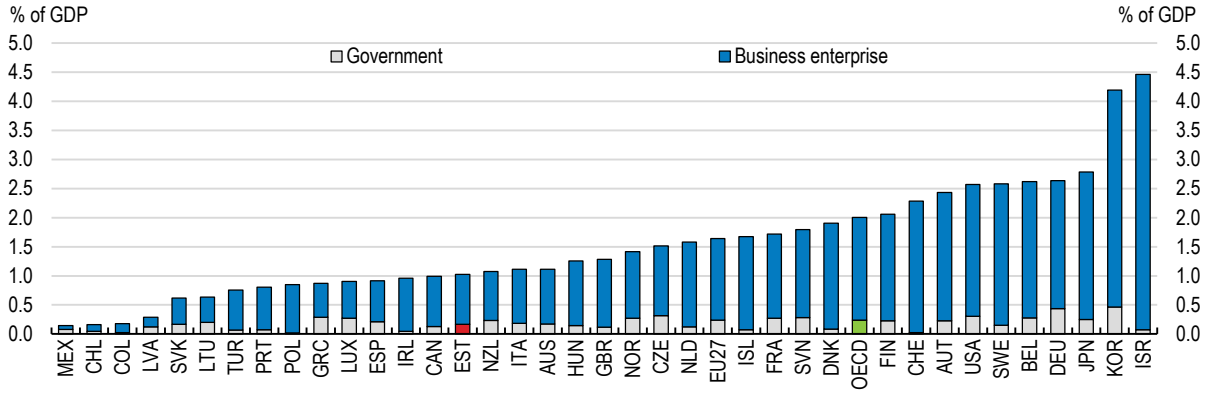
Private R&D investment and environment-related innovation is also relatively low and limited. Estonia's corporate tax system does not tax retained profits and this supports investment, including R&D. Estonia has a dynamic start-up scene and start-ups focused on low-carbon technologies, so called '*cleantech*', have received more funding than the EU average. But environment-related innovation still seems limited in many other dimensions. Estonian businesses lag behind most EU countries in environmentally-related patents and innovation (EC, 2020a). This might be due to a low share of large firms and a large share of

micro firms (EC, 2019). Only 0.3% of all firms invested in any R&D although this may be underreported (EC, 2020a). Overall, Estonia's private sector R&D was 0.9% in 2019 and lower than the OECD average.

Policies to increase private sector R&D should support the development of market-based low-carbon goods and services. Higher education institutions should increase their focus on environment-related research. On research, to translate public R&D into private sector applications, Estonia should strengthen the links between universities and the private sector by strengthening the role of technology transfer offices with a focus on environment-related innovation. Furthermore, Enterprise Estonia should focus more on R&D and environment-related R&D when attracting foreign investment.

Estonia should choose carefully the areas in which it has the competitive advantage and where to focus its R&D and innovation efforts. For example, in the National Environment and Climate Plan 2030, Estonia seeks to be at the forefront of next generation of renewable technologies, storage solutions, smart grid and home solutions, smart cities, building neutrality, clean transport, carbon capture and storage (CCS) and nuclear energy under the Horizon 2020 programme (the EU's research, innovation and competitiveness dimension). Finally, it will be important for Estonia's R&D sector to cooperate strategically within the EU on topics of mutual interest to maximise the return on its research.

Figure 2.17. R&D spending is relatively low and could be increased



Note: Data is for 2020 or latest available.
Source: OECD MSTI database.

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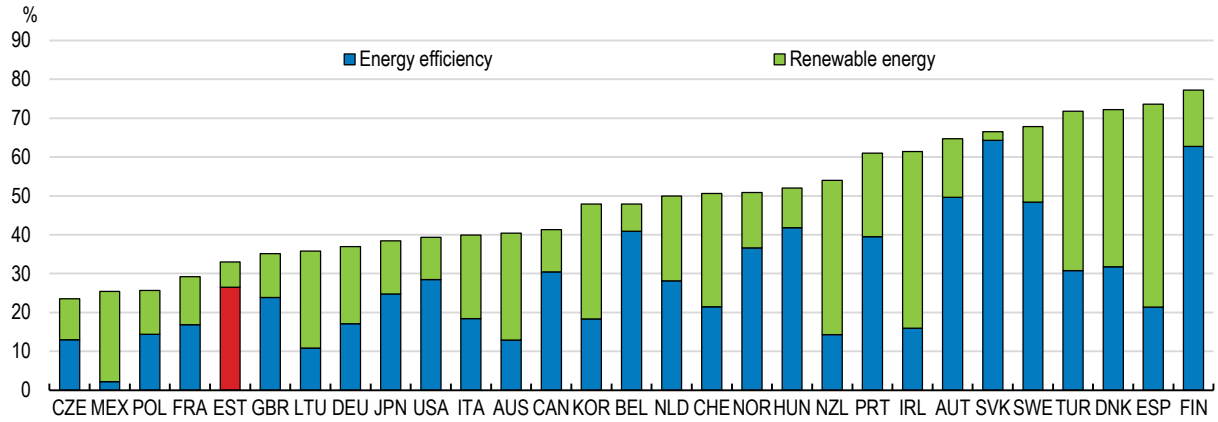
Figure 2.18. Public R&D spending on environment-related issues is among the lowest in the OECD

2020



Note: Data is for 2020 or latest available.
Source: OECD MSTI database.

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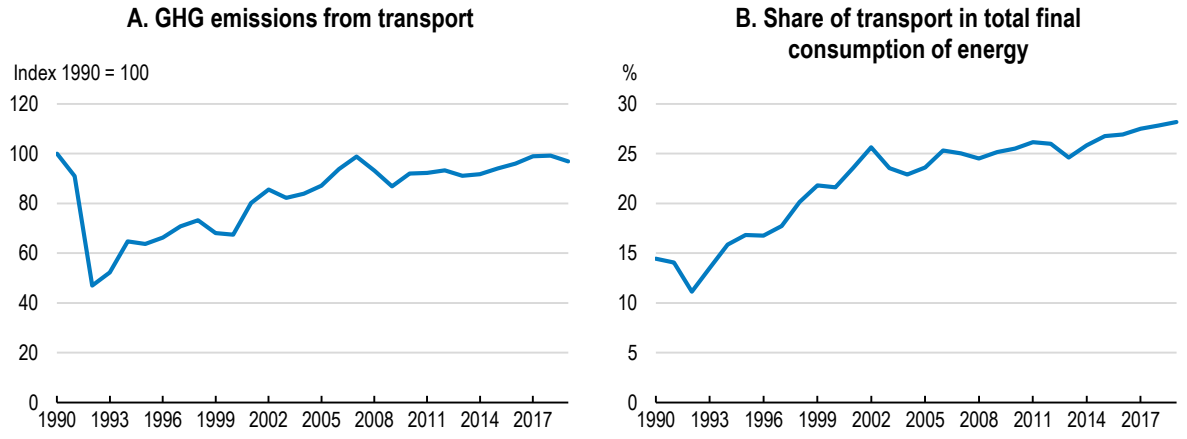
Driving transport sector emissions down

Transport sector emissions have grown since the early 1990s

GHG emissions in transport have steadily increased since 1992. The growth in the demand for road transport has led to a rise in overall transport sector emissions. Car intensity is particularly high in Estonia given its level of GDP. But there is considerable scope to reduce emissions from transport by increasing vehicle efficiency, improving transport infrastructure and using environmental taxation and subsidies to encourage the transition to low-carbon transport.

