

KLIMA-
NEUTRAALNE
AASTAKS
2035



TAL
TECH

RENOWAVE: RIIKLIKU ENERGIA- SÄÄSTUKOHUSTUSE TEEKAARDID

JAREK KURNITSKI
8.10.2024



ENERGIATÕHUSUSE
TIPPKESKUS





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

REFORM/SC2022/067

International Webinar
21 February 2024

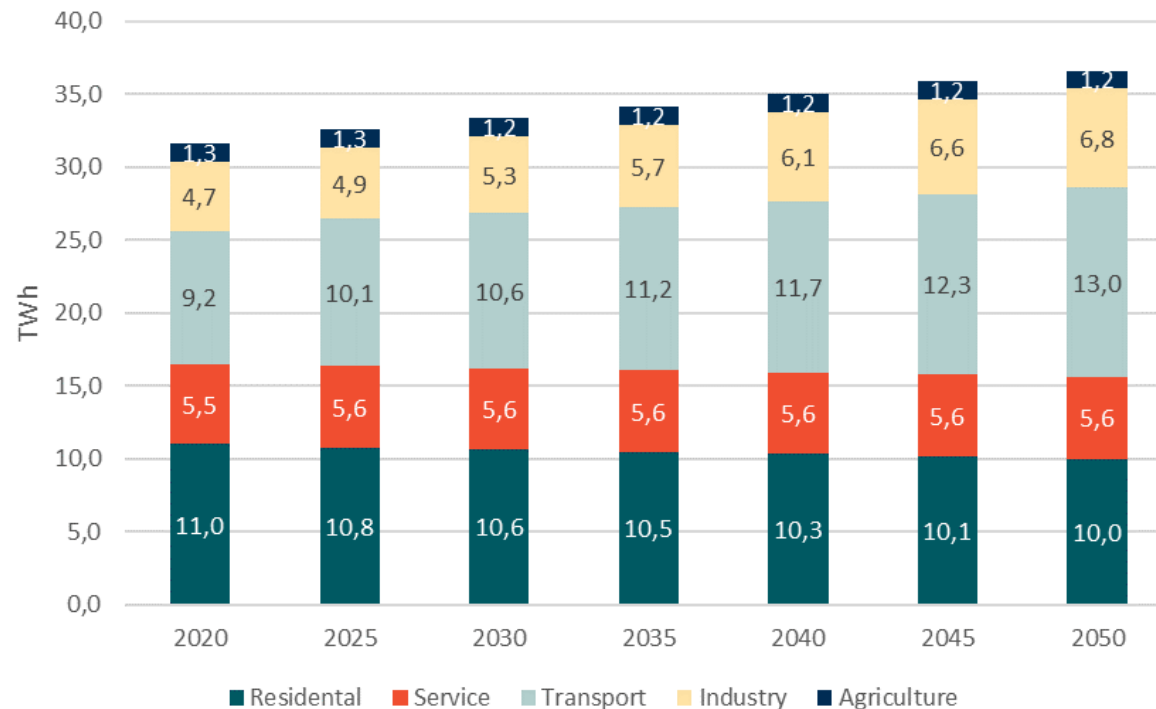


This project is carried out with funding by the European Union via the Technical Support Instrument and in cooperation with the Directorate General for Structural Reform Support of the European Commission

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FOOKUS ENERGIA LÕPPTARBIMISEL

- 2024-2030 EED eesmärk 1,5%/a lõpptarbimise sääst (0,8 %/a varem)
- Praeguste meetmetega 0,14%/a
- EED 2030 lõpptarbimise eesmärk 30 TWh (praegu 32-33 TWh)



- Ilma meetmeteta (BAU, joonisel) lõpptarbimine kasvutrendis
- Hooned → fond kasvab, aga tõhusus paraneb (residential + service)
- Tööstus → 1,5% kasv aastas
- Transport → tõusva ajaloolise trendiga
- Kõikides sektorites elektrifitseerimine

TÄNANE OLUKORD

Hooned (elamumajandus ja teenindusektor):

- Vana hoonefond nõrga energiatõhususega – sarnane Kesk-Euroopa olukorrale
- Madalad energiatõhusust parandavad renoveerimise mahud
- Väga suur säästupotentsiaal korterelamute tervikrenoveerimisel (70% eesti elanikest elab korterelamutes)
- Energiatõhususe parandamise motivatsiooni puudumine ärikinnisvaras

