MINISTRY OF PUBLIC WORKS, DEVELOPMENT AND ADMINISTRATION

Romanian National Long-term Renovation Strategy
Key Elements

Ministry of Public Works, Development and Administration

EIB, MEEMA and the EU Commission
Energy Financing Workshop

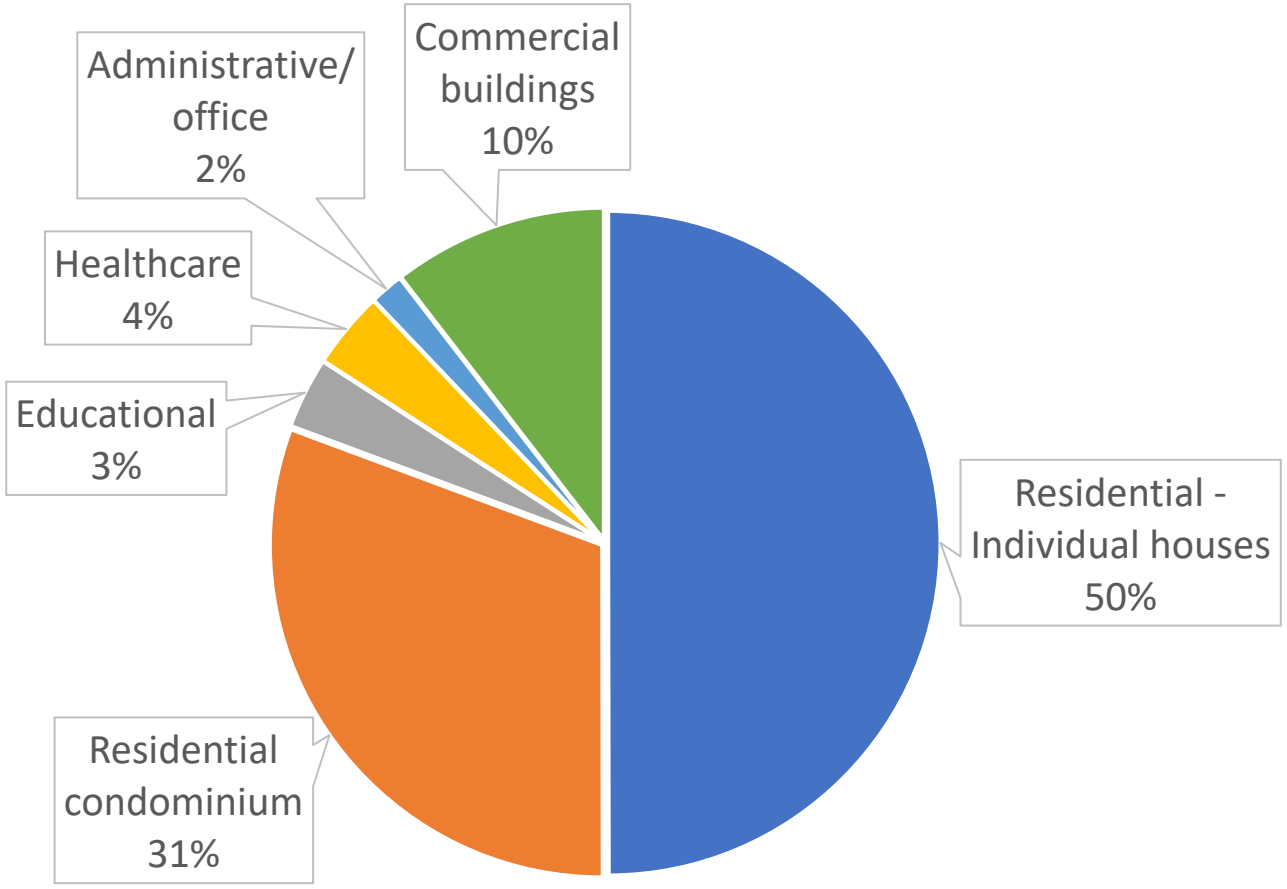
July 15, 2020

The strategy was developed with the World Bank support, within the project *Consolidation of the Strategic Planning Capacity of the Ministry of Public Works, Development and Administration for Renovation of the National Building Stock for Energy Efficiency and Seismic Risk, SIPOCA 606/MySMIS 127562*

