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Energy Union Factsheet Estonia

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COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE, THE COMMITTEE OF THE REGIONS AND THE EUROPEAN INVESTMENT BANK

Third Report on the State of the Energy Union

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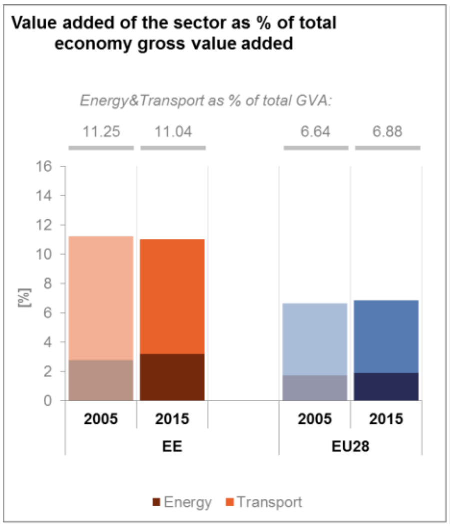
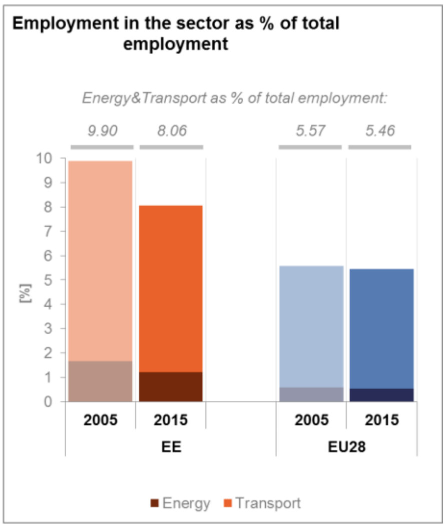
Estonia

Energy Union factsheet[1]

1. Macroeconomic implications of energy activities

Energy and transport are key sectors for the overall functioning of the economy as they provide important input and service to other sectors of the economy. The combined activity in these two sectors[2] accounted for 11 % of the total value added of Estonia in 2015. Similarly, their share in total employment[3] was 8 % in 2015, of which 6.8 % in the transport sector and 1.2 % in the energy sector.





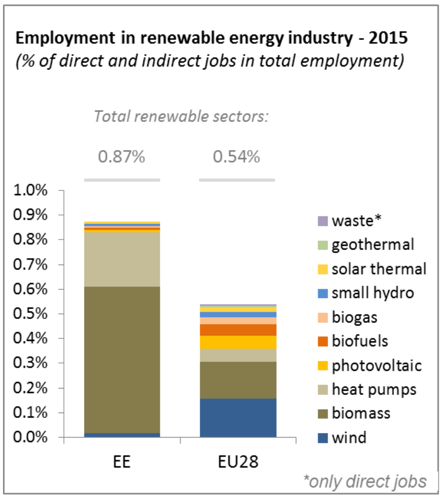
The decarbonisation of the energy and transport sectors will require significant investments and a shift in economic activities beyond these two sectors. The energy transition implies a structural shift in economic activity. Energy-related investment and jobs will in part migrate from traditional fossil fuel based activities towards construction, equipment manufacturing and other services related to the deployment of low carbon and clean energy technologies At the moment the efforts related to the energy transition in other sectors can only be partially quantified and are therefore not included.

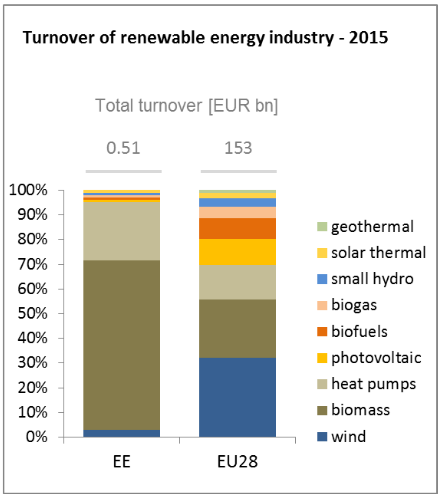
In the case of renewable energy sector, both the direct as well as the indirect effects on employment are being estimated. According to EurObserv'ER, in 2015, the share of direct and indirect renewable energy related employment in total employment of the economy in Estonia was 0.87 %, above the EU average of 0.54 %. The turnover of the renewable energy industry in the same year was estimated at around EUR 500 million, the largest part being attributed to biomass followed by heat pumps.

[1] The indicators used in this country factsheet largely build on indicators developed for the Commission Staff Working Document "Monitoring progress towards the Energy Union objectives – key indicators" (SWD(2017) 32 final) https://ec.europa.eu/commission/sites/beta-political/files/swd-energy-union-key-indicators_en.pdf

[2] Gross value added and employment in NACE sectors D-Electricity, gas, steam and air conditioning supply and H-Transportation and storage

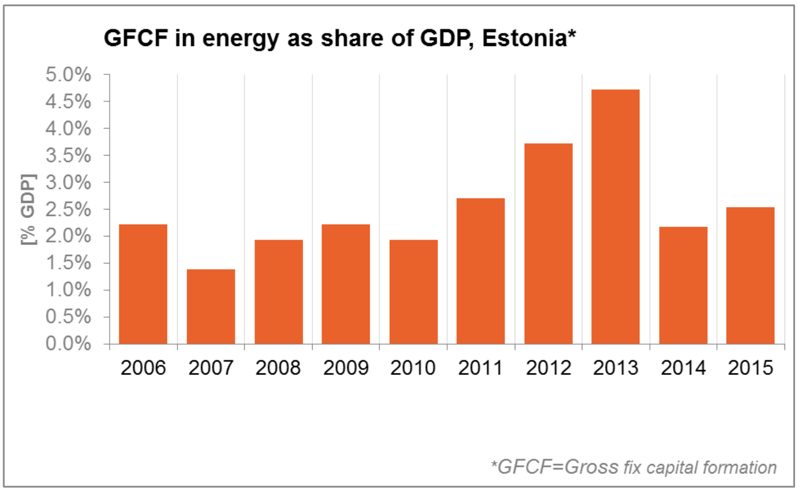
[3] National accounts, Eurostat





(source: EC based on Eurobserv'Er and Eurostat)

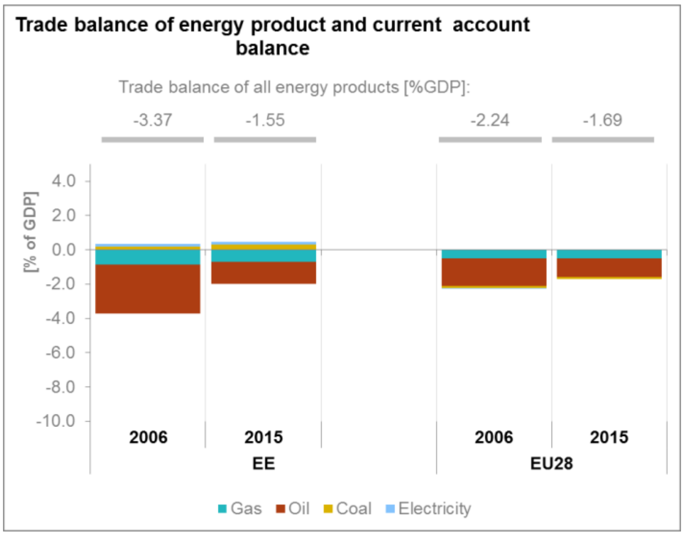
An indication of the level of efforts made and challenges encountered by Estonia in the energy sector is given by the Gross fixed capital formation (GFCF).[4] Investment in the electricity and gas sectors, which are taken as reference sectors, amounted to about 2.5 % of the country's GDP in 2015.



(source: Eurostat)

In terms of trade, Estonia is a net importer of fossil fuels and a net exporter of shale oil and electricity. The overall trade deficit in energy products has fallen from about 3.4 % of GDP in 2006 to 1.6 % in 2015, under the influence of falling oil prices and a decrease in oil imports.

[4] Gross fixed capital formation consists of resident producers´ acquisitions, less disposals, of fixed tangible or intangible assets. This covers, in particular, machinery and equipment, vehicles, dwellings and other buildings. It also includes foreign direct investment (FDI). Steam and air conditioning supply are also included in the figures mentioned above as Eurostat reports electricity, gas, steam and air conditioning supply together.

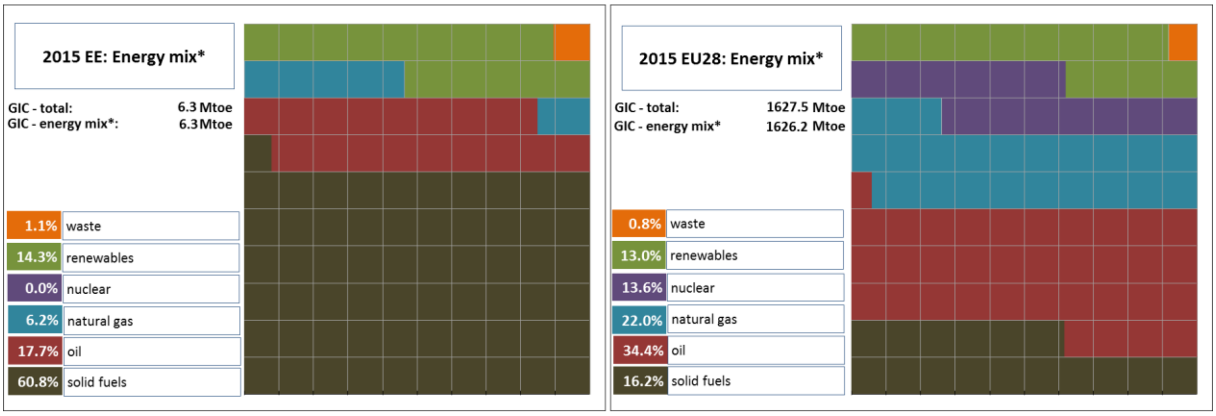


(source: Eurostat)

2. Energy security, solidarity and trust

2.1. Energy Mix

In comparison with the EU's average energy mix, the energy mix of Estonia is characterised by a much higher share of solid fuels (due to the use of shale oil) and a much lower share of petroleum products. The share of renewables in gross inland consumption is 14.3 %, higher than the EU average. The share of natural gas in Estonia's energy mix is 6.2 %, less than a third of the EU average (22 %). Estonia does not generate nuclear energy.



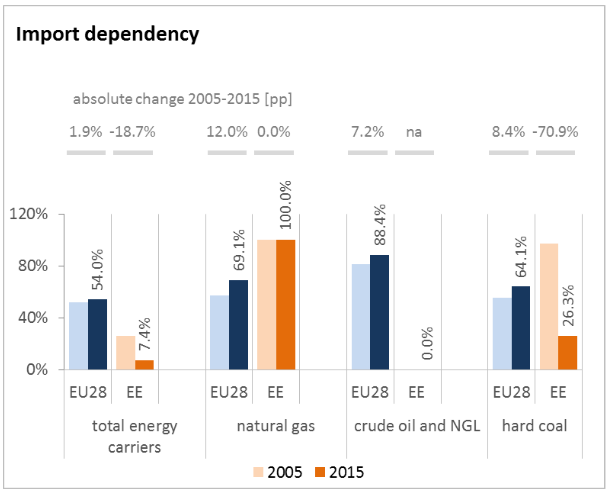
*energy mix as share share in GIC-excluding electricity and derived heat exchanges, GIC=gross inland consumption

(source: Eurostat)

2.2. Import dependency and energy security

7.4 % of Estonia's energy consumption comes from imports, much less than the EU average. The country remained highly dependent on direct imports of natural gas from Russia in 2015. At the same time, Estonia imported 20.3 % of the consumed natural gas through Lithuania. However, gas only represents 6.2 % of gross inland consumption and plays a marginal role in total energy imports. The dependency for solid fuels and petroleum products has decreased, mainly due to Estonia's domestic oil shale production and biomass use.