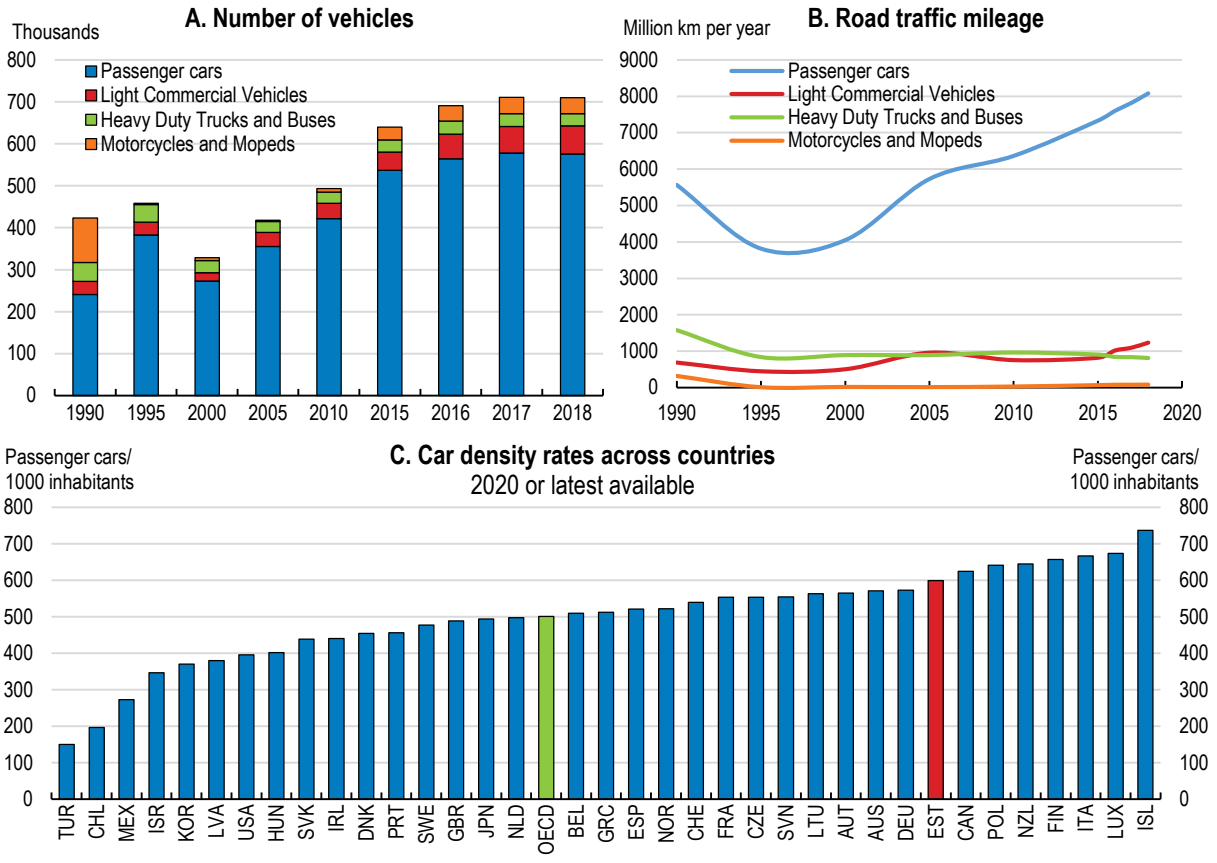
Since the early 1990s, GHG emissions kept steadily increasing (Figure 2.19). Transport emissions have doubled since 1992 and stood at around 2,400 tonnes of CO2-equivalent in 2019. They are now almost back to their 1990 levels. While transport emissions have increased by 20% in the EU and by 30% for the average OECD country since 1992, in Estonia they have doubled. Overall, emissions from transport account for around 6.5% of all GHG emissions. In terms of total final consumption of energy, transport accounted for 28% of all domestically consumed energy. Almost all of that energy came from refined oil, which was imported.

Figure 2.19. GHG emissions from transport have been rising since 1992



Source: OECD Greenhouse Gas Emissions database; and IEA World energy balance database. Latest data is for 2019.

Figure 2.20. Car use is intensive



Source: UNFCCC (2020); and OECD ITF database.

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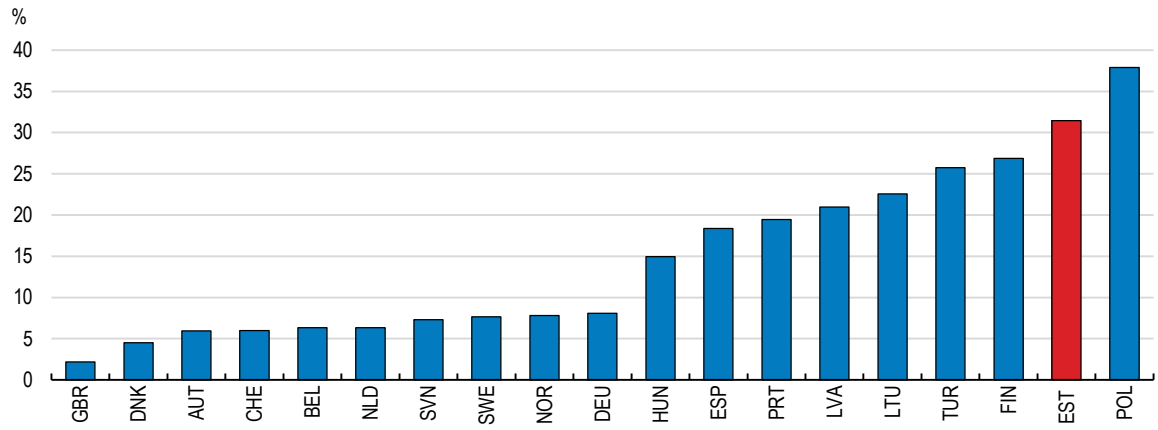
Figure 2.21. Estonia's passenger car fleet is relatively old

2019



Note: Data is 2019 or latest available. Old passenger cars are defined as those 20 years or older.
Source: Eurostat.

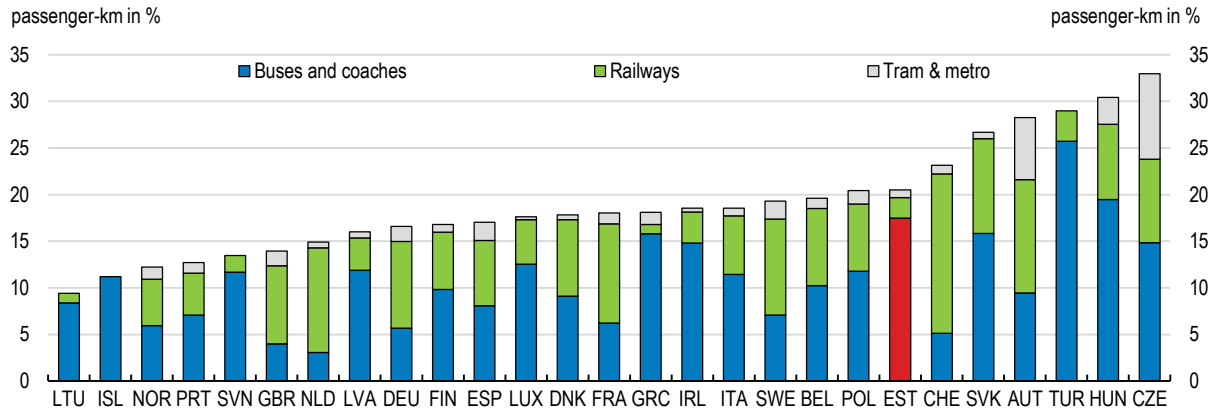
StatLink https://stat.link/67a90m

The increase in transport emissions has been driven by road transport. In Estonia, 98% of emissions in the transport sector arise from road transport. The number of vehicles, especially passenger cars, has been increasing over time (Figure 2.20 Panel A). Moreover, passenger cars accounted for most of the increase in the number of kilometres driven (Figure 2.20 Panel B). Although Estonia is less densely populated than the average OECD country, the population has not generally become more dispersed since 1990 (World Bank WDI, 2021). The increase in the number of cars is likely due to a strong income growth over the past three decades. Still, the prevalence of cars in the population in 2018 was similar to Germany and Australia, countries with higher living standards than Estonia (Figure 2.20 Panel C). However, Estonia's passenger car stock is particularly fuel inefficient when compared to other European countries. Car engines tend to be the largest in the EU (IEA, 2019). But Estonia's cars also tend to be the oldest (Figure 2.21). In 2019, around a third of Estonia's passenger cars were 20 years old or older (Eurostat, 2020). Together, more cars and more miles in fuel inefficient cars has led to an increase in transport emissions.

