REPUBLIC OF ESTONIA
MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS

Energy efficiency of buildings in Estonia

„Where the home of the average resident is older than himself“

Raiko Puustusmaa

Department of Construction and Housing

18.10.2022

Prerequisites

- **National Development Plan of the Energy Sector** (until 2030)
- **National Long-Term Renovation Strategy** (2020)
- **Government's coalition programme** (2021)
  - We will continue with energy efficiency programmes for buildings.
- **Country reports by European Commission** (2019, 2020)
- **Green Deal and Renovation Wave Strategy** (2020)
- **EPBD revision** (ongoing)
- **Carbon footprint, CO2, DNSH** (ongoing)
- **Bauhaus initiative** (ongoing)
- **Different studies and new strategies** (Coherent Policy Development for High-Quality and Sustainable Living Environment, BuildEST, Dwellings' shrinkage patterns, new environment sector development plan 2030)

National Long-Term Renovation Strategy

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- National strategy adopted in 2020 (residential and non-residential buildings)
- The main goal of the Estonia's Long-Term Renovation Strategy is to deeply renovate the whole housing stock by the year 2050 (2030, 22%; 2040, 64%; 2050, 100%):
  - 100,000 detached houses with a total area of 14 million m²
  - 14,000 apartment buildings with a total area of 18 million m²
  - 27,000 non-residential buildings with a total area of 22 million m²
- Analysis of the current situation and proposals for further action

Cumulative need for renovation

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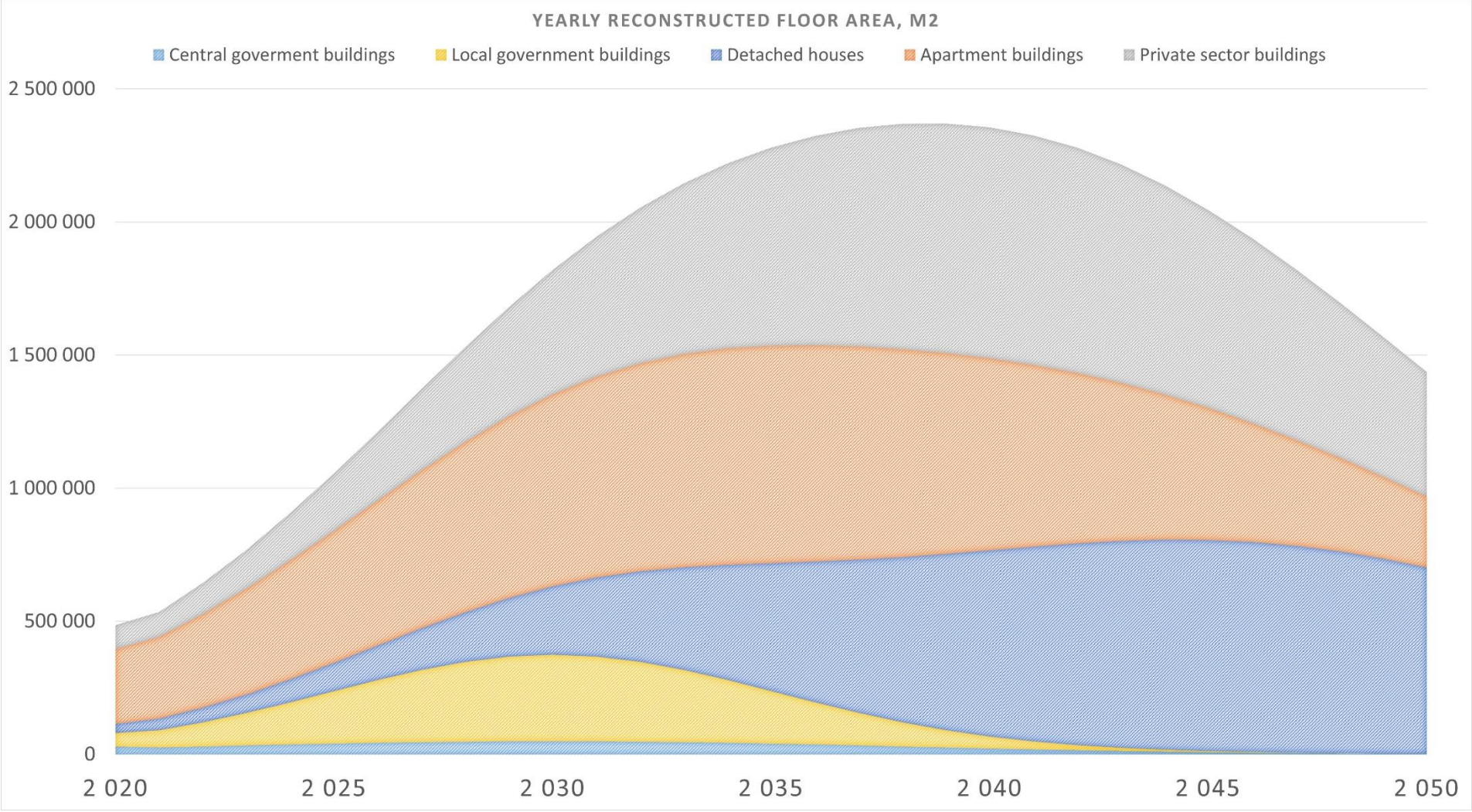

