Estonia: Raising Productivity and Benefitting More from Openness

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ABSTRACT/RÉSUMÉ

Estonia: Raising productivity and benefitting more from openness

Estonia can revitalise productivity growth and reap more benefits from its openness. Productivity is relatively low in manufacturing and in large firms, as the manufacturing sector focuses on low-technology goods exports to only a small number of destinations. The economic impact of the Estonian R&D system still appears to be limited, also because of a lack of knowledge transfer. Building on Estonia’s favourable business environment, productivity growth could be raised by promoting smart specialisation and innovation; removing remaining barriers to entrepreneurship and competition; ensuring access to finance for SMEs; upgrading infrastructure; and improving energy efficiency.


JEL Classification: F43, O38, O52.

Keywords: Productivity, innovation, knowledge transfer, infrastructure, energy efficiency.

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Estonie : accroître la productivité et tirer davantage parti de l’ouverture de l’économie

L’Estonie peut dynamiser la croissance de sa productivité et tirer davantage parti de l’ouverture de son économie. La productivité est relativement faible dans le secteur manufacturier et dans les grandes entreprises, car l’activité manufacturière est orientée essentiellement vers les exportations de biens à faible intensité technologique à destination d’un petit nombre de marchés. L’impact économique du système de R-D de l’Estonie semble encore limité, en raison pour partie de l’insuffisance des transferts de connaissances. Le pays offrant des conditions favorables à l’activité d’entreprise, la croissance de la productivité pourrait être renforcée en favorisant l’innovation et la spécialisation intelligente ; en supprimant les facteurs qui entravent encore l’entrepreneuriat et la concurrence ; en faisant en sorte que les PME aient accès à des financements ; en renouant l’infrastructure ; et en améliorant l’efficacité énergétique.


Classification JEL: F43, O38, O52.

Mots clefs: Productivité, innovation, transferts de connaissances, infrastructure, efficacité énergétique.
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Estonia: Raising Productivity and Benefitting more from Openness

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Modest productivity growth slows income convergence

1. Estonia has a large productivity catch-up potential. Although GDP per hour worked and incomes are considerably lower than in most OECD countries, labour productivity growth has slowed down since 2008 and is now in line with average productivity growth across OECD countries (Figure 1). Measuring productivity at the sectoral level is difficult. OECD data suggest that productivity has weakened in the services (Figure 2) more than in other OECD countries and is broad-based, extending to professional, financial and information services and, to some extent, wholesale and retail trade (OECD, 2013c). Labour productivity growth in manufacturing has held up, but over the past 15 years, productivity gains have been smaller than in some other countries with similar or higher income levels, such as the Slovak or Czech Republics. In construction, productivity growth increased, mainly because employment declined massively.

Figure 1. Evolution of productivity

![Graph showing the evolution of productivity in Estonia](image)

Source: OECD Productivity Database.

1. Andreas Kappeler is an economist on the Estonia/Germany Desk in the Economics Department of the OECD. This paper was originally produced for the 2015 OECD Economic Survey of Estonia. It was published as chapter one of this Survey under the authority of the Economic and Development Review Committee (EDRC) in January 2015. The author would like to thank Álvaro Pereira, Robert Ford and Andreas Wögötter for valuable comments on earlier drafts. This working paper also benefitted substantially from comprehensive comments from and many discussions with Andrés Fuentes Hutfilter. Special thanks go to Seung-Hee Koh and Eun Jung Kim for technical assistance and Heloise Wickramanayake for technical preparation.
2. Productivity levels are especially low among big firms (Figure 3). Many of them are manufacturing firms, which often focus on low technology exports in a small number of varieties that are easy to imitate. Also, their innovation activity is limited (Benkovskis and Rimgailaite, 2011; Economic Survey of Estonia 2011, OECD, 2011f). Productivity and R&D activity is also fairly low among small firms (OECD, 2013b). Small firms are internationally oriented, which may open the door to higher productivity in the future. The share of fast growing innovative firms is the 9th highest in a sample of 18 OECD countries (OECD, 2014d).

Openness and high value added foreign direct investment boost productivity and innovation

3. For a small economy, openness is a key source of income convergence. It provides small fast growing firms with access to foreign markets and is a source of knowledge transfer (Andrews and
Westmore, 2014). Estonia is one of the most open economies in the world, with exports and imports each about 90% of GDP. However, exports are concentrated in low and medium technological goods and appear to be comparatively un-diversified geographically (Economic Survey of Estonia 2012, OECD, 2012c). Only 2% of enterprises have more than 14 export destinations. Evidence suggests that Estonian firms expanding their export activity are often more productive than those keeping their export mix unchanged or decreasing its breadth (Masso and Vahter, 2014).