Emissions from rail transport have fallen over time but growing use of public transport has helped push up emissions. The volume of freight transported by rail more than halved between 2008 and 2018 contributing to falling emissions from rail transport, although part of it was transferred to road freight which has pushed up transport emissions due to higher carbon intensity of road freight (UNECE, 2020). At the same time, passenger traffic on both rail and roads increased leading to higher emissions. The volume of passenger traffic on trains rose by almost 60% between 2010 and 2019 but rail represents a relatively small share of Estonia's public transport. Most of Estonia's public transport is served by buses (Figure 2.22). Bus passenger traffic also grew, expanding by a quarter between 2008 and 2019. This was almost entirely due to growth in international bus travel while domestic bus traffic was broadly stable over the same period.

Figure 2.22. Public transport is important for mobility and is mostly focused on buses

2019



Note: Latest data is for 2019.
Source: European Commission.

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Transport emissions can be driven down

There is significant potential to reduce emissions in the transport sector. The transport sector is not currently covered by the EU ETS. Estonia's ambition is to reduce emissions by 30% by 2030 compared to 2005 while not exceeding total vehicle fuel consumption levels recorded in 2012 (MEAC, 2021). Since emissions have been rising, this could prove a challenge. Nonetheless, there is room to use targeted environmental taxation, subsidies and regulations to increase efficiency, improve infrastructure, and expand public transport in order to reduce emissions.

Estonia's current set of policies has partly addressed the need to reduce transport sector emissions. Estonia collects revenue from environment-related taxation (8.3% of total tax revenue in 2018), higher than the EU average of 6.14% (EC, 2019). However, most of the revenue comes from a narrow base such as an excise tax on fuels (Figure 2.23). Environment-related transport taxes, excluding transport fuel taxes, were just 0.2% in 2020, the lowest in the EU. Currently, Estonia does not have a carbon-based tax on transport fuels and there is no vehicle registration tax or any other tax based on carbon emissions of vehicles. Since 2019, heavy goods vehicles pay a toll to use roads. In addition, Estonia does not levy any special congestion charges in its cities or counties. Estonia had previously limited subsidy schemes to boost EV adoption and has built a functioning nation-wide charging network. Some of the main barriers to improving energy efficiency in the transport sector are a lack of comprehensive fiscal measures to support higher fuel efficiency and to incentivise a modal shift, that is, a move from private car use to public transport. There has also been a lack of long-term funding schemes for public transport, cycling infrastructure and pedestrian zones (IEA, 2019).

There are ambitions to expand the set of environmental policies to reduce transport sector emissions. In its National Development Plan for the Energy Sector 2030, Estonia aims to reduce transport sector emissions though several measures. These policies would encompass car taxation to encourage adoption of more efficient cars including EVs. It also entails expanding public transport to encourage a modal shift by encouraging greater use public transport to travel to and from work (MEAC, 2017a). The measures described in the strategy, if implemented, could reduce transport energy by up to 40% (IEA, 2019). The latest Transport and Mobility 2021-2035 Masterplan goes further in its ambition to increase the share of population travelling to work by public transport, bicycle or foot from 38% to 55% (MEAC, 2021). It aims to

improve mobility through more convenient, faster and more accessible public transport and better infrastructure. This entails improving urban and intercity connectivity. Higher use of public transport and rail electrification should also reduce emissions.

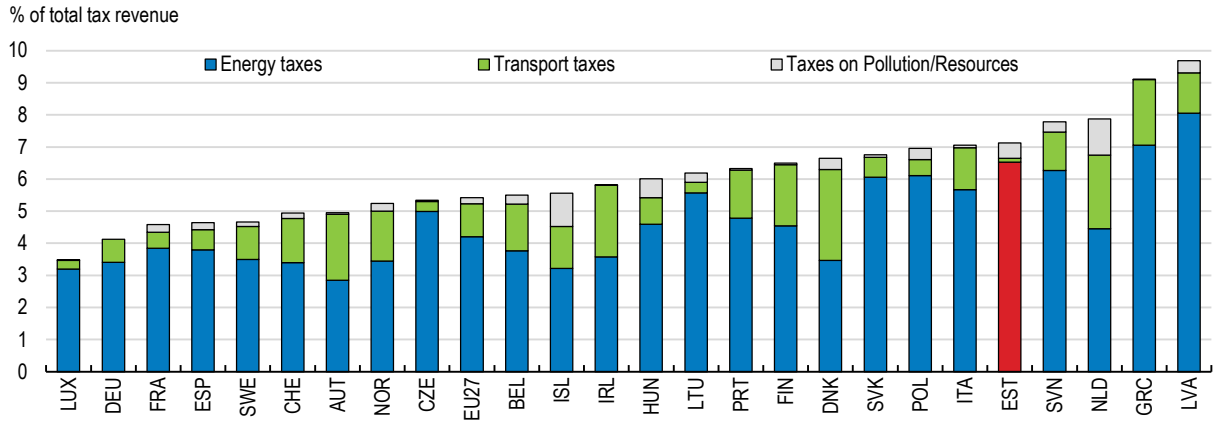
To complement its transport strategy, Estonia could benefit from carbon-linked taxes in the transport sector. Excise taxes on fuel such as petrol and diesel are high relative to average incomes. Given Estonia's car stock is older and relatively less efficient, these excise taxes should encourage higher efficiency, which can reduce emissions as households upgrade to newer and less polluting vehicles (OECD, 2019b). They can be an efficient policy for encouraging lower emissions but they should be directly linked to emissions. Nonetheless, fuel taxes do not necessarily account for other externalities such as congestion, accidents, wear and tear, and noise. An alternative tax to fuel taxes, based on a fitted device in the vehicle, could charge drivers based on how much and where they drive. While there may be higher operating costs, the advantage of such taxes is greater flexibility to optimise car use across Estonia. For example, high rates could be charged in cities where there are also congestion concerns and on routes where public modes of transport exist. In contrast, lower rates could be set in rural regions and areas where there are few alternative transport modes. Such a tax could allow for charges to depend on geolocation and also on the time of day or week. Such a system could also allow for big data collection, which would better inform public transport policy and infrastructure investment. In addition, this could potentially allow for more efficiently priced car insurance. Privacy concerns are important but user data would be protected within Estonia's world-leading X-Road infrastructure. Participation could be optional to address any additional privacy concerns. Cars without the device would be charged a flat rate based on an estimated average unfitted car profile.

