SMARTER FINANCE FOR FAMILIES

"SMARTER Finance for Families – Improving Citizens' Health Comfort and Financial Well-being by Supporting Banks, Residential Investors and Solution Providers with Green Homes and Green Mortgage programs"

D4.06 Sample Portfolio of Sustainable Residential Real Estate Projects

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Contents

Credits

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The author would like to thank the participants of the interviews and extended consultations during the study period (see Annex for full list of names).

Reviewers

List of Acronyms

ADB – Asian Development Bank

BOG – Bank of Georgia

CG – Corporate governance

CO_2 – Carbon dioxide

DHW – Domestic hot water

EE – Energy efficiency

EBRD – European Bank for Reconstruction and Development

EED Directive – Energy Efficiency Directive (Directive 2012/27/EU)

EeDaPP – Energy Efficiency Data Protocol and Portal

EEFIG – Energy Efficiency Financial Institutions Group

EeMAP – Energy efficient Mortgages Action Plan

EPB – Energy Performance of Buildings

EPC – Energy Performance Certification

EPS – Expanded polystyrene

EPBD – Energy Performance Building Directive (2010/31/EU)

ESG – Environmental, social and corporate governance

E5P – Eastern Europe Energy Efficiency and Environment Partnership

FINTECC – Finance and Technology Transfer Centre for Climate Change

FiM – Finance in Motion, Initiative

GEF – Global Environment Facility

GFA – Gross Floor Area

GHG – Greenhouse gas emissions

GBCG – Green Building Council of Georgia

GDP – Gross Domestic Product

GGF – Green for Growth Fund

GGU – Georgia Global Utilities

HFA – Heated Floor Area

ICMA - International Capital Market Association

IFI – International Financial Institutions

IFC – International Finance Corporation

kWh – Kilowatt hour

SFT – Sustainable Finance Taxonomy

SME – Small-medium enterprise

LED – Light Emitting Diode

MDB – Multi-dwelling building

MoESD – Ministry of Economy and Sustainable Development

Mt – Megatonne

MWh – Megawatt

NDC – National Determined Contributions

NBG – National Bank of Georgia

NECP – National Energy and Climate Plan

NFI – National Financial Institutions

NEEAP - National Energy Efficiency Action Plan

NREAP – National Renewable Energy Action Plan

OECD – Organization of Economic Cooperation and Development

PV – Photovoltaic

PVC – Polyvinyl chloride

RE – Renewable energy

RoI – Return on investment

SBN – Sustainable Banking Network

SDB – Single-dwelling building

SFT – Sustainable Finance Taxonomy

UNFCCC – United Nations Framework Convention on Climate Change

WGBC – World Green Building Council

XPS – Extruded polystyrene insulation

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Glossary

- **HEATED FLOOR AREA (HFA):** is the total floor area (in square meters) of enclosed heated space on all floors of a building, as measured at the floor level of the exterior surfaces of exterior walls enclosing the conditioned space.

- **GREEN BUILDING:** a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment. Green buildings preserve precious natural resources and improve our quality of life.

- **ENERGY-EFFICIENT (EE) BUILDING:** a building designed to provide a significant reduction of the energy need for heating and cooling, independently of the energy and of the equipment that will be chosen to heat or cool the building (ISOVER, 2021).

- **GREEN MORTGAGE:** a mortgage specifically targeted at green buildings. As an incentive for the borrower to either buy a green building or to renovate an existing one to make it greener, the bank would offer them either a lower interest rate or an increased loan amount (WBGC, 2021).

- **GREEN TARIFF:** a price structure, or an electricity rate, offered by a local utility and approved by the state's Public Utility Commission that allows eligible customers to source up to 100% of their electricity from renewable resources (WRI, 2021).

- **GREEN FINANCE:** refers to an increased level of financial flows (from banking, micro-credit, insurance and investment) from the public, private and not-for-profit sectors to sustainable development priorities. A key part of this is to better manage environmental and social risks, take up opportunities that bring both a decent rate of return and environmental benefit and deliver greater accountability (UNEP).

- **SINGLE-DWELLING BUILDING:** A single dwelling building includes Single-family house or detached house, Semi-detached house, Twin house, or Duplex, Row house or Terrace house. A single-family house or detached house: A house for a single family or household that is not attached to any other building. A semi-detached house, twin house, or duplex is a twin house/duplex/semidetached house is a house, typically with two separate entry doors (sometimes with one) divided into two parts and housing two separate owners or tenants; this can be side-by-side, or one above the other. A row house or terrace house is a row house/terrace house is one of a series of houses, often of similar or identical design, situated side by side and joined by common walls (Camarasa et al., 2015).

- **MULTI-DWELLING BUILDING:** this includes small multi-family or small apartment buildings: A small multi family home/small apartment building is a building where multiple separate housing units (12 or less) for residential inhabitants are contained within one building or several buildings within one complex. Large multi-family homes or large apartment buildings (Camarasa et al., 2015).

1. Introduction

1.1. Motivation

In Europe, buildings are responsible for over one third of the total final energy consumption and a great portion of this energy is used by the residential sector (20–30 percent of total final consumption on average). Demographic, economic and cultural changes are further increasing the pressure of energy use and related greenhouse gas (GHG) emissions. In parallel, the building sector –particularly the residential– has been recognized as hosting the greatest energy saving potential and, in most cases, through cost-effective interventions.

In Georgia, the level of energy consumption of buildings is high, as most of building stock was constructed during the Soviet period when, rather than energy efficiency (EE) and comfort, priority was given to low-budget and easy-to-build constructions. In 2015 the emissions from Georgia's building sector made 11 % of total emissions, from which the biggest portion (79%) accounted for the residential buildings (UNFCCC, 2019). Were it not for poverty, the amount of fuel consumed for heating in Georgia would be even higher. As of 2015, households in urban areas spend an average 37 EUR per month on utility bills, which is about 25% of the average monthly income (Geostat, 2016). Furthermore, by 2030 direct and indirect GHG emissions deriving from energy demand are expected to increase by 150% in the residential sector driven by a rising population and increased purchasing power. Many homes and apartments that now only have one heated room are expected to increase the amount of heated space over the next decade. If actual emissions from the building sector have been calculated equal to 1.95 $MtCO_{2eq}$, the baseline emissions for 2030 have been estimated to increase to 4.63 $MtCO_{2eq,}$ more than double.

The updated Nationally Determined Contribution (NDC) in Georgia is fully committed to an unconditional limiting target of 35 % below 1990 level of its domestic total GHG emissions by 2030 (UNFCCC, 2021). The country has committed to a target to reduce 50-57% of its total GHG emissions by 2030 as compared to 1990, in case the global GHG emissions follow the 2 degrees or 1.5 degrees scenarios respectively, with the international support. Though the updated NDCs don't specify the target for emission reductions in the building sector, it supports the low carbon development of the building sector through encouraging the climate-goals oriented EE technologies and services. To support this, the recently adopted "Georgia's 2030 Climate Change Strategy and Action Plan for 2021-2023" sets number of policy measures and actions for the development and implementation of low carbon approaches in the buildings sector, promotion and application of climate-friendly and EE technologies, which will provide for reaching emission reduction target for 2030 of 4.60 $MtCO_{2eq}$ (UNFCCC, 2021).

However, currently building renovation rates and practices in Georgia are far below reaching these targets. Most of the renovation efforts are not cost-optimal due to capacity and supply-chain limitations, as well as regulatory and policy limitations. To keep climate goals on track, substantial green and EE building investments are required, alongside with significant developments to building policies, standards and technologies.

1.2. Goal and scope of the study

In this context, the goal of the study is to characterize the current situation in Georgia in relation to the green mortgages and bonds required to unwrap the full EE and green homes investment potential.

This study can be advantageous to the EU as in provides an overview of opportunities and fronts to develop in the Georgian context to promote EE investments in the housing sector. Furthermore, the methodology developed in this study can be undertaken by other countries with analogue purposes as it is conceived as a neutral framework to enable cross-country comparability of the results[1].

[1] In a diverse national organization such as the EU, it is particularly essential to identify country- and cross-scale knowledge to generate an appropriate combination of common and country-specific policies (European Commission, 2020).

In terms of the scope and limitations, this report subscribes to the following:

- Residential buildings are the focus of this study, non-residential buildings might be mentioned only in the case in which policy or financial instruments apply to both;
- EE and Green residential buildings, yet due to the policy framework and data availability the content focuses mostly on EE interventions;
- No exclusion has been made based on the ownership type of the stock, covering both public- and private-owned buildings;
- New and refurbishment projects are included in the study;
- Opinions from all relevant financial institutions involved or affected by investments in EE/Green building projects in Georgia, namely public and commercial;

2. Methodology

This report follows a combination of quantitative and qualitative data collection and analysis methods, including both primary and secondary data. Secondary data is based on an extensive study covering a wide range of literature and data sources, such as the Georgia Department of Statistics, national and international reports, scientific publications, and other market information. All data sources are clearly indicated to allow the reader to access more detailed information as needed. The complete list of sources, including those used in the literature review study, can be found in the "References" section. As for the primary data, the concrete approach to attain the data, varies for each section:

A) Analysis of the residential building stock

The content in this chapter presents novel insights on the energy demand of the Georgian housing stock per building typology. It has been developed based on a combination of desk research and quantitative assessment methods. The latter is composed of two main calculations:
Baseline energy demand: The energy performance per building typology for the baseline case (kWh/m2/year) was developed by the GIZ funded research (Mayer et al., 2017). The stock volume for each of the building typologies is based on the data on "Energy consumption in households 2017" from the National Statistics Office of Georgia (GeoStat, 2020). The final annual energy demand for each type of buildings was then calculated by multiplying both of these values (total energy demand = **35 504 021 568** kWh/year).

Energy efficiency potential: In order to identify current EE potential (energy saving) in the housing building stock in Georgia, the baseline case is subtracted to three energy performance standards: Class A (Excellent, exemplary), Class B (Good) and Class C (minimum). For building Class C, an average annual specific consumption for multi-dwelling building is about 140 kWh/m^2/year and for single-dwelling buildings is about 130 kWh/m^2/year). These reference values (140 and 130 kWh/ m^2) are based on the average values across the three existing climatic zones. Likewise, Class B building energy performance equals to 60-62 kWh/m^2 (an average annual specific consumption for multi-dwelling building is about 60 kWh/m^2/year and for single-dwelling buildings is about 62 kWh/m^2/year). For Class A, the minimum standard value decreases to 30-32 kWh/m^2 (an average annual specific consumption for multi-dwelling building is about 30 kWh/m^2/year and for single-dwelling buildings is about 32 kWh/m^2/year). The baseline energy demand of each of the building typologies were then subtracted by each of these average values.

B) Policy framework in relation to EE/Green residential buildings

The content of this chapter is based on an extensive study covering a wide range of literature and data sources. These include data from national and international public reports, scientific publications. The main contribution is, therefore, the collection and summarization of this information, which is currently only available in a fragmented manner. All the data sources are clearly indicated to allow the reader to access more detailed information as needed.

C) Financial context for investments in EE/Green residential buildings

This chapter includes a combination of desk research, qualitative assessment, and quantitative assessment (incl. estimations). The desk research, once again, has been undertaken covering a wide range of literature and data sources. The methods used to conduct the quantitative and qualitative assessments are described below:

Quantitative assessment: Investment needed to meet the EE potential in the Georgian residential building stock
In order to inform the legal drafters about economic impact of the "Energy Performance in Buildings Directive 2010/31/EU (EPBD)" [2] transposition to Georgia, the NGO called Union of Experts Sustainable Energy and

[2] The EBRD and the Energy Efficiency Directive (EED) are the two main EU directives in place to boost energy performance of buildings.

Environment conducted the research "Impact of Georgian state regulations on the prices of the construction sector" funded by the Georgian Government (Namchavadze & Natroshvili, 2018). The research shared averages across all climatic zone numbers and construction types. The content focuses on the renovation of the current stock. For EE renovation measures, it is stipulated that the general average specific cost for per heated square meter (20 EUR/m2). This includes all basic EE renovation measures like insulation of building envelope, replacement of windows and doors, replacement of boiler and renovation of space heating and hot water supply system.

In order to adapt this value to each of the building typologies, a weighted average approach was conducted. To this end, the general weighted average cost for any type of building (20 EUR/m2) was multiplied by the specific energy consumption of each type of construction and dividing by total weighted average specific consumption, to calculate the individual average specific costs for each type of constructions. The formula used for calculation is presented below:

[General weighted average cost] * [specific energy consumption / total weighted average specific consumption]

*Example for Ancient building with specific consumption 150kWh/m²:20EUR/m² * [150kWh/m2 / 259kWh/m2] = 12 EUR/m²*

According to the existing research, it was identified an average specific cost (about 270 EUR/m2) of construction of standard inefficient (usual) building without any thermal insulation and/or EE equipment. Using the total condition areas and an average cost, the total costs for implementation of EE measures in current building stock were calculated. The estimates were based on 2019 prices, a correction was introduced to adapt 2019 prices to 2021 prices, both for new construction and refurbishment projects.