4. Foreign direct investment (FDI) inflows in high value added activities entail considerable long-term benefits (Vahter, 2011). FDI entails a considerable potential for transfer of knowledge, especially for a small economy with a large productivity gap, such as Estonia (OECD, 2008b). Estonia’s inward FDI stock is large, accounting for roughly 90% of GDP in 2012. However, a large share of inward FDI flows is directed towards financial intermediation. Inward FDI directed towards manufacturing is low (Figure 4) and concentrated on low-value added manufacturing goods (Masso et al., 2010). This is also reflected in a low participation in global value chains compared to other small open economies (OECD, 2013a).

Figure 4. Foreign direct investment inflows by sector

![Foreign direct investment inflows by sector](image)

Source: Estonian Central Bank.

5. Structural reforms can help to reap more benefits from Estonia’s openness and strengthen growth. Continued efforts are needed to promote smart specialisation and innovation; remove remaining barriers to entrepreneurship and competition; ensure access to finance for SMEs; upgrade infrastructure; and raise energy efficiency, as discussed below.

Reaping more benefits from innovation

6. Estonia scores well on innovation activity, low productivity growth notwithstanding. R&D spending in Estonia has increased considerably in recent years, to 2.2% of GDP in 2012 (Figure 5). This increase may well result in improved productivity and competitiveness in the future (Andrews and Westmore, 2014). However, the remarkable growth in R&D in 2010 and 2011 was partly the result of considerable one-off investments in the oil shale industry. R&D spending by the government, non-profit organisations and, to some extent, businesses increased in 2012 (Statistics Estonia, 2013). Services are active in business R&D and the share of young enterprises is comparatively large (OECD, 2012b; OECD, 2014d), especially in the ICT sector where Estonia has developed a marked comparative advantage (OECD, 2013b; OECD, 2012a). Manufacturing is characterised by relatively low R&D spending and a low share of young enterprises (OECD, 2014d). This reflects the focus of manufacturing on low technological
goods in a small number of varieties that are easy to imitate and are most often unprotected by patents (Benkovskis and Rimgailaite, 2011; Economic Survey of Estonia 2012, OECD, 2012c).

Figure 5. R&D spending

Source: Eurostat.

7. The economic impact of the Estonian R&D system appears to have been limited so far (European Commission, 2013d; National Audit Office of Estonia, 2013a; National Audit Office of Estonia, 2014a), which has prompted reforms by the government. Exports of medium and high-tech products; licence and patent revenues from selling technologies; and sales of new products are low (European Commission, 2014a; OECD, 2014c). One reason is that R&D policies have been fragmented and have duplicated support (European Commission, 2010; European Research Area Committee, 2012).

8. Estonia’s smart specialisation strategy is at the core of its efforts to reap more benefits from innovation, and thereby revitalise convergence of GDP per capita and productivity (Box 1). The strategy identifies ICT, healthcare and resource efficiency as having the greatest potential to create added value in the future in Estonia. For instance, in the ICT sector there is scope to diversify from the provision of services more towards the development of manufacturing goods, though that would require higher upfront investment (Estonian Development Fund, 2013). Smart specialisation is considered a useful regional policy framework for innovation driven growth. However, in Estonia, there seems to be scope to implement the smart specialisation strategy more effectively and raise its economic impact by enhancing framework conditions. Also, a particular focus should be put on promoting transfer of knowledge and enhancing management skills in the private sector, as discussed below.
The main responsibility for innovation strategy and implementation is shared by the Ministry of Education and Research and the Ministry of Economic Affairs and Communications. Coordination and collaboration between the two ministries was strengthened within the new innovation strategy (MER/MEAC, 2014). Effective innovation policy also requires close co-operation with private actors who are often better placed than governments to identify barriers to innovation or policy action (OECD/WB, 2014). Accordingly, Estonia set up a Steering Committee, which includes representatives from different ministries, industry and academia. To ensure effectiveness, such inter-ministerial working groups should be held accountable and their performance reviewed regularly. Collaboration on innovation could be
strengthened further, for instance by promoting horizontal ways of working across ministries (OECD, 2011b). This also applies to innovation measures that require cross-ministerial finance decisions (National Audit Office of Estonia, 2014a). Promoting effective collaboration among ministries may also be beneficial to promote energy efficiency, where research and development is key to improved performance (see below).

10. There are concerns that entrepreneurs and civil society organisations are not sufficiently represented in the political decision process (European Research Area Committee, 2012; European Commission, 2013b; OECD, 2013f). Private sector participation and rights to petition the government for information have improved considerably but remain below those of innovation leaders such as the Nordic countries (Figure 6). More can be done to hold public institutions accountable between elections and thereby enhance transparency; also, more opportunities for citizens’ engagement in the policy-making process can be provided (OECD, 2014e). Moreover, business sector representatives have argued that notification periods about changes in laws and regulation are often short in practice.