Overview of the national building stock

Tipuri de clădiri	Principalele categorii posibile	Imagine reprezentativă	Numărul de clădiri [-]	Suprafața totală încălzită [Mm2]	Suprafață construită <2000 [Mm2]	Renovată până în 2020 [%]	Zona nerenovată [Mm2]
Locuințe unifamiliale	Rurale		3810737	247.80	217.840	3%	211.30
	Urbane		1354263	124.46	102.012	8%	93.85
Condominiu rezidențial	<=P+4 etaje		92332	94.51	77.50	7%	72.07
	>P+4 etaje		61554	115.51	94.72	7%	88.09
Educație	Instituții de învăţământ		18000	17.50	16.63	15%	14.13
Sănătate și asistență socială	Spitale		547	5.47	5.42	1%	5.36
	Alte servicii de asistenţă medicală şi asistenţă socială		50766	3.80	3.61	1%	3.58
Administrație/birouri	Clădiri administrative		6000	5.26	4.73	5%	4.50
	Clădiri din sticlă și oțel		1500	3.10	0.05	5%	0.05
Clădiri comerciale	Hoteluri		7642	4.23	0.85	5%	0.80
	Restaurante/cafenele		36000	1.82	1.28	5%	1.21
	Magazine		122000	20.83	14.58	10%	13.12
Subtotal rezidențial		*90%*	**5,318,886**	**582.27**	**492.06**	**5%**	**465.31**
Subtotal comercial și public		*10%*	**242,455**	**62.01**	**47.14**	**9%**	**42.75**
Total		*100.0%*	**5,561,341**	**644.29**	**539.20**	**6%**	**508.07**

Final energy consumption by type of buildings [M toe]
Total in buildings = 9.52Mtoe



Source: estimation based on EUROSTAT 2017 data

Key messages from the building stock data

- The housing stock is very old **~85% of buildings are built before 2000, and ~60% build before 1977.**
- Access to sufficient, **quality building stock data remains a critical issue**. As with the last LTRS, many assumptions had to be made on the data so this should be viewed as indicative only.
- It is estimated that ~6% of buildings will be renovated by 2020, **and ~79% of buildings will require renovation or reconstruction by 2050.**
- The largest share ~91% of building requiring renovation are in the **residential sector** which have **highest energy consumption ~81%**
- ~65% of the buildings to be renovated are single family buildings (SFBs)*
- For the 2021-2030 period, the priority to reduce energy consumption and CO_2 reduction would be **to target larger multi apartment buildings first, followed by public buildings** and single family buldings.

Methodology - renovation packages calculation

Selected technical solutions of measures for buildings renovation packages:

(i) **minimum scope** (**to meet national regulations**, i.e., Class C);

(ii) **medium scope** (**full renovation excluding rooftop PV**, to avoid "lock-in" effect to allow for future, staged renovation to meet NZEB); and

(iii) maximum scope of renovation (**deep or nZEB renovation standard**) including RES-measures in existing buildings:

(i) residential single-family,

(ii) multi-apartment,

(iii) education, and

(iv) office buildings using different source of heating fuel: gas, wood or heat from district heating (DH).

The packages are **based on cost-optimal levels of minimum energy performance requirements for building and building elements methodology**. Estimated investment costs are based on the actual renovation costs reported in Romania, calculated global cost and effects on energy performance and CO_2 emissions. (Global costs are calculated as the net present value of all costs incurred during a defined period – 30 years, taking into account the replacement costs and residual values of equipment with longer lifetimes.)

The calculations were performed for **3 climatic zones** of Romania.

