



# **Demand Survey of Green Loans for New Energy Efficient Housing and Insulation in Ulaanbaatar's Ger Area**

Draft Report

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## **Acknowledgement**

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Geres is the lead project implementing organization, with other implementing partners, including the Mongolia Green Finance Corporation (MGFC), Mongolian National Construction Association (MNCA), Mongolian Women's Fund (MONES), and Mongolian University of Science and Technology's Building Energy Efficiency Centre (BEEC).

The research was carried out in the first two quarters of 2023.

## Executive Summary

The first objective of the study is to evaluate the demand for green loans specifically intended for insulation and energy-efficient houses within the ger areas of UB city. Secondly, we aim to investigate the operational, financial, and other challenges encountered by stakeholders involved in the value chain of issuing green loans for insulating existing detached houses or building energy-efficient houses. To accomplish these objectives, the research team employed a mixed-methods research approach, combining quantitative and qualitative methods. The quantitative research phase focused on gathering numerical data to determine the extent of the demand for green loans among the households living in detached houses in ger area of UB. To complement the quantitative findings and gain deeper insights into the challenges faced by stakeholders engaged in the supply chain of green buildings and green loans, we conducted focus group and in-depth interviews. Overall, the study utilized the framework for EE finance programs by the Asian Development Bank Institute Working Paper Series on “Energy Efficiency Programs: Best Practices to Leverage Private Finance”, as it’s used to help in the assessment of individual existing schemes and act as a guide to the necessary elements to include when designing such programs.

Under the first objective of the study, we assessed the socio-economic situation and demand for insulation and energy-efficient housing green loan employing two different approaches: (i) financial stress test and (ii) quantitative sample survey. Firstly, we conducted a comparative analysis using the latest available data from the Household Socio-Economic Survey (HSES) conducted in 2021 by the National Statistical Office (NSO). Through this analysis, we computed the income, expenditure, and financial capacity of households, and compared the results among various household groups categorized by their dwelling types. Additionally, we conducted a micro-simulation analysis to evaluate the impact of recent changes in inflation and welfare policies, which have posed challenges to households’ livelihoods, on households’ financial capability and default risk. Secondly, we conducted a sample survey among 500 households residing in the ger area of UB’s six districts, specifically those who are target for housing green loans. The primary data was collected through semi-structured interviews, utilizing a pre-prepared questionnaire. Based on the primary data, we identified the target households’ demographics, socio-economic situation, financial capabilities, dwelling conditions, insulation necessities and their demand for green loans for insulation and energy-efficient housing.

To fulfill the second objective of the study, we conducted interviews with 50 stakeholders representing various stages of the insulation and energy-efficient housing green loan supply chain, using both Focus Group Discussions (FGDs) and in-depth individual interviews. The average duration for FGDs ranged from 60 to 90 minutes, while individual interviews lasted approximately 30 to 60 minutes.

Using the ADBI EE finance program framework developed based on best practices to leverage private green finance for EE financing, the following questions were used as guidance for this report.

1. What is the target market?
2. Are there drivers for action?
3. Is there a supply chain?
4. What are the barriers across the supply chain?
5. What solutions can address the barriers?

Studying the project target market, the main findings of households’ financial stress test are outlined below:

- The target group for insulation and energy-efficient green loans, which are not connected to the central heating system, exhibited distinct characteristics when compared to other household groups. Specifically, the households in this target group had a higher average age of the household head and a financial capability that was higher than the national average but lower than that of households living in apartments. Based on the the demographic and socio-economic

indicators of the target group, it becomes evident that relatively young households with the financial capacity to meet the requirements for bank loans have either already moved to apartments or have intentions to do so. This trend can be attributed to the influence of mortgage loan programs and redevelopment programs which have been implemented consistently over the past 15 years. These initiatives have facilitated access to financing options for younger households rather than older households.

- Certain groups within the target group of households display a high sensitivity to price shocks. Specifically, when the inflation rate rose by 5% to 10%, there was an observed increase of 3% to 6% in the default probability of these households or facing difficulties in covering their expenses with their current income. The findings indicate that the possibility of price increases in insulation services can have significant implications for reducing the demand for such services.

The results of household sample survey are summarized below:

- The average household size among all surveyed households was 4.1, with 17% of households being headed by women. Additionally, over 60% of the households had a head of household who was over 45 years old, while 77% of the heads of households had a secondary education or lower. These indicators closely align with the results of HSES from NSO, suggesting that the sample of the survey is quite representative.
- Most households within the target group resided in non-professionally constructed, self-built houses that exhibited high levels of heat loss. For instance, 75% of the surveyed households reported that they had built their own houses. Among these households, 71.6% reported signs of heat loss in their detached houses. Furthermore, approximately 45% of all 500 households surveyed reported that they can't stay warm enough during winter.
- As the size of the house increases, the heat loss became more significant, leading to the adoption of heating solutions that consume significant amounts of improved briquette. Furthermore, larger houses tended to employ a combination of stove and electric heating, which resulted in higher heating costs. For instance, around 5% of all households surveyed used a combination of stove and electric heating and these households incurred significantly higher heating costs compared to others during winter times, ranging from 24% to 2 times higher on average. This observation suggests that households with relatively higher incomes and larger houses are benefiting from government incentives such as improved briquette and discounted night electricity tariffs.
- Furthermore, due to the higher costs associated with electric heating compared to conventional heating methods, households often exhibit reluctance to transition to electric heating solutions. Approximately 16.8% of the households surveyed reported that their electricity bills resulting from the use of electric heaters were deemed excessively high.
- It was observed that households often insulate their houses without conducting heat loss measurements, leading to inefficient and inadequate insulation outcomes. For example, out of the 500 households surveyed in the study, only 3.6% had tried heat loss measurement in their detached houses. Furthermore, among the households that had previously insulated their houses, 3 out of 5 did not experience a reduction in their heating costs after the insulation. Furthermore, construction brigades have highlighted that these non-standard constructions of detached houses pose challenges in the insulation process, leading to increased costs and, in certain cases, making insulation impossible.
- The actual demand for green loans was low due to the financial constraints of households. For instance, when assessing the demand for Green Loans based on three specific criteria – (i) the intention to insulate or construct energy-efficient house, (ii) the household's financial capability, and (iii) the presence of tax-secured income - only 4.4% of the total households surveyed met the requirements for green loans for insulation. Moreover, among households

surveyed, only 1.2% (or 6 households) were in demand of green loan for energy-efficient housing. When we investigate challenges faced by households in meeting banking requirements by primary source of income, the following findings were observed:

- Households with business income encounter difficulties in accessing loans due to the absence of tax-guaranteed income, despite having financial capacity.
- Pensioner households, on the other hand, may have a formal income but face challenges due to their financial incapability and lower income adequacy. It is worth noting that more than half of the households surveyed were headed by individuals aged 45 years or older.
- Salaried households, although relatively financially capable compared to other groups, have high debt-to-income ratios, or have already obtained loans for other purposes, which affects their eligibility for additional loans.
- The information about green loans is spread moderately among surveyed households. For instance, 40% of all households surveyed reported having heard or being aware of green loans for insulation, while 35% of households were aware of green loan for energy-efficient housing. Households generally tend to prioritize the financial benefits and incentives associated with green loans, such as discounted interest rates. However, there was limited awareness or understanding among households regarding the broader environmental benefits and importance of reducing ecological impacts and air pollution through qualified and professional insulation. This lack of awareness may be attributed to a lack of information dissemination on the environmental and health aspects of energy-efficient solutions.

The study analyzed the drivers for action in financing energy efficiency in the ger district, and counterproductive market drivers were higher in number and affected more than one stakeholder, while the drivers for action were observed for the material supply and improvement of the existing green loan product, by public and private sector initiatives. The focus group interviews revealed that financial constraints [elaborate] were the biggest issue facing many stakeholders, whereas human resource posed risk, and operational issues were identified between the MSME and the client.

Therefore, the project is recommended to (i) cooperate with policymakers to remove counterproductive market drivers and increase market drivers, (ii) request regulators to pilot EE loans with exceptions for the closest target market, households with business income (but can't validate it) and salaried households (high debt-to-income ratio), and (iii) explore appropriate supply chain financing instruments for the private sector (aggregate, syndicate loans, credit cards or credit lines, risk-sharing and guarantee mechanism).

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## List of Abbreviations

ADB	Asian Development Bank
ADBI	Asian Development Bank Institute
CIT	Corporate Income Tax
EE	Energy Efficient
ERC	Energy Regulatory Commission
EU	European Union
FI	Financial institution
FRC	Financial Regulatory Commission
GIZ	German Agency for International Cooperation
HSES	Household Socio-Economic Survey
MET	The Ministry of Environment and Tourism
MSME	Micro, small, medium-sized enterprises, or brigades
NBFI	Non-bank Financial Institution
NDC	Nationally Determined Contributions
NSO	National Statistical Office
P.A.	Per Annum
PIT	Personal Income Tax
SIC	Social Insurance Contribution
SOAP	Switch Off Air Pollution
UB	Ulaanbaatar
UB-CAP	Ulaanbaatar Clean Air Project
UN	United Nations
VAT	Value Added Tax

# 1. Introduction

As the world grapples with the challenges of climate change and the need for sustainable development, there is an increasing focus on promoting energy efficiency and reducing greenhouse gas emissions in the housing sector. The housing sector accounts for 6.2% of total emissions in Mongolia<sup>1</sup> and the informal ger district settlements harbor 139,943 households<sup>2</sup> living in houses/gers which emit not only greenhouse gases but toxic air pollutants that have far-reaching public health and socioeconomic effects. The SOAP I project reported that 93% of such housing require insulation<sup>3</sup> and in order to mitigate such issues, enabling access to energy-efficiency improvement options is imperative. In this context, green loans have emerged as a promising financial instrument, with financial support from the Ministry of Environment and Tourism providing a financing avenue for anti-air pollution activities, such as insulation and energy-efficient housing projects. However, despite extensive public outreach, MSME and supply chain building efforts, and green loan enhancements, detached housing insulation loans haven't achieved the scale that the SOAP-1 project aimed for. This called for a need to re-evaluate the socioeconomic status of the target market, as the global pandemic, war, and domestic inflation has sent shockwaves in the Mongolian market, specifically construction relation sectors.