Qualitative assessment: Investment landscape, barriers and opportunities: This information was mostly gathered through semi-structured interviews and discussions with key stakeholders. Responses were collected from November 2020 to January 2021 covering all stakeholder groups involved in the investment process of EE/Green residential buildings in Georgia. The list of stakeholders is described in Table 1, namely: international financial institutions (IFI) including multilateral development banks (MDB), national and local financial institutions (NFI). Also, property developers and civil society organizations working in building EE sector.
Due to COVID-19 pandemic restrictions, face-to-face meetings were not possible. Therefore, most of interviews and questionnaires were filled online all the respondents answered the questions and were followed up by bilateral discussions. The filled questionnaires were then processed, analysed and results presented in this document. Further information on the stakeholder interviews including the complete questionnaires and interviewee profile can be found in "Appendix

1. Questionnaire interviews per stakeholder group" and "2. List of Interviewees".

Table 1. Stakeholder groups interviewed

Stakeholder group	Organization	Interviewees role
IFI (incl. MDB)	- European Bank for Reconstruction and Development (EBRD) - Finance in Motion (FiM)	- Intermediated Finance Unit Lead, Associate Director, Energy Efficiency and Climate Change at EBRD - Georgia Office manager
NFI and LFIs	- National Bank of Georgia (NBoG) - TBC Bank - ProCredit Bank - Bank of Georgia (BOG)	- NBG`s Sustainable Finance Roadmap developers team member - Head of TBC Environmental & Social Risk management department

	- TBC Capital Ltd	- ProCredit`s Green and Sustainable issues manager - BOG SME`s department manager
NGO	- Sustainable Development & Policy Center (SDAP) - Green Building Council Georgia (GBCG)	- Head of SDAP - Head of GBCG
Property developers	- Anagi Development - Archi Development - Werkraum design architecture - M2 Development	- Construction quality unit head - Sales manager - Founder / CEO - Sales manager

3. Analysis of the residential building stock

3.1. Types of buildings in Georgia

Georgia is a country with 3500 year of statehood and its own ancient and medieval construction practices. Numerous building typologies have emerged during this time. For synthesis purposes, this section focuses on three main periods: historical (ancient, medieval and pre/industrial period), Soviet (1921-1990), and post-Soviet (1991-ongoing).

Multi-dwelling buildings: historical, early soviet, Stalin period and Post-soviet

Historical (before 1921)

Buildings developed before 1921 have the following features – excess thermal mass of the bearing and non-bearing structures: thick walls of stones or bricks that accumulate heat or cold during one daily peak and release it during the other. *Half-cave space concept*: construction of the dwelling of other building, which has vegetated roof; the spaces are surrounded by soil or rock from 5 sides, and the 6th side is used for access and daylight. *Cellars*: deep cellars under residential or public buildings were used to have constant temperature. This was applied in storage of food, producing and storage of wine.

Tbilisi, Melik-Azaryants House, built in 1912
Source: Goga Kartvelishvili collection

Photo: MarjaniShvili Theatre; Architect-Krichinsky, built in 1907, Photo: Xose Majiner

Development of the hill slopes: for defence and security reasons, most of Georgian medieval developments were located in mountains. The compact settlements' houses were built on the slopes facing to south, and sharing building envelopes of each other to minimize heat loss – part of the ceiling of the house was the floor or balcony for the next upper house. *Inner yards:* this included concept of inner yard, surrounded by building, sometimes with water basin. The heated yard surface or evaporant provided some stuck effect, making hot air go up from the center of the building, supporting natural ventilation in no-wind condition.

Early Soviet period: 1921-1937

Building of Parliament of Georgia, Built in 1930, Architect Severov
Photo: Kavkazplus

In this period, most of buildings were designed individually without any unified style so no unified typology was formed yet. Main environmental features are: building basements, bricks used for load bearing walls and the envelope (mainly 38 cm of thickness), timber beams and flooring, timber bearing structures for low rise developments, timber conservatories (timber/ glass), attic, sloped roofs, single timber glazing, enclosed or open type staircases, mainly low-rise concept applied.

Stalin period: 1937-1956

Apartment Building, Baratashvili St.
Photo-M.Lekveishvili collection

During the Stalin period a unified approach for building construction emerged, as most buildings were designed in the same way, underlining the strength of the empire by means of a single style in all locations.

The main environmental features are: design and construction according to regulations, building basements, bricks used for load bearing walls and the envelope (minimum 38 cm, in some cases 50 cm), reinforced concrete floor/ceiling slabs, reinforced concrete framed conservatories, attic, sloped roofs, single timber glazing or double timber glazing in colder areas, enclosed staircases average and high rise development concept applied

Khrushchov period (1956-1969)

The main feature of this period is low-cost and minimalism, caused by industrialization of the country and demand for large quantities of cheap buildings. In this period the approach was standard design for thousands of houses, use of the structures pre-fabricated in factories using concrete as the predominant material.

Photo: L.Natadze collection

Main environmental features are: design and construction according to regulations (putting target of minimum building envelope thickness, equivalent to 38 cm brick layer), building basements, diversification of the building envelope and load bearing structures: bricks, light concrete panels, reinforced concrete floor/ceiling slabs, reinforced concrete frame with non-bearing panels, reinforced concrete framed or light concrete blocks conservatories, single timber glazing or double timber glazing in colder areas, mainly open, in some cases - enclosed staircases, mostly high rise concept, attics with horizontal roofing.

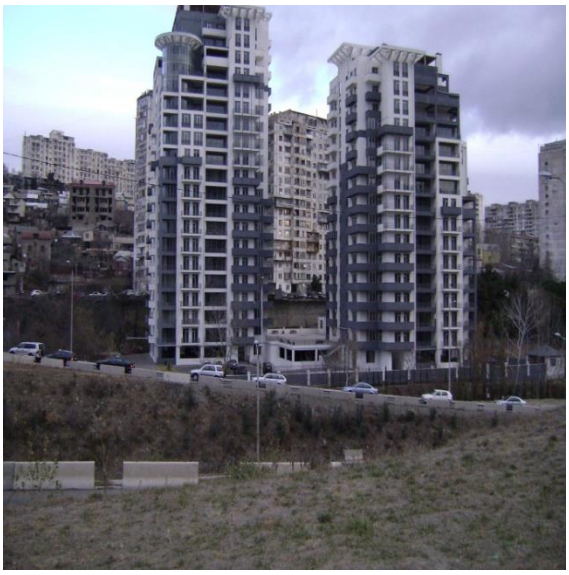
Developed socialism period: 1969-1990:

Features of the developed socialism period are practically the same as Krushchov period, with the main difference being that ceiling height increased from 2.40-2.50 m to 2.7-2.80 m. Wall insulation materials decreased bit in insulation properties and building height increased from 5-8 to 9-16 floors.


Photos: Levan Natadze collection

Post-Soviet (Current)

The post-soviet era resulted in cancelling of enforcement of environmental regulations. The standardized construction was diversified and many new architectural concepts are brought up in parallel. The vast majority of buildings are designed as reinforced concrete frame and slabs with small block filling.

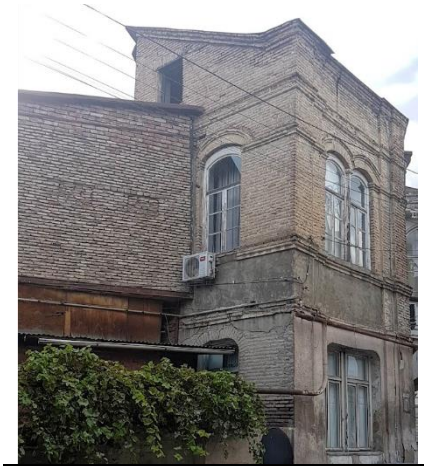
Photos: Levan Natadze collection

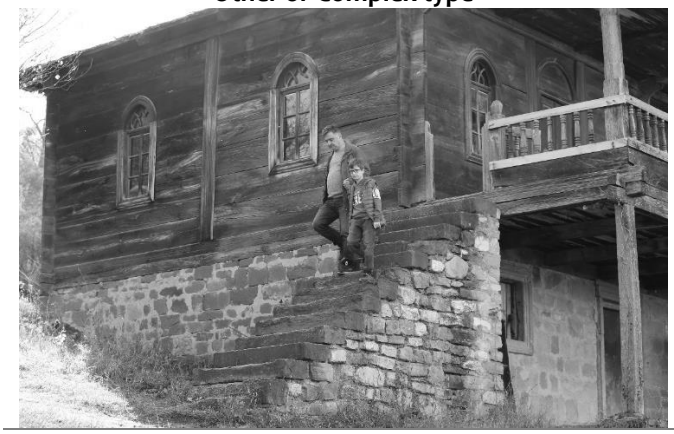
This approach resulted in the following prevailing environmental features: 20 or 30 cm thickness building envelope, mainly cavity blocks made of thermal conductive concrete, - double glazed PVC doors/windows, - no attic, - no conservatory, - horizontal roofing, - basement used as garage, without thermal insulation of permanently occupied space from bottom, - open type staircase, - high rise development, - overshadowing of the buildings, - blocked clear sky access for daylight.

Single-dwelling buildings (all Periods)

Single-dwelling buildings (SDB) are the predominant building typology, particularly in rural areas of Georgia. The vast majority of them having been constructed during the Soviet era, after World War II. More than by their period of construction, SDB can be classified in based on the following structures and features:

Table 2. Characterization of single-dwelling buildings (SDB) in Georgia

Building typology	Features
Timber 	Timber bearing structures and building envelope, without basement, with single glazed windows, with attic. *Photo: Levan Natadze collection*
Brick 	Brick, small block or concrete bearing structures and building envelope, with or without basement, with single or double glazed windows, with attic. *Photo: EEC Georgia collection/ L.Garibashvili*
Stone 	Stone bearing structures and building envelope, mainly without basement, with single glazed windows, with attic. *Ajara, village Maradidi* *Photo: Cultural Heritage Preservation Agency of Ajara*

Other or Complex type	Combination of all of the above
	*Photo: Viktoria Kavjaradze*

In this way, Georgia shows a great richness of typologies and construction practices. In terms of the condition of the built environment, it is estimated that more than 5% of the buildings are in a state of decay, with limited lifetime left. This in an additional argument and invaluable opportunity to retrofit the stock while improving its energy performance to attain the NDCs.

3.2. Energy demand per building typology

Based on the above characterization of the stock, the table below shows the average energy performance of each building typology. The Baseline average energy performance of the buildings (kWh/m2) are based on GIZ funded research EE in Construction (Mayer et al., 2017). The concrete calculations are described in section "2. Methodology".

As abovementioned, the SDB compose the majority of the housing stock (around 70%). From an energy performance perspective, they are also worse performing than any of the MDB (365 kWh/m2/year average consumption). This can partially attributed to the fact that many of these constructions have been erected with low cost / insulating materials and not prioritizing heating and cooling needs. In terms of MDB, results show that none of the building typologies have high energy performance. It is noteworthy that the typology with the best energy performance are the ones from the Ancient period (110 kWh/m2/year average consumption) and the worst performing the ones from the current period. One would have expected an improvement energy performance of buildings due to construction advances and economic developments.

Table 3. Energy performance per building typology in Georgia (Baseline case).

BUILDING TYPOLOGY	**PERFORMANCE**	**STOCK VOLUME**		**ENERGY DEMAND**
Multi-dwelling building (MDB)	**kWh/m²/year**	**m²**	**%**	**GWh/year**
Ancient (including up to 1921)	90-150 (average assumption 110)	3 811 128	11.7	666.94
Soviet era, early period: 1921-1937	150-250 (average assumption 200)			
Soviet era, Stalin period: 1937-1956	150-200 (average assumption 175)			

Soviet era, Khrushchov period (1956-1969)	230-260 (average assumption 250)	24 984 060	76.7	6495.85
Soviet era, socialism period: 1969-1990	250-300 (average assumption 275)			
Current (post-Soviet) period: 1990-current	320-350 (average assumption 340)	3 778 554	11.6	1265.81
Sub-total / Average	***259***	***32 573 742***	***100***	***8428.61***
Single-dwelling building (SDB)				
Timber	***Weighted average assumption 365***	***74 116 450***	***100***	***27075.40***
Brick				
Stone				
Other or Complex type				
Total / Average	**333**	**106 690 192**	**100**	**35504.02**

3.3. Energy efficiency potential per building typology

Incoming Georgian legislation will require achievement of minimum energy performance of the buildings. This means fulfilling of the following two requirements: (a) minimum performance of structures and systems; and (b) minimum annual energy use per m^2 of heated floor area (HFA). Below there will be described for the renovation scenarios: "Minimum required" (Class C), "Good" (Class B), and "Excellent" (exemplary performance, Class A).

The range of measures that apply to all of these scenarios, and level of achievement will depend on their combination and application.

Table 4. Portfolio of energy-efficiency measures

EE Measure	Description
Insulation of the roof (attic floor) and basement	*External (preferred) or internal insulation such as the rock wool or mineral wool, perlite powder, other breathable materials or Extruded polystyrene insulation (XPS), Expanded polystyrene (EPS)*
Insulation of the walls	*The mineral or rock wool insulation other "breathable" materials, composite façade systems, EPS and XPS systems*
Installation of the new EE windows and doors	*Double or triple glazed polyvinyl chloride (PVC), aluminium or wooden doors/windows with air sealing*
Ventilation	*Installation of "Prana"[3] type or equivalent heat recovery ventilation units.*
Heating	*Replacement of boilers, re-design of the system to low temperature heat carrier to allow condensation boilers, replacement of inefficient wooden stoves, insulation of pipes, use of invertor type water circulation pumps, application of whole building heating/cooling or district systems.*
Cooling	*Use of efficient individual cooling units, application of building or district chillers.*
Lighting	*Substitution of incandescent and fluorescent light emitters with light emitting diode (LED), optimization of interior and exterior lighting design, reduction of light pollution.*

[3] Heat exchanger Ventilation.