HOONEFONDI PÕHIPARAMEETRID MODELLEERIMISEL

- Hoonefondi (energiat kasutatakse sisekliima tagamiseks ja tööstushooned) netopind, m²

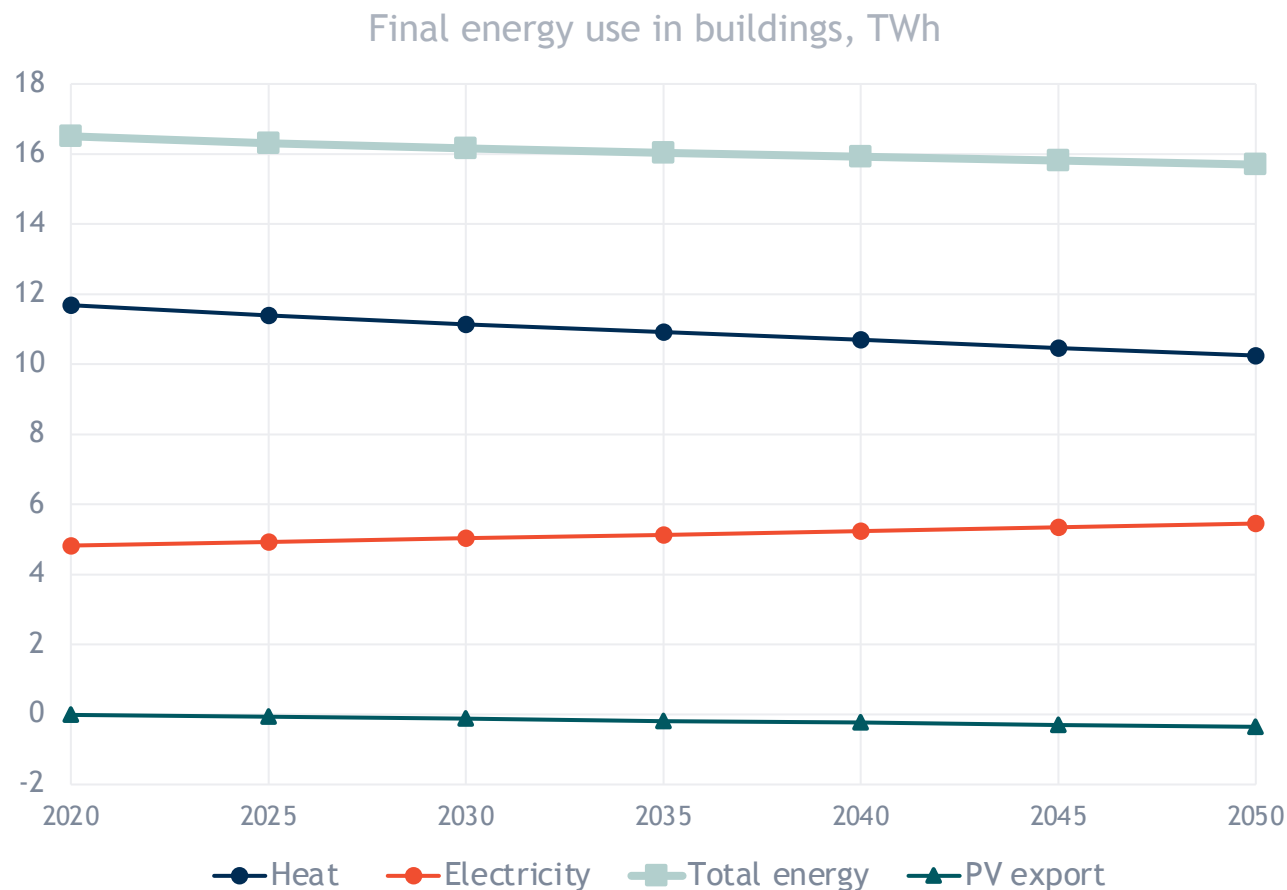
	Üksikelamud	Korterelamud	Büroohooned	Ärihooned	Haridus	Muu	Kokku
<2000	18 800 000	22 900 000	4 200 000	4 000 000	3 700 000	4 800 000	58 400 000
>2000	3 600 000	8 100 000	1 600 000	2 600 000	550 000	1 200 000	17 650 000
Kokku	22 400 000	31 000 000	5 800 000	6 600 000	4 250 000	6 000 000	76 050 000

