This project is funded by the European Union

REEP Plus Policy Dialogue

Developing a Long-Term Building Renovation Strategy for Kosovo

EECG meeting

Vienna, 11 March 2020

ECONOMIC CONSULTING ASSOCIATES

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Overview

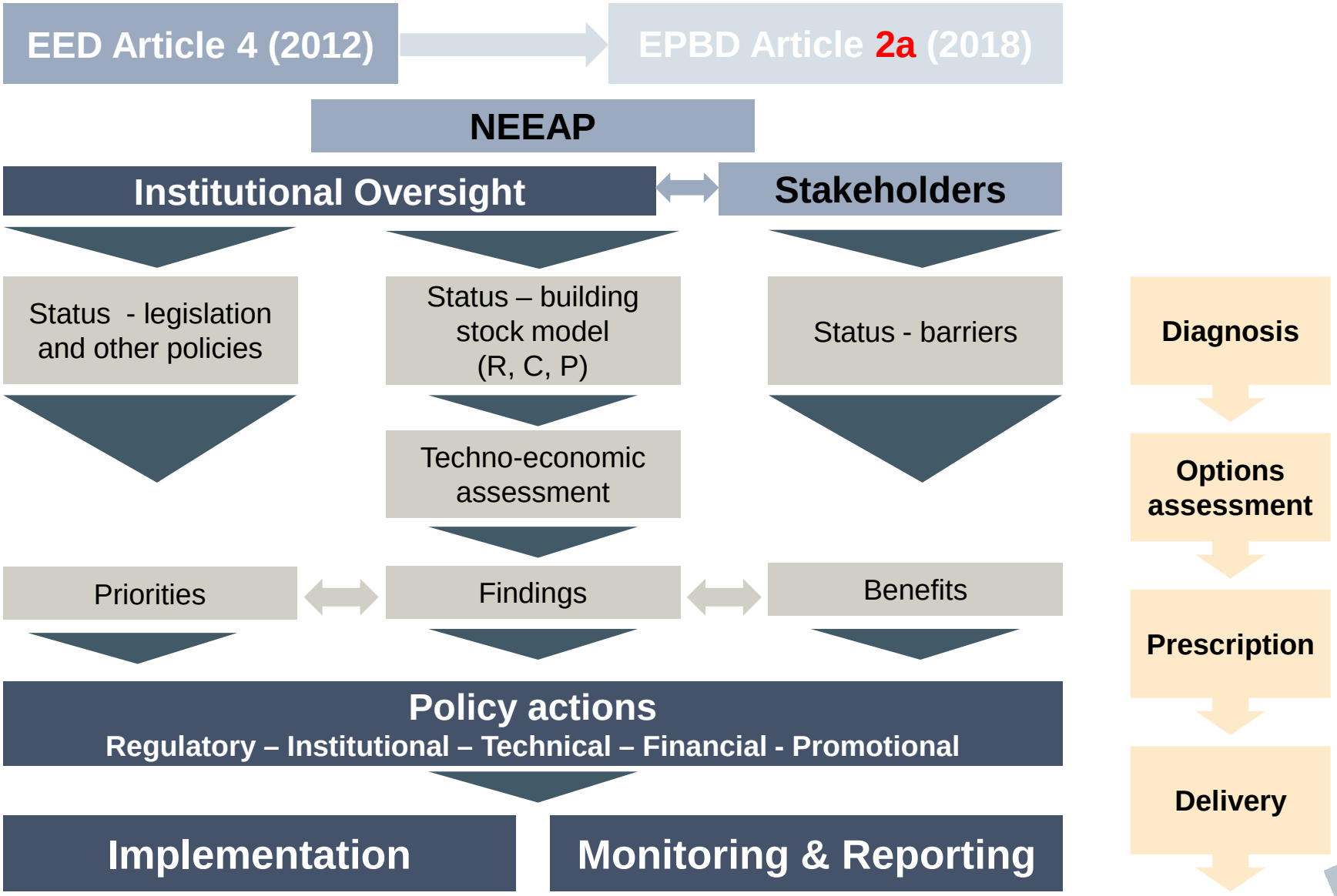
Overview

- An outline of the formulation of a long term building energy renovation strategy to comply with EED Article 4
  - Framework
  - Elements
  - Process
- This presentation relates to a DRAFT version of the building energy renovation strategy

Caveat:

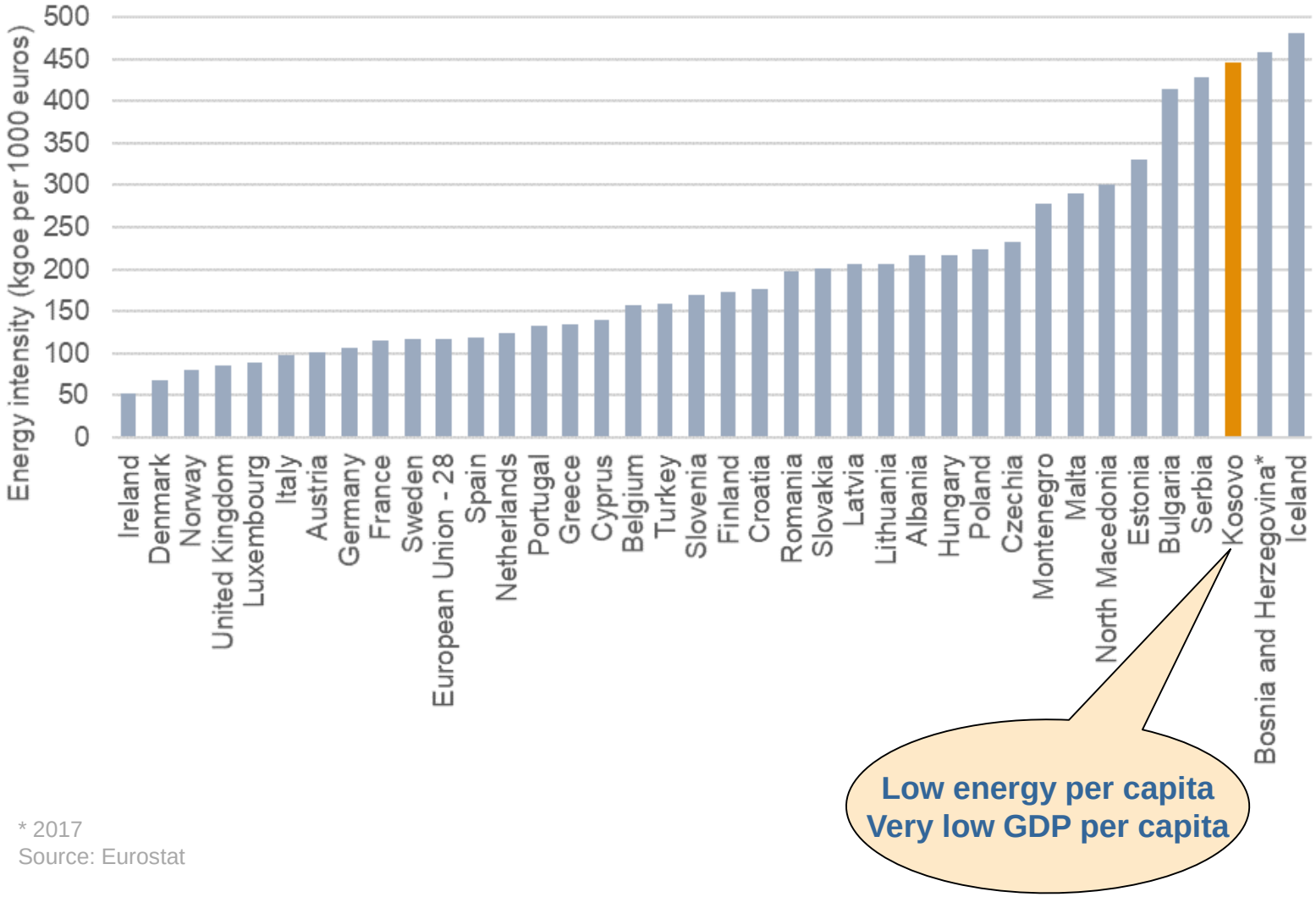
- Its findings are preliminary and indicative only, and subject to:
  - Verification on particular data inputs
  - Consultation and agreement with Technical Working Group
  - Consultation with wider stakeholder community