This report aims to conduct a comprehensive study on the market demand for green loans in the context of insulation for detached houses and energy-efficient housing construction for ger-district households. Furthermore, it seeks to shed light on the challenges faced by supply chain stakeholders involved in the distribution and implementation of these initiatives, in the dimensions of operations, finances, policy, and human resource. By analyzing these challenges, we can gain valuable insights into the barriers that hinder the effective utilization of green loans and hinder progress towards sustainable, energy-efficient housing for low-income communities.

We employed a multi-methods approach, using examination to identify insulation green loan market demand, and qualitative research to understand the challenges faced by supply chain stakeholders in the context of green loans for insulation and energy-efficient housing. By considering both the market drivers and counterproductive market drivers, we gained a comprehensive understanding of the obstacles that impede the success of these initiatives.

A list of proposed practical solutions and recommendations are summarized at the end as suggestions to address these challenges, promoting the efficiency, effectiveness, and adoption of green loan products within the supply chain.

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<sup>1</sup> NDC, Mongolia.

<sup>2</sup> NSO, Household housing survey. 2020

<sup>3</sup> SOAP I, BEEC.

## 2. Context

### 2.1. Policy environment

Mongolia's Vision - 2050 Long-Term Development Policy, the Nationally Determined Contributions submitted to the United Nations Framework Convention on Climate Change, National Air and Environmental Pollution Reduction Program, as well as the Ulaanbaatar City Master Plan and Development Approaches for 2030 and 2040 specifies development goals to increase energy efficiency of housing and support the financing of such products. However, the Ulaanbaatar City Master Plan and Development Approaches for 2040 acknowledges the development of ger districts as non-temporary residential area, and outlined the development of housing in Ulaanbaatar based on the 80/20 principle. According to the Ministry of Construction and Urban Development, housing for 80% of the households will be developed with engineering solutions (on-and off-grid), 30% of which will be high-rise housing (more than 8 floors), and the rest will be on-grid low-rise housing or off-grid housing with engineering solutions depending on the tactics. This means that the households beside the 20,000 households living in the area planned for redevelopment into high-rise residential apartments can be insulated. However, insulating ger district houses homes is an activity only included in the National Air and Environmental Pollution Reduction Program, which will be implemented until 2025, and the implementation of this measure is supported by the Green Loan Interest Subsidy Program of the Ministry of Environment and Tourism, which started in 2019.

The following table summarizes policy documents currently in effect regarding insulation and EE housing construction in the ger district specifically.

Policy	Clause
Vision-2050	Objective 3.2. Create conditions to provide affordable housing that meets the needs of households and families. Affordable housing Phase I (2021-2030): Creating a system to provide affordable housing that meets the purchasing power of families. 1. Have established a financing system to provide affordable housing that meets the purchasing power of families. 2. The affordable housing financing system will be strengthened. Phase II (2031-2040): Improving the quality and standards of affordable housing and green development models. 1. Improve ger district conditions, and improve the availability and supply of quality housing with green solutions at an affordable price. Goal 6.4. Develop a low-carbon, productive and inclusive green economy and contribute to international efforts to mitigate climate change. 4. Support and develop public-private partnership based national green financing vehicle and utilize international financing for environmentally friendly green projects and programs.
National Air and Environmental Pollution Reduction Program	4.1.7. Prepare and build the infrastructure for building affordable housing in the ger district and accelerate housing projects within the framework of the implementation of the "Affordable Housing" program, and provide long-term, low-interest loans to young people and low- and middle-income people; 4.2.6. implementation of projects and programs to improve home insulation and reduce heat loss;
Ulaanbaatar City Master Plan and Development Approaches for 2030	An improved residential area. 16.99% or 5982.21 hectares of the territory of Ulaanbaatar will be developed into an improved residential area. 22.1% of the city population is planned to live in improved residential areas at the level of 2020. New construction area. 2170.00 hectares of vacant land suitable for construction during the planning period.

	Re-planning and development section. 4,263.61 hectares of territory to be freed and re-planned and developed in accordance with the appropriate procedures, as the current form of settlement does not meet modern requirements. Urban development measures need to be taken, as it mainly covers the ger district areas.
Ulaanbaatar City Master Plan and Development Approaches for 2040	Support EE buildings, production and consumption in every way, within the goal of becoming a resource-efficient city
Green Taxonomy	Energy efficiency and Green building categories (2 out of 8) are related to 20% emission reduction from building energy use.
Green loan interest rate subsidy program	Starting from 2019, the MET started providing green loan interest subsidies for environmental pollution reduction products to 3 banks as part of the National Air Pollution Reduction Program. The interest rate subsidies allowed personal green loans at 8% p.a. until 2022. Starting from 2022, the interest rate subsidies increased, enabling personal green loans with 3% p.a. interest rate.

## 2.2. EE projects and campaigns

Approximately 10% of the housing units in the Ulaanbaatar ger district meet the requirements of construction norms and standards, while more than 100,000 of them were built without planning and design, and pose a high risk of heat loss<sup>4</sup>. The SOAP project identified that 93% of the households lack sufficient insulation. According to the World Bank Clean Air project, heat loss can be reduced by an average of 50% by insulating these homes.

The demand for affordable housing for people who want to improve their living conditions remains unmet and has no clear solution. But today, people need to have knowledge and information about energy-efficient housing when improving their living environment and building new houses, and it is becoming important to support people in making rational investment decisions. Within this framework, in addition to the SOAP project in the residential area, a few projects supporting the energy saving of homes are being implemented:

### World Bank – UB CAP project

The Ulaanbaatar Clean Air Project (2012-2019), started its second phase and plans to be completed by the end of 2023. In 41 selected khoros of 5 districts, the insulation of pre-fabricated houses, schools and kindergartens, and the Insulation Campaign and "Integrated Heating and Insulation Solutions" have been implemented for the 6th year. The insulation campaign is advertised in 39 khoros, for houses under 64 sq.m. As part of the insulation campaign, citizens pay 30% from their own resources as an advance payment, and the remaining 70% are paid by the project. The project is designed to have citizens perform the insulation themselves with the help of professionals. According to the project, 280 households were insulated in 2021, and 94 were insulated in 2022, totaling 863 since 2015. The project aims to retrofit 970 houses.

Within the comprehensive heating and insulation solution, in addition to having the insulation done at a 70% discount, it was also possible to lease-to-own the heater without interest. Within this framework, a total of 282 families got 400 storage heaters, and rent repayment issues continue.

### GIZ - Pilot project

GIZ, together with Mongolian Bankers Association (MBA) and the Mongolian Sustainable Finance Association, piloted the energy efficient housing financing scheme. Through the project, 18 million MNT advance payment subsidies were provided to 40 families, and low-interest housing loans were

<sup>4</sup> M.Delgerekh–UB City Head of Air Pollution reduction department, 2019

provided through 6 banks. The project operationalized construction SMEs, and energy auditors issued an energy certificate by conducting measurements and reviews at the design stage, execution stage, and the following winter after construction. As a result, total of 26 families were granted subsidized loans with an interest rate of 8%-12% and a term of up to 15 years.

### **ADB - AHURP project**

The Ulaanbaatar Green Affordable Housing and Resilient Urban Renewal Sector Project aims to provide sustainable and holistic solutions to revitalize the ger areas of Ulaanbaatar city through 5 project phases. These areas, characterized by substandard living conditions, climate vulnerability, and significant pollution, are planned to be transformed into affordable, low-carbon, climate-resilient, and livable eco-districts. The project's objectives include mobilizing private sector investment to achieve two main outcomes: firstly, the construction of 10,000 affordable green housing units, and secondly, the redevelopment of 100 hectares of ger areas into eco-districts. Through these initiatives, the project strives to create environmentally-friendly, socially inclusive, and economically viable neighborhoods for the residents of Ulaanbaatar.

### **Switch-Off Air Pollution - 1 project**

The SOAP project was initiated in 2018 with the aim of fostering an energy-efficient value chain in the Ger area of Ulaanbaatar, focusing on single-family homes. The project was implemented over a span of four years and concluded in December 2021. Furthermore, it received a complimentary extension of four months until April 2022 from the European Union (EU). The overarching objective of the project was to enhance the well-being of the Mongolian population through energy promotion, specifically targeting sustainable consumption patterns and behaviors within the individual housing sector. The project encompassed activities such as raising awareness, facilitating energy efficiency advisory services, providing financial intermediation, delivering technical training, and offering gender-responsive technical assistance to small businesses and households. The primary goal was to reduce energy consumption, as well as carbon dioxide (CO<sub>2</sub>) and particulate matter (PM) emissions, by encouraging the adoption of sustainable energy consumption practices and behaviors in the individual housing sector in the Ger areas of Ulaanbaatar.