- <2000 a ehitatud hooned on nõrga energiatõhususega ja vajavad renoveerimist
- Energiakasutust mõjutab väljalangevuse, uusehituse ja energiakaalutud C-klassi renoveerimise määr

Aastane muutus	Üksik- elamud	Korter- elamud	Büroo- hooned	Ärihooned	Haridus	Muu	Kokku
Väljalangevus, m ² / %	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%
Uusehitus, m ² / %	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%
Renoveeri- mine, m ² / %	85 000	280 000	47 500	62 500	42 250	20 000	692 250
	0.38%	0.90%	0.82%	0.95%	0.99%	0.33%	0.71%

HOONETE BAASJOON

- 52-53% energia lõpptarbimisest
- Soojus langustrendis (sõltub tugevalt renoveerimise mahtudest)
- Elekter tõuseb eriti mitteeluhoonetes, osaliselt tasakaalustab kohapealne tootmine
- PV eksport – joonisel negatiivne
- Hoonefondi energiatõhusus paraneb, sest uued liginullenergiahooned asendavad väljalangevaid, renoveerimise mõju tagasihoidlik



HOONETE MEETMED

			Cost and savings per year			2024-2030 cumulative			Cost allocation
			Cost (M€/a)	Savings (GWh/a)	Unit cost, first year (€/MWh)	Cost (B€)	Savings (TWh)	Unit cost (€/MWh)	
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

NÄIDE MODELLEERIMISEST

Renovation grant for apartment buildings								
Period	2024	2025	2026	2027	2028	2029	2030	Cumulative
Volume of the measure, M€	150	150	150	150	150	150	150	1050
Financial support %	30	30	30	30	30	30	30	
Investment with VAT, €/m2	450	459	468	478	487	497	507	
Energy saving heat, kWh/m2 a	102	102	102	102	102	102	102	
Energy saving electricity, kWh/m2 a	6	6	6	6	6	6	6	
New energy saving heat, GWh	113.3	111.1	108.9	106.8	104.7	102.6	100.6	
New energy saving electricity, GWh	6.7	6.5	6.4	6.3	6.2	6.0	5.9	
Annual energy saving heat, GWh	113.3	224.4	333.4	440.2	544.9	647.5	748.2	3052
Annual energy saving electricity, GWh	6.7	13.2	19.6	25.9	32.1	38.1	44.0	180
Tax return, M€	160	160	160	160	160	160	160	1120
Total volume of investments mobilised, M€	500	500	500	500	500	500	500	3500
New jobs created, man-year	8500	8500	8500	8500	8500	8500	8500	59500
Unit cost €/MWh	1250	631	425	322	260	219	189	325
Co-benefits rating								
Improved indoor climate and real estate value, reduced DALY and health care cost								

HOONETE PÕHILISED MEETMED

Eluhooned – riigi toetus läbi eelarveneutraalsete renoveerimistoetuste

- Renoveerimistoetused korterelamute tervikrenoveerimisele (30% toetus)
- Kinnisvaramaks vastavalt energiamärgise klassile toetuste rahastamiseks
- Maksusoodustus/tulumaksu tagastus väikeelamute renoveerimisel (teine tee väikeelamutele)
- Renoveerimistoetused teatud sihtgruppidele väikeelamutes (20-30%)