![Figure 6. Level of public participation and right to petition the government](source)

11. A number of OECD countries introduced independent productivity commissions that act as review and advisory bodies on microeconomic policy reform and regulation with the aim of achieving better informed policy decisions through independent, published analysis and advice (OECD, 2013i). For instance, in the Netherlands a Council of Chief Economists meets every month to discuss policy initiatives and outcomes. The Australian Productivity Commission played an important role in boosting the productivity performance of the Australian economy in the sixties and seventies. New Zealand and Norway have established a similar institution more recently. Denmark set up an independent standing productivity commission with a life of two years in 2012. The benefit of such a cross-cutting institution in Estonia could be to gain a better understanding of the factors behind the slow and volatile convergence, despite overall good framework conditions.

12. There seems to be scope to improve the responsibilities and corporate governance of public bodies implementing innovation policies (European Commission, 2013d). Board members were replaced repeatedly in 2014 upon strong political pressure in Enterprise Estonia, one of the largest institutions within the national support system for entrepreneurship (see Box 1). Also, overlapping activities may reduce effectiveness and accountability. Some innovation instruments are duplicated by multiple institutions, which may result in large administration overheads and reduce their impact (European
Research Area Committee, 2012). Against this backdrop, the scope to enhance the corporate governance of implementing institutions and make them more independent from the government should be reviewed. This would also strengthen the capacity of these institutions to get more involved in evidence-based policy development (OECD, 2011b).

13. Considerable effort has been made in recent years to improve evaluation of innovation policies (OECD, 2013f). Evaluation has become more independent from the Ministry of Economic Affairs and Communication. Effective design and implementation of innovation policies also requires constant experimentation, monitoring and adaptation (OECD/WB, 2014). In practice this means to experiment with new policy instruments on a small scale, to evaluate them thoroughly and, if proving effective, apply them on a larger scale. Evaluation should already be incorporated at the design stage. Pilot projects should test the practical feasibility of new research and innovation instruments and their potential to promote smart specialisation. This could also serve to reassess the effectiveness of existing innovation support instruments and whether they crowd out private innovation spending (Andrews and Criscuolo, 2013).

14. Estonia also applies regulatory impact assessments on a sectoral basis, following OECD best practice. A regulatory impact assessment identifies and quantifies benefits and costs of a proposed regulation if adopted. The focus of Estonia’s regulatory impact assessments is on reducing administrative burdens. In general, the trade and investment impacts of new regulations are only assessed for legislation which is drafted at EU level and affects external trade. In other cases, the approach may overlook negative implications of regulation for trade and investment (OECD, 2011a).

Promoting knowledge transfer between private and public institutions

15. R&D collaboration of firms across borders is comparatively widespread in Estonia (OECD, 2013b). However, international collaboration of firms seems to result in only limited transfer of knowledge (European Research Area Committee, 2012). Moreover, the share of firms collaborating on innovation with higher education and government research institutions is low, especially among SMEs (Figure 7; European Commission, 2014a; European Commission, 2013d). One reason may be that Estonia has few universities and research institutions and that collaboration with research units abroad is difficult. There is scope to focus university research more towards applied research and areas identified in Estonia’s smart specialisation strategy and to strengthen collaboration of universities with domestic firms. At the same time, keeping a balance between basic and applied research is key for future innovation and for new growth areas to emerge. Further efforts are also needed to promote collaboration of firms and universities with applied research institutes, including from abroad, such as VTT in Finland and Fraunhofer in Germany. Government support dedicated to fostering international collaboration is low (MER/MEAC, 2014).
The government should continue to move ahead with the open data initiative (European Commission, 2013c). Making publicly collected statistical information available more widely potentially increases government transparency and public awareness of government programmes and activities. It also helps to generate insights into how to improve government performance. Increased data transparency may provide new ways of collaboration among government and research institutions on R&D policies and collaboration in the creation of innovative, value-added public services (Ubaldi, 2013). The potential of the open data initiative is particularly large in Estonia due to its leading role in e-governance. When implementing the open data initiative, it should be ensured that technical, legal and financial restrictions do not limit data accessibility and reusability (Ubaldi, 2013).

**Promoting managerial and entrepreneurial skills**

Limited economic outcomes of international collaboration may reflect a limited capacity of local firms to absorb knowledge from collaboration with foreign affiliates (UNCTAD, 2011). Managerial and entrepreneurial skills are important for putting innovative ideas into practice and enabling organisations to adapt in competitive environments as well as absorb technological knowledge from abroad (Andrews and Westmore, 2014; OECD, 2011e). Estonia suffers from a lack of managerial skills needed to grow and internationalise a business (European Commission, 2013b; Andrews and Westmore, 2014). The aim of the smart specialisation strategy to strengthen the development of management competencies and long-term planning in enterprises is welcome (Ministry of Economic Affairs and Communications, 2013). Promoting international and applied management skills could be particularly beneficial given the size of the economy. This also requires competition among firms and limiting management structures that tend to be less successful, such as family owned firms managed by family members (Andrews and Westmore, 2014). There is also scope to enhance teaching at school of how to run a business. School education in entrepreneurship is weaker in Estonia than in most other OECD countries (OECD, 2013h). Early exposure to managerial and entrepreneurial skills has considerable long-term benefits (OECD, 2011e).