The SOAP I project aimed for 1,000 retrofitted houses and 1,000 houses that undertook energy audits. The project resulted in 1,546 retrofitted houses and 101 houses which undertook energy audits. Moreover, 73 brigades were trained and 20 technical solutions were developed. 3,556 tons of CO<sub>2</sub> emissions were prevented, and 2,411 tons of coal was prevented from being burnt.

### **Switch-Off Air Pollution - 2 project**

Based on the success of the SOAP I project, the SOAP II project aims to continue the energy transition in the housing sector of Mongolia, by limiting energy consumption of 5,900 houses of the unplanned Ger areas by 20%, and issue 1,000 EE green loans through 16 FIs, train 160 MSMEs and develop 5 new products, reaching 2.2 million people, and expand loans corresponding to more than 7,000 TeqCO<sub>2</sub> avoided emission yearly, thus improving air quality and reducing emissions of GHG and other health-damaging pollutants in Mongolian cities. The comprehensive approach, combining private sector strengthening, socially inclusive, women-centred mobilization, facilitated access to green financing, technical development and policy advocacy for the housing sector and client households, is designed to be scalable nation-wide, thus contributing to the uptake of less polluting and more resource-efficient practices in housing in Mongolia.

## **2.3. Green loan overview**

Green loans are financial products designed to encourage and support environmentally friendly initiatives such as energy-efficiency improvements in buildings and renewable energy projects.



According to the Mongolian Sustainable Finance Association, an industry-wide initiative, FIs are first advised to set up an environmental, social, governance risk management framework, and secondly, to develop green financial products using as guidance the Green Taxonomy of Mongolia and the SDG Taxonomy of Mongolia, to promote efforts against climate change and other sustainability challenges specific to the country. They are guided by the Sustainable Finance Roadmap of Mongolia.

Sustainable financing in Mongolia is valued by the International Finance Corporation – Sustainable Banking and Finance Network as “Advancing in Implementation”, with industry players (commercial banks) having high commitment in ESG integration, climate risk management, and financing sustainability.

Leading Mongolian commercial banks are adept in raising green financing from international sources of capital and are increasingly capable of measuring and reporting impact as per international standards. Among the 11 commercial banks, XacBank and Trade and Development Bank of Mongolia are the National Accredited Entities of the UN Green Climate Fund since 2016 and 2020 respectively, Khan Bank is a member of the UN Global Compact since 2010, and Golomt Bank is a member of the UN Environmental Programme Finance Initiative - Principles for Responsible Banking since 2015. XacBank\*, Capitron Bank, Golomt Bank, State Bank, and Khan Bank are now members of the Partnership for Carbon Accounting Officials, where they’ve committed to measure and disclose the carbon footprint of their loans and investments. XacBank and Khan Bank also receive sources of capital from the European Bank for Reconstruction and Development in promoting green lending, previously through the Mongolian Sustainable Energy Financing Facility (MONSEFF) program, and now through the Green Economy Financing Facility (GEFF) program, for verified EE and other climate mitigation and adaptation loans. Khan Bank has recently issued a 60 million USD green bond, with multiple other investments tackling gender-based financing and MSME development, which presents many good cases for raising green sources of capital in the Mongolian banking industry.

Specifically as guidance for the green products, Mongolia has approved its Green Taxonomy in 2019, by the Financial Stability Council, to define a common vocabulary and classification for green projects,

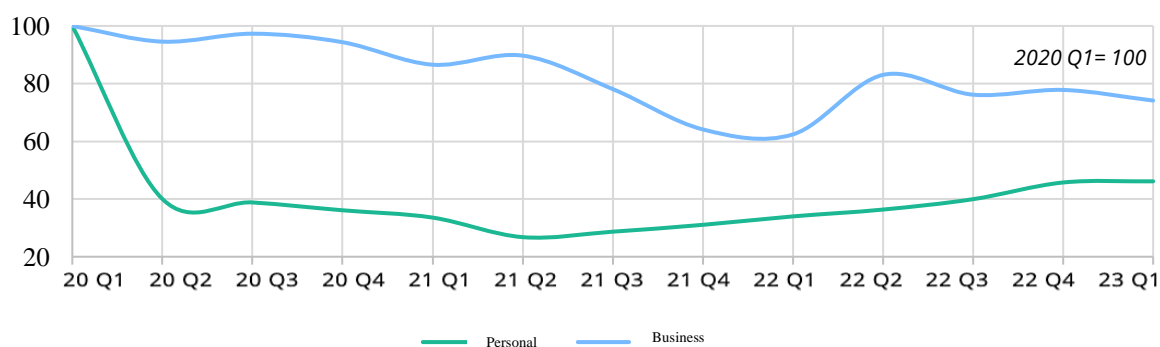
which can be used to identify green loans/bonds, or as a building block to develop various green financial products and instruments with the opportunity for FIs to include their own additional criteria and monitoring requirements.

The Central Bank of Mongolia started obtaining quarterly green loan statistics from banks since 2020, and since Q3 of 2023, a more detailed data collection method was used, including loan quality, and attribution to domestic/foreign funding sources and issuance to public/international organizations.

### Bank green loan report

The outstanding loan as of the Q1 of 2023 is shown starting from 2020 (Figure 1). Personal loans have reduced drastically and green loan issuance is on the rise post-COVID. Green business loans have risen starting from Q2 of 2022.

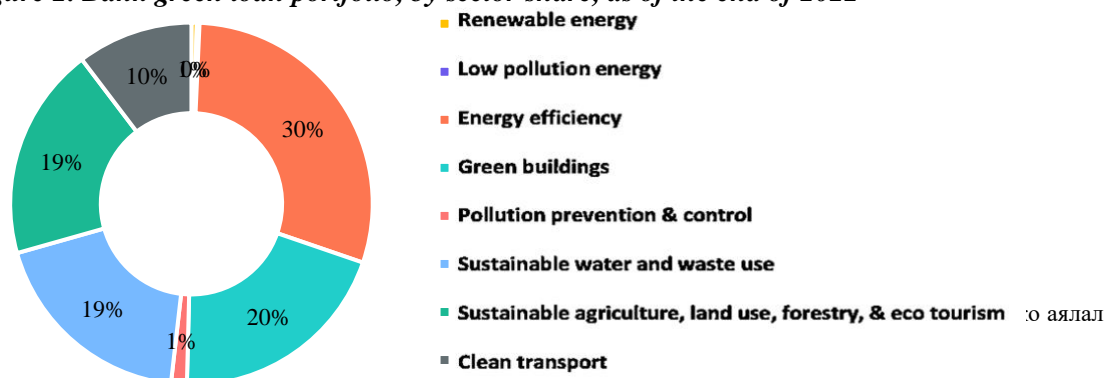
**Figure 1. Outstanding green loan, 2020-2023, %**



Source: Mongolbank 2020-2023 green loan statistics

As of the end of 2022, banks' green loan portfolio was 315.1 billion MNT, where 29.5% consisted of EE, 20.1% green building, and 19% on sustainable water, waste management and sustainable agriculture each, while low carbon transport was at 10%, and the rest of the sectors below 1% (Figure 2).

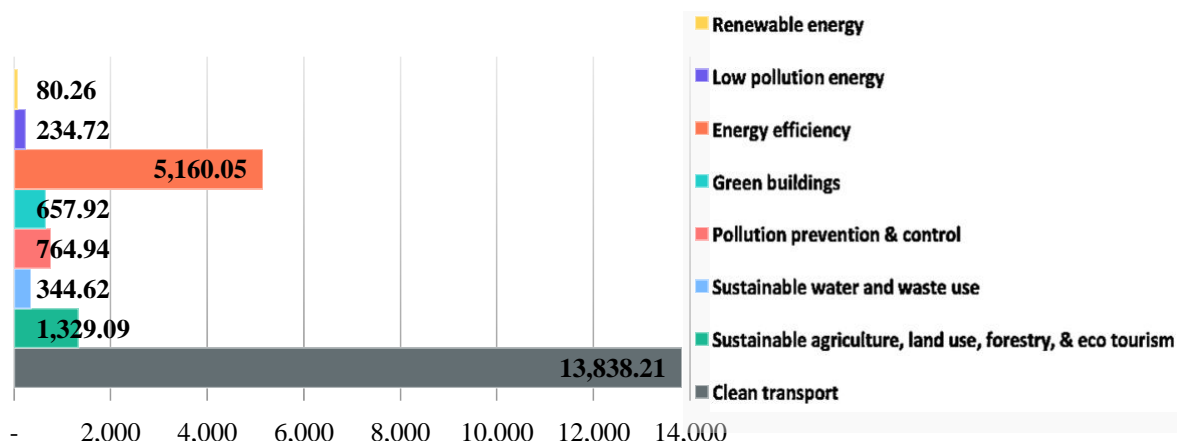
**Figure 2. Bank green loan portfolio, by sector share, as of the end of 2022**



Source: Mongolbank green loan statistics, Q4 2022

Personal green loan share accounts for 8.1% of the total green loan portfolio, or 25.6 billion MNT. The green loans newly issued in 2022 shows 62% financing low carbon transportation, 23% for EE, whereas other sectors accounted for less than 6% (Figure 3). This indicates that individuals have obtained loans for hybrid cars, and EE electric appliances and EE improvements in their houses, more than any other purposes.

**Figure 3. Amount of total new green loan issuance in 2022 (households), by sector, million MNT**



Source: Mongolbank green loan statistics, all quarters of 2022

In the Q1 of 2023, a total of 5.7 billion MNT personal loans were issued, 43% (2.5 billion MNT) of which accounted for EE loans. Of this, 1.22 billion MNT or approximately half the loans were for EE final products, and the remaining half (1.23 billion MNT) was for building EE housing. The period also showed non-performing loan at 2%, substandard loan at 1%, and loan in watch-list at 2% in the total green loans, whereas for EE loans, despite accounting for 28% of the portfolio, doesn't have poor loans (Table 1).