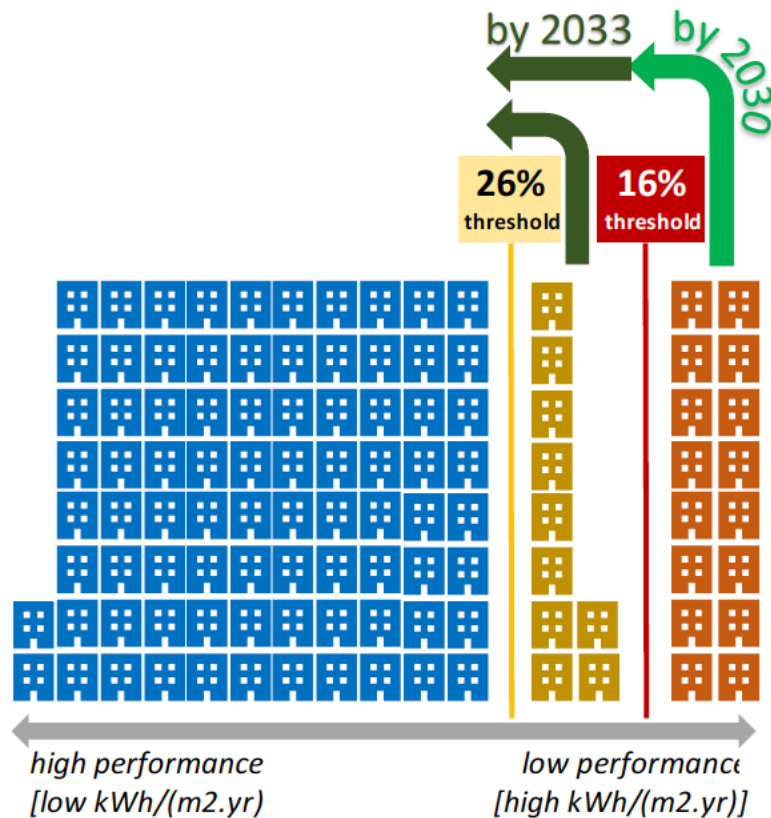
Mitteeluhooned – riigi toetus ei ole vajalik

- MEPS energiatõhususe miinimumstandardite rakendamine (energiamärgise E ja F klassi miinimumnõue)
- Kinnisvaramaks vastavalt energiamärgise klassile
- Avalike hoonete renoveerimiskohustus (3%/a)

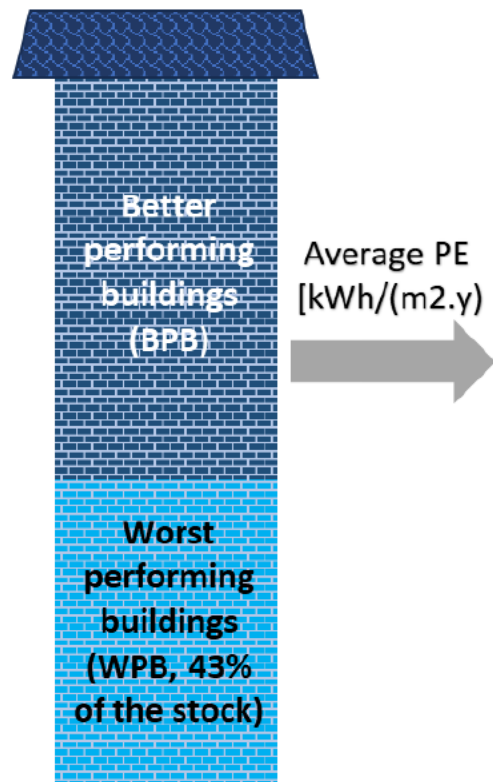
EPBD TÖÖRIISTAD

Mitteeluhooned: tõsta halvima tõhususega hooned F ja G klassist välja rakendades energiatõhususe miinimumstandardid (MEPS)