A carbon-based transport tax should be complemented by means-tested incentives, particularly for most affected groups, to upgrade to EVs and more fuel-efficient vehicles as well as to scrap old cars. The revenues from a transport tax could be used to subsidise new EV purchases, up to a limit, in order to accelerate the transition to greener transport. Among EU countries, Estonia has the lowest share of registered electric and hybrid vehicles (Figure 2.24). Currently, Estonia has reintroduced subsidies to EV owners who commit to driving at least 80,000km over 4-year period (Broughel and Viiding, 2021). This scheme should be widened to encourage a greater number of EV sales although subsidies do not necessarily need to be as generous as before given the cost of EVs has significantly declined. The longevity of such schemes will be important until EV use becomes more widespread. In addition, a scrappage bonus could also be paid to those scrapping their old cars when purchasing newer and more fuel-efficient vehicles.

Regulation can also help reduce transport emissions. Setting a minimum emission standard could remove the most polluting vehicles and encourage drivers to upgrade to cleaner vehicles. Adopting and communicating a long-term timetable that sets out how minimum standards will be changing over the next few decades can provide a powerful signal to the transport sector. For example, announcing a phasing out of internal combustion engine vehicles by a specific date can show commitment to a reduction in emissions. In the EU, Austria, Belgium, Denmark, Greece, Ireland, Lithuania, Luxembourg, Malta and Netherlands have requested the European Commission to support a specific date for an EU-wide phase-out of the sale of new petrol and diesel passenger light duty vehicles (IEA, 2021). Similarly, the public sector can lead by example through reducing emissions in its use of zero-carbon official vehicles and by decarbonising public transport. In that respect, Estonia is heading in the right direction with its planned use of biomethane in buses.

Figure 2.23. Environment-related tax revenues are high but mostly come from transport

2020

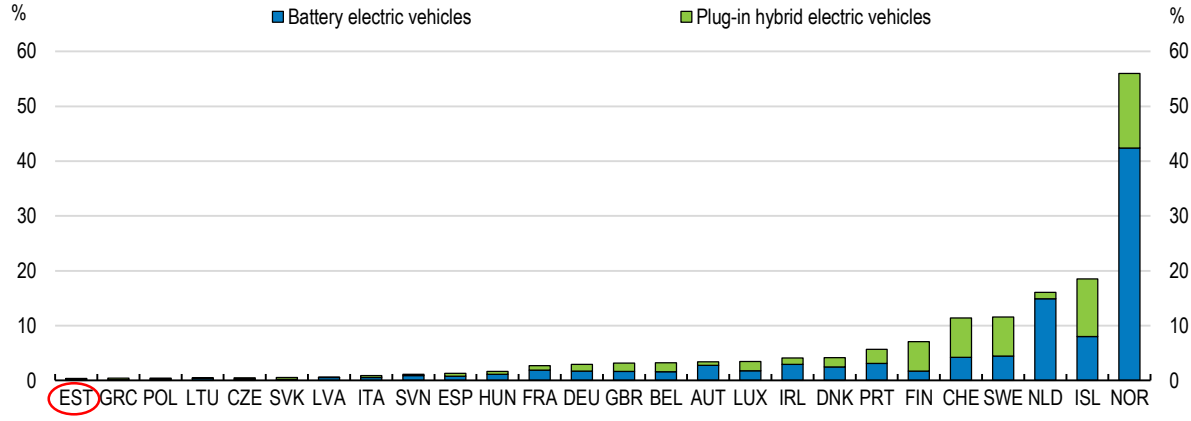


Note: latest data is for 2020.
Source: Eurostat Environmental Tax Revenues database.

StatLink https://stat.link/d19c42

Figure 2.24. The share of registered electric and hybrid vehicles is very low

2019



Note: latest data is for 2019.
Source: European Environment Agency.

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The public sector should invest more in cost effective electric charging infrastructure. In the past, range anxiety, lack of charging infrastructure and high upfront costs were the main factors that impeded EV adoption (Rezvani et al., 2015). To address these issues, Estonia developed the world's first nation-wide fast-charging network for EVs in the early 2010s. However, alongside subsidies, the network insufficiently encouraged EV use as prevailing range anxiety and the high cost of owning EVs prevented a significant spread of EVs (see Box 2.6). But now ranges have increased to 300-400km even though they can be 20% lower in winter conditions (NAF, 2020). This should be adequate for Estonia where the maximum distance east to west is 450km and north to south is 240km. The cost of EVs has also decreased substantially since 2010, increasing their affordability, while the range of EVs on offer has expanded. To complement carbon-based transport taxation and EV subsidies, policies should invest more in the charging infrastructure. The

existing charging network has been auctioned off to Elektrilevi, Estonia's largest distribution grid operator (KredEx, 2018a). Elektrilevi will invest to upgrade the charging infrastructure (Broughel and Viiding, 2021). Additional investment in fast-charging stations could improve the network. More importantly, policy should focus on improving access to charging in residential areas as much EV charging is expected to occur at home. Many Estonians live in apartment buildings and might not have a readily available charger near their home.

The public transport network should also be electrified as much as possible. Most Estonian cities have a well-developed public bus network that could be electrified (Broughel and Viiding, 2021). At the moment, electric buses tend to be cost-effective on the busiest routes but, as purchase costs decline, an increasingly higher share could be electrified. This will also need to be accompanied by investment in appropriate charging infrastructure. This could complement efforts to use biomethane as a fuel for buses. Moreover, Estonia's rail network currently relies heavily on diesel fuel and there is a considerable opportunity to further electrify the network (EC, 2019).

Additional investment in the public transport system coverage will be needed to encourage greater use. The use of public transport in Estonia accounted for around 20% of all distance travelled in 2019 and was around the EU average. But as passenger traffic in Estonia increased, most of it was due to higher car use given their larger share in transport. There is considerable scope to increase the share of public transport in overall travel in Estonia. For example, domestic bus travel stagnated between 2008 and 2018. Nationally, Estonia could consider using geolocation data to better understand where additional regional and national public transport services could be profitable and help reduce reliance on personal transport. Rail transport could be expanded as well. An investment programme to upgrade and extend the rail network by introducing new inter-city and suburban services finished in 2013 and led to strong growth in the number of passengers. Further connections, national and local, could be introduced to stimulate the use of trains. Locally, ensuring more convenient and more frequent public transport services could also encourage the modal shift to public transport.