Residential Buildings

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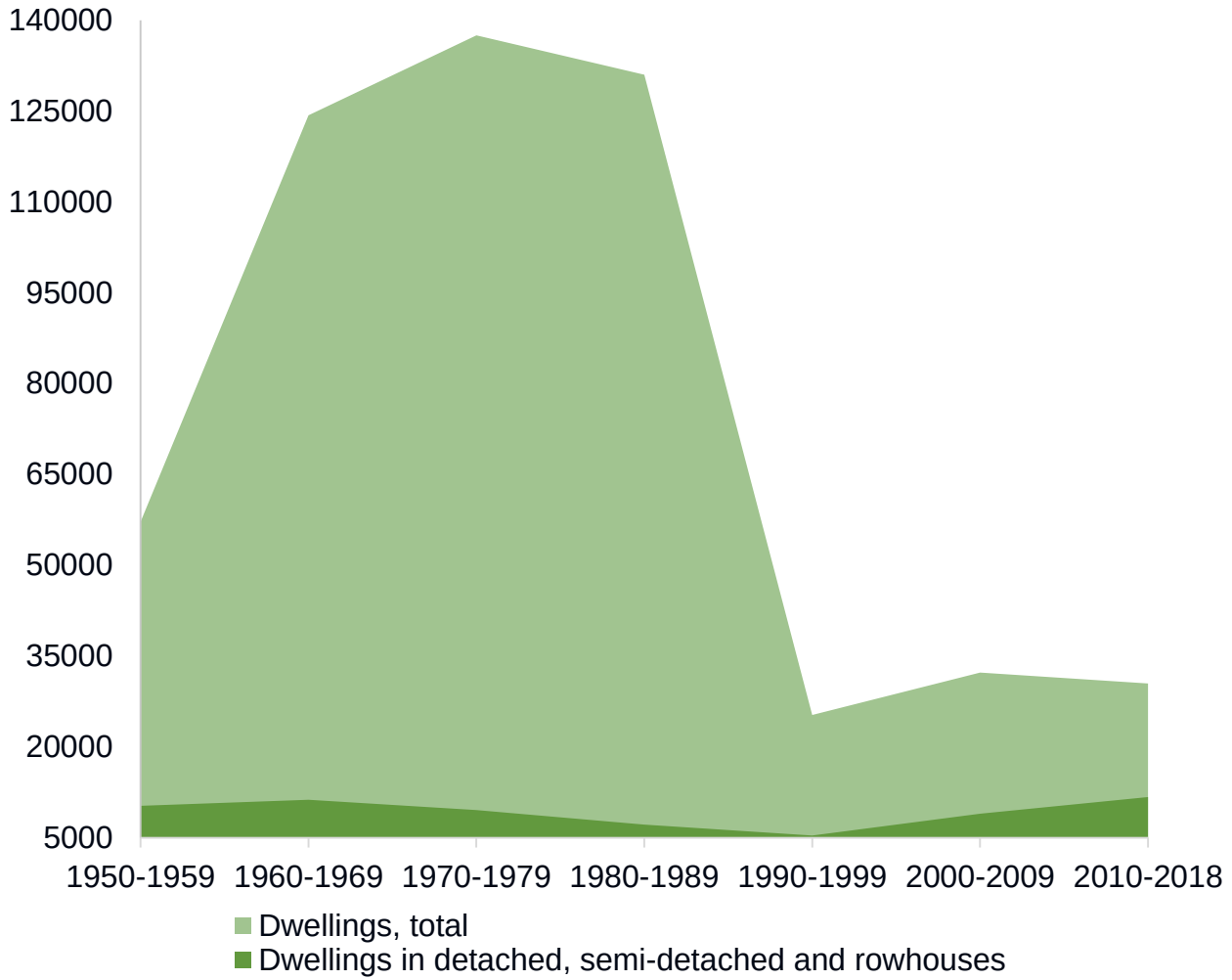
- 706 000 dwellings, of which 70% apartments in ca 24 000 buildings (14 000 to be renovated)
- 98% dwellings privately owned
- Managed by Apartment Associations (legal body, non-profit, 50%+1 simple majority)
- 10% of existing dwellings built after 2001
- About 6% of dwellings are renovated with support measures



KREDEX Fund

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All EE measures are implemented by KredEx, foundation set up by the Ministry of Economic Affairs and Communications in 2001 (one-stop-shop)

- Gives initial advisory service and recommendations to the appliers of EE measures
- Guarantees private housing loan for buying to renovate or renovating housing and to reduce down payment obligation
- Provides loan guarantee for apartment associations who want to take a bank loan, but banks evaluate risk higher than normal (a high share of people are in debt, the apartment building is in an area with low property values or in a monofunctional settlement, the investment per square metre is significantly higher than normal)
- Offers apartment building renovation loan to apartment associations that have received a negative response to their renovation loan application from a bank or an offer with unreasonable terms (very short-term loan, an interest rate that is significantly higher than usual)

Renovation Grant

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- Alltogether more than 1100 apartment buildings reconstructed (2010-2020), 2/3 in heavily populated areas
- From 2010-2014 661 apartment buildings with a total area of 1.6 million m² were reconstructed
- From 2015-2020 453 apartment buildings have received a positive decision with the total area of 1.2 million m²
- Average cost of renovation is 250-300 €/m² which together with the 40% support is around 10,000 € for a 50 m² apartment generally paid in the form of loan payments over an extended period of time.
- Until 2019 grants were provided with the rates of 15%, 25% and 40% with the rate being 10% higher in Ida-Viru County
- From 2019 grant allocation in rural areas up to 50%, large settlements up to 40%, Tallinn and Tartu 30%

Renovation Grant Principles

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Reduce the energy consumption with comprehensive renovation projects, renovation aimed at energy class „C“ (some cases „D“)