Non-residential building stock 2020

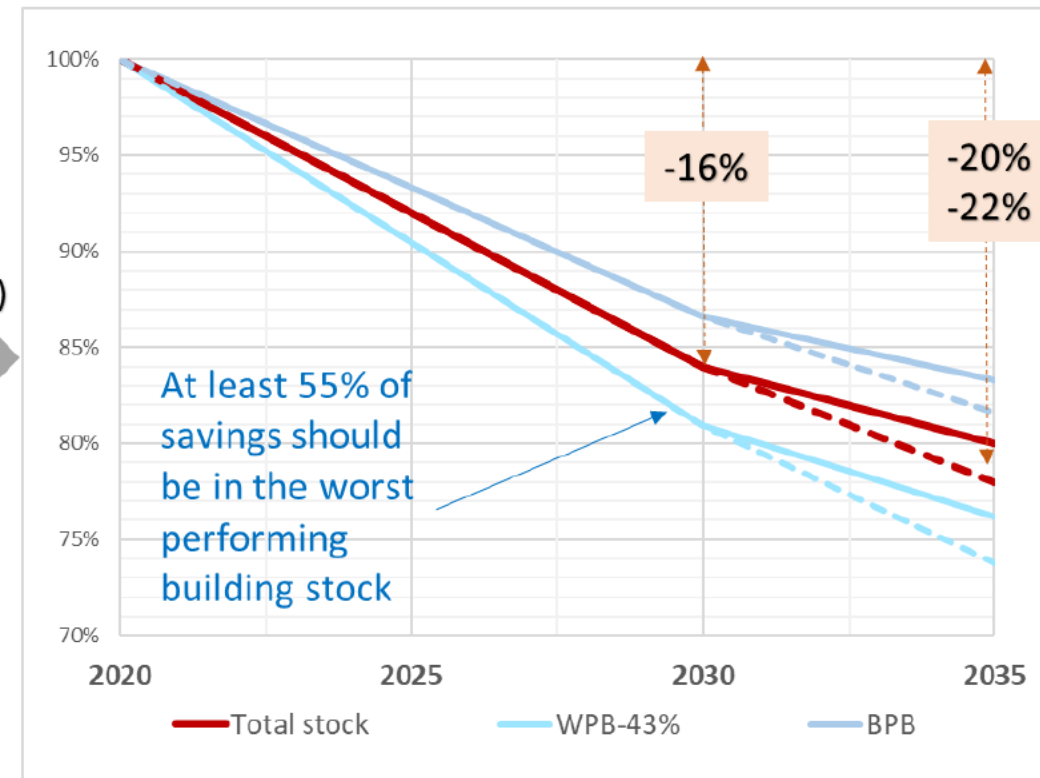


Residential building stock 2020



Eluhooned: meetmetega saavutada trajektoor, milles keskmine energiakasutus väheneb m² kohta 16%/2030 ja 20-22%/2035

National trajectory for the average primary energy use in kWh/(m2.y)



Buildings

Flagship measure: Budget neutral renovation grants in multifamily

Massive savings with deep renovation

- Large volumes of similar buildings
- Standard solutions



Quantification of economic benefits of renovation of apartment buildings as a basis for cost optimal 2030 energy efficiency strategies

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ARTICLE INFO

Article history:
Received 21 April 2014
Received in revised form
30 September 2014
Accepted 4 October 2014
Available online 17 October 2014

Keywords:

Investment benefits
Renovation of apartment buildings
Cost optimality
Energy and cost savings
Tax revenue
Job generation

ABSTRACT

As a part of the 2030 energy and climate policy discussion, the Estonian energy roadmap ENMAK 2030+ is being developed to set optimal national targets for 2030. Developing such a national roadmap requires solid evidence of which scenarios with varying ambition can be developed. This study looked at economic benefits, including tax revenue, job generation, and disposable net income per 1 M€ of investment, and energy savings on both an individual and national level. In addition, economic quantification for the three scenarios was carried out. The study relied on secondary data collection with validation of the data through a sample analysis and interviews with project stakeholders. The main findings show that in all 17 jobs per 1 M€ of investment in renovation were generated per year and direct tax revenue was between 32–33%, depending on the renovation project. Results revealed that over a 20 year period, there are essentially two national energy policy options: both the living quality and asset value brought about by integrated renovation at 105€/m² or alternatively that brought about by non-energy efficiency repairs at 31€/m². The study confirms that investment in energy efficiency is not only environmentally important but provides economic benefits on an individual and government budget level.
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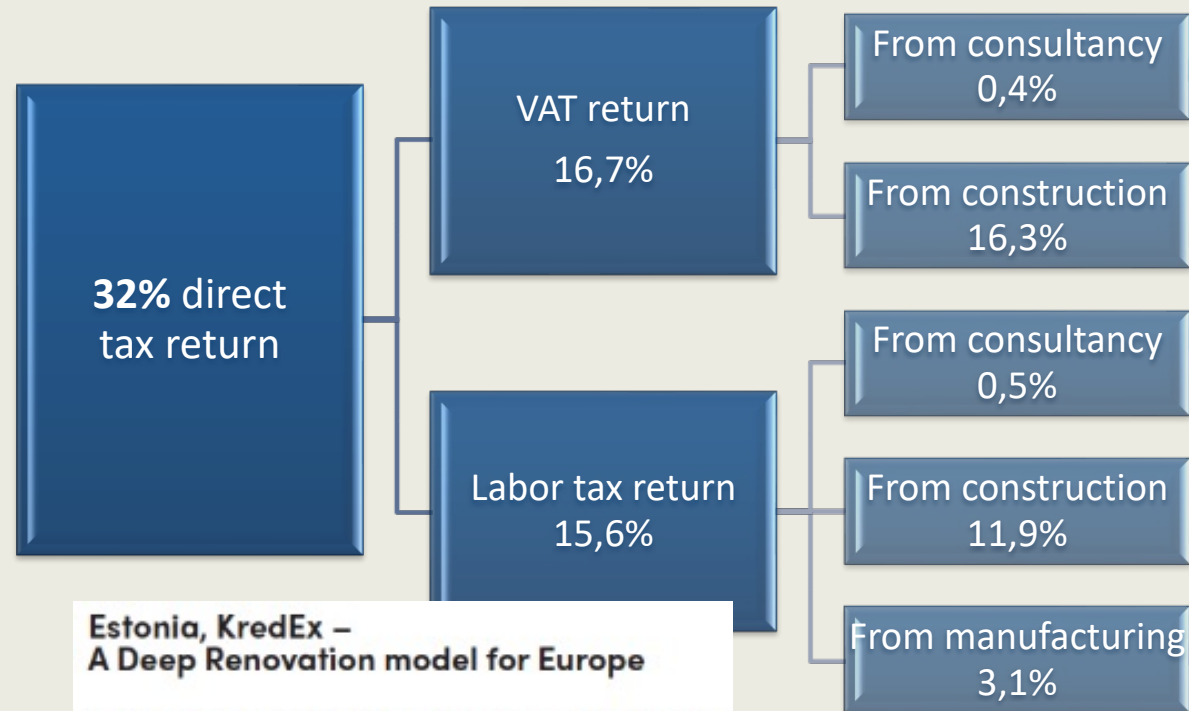
1. Introduction