Overview


EED Article 4 (2012)
EPBD Article 2a (2018)
NEEAP
Institutional Oversight
Stakeholders
Status - legislation and other policies
Status – building stock model (R, C, P)
Status - barriers
Techno-economic assessment
Priorities
Findings
Benefits
Policy actions
Regulatory – Institutional – Technical – Financial - Promotional
Implementation
Monitoring & Reporting
Diagnosis
Options assessment
Prescription
Delivery

Kosovo: Energy efficiency policy and market background

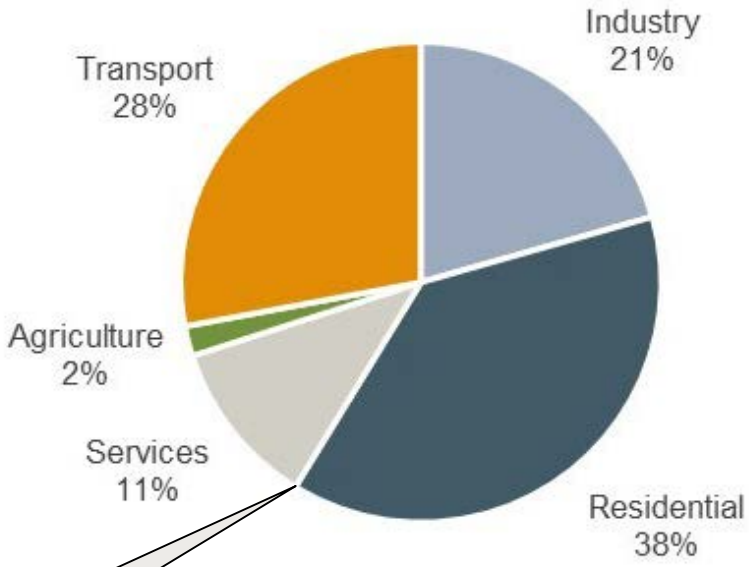
Energy intensity across Europe (2018)



* 2017
Source: Eurostat

Energy profile of Kosovo, 2018

- 1.8 M population
- Primary energy consumption 30,000 GWh (2.6 Mtoe)
  - 16,500 kWh per capita
- Final energy consumption 18,000 GWh (1.5 Mtoe)
  - 9,500 kWh per capita
- Import dependency 32 %
- Energy costs in buildings €500 M
- CO_2 emissions for buildings 6Mt p.a.



48% of energy consumption is in buildings

Source: Energy balances from Kosovo Statistics Agency and Ministry of Economic Development

Information sources and data gaps

SOURCES:

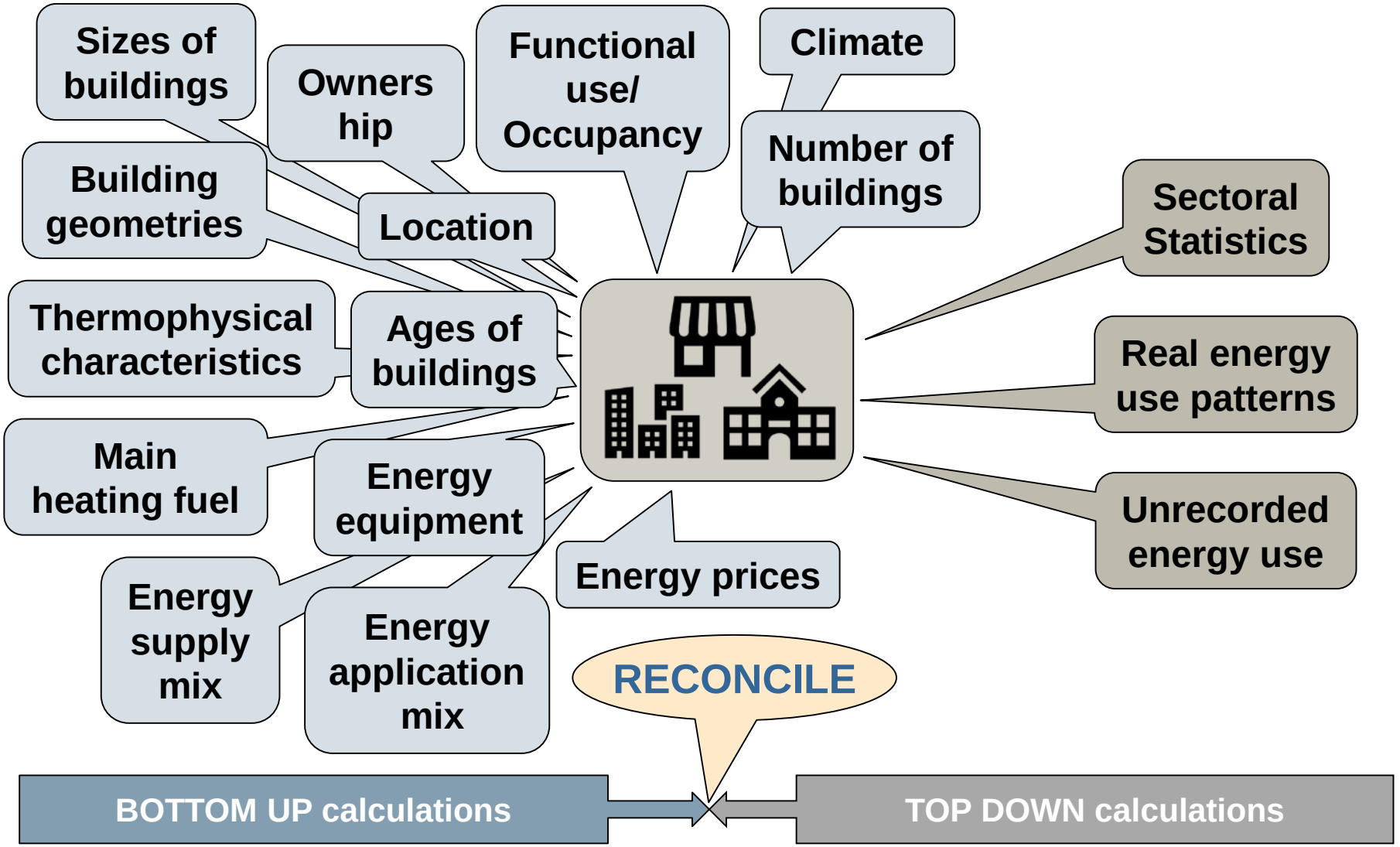
- National statistics
- National plans on energy and climate
- Existing policy instruments (including primary and secondary legislation) and programmes impacting renovation
- National or *sectoral* commissioned studies
- Preceding donor or academic studies
- EU studies and guidance, including the EU Commission, the Buildings Performance Institute Europe (BPIE) and the Joint Research Centre (JRC)
- Published findings from EED and EPBD 'Concerted Action' initiatives
- Published findings from former 'Intelligent Energy for Europe' (IEE) and EU Horizon 2020 projects, for example 'Build Upon'
- Derivation from examples of building renovation strategies of other countries

DATA GAPS, especially:

- General: Limited levels of detail on energy end use applications
- Commercial sector typologies
- Local data on EE installation costs

Baseline status appraisal: Building stock model

Building stock model



Examples of building stock profiling

Total area per type and age cohort [m²]

Construction period	Single Family houses	Terraced houses	Multifamily houses	Apartment blocks	% per age
Pre-1960	534,722	24,282	25,554	0	1.7%
1960 - 1969	893,641	33,650	13,260	122,834	3.1%
1970 - 1979	3,066,617	261,476	288,504	422,371	11.7%
1980 - 1999	7,624,647	523,311	1,114,731	1,598,598	31.5%
2000 - 2017	5,914,917	1,091,308	574,153	10,314,003	52.0%
% per type	52.4%	5.6%	5.9%	36.2%	100.0%
Total building area (m²)					34,442,579

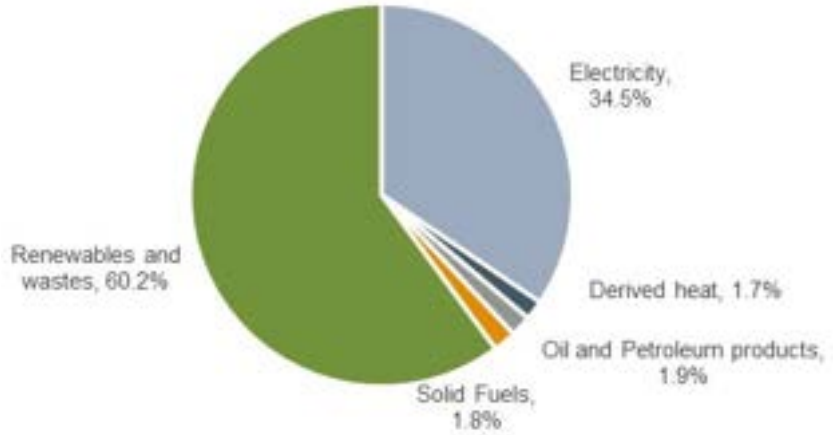
Source: GIZ (2019)