Various/other	*Upgrade of elevators, and other process energy consumers*
Renewables	*Application of photovoltaic panels (PV), domestic hot water (DHW) systems, ground heat pumps, biomass (where applicable)*

Table 5. Energy-efficiency measures and applicability per building typology

Type / Scenario/Level	Minimum (Class C)	Additional measures for "Good"(Class B)	Additional measures for "Excellent" (Class A)
Multi-dwelling buildings			
Ancient (including up to 1921)	Insulation of the roof (attic floor) and basement: external (preferred) or internal insulation such as the rock wool or mineral wool, perlite powder, other breathable materials, or EPS and XPS. Insulation of the walls (mainly from internal side): mineral or rock wool insulation. Other "breathable" materials, composite façade systems, EPS and XPS systems. Installation of the new EE windows and doors: double or triple glazed PVC, aluminium or wooden doors/windows with air sealing. Ventilation: installation of "Prana" type or equivalent heat recovery ventilation units (where applicable). Heating: replacement of boilers, re-design of the system to low temperature heat carrier to allow condensation boilers, replacement of inefficient wooden stoves, insulation of pipes, use of invertor type water circulation pumps. Cooling: use of efficient individual cooling units. Lighting: substitution of incandescent and fluorescent light emitters with LEDs. Various/other: upgrade of process energy consumers Renewables: application of PV) and DHW systems.	Enhanced measures (e.g. more wall or attic insulation or more efficient boiler) Optimization of interior and exterior lighting design.	Reduction of light pollution. Ground heat pumps, biomass (where applicable) Application of whole building heating/cooling or district systems
Early Soviet period: 1921-1937	Insulation of the roof (attic floor) and basement: external (preferred) or internal insulation such as the rock wool or mineral wool, Perlite powder, other breathable materials, or EXPS, EPS. The mineral or rock wool insulation, other "breathable" materials, composite façade systems, EPS and XPS systems Note: in many cased only internal insulation can be applied due to façade decorative elements Installation of the new EE windows and doors: double or triple glazed PVC, aluminium or wooden doors/windows with air sealing Ventilation: installation of "Prana" type or equivalent heat recovery ventilation units.	Enhanced measures (e.g. more wall or attic insulation or more efficient boiler) Optimization of interior and exterior lighting design.	Reduction of light pollution. Ground heat pumps, biomass (where applicable) Application of whole building heating/cooling or district systems

	Heating: replacement of boilers, re-design of the system to low temperature heat carrier to allow condensation boilers, replacement of inefficient wooden stoves, insulation of pipes, use of invertor type water circulation pumps. Cooling: use of efficient individual cooling units. Lighting: substitution of incandescent and fluorescent light emitters with LEDs,. Various/other: upgrade of elevators, and other process energy consumers Renewables: application of PV, DHW systems		
Stalin period: 1937-1956	Insulation of the roof (attic floor) and basement: external (preferred) or internal insulation such as the rock wool or mineral wool, Perlite powder, other breathable materials, or EXPS, EPS. Insulation of the walls The mineral or rock wool insulation Other "breathable" materials, composite façade systems, EPS and XPS systems. Note: In most cases façade walls insulation will be installed from interior side due to façade decorations. Installation of the new EE windows and doors: double or triple glazed PVC, aluminium or wooden doors/windows with air sealing Ventilation: installation of "Prana" type or equivalent heat recovery ventilation units. Heating: replacement of boilers, re-design of the system to low temperature heat carrier to allow condensation boilers, replacement of inefficient wooden stoves, insulation of pipes, use of invertor type water circulation pumps, application of whole building or district systems. Cooling: use of efficient individual cooling units, application of building or district chillers. Lighting: substitution of incandescent and fluorescent light emitters with LEDs, pollution. Various/other: upgrade of elevators, and other process energy consumers Renewables: application of PV, DHW systems,	Enhanced measures (e.g. more wall or attic insulation or more efficient boiler) Enhanced measures (e.g. more wall or attic insulation or more efficient boiler) Optimization of interior and exterior lighting design.	Reduction of light pollution. ground heat pumps, biomass (where applicable) Application of whole building heating/cooling or district systems
So called Khrushchov period (1956-1969) ***Developed socialism period: 1969-1990***	Insulation of the roof (attic floor) and basement: external (preferred) or internal insulation such as the rock wool or mineral wool, Perlite powder, other breathable materials, or EXPS, EPS. Insulation of the walls The mineral or rock wool insulation other "breathable" materials, composite façade systems, EPS and XPS systems	Enhanced measures (e.g. more wall or attic insulation or more efficient boiler) Enhanced measures (e.g. more wall or attic insulation or more efficient boiler)	Reduction of light pollution. ground heat pumps, biomass (where applicable) Application of whole building heating/cooling or district systems

Current (post-soviet) period	Note: In most cases façade walls insulation will be installed from interior side due to façade decorations. Installation of the new EE windows and doors: double or triple glazed PVC, aluminium or wooden doors/windows with air sealing Ventilation: installation of "Prana" type or equivalent heat recovery ventilation units. Heating: replacement of boilers, re-design of the system to low temperature heat carrier to allow condensation boilers, replacement of inefficient wooden stoves, insulation of pipes, use of invertor type water circulation pumps, application of whole building or district systems. Cooling: use of efficient individual cooling units, application of building or district chillers. Lighting: substitution of incandescent and fluorescent light emitters with LEDs, pollution. Various/other: upgrade of elevators, and other process energy consumers Renewables: application of PV, DHW systems,	Optimization of interior and exterior lighting design.	
Single-dwelling building			
All types: **Timber, Brick, Stone, Other or Complex type**	Insulation of the roof (attic floor) and basement: external (preferred) or internal insulation such as the rock wool or mineral wool, Perlite powder, other breathable materials, or EXPS, EPS. Insulation of the walls The mineral or rock wool insulation other "breathable" materials, composite façade systems, EPS and XPS systems Note: In most cases façade walls insulation will be installed from the interior side due to façade decorations. Installation of the new EE windows and doors: double or triple glazed PVC, aluminium or wooden doors/windows with air sealing Ventilation: installation of "Prana" type or equivalent heat recovery ventilation units. Heating: replacement of boilers, re-design of the system to low temperature heat carrier to allow condensation boilers, replacement of inefficient wooden stoves, insulation of pipes, use of invertor type water circulation pumps, application of whole building or district systems. Cooling: use of efficient individual cooling units, application of building or district chillers. Lighting: substitution of incandescent and fluorescent light emitters with LEDs, pollution.	Enhanced measures (e.g. more wall or attic insulation or more efficient boiler) Enhanced measures (e.g. more wall or attic insulation or more efficient boiler) Optimization of interior and exterior lighting design.	Reduction of light pollution. ground heat pumps, biomass (where applicable) Application of whole building heating/cooling or district systems

	Various/other: upgrade of elevators, and other process energy consumers Renewables: application of PV, DHW systems,	

Quantitative assessment of energy efficiency potential per building typology in Georgia

The incoming Georgian legislation will require a minimum annual energy use per m² of HFA per building typology and climatic zone (#1, 2 and 3). Therefore, the calculations to assess the energy efficiency potential per building typology in Georgia are based on the average values of existing three climatic zones.

In order to identify current EE potential in Georgia, the baseline scenario is compared to minimum building energy performance across various standards:

- Class A (Excellent): an average annual specific consumption of 30 kWh/m²/year in MDB, and 32 kWh/m²/year in SDB.
- Class B (Good): an average annual specific consumption of 60 kWh/m²/year in MDB, and 62 kWh/m²/year in SDB.
- Class C (Minimum): an average annual specific consumption of 140 kWh/m²/year in MDB, and 130 kWh/m²/year in SDB.

The energy saving potential for each type of building including percentage share are provided in Table 6-8:

According to these calculations, if Class A standards are achieved, up to 32119.5 GWh could be saved each year. Likewise, 28979.08 GWh/yr for Class B and 21640.58 GWh/yr for Class C. The building typology with the largest saving potential are SDB. Within MDB, the building typology with the largest saving potential is the combination of Soviet era Khrushchov and Socialism (1956-1990).

Table 6. Energy efficiency potential per building typology in Georgia compared to Class A (Excellent).

<table>
<tr><th>Building typology</th><th colspan="2">Baseline</th><th colspan="2">To achieve excellent EE standards (Class A)</th><th colspan="3">Energy saving potential (Baseline – Class A) Saving Percentage</th></tr>
<tr><th>Multi-dwelling building (MDB)</th><th>kWh/m²/yr</th><th>GWh/yr</th><th>kWh/m²/yr</th><th>GWh/yr</th><th>kWh/m²/yr</th><th>GWh/yr</th><th>%</th></tr>
<tr><td>Ancient (including up to 1921)</td><td>150</td><td rowspan="3">666.94</td><td rowspan="5">30</td><td rowspan="3">115.60</td><td>120</td><td rowspan="3">551.34</td><td rowspan="3">7.5</td></tr>
<tr><td>Soviet era, early period: 1921-1937</td><td>200</td><td>170</td></tr>
<tr><td>Soviet era, Stalin period: 1937-1956</td><td>175</td><td>145</td></tr>
<tr><td>Soviet era, Khrushchov period (1956-1969)</td><td>245</td><td rowspan="2">6495.85</td><td rowspan="2">757.84</td><td>215</td><td rowspan="2">5738.00</td><td rowspan="2">77</td></tr>
<tr><td>Soviet era, socialism period: 1969-1990</td><td>275</td><td>245</td></tr>
<tr><td>Current (post-Soviet) period</td><td>335</td><td>1265.81</td><td>114.61</td><td>305</td><td>1151.19</td><td>15.5</td></tr>
<tr><td>Sub-total / average</td><td>259</td><td>8428.61</td><td>30</td><td>988.070</td><td>228</td><td>7440.54</td><td>100</td></tr>
<tr><td>Single-dwelling building (SDB)</td><td>kWh/m²/yr</td><td>GWh/yr</td><td>kWh/m²/yr</td><td>GWh/yr</td><td>kWh/m²/yr</td><td>GWh/yr</td><td>%</td></tr>
<tr><td>All types: Timber, Brick, Stone, Other</td><td>365</td><td>27075.40</td><td>32</td><td>2396.43</td><td>333</td><td>24678.97</td><td>100</td></tr>
</table>

or Complexed							
Total / average	**333**	**35504.02**	**32**	**3384.50**	**301**	**32119.51**	**100**

Table 7. Energy efficiency potential per building typology in Georgia compared to Class B (Good).

Building typology	**Baseline**		**To achieve good EE standard (Class B)**		**Energy saving potential (Baseline – Class B)**		
Multi-dwelling building (MDB)	**kWh/ m²/yr**	**GWh/yr**	**kWh/ m²/yr**	**GWh/yr**	**kWh/ m²/yr**	**GWh/yr**	**%**
Ancient (including up to 1921)	150	666.94	60	228.66	90	438.27	7
Soviet era, early period: 1921-1937	200				140		
Soviet era, Stalin period: 1937-1956	175				115		
Soviet era, Khrushchov period (1956-1969)	245	6495.85		1499.04	185	4996.81	77
Soviet era, socialism period: 1969-1990	275				215		
Current (post-Soviet) period	335	1265.81		226.71	275	1039.10	16
Sub-total / average	259	8428.61	60	1954.42	199	6474.19	100
Single-dwelling building (SDB)	kWh/ m²/yr	GWh/yr	kWh/ m²/yr	GWh/yr	kWh/ m²/yr	GWh/yr	%
All types: Timber, Brick, Stone, Other or Complexed	365	27075.40	62	4570.51	304	22504.88	100
Total / average	**333**	**35504.02**	**61**	**6524.93**	**272**	**28979.08**	**100**

Table 8. Energy efficiency potential per building typology in Georgia compared to Class C (Minimum).

Building typology	**Baseline**		**To achieve min. EE standards (Class C)**		**Energy saving potential (Baseline – Class C)**		
Multi-dwelling building (MDB)	**kWh/ m²/yr**	**GWh/yr**	**kWh/ m²/yr**	**GWh/yr**	**kWh/ m²/yr**	**GWh/yr**	**%**

Ancient (including up to 1921)	150	66.94	140	532.28	10	134.65	3
Soviet era, early period: 1921-1937	200				60		
Soviet era, Stalin period: 1937-1956	175				35		
Soviet era, Khrushchov period (1956-1969)	245	6495.85		3489.44	105	3006.41	78
Soviet era, socialism period: 1969-1990	275				135		
Current (post-Soviet) period	335	1265.81		527.73	195	738.07	19
Sub-total / average	259	8428.61	140	4549.46	119	3879.15	100
Single-dwelling building (SDB)	**kWh/ m²/yr**	**GWh/yr**	**kWh/ m²/yr**	**GWh/yr**	**kWh/ m²/yr**	**GWh/yr**	**%**
All types: Timber, Brick, Stone, Other or Complexed	365	27075.40	126	9313.96	240	17761.43	100
Total / average	**333**	**35504.02**	**130**	**138634.33**	**203**	**21640.58**	**100**

HIGHLIGHTS CHAPTER 3

> Residential buildings in Georgia are a mixture of various building typologies and construction practices, most of them developed during the Soviet era and around 5% is in state of decay.

> SDB constitute the largest percentage of the housing stock, particularly in rural areas (approx. 70%)

> In nearly all cases, residential buildings in Georgia do not comply with minimum EE standards.

> There is a huge untapped energy saving potential across all building typologies: if Class A standards are achieved, up to 32119.5 GWh could be saved each year. Likewise, 28979.08 GWh/yr in Class B and 21640.58 GWh/yr in Class C.

> The building typology with the largest saving potential are SDB. Within MDB, it is the combination of Soviet era Khrushchov and Socialism (1956-1990).

4. Policy framework in relation to EE/Green residential buildings

Georgia's overarching policy framework on green and EE development is strongly influenced by international commitments and cooperation agreements.

Since independence in 1991, Georgia has sought to integrate into the global community and has committed to a large number of international environmental agreements, including all major climate agreements. Georgia ratified the Kyoto Protocol in June 1999, acceded to the Copenhagen Accord in 2010, and ratified the Paris Agreement in May 2017. On April 8, 2021 the updated Nationally Determined Contribution (NDC) was adopted. Under the updated NDC the country is fully committed to an unconditional target of domestic total GHG emissions reduction of 35 % by 2030 compared to 1990 levels (UNFCCC, 2021). Alongside with updated NDC, on the same date, two other important documents were adopted: Georgia's 2030 Climate Change Strategy and Action Plan for 2021-2023 (see details further).

Though the updated NDC doesn't specify the target for the building sector, it supports its low carbon development through encouraging the climate-goals oriented EE technologies and services. Likewise, Georgia's 2030 Climate Change Strategy and Action Plan for 2021-2021 (see below) set a number of policy measures and actions for the implementation of low carbon approaches in the buildings sector, as well as the promotion and application of climate-friendly and EE technologies to reach the carbon reduction target.

On EE matters, one of the most relevant policy is Georgia's first National Energy Efficiency Action Plan (NEEAP) - see further below. The NEEAP is an indicative policy document -not legally binding- with a checklist of measures that Georgia needs to undertake over the next three years to improve its EE levels while satisfying a higher energy demand.