The government’s “e-residence initiative” is a promising step to strengthen the country’s international profile. E-residence facilitates persons across the world to do business with and in Estonia. For instance it will be possible to register a company, to pay fees and open a bank account in Estonia from abroad. It may also make it easier for foreign investors to play a more active role in the management of companies located in Estonia (Taavikotka, 2014).
Improving product market regulation

19. Competition-friendly product market regulation stimulates innovation and technology diffusion by ensuring flexible resource allocation and faster convergence to the productivity leaders (Johansson and Olaberria, 2014; Andrews and Westmore, 2014). Overall regulation in Estonia appears more competition-friendly than in OECD countries on average (Figure 8). However, there is scope to strengthen competition and the effective use of resources by removing remaining entry barriers for foreigners and continuing the reform of corporate bankruptcy procedures.

![Figure 8. Product market regulation](image)

Note: OECD refers to the simple average.

Source: OECD (2013), Product Market Regulation Indicators.

Removing entry barriers for foreigners

20. Continued efforts are needed to identify and remove remaining entry barriers that hold back competition and growth, especially in services. Entry barriers can hold back productivity growth throughout the economy because of the services’ role as intermediate inputs. Excessive regulation of professional services has particularly strong negative growth effects in downstream service intensive industries (Bourlès, et al., 2013; Barone and Cingano, 2011). In Estonia, the services account for 58% of total value added and over half of domestic value added in exports. The regulatory regime is overall conducive to fostering competition in the services (OECD, 2014b). However, some entry barriers remain in the services, notably:

- Some professional services in Estonia benefit from a number of exclusive rights, according to the OECD PMR indicator 2013. For instance, engineers have exclusive rights to conduct environmental assessments and monitoring of engineering projects. Unlike in many other countries, a range of audits can only be conducted by accountants. For some of these exclusive rights it would be possible to open the market to a broader range of providers without harming service quality or endangering consumer protection.

- Entry barriers are high for non EU-foreigners in some professional services, notably in legal services. There is no process for the recognition of foreign qualifications in regulated professions except for countries with which Estonia has signed special agreements. Re-qualification exams
have to be taken in Estonian, which imposes unnecessary entry barriers, including on entrants from EU countries. Similar language restrictions may also exist in other cases. Also, only lawyers who are fully licenced in an EU Member state may own shares and be partners in law firms (OCED, 2014b).

- In maritime transport, nationality and residency conditions are imposed on registering ships. Government plans to facilitate market access for foreigners are welcome. A majority of the board of directors in maritime transport firms registered in Estonia must be Estonian citizens. Moreover, maritime and air transport are the only service sectors in which Estonia employs foreign equity restrictions, with a maximum foreign equity share of 49% (OCED, 2014b).

21. Another barrier for foreigners to do business in Estonia are restrictions for non-EU citizens to purchase land in eastern border areas of the country, even if they reside in Estonia (OECD, 2011f). There is also scope to further expand the use of English in the administration. Some domestic standards are not available in English (OECD, 2011a). To furnish an already transparent regulatory environment, authorities may consider translating into English those domestic standards currently available only in Estonian, including at the local level.

**Continuing to review corporate bankruptcy procedures**

22. Corporate bankruptcy laws which impose excessively high exit costs in the event of business failure may make entrepreneurs less willing to experiment and thus hold back the efficient reallocation of resources and innovation (Andrews and Criscuolo, 2013). At the same time, bankruptcy codes that do not provide sufficient safeguards for creditors may reduce the supply of credit, so some balance is required (Andrews and Criscuolo, 2013; OECD, 2014d). Estonia made considerable progress with reforming bankruptcy legislation in 2011. Nonetheless, recovery of creditor claims is relatively weak and insolvency procedures are long (Figure 9). This may also be one reason for the fairly negative attitude of the public towards entrepreneurs on a second start after failure (European Commission, 2013a; OECD, 2013h). Lengthy procedures may be one reason for low recovery rates, also because it raises uncertainty. Efforts should continue to reform insolvency procedures and make them more efficient. In particular, the duration of insolvency procedures should be reduced and recovery of creditor claims increased. It should also be considered whether a voluntary non-judicial debt settlement process can raise efficiency. Such a settlement process has been introduced for example in the United Kingdom (“Company Voluntary Arrangements”), where the debtor appoints an insolvency practitioner to draw up a debt restructuring plan, allowing the company to continue to operate if creditors agree.
There are concerns that corporate insolvency cases are not always resolved in a manner that contributes to an efficient allocation of resources (Economic Survey of Estonia 2011, OECD, 2011f). The decision to liquidate or rehabilitate a company can be complex, and require economic expertise. Judges may not be able to draw on the necessary expertise to deal with complex cases (European Commission, 2013b). Debt restructuring procedures allow outside expertise, but it is almost never used because insolvent debtors must pay for the experts and they rarely have the funds to do so. Courts should be given the power to require the creditor to pay for experts, particularly in more intricate corporate cases. A specialised bankruptcy court could ensure that sufficient judicial expertise is applied to bankruptcy procedures, as suggested in previous Surveys.