Total annual energy demand per type and age cohort [MWh]

Construction period	Single Family houses	Terraced houses	Multifamily houses	Apartment blocks	% per age
Pre-1960	162,206	7,350	4,715	0	1.8%
1960 - 1969	278,471	7,593	3,976	19,560	3.2%
1970 - 1979	1,670,563	82,260	50,081	46,436	19.3%
1980 - 1999	3,517,798	170,082	185,682	200,221	42.6%
2000 - 2017	2,522,890	74,948	64,092	489,074	33.0%
% per type	85.3%	3.6%	3.2%	7.9%	100.0%
Total annual energy demand (MWh)					9,557,998

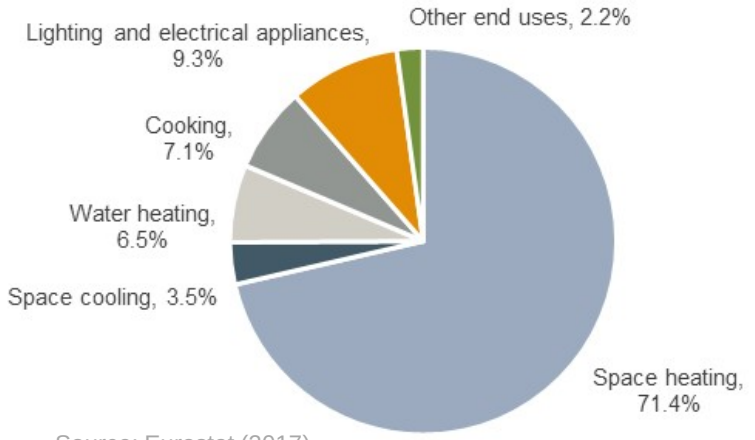
Source: Calculated based on GIZ data (2019)

Estimated energy mix in the residential sector (2017)



Source: Calculated based on GIZ data (2019)

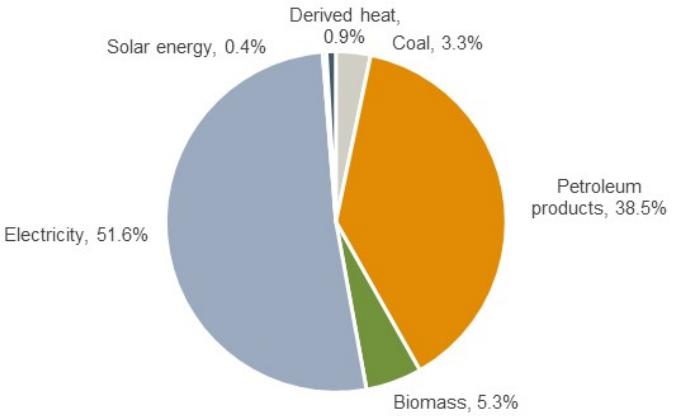
Distribution of energy use by application (2017)



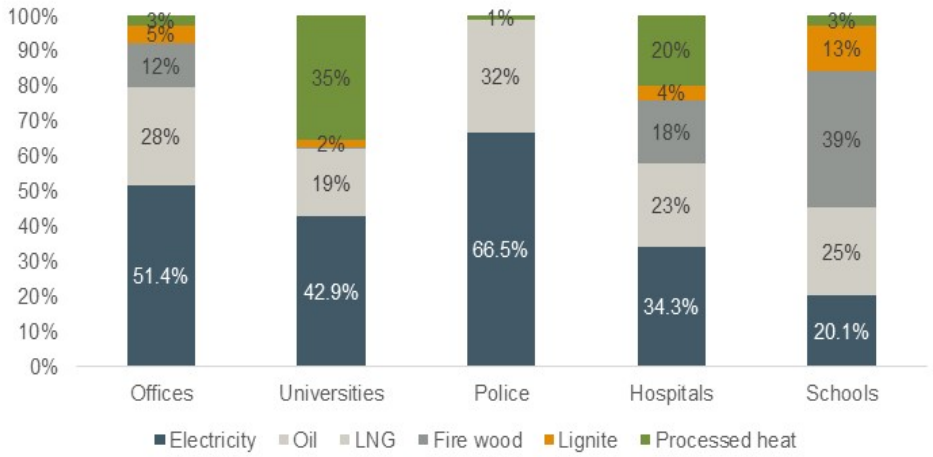
Source: Eurostat (2017)

Examples of building energy profiling

Energy supply mix in the commercial sector

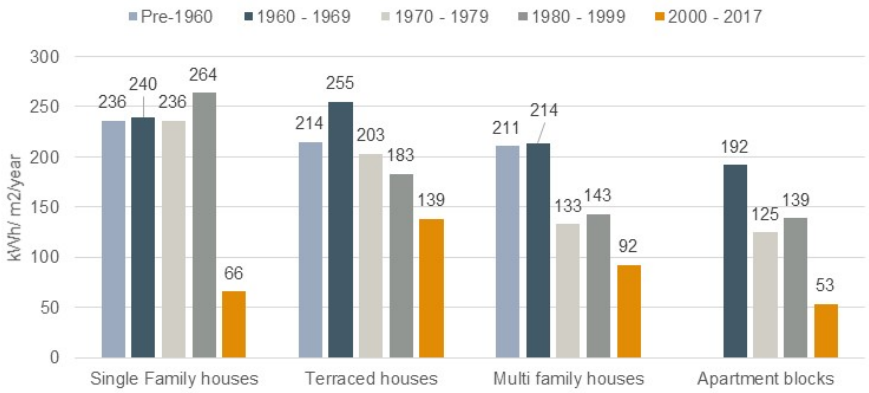


Energy supply mix in the public sector

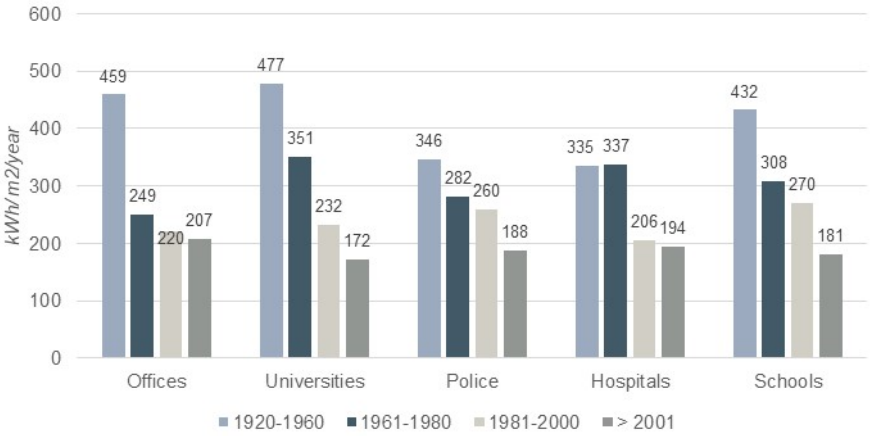


Source: Feasibility Study of Energy Efficiency and Implementation Measures in Public Buildings in Kosovo, 2015

Baseline energy intensities for different building types (kWh/m²)



Source: Calculated based on GIZ data (2019)



Source: Calculated based on WB data (2016)

Summaries of sectoral baseline figures

Parameters	Value	Unit
Number of dwelling units	412,883	#
Total floor area	34.4	million m^2
Gross annual energy use for the sector	6,580	GWh
Average annual energy use per dwelling	15,937	kWh
Average energy intensity	278	kWh/m^2year
CO_2 emissions for the sector	4.113	$MtCO_2$per annum
Total annual energy costs for the housing sector	300	€ million
Average annual energy cost per dwelling	726	€

