Support to the renovation wave - energy efficiency pathways and energy saving obligation in Estonia

Final synthesis report

(REFORM/SC2022/067)

This project is carried out with funding by the European Union via the Technical Support Instrument and in cooperation with the Directorate General for Structural Reform Support of the European Commission.

Contract details

European Commission, DG REFORM

Support to the renovation wave - energy efficiency pathways and energy saving obligation in Estonia (REFORM/SC2022/067)

Authors

Frank Gérard (Trinomics)

Nora Cheikh (Trinomics)

Jessica Glicker (Trinomics)

Louise Aeby (Trinomics)

Professor Jarek Kurnitski (TalTech)

Professor Kati Kõrbe (TalTech)

Reeli Kuhi-Thalfeldt (TalTech)

Miikael Einstein (TalTech)

Markus Tamm (Energex)

Rander Süld (Energex)

Ulf Johansson (Sweco)

Contact person

Mr. Frank Gérard

T: +32 (0) 496 38 92 78

E: Frank.Gerard@trinomics.eu

Date

Rotterdam, 21 February 2024

Acknowledgement

This project is funded by the EU via the Technical Support Instrument and implemented by Trinomics, TalTech, Energex and SWECO, in collaboration with the European Commission.

Disclaimer

Trinomics

Rotterdam, 21 February 2024

Client: DG REFORM

Support to the renovation wave - energy efficiency pathways and energy saving obligation in Estonia (REFORM/SC2022/067)

Final synthesis report

In association with:

TAL TECH

Energex ENERGY EXPERTS

SWECO

CONTENTS

Executive summary

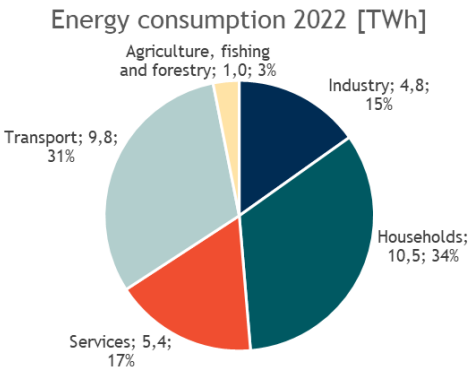
Technical support project : Support to the renovation wave - energy efficiency pathways and energy saving obligation in Estonia
Technical support provider: Trinomics, Energex, TalTech, Sweco
Overall objective of the project: Support Estonia in identifying an action plan to achieve the Energy Efficiency targets for 2030 and beyond, to revise its ESDP[1] and NECP[2], focusing on policy measures in the building, transport, industry and agriculture sectors.
Duration of the project: Nov 2022 – March 2024
Beneficiary authority: Estonian Ministry of Climate
Outputs: a report on data collection and baseline scenario (deliverable 2, incl. XLS); a comprehensive study of energy efficiency pathways for Estonia (deliverable 3, incl. XLS); an action plan for implementing the optimal energy efficiency pathway (deliverable 4, incl. XLS); a detailed concept of the energy efficiency flagship policy, including a monitoring and verification approach (deliverable 5, incl. XLS); a catalogue of energy saving measures and calculation methodologies (deliverable 6, incl. XLS); an internal report (on lessons) ; a final synthesis report and its Comprehensive Executive Summary.

Energy use in Estonia

While final energy demand in Estonia has experienced a slight decline of 4% over the past decade (2012-2022), Estonia is still the most energy intensive of the Baltic states, due to the use of oil shale, and the presence of energy intensive industry. The bulk of the decline can be attributed to a shift from manufacturing to services in the country.

The energy demand is divided among different sectors, as depicted by Figure 0-1.

Figure 0-1 - Energy consumption by sector, 2022



Source: Trinomics, Energex & TalTech

Following the ongoing recast of the EED, Estonia will need to seriously adjust its energy efficiency strategy to be aligned with the new energy saving targets. There remains potential for savings in each sector to reach the target, but these will need to be adjusted to sector specific constraints, and cost effectiveness.

[1] Energy Sector Development Plan, at 2035 time horizon
[2] National Energy and Climate Plan, at 2030 time horizon

Energy Efficiency Directive Target

The recast Energy Efficiency Directive (2023 EED[3]) sets a binding target of reducing EU final energy consumption by 11.7% by 2030, compared to the projected energy use for 2030[4]. It translates into a primary energy consumption target of 992.5 million tons of oil equivalent (Mtoe) and a final energy consumption target of 763 Mtoe by 2030. Additionally, the Directive foresees an increase of the annual energy savings **obligation for Member States from the current level of 0.8% to average 1.5% energy savings between 2024 to 2030, and achieve 1.9% for 2028, 2029 and 2030**. This increased target has a huge impact and will require significant reinforcement of energy savings policies and measures, probably in all sectors.

Table 0-1 illustrates all targets that have been fixed by the 2023 EED, and compare some of them with targets set in the previous 2018 EED.

Table 0-1 - 2030 energy efficiency targets and savings

Targets derived from EED	EED 2018	EED 2023	Reference
Final energy consumption in 2030 (TWh)	33	30	Art 4, binding at EU, Estonia contribution
Primary energy consumption in 2030 (TWh)		45.7	Art 4, indicative at EU, Estonia contribution
Annual final savings rate, 2024-2030 average (%)	0.8%	1.5%	Art 8(1), binding per MS
Annual final energy savings rate in 2030 (%)	NA	1.90%	Art 8(1), binding per MS
Cumulative savings over the 2021-2030 period (TWh)	14.767	21.279	Art 8(1), binding per MS

Current policy measures are not enough

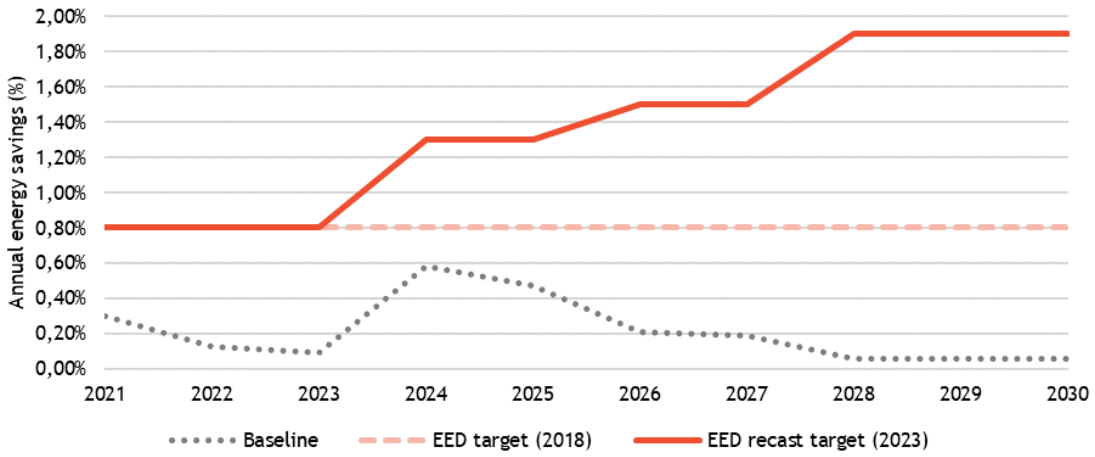
Despite current plans, strategies, and associated ongoing policies, Estonia will not reach the previous EED targets set by EED (2018), due to the too limited energy savings generated by existing measures (probably due to the lack of political willingness to mobilize more public money or to activate a stronger price signal, via taxation). In particular it will not reach the 0.8% annual energy savings defined in the 2018 EED, and consequently is far from reaching the new target of 1.5%, as depicted by

Figure 0-2 - Forecast of annual energy savings with the existing energy efficiency measures shows that Estonia is far behind the EED target (the baseline dotted line refers to the “business as usual” situation with the existing policy measures, showing a drop in 2027 after the disbursement of funds from the Recovery and Resilience Facility). The proposed measures and the related energy efficiency targets in the 2019 National Energy and Climate Plan (NECP) and its updated 2023 version are too low.

Energy efficiency investments involve high up-front costs, making them unattractive and often untenable for individuals as the generated savings are not paying back the investment (due to among others low energy prices). Insufficient incentives and norms exist to improve energy efficiency. Overall, addressing these challenges is crucial for Estonia to achieve its energy efficiency targets, to comply with the EED new energy efficiency targets.

[3] DIRECTIVE (EU) 2023/1791 of 13 Sept 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast)
[4] https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-targets_en

Figure 0-2 - Forecast of annual energy savings with the existing energy efficiency measures shows that Estonia is far behind the EED target



Source: Trinomics, Energex & TalTech

To conclude, there is urgency to significantly **accelerate (having in mind that savings are cumulative over the period) and increase the amount of the existing energy efficiency measures in all sectors and implement new ones, to reach the 2030 energy saving target, and continue the trends towards the carbon neutrality goal**.

New measures are necessary to reach the targets

Reaching the energy efficiency targets is challenging and will require a large set of Energy Efficiency policies and measures in all concerned sectors. Considering the high ambition level, all sectors should be concerned and contribute significantly to the collective efforts.

In the **building sector**, 8 measures are analyzed for residential and 8 other measures for non-residential buildings. Those measures include Minimum Energy Performance Standards (MEPS) at rental/selling point, carbon taxation, various grants or incentives, an obligation scheme for commercial buildings and a property taxation in function of the Energy Performance Certificate (EPC) level.

For the **industry and agriculture**, 6 policy measures are considered, among which a voluntary agreement (VA) and a set of various grants and support schemes.

The **transport** sector encompasses the largest number of measures, given its broader scope. The measures concern vehicle taxation to encourage more efficient engines, EV (Electric Vehicle) charging stations deployment, obligation to use efficient vehicles for specific fleets (e.g. public procurement, taxis), investments in public transport and active mobility infrastructure (rail, tram, active lanes), congestion charges in cities, incentives to use public transport and active mobility.

Among these measures, Minimum Energy Performance Standards and voluntary agreement are considered to be important new policy measures for the future, and as such are considered to be flagship policies.

Although not budgeted under the model, various additional measures have to be taken[5] with regard to building the technical and organizational capacity, setting up the awareness and support instruments (e.g. One-Stop-Shop, Energy Performance Contracting, audits, public transport ticketing, active mobility applications), facilitating the access to finance, facilitating the deployment of new

[5] However, they are not comprised within the model (and not budgeted)

technologies (e.g. digitalization), empowering end-consumers, or awareness campaigns. The model focused on quantifying investment needs (e.g. in infrastructure) rather than looking at operational costs (e.g. hiring additional civil servants to manage the different reforms and policies). This is why these "enabling" measures were not budgeted in the model.

This technical support project identified relevant EE measures, bundled them into different pathways varying the efforts between the sectors. Six pathways were analyzed, out of which four were more sector oriented: the Energy Efficiency Obligation Scheme (EEOS) focused on the industry and building; the Voluntary Agreement (VA) focused on the industry; the Renovation Wave (RenoWave) focused on the building (residential and non-residential) and the Energy Efficiency Transport focused on transport (EET). Two additional pathways were analyzed, proposing a balanced allocation of measures among the sectors, combining incentive, normative and enabling measures: the Comprehensive Energy Efficiency Reform (CEER) 1 & 2. The second pathway (CEER2), reinforcing some policy measures of the first (CEER1), was considered to be the optimal pathway, allowing to reach the highest number of 2023 EED targets with the most balanced set of policy measures, as presented hereafter.

Measures implementation towards the EED targets

Tables 0-2 depicts the results for all targets set in the EED, but also additional targets set by Estonia in its NECP/ESDP[6], among which the target for reducing transport fuel consumption by 2030 remains hard to reach (only EET allows to reach this target). Almost all pathways, except the EEOS and VA pathways, achieves the final energy consumption target set by EED. However, the cumulative savings cannot be reached in 2030 by any of the 6 pathways.

Table 0-2 - Summary of the optimal pathway achieving the targets

Objective	Year	Unit	EED target	NECP 2030[7]	Baseline	CEER2
Final energy consumption	2030	TWh	30	33,3	32,8	29,3
Cumulative energy savings	2021-2030	TWh		21,3	5,5	18,0
Final energy savings rate	2030	%	1,90%	1,90%	0,1%	1,96%
Final energy savings rate, average	2024-2030	%	1,50%	1,50%	0,1%	1,6%
Primary energy consumption	2030	TWh	45,7	63,9	51,5	46,2
Final energy savings of public sector/buildings	2021-2030	%	1,90%		0,0%	1,0%
Renovation rate of public owned buildings	2021-2030	%	3,00%		0,9%	3,8%
Total renovated area of central government buildings	2021-2030	mln. m2		0,3	0,12	0,54
Industry annual energy savings	2030	GWh		232	313	833,4
Transport fuel consumption	2030	TWh		8,3	10,1	8,6

Source: Trinomics, Energex & TalTech

Even for CEER2, the required cumulative savings is only achieved at the end of 2031, due to the weak performance during the first half of the obligation period (2020-2025), and the target fixed for transport remains highly challenging even for a pathway based on transport measures, due to the important dependence on behavioral change to reduce energy use in transport (e.g. the availability of

[6] Energy Sector Development Plan, at 2035 time horizon
[7] Directive (EU) 2023/1791

public transport does not mean that people will consequently use them). On top of investment (e.g. in infrastructure and fleets) individual motivation is needed to ensure people are using bikes and public transport.

Impact assessment

Table 0-3 - Summary of impact assessment

Indicator	Time period	Unit	Baseline	CEER2
GHG emission reduction, cumulative	2021-2030	MtCO2	1,26	4,63
Investment costs (total), cumulative	2021-2030	MEUR	1.588	13.306
of which public support, cumulative	*2021-2030*	*MEUR*	*331*	*5.026*
Cost savings, cumulative	2021-2030	MEUR	489	1.796
Impact on GDP	2021-2030	%	0,6%	4,4%
Impact on disposable income	2021-2030	%	0,8%	3,6%
Impact on employment (Average annual job creation)	2021-2030	Thousand employees	0,83	17,41
Impact on tax revenue	2021-2030	%	0,6%	2,1%
Average energy cost as a share of household disposable income	2021-2030	%	7,98%	7,46%
Average yearly GDP	2021-2030	MEUR	42.823	44.423
Average yearly Investment costs (total)	2021-2030	MEUR	159	1.331
Average yearly tax revenue	2021-2030	MEUR	16.042	16.274
Average yearly public support	2021-2030	MEUR	33	503

Source: Trinomics, Energex & TalTech

Residential buildings and transport are each representing approximately 1/3 of final energy use and should be addressed as first. However, renovation of dwellings requires important investments and a strong incentive to carry them out. Also, energy efficiency in transport has some limits and requires important behavioral changes (e.g. public transport or active mobility lane can be deployed, they still need citizens to use them) which takes time. Almost all pathways are not able to reach the transport target fixed by the transport and mobility development plan until 2035 to consume less than 8.3 TWh, while the sector faces clear growth. Only EET can reach the target, but this requires rapid changes which are more than likely not realistic.

Non-residential buildings and industry (including agroforestry) are each representing approximately 1/6 of final energy use. These 2 sectors could be left aside regarding financial support measures (to concentrate efforts on residential and transport), but non-residential offers substantial perspective for energy savings with regulatory minimum energy performance standards (MEPS) (where there is currently a very bad level of performance, leaving potential for substantial energy savings), while industry should be accompanied along its decarbonization path, to remain competitive and attractive at EU scale. For that reason, there are no mandatory schemes or obligations proposed for industry. Consequently, the important efforts towards energy saving targets set by the EED has to be spread properly between sectors, which is the aim of the proposed set of measures. The targets are too ambitious to leave any sector aside.

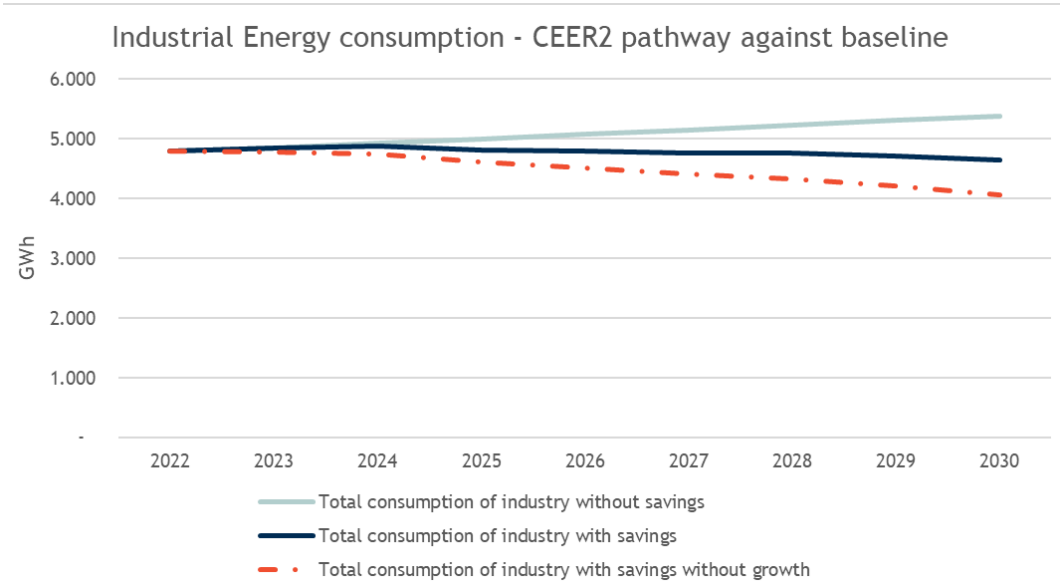
Energy efficiency and growth

Increasing energy efficiency should not become an obstacle to growth in the country. In that regard, the baseline scenario (deliverable 2) was built on growth expectations.

Figure 0-3 - Comparison of industrial consumption in a growth scenario and in a status quo scenario illustrates the case of the industry:

- The light blue line shows the expected energy consumption of the industry in a growth scenario, with an average yearly increase of 1.5% of industrial activity (all sectors included), without considering any savings;
- The dark blue line shows the results when applying energy efficiency measures to the industry. The difference between these lines shows the savings, highlighting that the difference between 2030 and 2022 is rather small (savings being compensated by growth);
- The red dotted line shows a fictive scenario where there is no growth in the industrial production. This is what would happen if there is no change in the industrial production, but energy savings are made across the industry. The difference between the dark blue and the red lines shows the potential for growth, including the arrival of new industrial players within Estonia.

Figure 0-3 - Comparison of industrial consumption in a growth scenario and in a status quo scenario



Source: Trinomics, Energex & TalTech

Risks of the pathway

The implementation of all these energy efficiency policies and measures are facing various risks, which are tentatively summarized below:

- The major risk relates to the sharp decrease in public fundings beyond the RRF (finishing in 2027), if the government does not anticipate with adequate budget mobilization. Grants may over-subsidize beneficiaries with a lumpsum level of support (usually 30% in Estonia). This must change to increase the efficiency of the scheme (adapting to the effective Levelized Cost of the investments). Also, there is need to adapt the level of support to overcome energy poverty issues (e.g. by providing higher grants to low-income households).

- MEPS will be complex to set up, and be socially sensitive to implement, therefore starting with a limited portfolio (i.e. targeted buildings) should be considered.
- The lack of skilled labor makes it difficult to properly implement measures, especially to meet the increased demand. There are resource constraints related to training and capacity building, as well as overall funding. The complex decision-making process of multiple person ownership makes implementing measures timely and difficult.
- The lack of interest of building occupiers and owners remains a major barrier.
- For the Voluntary Agreement, the financial advantage or compensation for the industry might not be straight nor attractive enough for the industry to seriously commit. The lack of resources on Ministry side to conduct the process to prepare and negotiate VA and other measures like the SME office (these processes will be demanding). The lack of a strong counterparty from business side, representing SMEs, and agricultural/fisheries/forestry exploitations makes it difficult to enter the dialogue.
- There are currently debate/discussion about the proposed vehicle taxation system, which does not incentivize the shift to more efficient vehicles (to low carbon), given that it could impact on vulnerable people, who often have older and hence less efficient cars. Insufficient investments in grid modernization can hinder the deployment of EV.
- Public authorities do not comply with the targets for clean and energy efficient public road transport vehicles. There is lack of skilled workforce for implementation of charging infrastructure, and a lack of grid modernization (inappropriate deployment of charging infrastructure (too slow/too rapid, in wrong places, etc.)).
- Deploying public transport and active mobility requires high degree of planning and integration. Many actors should be involved/consulted in the process, which increases complexity of implementation. There is currently a lack of harmonization between development of mobility and transport infrastructures and new residential/business districts. There is a lack of cooperation from public transport operators, a lack of skilled workforce to construct infrastructure, and a lack of funding available to develop the necessary infrastructure. There is a lack of consideration of existing public transport infrastructure to develop mobility hubs.
- There is concern about the social impact of property taxes because: 1) wealthier households tend to have higher energy performance dwellings (will have low property tax) and 2) property owners can pass down the cost of the tax to tenants. The property tax needs to be designed (e.g. progressive tax based on amount of energy consumption) or supplemented with support schemes to avoid adverse impacts on vulnerable households. These are the main reasons for postponing the property taxation (after 2030).

Overarching action plan

As already highlighted, there is urgency to implement new measures, to ensure they still can produce effects and contribute rapidly to cumulative savings expected by 2030. If all measures should be implemented as soon as possible, it is also clear that some will take more time to enter into force than others. On the other side their duration also depends on the type of measure. E.g. measures relying on public budget (like subsidies) cannot be continuous, while normative measures (like MEPS) will have a longer duration. Therefore, deliverable 4 describes into the details all actions that should be taken in order to design, develop and implement all measures selected in CEER2. The following series of tables summarize the grouping of measures (by measure category) for each sector, showing their time horizon

(entry into force and duration), providing the total investments need at 2030 (to be as close as possible to the new 2023 EED targets), and showing which authority should take their responsibility.

Table 0-4 - Action plan per sector

Set of measures	Timeline	Responsibility	EE total investment 2024-2030 needed to fill 2030 targets	Financing
BUILDINGS			**9 147 Meur**	
Existing measures	2021 - 2024	RAM[8]	346 Meur (~30% public)	RRP
Property taxation	2030 ->	RAM	403 Meur (100% private)	
Other taxes (deduction, CO_2)	2027 ->	RAM	2 338 Meur (100% private)	
Continue renovation grants for all buildings	2027 - 2035	KLIM[9]	3 875 Meur (~30% public)	ETS & ETS2 revenues
Minimum Energy Performance Standards	2027 ->	KLIM	2 100 Meur (100% private)	
Obligation scheme for non-residential	2030 ->	KLIM	84 Meur (100% private)	

Set of measures	Timeline	Responsibility	EE total investment 2024-2030 needed to fill 2030 targets	Financing
INDUSTRY & AGRICULTURE			**430 Meur**	
Existing measures	2021 - 2024	MKM[10]	170 Meur (~30% public)	RRP
Grants and subsidies for all plants (large, SMEs, agricultural)	2024 ->	MKM	122 Meur (~30% public)	ETS revenues
Voluntary Agreement	2024 - 2035	MKM	139 Meur (100% private)	ETS revenues or Exemption of fees to support RES electricity

Set of measures	Timeline	Responsibility	EE total investment 2024-2030 needed to fill 2030 targets	Financing
TRANSPORT				**2 667 Meur**
Existing measures	2021 - 2027	KLIM, TRAM[11]	10 Meur (100% private)	
Fiscal measures (vehicle tax, congestion charge)	2025 ->	KLIM, TRAM	1 Meur (100% private)	

[8] RAM is the Ministry of Finance
[9] KLIM is the Ministry of Climate
[10] MKM is the Ministry of Economic Affairs and Communication
[11] TRAM is the transport agency

Deploy EV charging infrastructure	2025 - 2035	KLIM, TRAM	40 Meur (50% private)	ETS revenues
Energy efficient vehicles in public procurement	2025 – 2035	KLIM, TRAM	552 Meur (100% public)	Gov budget
Subsidise public transport use & active mobility	2025 – 2035	KLIM, TRAM	8 Meur (100% public)	ETS & ETS2 revenues
Develop public transport & priority lanes for active mobility	2025 ->	KLIM, TRAM	2 056 Meur (100% public)	ETS & ETS2 revenues

Set of measures	Timeline	Responsibility	EE total investment 2024-2030 needed to fill 2030 targets	Financing
Excises & Fuel VAT (existing)			**1 062 Meur**	
Cross cutting	2021 ->	RAM	1 062 Meur (100% private)	
TOTAL				
		KLIM	**13 306 Meur**	

After a thorough analysis of several pathways (conducted in deliverable 3), this Comprehensive Energy Efficiency Reform pathway has been considered to be the most optimal, as it reaches the highest number or EED targets. It will require around EUR 13.3 billion over the obligation period (2021-2030), with approximately 88% of the investments to be made during the 2025-2030 period. However, it should be pointed out that its feasibility is not obvious, and it remains highly challenging, due to the high EED ambition. This pathway also contains several risks (identified above) that will require attention in the next phases of planning EE actions.

In the **building sector**, grants remain the main driver of renovation and performance up to 2030 (assuming those will continue after the 2027 end of RRF). From 2030, more normative measures like MEPS and fiscal measures like property and carbon taxation should take over and become the main drivers of continuous renovation.
In the **industry sector**, grants will continue to accompany the transformation, while Voluntary Agreement will only start progressively during the second half of the decade. It is expected that Voluntary Agreement will become the main driver to increase energy efficiency within the industry and therefore provide significant results after 2030.
In the **transport sector**, the first period will require important investments in infrastructure (public transport and active mobility), with some additional subsidize to incite the use of alternative to individual cars. At the end of the period, fiscal measures like vehicle and fuel taxation will progressively ramp up and become slowly more prominent. Public procurement has also an important role to play and will drive substantive investments, that will support structuring the market.

The following table summarizes a few indicators for the same set of measures within each sector.

Table 0-5 - Summary indicators complementing the Action plan per sector

Main measures to fill EED targets for 2030	Average yearly energy saving 2021-2030 [%]	GHG reduction 2021-2030 [MCO2t]	GHG reduction 2021-2030 [MCO2t] in addition to scenario w/o measures	Total investment costs 2021-2030 [MEUR]	Total public costs 2021-2030 [MEUR]	Responsible bodies
Buildings existing measures	0,00%	-0,71	0,08	346	225	Ministry of Climate (building department)
Property taxation	0,02%	-0,78	0,01	403	110	Ministry of Finance
Other building tax (deduction, CO2)	0,12%	-0,61	0,17	2.338	429	Ministry of Climate (building department)
Grants	0,34%	-0,22	0,57	3.875	1.471	Ministry of Climate (building department)
MEPS	0,17%	-0,46	0,33	2.100	-	Ministry of Climate (building department)
Obligation scheme	0,01%	-0,78	0,01	84	-	Ministry of Climate (building department)
Buildings total	**0,66%**	**0,39**	**1,18**	**9.147**	**2.236**	
Industry existing measures	0,06%	-0,14	0,65	170	81	Ministry of Economic Affairs & Communications (dpt industry)
Industry new measures (grants)	0,08%	-0,42	0,37	122	74	Ministry of Economic Affairs & Communications (dpt industry)
Including Voluntary Agreements	0,15%	-0,48	0,30	139	-	Ministry of Economic Affairs & Communications (dpt industry)
Industry total	**0,29%**	**0,54**	**1,32**	**430**	**155**	
Transportation existing measures	0,00%	-0,73	0,06	10	10	Ministry of Climate (department mobility), Estonian Transport Administration
Fiscal measures (vehicle tax, congestion charge)	0,00%	-0,79	0,00	1	1	Ministry of Finance
Deploy EV charging infrastructure	0,00%	-0,78	0,01	40	20	Ministry of Climate (department mobility), Estonian Transport Administration
Energy efficient vehicles in public procurement	0,04%	-0,71	0,08	552	552	Ministry of Climate (department mobility), Estonian Transport Administration
Subsidise public transport use & active mobility	0,07%	-0,60	0,19	8	7	Ministry of Climate (department mobility), Estonian Transport Administration
Develop public transport & priority lanes for act	0,47%	0,59	1,38	2.056	2.032	Ministry of Climate (department mobility), Estonian Transport Administration
Transportation total	**0,57%**	**0,93**	**1,72**	**2.667**	**2.622**	
Existing excises and fuel VAT	0,08%	0,41	1,20	1.062	14	Ministry of Finance
Fiscal total	**0,08%**	**0,41**	**1,20**	**1.062**	**14**	
ALL MEASURES IN TOTAL	**1,60%**	**4,63**	**5,42**	**13.306**	**5.026**	

Conclusions and way forward

Political commitment in Estonia is crucial to achieve energy efficiency gains in buildings, industry and transport to meet the ambitious targets at the European Union level. **Given the current trajectory and measures, Estonia is not on track to meet the Energy Efficiency Directive Targets.** It is imperative to take additional actions to fully unlock the potential of cost-effective energy savings, including ramping up measures and investment in energy efficiency. With all measures, additional resources need to be considered to **address energy poverty**. This would entail a prioritization of measures, identifying vulnerable groups, developing tailored support to allow easy and fair distribution of costs and benefits.

To reach EED targets, Estonia will need to **invest approximately EUR 13.3 billion up to 2030**, with EUR 9.1 billion in the building sector, EUR 0.4 billion in the industry and EUR 2.6 billion in transport. An additional EUR 1.2 billion of investments will come from the different sectors (building and transport) thanks to fuel taxation. Out of the total investment needs, EUR 5 billion will be public money (grants and support but also investment in public infrastructure and activities). Given the large public and private investments, where both the public and financial sector need to be involved, a wide array of financial instruments needs to be mobilized - from funds, grants to loans and guarantees.

Developing and implementing the optimal pathway (CEER2) towards the 2030 target requires the **mobilization of all administrations** concerned by the building sector; the public authorities, health, education (as administrative building owners); the economic affairs (to address private service buildings and SMEs); transport and spatial planning; the industry (to engage all important sub sectors); and the finance and budget (to manage incomes and outcomes).

There is now need to dig into the details of the selected energy efficiency policies and measures that were analyzed and developed in the study (cf. deliverables 4 and 5). Decision makers should take ownership of these policies to **complete their design, proceed with consultation, guide the political discussion, and implement them rapidly**. Each policy or measure requires a step by step process, requiring phased actions (described in deliverable 4) to develop it properly with all parties that will play a role in its implementation. Among the Energy Efficiency measures, some are well known since more than two decades (like grants and support, public transport infrastructure, carbon price, subsidies, …), and others that are more recent or even unknown for Estonia, like a Voluntary Agreement, MEPS, an obligation scheme, or a vehicle/property taxation.

All types of policies and measures are necessary to move to continuously increase energy efficiency across all sectors in Estonia. Support schemes (for building renovation, more efficient industrial processes or stimulating the use of alternatives to passenger cars) are needed on the short term to stimulate fast changes and investments, but are not affordable on the long term (public cost). Normative measures have the aim to conduct to progressive but long-term changes thanks to market signals, but their implementation requires more time and should cautiously pay attention to vulnerable households. Voluntary measures such as a Voluntary Agreement with the industry can strengthen the relationship between decision-making and the industry well beyond energy efficiency, to deal with the worldwide transition and its consequences on all economic activities.

Hiring new staffs in the concerned administration will more than likely be required to manage the different files, as some will require new knowledge to be built, new expertise to be developed, and new activities to be conducted. Among the activities, carrying out **important consultation processes** to get all concerned parties involved and engaged will be key to ensure the successful implementation of the measures.

To conclude, we highly recommend the authorities to designate the **responsibilities within each concerned ministry**, to rapidly **implement the proposed action plan of energy efficiency measures and policies**. It becomes urgent to set up a coherent and comprehensive package of policies to move to an energy resilient Estonia.

1 Introduction

This report is the executive summary report that aims to summarise the main deliverables of the project "*Support to the Renovation Wave – Energy Efficiency Pathways and Energy Savings Obligation in Estonia*".

The general objective of the project was to support the European Commission DG REFORM and as beneficiary, the Estonian Ministry of Economic Affairs and Communication (MEAC), in formulating and writing a national energy efficiency policy covering all main economic sectors in Estonia. The deliverables of the project were designed to result in the following two specific objectives in Estonia:

- Objective 1: Energy efficiency targets are adopted as part of the Energy Sector Development Plan until 2035 and the National Energy and Climate Plan based on a detailed energy efficiency pathway and action plan.
- Objective 2: New policy measures for achieving Estonia's energy saving obligation are adopted. These will cover several sectors and shall be closely interlinked with other energy efficiency policies.

The project was organised in five main deliverables:

1. Report on data collection and baseline scenario (**Deliverable 2**);
2. Comprehensive study of energy efficiency pathways for Estonia (**Deliverable 3**);
3. Action plan for implementing the optimal energy efficiency pathway (**Deliverable 4**);
4. Detailed concept of the energy efficiency flagship policy, including a monitoring and verification approach (**Deliverable 5**);
5. Catalogue of energy saving measures and calculation methodologies (**Deliverable 6**).

The main objectives and takeaways from Deliverables 3 to 6 are described in this final report. The last chapter of this project presents a summary of 10 key project recommendations including timetable, developed across deliverables to provide a quick overview of priority actions to be carried out by Estonia.

***Disclaimer**: the Estonian contribution to the EU energy efficiency target (art 4(1) EED(2023/1791)) with regard to final energy consumption (EU should be limited to 763Mtoe) is based on a June 2023 communication, and amounted to 30TWh for Estonia. A more (January 2024) recent figure was communicated and amount to 33.1 TWh, which is closer to the previous target (EED(2018) amounted to 33.3 TWh).*
With regard to primary energy consumption (EU should be limited to 992.5 Mtoe), the Estonian contribution was communicated in June 2023 to amount to 45.7 TWh, while the recent figure is at 41.8 TWh.
This study is based on June 2023 figures, and have not been updated. In general terms, the evolution of the figures, if they are confirmed, will result in decreasing the efforts on final energy consumption (considering the other targets though), while efforts regarding the electricity production would require to be reinforced.

2 Baseline scenario (D2)

Based on Deliverable 2 data (with historical data about sectoral energy consumption, main energy efficiency indicators, information of fuel and energy prices, etc.), the main objective of this chapter is to develop a baseline scenario of energy consumption for housing, business and service, transport and industry sectors in Estonia, considering existing energy efficiency measures and trend.

The baseline is built by sector

- Section 2.1 elaborates the building sector scenario
- Section 2.2 elaborates the transport sector scenario
- Section 2.3 elaborates the industry sector scenario

Section 2.4 compiles the sectoral scenarios into one global final energy consumption forecast.

2.1 Energy consumption forecasts of the Households and Service sectors

Estonia has an active construction market and building stock that increases every year, where the construction of new buildings is more than the number of buildings that are demolished. The largest consumer of final energy in 2020 was the household sector (35% of total final energy consumption).

2.1.1 Data and methodology

The net floor area of the building stock in 2020 is shown in Table 2-1 below. Detached houses and apartment buildings represent households and other building categories, i.e., 'Office', 'Commercial', 'Education' and 'Other' represents the service sector.

Table 2-1 Net floor area (m^2) of the building stock divided into main building categories in 2020

Data (m^2)	Detached	Apartment	Office	Commercial	Education	Other	Sum
Constructed < 2000	18 800 000	22 900 000	4 200 000	4 000 000	3 700 000	4 800 000	**58 400 000**
Constructed ≥ 2000	3 600 000	8 100 000	1 600 000	2 600 000	550 000	1 200 000	**17 650 000**
Total	**22 400 000**	**31 000 000**	**5 800 000**	**6 600 000**	**4 250 000**	**6 000 000**	**76 050 000**

Source: EHR Building Registry database

The baseline scenario is calculated by applying a yearly **energy weighted renovation**, a **dropout rate** and a **new construction building rate** following the current trendlines and considerations described below. Energy weighted renovation and dropout rates are taken from Estonian Long Term Renovation Strategy[12], where these parameters have been comprehensively analysed. New building rate represent an average of statistics from 2010-2021. The results for households and service sectors are summarised in Table 2-2 below.

Table 2-2 Yearly energy weighted renovation, dropout and new building rates in m^2 and percentage, that is used in the baseline scenario calculation in building categories

Yearly change (m^2)	Detached	Apartment	Office	Commercial	Education	Other	Sum
Renovation	85 000	280 000	47 500	62 500	42 250	20 000	**537 250**
	0.38%	0.90%	0.82%	0.95%	0.99%	0.33%	**0.71%**

[12] Long-term strategy for building renovation (July 2020). Available at: https://energy.ec.europa.eu/system/files/2020-09/ee_2020_ltrs_official_translation_en_0.pdf

Yearly change (m^2)	Detached	Apartment	Office	Commercial	Education	Other	Sum
Dropout	95 000	110 000	20 000	20 000	10 000	20 000	**275 000**
	0.42%	0.35%	0.34%	0.30%	0.24%	0.33%	**0.36%**
New building	245 000	310 000	75 000	65 000	35 000	50 000	**780 000**
	1.09%	1.00%	1.29%	0.98%	0.82%	0.83%	**1.03%**

Source: EHR Building Registry database

Some considerations are taken into account to model the baseline scenario:

- The energy weighted renovation rate describes the percentage of existing building stock renovated to the energy performance class C in Estonia which typically leads to an achievement of a final energy reduction of 50-60%.
- The baseline scenario calculated for the building stock considers energy that is used for providing indoor climate (empty buildings are not included).
- Industrial buildings are not included in this building stock because they belong to the industry sector.
- The new building rate is taken from the building statistics database from the past 20 years.
- Renovation rates are taken from the Estonian long-term renovation strategy (LTRS) and these values are considerably lower than the ones provided by building use permits. However, LTRS operates with deep renovation rates which are not straightforward to assess from building use permits.
- For dropout rates, a conservative estimate equaling 50% of rates reported in the long-term renovation strategy has been used.

2.1.2 Total building stock scenario

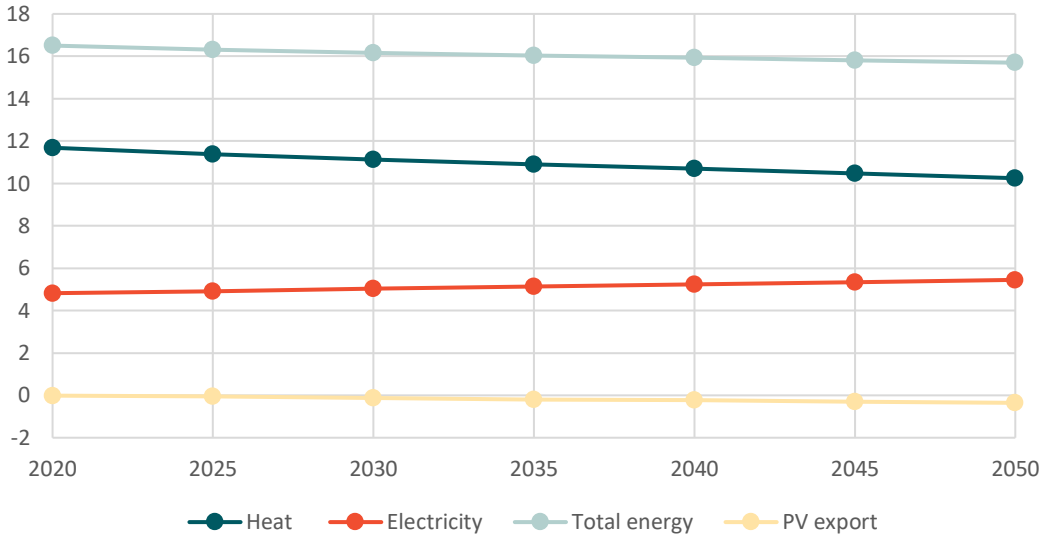
The baseline scenario results for the **final energy use in households and service sectors** are calculated with TalTech's building stock hourly energy model and assumptions are reported in the tables above (i.e. Table 2-1 and Table 2-2). Final energy use in the building stock from 2020 to 2050 are shown in Table 2-3 and Figure 2-1 below, which differentiates the energy fuels. The category of 'Heat' in the table and figure includes district heat and fuels. The "PV to Grid" figure refers to the surplus on-site electricity generation that is exported to the grid, and are presented as negative numbers in Table 2-3. This surplus of electricity exported to the grid almost compensates for the increase in electricity consumption in buildings.

Final energy use of the building stock beyond 2020 decreases even with small renovation rates applied in the baseline scenario. This can be a result of the construction of new nearly zero energy buildings, which will slowly replace the existing building stock with high energy-performing buildings.