- Open-call scheme with verification control and evaluation process (listed by energy consumption and floor area)
- Required activities and documents:
  - Procurement through the public procurement register
  - More complex building design documents (energy efficiency calculation)
  - Expertise for building design documents
  - Compulsory technical consultants
  - Measurements protocols of ventilation and heating systems
  - Agreements for post-maintenance
  - Measured energy label year after completion of the project

Renovated Apartment Buildings

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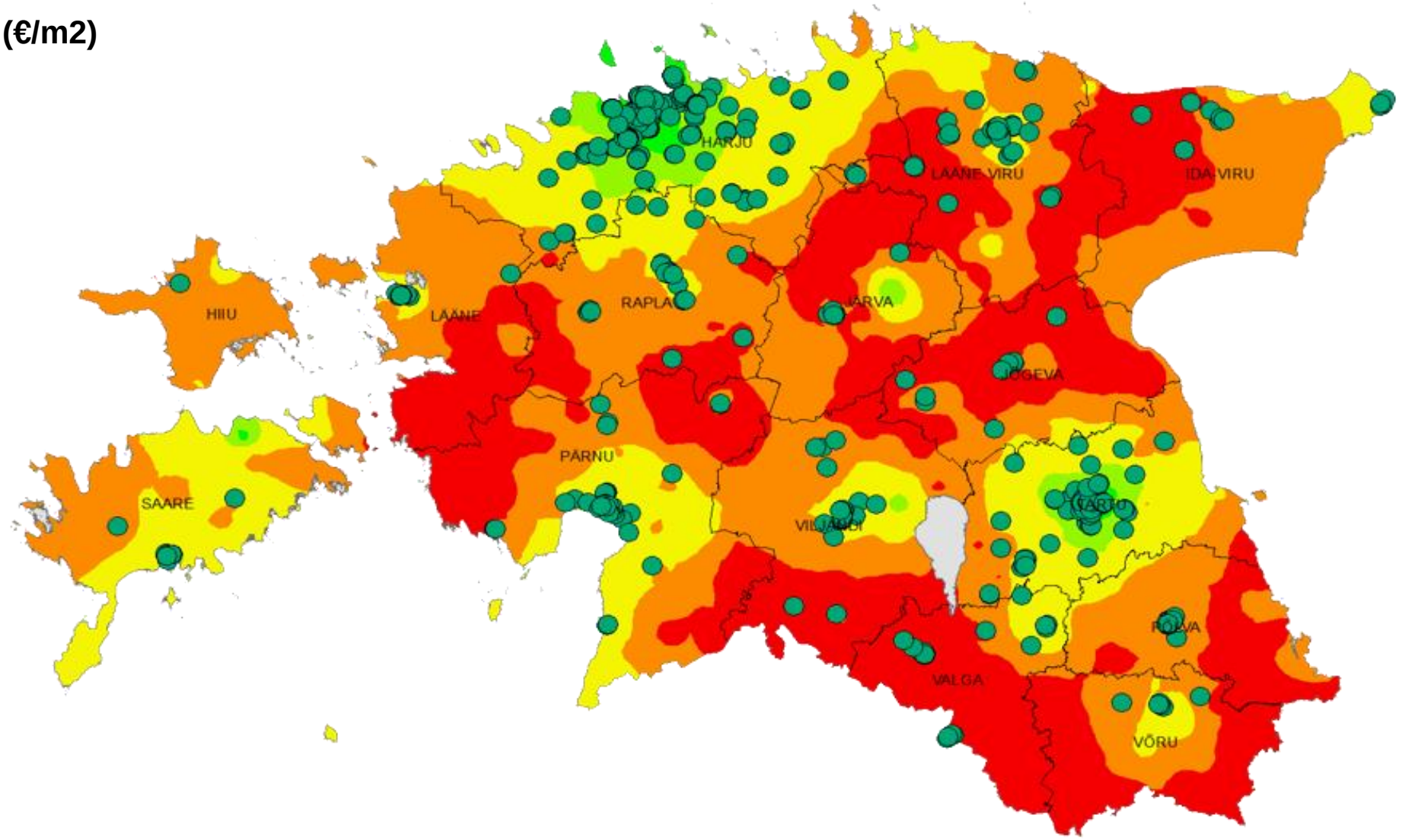
Value zones (€/m2)
< 100
101-200
201-500
501-900
> 901

Renovated apartment buildings



Renovation Challenges

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In terms of energy efficiency renovations, the main challenges are:

- Dependance on the economy, the forecast of economic growth or decline and the assessment of the economic cycle
- Increasing volumes, current investment rate is too low, and it should raise from around 200 million € up to 900 million € per year
- buildings are renovated not because of energy savings but, for example, to improve only the indoor climate, functionality or aesthetics
- property owners do not have the financial capacity to renovate their building to the energy efficiency class C of the energy label
- property owners don’t consider sustainability, health and energy efficiency in the long term (20-30 years) as part of the renovation and have a legitimate expectation of state support to achieve national goals