**Table 1. Green loan quality, Q1 of 2023, %**

Category	Normal loan	Watch-list	Substandard loan	Doubtful loan	Non-performing loan	Total green loan issued, mil MNT	Share of total green loan, %
TOTAL	96%	2%	1%	0%	2%	25,811.80	100%
Renewable energy	100%	0%	0%	0%	0%	116.94	0%
Low pollution energy	99%	0%	0%	1%	0%	278.91	1%
EE	97%	2%	0%	0%	0%	7,136.59	28%
Green building	100%	0%	0%	0%	0%	232.70	1%
Pollution prevention, control	98%	1%	0%	0%	1%	1,508.58	6%
Sustainable water and waste management	100%	0%	0%	0%	0%	197.83	1%
Sustainable agriculture, land use, forestry, and eco-tourism	96%	3%	0%	0%	0%	1,790.30	7%
Low carbon transport	94%	1%	1%	0%	3%	14,549.96	56%



During the reporting period, 21 NBFIs granted 25.7 billion MNT loans to 1,460 borrowers at an average interest rate of 2.0 percent per month, and 21.9 billion MNT loans were repaid from 9,795 borrowers of 24 NBFCs. As of the first quarter of 2023, 28 NBFCs had "green" outstanding loans of 114.8 billion MNT from 8,413 borrowers. EE loans accounted for 0.3% of the portfolio with 370.9 million MNT disbursed to 61 lenders.

**Table 2. Green loan report, million MNT**

Categories		New loan		Paid loan		Outstanding loan	
		Amount	Number of lenders	Amount	Number of lenders	Amount	Number of lenders
1	Renewable energy	-	-	-	-	-	-
2	Low pollution energy	-	-	-	-	0.1	2
3	EE	2.6	2	63.2	57	370.9	61
4	Green building	1,130.7	114	1,373.8	183	8,445.5	800
5	Pollution prevention, control	-	-	49.9	2	0.1	1
6	Sustainable water and waste management	-	-	-	-	-	-
7	Sustainable agriculture, land use, forestry, and eco-tourism	40.0	-	117.9	13	837.7	17
8	Low carbon transport	24,572.8	1,344	20,346.7	9,450	105,162.9	7,532
<b>Total</b>		<b>25,719.1</b>	<b>1,460</b>	<b>4,292.5</b>	<b>2,217</b>	<b>114,817.3</b>	<b>8,413</b>

Source: Financial Regulatory Commission, quarterly report, 2023 Q1

Of the total outstanding loan, 95.7% were considered normal, 3.2% on the watch-list, and 1.1% was non-performing loan, and the highest non-performing loan category was the green building sector at 1.9%.

### Energy efficiency loans

According to the Green Taxonomy, EE is measured by 20% reduction in energy loss or improved efficiency and it includes the following three categories:

- i) Energy efficiency improvement in existing industry:
  - a. Energy efficient equipment and technology improvement
  - b. Installation of Combined Heat and Power (CHP)/co- or tri-generation equipment
  - c. Energy efficiency in energy generation, transmission and distribution systems
  - d. District heating
- ii) Energy efficiency improvements in the utility sector and public services
  - a. Energy- efficient lighting or equipment
  - b. Energy efficient products (end user)
  - c. Energy conservation services
- iii) Energy efficient buildings
  - a. Energy efficient building construction
  - b. Efficiency improvements in existing commercial, public, residential and industrial buildings

In addition, pollution prevention and control includes the following air quality related measures:

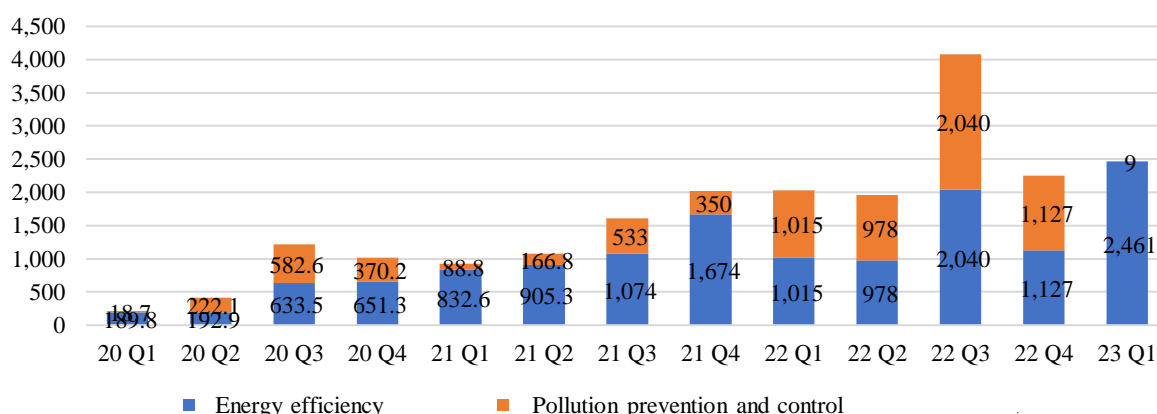
- i) Air quality:

- a. Industrial air pollution treatment, recycling facilities
- b. Production and deployment of clean heating appliances for households and MSMEs
- c. Carbon capture and storage

Currently, 5 banks and 1 NBFIs have 21 types of green personal loan products with the aim of energy saving and reducing air pollution (Annex 3). In order to increase the issuance of green loans, banks are offering products with more favorable terms, such as consumer loans with no down payment and, in some cases, no loan fees, with a term of up to 30 months. The bank offers 3% annual interest rate within the framework of the MET’s interest subsidized loans aimed at reducing air pollution, while other green loans have an annual interest rate of 12%-16.8%. For NBFIs, annual interest rates of 24%-36% are offered, and the products have terms of 24-60 months depending on the purpose.

Within the taxonomy, the construction of new EE buildings and building insulation fall under the EE taxonomy category, and the purchase of new heaters fall under the category of pollution prevention and control. Specifically for the construction of EE in detached housing, 5 commercial banks provide green loans and 2 provide green loans for detached housing insulation, all personal green loans with a requirement of achieving minimum EE of 20% verified by an energy auditor (Detailed table in Annex). These 2 category loans are on a rising trend as seen in Figure 4, and in the Q3 of every year, there’s an increase in loan issuance. This is the season to start construction of new homes and insulation work, but despite that, Q2 loans are not high, which can be attributed to the delay in MET interest subsidies until the first half of each year.

**Figure 5. Newly issued loans, by relevant category (mil MNT)**



Source: analyzed from the Mongolbank green loan statistics, 2020-2023

### Switch-Off Air Pollution - 1 project

According to data provided by the project, the Phase 1 resulted in 33 insulation jobs conducted through a green loan via 3 FIs, while 1,429 houses were retrofitted using the Simple Solutions campaign, and the rest through the project or individual financing.

**Table 3. SOAP I loan issuance**

Funding source	Insulation work
XacBank	17
Transcapital NBFIs	14
Khan Bank	2
<b>Total</b>	<b>33</b>

### **3. Research Methodology and Scope**

This study comprises two main parts: the examination of the demand for green loans among households residing in detached houses, and qualitative analysis of stakeholders in the supply chain of EE buildings and green loans.

In the first part of the study, we examined the demand for green loans among households residing in detached houses employing two different approaches. Firstly, we conducted a comparative analysis using the latest available data from the Household Socio-Economic Survey (HSES) conducted in 2021 by the National Statistical Office (NSO). Through this analysis, we computed the income, expenditure, and payment capacity of households, and compared the results among various household groups categorized by their dwelling types. Additionally, we conducted a micro-simulation analysis to evaluate the impact of recent changes in inflation and welfare policies, which have posed challenges to households' livelihoods, on households' financial capability and default risk. Secondly, we conducted a sample survey among 500 households residing in the ger area of UB's six districts, specifically those who are target for housing green loans. The primary data was collected through semi-structured interviews, utilizing a pre-prepared questionnaire. Based on the primary data, we evaluated the target households' demographics, socio-economic situation, financial capabilities, dwelling conditions, insulation necessities and their demand for green loans for insulation and EE housing.

Secondly, we examined the challenges faced by the stakeholders in green housing and green loan value chain utilizing the qualitative research method. Desk review, focus group discussions and individual interviews were conducted to identify factors affecting the deployment of insulation products and issuance of such green loans. We conducted interviews with 50 stakeholders representing various stages of the insulation and energy-efficient housing green loan supply chain, using both Focus Group Discussions (FGDs) and in-depth individual interviews. The average duration for FGDs ranged from 60 to 90 minutes, while individual interviews lasted approximately 30 to 60 minutes.

The interviews were carried out in the form of individual and group interviews with the participant about the household insulation, energy-efficient housing, green loan understanding and attitude, improving housing conditions, difficulties and possible solutions for participating in green loans. Also, through focus group interviews and in-depth interviews, challenges faced at each stage of the supply chain of green products, equipment and solutions were identified.