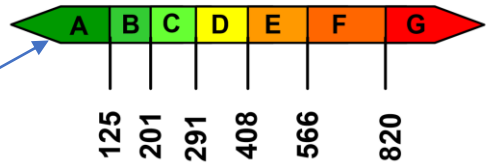
Cost effective approaches to renovation (1)

A. Existing residential multi-apartments buildings (MAB)

Built in 1967

Built in 1982

Heating, DHW, Lighting



Stage 1
- Thermal insulation
- BVs, TRVs
- Ventilation solution*

Stage 2
- Solar DHW
- Photovoltaic panels

A trigger points:

- A panning list of MAB renovation created by local authority with proposal to apartment owners for renovation with public financial support.
- A disaster/incident (e.g. fire, earthquake, flood) after which building must be restored with improved energy performance characteristics as defined in stage 1.
- Planned major capital repair of building.

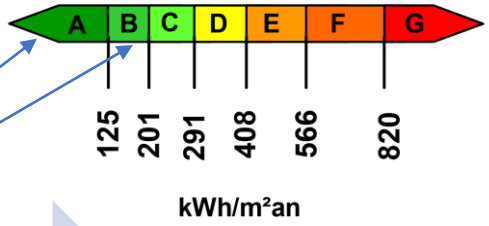
*modifications made for the natural ventilation channels inside the building and apartments must be properly assessed and relevant ventilation strategy solution shall be proposed.

Cost effective approaches to renovation (2)

B. Existing Single- family (individual) buildings:

Heating, DHW, Lighting

Built in 1958



Stage 1

- Thermal insulation
- Firewood stoves improvement (issue of incomplete combustion, without particle filters)*

Stage 2

- Solar DHW
- Photovoltaic panels
- Heat pump air-water/ground

A trigger points:

- A transaction- sale or rent of building for which owner is required to renovate building corresponding to the cost-effective approach specified in the stage 1 above.
- disaster/incident (e.g. fire, earthquake, flood) building must be restored with improved energy performance characteristics as defined in stage 1.
- Planned major capital repair of building for which building owners need from the local authority to obtain construction permit.

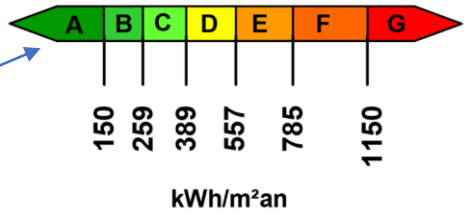
* Specific program is needed on: Efficient use of *firewood,* biomass, modern heat generation systems, in particular for rural heating (NECP)

Cost effective approaches to renovation (3)

C. Education institutions buildings

Built in 1948/ partially renovated in 2010

Heating, DHW, Lighting,
Mechanical ventilation
Air-conditioning,



Stage 1
- Thermal insulation
- Heat recovery
- Air-conditioning
- DH or Heat pump air-water/ground

Stage 2
- Solar DHW
- Photovoltaic panels

Recommended to implement in one stage

A trigger points:

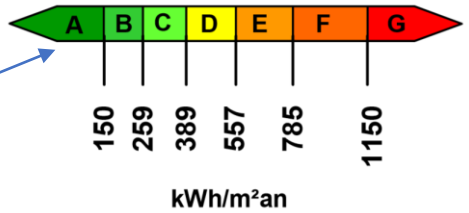
- Education facilities network optimization program run by state or local authority in which is planned extend/reduce educational facilities based on education service demand/supply analysis in specific location.
- disaster/incident (e.g. fire, earthquake, flood) building must be restored with improved energy performance characteristics as defined in Stage 1 and Stage 2 above.
- Planned major capital repair of education building for which education building owners/managers need from the local authority to obtain construction permit.