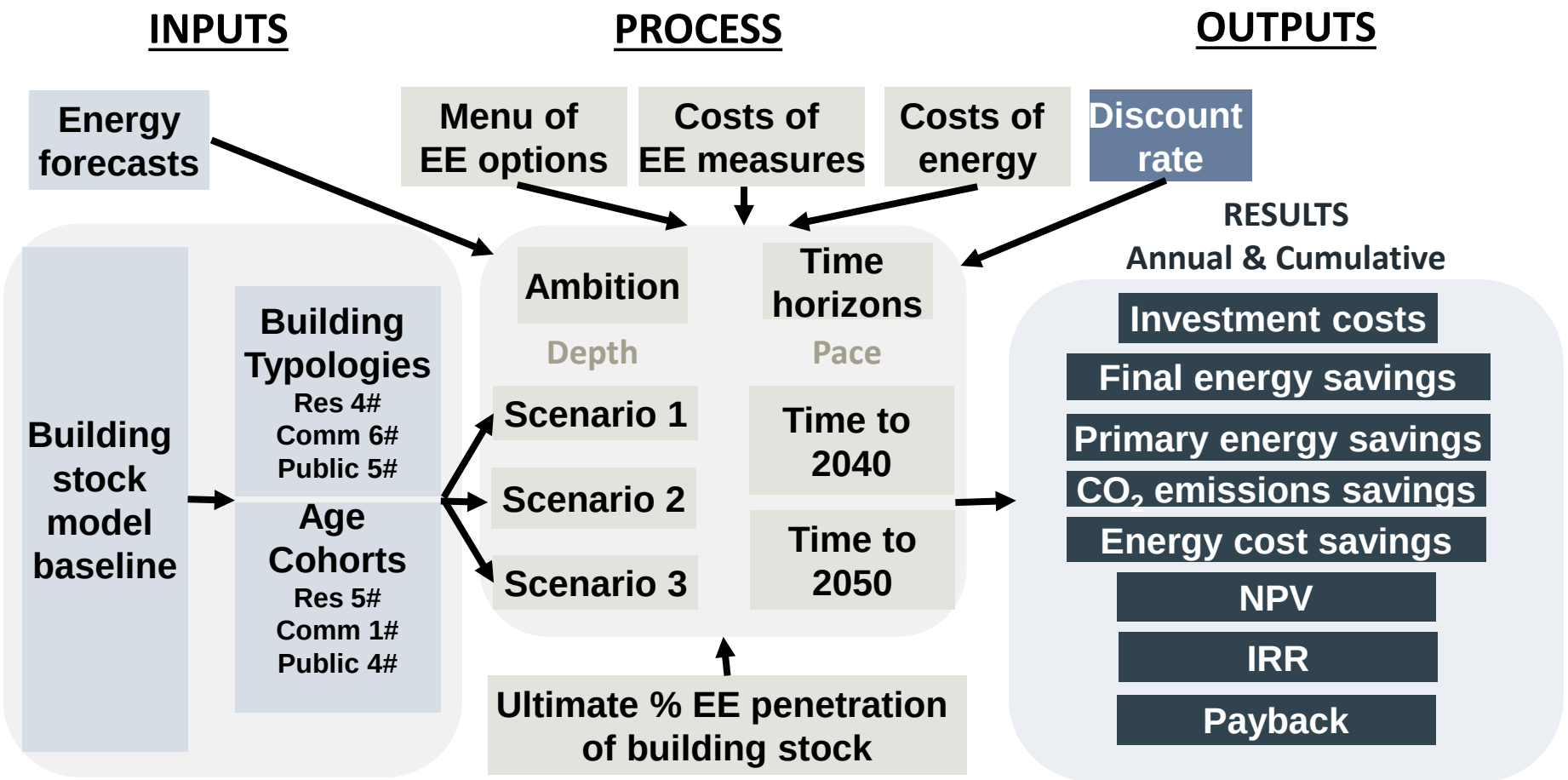
Parameters	Value	Unit
Number of public buildings	1,652	#
Total floor area	3.0	million m^2
Gross annual energy use for the sector	296	GWh
Average annual energy use per building	179,474	kWh
Average energy intensity	436	kWh/m^2year
CO_2 emissions for the sector	209	tonne CO_2 per annum
CO_2 emissions per building	0.13	tonne CO_2 per annum
Total annual energy costs for the public sector	23	€ million
Average annual energy cost per building	13,926	€

Parameters	Value	Unit
Number of commercial buildings	50,452	#
Total floor area	9.4	million m^2
Gross annual energy use for the sector	1,694	GWh
Average annual energy use per building	33,567	kWh
Average energy intensity	515	kWh/m^2year
CO_2 emissions for the sector	1,468	$MtCO_2$ per annum
CO_2 emissions per building	0.03	tonnes CO_2 per annum
Total annual energy costs for the commercial sector	149	€ million
Average annual energy cost per building	2,946	€

Unit
#
million m^2
GWh
kWh per unit
kWh/m^2 year
$MtCO_2$ per annum
€ million
€ per unit

Techno-economic assessment

Techno-economic appraisal (for each sector)



Scenarios and Time Horizons

Example of scenario inputs:

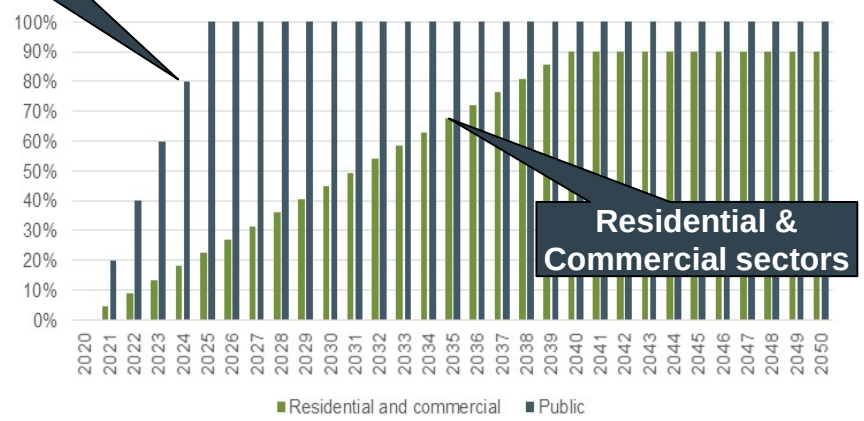
‘Not very ambitious Renovation’

‘Energy efficient Renovation’

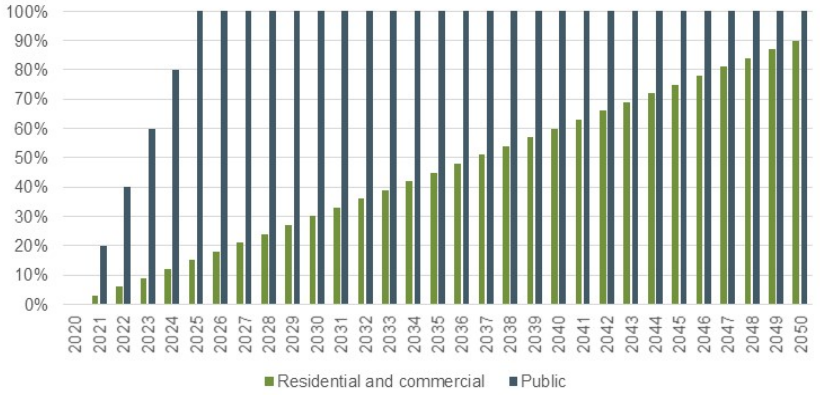
‘Very energy efficient Renovation’

	Scenario 1	Scenario 2	Scenario 3
Building Envelope			
Roof insulation	No insulation	20cm thermal insulation	20cm thermal insulation
Wall insulation	10cm thermal insulation	14cm thermal insulation	14cm thermal insulation
Glazing	Double-glazed windows with low-E	Triple-glazed windows with low-E	Triple-glazed windows with low-E
Floor insulation	No refurbishment	No refurbishment	No refurbishment
Energy systems			
Heating system	Baseline system (no refurbishment): Individual electric heaters or stoves	Baseline system (no refurbishment): Individual electric heaters or stoves	Central heating system with electrical heat pump system
Domestic hot water	Baseline system (no refurbishment): Individual electric water heater	Central domestic hot water system connected to heating system and solar collector system	Central domestic hot water system connected to heating system and solar collector system
Ventilation system	Baseline system	Baseline system	Baseline system
Space cooling	Baseline system	Baseline system	Baseline system
Lighting system	Baseline system	Baseline system	Baseline system
Cooking and other appliances	Baseline system	Baseline system	Baseline system

2040 (‘fast’) time horizon:

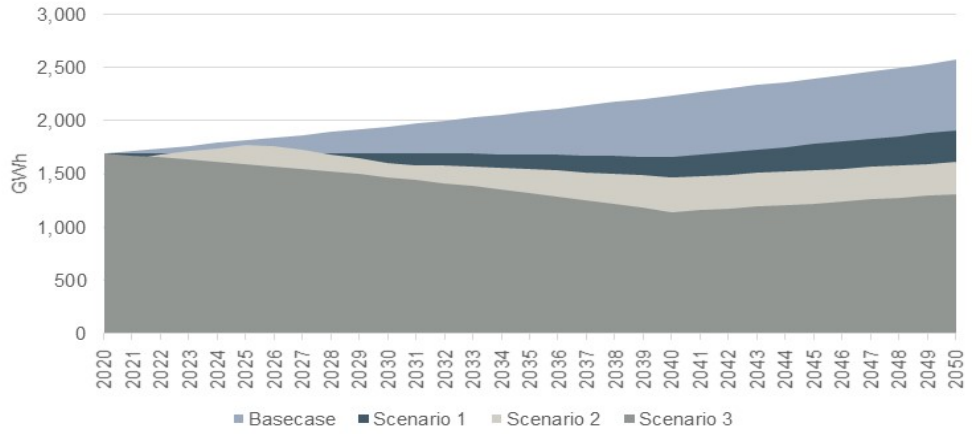


2050 (‘steady’) time horizon:

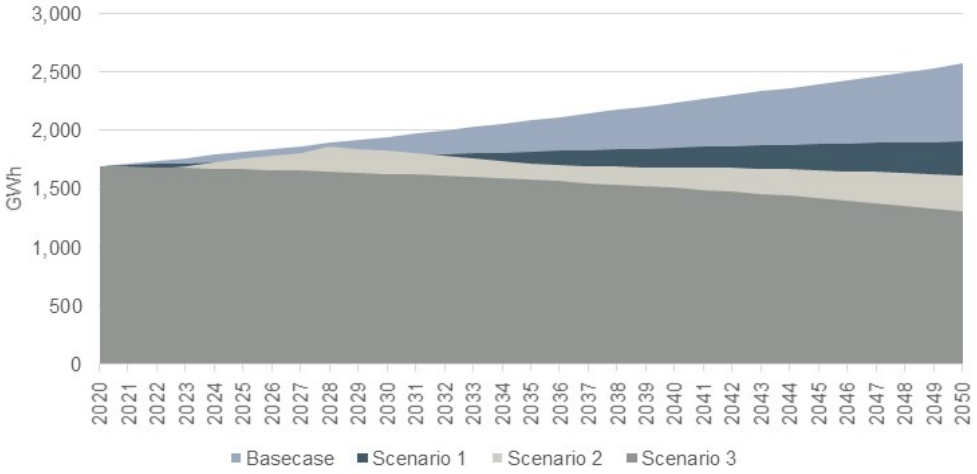


Examples of projected energy consumption trajectories

2040 investment time horizon



2050 investment time horizon



Preliminary findings

Provisional/ indicative findings

- Ultimate potential 53% energy saving relative to 2020 baseline
- Cumulative investment required €2.85 billion
- Annual investment required:
  - 2050 time horizon: €168 M
  - 2040 time horizon: €123 M
- Annual final energy savings up to 4500 GWh
- Annual CO_2 emissions savings up to 2.7 Mt CO_2
- Annual energy cost savings up to €342 M
- Cumulative energy savings relative to baseline forecast:
  - 2050 time horizon: 66000 GWh
  - 2040 time horizon: 89000 GWh
- Average payback period 8-12 years

Caveats

- Data reliability concerns
- Upstream energy efficiency and decarbonisation savings – in electricity and district heating supplies – are not included in this assessment
- Forecast growth in baseline profile – 67% of average of past 5 years
- Energy poverty indications and comfort taking (‘rebound effect’)
- But significant co-benefits apply

Strategic approach and issues

Pillars of the strategy

- Scale impact initiatives aimed at the most promising market sectors to mobilise deep or deeper energy efficiency renovation actions in the short term
- Pilot scale initiatives to help provide evidence and confidence to stakeholders in order to tackle key points of resistance (perceived market failures)
- Longer term underpinning developmental initiatives aimed at building capacity and an active healthy building EE renovation service sector, with a supply chain of competence, often in conjunction or in parallel with actions under the other two pillars.

Issues

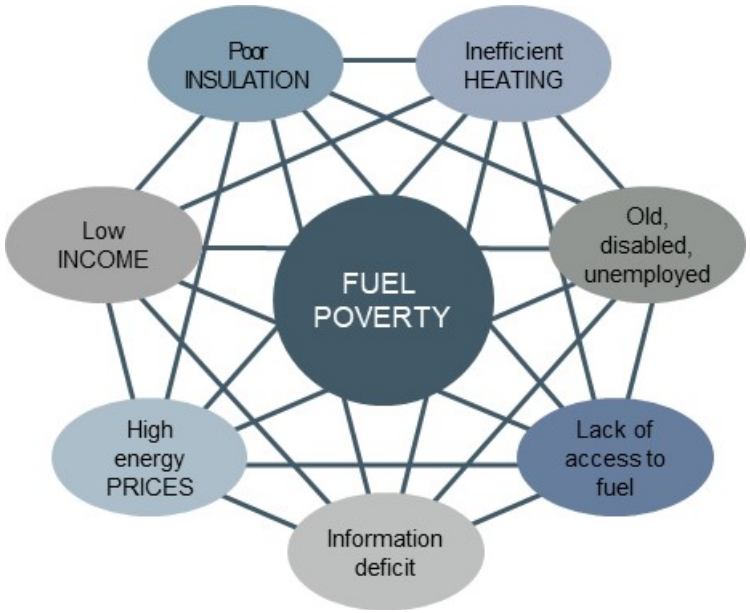
- **‘Deep’ renovation** – absolute, relative, energy money, packages, NZEB, RES
- **‘Long term’ perspective** –LCA, asset life, multi-annual
- **‘Cost effective’** – for whom, time horizon, NPV, IRR, payback, key assumptions (energy & CO2 pricing, interest rates, discount rates, inflation rates, opportunity cost, rebound effect
- **‘Trigger points’** – newly purchased, extension/ upgrade, EPBD 25% rule, seismic protection, marginal costs
- **Visibility of benefits** – EPC, asset value, other co-benefits
- **‘Staged’ renovation** – ‘fabric first’ or ‘equipment first’, ‘lock in’ effects, ‘renovation passports’
- **Prioritising poorest performing buildings** – old, high absolute energy, high energy intensity, energy poverty

Indications of ‘energy poverty’