### 3.1. Research scope

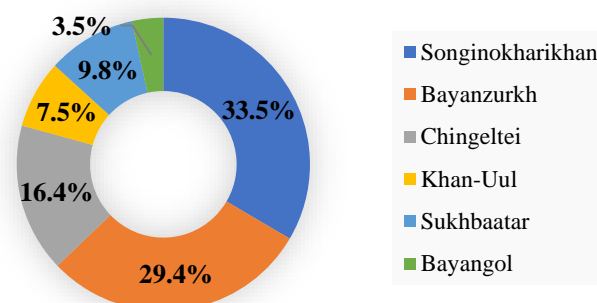
#### 3.1.1. Household sampling

The research team surveyed 500 households residing in the ger area of 6 districts (Bayangol, Bayanzurkh, Sukhbaatar, Songinokhairkhan, Khan-Uul and Chingeltei districts) in Ulaanbaatar. To ensure that the survey results align with the research objective, the following criteria were applied to select households.

1. Households living in detached houses.
2. Households who own their dwelling and not those who rent.
3. Households residing in the redevelopment region and isolated districts (Bagakhangai, Baganuur, and Nalaikh) will be excluded from the survey sample.

We employed a proportional and quota random sampling method. At the first stage of the sampling process, we obtained the number of households residing in six districts of UB from the Population and Housing Census (2020). We then calculated the proportional ratio for each district based on these figures. This proportional ratio was used to allocate the sample size across the districts, ensuring that it was representative of the population distribution. For instance, according to the Housing Census 2020, there are 77,287 detached houses in the Ulaanbaatar area as of 2019. A total of 112 thousand households are living in detached houses. Out of the total 112 thousand households living in detached houses, around 69.3 thousand meet the criteria set by the research team. The Songinokhairkhan and Byanzurkh districts have the highest number of households meeting the criteria at 33.5% and 29.4%, respectively. The Chingeltei, Khan-Uul, Sukhbaatar, and Bayangol districts have 16.4%, 9.8%, 7.5%, and 3.5% of households, respectively (Figure 7).

**Figure 7. Households living in detached houses, by district.**



*Source: Population and Housing Census*

At the next stage of the sampling, we selected khorooos considering the number of households living in the detached house in the khoroo and the location of the khoroo. For instance, we selected khorooos with a higher number of households residing in their own detached houses and excluded those within redevelopment areas. By prioritizing khorooos with larger populations in detached houses and avoiding areas undergoing redevelopment, the sample represented households that were more likely to meet the study's objectives. A total of 25 khorooos from six districts were chosen for the study, with each khoroo having between 17 and 21 households included in the survey. The table below outlines the sampling by districts and selected khorooos.

**Table 4. Household survey sampling by location**

District	Sample size	Percentage share, %	Number of khorooos	Khoroo №
Bayangol	17	3.4	1	21
Bayanzurkh	147	29.4	7	5,9,17,19,24, 27, 32

Songinokhairkhan	167	33.4	8	3, 4, 8, 9, 11, 25, 26, 31
Sukhbaatar	49	9.8	3	13, 14, 16
Khan-Uul	38	7.6	2	9, 16
Chingeltei	82	16.4	4	12, 14, 16, 18
<b>Total</b>	<b>500</b>	<b>100.0</b>	<b>25</b>	

It is important to note that 2 khoros were changed from the originally planned due to the recent structural modifications, including the division of existing khoros and the inclusion of new khoros in the re-development area. This change was not reflected in the list the Agency for Land Administration and Management, Geodesy and Cartography provided.

The research team used the random walk method when selecting households to survey. The random walk method is a process for determining the probable location of a point subject to random motions, given the probabilities (the same at each step) of moving some distance in some direction. In our survey, the households will be selected by skipping two households in any direction from the starting point of the khoroo. We have also set a limit to survey a maximum of three households from the same street. The field data collection was implemented between April 13<sup>th</sup> and May 1<sup>st</sup>.

### **3.1.2. Stakeholder challenges analysis**

After identifying the green loan demand of households, the consultant team studied the operational, financial and other challenges facing stakeholders involved in issuing the insulation green loan. Desk review, focus group discussions and individual interviews were conducted to identify factors affecting the deployment of insulation products and issuance of such green loans.

The consultants were guided by the framework for energy efficiency finance programs developed in the “Energy Efficiency Finance Programs: Best Practices To Leverage Private Green Finance” (ADB Working Paper Series, 2018) report. As the authors noted, “the framework can help in the assessment of individual existing schemes and act as a guide to the necessary elements to include when designing a program”.

#### **Desk review:**

A comprehensive review of relevant literature was conducted to gather insights into the green loan market, insulation products, and supply chain challenges and opportunities. This provided a foundation of existing knowledge and identified external challenges to the supply chain:

- Publications on energy efficiency financing schemes around the world,
- The legislative and policy environment for insulation, energy efficient housing, and green loans in Mongolia, and
- Industry publications and reports from energy efficiency related projects in Mongolia, such as the SOAP-I, II projects, MGFC, UBCAP, and AHURP.

#### **Focus group discussion:**

- Stakeholder identification: As per the terms of reference and consultation with the client, 50 parties from 6 stakeholder groups were identified. This included (i) financial institutions, (ii) insulation brigades, (iii) insulation product manufacturers and importers, (iv) households who insulated their house through SOAP project, (v) energy auditors, and (vi) policy makers, regulatory bodies, and other relevant parties.
- Choosing representatives (Annex): For financial institutions, the consultants chose the three banks and one non-bank that partners with SOAP project and has experience issuing insulation and energy efficient housing green loans, and one non-bank that doesn't partner with SOAP-II project. Six out of a total of 19 brigades (31.6%) were chosen at random, based on the number of insulation conducted, with two having insulated via green loans. To represent the clients, a total of 14 insulated households out of 115 (12.1%) were chosen, with 3 to represent each year, and based on their availability, in addition to two people who have contacted the project but were unable to have the insulation done. Three construction companies who build energy efficient housing were chosen from the participating companies in Energy efficient housing pilot project implemented by the GIZ, Mongolian Bankers Association, and Mongolian Sustainable Finance Association. In addition, two energy auditors and three households who were beneficiaries of the mentioned project were chosen.
- Questionnaire design (Annex): The focus group questionnaires were then produced for financial service providers, technical service providers (insulation brigades/energy efficient housing construction companies/energy auditors), and insulated households, and reviewed by the SOAP II implementing partner organizations.
- Conducting the interviews: As per Table 1, semi-structured interviews were conducted with the chosen representatives to gain their perspectives. The interview identified stakeholders' perspective on external factors, such as the policy environment and market awareness, and internal factors, such as stakeholder challenges across dimensions of finance, operations, human resource, and technical capacity, as well as other relevant qualitative information.

**Table 1. Number of attendees in the FGD and interviews**

Focus group discussions		No. of attendees
1	Brigades	6
2	EE construction companies	4
3	Banks	5
Individual interviews		No. of attendees
0	Project IPs	5
1	Bank	1
2	NBFI	2
3	Insulation material manufacturer	4
4	Association of material manufacturers	1
5	Green technology importers	2
6	EE auditor	3
7	Policymaker/regulator	3
8	Households	14
	<i>who got insulation loan</i>	5
	<i>who got EE housing loan</i>	5
	<i>who declined insulation</i>	2
	<i>who built EE housing through own financing</i>	2
9	Relevant international projects	2

#### **Data analysis:**

- Thematic analysis: The collected data was analyzed using thematic analysis to identify recurring patterns, themes, and challenges. Additionally, sales data and performance metrics provided by the implementing organizations was analyzed to provide a quantitative perspective on the challenges faced.
- Process bottleneck analysis: The flow of materials, information, and resources were mapped between the supply chain stakeholders to identify bottlenecks in the process. The insulation and energy efficient housing green loan processes were also diagrammed and challenges were described in detail. Analyzing internal factors within the supply chain, including process inefficiencies, bottlenecks, capacity constraints, communication gaps, and technology limitations, to identify internal challenges that hinder supply chain effectiveness.
- Framework for energy efficiency finance programs: Using the ADB paper, a general supply chain analysis used
- Validation of findings: The study findings, along with the proposed solutions, were shared and discussed among the project implementing partners. Individual meetings were organized with the partners to validate the accuracy, relevance, and feasibility of the identified challenges and recommendations through individual interviews with the implementing partners.

#### **Limitations and constraints**

The consultant team acknowledges some limitations to the qualitative assessment of the challenges facing stakeholders. It should be noted that the number of stakeholders interviewed is not considered representative of the groups as a whole, but serve as guidance and case studies.

## 4. Results

### 4.1. Households Demand for Housing Green Loan

#### 4.1.1. An analysis of the financial stress of households living in a detached house in the Ulaanbaatar city's ger area

This section of the study presents the results from our analysis on financial situation and solvency risks of households living in a detached house in the capital city's ger area. The analysis employs the primary data of the Household Socio-Economic Survey (HSES) 2021 which is conducted annually by the National Statistics Office (NSO).

The HSES collects information on education, health, employment, family business, all types of income, expenses, savings, loans, housing, livestock, and properties through over 430 questions which are answered by every family member. At the moment, the latest publicly available dataset of HSES is for 2021, and the NSO hasn't published the dataset for 2022 yet.

To be consistent with our survey, we selected households that own and live in a detached house in ger areas of 6 districts of Ulaanbaatar, namely Bayangol, Bayanzurkh, Songinokhairkhan, Sukhbaatar, Khan-uul, and Chingeltei, and conducted some quantitative analysis on their livelihood and financial situation. Our survey doesn't cover households that live in yurts (ger), public dwellings, and non-purpose dwellings. However, to shed light on the characteristics of the households living in detached houses, we also consider other types of households for comparison.

The HSES 2021 surveyed 1720 households from the ger area of Ulaanbaatar using random sampling. Out of these, 56.2% or 967 households belong to our target group. The below table shows some main socio-economic indicators of households in Ulaanbaatar by household types.