"I believe that renovation of buildings to high energy performance standards could be one of the most cost effective investments a nation can make, given the benefits in terms of job creation, quality of life, economic stimulus, climate change mitigation and energy security that such investments deliver". Oliver Rapf, Executive Director, BRE [1].

The Estonian energy roadmap ENMAK 2030+ is being developed in line with the objectives described in the Green Paper "A 2030 Framework for climate and energy policies" [2]. Developing a national roadmap requires scientific evidence, and on the basis of this evidence, different scenarios may be envisaged. With this in mind, a statistical study involving integrated and energy and

investment analyses of Estonian building stock, including apartment buildings, was carried out [3]. For each building type, three to four different renovation packages were studied to identify cost optimal solutions [3]. However, the study focused only on energy efficiency/energy savings and investment intensity and did not consider the economic impacts of these renovation measures/packages.

Buildings account for a large share of the energy consumed nationally and produce 36% of the EU's CO₂ emissions [4]. In 2010, 20% reduction in both CO₂ emissions and energy consumption by 2030 was set as a target for all EU member states [5], the aim being to maintain energy consumption at a 2010 level. According to the above mentioned study [3], in 2010, Estonian building stock account for up to 50% of total national final energy consumption, significantly above an average 37.5% across all EU countries [3]. Estonian final energy use amounted to 33.0 TWh/a, total primary energy use, 45.5 TWh/a (Buildings for 55%, and non-renewable primary energy use, 15.3 TWh/a (Buildings accounting for 47%) [3]. The Estonian building stock has clearly played a major role in energy use, exceeding consumption by industries such as transportation and manufacturing. If national measures are not adopted, overall energy consumption of buildings may even increase, due to the relatively low replacement rate of existing buildings (0.3% per year)



Estonia, KredEx – A Deep Renovation model for Europe

Estonia has achieved great results in deep renovation, thanks to the KredEx renovation grant system. Backed by the EU since its 2010 kick-off, KredEX features strict technical requirements, focusing on high-level energy efficiency and indoor climate conditions.

Perpetuum mobile?