**Ensuring access to finance for SMEs**

Foreign banks, mostly from Nordic countries account for 94% of total bank assets (Eesti Pank, 2013). Foreign ownership cushioned the impact of the crisis on the country’s financial system (Eesti Pank, 2013; OECD, 2011c). Foreign-owned banks rely on scoring and hard verifiable information for lending decisions and real estate as collateral (Beck et al., 2008; OECD, 2011c). As a result, interest rates on bank loans may be higher for SMEs or their applications more likely to be rejected. Smaller companies are harder to assess for banks, as usually their financial reports contain less information and their credit histories are short (Eesti Pank, 2014).

Access to bank lending is more difficult for SMEs than in many other EU countries (European Commission, 2013b; OECD, 2013b, World Bank, 2014). The share of small firms using external funding is one of the lowest in the EU. Instead, funding through sources outside the financial sector is more widespread. The share of SMEs whose loan application is rejected is fairly high (European Commission, 2013g). It is welcome that the availability of venture capital has improved recently. Small enterprises with less than 250 employees account for 78.4% of total value added, more than in most other OECD countries (OECD, 2014d).

Savings and loan associations are considered to be particularly conducive to SME lending (Ayadi, R. et al., 2010). Through relationship lending, they reduce asymmetric information which is likely
to limit SMEs’ access to funding. Savings and loan associations also diversify financial intermediation, which is conducive to greater financial stability and regional growth (Chiaramonte et al., 2013). Local banks are also more likely to use savings to fund investment in the same region, which tends to favour development of regions with relatively low income levels. In the absence of local banking, credit rationing may hit poor regions particularly hard because of lower initial endowments, which may, for example, restrict available collateral (Hakenes et al. 2009). Savings and loan associations may also contribute to lower borrowing costs for enterprises by increasing competition. They have a long tradition, for instance in Germany, where they account for 13% of total bank assets, and in Austria (Ayadi, R. et al., 2010).

27. Twenty savings and loan associations existed in Estonia in January 2014. Their loan volume increased by more than 70% since 2012, mainly on account of rising business loans. Nonetheless, they only account for 0.1% of total lending (Eesti Pank, 2014; OECD, 2011a). Loans tend to be small on average, 6 000 euros for private individuals and 43 000 euros for companies, mostly SMEs. Savings and loan associations offer higher interest rates on deposits than banks, what makes them attractive for depositors especially in the current low interest environment. The proportion of non-performing loans is comparatively small (Eesti Pank, 2014).

28. Savings and loan associations are not supervised by the Financial Supervision Authority, as they do not have a banking licence. They are regulated by the Savings and Loan Associations Act. They accept deposits only from members and their deposits are not covered by deposit insurance. Loans may not exceed the contribution paid in by a member more than 20 times, nor may it exceed 20% of the association’s equity. This limits the growth potential of these associations. Obtaining a banking licence could help savings and loan associations to expand. However, requirements for savings and loan associations to receive a banking licence are stringent.

29. The EU banking sector directive allows for some leeway to reduce regulatory burdens on small licenced banks, regarding for instance the conditions capital instruments have to meet to qualify as Common Equity Tier 1 instruments (European Commission, 2013e; European Commission, 2013f). Also, the administrative burden and information requirements related to recovery and resolution plans can be reduced considerably for small credit institutions (European Commission, 2014b). This leeway is not being used fully in Estonia. Unnecessary barriers for savings and loan associations to apply for a banking licence should be addressed. Moreover, unlike banks, cooperatives do not benefit from an exemption of interest on deposits from personal income tax (Eesti Pank, 2014), distorting competition for deposits.

30. Several governments of OECD countries attempted to facilitate lending relationships by reducing asymmetric information between lenders and borrowers, which is particularly marked in the case of small borrowers. In some countries, independent public institutions conduct an assessment of credit worthiness, for example with the support of the central bank, as in France. Credit mediators may also be entrusted with other ‘soft’ functions, such as monitoring the financing framework, assessing the difficulties encountered by SMEs and providing advice to competent authorities. In general, credit mediation schemes depend entirely on public funding (OECD, 2013d). In the wake of the 2008-2009 global financial crisis, a number of European OECD countries introduced credit mediation schemes intended as temporary mechanisms. In France and Belgium credit mediation schemes evolved into longer term initiatives (OECD, 2013d).