In June 2014, Georgia signed an Association Agreement with the EU, which has also played a part in driving the development of domestic policy, necessitated the introduction of significant legislative changes and reforms for all sectors. The Energy Sector has immensely benefited from this process, as the Legislation governing the sector was very outdated and despite numerous amendments was incapable of addressing the challenges arising during the transition. Additionally, in 2017 Accession of Georgia to the Energy Community Treaty was finalized, which in turn, established several important targets milestones for the sector to achieve.

Updated Nationally Determined Contribution (NDC) of Georgia -adopted April 8, 2021

Key components of Georgia's updated NDC include:

Georgia is fully committed1 to an unconditional limiting target of 35 % below 1990 level of its domestic total greenhouse gas emissions by 2030. Georgia is committed to a target of 50-57% of its total greenhouse gas emissions by 2030 compared to 1990, in case of international support. The updated NDC is setting out feasible targets for limiting emissions in seven sectors: Transport, buildings, energy generation and transmission, agriculture, industry, waste and forestry.

Georgia's 2030 Climate Change Strategy- -adopted April 8, 2021

To achieve the long-term vision declared for 2030, which means reducing GHG emissions to 35% below 1990 levels by 2030 for all sectors of the economy, the Climate Strategy and Action Plan set the following goals for each sector:

- Reduce greenhouse gas emissions in the energy generation and transmission sector to 15% below the reference scenario projections by 2030;
- Reduce greenhouse gas emissions in the transport sector to 15% below the reference scenario projections by 2030;
- **Support development of low-carbon approaches in the buildings sector by promoting climate-smart and energy-efficient technologies and services (author highlights);**

- Support development of the low-carbon approaches in the industry sector by promoting climate-smart and energy-efficient technologies and services to reduce greenhouse gas emissions to 5% below the reference scenario projections by 2030;
- Support the low carbon development of the agriculture sector by encouraging the climate-smart and energy-efficient technologies and services;
- Support the low carbon development of the waste sector by promoting climate-smart and energy-efficient technologies and services;
- Increase the carbon capturing capacity of the forestry sector by 10% for 2030 compared to 2015.

„The Main Directions of the State Energy Policy of Georgia" [4] **June 2015**

According to Article 7 (1) of the Law on "**Energy and Water Supply"** "the Ministry, in cooperation with the Government of Georgia, the Commission and other relevant parties, shall develop a state energy policy for at least a 10-year period, and ensure its implementation, following its approval and promulgation by the Parliament of Georgia".

The Energy Policy presents a long-term comprehensive national vision, which is the basis for the development of short, medium- and long-term strategies, with a special emphasis on the utilization of Georgia's renewable energy resources. Energy efficiency is also incorporated into the document.

The Law of Georgia on Energy Efficiency[5]**- May 21,2021**

The Law on Energy Efficiency, prepared according to EU EED No. 2012/27/EU, aims to: increase energy savings, the security of energy supply, and energy independence, and to remove the barriers to the improvement of EE in the energy market; Establish a common legal framework for promotion and implementation of the EE measures in the country; Establish the procedures for the development of national EE targets through an Energy Efficiency Action Plan, outlining measures to meet the target; Establish the process for the adoption of a National Energy Efficiency Action Plan (NEEAP); Set up an Energy Efficiency Obligation Scheme and/or Alternative Policy Measures to ensure energy savings; Implementation of control, supervision and monitoring of the EE policy in the country.

The scope of the Law includes: horizontal (cross-sectoral) policy that impacts public and private sectors and is related to energy services and their monitoring, measurement and confirmation; specific sectors: private building, including building for commercial purposes, and the sectors of industry, energy production, transformation, transmission and distribution. The Law also defines the obligations and responsibility measures of public and private institutions, household customers, energy service providers, and other industry and economic sectors in the process of energy consumption efficiency, energy saving, and the market development of energy services.

Articles 16-18 of the Law relate to EE in buildings and includes: EE policy of buildings and related measures, EE policy of buildings occupied by administrative body, certification of the energy efficiency of buildings, the accreditation of independent experts, and the inspection of heating and air conditioning systems.

The Law of Energy Efficiency of Buildings [6] **May 21,2021 (amended 10/06/2021)**

The purpose of this Law is to promote the rational use of energy resources and to improve the energy efficiency of buildings, taking into account the external climate and local conditions of buildings, the demand for indoor climate conditions and cost-effectiveness.

As specified by the Law, by June 30, 2021 the Government shall adopt the National Methodology for Calculating the Energy Performance of Buildings and by June 30, 2022 establish minimum energy performance requirements for buildings, as well as shall adopt the comparative methodology for calculating

[4] Main Directions of The State Policy in Energy Sector of Georgia

[5] https://matsne.gov.ge/en/document/download/4873938/0/en/pdf

[6] https://www.matsne.gov.ge/en/document/view/4873932?publication=0

cost-optimal levels for minimum energy performance requirements for building units. By January, 2022 the Government shall approve the procedure for the energy performance certification of buildings, the procedure of the regular inspection of heating and air conditioning systems in buildings, the procedures for the accreditation and certification of an independent expert issuing energy efficiency certificates for buildings and implementing the inspection of heating and air conditioning systems in buildings; the procedures for inspecting and verifying the reports of the inspection of energy performance certificates and heating and air conditioning systems of buildings.

As specified by the Law, the certification of the energy performance of a building and the inspection of heating and air conditioning systems in the building shall be carried out by an **independent expert.** The procedures for the accreditation and certification of an independent expert issuing energy performance certificates of buildings, and inspecting heating and air conditioning systems in buildings, and the procedures for monitoring and registration, shall be approved by a normative act of the Government of Georgia.

Most Recently – **"Minimal requirements for energy efficiency of buildings" has been drafted and adopted by the GoG (Ordinance #352,13/07/2021)**[7] **,** however the entry into force has been postponed and is expected to be finalized **by June 30th, 2022**. The adoption of the act will facilitate the implementation of energy efficiency measures within buildings, as newly built buildings must adhere to minimal requirements to be allowed to enter exploitation.

The introduction of EPC will require capacity building of energy auditors as well creation of an accredited entity, which will be authorized to issue the certificates. According to the Georgian legislation, only entities authorized by Georgian Accreditation Centre can issue certificates (Georgian Accreditation Center, 2021). Currently in Georgia, there is a pool of specialists that have been trained in energy auditing of buildings through technical assistance projects implemented by various international donors. Due to the upcoming directive on EE requirements in buildings, the demand for energy auditing will increase and the accredited entities will need to increase accordingly.

The requirement of minimum energy performance standards for new construction and major renovations are likely to have a large economic impact through increased construction and renovation costs but may lead to substantial energy cost savings. It may boost the sustainable construction segment of the market e.g. developers with expertise in green buildings, engineers with expertise on green construction and equipment, producers and importers of green building material etc.

The Law on Energy Labelling [8]**- December 20,2019**

This Law governs energy labelling in Georgia. It consists of five chapters: General provisions (I); Obligation to provide information and obligations of the supplier/dealer (II); Surveillance (III); Administrative liability (IV); and Transitional provisions (V). This Regulation lays down a framework that applies to energy-related products placed on the market or put into service. It provides for the labelling of those products and the provision of standard product information regarding energy efficiency, the consumption of energy, thereby enabling customers to choose more efficient products in order to reduce their energy consumption. The adoption of the fifteen product regulations required by the Law is pending till 30 September, 2021. These include rules for energy labelling of household dishwashers, household refrigerators and freezers, household clothes washers; televisions; ventilation appliances; household air conditioners; cold storage rooms, household heating appliances, solid fuel boilers and necessary appliances for solid boilers, kitchen stoves and stove ventilation, vacuum cleaners, water heaters, hot water tanks, and solar panel complete sets; combined complete sets for temperature control, solar panels and heaters, temperature control and solar panels; bulbs and lamps; household dryers; combined clothes dryers.

[7] Ordinance of the Government of Georgia №352 amending the Ordinance of the GoG №255 "on the issuance of building permits and conditions for the entry of building into exploitation" (13/07/2021)
[8] https://matsne.gov.ge/ka/document/view/4745123?publication=1(GE)

Climate Action Plan (2021-2023) - April 8,2021[9]

The Action plan covers a period of 2021-2023. Objectives 1 and 3, are devoted to Renewable Energy and Energy Efficiency of buildings respectively. The Action plan outlines several measures – the integration of Variable Renewable Energy, VRE, development of the Electricity transmission network, Informational campaigns for both residential and commercial sectors and support use of solar water heaters, energy efficient lighting, energy efficient stoves, legislative reforms, etc. in line with existing NREAP and NEEAP (see below).

A National Energy Efficiency Action Plan (NEEAP)[10]

Georgia's First National Energy Efficiency Action Plan (NEEAP)[11] sets out targets for improved energy efficiency in 2020, 2025 and 2030 with concrete actions for energy transmission and demand sectors in the years 2019-2020. The NEEAP has been developed in compliance with the EU Energy Efficiency Directive. It was initiated in 2015 (based on 2014 data), and after intensive discussions and numerous amendments it was approved in late 2019.

NEEAP lays out targets for savings of primary energy consumption as well as policy and investment measures to achieve these targets. Measures outlined in NEEAP for building sector include: qualification, accreditation, and certification schemes; standards and norms and labelling schemes in appliances. It reflects the EU Energy Performance of Buildings Directive, EPBD, its Transposition and Enforcement is specified, as is standards and norms and energy performance certification schemes in buildings. Regulations leading to improved efficient lighting systems in residential and commercial buildings; Improvement of the energy efficiency in public buildings; Energy efficient procurement; Improvement of efficiency in street-lighting/outdoor lighting; Solar hot water heating;

According to the Georgian Law on Energy and Water Supply, the National Energy and Climate Plan (NECP) should be an "Annex of the Energy Policy". It is treated as an overarching strategic document in contrast to the three-year action plans required under the new Law on Energy Efficiency and the Law on the Promotion of the Generation and Use of Energy from Renewable Sources. Currently the work on the elaboration of the document is underway.

Regulations and Standards in the Construction Sector in Georgia

Currently, activities and standards in the construction sector in Georgia are regulated through various legal acts, decrees and resolutions, these are:

- The Georgian Law on "Construction Activities" (2000);
- Decree #57 of the Government of Georgia (March 24, 2009) about „Rules on Conditions of Issue of Construction Permits". Sets the rules for issuing construction permits on the territory of Georgia and the conditions necessary for obtaining such permits, covering also technical information on the use of land parcels, types of buildings, supervision of building activities and the process of accepting buildings in exploitation;
- Georgian Law on "Licenses and Permits" (July 18, 2005);
- Georgian Law/Regulations on "Technical Safety" (May 27, 2014);
- General Administrative Code of Georgia (June 25, 1999);
- Georgian Law on "Spatial Arrangement and Basics of Urban Development" (June 2, 2005);
- Soviet Construction Rules and Norms – "SNIPS"[12]; According to Government Decree #521 (2014) on validity of operation and recognition of technical regulations of construction in Georgia. It

[9] https://climatepolicydatabase.org/policies/georgias-2030-strategy-and-2021-2023-action-plan-climate-change-mitigation-csap

[10] https://www.energy-community.org/dam/jcr:78842158-474a-41b0-9793-428251e569a5/NEEAP_GE_082020.pdf

[12] *SNIPS – Construction Rules and Norms, which were uniform and obligatory in Soviet Union*

recognizes the existing technical regulations that are not contrary to the applicable legislation and/or the international treaties to which Georgia is a party, (M. of E. Georgia, 2020) .Their later modifications, are fully or partially recognized in Georgia and will remain applicable until relevant national technical regulations are adopted;

- Governmental Decree №50 (March, 2013) approves the usage of Technical Regulations of member-states of the European Union and the Organization for Economic Cooperation and Development for construction activities in Georgia. The Decree allows the use of regulations from 37 countries;
- Decree #41 of Government of Georgia on (January 28, 2016) "Approval of Technical Regulations and Safety Rules for Buildings";

In this way, building codes and standards are currently a mix of several requirements and specifications. Many of them established during the Soviet Union era and have not been updated in over a decade. The lack of consistency of the existing building codes is aggravated by a lack of licensing in the construction practices. One of the latest building regulation is the "Building Safety Rules", in force since 2016. This code aims to define minimal requirements to achieve public safety, health and general welfare. It focuses on the provision of exit facilities, sanitation, proper lighting and ventilation, life and property protection from fire to the building. It also briefly addresses the EE of the building, as well as the upgrade of specific building components such as roofs. Likewise, in 2019, the Georgian Parliament adopted the new code-Georgian Spatial Planning, Architectural & Construction Activity Code (T. P. of Georgia, 2020), which was later amended and finally its consolidated version published on 15/07/2020. The code has article No. 87 on Building's Energy Efficiency and article No. 88 on Application of RE technologies in the buildings that set up requirements for development of high-energy performance buildings and application of RE technologies. No. 87 – EE of buildings addresses the maximum EE of the building should be ensured by its rational location in the building, the correct orientation in relation to the sides of the horizon, the selection of enclosing structures and parameters on the basis of thermal calculations, proper insulation of enclosing structures, taking into account sun protection elements based on the calculation of insolation, the use of equipment and installations of heating, air conditioning, lighting, ventilation or (and) other modern energy-saving equipment and installations. No. 88, on the other hand, addressed the one of RE in buildings and structures. 1. The design and construction of buildings and structures should take into account the possibility of using RE. 2. Use in buildings and constructions of RE can be carried out by means of the following technical means: a) passive use of solar energy; b) active use of solar energy (solar-powered heating plants, combined hot water systems, solar cells); c) use of wind energy; d) geothermal heating/cooling and hot water systems; e) other systems enabling the efficient use of RE.

Guidelines for Sustainable Finance: Comparing the EU Taxonomy with the Sustainable Finance Taxonomy in Georgia

A key component to navigate the transition to an EE and low-carbon economy is to ensure that the economic activity is environmentally sustainable. To this end, the EU has developed the EU Taxonomy as a classification tool targeted at investors, companies and financial institutions to define environmental performance of economic activities across a wide range of industries, and sets requirements corporate activities must meet to be considered sustainable (European Commission, 2021).