Future outlook

The goal is to reduce dependence on (Russian) fossil fuels

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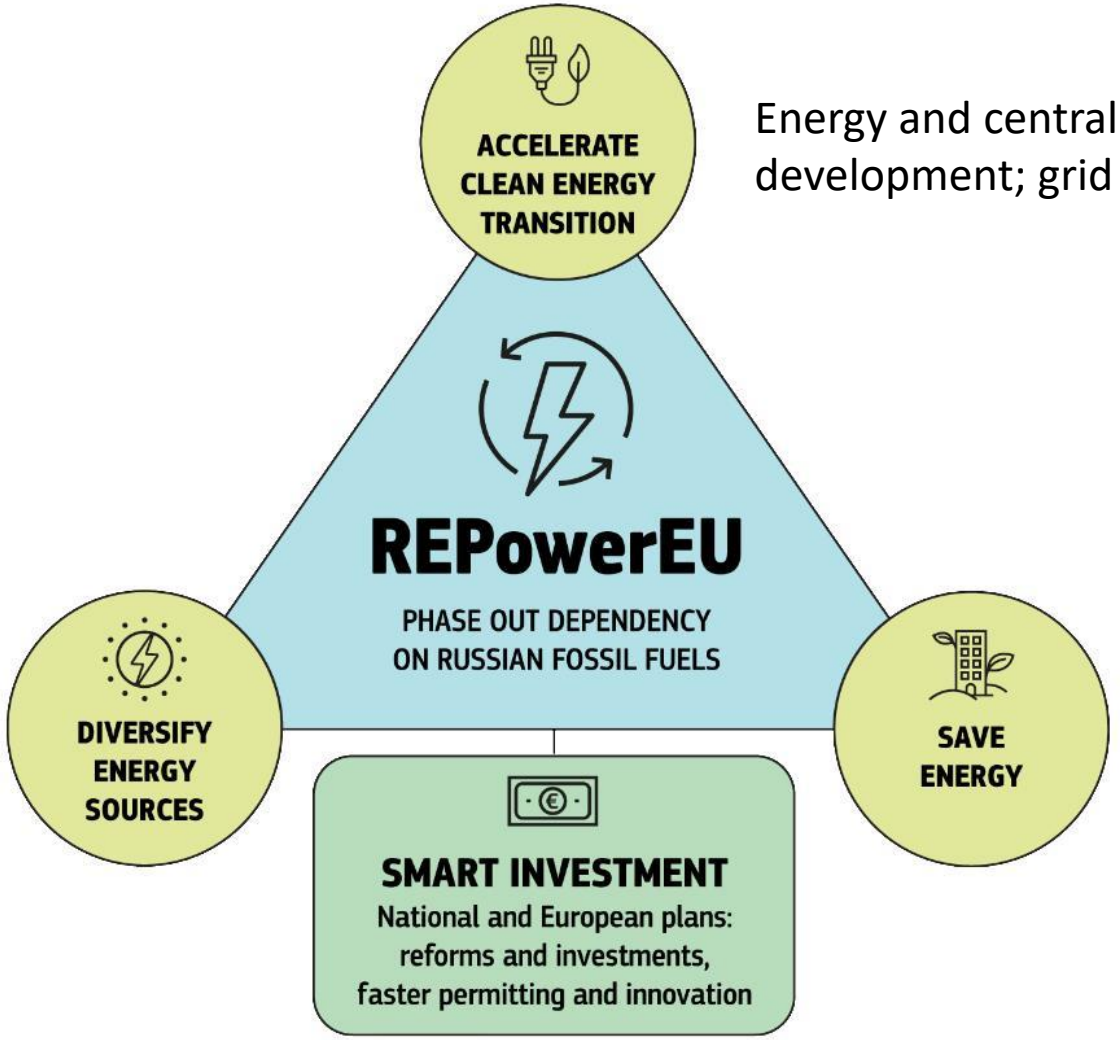
Renewable energy investment measures



Energy and central heating network development; grid connecting measures

Energy efficiency measures

Energy efficiency opinion survey of residents, entrepreneurs and local governments

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„According to residents, in order to achieve energy savings, the industrial sector should be dealt with in particular – 78% think so“

1. The main obstacle to energy efficiency investments is the lack of financial resources.
2. In large apartment buildings, the problem is (1) the opposition of fellow residents to renovation, (2) the board of the apartment association does not consider it important, and (3) there is no leader.
3. Three-quarters of respondents who have changed their home in recent years or plan to do so consider the energy label important. However, only a quarter of them prefer a living space with a better energy label when choosing a new home. However, other factors such as location, size, layout and price are more decisive.