31. The relatively short time of operation of these credit mediation services and the lack of firm-level data do not yet allow definitive conclusions about their economic impact to be drawn. However, available evidence suggests that credit mediation schemes have been effective in responding to the needs of SMEs that had been denied credit (OECD, 2013d; Banque de France, 2011). Such instruments may turn out to be particularly useful in economic downturns or financial crises.
Closing existing infrastructure gaps

32. Transport, communication and energy networks are key factors for internationalization and economic growth. They reduce isolation, open new markets and encourage companies to invest (European Commission, 2012). Estonia has made considerable progress in upgrading its infrastructure (World Economic Forum, 2013). Investment in infrastructure is high compared to most other EU countries (Wagenvoort et al., 2010). One reason is EU funding, which is used to a large extent to finance infrastructure projects and accounted for 4% of GDP in 2012 (Eesti Pank, 2013). However, a number of cross-border and domestic infrastructure bottlenecks remain, holding back private sector development and constraining mobility (National Audit Office, 2013b).

- Transport infrastructure links to the rest of the EU should be improved, particularly for railways, and the Baltic-Adriatic highway link further developed (European Commission, 2012). The Rail Baltica project, which will connect Estonia with the EU via high-speed railway needs to be realised without further delays (AECOM, 2011; IMF, 2014).

- Integration of Estonia in the European gas network remains weak. The Estonian gas market is small and is at present fully dependent on Russian gas imported by the monopolist company Eesti Gaas, which is majority-owned by Russia’s Gazprom (IEA, 2013). To address these weaknesses, the government has developed further plans to diversify gas imports. Plans to better integrate in the EU gas networks and install a regional liquefied natural gas terminal together with Finland should be implemented rapidly to enhance the security of supply. This is of increasing importance in an uncertain geopolitical environment; with the share of renewable energies continuing to rise; and domestic oil shale being increasingly used for fuel instead of electricity production.

- Estonia has made considerable progress with integrating in the European electricity market. Two electricity transmission links with Finland already operate. However, synchronised operation within the EU electricity network is not envisaged before 2025. This requires cooperation with EU countries in the region (IEA, 2013).

- Funding for domestic infrastructure projects was primarily directed to large projects, which can be financed with EU funds, leaving fewer funds for smaller rural projects. There is evidence that some EU-funded projects have been designed too large (National Audit Office of Estonia, 2013a). Instead, the quality of the road and rail network is low, particularly in rural areas (European Commission, 2012); the availability of high-speed broadband seems to be limited in rural areas (OECD, 2013b); and investment in renovation is low (National Audit Office of Estonia, 2013b). This suggests that there is scope to improve monitoring and decision making on how infrastructure projects are selected. As Estonia continues to upgrade its infrastructure, it should be ensured that sufficient funding is directed towards balanced regional development. This could also help to overcome the spatial mismatch of jobs and job searchers.

- Continued efforts are needed to better connect transport modes, including railway, ports and airports (European Commission, 2012). Insufficient connection of modes may limit mobility and constrain economic activity and exports. There is also scope to harmonise travel schedules of different transport modes (European Commission, 2013b).

- Gaps in public water supply and sewerage treatment remain, despite large investments over the past decade. Waste water is still not collected in the required quantities and its treatment does not always meet requirements. Access to drinking water of sufficient quality is not guaranteed in some areas (National Audit Office of Estonia, 2013c). This is reflected in a fairly low satisfaction
with water quality (OECD, 2013g). Remaining gaps in the provision of high quality drinking water and sewerage treatment should be closed.

Reducing CO₂ emissions and energy consumption

The efficient use of energy can raise competitiveness by bolstering innovation and reducing costs, including those of environmental damage (OECD, 2011d). The cost of high energy use will increase when CO₂ prices in the European Union’s emissions trading system rise from currently unsustainably low levels. It has also an important environmental dimension. Greenhouse gas emissions per unit of GDP are less than half the 1990 level but remain among the highest in the OECD (Figure 10). High emissions are largely due to the use of oil shale especially in electricity generation, of which part is exported, as well as in heating and industrial process use. Estonia has large oil shale reserves and is the only country in the world in which oil shale is the primary source of energy, covering 70% of energy demand. Exploiting these reserves has contributed to meeting energy security objectives. However, the CO₂ intensity of oil shale combustion is particularly high. CO₂ emission intensity of electricity and heat is among the highest in the OECD (IEA, 2013), whereas emissions in transport are comparatively low (OECD, 2013e). The amount of CO₂ emissions and oil shale ash created per unit of oil shale energy and heat production has increased by 11% between 2007 and 2012 (National Audit Office of Estonia, 2014b).

Figure 10. Greenhouse gas emissions and energy consumption

1. Data refer to gross direct emissions including emissions from land-use, land-use change and forestry (LULUCF). Removals/sequestration of greenhouse gas through LULUCF are deducted.
2. It refers to total primary energy supply and equals production plus net trade minus international bunkers plus or minus stock changes.