**Table 5. Demographic and economic indicators of households in Ulaanbaatar**

Indicator	Target households in ger area	Non-target households in ger area	Households living in apartments
<b>Demographic indicators</b>			
Household size	3.8	3.7	3.6
Number of employed household members	1.1	1.0	1.2
Number of children	1.3	1.6	1.4
Share of households with household head with tertiary education	16.7%	11.4%	48.8%
Share of female-headed households	22.7%	33.2%	25.2%
Average age of household head	50.0	46.8	46.9
<b>Household income and expenditure</b>			
<b>Average monthly income, MNT</b>	<b>1,517,237</b>	<b>1,251,869</b>	<b>2,158,380</b>
Salary income, MNT (Share in total income)	802,559 (53%)	687,033 (55%)	1,266,077 (59%)
Pension and benefits, MNT (Share in total income)	501,641 (33%)	450,397 (36%)	458,998 (21%)
Business income, MNT (Share in total income)	90,396 (6%)	27,214 (2%)	122,238 (6%)
<b>Average monthly expenditure, MNT</b>	<b>1,401,814</b>	<b>1,121,018</b>	<b>1,892,629</b>
Food expenses (Share in total expenditure)	368,018 (26%)	329,644 (29%)	445,447 (24%)

Source: Authors' calculations using the HSES-2021 dataset



As can be seen from the table, the average household size of the target households is bigger than other households while the average number of children is smaller. On the other hand, the number of employed members of target households is slightly higher than that of other households in ger area while it is lower than that of households living in apartments. The share of households with household head with tertiary education is higher for the target households (16.7%) compared to other households in ger area while it is much higher for households living in apartments (48.8%). Another main characteristic of the target households is that the average age of their household heads (50) is higher than other types of households while the share of female-headed households is lower (22.7%).

The average income and expenditure of the target households are higher than that of other households in ger area and lower than that of households living in apartments. On the other hand, the share of salary income in total income of the target households (53%) is lower compared to other types of households while the share of pension and benefits in their total income (33%) is around the average of all households. In contrast, the share of salary income (59%) is highest for the households living in apartments while the share of pension and benefits is lowest (21%). The share of food expense in total expenditure is highest for non-target households in ger area (29%) while it is lower (26%) for the target households.

We discuss more in detail the district-specific differences in livelihood of the target households in this part. When we divide all households in Ulaanbaatar into 5 income groups and compare the target households across districts, we find that the share of poor and lower-middle income households is lowest in Bayangol district while the share of rich and upper-middle income households is highest. On the contrary, the share of poor and lower-middle income households is highest in Songinokhairkhan district while the share of rich and upper-middle income households is lowest. In other words, the livelihood of target households in Bayangol district is relatively good, and the livelihood of those in Songinokhairkhan district is relatively poor. If we compare average monthly household income, target households in Bayangol district have the highest level of income which is around MNT 1,679,979 on average. On the other hand, the monthly average income of target households is MNT 1,468,209 in Chingeltei district which is the lowest, while it is MNT 1,496,994 in Songinokhairkhan district.

Now, we compare some financial indicators of the target households with other types of households. As shown in Table 6, savings and loan indicators of households living in apartments are quite different from those of households in ger area due to their superior income level.

**Table 6. Financial indicators of households in Ulaanbaatar**

	Target households in ger area	Non-target households in ger area	Households living in apartments
The share of households that accumulated savings in the last 12 months	28.1%	21.1%	48.6%
Average amount of accumulated savings in the last 12 months, MNT	4,265,684	3,778,500	4,953,759
The share of households that took a loan in the last 12 months	20.6%	17.5%	12.6%
The average amount of loan in the last 12 months, MNT	9,546,871	5,66,867	20,930,520
The share of households that currently have outstanding loans	51.2%	45.2%	47.6%
The average loan balance of households with outstanding loans, MNT	11,339,080	8,456,843	43,363,330
Monthly loan repayment (interest and principal), MNT	455,633	374,659	666,190

*Source: Authors' calculations using the HSES-2021 dataset*

The savings and loan indicators of the target households are higher than those of non-target households in the ger area. For instance, the target households tend to have higher amount of savings and accumulate more savings in the last 12 months. They also have a higher tendency to take loans, take higher amounts of loans, and have higher outstanding loan balances. Due to this, the target households pay higher amount of monthly loan repayment compared to non-target households in ger area.

The below table shows the types of loans taken by the target households and compares it to other households in Ulaanbaatar. Here we assume that a particular household has taken a particular type of loan if one of the members of that household is making repayment of that type of loan. As can be seen from the table, households in ger area have taken salary loans the most while households living in apartments have taken housing loans the most. It should also be noted that some households may have taken more than one loan.

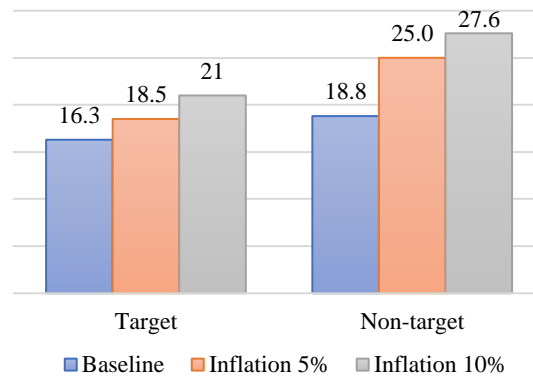
**Table 7. The share of households with loans in Ulaanbaatar, by types of loan**

Type of loan	Target households in ger area	Other households in ger area	Households living in apartments
Salary loan	29.5%	25.6%	18.7%
Pension loan	4.9%	5.0%	1.9%
Housing loan	2.6%	0.8%	25.2%
Consumer loan	9.3%	9.5%	3.7%
Herder loan	0.4%	0.4%	0.1%
Business loan	2.6%	0.7%	3.1%
Leasing	5.4%	4.4%	2.6%
Automobile loan	7.2%	7.2%	5.8%
Other	6.4%	6.0%	3.5%

*Source: Authors' calculations using the HSES-2021 dataset*

We also analyze the financial burden on the target households. In doing so, we calculate the household financial margin – i.e., household income minus basic expenses, loan payments, and rent payments. We consider the minimum subsistence level as basic expenses – i.e., the essential expenses. Specifically, the minimum subsistence level is MNT 313,400 in the first quarter of 2023 as determined by the NSO. Moreover, as we used data from 2021, we deducted the pension and benefits given to households for the purpose of aiding household income during the Covid-19 pandemic from total household income. In addition, we also calculated a household income growth index using the household income data for the first quarter of 2023 published by the NSO to use in our analysis. If the financial margin of a particular household is minus, that household is considered as having difficulties repaying loans and prone to the risk of default. In other words, those households are considered likely to fail to repay loans as their income is only sufficient to meet their basic needs.

**Figure 9. Financial burden of households in ger area**



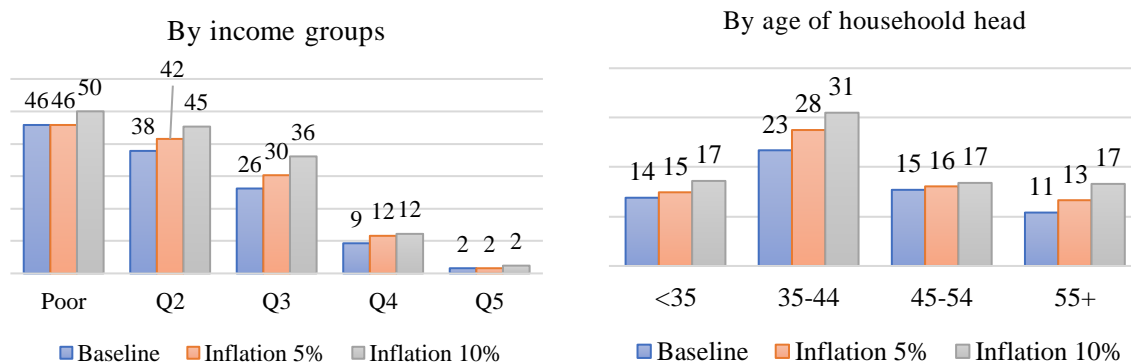
Source: Authors' calculations using the HSES-2021 dataset