The overall import dependency of Estonia decreased 18.7 % between 2005 and 2015, while at the EU level, import dependency increased by 1.9 percentage points over the same period.



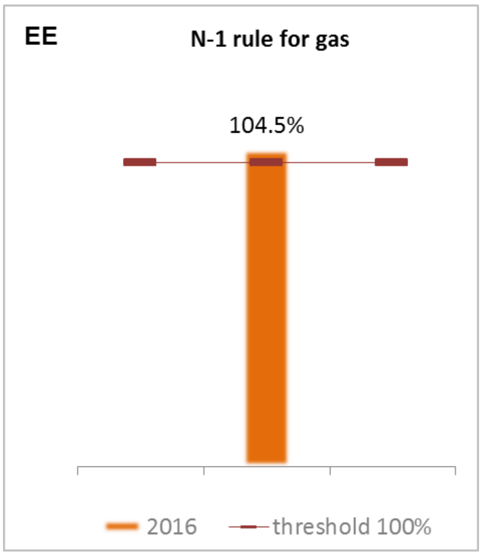
2015: Top non-EU suppliers for main energy carriers*

Natural gas		Crude oil and NGL		Hard coal	
EE	EU28	EE	EU28	EE	EU28
Russia 100.0%	Russia 37.3%		Russia 28.8%	Russia 100.0%	Russia 29.1%
	Norway 32.8%		Norway 12.4%		Colombia 24.3%
	Algeria 10.7%		Nigeria 8.3%		United States 16.0%

*share in total imports for the MS and in total non-EU imports for the EU28

(source: Eurostat)

The security of gas supply Regulation requires that, if the single largest gas infrastructure in one Member State fails, the capacity of the remaining infrastructure is able to satisfy total gas demand during a day of exceptionally high gas demand. Estonia complies with this requirement.



(source: Gas Coordination Group)

3. Internal market

3.1. Interconnections and wholesale market functioning

3.1.1. Electricity

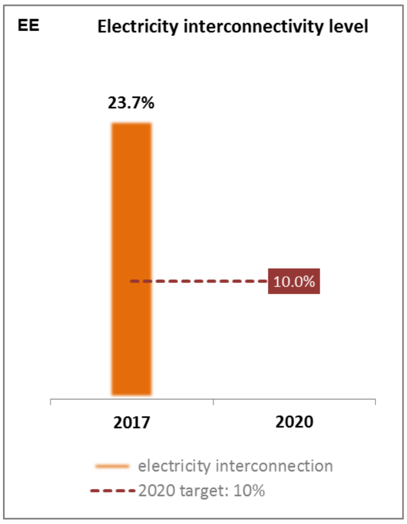
Estonia is part of the Nordic and Baltic wholesale electricity market. The interconnection capacity for electricity in the Baltic States increased to around 10 % after the Estlink2 interconnection with Finland entered into operation in 2014. Once the LitPol Link (connecting Lithuania and Poland) and

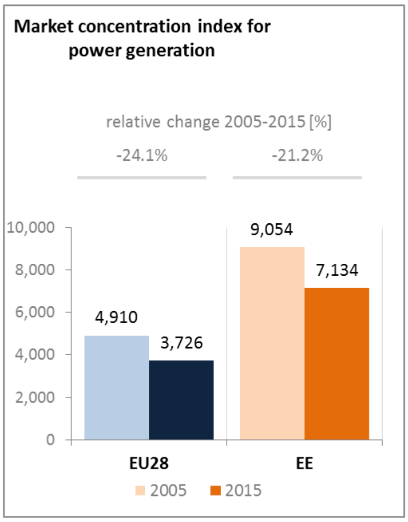
NordBalt (connecting Lithuania and Sweden) began operating in 2015, the interconnection capacity[5] rose to around 23 % for the three Baltic States together. Furthermore, the launch of the Estlink 2 interconnection has remarkably increased Estonian connectivity with the Nordic power market.

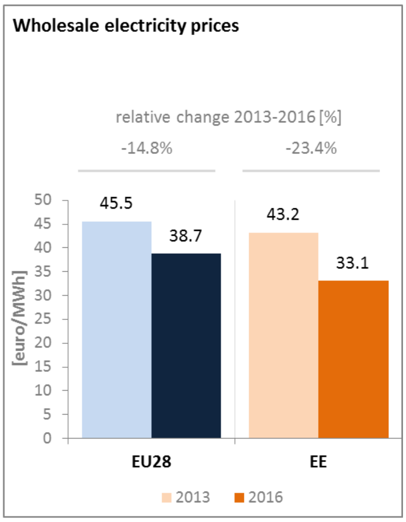
Thus in 2017 the electricity interconnection level of Estonia was 23.7 %, well above the 2020 target of 10 %. Better interconnection has increased competition and at the same time benefitted Estonian electricity consumers. Nevertheless, the limited capacity of the interconnection between Estonia and Latvia has an adverse impact on the electricity markets of Estonia and other Baltic states. Several projects in the region have received the label of Projects of Common Interest (PCI) in the framework of the trans-European energy networks policy. They are expected to contribute to enhancing security of supply, effectiveness of operation and competitiveness of the electricity markets in the entire Baltic region. The transfer capacity on the Latvian – Estonian border will be improved and the existing bottlenecks will be removed in several steps by 2020, 2024 and 2025 through the construction of the Estonia-Latvia 3rd interconnection and the enhancement of transfer capacity of internal lines within the Baltic States.

Market concentration in electricity and gas markets is higher than the EU average. The Estonian electricity market was fully liberalized at the beginning of 2013, eliminating regulated prices and opening the market to competition. Estonia is part of the Nord Pool Spot power exchange and from 2013 all the prices have been determined by the market.

In 2016, wholesale electricity prices were below the EU average, and between 2013 and 2016 they recorded a higher decrease than the EU average (23.4 % in Estonia vs 14.8 % in the EU as a whole).







(source: EC based on ENTSO-E scenario outlook and adequacy forecast 2014)

(sources: EC services based on Eurostat for the left graph and based on Platts and European power exchanges for the right graph)

[5] The interconnectivity level is calculated as a ratio between import interconnection and net generation capacities of the country (i.e. the 2017 value is the ratio between simultaneous import interconnection capacity [GW] and net generating capacity [GW] in the country at 11 January 2017, 19:00 pm as resulted from ENTSO-E Winter Outlook 2016/2017). For the three Baltic states it is considered the common interconnection level witht the rest of the EU.

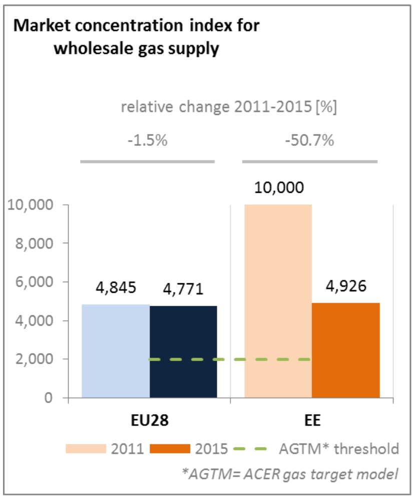
In 2015, the three Baltic States agreed on a common strategic goal: the synchronisation of their power systems with the European network. It is recognised as a self-standing objective of the reinforced BEMIP cooperation (Baltic Energy Market Interconnection Plan) as it would contribute to achieving a fully functioning and connected internal energy market and to increasing energy security in the electricity and gas sectors of the Baltic States. A dedicated BEMIP Working Group was set up supported by the Commission to work on the identification of the most cost-efficient synchronisation scenario that ensures system stability. The infrastructure element of the synchronisation of the Baltic States' electricity system with the European network has been included in the 3rd list of Projects of Common Interest.

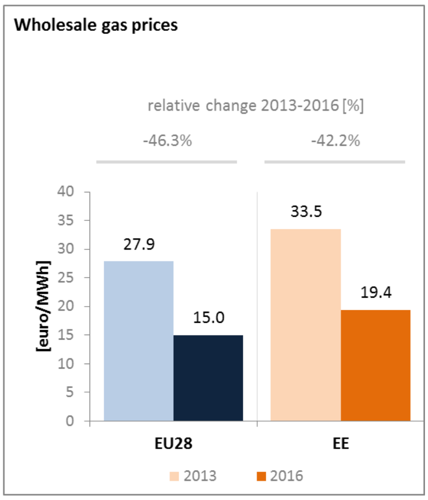
3.1.2. Gas

Estonia has natural gas network connections with Russia and Latvia. Through the Klaipeda LNG terminal Estonia already has access to new sources of gas, ending its previous isolation in the gas sector. Besides the existing Klaipeda LNG terminal, there are plans for other LNG projects to be developed in the coming years.

The ongoing construction of the Poland–Lithuania gas interconnector (GIPL) will provide a pipeline connection between the Baltic States and the EU gas transmission network and the natural gas pipeline Balticconnector between Finland and Estonia will further increase security of supply and diversification in the region. Additionally, the Baltic States and Finland are engaged in a project to create a broader regional gas market.

Wholesale gas prices have decreased the last few years, but remain above the EU average. Estonia's gas market is liberalised from 2007. In addition, Estonia finished unbundling the vertically integrated TSO from natural gas supply in 2015. The natural gas market remains very small (below 1 bcm). Four companies now have licenses for importing gas. It is expected that competition on the gas market will improve once the broader regional gas market is established.





(source: ACER for the left graph and EC services based on Platts, gas hubs, Eurostat for the right graph)

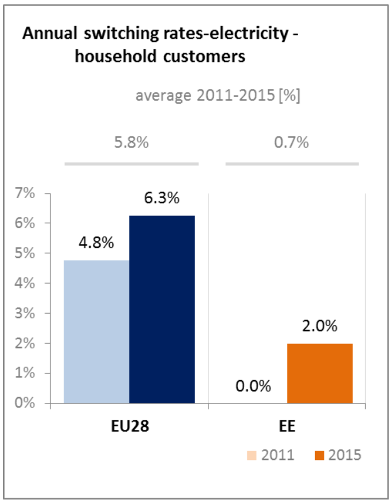
3.2. Retail electricity and gas markets

3.2.1. Electricity

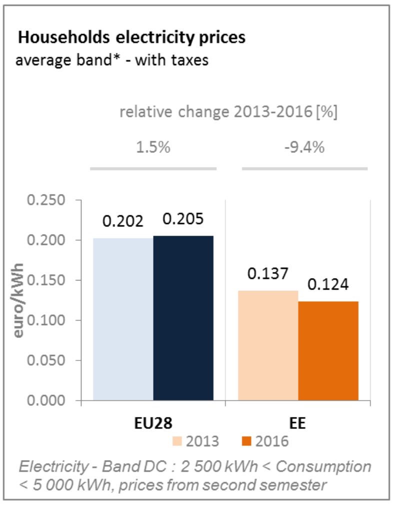
On 1 January 2013 the electricity market opened to competition, and currently there are 16 suppliers of electricity on the market.