Cost effective approaches to renovation (4)

D. Offices Buildings

Built in 1972

Heating, DHW, Lighting,
Mechanical ventilation
Air-conditioning,



Stage 1

- Thermal insulation
- Radiators for variable refrigerant volume
- AHU with heat recovery
- DH or heat pump air-water/ground

Stage 2

Photovoltaic panels

A trigger points:

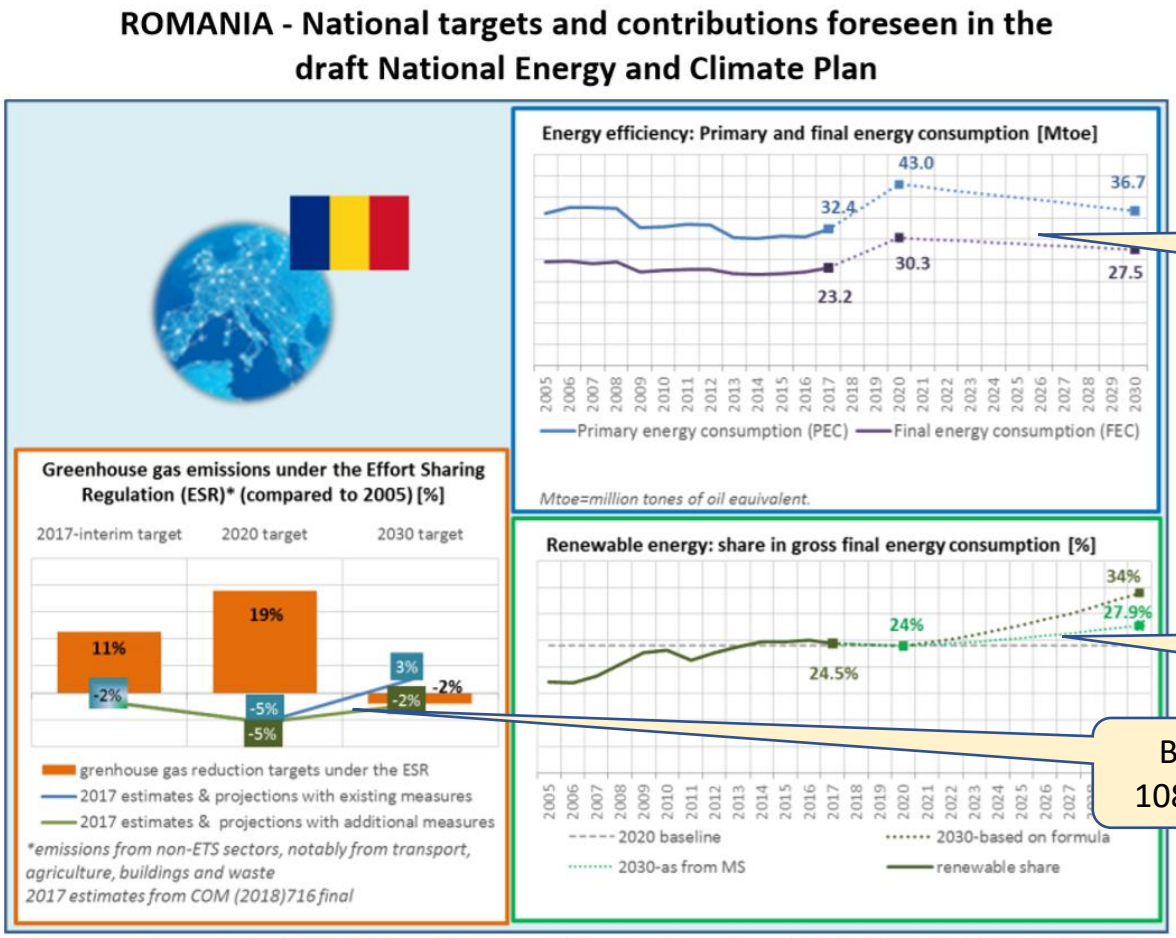
- A transaction- sale or rent of building for which owner is required to renovate building corresponding to the cost-effective approach specified above.
- Disaster/incident (e.g. fire, earthquake, flood) building must be restored with improved energy performance characteristics as defined in stage 1 above
- Planned major capital repair of building for which building owners need from the local authority to obtain construction permit.
- Administrative facilities network optimization program run by state or local authority in which is planned extend/reduce public institutions facilities based on the public service demand/supply analysis.