Table 2-3 Final energy use in households and service sectors in the baseline scenario, TWh

	2020	2025	2030	2035	2040	2045	2050
Heat	11.68	11.38	11.13	10.91	10.69	10.47	10.25
Electricity	4.82	4.92	5.03	5.13	5.24	5.34	5.45
Total energy	**16.50**	**16.30**	**16.16**	**16.04**	**15.93**	**15.81**	**15.70**
PV to Grid	-0.01	-0.06	-0.12	-0.19	-0.24	-0.29	-0.35

Figure 2-1 Final energy use in household and service sectors, and electricity export in the baseline scenario in TWh



Source of data: "DATABASE D2_26052023.xlsx", tab "Baseline scenario"

The baseline scenario results for the breakdown of heat in households and service sectors from 2020 to 2050 is presented in Table 2-4 below. The main energy sources up to 2050 are district heating and wood, and to a smaller extent, gas. The overall trend shows a decrease in the use of wood, gas, oil and coal. District heating energy remains quite constant with only a slight decrease, while the share of biogas increases.

Table 2-4 District Heating and fuels for heat generation in household and service sectors, in GWh

	2020	2025	2030	2035	2040	2045	2050
District heating	5 203	5 172	5 164	5 169	5 175	5 181	5 186
Wood	4 666	4 465	4 285	4 118	3 952	3 785	3 618
Gas	1 351	1 305	1 263	1 224	1 185	1 145	1 106
Oil	389	366	345	324	303	282	261
Coal	53	50	47	45	42	40	38
Biogas	21	24	27	30	32	35	37

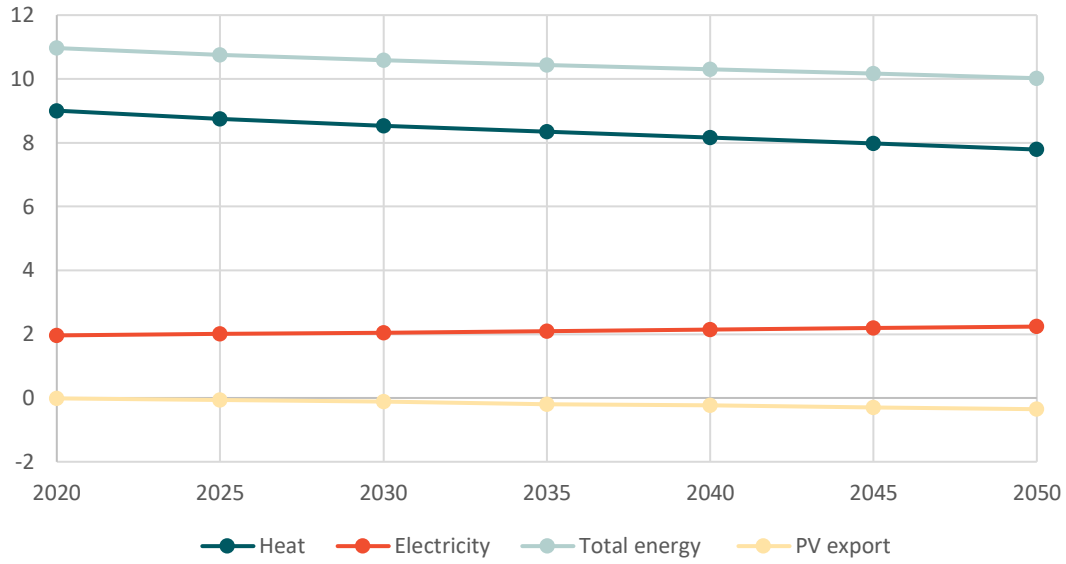
2.1.3 Detailed analysis of the residential building stock

The baseline scenario results for the **final energy use in households** from 2020 to 2050 is shown in Table 2-5 and Figure 2-2. The energy consumption data for 2020 is taken from the statistics database, and the consumption for the following years is calculated with the building stock model.

Table 2-5 Final energy use in households in the baseline scenario, TWh

	2020	2025	2030	2035	2040	2045	2050
Heat	9.01	8.75	8.53	8.34	8.16	7.97	7.79
Electricity	1.96	2.00	2.05	2.10	2.14	2.19	2.24
Total energy	10.97	10.75	10.58	10.44	10.30	10.16	10.02
PV export	-0.01	-0.06	-0.12	-0.19	-0.24	-0.29	-0.35

Figure 2-2 Final energy use in households and electricity export in the baseline scenario, in TWh



Source of data: "DATABASE D2_26052023.xlsx", tab "Baseline scenario"

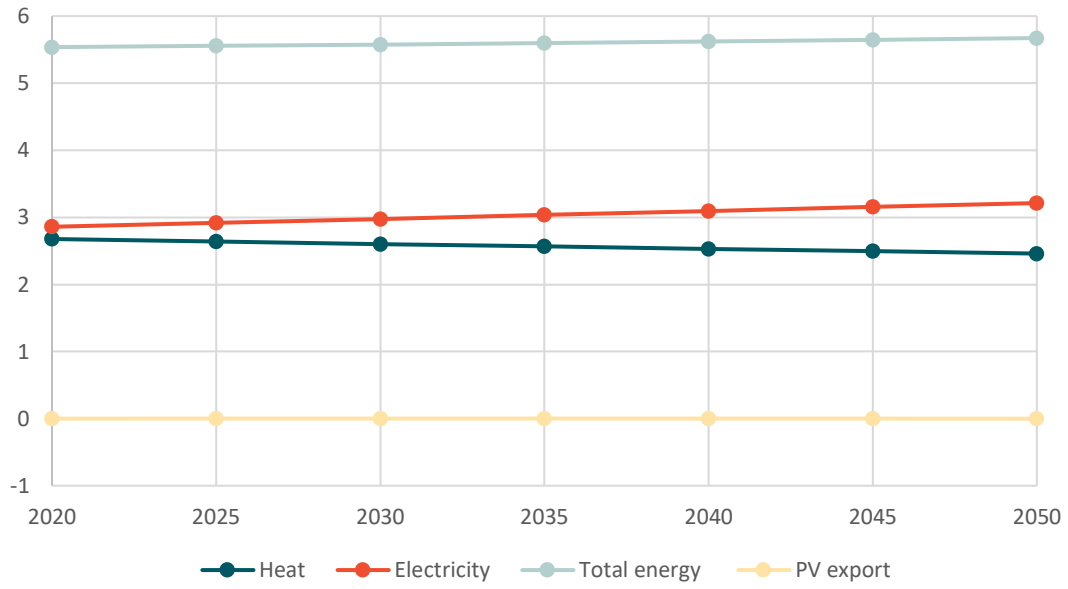
2.1.4 Detailed analysis of the non-residential building stock

The baseline scenario results for the final energy use in the service sector from 2020 to 2050 is shown in Table 2-6 and Figure 2-3 below.

Table 2-6 Final energy use in service sector in the baseline scenario, TWh

	2020	2025	2030	2035	2040	2045	2050
Heat	2.68	2.64	2.60	2.57	2.53	2.50	2.46
Electricity	2.86	2.92	2.98	3.04	3.09	3.15	3.21
Total energy	5.54	5.56	5.58	5.60	5.63	5.65	5.67
PV export	0.000	0.000	0.000	-0.001	-0.001	-0.001	-0.001

Figure 2-3 Final energy use and energy export in service sector, in TWh



Source of data: "DATABASE D2_26052023.xlsx", tab "Baseline scenario"

2.2 Energy consumption forecasts of the Transport sector

Energy consumption in the transport sector has increased from 8 736 GWh to 9 178 GWh in the period of 2010 to 2020. Energy consumption of the transport sector accounted for 29% of the total final energy consumption in Estonia in 2020.

2.2.1 Data and methodology

The baseline scenario in the transport sector is constructed as a business-as-usual scenario, where it is assumed that there will be no significant changes in people's attitudes and driving habits, or no major changes in technology, economy, without string and effective policy measures. The baseline is the continuation of the historical scenario showing the energy demand forecast with a status quo of the current circumstances. No new policies (e.g., the transport package from the Fit-for-55) on energy demand are included in this scenario. Energy consumption will continue to grow with the current trend which is around 1% increase per year.

The calculation of the baseline scenario for the transport sector uses a consumption prognosis methodology, taking the following approach:

- Firstly, the total energy consumption in the sector is forecasted based on the statistical data for the period of 2010 to 2021;
- Secondly the share of each fuel is forecasted as a trendline of historical period;

Finally, the consumption forecast of each fuel is calculated by multiplying the share with the total consumption.

When looking at the share of fuels in total energy consumption, there is a clear trend of replacing gasoline-driven vehicles with diesel engines. This trend is also visible in stock changes, where the number of vehicles with diesel engines is increasing. Motor spirit consumption has dropped from 3 366 GWh in 2010 to 2 322 GWh in 2021 while diesel oil consumption has risen from 5 210 GWh to 6 404 GWh.

Consequently, the share of motor spirit consumption in transport energy consumption has decreased from 39% in 2010 to 24% in 2021 while the share of diesel has increased from 60% to 66%.

2.2.2 *Total transport scenario*

Table 2-7 presents an overview of the expected share of fuels in the total energy consumption of the transport sector by 2050. The share of aviation gasoline, Liquefied Petroleum Gas (LPG) and Natural Gas for Vehicles (NGV) is expected to remain at the current level.

Table 2-7 Forecast of percentage share per fuel type in the transport sector by 2050, in percentages

Fuel type	% share in 2020	% share in 2021	% share in 2050
Gasoline	27	24	10
Diesel	63	66	76
Bioethanol	0.8	0.5	0.2
Biodiesel*	4.1	4.5	5.2
Biogas	1.1	1.4	1.9
Electricity	0.3	0.3	3.2

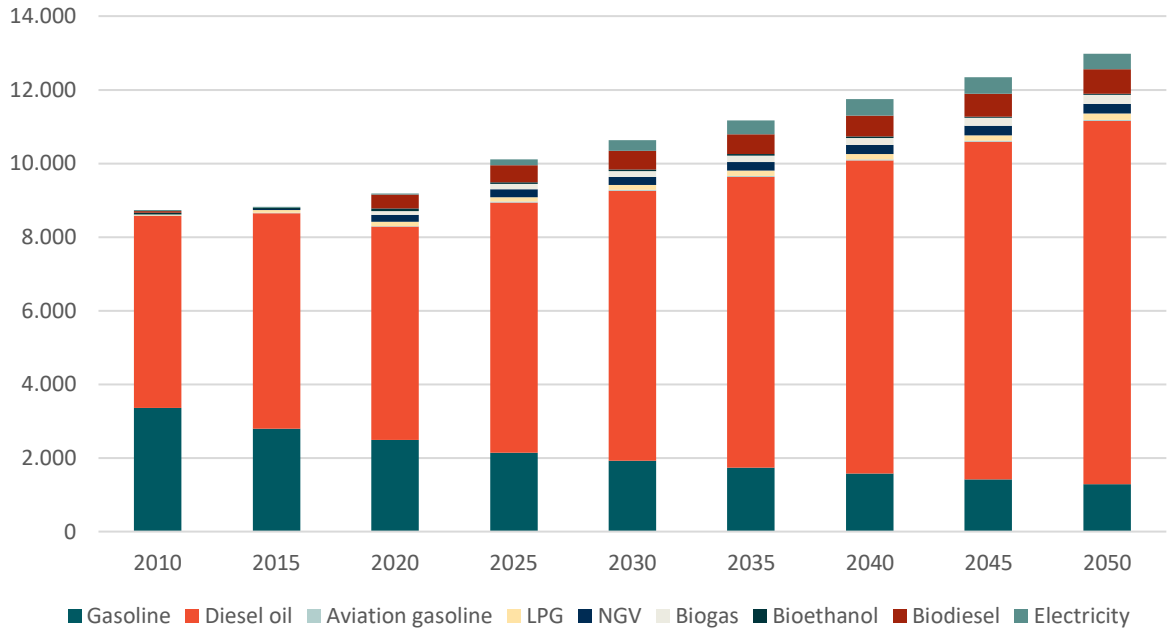
*Blending concentration will remain the same

The forecast for **fuel consumption in the transport sector** at 2050 is shown in Table 2-8 and Figure 2-4 below showing clearly a significant increase for diesel engines. By 2050, the total energy consumption of the transport sector increases to 12 972 GWh (from 9 178 GWh in 2020), of which diesel oil accounts for 9 877 GWh. The consumption of biofuels, i.e. biogas, bioethanol and biodiesel, increases to 942 GWh, accounting for 7.2% of the total consumption, while electricity-driven vehicles account for 10.5% of the total fuel consumption in the transport sector.

Table 2-8 Forecast of fuel consumption in transport sector up to 2050, in GWh

	2010	2015	2020	2025	2030	2035	2040	2045	2050
Gasoline	3 366	2 799	2 493	2 139	1 931	1 743	1 573	1 420	1 281
Diesel oil	5 210	5 852	5 796	6 799	7 326	7 894	8 506	9 166	9 877
Aviation gasoline	11	17	14	23	24	25	26	28	29
LPG	26	63	118	126	133	140	147	154	162
NGV	1	32	181	208	219	230	242	254	267
Biogas	1	1	98	149	164	182	201	222	245
Bioethanol	47	35	72	45	41	37	33	30	27
Biodiesel	38	0	381	461	497	535	577	622	670
Electricity	37	23	26	165	297	389	439	448	415
Total	**8 736**	**8 821**	**9 178**	**10 116**	**10 632**	**11 174**	**11 744**	**12 343**	**12 972**

Figure 2-4 Energy consumption forecast of transportation up to 2050, in GWh



Source of data: "DATABASE D2_26052023.xlsx", tab "Baseline scenario"

2.3 Energy consumption forecasts of the Industry sector

In 2020, the consumption of the industry sector accounted for 15% of the total final energy consumption. There is so much uncertainty in the future energy consumption of Estonian industry today that it is extremely difficult to forecast the level of energy consumption even for the next couple of years.

Most of the energy efficiency improvements of the industry and, consequently, the reduction of its consumption, dependents on the enterprises willingness, as limited state aid is foreseen. Companies are only requesting the government to maintain a normal business environment to survive in an intensifying competition. This includes the exemption of renewable energy fees added in the electricity bill, the establishment of a tax ceiling, or special features of the excise tax for energy-intensive productions etc.

2.3.1 Data and methodology

The baseline scenario of the industry's future energy consumption assumes that energy intensity will remain at the level of 2021 until 2050, while growth in industrial activity is assumed to increase by 1.5% per year. It is also assumed in the baseline scenario that a new bio-products factory will be completed in Estonia by 2030, and that new renewable electricity production capacities would be continuously built starting in 2024. The given assumptions also align with the assumptions given in the update of the Energy Roadmap.[13]

2.3.2 Total industry scenario

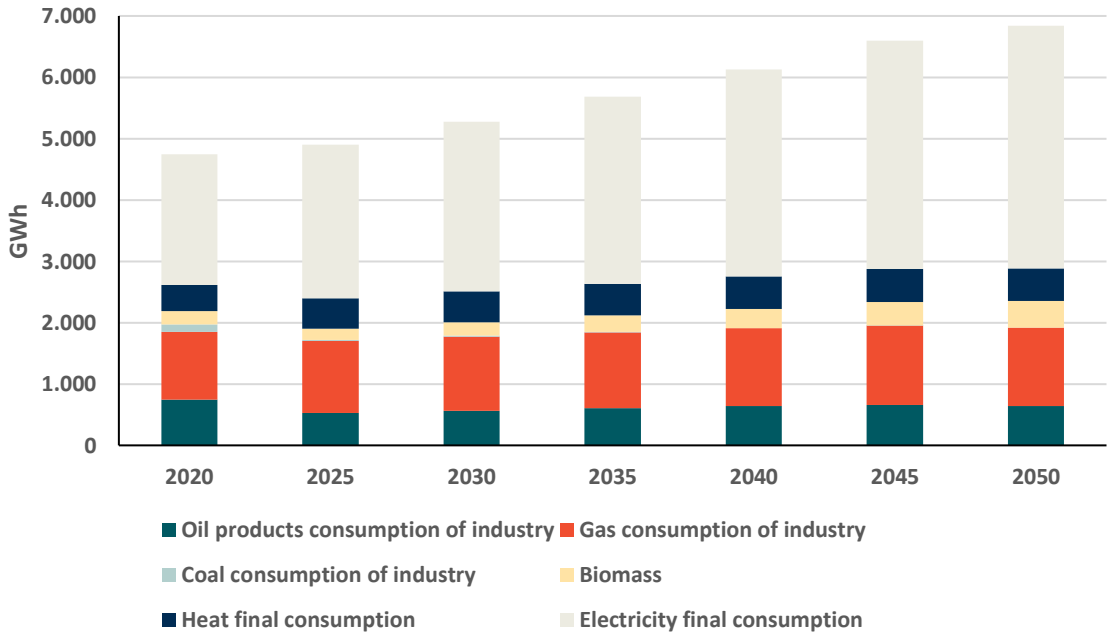
[13] Green Tiger. Energy roadmap update – roadmap 2023 (in Estonian). Available at: https://rohetiiger.ee/wp-content/uploads/2022/10/Teekaardilugu2023-1.pdf

The forecast for the **fuel, heat, electricity, and total energy consumption in the industry sector** in the baseline scenario up to 2050 is shown in Table 2-9 and Figure 2-5 below.

Table 2-9 Forecast of fuel, heat, electricity, and total energy consumption until 2050, in GWh

	2020	2025	2030	2035	2040	2045	2050
Electricity	2 129	2 503	2 764	3053	3372	3727	3958
Natural Gas	1 101	1 178	1207	1236	1267	1298	1279
Oil products	749	522	560	600	632	647	638
Heat	430	490	502	514	527	540	532
Biomass	218	189	225	267	318	378	430
Coal	118	16	18	13	9	11	0
Total energy	**4 745**	**4898**	**5276**	**5 684**	**6 124**	**6 598**	**6 836**

Figure 2-5 Final energy consumption forecast of industry (baseline scenario), in GWh



Source of data: "DATABASE D2_26052023.xlsx", tab "Baseline scenario"

2.4 Final energy consumption forecast in the baseline scenario

The forecast for the **total final energy consumption by sector** up to 2050 is shown in Table 2-10, Figure 2-6, and Figure 2-7 below.

According to forecasts (see Figure 2-6 and Figure 2-7):

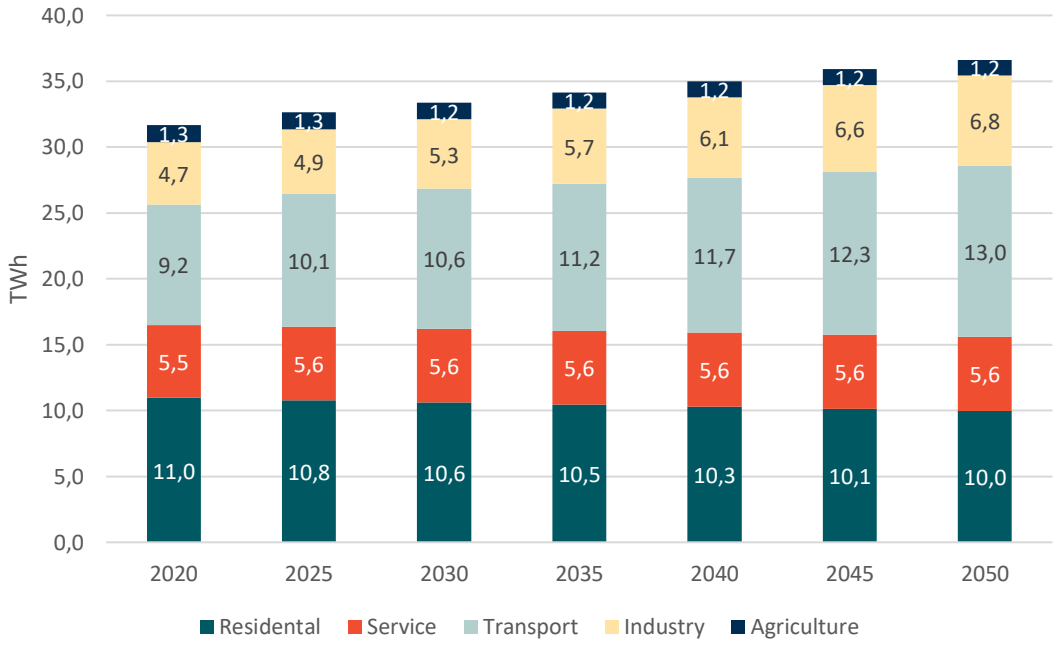
- The share of the transport sector will increase from 29% in 2020 to 33% in 2050;
- The share of the industrial sector increase from 15% in 2020 to 19% in 2050;
- The share of household energy consumption in final consumption will decrease from 35% in 2020 to 28% in 2050;
- The share of the service sector will decrease slightly from 17% in 2020 to 16% in 2050;

- The share of agriculture in the total final consumption was about 4% in 2020. It will decrease to about 3.3% in 2050. It has been assumed that the share of agriculture will remain practically at the same level in 2050 as it was in 2020.

Table 2-10 Final energy consumption forecast by sector until 2050 (baseline scenario)

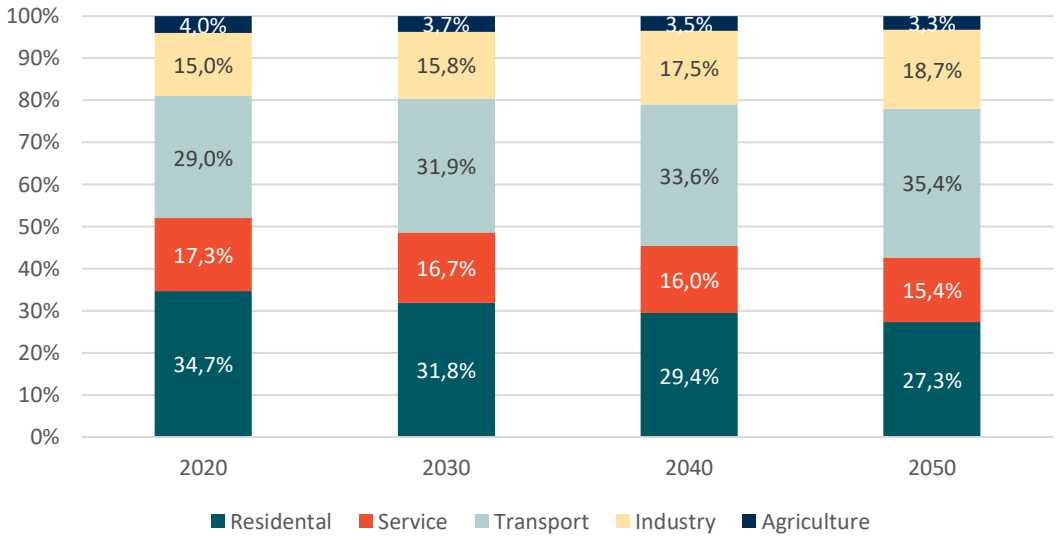
	2020	2025	2030	2035	2040	2045	2050
Residential	10.99	10.78	10.62	10.46	10.31	10.15	9.99
Service	5.48	5.57	5.58	5.59	5.60	5.61	5.62
Transport	9.18	10.12	10.63	11.17	11.74	12.34	12.97
Industry	4.75	4.90	5.28	5.68	6.12	6.60	6.84
Agriculture	1.27	1.27	1.27	1.27	1.27	1.27	1.27
Total energy	**31.7**	**32.6**	**33.4**	**34.1**	**3 5,0**	**535.9**	**36.6**

Figure 2-6 Forecast of final energy consumption until 2050 (baseline scenario), in TWh



Source of data: "DATABASE D2_26052023.xlsx", tab "Baseline scenario"

Figure 2-7 Share of sectors in final energy consumption



Source of data: "DATABASE D2_26052023.xlsx", tab "Baseline scenario"

3 Energy efficiency pathways (D3)

Deliverable 3 proposes different strategies to reach the new energy efficiency targets. The results of the study should feed in the updated NECP to be submitted to the EC by June 2024 (a draft was submitted in June 2023) to show how it will reach the targets. The results should also be used for the preparation of the national development plan for the energy sector (at 2035). Deliverable 3 includes the main impacts and co-benefits of the pathways, with a detailed description of the underlying policy options.

3.1 Energy efficiency measures to meet the Energy Efficiency Directive Target

The 'Fit for 55' package and the revised Energy Efficiency Directive (EED) aim to increase the EU energy efficiency target to 39% for primary energy consumption and 36% for final energy consumption.[14] Additionally, the recently adopted Energy Efficiency Directive[15] foresees an increase of the annual energy savings **obligation for Member States from the current level of 0.8% to average 1.49% energy savings between 2024 to 2030, and achieve 1.9% for 2028, 2029 and 2030**.[16] This increased target has a huge impact and will require significant reinforcement of energy savings policies and measures, probably in all sectors.

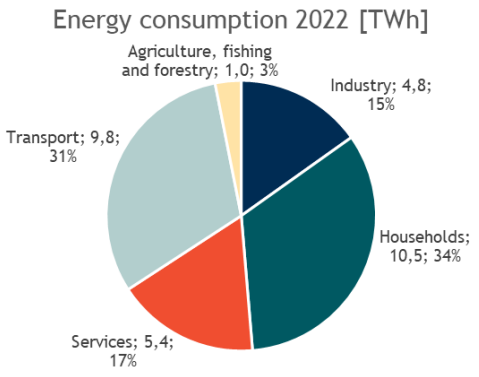
With existing measures, Estonia will not reach the previous EED target of 0.8% annual energy savings, and consequently is far from reaching the new target of 1.5%. The National Energy and Climate Plan (NECP) proposed measures' impact is unclear, and the energy efficiency targets are considered too low. Energy efficiency investments involve high up-front costs, making them unattractive and often untenable for individuals as the generated savings are not paying back the investment (due to among others low energy prices). Insufficient incentives exist to improve energy efficiency. Overall, addressing these challenges is crucial for Estonia to achieve its energy efficiency targets, to comply with EED.

3.2 Energy use in Estonia

While final energy demand in Estonia has experienced a slight decline of 4% over the past decade (2012-2022), **Estonia is still the most energy intensive of the Baltic states,** due to the use of oil shale, and the presence of energy intensive industry. The bulk of the decline can be attributed to a shift from manufacturing to services in the country.

The energy demand is divided among different sectors, as depicted by Figure 3-1.

Figure 3-1 - Energy consumption by sector, 2022



Source: Trinomics, Energex & TalTech

[14] https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-targets_en
[15] https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en
[16] European Commission. 10.03.2023. European Green Deal: EU agrees stronger rules to boost energy efficiency. Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_23_1581

Following the ongoing recast of the EED, **Estonia will need to seriously adjust its energy efficiency strategy to be aligned with the new energy saving targets.** There remains potential for savings in each sector to reach the target, but these will need to be adjusted to sector specific constraints, and cost effectiveness.

Table 3-1 illustrates all targets that have been fixed by the revised EED ((EU) 2023/1791), and compare some of them with targets set in the previous EED (2018).

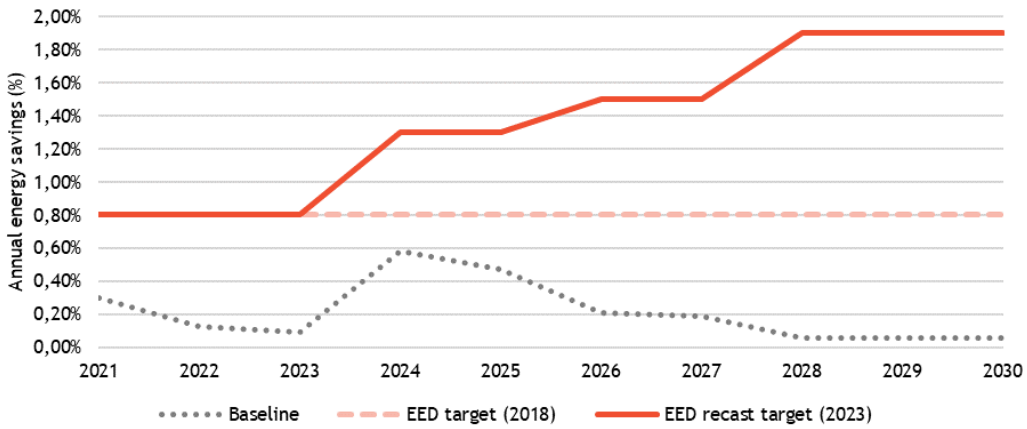
Table 3-1: 2030 energy efficiency targets and savings

NECP 2030 objective	EED 2018	EED 2023[17]	Reference
Final energy consumption in 2030 (TWh)	33	30	Art 4, binding at EU, Estonia contribution
Primary energy consumption in 2030 (TWh)		45.7	Art 4, indicative at EU, Estonia contribution
Annual final savings rate, 2024-2030 average (%)	0.8%	1.5%	Art 8(1), binding per MS
Annual final energy savings rate in 2030 (%)		1.90%	Art 8(1), binding per MS
Cumulative savings over the 2021-2030 period (TWh)	14.767	21.279	Art 8(1), binding per MS

3.3 Existing policies will not deliver enough savings

Despite current plans, strategies, and associated ongoing policies, Estonia will not reach the previous EED additional yearly saving target set by EED (2018), as illustrated in Figure 3-2. The new target set by EED (2023) is way more ambitious than the previous and is therefore increasing the gap significantly, showing the negligible effect of the baseline pathway (i.e. existing EE measures).

Figure 3-2 - Forecast of annual energy savings with the existing energy efficiency measures shows that Estonia is far behind the EED target



Source: Trinomics, Energex & TalTech

To conclude, a comprehensive pathway covering all sectors and strengthening the existing measures and implementing new ones is needed to reach the 2030 energy saving target.

3.4 New measures are necessary to reach the targets

Reaching the energy efficiency targets is challenging and will require a large set of Energy Efficiency policies and measures in all concerned sectors. Several policy measures are considered to build

[17] DIR (EU) 2023/1791

different pathways that will tend to achieve the EED targets. Considering the high ambition level, all sectors should be concerned and contribute significantly to the collective efforts.

In the **building sector**, 8 measures are analysed for residential and 8 other measures for non-residential buildings, among which Minimum Energy Performance Standards, carbon taxation, and various grants as priority measures. Property taxation will be re-assessed later on.

Residential	nR1	Obligation scheme for residential sector
	nR2	Minimum Energy Performance Standard (EPS) targeting rented/selling dwellings
	nR3	MEPS for all dwelling (regulatory requirements for EPC class E, F, and G or above)
	nR4	Renovation grants for single family houses (20-30% support)
	nR5	Tax deduction for renovation works by private persons (=parallel track for single family)
	nR6	Renovation grants for multifamily buildings/housing associations (30% support)
	nR7	Property tax (according to EPC levels)
	nR8	CO2 tax for end energy use of residential buildings

Service	nS1	Obligation scheme for service sector
	nS2	Central government buildings renovation support (100% support)
	nS3	Public and municipality buildings renovation support (60% support in average)
	nS4	Commercial buildings energy performance investments support
	nS5	CO2 certificate sales based on energy savings from commercial buildings renovation, income invested as renovation support
	nS6	CO2 tax for end energy use of commercial buildings
	nS7	Property tax (according to EPC levels)
	nS8	Minimum energy performance standards for non-residential buildings (regulatory requirements for EPC class E and F)

For the **industry**, 6 policy measures are considered, among which a voluntary agreement and various grants.

Industry	nI1	Voluntary scheme for the industry, with binding targets based on incentives
	nI2	Promotion of resource-efficient green technologies of industrial enterprises (RRP)
	nI3	Supporting energy efficiency investments in energy-intensive companies
	nI4	Investment support for the food industry to ensure security of energy supply
	nI5	Supporting energy efficiency investments in companies
	nI6	Energy consulting and networking events for small and medium enterprises (SMEs)

The transport encompasses the largest number of measures, given the complexity of the sector, and its broader scope. The measures concern the increase of efficiency in road transport, by encouraging more efficient engines. They also concern public transport and active mobility investment and use by citizens and companies.

Transport	nT1	Promotion of clean and energy efficient road transport vehicles in public procurement
	nT2	Subsidy for public transport usage instead of personal vehicle
	nT3	Priority lanes for micromobility
	nT4	Electric charging infrastructure for existing inhabitance areas
	nT7	Vehicle tax for registration
	nT8	Annual vehicle tax
	nT9	Development of convenient and modern public transport
	nT11	Developing the railroad infrastructure (includes the building of Rail Baltic)
	nT12	The railroad electrification
	nT15	Acquisition of additional passenger trains
	nT16	New tram lines in Tallinn
	nT17	Subsidy for micromobility usage instead of personal vehicle
	nT18	All Tallinn and Tartu taxis run on electricity
	nT19	Tallinn and Tartu congestion charge
	nT20	Mileage-based road use fee for heavy vehicles.

Some measures were considered at the beginning, but were finally discarded due to their limited impact on energy efficiency.

Transport (discarded)	nT5	Biomethane infrastructure
	nT6	Hydrogen infrastructure
	nT13	Promoting the use of biomethane in buses
	nT14	Promoting the use of electricity in buses
	nT21	Subsidizing biofuel that meets the criteria of sustainability or imposing the obligation to sell it to filling stations

3.5 Pathways to accelerate the uptake of energy savings

Policy measures are combined into different pathways, which are targeting the different sectors in different ways, by implementing well defined sets of measures. In order to define the most optimal and comprehensive pathway to reach the energy saving 2030 target, policies and measures are bundled into 7 energy efficiency pathways which will be compared to support the selection of the optimal path to the targets.

Table 3-2 briefly describes the pathways that consist of a carefully selected and designed set of measures or policies. The pathways and their measures have different emphasis on different sectors, to illustrate the benefits, drawbacks, impacts and risks of various measures' bundling. Given the high ambition set with the targets, it is unrealistic to focus on one sector only, therefore, although some pathways focus on a specific sector, they contain measures addressing all sectors with varying intensities.

Table 3-2: Brief description of the pathways

Pathway	Sector focus	Description
Baseline	n/a	The baseline pathway assumes that all existing energy efficiency measures are continued from 2021 to 2027.This also includes energy taxation which continues up to 2030 (the last modelled year).
Energy efficiency obligation scheme (EEOS)	Buildings and Industry	This pathway focuses on the implementation of an **Obligation Scheme (as per Article 9 2023 EED)**, where certain energy operators are obliged to trade energy savings certificates to stimulate cost-effective investments in energy efficiency in buildings. It also obliges building owners to renovate at trigger points (rental/selling) via MEPS, and contains support schemes for single houses, public buildings and industry. Property taxes for non-residential and efficient transport measures start in 2030, to a limited extent.
Voluntary Agreements (VA)	Industry and Buildings	This pathway focuses on the use of **voluntary agreements** (VAs) between government and industry to commit to energy targets, with incentives via reduced grants. However, VAs alone does not bring sufficient energy savings to reach EE targets, therefore a basic package of building measures is taken in addition, including building MEPS (at rental/selling point), grants for residential and public buildings, CO2 tax for residential and non-residential. It also includes partial implementation of transport measures.
Renovation Wave (RenoWave)	Buildings	This pathway focuses on increasing the renovation rate of residential and non-residential buildings by introducing **MEPS** for all dwellings and non-residential buildings, tax deduction for renovation works and renovation grants as well as partial uptake of property and CO2 tax for residential and non-residential buildings. The pathway also has a partial uptake of industry and transport support measures. Property taxes for buildings and efficient transport measures start.
Energy Efficient Transport (EET)	Transport and Buildings	This pathway focuses on implementing energy-efficient transport policy, where the government would take a leading role in investing in required infrastructure to promote greater use of low-carbon and soft mobility options. The measures making up this pathway are focused on developing and subsidising public transport and micro-mobility as well as increasing vehicle taxes to replace old vehicles by more efficient ones. The same basic package of building measures as under the *VA* is taken in addition, and the partial uptake of industry measures, such as in the RenoWave.
Comprehensive energy efficiency reform 1 (CEER1)	Buildings, Industry and Transport	This pathway takes a holistic approach, which brings in various measures from the other pathways to create a comprehensive and integrated path. In residential, it includes building MEPS (at rental/selling point), as much grants as under *RenoWave*, but does not include the CO2 tax. For non-residential, it includes grants for public buildings, and MEPS for all buildings. It introduces a strong property taxation (in function of EPC level) in 2030. For the industry, like in the *VA* it comprises the voluntary agreement complemented by grants. For transport, it comprises all measures of the EET.
Comprehensive energy efficiency reform 2 (CEER2)	Buildings, Industry and Transport	Considering that *CEER1* does not reach all EE targets, it's necessary to reinforce some of the measures. On top of the *CEER1* measures, this pathway reintroduces a "partial" CO2 tax for residential & non-residential, an obligation scheme for non-residential. It strengthens the voluntary scheme of the industry while strengthening support measures. In transport it doubles the subsidies provided to stimulate the use of public transport, and the development of convenient and modern public transport.

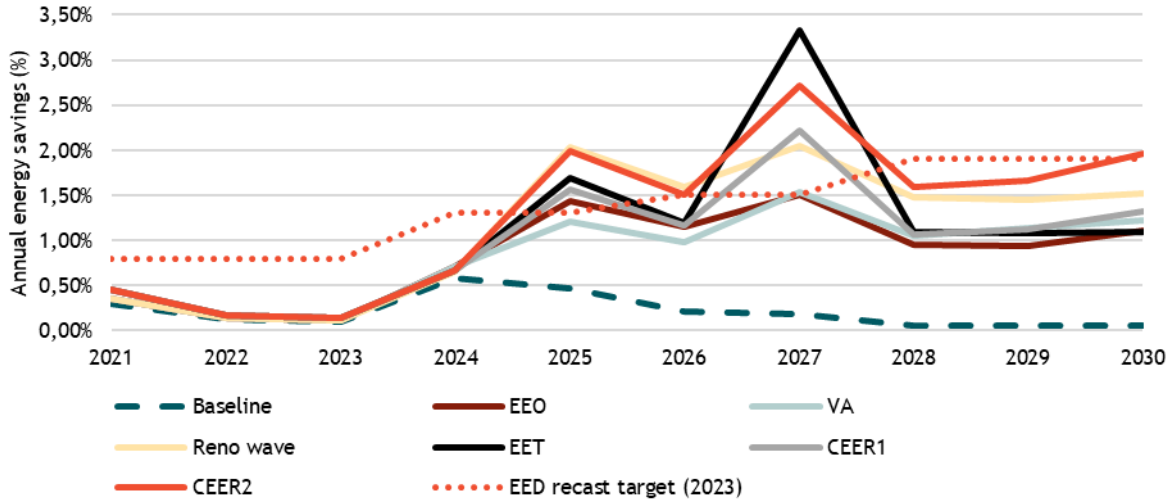
The 7 pathways will be compared to each other against the following set of criteria

- The ability to reach the target. Given the high level of ambition, all pathways will not be able to reach all targets set by EED (2023);
- The assessment of various impacts like job creation, increase of GDP, tax revenues, etc;
- Their feasibility (from a political, socio-economic and technical point of views), and expectation from each sector;
- Advantages and disadvantages linked to the pathways.
- Risks linked to the pathways.

3.5.1 *Ability of the pathways to reach the targets (criterion 1)*

The following figure shows how the pathways are performing with regard to additional yearly savings, and particularly the 1.9% yearly savings in (2028, 2029 & 2030). It is expected that the new measures are entering into force in 2025, and directly show results (strong grants and supports), allowing all pathways to be above expectations. **Only CEER2 achieves the target of 1.9% additional yearly savings** in 2028, 2029 and 2030, all other pathways aren't able to remain at such high level of 1.9%/y, which is very ambitious. The average annual energy savings over the 2024-2030 (1.5%) can be reached by the RenoWave and the CEER2 pathways, those having the strongest component to renovate the building stock.

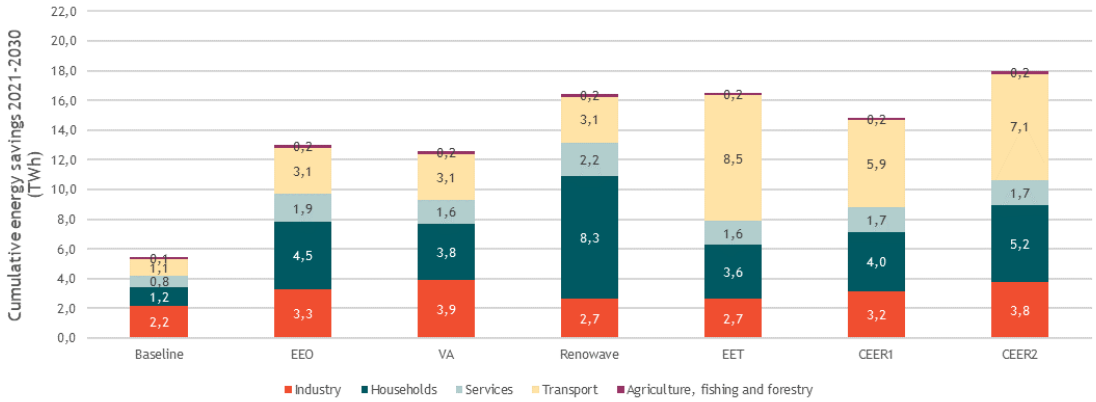
Figure 3-3 - Annual energy savings (%)



Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

Cumulative energy savings per sector vary depending on the chosen pathway and associated measures, as each pathway has an emphasis on different sector(s). Figure 3-4 illustrates how much savings each sector is responsible for by pathway. **None of the pathways achieve the cumulative target of 21.3 TWh** over the 2021-2030 period at the end of 2030.