In 2016, electricity prices for households in Estonia were below the EU average. Between 2013 and 2016, average retail electricity prices decreased slightly. The annual switching rate by consumers from one electricity supplier to another is less than a third of the EU average: in 2015 only 2 % of household consumers switched electricity supplier.

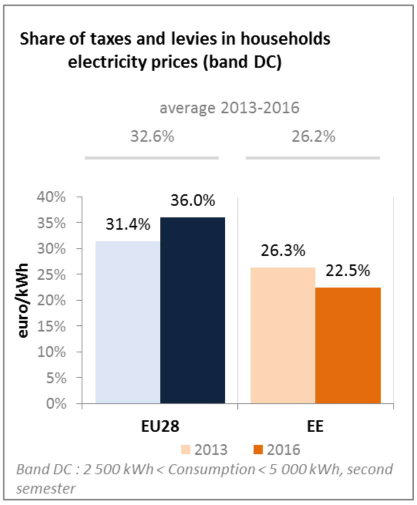
The roll-out of smart metering is complete and since 1 January 2017 all consumers have remote reading devices. The roll-out of smart meters along with utilising an innovative data hub has been a real success story enabling a decrease in grid losses and network tariffs. One third of Estonian electricity consumers are buying electricity with spot prices/choosing dynamic price contracts.



(source: ACER)



(source: Eurostat)

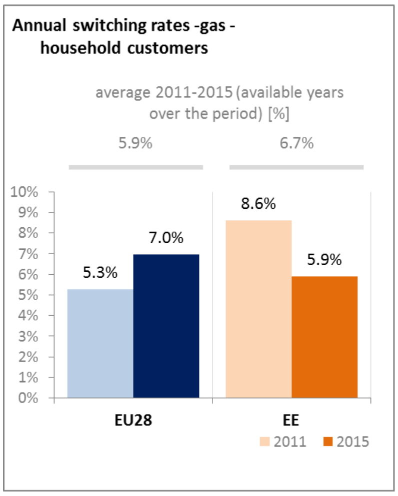


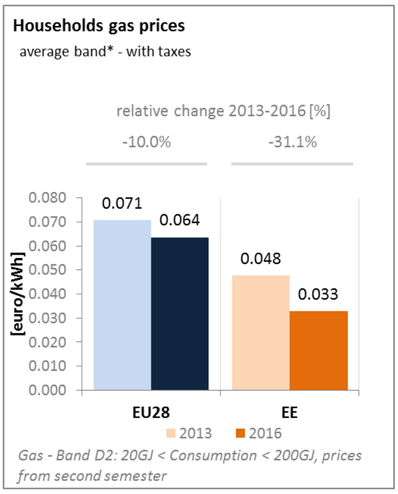
(source: Eurostat)

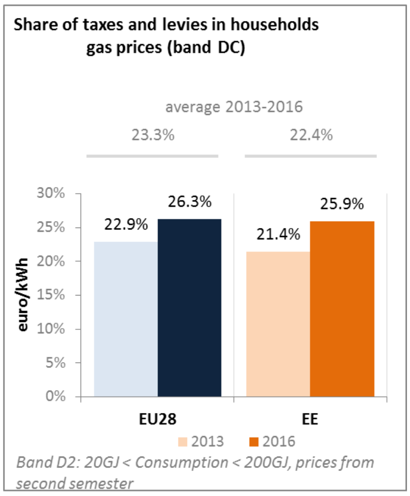
3.2.2. Gas

Estonian gas market is still highly dependent on Russia and is dominated by one supplier (AS Eesti Gaas), although in 2015, due to the emergence of new importers in the market, the share of Eesti Gaas in the retail market had decreased to 77.7 % (compared to 93.4 % in 2014). There are currently 36 retailers of gas on the Estonian market.

In 2015 household gas prices were significantly below the EU average despite higher wholesale price. In 2015 the switching rate of gas household customers (5.9 %) was almost three times higher than for electricity customers (2 %), but remained lower than the EU average (7 %).



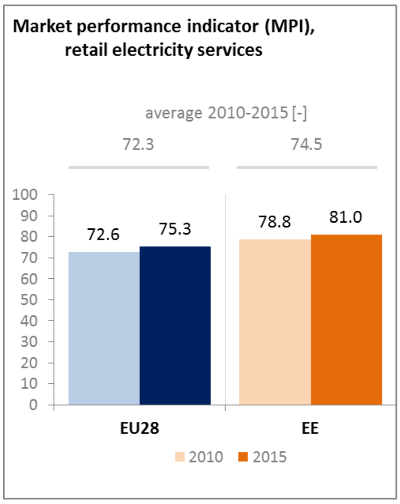


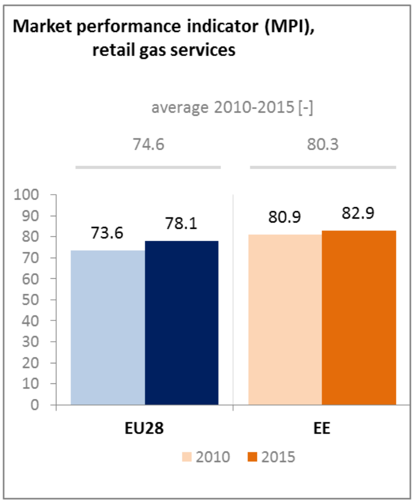


(source: ACER) *(source: Eurostat)* *(source: Eurostat)*

3.2.3. Market performance indicators

According to the periodical survey of DG JUST, the Estonian consumers are more satisfied than the EU average about the services received in energy retail markets.





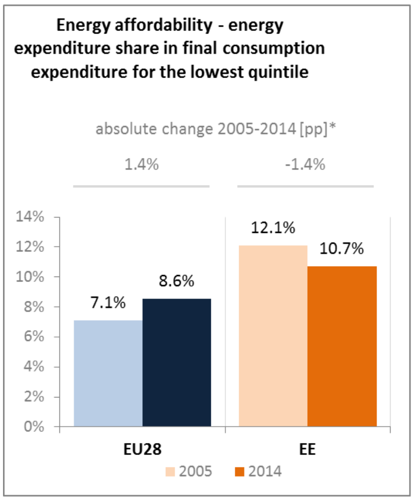
(source: DG JUST survey)

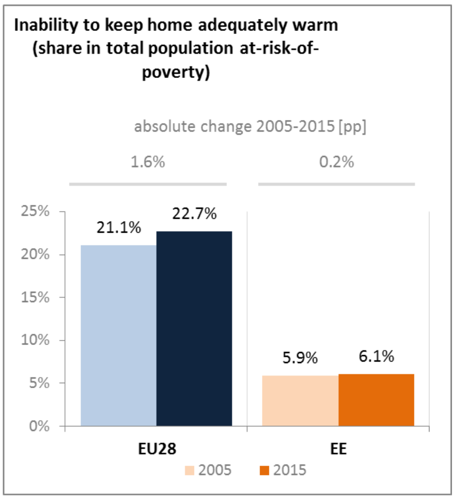
3.3. Energy affordability

Energy poverty in Estonia is measured by the ability to keep the home adequately warm is far lower than the EU average. Therefore, only 6.1 % of citizens below the "at-risk-of poverty" threshold consider that they are unable to keep their home adequately warm.

In Estonia, climate conditions result in significant heating needs which contributes to the fact that the share of energy in total household expenditure in the lowest quintile (in terms of income) of the population is higher than the EU average and the 20 % of the poorest households spend 10.7 % (EU-28: 8 %) of their income on domestic energy services (at 2012 level, the latest available figures for Estonia).

Effective and targeted measures to protect vulnerable and low-income consumers are in place.



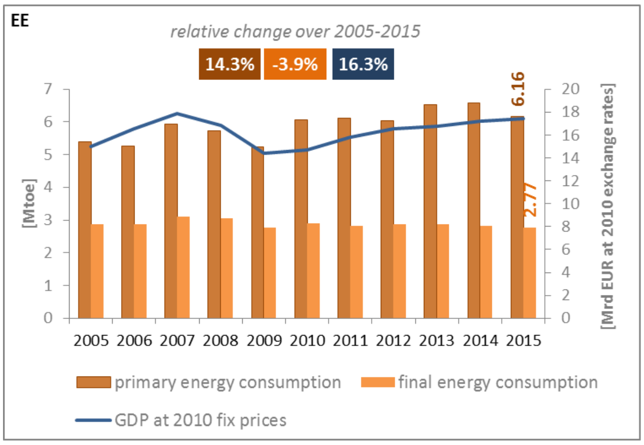


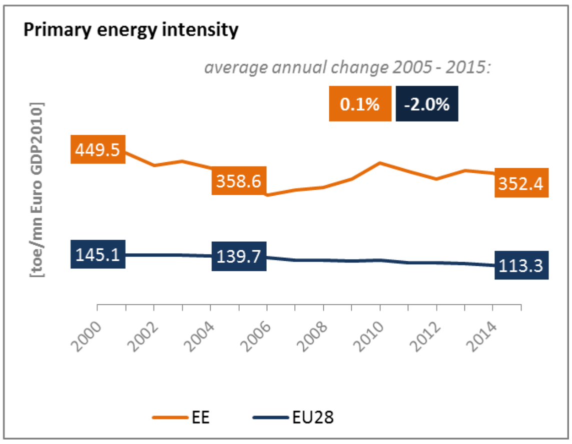
(source: ad-hoc data collection of DG ENER based on HBS with the support of Eurostat and national statistics)

4. Energy efficiency and moderation of demand

Estonia has achieved levels of primary and final energy consumption (6.2 and 3 Mtoe respectively) that are below its national targets (6.5 and 2.8 Mtoe respectively), but maintaining these levels until 2020 will remain a challenge. The slight increase in international oil prices has made the country's oil shale sector competitive again, and this could have an impact on Estonia's primary energy consumption. However, there is a great potential for energy savings in residential buildings, energy distribution, the service and transport sectors.

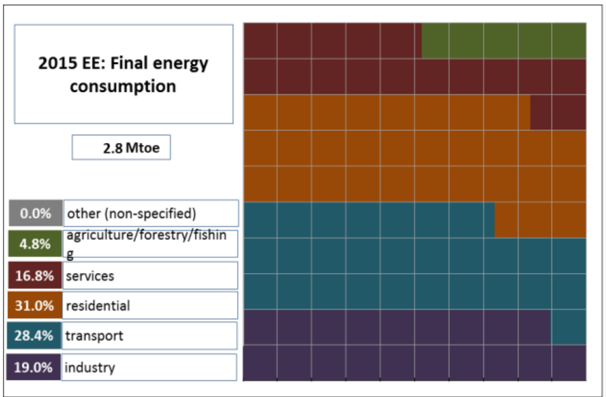
Estonia experienced the largest annual increase of primary energy consumption in the EU between 2005 and 2015, with primary energy use amounting to 6.16 Mtoe in 2015. Similarly, primary energy intensity in Estonia increased from 2005 onwards and remains significantly above the EU average. Over the same period, final energy consumption decreased by 3.9 % to 2.77 Mtoe in 2015.