Methodology and key assumptions for scenario selection

- **Three scenarios were developed based on different paces of renovations for each decade**, and based on the different targeting of buildings types:
  - **Scenario 1** was defined as **incremental renovations** which scope increases by 0.1-0.15% each year. This scenario maybe attractive in the first decade due to the need to build market capacities; however this will **require a major increase in pace from 2030-50 in order to meet the 2050 target** which will be a big challenge.
  - **Scenario 2 was defined with a more gradual increase in pace for each decade. The first decade has a greater focus on MABs (~40%) as they offer the highest energy savings and CO_2 reduction potential.**
  - **Scenario 3** was defined as **relatively equally distributed annual renovation rates in each decade**. Such scenario maybe difficult to implement 2021-30 when **the market may not be fully capable for such a pace of renovations and financing would be much more difficult to mobilize**.

	2021-2030 annual renovation rates	2031-2040 annual renovation rates	2041-2050 annual renovation rates
Scenario 1	Incremental from 0.35% to 1.71%	Incremental from 2.22% to 4.78%	Incremental from 4.85% to 6.41%
Scenario 2	1.88%	3.79%	4.33%
Scenario 3	3.13%	3.24%	3.62%

Buildings renovation scenario 2 impact to the National targets of the Integrated Energy and Climate Plan of Romania



Buildings can contribute by 30% (-0.83Mtoe reduction)

Buildings can contribute by 87% (+0.22Mtoe increase)

Buildings can contribute by 108% (-3.28 M tons reduction)

Sources: Romania's draft National Energy & Climate Plan, Eurostat (PEC2020-2030, FEC2020-2030 indicators and renewable SHARES), COM (2018) 716 final (2017 GHG estimates)