Figure 3-4 - Cumulative energy savings (TWh) 2021-2030



Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

CEER2 achieves the required cumulative savings at the end of 2031, Renowave and EET by early 2032. **Given the weak performance during the first half of the obligation period (2020-2025), cumulative savings become hard to achieve**. CEER1 achieves the target later in 2032, while EEO & VA only achieve the targets in 2033.

The savings of the pathways are not cumulative, and cannot be added, but a mix of the measures under each pathway could achieve the target by balancing the efforts across the sectors.

Table 3-3 depicts the results for all targets set in the EED, but also additional targets set by Estonia in its NECP/NDPES, among which the transport fuel consumption in 2030 remains hard to reach (only EET allows to reach this target). Almost all pathways, except the EEO and VA pathways, achieves the final energy consumption target set by EED. However, the cumulative savings cannot be reached in 2030 by any of the 7 pathways.

Table 3-3: Summary of pathways achieving the targets

Objective	Year	Unit	EED target	NECP 2030 [18]	Baseline	EEO	VA	Reno Wave	EET	CEER1	CEER2
Final energy consumption	2030	TWh	30	33,3	32,8	30,7	30,7	29,8	29,9	30,3	29,3
Cumulative energy savings	2021-2030	TWh		21,3	5,5	13,0	12,6	16,4	16,5	14,8	18,0
Final energy savings rate	2030	%	1,90%	1,90%	0,1%	1,1%	1,2%	1,5%	1,1%	1,3%	1,96%
Final energy savings rate, average	2024-2030	%	1,50%	1,50%	0,1%	1,0%	1,0%	1,4%	1,3%	1,2%	1,6%
Primary energy consumption	2030	TWh	45,7	63,9	51,5	48,2	48,1	46,7	47,6	47,7	46,2
Final energy savings of public sector/buildings	2021-2030	%	1,90%		0,0%	1,0%	0,8%	1,0%	0,8%	0,9%	1,0%
Renovation rate of public owned buildings	2021-2030	%	3,00%		0,9%	3,5%	2,9%	3,8%	2,9%	3,4%	3,8%
Total renovated area of central government buildings	2021-2030	mln. m2		0,3	0,12	0,43	0,40	0,50	0,40	0,47	0,54
Industry annual energy savings	2030	GWh		232	313	564,0	862,9	417,5	417,5	645,0	833,4
Transport fuel consumption	2030	TWh		8,3	10,1	9,6	9,6	9,6	8,3	9,0	8,6

Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

The global average scoring of this criterion 1 on the ability of the pathways to reach the targets can be made by retaining the mandatory targets set by the revised EED, as depicted by Table 3-4.

Table 3-4: Scoring of pathways achieving the targets

Objective	EED target	Baseline	EEO	VA	Reno Wave	EET	CEER1	CEER2
Final energy consumption	30,0	32,8	30,7	30,7	29,8	29,9	30,3	29,3
Cumulative energy savings	(21.3)	5,5	13,0	12,6	16,4	16,5	14,8	18,0
Final energy savings rate	1,90%	0,1%	1,1%	1,2%	1,5%	1,1%	1,3%	1,96%
Final energy savings rate, average	1,50%	0,1%	1,0%	1,0%	1,4%	1,3%	1,2%	1,6%
Primary energy consumption	45,7	51,5	48,2	48,1	46,7	47,6	47,7	46,2

[18] DIR (EU) 2023/1791

Renovation rate of public owned buildings	3,0%	0,9%	3,5%	2,9%	3,8%	2,9%	3,4%	3,8%
Global average scoring								

Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

CEER2 is scoring green due to the fact it achieves the highest number of targets, although not all (as already mentioned none is able to achieve the cumulative savings over the period), while RenoWave is the second in terms of number of targets achieved, but still misses the final energy savings rate due in 2030 and the average rate over the 2024-2030 period (mainly due to the RRP funds ending in 2027, the lack of measures to replace those support, and the postponement of property taxation after 2030).

3.6 Impact assessment (criterion 2)

Taking the policy pathways and direct impacts into effect, in particular direct costs and costs savings borne by the public sector and private sector, Table 3-5 below illustrates these impacts by pathway:

- As the **CEER2 pathway** has the greatest potential for energy savings, this leads directly to the greatest impact on GHG emissions reduction and cost savings on energy costs. At the same time, this pathway also leads to relatively higher investment costs, which in turn leads to greater impact on GDP, employment and tax revenue from investments.
- The **RenoWave pathway** has the highest investment requirements, although it does not lead to relatively higher energy savings, thus relatively less impactful on GHG emissions and cost savings. Notably, the RenoWave pathway has the greatest increase in employment, considering the labour intensity of renovation.
- The **EET and CEER1 pathways** lead to moderate impacts, in terms of their relative impact on GHG emissions, investment costs (and GDP), cost savings and impact on average energy costs for households. Notably, the EET pathway requires the greatest investment from public sources, given the focus on improving public (transport) infrastructure.
- Compared to the other pathways, the **VA and EEO pathways** are the worst performing pathways in terms of impacts, taking into account a relatively low impact on GHG emissions, low-cost savings, low impact on employment and minimal impact on reducing energy costs for households.

Table 3-5: Summary of impact assessment

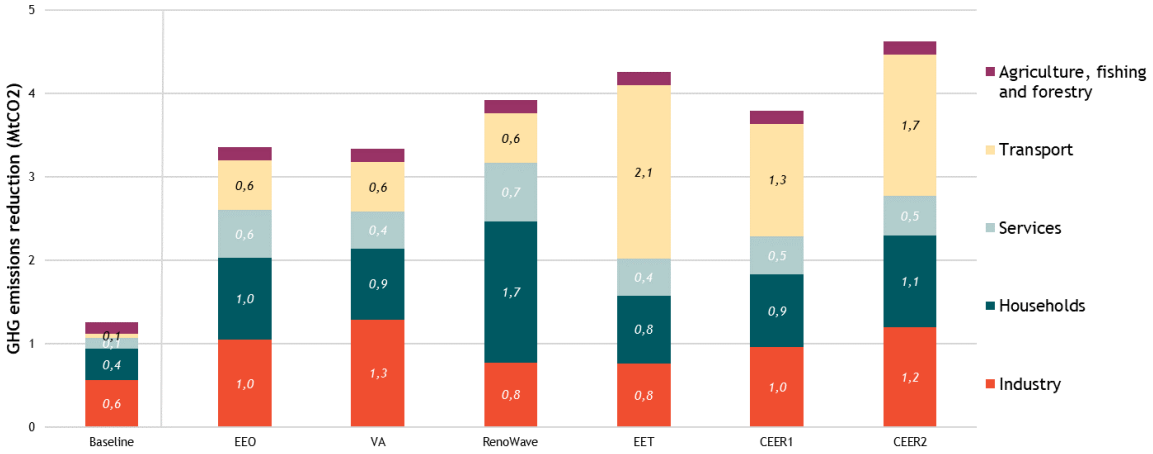
Indicator	Time period	Unit	Baseline	EEO	VA	RenoWave	EET	CEER1	CEER2
GHG emission reduction, cumulative	2021-2030	MtCO2	1,26	3,36	3,34	3,92	4,26	3,79	4,63
Investment costs (total), cumulative	2021-2030	MEUR	1.588	8.660	9.048	16.231	11.262	9.619	13.306
of which public support, cumulative	*2021-2030*	*MEUR*	*331*	*2.836*	*2.929*	*3.926*	*5.720*	*3.874*	*5.026*
Cost savings, cumulative	2021-2030	MEUR	489	1.261	1.206	1.621	1.667	1.476	1.796
Impact on GDP	2021-2030	%	0,6%	2,9%	3,0%	5,2%	3,7%	3,2%	4,4%
Impact on disposable income	2021-2030	%	0,8%	1,4%	2,1%	0,8%	3,8%	2,5%	3,6%
Impact on employment (Average annual job creation)	2021-2030	Thousand employees	0,83	11,96	11,64	24,23	14,80	12,88	17,41
Impact on tax revenue	2021-2030	%	0,6%	1,5%	1,7%	2,8%	1,5%	1,5%	2,1%

Average energy cost as a share of household disposable income	2021-2030	%	7,98%	7,67%	7,67%	7,41%	7,56%	7,63%	7,46%
Average yearly GDP	2021-2030	MEUR	42.823	43.787	43.828	44.761	44.156	43.931	44.423
Average yearly Investment costs (total)	2021-2030	MEUR	159	866	905	1.623	1.126	962	1.331
Average yearly tax revenue	2021-2030	MEUR	16.042	16.186	16.205	16.389	16.183	16.183	16.274
Average yearly public support	2021-2030	MEUR	33	284	293	393	572	387	503

Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

Figure 3-5 illustrates the distribution of GHG emission reduction per sector, showing the efforts on each sector in each pathway (e.g. EEO focusing on non-residential, VA on the industry, RenoWave on residential, EET on transport, CEER1 more balanced but too low, CEER2 more balanced but reaching several targets, as explained above).

Figure 3-5 GHG Emission reduction per sector ($MtCO_2e$) 2021-2030



Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

The global average scoring of this criterion 2 on the impact assessment of the pathways to reach the targets can be made by retaining the mandatory targets set by the revised EED, as depicted by Table 3-6.

Table 3-6: Scoring of the impact assessment

Indicator	Time period	Unit	Baseline	EEO	VA	RenoWave	EET	CEER1	CEER2
GHG emission reduction, cumulative	2021-2030	MtCO2	1,26	3,36	3,34	3,92	4,26	3,79	4,63
Investment costs (total), cumulative	2021-2030	MEUR	1.588	8.660	9.048	16.231	11.262	9.619	13.306
of which public support, cumulative	*2021-2030*	*MEUR*	*331*	*2.836*	*2.929*	*3.926*	*5.720*	*3.874*	*5.026*
Impact on GDP	2021-2030	%	0,6%	2,9%	3,0%	5,2%	3,7%	3,2%	4,4%
Impact on disposable income	2021-2030	%	0,8%	1,4%	2,1%	0,8%	3,8%	2,5%	3,6%
Impact on employment (Average annual job creation)	2021-2030	Thousand employees	0,83	11,96	11,64	24,23	14,80	12,88	17,41

Impact on tax revenue	2021-2030	%	0,6%	1,5%	1,7%	2,8%	1,5%	1,5%	2,1%
Average energy cost as a share of household disposable income	2021-2030	%	7,98%	7,67%	7,67%	7,41%	7,56%	7,63%	7,46%
Global average scoring									

Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

The scoring is mainly justified by the following considerations

- GHG emissions savings is significantly higher for CEER2 than for the other pathways, although closely followed by EET
- Although this is balanced by the fact that public budget (support and own investments) is significantly higher for CEER2 than for RenoWave, mainly due to public investments (in transport), as RenoWave is already intense in support
- The positive impact on GDP is significantly higher for RenoWave than for the other pathways, thanks to the focus on the building sector which contributes significantly to GDP
- The impact on disposable income is much higher for CEER2 and EET than for the other pathways, including RenoWave due to the important investment of households
- RenoWave creates significantly more jobs than all other pathways, although the importance of the building sector gives to CEER2 a good second position in job creation
- Building renovation generates more tax revenues than measures in other sectors, and consequently RenoWave has the best score, closely followed by CEER2
- The average energy cost as a share of household disposable income is the lowest for CEER2 (thanks to the balance of measures between sectors).

3.6.1 Feasibility and expectation from each sector (criterion 3)

To varying degrees, the 7 pathways require the building, industry and transport sectors to take action to reduce energy consumption, where reaching these expectations for each sector can be complicated and may not be feasible. To investigate the feasibility of the pathways for each sector, the table below illustrates the expectations for renovation for residential and non-residential buildings as well as the savings rates for industry and transport over the next decade. Notably, certain pathways require a significant increase in energy savings:

- The **EEO pathway** increases the renovation rate of residential and non-residential buildings, namely renovating 50.7% and 71% of the building stocks respectively by 2035, which is very challenging although Obligation Scheme is expected to remain shallow renovation (and not deep renovation). Renovating such share of the non-residential building stock (both public and commercial) in 10 year appears to be unfeasible (it represents an average 6.2% annual renovation rate, well beyond the current capacity of the construction sector), even with additional support;
- The **VA pathway** notably requires a significant increase in energy savings in industry, which is extremely ambitious, and probably not realistic due to the expected duration of the measure implementation (at least 2 years to see the first limited results, and 5 years to see significant results);
- The **Renovation Wave pathway** pushes the annual renovation rate of residential buildings from 0.5% to 7.9% (well beyond the current capacity of the construction sector), leading to 88.8% of the residential building stock being renovated by 2035, which is highly challenging. Renovating almost the entire residential building stock in 10 year appears to be unfeasible. Even with massive grants, this would remain unrealistic;

- The **EET pathway** increases the energy savings rate of transport by 17x compared to the baseline, which would require a huge behavioural change, inciting citizens to significantly decrease the use of their car, while at the same time replacing the old vehicle stock by more efficient ones (with a strong switch to EV, but not only);
- The **CEER1 and CEER2 pathways** overall require a significant increase in renovation (residential and non-residential and reduction of energy consumption of the transport sector. But globally, these pathways are more balanced regarding the efforts expected in each sector.

Table 3-7 Renovation rate for buildings (%) and energy savings rate for industry and transport (%), 2024-2035

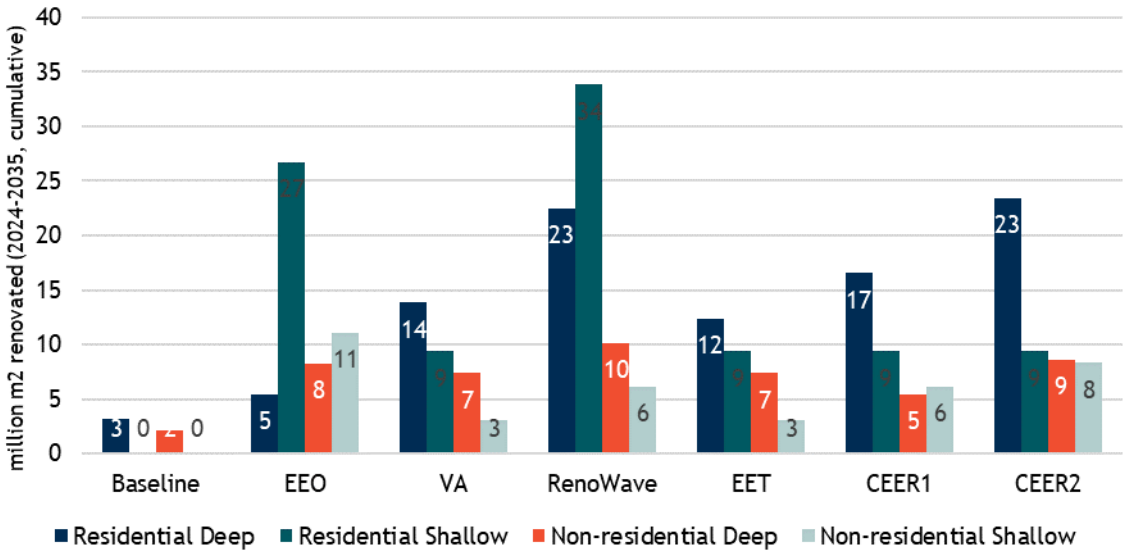
Sectoral saving rates	Baseline	EEO	VA	Reno Wave	EET	CEER1	CEER2
Residential annual renovation rate (%)	0,5%	4,5%	3,2%	7,9%	3,0%	3,6%	4,6%
% of residential buildings renovated (in 2035 vs 2024)	5,1%	50,7%	36,6%	88,8%	34,2%	40,9%	51,6%
Non-residential renovation rate	0,7%	6,2%	3,4%	5,3%	3,4%	3,8%	5,5%
% of non-residential buildings renovated (in 2035 vs 2024)	7,9%	71,0%	38,5%	60,0%	38,5%	42,6%	62,3%
Industry energy savings rate	0,3%	1,0%	2,3%	0,6%	0,6%	1,6%	2,3%
Transport energy savings rate	0,1%	0,5%	0,5%	0,5%	1,7%	1,1%	1,4%

Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

The focus of the pathways with regards to the sectors should consider the constraints in each sector: **Buildings** (residential and service) can cost-effectively improve their energy performance and reduce energy consumption, through deep renovation having also co-benefits of improved indoor climate and well-being, service-life and life quality, which means that the room for significant impact is important.

Figure 3-6 illustrates the various degrees of renovation depth required per pathway. The Renovation Wave pathway requires the most deep and shallow renovation of residential buildings, corresponding to the highest investment requirements as noted in the impact assessment. The CEER1 and CEER2 pathways also require significant deep renovation of residential buildings, though less shallow renovations. The use of obligation schemes in the EEO pathway leads to a significant increase in shallow renovations of both residential and service buildings

Figure 3-6 Deep and shallow renovated residential and non-residential building stock per pathway, 2024-2035 cumulative



Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

(*) Shallow renovation means that the expected savings remain limited (e.g. for single houses shallow could lead to 34kWh/m^2); for deep renovation, the expected savings are higher (e.g. for single houses shallow could lead to 64kWh/m^2).

Industry can still increase energy efficiency, but industrial processes have limits to savings and cannot significantly reduce energy consumption without decreasing competitiveness. Notably, the VA pathway puts the most pressure on industry, requiring a total of 10.1 TWh of savings from 2024 to 2035 and 1 BEUR of investment. This is also the case for the EEO, CEER1 and CEER2 pathways, but to a lesser extent.

Table 3-8 Industry energy savings and investment needs, 2024-2035 cumulative

Objective	Baseline	EEO	VA	RenoWave	EET	CEER1	CEER2
Energy savings (GWh) (2024-2035)	3.460	6.233	10.134	4.613	4.613	7.525	9.792
Investment needs (incl. tax) (MEUR) (2024-2035)	405	632	1.001	503	503	769	968

Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

Energy efficiency in **transport** mainly relies on reducing the use of personal cars (less persons*km, and less ton*km) calling to develop public transport, active & micro-mobility, and replacing the old vehicle stock by more efficient ones. The table below shows that the EET, CEER1 and CEER2 have the greatest efforts to reduce energy consumption in transport, compared to the other pathways.

Table 3-9 Transport energy savings and investment needs, 2024-2035 cumulative

Objective	Baseline	EEO	VA	RenoWave	EET	CEER1	CEER2
Cumulative energy savings (GWh) (2024-2035)	1.905	6.377	6.377	6.377	18.750	12.538	15.695
Investment needs (incl. tax) (MEUR) (2024-2035)	844	1.914	1.914	1.914	4.594	2.880	3.567

Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

Agroforestry has limited room to improve efficiency, where all pathways have the same increase in energy savings and investment needs for the next decade borne from the addition of auditing in large agriculture holdings.

Table 3-10 Agroforestry energy savings and investment needs, 2024-2035 cumulative

Objective	Baseline	EEO	VA	RenoWave	EET	CEER1	CEER2
Cumulative energy savings (GWh) (2024-2035)	182	386	386	386	386	386	386
Investment needs (incl. tax)[19] (MEUR) (2024-2035)	82	93	93	93	93	93	93

Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

Consequently, there is more room to significantly reduce energy consumption in buildings, than in the industry and agro-forestry. Energy efficiency in transport relies heavily on spatial planning, public transport infrastructure long-term investments, fuel and vehicle taxation, and consequent behavioural changes that somewhat depend on users' willingness.

Residential buildings and transport are each representing ~1/3 of final energy use and should be addressed as first. However, renovation of dwellings requires important investments and a strong incentive to carry them out (as shown in the *RenoWave* pathway, there is need to boost grants to accelerate the pace of renovation). Also, energy efficiency in transport has some limits and requires important behavioural changes which takes time (almost all pathways are not able to reach the transport target fixed by the transport and mobility development plan until 2035 to consume less than 8.3 TWh, while the sector faces clear growth). Non-residential buildings and industry (inc. agro forestry) are each representing ~1/6 of final energy use. These 2 sectors could be left aside regarding financial support measures (to concentrate efforts on residential and transport), but non-residential offers substantial perspective for energy savings with regulatory minimum energy performance standards (MEPS) (where there is currently a very bad level of performance, leaving potential for substantial energy savings), while industry should be accompanied along its decarbonisation path, to remain competitive and attractive at EU scale. For that reason, there are no mandatory schemes or obligations proposed for industry. Consequently, the important efforts towards energy saving targets set by the EED has to be spread properly between sectors. The targets are too ambitious to leave any sector aside.

The table below summarises the feasibility of each pathway

Table 3-11 Summary of feasibility for each pathway

Pathway	Description
EEO	• The focus on building via an Obligation Scheme is highly ambitious, and probably unrealistic
VA	• The Voluntary is key for the industry, but to allow this pathway dedicated to accelerate EE in the industry, the VA should be too fast and effective, with an important additional annual savings (2.3%/y)
RenoWave	• A strong focus on building, similar to the EEO, does reach unrealistic levels of renovation rates
EET	• Accelerating EE in transport is essential and highly challenging, but with a strong political willingness to deploy alternatives to individual cars, this might be feasible
CEER1	• This more balanced pathway is spreading the efforts across sectors, and should be the most realistic

[19] This includes the additional costs related to tax measures

CEER2	• Starting from the CEER1 which is the most realistic but does not reach the goals, there is a need to reinforce some of the measures leading to more challenging pathway than CEER1

Scoring

Good score -> lead to selection
Medium score
Bad score -> lead to exclusion

3.6.2 Pros, cons and risks related to pathways (criterion 4)

The table below lists an overview of the pros and cons of each pathway, in addition to their feasibility.

Table 3-12 Summary of Pros and cons for each pathway

Pathway	Pros	Cons
EEO	• Cost-effective energy savings • Leverages from EU best practices, streamlining implementation. • Creates demand for energy-efficiency technology • Shifts focus from energy as a product to a service • Accelerates knowledge building relating to renovation.	• High administrative costs, especially for small-scale energy savings units. • Complexity in navigating small-scale energy savings units. • Risk of higher energy prices for vulnerable households if there is no dedicated support • For building renovation, it may lead to a missed opportunity to deep renovation (remaining shallow)
VA	• Tailored solutions for cost-effective energy savings • Promoting stakeholder collaboration and ownership • Scalable across sectors and levels, accommodating diverse efficiency goals. • Encourages innovation, public-private partnerships, and collaboration, enhancing market appeal.	• Voluntary agreements may have lower participation without sufficient incentives. • Initial energy efficiency investments seen as barriers for some stakeholders. • Limited enforcement and varying commitments may lead to uneven outcomes.
RenoWave	• Greater access to EU funds, grants and loans for renovation • Generates jobs, boosting construction and manufacturing sectors • Drives economic growth • Enhances energy security, optimising energy usage with smart technologies	• High upfront costs deter building owners from energy-efficient solutions. • Challenges in implementing universal MEPS for dwellings. • Limited awareness hampers adoption. • Shortage of skilled professionals and lack of sufficient energy-efficient renovation expertise.
EET	• Strong commitment to sustainability and energy efficiency, backed by clear government support for promoting energy-efficient transport initiatives. • EVs create an opportunity to both reduce emissions and enhance energy efficiency. • Promotion of active transportation (cycling and walking) • Integrated transport systems and multimodal transportation can optimize energy utilization and enhance overall efficiency.	• Limited EV/public infrastructure hampers adoption of EVs/public mobility • Public resistance and lack of awareness
CEER1 & CEER2	• Strong commitment to sustainability and energy efficiency, backed by clear government support for promoting energy-efficient initiatives. • Balanced between sectors, allowing for diverse funding mechanisms • Rapid advancement of EE technologies offers innovative and cost-effective renovation solutions, and job opportunities. • EVs create an opportunity to both reduce emissions and enhance energy efficiency. • Promotion of active transportation (cycling and walking)	• Limited EV/public infrastructure hampers adoption of EVs/public mobility • Public resistance and lack of awareness • High renovation costs and limited awareness of benefits of renovation • Shortage of skilled professionals and lack of sufficient energy-efficient renovation expertise.

	• Integrated transport systems and multimodal transportation can optimize energy utilization and enhance overall efficiency. • Enhances energy security, optimising energy usage with smart technologies	

3.6.3 *Risks related to pathways (criterion 5)*

The table below shows the main risks and mitigation measures related to each pathway.

Table 3-13 Summary of risk related to each pathway

Pathway	Technical skills	Social	Economic	Environmental	Administrative
EEO	• Specialized knowledge needed for complex technologies. • Training for energy operators and stakeholders essential. • Flexible framework required for adjustments based on tech advancements. • Regularly update eligible technologies list to include new innovations. • Energy operators need market knowledge for identifying cost-effective projects.	• Opposition due to administrative burden and perceived financial strain for obligated parties. • Resistance from high-energy consumption industries citing competitiveness/cost concerns. • Energy operators need effective communication to convince consumers for EE projects. • Mitigation through public awareness, dialogue with obligated parties, and incentives. • Support energy operators with awareness campaigns to enhance acceptance.	• Passed-on costs might cause financial strain, especially for vulnerable households • Challenges with initial investment for energy operators, especially for smaller companies • Consumer protection policies, price caps, and financial support can mitigate cost impact. • Transparent communication enhances understanding and acceptance of program objectives and costs. • Regular market monitoring and program flexibility address competitiveness concerns.	• Promotion of EE might inadvertently promote increase in demand for non-renewable/high-emission sources. • EEO programs should take a holistic approach, targeting multiple sectors and technologies, addressing a wide range of energy-saving opportunities, ensuring adaptability to changing market dynamics and technological advancements.	• Requires agreement on accepted projects, savings calculation, verification, compliance, etc. • Complexity in savings calculation for industrial consumers challenges standardization.
VA	• High upfront costs for new technology • Required updated skilled workforce, potential shortage of skilled labour • Mitigation through financial incentives, grants, subsidies and low-interest loans • Investment in training programmes	• VAs are voluntary programs, requiring participants to be: ○ Aware of the program ○ Well-informed about the benefits ○ Willing to participate • Mitigation strategies include: ○ Awareness campaigns ○ Informing about energy renovation benefits and financial options () ○ Involving stakeholders (technology providers, experts, end-users) in decision-making ○ Fostering collaborative efforts to address technological risks	• Risk of market distortions due to varying compliance costs • Longer payback periods deter participation • Changes in market demand or energy prices affect cost-effectiveness • May impact vulnerable consumers through increased prices • Potential mitigations measures include: ○ Allow flexibility in timing and sequence of measures ○ Collaborative efforts ○ Dedicating funding ○ Clear and stable policies to reduce uncertainty	• Increasing construction activities can generate more waste and pollution. To mitigate this risk, Incorporate life-cycle assessments into the design phase of renovations. Strengthen waste management of construction-related waste to promote recycling and re-use of materials.	• Administrative burden for obligated parties and implementing authorities relating to complying to specific targets and regularly reporting progress • Need for accurate data for realistic targets and progress monitoring • Complexities with parallel initiatives, which requires coordination and integration to reduce inefficiencies • To mitigation risks: ○ Simplify reporting ○ Implement digital solutions ○ Encourage transparency and cooperation ○ Engage stakeholders ○ Regularly assess effectiveness of VAs
Reno Wave	• Major risk of lack of sufficient labour for construction activities. Mitigate through training programmes	• Lack of public acceptance of MEPS and disproportionate impact on low-income housholds. Mitigate through direct grants for low-income	• Fluctuations of energy prices create uncertainty for the cost-effectiveness of energy-savings measures. Consider	• Increasing construction activities can generate more waste and pollution. To mitigate this risk, Incorporate life-cycle assessments	• Ensuring compliance with MEPS regulation could be a challenge in terms of enforcing inspections and

Pathway	Technical skills	Social	Economic	Environmental	Administrative
	• Constraints on material availability. Mitigate by promoting local production and encourage resource efficiency and recycling/reuse of materials.	households affected by MEPS • Lack of awareness of new developments/benefits of public transport. Mitigate through awareness campaigns.	loan schemes based on actual cost savings to reduce the impact of fluctuating energy prices.	into the design phase of renovations. Strengthen waste management of construction-related waste to promote recycling and re-use of materials.	penalties for non-compliance. • Given the amount of grants, there is a lot of issues to access and information sharing, as well as monitoring compliance of measures.
EET	• Complexities in integrating EE technologies in existing transport systems • Establishing reliable EV charging infrastructure • Lack of skilled labour for installing/maintaining EE transport technologies. Mitigate with training and capacity building	• Resistance to change behaviour and lifestyle. Mitigate through awareness campaigns and financial incentives • Limited access/affordability for EE transport among low-income/ marginalised communities. Mitigate with inclusive design/engagement and assessment of social equity.	• Requires high upfront costs relating to upgrading/ developing infrastructure	• Indirect emissions from vehicles, relating to the lifecycle emissions of new technologies. • Environmental impact of resource extraction, including habitat destruction and water pollution, from new technologies (i.e., new lanes, EVs). • Mitigate by conducting comprehensive LCA for EE technologies and prioritising measures with the overall lowest impact. Also, having careful land use planning	• Lengthy and bureaucratic public procurement processes. Mitigate through streamlining and creating flexibilities in the procurement process.
CEER1	• Major risk of lack of sufficient labour for construction activities. Mitigate through training programmes • Constraints on material availability. Mitigate by promoting local production and encourage resource efficiency and recycling/reuse of materials.	• Lack of public acceptance of MEPS and disproportionate impact on low-income households. Mitigate through direct grants for low-income households affected by MEPS • Lack of awareness of new developments/benefits of public transport. Mitigate through awareness campaigns.	• Fluctuations of energy prices create uncertainty for the cost-effectiveness of energy-savings measures. Consider loan schemes based on actual cost savings to reduce the impact of fluctuating energy prices.	• Increasing construction activities can generate more waste and pollution. To mitigate this risk, Incorporate life-cycle assessments into the design phase of renovations. Strengthen waste management of construction-related waste to promote recycling and re-use of materials.	• Ensuring compliance with MEPS, particularly concerning the enforcement of inspections and penalties for non-compliance. • Mitigation measures should focus on the need for effective coordination, monitoring, and implementation, given that this pathway comprises numerous ad hoc, small-scale measures that require diligent oversight.
CEER2	• Major risk of lack of sufficient labour for construction activities. Mitigate through training programmes • Constraints on material availability. Mitigate by promoting local production and encourage resource efficiency and recycling/reuse of materials.	• Lack of public acceptance of MEPS and disproportionate impact on low-income households. Mitigate through direct grants for low-income households affected by MEPS	• Fluctuations of energy prices create uncertainty for the cost-effectiveness of energy-savings measures. Consider loan schemes based on actual cost savings to reduce the impact of fluctuating energy prices.	• Increasing construction activities can generate more waste and pollution. To mitigate this risk, Incorporate life-cycle assessments into the design phase of renovations. Strengthen waste management of construction-related waste to promote recycling and re-use of materials.	• Given the increased ambition of the measures, keeping up with all administrative tracking, implementation, compliance and monitoring will be a real challenge. • If the administrative processes are too burdensome, or unable to keep up with new measures, construction, permitting, etc, this may cause a significant roadblock to implementation.

3.6.4 Final comparison of the 7 pathways (all 5 criteria)

The following table compares the pathways against the 5 criteria.

Table 3-14 Summary of all criteria for each pathway

Criteria	Baseline	EEO	VA	Reno Wave	EET	CEER1	CEER2
1: Ability of the pathways to reach the targets							
2: Impact assessment							

3: Feasibility and expectation from each sector							
4: Pros and cons related to pathways							
5: Risks related to pathways							

It is assumed that these 5 criteria encompass all considerations which are relevant for the implementation of the measures contained in each pathway, including social and/or political acceptance which are key factors for the selection of the optimal pathway.

Considering that CEER2 is the pathway which allows to reach the highest number of targets fixed by EED, has consequently the best performance with regards to impacts (similarly to RenoWave), and is scoring high related to the balance between advantages and disadvantages, we conclude that CEER2 is the optimal pathway. It will require around EUR 13.3 billion over the obligation period (2021-2030), with bulk of the investments to be made during the 2025-2030 period.
However, it should be pointed out that its feasibility is not obvious, and it remains highly challenging, due to the very high EED ambition. This pathway also contains several risks that will require attention in the next phases of planning EE actions.

CEER2 pathway articulates actions in all sectors, with the goal to drive notable enhancements in energy efficiency across the entire economy, and hence all sectors:

- In residential buildings, *CEER2* combines renovation grants, MEPS (for rented/selling buildings), a minimal level of CO_2 tax, and property taxation from 2030. Among these long-term measures, renovation grants may be seen as intermediate especially in single family dwellings, to support the transition to mandatory renovation via MEPS and disadvantageous property taxation. Renovation grants in multifamily dwellings represent single largest saving potential in the case of deep renovation and are likely needed for longer period to avoid renovation locks and other negative implications otherwise caused by MEPS. Tax reduction for renovation is also an intermediate measure but could possibly stay for a longer period. All these measures are forming a coherent and efficient set to improve residential building stock energy performance, in the most balanced and optimal way;
- In non-residential buildings, *CEER2* combines an obligation scheme for all buildings, MEPS to strengthen and accelerate the effect of the obligation, a minimal level of CO_2 tax, and property taxation from 2030. These long-term measures require, however, to be accompanied by renovation support for public buildings (central and municipal). However, no support for commercial buildings is deemed necessary, as the savings are expected to come via obligation schemes and MEPS. All these measures are forming a coherent and efficient set to improve non-residential buildings energy performance, in the most rapid and cost-effective way;
- In the industry, a strong voluntary scheme is considered as the most appropriate option, engaging a long-term dialogue between the government and the industry, to ensure sustainable savings, and possibly full decarbonisation. To incentivise the industrial actors, supports are necessary, to help investing (via promoting resource-efficient green technologies, support energy efficiency investments in energy intensive industry & other companies, support for the food industry, energy consulting and networking for SMEs), or to motivate commitment towards energy efficiency targets (and reduced GHG emissions). The measures were chosen considering two main outcomes - increase energy efficiency of industry without hurting competitiveness;

- In transport, alternatives to personal cars are proposed, such as public transport & active mobility modes, and encourage users to choose these alternatives, CEER 2 combines:
    - Investments in the required infrastructure (priority lanes for micro mobility, EV charging, development of convenient public transport, railroad and its electrification, tram line in Tallinn,
    - Direct investments or incentives to invest in the required vehicles (additional passenger trains, EV taxis in Tallinn & Tartu,
    - Incentives to use alternatives (subsidy for public transport usage, subsidy for micro mobility usage),
    - Price adjustment to de-incentivise the use of personal cars (congestion charge),
    - Price adjustment to incentivise the purchase of more efficient cars (vehicle tax for registration and annual vehicle tax).
- In agroforestry, *CEER2* proposes to accompany enterprises to manage better energy use and to support energy efficiency measures in fisheries.

The fuel tax measure should also be considered as a long-term supporting policy option, as it would direct consumers towards energy efficiency and incentivises best performing consumers.

In each sector, these combinations are necessary to ensure the right balance:

- Accelerating the transition (via expensive support) and ensure long term affordability (moving to norms and price signal);
- Avoiding too expensive options requiring massive investments and support from the public, and possibly influence behavioural changes thanks to price signal;
- Incentivising investments and changes by providing support, and then by progressively de-incentivising (via normative measures);
- Setting up realistic and the least complex options (it is hard to say simple, as none of the measures can be considered to be simple), from a technical and administrative point of view;
- Engaging the concerned actors, namely consumers and professionals;
- Designing all measures in a coherent package to ensure the measures are complementing each other;
- Allowing easy and fair distribution of costs, to deal with energy poverty concerns.

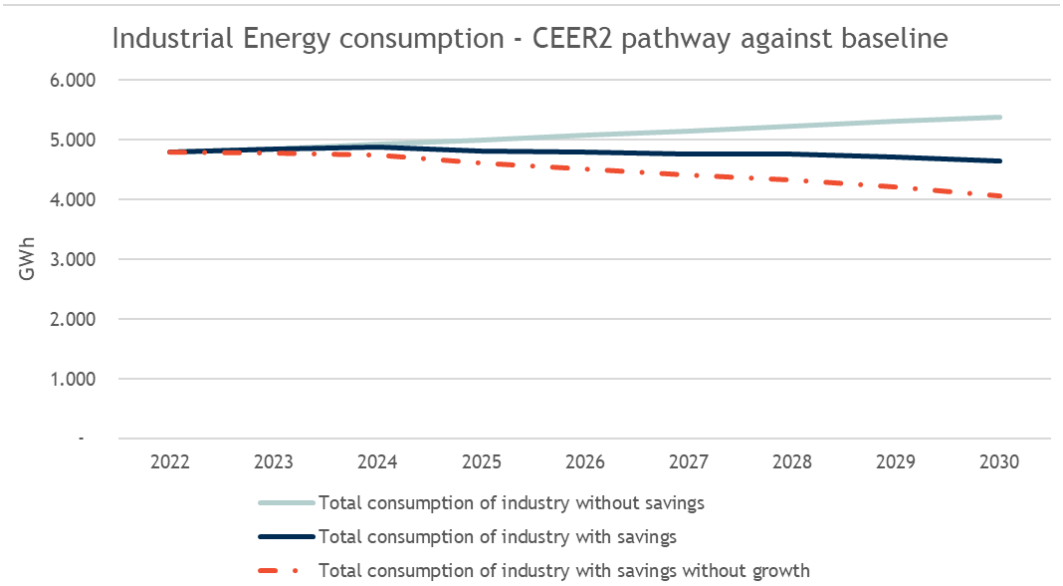
3.7 Energy efficiency and growth

Increasing energy efficiency should not become an obstacle to growth in the country. As explored in the work done to build the baseline, growth expectations have been included since the beginning.
Figure 3-7 illustrates the case of the industry

- The light blue line shows the expected energy consumption of the industry in a growth scenario, with an average yearly increase of 1.5% of industrial activity (all sectors included), without considering any savings except the “natural” trend;
- The dark blue line shows the results when applying energy efficiency measures to the industry. The difference between these lines shows the savings, highlighting that the difference between 2030 and 2022 is rather small (savings being compensated by growth)
- The red dotted line shows a fictive scenario where there is no growth in the industrial production. This is what would happen if there is no change in the industrial production, but

energy savings are made across the industry. The difference between the dark blue and the red lines shows the potential for growth, including the arrival of new industrial players within Estonia

Figure 3-7 Comparison of industrial consumption under CEER2 pathway in a growth scenario and in a status uo scenario



Source of data: "D4 Modelling v8.2.xlsx", tab "Exec. Sum"

3.8 Looking at some Energy Efficiency measures more closely

The pathways bundle existing and new EE measures/policies to try to achieve collectively the different targets, assessing their feasibility, pros, cons and risks through the analysis of their dominant underlying EE measures. However, the **optimal pathway selection remains highly indicative, as each EE measures should be considered in an isolated way when it comes to their design** (incl. level of ambition) & implementation (incl. political decision). Their contribution to energy savings also directly depends on their entry into force and duration. The most appropriate approach is always to **balance normative with incentive measures**, by providing grants or by using price signals as levers to invest or change behaviours. We assume that funding and grant capacity of the government remains limited, and cannot provide support to all sectors on the long run. Hence, such supporting measures should be considered as transitional measures and require a long-term price signal and normative combination.

Until now, the pathway analysis did not look at each specific measure with regards to the others. The pathways look at the coherence and complementarity of the EE measures, but not specifically at their interactions, while this could become a critical aspect of their feasibility, or efficiency.

This section shortly assesses some measures that were considered since the beginning, but could be addressed differently (postponed, combined, or removed):

- CO_2 on fuel should wait until the new ETS2 (BRT ETS or Building and Road Transport) is entering into force, starting in 2027 in the model (although, existing excises on fuels must come back to the previous level);

- Obligation scheme should not be implemented at this stage, to avoid launching too many measures at the same time, starting in 2031 in the model.
- Property taxation, to be reassessed later on, starting only in 2031 in the model;

3.8.1 Carbon taxation & fuel excise

From 2027, the buildings sector will be included in the new EU ETS (ETS Buildings and Road Transport sector) and will also have to apply the new MEPS scheme (Minimum Energy Performance Standard). In the new ETS BRT, for emissions related to fossil fuels used for heating and cooling of the buildings, CO2 allowances will need to be purchased, at an estimated unit price level of € 40 / 45 €/tCO2eq (for the first years of this ETS). For the longer term, the European Commission has indicated its intention to propose integrating the new BRT ETS into the existing. This would probably lead to a considerable increase of the unit cost of CO2 allowances.