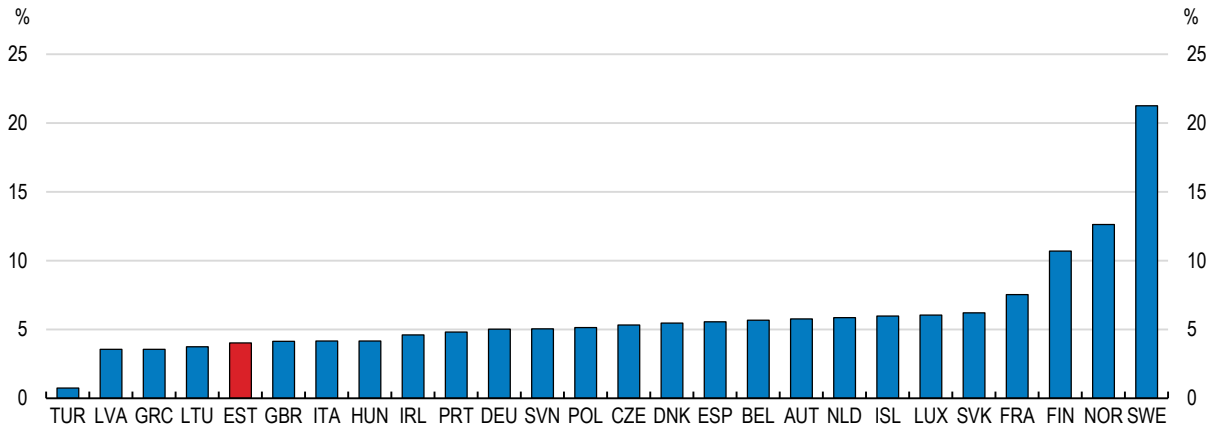
Public transport investment should be complemented by a wider set of policies to encourage a greater shift to public transport. In 2013, Tallinn became the first capital city in the EU to provide free public transport for all permanent city residents and initially this led to an increase in public transport use. However, by the end of 2016 the share of public transport use fell and the use of private cars increased (IEA, 2019). In mid-2018, 11 out of 15 counties introduced free bus travel and initial evidence suggested an increased take-up although the overall impact is not yet clear. Thus, to maximise the impact of public transport policies it is important to take a comprehensive approach and to introduce policies to discourage private car use. For example, in urban areas increased parking charges and park-and-ride options could facilitate a large-scale shift to public transport. Greater availability of bicycle lanes could encourage more cycling. In addition, land use could be given increased consideration. Land-use projects, such as mixed-use urban developments within close proximity (walking distance) to mass transit facilities, that promote inter-modal transport use for commuters and encourage accessibility should be prioritised (ITF-OECD, 2017). The use of precise local indicators on accessibility to goods, services and opportunities, like the Public Transport Accessibility Level used in London, could help target areas and people that are most in need, to adjust the transport system but also land use policies (OECD, 2019c).

Increased use of lower carbon fuels will be important in helping reduce transport emissions in the interim. The transition to cleaner and low-carbon transport will take time. For example, even if all new car sales before the pandemic were EVs, it would take around 18 years for Estonia's entire car stock to be replaced with new cars. In Norway, experience has shown that policy packages that include tax cuts, carbon pricing and reduced urban tolls for green vehicles can considerably increase the share of EVs but policy takes time to have an impact (OECD, 2021a). A sizeable portion of cars will rely on fossil fuels in the future during the transition. The EU Renewable Energy Directive (2009/28/EC) requires Estonia to ensure that 10% of energy used in the transport sector comes from renewable sources by 2020 but Estonia has not managed to meet this goal. Blending bio fuels into transport fuels can partly help Estonia achieve this objective.

Suppliers are responsible for blending conventional fuel with biofuel but a lack of clarity on fuel standards impeded implementation. Policy could coordinate and facilitate standard adoption to speed up the supply of biofuels. Estonia is also promoting the use of biomethane in its public bus transport system. Since 2015, Estonia has provided subsidies to establish biomethane filling stations and has awarded grants to public bus operators that use it as a fuel. Biomethane has been locally produced since 2018 and there are subsidies for production, too (MEAC, 2018a). In 2019, the share of biofuels stood around 4% in Estonia below most other EU countries (Figure 2.25). Setting standards is important although a carbon-based tax on fuels might be more efficient in encouraging the market to provide the most cost efficient biofuels.

Figure 2.25. The share of biofuels remains relatively low

2019



Note: latest data is for 2019.
Source: European Commission Transport Statistics.

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Box 2.6. Pioneering the adoption of EV technology: learning the lessons

Estonia pioneered the use of EV technology. In the early 2010s, it was the first country in the world to develop a nationwide charging network. It introduced subsidies for EV purchases. Despite these policies and expectations at the time, EVs did not become widespread and many countries have caught up with Estonia since then. This experience holds a few useful lessons (Broughel and Viiding, 2021).

In the early 2010s, Estonia developed the world's first nation-wide fast charging network. The network was based on a Japanese charging standard, the ChaDemMo protocol, which was successfully used in several other countries (Mitsubishi, 2011). By 2013, Estonia built 165 charging stations throughout the country (ABB, 2013). The aim of was to alleviate consumers' range anxiety since most EV driving ranges did not exceed 100km (Pearre *et al*, 2011).

Estonia also introduced subsidies and a rental program to encourage EV adoption (Broughel and Viiding, 2021). Funded by the sale of CO_2 emissions quotas to Japan, Estonia subsidised new EV purchases up the 50% of the EVs' listed price or up to a ceiling of €18,000. This programme was quite generous with the average subsidy amounting to €16,500 (KredEx, 2018a). The initial programme was extended with further funding until 2014 (KredEx, 2012). Estonia also introduced an additional EV rental programme to familiarise the public with electric mobility. This led to over 8,000 users. But the average distance per user was around 300km and only 24 customers used rental EVs more than once a week (Broughel and Viiding, 2021). The funding for the programme expired by the end of 2014.

These policies did not lead to widespread EV adoption in Estonia. Between 2011 and 2014, only 650 private EVs were purchased and 507 EVs were purchased by the public sector (Broughel and Viiding, 2021). The programmes ended in 2014. In the meantime, other countries developed EV charging networks and introduced EV subsidies. By 2020, the share of newly registered electric vehicles in the total passenger car fleet in Estonia was among the lowest in Europe (Figure 2.24).

There are three reasons why Estonia's pioneering policy was not successful. First, the assumption of the EV programme was that EV prices would decline much faster than they did, reducing the need for subsidies (Broughel and Viiding, 2021). Second, consumers were not ready to accept relatively short driving ranges and longer charging times compared to refilling at a gas station. EVs were mostly purchased by consumers who could charge at home. Apartment building residents were much less likely to purchase EVs despite the possibility of using publicly available charging stations (Broughel and Viiding, 2021). Third, Estonia's EV program adopted a Japanese charging standard. At the time, there was no universal charging standard in Europe although eventually a different standard, the Combo-2, was adopted Europe-wide.

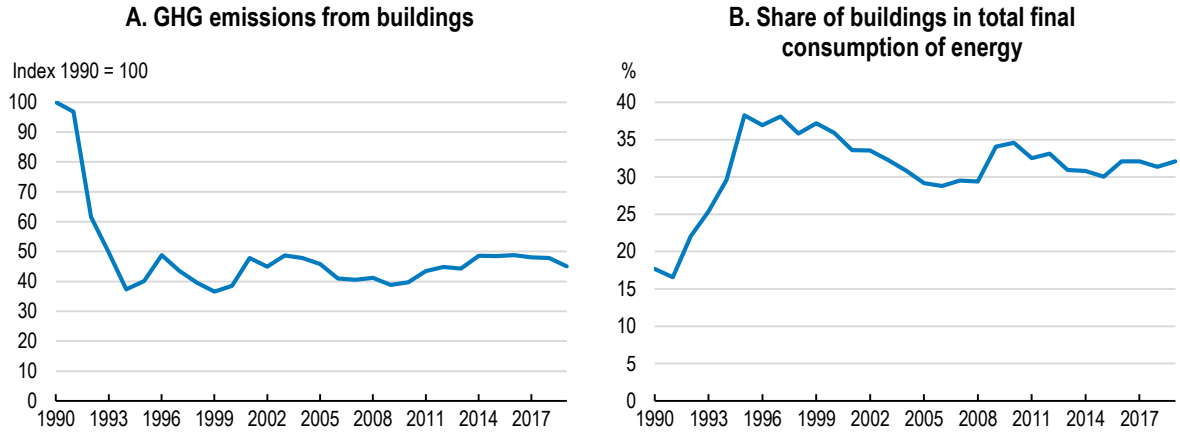
Reducing emissions through increasing building efficiency

Buildings contribute to Estonia's GHG emissions by consuming heat and electricity. Reducing their demand for energy means building or upgrading buildings so that they more efficiently retain heat in winter and keep cool in summer. For Estonia's ageing building stock, there is lots of potential to improve energy efficiency. Renovation should be prioritised over new construction, as this is less carbon intensive. Still, improvements will take a few decades to fully implement. Progress will depend on how fast such projects are implemented and on the capacity of the market to provide the requisite services.