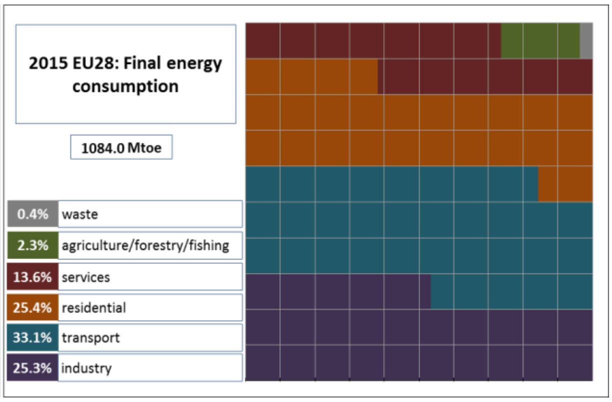




(source: Eurostat)

In 2015, the residential sector was the largest energy consuming sector in Estonia, representing 31 % of total final energy consumption, which is above the EU average (25.4 %). In 2015 the energy consumption of Estonia's transport sector was at 28.4% of total final energy consumption, below the EU average of 33 %. The Estonian energy consumption of the services sector (16.8 %) is also above the EU average (13.6 %). In contrast, the final energy consumption in the industrial sector in Estonia (19 %) is below the EU average (25.3 %).

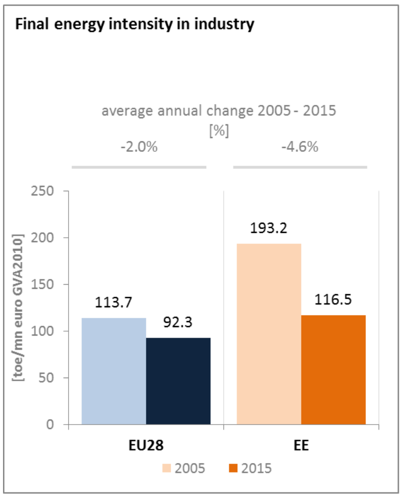


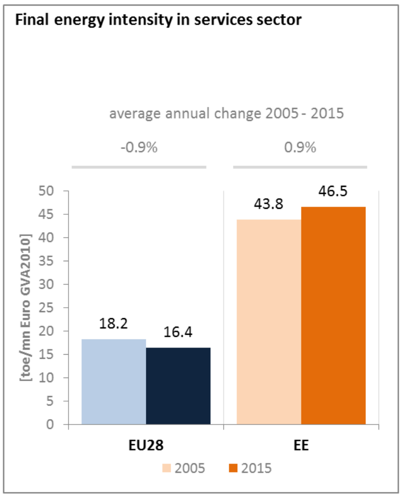


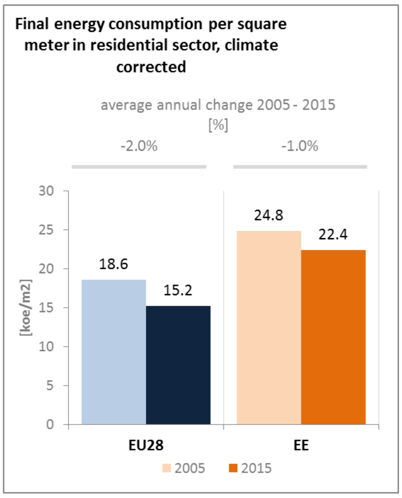
(source: Eurostat)

Nevertheless, a high energy intensity reduction is recorded in the industrial sector, i.e. about 40 % between 2005 and 2015, significantly more than the average energy intensity reduction in the EU.

Specific energy consumption by households and the energy intensity of the services sector are above EU average and remained quasi-stagnant from 2005 onwards.



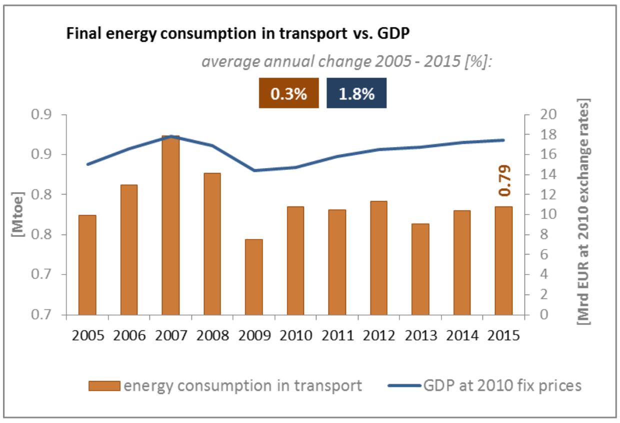


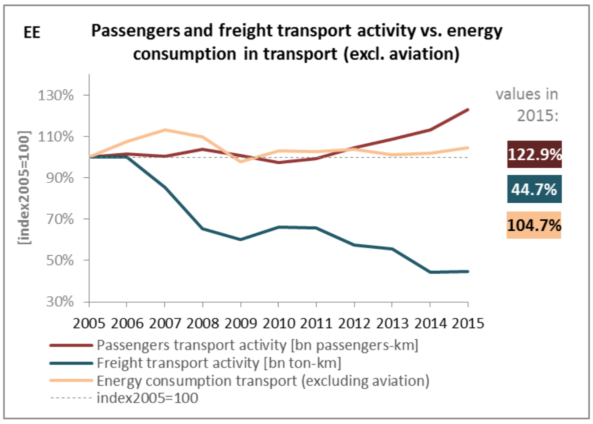


(source: Eurostat) (source: Eurostat) (source: Odyssee database)

In transport, between 2005 and 2015, the final energy consumption in Estonia recorded an average annual increase of 0.3 %, slower than the 1.8 % average annual increase of the GDP.

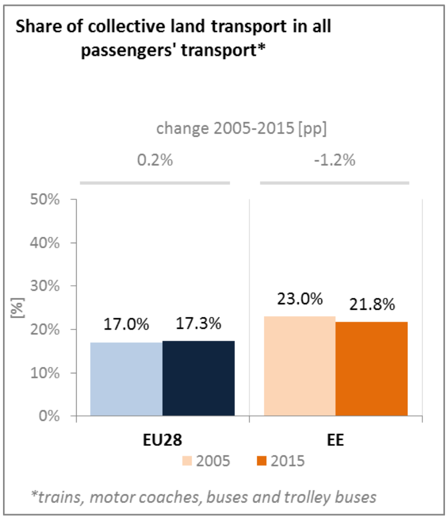
Passenger transport activity in 2015 was 22.9 % above the 2005 level. On the other hand, freight transport activity has decreased consistently since 2005, by about 44.7 %. Between 2005 and 2015, the share of collective land transport has decreased by 1.2 % while it remained almost constant in the EU as a whole.





passengers transport activity=Private cars + bus + rail + tram & metro
freight transport activity=road+rail+inland waterways+pipeline

(source: Eurostat) (source: Eurostat and DG MOVE pocketbook)



(source: Eurostat)

Estonia has made progress promoting public transport; its main policy measure is to reduce air pollution and energy consumption in transport. The introduction of new inter-city and sub-urban trains and upgrading the infrastructure has brought along a considerable (17 %) increase in use of passenger trains[6]. Similarly, the introduction of free public transport in the capital – Tallinn - has increased the use of public transport by 13 %[7]. Estonia is also in the process of changing its Public Transport Law legalising collaborative economy in passenger transport and is preparing an amendment to Traffic Law to allow delivery robots on roads. The energy labelling scheme for new passenger cars was introduced in 2016.

Investments in transport infrastructure depend mainly on EU funds and are focused on a small number of major projects such as Rail Baltic, which is a project of high strategic importance to all three Baltic States and has high priority under the CEF instrument. Coordinated implementation of the project is progressing, with a target completion date of 2025.

Estonia is facing challenges in reaching its 2020 goal of 10 % renewable energy in the transport sector, and the current level remains under 1 %. Nevertheless, Estonia continues to promote the use of bio-methane.

Currently, there is no transport related taxation to improve energy efficiency or to reduce emissions of CO_2 in Estonia. However, the country is gradually increasing the excise tax on motor fuel and is also preparing a time-based road charging scheme for heavy goods vehicles (HGV) above 12t (covering an estimate of 75% of all HGVs registered in Estonia) for possible implementation in 2018.

5. Decarbonisation of economy

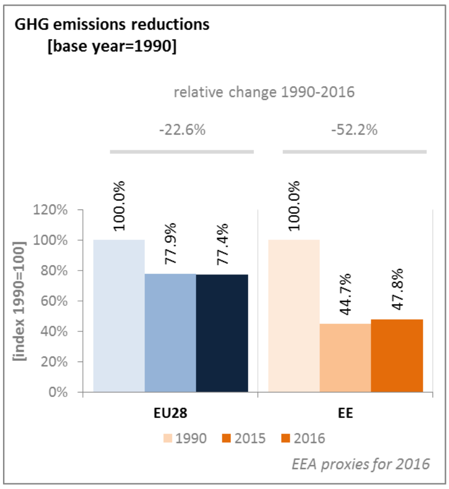
5.1. GHG emissions

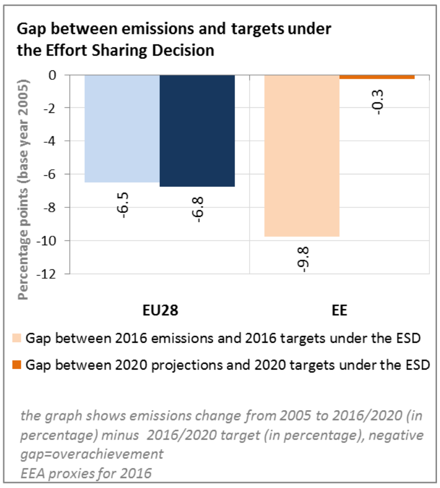
According to preliminary estimates, greenhouse gas emissions in sectors not covered by the EU Emissions Trading System increased by 8 % between 2005 and 2016. According to the latest national

[6] For Elron trains, from 5.8 million in 2014 to 6.8 million passengers in 2016 (http://elron.ee/elron/organisatsioon-2/)

[7] 2012-2015, based on a poll by Turu Uuringute AS

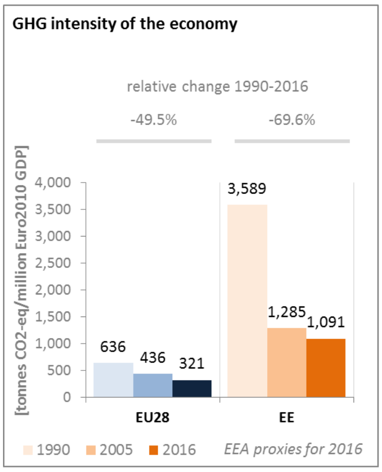
projections based on existing measures, non-ETS emissions will increase by 11 % between 2005 and 2020. The target is consequently expected to be met with a margin of 0.3 percentage points.