- Heating energy savings 60-70%
- Small increase or decrease in electricity depending on PV installation



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Buildings

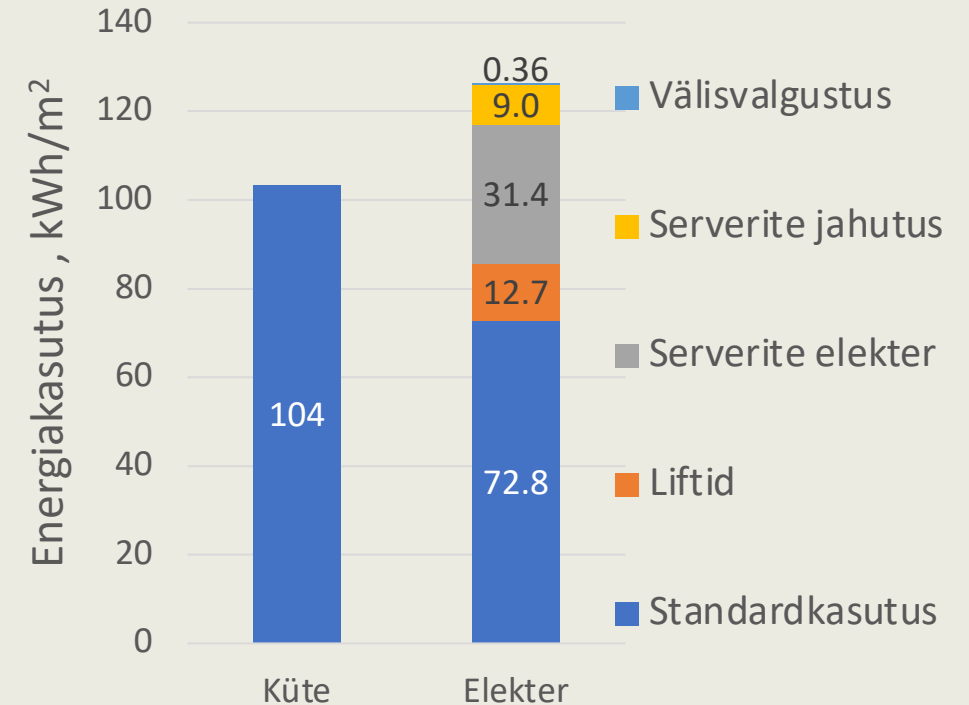
Flagship measure: Non-residential MEPS

Commercial building 16 990 m², 2008:

- Metered energy use, gas heating



- EPC class G according to main meters EP=357
- Submetering provides EP=250, class E
- 37 €/m² investment to BMS, HVAC and PV results in EPC D
- High saving potential with MEPS



ETA või KEK, kWh/(m²a)	Klass
ETA või KEK ≤ 100	A
101 ≤ETA või KEK ≤ 130	B
131 ≤ETA või KEK ≤ 160	C
161 ≤ETA või KEK ≤ 210	D
211 ≤ETA või KEK ≤ 260	E
261 ≤ETA või KEK ≤ 320	F
321 ≤ETA või KEK ≤ 400	G
ETA või KEK ≥ 401	H

Kuivjõgi et al. 2021

<https://doi.org/10.1051/e3sconf/202124605002>

7 TEEKAARTI, MILLEST 3-GA ON EESMÄRK SAAVUTATAV

- CEER2, RenoWave (rõhk hoonetel) ja EET (rõhk transpordil) parimad
- Investeerimisvajadus 13,3 mld, millest 5 mld riik
- Tööhõive, SKT ja maksulaekumise mõju suurim RenoWave-s (ehitus on töömahukas)
- Positiivne mõju energia maksumusele kui % kodumajapidamise netosissetulekust

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
<i>of which public support, cumulative</i>	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

JÄRELDUSED

- Hoonete renoveerimisel suur roll kõikides teekaartides – suurim sektor energia lõpptarbimises
- Korterelamute tervikrenoveerimise renoveerimistoetusele ei leidunud alternatiivi – suure mõjuga ja lihtsasti teostatav
- 150 mln eur/a maksimaalselt 30% toetust RenoWave hinnangul pikas perspektiivis realistlik – võib pidada lisanduvaks ja eelarveneutraalseks
- Väikeelamute teine tee – stimuleerimine maksusoodustustega, nt tulumaksu tagastus renoveerimistöödelt
- Kinnisvaramaks vastavalt energiamärgise klassile – loogiline toetuste katteallikas riigieelarve seisukohalt
- Ärikinnisvara ei vaja riigi toetust – EPBD MEPS peaks looma motivatsiooni energiatõhususe parandamiseks

RENOWAVE MATERJALID

- Energiatalgud.ee → uuringud → energiatõhususe uuringud
- <https://energiatalgud.ee/node/8919>
- Aruanded, baasjoon, meetmete kataloog ...