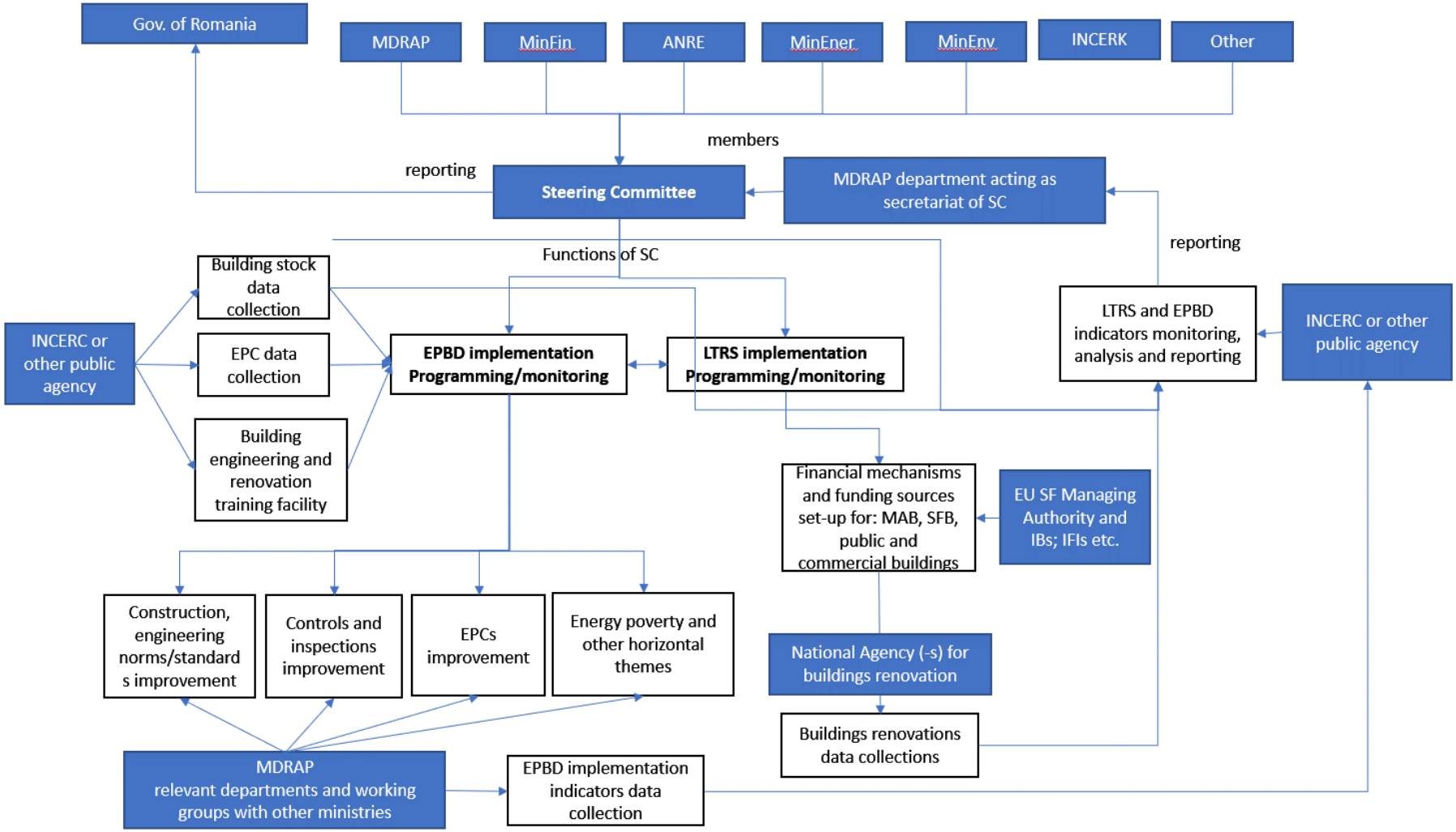
Summary of recommended buildings renovation scenario (2)

Building types	Possible main categories	Area [M m2]	Buildings [units]	Investment [M EUR]	Energy savings [M toe]	CO2 reduction [Mton]	Renewables increase [Mtoe]
Residential - Individual houses	Rural	10.57	162,475	1,736.87	0.17	0.04	0.07
	Urban	9.39	102,120	1,449.88	0.14	0.11	0.04
Residential condominium	<=P+4 floors	21.62	21,124	2,791.47	0.11	0.47	0.02
	>P+4 floors	44.04	23,471	4,877.24	0.36	1.41	0.05
Educational	Schools	4.24	4,361	874.84	0.03	0.14	0.01
Healthcare	Hospitals	1.61	161	318.33	0.01	0.06	0.01
	Other	1.07	14,324	192.52	0.01	0.02	0.00
Administrative/office	Admistrative buildings	1.35	1,539	236.55	0.01	0.03	0.00
	Glass & steel buildings	-	-	-	-	-	-
Commercial buildings	Hotels	0.04	73	9.38	0.00	0.00	0.00
	Restaurants/ Coffee shops	0.12	2,394	27.05	0.00	0.00	0.00
	Shopping	1.31	7,686	269.40	0.01	0.06	0.01
Total		**95.36**	**339,726**	**12,783.53**	**0.83**	**2.34**	**0.22**

Required investments amount ~12.78 billion euro by 2030

Governance and Institutional Set-up

LTRS Governance Framework



Financing: mobilization of investments into the renovation needed to achieve the goals