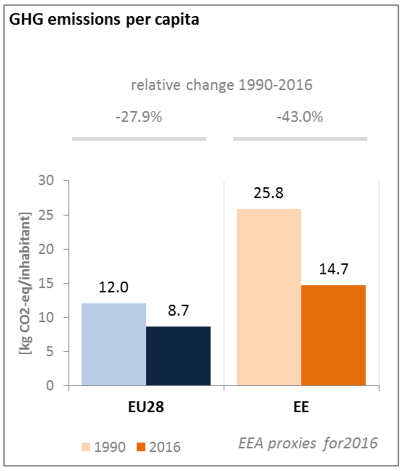




(source: EC and EEA)

As a producer of electricity and heating from oil shale and being a net-exporter of electricity, Estonia is the most carbon-intensive economy in the EU, and has one of the highest carbon intensities in its energy use.



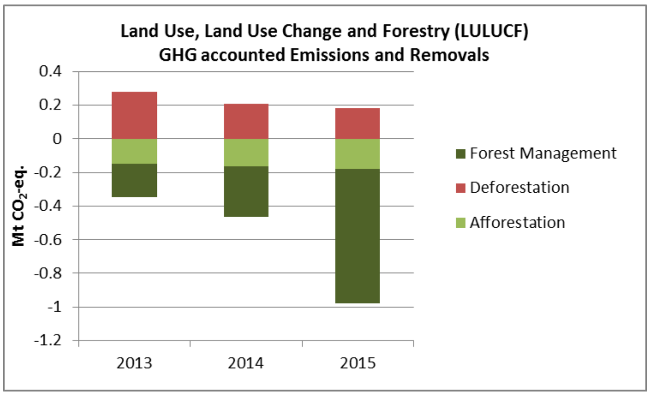


Largest Sectors of GHG Emissions in 2015	EE	EU28
Energy/power industry	67.9%	30.9%
Transport	12.9%	21.0%
Industry	5.6%	19.9%
Agriculture (incl. forestry & fishery)	9.4%	12.0%
Residential & Commercial	2.3%	12.8%
Waste	1.8%	3.2%
Other	0.2%	0.2%

(source: EC and EEA)

Preliminary accounts under the Kyoto Protocol for Estonia show overall removals of -0.4 Mt CO_2-eq. as an annual average in the period 2013-2015. For comparison, the annual average of the EU-28 accounted for removals of -119.0 Mt CO_2-eq. It should be noted that in this preliminary simulated accounting exercise, removals from Forest Management did not exceed the accounting cap.

The relative importance of activities changed over the period of three years. While removals by Forest Management were lower than emissions by Deforestation, its increase in 2015 made it by far the most important contributor. Removals by Afforestation became as important as emissions by Deforestation. Overall, there is an increasing trend in removals mainly due to above-mentioned increasing removals by Forest Management. Emissions by Deforestation decreased notably and removals by Afforestation increased slightly over the course of the three-year period.

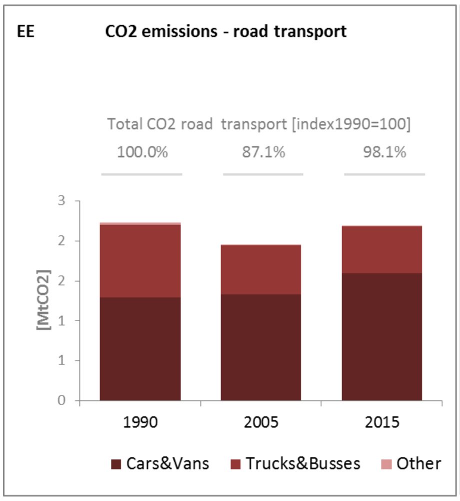


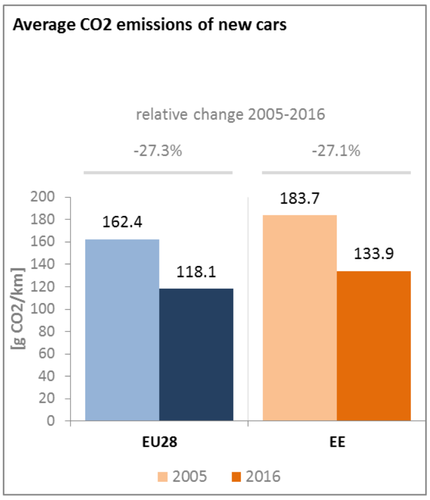
Note: Forest Management credits are capped and presented as yearly averages when the total Forest Management credits of the considered period exceed the simulated cap over the same period.

(source: EC and EEA)

CO_2 emissions in transport and alternative fuelled vehicles

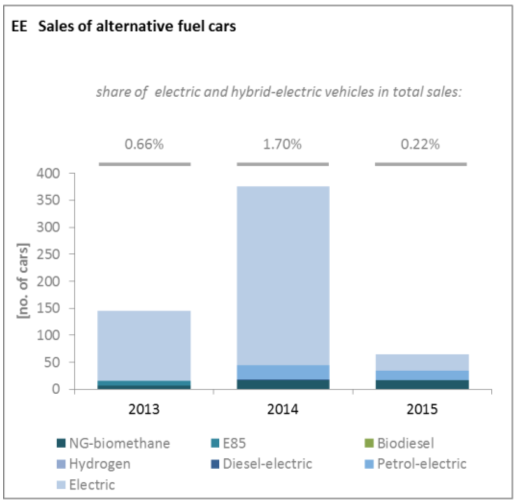
Average CO_2 emission from new vehicles in Estonia remain the highest in the EU, with an average CO_2 emission of 134 grams per kilometre compared to the EU-28 average of 118 grams in 2016, although decreasing significantly compared to the 2005 levels, in line with the EU trend.

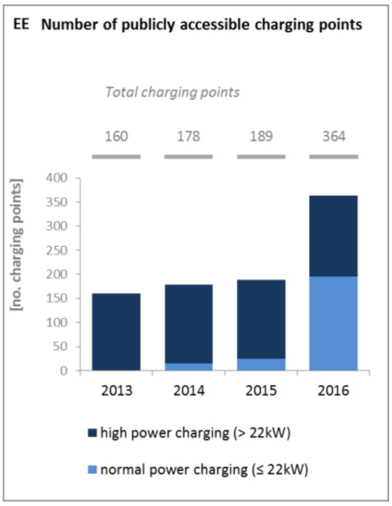




(source: European Environment Agency)

The number of electric charging points in Estonia more than doubled between 2013 and 2016, while the largest year-on–year increase happened between 2015 and 2016 when the number increased from 189 to 364 units.





(European Environment Agency) *(European Alternative Fuels Observatory)*

National Policy Frameworks under Directive 2014/94/EU on alternative fuels infrastructure have to establish targets, objective and measures for the development of the alternative fuels market in the transport sector and the deployment of the relevant infrastructure. Estonia has submitted its National Policy Framework as requested under article 3 of the Directive 2014/94/EU.

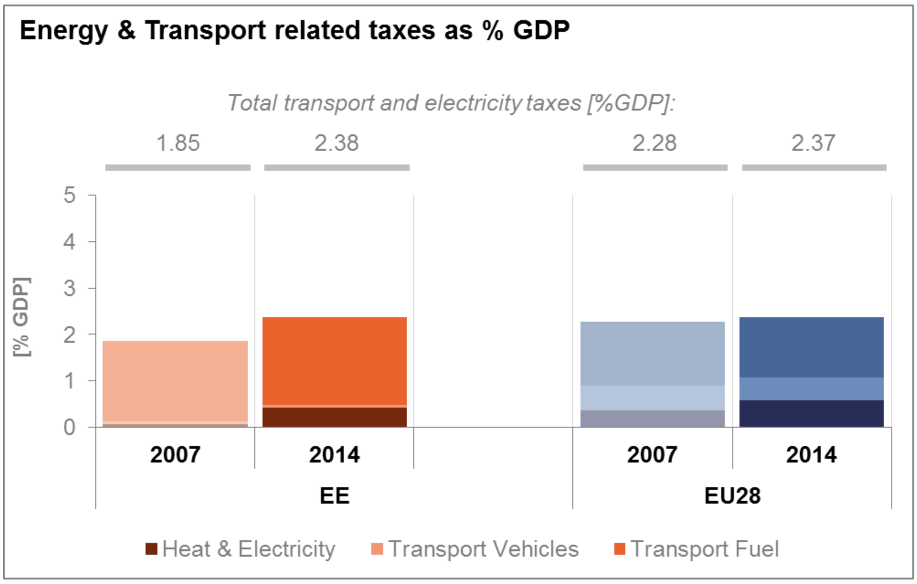
A detailed assessment of the Estonian National Policy Framework in terms of its compliance with the requirements of Directive 2014/94/EU on alternative fuels infrastructure, its contribution to achievement of long-term energy and climate objectives of the EU and coherence of its targets and objectives in terms of cross-border continuity has been published as part of the Communication on Alternative Fuels Action Plans (COM(2017)652) and the related staff working document SWD(2017)365.

5.2. Adaptation to climate change

The Estonian National Strategy on climate change adaptation was adopted in 2017. It calls for eight sub-goals for the following priority areas: human health and rescue preparedness, land use and spatial planning, natural environment, bio-economy, economy, society, infrastructure and buildings, and finally energy and energy supply systems. The action plan to implement the adaptation strategy was developed in parallel with the Strategy itself and supports the goals and sub-goals that are developed in it. For the time being, monitoring mechanisms are under development, so no system is in place for monitoring mainstreaming of adaptation into specific sectoral policies or assessing adaptation actions that are being implemented.

5.3. Taxes on energy and transport

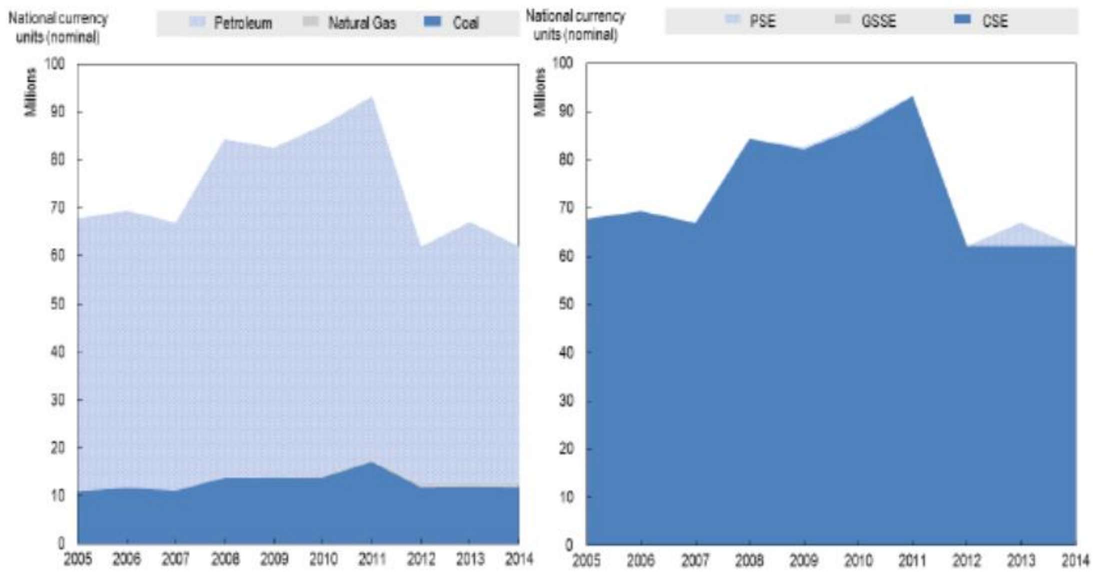
The overall tax burden on energy and transport in Estonia amounts to 2.4 % of GDP, which is in line with the EU average. The increase registered from 2007 is due to higher revenue from taxation of heat and electricity as well as of transport fuels. In contrast, the tax burden on vehicles has remained stable. Moreover, taxation of transport vehicles is among the lowest in the EU. Estonia has no general CO_2 component in its taxation framework for energy products or in the taxation of vehicles.