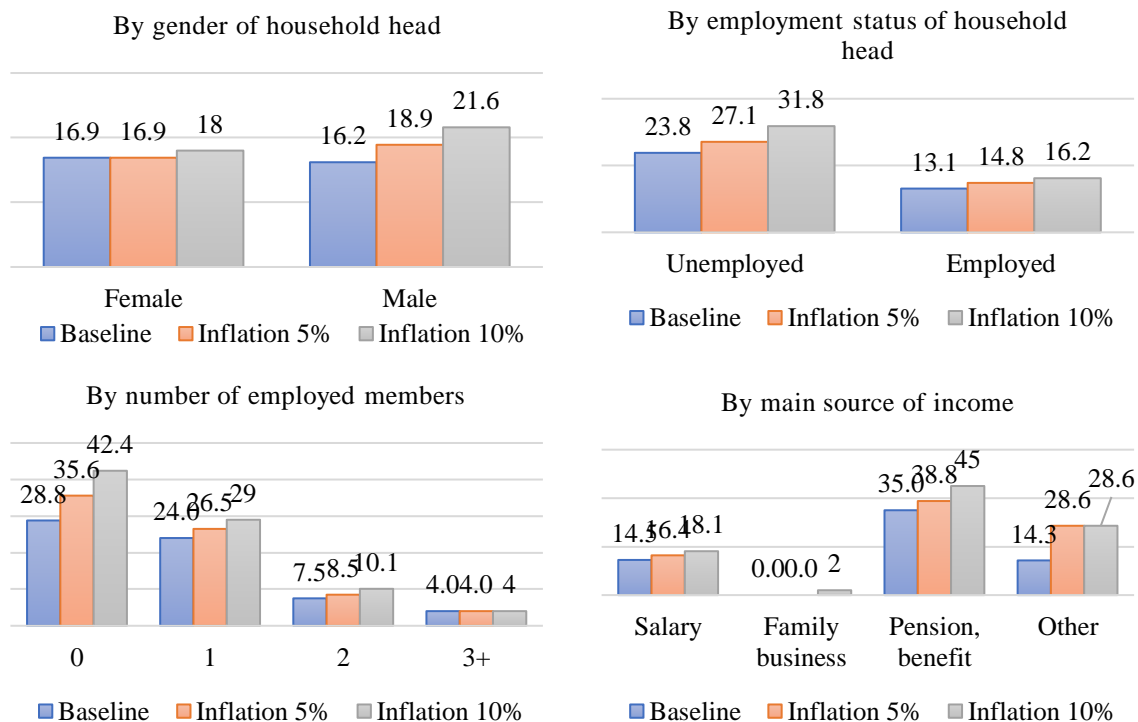
The above figure illustrates the default risk of households in ger area that have loans. Specifically, the probability of default is 16.3% for the target households while it is 18.8% for non-target households in the ger area. If we take into account the basic consumption inflation as 5% and 10%, the probability of default increases to 18.5% and 21% respectively for the target households while it increases to 25% and 27.6% respectively for non-target households in the ger area.

When we look at the household credit burden – i.e., the share of loan payment in household income, it is 26.1% for the target households which is close to that of non-target households in ger area. The credit burden is 28.8% at the country level. Based on this, we can conclude that the target households have a lower probability of default and lower debt burden compared to the country average.

Now let's have a closer look at the financial situation of the target households. Figure 10 shows the credit burden faced by the target households with loans by comparing different groups of households. For example, part A of the figure illustrates the credit burden of the target households by 5 income groups. As can be seen, the poorest households have a minus financial margin – i.e., have the highest risk of default (46.0%) even if they have similar loan-income ratio to other groups (25.5%). On the other hand, households with the highest income have the lowest credit burden (22.4%) and risk of default (2%).

Figure 10. Financial stress of the target households, by household groups





Source: Authors' calculations using the HSES-2021 dataset

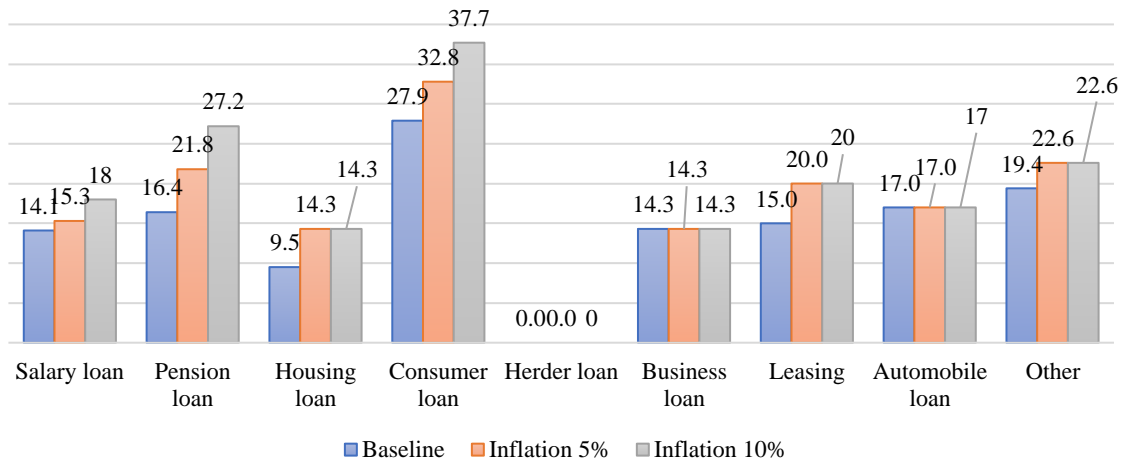
If we look at the results by the age of household head (Figure 10. B), we can see that the older the age of household head, the lower the debt burden of households. The probability of default is the highest among the households with a household head aged 35-44. Looking at the household head's gender (Figure 10. C), it is seen that male-headed households have higher debt burden and higher risk of default compared to female-headed households. However, this difference is not substantial.

When compared by the employment status of household head (Figure 10. D), debt burden and default risk of the households with an unemployed household head are much higher than those of households with an employed household head. Similarly, the more employed members the household have, the lower the debt burden and default risk (Figure 10. E). On the other hand, households with no employed members have relatively less debt burden due to the fact that they have limited ability to take loans from financial institutions.

If we classify the households by the main source of their income and compare their financial indicators (Figure 10. F), the target households that run a family business have the least credit burden and probability of default (18.3% and 2% respectively). On the other hand, households that rely on salary income have the highest credit burden (28.5%). Households that rely on other income sources (aids from others, transfers from abroad, interest, rent, dividend etc.) as their main income source have the highest probability of default (14% - 28.6%). Credit burden and default risk of households whose main income sources are pension and social benefits are around the country average.

Finally, we analyze the financial stress of households by the main type of loan they have taken. As shown in Figure 11, there is no household with the risk of default among the few households that have housing loans or herder loans. Households with salary loans have the lowest probability of default (14.1% - 18%) while households with consumer loans or other types of loans have the highest probability of default (27.9% - 37.7%). If we exclude households with housing loans and herder loans, households with the highest loan payment-to-income ratio are households with automobile loans, salary loans, and consumer loans.

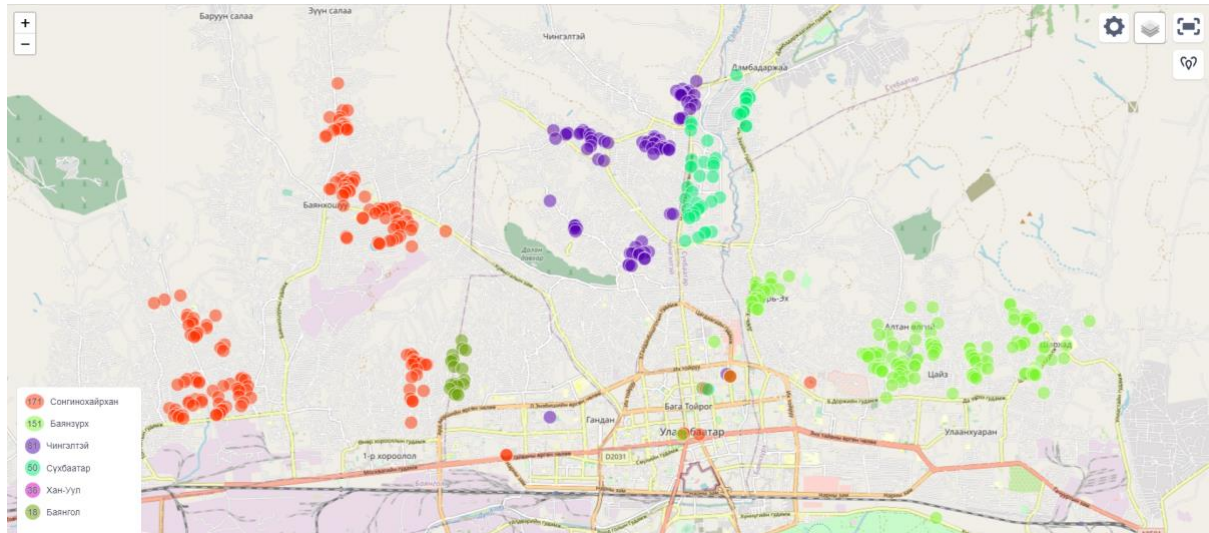
**Figure 11. Financial stress of the target households, by type of loan**



#### 4.1.2. Household Survey Results

The research team conducted a survey in six districts of Ulaanbaatar, collecting data from 500 households. We utilized a pre-prepared questionnaire for this purpose. The following figure shows the location of the selected households in the survey. As we mentioned before, we chose the areas not selected in the redevelopment, so it can be seen that the selected households are situated slightly far from the city center.

*Figure 1. The location of selected households*

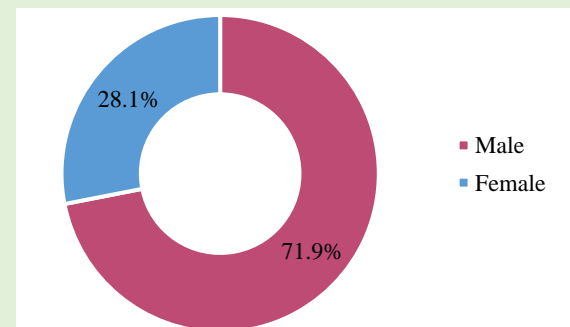


The survey data were collected by conducting interviews with adults within each household who are responsible for making financial decisions and possess knowledge about all household members. In particular, interviewees within the households are as follows: 44.6% (223) were the heads of households, 37.8% (189) were the spouse of household heads, 11.4% (57) were adult sons or daughters, and the remaining 5% comprised the parents of the household heads. In terms of gender, 64.6% of the household members interviewed were male, while 35.4% female. The average age of the interviewees was 42.2 years.