Vacancy rate is 9% (ca 52 000 dwellings) based on 2019 ⚠ data

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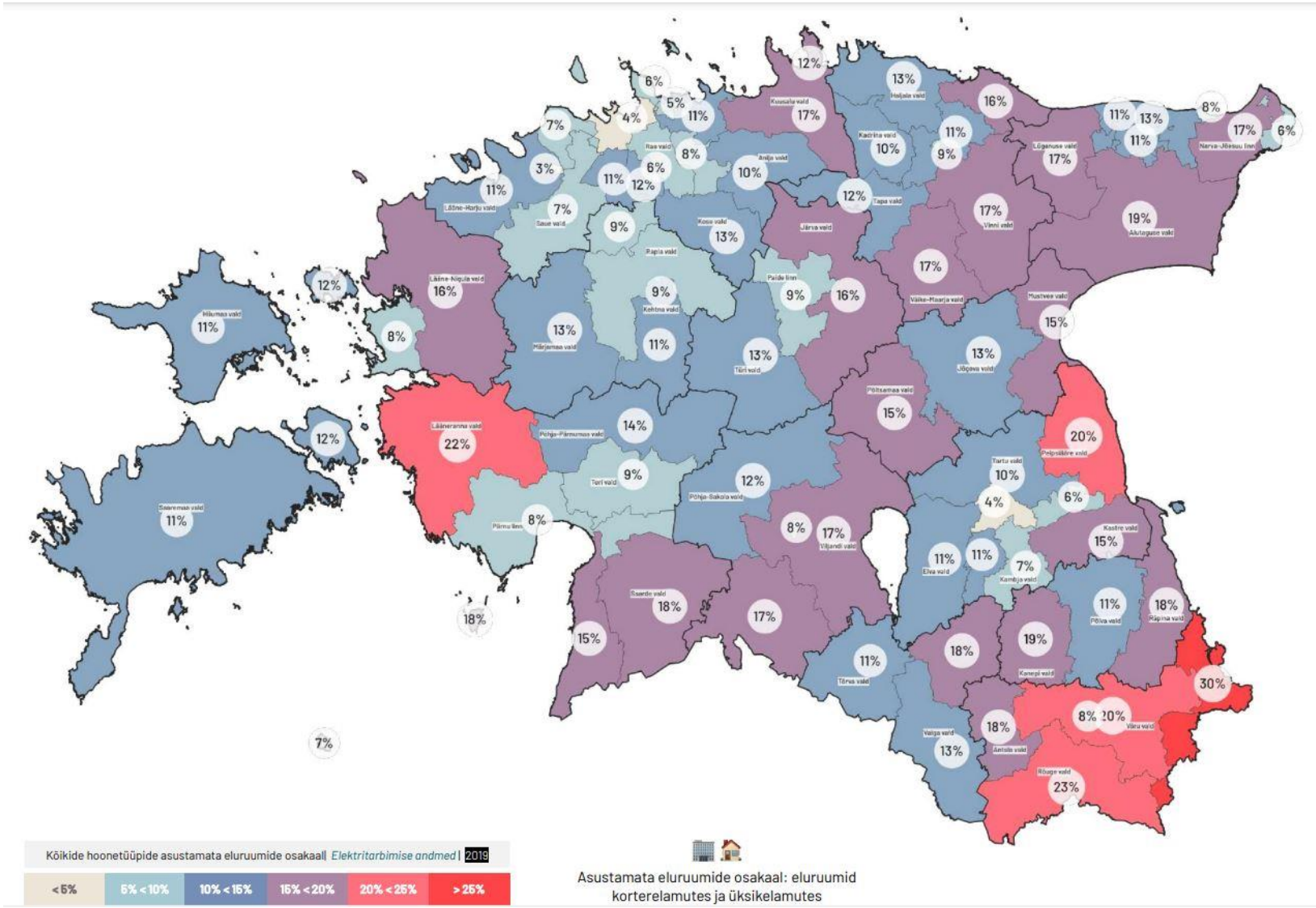

Living in small dwellings is popular

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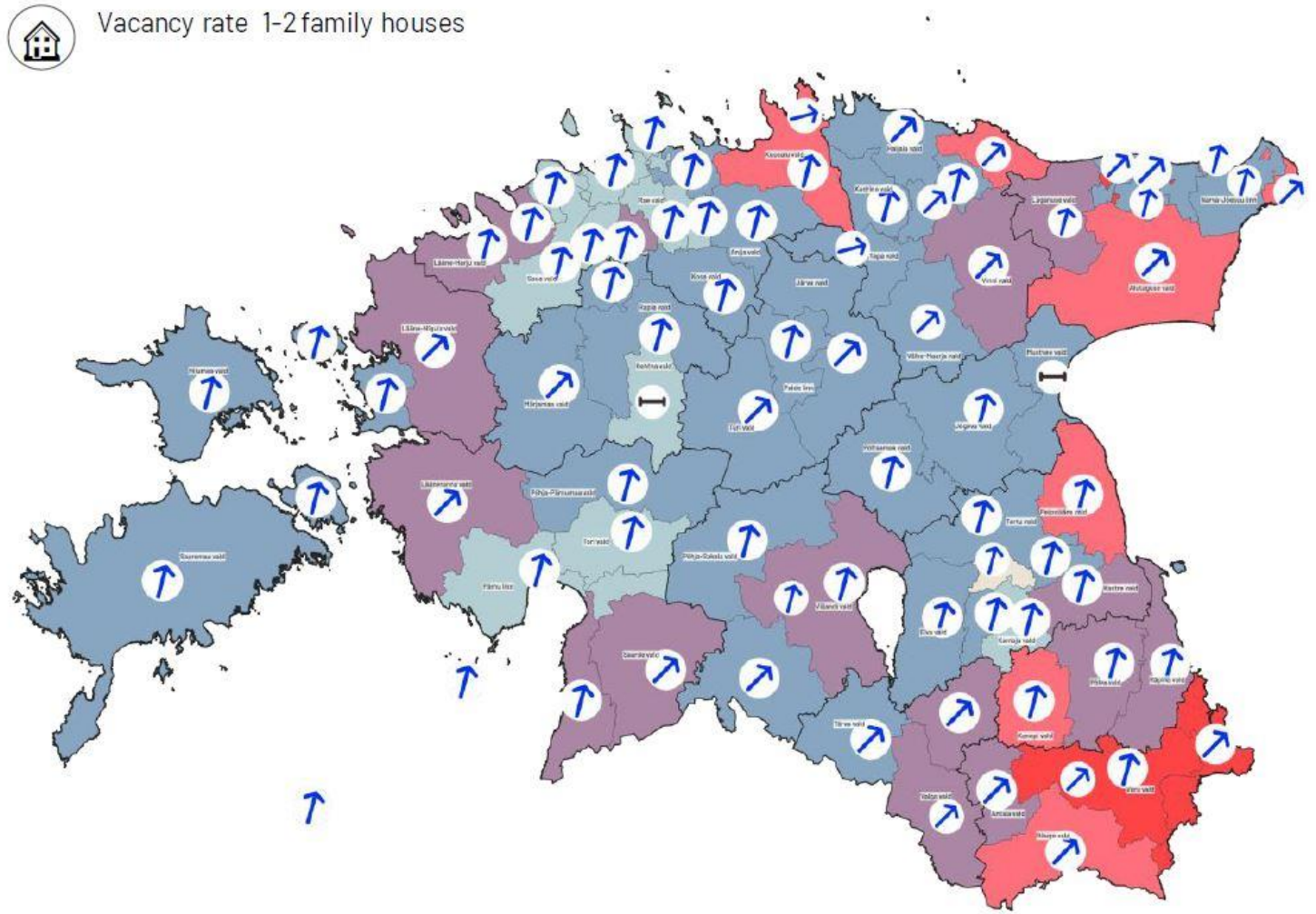