Energy & Transport related taxes as % GDP

(source: Eurostat)

Fossil fuel subsidies have been relatively stable in Estonia over the last decade (about EUR 3.8 million in 2014), with a decreasing trend since 2011. At the end of that year, fuel tax exemptions for the forestry and construction sectors were abolished.

Total support for fossil fuels in Estonia by fuel type (left) and support indicator (right)

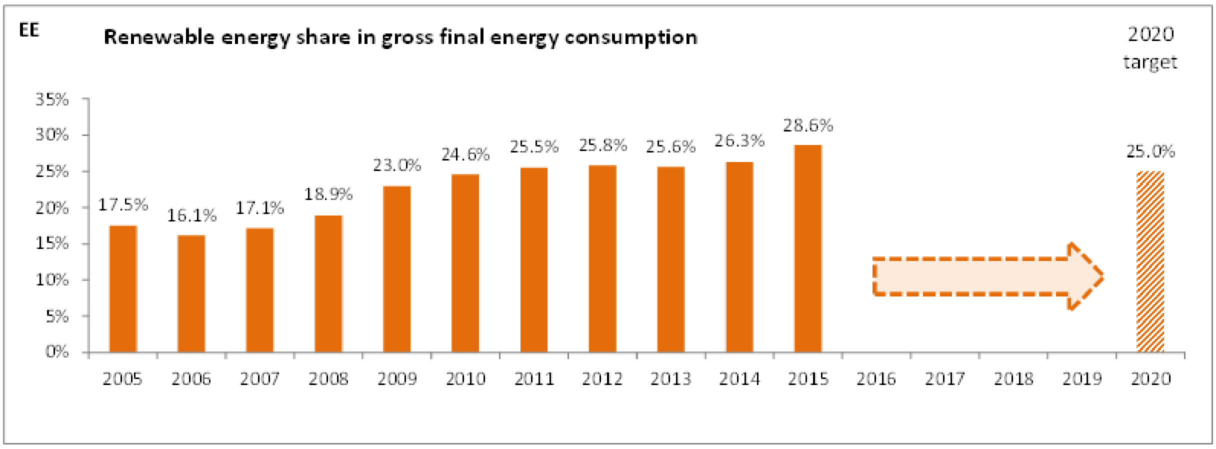


Note: CSE=Consumer Support Estimate; PSE=Producer Support Estimate; GSSE=General Services Support Estimate

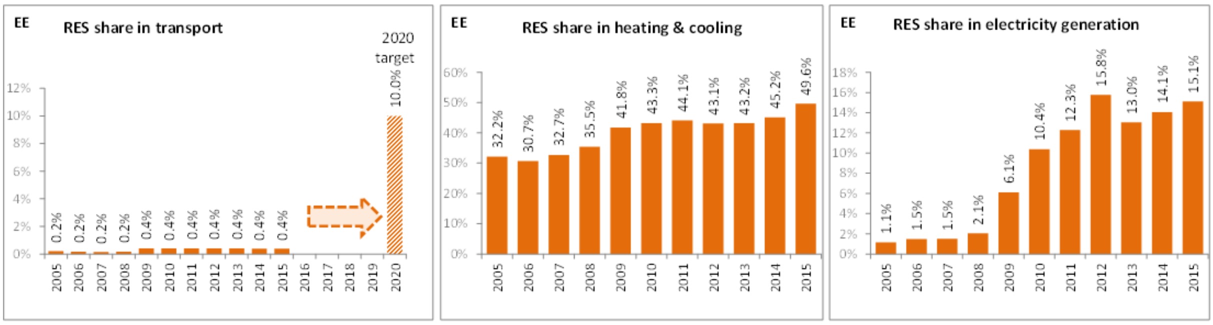
(source: OECD Inventory of Support Measures for Fossil Fuels 2015)

5.4. Renewable energy

With a 28.6% share of renewable energy in gross final energy consumption in 2015, Estonia is already above its 25 % target for 2020. In 2015 the share of renewables in the heating and cooling sector was 49.6 % and in electricity generation the share was 15.1%. However, in transport the share of renewables was only 0.4 %. Starting in 2011, Estonia developed a nationwide network of fast-charging points for electric vehicles.



(source: Eurostat-SHARES)



(source: Eurostat-SHARES)

Estonia's renewable electricity production is mainly based on two sources: wind and biomass. For onshore wind, the technology deployment is below the planned trajectory whereas biomass growth is over-performing.

During the years 2008-2010, the country experienced fast growth in the renewable energy sector, and gained momentum again in 2015. Since 2003, electricity from renewable energy sources has mainly been promoted through a feed-in tariff policy. For costs containment reasons, the scheme was reformed in 2007 to feed-in premium and a 600 GWh/year support ceiling for wind power and a downward adjustment of the tariff were established. Currently, the scheme is being further reformed in order to shift the scheme to competitive bidding processes.

As regards renewable heating and cooling, the Estonian National Renewable Energy Action Plan (NREAP) anticipates a share of 38.4 % of renewables in heating and cooling in 2020. In 2015 the share was close to 50 %. The main source of renewable heating is biomass.

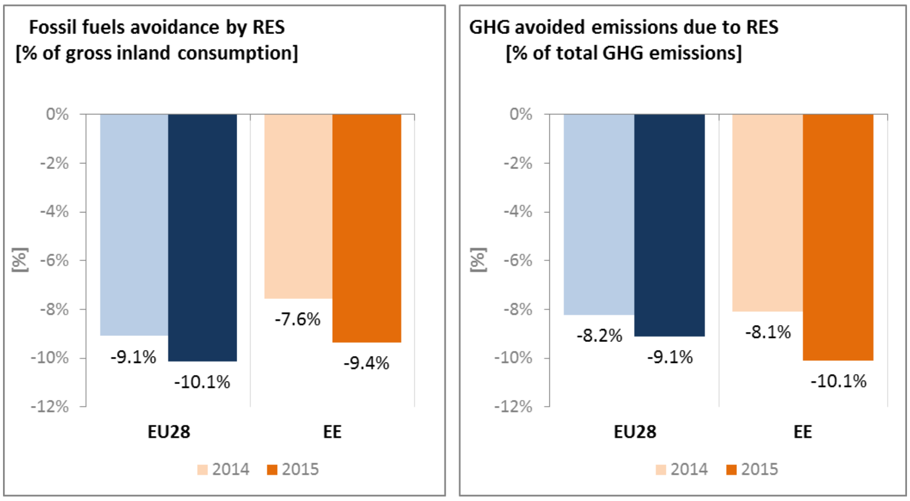
The government puts great emphasis on district heating and networks. Between 2007 and 2015, Estonia implemented subsidies for investment in renewables heating and cooling installations. The subsidies were granted for the refurbishment of boilers and heat distribution networks as well as for the construction of combined heat and power plants. In 2016 this support programme was replaced by investment support for heating infrastructure and for the refurbishment of piping and boilers.

According to the NREAP, the share of renewables in transport is expected to reach 10 % by 2020. However, the renewables' share in transport was only 0.4 % in 2015. In Estonia, the support of renewables in transport takes the form of an excise duty exemption for biofuels. Estonia has amended the Liquid Fuel Act, which would ensure that the share of biofuels will gradually rise to at least 10% by 2020. In addition, a support scheme was put in place to promote the purchasing of electric cars that use power produced from renewable energy sources. At the end of 2015, a support scheme for the promotion of biomethane use in the transport sector was introduced.

Estonia imports all of the petrol and diesel used in transport. The drop in international crude oil prices has affected Estonia's retail petrol and diesel prices as well. At the beginning of 2015, both fuels were approximately 30 % cheaper compared to prices one year before. This had a negative impact on several biofuels projects.

In order to promote the consumption of biomethane, two support measures have been created and implemented using funding from the Cohesion Fund. One of these measures grants investment support to applicants who wish to establish a biomethane filling station. The other measure grants support to public institutions which operate public bus services that use biomethane as fuel.

Thanks to a consistent deployment of renewables since 2005, it is estimated that in 2015 Estonia avoided 9.4 % of fossil fuels in gross inland consumption and 10.1 % of greenhouse gas emissions at national level.[8]



(source: EEA)

5.5. Contribution of the Energy Union to better air quality

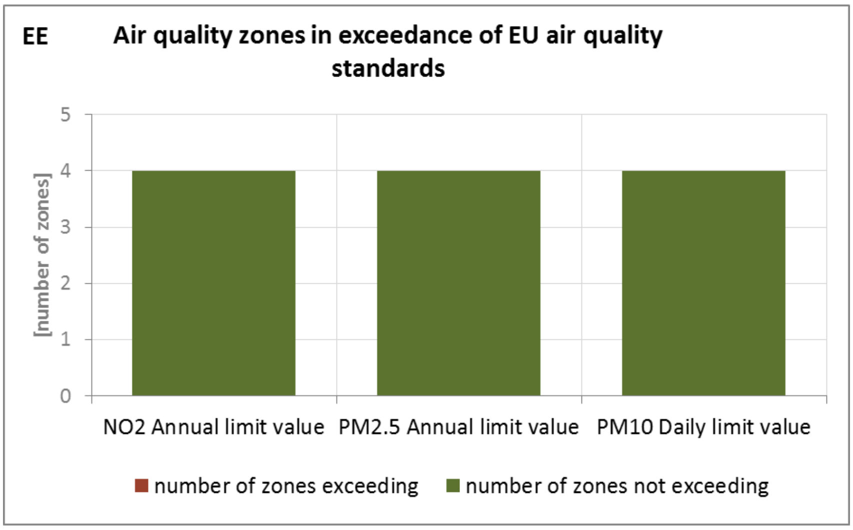
Air quality in Estonia is reported to be generally good, with exceptions. Nevertheless, for the year 2013, the European Environment Agency estimated that more than 690 premature deaths were attributable to fine particulate matter ($PM_{2,5}$) concentrations[9].

In 2015, Estonia reported no instances of exceeding the binding EU air quality standards[10].

8 Avoided GHG emissions mentioned here have a theoretical character as these contributions do not necessarily represent "net GHG savings per se" nor are they based on life-cycle assessment or full carbon accounting.

9 European Environment Agency, 2016, Air Quality in Europe – 2016 Report, table 10.2. The report also includes details as regards the underpinning methodology for calculating premature deaths.