Such measure would need to be implemented before the start of the new BRT ETS (since from 2027 on it would most probably be replaces by the new ETS). This would leave very limited time for the preparation, reaching agreement and decisions on, entering into force and implementing of such measures.

3.8.2 Obligation scheme for later

An **obligation scheme** (applying on commercial buildings) and a **MEPS** could possibly be conflicting instruments if not designed and implemented properly, as they both aim at obliging 2 different actors to achieve results: an energy supplier has to reduce its supply (on entire portfolio) by stimulating investments, while at the same time a building owner has to increase the performance of its building. Energy supplier and building owner have both the same objective: improve building performance, but with possibly different agenda/timeline, scope (one building vs a portfolio), or even ambition. To conclude, it might be risky to implement both instruments at the same time, as ensuring coherence and complementarity might be complex without experience and proper operation of at least one of the two. Given that MEPS will be implemented in any case, we therefore recommend considering an obligation scheme at a later stage if deemed needed (e.g. if MEPS does not deliver expectations), targeting only non-residential commercial buildings.

3.8.3 Property taxation

Rationale to adjust property taxation

A taxation on residential immovable property that is well-designed can play a crucial role in a country's overall tax mix and tackle different policy concerns, such as inequality. Recurrent immovable property taxes are considered to be among the taxes that have the least negative impact on growth and can be developed in a manner that reduces the wealth gap and post-tax income disparities within the population.

Furthermore, recurrent immovable property taxes can support the green transition outlined in the European Green Deal, which states that taxation can play a crucial role in the transition towards an inclusive and climate-neutral economy. Recurrent taxes on immovable property can be an effective tool in addressing the worldwide challenge of climate change, provided that they are designed appropriately and encourage the positive incentives[20].

[20] Leodolter A, Princen S and Rutkowski A; "Immovable Property Taxation for Sustainable & Inclusive Growth", European Economy Discussion Paper 156 (2022)

A property tax base that is based on value may discourage investments in making a building more energy efficient and create a trade-off between equity and environmental objectives. Since the tax base is likely to increase as a result of an energy efficiency improvement, value-based property taxation may discourage building upgrades, especially if energy consumption taxes fail to account for the full environmental cost of energy consumption.

Mainstreaming energy performance in property taxation

Adjusting the property tax base to include a building's energy performance could be a solution. However, studies have indicated that redistributing the tax burden from more energy-efficient to less energy-efficient buildings based on energy performance would shift taxation from suburban to rural properties, with urban properties remaining largely unaffected. While taxes for apartments would decrease, those for terraced houses would increase. Therefore, should energy efficiency become a factor in property taxation, distributional effects must be considered. Households with higher incomes are more likely owners of energy-efficient buildings and would not be as much affected as households with lower incomes.[21]

The design of tax incentives for energy-efficient investments is critical for their effectiveness, as otherwise they may unfairly benefit high-income earners. While cost is often the primary barrier to renovation, evidence on the impact of income tax incentives for clean energy investments is not clear. As households may use tax incentives to finance energy-efficiency investments while simultaneously increasing their energy consumption, energy consumption taxes may be necessary as an additional measure.

Furthermore, the question of which types of renovation should be supported is significant, as minor renovations may create lock-in effects and delay highly effective major renovations.[22] There may be a trade-off between increased energy efficiency and redistributive objectives, as tax reductions related to energy efficiency have been shown to primarily benefit higher-income households due to factors such as their exclusive availability to homeowners, the non-refundable nature of tax credits, and limited access to credits for lower-income households.[23]

Potential for a property taxation in Estonia that creates positive incentives for energy efficiency

Property taxation is found in all EU member states and the level of taxation varies. However, many Member States have relatively low levels of recurrent taxation on immovable property, where Estonia currently has the lowest revenues from property taxation (as percent of GDP in the EU[24]). This implies that creating positive incentives within the current levels of taxation will be difficult. The Estonian context with regards to the overall tax system plays an important role here. Taxation on property has always been very low in Estonia, where focus so far has been on consumption and income taxes. Furthermore, while the property tax is formally a national tax, 100% of the revenue is redistributed to the local authorities. They can also, within certain limits, decide the level of property tax in their own municipality.

[21] Davis P., M. McCord, W.J. McCluskey, E. Montgomery, M. Haran and J. McCord; "Is Energy Performance too taxing: A CAMA approach to modelling residential energy in housing in Northern Ireland", Journal of European Real Estate Research 10/2: 142-148 (2017)
[22] Dubois Maarten and Karen Allacker; "Energy Savings from Housing: Ineffective Renovation Subsidies vs Efficient Demolition and Reconstruction Incentives", Resources and Energy 10(3): 191-212 (2015).
[23] Borenstein, Severin and Lucas W. Davis; "The Distributional Effects of US Clean Energy Tax Credits", "Tax Policy and the Economy, Volume 30", University of Chicago Press (2015).
[24] Sources: EU Commission 2019, OECD 2021

Property taxation with an "energy component" risks to be a regressive taxation and especially so for the about one third of Estonian population currently living in or close to poverty. There are also large regional socioeconomic disparities in the country. Furthermore, there is an exception in Estonian property tax legislation for homes where a person lives permanently are exempt from property tax. In this context, the current construction of a property tax for apartments and private homes cannot currently provide positive incentives for energy efficiency measures.

One area where property taxation could provide stimuli for energy efficiency measures is commercial property. It is more difficult to manipulate and avoid taxation for business property and the incentives to make energy efficiency measures could be connected to the tax level. However, also in this case the regional disparities need to be accounted for when designing such a tax.

Conclusion

With the design of the tax system in Estonia and its current tax mix, it is very difficult to introduce a property tax related to energy efficiency of buildings. Furthermore, the risk of increased burden on the lower income households, as outlined above, cannot be ignored. While from many aspects it would make sense to introduce an energy efficiency component in the property tax it would need an overhaul of the entire taxation system (especially the tax mix) to be politically feasible.
Timing is another issue that plays role here. Introducing new taxes in the current political debate in Estonia seems very difficult, if not impossible. The introduction of a property tax in Estonia that takes into account the energy efficiency of a building could be a valid measure in the future and then after reengineering the entire tax system towards higher taxation on property and wealth. **We highly recommend assessing this opportunity in the coming three to five years**.

3.9 The way forward

Political commitment in Estonia is crucial to achieve energy efficiency gains in buildings, industry and transport to meet the ambitious targets set by the European Union. **Given the current trajectory and measures, Estonia is not on track to meet the Energy Efficiency Directive Target.** It is imperative to take additional actions to fully unlock the potential of cost-effective energy savings, including ramping up measures and investment in energy efficiency. With all measures, additional resources need to be considered to address energy poverty. This would entail a prioritization of measures, identifying vulnerable groups, and developing tailored support.

Developing and implementing the optimal pathway towards the 2030 target requires the mobilization of all administrations concerned by the building sector; the public authorities, health, education (as administrative building owners); the economic affairs (to address private service buildings and SMEs); transport and spatial planning; the industry (to engage all important sub sectors); and the finance and budget (to manage incomes and outcomes). The optimal pathway will require around EUR 13.3 billion over the obligation period (2021-2030), with bulk of the investments to be made during the 2025-2030 period, out of which EUR 5 billion will be public money (grants and support but also public infrastructure). Given the large public and private investments, where both the public and financial sector need to be involved, a wide array of financial instruments needs to be mobilised - from grants to loans and guarantees.

Ultimately, decision makers implement EE policies and measures, not pathways. Hence, these underlying EE measures which are the backbone of the pathways need to be looked at more closely, and particularly for the optimal pathway. This is the aim of chapter 4, which will be a bit more descriptive on the content of all measures. This chapter will also mainly suggest a clear action plan to proceed with the implementation of the CEER2 EE measures, and additional enabling measures. The optimal CEER2 pathway is a balanced mix of almost all EE measures, with some being well known since more than two decades (like grants and support, public transport infrastructure, carbon price, subsidies, …), and others that are more recent for Estonia (like voluntary agreement, MEPS, obligation scheme, vehicle/property taxation). Out of the new EE measures, Voluntary Agreement scheme and Minimum Energy Performance Standards have been considered as flagship measures, and will be further analysed in chapter 5.

4 Action plan for implementing the optimal energy efficiency pathway (D4)

The aim of chapter 4 is to provide the Estonian authorities with a detailed implementation action plan up to 2035 and less detailed action plan until 2050 for the optimal pathway EE measures. It summarises the detailed action plan provided in Deliverable 4, for the successful achievement of the optimal pathway and may feed into the update of Estonia's National Energy and Climate Plan.

Deliverable 4 details the concerned EE measures, explains the required legislative, regulatory, fiscal, institutional and procedural changes and reforms that Estonia should undertake and provide high-level recommendations for the changes to be made in order to implement the optimal pathway. It includes a timetable and highlight interlinkages between actions. It supports the identification of public and private funding sources to support the implementation of the pathway. Building on the risk analysis carried out under Deliverable 3, it provides for the EE measures with the highest risk, suggestions for alternative options.

4.1 Selected pathway and its energy efficiency measures

The selected pathway (Comprehensive Energy Efficiency Reform 2 (CEER2) pathway) is the only pathway allowing to reach most of the very ambitious Energy Efficiency targets, set by the new regulatory framework (EED).

Being the most ambitious, it also ensures a holistic approach, that brings together various measures from all the previous pathways with implementation across buildings, industry and transport while considering the balance of efforts between the sectors and subsectors. It is the most pragmatic and cost-effective option to reach the EED targets, achieving significant energy efficiency improvements across different sectors and domains. The measures largely consist of building renovation, all transport measures, while boosting the industry to increase its energy savings via Voluntary Agreements.

Particularly, this pathway has more emphasis/support for grants (multifamily), the implementation of a CO_2 tax, the implementation of obligation schemes for non-residential, accelerated energy savings in the industry via strengthened *VA*, and more promotion of public transport. By combining these measures, *CEER2* aims to create a synergistic effect that amplifies the impact of individual actions.

The key action areas to fasten energy savings and the associated measures of the Comprehensive Energy Efficiency Reform the pathway are:

- **Energy efficiency measures into buildings**, comprise a mix of normative measures (MEPS and obligation scheme) with grants and fiscal measures to incentivise renovation of residential and non-residential buildings. Grants remain the main driver of renovation and performance up to 2030, while more normative measures like MEPS and fiscal measures like property and carbon taxation will take over and become the main drivers of continuous renovation between 2025 and 2030. Enabling measures tackle issues relating to technical, social and economic barriers to renovation.

	Residential buildings		Non-residential buildings	
	Single family houses	Multi-family houses	Public buildings	Commercial buildings
Normative measures	MEPS targeting rented/selling dwellings		- Obligation scheme for service sector - MEPS (regulatory requirements for EPC class E&F)	

Positive incentives	Renovation grants (20-30% support)	Renovation grants (30% support)	Central government buildings (100% support) and Public and municipality buildings (60% support in average) renovation support	
Fiscal measures	Excise and VAT of natural gas, electricity, heating, gasoline, diesel fuel and light fuel oil			
	VAT of firewood and wood chips and waste			
	Property tax (according to EPC levels), from 2030			
	CO_2 tax for end energy use, from 2027			
	Tax deduction for renovation works by private persons			
Enabling measures	Technical capacity building (professionals training & certification)	Attract workforce to face higher renovation rate, with required technical capacity (professionals)	Technical capacity building (professionals training & certification)	
	Set up instruments (e.g. One-Stop-Shop, Building Renovation Passports, building observatory)	Set up instruments (e.g. Energy Performance Contracting)	Set up instruments (e.g. Building Renovation Passports, EPContracting, building observatory)	
	New technological solutions (e.g. digital)	New technological/business solutions (e.g. digital, prefabricated, attractive programmes)	New technological solutions (e.g. digital, pre-fabricated)	
	Sustainable financing	Sustainable financing for companies		
	Empowering households	Empowering associations, building owners	Empowering building occupiers / operators	

- **Energy efficiency measures into the industry**, which supports industry efficiency by setting up voluntary schemes for large industry and set up a dedicated support office for SMEs, along with financial support and fiscal incentives to increase energy efficiency. Financial or promotional support (i.e. grants) will continue to accompany the transformation, while Voluntary Agreement will only start progressively during the second half of the decade, to become the main driver only after 2030. Enabling measures primarily focus on addressing technical and organisational barriers (e.g. lack of technical competences and support).

	Industry, agriculture, fisheries & forestry	
	Large industry	**Small scale plants & SMEs**
Voluntary	Voluntary scheme, with binding targets based on incentives	Energy consulting and networking events for small and medium enterprises (SMEs)
Positive incentives	- Promotion of resource-efficient green technologies of industrial enterprises (RRP) - Investment support for the food industry to ensure security of energy supply - Supporting energy efficiency investments in companies	
	Supporting energy efficiency investments in energy-intensive companies	Energy efficiency measures in the fisheries sector
Fiscal measures	Excise and VAT of natural gas, electricity, heating, gasoline, diesel fuel and light fuel oil	
	VAT of firewood and wood chips and waste	
Enabling measures	Technical capacity building (various trainings)	
	Set up instruments (e.g. audits, EPContracting)	
	New technological solutions (e.g. digital, alternative low carbon fuels, breaktrough technology)	
	Empowering industry	
		Audits in large agricultural holdings

- **Energy efficiency measures into transport,** which incentivises car/vehicle efficiency, public transport and micro-mobility by primarily developing infrastructure and providing positive incentives to use alternative modes of transport. Enabling measures primarily tackle technical (e.g. lack of infrastructure) and social (e.g. individual car being considered as a key ownership) barriers.

	Transport		
	Car efficiency	**Public transport**	**Micro-mobility**
Positive incentives	Promotion of clean and energy efficient road transport vehicles in public procurement	Subsidy for public transport usage instead of personal vehicle	Subsidy for micro-mobility usage instead of personal vehicle
Investment in infrastructure	Electric charging infrastructure for existing inhabitance areas	-Convenient and modern public transport - Railroad infrastructure (includes the building of Rail Baltic) - Railroad electrification - Acquisition of additional passenger trains - New tram lines in Tallinn	Priority lanes for micro-mobility
Fiscal measures	Excise and VAT of Gasoline and diesel fuel		
	Vehicle tax for registration Annual vehicle tax	Tallinn and Tartu congestion charge	
Enabling measures	Technical capacity building (e.g. for charging infra deployment)	Technical capacity building (strategic mobility plan, training operators)	Technical capacity building (training professionals)
	Set up instruments (e.g. EV subscription for public recharging, ...)	Set up instruments (e.g. combined tickets train-tram-bus, ...)	Set up instruments
	New technological solutions (e.g. digital userfriendly application)	New technological solutions (e.g. digital userfriendly application)	New technological solutions (e.g. digital userfriendly application, e-bike market support)
	Incite passengers to purchase more efficient cars (ICE or EVs)	Incite passengers to use car alternatives	Incite passengers to use car alternatives
		Mobilise required land to deploy the infrastructure	

4.2 Action plan

The Action Plan is structured into sectors, with sub-sectors

- Residential buildings, with detached dwellings and apartments;
- Non-residential buildings, with public (central government and municipalities) and commercial buildings;
- Industry and agro-forestry, with large plants and SMEs/small plants;
- Transport, with car efficiency, public transport, and active/micro mobility
- Cross-cutting fiscal & taxation measures

These action plans have been split into short term horizon, to show the actions that should be taken now, and the longer-term actions, at the 2050 horizon. However, **given the ambitious level of energy efficiency at 2030 (EED targets as described under D3), (almost) all measures have to be implemented as soon as possible**, and consequently all actions should be taken to implement these measures.

4.2.1 Residential buildings

While there are similarities and commonalities between detached dwellings, apartments, public service and commercial service buildings, these four sub-sectors have been divided, in order to appropriately tailor measures to the differences in the building stock sectors.

Detached dwellings

This part of the action plan addresses all measures that need to be implemented to reach the energy efficiency targets set in detached dwellings (or single family houses). All EE measures are tailored to the specific policy, market, financial, technical, and social barriers the deep renovation and significant improvement of detached dwellings are facing (all details are provided in Deliverable 4).
Table 4-1 summarises the actions to be taken, including all enabling measures that are needed to support the implementation of the main measures.

Table 4-1 - Overarching action plan for detached single family houses

Action - single family	Timeline	Responsible	Other parties	Cost - Investments or Administrative	Source of public money
Set up MEPS	Adapt EPC & design MEPS - short term (2025-2027) Implement - medium term (from 2027)	Ministry of Climate (building department)	Architects, construction, building owners and operators	EE Investments; 100% private;	/
Adapt renovation grants for single family	Design grant - short term (2025-2027) Implement - medium term (from 2027)	Ministry of Climate (building department)	KredEx, architects, construction, building owners and operators	EE Investments; ~30% from public;	ETS revenues; ETS2 revenues
Implement tax deduction	Design tax scheme - short term (2025-2027) Implement - medium term (from 2027)	Ministry of Finance	Ministry of Climate, KredEx, architects, construction, building owners and operators	EE Investments; 100% private; No direct cost for public;	/
Implement property tax	Design tax scheme - medium term (2029-2030) Implement - medium/long term (from 2031)	Ministry of Finance	Ministry of Climate, architects, construction, building owners and operators	EE Investments; Split depends on design (bonus, malus, neutral)	/
Implement CO_2 tax	Preparation (incl. awareness) - short term (2025-2027) Implement ETS2 - medium term (from 2027)	Ministry of Finance	Ministry of Climate, architects, construction, building owners and operators	EE Investments; Additional gov. income;	/
Implement training programmes	Design trainings - short term (2024-2030) Implement - long term (2025-2035)	Ministry of Climate (building department)	Architects, construction, building owners and operators	Admin costs;	Gov. budget

Create an online repository	Design repository – short term (2024-2025) Implement – medium term (2026-2030)	Ministry of Climate (building department)	Architects, construction, building owners and operators	Admin costs;	Gov. budget
Develop EPContracting	Design EPContracting – short term (2025-2026) Implement – medium term (from 2026)	Ministry of Climate (building department)	Architects, construction, building operators	Admin costs;	Gov. budget
Establish a One-Stop-Shop	Design OSS – short term (2025-2026) Implement – medium term (from 2026)	Ministry of Climate (building department)	Architects, construction, building owners, local authorities, KredEx	Admin costs;	Gov. budget
Develop a BRP (to complement EPC)	Design BRP – short term (2025-2027) Implement – medium term (from 2027)	Ministry of Climate (building department)	Architects, construction, building owners, local authorities	Admin costs;	Gov. budget

Minimum energy performance standard (MEPS)

This is a new measure for Estonia in-line with the EBPD requirements, and will require the following main steps

- Validate EPCs are Fit for Purpose (Legally Binding)
- Design the renovation Requirements Based on EPC Labels
    - EPC labels F & above must be renovated until label D by 2026.
    - EPC labels E & above must be renovated until label C by 2031.
- Define Trigger Points for Renovation: mandate renovations at points of rental or sale, with specified prerequisites for compliance.
- Mandate EPC for Transactions
- Control and Validation by Administration
- Oblige Property Owners
- Sanction Non-Compliance
- Prohibit Renting Below EPC Threshold
- Protect Low-Income Households

Grants

Existing grant programmes for building renovation should be further developed and expanded to provide flexibility and efficiency, by considering two strategies: focus on a dynamic grant structure based on the investment-savings gap or alignment with supporting compliance with Minimum Energy Performance Standards (MEPS) within specified deadlines.

- **Option 1 - Investment-Savings Gap Principle**
    - Principle Basis: Utilize the investment-savings gap principle for enhanced efficiency rather than a fixed percentage (e.g., 30%).
    - Components to Support: Identify key components for support: wall & roof insulation, glazing, efficient heating and hot water systems (HP, bio-based appliances, solar heat), and ventilation.

    - Calculation Method: Calculate support based on a 15-year payback time. Formula: SPBT (Simple Payback Time) = INV (EUR) / [YEARLY SAVINGS (kWh/y) / ENERGY PRICE (eur/kWh)]. If SPBT > 15y, reduce investment cost by a percentage. For example, if SPBT is 20y, grant reduces by 25%.
    - Income-Dependent Grant: Evolutive grant structure, with support levels three times higher for low-income households compared to high-income ones (capped at 80%).
- Option 2: Supporting MEPS Compliance Ahead of Deadlines
    - Before 2026: grant to cover 15% of renovation costs if renovated up to level D, 25% if up to level C, 30% if up to level B and 45% if up to level A.
    - Before 2029: 15% of renovation costs if renovated up to level C, 25% if up to level B, 35% if up to level A.
    - Before 2036: 15% of renovation costs up to level B, 25% up to level A.
    - Before 2042: 15% of renovation costs up to level A.
    - Low-income groups and worst-performing buildings would get a higher support rate on top (+5%).

This would require the following steps

- **Gradual Reduction: l**ower the tax rate from 20% (2024 rate of 22%) to 6% for all renovation projects aimed at improving the energy performance of the building.
- **New Buildings Incentive:** Maintain a 20% tax rate for new buildings to encourage energy-efficient construction practices.
- **Comprehensive Coverage:** Extend the tax reduction to cover expenses related to both renovation works, materials, and associated labor costs.
- **Simplified Application (Option 1):** Explore the option of automatic application by construction workers. They would need to declare the purpose of their work, streamlining the process and minimizing administrative burden.
- **Direct Refund to Homeowner (Option 2):** Alternatively, consider a mechanism where the tax difference is refunded directly to the homeowner. While this may entail more effort for individuals, it could provide a transparent and direct benefit.
- **Compensatory Mechanism:** Acknowledge that the reduced tax revenue will be offset by an anticipated increase in renovation volumes, contributing to overall economic growth.
- **Incentivizing Replacement:** Extend the tax reduction to new buildings replacing demolished structures, particularly those with poor energy performance. This aims to stimulate the replacement of outdated and inefficient buildings.

Property taxation

Assess later on the opportunity to establish a property tax determined by the energy performance of the building (potential for a possible incentive if the building has a high rating).

CO2 tax for energy use

Establish a CO_2 tax for energy use in buildings, in line with ETS2.

Involved parties roles and responsibilities

Table 4-2 presents the roles and responsibilities of the different parties in the implementation of the measures included dedicated to detached dwellings.

Table 4-2 - Involved parties, roles and responsibilities

Actors	Roles, responsibilities and tasks

Ministry of Climate, building and housing,	• Collaboration on Minimum Energy Performance Standards (MEPS):
	  ○ Define acceptable speed and expected depth of renovation for the worst-performing buildings (*).
	  ○ Collaborate on developing rules addressing poverty aspects related to MEPS.
	• Property Taxation:
	  ○ Work jointly to develop guidelines for municipalities, involving local authorities' central administration.
	• Grant Programs:
	  ○ Establish the list of eligible investments for energy efficiency measures.
	  ○ Conduct investment-saving gap calculations, requiring research on products and the energy market.
	  ○ Mobilize budgetary resources for grant programs.
	• CO2 Tax:
	  ○ Determine an appropriate tax level in coordination with relevant tax authorities.
	• Tax Deduction:
	  ○ Define the scope of eligibility for tax deductions related to energy efficiency measures.

Local authorities (cities and municipalities)	• Contribution to Designing Minimum Energy Performance Standards (MEPS):
	  ○ Collaborate in the design and development of MEPS to ensure local nuances and concerns are considered.
	• Involvement in Property Taxation:
	  ○ Provide insights and inputs for the development of property taxation guidelines, drawing on their close proximity to households and understanding of local concerns.
	• Proximity to Households:
	  ○ Leverage their proximity to households to gain insights into the specific concerns and preferences of the local community.
	• Early-Stage Involvement:
	  ○ Participate in energy efficiency initiatives at an early stage to ensure that local perspectives are integrated from the beginning of the planning process.
	• Communication and Outreach:
	  ○ Facilitate communication and outreach efforts to educate and involve local residents in energy efficiency programs and initiatives.

Actors	Roles, responsibilities and tasks

Architects and construction companies	• **Consultation on MEPS (Minimum Energy Performance Standards):**
	  ○ Provide expert consultation on the development and refinement of MEPS, leveraging architectural expertise to ensure practical and effective standards.
	• **Building Renovation Passports (BRP):**
	  ○ Contribute to the creation and implementation of Building Renovation Passports, offering insights on the technical aspects and energy efficiency features during the design and renovation phases.
	• **Input for Relevant Trainings:**
	  ○ Provide input and recommendations for training programs related to energy efficiency, ensuring that professionals in the field are equipped with the necessary skills and knowledge.
	• **Skills Needs Assessment:**
	  ○ Collaborate in assessing the skills needs within the architectural and construction sectors concerning energy-efficient practices, facilitating ongoing professional development.
	• **Implementation Support:**
	  ○ Assist in the practical implementation of energy efficiency measures, incorporating sustainable design principles and construction practices into building projects.
	• **Innovation and Technology Integration:**
	  ○ Explore innovative technologies and construction methods that enhance energy efficiency, contributing to the evolution of industry standards.
	• **Client Education:**
	  ○ Educate clients on the benefits of energy-efficient designs and renovations, promoting sustainable practices in construction projects.

(*) Some buildings will never undergo significant reconstruction and there is no need for it. Some buildings tend to fall out of use due to their technical condition, unsuitable location or construction solution, etc., and it is not reasonable to reconstruct them. Also, the owner does not have the economic sense nor motivation to reconstruct buildings in unattractive areas where, due to the change in the economic structure, there is no longer the former perspective. This applies to private houses, apartment buildings (because the investments made, even if it were possible for this group of residents, do not increase the value of the property in comparison to the investment made), public sector buildings and other buildings. Taxing such buildings accelerates their natural obsolescence and creates social problems. There is a risk of spending support funds on buildings that should actually be demolished after some time of use until depreciation. It would be necessary to consider an exemption mechanism to prevent unreasonable investments.

Apartments

This part of the action plan addresses all measures that need to be implemented to reach the energy efficiency targets set in multi-family apartments. All EE measures are tailored to the specific policy, market, financial, technical, and social barriers the deep renovation and significant improvement of apartments are facing (all details are provided in Deliverable 4).
This action plan shares many aspects and measures with residential – detached buildings.

Table 4-3 summarises the actions to be taken, including all enabling measures that are needed to support the implementation of the main measures.

Table 4-3 - Overarching action plan for multifamily buildings / apartments

Action multifamily	Timeline	Responsible	Other parties	Cost - Investments or Administrative	Source of public money
Continue renovation grants for single family	Design grant – short term (2025-2027) Implement – medium term (from 2027)	Ministry of Climate (building department) and finance	KredEx, architects, construction, building owners and operators	EE Investments; ~30% from public;	ETS revenues; ETS2 revenues
Implement property tax	Design tax scheme – medium term (2029-2030) Implement – medium/long term (from 2031)	Ministry of Finance	Ministry of Climate, architects, construction, building owners and operators	EE Investments; Split depends on design (bonus, malus, neutral)	ETS revenues; ETS2 revenues
Implement CO2 tax	Preparation (incl. awareness) – short term (2025-2027) Implement ETS2 – medium term (from 2027)	Ministry of Finance	Ministry of Climate, architects, construction, building owners and operators	EE Investments; Additional gov. income;	/
Attract workforce	Design trainings – short term (2024-2030) Implement – long term (2025-2035)	Ministry of Climate (building department) & of employment	Architects, construction, building owners and operators	Admin costs;	Gov. budget
Create an online repository & OSS	Design repository – short term (2024-2025) Implement – medium term (2026-2030)	Ministry of Climate (building department)	Architects, construction, building owners and operators	Admin costs;	Gov. budget
Develop EPContracting	Design EPContracting – short term (2025-2026) Implement – medium term (from 2026)	Ministry of Climate (building department)	Architects, construction, building operators	Admin costs;	Gov. budget
Support new business	Consult business – short term (2025-2027)	Ministry of Climate	Architects, construction,	Admin costs;	Gov. budget

models (e.g pre-fab)	Implement – medium term (from 2027)	(building department)	building owners, local authorities		

Minimum energy performance standard (MEPS)

MEPS will be complex for apartments.

Grants

The 2 strategic options considered under detached are also relevant for apartments. However, additional aspects could be considered:

- Option 1 – Single ownership/homeowner association
  - Base it on investment-savings gap principle (rather than fixed 30%), to be more efficient
    - Identify the main components to be supported: wall & roof insulation, glazing, efficient heating and hot water system (HP, bio-based appliance, solar heat), ventilation
    - Calculate support for 15 years payback time, for average : SPBT (simple payback time) = INV (EUR) / [YEARLY SAVINGS (kWh/y) / ENERGY PRICE (eur/kWh)]. If SPBT>15y, then investment not attractive. E.g., if SPBT is 20y, then investment cost should be reduced by 25% ((20-15)/20) {i.e. 25% grant}
    - Evolutive grant, depending on level of income: 3 times more for low income than for high income households (with a cap at 80%)
- Option 2 – Industrial prefabrication
  - Provide grants for industrial prefabrication solutions to multi-family apartment buildings
  - Grants should be eligible for application by homeowner associations and building developers
  - Prefab solutions must achieve EPC C to qualify
- Option 3 – Establish a guarantee fund to de-risk loans for energy savings projects
  - Develop a comprehensive design for the guarantee fund, outlining its structure, purpose, and key operational mechanisms.
  - Define the scope of coverage, specifying which energy efficiency measures and projects will be eligible for support from the guarantee fund.
  - Establish the size and financial capacity of the fund, considering the scale of expected projects and the potential risks involved.

Property taxation

Similar to detached dwellings.

CO2 tax for energy use

Similar to detached dwellings.

Involved parties roles and responsibilities

Table 4-4 presents the roles and responsibilities of the different parties in the implementation of the measures dedicated for apartments.

Table 4-4 - Involved parties, roles and responsibilities

Actors	Roles, responsibilities and tasks

Ministry of Climate, building and housing	• **Grants Management:**
	  • *List of Eligible Investments:* Develop and maintain a comprehensive list of eligible investments for the grant program, aligning with energy efficiency goals.
	  • *Investment-Saving Gap Calculation:* Conduct thorough research on products and the energy market to calculate the investment-saving gap, ensuring efficient allocation of resources.
	  • *Budget Mobilization:* Spearhead efforts to mobilize the budget required for the grant program, coordinating with relevant stakeholders and authorities.
	• **CO2 Tax Implementation:**
	  • *Determine Tax Level:* Assess and determine the appropriate level of the CO2 tax, considering environmental impact and consulting with relevant tax authorities for alignment with regulatory frameworks.
	• **Tax Deduction Oversight:**
	  • *Scope Definition:* Define the scope of eligibility for tax deductions, outlining criteria and parameters for homeowners and entities to qualify for energy efficiency-related tax benefits.

Local authorities (cities and municipalities)	• **Proximity to Households:** *Understanding Concerns:* Leverage close proximity to households to gain insight into their specific concerns regarding energy efficiency measures, ensuring that initiatives are aligned with local needs. • **Early Stage Involvement:** *Engagement at Early Stages:* Actively participate in the planning and decision-making processes of energy efficiency measures from the early stages, allowing for comprehensive input and community involvement.
Architects and construction companies	• **Input for Relevant Trainings and Skills Needs:** *Identifying Training Needs:* Offer insights into the training needs and skill requirements related to energy-efficient construction practices, contributing to the development of relevant training programs. • **Execution of Energy Efficiency Renovations:** *Implementing Measures:* Undertake the actual construction and renovation work to improve energy efficiency in buildings, ensuring compliance with established standards and guidelines.

4.2.2 *Non-residential buildings*

Public (central government and municipal)

This part of the action plan addresses all measures that need to be implemented to reach the energy efficiency targets set in public buildings (central government and municipal). All EE measures are tailored to the specific policy, market, financial, technical, and social barriers the deep renovation and significant improvement of public buildings are facing (all details are provided in Deliverable 4).

Table 4-5 summarises the actions to be taken, including all enabling measures that are needed to support the implementation of the main measures.

Table 4-5 - Overarching action plan for public buildings

Action - public buildings	Timeline	Responsible	Other parties	Cost - Investments or Administrative	Source of public money
Continue renovation grants for central gov buildings	Adapt grant - short term (2025-2026) Implement - medium term (from 2027)	Ministry of Climate (building department) and finance	Application unit, architects, construction, local authorities	EE Investments 100% public;	Budget & ETS revenue; ETS1 & ETS2 revenues
Continue renovation grants for local gov buildings	Adapt grant - short term (2025-2026) Implement - medium term (from 2027)	Ministry of Climate (building department) and finance	Application unit, architects, construction, local authorities	EE Investments 100% public;	Budget & ETS revenue; ETS1 & ETS2 revenues
Implement property tax	Design tax scheme - medium term (2029-2030) Implement - medium/long term (from 2031)	Ministry of Finance	Ministry of Climate, architects, construction, building owners and operators	EE Investments; Split depends on design (bonus, malus, neutral)	ETS revenues; ETS2 revenues
Implement CO2 tax	Preparation (incl. awareness) - short term (2025-2027) Implement ETS2 - medium term (from 2027)	Ministry of Finance	Ministry of Climate, architects, construction, building owners and operators	EE Investments; Additional gov. income;	/
Set up MEPS	Adapt EPC & design MEPS - short term (2025-2027) Implement - medium term (from 2027)	Ministry of Climate (building department)	Architects, construction, local authorities	EE Investments; 100% private;	/
Create an online repository	Design repository - short term (2024-2025) Implement - medium term (2026-2030)	Ministry of Climate (building department)	Architects, construction, local authorities	Admin costs;	Gov. budget
Develop EPContracting	Design EPContracting - short term (2025-2026)	Ministry of Climate	Architects, construction, local authorities	Admin costs;	Gov. budget

	Implement – medium term (from 2026)	(building department)			
Support new business models (e.g pre-fab)	Consult business – short term (2025-2027) Implement – medium term (from 2027)	Ministry of Climate (building department)	Architects, construction, local authorities	Admin costs;	Gov. budget

Grants: Central government and public/municipal support

Grant should be linked to an obligation to renovate (e.g., based on Art 6 of the EED on public renovation buildings). there is need to establish a list of relevant measures or savings potential.
In order to be eligible for a grant, buildings must have an EPC, and BRP, and defined as "eligible building" (e.g., all public buildings or only ones below a certain energy performance level)
There is need to update the list of central government bodies in Annex I of the Estonian 2017 NEEAP.

Property taxation

Similar to detached dwellings and apartments.

CO_2 tax for energy use

Similar to detached dwellings and apartments.

MEPS

Establish Minimum Energy Performance Standards for public buildings could build on:

- Validate EPC are fit for purpose (as they would become legally binding instrument) – Renovate worst performing first, creating a dynamic progressive system (see annex V of proposed EPBD)
    - EPC is required at certain trigger points – point of sale or new lease
    - All public buildings require an EPC over time (2025 for national buildings, 2027 for municipal)
    - Ensure all EPCs are digitally stored (in line with proposed EPBD) and accessible to all relevant parties
- Owner (developers, public authorities) is obligated party
- Renovate starting with the worst performing (lowest performing 15% according to EPCs)
- Larger buildings with single ownership often have professional financial and technical management open to a wider range of resources
- Often have a shorter renovation cycle – trigger point for renovation
- Tranches are set up according to building stock segments as determined in the LTRS/NBRP

Involved parties roles and responsibilities

Table 4-6 presents the roles and responsibilities of the different parties in the implementation of the measures included dedicated to public buildings.

Table 4-6 - Involved parties, roles and responsibilities

Actors	Roles, responsibilities and tasks
Local authorities (cities and municipalities) and the Ministry in charge of local authorities	**Setting Up MEPS:** • Local Implementation: Align local building regulations with national MEPS standards. Monitor compliance and conduct inspections.

Actors	Roles, responsibilities and tasks
	• Community Engagement: Educate builders and property owners on MEPS requirements. Facilitate community discussions on energy performance standards. **Training for Building Professionals:** • Local Training Programs: Establish local training initiatives for construction professionals. Collaborate with local educational institutions for skill development. **Grants:** • Local Grant Programs: Administer grants for local energy efficiency projects. Evaluate grant applications and disburse funds accordingly. **Community Outreach:** • Promote grant opportunities through local channels. Including running and overseeing local one-stop-shops. Support community-led projects with grant funding. **Public Awareness:** • Communicate the purpose and impact of CO2 taxes to the community. Encourage carbon-conscious behavior through local campaigns.

Ministry of Climate, building and housing,	**Setting Up MEPS:**
	• **Policy Development:** Formulate and enforce Minimum Energy Performance Standards (MEPS). Collaborate with stakeholders for MEPS establishment.
	• **Regulation Oversight:** Oversee adherence to MEPS in building projects. Ensure compliance through inspections and penalties.
	Training for Building Professionals:
	• **Education Initiatives:** Develop training programs for architects, engineers, and contractors. Collaborate with educational institutions for skill development.
	• **Accreditation Systems:**
	  • Establish accreditation systems for energy auditors.
	  • Encourage professional development in sustainable practices.
	Grants:
	• **Grant Management:** Design and manage grant programs for energy-efficient projects. Evaluate grant applications for building retrofits.

Architects, developers, and construction companies	**Consultation on MEPS (Minimum Energy Performance Standards):** • Provide expert consultation on the development and refinement of MEPS, leveraging architectural expertise to ensure practical and effective standards. **Input for Relevant Trainings:**

Actors	Roles, responsibilities and tasks
	• Provide input and recommendations for training programs related to energy efficiency, ensuring that professionals in the field are equipped with the necessary skills and knowledge. **Skills Needs Assessment:** • Collaborate in assessing the skills needs within the architectural and construction sectors concerning energy-efficient practices, facilitating ongoing professional development. **Implementation Support:** • Assist in the practical implementation of energy efficiency measures, incorporating sustainable design principles and construction practices into building projects. **Client Education:** • Educate clients on the benefits of energy-efficient designs and renovations, promoting sustainable practices in construction projects.
Energy providers/utilities	**Energy Efficiency Programs:** • Develop and promote energy efficiency programs that align with MEPS. • Support customers in adopting measures to enhance energy performance. **Training for Building Professionals:** • Partner with training institutions to offer courses for building professionals. • Facilitate workshops or training sessions on energy-efficient technologies and practices. **Project Support:** • Provide technical support to customers applying for grants related to energy efficiency. • Offer insights on eligible projects that align with grant criteria. **CO2 Tax**: • Administer and collect CO2 tax. • Carbon Accounting: Monitor and report carbon emissions associated with energy provision. Explore ways to reduce the carbon footprint of energy generation. • Tax-Related Services: Collaborate with tax authorities to implement CO2 tax-related services. Educate customers on the environmental impact and benefits of carbon taxation.

Commercial

This part of the action plan addresses all measures that need to be implemented to reach the energy efficiency targets set in commercial buildings. All EE measures are tailored to the specific policy,

market, financial, technical, and social barriers the deep renovation and significant improvement of commercial buildings are facing (all details are provided in Deliverable 4).

Table 4-7 summarises the actions to be taken, including all enabling measures that are needed to support the implementation of the main measures.

Table 4-7 - Overarching action plan for commercial buildings

Action - commercial buildings	Timeline	Responsible	Other parties	Cost - Investments or Administrative	Source of public money
Establish an obligation scheme (*)	Assess relevance - medium term (2027-2030); Design & implement where relevant (>2030)	Ministry of Climate (building department) and finance	KredEx, architects, construction, local authorities	EE investments 100% public	Budget & ETS revenue; ETS1 & ETS2 revenues
Implement property tax	Design tax scheme - medium term (2029-2030) Implement - medium/long term (from 2031)	Ministry of Finance	Ministry of Climate, architects, construction, building owners and operators	EE Investments; Split depends on design (bonus, malus, neutral)	ETS revenues; ETS2 revenues
Implement CO2 tax	Preparation (incl. awareness) - short term (2025-2027) Implement ETS2 - medium term (from 2027)	Ministry of Finance	Ministry of Climate, architects, construction, building owners and operators	EE Investments; Additional gov. income;	/
Set up MEPS	Adapt EPC & design MEPS - short term (2025-2027) Implement - medium term (from 2027)	Ministry of Climate (building department)	Architects, construction, local authorities	EE Investments; 100% private;	/
Enable KredEx to coordinate more works	Develop and implement - short term (2024-2027)	Ministry of Climate and of finance	KredEx, architects, construction, building owners and operators	Admin costs;	Gov. budget
Create an online repository	Design repository - short term (2024-2025) Implement - medium term (2026-2030)	Ministry of Climate (building department)	Architects, construction, local authorities	Admin costs;	Gov. budget
Develop EPContracting	Design EPContracting - short term (2025-2026) Implement - medium term (from 2026)	Ministry of Climate (building department)	Architects, construction, local authorities	Admin costs;	Gov. budget
Support new business models (e.g pre-fab)	Consult business - short term (2025-2027) Implement - medium term (from 2027)	Ministry of Climate (building department)	Architects, construction, local authorities	Admin costs;	Gov. budget

Obligation Scheme

As explained under chapter 3, it is recommended to first operate MEPS, and assess later on the opportunity and way to design the Obligation Scheme if deemed relevant, and only for commercial buildings.