Actual consumption as a % of calculated consumption

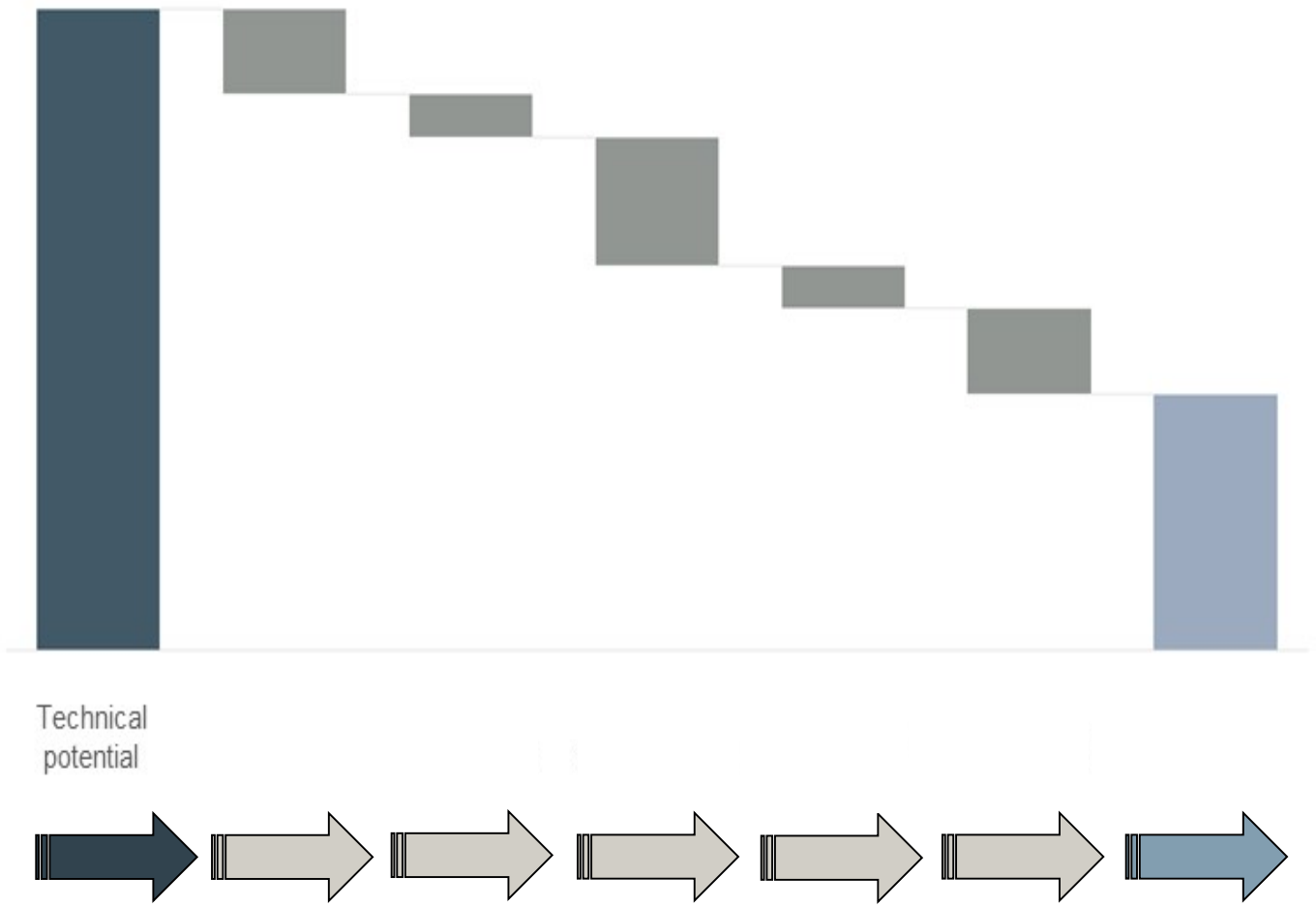
Typology	% of consumption at comfort level	World Bank study categories
Single Family Houses	75%	One storey house
Terraced houses	49%	Two storey villa >100m^2/storey
Multi-family houses	81%	Up to five storey building 1960-1990, 1970-1999, 1980-1999, 1999-2011
Apartment blocks	96%	Above five-storey building constructed in 1999-2012