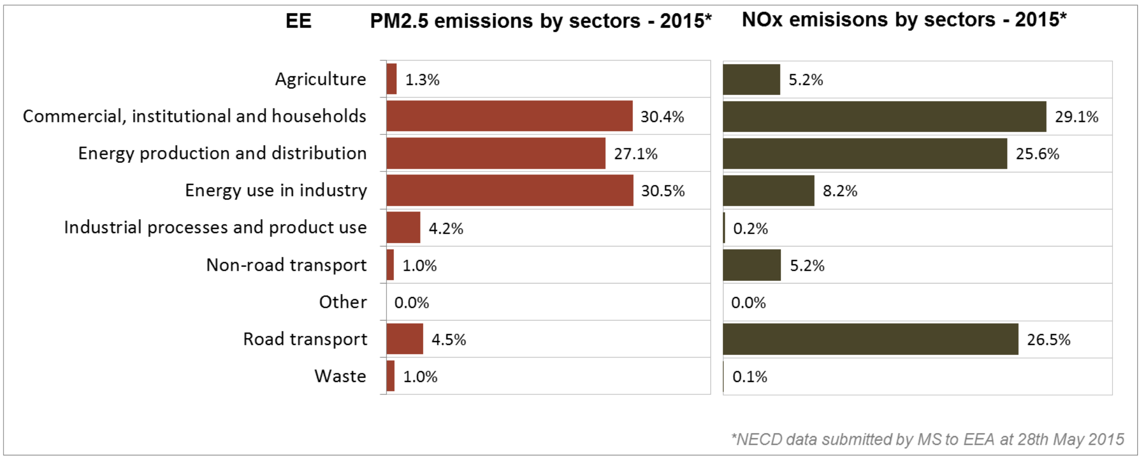
10 Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe, OJ L 152, 11.6.2008, p.1-44



(*source:EEA*)

The health-related external costs from air pollution in Estonia have been estimated to be more than EUR 414 million/year (income adjusted, 2010), which includes the intrinsic value of living a healthy life without premature death as well as the direct costs to the economy such as healthcare costs and lost working days due to sickness caused by air pollution[11].

The Energy Union can substantially contribute to further improve air quality in Estonia through measures reducing emissions of both GHG and air pollutants such as PM and nitrogen oxides (NO_x) from major contributing sectors such as (road) transport, energy production, industry and residential heating[12].



(Source: EEA. This table reflects only sources of primary PM2,5 emissions.)

[11] See also the EU Environmental Implementation Review Country Report for Estonia, SWD(2017)40 final of 3.2.2017

[12] National emission data as reported by the Member States to the EEA (available on the EEA's Eionet/Central Data Repository), http://cdr.eionet.europa.eu/ee/eu/nec_revised

6. Research, innovation and competitiveness

6.1. Research and innovation policy

Energy research in Estonia is driven by societal and economic factors that include the country's high level of urbanisation, the dominance of oil shale in domestic energy production, and the transition to a knowledge economy. The most important energy research area in Estonia is oil shale, due to its importance in the primary energy mix and in the Estonian economy. Other research areas are renewable energies (including smart grids) and nuclear technologies.

The Estonian Energy Technology Programme (ETP) is the country's main programme for funding energy R&I. The ETP is a thematic programme within the country's Innovation Strategy 'Knowledge-based Estonia' and is managed by the Ministry of Economic Affairs and Communications in collaboration with the Ministry of Education and Research and the Ministry of Environment. The role of the Estonian ETP is to identify energy-related R&D trends and priorities and to set funding priorities accordingly. The ETP provides the framework for setting research and technology objectives and carrying out research. It also facilitates stakeholder collaboration by collecting input from the energy industry and the public sector, and through international cooperation.

Estonia is not a very active contributor to the ongoing work of the Strategic Energy Technology (SET) Plan. It only participates in four (out of fourteen) temporary working groups for the implementation of the integrated SET Plan.

Regarding the Horizon 2020 programme, Estonia has received so far 0.8 % of the EU contribution devoted to the 'secure, clean and efficient energy' part of the programme. As of January 2017, 35 participations from Estonian organisations have been awarded about EUR 12 million in Horizon 2020 energy projects. This includes nine grants totalling over EUR 8.2 million to Estonian beneficiaries participating in project SmartEnCity (smart zero emissions cities).

6.2. Investments and patents in the Energy Union R&I priorities

In 2014, public (national) investments in the Energy Union R&I priorities reached EUR 2.4 million displaying a 5.5 % decrease compared to 2013. The highest share of investments (62 %) was attracted by the Smart System priority of the Energy Union, followed by Renewables (33 %). In the period 2011-2014, the maximum annual public investment was EUR 8 million, reported in 2011. In 2014, the most recent year for which data for most Member States are available, public investment per GDP in Estonia was lower than the EU average.

Private investment in the Energy Union R&I priorities in 2013 was estimated at EUR 5 million (0.03 % of the private R&I investment in Energy Union R&I priorities in the EU). The focus was on Sustainable Transport, which received 54% of these investments, followed by Efficient Systems with a share of 38 %.

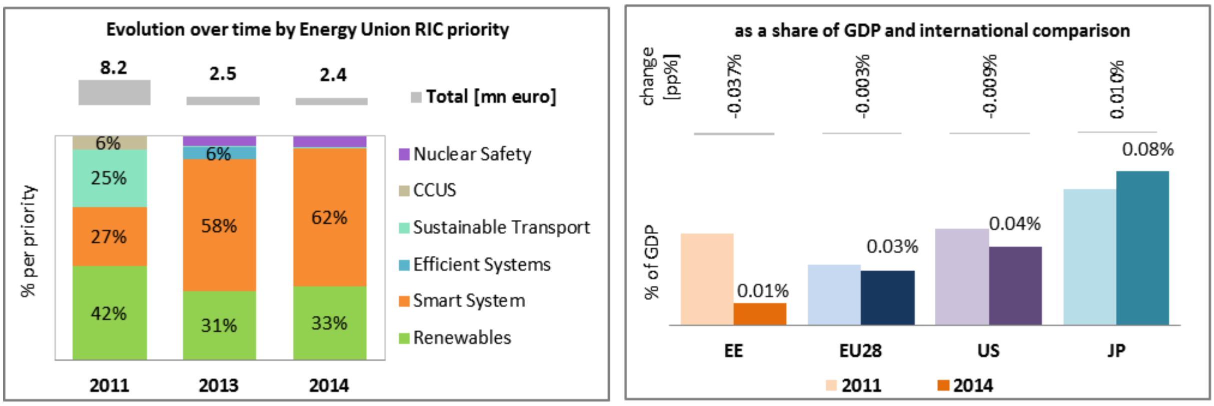
In 2013, the most recent year for which complete patent[13] statistics are available, 4 companies and research organisations based in Estonia filed 2 patents in low-carbon energy technologies (0.03 % of

[13] In the context of this document, the term 'patent' refers to patent families, rather than applications, as a measure of innovative activity. Patent families include all documents relevant to a distinct invention (e.g.

the EU total). The focus was on Sustainable Transport and Efficient Systems (44% each), followed by the Smart System priority (12%).

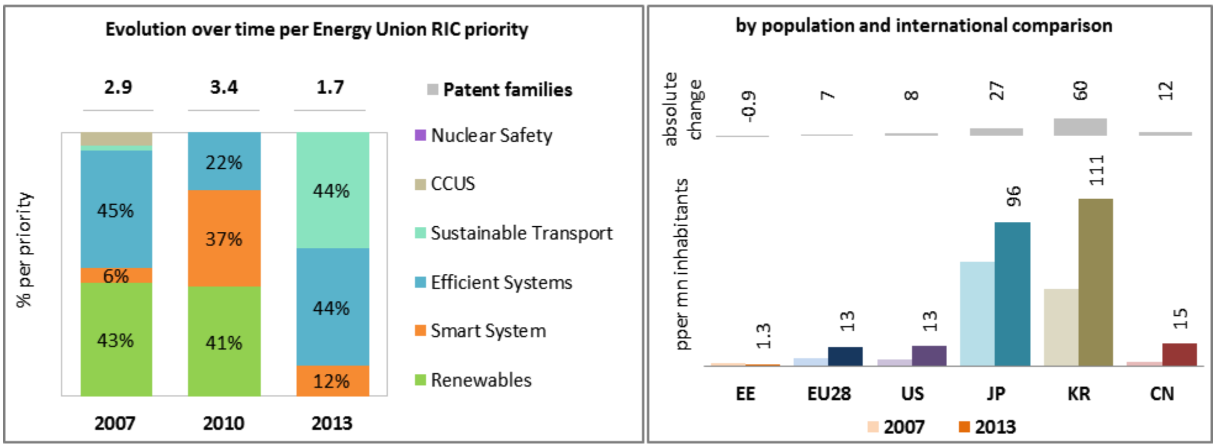
In 2013, private R&I investments and patents in Energy Union R&I priorities were lower than the EU average when normalised by GDP and by population respectively. In the period 2007-2013, both private R&I investments and the number of patents have decreased on average by 5 % and 8 % per year respectively, contrary to the EU indicators that increased at average rates of 6 % and 15 % respectively.

Public R&I investment in Energy Union Research Innovation and Competitiveness priorities



Note: Data only available for the period 2011 – 2014.

Patent families in Energy Union Research Innovation and Competitiveness priorities



(Data sources: Public investment as available in the International Energy Agency RD&D Statistics database[14] for codes relevant to Energy Union RIC priorities. Patent data based on the European Patent Office PATSTAT database[15]. Private investment as estimated by JRC SETIS. Detailed methodology available from the JRC[16].)

applications to multiple authorities), thus preventing multiple counting. A fraction of the family is allocated to each applicant and relevant technology.

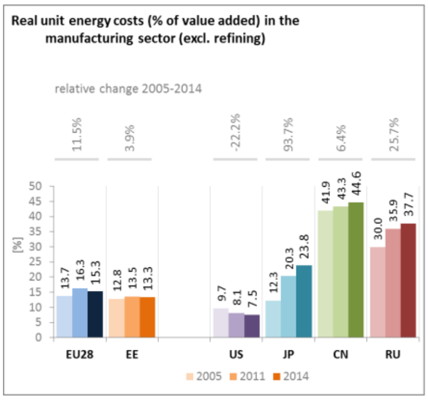
14 http://www.iea.org/statistics/RDDonlinedataservice/

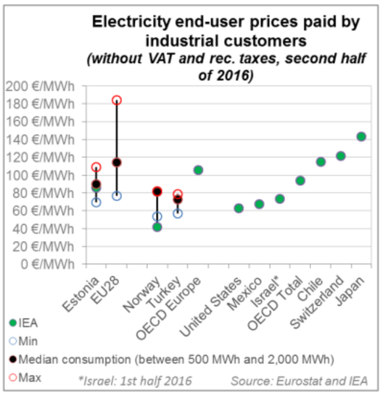
15 https://www.epo.org/searching-for-patents/business/patstat.html#tab1

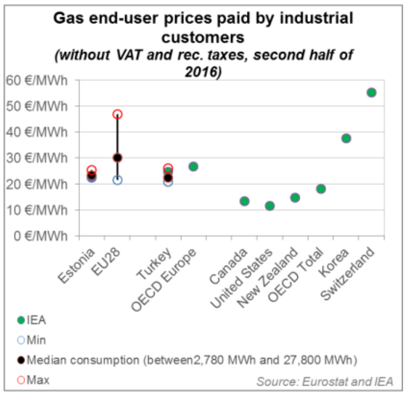
16 https://setis.ec.europa.eu/related-jrc-activities/jrc-setis-reports/monitoring-ri-low-carbon-energy-technologies

6.3. Competitiveness

In 2014, the real unit energy costs (RUEC)[17] in Estonia (13.3) were slightly below the EU average (15.3), almost twice more than those in the US but well below those in Japan and China. The electricity prices paid by the median industrial customers in Estonia are below those paid in the EU and OECD. At present, Estonia does grant exemptions on energy-related taxes to energy intensive industries. The government is currently drafting a legislation that may introduce such targeted exemptions in the coming years. Conversely, gas prices for the median industrial consumer are similar to those in the EU but above those in the OECD.