34. High CO$_2$ emissions may become very costly in the future. Carbon prices in the European Union’s emission trading system are likely to rise when economic activity strengthens in Europe and stricter CO$_2$ emissions targets are applied. Estonia has set a target for greenhouse gas emissions in sectors outside the European emissions trading system (ETS) for 2020, which limits their growth to 11% from the level in 2005. While the government expects to meet this target on current policies, more ambitious emission targets may have to be met beyond 2020 in the context of targets set by the European Union (OECD, 2014a). Estonia has also committed to increasing the share of renewable energy to 25% of gross final energy consumption. It reached 14.1% in 2012, with the largest part being generated by the use of biomass, mainly for heating purposes (IEA, 2013).

**Reviewing tax incentives to promote energy efficiency**

35. Implicit carbon tax rates, defined as tax revenue per tonne of CO$_2$, are low on average and vary considerably across energy sources and uses. Tax rates on fossil fuels used in heat and electricity generation are much lower than on transport and these differences are bigger than in many other OECD countries (OECD, 2013e). Moreover, oil shale used for heat production and electricity generation is taxed at lower rates than other fossil fuels (IEA, 2013; OECD, 2014a). Natural gas is only taxed when used for heating; instead, coal used for heating is untaxed. Also, gasoline is taxed at a higher rate than diesel, both in terms of energy and CO$_2$ content. Tax rates should reflect the CO$_2$ emission content of each energy source to provide effective price signals (OECD, 2013e). This can be a gradual process, provided a firm commitment to future increases is made.

36. More efforts are needed to identify and internalise externalities generated by oil-shale use (National Audit Office of Estonia, 2014b). Important goals of the government’s oil shale development plan have not been achieved, including to mine and use oil shale more efficiently and reduce the environmental impact thereof (National Audit Office of Estonia, 2014b). It is welcome that the government envisages a new oil shale development plan and intends to increase taxes on oil-shale related activities which damage the environment. Raising taxes on oil shale use and harmonizing tax rates according to the CO$_2$ emission content of energy sources would help to encourage processing oil shale into lighter oil products instead of using it for electricity generation which would reduce CO$_2$ emissions from oil shale use by two-thirds (IEA, 2013). Also, continued R&D investment is needed to lower the carbon intensity of the Estonian economy, including by the private sector and Eesti Energia (IEA, 2013). Further efforts are also needed to internalise the costs of reusing or recycling the considerable waste amounts generated in oil shale use (National Audit Office of Estonia, 2013a). Moreover, it should be ensured that the state receives an appropriate share of revenues from oil shale mining and use (National Audit Office of Estonia, 2014b).

37. Fuel poverty is of increasing concern as energy costs rise (Thomson, 2013; Association for the Conservation of Energy, 2013). It is usually defined as the percent of household disposable income spent on energy; for instance more than 10% is often characterised as energy poverty. Low-income households should receive more financial support for energy-saving investments, such as for the purchase of energy-saving household appliances (IEA, 2012). Currently subsidies are available only to improve energy efficiency of family houses and apartment buildings by Kredex (see Box 1). Subsistence payments should be regularly adjusted for changes in energy prices, for instance due to increases in energy taxes. This would preserve incentives to save energy.

**Enhancing energy efficiency of district heating and buildings**

38. Emissions can be reduced considerably by improving energy efficiency in district heating (European Commission, 2013b). The sector is predominantly operated by privately owned entities and, in some areas, municipalities. Losses in heat networks, to which 70% of the population are connected, amount to 22% (IEA, 2013). The government’s plans to introduce regulation which will provide networks
with incentives to reduce losses to 15% by 2017 are welcome. The government has also proposed draft regulation that encourages the use of renewable biomass in district heating.

39. Regulation of heat networks should be reviewed for scope to raise incentives for efficiency improvements. Currently, regulation of prices is based on an ex-ante cost-based principle, which may entail limited incentives to invest (Egert, 2009; IEA, 2013). It should be considered whether incentives for efficiency improvements in the network could be enhanced, for example by penalizing operators which fail to attain ambitious efficiency benchmarks (yardstick competition). Using the costs and quality standards achieved by other service providers for regulating prices of each service provider generates incentives to improve quality and reduce costs. These incentives are partly lost if price regulation is based on each provider’s own costs (OECD, 2006).

40. There is scope to raise incentives of households and building owners to invest in energy efficiency of buildings. Many district heating systems have inadequate or no metering. Also, landlords have few incentives to invest in efficiency improvements which will mainly benefit the tenant. Tenants have few incentives to make investments in a residential property they do not own. The government may need to adopt targeted measures to address “split incentives” between landlords and tenants. For instance, tax incentives may be provided to landlords or it should be ensured that investment costs can be passed on to the tenant or beneficiary of the reduced energy bills (OECD, 2008a; IEA, 2012). Moreover, customers with obligatory connections to district heating systems may be prevented from investing in economically justified high-efficiency alternatives. Some local governments establish district heat supply areas, in which customers cannot change the type of heat supplied unless they switch to renewable energy (IEA, 2013).