Currently, Georgia has no regulation in force compatible with EU Taxonomy. However, the National Bank of Georgia (NBG) has established the working group and is in close cooperation with International Finance Corporation (IFC) and Sustainable Banking Network (SBN) to develop a Sustainable Finance Taxonomy (SFT) for Georgia in 2021. NBG anticipates that SFT will closely align with the EU Taxonomy. To track the progress of sustainable financing in Georgia, SFT will include measurement and reporting tools in line with EU Taxonomy on sustainable finance.

The main similarities and differences between NBG`s Sustainable finance regulation and the EU Taxonomy, as defined by the NBG are:

- The NBG Sustainable Finance Taxonomy identifies sectors / activities that have positive environmental and / or social effects. The purpose of this taxonomy is to promote the development

of a sustainable financing market and, consequently, to contribute to the sustainable development goals of the country. This general purpose is similar to the purpose of the EU Taxonomy.

- However, unlike the taxonomy of the European Union, the taxonomy of the NBG includes both green and social taxonomy.
- The NBG has not yet completed its work on defining the specific activities / sectors and the relevant technical standards and criteria. However, in determining the criteria, international practice will be taken into account, including EU and Georgian regulations.
- The NBG does not have an official definition of the green loan and green bond at this stage

Hence, Georgia is in the path to developing its own Taxonomy to ensure a favourable framework for EE and Green investments. In doing so, it has carefully studied the EU approach, adapted to its own context and additionally considered social aspects into this framework.

HIGHLIGHTS CHAPTER 4

- Georgia's overarching policy framework on green and EE development is strongly influenced by international commitments and cooperation agreements

- Building codes and standards in Georgia are currently a mix of several requirements and specifications dated back from the beginning of the century. Mostly, these have not been updated and pay no attention to EE requirements in buildings

- Georgia will enact two main laws affecting EE in Buildings: the EE Law and Law on Energy Performance of Buildings, both mirroring the EU Directives, They will establish the follow up regulatory framework to enable the implementation of the laws and the decarbonisation of the building sector

- In parallel, a Sustainable Finance Taxonomy (SFT) is under development reflecting the EU Taxonomy. Unlike the EU Taxonomy, Georgia´s STF will include social aspects into the Taxonomy.

5. Investment volumes for EE/Green residential buildings in Georgia

Key to fostering investments in EE/Green buildings in Georgia is the understanding of the current finance and investment climate in the construction and renovation sector. This section aims to present italong with describing how investments are taking place. That is: who are the key actors, and what are their main products & services in relation to EE and Green housing in Georgia.

According to the MoESD, investment in buildings' EE **amount to 25 EUR/m2 at minimum** after EPBD transposition. Estimated **EE related investment out of the total investment is around 5%**. In relation the discussions of the new legal frameworks in the parliament in February 2020, the MoESD Deputy gave estimates of construction cost increase due to EE investment in terms of different climatic zones of Georgia. He also estimated the payback time of such investment with due considerations of energy cost savings (Table 9). The estimates made by the government roughly align with the testimonies collected from the stakeholder interviews conducted for this study, where property developers stated: *"EE measures increases the overall cost of a building by 3 % - 5 %, and up to 10% for a highly energy-efficient buildings, plus 1 % for marketing (as estimated from residential building overall cost)"*. Developers also estimate that EE measures increases cost per square meter of a building by 17 EUR to 25 EUR, declaring that *"At this point in time, construction companies and developers are incorporating EE improvements on a voluntary basis, and not according to a set standard, though that will change with the development of the legal and regulatory framework the coming years."* (Anagi dvelopment, Werkraum design and Archi development).

Table 9. Construction costs and payback periods per climatic zone. Source: MoESD: during discussion in parliament on the Energy Efficiency Law draft.

Construction cost increase	**Climatic Zone I**	**Climatic Zone II**	**Climatic Zone III (mountainous)**
%	5.7%	7.4%	9.5%
payback period based on saved energy cost, years	7.5	< 6	4.5

On the basis of the investment required in EE buildings shared by the MoESD, the tables below show estimates of the investment required to achieve minimum EE standards (Class C)[13] for each of the residential building typologies in Georgia in renovation projects (Table 10). As can be depicted, the total investment needed to renovate the residential building stock to minimum EE standards is of around 2 153 million EUR. In MDB, the building typology with the highest average cost of 20 EUR per square meter is the current period (post-soviet) more than double the price of those coming from the ancient times (including up to 1921) due to their thick brick walls and high thermal inertia. The same cost is equally high in SDB across all construction types and ages, that is timber, brick, stone, etc., leading to a total of 1 496 million EUR of investment required - more than half of the total required in renovation, due to the large percentage of the stock belonging to this typology.

Table 10. Estimations of total investment required to meet total EE potential in Georgia: the renovation case (Class C).

Investments to achieve minimum EE standard level (Class C) *in renovations*

[13] Only Class C is calculated due to the lack of data for Class A and B.

Building typology	Heated floor area (HFA)	Average specific cost of EE measures[14]	Total cost for EE measures
Multi-dwelling buildings (MDB)	**m²**	**EUR/m²**	**million EUR**
Ancient (including up to 1921)	3 811 128	12	52
Early Soviet period: 1921-1937		16	
Stalin period: 1937-1956		14	
Khrushchov period (1956-1969)	24 984 060	19	507
Developed socialism period: 1969-1990		21	
Current (post-soviet) period	3 778 554	26	99
Sub-total / average	32 573 742	20	657
Single-dwelling buildings (SDB)			
All types: Timber, Brick, Stone, Other or Complexed	74 116 450	20	1 496
Total / average	**106 690 192**	**20**	**2 153**

Source: Own elaboration.

Results from investment costs for renovating the housing stock to minimum EE requirements are highly concerning given that the current EE objectives and the need for GHG emission reduction. It is outstanding that ancient constructions have a better thermal conditions given the developments in construction practices and technologies available to improve this parameter and subsequent indoor thermal

HIGHLIGHTS CHAPTER 5

• MoESD estimates EE residential investments as EUR 25 per m2 building area and as 5% of a building`s total cost, similar to the values provided by the Property developers

• MoESD forecasts estimate that construction cost will increase due to effect of EE law in range of 5.7 % - 9.5 % depending on climatic zone. MoESD also and 14 % energy savings compared with "business as usual "in next 6 years under energy-efficiency action plan.

• To achieve minimum EE standards (Class C), this will derive in approximately 2 153 million EUR of investments for renovation

• It is noteworthy that in renovation, building typologies from ancient times (including up to 1921) have lower costs per square meter that modern ones.

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6. The finance ecosystem in Georgia in respects to EE/green housing

In order to understand how investments in are taking place, it is crucial to know: who are the various stakeholders involved, their role in the investment process, how they interact with each other, and what are the products and services that they offer. Consequently, this chapter describes these four key aspects in the context of EE/Green residential investments in Georgia.

6.1. Key stakeholders and interactions in EE/green residential investments

Stakeholders involved in the investment process can be broadly divided into two groups: capital providers and capital recipients. Capital providers, can be subdivided into: (1) International financial institutions (IFI) including MDB, (2) the Georgian Government – in its role both as setting the regulatory framework and as a brokerage or intermediate capital providers, and (3) commercial banks, entailing both national and international institutions. In terms of the capital demand actors, these can be subdivided into three main groups; (1) private homeowners, (3) property developers, and (3) public-building owners.

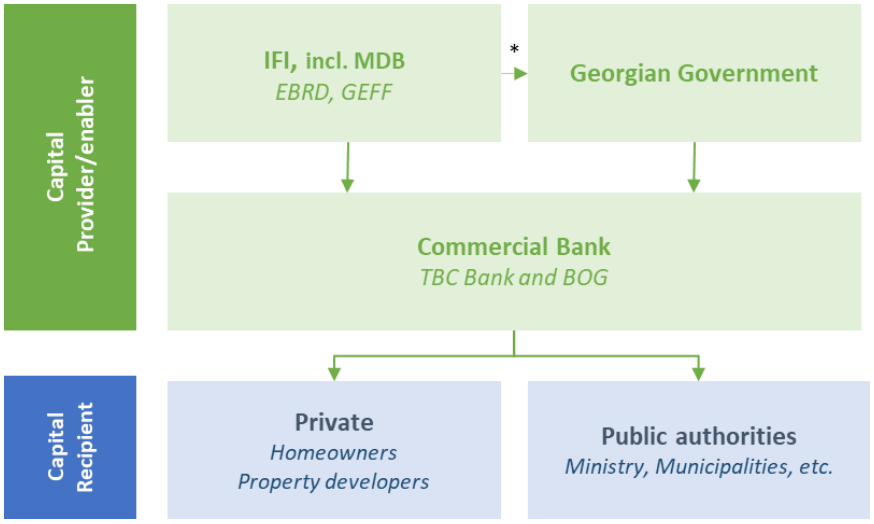
The concrete definition and role of each of the stakeholder groups are described in the table below:

Table 9. Stakeholder roles in the investment process.

Cluster	Stakeholder group	Definition / role in the investment process
Capital provider/enabler	IFI *(EBRD, GEFF)*	A financial institution that has been established (or chartered) by more than one country, or operates in the international arena, and hence is subject to international law. In the context of EE/Green residential investments, IFIs are providing finance to the Georgian government and/or directly to commercial banks as grants, loans, guarantees, used for de-risking of the EE investments.
	Georgian government	The role of the Georgian government is twofold: • Regulatory: setting up policy and regulatory frameworks and enforcing this. this includes also the National Bank of Georgia (NBG) • Brokerage and intermediate: channelling IFI- and national finance to the commercial banks, NGOs or private owners. In the case of catering funds to businesses, this is for instance done through "Enterprise Georgia" a governmental agency.
	Commercial bank *(TBC Bank and BoG)*	These can be split in national and international and their main role is to provide finance in the form of a range of instruments, and in various products, with the aim of a commercial profit.
Capital recipient	Private homeowners	Their main role is to request finance in the form of a loan or a credit (mortgage) to undertake either EE refurbishment or new construction.
	Property developers	Develops construction and/or refurbishment projects for lucrative purposes. In the case of EE/Green investments, they are responsible for requesting green finance to undertake the construction and/or refurbishment.
	Public authorities *(Ministry, Municipalities)*	Public authorities such as Ministries or Municipalities can own and/or manage public buildings or assets, such as social housing. In such cases they request finance in the form of a loan or a credit to undertake either EE refurbishment or new construction.

The actual relationships among these stakeholder groups depends on the type of finance (its origin) and the purpose of the finance. The figures below illustrate some concrete cases of these relationships within the Georgian context. The four examples are not exhaustive, and more actual relationships can be found..

Figure 1. Stakeholder chain for energy efficiency investments.



***** *Funds can origin in the IFI or directly from the Georgian government, the majority is not from the Government of Georgia.*

In this way, stakeholder interactions in EE/Green housing investments in Georgia do not differ substantially from investments in other contexts. The main difference being the concrete institutions involved and the specific products they offer, as described in the following sections.

6.2. Roles and products of capital providers

IFI and MDB: their role and products in energy-efficient and/or green in residential investments

IFIs play a dual role of provision of finance and technical assistance/advice to their partners. In Georgia in the last five years, there are only a few IFI dedicated to residential EE: European Bank for Reconstruction and Development (EBRD) and the Green for Growth Fund (GGF), which was established by the European Investment Bank and Germany's KfW Development Bank.

European Bank for Reconstruction and Development (EBRD)

The European Bank for Reconstruction and Development (EBRD) is a leading IFI in Georgia. Since the start of its operations in the country to 2020, the Bank has invested over 3.7 billion EUR across 249 projects covering the financial, corporate, infrastructure and energy sectors. Out of which, 87 % are in the private sector. EBRD works with the Government (including the central/national bank), with commercial financial institutions, private sector investors and consultants (incl. property developers). EBRD applies risk sharing frameworks with their partners and uses a range of instruments e.g. debt, equity, and guarantees (not specific to green) and believes that the enabling legal framework for EE and sustainable finance will greatly improve the market, stimulate the demand and improve the EE performance. To ensure this, EBRD is continuously monitoring the market and engaging with the partner institutions on these developments. Through the interviews, EBRD representatives acknowledged that the definitions of green financing is not fully clear for some yet, but does not share the perception that increasing of green financing regulatory disclosure and reporting requirements (by NBG) may become a significant financial / non-financial burden for the banks. EBRD will contribute to capacity building on green financing disclosure and reporting of lender banks.

In terms of their green finance portfolio, EBRD has a range of projects many of which are not directly related to investments in residential EE. Some examples are the EU4Business-EBRD Credit Line directed to small-medium enterprises (SMEs). This Credit Line is related to the Deep and Comprehensive Free Trade Agreement (DCFTA) and the EU Directives, providing loan/leasing finance and cash-back (EU4Business - EBRD Creditline, 2021); and the Finance and Technology Transfer Centre for Climate Change (FINTECC)

supported by EU and Global Environment Facility (GEF) also assisting SMEs to adopt innovative, greener technologies (FINTECC, 2021).

Green Economy Financing Facility (GEFF)

Certainly, the most important programme in the context of this study is the Green Economy Financing Facility (GEFF). GEFF works in two directions in Georgia: (1) residential and commercial, and (2) industrial and residential. The table below shares an overview of the GEFF programmes and initiatives within the Georgian context.

Table 10. Overview of GEFF's programmes and initiatives in Georgia.