(source: ECFIN) *(source: Eurostat and IEA)*

Regarding the competitiveness in wind and solar energy, Estonia is performing quite well in the wind sector where the revealed comparative advantage[18] is around the EU average and has increased significantly since 2005. This is mainly due to a strong specialisation in power electronics. The relative trade balance[19] confirms that Estonia is a net exporter of wind components, also around the EU average. As indicated by the revealed comparative advantage, the Estonian economy is not specialised in solar PV and records a trade deficit in this technology.

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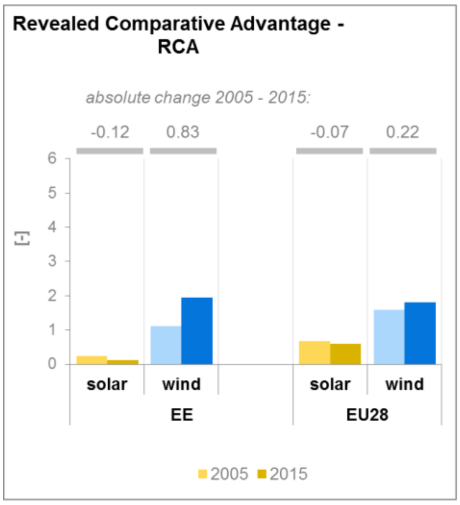
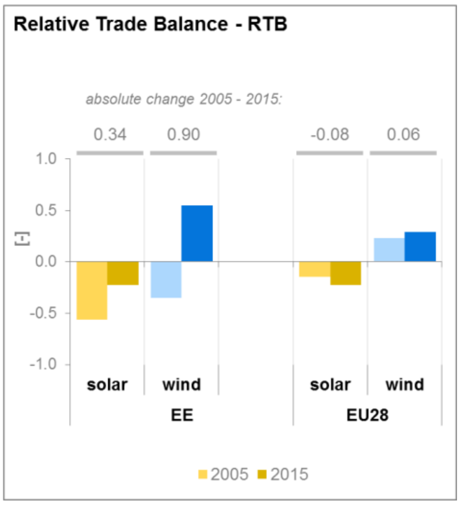
17 This indicator measures the amount of money spent on energy sources needed to obtain one unit of value added.

18 The RCA index for product "i" is defined as follows: $\mathrm{RCA_i} = \frac{\frac{X_{j,i}}{\Sigma_i X_{j,i}}}{\frac{X_{w,i}}{\Sigma_i X_{w,i}}}$ where X is the value of exports, and j is the country and w is the reference group, the World economy. 2005 refers in the text to the indicator average over the 2000-2009 period, while 2015 represents the average over the 2010-2016 period. The same applies for the RTB indicator - see below.

19 The RTB indicator for product "i" is defined as follows: $RTB_i = \frac{X_i - M_i}{X_i + M_i}$ where X_i is the value of product's "i" exports and M_i imports.





(source: UN comtrade)

7. Regional and local cooperation

Estonia is part of the Baltic Energy Market Interconnection Plan (BEMIP). BEMIP's main objectives are to develop an internal and regional energy market between the EU Member States in the Baltic Sea region and integrating it fully into the EU's energy markets thus increasing security of supplies. BEMIP projects have been part of the European Economic Recovery Plan (EERP) and the Trans-European Energy Networks Programme. BEMIP projects have also been funded through the EU's structural funds, including the European Regional Development Fund (ERDF) and the Cohesion Fund (CF). Many infrastructure projects are supported through CEF co-funding, to a total of EUR 534.3 million. In the framework of the societal challenge for secure, clean and efficient energy of the Horizon 2020 programme, EUR 16.9 million have been allocated to participants from the Baltics to stimulate research and innovation in this field.

The Baltic region was the first region that adopted in 2012 a joint Risk Assessment of the risks affecting the security of gas supply in the region under the Regulation on Security of Gas Supply which is currently being updated[20]. The three Baltic countries and Finland are working together on the preparation of a joint Preventive Action Plan and an Emergency Plan for the region.

The EU macro-regional strategy for the Baltic Sea Region in which Estonia takes part can be used as a basis for regional cooperation on energy. European Territorial Cooperation – 'Interreg' – under EU cohesion policy also provides further opportunities for cross-border, transnational and interregional cooperation, including in the Energy Union areas.

Cities and urban areas have a key role in the energy and climate challenge. The Urban Agenda for the EU, established by the Pact of Amsterdam in May 2016, better involves cities in the design and implementation of policies, including those related to the Energy Union. It is implemented through Partnerships, in which the Commission, Member States, cities and stakeholders work together on a number of important areas, including on Energy Transition, Urban Mobility, Air Quality, Climate Adaptation and Housing.

[20] Regulation (EU) No 994/2010

By 2016, the sustainable energy action plans delivered by three Estonian municipalities participating in the Covenant of Mayors, had been assessed. Overall, these three municipalities cover about 400 000 inhabitants representing around 30 % of the total population in Estonia. All together, these municipalities committed to reduce by 2020 the GHG emissions by 20.1 % (as compared to the 1990 baseline).

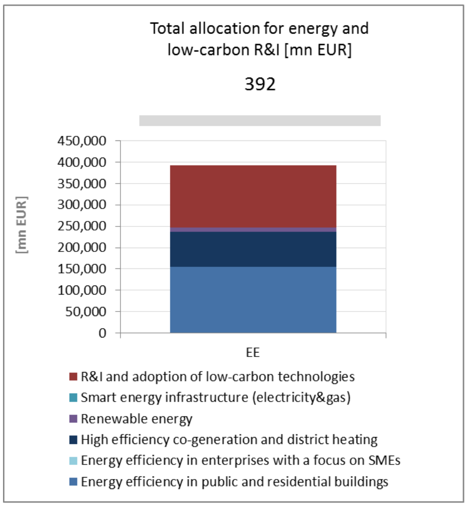
	No. of SEAPs submitted	Population covered by SEAPs [million]	Average GHG emissions [t CO2-eq/capita*year]		Relative GHG savings by 2020
			Baseline emissions	by 2020	
Estonia	3	0.42	9.42	7.52	-20.1%
European Union	5332	160.06	5.50	4.00	-27.2%

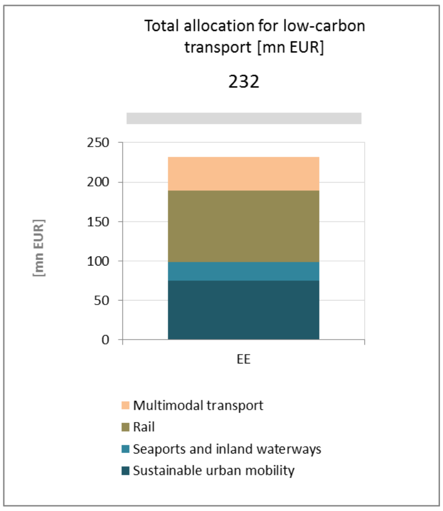
In Estonia, by September 2016, 1 city (covering 0.41 million inhabitants) has committed to conduct vulnerability and risk assessment and develop and implement adaptation plans in the framework of the Covenant of Mayors for Climate and Energy.

8. Cohesion policy and EU-supported clean energy investments

EU cohesion policy makes a key contribution to delivering the Energy Union objectives on the ground, including important investments to implement energy policy objectives in Estonia which are complemented by national public and private co-financing, aiming at optimal leverage. It also ensures integrated territorial solutions to energy and climate challenges, supports capacity building and provides technical assistance.

Over 2014-2020, cohesion policy is investing some EUR 247 million in energy efficiency improvements in public and residential infrastructure, as well as in high-efficiency cogeneration and district heating and renewable energy in Estonia. Cohesion policy is also investing significantly in R&I and in SME competitiveness in Estonia, based on the national strategy for smart specialisation. For Estonia, the strategy includes a focus on more efficient use of resources. At this stage, at least EUR 145 million is foreseen for investments in R&I and adoption of low-carbon technologies in Estonia, but this might increase further in line with the evolving content of the smart specialisation strategy. A further estimated EUR 232 million is invested in supporting the move towards an energy-efficient, decarbonised transport sector.





(source: DG Regio)

These investments are expected to contribute to around 40 000 households with improved energy consumption classification, as well as to around 110 km of reconstructed or upgraded railway lines. Overall, the EU cohesion policy investments in Estonia over 2014-2020 are expected to contribute to an estimated annual decrease of GHG emissions of around 40 000 tonnes of CO2eq.

For example, the Tartu Biogaas OÜ project involves co-production of electricity and heat from bio-waste (dung, waste from food processing industry) and biomass, with an annual capacity to process ca 80,000 tonnes. Annually it is producing 1.5 MW electricity and 1.5 MW heat. The total cost of the project is EUR 4 million, of which EUR 1.5 million from the European Regional Development Fund (ERDF).

As another example, the Tallinn Technical University ZEBE – Centre of Excellence for zero energy and resource efficient smart buildings and districts (ZEBE CER) contributes to energy and resource efficiency improvement in buildings and districts. It consolidates five existing research groups active in the ZEBE domain at three Estonian universities in order to build up key competences of CER. ZEBE CER contributes to the Estonian smart specialisation growth area of "Efficient Use of Resources, Smart and more efficient construction of buildings". Expected results can be utilized and applied in construction and energy sectors especially when moving to build nearly zero energy buildings as well as in deep integrated renovation of existing buildings. The total cost of the project is EUR 4.4 million, of which EUR 4.1 million from the European Regional Development Fund (ERDF).

Through its support to sustainable transport systems, the Connecting Europe Facility (CEF) also contributes to the goals of the Energy Union. Following Estonian participation in the CEF – Transport 2014-2015 Calls, the Estonian action portfolio comprises 10 signed grant agreements, allocating EUR 204.6 million of CEF Transport Funding to Estonian beneficiaries (state-of-play February 2017)[21]. The transport mode which receives the highest share of funding is rail (91.1 % of actual funding). Estonia is participating in two multinational, cross-border rail actions, both dealing with the Rail Baltic line, the most significant and strategic Global Project of the North Sea-Baltic Corridor. The Estonian activities of these CEF actions cover preparatory and technical studies combined with land acquisition and with the first set of works. Estonia is also demonstrating a strong commitment to maritime projects and participates in the further upgrade of the maritime line Helsinki-Tallinn with operational and environmental upgrades of both port infrastructure and an LNG powered passenger vessels. Moreover, Estonia continues to support the use of LNG as a fuel solution for maritime transport.[22]

[21] Note that European Economic Interest Groups and International Organisations are excluded from the analysis.
[22] Source: INEA