Vacancy rates

2019

"Electricity consumption data."

- < 5%
- 5% < 10%
- 10% < 15%
- 15% < 20%
- 20% < 25%
- > 25%

Vacancy trajectory

2013-2020

"Population registry."

- Occupancy >25%
- 25% < 15%
- 15% < 5%
- 5% -5%
- Vacancy 5% < 15%
- 15% < 25%
- >25%

Renovation project cost, on average, has risen 15%

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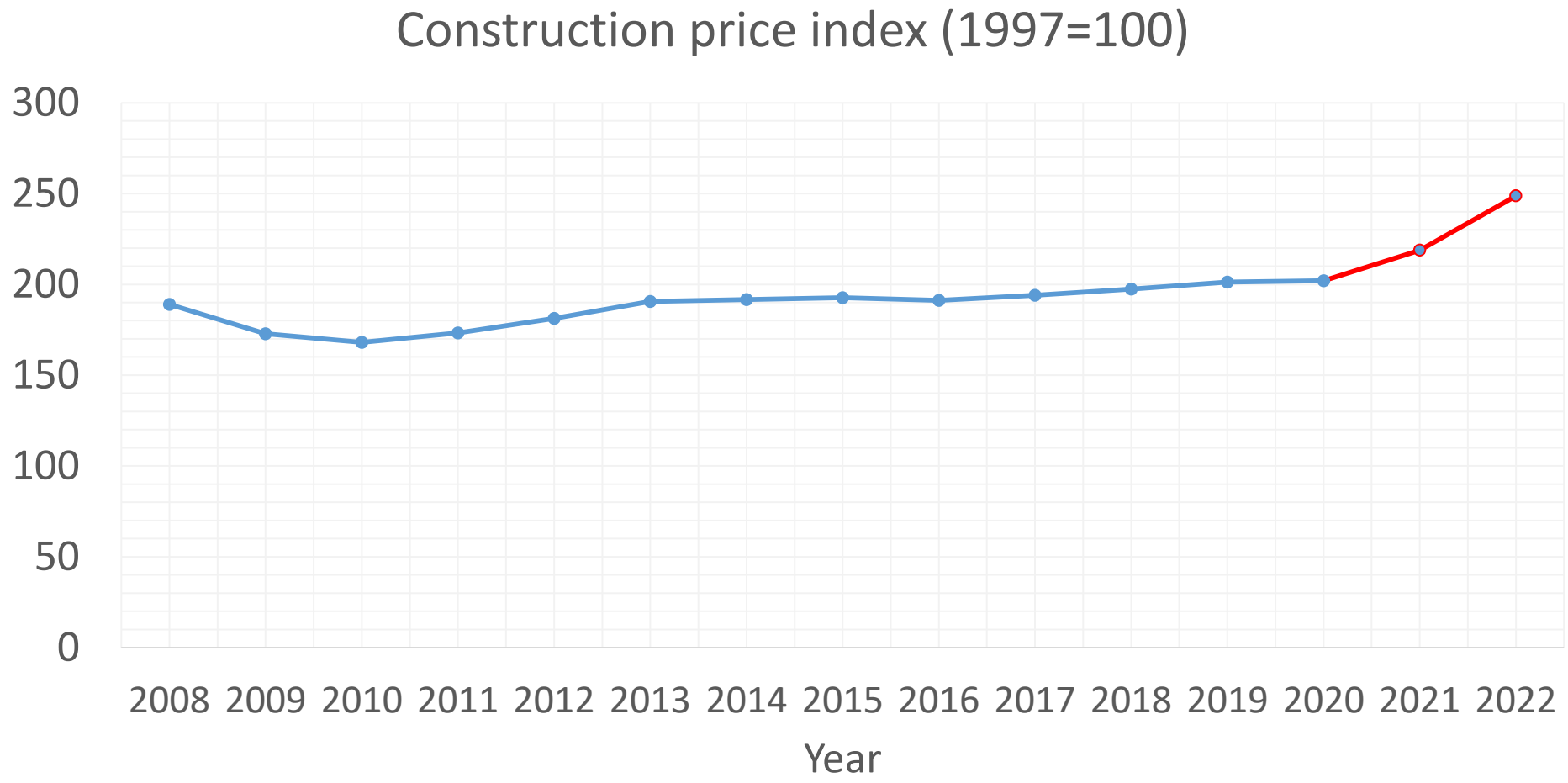