GEFF in Georgia	
Residential and Commercial	**Industrial and Residential**
GEFF provides a credit line facility of up to 45 million EUR to participating financing institutions (see below) in Georgia to on-lend to residential and commercial clients investing in EE and renewable energy projects. The local participating financial institutions are: - ProCredit Bank - TBC Bank - Basis Bank The size of the individual credits/loans are: • up to 250k EUR for small scale well-defined project that comprise high-performing equipment and materials from the Green Technology Selector , • up to 0.83 million EUR for large scale EE and renewable energy projects, where GEFF team can provide technical advice to individual private persons. • up to 4.16 million EUR for large scale EE and renewable energy projects, where GEFF team can provide technical advice – to Businesses, Service Providers, Vendors and Producers. Financing is subject to the usual financing criteria and assessment process of each participating financial institution.	Caucasus Sustainable Energy Financing Facility - Energocredit provided a credit line of up to 83.3 million EUR to participating financing institutions in the Caucasus for EE and renewable energy investments. • EUR 83.3 million set aside from the EBRD to participating financial institutions in Georgia, Armenia and Azerbaijan for on-lending to EE and renewable energy investments in residential and industrial sectors. • Since the launch of Energocredit in Georgia in 2012 till the end of 2019 , 31 companies and more than 29k households have together received in excess of 44 million EUR (end 2020) in green financing through six local banks – TBC Bank, Bank of Georgia, Bank Republic (now TBC Bank), BasisBank, Credo Bank and VTB Bank (Georgia). 51% of the total of 30k sub-projects was in the residential sector. • Borrowers could select pre-approved technologies, such as insulation, boilers, solar PV, that meet the high EE standards from the online Technology Selector. • Advisory services from experts were made available to borrowers and partner financial institutions and included energy assessments, training and marketing support. • The advisory package and investment incentives were funded by the donors, the European Union (EU) and the Austrian Ministry of Finance (BMF). • The Energocredit investments captured: - EE machinery that emitted at least 20% fewer GHG emissions or saved energy. - Renovations that improved the EE of existing buildings by at least 20%. - Environmentally friendly investments aimed at saving at least 20% of water or providing sustainable land management. - Separate investments in RE technologies. - The facility's investments have contributed to saving more than 227 630 kWh of energy per year and more than 45,830 tons of CO_2 emissions per year in Georgia.

Source: Own elaboration

> ***ENERGOCREDIT Success story***
> *To keep up with modern developments, Archi -one of the leading Georgian development companies- decided to invest in EE technologies. The EBRD's GEFF program helped the company achieve this goal.*
> *The company decided to use EE materials in its complex, such as Ytong building blocks, EE windows, doors, ventilation systems and insulation. As a result, Archi was able to erect green buildings that is in line with EU standards. The project is supported by EU4Energy and the Austrian Federal Ministry of Finance. In 2018, GEFF invested approximately EUR 386k in this project. Archi resulted in 43% reduction in the buildings' energy use.*

Another EBRD initiative is the Eastern Europe Energy Efficiency and Environment Partnership (E5P). E5P was established to facilitate municipal infrastructure investments boosting EE and environmental protection in the Eastern Partnership countries, in particular aiming at reducing GHG emissions. E5P co-finances district heating and public buildings projects together with local transport, solid waste and street lighting investments. Its resources are close to 235 million EUR. The EBRD acts as the fund manager on behalf of contributors and other IFI[15].

In 2020, GEFF continues to fund Georgia's partner banks (ProCredit, TBC, BOG and BasisBank) for on-lending in EE in buildings. Furthermore, EBRD is interested in structuring and investing in Green Bonds, if an issuer meets their financial and environmental benchmarks.

Green for Growth Fund (GGF)

Another IFI that invests significantly in Georgia's EE residential stock is the Green for Growth Fund (GGF). GGF was established as an initiative of the European Investment Bank (EIB) and Germany's KfW Development Bank. Founded in 2009, GGF is a unique public-private partnership with a layered risk-return structure that blends funding from public sources and international financial institutions to attract private capital, engaging a wide array of investors in its activities.

GGF are partnering directly with local commercial banks:

- With *Basisbank* in February 2019 through a local currency loan equivalent to 8 million EUR and 1 million EUR loan for on-lending to households and farmers for EE measures and the purchase of small RE equipment. EE and RE measures financed with the loan are projected to result in annual primary energy savings of approx. 7 050 MWh and CO_2 emission reductions of approx. 2 200 metric tons.
- With the *Bank of Georgia* a 28.3 million EUR loan for EE & renewable energy lending, utilized for further expanding the bank`s portfolio in EE and renewable energy (RE) lending to larger companies, SMEs and public entities. EE and RE measures financed with the GGF loan are projected to result in annual primary energy savings of approx. 22 086 MWh and CO2 emission reductions of approx. 3 164 metric tons.
- In September 2020 with *TBC* expanding access to local currency finance for EE measures. Loans to the local currency equivalent of 4.6 million EUR will facilitate increased business leases of energy efficient machinery and vehicles. Investments are estimated to result in 13 380 MWh/a of primary energy savings and prevent emission of 2 863 tons of CO_2.
- In December 2020, a strengthened partnership with *ProCredit Bank* for a 20 million EUR loan. The investment aims to help businesses and households' access dedicated financing for energy and resource efficiency measures, especially in light of the difficult economic circumstances brought about by the COVID-19 crisis. The measures to be financed by this loan are estimated to result in 19 100 MWh of primary energy savings per year and reduce 5 050 tons of CO_2 emissions annually.

[15] https://www.ebrd.com/who-we-are/our-donors/multi-donor-funds.html#e5p

The National Bank of Georgia: current negotiations on the emerging regulation for green finance and other efforts influencing energy-efficient and green investments in the Georgian residential building stock

National bank of Georgia (NBG) is the central bank of Georgia. The NBG has made some progress in supporting the sustainable finance. The first step was to join the Sustainable Banking Network (SBN) in September 2017. The NBG has been actively working with different international organizations and networks such as International Finance Corporation (IFC), Organization of Economic Cooperation and Development (OECD) to develop sustainable finance policy framework in Georgia. With the purpose of increasing awareness about the sustainable finance, the NBG in cooperation with the private sector translated the International Capital Market Association (ICMA) Green, Social and Sustainable Bond Principles in Georgian language. The translated documents are now available on the ICMA website.

The Roadmap for Sustainable Finance in Georgia

The Roadmap for Sustainable Finance in Georgia has been created in cooperation with the IFC /SBN in 2019, and is consistent with the EU Commission Action Plan. The Roadmap outlines the action plan for the next four years in terms of sustainable finance development in Georgia. The ultimate goal of this Roadmap is to provide a credible, predictable and stable regulatory framework and prepare the market for transitioning to sustainable finance. It also aims to support incorporation of sustainability issues into decision-making by providing coherent and consistent actions and allowing time for the system to adapt. The Sustainable Finance Roadmap consists of the four main pillars, as can be seen in the figure below:

Figure 2. The Roadmap for Sustainable Finance in Georgia

Source: (National Bank of Georgia, 2019).

The NBG has established the working group and in close cooperation with IFC and the SBN will be finalizing the development of the SFT for Georgia in 2021. Established working group has already developed the draft document and currently the work is on the elaboration of indicators.

Specific elements of the Road Map belonging to "Sustainable Finance Flows" (Pillar 2)

- One of the important documents that the NBG will be preparing within next few years is the *Sustainable Finance Guidelines*. It will combine all the existing definitions of sustainable financing products, including green, social and sustainable bonds, green credits; provide the guidelines for issuing green bonds; describe the ESG risk management requirements; and summarize ESG integration into the corporate governance codes with corresponding disclosure and reporting principles.

- NBG is currently working on the development of a *Sustainable Finance Taxonomy* for Georgia and it is anticipated that it will closely follow the EU taxonomy in objectives and standard`s requirements. However unlike EU taxonomy in addition it will include "Social taxonomy" which defines the minimum criteria that economic activities should comply with in order to be considered socially sustainable. This defining "taxonomy" will specify national requirements, thereby helping local institutions to contribute to achieving Georgia's sustainability goals.

Through the elements of the Road Map, NBG will influence EE investments in residential buildings, including barriers and opportunities, targeting the main stakeholder in residential EE investments - national commercial banks. The quality of this Roadmap will greatly influence residential EE financing by commercial banks. Currently, the NBG conducts more research before choosing concrete measurements. The NBG will closely monitor its green and sustainable regulations enforcement, when it comes into place, and evaluate effects on sustainable finance market in Georgia to further improve actions and enhance green finance market. Please refer to NBG`s planned actions shown above in Sustainable Finance Roadmap 2019 – 2022.

The introduction of new products: Green bonds in Georgia

A number of green bonds have been issued in Georgia, both from national and international funds catering energy utilities, high-end developers and other SMEs. The concrete cases are listed below.

Asian Development Bank to Georgia Global Utilities

The Asian Development Bank (ADB) announced an investment of up to 17 million EUR in green bonds to be issued by Georgia Global Utilities JSC (GGU). The investments is part of a 206 million EUR issue by GGU within a 5-year span green bond program. Key partners were J.P. Morgan, which acted as a leading agent of the Notes and TBC Capital as Co-Manager, Freshfields Bruckhaus Deringer LLP and Baker & McKenzie LLP that acted as legal advisors to J.P. Morgan and GGU, respectively. The issuance was supported by three IFIs: the Deutsche Investition und Entwicklungsgesellschaft mbH (DEG), the Netherlands Development Finance Company (FMO) and the ADB[16].

ProCredit Holding to SMEs

In May and September 2019 ProCredit Holding (100% share in ProCredit Georgia)[17] placed its first green bonds totalling around 75 million EUR with the IFC specifically for the purpose of financing the green investments of SME's in emerging economies, including Georgia, namely investments in EE, RE and environmentally friendly measures.

TBC Capital to Lisi Lake Development JSC (property developer)

Lisi Lake Development SJC is a **high-end** Georgian property developer committed to a green philosophy, and the first and only company in the real estate sector obtaining an international credit rating. In 2018, the Georgian brokerage firm TBC Capital, issued bonds for Lisi Lake Development JSC, with a value of approximately 12 million EUR. Bonds bear 8% of annual effective interest rate and have three years of maturity. The bonds are listed at the Stock Exchange of Georgia, which means that the bond may eventually

[16] https://tbccapital.ge/news/GGU--with-the-help-of-TBC-Capital--places-US--250-million-International-Green-Bonds

[17] https://procredit-holding.com/2019/05/08/procredit-holding-has-agreed-to-place-green-bonds-totalling-usd-90-million-with-the-international-finance-corporation/

be available for the international investors. In 2020, International rating company Scope Ratings has maintained the credit rating of Lisi Development at "B + / stable outlook", and the rating of the bonds issued by the company is "BB-".

National and local commercial banks; products for property developers and private owners

National commercial banks are active stakeholders in funding EE in residential buildings targeting both property developers as well as for private clients wishing to purchase new apartments or upgrade their existing ones. They mainly act as an on-lending entities of IFI funds to end users, such as developers and private customers. However, there are cases when banks finance EE with their own funds. Three banks; ProCredit, TBC and Bank of Georgia (BOG) are clear frontrunners in residential EE financing.

ProCredit Bank

The Bank offers ECO-loans for both private clients and businesses, focusing on three main areas:

- EE at home and business facilities;
- Renewable energy resources;
- Other environmentally friendly activities;

Moreover, the bank has an EE dedicated ECO-deposit opportunity, which is one of the most important products within the Bank's ECO strategy, as it uses ECO-savings to grant ECO-loans at preferential interest rates to supports the promotion of eco investments because this increases the number of financed ECO projects. The bank's headquarters has also received the international EDGE certification (EE improvements of more than 20%).

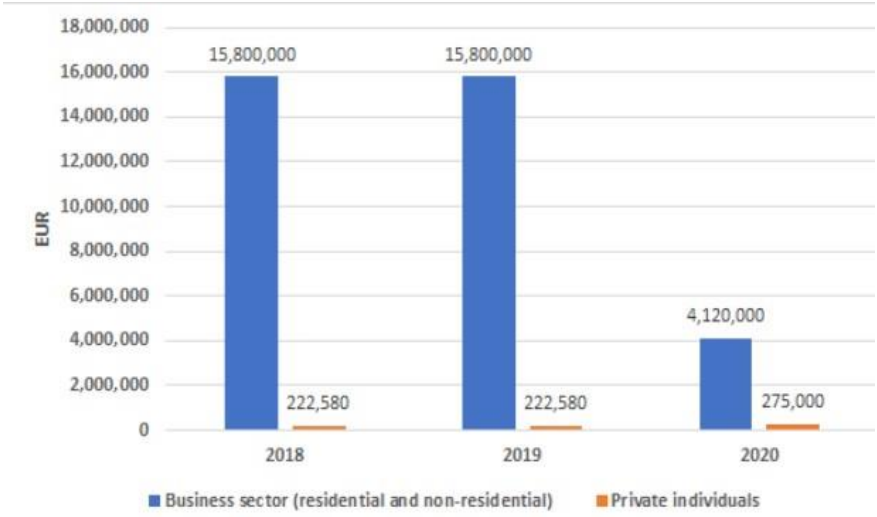
The EDGE certification also inspired the bank to introduce in February 2021 a special financing programme – *The Green Building Initiative*, to help customers and developers build and purchase sustainable EE buildings. The programme aims to finance green construction under attractive conditions (market competitive interest - 0.5%). Sintali-SGS (the official certifier) will help companies successfully navigate the EDGE certification process, and, if successful, ProCredit customers will benefit from special discounts from Sintali-SGS to undergo EDGE certification. The Initiative targets residential apartments; parts of MDB e.g. commercial area at buildings ground floor; and new buildings, existing buildings as well as refurbishments. Besides the advantages in the EDGE certification, the loans carriers a discounted interest rate of up to 0.5 % on dedicated loans.

Additional support provided is:

- 10% discount on the audit fees for all ProCredit clients, or
- 20% discount on the audit fees for projects going for remote audit.
- Bonus: the first three projects to sign up for the EDGE certification process will receive free registration (an additional approx. 250 EUR discount)

Buildings that are part of the programme should achieve 20% energy saving compared with local baseline and this should be verified in quantified impact reporting. EDGE definition of 20% quantified resource efficiency is aligned with EU Taxonomy Principles. 100 % of such finance or re-finance can be counted as green.