Property taxation

Similarly to detached dwellings.

CO_2 tax for energy use

Similarly to detached dwellings.

Minimum energy performance standards (MEPS)

Aim: to establish a baseline level of energy efficiency, ensuring that buildings meet a minimum standard to reduce energy consumption and promote environmental sustainability

Steps for implementing Minimum Energy Performance Standards (MEPS) in non-residential commercial buildings:

- Validate EPCs for Legal Compliance
  - Ensure Energy Performance Certificates (EPCs) are legally binding instruments.
  - Prioritize renovation of the worst-performing buildings, establishing a dynamic and progressive system (refer to Annex V of the proposed EPBD for EPC template).
- Establish a Common Energy Indicator
  - Adopt a common energy indicator, measured in kWh/m2 per year
  - Classify buildings on a scale from A (zero-emissions) to G (15% worst-performing buildings in the national stock)
- Obligated Parties
  - Make owners (corporations, real estate developers, NGOs, retail chains, hotels) the obligated parties for compliance.
- Renovation Approach:
  - Implement a phased renovation approach, starting with the lowest-performing 15% of buildings according to EPC ratings
  - Focus on larger buildings with single ownership, often equipped with professional financial and technical management and more accessible resources
- Considerations for Larger Buildings:
  - Recognize that larger buildings with single ownership often have shorter renovation cycles, providing a natural trigger point for renovation activities
- Tranche Segmentation:
  - Establish tranches based on building stock segments determined in the Long-Term Renovation Strategy (LTRS) or National Building Renovation Plan (NBRP).

Involved parties roles and responsibilities

Table 4-8 presents the roles and responsibilities of the different parties in the implementation of the measures included dedicated to commercial buildings.

Table 4-8 - Involved parties, roles and responsibilities

Actors	Roles, responsibilities and tasks
Building owners - developers, real estate	**Setting Up Minimum Energy Performance Standards (MEPS):**

Actors	Roles, responsibilities and tasks
(REITs), Retail chains, hospitality	• Collaborate with policymakers and industry stakeholders to contribute to the establishment and enhancement of MEPS. • Ensure that new developments adhere to MEPS and consider exceeding the minimum requirements for energy efficiency. • Incorporate MEPS compliance into investment strategies and criteria when acquiring or developing properties. • Advocate for policies that encourage energy-efficient buildings within the real estate industry. **Trainings for Building Professionals:** • Invest in training programs for architects, engineers, and contractors to ensure they are well-versed in energy-efficient building design and construction. • Facilitate training sessions for property managers and maintenance staff to enhance their skills in energy-efficient building management. **Grants:** • Collaborate with local authorities to develop grant programs that incentivize sustainable building practices. **CO2 Tax:** • Factor potential CO2 taxes into project budgets and consider low-carbon construction materials and practices.

Ministry of Climate, building and housing,	**Setting Up MEPS:**
	• **Policy Development:** Formulate and enforce Minimum Energy Performance Standards (MEPS). Collaborate with stakeholders for MEPS establishment.
	• **Regulation Oversight:** Oversee adherence to MEPS in building projects. Ensure compliance through inspections and penalties.
	Training for Building Professionals:
	• **Education Initiatives:** Develop training programs for architects, engineers, and contractors. Collaborate with educational institutions for skill development.
	• **Accreditation Systems:**
	  • Establish accreditation systems for energy auditors.
	  • Encourage professional development in sustainable practices.
	Grants:
	• **Grant Management:** Design and manage grant programs for energy-efficient projects. Evaluate grant applications for building retrofits.

Local authorities (cities and municipalities)	**Setting Up MEPS:** • Local Implementation: Align local building regulations with national MEPS standards. Monitor compliance and conduct inspections.

Actors	Roles, responsibilities and tasks
	• Community Engagement: Educate builders and property owners on MEPS requirements. Facilitate community discussions on energy performance standards. **Training for Building Professionals:** • Local Training Programs: Establish local training initiatives for construction professionals. Collaborate with local educational institutions for skill development. **Grants:** • Local Grant Programs: Administer grants for local energy efficiency projects. Evaluate grant applications and disburse funds accordingly. **Community Outreach:** • Promote grant opportunities through local channels. Including running and overseeing local one-stop-shops. Support community-led projects with grant funding. **Public Awareness:** • Communicate the purpose and impact of CO2 taxes to the community. Encourage carbon-conscious behavior through local campaigns.
Building owner representatives (HOAs)	**Setting Up MEPS:** • **Compliance Management:** Ensure that all properties under ownership comply with established MEPS. • **Renovation Planning:** Strategize and plan renovations to meet or exceed MEPS requirements. • Seek energy-efficient solutions for property upgrades. **Training for Building Professionals:** • **Engagement with Professionals:** Encourage building professionals working on owned properties to undergo relevant training. • Collaborate with HOAs to organize training sessions for property managers. • **Incorporate Energy Efficiency:** Work with trained professionals to integrate energy-efficient practices in property management. • Support ongoing education for property management staff. **Grants:** • Assist in preparing and submitting grant applications for eligible projects. **Communication and Awareness:** • Communicate the importance of carbon reduction to residents. • Encourage participation in carbon offset programs and tax-related initiatives.

Actors	Roles, responsibilities and tasks
Architects, developers, and construction companies	**Consultation on MEPS (Minimum Energy Performance Standards):** • Provide expert consultation on the development and refinement of MEPS, leveraging architectural expertise to ensure practical and effective standards. **Input for Relevant Trainings:** • Provide input and recommendations for training programs related to energy efficiency, ensuring that professionals in the field are equipped with the necessary skills and knowledge. **Skills Needs Assessment:** • Collaborate in assessing the skills needs within the architectural and construction sectors concerning energy-efficient practices, facilitating ongoing professional development. **Implementation Support:** • Assist in the practical implementation of energy efficiency measures, incorporating sustainable design principles and construction practices into building projects. **Client Education:** • Educate clients on the benefits of energy-efficient designs and renovations, promoting sustainable practices in construction projects.
Energy providers/utilities	**Energy Efficiency Programs:** • Develop and promote energy efficiency programs that align with MEPS. • Support customers in adopting measures to enhance energy performance. **Training for Building Professionals:** • Partner with training institutions to offer courses for building professionals. • Facilitate workshops or training sessions on energy-efficient technologies and practices. **Project Support:** • Provide technical support to customers applying for grants related to energy efficiency. • Offer insights on eligible projects that align with grant criteria. **CO2 Tax**: • Administer and collect CO2 tax. • Carbon Accounting: Monitor and report carbon emissions associated with energy provision. Explore ways to reduce the carbon footprint of energy generation.

Actors	Roles, responsibilities and tasks
	• Tax-Related Services: Collaborate with tax authorities to implement CO2 tax-related services. Educate customers on the environmental impact and benefits of carbon taxation.

4.2.3 *Industry & agro-forestry*

Large plants/factories

This part of the action plan addresses all measures that need to be implemented to reach the energy efficiency targets set in the industry and agriculture sectors, with a focus on large plants or factories. All EE measures are tailored to the specific policy, market, financial, technical, and social barriers that hamper significant energy saving improvements (all details are provided in Deliverable 4). This part is complementary to the part dedicated to SMEs and small plants.

It concerns large plants from the following industrial sectors.

Final energy consumption of the industry in 2022 (GWh)	Total (GWh)		Comprises large plants (in % of energy consumption) (*)
Final energy consumption of food	832,41	GWh	50%
Final energy consumption of textile	101,56	GWh	50%
Final energy consumption of wood industry	969,04	GWh	100%
Final energy consumption of paper	740,11	GWh	100%
Final energy consumption of chemicals	379,31	GWh	80%
Final energy consumption of non-metallic minerals	396,14	GWh	50%
of which cement		GWh	100%
Final energy consumption of iron and steel	10,94	GWh	100%
Final energy consumption of non-ferrous	9,54	GWh	100%
Final energy consumption of machinery & metal products	365,84	GWh	50%
of which fabricated metals		GWh	
Final energy consumption of transport vehicles	93,43	GWh	50%
Final energy consumption of other manufacturing	211,26	GWh	50%
Final energy consumption of manufacturing (sum of branches)	**4.110**	GWh	
Final energy consumption of mining	54,15	GWh	0%
Final energy consumption of water processing	0,00	GWh	0%
Final energy consumption of construction	633,21	GWh	0%
Final energy consumption of industry (sum of branches)	**4.797**	GWh	

(*) Out of the total consumption of a sector (e.g. for food a total of 832 GWh consumed), the share represents what can be allocated to large industries (e.g. leading to 416 GWh for the food industry in large companies). The reasoning behind the percentages is provided in Deliverable 4.

Out of the total industrial final energy consumption, large plants represent about 50%[25] of the total final consumption (and SMEs represent the other 50%), i.e. 2 398 GWh.

Large enterprises were defined as enterprises that have more than 250 employees and meet at least one of the economic parameters - revenue over 50 MEUR and/or balance sheet of 43 MEUR[26]. Of

[25] The 50/50 split is based on the Consumer Protection and Technical Regulatory Authority overview of large entreprise energy audits, based on following qualification; "250 employees or revenue more than 50 mln € and balance sheet more than 50 mln € together".
[26] Large entreprise Energy audits. Available at: https://ttja.ee/ariklient/ehitised-ehitamine/suurettevotete-energiaauditid

course, the focus should be given to these enterprises with an industrial production activity in Estonia, but there is currently no public data to make the distinction (a large corporate with only office activities in Estonia might fall within the group of large enterprises, while it has no production capacity). In the future, large enterprises (or companies) could be replaced by large-scale industrial plants, and the split could be made on the basis of the level of energy consumption. These changes will also be implemented for the large enterprise energy audit requirements. In the future, enterprises need to conduct a large enterprise energy audit if they have an energy consumption over 10 TJ (or ~2.7 GWh) per annum or if they have an environmental management system, then the threshold will be 85 TJ (~23.6 GWh). We propose to use the 10 TJ (or ~2.7 GWh) energy consumption as the threshold of large industrial plant in the future.

Final energy consumption of Agriculture, fishing and forestry in 2022			**Comprises large plants (in % of energy consumption) (*)**
Final energy consumption of agriculture, fishing and forestry	**991**	GWh	0%

(*) this is highly approximate and only gives an idea of the sectors concerned by large plants, and those concerned by SMEs (all "non-large plants").

Table 4-9 summarises the actions to be taken, including all enabling measures that are needed to support the implementation of the main measures.

Table 4-9 - Overarching action plan for large industry (>250FTE)

Action - large industry (>250 FTE)	Timeline	Responsible	Other parties	Cost - Investments or Administrative	Source of public money
Set up a Voluntary Agreement scheme with top 30 companies	Design & develop VA - short term (2024-2025) Implement - short/medium term (from 2025) First investments (from 2026)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Investments is 100% private, but there is financial compensation from public	ETS revenues; Exemption of fees to support RES electricity
Set up a Voluntary Agreement scheme for sectors	Design & develop VA - medium term (2026-2027) Implement - medium term (from 2028) First investments (from 2029)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Investments is 100% private, but there is financial compensation from public	ETS revenues; Exemption of fees to support RES electricity
Promotion of resource-efficient green tech of ind. (RRF)	Implementation - short term (ongoing - until 2026) Revision and extension (from 2027)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Support scheme from the public with 30% support in average	RRF Fund and then after 2027 ETS revenues
Supporting EE investments in energy-	Implementation - long term (ongoing - until 2035)	Ministry of Economic Affairs &	Ministry of Climate, companies;	Support scheme from the public with 30%	Budget

intensive companies	Revision in the frame of VA (from 2025)	Communications (dpt industry)	representatives of auditors	support in average	
Investment support food ensuring SoS	Implementation – long term (ongoing – until 2024) Revision and extension (from 2025)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Support scheme from the public with 30% support in average	EU funds and then ETS revenues
Supporting energy efficiency investments in companies	Implementation – long term (ongoing – until 2035) Revision in the frame of VA (from 2025)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Support scheme from the public with 30% support in average	ERDF and then ETS revenues
Strengthen MEAC (hire 1 person)	Hire 1 person & network - short term (2024) Implement action plan - short/long term (2024-2035)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Admin costs;	Gov. budget
Strengthen industry (via associations)	Exchange with industry - short term (2024) Provide support - short term (2025-2030)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Admin costs;	Gov. budget
Strengthen technical capacity	Assess training needs - short term (2024) Deliver trainings (practitioners & industry) - short/medium (2024-2035)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Admin costs;	Gov. budget
Enhance the audit framework	Assess improvement needs - short term (2024-2025) Adapt/improve - short term (2025-2026)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Admin costs;	Gov. budget
Develop EPContracting	Assess needs for EPC - short term (2025) Develop EPC guidelines - short/med term (2025-2027)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of ESCOs	Admin costs;	Gov. budget
RD&I in Energy Efficiency	Assess needs/opportunities for EE RD&I - short term (2025-2027) Integrate EE in RD&I - medium term (from 2027)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; Ministry of finance	Admin costs;	Gov. budget

Strengthening the administration

The administration is currently lacking the required resource(s) to implement the actions needed to accelerate the uptake of energy efficiency in the industry (and agricultural sector). The industry is also

a demanding party to have a clear framework from the administration to accompany the process, provide guidance, fix objectives, coordinate efforts, ensuring the sharing of practices, etc.
It is therefore recommended to **hire 1 person at the administration** to implement all actions related to this specific Action Plan. This person could be hosted by KliM, and would require the support of KredEx for the implementation of all actions, and to provide technical assistance.
Further details on the profile will be provided under Deliverable 5.

Voluntary Agreement

Considering that the Voluntary Agreement is the main measure to be taken for the large industrial plants, it should be started as soon as possible, in order to engage the dialogue with the industry and build together the most efficient path towards its decarbonization (starting with Energy Efficiency, but already having in mind the fuel switch, including process electrification):

- The concerned administrations (KliM, agriculture) should agree on the **main design parameters**:
    - The **obligated party** should more than likely be the industrial plants directly (the largest in a first step), to progressively evolve to associations representing the industrial sectors (or activities). The obligated party could therefore be adapted according to the built relationship. It is key to remind that a VA is built on a strong and trust relationship between authorities and industrial companies;
    - The **level of the VA**, to be directed to all sectors (a sector specific approach could be an evolution, but is not needed in a first step);
    - The **general approach to engage the commitment** of the industry,
    - The specific approach to establish an **EE roadmap at plant level**, via audits conducted by independent auditors;
    - The rule to **fix the target**, to be a negotiated target (at least in the first step);
    - The **advantage for industrial plants** signing up a VA with the authorities like direct support (grants), tax exemption (e.g. on the energy fees);
    - Agree on the specific need for a revised audit scheme, on the need for additional and knowledgeable auditors;
    - Agree on the specific need for supporting actions.
- Organise a **consultation** with all concerned potential industrial plants, to start creating awareness, to demonstrate authority's commitment, to present and start the dialogue about the main design parameters;
- Based on the specific need assessment, develop or review the **audit framework**: tailor the content of energy audits to the design parameters of the VA, tailor the indicators of the audits, define the audit verification procedures (if a control is deemed relevant);
- Develop the **Voluntary Agreement** based on the main design parameters and agreement between the authorities and the industry (i.e. industrial plants in a first step), and engage the industry to sign;
- Develop an **implementation action plan**: auditing phase; negotiation phase; investment phase; monitoring & reporting phase.

Further details on the design parameters of a VA system, on how to proceed with the consultation (e.g. which industry to reach out), on the audit framework, and on the contractual basis of VA will be provided in chapter 5 (and under Deliverable 5).

Developing one overarching support programme (in line with VA)

The current support schemes (mainly grants) are spread across sectors and funding sources:

- The "Promotion of resource-efficient green technologies of industrial enterprises" relies on the Recovery and Resilience Plan (RRF), and will therefore not carry on beyond 2027, the main difference

with the measure "Supporting energy efficiency investments in companies" is the fund used to finance investments;

- The "Supporting energy efficiency investments in energy-intensive companies" is proposed to be state funded;
- The "Investment support for the food industry to ensure security of energy supply" only supported one sector, relying on the European Agricultural Fund for Rural Development. This support is now done, and it is proposed to prolong it until 2030 at least;
- The "Supporting energy efficiency investments in companies" relies on the Cohesion- and Regional Development Funds and is expected to continue.

The schemes are not combined together and not providing a clear long-term perspective.

To ensure coherence, avoid overlaps (e.g. for some sectors, like the food industry, accessing different schemes), adapt the support to the needs of individual EE investments, cover the relevant sectors with regard to the Voluntary Agreement, there is a need to set up a comprehensive and overarching support programme encompassing all existing schemes.

Setting up instruments (audit & EPC)

Reinforcing the audit framework to fit the needs of the Voluntary Agreement (cf. above) and to fit support programmes is required, also helping to design the appropriate level of support.

Energy Performance Contracting might also be needed to support industrial plants in their EE investments.

- Review the audit framework to improve its impact, extend the scope to full decarbonization, clearly defining the KPIs to monitor progress, and help calculating ex-post funding gaps (to determine the appropriate level of support for a specific investment in a specific industrial segment);
- Consult Energy Saving Companies (ESCO), energy suppliers and energy managers (at industrial plant level) to assess the need to establish an EPC guidance;

Provide support to establish industry associations

The relationship between the authorities and the industry is a key pillar of a successful implementation of any kind of EE measures. Therefore, helping the industrial sectors to organise themselves and to become reliable and knowledgeable representatives of the industry is needed.

- Provide support to the interested sectors to help them organize a sectoral association, to ease expansion of VA to larger number of industries and sectors.

Involved parties roles and responsibilities

Table 4-10 presents the roles and responsibilities of the different parties in the implementation of the measures included dedicated to commercial buildings.

Table 4-10 - Involved parties, roles and responsibilities

Actors	Roles, responsibilities and tasks
Top 20-30 Large companies, with industrial plants >250 FTEs or over 43 Meur balance sheet and 50 Meur revenue (in wood, paper, chemicals, non-metallic, non-ferrous, machinery & metal products)	• Engage intensively in VA • Consulted for support programmes, and for capacity buildings
Ministry of Climate (incl. housing, transport, energy) / Ministry of Economic Affairs and Communications (MEAC))	• Lead the following actions: VA, support program, training, EPC/audit, RD&I

Actors	Roles, responsibilities and tasks
KredEx	• Guide/advice on: VA, support programme, training, EPC/audit
Minister of Regional and Rural Affairs (former spatial planning dept housed in Min. of Finance is moved here)	• Contribute to: VA, support programme, training
Ministry of finance	• Contribute to: support programme
Representatives of ESCO, energy operators	• Contribute to: VA, support programme, EPC/audit

SMEs and small-scale plants

This part of the action plan addresses all measures that need to be implemented to reach the energy efficiency targets set in the industry, agricultural and forestry sectors, with a focus on small and medium size companies. All EE measures are tailored to the specific policy, market, financial, technical, and social barriers that hamper significant energy saving improvements (all details are provided in Deliverable 4). This part is complementary to the part dedicated to large industrial plants.

It concerns SMEs from the following industrial sectors.

Final energy consumption of the industry in 2020 (GWh)	Total (GWh)		Comprises SMEs & small-scale plants (in % of energy consumption)(*)
Final energy consumption of food	832,41	GWh	50%
Final energy consumption of textile	101,56	GWh	50%
Final energy consumption of wood industry	969,04	GWh	0%
Final energy consumption of paper	740,11	GWh	0%
Final energy consumption of chemicals	379,31	GWh	20%
Final energy consumption of non-metallic minerals	396,14	GWh	50%
of which cement		GWh	0%
Final energy consumption of iron and steel	10,94	GWh	0%
Final energy consumption of non-ferrous	9,54	GWh	0%
Final energy consumption of machinery & metal products	365,84	GWh	50%
of which fabricated metals		GWh	
Final energy consumption of transport vehicles	93,43	GWh	50%
Final energy consumption of other manufacturing	211,26	GWh	50%
Final energy consumption of manufacturing (sum of branches)	**4.110**	GWh	
Final energy consumption of mining	54,15	GWh	100%
Final energy consumption of water processing	0,00	GWh	100%
Final energy consumption of construction	633,21	GWh	100%
Final energy consumption of industry (sum of branches)	**4.797**	GWh	

(*) Out of the total consumption of a sector (e.g. for food a total of 832 GWh consumed), the share represents what can be allocated to SME and small scale plants (e.g. leading to 416 GWh for the food industry in large companies). The reasoning behind the percentages is provided in Deliverable 4.

Out of the total industrial final energy consumption, SMEs and small-scale plants represent about 50% of the total final consumption (and large plants represent the other 50%), i.e. 2 398 GWh.

Small and medium enterprises (SMEs) were defined as enterprises that have less than 250 employees[27]. Changes to make the distinction between large companies (or plants) and SMEs is described under Deliverable 4 (using 85TJ or ~23.6 GWh/y as threshold).

Agriculture, fishing and forestry			Comprises large plants (in % of energy consumption)(*)
Final energy consumption of agriculture, fishing and forestry	**1.273**	GWh	100%

(*) this is highly approximate and only gives an idea of the sectors concerned by large plants, and those concerned by SMEs (all "non-large plants").

All agriculture, fishing and forestry plants are covered in SMEs and small-scale plants.
Table 4-11 summarises the actions to be taken, including all enabling measures that are needed to support the implementation of the main measures.

Table 4-11 - Overarching action plan for small industry

Action - small industry	Timeline	Responsible	Other parties	Cost - Investments or Administrative	Source of public money
Promotion of resource-efficient green tech of ind. (RRF)	Implementation - short term (ongoing - until 2026) Revision and extension (from 2027)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Support scheme from the public with 30% support in average	RRF until 2027 and then ETS revenues
Investment support food ensuring SoS	Implementation - long term (ongoing - until 2024) Revision and extension (from 2025)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Support scheme from the public with 30% support in average	EU funds and then ETS revenues
Supporting energy efficiency investments in companies	Implementation - long term (ongoing - until 2035) Revision in the frame of VA (from 2025)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	Support scheme from the public with 30% support in average	ETS revenues
Energy efficiency measures in the fisheries sector	Revision and design - medium term (2026) Implementation (from 2027)	Ministry of Regional and Rural Affairs	Ministry of Climate, industry associations, KredEx	Support scheme from the public with 30% support in average	EMKF combined with ETS revenues
Setting up an SME office	Hire 1 person & network - short term (2024) Implement action plan - short/long term (2024-2035)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of industries	Admin costs;	Gov. budget

[27] Large entreprise Energy audits. Available at: https://ttja.ee/ariklient/ehitised-ehitamine/suurettevotete-energiaauditid

		and Ministry of Regional and Rural Affairs			
Strengthen industry (via associations)	Exchange with industry – short term (2024) Provide support – short term (2025-2030)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; Ministry of Regional and Rural Affairs	Admin costs;	Gov. budget
Strengthen technical capacity	Assess training needs – short term (2024) Deliver trainings (practitioners & industry) – short/medium (2024-2035)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; Ministry of Regional and Rural Affairs	Admin costs;	Gov. budget
Enhance the audit framework	Design agri & SME scheme – short term (2024-2025) Adapt/improve & promote – short term (2025-2027)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; Ministry of Regional and Rural Affairs	Admin costs;	Gov. budget
Develop EPContracting	Assess needs for EPC – short term (2025) Develop EPC guidelines – short/med term (2025-2027)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; Ministry of Regional and Rural Affairs; representatives of ESCO	Admin costs;	Gov. budget
SME digitalisation	Assess needs/opportunities for SME digitalisation – short term (2025-2027) Set up programmes – medium term (from 2027)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; Ministry of Regional and Rural Affairs	Admin costs;	Gov. budget

Strengthening the administration

The administration is currently lacking the required resource(s) to implement the actions needed to Support SMEs, small-scale industrial, agricultural, fisheries and forestry plants to make more energy savings. Enterprises can benefit from a clear framework from the administration to support the process, providing guidance, helping to fix objectives, coordinating efforts, ensuring the sharing of practices, developing *ad hoc* guidance, or training etc.

It is therefore recommended to **hire 1 person at the administration** to implement all actions related to this specific Action Plan. This person could be hosted by KliM, and would require the support of KredEx for the implementation of all actions, and to provide technical assistance.

This could form the basis for a kind of SME office which would be in charge of, among others:

- Stimulating & organizing networking events;
- Developing a guidance to support Estonian companies in finding energy savings by their own;
- Collecting and diffusing best practices among practitioners;
- Organizing trainings

Developing one overarching and coherent support programme

Similarly to large industrial plants.

Develop agriculture, fisheries and forestry audit scheme

Developing a simplified and adapted audit framework to match the needs of the agricultural, fishery and forestry exploitations, while being also an important input for the design of appropriate support schemes (e.g., help identifying eligible investments or actions, determining the economic gap of investments, precising priorities, mainstreaming a full decarbonization approach, etc.).

Provide support to establish industry associations

The relationship between the authorities and businesses is a key pillar of a successful implementation of any kind of EE measures. Therefore, helping the industrial, agricultural, fisheries and forestry sectors to organise themselves and to become reliable and knowledgeable representatives is needed, by focusing on major sectors in a first instance.

- Provide support to the interested sectors to help them organize their sectoral associations (or strengthen existing associations), to support the organization of networks (creating links between companies), of trainings, and other diffusion of material (like guidelines) dedicated to energy efficiency;
- Strengthened associations could also give the opportunity to progressively joining VA.

Involved parties roles and responsibilities

Table 4-12 presents the roles and responsibilities of the different parties in the implementation of the measures included dedicated to commercial buildings.

Table 4-12 - Involved parties, roles and responsibilities

Actors	Roles, responsibilities and tasks
Representatives of SMEs	• Consulted for SME office, advisory service, digitalization of SME, business association
Ministry of Economy Affairs and Communications	• Lead the following actions: SME office, advisory service, digitalization of SME, industry/business associations
Ministry of Climate (incl. housing, transport, energy)	• Support the following actions: SME office, advisory service, digitalization of SME, industry/business associations
KredEx	• Guide/advice on: SME office, support program, all enabling measures (agri audit, advisory, training, digital)
Minister of Regional and Rural Affairs (former spatial planning dept housed in Min. of Finance is moved here)	• Contribute to: SME office, support program, advisory service, audit for large agricultural exploitations, digitalization of SME, industry/business associations
Ministry of Finance	• Contribute to: support program

Actors	Roles, responsibilities and tasks
Representatives of ESCO, energy operators	• Contribute to: SME office, audit for large agricultural exploitations, advisory service, training

4.2.4 *Transport*

Car efficiency

This part of the action plan addresses all measures that need to be implemented to reach the energy efficiency targets set in the transport sector especially regarding the energy efficiency of road transport. All EE measures are tailored to the specific policy, market, financial, technical, and social barriers hampering the acceleration of the uptake of efficient cars within the Estonian vehicle stock (all details are provided in Deliverable 4).

Table 4-13 summarises the actions to be taken, including all enabling measures that are needed to support the implementation of the main measures.

Table 4-13 - Overarching action plan for transport - car efficiency

Action - car efficiency	Timeline	Responsible	Other parties	Cost - Investments or Administrative	Source of public money
Energy efficient vehicles in public procurement	Preparatory phase - short term (2024) Design phase - short term (2025-2026) Agreement & implementation - medium term (2026-2029)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Investment in new vehicle fleet	Gov. budget
Deploy EV charging infrastructure	Preparatory - short term (2024) Development and implementation (2025-2029)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Investment in charging infrastructure; 50% public budget	ETS revenues
Set up a vehicle tax registration scheme	Preparatory - short term (2024) Proposal & negotiation - short term (2025) Implementation - medium term (from 2025)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Purchase of more efficient vehicles; Private purchase	

Set up a annual vehicle tax scheme	Preparatory – short term (2024) Proposal & negotiation – short term (2025) Implementation – medium term (from 2025)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Purchase of more efficient vehicles; Private purchase	
All Tallinn and Tartu taxis run on electricity	Consult taxi companies – short term (2024) Implementation – medium term (2025-2028)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Support scheme from the public with 30% support in average	ETS revenues
Technical capacity building	Assess capacity needs – short/medium term (2025) Implement capacity building – medium term (2026-2030)	Ministry of Climate (department mobility), Estonian Transport Administration	Local authorities; system operators and NRA; businesses, energy companies	Admin costs;	Gov. budget
Set up EV subscription for public transport	Assess needs for EV subscription – short term (2024) Implement EV subscription – short term (2025-2030)	Ministry of Climate (department mobility), Estonian Transport Administration	Local authorities; system operators and NRA; businesses, energy companies	Admin costs;	Gov. budget
Develop user-friendly application	Assess needs for mapping application – short/medium term (2025) Develop the application – short/medium (2026-2030)	Ministry of Climate (department mobility), Estonian Transport Administration	Local authorities; system operators and NRA; businesses, energy companies	Admin costs;	Gov. budget
Implement a campaign inciting the purchase of more efficient vehicles	Campaign to promote new taxation regime – short term (from 2025)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; Local authorities; system operators and NRA; businesses, energy companies;	Admin costs;	Gov. budget

Revision of the proposed car taxation scheme

Aim: Impose a tax on ICE vehicles at registration to disincentivize the purchase of personal vehicles. Provide VAT deductions to promote more efficient vehicles.

The main steps to be taken to revise the proposed car taxation scheme are as follows:

- **Conduct a market analysis and an opportunity assessment** to identify available energy-efficient vehicle options.
- Define adequate VAT reduction rates per category of vehicle.
- **Establish a proposal for the revision** of the proposed car taxation scheme (eco-bonus scheme) to be submitted to the Ministry of Finance.
- **Negotiate the proposed revision** with relevant ministries.
- **Implement the proposed revision** in collaboration with the Ministry of Finance.

Design of public procurement scheme for clean and energy efficient vehicles

Aim: Integrate specific criteria regarding the energy efficiency of road transport vehicles into the public procurement process in order to stimulate a shift. These criteria should reflect a decrease in carbon emissions and energy use of public road transport vehicles.

The main steps to be taken to design the public procurement scheme are as follows:

- **Conduct a market analysis and an opportunity assessment** to identify available energy-efficient vehicle options and **precise the scope** of the public procurement scheme. Who are the concerned public bodies? Which categories of vehicles (e.g. cars, buses, trucks, etc.) are included?
- **Establish the design** of the public procurement scheme. This includes: defining clean and energy efficiency vehicles for each category as well as exempted categories of vehicles, fixing the target as share of vehicles that must comply with clean and energy efficiency criteria, distributing the target per type of vehicle and per public authority, defining the timeline of implementation, establishing rules for new public purchase contracts.
- **Assess the cost of purchasing** clean vehicles in comparison with ICE vehicles (evaluate market maturity), **analyse possible financial support** from national authorities and **define the most adequate support scheme**.
- **Consult** all public bodies with a first proposal of the public procurement scheme.
- Develop **concrete contractual provisions** for procurement.
- Implement the new public procurement scheme:
    - Set up a **monitoring scheme**;
    - Integrate the procedure into the public procurement legislation in Estonia, by **implementing provision in contracts**.

Deployment of charging infrastructure for EVs

Aim: Increase the number of electric vehicles (EV) that can be charged in public spaces by installing a large amount of electric charging infrastructure available in existing inhabited areas

The main steps to be taken to deploy charging infrastructure for EVs are as follows:

- **Organise a preliminary consultation** with charging infrastructure providers and operators, EV distributors and electricity system operators (DSOs/TSOs) to assess the potential, trends and barriers for the deployment of EV.
- From there, **define the need to deploy the infrastructure**, by private actors, and **precise the scope** (publicly available, privately owned) and the remaining barriers to EV charging infrastructure deployment.
- **Identify key areas** for the deployment of EV charging infra, in line with the needs.

- **Engage private actors** to invest, and take **required (public) actions to support** them.

Raising awareness and incentives to shift towards the use of alternative transport modes

This measure concern the launch of a public awareness campaign to educate consumers as well as public authorities about benefits of energy-efficient vehicles. This measure should be launched in parallel with the new car taxation scheme to ensure consumers understand the rationale behind this new taxation scheme. The message should be clearly defined and focus on aspects such as:

- Social benefits - Positive impact on health of reduced air pollution, reduced congestion and lower time spent in transport, etc.
- Economic benefits - Cost savings, new job openings, use of EVs as storage device for self-generated electricity, etc.
- Environmental benefits – Lower GHG emissions, reduced air pollution, etc.
- Increased prioritisation of clean and energy efficient vehicles in public policy – Growing number of parking spots for clean and energy efficient vehicles at the expense of decreasing number of parking spots for ICE vehicles (including associated sanctions, e.g. fines and controls).

Involved parties roles and responsibilities

Table 4-14 presents the roles and responsibilities of the different parties in the implementation of the measures included dedicated to car efficiency.

Table 4-14 - Involved parties, roles and responsibilities

Actors	Roles, responsibilities and tasks
Ministry of Energy and Climate (department of mobility and investment), in collaboration with Estonian Transport Administration	Coordination of all measures, mainly: • In coordination with tax authorities, set up, collect and monitor annual and registration vehicle taxation • Adapt the public procurement procedure for road transport vehicles and distribute target among national and local authorities • Conduct preliminary assessment and develop strategic mapping for the deployment EV charging infrastructure • Provide necessary funds for implementation of the measures
Ministry of Finance	Set up, collect and monitor annual and registration vehicle taxation
Local authorities	Contribute to: • Strategic planning of EV charging infrastructure deployment • Adapt public procurement of road transport vehicles and contribute to the target
System operators (DSOs and TSOs) and NRAs	• Ensure grid infrastructure modernisation • Implement time of use/dynamic tariffs
Local residents, businesses, communities, landowners, energy companies	• Participation in the strategic mapping of EV charging infrastructure deployment through public consultation

Public transport

This part of the action plan addresses all measures that need to be implemented to reach the energy efficiency targets set in the transport sector especially regarding public transport. All EE measures are tailored to the specific policy, market, financial, technical, and social barriers hampering the

acceleration of the uptake of public transport within the Estonian social context (all details are provided in Deliverable 4).

Table 4-15 summarises the actions to be taken, including all enabling measures that are needed to support the implementation of the main measures.

Table 4-15 - Overarching action plan for public transport

Action - public transport	Timeline	Responsible	Other parties	Cost - Investments or Administrative	Source of public money
Subsidy for public transport use instead of personal vehicle	Preparatory phase - short term (2024) Implementation phase - short term (2024-2025) Monitoring & adaptation phase - medium term (from 2025)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, bus operators	Subsidies to households, enterprises, public institutions	ETS revenues; ETS2 revenues
Develop convenient and modern public transport	Comprehensive assessment - short term (2024-2025) Update Transport & Mobility Plan and consult - short/medium term (2025-2026) Prioritisation and implementation - medium term (2026-2028) Monitoring (from 2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, bus operators	Investment infrastructure; 100% public budget	ETS revenues; ETS2 revenues
Develop the railroad infrastructure (includes the building of Rail Baltic)	Comprehensive assessment - short term (2024-2025) Update Transport & Mobility Plan and consult - short/medium term (2025-2026) Prioritisation and implementation - medium term (2026-2028) Monitoring (from 2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Investment infrastructure; 100% public budget	ETS revenues; ETS2 revenues
Proceed with the electrification of the railroad	Comprehensive assessment - short term (2024-2025) Update Transport & Mobility Plan and consult - short/medium term (2025-2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Investment infrastructure; 100% public budget	ETS revenues; ETS2 revenues

	Prioritisation and implementation – medium term (2026-2028) Monitoring (from 2026)				
Acquire additional passenger trains	Comprehensive assessment – short term (2024-2025) Update Transport & Mobility Plan and consult – short/medium term (2025-2026) Prioritisation and implementation – medium term (2026-2028) Monitoring (from 2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Investment infrastructure; 100% public budget	ETS revenues; ETS2 revenues
Develop new tram lines in Tallinn	Comprehensive assessment – short term (2024-2025) Update Transport & Mobility Plan and consult – short/medium term (2025-2026) Prioritisation and implementation – medium term (2026-2028) Monitoring (from 2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Investment infrastructure; 100% public budget	ETS revenues; ETS2 revenues
All Tallinn and Tartu taxis run on electricity	Consult taxi companies – short term (2024) Implementation – medium term (2025-2028)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Support scheme from the public with 30% support in average	ETS revenues; ETS2 revenues
Mobilise required land to deploy the infrastructure	Assess land availability & needs – short term (2024) Mobilise land – short term (2024-2030)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; Local residents, communities, landowners, energy companies	Admin costs;	Gov. budget
Build technical capacity	Assess capacity needs – short/medium term (2025) Implement capacity building – medium term (2026-2030)	Ministry of Climate (department mobility), Estonian Transport Administration	Local authorities; system operators and NRA; businesses, energy companies	Admin costs;	Gov. budget

Set up combined tickets system	Design the combined ticketing scheme – short term (2024) Implement the combined ticket – short term (2025-2030)	Ministry of Climate (department mobility), Estonian Transport Administration	Local authorities; system operators and NRA; businesses, energy companies	Admin costs;	Gov. budget
Implement a campaign inciting alternatives to personal vehicles	Campaign to promote new taxation regime – short term (from 2025)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; Local authorities; system operators and NRA; businesses, energy companies;	Admin costs;	Gov. budget

Conduct a comprehensive assessment of mobility

Aim: Provide a reliable and efficient public transport system that is affordable and available to all citizens, regardless of their location or economic status

- Conduct a comprehensive assessment of mobility
- This step is a preliminary requirement for the Action Plans 'Public Transport' and 'Active and Micro Mobility'. It should **build on existing assessments** of mobility that have already been conducted in Estonia and should fill in the gaps.
- The assessment will consist of three levels:
    1. Start with the train as main backbone of public transport (big capacity, fast connections, limited points/hubs/nodes to connect) to connect rural areas with large cities – Level 1 (public);
    2. Develop a second network to connect a larger number of points/hubs/nodes (with smaller capacities) to increase the number of alternative mobility options in sub-urban and urban areas – Level 2 (public);
    3. These will be complemented by active and micro mobility infrastructure (cf. Action Plan 'Active and Micro Mobility' in section 0), for an additional granularity and to increase the number of alternative mobility options in sub-urban and urban areas – Level 3 (micro).
- For public transport (levels 1 and 2), **map the needs** in cities (bus, tram, underground, train), in suburban areas (train, bus) and in rural areas (train, bus), linking living-working-shopping areas together.

Update the Transport and Mobility Development Plan

- Based on the comprehensive assessment of mobility, **update the Estonian Transport and Mobility Development Plan**.
- Integrate at least the following topics/items:
    1. Deployment of public transport infrastructure and services;
    2. Incentivize people to use public transport which are made available;
    3. Disincentive the use of personal/passenger cars.

Prioritisation and implementation of actions of the Transport and Mobility Development Plan

- Score and rank the needs for public transport

- **Identify and implement quick wins/no-regret actions** with regards to infrastructure, services and support schemes. The measures that should be prioritised for a **short- and medium- term** implementation are:
    1. **Ensure that transport and mobility issues are integrated into urban planning and linked with the development of new residential and business district**. *This measure is new in Estonia.*
    2. **Set up a combined public transport ticketing system (tram / train / bus)**. *This measure is planned in the Estonian Transport and Mobility Development Plan, but a study of the feasibility, cost and impact should be conducted for a more adequate implementation.*
    3. **Develop convenient and modern public transport**. *This measure is new in Estonia.*
    4. **Develop railroad infrastructure**. *This measure is planned in the Estonian Transport and Mobility Development Plan. The government should support railroad operators in the implementation of this measure.*
    5. **Invest in new passenger trains**. *Investments in new passengers trains are planned for 2025. The government should support railroad operators in this process.*
    6. **Electrify old diesel railroad**. *The electrification of part of the railroad network is foreseen in the Plan for Estonian Railway Electrification 2020-2028 of Eesti Raudtee, which maps lines that will be converted. The government should support the implementation of this plan by establishing regulatory procedures (environmental assessment, permitting, land acquisition), providing single point of contact and developing communication strategies. In addition, it should plan the electrification of the remaining railroad network.*
    7. **Develop new tram lines in Tallinn**. *Five lines are already considered by the municipal administration (Pelguranna; Kalaranna; Narva mnt; Liivalaia; Järve). The government should support the municipal administration in the development of these lines.*
    8. **Establish a subsidy for public transport usage instead of personal vehicle**. *This measure is new in Estonia.*
    9. **Establish a congestion charge scheme in Tallinn and Tartu**. *This measure is new in Estonia.*
- **Identify and implement** actions for a **long-term** implementation:
    1. **Develop training for professionals of the public transport sector**;
    2. **Develop supporting technological solutions (digital public transport application)**;
    3. **Awareness raising through information campaigns**.