Statistics Estonia: https://andmed.stat.ee/et/stat/majandus__hinnad/IA10

Five Steps For Energy Efficiency

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- **Main activities to promote energy efficiency investments**
  - **Introduction of new technological solutions.** Renovation of common apartment buildings with factory-produced elements, digital tools to create energy measurements (audits) and visualisation tools showing the results of the renovation.
  - **Research and development.** National databases development, anaylsis of the renovation motivation, renovation impact assessment, technical advisory development.
  - **Awareness raising.** Creation of the instructional materials and information sharing.
  - **Demolition of decommissioned buildings.** Due to urbanization, inefficient buildings in rural areas are decommissioned and need demolition for the coherent spatial planning and safety.
  - **Financing measures.** Providing incentives for renovation through loans, loan guarantees and grants. (SF21+, Modernisation Fund, emissions trading revenue, other)

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Energy Efficiency Pilots

Apartment building renovation with prefabricated elements:

- Growth in construction volumes - European Commission's renovation strategy envisages at least a doubling of reconstruction over the next ten years
- A lot of standard project apartment buildings in the housing stock - 70% of the dwellings are in the apartment buildings
- Unused resource of wooden house manufacturers - pre-fabrication experience and production of elements
- Minimization of adverse effects on the environment - better quality of controlled conditions, specified material consumption calculations, wood as biomass and CO2 storage (building life cycle)
- Strong and determined R&D sector (TalTech) - technical solution developments, completed and ongoing renovation projects

MORE— CONNECT

Reconstruction of TalTech student dormitory in Tallinn, Akadeemia tee 5a

Energy Efficiency Pilots

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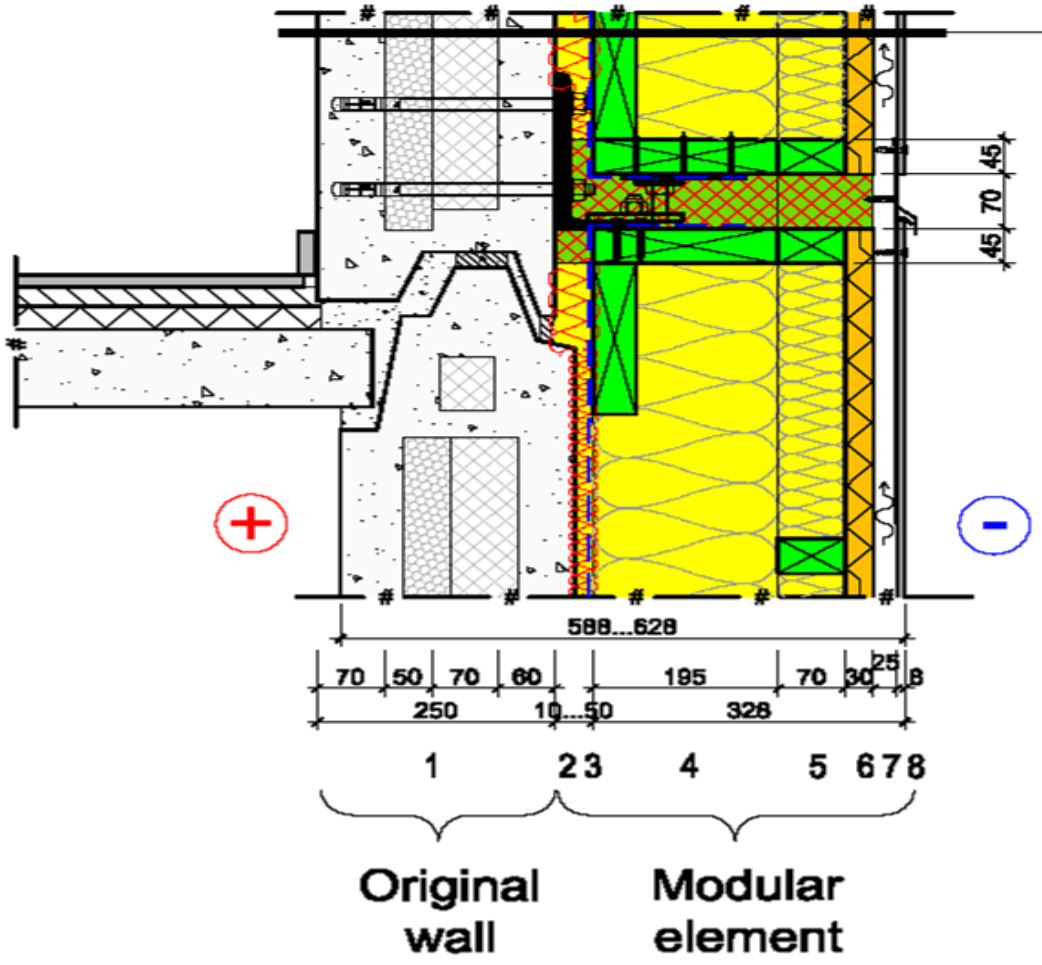

1. Existing concrete panel	250mm
2. Filling mineral wool (A1; λ_D=0.035 W/(mK))	10...50mm
3. Air&vapor retarder (vapor resistance Z_p=1.6...27×10^9 (m^{2}sPa)/kg)	
4. Timber frame 45×195mm cc.600mm / min.wool (A1; λ_D=0.035 W/(mK))	195mm
5. Timber frame 45×70mm cc.600mm / min.wool (A1; λ_D=0.035 W/(mK))	70mm
6. Semi-rigid mineral wool slab with special wind barrier facing (vapor permeability δ_p=150×10^{-12} kg/(msPa); taped joints, A2-s1,d0; λ_D=0.031 W/(mK))	30mm
7. Ventilated airgap	25mm
8. Facade board - rainscreen	8mm

Energy Efficiency Digitalization

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e-construction platform - common architecture, language, philosophy

VR/AR services
Construction diaries
Detail plan (zoning) application
...
Digital Twin visualization
Data conversion and import/export
... ...
Building permit application
Construction notification service
Usage permit application
My buildings
... ...
Land survey services
Utility connections
...
BIM-based automated checking process
Emergency acccess points
...