Source: WB (2013) - National Building Energy Efficiency Study for Kosovo



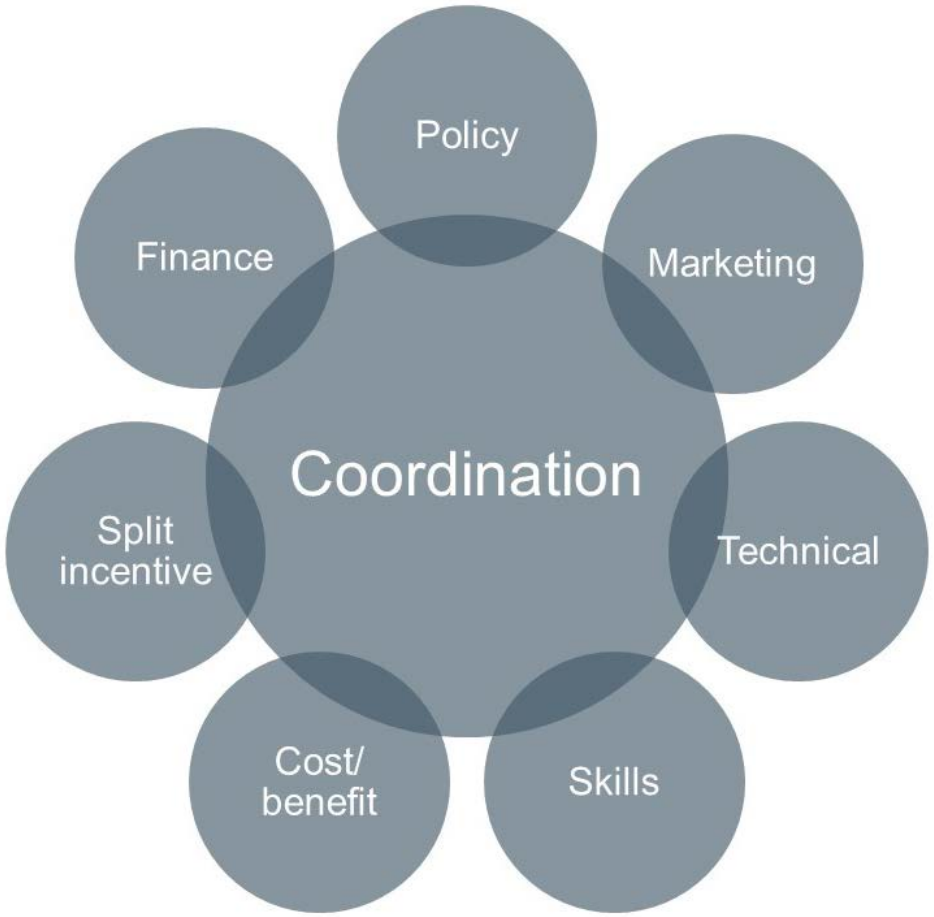
Source: ECA

From technical potential to realisable potential



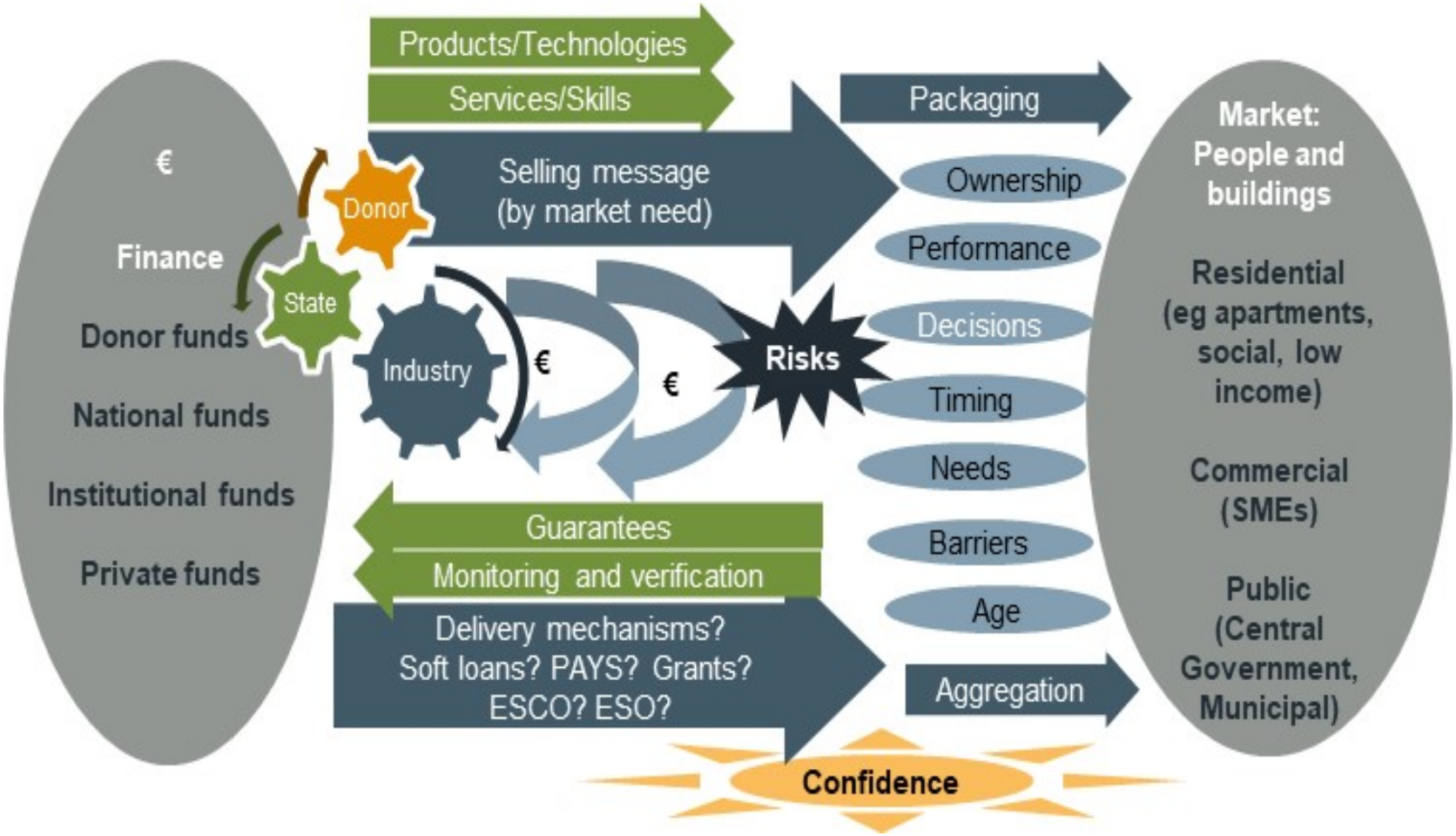
Barriers & Financing

Barriers to implementing energy efficiency renovation

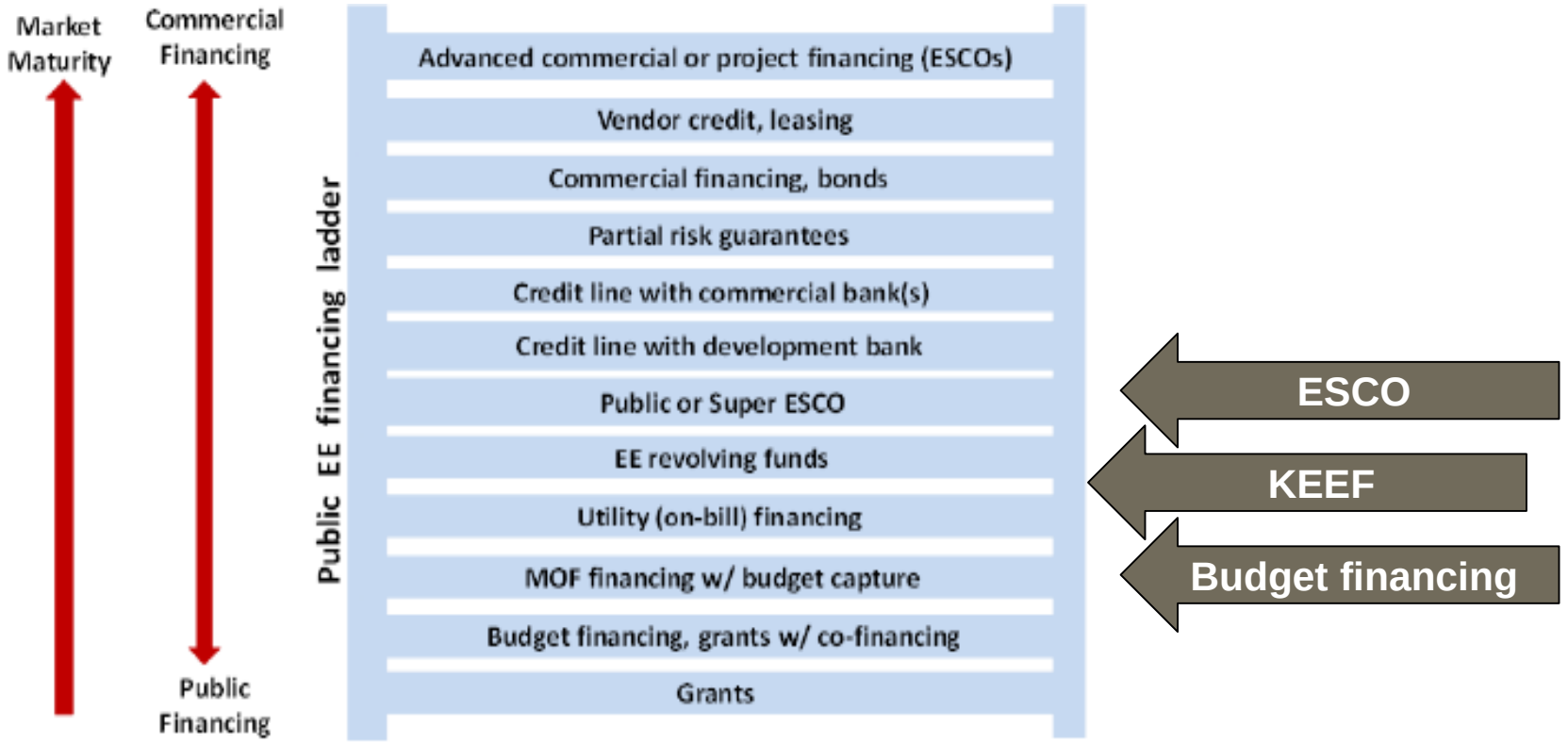


Barriers ⟷ Ingredients for success

Financing energy efficient buildings: sourcing funds, stimulating demand, delivery mechanisms

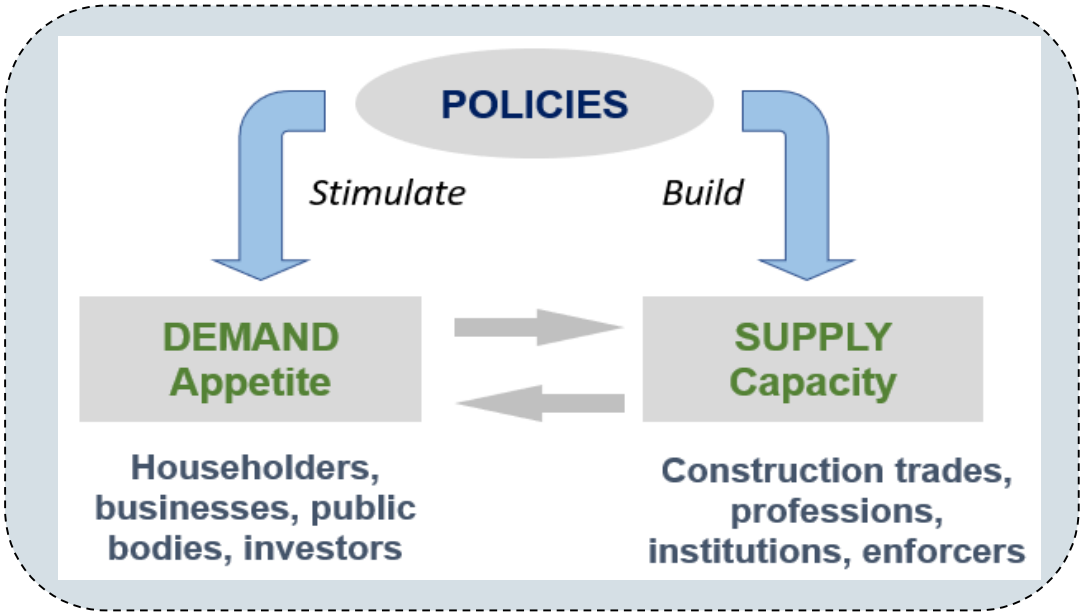


‘Financing ladder’ for energy efficiency projects



Policy measures

Policy actions



No	Regulatory Action	Status
	Inventory of energy performance indicators of energy-intensive municipal buildings, and regular reporting	
13	Adoption of Technical Regulation on Thermal Energy Saving and Thermal Protection in Buildings, establishing calculation method and standards for thermal performance for both new buildings and for renovation work representing more than 25% of the surface or value of the building	
14	Adoption of MESP Regulation on National Calculation Methodology for energy performance of buildings	
15	Adoption of MESP Regulation on procedures and responsibilities for Energy Performance Certification (EPC)	
16	Adoption of MESP Regulation on Minimum Energy Performance Requirements (MEPR) for the of Buildings, including general definition of NZEB	
17	Publication of National Plan for increasing the number of NZEB	
18	Finalising the cost optimal methodology and the evaluation and recommendation of MEPR/ NZEB standards using this methodology, including the robustness of standards for major and for minor renovations	
19	After reviewing and defining NZEB requirements and methodology for new buildings and major renovations (affecting over 25% of the building) in all sectors, updating and elaborating these elements in Technical Regulation or other secondary legislation	
20	Amending MESP regulations to require an appropriate proportion of major renovations to meet MPER/ NZEB standards in a defined timescale	
21	MESP Regulation No. 03/18 makes visible advertising of EPCs mandatory on all buildings being offered for sale or rent, as required by EPBD Article 12	
22	Considering using legislation to mandate improvement of buildings with poor energy characteristics (eg introducing various restrictions on the sale and renting of buildings with an energy class worse than D)	
23	Completing secondary transposition of EU Directive on energy labelling, by means of Delegated Regulations – application to boilers/stoves fired by biomass and oil; heat pumps; motors; air conditioners; lighting; refrigerators etc	
24	Elaborating Public Procurement rules through secondary legislation covering, inter alia, minimum thresholds of energy performance (EPCs) for building purchase or rental, registers of energy efficient products/equipment, mandatory selection of registered qualifying products, encouragement of ESCOs and renewable energy supply	
25	Introducing Green Public Procurement (GPP) criteria in Building Design, Construction and Management (including renovation), such as proposed by the EU, to facilitate inclusion of green requirements appropriate to Kosovo in public tenders	