Development of convenient and modern public transport

Aim: Provide a reliable and efficient public transport system that is affordable and available to all citizens, regardless of their location or economic status.

The development of convenient and modern public transport shall be based on the results of the comprehensive assessment of mobility.

Higher efficiency of public transport should be competitive with personal cars based not only direct costs but also value of time. This means not only reducing ticket prices, but also reducing the time wasted from changing modes of transport or waiting for the first leg of transport. This necessitates the following steps:

- Synchronized route plans between transport modes;

- Accessible parking areas near public transport hubs at the border of densely and sparsely populated areas;
- Data-based routes based on actual needs, not historical tradition.

A monitoring system to track progress of the development of convenient and modern public transport should be developed, including SMART performance indicators.

Subsidy for public transport usage instead of personal vehicle

Encourage and promote the use of public transport over personal vehicles as a more sustainable and efficient mode of transportation. Reduce individual car usage and traffic congestion, lower carbon emissions, improve air quality, and enhance overall urban mobility.

The development and implementation of a subsidy for public transport usage involve should be as follows:

- As a first step, the government should conduct a comprehensive analysis to determine the need for a subsidy aimed at promoting the use of public transport. The analysis should consider factors related to local transportation patterns, environmental concerns, commuting behaviours and company car policies.
- If the analysis shows that a subsidy would allow to increase the use of public transport instead of a personal car, the government should determine the appropriate channel for providing the subsidy. We propose two different options:
    1. **Option 1 – Reduced price of public transport for users without personal car**
       When buying their public transport subscription, users would need to prove they do not have a personal car and would then benefit from a reduced price.
    2. **Option 2 - Subsidy or fiscal advantage for companies to pay public transport to employees instead of providing a company car**
       For example, in Germany, companies of any size can offer a tax-exempt reimbursement of public transport to their employee as mobility benefit.[28] The public transport allowance applies to all types of public transport tickets (monthly subscriptions, annual passes, season tickets, weekly and individual tickets).
- Depending on the option selected, the government should the determine eligibility criteria for the subsidy, e.g. whether it is for companies only or also for individuals.
- Finally, the appropriate amount of the subsidy should be defined (per trip, ticket or subscription) based on the affordability of public transport, the expected impact of the subsidy on ridership and the available budget. The subsidy can also be differentiated per level of income, remoteness of habitat or the amount spent in public transport monthly (e.g. in Hong-Kong, the government provides a subsidy that is equal to 1/3 of the actual monthly public transport expenses in excess of $400[29]). If Option 1 is selected, the government should collaborate with public transport agencies to integrate the subsidy into their ticketing fare structures and mobile applications.

Developing the railroad infrastructure (includes the building of Rail Baltic)

Aim: Enhance the accessibility, reliability, and convenience of rail travel, encouraging people to opt for train transportation as a sustainable and efficient mode of travel. The measure includes the construction and enhancement of Rail Baltic, a major cross-border railway project connecting several European countries.

[28] Public transport tickets allowance in Germany explained | NAVIT
[29] Public Transport Fare Subsidy Scheme - Purpose and Features (ptfss.gov.hk); Public Transport Fare Subsidy Scheme - Subsidy Calculation (ptfss.gov.hk)

Railroad electrification

Develop the electrification of railroads to decrease the amount of CO2 emitted by rail transport and to promote a greener and more sustainable rail transportation system.

Acquisition of additional passenger trains

Enhance and expand the existing rail transport services by acquiring additional passenger trains to improve the efficiency, capacity, and overall quality of passenger rail services.

New tram lines in Tallinn

Enhance public transportation in Tallinn by constructing new tram lines, thereby expanding the existing network and improving overall accessibility and connectivity within the city.

This measure is considered to be a priority to reach the energy efficiency targets in the transport sector. Therefore, the proposed measure goes beyond what is currently proposed in Estonia.

Tallinn and Tartu congestion charge

Impose a road use tax for cars and vans to reduce motor vehicle traffic during peak hours, alleviate traffic congestion, improve air quality and promote sustainable transportation alternatives.

Set up supporting instruments

Developing instruments that will support the implementation of the measure of this action plan.

The Estonian Transport and Mobility Development Plan plans to modernise the ticket system by creating a unified nationwide ticket sales system where the same ticket products/channels can be used both on public and commercial lines regardless of the mode of transport.

Involved parties roles and responsibilities

Table 4-16 presents the roles and responsibilities of the different parties in the implementation of the measures included dedicated to public transport.

Table 4-16 - Involved parties, roles and responsibilities

Actors	Roles, responsibilities and tasks
Ministry of Regional Affairs (department on public transport), in collaboration with Estonian Transport Administration	Coordinate all measures, mainly: • Design the subsidy for public transport • Conduct comprehensive assessment of mobility, and develop and implement the strategic mobility plan • In coordination with tax authorities, set up, collect and monitor congestion charge • Act as single point of contact for railroad electrification • Provide necessary funds for implementation of the measures and attract private financing
Tax authorities	Set up, collect and monitor congestion charge
Public transport agencies/operators	Implement actions related to the development of public transport and railroad
Citizens, business, communities, public transport agencies/operators, urban planners,	• Consultation for the assessment of mobility and development of the strategic mobility plan

Actors	Roles, responsibilities and tasks
architects, engineers, and transportation experts	

Active/micro mobility

This part of the action plan addresses all measures that need to be implemented to reach the energy efficiency targets set in the transport sector especially regarding active and micro mobility. All EE measures are tailored to the specific policy, market, financial, technical, and social barriers hampering the acceleration of the uptake of active and micro mobility within the Estonian social context (all details are provided in Deliverable 4).

Active/micro mobility includes:

- Active mobility modes of transport such as walking and cycling that are low-cost and zero emission and bring about health co-benefits associated with more active lifestyles[30]; and
- Micro mobility which refers to a range of small, lightweight human powered or electric vehicles operating at speeds below 25 km/h, e.g. (e-)bikes, (e-)scooters, (e-)skateboards, shared bicycles, etc.[31,32]

Table 4-17 summarises the actions to be taken, including all enabling measures that are needed to support the implementation of the main measures.

Table 4-17 - Overarching action plan for active/micro mobility

Action - active mobility	Timeline	Responsible	Other parties	Cost - Investments or Administrative	Source of public money
Develop priority lanes for micro/active-mobility	Comprehensive assessment - short term (2024-2025) Update Transport & Mobility Plan and consult - short/medium term (2025-2026) Prioritisation and implementation - medium term (2026-2028) Monitoring (from 2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, bus operators	Investment infrastructure; 100% public budget	ETS revenues; ETS2 revenues
Provide subsidy for micro/active mobility usage instead of personal vehicle	Preparatory phase - short term (2024) Implementation phase - short term (2024-2025) Monitoring & adaptation phase - medium term (from 2025)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, bus operators	Subsidies to households, enterprises, public institutions	ETS revenues; ETS2 revenues

[30] Active mobility: walking and cycling (europa.eu)
[31] ITDP_The-Electric-Assist_-Leveraging-E-bikes-and-E-scooters-for-More-Livable-Cities.pdf
[32] Transportation Transformation: Is Micromobility Making a Macro Impact on Sustainability? - Michael McQueen, Gabriella Abou-Zeid, John MacArthur, Kelly Clifton, 2021 (sagepub.com)

Set up a congestion charge in Tallinn and Tartu	Assess the opportunity for a charge – short term (2024) Consult and design the charge – short/medium term (2025-2026) Implement – medium term (from 2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, bus operators	Investment infrastructure and service; 100% public budget	ETS revenues
Mobilise required land to deploy the infrastructure	Assess land availability & needs – short term (2024) Mobilise land – short term (2024-2030)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; Local residents, communities, landowners, energy companies	Admin costs;	Gov. budget
Build technical capacity	Assess capacity needs – short/medium term (2025) Implement capacity building – medium term (2026-2030)	Ministry of Climate (department mobility), Estonian Transport Administration	Local authorities; system operators and NRA; businesses, energy companies	Admin costs;	Gov. budget
Set up combined tickets system	Design the combined ticketing scheme – short term (2024) Implement the combined ticket – short term (2025-2030)	Ministry of Climate (department mobility), Estonian Transport Administration	Local authorities; system operators and NRA; businesses, energy companies	Admin costs;	Gov. budget
Implement a campaign inciting alternatives to personal vehicles	Campaign to promote new taxation regime – short term (from 2025)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; Local authorities; system operators and NRA; businesses, energy companies;	Admin costs;	Gov. budget

Conduct a comprehensive assessment of mobility

Similarly to public transport.

Update the Transport and Mobility Development Plan

Similarly to public transport.

Prioritisation and implementation of actions of the Transport and Mobility Development Plan

Similarly to public transport.

Mobility hubs

Aim: develop mobility hubs in Estonia to connect different modes of transport and foster multi-modality.

To provide opportunities for car users to avoid taking their vehicles inside cities, mobility hubs must be developed. This means places where cars which are used to travel distances not covered by public transport or from regions too sparsely populated for efficient public transport can be safely stored while their owners utilize the public transport in densely populated region.

Monetary cost is related to procuring the land needed and developing necessary infrastructure. Efficiency is directly related to the number of cars possible to store in them.

Safe and attractive infrastructure for active/micro mobility

Construct new or release existing infrastructure (e.g. sidewalks, bicycle paths, priority lanes for micro mobility such as e-scooters, bicycle/micro mobility parking lots around public transport hubs, etc.) for active and micro mobility to enhance the safety, accessibility, and convenience of active and micro mobility modes for commuters and travellers

As part of the comprehensive assessment of mobility, the government should:

- Assess the existing infrastructure dedicated to active and micro mobility, in particular:
    - Dedicated paths and lanes, i.e. sidewalks, bicycles paths and priority lanes for micro mobility;
    - Parking lots for bicycles and micro mobility around public transport hubs.
- Identify the gaps and potential suitable routes for active and micro mobility, considering existing public transport infrastructure and most frequently used routes. In the comprehensive assessment of infrastructure dedicated to active and micro mobility, factors such as traffic flow, connectivity, safety, and integration with other modes of transportation should be considered.
- Conduct a stakeholder consultation to better understand the needs for additional or adapted infrastructure dedicated to active and micro mobility.

The results of the comprehensive assessment will allow to identify the needs for first adapting existing infrastructure dedicated to active and micro mobility and if deemed necessary, building new infrastructure:

- **Potential adaptations to existing infrastructure** can include repainting road markings and installing traffic signs on existing dedicated paths and lanes, adding physical barriers to protect existing dedicated roads, increasing space and safety of existing parking lots for bicycles and micro mobility, etc.
- **New construction of infrastructure** would involve road dieting to free up space for adding sidewalks, bicycle paths or priority lanes for micro mobility, constructing new parking lots, etc.

In any case, the government should ensure that the infrastructure meets safety standards and is accessible for all users, including pedestrians and people with disabilities. In this context, the government should also ensure that mechanisms for enforcing rules and regulations regarding the use dedicated infrastructure is adequate.

This process should be prioritised in large and dense cities (Tallin, Tartu, Narva and Pärnu). In a second instance, it should be replicated in smaller towns.

Once the infrastructure has been adapted and/or built, regular assessments (e.g. every 3 to 5 years) should be conducted to evaluate the effectiveness of the infrastructure and make adjustments if necessary. This can be done through stakeholder consultation (e.g. surveys) and traffic flow analyses.

Subsidy for active/micro mobility usage instead of personal vehicle

Aim: provide a subsidy for active and micro mobility usage instead of personal cars to incentivise individuals to opt for small, lightweight vehicles (e.g. walk, bicycle or micro mobility) for short-distance trips within the city.

As a first step, the government should conduct an analysis to determine the need for a subsidy aimed at promoting active and micro mobility usage. The analysis should consider factors related to local transportation patterns, environmental concerns, commuting behaviours and company car policies.

If the analysis shows that a subsidy would allow to increase the use of active and micro mobility instead of a personal car, the government should determine the appropriate channel for providing the subsidy. We propose two different options:

- **Option 1 – Fiscal advantage for all companies to remunerate employees who walk/bike to work**

  This option takes the form of a tax-exempt remuneration that can be granted by employers to their employees per kilometres walked or biked on the distance between work and home. For example, in Belgium, a kilometre allowance can be granted by employers to employees who use a bicycle to cover all or part of the distance between home and work. The allowance is exempt from any tax up to 0.25 €/km. If an employer grants a higher kilometre allowance, the excess is taxed as professional income.[33]

- **Option 2 – Obligation for companies (>10 FTEs) to remunerate employees who walk/bike to work**

  This option obliges employers medium- and large-sized companies to provide a remuneration to employees per kilometres walked or biked on the distance between work and home. The remuneration is not necessarily tax-exempt.

Depending on the option selected, the government should the determine eligibility criteria for the subsid, e.g. whether it is for companies only or also for individuals, whether it should be for people below a certain level of income, etc. If Option 2 is selected (obligation), potential exemptions can be defined.

Finally, the appropriate amount of the subsidy should be defined (per kilometre or as a % of the investment cost with maximum amount), and if deemed necessary, the varying rates per types of bicycle. In doing so, the available budget should be considered.

Tallinn and Tartu congestion charge

Congestion charges are supporting the move to public transport, but are also supporting an increased used of active mobility, when infrastructure are readily available, as a complement to public transport.

Integration of transport and mobility into urban planning

Aim: increased optimisation of the existing transport infrastructure by ensuring that transport and mobility issues are integrated into urban planning and the development of new residential and business district.

This enabling measure consists in the provision of national guidelines for municipalities, and more importantly cities, to integrate transport and mobility considerations into their urban planning. This should include the development of an action plan included within existing or upcoming urban development strategies and plans, which outlines specific actions aimed at promoting the use of existing infrastructure and directing new real estate developments towards this infrastructure. This can

[33] Bicycle kilometre allowance in Belgium: https://finances.belgium.be/fr/particuliers/transport/deduction_frais_de_transport/trajet_domicile_travail/velo#q2

also include the strategic purchase of land close to existing and efficient transport infrastructure in order to build new districts.

Involved parties roles and responsibilities

Table 4-18 presents the roles and responsibilities of the different parties in the implementation of the measures included dedicated to public transport.

Table 4-18 - Involved parties, roles and responsibilities

Actors	Roles, responsibilities and tasks
Ministry of Regional Affairs (department on public transport), in collaboration with Estonian Transport Administration	Coordinate all measures, mainly: • Conduct comprehensive assessment of road network and coordinate the building necessary infrastructure for active mobility lanes • Design the subsidy for micro mobility • In coordination with tax authorities, set up, collect and monitor congestion charge
Tax authorities	Set up, collect and monitor congestion charge
Citizens	Consultation via public/citizen participation to better understand their needs
Communities, businesses, architects, urban planners, transportation experts and active mobility stakeholders/ operators	• Consultation for the assessment of Safe and attractive infrastructure for active/micro mobility • Consultation for the development of adequate trainings

4.2.5 Cross-cutting - fiscal and taxation

This part of the action plan addresses all measures that need to be implemented to reach the energy efficiency relating to fiscal and taxation measures. The overarching objective of the fiscal/tax measures is two-fold, i.e. double dividend, where the measures should bring two benefits:

1. Incentivise reduction in energy consumption by raising cost of energy use; and
2. Revenues from the measures should finance energy savings actions (*).

(*) Among Estonia's State Budget Strategy principles in relation to budget policy, we know one principle is seeking to increase budget flexibility. However, we highly recommend reconsidering this principle with regard to the polluter pays principle and the double dividend to redirect new income generated by climate policy towards the same climate agenda, especially for the income generated by the ETS.

Table 4-19 presents the energy efficiency targets set for each measure.

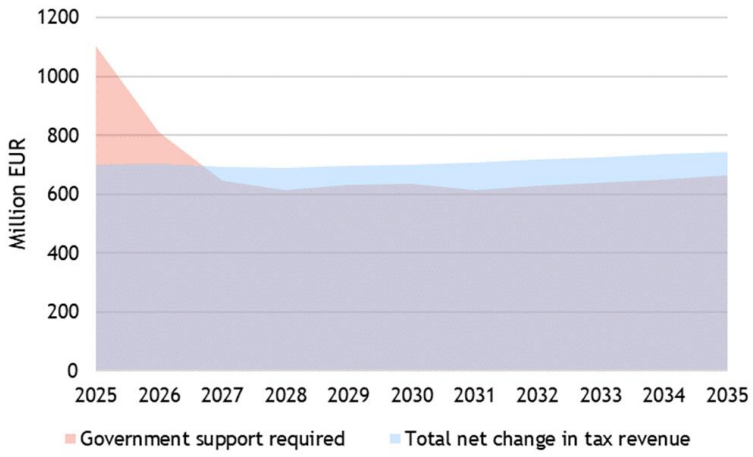
Table 4-19 - Energy efficiency fiscal measures

All fiscal measures combined	Savings target [GWh/y]	additional savings [%/y]	Tot INV [Meur/y]	Public support [Meur/y]	Total revenue per year [Meur/y]
Approximate energy use all sectors included [GWh, 2022 data]					***31.588***
Tax deduction for renovation works by private persons (=parallel track for single family)	6,5	0,02%	33	-	-3
Residential property tax (according to EPC levels)	34,5	0,11%	193	58	60
CO2 tax for end energy use of residential	35,5	0,11%	188	56	65
Non-residential property tax (according to EPC	19,2	0,06%	188	56	65
CO2 tax for end energy use of non-residential	18,7	0,06%	193	58	60
Vehicle tax for registration	0,1	0,00%	0,2	0	58
Annual vehicle tax	0,3	0,00%	0,2	0	2
Tallinn and Tartu congestion charge	-	0,00%	0,1	0	-
Excise and value added tax of natural gas	2,7	0,01%	0,1	0	6
Excise and value added tax of electricity	3,7	0,01%	0,3	0	37
Excise and value added tax in heating sector	15,9	0,05%	0,4	0	45
Excise and value added tax of gasoline	1,1	0,00%	1,2	1	0
Excise and value added tax of diesel fuel and	11,9	0,04%	2,1	0	76
Value added tax of firewood	4,0	0,01%	0,1	0	0
Renewable energy fee	-	0,00%	-	-	-
Wood chips and waste VAT	0,3	0,00%	0,0	0	1
Total	154	0,49%	800	231	471

Source: Excel sheet "D4 Modelling v8.2", tab "AP Fiscality"

Figure 4-1 illustrates to what extent the estimated overall revenues generated by the proposed fiscal measures (including tax revenue from energy efficiency investments) cover the government costs for the existing and newly proposed energy efficiency measures. From 2025 to 2027, the existing measures are still ongoing, which are mainly funded by EU funds. From 2027 onwards, after the halt of existing measures (grants under RRF), the net gain in tax revenues covers the government support requirements from the new energy efficiency measures.

Figure 4-1 - Government support required vs. total net gain in tax revenue (tax revenues from measures - reduction in taxes from energy savings) (MEUR) (2025-2035)



Source: Excel sheet "D4 Modelling v8.2", tab "AP Fiscality"

The main barriers to implementing fiscal and tax measures are public perception and awareness, social impact, administrative barriers and international competitiveness:

- Public perception and awareness

One of the major challenges to implementing fiscal measures (i.e. taxes, negative incentives) is the resistance from the public, which are generally averse to higher costs and taxes. This can be exacerbated by a lack of awareness of the need and (long-term) benefits of fiscal measures. On the other side this could also be compensated by feeding back to the "payers" by other ways (e.g. reduced VAT on specific goods, or reduced personal taxation).

- Social impact

Increasing taxes can directly adversely impact consumers' purchasing the good concerned by the tax (fuel, car or property), especially for low-income households. When essential goods and services, particularly heating costs, become more expensive via taxation, this can lead to a lower standard of living for citizens. Therefore, it is important that tax schemes are designed equitably and additional measures developed to support low-income households. Among the measures, supporting massively low-income households to insulate rapidly their dwelling (or live in well insulated dwellings, in case of rental). This can be done via more advantageous grants (cf section on building), or via dedicated programs targeting these households in priority. Access to public transport in some areas having currently limited options, to offer alternatives to the use of personal cars.

- Administrative barriers

Designing effective fiscal systems that will specifically address energy efficiency while also taking into account fairness and limiting overburdening taxpayers can be a complex task. This requires thorough research, planning of tax policies, implementation into legislation, setting up the tax collection infrastructure and ensuring compliance. This complexity can create delays in implementation as well as impact the effectiveness (e.g. unintended loopholes).

- International competitiveness

Higher energy costs due to taxes facing local businesses can impact the international competitiveness of these companies on the global market. This can have adverse effects on profits, employment and potentially lead to businesses relocating to other countries with more favourable fiscal policies. Therefore, it's important to create a balanced fiscal scheme which ensures that domestic businesses remain competitive in the global market.

Table 4-20 summarises the only action which is not listed in the sectoral sections above.

Table 4-20 - Overarching action plan for cross-cutting fiscal measures (not comprised in the other action plans)

Action - fiscality	Timeline	Responsible	Other parties	Cost - Investments or Administrative	Source of public money
Adapt excise and value added tax of all fuels (*)	Establish tax rates – short term (2024) Adjust existing legislation – short/medium term (2024-2025) Implement – medium term (from 2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, bus operators	Investment infrastructure and service; 100% public budget	ETS revenues

(*) the adaptation of the fuels' excises and VAT should consider the entry into force of the ETS2, from 2027, and be seen as an introductory or intermediary scheme.

Tax deduction for renovation works by private persons

Aim: Incentivise single-family homeowners to renovate

This tax deduction would take the form of reduced VAT (from the standard Estonian VAT rate of 20%, starting from 2024 VAT rate of 22%).

Residential and non-residential property tax (according to EPC level)

Cf. detached buildings.

Taxes on property are intended to incentivise renovation by sending a price signal to property owners of buildings with a low EPC rating. There would be a standard property tax, where property owners can apply from an exemption based on EPC rating (i.e. energy performance of the building). Currently, every property owner is liable to pay land tax (*maamaks*), which rate depends on the type of real property.

The **measure is modeled with an entry into force in 2031**.

The measure for the residential sector assumes that the average tax per year is 1 EUR/m2, bringing in 50 MEUR per year in tax revenue and leading renovation of 0.7% of the residential building stock per year. The tax measure would bring an additional 40 GWh/year of energy savings (370,370 m2 renovated/year)[34], inciting roughly 167 MEUR per year in renovation investments. The property tax itself and the taxes on renovation works would bring in about 68 MEUR in tax revenue per year, whereas energy savings would decrease energy tax revenue by an additional 0.6 MEUR per year (bringing up to almost 6 MEUR decrease in taxes by 2035). On average, the measure would (net) increase tax revenue by 64 MEUR. The increase in renovation would increase employment by about 2800 jobs per year.

The measure for the non-residential sector assumes that the average tax per year is 2 EUR/m2, bringing in 50 MEUR per year in tax revenue and leading renovation of 5.9% of the non-residential building stock per year. The tax measure would bring an additional 72 GWh/year of energy savings 1.3 million m2 renovated/year)[35], inciting roughly 167 MEUR per year in renovation investments. The property tax itself and the taxes on renovation works would bring in about 68 MEUR in tax revenue per year, whereas energy savings would decrease energy tax revenue by an additional 0.1 MEUR per year (bringing up to almost 0.8 MEUR decrease in taxes by 2035). On average, the measure would (net) increase tax revenue by 67 MEUR. The increase in renovation would increase employment by about 2800 jobs per year. However, there are concerns that this property tax (exemption) is not equitable, as primarily wealthier property owners can afford to have energy efficient buildings (high EPC rating) and property owners may pass on the property tax costs to tenants (cf. also chapter 3). There are several actions to make this measure more equitable:

- **Tenant protection**, by implementing regulation to prevent landlords from passing costs on to tenants (e.g. rent caps);
- **Targeted assistance programmes in tandem**, such as grants and tax deductions, which are already included in this action plan. Educating property owners of the available resources for improvements is also important so that property owners are knowledgeable of what options they have for energy renovation, as renovation will not only decrease the property tax but also decrease energy costs. These support schemes can be designed in a more targeted manner to focus on vulnerable households;
- **Progressive tax structure**, where properties with larger energy consumption face higher taxes.

[34] Assume that the required investment for renovation is 450EUR/m2, with energy savings of 102kWh/m2 of heat and 6 kWh/m2 of electricity.
[35] Assume that the required investment for renovation is 125EUR/m2, with energy savings of 29kWh/m2 of heat and 25 kWh/m2 of electricity.

CO_2 tax for end energy use of residential and non-residential buildings

Carbon taxes for end energy use of buildings is intended to decrease energy use by directly putting a price of emissions. There is currently no direct tax on emissions in the building sector, where this tax would be on top of the existing excise and VAT tax on energy use. The tax would be calculated based on the type and quantity of energy consumed (i.e., electricity use, natural gas, heating oil, etc.) and calculating the resulting CO2 emissions. The tax is then collected through energy bills or through a separate tax mechanism. Energy providers, such as utilities, are responsible for billing and collecting the tax on behalf of the government.

The carbon tax for the residential sector assumes that the average tax per year is 1 EUR/m2, bringing in 50 MEUR per year in tax revenue and leading renovation of 0.7% of the residential building stock per year. The tax measure would bring an additional 40 GWh/year of energy savings (370,370 m2 renovated/year)[36], inciting roughly 167 MEUR per year in renovation investments. The CO2 tax itself and the taxes on renovation works would bring in about 68 MEUR in tax revenue per year, whereas energy savings would decrease energy tax revenue by an additional 0.6 MEUR per year (bringing up to almost 6 MEUR decrease in taxes by 2035). On average, the measure would (net) increase tax revenue by 64 MEUR. The increase in renovation would increase employment by about 2800 jobs per year.

The carbon tax for the non-residential sector assumes that the average tax per year is 2 EUR/m2, bringing in 50 MEUR per year in tax revenue and leading renovation of 5.9% of the non-residential building stock per year. The tax measure would bring an additional 72 GWh/year of energy savings 1.3 million m2 renovated/year)[37], inciting roughly 167 MEUR per year in renovation investments. The property tax itself and the taxes on renovation works would bring in about 68 MEUR in tax revenue per year, whereas energy savings would decrease energy tax revenue by an additional 0.1 MEUR per year (bringing up to almost 0.8 MEUR decrease in taxes by 2035). On average, the measure would (net) increase tax revenue by 67 MEUR. The increase in renovation would increase employment by about 2800 jobs per year.

This CO_2 tax will become the ETS2 in the buildings and transport sector, considering that developing a complete scheme for an intermediate period would make no sense, unless it is designed and implemented for the long run.

Vehicle tax for registration

The purpose of imposing a tax on vehicle registration is to minimise the purchase of personal vehicles and ultimately incentivise other modes of transport. This tax is aimed at revising the current proposed tax in Estonia, which does not provide an incentive to promote energy efficient cars. All thermal vehicle owners who are registering a new or second-hand vehicle must pay a one-time tax, including trucks, buses, vans, SUVs, cars and motorcycles. There is an exemption for public service vehicles and a zero rate loan facility for vulnerable households. The rates would vary based on the type and weight of the vehicle.

It is assumed that the tax would affect 6.75% of the Estonian fleet, where the current tax rate is 192 EUR and the proposed rate is 1.595 EUR. Every year, the tax would save an additional 3.5 GWh. There would be 0.2 MEUR of administrative costs in the first year of implementation. The tax would bring in 58 MEUR of tax revenue each year. Where there would be on average a 0.01 MEUR loss of tax revenue from energy taxes (via the energy savings). There would be on average an additional 285 jobs lost each year from the tax, due to the decrease in demand for vehicle services (e.g. logistics, maintenance).

[36] Assume that the required investment for renovation is 450EUR/m2, with energy savings of 102kWh/m2 of heat and 6 kWh/m2 of electricity.

[37] Assume that the required investment for renovation is 125EUR/m2, with energy savings of 29kWh/m2 of heat and 25 kWh/m2 of electricity.

Annual vehicle tax

The purpose of imposing an annual vehicle tax (described in Section 4.2) is to minimise the ownership of personal, fossil fuel-powered vehicles and ultimately incentivise other modes of transport. This tax is aimed at revising the current proposed tax in Estonia, which does not provide an incentive to promote energy efficient cars.

It is assumed that the tax would affect 6.75% of the Estonian fleet, where the current tax rate is 60 EUR and the proposed rate is 100 EUR. Every year, the tax would save an additional 17.6 GWh. There would be 0.2 MEUR of administrative costs in the first year of implementation. The tax would bring in 2 MEUR of tax revenue each year. Where there would be on average a 0.1 MEUR loss of tax revenue from energy taxes (via the energy savings). There would be on average an additional 285 jobs lost each year from the tax, due to the decrease in demand for vehicle services (e.g. logistics, maintenance).

Talinn and Tartu congestion charge

The congestion charge would take the form of a flexible road use tax aimed at reducing traffic during peak hours. To make sure the tax does not adversely impact low-income households, a reduction of the tax can also be considered for:

- Vulnerable households (i.e. below a certain level of income) and people with disabilities;
- Essential travels during peak hours (e.g. reimbursement of the congestion charge if travel was made for a medical visit).

It is assumed that the tax would affect 6.75% of the Estonian fleet. Every year, the tax would save an additional 0 GWh. There would be 0.1 MEUR of administrative costs in the first year of implementation. The tax would bring in 0 MEUR of tax revenue each year.

Excise and/or VAT of (1) natural gas, (2), electricity, (3) heating, (4) gasoline, (5) diesel and light fuel oil, (6) firewood and (7) wood chips and waste

Excise duty and VAT on energy sources effectively incentivises the reduction of energy consumption across all sectors. These taxes already exist, where the proposal is to increase these taxes over the next few years. Excise duty is to increase for natural gas (+100% from 2023 to 2025), electricity (+350%), fuel oils (+30%) and diesel (+30%) in 2024 and 2025. VAT remains at 20%, but energy prices increase, increasing the VAT collected (households only). The tax is then collected through energy bills. Energy providers, such as utilities, are responsible for billing and collecting the tax on behalf of the government.

The rate of increase of the energy taxes is based on the 2020 KPMG study on fiscal measures to reduce energy consumption, where it is assumed that the increase in taxes will be implemented in 2024 (compared to 2021 in the study). Based on the price elasticity of various energy sources, in impact on energy consumption is estimated.

All changes in excise/VAT of the various energy sources is estimated to save about 40 GWh per year. This will increase tax revenue by about 155 MEUR per year (164 MEUR from increase in tax rate minus 9 MEUR from energy savings).

Involved parties roles and responsibilities

Table 4-21 presents the roles and responsibilities of the different parties in the implementation of the measures included dedicated to public transport.

Table 4-21 - Involved parties, roles and responsibilities

Actors	Roles, responsibilities and tasks
Ministry of Climate	• property taxation: develop together a guideline for municipalities, also involving local authorities' central administration • CO2 tax: determine appropriate tax level to check with relevant tax authorities • Tax deduction: define scope of eligibility
Energy providers/utilities	Key role in tax collection and offering energy performance contracts
Local authorities (cities and municipalities)	To contribute in designing property taxation. They are close to households, so they know their concerns. Involvement at an early stage is required
Ministry of Mobility and Transport	• In coordination with tax authorities, set up, collect and monitor annual and registration vehicle taxation • Provide necessary funds for implementation of the measures
Tax authorities/Ministry of Finance	Set up, collect and monitor: • Congestion charge • Energy taxation • Annual and registration vehicle taxation

4.3 Financing & fundings

This section develops the different funding and financing sources that might be considered to support the implementation of the different EE measures requiring funding (e.g. support and grants). The eligibility of the measure is assessed, and the availability of the source is evaluated to a certain extent, and the timetable shall provide detailed planning for government actions in this regard.

Table 4-22 - funding sources and short evaluation

Sources	Fund	Interest short evaluation
EU funds	The RRF	As main instrument for EE in EU, RRF is an important source for grant schemes in Estonian policies. It ends in 2027, which will create an important stop of funding.
	MFF 2021-2027 Cohesion policy funds (eligible until 2029)	Highly relevant for large infrastructure like rail lines and for Energy Efficiency (e.g. in buildings), if funds still available beyond 2029.
	Mobilising investments through InvestEU	Not a priority, providing loans and other financial products where regular finance remains inaccessible
	ELENA	Highly relevant to develop dedicated services to assist building managers or even industry operators to accelerate their energy efficiency transition
	Horizon Europe (until 2027)	Target RD&I, especially cluster 5 on Climate, Energy and Mobility
	Innovation fund	This could support the transition of some industries, moving to new innovative processes lowering carbon emissions

	European Energy Efficiency Fund (EEEF)	innovative PPP dedicated to mitigating climate change through energy efficiency measures, focuses on financing EE and clean urban transport projects targeting municipal, local and regional authorities and public and private entities
	The modernisation fund	The Modernisation Fund supports investments consistent with the 2030 climate and energy objectives of the Union, as well as the Paris Agreement. However, it has already been forecasted for Estonia (for public buildings and transport)
National carbon revenues	Current ETS	The revenues from the current ETS should be used as a priority, particularly to support the industry (e.g. Voluntary Agreement financial compensation in case of need, hiring and SME office, support, etc.). It should also be used before the entry into force of ETS2 for the building and transport sectors.
	Coming ETS2, on Building & Road Transport (BRT)	The revenues of the ETS2 (to come at the end of the obligatory period 2021-2030) should be used to prolong current support scheme, with a specific focus on vulnerable households

4.3.1 Other national practices

- Home Energy Efficiency Programmes for Scotland (HEEPS) - The HEEPS funds local authorities to develop and deliver energy efficiency programmes (mainly solid wall insulation) in areas with high levels of fuel poverty. This funding is blended with Energy Company Obligation funding, owners contributions and funding from registered social landlords who may choose to insulate their homes at the same time.
- Home energy grants in Ireland - The Home Energy Grant is a service managed by the Sustainable Energy Authority of Ireland (SEAI) and includes:
    - home survey
    - contractor selection
    - contractor works
    - follow up Building Energy Rating (BER)

  SEAI Fully Funded Energy Upgrades, comprising the Warmer Homes Scheme, is co-funded by the Government of Ireland and the European Union through the ERDF Northern and Western and Southern, Eastern & Midland Regional Programmes 2021-27.

- Home Energy Scotland - Home Energy Scotland, funded by the Scottish Government, is a network of local advice centres covering all of Scotland.
- Norway - https://klimatilskudd.no/isolasjon-boliger
- Austria – transport - https://www.klimaticket.at/en/

4.4 Conclusions & overall action plan

4.4.1 Risk and mitigation measures

Risks are assessed for each sector and sub-sector, and then at the level of individual measures, to identify the mitigation or even alternatives to the specific Energy Efficiency measure.

The colour code illustrates the level of the global risk associated with each Action Plan's EE measure.

Table 4-23 - risk and mitigation measures for each action plan

High risks
Medium risks
Limited risks

Action Plan	Risk for specific EE measures that may jeopardize the action plan & mitigation measures or alternative measures
Residential buildings - detached	There is an important risk that no (or limited) budget can be found after 2027, compromising grants, and consequently requiring to accelerate the uptake of normative (MEPS) & fiscal measures (fuel CO2); There is apparently limited capacity to improve the grant schemes (e.g. more adapted level of support, to avoid over-subsidization); MEPS will be complex, and possibly require several iterations. If there is a massive political/social blockage, then it should be reduced to focus on a very limited number of buildings while providing important grant/support.
Residential buildings - apartments	There is apparently limited capacity to improve the grant schemes (e.g. more adapted level of support, to avoid over-subsidization); Lack of skilled labour makes it difficult to properly implement measures, especially to meet the increased demand caused by grant availability; Complex decision-making process of multiple person ownership makes implementing measures timely and difficult.
Non-residential - public (central government & municipal)	No capacity to improve the grant schemes (more adapted level of support, to avoid over-subsidization; MEPS will be complex, and possibly require several iterations. If there is a massive political/social blockage, then it should be reduced to focus on a very limited portfolio while providing important grant/support; Lack of skilled workforce to implement the measures - there are resource constraints related to training and capacity building, as well as overall funding.
Non-residential - commercial	Large risk due to the administrative burden of setting up, running and implementing both a MEPS scheme as well as an EEOS; Lack of interest/will given barriers and timing associated with implementing measures.
Industry (agro-forestry) - large plants	For the Voluntary Agreement, the financial advantage or compensation for the industry might not be straight nor attractive enough for the industry to seriously commit; Lack of resources on Ministry side to conduct the process which will be demanding to prepare and negotiate VA;
Industry (agro-forestry) - SMEs	Lack of strong counterparty from business side, representing SMEs, and agricultural/fisheries/forestry exploitations; Lack of resources on Ministry side to conduct the process of preparing measures which will be demanding to liaise with the businesses on the most cost-efficient and necessary aspects to raise attractiveness.
Transport - car efficiency	**Action plan:** Current debate/discussion about the proposed vehicle taxation system, which does not incentivise shift to more efficient vehicles Insufficient investments in grid modernisation can hinder the deployment of EV

	Car taxation: No integration of GHG emissions concerns into car taxation Impact on vulnerable people, who often have older and hence less efficient cars **Public procurement:** Non-compliance of public authorities with the targets for clean and energy efficient public road transport vehicles **Electric charging infrastructure:** Lack of skilled workforce for implementation of charging infrastructure Lack of grid modernization Inappropriate deployment of charging infrastructure (too slow/too rapid, in wrong places, etc.)
Transport – public transport	**Action plan:** Requires high degree of planning and integration between the different actions related to developing infrastructure for public transport and micro-mobility Many actors involved/consulted in the process, which increases complexity of implementation Lack of harmonization between development of mobility and transport infrastructures and new residential/business districts **Development of public transport services and infrastructure:** Lack of cooperation from public transport operators Lack of skilled workforce to construct infrastructure Lack of funding available to develop the necessary infrastructure **Subsidy for public transport usage:** Low uptake of the subsidy, preference for company/personal car usage **Congestion charge:** Impact on vulnerable people
Transport – multi modal	**Action plan:** Requires high degree of planning and integration between the different actions related to developing infrastructure for public transport and micro-mobility Many actors involved/consulted in the process, which increases complexity of implementation Lack of harmonization between development of mobility and transport infrastructures and new residential/business districts **Development of infrastructure:** Lack of consideration of existing public transport infrastructure to develop mobility hubs Lack of skilled workforce to construct infrastructure Lack of funding available to develop the necessary infrastructure **Subsidy for micro and active mobility usage:** Low uptake of the subsidy, preference for company/personal car usage **Congestion charge:** Impact on vulnerable people
Cross-cutting – fiscal & taxation	**Property tax:** there is concern of the social impact of property taxes because: 1) wealthier households tend to have higher energy performance dwellings (will have low property tax) and 2) property owners can pass down the cost of the tax to tenants. The property tax needs to be designed (e.g. progressive tax based on amount of energy consumption) or supplemented with support schemes to avoid adverse impacts on vulnerable households. **CO2 tax:** can potentially lead to an overburdening of costs of consumers, given the upcoming implementation of ETS for buildings/transport. Important to take ETS into account when developing the CO2 tax (for instance setting a CO2 price, where the CO2 tax is the difference between the ETS price and set CO2 price)

4.4.2 Overarching action plan

Table 4-24 groups the policy measures by similar types, and sum up the actions to be taken at sector and measure (set of measures) level.