The buildings sector accounts for a significant share of total energy demand in Estonia. In 2019, buildings' share of total final consumption of energy within Estonia was 32% (Figure 2.26 Panel B). Most of the

energy consumed came from bioenergy and waste and heating but around 20% can be accounted for by electricity (Figure 2.7). Altogether, this contributed 882 thousand tonnes of CO_2 equivalent in 2019, making up around 3% of total GHG emissions. The amount of GHG emissions has been broadly stable since the early 1990s and has shown little improvement (Figure 2.26 Panel A). In contrast, across the OECD and the EU there has been a steady downward trend in buildings' emissions.

Figure 2.26. GHG emissions from buildings have been broadly stable since the mid-1990s



Note: Latest data is for 2019.
Source: OECD Greenhouse Gas Emissions database; and IEA World Energy Balance database.

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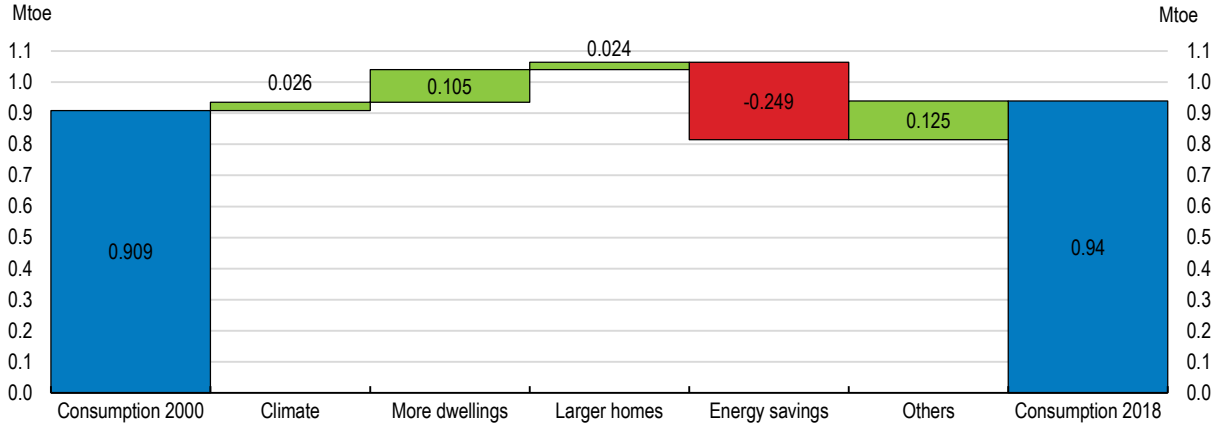
Most of the energy demand and related GHG emissions came from the residential sector. In Estonia, residential buildings account for three quarters of all building floor area (EC, 2021). In 2018, space heating accounted for 59% of the energy demand with water heating making up 16%. Cooking accounted for 17% and electricity consumption of appliances was 9% of the sector's consumption (ODYSSEE, 2021). Between 2000 and 2018, energy consumption in residential buildings increased by about 3.5%. This was partly due to more dwellings and, to a smaller extent, larger homes. At the same time, energy efficiency improved and the energy used by space heating fell, decreasing emissions (Figure 2.27).

Figure 2.27. More dwellings pushed up on GHG emissions but energy efficiency improved between 2000 and 2018



Note: The chart above decomposes Estonia's buildings' energy consumption between 2000 and 2018
Source: ODYSSEE.

StatLink https://stat.link/2g4h9i

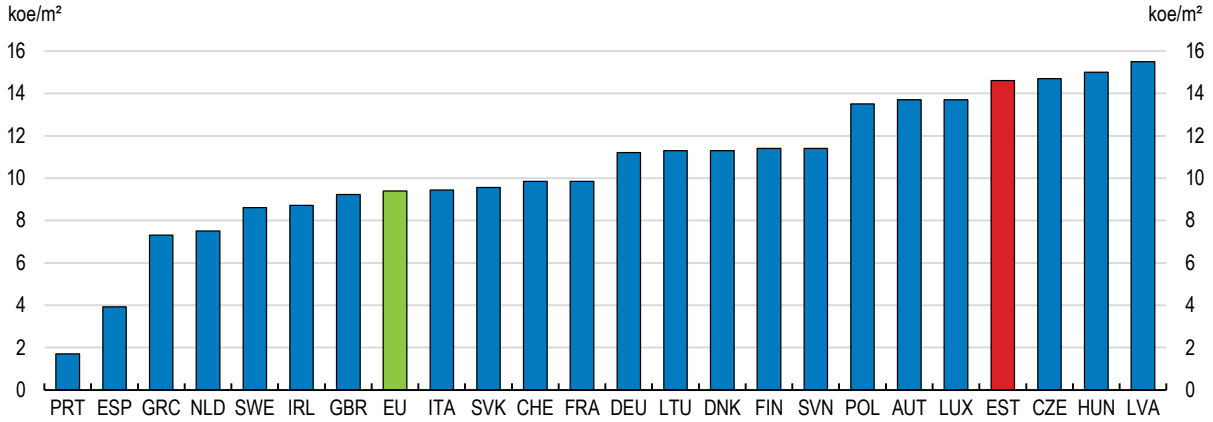
Still, Estonia's residential building stock remains somewhat energy inefficient. Compared to other EU countries, energy use in residential space heating in Estonia in 2019 was among the highest. In part, this can be explained by a relatively cold climate with an average yearly temperature of 6.7°C, which translates into higher heating demand. Nonetheless, the high use of energy in heating is driven more by low energy efficiency since that Estonia's heating energy consumption is much higher than in its Nordic neighbours (Figure 2.28). This is related to the fact that Estonia's residential buildings are quite old with 86% of buildings constructed before 1991 and only 7% built after 2006 (IEA, 2019) – Figure 2.29. Most of the residential buildings are owner-occupied and around 60% are organised into apartment associations. In 2018, renewed legislation also created apartment associations in buildings where none previously existed. The public sector owns a small fraction of residential real estate, less than 4% of the residential housing stock, while social housing accounts for less than 1% (MEAC, 2017b).

The current set of policies to improve the energy of buildings have focused on subsidies. Apartment associations can apply to the Credit and Export Guarantee Fund, SA KredEx, for expert advice and grant support and this can provide 35-40% of the total cost of the renovation. Additional support can be given with up to 50% of total cost with technical consultant or renovation supervisor fees reimbursed. Bigger grants require a larger and more extensive renovation plan. For example, a full 40% grant would require 20% energy savings, heating system reconstruction, façade and roof insulation, new windows installation and ventilation system with heat recovery (MEAC, 2017b). EU funds, as part of Cohesion Policy Funding, also include support for renovation of apartment buildings built before 1993 with financing up to 50% of total costs (ODYSSEE, 2021). Given that renovation projects can be costly, many apartment associations in Estonia often finance part of their renovation through loans. This works for some buildings but in some cases finance can be restricted when the building profile is more risky due to its location, size, etc. For example, lower property values can be a barrier in most regions outside of Tallinn and its surrounding area. SA KredEx can provide loan guarantees in such situations and can cover up to 80% of the loan amount. House owners can also access grants and loans for renovations.