**Behaviourally informed policies can promote energy efficiency**

41. Traditional incentive and regulatory instruments can be effectively supplemented by behavioural regulatory measures in many cases, including to promote energy efficiency. Behaviourally informed regulation, while preserving free choice, aims at designing the decision context so to make better-informed decisions more likely. Often behaviourally informed policies are low-cost and strengthen the effectiveness of incentives provided, for example, by taxes or regulation. Though, their design may require considerable research efforts. An empirical approach, using local policy trials and experiments to test behaviourally informed ideas is most promising, as experience from other countries suggests (Lunn, 2014). For instance, in the UK behaviourally informed policy instruments are used to encourage households to install better insulation in cases where there is a tendency to underinvest (Box 2). Upgrading energy efficiency of buildings is one of Estonia’s most significant energy efficiency challenges.

**Box 2. Using behavioural science to encourage investment in insulation – evidence from the UK**

The UK Behavioural Insights Team, which acts as an internal consultancy for UK policy makers, has organised a series of trials that use behavioural science to encourage households to install better insulation (Lunn, 2014). The primary problem to overcome, according to behavioural economic research, is that householders are likely to weigh immediate costs disproportionately relative to benefits that only accrue over many years. While individuals tend to be sure of immediate costs, they may be more uncertain about the scale of future benefits than available data warrant. Moreover, when individuals are unsure about decisions, they often copy the decisions of others around them. This strengthens the impact of policies improving informed decision-making.

The UK Behavioural Insights Team, in partnership with local authorities and retailers, used this evidence to design and test four behavioural mechanisms for their potential to increase the take-up of insulation: an upfront reward (for instance in form of a voucher or a one-month holiday from local taxation); discounts for signing up neighbours for energy efficiency improvements; community rewards for signing up additional households; and subsidised loft clearance. While full comparative results are not yet published, one perhaps surprising finding to emerge from the trials is that the impact of subsidising loft clearance turned out to be particularly strong, resulting in a four-fold increase in the probability of installing loft insulation.
Estonia should consider engaging more in local policy trials and experiments to promote energy efficiency through behaviourally informed policies. Such policies may be designed and monitored by a Behavioural Policy Unit, following the example of the UK Behavioural Insights Team (see Box 2). Information policies may also help to realise considerable energy saving efforts, for example by providing a regular indication of energy costs to households, even in cases where end-user metering is not economic (IEA, 2013).

Box 3. Recommendations to raise productivity and benefit more from openness

Reaping more benefits from innovation
- To strengthen knowledge transfers to domestic firms, promote applied research and improve collaboration with domestic and foreign institutions conducting applied research. Move ahead with the open data initiative.
- To raise the effectiveness of innovation policies, ensure inter-ministerial working groups are held accountable and their performance is regularly reviewed. Assess the need for an independent review and advisory body on microeconomic policy reform and regulation with the aim of achieving better informed policy decisions.
- Enhance effectiveness of evaluation of innovation policies by incorporating monitoring and evaluation already at the design stage. Test individual instruments through pilot projects.
- Extend the impact assessment of regulations to systematically capture implications for trade and investment.
- Promote international and applied management skills and enhance the teaching of skills to run a business at school.

Removing barriers to entrepreneurship
- Shorten corporate insolvency procedures and improve their efficiency. Strengthen expertise to deal with complex insolvency cases, for example by giving courts the power to require the creditor to pay for experts. Review the need for a specialised bankruptcy court.
- Continue efforts to identify and remove entry barriers in services that hold back competition and growth, including in professional and transport services. Consider relaxing restrictions on land purchases by non-EU citizens with a permanent residence permit. Promote the use of English in the administration.
- To remove barriers to SME lending, consider making it easier for savings and loan associations to apply for a banking licence. For instance, reduce capital requirements and requirements for recovery and resolution plans. Tax returns on bank deposits equally across all banks. Assess the need of a credit mediation programme.

Removing remaining infrastructure bottlenecks
- Implement plans to expand access to European high-speed rail networks and energy supply facilities.
- Provide sufficient funding for small, rural infrastructure projects. Improve inter-modal transport connections. Close remaining gaps in the provision of high quality drinking water and sewerage treatment.
- Raise efforts to monitor the effectiveness and efficiency of infrastructure spending.

Raising energy efficiency
- Gradually align and raise tax rates on the various energy sources according to their CO₂ emission content. Ensure income support for low income households accounts for the impact of higher energy costs on poverty risks.
- Continue efforts to process oil shale into lighter oil products instead of using it for electricity generation. Internalise all social and environmental costs of oil shale.
- Strengthen incentives to improve efficiency in the regulation of heating networks.
- Strengthen incentives to invest in energy efficiency of buildings.
- Consider engaging more in local policy trials and experiments to promote energy efficiency through behaviourally informed policies.

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