Table 4-24 - action plan per set of measures

Set of measures	Timeline for action	Responsible	Other parties	Source of public money
BUILDINGS				
Set up MEPS (single family and non-residential)	Adapt EPC & design MEPS - short term (2025-2027) Implement - medium term (from 2027)	Ministry of Climate (building department)	Architects, construction, building owners and operators, local authorities	/
Continue renovation grants for all buildings	Design or design grant - short term (2025-2027) Implement - medium term (from 2027)	Ministry of Climate (building department)	KredEx, architects, construction, building owners and operators	ETS revenues; ETS2 revenues
Implement tax deduction (single family)	Design tax scheme - short term (2025-2027) Implement - medium term (from 2027)	Ministry of Finance	Ministry of Climate , KredEx, architects, construction, building owners and operators	/
Implement property tax (all buildings)	Design tax scheme - medium term (2029-2030) Implement - medium/long term (from 2031)	Ministry of Finance	Ministry of Climate, architects, construction, building owners and operators	ETS revenues; ETS2 revenues
Implement CO2 tax (all buildings)	Preparation (incl. awareness) - short term (2025-2027) Implement ETS2 - medium term (from 2027)	Ministry of Finance	Ministry of Climate, architects, construction, building owners and operators	/
INDUSTRY & AGRICULTURE				
Voluntary Agreement scheme with top 30 companies	Design & develop VA - short term (2024-2025) Implement - short/medium term (from 2025) First investments (from 2025, first savings 2026)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	ETS revenues or Exemption of fees to support RES electricity
Voluntary Agreement scheme for all sectors	Design & develop VA - medium term (2026-2027) Implement - medium term (from 2028) First investments (from 2029)			
Continue grants for industry	Implementation - short to long term (ongoing - until 2026 or 2035) Revision in the frame of VA (from 2025)	Ministry of Economic Affairs & Communications (dpt industry)	Ministry of Climate, companies; representatives of auditors	ETS revenues, EU funds (on short term)
TRANSPORT				

Energy efficient vehicles in public procurement	Preparatory phase – short term (2024) Design phase – short term (2025-2026) Agreement & implementation – medium term (2026-2029)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	Gov. budget
Deploy EV charging infrastructure	Preparatory – short term (2024) Development and implementation (2025-2029)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	ETS revenues
Set up a vehicle tax (registration & annual) scheme	Preparatory – short term (2024) Proposal & negotiation – short term (2025) Implementation – medium term (from 2025)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, energy companies	
Subsidy for public transport & active mobility instead of personal vehicle	Preparatory phase – short term (2024) Implementation phase – short term (2024-2025) Monitoring & adaptation phase – medium term (from 2025)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, bus operators	ETS revenues; ETS2 revenues
Develop public transport (rail, bus, tram)	Comprehensive assessment – short term (2024-2025) Update Transport & Mobility Plan and consult – short/medium term (2025-2026) Prioritisation and implementation – medium term (2026-2028) Monitoring (from 2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, bus operators	ETS revenues; ETS2 revenues
Develop priority lanes for micro/active-mobility	Comprehensive assessment – short term (2024-2025) Update Transport & Mobility Plan and consult – short/medium term (2025-2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses,	ETS revenues; ETS2 revenues

	Prioritisation and implementation – medium term (2026-2028) Monitoring (from 2026)		communities, landowners, bus operators	
Set up a congestion charge in Tallinn and Tartu	Assess the opportunity for a charge – short term (2024) Consult and design the charge – short/medium term (2025-2026) Implement – medium term (from 2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, bus operators	ETS revenues
Adapt excise and value added tax of all fuels (*)	Establish tax rates – short term (2024) Adjust existing legislation – short/medium term (2024-2025) Implement – medium term (from 2026)	Ministry of Climate (department mobility), Estonian Transport Administration	Ministry of finance; local authorities; system operators and NRA; Local residents, businesses, communities, landowners, bus operators	/

Table 4-25 summarises the time horizon of each policy measure, providing the total investments need at 2030 (to reach the new EED targets).

Table 4-25 - Action plan per sector

Set of measures	Timeline	Responsibility	EE total investment 2024-2030 needed to fill 2030 targets	
BUILDINGS			**9 147 Meur**	
Existing measures	2021 - 2024	RAM	346 Meur (~30% public)	RRP
Property taxation	2030 ->	RAM	403 Meur (100% private)	
Other taxes (deduction, CO2)	2027 ->	RAM	2 338 Meur (100% private)	
Continue renovation grants for all buildings	2027 - 2035	KLIM	3 875 Meur (~30% public)	ETS & ETS2 revenues
Minimum Energy Performance Standards	2027 ->	KLIM	2 100 Meur (100% private)	
Obligation scheme for non residential	2030 ->	KLIM	84 Meur (100% private)	
INDUSTRY & AGRICULTURE			**430 Meur**	
Existing measures	2021 - 2024	MKM	170 Meur (~30% public)	RRF, EDRF, CF
Continue grants for all industrial plants	2024 ->	MKM	122 Meur (~30% public)	ETS revenues
Voluntary agreement	2024 - 2035	MKM	139 Meur (100% private)	ETS revenues or Exemption of fees to support RES electricity
TRANSPORT			**2 667 Meur**	

Existing measures	2021 - 2027	KLIM, TRAM	10 Meur (100% private)	
Fiscal measures (vehicle tax, congestion charge)	2025 ->	KLIM, TRAM	1 Meur (100% private)	
Deploy EV charging infrastructure	2025 - 2035	KLIM, TRAM	40 Meur (50% private)	ETS revenues
Energy efficient vehicles in public procurement	2025 – 2035	KLIM, TRAM	552 Meur (100% public)	Gov budget
Subsidise public transport use & active mobility	2025 – 2035	KLIM, TRAM	8 Meur (100% public)	ETS & ETS2 revenues
Develop public transport & priority lanes for active mobility	2025 ->	KLIM, TRAM	2 056 Meur (100% public)	ETS & ETS2 revenues
Excises & Fuel VAT (existing)			**1 062 Meur**	
Cross cutting	2021 ->	RAM	1 062 Meur (100% private)	
TOTAL				
		KLIM	**13 306 Meur**	

Source of data: "D4 Modelling v8.2.xlsx", tab "AP Building" cells B139-O145 for building figures; tab "AP Industry" cells B114-O117; "AP Transport" cells B127-O133; "AP Fiscality" cells B118-O119.

In the **building sector**, grants remain the main driver of renovation and performance up to 2030 (assuming those will continue after the 2027 end of RRF). From 2030, more normative measures like MEPS and fiscal measures like property and carbon taxation should take over and become the main drivers of continuous renovation.
In the **industry sector**, grants will continue to accompany the transformation, while Voluntary Agreement will only start progressively during the second half of the decade, while it will become the main driver and will provide significant results only after 2030.
In the **transport sector**, the first period will require important investments in infrastructure (public transport and active mobility), with some additional subsidise to incite the use of alternative to individual cars. At the end of the period, fiscal measures like vehicle and fuel taxation will progressively ramp up and become slowly more prominent. Public procurement has also an important role to play and will drive substantive investments, that will support structuring the market.

The following table summarises a few indicators for the same set of measures within each sector.

Table 4-26 - Summary indicators complementing the Action plan per sector

Main measures to fill EED targets for 2030	Average yearly energy saving 2021-2030 [%]	GHG reduction 2021-2030 [MCO2t]	GHG reduction 2021-2030 [MCO2t] in addition to scenario w/o measures	Total investment costs 2021-2030 [MEUR]	Total public costs 2021-2030 [MEUR]	Responsible bodies
Buildings existing measures	0,00%	-0,71	0,08	346,39	225,48	Ministry of climate (building department)
Property taxation	0,02%	-0,78	0,01	403,36	110,41	Ministry of finance
Other building tax (deduction, CO2)	0,12%	-0,61	0,17	2.337,84	428,81	Ministry of climate (building department)
Grants	0,34%	-0,22	0,57	3.875,29	1.470,96	Ministry of climate (building department)
MEPS	0,17%	-0,46	0,33	2.100,18	-	Ministry of climate (building department)
Obligation scheme	0,01%	-0,78	0,01	84,26	-	Ministry of climate (building department)
Buildings total	**0,66%**	**0,39**	**1,18**	**9.147,31**	**2.235,66**	
Industry existing measures	0,06%	-0,14	0,65	169,62	81,30	Ministry of Economic Affairs (dpt industry)
Industry new measures (grants)	0,08%	-0,42	0,37	121,53	73,86	Ministry of Economic Affairs (dpt industry)
Including Voluntary Agreements	0,15%	-0,48	0,30	138,79	-	Ministry of Economic Affairs (dpt industry)
Industry total	**0,29%**	**0,54**	**1,32**	**429,95**	**155,16**	
Transportation existing measures	0,00%	-0,73	0,06	10,29	10,29	Ministry of Climate (department mobility), Estonian Transport Administration
Fiscal measures (vehicle tax, congestion charge)	0,00%	-0,79	0,00	0,90	0,90	Ministry of finance
Deploy EV charging infrastructure	0,00%	-0,78	0,01	40,32	20,16	Ministry of Climate (department mobility), Estonian Transport Administration
Energy efficient vehicles in public procurement	0,04%	-0,71	0,08	551,98	551,98	Ministry of Climate (department mobility), Estonian Transport Administration
Subsidise public transport use & active mobility	0,07%	-0,60	0,19	8,38	6,95	Ministry of Climate (department mobility), Estonian Transport Administration
Develop public transport & priority lanes for act	0,47%	0,59	1,38	2.055,60	2.031,60	Ministry of Climate (department mobility), Estonian Transport Administration
Transportation total	**0,57%**	**0,93**	**1,72**	**2.667,47**	**2.621,87**	
Existing excises and fuel VAT	0,08%	0,41	1,20	1.061,62	13,72	Ministry of Finance
Fiscal total	**0,08%**	**0,41**	**1,20**	**1.061,62**	**13,72**	
ALL MEASURES IN TOTAL	**1,60%**	**4,63**	**5,42**	**13.306,34**	**5.026,41**	

Source of data: "D4 Modelling v8.1.xlsx", tab "Per sector"

As can be observed, the investment need for the non-existing measures (investment to be realised during the 2025-2030 timeframe) represents the main part of the investments need. As example, for the building sector, existing measures expect ~346 Meur, while the new measures (2025-2030) would expect ~8.801 Meur.

5 Detailed concept of the energy efficiency flagship policy, including a monitoring and verification approach (D5)

Chapter 5 summarises two flagship policy for achieving Estonia's energy efficiency obligation which are further conceptualised and described under Deliverable 5:

- A voluntary agreements scheme, which should be implemented by the Ministry of Economic Affairs & Communications;
- A Minimum Energy Performance Standard, which should be implemented by the Ministry of Climate, Building department.

It first recalls best practices of these flagship policies in other EU Member States. For each policy it then presents the following summaries:

- A description of the functioning of the new policy/scheme in Estonia;
- Main legislative and regulatory changes;
- Recommendations for different funding and delivery models;

The administration and monitoring / verification of the schemes can be found under Deliverable 5.

5.1 Best practices

5.1.1 Voluntary agreement

Voluntary agreements (VAs) are defined by the International Energy Agency (IEA) as government-industry contracts with negotiated targets and commitments. Unlike traditional policies, VAs are tailored to specific contexts. They involve public authorities and firms agreeing on energy efficiency goals. Voluntary agreements are collaborative agreements between governments and industries where individual firms or groups negotiate and commit to specific targets and timelines for enhancing energy efficiency. These agreements often incorporate enforceability measures, defining rewards and penalties for compliance. VAs vary in form, legality, and participants.

In Europe, VAs gained traction in the early 1990s. France initiated the first VA, followed by Germany, Austria, Belgium (Wallonia & Flanders), and the Netherlands.

Designing VAs entails defining sectors, targets, schedules, and coverage levels. Implementation and target-based approaches are options. Distribution methods, energy management, and networking can support VAs. Enforcement may involve rewards or penalties, as explained in sectoral sections below.

To generate interest in the scheme, a compelling financial incentive is essential. Currently, securing investment grants for energy efficiency often entails submitting applications and sometimes undergoing audits as prerequisites. Similarly, to encourage industries to participate in the voluntary agreement program, an additional requirement linking energy efficiency grants and the agreement can be introduced. This would obligate enterprises to meticulously monitor their energy consumption and make broader strides in improving energy efficiency.

History and prospect of voluntary agreements on industrial energy efficiency in Europe (Tractebel, 2019)

The paper „History and prospect of voluntary agreements on industrial energy efficiency in Europe“ (Tractebel, 2019) provides numerous other applications of such scheme across Europe, as depicted by the table below

Table 2: Characteristics of the European voluntary agreements on industrial energy efficiency

Country (1)	Voluntary agreement	Operational in	Coverage	Structure	Concept	Approach	Commitment determining method	Supporting actions	
								Energy Mgt. Sch.	Network
NL	Long Term Agreements 1	1991-1998	Industry, services	2 levels	Negotiated	Target	Energy audits		
	Long Term Agreements 2 (2)	2000-2012	Non-ETS industry, services	2 levels	Negotiated	Target	Energy audits		
	Benchmarking Covenant (2)	2000-2012	ETS industry	2 levels	Negotiated	Target	Sector benchmarks		
	Long Term Agreements 3	2008-2020	Non-ETS, services, transport + supply chain	2 levels	Negotiated	Target	Energy audits Roadmaps	X	
	Long Term Agreement – ETS	2009-2020	ETS industry + supply chain	2 levels	Negotiated	Target	Energy audits Roadmaps	X	
FI	Energy Audit Programme	1992-1997	Industry, services, energy sector	2 levels	Public vol.	Implem.	Energy audits		
	Energy Conservation Agreement	1997-2007	Industry, services, energy sector	2 levels	Negotiated	Implem.	Energy audits		
	Energy Efficiency Agreements (3)	2008-2016	Industry, services, energy sector	2 levels	Negotiated	Target	Energy audits	X (3)	
	Energy Efficiency Agreements (3)	2017-2025	Industry, services, energy sector	2 levels	Negotiated	Target	Energy audits	X (3)	
DE	EWK I (4)	1995-1999	Industry, power production	2 levels	Unilateral	Target	(Not specified)		
	EWK II (4)	2000-2012	Industry, power production	2 levels	Negotiated	Target	(Not specified)		
FR	AERES 1 (5)	1995-2002	Energy intensive industry	1 level	Unilateral	Target	(Not specified)		
	AERES 2 (5)	2002-2007	Energy intensive industry	1 level	Unilateral	Target	(Not specified)		
DK	Agreement on Industrial Energy Efficiency	1993-1996	Energy intensive industry	1 level	Public vol.	Implem.	(Not specified)	X	
	Revised agreement	1996-2013	Energy intensive industry (6)	1 level	Negotiated	Implem.	Energy audits	X	
	Revised agreement	2015-	Energy intensive industry	1 level	Negotiated	Implem.	Energy audits	X	
IE	Large Industry Energy Network	1996-	Energy intensive industry	1 level	Public vol.	Implem.	Energy audits	X	X
	Energy Agreements Programme	2006-	Energy intensive industry	1 level	Public vol.	Implem.	Energy audits	X	X
LU	Voluntary Agreements 1	1996-2000	Industry, services	1 level	Negotiated	Implem.	Energy audits		
	Voluntary Agreements 2	2000-2010	Industry, services	1 level	Negotiated	Implem.	Energy audits	X	
	Voluntary Agreements 3	2011-2016	Industry, services	1 level	Negotiated	Implem.	Energy audits	X	
	Voluntary Agreements 4	2017-2020	Industry, services	1 level	Negotiated	Implem.	Energy audits	X	X
UK	Climate Change Agreements 1 (7)	2001-2011	Industry, services, agriculture	2 levels	Negotiated	Target	(Not specified)		
	Climate Change Agreements 2	2013-2023	Industry, services, agriculture	2 levels	Negotiated	Target	(Not specified)		
CH	Emission Reduction Target Agreements	2002-	Industry	1 level	Negotiated	Large: Target SME: Implem.	Large: energy audits SME: benchmarks	X	X
BE-VLA	Benchmarking Covenant	2002-2014	ETS industry	1 level	Negotiated	Target	Sector benchmarks		
	Auditing Covenant	2005-2014	Non-ETS industry	1 level	Negotiated	Implem.	Energy audits		
	Energy Governance Agreement - ETS	2014-2020	ETS industry	1 level	Negotiated	Implem.	Energy audits	X	
	Energy Governance Agreem. – non-ETS	2014-2020	Non-ETS industry	1 level	Negotiated	Implem.	Energy audits	X	
BE-WAL	Branch Agreements 1	2003-2012	Industry	2 levels	Negotiated	Implem.	Energy audits		
	Branch Agreements 2	2014-2020	Industry	2 levels	Negotiated	Implem.	Energy audits Roadmaps		
NO	Programme for Energy Intensification	2004-2014	Energy intensive industry	1 level	Negotiated	Implem.	Energy audits	X	
SE	Programme for Energy Intensification	2005-2013	Energy intensive industry	1 level	Negotiated	Implem.	Energy audits	X	
LV	Agreements on Energy Efficiency	2011-2016	Industry	1 level	Negotiated	Implem.	Energy audits		
MT	Energy Efficiency Partnership Initiative	2016-2018	Industry	1 level	Negotiated	Implem.	Energy audits		
SK	Energy Savings Agreement	2016-	Industry	1 level					

Source: Tractebel, 2019

5.1.2 *Minimum Energy Performance Standards (MEPS)*

Introduction

Within the building sector, Minimum Energy Performance Standards (MEPS) focus on building owners, while in other sectors, such as transportation, they might apply to producers like car manufacturers, mandating them to meet minimum fuel efficiency levels. On the other hand, industry binding targets are tailored specifically for industrial actors to ensure their adherence to set energy efficiency goals.

Minimum Energy Performance Standards (MEPS) are defined by the United Nations as a ‘specification containing a number of performance requirements for an energy-using device, and that effectively limits the maximum amount of energy that may be consumed by a product in performing a specified task.’[38] Globally, MEPS have already been introduced in various countries, for different sectors or applications that consume energy, usually to achieve certain safety, environmental or energy efficiency objectives.

[38] minimum energy performance standards (unescwa.org)

As part of its Renovation Wave strategy, the European Commission proposes to introduce MEPS in the building sector to improve energy efficiency and increase renovation rates.[39] In 2021, the European Commission published its proposal for the revision of Directive 2010/31/EU on Energy Performance of Buildings (EPBD proposal) in which it introduces MEPS for the building sector and defines them as '**rules that require existing buildings to meet an energy performance requirement** as part of a wide renovation plan for a building stock or at a trigger point on the market (sale or rent), in a period of time or by a specific date, thereby triggering renovation of existing buildings.'[40]

The 2023 EBPD recast, as per provisional agreement on 7 December 2023, states that for the non-residential building stock, the revised rules require to gradually improve it via minimum energy performance standards. This will lead to renovating the 16% worst-performing buildings by 2030 and the 26% worst-performing buildings by 2033.[41]

Advantages and drawbacks of MEPS

MEPS offers various advantages including drawing clear lines for decision-making in multi-owner buildings, fostering investment in energy efficiency, reflecting energy performance in the value of a building, increasing the awareness of the benefits of renovation, etc.[42,43] However, the EPBD proposal also lists a number of negative impacts associated with the introduction of MEPS in the building sector, which should be carefully considered when designing them. For example, landlords might be tempted to pass renovation costs to tenants, or the further reduction in prices of worst-performing buildings.[44]

Impacts

Administering MEPS can be administratively burdensome. MEPS implementation requires guidance, financing support, as well as monitoring and verification measures. Of importance is the consideration of implementing *both* MEPS and Energy Efficiency Obligation Scheme (EEOS). In certain cases, an energy efficiency obligation scheme for buildings can work well alongside minimum energy performance standards. However, in countries with limited capacity to establish new administration, the administrative workload can become too burdensome.

Without effective support mechanisms accompanying MEPS requirements, there's a potential for increased energy poverty and general poverty risks. However, in the long run, enhancing energy efficiency in housing can mitigate risks associated with volatile energy prices and enhance overall living conditions. It's essential to consider social and low-income housing to prevent adverse effects on these groups. Estonia should clarify the categorization of social housing and ensure targeted financing is available to address these concerns.

Practices

In France

As part of its Long-Term Renovation Strategy (LTRS)[45], France has introduced a progressive set of measures and obligations for the renovation of poorly performing buildings (called 'passoires thermiques', with a MEPS equal to energy performance classes F or G). These measures are laid down in the Law on

[39] Renovation Wave Communication (europa.eu)
[40] resource.html (europa.eu); https://www.europarl.europa.eu/doceo/document/TA-9-2023-0068_EN.pdf
[41] New rules to boost energy performance of buildings (europa.eu)
[42] Renovation Wave Communication (europa.eu)
[43] qe-05-22-310-en-n.pdf (europa.eu)
[44] resource.html (europa.eu)
[45] fr_ltrs_2020_0.pdf (europa.eu)

Energy and Climate adopted in 2019.[46] As of 2021, rent increases will no longer be possible for poorly performing buildings (buildings below the MEPS) and landlords will only be able to ask a financial participation from tenants if the renovation works allow to reach MEPS. As of 2023, buildings for which the final energy consumption exceeds a certain threshold can no longer be rented. All poorly performing buildings will have to be renovated by 2028 and reach at least the energy performance class E. Sanction for the non-renovation of these buildings will be defined by the government in 2023.

MaPrimeRénov is another French grants scheme for energy efficiency measures to meet certain standards.[47]

In the Netherlands

In the Netherlands, there are approximately 96,000 offices, with 62,000 expected to adhere to the standard (the remainder being exempted as detailed below). Among these, 56% currently lack an EPC. Among those with an EPC, roughly three-quarters (20,500) possess an "A"-"C" label, while one-quarter (7,000) hold a label of "D"-"G," necessitating work to meet the standard.[48]

The Dutch government has implemented MEPS as part of its LTRS.[49] All offices with a total surface that is higher than 100m^2 and of which at least 50% is used as an office space must have an energy label of at least C by 2023 (which corresponds to primary fossil energy consumption of 225 kWh/m^2 per year) and at least A by 2030.[50]

The obligation is set in the Dutch Building Decree. Non-compliance will be addressed through administrative enforcement measures, including periodic penalty payments, fines, or the potential closure of the office building.

It was communicated in 2018 which provided actors with sufficient time to adapt and comply with the obligation. In addition, three leading financial institutions (ING, Rabobank and ABN AMRO) indicated they would stop financing office buildings with label D or lower in 2019.[51]

In Belgium (Flanders)

The region of Flanders (Belgium) has set MEPS for roof insulation and double glazing in rented housing. The norm for roof insulation was implemented in 2015 and gradually increased until 2020. As of 2020, rented dwellings without roof insulation can be declared as ‘unsuitable for habitation’.[52] In 2020, the government implemented the obligation for double glazing. Each dwelling in Flanders must have double glazing. Double glazing weighted increasingly more in the assessment of energy performance of a dwelling. As of 2023, rented dwellings without double glazing can also be declared as ‘unsuitable for habitation’.[53]

In Ireland

In Ireland, 60% of public buildings (with a surface area that is higher than 500m^2) are leased from private landlords which may create a split incentives issue. Hence, the Irish government has implemented a

[46] Loi énergie-climat | Ministères Écologie Énergie Territoires (ecologie.gouv.fr)
[47] https://www.french-property.com/guides/france/building/renovation/energy-conservation/
[48] https://www.aceee.org/sites/default/files/pdfs/buildings_standards_6.22.2020_0.pdf
[49] nl_2020_ltrs_en_0.pdf (europa.eu)
[50] Energielabel C kantoren (rvo.nl)
[51] IGBC-SEAI-Report-Final.pdf
[52] Dakisolatie is verplicht | Vlaanderen.be
[53] Dubbele beglazing in elke woning | Vlaanderen.be

regulation which stipulated that public bodies can only enter into new rental or leasing agreements for privately owned buildings if these buildings have a Building Energy Rating (BER) level of at least A3.[54] This corresponds to primary energy use between 50 and 75 kWh/m² per year.[55]

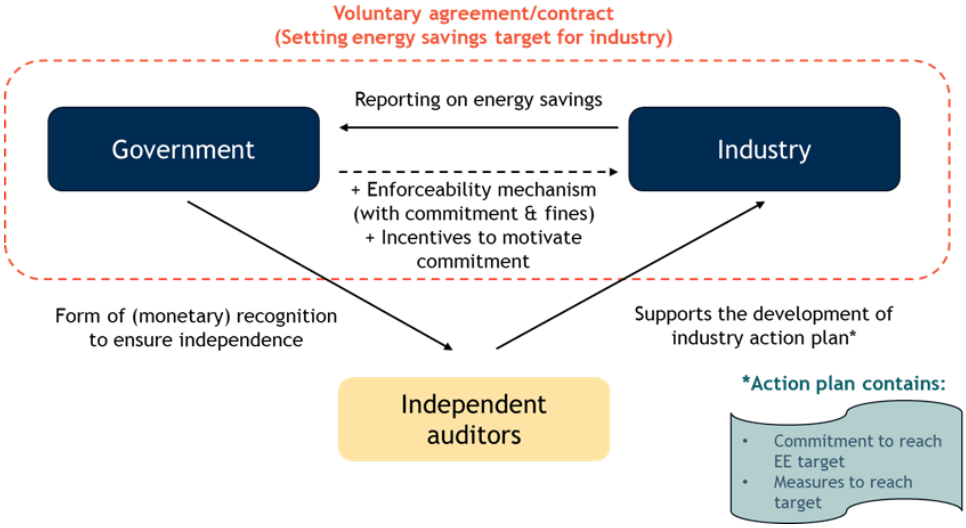
5.2 Voluntary Agreement

5.2.1 Description of the functioning of the new policy/scheme in Estonia

This section describes the key elements to take into account for a Voluntary Agreement, and can be used by the authorities when approaching the industry:

- Starting by recalling the advantages of a VA scheme
- Proposing a comprehensive process into 6 steps
- Proposing a list of potential participants, to steer the discussion on a concrete basis
- Consult participants directly without mediation of associations
- Make changes to the scheme based on the feedback of participants

The principle of of Voluntary Agreement is depicted in the following figure (details provided under Deliverable 3).



Source: Trinomics, own illustration

Advantages of a VA scheme

In a sectoral Voluntary Agreement, the commitment of companies is voluntary. They find the following advantages:

- good knowledge of their energy flows via an energy audit carried out on each of their sites thanks to the financial support from public authorities;
- long-term visibility in terms of investment programs and energy costs;
- regular contact between their federations, the administration and political power and therefore better knowledge of each other;
- ultimately, an improvement in their energy efficiency and therefore their operating costs.

For their part, the public authorities are assured of:

[54] Tab A - Ireland's Long Term Renovation Strategy (europa.eu)
[55] BER-Homeowner-Leaftlet.pdf (seai.ie)

- a substantial and objectively measured effort in terms of reduction of energy consumption and CO_2 emissions from industry;
- criteria for the selection of rigorous improvement objectives and voluntarily ambitious;
- a methodical monitoring of progress made through the use of objective indicators;
- the better mobilization of resources and knowledge, the potential for energy savings being best identified by the companies' internal skills.

In addition, the dynamics of VA can have numerous beneficial effects, improving knowledge and influencing the way of working in industries. Among others:

- the contractual nature of the agreement can move energy management in the top priority concerns of the Board;
- in-depth knowledge of the energy performance of the company's production tools helps industrialist to optimally schedule its production during periods of economic downturn, an effect that has clearly been observed in the evolution of efficiency indices in other countries;
- the availability of an audit methodology and a table of energy consumption as a monitoring tool can generate a dynamic of research and implementation of new measures, which were possibly not identified by the audit, or for which the audit had expressed risks regarding their feasibility;

Setting up the right process

The Voluntary Agreement should constitute a real “win-win” partnership commitments between the national authorities and an industrial company and/or an industrial sector (represented by its association/federation). The Estonian authorities would then obtain from the concerned industry a number of commitments in terms of energy performance, while the concerned company or sector benefits in return from various financial and administrative advantages from the Estonian authorities. Therefore, the process to get there is crucial to establish a solid base for collaboration for the period of implementation.

Precising the parties engaged

- **Authority**: Ultimately, the authority refers to the government, but the term "authority" is used for precision. For instance, the administration of economic affairs might have a full mandate to manage the process, establish the Voluntary Agreement (VA), and sign contracts. However, it is advisable to retain the responsibility at the government level;
- **Participants**: These include companies and sectoral associations/federations that sign the Voluntary Agreement (VA) and pledge to achieve an energy saving target
    - When a company is the direct signatory party, it commits on standalone basis;
    - When a company is indirectly engaged in the VA through its umbrella organization, both the association/federation and the company are required to sign. The association signs the agreement with the state agency or ministry, while the company signs the agreement with the association/federation.

Voluntary Agreements should be carried out following 6 main steps

1. Signature of a declaration of intent with a company or federation representing a sector wishing to take part in the agreement (in a sector, all companies participating should sign). This step is crucial as it will pave the way for a successful scheme, entering the dialogue with the industry, and creating the relationship between industry and authority;

2. Conducting energy audits on each of the industrial sites concerned, by independent auditors acknowledged by the authority, guaranteeing their independence against suppliers of energy equipment, energy suppliers, or other service providers. The identified savings potential helps preparing plans to reduce greenhouse gas emissions and/or improve energy efficiency. The authority provides grants, to complement the financing of audits;
3. Based on the options for improvement identified by the audits (investments, changes in process, in behaviours, changes of feedstock, in product design, etc.), each company defines individually an improvement objective of its energy efficiency and its efficiency in terms of reduction of greenhouse gas emissions. In the case of sectoral federation signing a VA, there are 2 options:
    a. Option 1: the commitment remains at the level of company;
    b. Option 2: sectoral federation consolidates the individual objectives of companies and determines sectoral improvement objectives;
4. The voluntary agreement is drawn up and submitted to public inquiry;
5. The voluntary agreement is then signed by the companies, the professional federation and the authority. This takes the form of contract between the authority (the government) and the industry (company or sectoral association). It stipulates the objectives to which the sector is committed and the duration of the agreement. It specifies the arrangements for monitoring the agreement and the penalties that should be applied in the event of non-compliance announced objectives;
6. the agreement is implemented: each company implements (invests in) the identified efforts in the audit and declares its performance annually, certified by a reviewer. A sectoral report is published every year on the progress made to
    a. Option 1: the authority directly;
    b. Option 2: its sectoral federation, which draws up a consolidated progress report.

5.2.2 Phase end participants to the VA

The Participant is the concerned party signing the Voluntary Agreement. There are 2 options: work directly with the companies, or work via sectoral representatives (i.e. associations/federations). We propose to start with direct consultations with companies and work via associations/federations in next phases. As explained below we propose starting to work with 20-30 largest companies, which allows a manageable consultation (limited number of people to contact).

In the second phase, there are two main reasons to work with “intermediate” associations/federations rather than with companies in direct:

- Managing the process can be burdensome
- Compiling data facilitates sector-wide commitments rather than individual company commitments, offering flexibility within the sector

However, due to the limited number of companies in some sectors, and the limited representativeness of the sectors, it is recommended to work in 2 steps, as described below.

- 1st phase (wave) of VA (2 first years)

  We recommend working in steps, starting with a 1st “phase” of VA targeting only the top major industrial plants in Estonia. This is to limit the number of participants (and consequently reduce the administrative load), while focusing on the plants with the highest impact regarding energy savings and reduction of GHG emissions.

  For the 1st “phase”, to test proof the concept of VA, and target the most relevant energy users, we recommend starting with the top 20 largest industrial plants (a preliminary selection is provided in the table below). The list of industries has been established on the basis of revenues and number of employees (excluding electronics sector and energy conversion) and as such does not directly reflect

their energy consumption[56], considering that energy consumption of Industries is not publicly available.

Company	Sector / activity	Comments
Aktsiaselts Merko Ehitus Eesti	Construction	Construction of buildings, may need additional analysis if suitable for VA
AS Maag Eesti	Food and Beverages	Include
Stora Enso Eesti AS	Wood	Include
Prysmian Group Baltics AS	Manufacturing	Include
Aktsiaselts A. Le Coq	Food and Beverages	Include
Riigimetsa Majandamise Keskus	Wood	State owned forest management
Valio Eesti AS	Food and Beverages	Include
Scandagra Eesti Aktsiaselts	Agricultural products	Include
Orkla Eesti AS	Food and Beverages	Include
Aktsiaselts Metaprint	Manufacturing	Include
Saku Õlletehase Aktsiaselts	Food and Beverages	Include
Aktsiaselts Konesko	Manufacturing	Include
Osaühing Mapri Ehitus	Construction	Construction, concrete, include
Verston OÜ	Construction	Road construction, include
Aktsiaselts Norma	Manufacturing	Car safety components, include
Estonian Cell AS	Manufacturing	Biggest consumer of energy in Estonia, pulp and paper, include
Kunda Nordic Tsement AS	Manufacturing	Consumption has declined recently, include
„Horizon“ Tselluloosi ja Paberi AS	Manufacturing	Pulp and paper, include
OÜ Harmet	Manufacturing	Modular houses, include
NPM Silmet OÜ	Manufacturing	Metallurgy, rare metals and rare-earth metals

- 2d wave of VA (starting after 2 years)
  On the long run it will not be possible for the authority to deal with all interested parties if the number of companies increases significantly. For this second wave of VA, we recommend to progressively expand to sectoral federations/associations, possibly focusing on those with large and medium size companies/plants. The second wave of VA should include all sectors of industry. Since the primary incentive for enterprises is reduced energy costs, it follows that enterprises with higher energy consumption are more inclined to sign the agreement. Alternatively, VA could be managed by one single association (umbrella organisation) that unifies industrial enterprises. Current Estonian Chamber of Commerce and Industry may represent too broad set of enterprises to establish a suitable framework for the VA, for that reason a new association or federation specifically for industries may be needed.
  Feedback from workshops indicates that such a new association would necessitate state aid, at least during the implementation phase. Assistance can be provided through schemes supporting expert

[56] Biggest industries in Estonia by revenue and number of employees. Available at: https://www.teatmik.ee/et/statistics/legal/eyJhcyI6WyJDIl0sImFzcCI6dHJ1ZX0=

hiring within the association or through direct financial aid. Ultimately, the association is expected to attain self-sufficiency through membership fees.

During the 1st wave of VA, we recommend starting the dialogue with the existing sectoral federations/associations, to assess their willingness to enter such process, but also their capacity to deal with such process. In the case of weak capacity, if deemed relevant, support could be provided by the authority for the companies (or associations) to structure themselves. The associations would represent the companies of the sector and ease the collaboration with the authorities. Alternatively, developing a new umbrella organization specifically for industry and VA may be required. A multi-layer approach may also be considered, where an umbrella organisation oversees the implementation VA, but sectors must submit their reports to their representative association. As not all enterprises have joined associations, development of a new umbrella organisation specifically for industry and VA is encouraged.

5.2.3 Other key components

Contract of Voluntary Agreement

Structure of the VA

VA can be organized in two levels with a framework agreement and sector specific agreements or in one level with an agreement for all participants. For the 1st wave, we recommend structuring in one level, i.e., one agreement for all participants.

Approach to fix the commitment

The commitments to improve energy efficiency should ideally be fixed via negotiated agreements, involving the industry and the public authorities.

Rights and other obligations

To encourage the fast realisation of audits, we recommend providing to companies participating in a sectoral VA a preferential subsidy rate of 75% for carrying out an energy audit.

Among others, the authority should organise networking activities to foster knowledge exchange; organise training sessions to stimulate knowledge sharing.

A preliminary and essential factor for controlling energy consumption in a company consists of setting up analytical accounting for fluids and energy carriers. Participants in VA should have the obligation to implement an energy management system, with a well specified energy accounting system.

Compensation or financial advantage

This is further detailed below.

Audit

Energy audits include

- Establishing a detailed distribution of energy flows across all activities of an industrial plant;
- The establishment of a baseline (for the reference year, according to data availability regarding energy use, energy flows and production or other activity indicator);
- Performance Indicators (KPIs) related to production or activity. Identifying a range of improvement options, including cost estimates (both capital expenditure and operational expenditure), and projected savings (including fuel and operational expenditure);
- The identification of a set of improvement options, with estimations regarding costs (capex & opex), and generated savings (incl. fuel & opex).

Energy audits should be conducted by accredited or certified auditors (level 7 or 8 EQF[57]).
All audit results are communicated to the regional administration which is responsible for their validation.

Way to determine the commitment

We recommend using a target-based (quantitative) VA, rather than an implementation-based (qualitative targets), to fix concrete & quantified objectives, for more efficient actions to be taken by the industry.
Each company or sectoral association/federation should establish an objective to improve energy efficiency and reduce its greenhouse gas emissions using the options for improvement identified within the audits. The objective must at least match the improvement that would be achieved by implementing:

- all 1-rated areas/options[58] for improvement and having a simple payback period of less than or equal to 5 years, although this might require some flexibility, by considering some 2-rated areas/options, or by reducing the simple payback period (to 4 years e.g.) for some investments (with due justification);
- Current or recently completed measures are also taken into consideration;
- Similarly, investments already planned by the company are included in the calculation of the objective, even if they do not satisfy the feasibility and cost-effectiveness criteria.

The companies/associations agree on their objectives (expressed in terms of %) and not on achieving the areas for improvement that were identified by the audit to calculate them. This approach allows technological advances and changes to manufacturing procedures to be considered over the implementation period of the agreement, thereby allowing the company to choose the investments they actually make, or that are the most relevant for several reasons.

Monitoring Companies' progress

Progress made during the VA could be measured by the annual calculation of an energy efficiency indicator (Energy Efficiency Indicator, EEI) which is the ratio between:

- the site's total consumption for the year in question (expressed in primary energy units);
- the energy consumption that would have occurred for the same production as that of the year in question, but under the hypothesis that the performance of the production facilities was that of the reference year which served as a basis during the energy audits (often called «reference energy consumption»).

An additional greenhouse gas emissions indicator (GHG Indicator, GHGI) relating to the reduction of CO_2 emissions could be created in the same way, based on the identification of the energy carriers used and by applying official GHG emission factors.

Monitoring the indicators & consolidation at sectoral level

The evolution of these indicators could be calculated every year and compared to the objectives.
The consolidation of the companies' sectoral commitments could be performed in the same way.

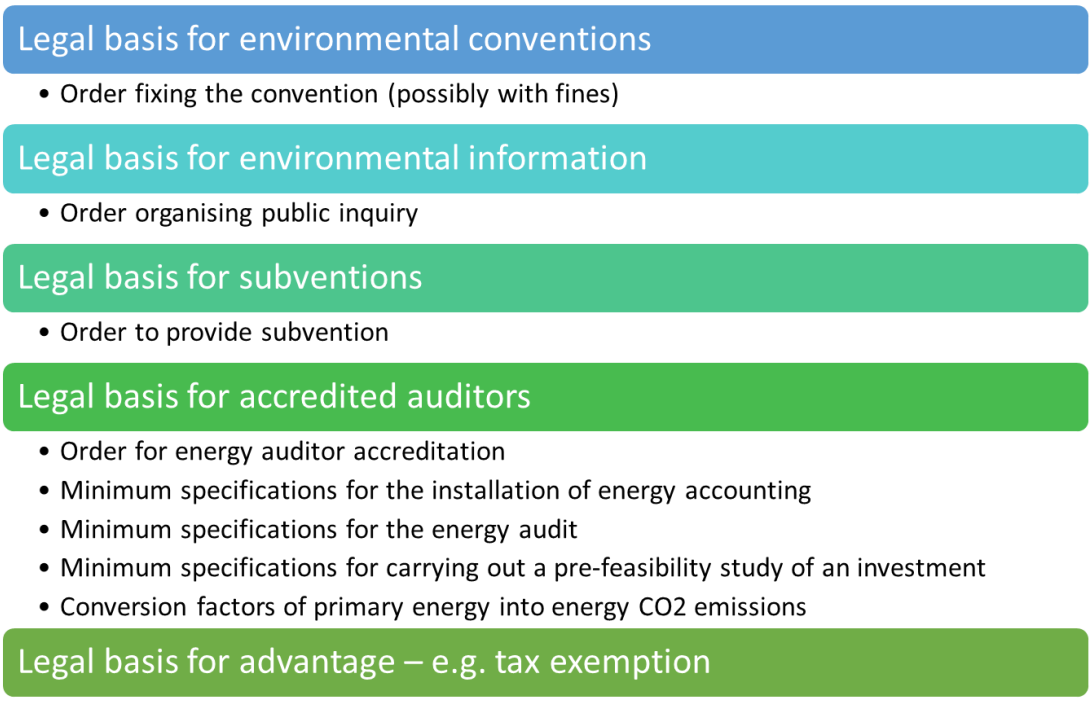
Inspection & monitoring

The sectoral agreement and sectoral energy efficiency action plan should be public documents.
The implementation of each agreement could be monitored by a steering committee comprised of an equal number of representatives from the public authorities and the sector.
Every year, each company or sector could submit an annual progress report to its steering committee, which must review and approve it.

[57] The European Qualifications Framework. Available at: https://europa.eu/europass/et/europassi-vahendid/euroopa-kvalifikatsiooniraamistik
[58] 1-rated according to the audit assessment of the feasibility of the option

5.2.4 Main legislative & regulatory changes

The following figure depicts the main changes required to set up the complete VA scheme.



The details are provided in Deliverable 5.

Legal basis for environmental conventions

A legal basis is needed to establish the official framework of the voluntary agreements, which are legally binding. From this legal basis, specific agreements will be signed (and validated) by the government.

We propose to look at the legislation setting up Environmental Conventions, between the government and the private sector.

Table 5-1 proposes the legal framework to be used for this purpose.

Table 5-1 - legal basis for environmental conventions

Requirement	Current legislative or regulatory basis in Estonia	Gap analysis	Barriers to the implementation
Legal basis for environmental convention, Or similar convention between the government and the private sector	The Energy Sector Organisation Act[59] defines voluntary agreements as a policy measure a policy measure that helps to increase energy efficiency.	There is a need to implement new regulation regarding the implementation and framework of VA. Climate law is being compiled by the Ministry of Climate.	We propose to integrate VA regulation into the new Climate law of Estonia. Climate law is expected to be accepted by January 2025[60].