The public sector is leading by example. The EU Energy Efficiency Directive stipulates that 3% of central government building stock must be renovated each year. This is implemented by the Ministry of Finance. The sale of CO_2 allowances funds such green investment with roughly half going to central government and half to local government (MEAC, 2017b). The funding of CO_2 allowances also finances other green investment such as district heating system renovation, street lighting, etc.

Figure 2.28. Energy use in residential space heating is comparatively high

2019



Note: latest data is for 2019.
Source: ODYSSEE-MURE.

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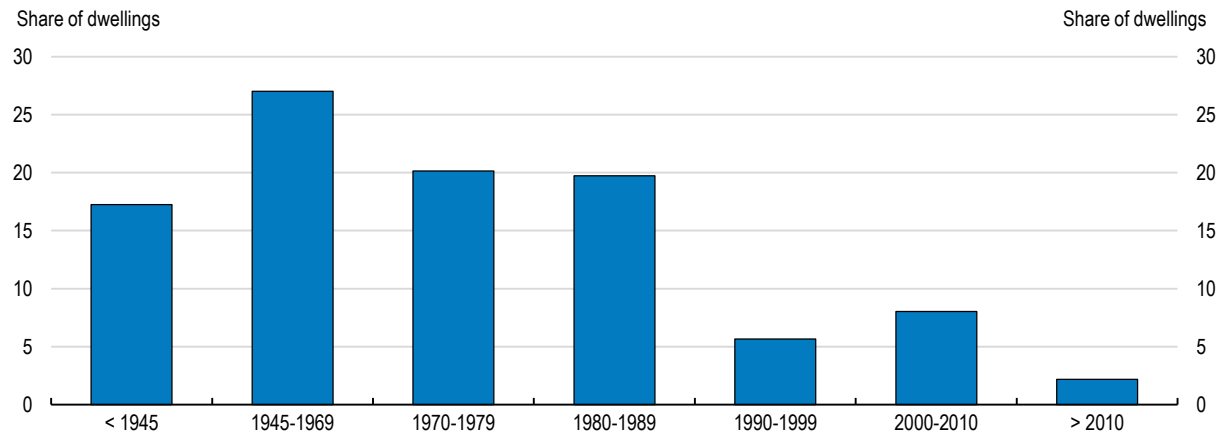
Figure 2.29. Most of Estonia's buildings are old



Source: European Commission EU Buildings Factsheets.

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New buildings standards should improve buildings' energy efficiency. In 2013, the new building code introduced requirements for nearly zero-energy buildings (nZEB). From 2019, all new public sector buildings must comply with the new standard while all new private buildings must do so from 2021 onwards. This should represent a significant improvement in energy efficiency although the challenge will be to upgrade existing skills and competences in the construction sector to be able to deliver the new nZEB standard.

The potential for improving energy efficiency for residential buildings is substantial. Government studies suggest that if the buildings were fully renovated it would be possible to lower heating consumption by up to 70% (~6.4 TWh/y) and electricity consumption by up to 20% (~0.5 TWh/y) (MEAC, 2020). To achieve the targets set out in its national energy strategy, the annual renewal rate in the residential building stock would need to be 1% of new construction and 2% of renovation but the actual renewal rate is around 0.5%, on average (IEA, 2019).

Renovation should be further incentivised and accelerated. The government has designed efficiency packages for five energy performance levels of buildings to help facilitate the renovation process. However, the efficiency packages that represent the best economic value are not the packages that achieve highest energy efficiencies and will not deliver the targeted energy savings set out in the national energy strategy. To mitigate the upfront costs of renovations, boosting and widening the existing availability of long-term credit and focusing on the least energy efficient buildings would help increase renovation rates. In this respect, a special loan facility is being prepared by the Ministry of Economic Affairs and Communication. For those residents unable to finance and/or obtain credit for renovation, more extensive support could be offered through KredEx than has previously been done in order to support the most vulnerable households. Furthermore, renovation requirements could also take spatial and financial risks into account. For example, exemptions or extensions could be given to areas where incomes and property prices are lower, and areas where depopulation might limit the need for renovation.

Policy could help expand the private sector market for renovations. The capacity of the market to meet the demand for renovation will be crucial in accelerating energy efficiency improvements. One approach that has worked in other countries is to set up a market for energy service companies (ESCOs). ESCOs are integrated companies of energy engineers and experts that provide energy saving solutions. Such companies can be very effective in delivering energy efficiency savings across sectors (IEA, 2019). While the Estonian market appears too small to support ESCOs, renovation projects could be bundled so that companies can bid on multiple apartment buildings. This could encourage and attract the interest of larger

companies and could allow expertise to be developed. An active renovation market could also encourage the development of renovation service companies that offer owners technical advice as well as financing and renovation construction solutions. The public sector, through its renovation programme, can also help stimulate an active renovation market through larger projects which, once established, can then continue with private building renovation. As mentioned, it will be important to train new workers and build skills in the industry so that increased demand for renovations can be met with a sufficient supply of workers. But given tight labour markets and scarce skills, a higher supply of workers could come from existing workers in construction shifting to renovation, a rise in labour market participation or through increased immigration. Policies to boost the supply of skilled workers will be important. Otherwise, the increased demand for renovation could push up wages, increase costs and reduce the financial benefit of renovating which could, on the margin, slow down the pace of renovation.

Policies for a low-carbon transition should be comprehensive and balanced

The implementation of policies to reduce GHG emissions in Estonia will be a challenging task. The policy mix should be comprehensive and balanced. It should rely on combination of policies such as carbon pricing (including carbon taxes or ETS), regulation and subsidies. But it should also be complemented by policies that specifically target infrastructure investment and R&D. The transition to a low-carbon economy will require substantial financing and both the public sector and the private sector will be important in driving the change. The transition to a low-carbon economy will also need to be just and fair. The impact of taxation and subsidies should be progressive in order to mitigate the effects on those most affected by environment-related policies but least able to cope with them. Understanding public attitudes towards climate change and policies to mitigate climate will be key in building support and maximising policy effectiveness.

The role of the state will need to be larger in Estonia. Even in a low-tax market-based economy such as Estonia's, the state will need to play a larger role in getting to net zero GHG emissions by 2050. This is because there are market failures associated with climate change. The social costs of carbon-intensive activities are not fully reflected in private costs and investment in certain areas such as basic R&D and infrastructure might be too low if left to the private sector alone. To correct these market externalities, carbon-based prices should be widened and increased while the public sector should spend more on basic R&D. The net effect on public finance is ambiguous. Carbon-related taxation and subsidies can be designed in a revenue-neutral way through targeted redistribution of tax revenues. Moreover, to the extent that it is financed through higher debt, investment in R&D and infrastructure should yield a positive return in the long run especially given the current historically low costs of finance.