Private sector
Other public services
Digital Twin services
Building Registry (EHR) services
Utility Network (VRA) services
BIM services

X-road
Open platforms
APIs
e-ID authentication
KSI blockchain
Access point to digital twin

Private sector systems
Planning registry
Road registry
Building registry
EHR external data tables
Portals
Land board registries
Other Databases

Energy Efficiency Promotion

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The aim of the energy efficiency promotion is to cover the whole customer journey from information, technical assistance, application and advising financial support schemes to facilitate deep renovation:

- Good availability of information means a good web page and digital tools that support the decision-making process for deep renovation. That includes visualization tools for private owners and the development of the e-building platform for automated EPC and other digital calculators/tools
- Technical assistance will be achieved through training of the technical specialists who support the applicants in the process of preparation of the renovation projects (apartment associations)
- Due to regional disparities, local networks are emphasized to support the increase of renovation rates (special focus to Ida-Viru region). Local level knowledge supports local level spatial planning and quarter-based renovation projects with multiple stakeholders (local municipality, heating district manager, etc)
- Counselling in Regional Development Centres will help build strong project pipelines that offer integrated solutions and strong partnerships with local actors (qualified professionals, financial institutions, apartment associations, energy and building agencies, residents)
- Eligible costs and promotion for improvements of accessibility to address the demographical challenge and equal housing quality in the cities and rural areas

Building guide – visualizing regulation

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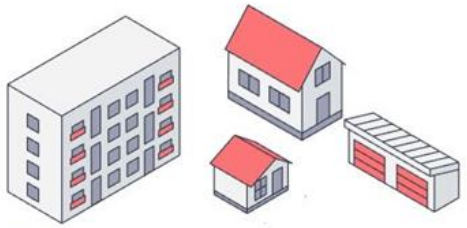
Ehitusgiid

Sinu teejuht ehitamisel: selgitab mõisteid, kirjeldab tegevusi ja nõudeid, aitab kontrollida, kas ja milliseid lubasid või kooskõlastusi on vaja — näitab kogu protsessi ja suunab õigetesse kohtadesse.



Eluhoone

Ühe või mitme pere elamu, ridamaja, kortermaja, saun, aiamaja, suvila

Mitteeluhoone

Büroohoone, kauplus, kool, lasteaed, kino, tootmishoone

Rajatis

Tee ja tänav, mängu- ja spordiväljak, piirdeaed, prügimaja, rattamaja, vaatetorn

Tehnosüsteem

Päikesepaneel, soojuspump, alajaam, puurauk, reoveepuhasti

Vali eluhoone ehitustegevus

Eluhoonega seotud ehitustööd, hoone kasutusele võtmine või andmete korrastamine

Remont

Hoone maht ja pindala ei muutu (**osa asendamine samaväärsega**), nt:

- akende vahetamine
- värvimine
- puitvoodri asendamine
- siseseinte tööd

Rekonstrueerimine

ehk hoone **ümberehitamine** (maht ja pindala võib vähesel määral muutuda), sh:

- soojustamine
- uus vundament või katus
- välisseinte tööd

Laiendamine

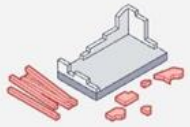
Hoonele **juurdeehitise tegemine**. Maht ja pindala muutuvad. Nt:

- rõdu, veranda, terrass
- katuse tõstmine
- teise korruse väljaehitamine

Uue hoone ehitamine

Ehk püstitamine, sh:

- vanale vundamendile ehitamine
- moodulmaja



Lammutamine

Hoone **eemaldamine** või **likvideerimine**

- osaline
- täielik
- lahtivõtmine ja mujal kokkupanek

Tööd krundil

Ehitamine **hoone ümbruses**

- kraav ja tiik
- piirdeaed
- lipumast
- puu mahavõtmine

Kasutusloa taotlemine

Hoone kasutusele vastavuse kontroll

- kasutusotstarbe muutmine
- uus hoone, vana hoone

Andmete muutmine ehitusregistris

Hoone ametliku info parandamine

- valed andmed
- täielik
- puuduvad andmed

Housing Investment Fund (HIF)

Republic of Estonia
Ministry of Economic Affairs and Communications

Phase I (ongoing) – Identifying potential investors and clarifying their requirements

- decision on the type of fund structure

Phase II (ongoing) – Legal fulfillment of preconditions

- development of the fund structure; decision-making process (permits, government decisions); ex-ante impact assessment; setting up a fund structure (statues, agreements, registrations)

Phase III (TBC) – Financing agreements

- negotiation of investment and loan agreements; development of HIF services; procurement procedures

Phase IV (TBC) – Launch of HIF

- forming an organization and getting started

Summary

Collaboration and knowledge sharing (BAUHAUS initative)

Innovation and technological advancements (factory solutions)

Sustainability of the renovation (circular bioeconomy, material tech)

Awareness of the owners and renovation readiness (low access barrier, information sharing)

Regional development (accessibility to quality housing)

Eligible costs (electric car charging points, accessibility)

Complementarity and consistency of the financing solutions (HIF)

Thank You For Your Attention!

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http://masshousing-new.strelka-kb.com/9/