Figure 3. Financing EE on the ProCredit Bank: 2018-2020

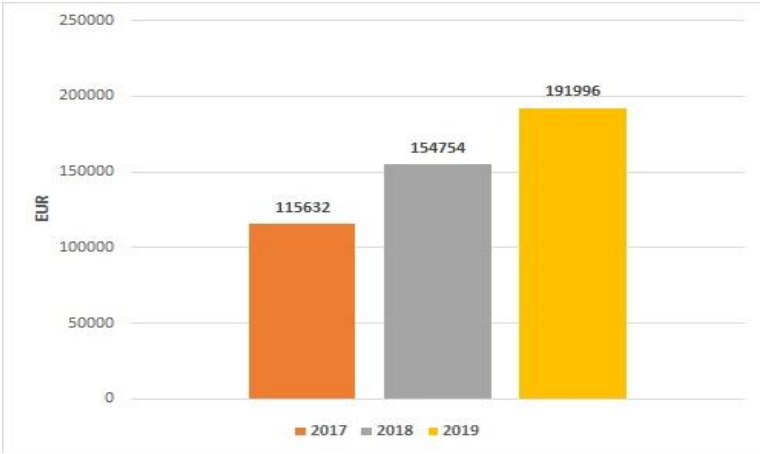


In this way, EE financing plays significant role in ProCredit Bank's Green Finance policy. In 2019, the green loan portfolio grew by 17.4% and at the end of the financial year accounted for 16.6% of the total customer loan portfolio (2018: 15.4%). The fact that EE Financing decreases in 2020 is partially attributed to the fact that the results for Q3 were not collected by the time the data was retrieved. ProCredit Bank Georgia cooperates with both EBRD and GGF. It also cooperated with EBRD and GEFF for on-lending in EE investments in 2018 – 2020, specifically targeting the business sector. Furthermore, the GGF in provided the earlier mentioned 16 million EUR of investment in light of the difficult economic circumstances brought about by the COVID-19 crisis. In parallel, the ProCredit Holding – 100% shareholder of ProCredit Georgia issued green bonds in 2019.

TBC Bank

TBC Bank is a leading universal financial group in Georgia, holding 39.5% and 39% market shares in total loans and total deposits respectively, as of December 2019. TBC seeks to increase its positive impact on society and economy through financial products and services and offer the following tailor-made products - Women in Business, Renewable Energy, EE and Youth Support [18].TBC Bank achieved significant 64% more growth in its total sustainable loan portfolio during 2017-2019. Its sustainable loan portfolio in million EUR for the period 2017-2019 as well as the breakdown of the loan portfolio by years are given in Figure 4 and Figure 5 below.

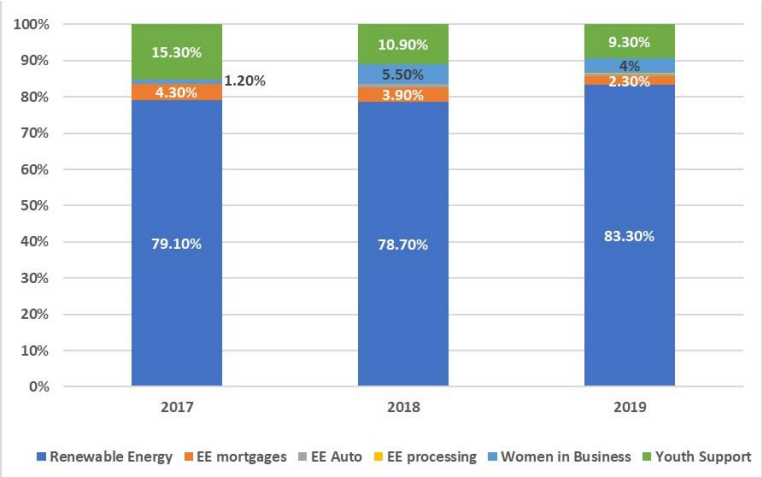
Figure 4. Sustainable Loan Portfolio (2017-2019).



[18] "TBC Sustainability Report-2019"; https://tbcbankgroup.com/media/2235/sustainability-report-2019.pdf

Source: TBC- 2019 Annual Report

Figure 5. Sustainable Loan Portfolio: Breakdown per product (2017-2019).



Source: TBC- 2019 Annual Report

Despite the total sustainable portfolio growth by 64%, EE mortgages share in total portfolio decreased by 2% in 2019. Reasons behind this recession include -according to the lender bank- the lack of capacity from the lenders side to ensure that the green loans perform appropriately so they end up not promoting them. Also, the fact that the recipient of the green financing is obliged to meter and report on the progress and performance, which might discourage some clients. Furthermore, in some instances the competing non-Green products offer better conditions.

TBC is as well a leader in Georgia in RE financing, with a core segment in hydropower stations. In terms of EE, financing projects include the purchase of fuel-efficient vehicles, EE housing improvement loans, etc. Hence, there are certain barriers such as potential lack of knowledge or difficulties which preclude from advancement of EE mortgage loans portion in bank`s sustainable portfolio.

Bank of Georgia

In February 2021, Bank of Georgia (BoG) launched "Energocredit for Solar energy programme" in cooperation with the government agency "Enterprise Georgia". The bank analysed the electricity tariffs increase from 2021 for both households and business customers and in response offered dedicated loans with target of energy saving. "Energocredit" finances mainly business with significant electricity costs, and support the set up solar-PV system (project) and energy savings through following terms and procedure:

- The business shares information on its energy cost before project with the bank.
- The bank calculates the "Energocredit" loan amounts based on energy cost savings anticipated after the project implementation.
- The "Energocredit" loan interest is around 11 % p/a in GEL, comparable with market.
- "Enterprise Georgia" will finance 10 % of this interest during first 7 years.

HIGHLIGHTS CHAPTER 6

- **While the recipients of capital for EE residential investments are private homeowners, developers, and the public sector, the providers of capital are IFIs, the Government, and Private Commercial Banks, often in an internal relationship that implies on-lending and even blending of finance.**

- **In Georgia, the most active IFIs dedicated to residential EE are the European Bank for Reconstruction and Development (EBRD) and the Green for Growth Fund (GGF), established by the European Investment Bank (EIB) and Germany's KfW Development Bank; IFI's are offering new dedicated programs, e.g. Green Economy Financing Facility (GEFF) a framework programme og EBRD is a big player, and GGF's total allocation in 2019 and 2020 reached 60 million EUR in BasisBank, Bank of Georgia, TBC bank and ProCredit bank.**

- **The National Bank of Georgia (BOG) plays a key role in establishing an enabling environment, and joined the Sustainable Banking Network (SBN) in September 2017. The Roadmap for Sustainable Finance in Georgia has been created in cooperation with the IFC/SBN in 2019, and is consistent with the EU Commission Action Plan. The Roadmap outlines the action plan for the next four years in terms of sustainable finance development in Georgia. The ultimate goal of this Roadmap is to provide a credible, predictable and stable regulatory framework and prepare the market for transitioning to sustainable finance.**

- **There are several relatively new green bonds in Georgia, and at least one of them with international concessional finance (i.e. ADB and Utilities). Although none of them relate specifically to EE measures in housing, they do finance high-end developers and other SMEs working on this arena;**

- **National commercial banks are active stakeholders in funding EE in residential buildings targeting both property developers as well as private clients wishing to purchase new apartments or upgrade their existing ones. They mainly act as an on-lending entities of IFI funds to end users, such as developers and private customers. However, there are cases when banks finance EE with their own funds. Three banks; ProCredit, TBC and Bank of Georgia (BOG) are clear frontrunners in residential EE financing, and have their discrete niches;**

- **Some of the numbers obtained from the commercial banks indicate that demand for EE mortgages has gone down in the last years amongst others due to the lack of capacity of the banks to ensure that the green loans indeed perform as expected. Also, the fact that the client (recipient of the EE mortgage) is obliged to meter and report on the progress and performance might discourage some clients. Furthermore, in some instances the competing non-Green products offer better conditions, and the bank are not promoting the EE mortgages.**

7. Barriers and opportunities in energy efficient and green investments in residential building in Georgia

Results from this study highlight the great potential of EE/Green investments for residential buildings in Georgia. However, a number of barriers currently hinder investments in favour of green and EE measures at a larger scale. According to the stakeholders interviewed, these are the main barriers (see table below):

Table 15 Stakeholders opinion on real or perceived barriers and drivers of EE/green measures.

Category	Barriers	Opportunities
Market conditions	**Property developers** - Almost all EE products and equipment need to be imported. Some large developers managed construction EE materials production locally, e.g. Anagi development`s EE building block plant near Tbilisi. However, currently vast majority of EE materials & equipment are imported. This significantly contributes to a 3% -5% - and in case of advanced EE materials / measures even 10% -increase of building`s overall cost. This in connection with national currency depreciation keeps EE apartments prices significantly higher and hold back middle class customers choosing EE apartments vs the apartments with some EE futures. **Commercial Banks** - Lender bank has no capacity to ensure monitoring of green loan performance metering and reporting by borrower business	- Increasing share of EE material & equipment produced locally / enhancement of local building block production - IFI`s technical support in green finance
Information and awareness	**Property developers** - Lack of awareness from the customer's side on needs and the multiple benefits of EE measures **Commercial banks** - Definition of green financing is not fully clear for the bank yet. For example, does GF include water management or waste management financing - Green financing regulatory disclosure and reporting requirements may become significant financial / non-financial burden for bank. - Obligation for recipient of green financing to meter and report green loan performance is very hard to meet. Borrower has lack of technical knowledge capacity, resources and time to meet this obligation. **NGO's** - Absence of the technical experience related to development of technical design with the insulation of building envelope as well as practical application of the external composite systems with insulation.	- Increase of EE advertisement and usage by developers / builders - Issuing of high quality clear green finance regulations - IFIs technical support to systematise green reporting - Education of developers / architects in green building and sustainability areas

	- Lack of knowledge of EE building`s design, materials and construction among developer / architect and builder still needs significant improvement	
LegAL & regulatory	**Property developers** - Law enforcement is slow. EE law is not functioning yet: National methodology for calculating buildings EE taking into account relevant national and European Standards, European Commission delegated Regulation N 244/2012 of 16 January 2012, and Energy Community Legislation **NGO's** - EE law is not enacted yet. The lack of a concrete regulatory framework impedes action from a number of stakeholders - No EE evaluation and ranking system in place - Absense of the EE standards, that is mandatory for execution	- Develop clear codes and regulations supporting new legislation in relation to EE in buildings - Enforcement of EE law /standards - Adoption of best practice from EU and beyond
economic and Financial	**Property developers** - No residential EE dedicated loan with better terms vs market - Majority of developer keep minimum EE investments in façade and possibly roof to manage apartment's sales. - Low cost developer insulate only external envelope to keep price low. - No Green tariff established - Limited technical assistance **Commercial banks** - Green loan`s higher cost compared with existing standard loans on the market.	- IFI support for favourable long term loans - EE dedicated loan with better terms vs market - Economic development - Customer`s purchasing power increase. - Establish clear guidelines for a Green tariff - Technical assistance to EE dedicated loans both for developers

The barriers for EE/Green investments in residential buildings in Georgia stated above affect both on demand and supply side. On demand side, the major barrier is lack of awareness among borrowers on the potential benefits (economical, environmental, health) from investments in green or EE buildings which is explained by shortage of informational/promotional means (media, advertisements, best examples, case studies). Subsidized energy tariffs for population as well as energy subsidies for fossil fuels do not stimulate investments lowers interest to EE improvements among population. On supply side, barriers to be mentioned are delay with the adoption of secondary legislation (methodology for energy performance calculation, certification rules, regulation on inspection of heating and air-conditioning systems, regulation on minimum energy performance requirements for buildings, report on heating and cooling systems, and alternative measures of regularity compliance inspection) to the Law on Energy Performance of Buildings. Barriers to the implementation of the adopted regulations are lack of qualified and certified human resources in EE/green buildings (i.e. designers/architects, installers of EE equipment, energy auditors, property evaluators, and bank credit officers). High investment costs for the implementation of EE improvements is a significant barrier on supply side as almost all materials and technologies are imported. Very few financial institutions are willing to offer considerable loans for execution of EE projects. Commercial banks play an important role in providing access to green finance. However, market conditions in Georgia

constraint the involvement of commercial banks, they have only established specific environmental credit lines when supported by IFI. The EE Law promotes the use of energy service companies but does not include a framework to support public financing. Nevertheless, a large number of international technical assistance and financing programmes support EE measures, especially in the building sector.

Champions and drivers in promoting the investments in EE/green measures in residential buildings in Georgia

While the legal framework and enabling environment is under development, it is likewise useful to identify who are the champions advancing EE/green housing in Georgia. Result of the stakeholder interviews identified two main champions: high-end property developers and commercial banks.

Champions #1: "High-end" property developers

High-end developers are conceived as the number one champion for being pioneers in the Georgian market in implementing EE/green measures. These measures include, among others: ceiling and wall insulation, heated floors, EE doors and windows (only 10% are currently European class); facade insulation; HVAC systems; energy source and possibly generation; energy storage; ventilation systems; LED lighting; and smart monitoring and metering.

However, this activity remains a nice. As a matter of fact, there are not many companies in this collective and mostly all of their projects target upper class or upper middle class. All of which are facing the barriers mentioned above e.g. the lack of domestically fabricated construction materials, and the need to import these, making the construction more expensive. They are also likely to face the limited understanding of the general consumers of the increased costs/price.

Based on the interviews, motivation of the high-end developers to aim for higher EE standards are, amongst others:

- **Providing a visibly and "felt" more high quality building**: EE measures contributes to a noticeable better apartment, e.g. no mold and condensate on the wall and ceiling due to thin non insulated envelope; rooms are warm without overheating in cold winter days.
- **Competitive advantage**: Strengthen the image of the developer and **decreases reputational risk.**
- **The market demand**: despite the increased price, EE characteristics are in demand already today. The high end developer always refer to EE characteristics of its buildings / apartments in marketing campaign, e.g. health, safety and comfort for buyers of its EE apartments, long term savings of energy cost of EE apartments.