The key policies suggested in this chapter could amount to around 3% of GDP per year by 2050. Widening carbon pricing to include the remaining 30% of unpriced CO_2 emissions and pricing them at EUR 5 per tonne of CO_2 would amount to 0.2% of nominal 2019 GDP per year. But to fully meet the commitment under the Paris agreement, carbon pricing would need to be at least EUR60 per tonne. Increasing the carbon price EUR60 of Estonia's CO_2 emissions that are currently priced below EUR60 would amount to another 1.8% of nominal 2019 GDP per year. Such carbon price increases apply to all sectors except the road sector where current carbon prices are well in excess of EUR60 per tonne of CO_2. The tax revenues raised could then be recycled and redistributed to target those households that are affected but much less able to adjust. This could be done through lump-sum transfers, lower taxes for those groups or active social and labour market policies, for example. Part of the additional carbon tax revenue could also be invested in low-carbon projects. Additional and targeted R&D spending would require at least another 1% of GDP per year to bring it in line with OECD average of 2% of GDP and close to strong performers like Denmark. Overall, these estimates suggest the net investment in the Estonian economy could be around 3% of GDP per year although this is subject to lots of uncertainty and there are upside risks. This estimate does not include additional infrastructure investment or the potential cost of stranded assets in the event of an accelerated transition to a low-carbon economy. This can push up the cost of the transition. The impact on

public finances could be smaller, though. Carbon-taxes can be designed to be neutral as higher tax revenues are redistributed. At the same time, the increases in R&D and higher investment infrastructure is likely to be covered by EU funds implying little additional pressure on public finances. Nonetheless, the precise effect of carbon prices and environmental regulation on GHG emissions reduction is uncertain and the nature of the low-carbon transition might require more investment to be made at an earlier stage. It will be important to recognise these uncertainties and maintain a flexible policy approach.

This is consistent with Estonia-specific estimates of the amounts investment required for the low-carbon transition. The top-down estimates of around 3% of GDP per year presented above are on the same order of magnitude as bottom-up SEI estimates of investment required to reduce GHG emissions in Estonia. Based on specific projects across different sectors in the economy, the SEI estimated that total investment in Estonia would need to rise by an annual 4% of GDP in 2021-30 before gradually falling to an additional 1% by 2050. The SEI targets net zero emissions by 2050. Of course, there is considerable uncertainty around these estimates. It is unclear what levels of average effective carbon tax rate are needed to significantly reduce emissions and the required investment in low-carbon projects might be higher than anticipated, particularly over the next decade.

Public support for comprehensive and significant environment-related policies is crucial for the low-carbon transition. Estonian attitudes towards the environment are generally positive. In 2020, 95% of Estonians were interested in information about the environment and 83% appeared concerned about some environmental issues (MoE, 2020). Around 80% of Estonians consider themselves environmentally aware. However, there is not always a clear understanding of the links between personal behaviour and the impact on the environment. For example, Estonians' behaviour is more related to dealing with the consequences of environmental harm, such as sorting waste, rather than preventing further environmental damage through changing consumption behaviour (MoE, 2020). These results are partly echoed in an OECD cross-country survey which suggests that, across Germany, Denmark, France and the US, most people believe climate change is an important problem but do not think that it will have a negative impact on their lives. There is limited willingness to adopt a sustainable lifestyle. Public support seems to be largest if revenues are used to fund low-carbon infrastructure and to subsidise low-carbon technologies. Support can be higher in urban areas than rural areas (Dechezlepretre and Kruse, *forthcoming*). Understanding public acceptability of environment-related policies is key to taking effective policy action. It will be important to continue studying such attitudes in Estonia in order to better inform and prioritise environment-related policies. This can then allow policies to address potential obstacles and to build widespread support.

MAIN FINDINGS	RECOMMENDATIONS (KEY RECOMMENDATIONS IN BOLD)
Carbon pricing in the economy	
Estonia's pricing of greenhouse gas emissions has been incomplete and prices in some sectors have been too low to effectively discourage carbon-intensive economic activities.	**Ensure comprehensive carbon pricing across sectors. Gradually increase effective carbon prices in the medium term while mitigating the impact on vulnerable groups.**
Transforming the energy sector from brown to green and managing the transition	
Estonia has a relatively carbon intensive economy among OECD countries. The energy sector in Estonia accounts for a large share of the country's greenhouse gas emissions. Fossil fuels and oil shale, in particular, are prevalent in Estonia's energy production.	**Reduce oil shale output over time as planned but mitigate the social impact on the Ida-Viru region through a funded comprehensive and long-term development plan.** Use regional development policies to incentivise and support new industries in Ida-Viru, particularly those that capitalise on existing capital and labour resources. Deploy targeted active labour market policies to retrain and reallocate workers in the oil shale industry. Provide extended income support to those workers during the transition to prevent a rise in poverty.
The use of woody biomass is important but sources of renewable energy should be further diversified.	Encourage private investment to shift district heating, where appropriate, towards new technologies in the medium-term, such as large capacity heat pumps, that can also utilise other renewable energy sources.
So far, wind and solar energy have accounted for a small share of Estonia's renewable energy but they have a large potential to grow. **Several restrictions have limited the growth of wind power as well as solar power.**	**Provide a more certain regulatory and business environment through clear and definitive spatial plans and permitting processes.**
Electrification of energy demand and a renewable energy supply will require a strong electricity network. The importance of balancing power and regional cooperation will increase.	Invest to strengthen and expand the electricity grid, based on cost-benefit analysis. Continue with implementing investment plans by Elering, the transmission service operator, that develop and strengthen energy infrastructure in a cost-effective manner.
Future electricity production will be more volatile.	Continue and enhance regional cooperation to ensure sufficient electricity generation and to avoid volatility in the network by ensuring a stable and secure energy supply.
Estonia's investment in R&D is low but technological innovation will be key to getting to net zero and transitioning to a low-carbon economy.	**Further encourage low-carbon technology innovation by expanding public R&D investment and by increasing the share of funding on environment-related issues.** **Focus public research on environment-related issues. Support deployment of new technologies.**
Reducing transport emissions	
Transport emissions have increased since 2005. This has been driven by a rise in passenger car transport. The car stock is relatively old and fuel inefficient.	**Provide and encourage the development of user-friendly and low carbon alternatives to private car use by making active mobility, public transport, low-carbon shared mobility more attractive and adapt land management in order to reduce the need for private car use.**
The uptake of low-carbon vehicles is low relative to other European countries.	Broaden subsidies for EV purchases, up to a limit, and offer a scrappage bonus for old cars. Boost investment in charging infrastructure. Electrify public transport, including rail, and consider expanding the regional and national public transport network. Accelerate the adoption of sustainable biofuels such as biomethane.
Increasing buildings' energy efficiency	
The buildings sector accounts for a significant share of total energy demand in Estonia. Estonia's residential building stock is comparatively energy inefficient. The pace of renovation is too slow and below the targeted rate.	**Provide more extensive financing and counselling support for renovations and retrofitting through KredEx. Focus on the least energy efficient buildings, where appropriate, while considering the impact on vulnerable households.**
Skills and competences to improve energy efficiency in the buildings sector are in short supply.	Increase the supply of skilled construction workers through increased training provision. Consider boosting labour market participation and/or increasing immigration to ensure adequate supply of required skills.

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ESTONIA

Since its independence, Estonia has made tremendous progress towards greater economic prosperity. Estonia enjoys solid institutions, political stability, a strong and credible fiscal policy, as well as a robust financial sector. Estonia is also a frontrunner in digital governance and innovation. Stable and secure digital services are in fact one of the factors that have allowed Estonia to cushion better than others the sanitary and economic shock from the pandemic. After an impressive post-pandemic rebound, a renewed focus on structural reforms will help Estonia remain on a path of rapid convergence and cushion the new shock entailed by the war in Ukraine. Reforms should focus on addressing labour shortages and skills mismatches, while protecting the existing flexibility of the labour market. Very high inflation could aggravate an already high-level prevalence of poverty, and social transfers could be better targeted towards people left behind. Spending on health and infrastructures should also be made more efficient to deliver better value-for-money. The oil shale sector is highly energy intensive and is the main culprit behind Estonia's high greenhouse gas emissions, but reducing dependence on the sector is challenging. This *Economic Survey of Estonia* assesses the country's macroeconomic performance and proposes policy measures to promote higher, greener, more resilient and inclusive growth.

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