[59]The Energy Sector Organisation Act. Available at: https://www.riigiteataja.ee/akt/EnKS
[60] Estonian Climate law. Available: https://kliimaministeerium.ee/eesti-kliimaseadus

Order fixing the convention

Once the legal basis for sectoral voluntary agreements has been established (based on the environmental conventions), their legal form could take the following shape.

Table 5-2 proposes the legal framework to be used for this purpose.

Table 5-2 - Order fixing the convention

Requirement	Current legislative or regulatory basis in Estonia	Gap analysis	Barriers to the implementation
Legally binding voluntary agreement.	Currently, ministerial decrees are issued for the implementation of specific measures.	There is a need for a decree to implement the VA scheme.	The legal basis for the adoption of VA scheme as measures need to be developed first. This creates the necessary legislative framework for developing the decree for implementing the VA scheme.

Legal basis for environmental information

A legal basis is needed to establish the preparation process of voluntary agreements, which should be communicated to a broad public given their importance. From this legal basis, proposal of sectoral agreements are subject to a public inquiry organised by the authority.

We propose to look at the legislation grant the right to access Environmental Information.

The table below proposes the legal framework to be used for this purpose.

Table 5-3 proposes the legal framework to be used for this purpose.

Table 5-3 - Legal basis for environmental information

Requirement	Current legislative or regulatory basis in Estonia	Gap analysis	Barriers to the implementation
Legal basis for access to environmental information.	Aarhus Convention[61] Public environmental reports[62] Sustainability reports CSDR (upcoming)[63]	Access of environmental data is mostly public, but the level of description and ease of getting information could be improved.	Public authorities are to disseminate and make available to the public the environmental information they hold in a user-friendly way which requires

[61] The Convention on Access to Environmental Information, Public Participation in Environmental Decision-making, and Access to Justice in Environmental Matters. Available at: https://www.riigiteataja.ee/akt/78466

[62] The General Part of the Environmental Code Act. Available at: Keskkonnaseadustiku üldosa seadus-Riigi Teataja

[63] Corporate sustainability reporting. Available at: https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

			additional investments in IT systems.

Order organising public inquiry

Once the legal basis for organising the public inquiry has been established (based on the access to environmental information), their legal form could take the following shape.

Table 5-4 proposes the legal framework to be used for this purpose.

Table 5-4 - Order organsing public inquiry

Requirement	Current legislative or regulatory basis in Estonia	Gap analysis	Barriers to the implementation
Proposal of Voluntary agreement with public inquiry	The Energy Sector Organisation Act[64]	As VA has not been implemented previously, there is no framework for providing public information regarding such agreements	A solution for disseminating VA agreements needs to be developed.

Legal basis for accredited auditors & audits

VA auditing could be integrated into existing large enterprise energy audit framework to avoid duplicating auditing requirements for large enterprises (large enterprise energy audit is already mandatory for large enterprises). Additional requirements may be set on audits that are conducted for enterprises included in the VA scheme (as an annex to the large enterprise energy audit). The process is overseen by Consumer Protection and Technical Regulatory Authority. Audit must be signed by a Chartered Specialist in energy performance of buildings, level 7, but if the enterprise's total annual energy consumption exceeds 5000 MWh, the audit must be signed by Chartered Specialist in energy performance of buildings level 8 instead[64].

If a large enterprise which wants to join VA has existing EMS system or ISO 50001 and is thus exempt from submitting an large enterprise energy audit to the Consumer Protection and Technical Regulatory Authority, then in order to comply with the requirements of VA, an additional audit would still be required in order to assess the investment needs and possibilities for the VA.

A legal basis is needed to provide any kind of support, and to certify energy auditors, and the content of audits.

Table 5-5 proposes the legal framework to be used for this purpose.

Table 5-5 - Legal basis for accredited auditors & audits

Requirement	Current legislative or regulatory basis in Estonia	Gap analysis	Barriers to the implementation
Legal basis for subventions,	The Energy Sector Organisation Act[65]	An improved legal basis is required to support	The requirements of the energy audits need

[64] Requirements for large enterprise energy auditors, The Energy Sector Organisation Act. Available: https://www.riigiteataja.ee/akt/EnKS

[65] The Energy Sector Organisation Act. Available: https://www.riigiteataja.ee/akt/EnKS

certified auditors & audits	defines the requirements for energy audits and energy management systems and energy auditors	the implementation of the VA scheme	be reassessed and the level of available expertise need to be increased

Order for energy auditor accreditation

Energy auditors are certified by Estonian Society of Heating and Ventilation Engineers in accordance to the law[66]. In order to get a certification, the applicant must show his or her competence in assessing the energy performance of buildings, technical and economic analysis, conducting energy audits, consulting on energy efficiency, calculating energy performance class to buildings and modelling the energy use of a building[67].

In order to integrate VA requirements into the auditing process, additional requirements for auditors may be required. For example, knowledge of energy intensive industries and opportunities and barriers specific to such industries. The current system of certification focuses heavily on buildings, but does not take into account the fact that auditors need to conduct energy audits also for energy intensive industry where the share of energy used for heating and cooling is insignificant and the biggest consumer is industrial equipment – pumps, engines, process lines, etc.

Once the legal basis for certifying energy auditors has been established (based on the corresponding decree), their legal form could take the following shape.
Table 5-6 proposes the legal framework to be used for this purpose.

Table 5-6 - Order for energy auditor accreditation

Requirement	Current legislative or regulatory basis in Estonia	Gap analysis	Barriers to the implementation
Certified energy efficiency auditor with expertise in industry	Current certification standards require applicant to prove their competence in energy performance of buildings, but not industries	There is a lack of requirements for knowledge of industrial processes. Focus is mainly on the energy performance of buildings, not processes. On the other hand, energy and resource auditors may have the required knowledge, but cannot get the certification because of the lack of knowledge in energy performance of buildings (i.e. energy consumption modelling is required which is not part of auditing process)	Lack of experts with in-depth knowledge of industry. Requires new certification standard or amending current energy efficiency specialist certification

[66] Professional law. Available at: https://www.riigiteataja.ee/akt/102072013010?leiaKehtiv
[67] Register of certifications. Available at: https://www.kutseregister.ee/ctrl/et/Standardid/vaata/10666428

Minimum specifications for the installation of energy accounting

Companies having signed a VA could be obliged to install an energy accounting system. To ensure that the system is appropriate and delivers its expected operating results, there is need to provide technical specifications for the installation and operation. Enterprises with EMS could be excluded from the requirement i.e., ISO 50001.

Minimum specifications for the energy audit

Additional (to the existing audit scheme[68]) proposed requirements (example of provisions):

- The audit must include the development of a global action plan prioritizing the actions to be undertaken and aimed at improving the energy efficiency of the company by evaluating the relevance of an investment to be made and intended. This overall action plan consists of all the measures that the company will implement over the coming years, including investments to achieve this objective. It includes a quantified evaluation of the efficiency of each of these measures (reduction in energy consumption, costs), as well as a schedule specifying the staggering of the investments to be made over time. Description of necessary actions is already required in the current energy audit, but heavier focus should be on the relevance of the energy efficiency measures and on action plan.
- Proposals to use renewable energy sources or quality cogeneration (missing from current mandatory requirements).

The overall energy audit must in particular establish:

- A global analysis of the company's energy flows, namely energy **consumption for the last three calendar years** by energy vector (gas, shale oil, fuel oil, electricity, coal, etc.) expressed in physical units (kWh, ton , litre,...), in kWh and **normalised consumption** (reduced to a normal climatic year - for uses that justify it) resulting in a table of final consumption converted into primary energy (MWh) and CO_2 emissions (kg of CO_2). Currently, it is required to submit data for at least one calendar year and normalised consumption data is not required.
- An identification of the points of improvement of the company's energy efficiency classified by order of priority, **including the use of renewable energies and quality cogeneration**;
- Annual accounting, at company level, of energy consumption and production volumes (in physical units), **by product, and possibly by production line or stage**;
- The construction of **indicators**, based in particular on **specific consumption**;
- The identification, justification and technical-economic evaluation of the best energy efficiency improvement projects and its variants, based in particular on the following criteria:
    a) technical-economic quality;
    b) **acceptability by the company**, particularly with regard to its internal organization and the required maintenance activities;
    c) the **potential reduction in primary energy consumption**;
    d) the potential reduction in CO_2 emissions.

The audit **must result in the development of a global action plan** aimed at improving the company's energy efficiency, and must include:

- Analysis of consumption - ideally over a minimum of **3 years for each vector analysed** - (in raw values and corrected if necessary); where applicable, changes in consumption over a given period (calendar year, summer period, etc.) which may reveal transitory phenomena (quarter-hourly peak, peak consumption, etc.);

[68] Large enterprise energy audits, minimum requirements. Available at: https://www.riigiteataja.ee/akt/123122016003

- The possible use of technologies such as cogeneration, the use of renewable energy sources;
- **The aid available** for the various improvements envisaged (Source, amount, etc.);
- Conclusions, which must be clear and interpretable by a person without specific knowledge in the areas covered.

5.2.5 Recommendations for different funding and delivery models

To motivate the industry to commit on a voluntary basis, a compensation or incentive should be provided, which can take various forms, such as:

- rebate on electricity/energy tax or fee;
- exemption of renewable energy taxation.

Such compensation or incentive could be bound to the achievement of EE targets fixed at plant level. It is also key to take into account that the level of compensation or incentive should comply with the State Aid guidelines set by the EC. Enterprises signing a VA have no more access to additional grants.

It is also recommended to remove the current exemption for energy intensive industries, to start discussing the compensation or incentive.

The renewable energy tax rebate was seen as the primary incentive as it is covered equally by all consumers and is considered a burden on industries. As of 2023 the renewable energy tax is 12,40 €/MWh and with VAT 14,90 €/MWh[69]. The renewable energy tax may increase if large scale off-shore (or on-shore) windfarms are constructed, although the effect on previous scheme on renewable energy tax is diminishing as the subsidies are paid for 12 years after the construction of renewable energy unit and the scheme was finished by the end of 2020.

At first a 50% rebate on renewable energy tax could be proposed to industries, if the incentive does not seem attractive enough, then a near total tax exemption should be considered (level should be negotiated with European Commission). In order to keep energy costs under control for industries not in the VA scheme and for private users, the costs should be covered from the state budget (i.e. income from CO_2 quotas). The other approach would be to set the additional burden on all other consumers that have not joined VA, as such the measure would be budget neutral. Given the feedback from workshops that the second option (increasing the tax on other consumers) would not be politically viable, we recommend subsidising renewable energy tax from state budget. Cost of the measure would depend on the level of the rebate negotiated with the industry (with a maximum cost of 12,40 €/MWh on industrial consumption participating in VA).

One major point of attention is linked to ensuring compliance with the State Aid Guidelines (2022/C80/01). It might be needed to set up different levels of exemption, based on yearly energy consumption(e.g. <20GWh; <100GWh; <300GWh; >300GWh), due to the profile of enterprises, and also possibly to their sector.

In Wallonia, there are 2 exemption schemes

- Exempting to pay an electricity surcharge is considered to be a state aid. However, companies that are exposed to international trade & are heavily dependent on electricity for their value creation (Nace code according to Annex 1), can claim for an exemption (art 4.11). In Wallonia, out of the

[69] Renewable energy tax. Available at: https://www.elering.ee/taastuvenergia-tasu#tab0

almost 300 companies having signed the Voluntary Agreement, about 100 can benefit from this exemption);

- Partially exempting to pay the Green Certificates[70], as a quota on the electricity bill. The discussion is still ongoing with the European Commission to determine it should be considered as a state aid. This is still in the pre-notification phase

5.3 MEPS

5.3.1 Detailed description of the functioning of the new policy/scheme in Estonia

MEPS schemes should be comprehensive, addressing both residential and non-residential buildings to maximize energy efficiency and carbon reduction opportunities. Given the distinct ownership structures in these sectors, targeted support is essential for tailored MEPS designs. It is crucial to differentiate between non-residential and residential buildings, considering factors like shorter renovation cycles and larger floor areas in the former.

Public buildings, owned by authorities, play a special role and should set an example in implementing the EU Renovation Wave Strategy. Designing specific MEPS for public buildings is vital to meet the Energy Efficiency Directive's recast requirement, ensuring the renovation of 3% of total floor area annually to NZEB or ZEB levels. The implementation of diverse MEPS designs for various building types is crucial for smooth and effective execution, as demonstrated by practical examples, supported by appropriate policy frameworks and targeted communications to diverse stakeholders.[71]

In the case of Estonia, MEPS are being considered for (1) single-family – detached homes, (2) non-residential, commercial buildings and (3) non-residential, public buildings. The only building segment not included is multi-family apartment buildings, due to the complex decision making process of multiple person ownership, making renovation decisions difficult.

There are two approaches to MEPS implementation depending on the building sector: dynamic requirements adjusted over time, and minimum standards implemented with the guidance of building renovation passports.

The dynamic approach is suitable for larger buildings, with more straightforward decision making and ownership, such as large non-residential buildings and public buildings. These sectors usually have more capacity (both technically via management and economically) to implement renovation measures.

5.3.2 Application to Estonian buildings

Single-family houses

In residential single-family houses it is recommended to apply MEPS for buildings which will be sold or rented. The building category covered by MEPS requirement is detached houses – single housing units with 11101 code (https://www.riigiteataja.ee/akt/126022021006). Terraced houses or houses with two housing units cannot belong under MEPS with the current EPC scheme, because EPC is issued for the whole building and not for a single housing unit. The same applies for multifamily residential buildings where EPC is issued for whole building and MEPS requirements are not possible to apply within existing legislator framework.

[70] The market of green certificates in Wallonia can be used to illustrate a possible scheme. Available: 1681217821Certificats Verts ENG_2023_full.pdf (febeliec.be)

[71] https://www.bpie.eu/publication/minimum-standards-maximum-impact-how-to-design-fair-and-effective-minimum-energy-performance-standards/

A detached house to be sold or rented should fulfil MEPS requirement of EPC class D. In Estonian context EPC class C means a major renovation and class D can be seen as light renovation required by MEPS. It should be made possible to convert the duty to conduct light MEPS renovation of the house to new building owner. In such a case, the house will need to be renovated within 5 years from the sales date.

The Council and the Parliament reached on 7 December 2023 provisional political agreement on a proposal to revise the energy performance of buildings directive. According to the deal, concerning the **renovation target for residential buildings,** member states will ensure that the residential building stock will reduce the average energy consumption by 16% in 2030 and a range between 20-22% in 2035. 55% of the energy reduction will have to be achieved through renovation of the worst performing buildings. [72]
The deal does not foresee mandatory MEPS for residential buildings. However, considering the high level of ambition set by the deal for 2030, MEPS remains a strong scheme to achieve the target. It is therefore recommended to seriously consider the implementation of the scheme for residential single family dwellings. We recommend using the same 16% threshold of worst performing buildings for the first phase as for non-residential buildings (cf. below), to be renovated up to EPC level D.

Non-residential buildings

For non-residential buildings, MEPS requirement shall apply for all building categories for which energy performance requirements apply according to the building law. Only the last category No 11 in the regulation (https://www.riigiteataja.ee/akt/105072023309), highly energy consuming buildings because of the process, should be left out, as it is planned in ongoing revision of energy regulation not to set numeric requirements and EPC classes for these buildings. All other non-residential buildings covered by this regulation (category 1-10 in Article 1 for non-residential) have energy performance requirements and EPC classes. Therefore, for these buildings EPC class D requirement can be established.

The council and parliament agreed the revised EPBD on 7 September 2023, regarding the **minimum energy performance standards (MEPS),** states that in 2030 all non-residential buildings will be above the 16% worst performing and by 2033 above 26%.[73]

5.3.3 Designing MEPS

Months 1-6: Conduct Stakeholder Engagement

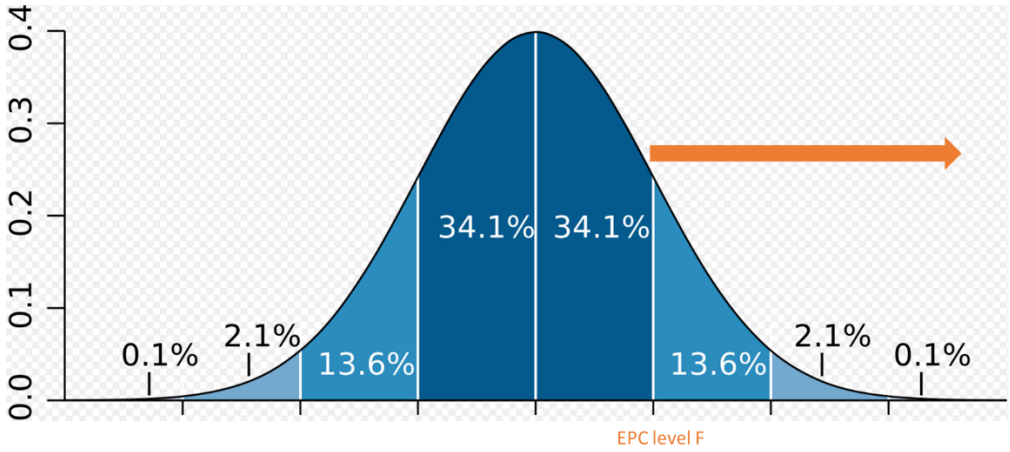
- before conducting stakeholder engagement, establish a **draft design of the scheme** that will be fine-tuned in the next steps, comprising:
  - the conversion of the share of 16% worst performing building into EPC level (currently supposed to be level F);
  - the need to adapt the EPC system which should be calculated rather than measured (to calculate the expected savings)

[72] 'Fit for 55': Council and Parliament reach deal on proposal to revise energy performance of buildings directive - Consilium (europa.eu)
[73] 'Fit for 55': Council and Parliament reach deal on proposal to revise energy performance of buildings directive - Consilium (europa.eu)

  - the rules to reach EPC level D: developing a Building Renovation Passport, or establishing a list of standard investments/works
  - the fines for non-compliance
  - for non-residential, define a procedure and timeline for completion of the work to reach the D level
  - for residential, insert EPC level and obligation trigger in notarial act for rental and selling
- Initiate a comprehensive engagement process involving key stakeholders. This phase aims to gather insights, expectations, and concerns from various parties involved in or impacted by MEPS, based on the draft design.

Months 6-18: EPC Validation and Legal Framework Establishment

- Focus on validating or amending Energy Performance Certificates (EPCs) by reviewing existing ones to ensure accuracy and reliability, but also to allow the calculation of expected savings following building investments/works.
- Simultaneously, work on establishing a robust legal framework that will provide the necessary basis and authority for the MEPS implementation.
- Review the state of the building stock based on the national LTRS to divide buildings into the appropriate category for MEPS implementation (Large non-residential buildings, public buildings, and single family, detached homes). On that basis, carry out the buildings distribution for the EPC level (see illustration below, a standard normal gaussian distribution[74]). With the distribution, categorizethe worst-performing buildings on the 16% threshold, by idenifying the corresponding EPC level above which all buildings belong to the category (of worst performing).



*Source: Trinomics, own elaboration (**this is a fictive case, and should be realised with Estonian data**)*

Months 18-24/36: Renovation Requirements Investigation

- Delve into the specifics of renovation requirements, outlining a detailed plan that includes timelines, trigger points for renovation initiation, and the introduction of mandatory EPCs for relevant structures. This phase lays the groundwork for the practical application of MEPS.

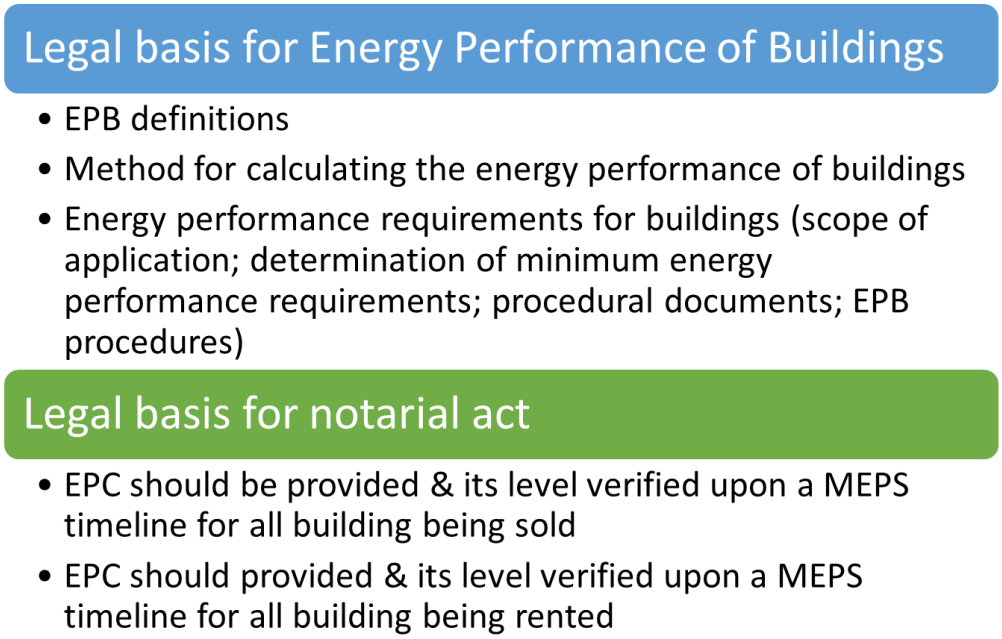
[74] https://en.wikipedia.org/wiki/Normal_distribution

Two/three Years Onward: Implementation and Compliance

- Clearly communicate timelines and milestones in advance of implementation – at least five years or order for building owners to plan investment.
- Roll out the MEPS, putting the established legal framework into action. This includes the enforcement of renovation requirements, monitoring compliance, and addressing any challenges that may arise during the implementation phase. Continuous evaluation and adaptation of MEPS will be integral to ensuring sustained effectiveness.

5.3.4 Legislative & regulatory changes

The following figure depicts the main changes required to set up the complete VA scheme.



Legal basis for Energy Performance of Buildings

A legal basis is needed to establish the Minimum Energy Performance Standards into place, given they ae legally binding character. From this legal basis, specific provisions will be set up and decided by the government.

We propose to use the legislation transposing the EPBD 2010/31/EU as basis, and identify places to be changed.

Table 5-7 proposes the legal framework to be used for this purpose.

Table 5-7 - Legal basis for Energy Performance of Buildings

Requirement	Current legislative or regulatory basis in Estonia	Gap analysis	Barriers to the implementation
General requirement for the Energy Performance of Buildings	The Estonian law/decree transposing the EPBD (building law)	There are several small loopholes in the current legal framework, that should be overcome by	The main barrier is the need to develop a completely new EPC scheme based on calculation method,

		amending the EPB law/decree; There is one major gap regarding the EPC which is currently based on energy actually consumed while it should be calculated	rather than on energy actually consumed.

To establish MEPS requirements, the corresponding mandate has to be set in the building law. The scope of MEPS should be introduced in the EhS article 7 on Energy performance of buildings (https://www.riigiteataja.ee/akt/130062023002).

Regulation of MEPS requirements

Estonian law/decree transposing the EPBD gives a mandate to the government to address MEPS in the regulation of Energy performance minimum requirements.
In this regulation for instance MEPS EPC class D or primary energy EP-value requirements for different building categories and application times can be introduced.

Dealing with the current EPC and how it should evolve

It is still a question-mark how the current actual energy use EPC scheme should evolve to be usable for MEPS, there are basically 2 main options

- Either, it has to be replaced by a calculated EPC (with an actual energy use EPC, there is no possibility to calculate what will be the impact of renovation works on the EPC level, which is counterproductive considering that the aim of the EPC is precisely to determine how a household can reach the targeted EPC level);
- Either, it can evolve or be built on a transitionary calculated EPC. The next paragraph illustrates such option.

Attention needs to be provided to MEPS requirement verification which will need some development of EPC regulation. If a building already has EPC with class D, i.e. EPC of an existing building based on metered energy use, the present regulation works as it is and no changes are needed. If a building needs a light renovation to achieve EPC class D, the building permit and design documentation including calculated EPC is required. This calculated EPC is valid for two years from the use permit date. After two years in operation, new EPC is needed, being based on metered energy use which is then supposed to confirm the ex-ante calculated EPC. Therefore, there is a possibility that previous calculated EPC changes to metered energy based EPC (valid for 10 years), and EPC class will change at the same time for instance from D to E. There can be objective reasons, such as longer operation times or higher occupancy compared to so called standard use of the building that is used to simulate energy performance of building.
Therefore, a normalisation method needs to be developed to show compliance with MEPS requirements in the cases when EPC class will drop out of D. This normalisation method should use energy BIM model what was used in the renovation design phase. It is important to establish a requirement that energy BIM will be uploaded to the building registry with other design documentation to be available. In the compliance assessment, energy BIM needs to be calibrated with metered data and real occupancy and

use patterns of a building. After calibration, the standard use input data should be applied, and the result of energy simulation should comply with EPC class D. If the result will not comply with D, it means that the renovation is not implemented according to the design documentation, and energy performance of a building needs to be improved. This real use normalisation method should be added to EPC regulation .(https://www.riigiteataja.ee/akt/105072023289) where weather normalisation is already included. For that purpose a methodology development project would be needed.

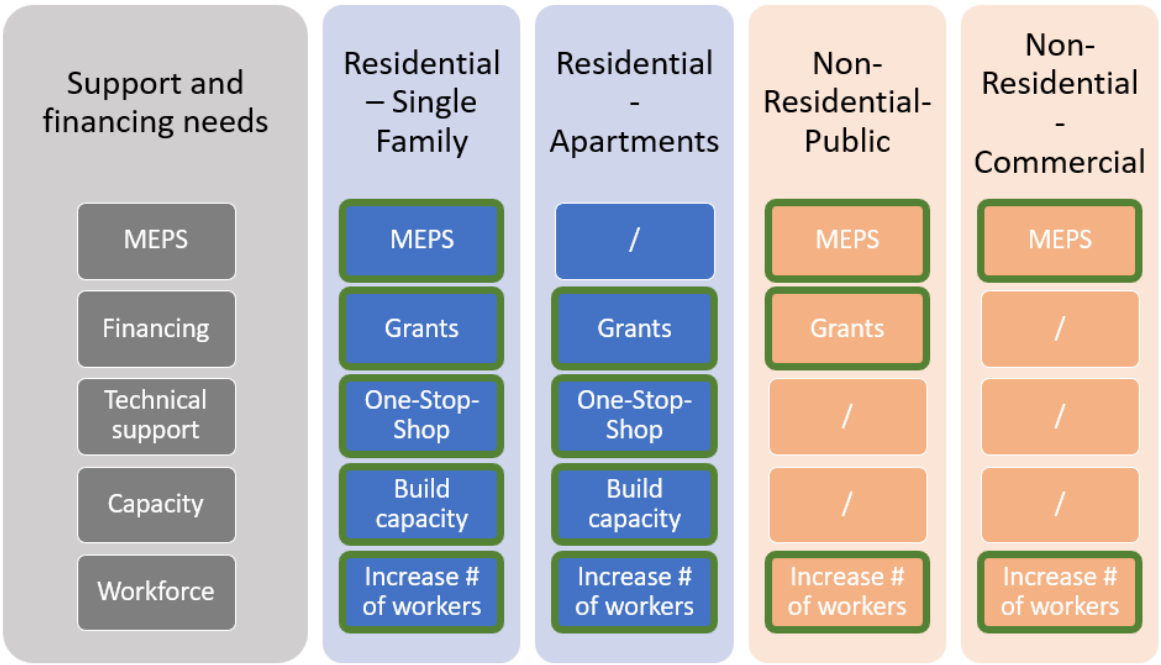
5.3.5 *Recommendations for different funding and delivery models*

Single-family MEPS can go under proposed renovation grants and tax reduction measures and receive financial support. As an enabling measure, single family MEPS needs a proposed OSS with necessary digital tools and model renovation solutions.

For non-residential MEPS for commercial buildings no support schemes are planned. The competence of qualified energy specialists, energy modellers, energy auditors and HVAC and other designers is already available in the market. While renovation volumes will increase the amount of these specialists has to be increased. As university level master programmes exist, only the continuous education training offering needs to be added.

The following graph illustrates for each building category what are the needed (and modelled under D3 and D4) instruments.

Figure 5-1 Building categories and associated needs

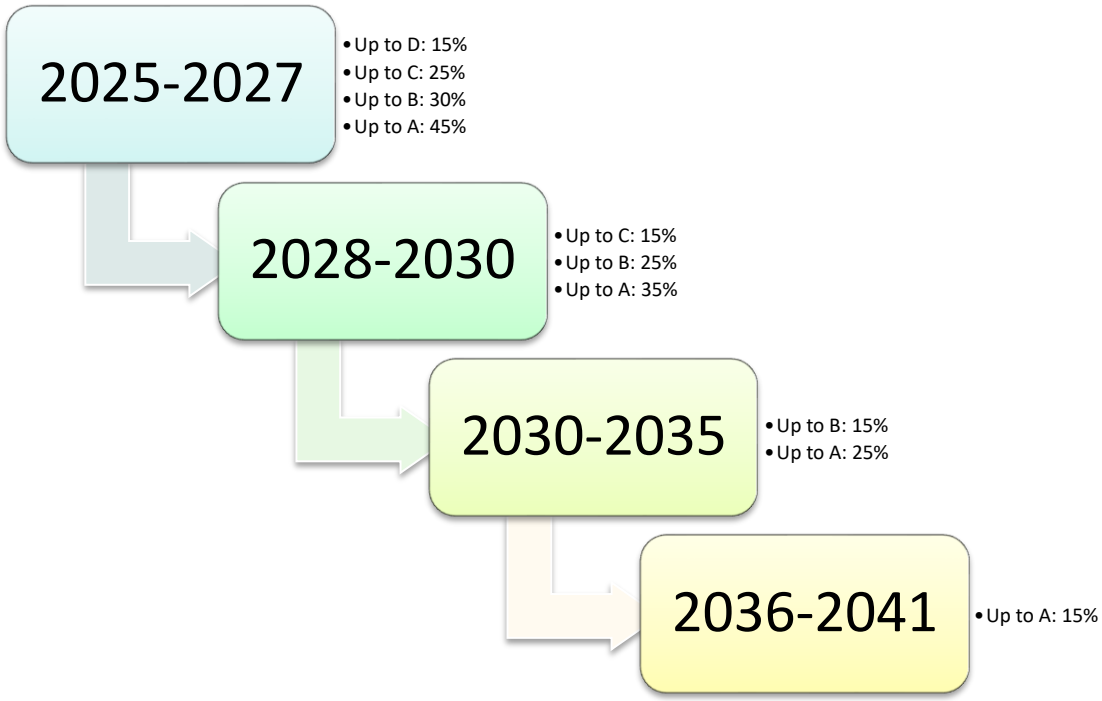


MEPS requirements can be included in the renovation grants, and in such a case, renovation grants will provide funding for MEPS. This is especially relevant for single family houses where renovation grants have not had specific EPC class or EP-value requirements, which can be specified for MEPS. As renovation grants for multifamily require EPC class C, these projects always fulfil MEPS requirements.

To facilitate MEPS compliance well ahead of the deadline by promoting deep renovation, a phased grant system is proposed. Up until 2027, renovations reaching level D receive a 15% grant, level C gets 25%,

level B receives 30%, and level A qualifies for a 45% grant. Subsequently, before 2030, renovations achieving level C get a 15% grant, level B receives 25%, and level A is eligible for a 35% grant. Before 2036, a 15% grant is offered for renovations reaching level B and 25% for those achieving level A. Finally, before 2042, a 15% grant is extended to renovations achieving level A. To provide extra support, low-income groups and the worst-performing buildings can benefit up to a doubling of the grant level.

Figure 5-2 - Supporting a phased in MEPS approach, 2025-2041



Beyond alignment of public expenditure, the MEPS framework can serve as a potent tool for steering private financing toward MEPS compliance. This could be achieved through the implementation of Mortgage Portfolio Standards, compelling all mortgage lenders to enhance the average energy performance of their mortgage portfolios in line with MEPS framework requirements and the overarching objective of achieving climate neutrality by 2050.

MEPS would effectively communicate that non-compliant assets face the risk of devaluation, prompting lenders, investors, and insurers to incorporate this risk into their considerations. Integrating Mortgage Portfolio Standards into the EPBD would be transformative, as it would mandate major financial stakeholders in European buildings (with a total lending of 7,000 billion euros against residential property) to offer financial products encouraging energy efficiency measures for their 50 million customers and prioritize high standards when acquiring properties.[75]

[75] https://institutdelors.eu/wp-content/uploads/2021/11/PP271_Adressing-the-climate-and-social-emergencies_Defard_EN.pdf

5.4 NECP monitoring and reporting scheme

An XLS sheet has been prepared separately to guide the implementation of the COMMISSION IMPLEMENTING REGULATION (EU) 2022/2299 of 15 November 2022 laying down rules[76] as regards the structure, format, technical details and process for the integrated national energy and climate progress reports.

This separate XLS "Estonia Renovation Wave_ D5_EE monitoring tool.xlsx" also illustrates the guidance with the complete reply for the Voluntary Agreement.

6 Catalogue of energy saving measures and calculation methodologies (D6)

The catalogue of energy saving measures and calculation methodologies was composed as one excels sheet (in "D6 catalogue_2024-01-19_Final.xlsx") per energy saving measure with all calculation's assumptions and formulas, that have directly fed in the overall model.

The catalogue is structured by sector, i.e., residential, non-residential, industry, transport, and agriculture/forestry. It is focusing on the final energy consumption, i.e. the total energy consumed by end users, such as households, services, transport, industry and agriculture. Final energy is the energy which reaches the final consumer's door and excludes that which is used by the energy sector itself.

All together 45 energy saving measures are included with standardised calculation methodologies and indicators for calculating energy savings in line with Article 7 and Annex V of the EED and adapted to the Estonian context.

In the following summary table 6-1, all measures with annual volumes and energy savings as well as with a unit cost are reported. It should be noted that there are considerable differences in the unit cost and in the cost allocation. Depending on the sector and the type of measure, 100% of the cost may come to the government, or smaller fraction of government may mobilise private sector investments or 100% may be covered by end users, making direct cost comparison complicated. Differences in the unit costs in principle show variations in the efficiency, but evidently the targets cannot be achieved with low-cost measures only. The total row in the table sums costs and savings of all measures which is indicative, because obviously all measures cannot be applied at the same time as some of them operate with similar target groups and summing can lead to double counting. Therefore, the summary table aims to present a complete palette of possible measures with key performance indicators, from which different energy efficiency pathways may be constructed as it is done in Chapter 3 (D3) of this report.

[76] for the application of Regulation (EU) 2018/1999 of the European Parliament and of the Council

Table 6-1 Summary table of the energy saving measures

			Cost and savings per year			2024-2030 cumulative			
			Cost (M€/a)	Savings (GWh/a)	Unit cost, first year (€/MWh)	Cost (B€)	Savings (TWh)	Unit cost (€/MWh)	Cost allocation
Residential	nR1	Obligation scheme for residential sector	379.7	109.0	3483	2.4	2.3	1046	Energy provider (billed to end user)
	nR2	MEPS targeting rented + sold dwellings	337.5	55.3	6102	2.1	1.2	1833	Building owner
	nR3	MEPS for all dwelling (regulatory requirements for EPC class E, F, and G or above)	1108.1	181.6	6102	7.0	3.8	1833	Homeowners
	nR4	Renovation grants for single family houses (20-30% support)	10.0	8.0	1250	0.1	0.2	325	30% government 70% homeowners (government cost reported)
	nR5	Tax deduction for renovation works by private persons (=parallel track for single family)	3.0	7.2	417	0.0	0.1	123	Tax deduction to homeowners (lost tax for the government)
	nR6	Renovation grants for multifamily buildings/housing associations (30% support)	150.0	117.6	1275	1.1	3.2	325	30% government 70% homeowners (government cost reported)
	nR7	Property tax (according to EPC levels)	50.0	40.0	1250	0.3	0.8	369	Homeowners
	nR8	CO2 tax for end energy use of residential buildings	50.0	40.0	1250	0.3	0.8	369	Homeowners
Service	nS1	Obligation scheme for service sector	152.6	56.0	2726	1.0	1.2	819	Energy provider (billed to end user)
	nS2	Central government buildings renovation support (100% support)	15.0	1.8	8333	0.1	0.1	2213	80% government
	nS3	Public and municipality buildings renovation support (60% support in average)	66.0	13.2	5000	0.4	0.3	1502	60% central government 40% local government (government cost reported)
	nS4	Commercial buildings energy performance investments support	50.0	72.0	694	0.3	1.5	205	30% government 70% building owners (government cost reported)
	nS5	CO2 certificate sales based on energy savings from commercial buildings renovation, income invested as renovation support	10.0	14.4	694	0.1	0.3	205	Businesses buying certificates
	nS6	CO2 tax for end energy use of commercial buildings	50.0	72.0	694	0.3	1.5	205	Building owners
	nS7	Property tax (according to EPC levels)	50.0	72.0	694	0.3	1.5	205	Building owners
	nS8	Minimum energy performance standards for non-residential buildings (regulatory requirements for EPC class E and F)	70.0	30.2	2315	0.4	0.6	695	Building owners
Industry and agriculture	nI1	Voluntary scheme for the industry, with binding targets based on incentives	4.1	81.9	50	0.0	0.5	50	Industry
	nI2	Promotion of resource-efficient green technologies of industrial enterprises (RRP)	0.2	0.6	407	0.0	0.3	71	government + industry (government cost reported)
	nI3	Energy savings from electro intensive companies	1.7	4.1	407	0.0	0.1	116	government + companies (government cost reported)
	nI4	Investment support for the food industry to ensure security of energy supply	1.4	3.4	407	0.0	0.1	116	government + companies (government cost reported)
	nI5	Supporting energy efficiency investments in companies	5.8	14.1	407	0.0	0.3	116	government + companies (government cost reported)
	nI6	Energy consulting and networking events for small and medium enterprises (SMEs)	0.7	1.0	688	0.0	0.0	197	100% government
	nA2	Energy efficiency measures in the fisheries sector	1.4	6.8	200	0.0	0.1	80	government + companies (government cost reported)
Transport	nT1	Promotion of clean and energy efficient road transport vehicles in public procurement	87.5	13.8	6321	0.6	0.3	1899	100% government
	nT2	Subsidy for public transport usage instead of personal vehicle	0.4	23.3	17	0.0	0.1	16	100% government
	nT3	Priority lanes for micromobility	16.0	23.3	686	0.1	0.5	196	100% government
	nT4	Electric charging infrastructure for existing inhabitance areas	3.4	-1.0	-3507	0.0	0.0	-1002	50% government
	nT5	Biomethane infrastructure	5.4	-1.0	-5355	0.0	0.0	-1530	50% government
	nT6	Hydrogen infrastructure	2.7	0.0	-72292	0.0	0.0	-20655	50% government
	nT7	Vehicle tax for registration	0.2	-4.2	-36	0.0	-0.1	-2	Vehicle owners
	nT8	Annual vehicle tax	0.2	-11.2	-13	0.0	-0.1	-2	Vehicle owners
	nT9	Development of convenient and modern public transport	3.3	43.6	75	0.0	0.9	48	100% government
	nT11	Developing the railroad infrastructure (includes the building of Rail Baltic)	420.0	339.4	1237	1.4	1.4	995	100% government
	nT12	The railroad electrification	200.0	46.7	4283	0.4	0.7	570	100% government
	nT13	Promoting the use of biomethane in buses	0.0	-0.8	0	0.0	0.0	0	100% government
	nT14	Promoting the use of electricity in buses	2.5	0.5	5401	0.0	0.0	6751	100% government
	nT15	Acquisition of additional passenger trains	20.0	21.6	926	0.1	0.3	206	100% government
	nT16	New tram lines in Tallinn	55.0	59.9	919	0.1	0.4	153	100% government
	nT17	Subsidy for micromobility usage instead of personal vehicle	0.4	23.3	17	0.0	0.3	7	100% government
	nT18	All Tallinn and Tartu taxis run on electricity	0.0	0.8	0	0.0	0.0	0	50% government 50% taxi companies
	nT19	Tallinn and Tartu congestion charge	0.1	0.0	-	0.0	0.0	-	Road users
	nT20	Mileage-based road use fee for heavy vehicles.	0.0	-1.1	0	0.0	0.0	0	100% government
	nT21	Subsidizing biofuel that meets the criteria of sustainability or imposing the obligation to sell it to filling stations	43.3	66.6	650	0.3	1.4	186	100% government
	nT22	Replacing existing street lamps with LED lamps	3.8	5.9	641	0.0	0.1	183	100% government
Total			**3431**	**1652**		**19.2**	**26.8**		

Annex A – Action Plan from Deliverable 4

Excel sheet “D4 Modelling v8.3.xlsx”