- **Public EE financing mechanisms:**
  - A key objective is to reduce the share of annual investment requirement from nation and EU budgets, as these funds are limited and not scalable or sustainable
  - **Integrated management of public financing** from EU and national budgets into buildings renovation in the form of partial grants, repayable grants, investments into other financing instruments (e.g., revolving funds, guarantees, etc.).
- Commercial bank lending (credit lines, guarantees),
- **Need to improve share of creditworthy borrowers** (i.e., Home owners associations, maintenance firms, municipalities, ESCOs, etc.)
- Need to promote and foster **innovations in financing** to see what works (e.g., residential home/appliance credit, commercial building renovation credits, on-bill utility financing, property assessed clean energy or PACE)

Financing: €12.8B investment [€5.0B public and €7.8B private]

Central government buildings CGBs (~€300M from public budget/EU funds)

- Option 1 (100% budget support) can be most suitable for CGBs as it is based on 100% grant option.
- If there are savings, government can reduce budget appropriations for the energy and maintenance costs for renovated buildings.

Municipal public buildings (~€1.3B of which ~€700M public budget/EU funds and ~€600M from private sector)

- Option with a revolving preferential loan and/or a partial grant/repayable grant.

Multi apartment buildings (~€7.6B of which ~€3.5B public budget/EU funds, ~€4.2B from private sector)

- Option with a revolving loan and a partial grant for example an initial maximum level of 80%, decreasing to 60% after 5 years, 40% after 10 years, etc. To be determined.
- Repaid amounts could be collected and used to repay IFIs, or could revolve under Program for future phases

Single family buildings (~€3.2B of which ~€500M public budget/EU funds, €2.7B private sector)

- Mortgage loans and partial grants for thermal insulation and RES installations

Commercial buildings (~€300M from private sector)

- Own financing of commercial buildings owners
- Loans from commercial banks

Roadmap **Indicators and milestones of buildings renovation contributing to EU targets**

Indicator	Unit	Baseline value	Target values (incremental)		
		2020	2030	2040	2050
Final energy savings	**M Toe**	**0**	**0.83**	**3.32**	**6.14**
	%	**0%**	**9%**	**35%**	**65%**
- Residential	M Toe	0	0.77	3.19	5.88
- MAB	M Toe	0	0.47	0.79	1.08
- SFH	M Toe	0	0.31	2.40	4.80
- non-residential	M Toe	0	0.06	0.13	0.26
- public	M Toe	0	0.05	0.09	0.16
- commercial	M Toe	0	0.01	0.04	0.10
CO2 emissions reduction	**M Toe**	**0**	**2.34**	**4.91**	**7.85**
	%	**0%**	**24%**	**50%**	**80%**
- Residential	M m2	0	2.03	4.20	6.41
- MAB	M m2	0	1.87	3.19	4.37
- SFH	M m2	0	0.16	1.02	2.03
- non-residential	M m2	0	0.31	0.71	1.45
- public	M m2	0	0.25	0.49	0.82
- commercial	M m2	0	0.06	0.22	0.63
Increase of NZEBs (PE <50kWh/m2/y; RES >40%; CO2 <7kgCO2m2)	M m2	0	3.45	20.58	117.40
	%	0	1%	4%	23%
- Residential	M m2	0	0.86	13.31	93.06
- MAB	M m2	0	0.66	5.69	32.03
- SFH	M m2	0	0.20	7.63	61.03
- non-residential	M m2	0	2.60	7.27	24.34
- public	M m2	0	2.52	6.74	16.75
- commercial	M m2	0	0.07	0.53	7.59
Reduction of people affected by energy poverty	%	0%	-30%	-70%	-100%
Reduction of buildings in the lowest energy classes	%	0%	19%	23%	26%
Non-residential buildings equipped with BEMs or similar smart systems	%	0%	18%	45%	100%
- non-residential	units	0	30,537	76,488	170,221
- public	units	0	20,384	40,768	67,947
- commercial	units	0	10,153	35,720	102,275
No of one-stop shop initiatives	No	0	4	5	6
Awareness raised that lead to concrete actions (% of owners taking renovation actions out of targeted owners)	%	0	19%	57%	100%

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Thank you for your attention!

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