As a new trend, some developers are not only advertising EE measures upfront before construction and sale, but engage also in post construction and post-sale management. The EE scope and performance in the buildings of such developers are much better compared to those where the developer/builder does not assume post sale management responsibility.

Champion #2: Commercial banks

Four commercial banks are identified as champions in the residential EE market of commercial bank`s residential EE activities. The table bellows shows the overview of the investment volumes each one of them is responsible for.

Table 8. Commercial banks' EE investment programs eligible to residential buildings in 2010 – 2020. Source: Own elaboration.

IFI / partner commercial bank	EBRD/GEFF	Green for Growth Fund (GGF)	Bank`s own financing
ProCredit Bank		20 million EUR (2020)	Yes, including Green bonds (by ProCredit group)

TBC Bank		5 million EUR (2020)	
Bank of Georgia	2 million EUR (2020) 6 million EUR (2019)	25 million EUR (2020)	Yes, in cooperation with "Enterprise Georgia"
Basis Bank	44 million EUR signed to 6 PFI*s (51% in the residential sector) (2010 - 2020)	8.33 million EUR (2019)	
TOTAL	22.44 million EUR (residential sector)	59.33 million EUR /	

**6 commercial banks partnered with GEFF and 4 with GGF, in EE financing, out of 16 banks operating in Georgia today.*

These champions are not exclusively green, but also cater for the EE market niche. Inasmuch as it is still a nice, the market is expected to grow pushed by the developments in the legal framework (e.g. Law on Energy Performance of Buildings).

They are likely to be facing the same barriers, as mentioned above, and be motivated by the same elements as the developers e.g. the demand for EE financial products, the wish to be contributing to something positive, and the avoidance of a reputational risk. In addition, some of the banks are entering the global market with bonds, with credit ratings etc. Their products are slightly different, and some of the new trends (Procredit bank) is to combine the offer to customers with links to certifiers, to allow both green credits and savings etc.

HIGHLIGHTS CHAPTER 7

- **There is a strong consensus among interviewed stakeholders: main barriers hindering the upscaling of these investments are mostly related to the lack of enforcement mechanisms of EE in the building sector, as well as other aspects related to the lack of market maturity (i.e. lack of awareness, lack of capacity, and even lack of market materials and technologies, etc.).**
- ***The barriers affect both on demand and supply side.***
- ***Results from the stakeholder interviews identified two main champions: high-end property developers and commercial banks.***
- ***Both champions in EE/Green residential in Georgia indicate similar motivations and willingness to innovate their products and services: supplying a demand for EE products and addressing a niche.***

8. Synthesis and Conclusions

Under the updated NDC, Georgia has committed to an unconditional target by 2030 of 35 % reduction of CO_2 emissions compared to 1990 levels of its domestic total GHG emissions (UNFCCC, 2021). The building sector alone is responsible for 15% of the total GHG emissions (excluding electricity). Furthermore, it is estimated that more than 5% of the buildings are in a state of decay, with limited lifetime left. In this way, the EE/green transformation of the building sector is key to achieve national carbon reduction targets, while upgrading the stock, and attaining a wide range of ancillary benefits, such as alleviating energy poverty, improving health, and increasing energy security.

Presently, the housing stock in Georgia has very poor energy performance, with an average of 259 kWh/m2/year in MDB and 333 kWh/m2/year in SDB. Fortunately, Georgia shows great potential for EE improvements in residential buildings with low payback time (PBT) across all climatic zones. It is estimated that a total of 2 153 million EUR of investment for renovation and 3 304 million EUR for new construction will be required to upgrade the housing stock to a minimum EE standard (Class C). While a number of financial products and services are already in place, and new ones are being established e.g. green bonds, ventures on green and/or EE residential buildings are currently well below this reference value. In general, IFIs, and in particular EBRD, plays a major role within finance, while commercial banks act as on-lenders, and the government, and in particular the National Bank of Georgia, develops the green finance enabling framework through the sustainable finance roadmap, aligned with EU. It is hoped that the road map will create incentives for EE investments, also in the residential sector, and a level playing field compared to conventional finance. The main barriers hindering the upscaling of these investments are mostly related to the lack of enforcement mechanisms of EE in the building sector, as well as other aspects related to the lack of market maturity (i.e. lack of awareness, lack of capacity, and even lack of market materials and technologies, etc.). For instance, banks are hesitant towards ensuring the actual EE performance of EE mortgages, and clients hesitant towards the metering and reporting of performance. Thus, the products and services provided by banks are currently insufficient to meet Georgia's carbon targets in the building sector. Thus, further actions should focus on mobilizing finance for EE in buildings to upgrade the existing building stock (see General recommendations).

While waiting for further instruments connecting international commitments and national targets with local action (e.g., building codes with concrete kWh to be achieve per building typology, both in refurbishment and new construction), some pioneers and champions are already working to introduce EE improvements in the housing stock. These are mostly high-end property developers and a few key commercial banks, both with similar motivations and willingness to innovate their products and services. Though this is a positive market signal, it is important to guarantee that the EE investments address all segments of the population (see General recommendations).

For this to happen, EE loan should be competitive with non-EE to incentivise for demand-side actors. Also, the concept "total cost of home" should be considered in order to ensure these investments are perceived as appealing for the homeowners and investors. That means, making sure that the whole lifetime costs of the real estate are taking into consideration -including the energy bill- when assessing the costs. From the banks point of view, it requires an understanding that EE related mortgages are less likely to default, because the residential is of higher value, the cost for the owner lower, etc.

9. General recommendations

In order to foster EE/green improvements of residential buildings in Georgia, actions are needed at different levels.

International level

- Maintain and strengthen the engagement with the foreign donor community (IFI etc.) and champion alliances to mobilize climate finance at scale;
- Facilitate the establishment of international partnerships between public and private investors (e.g. as seen in the green bond market described), to foster and mobilize green infrastructure financing;
- Strengthen the investments through managing risks and uncertainties, such as supporting the development of robust investment plans, developing solid business cases or identifying its replication potential;
- Increase the participation in international platforms (such Network for Greening the Financial System for central banks) and forums to learn from best practices on large-scale deployment of energy-efficient technologies in the building sector;

National level

- Promote alliances and collaborations between stakeholders across the building value chain as well as across scales (i.e. from the national to local levels), to enable energy-efficient building projects;
- Further develop the supporting regulation (e.g. building codes and certifications) to ensure that these are sufficiently comprehensive and address all building stock segments towards strict energy-efficient requirements;
- Establish a robust data collection framework, including various open data sources, from national agencies, city government collection arrangements, audits of individual buildings, etc.; This should include defining methodologies and frequency of data collection and reporting;
- Enhance transparency and dissemination of best study cases to support the promotion of replication of best practices;
- Apply environmental taxes to construction companies that do not follow EE standards, mainly targeting at publicly owned buildings;
- Develop and promote exemplary projects encouraged by voluntary green building and green finance standards;
- Promote the need for residential green certification as well as ensure the necessary capacity building in order to develop them;
- Increase the amount of soft loans to incentivise sing and portfolio owners to undertake EE projects;
- Facilitate subsidies to promote specific EE technologies, especially those doomed most promising in the market to reach climate protection goals.
- Guarantee that the EE investments are not only affecting the high-end market (thus higher social classes) but actually address all segments of the population. In order to alleviate energy poverty, increase energy access, generate local qualified job creation and energy security;

Local/city level

- Increase the local knowledge and interest in EE, its opportunities and benefits by building local capacity and raising awareness;
- Align National and Local Regulations with the EU Taxonomy for Sustainable Activities; this can be partially done through the coordination of national and local governments in this topic;

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Appendix

1. Questionnaire interviews per stakeholder group

In line with project`s work program, key stakeholders identified: Construction developers, Non-governmental organization (NGO`s) with international project experience in residential EE, National Bank of Georgia and commercial banks: ProCredit and TBC. Based on WP`s section: Financial context for EE investments in Georgia and item: Comparison of the EU Taxonomy and the standards in Georgia, appropriate questionnaires' targeting key stakeholders, listed above, were elaborated

Construction Developers

1. What drives your company to invetst in EE of residential buildings?

2. Could you please indicate the most common EE-measures you implement in residential buildings you built?

- In building envelope:
  - Façade
  - Windows:
  - Roofs
- HVAC systems
- Energy generation (e.g. Photovoltaic panels)
- Energy storage
- Monitoring and Smart metering
- Lighting systems
- Other (please describe)

3. What is estimated amount of EE investments in your building (% from the total)

4. Please outline current linkages of stakeholders (developers, investors, finance institutions, public authorities, civil society, construction etc.) within EE in residential investments, what are their respective roles and relationships.

5. What is your company`s role in this linkage. Who are driving / objecting to EE promotion?

6. What are real or perceived barriers and drivers of EE/green measures (from a financial point of view) to invest / upgrade residential buildings:

- Stakeholder group interests:
  - Barriers:
  - Drivers:
- limited capacity/understanding:
  - Barriers:
  - Drivers:
- stake in status quo :
  - Barriers:
  - Drivers:
- legislative / regulatory
  - Barriers:
  - Drivers:
- incentives / disincentives

- availability of finance
  Barriers:
  Drivers:

- other

7. What influence the new law of EE / EE in buildings will have on investments in residential EE?

8. Will you be interested in dedicated EE financing loans from banks, if you will have obligation to share loan /energy performance information with lender bank if:

- loan will have generally equal conditions (percentage, tenor) with corporate loans on the market;
- loan will have more favourable conditions (percentage, tenor) then corporate loans on the market;

9. Are benefits of energy efficient building fully disclosed and clearly communicated in your advertisement of EE apartments

IFI's in Georgia

1. Which Georgian partners (National bank, comercial banks, others) do you cooperate with to advance residential EE investment in Georgia?

2. What kind of cooperation with each partner you have to implement residential EE programs in Georgia and what is progress / performance of this cooperation?

3. What is current potential of residential EE investments market in Georgia?

What is your impression of the uptake of EE investments in residential buildings in Georgia?

Who are the drivers and spoilers in the promotion of EE investments in residential buildings in Georgia?

4. How does the current legislation in EE and Sustainable Finance, and its planned development affect the residential EE market?

5. What are real or perceived barriers and drivers of EE/green measures (from a financial point of view) to invest / upgrade residential buildings:

- Stakeholder group interests:
  Barriers:
  Drivers:
- limited capacity/understanding:
  Barriers:
  Drivers:

- stake in status quo :
  Barriers:
  Drivers:

- legislative / regulatory
  Barriers:
  Drivers:

- incentives / disincentives
- availability of finance
  Barriers:
  Drivers:

- other

6.

a) What residential EE investment programs you have in Georgia?

b) What is financial performance estimate of these programs in 2018, 2019 and 2020?

7.

a) Who are your local partners for your Green / EE programs in Georgia?

b) What is financial performance estimate per partner bank for these programs in 2018, 2019 and 2020?

8.

a) What Green / EE financing programs you implement / plan in Georgia in 2020 2021 and 2022?

b) What is financial performance estimate of these programs in 2020, 2021 and 2022?

8. What is your plan concerning with Green Bond issuance support in Georgia?

National Bank of Georgia (NBG)

1. What Green / Sustainable Finance regulation you have in force currently?

2. What Green / Sustainable Finance regulation you plan to develop in next 2-3 years and through what process?

3. What is main similarities and differences between NBG`s Sustainable finance regulation comparted to EU Taxonomy?

- In objectives
- In Standard`s requirements
- Other (please describe)

4. What other efforts NBG have / plan to influence EE investments and what needs to happen from the point of view of NBG to foster EE measures in residential buildings in Georgia)?

5. What are real or perceived **barriers** and **drivers** of EE/green measures to upgrade residential buildings?

- Stakeholder group interests:
  - barriers
  - drivers
- limited capacity/understanding:
  - barriers
  - drivers

- stake in status quo :
  - barriers
  - drivers

- other (please describe)
  - barriers
  - drivers

- Economic and financial

o Split incentives

- barriers
- drivers

o Lack of attractiveness in the investment (e.g. long payback me for the "small perceived gain")

- barriers
- drivers

o High initial costs

- barriers
- drivers

o Lack of access to finance

- barriers
- drivers

Awareness, information and related social barriers

o Lack of technical capacity to implement, operate and maintain new EE technologies

- barriers
- drivers

o Asymmetric information on EE potential

- barriers
- drivers

o Lack of environmental sensitivity

- barriers
- drivers

o Aversion to new solutions and technologies

- barriers
- drivers

Institutional/market structure

o Few providers (oligopoly) of EE technologies / services or a single provider (monopoly)

- barriers
- drivers

o Highly controlled / regulated markets

- barriers
- drivers

o Limited municipal incentives to save energy and try new approaches

- barriers
- drivers

Legal

o Lack of a comprehensive/detailed regulatory framework

- barriers
- drivers

2. List of Interviewees

Table 11. List of interviewees: name, stakeholder group, job title, type of interview and date.

No.	Interview name	Stakeholder group / company or org.	Job Title	Interview type (Tel, F2F, email)	Date
1	SDAP	NGO	CEO	Tel. + email	Dec,2020
2	Green Building Council	NGO	CEO	Tel. + email	Jan, 2021
3	Anagi development LLC	Property developer	Project manager	Tel. + email	Feb, 2021
4	Werkraum architecture	Property developer / Architecture	CEO	Tel. + email	Feb, 2021
5	Namai Vake	Property developer	Sales manager	Tel	Feb, 2021
6	ProCredit Bank	Bank	Head of Sustainability department	Tel. + email	Jan, 2021
7	TBC Bank	Bank	Head of Environmental and Social Risk Management Group	Tel. + email	Dec, 2020, Jan 2021
8	Bank of Georgia	Bank	Freedom square Service Center manager	F2F	Feb, 2021
9	NBG	National Bank	Contributor in Sustainable Finance Roadmap, Macroeconomics & Statistics department	Email	Jan, 2021
10	EBRD	IFI /MDB	Country team	Email	Dec, 2020
11	GEF-Finance in Motion	IFI / MDB	Georgia`s office	Tel	Dec, 2020