- Regulatory
- Institutional
- Technical
- Financial
- Promotional

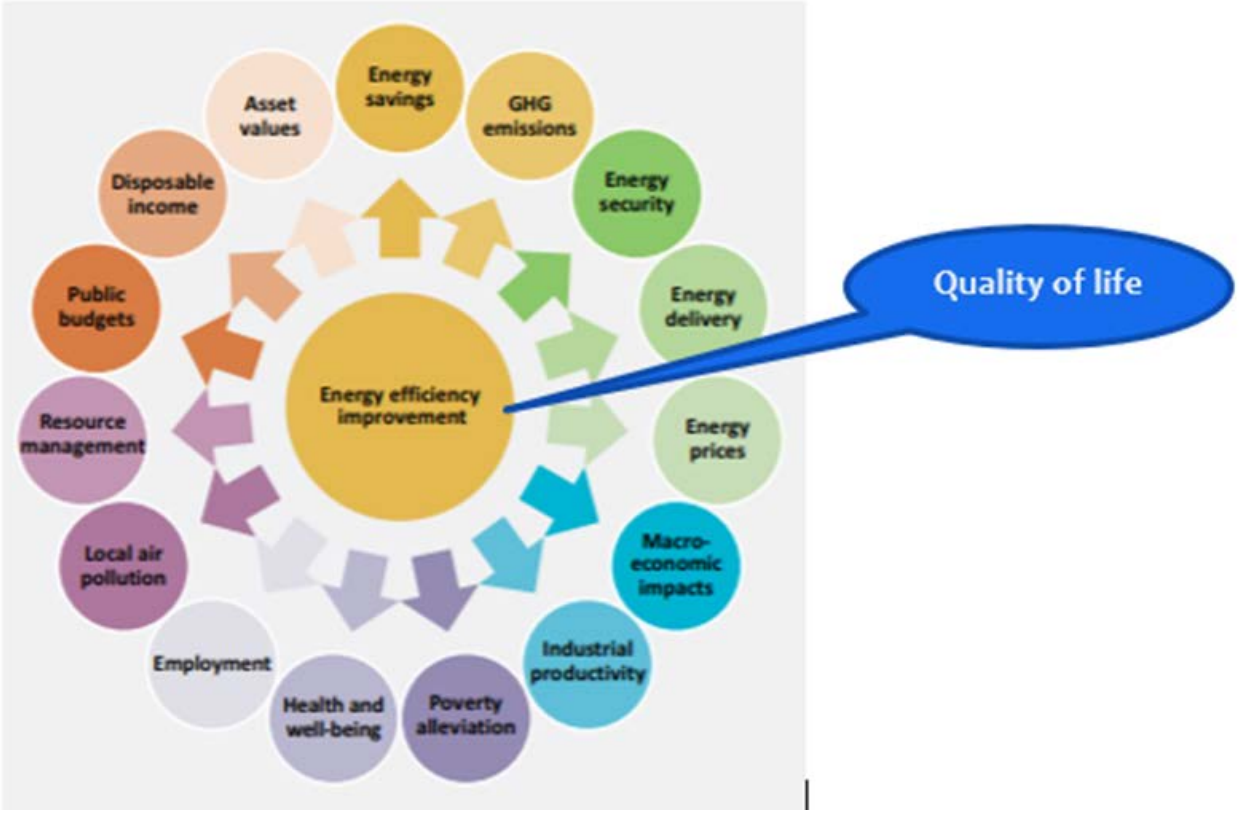
Public sector as exemplar – early priority: Why?

- **Mandatory requirement:** Obligation under EED Article 5 to renovate 1% of central government buildings annually. Inventory prepared
- **Influence:** Can demonstrate good solutions particularly relevant to commercial buildings
- **Best prepared:** Available baseline data and energy audits (eg the KEEREP study) providing strongest evidence base
- **Credit risk**: Central government (and possibly some municipalities) expected to have better credit rating than the market in general
- **Business models**: In principle public sector has potential to pioneer engagement with new business models for energy renovation, e.g. with ESCOs/ energy performance contracting contracts) and performance monitoring and verification protocols and guarantees

Benefits

Co-benefits & total benefits

- Energy
- Economic
- Social
- Environmental
- Total benefits can be over 4 x energy savings



Source: International Energy Agency

- Other countries: For every €1 invested returned €2-5 to state coffers (mainly in job creation) and €5 net benefit to society

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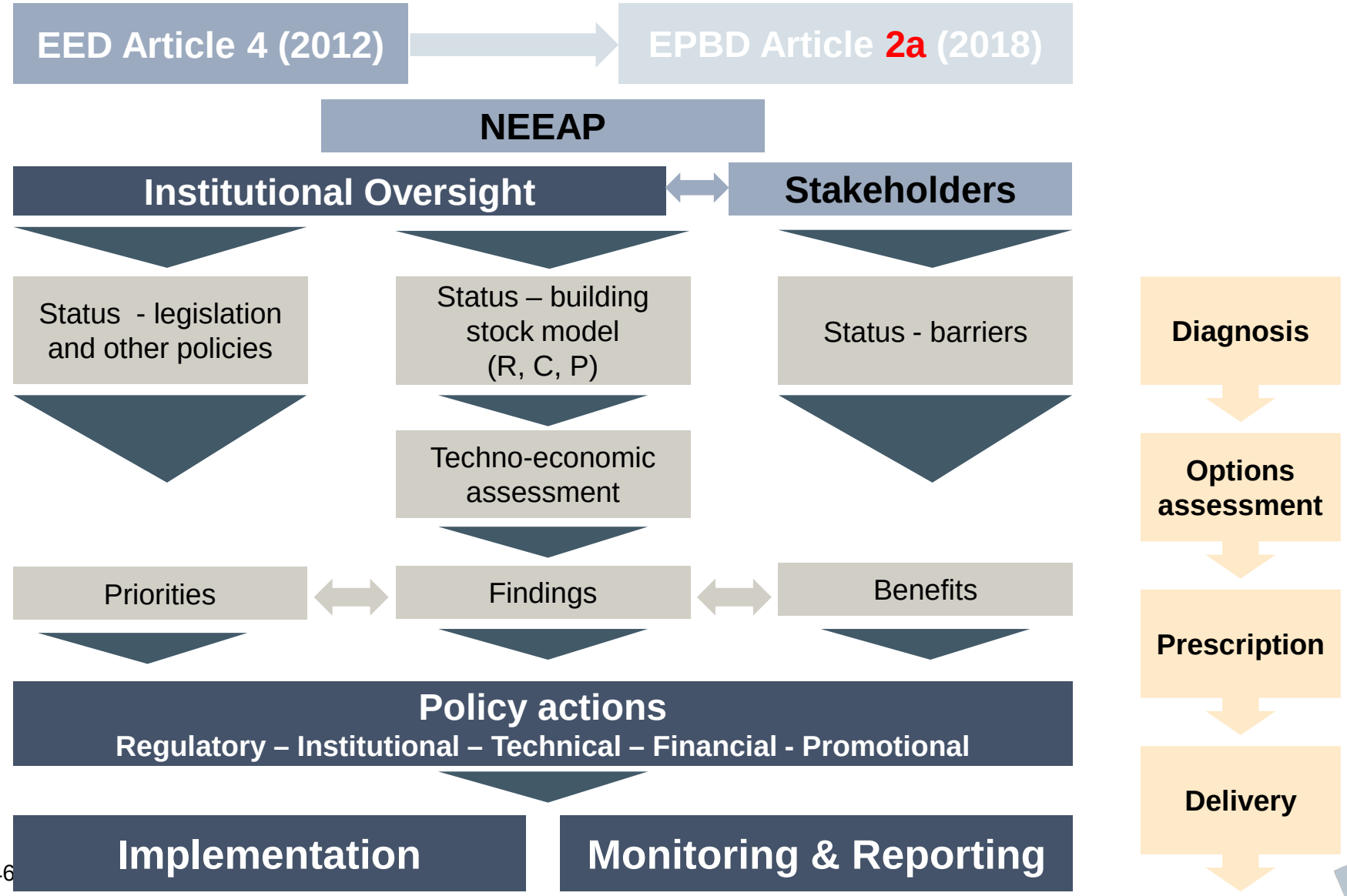
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