*Table 8. The number of interviewees and the relation to household head*

	Frequency	Percentage, %
Household head	224	44.8
Spouse	189	37.8
Son/daughter	57	11.4
Parents	19	3.8
Other adult member	11	2.2
<b>Нийт</b>	<b>500</b>	<b>100.0</b>

*Figure 2. The number of interviewees by gender*



##### 4.1.2.1. Demographic indicators of households

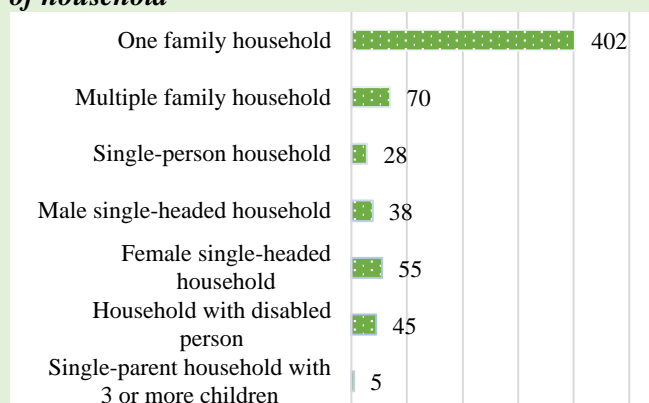
In the surveyed households, the average household size was 4.1. The households with 5 members or more comprised of 38.8% of total surveyed households. Examining the household structure, single-person households constituted a small portion, with 28 or 5.6% of the total surveyed households. Multiple family households, including parents, siblings, or relatives living together, accounted for 14%

(70 households). The majority, 80.4% (402 households) were one family households. Additionally, 38 households (7.6%) were identified as male single-headed households, while 55 households (11%) were female single-headed households. Moreover, the study included 5 single-parent households with 3 or more children. Also, 9% of the surveyed households, totaling 45 households, had a disabled member.

**Table 9. Household size**

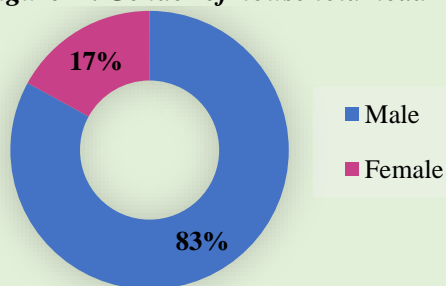
Household size	Frequency	Percentage, %
1	27	5.4
2	74	14.8
3	83	16.6
4	122	24.4
5	96	19.2
6	68	13.6
7 and more	30	6.0
<b>Иит</b>	<b>500</b>	<b>100.0</b>

**Figure 3. The number of surveyed households by type of household**



Out of all surveyed households, 17% or 85 households were female-headed (Figure 4). Analyzing the age distribution of household heads, 58.2% of total household head were 45 years old or older (Table 10). Among them, 30.8% of the households had elderly head or 55 years old or older. As mentioned in the previous section, the average age of the head of a household living in a detached house was higher than that of households living in other types of housing.

**Figure 4. Gender of household head**



**Table 10. Age of household head**

Age group	Frequency	Percentage, %
18-24	10	2.0
25-34	76	15.2
35-44	123	24.6
45-54	137	27.4
More than 55	154	30.8
<b>Total</b>	<b>500</b>	<b>100.0</b>

A significant proportion of the surveyed households (54.4%) were found to have a household head with a secondary education. Among the households, 23% (115) of the household heads had tertiary education, while 15.4% had post-secondary education (Table 11). It was observed that as the age of the household head increase, the level of education tends to decrease. For instance, there were 7 household heads with either primary education or no education, and 5 of them were over 55 years old. Additionally, out of 29 household heads with basic education, 22 of them were over 45 years old.

**Table 11. Education level of household head**

Education level	Frequency	Percentage, %
Tertiary <sup>5</sup>	115	23.0
Post-secondary <sup>6</sup>	77	15.4
Secondary	272	54.4

<sup>5</sup> Master and higher, Bachelor and Diploma

<sup>6</sup> Specialized secondary and vocational



Basic	29	5.8
Primary/None	7	1.4
<b>Total</b>	<b>500</b>	<b>100.0</b>

### Employment of Household Members

There were 1272 adults among the surveyed households. Regarding employment status, 40% (509 individuals) of all participants were permanent employees, indicating continuous employment over the past 12 months. Among the participants, there were 144 self-employed individuals (11.3%). Out of these, 30 individuals were employers, while the remaining 114 were engaged in micro-enterprises and market-oriented family enterprises. On the other hand, a total of 124 individuals (9.7% of the adult members in the surveyed households) were unemployed. Furthermore, there were 397 individuals (31.2% of all adults) were in outside of labor force. Among this group, 210 individuals (16.5%) were retired, and 129 individuals (10.1) were studying.

*Table 12. Employment status of adult members*

Employment status	Давтамж	Хувийн жин, %
<b>Salaried employee:</b>		
Permanent employee	509	40.0
Temporary employee	79	6.2
<b>Employer:</b>		
Enterprise	17	1.3
Market oriented family enterprise	13	1.0
<b>Not employing workers:</b>		
Enterprise	30	2.4
Market oriented family enterprise	84	6.6
Contributing household member	19	1.5
Unemployed	124	9.7
<b>Outside of labor force</b>		
Retired	210	16.5
Studying	129	10.1
Disabled	31	2.4
On maternity leave	27	2.1
<b>Total</b>	<b>1272</b>	<b>100.0</b>

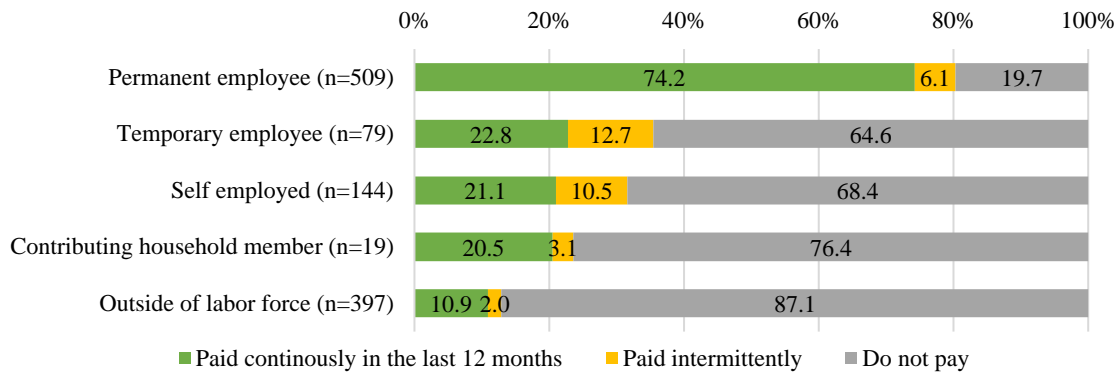
Out of the total surveyed households, 14.5% (59) were households in which all adults were unemployed or out of the labor force. Among these households, 53 had only retired adults, while 6 had adults who were either unemployed or out of the labor force.

With regards to Social Insurance Contribution (SIC) and personal income tax (PIT), the majority of the population, excluding those with permanent employment, did not make contributions from their labor income. Specifically, there were 751 individuals working (including salaried and self-employed individuals), out of which, 64.7% (486) pay SIC. When categorized by employment status, 80.3% of the individuals with permanent salaried jobs (4 out of 5 individuals) pay SIC (Figure 12). However, the payment of social insurance was relatively low among self-employed individuals and temporary workers. For instance, out of the total of 144 self-employed individuals in the surveyed households, only 31.6% (36) pay SIC. These workers face challenges in making regular payments, alongside the small percentage of SIC. Specifically, almost three-quarters of permanent employees had made



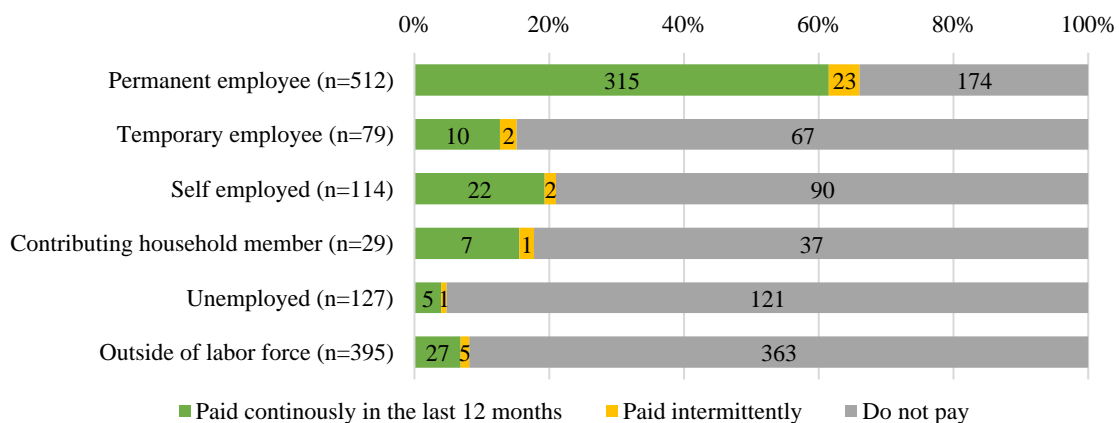
continuous payments over the past 12 months. On the other hand, only 22.8% of temporary employees, and 21.2% of self-employed individuals had made continuous SIP over the past 12 months. This discrepancy arises from the seasonal or irregular nature of their work, which makes it difficult for them to consistently pay SIC. Additionally, some self-employed individuals explained that they intentionally avoid SIC to keep their costs as low as possible.

**Figure 12. SIP contribution, by employment status**



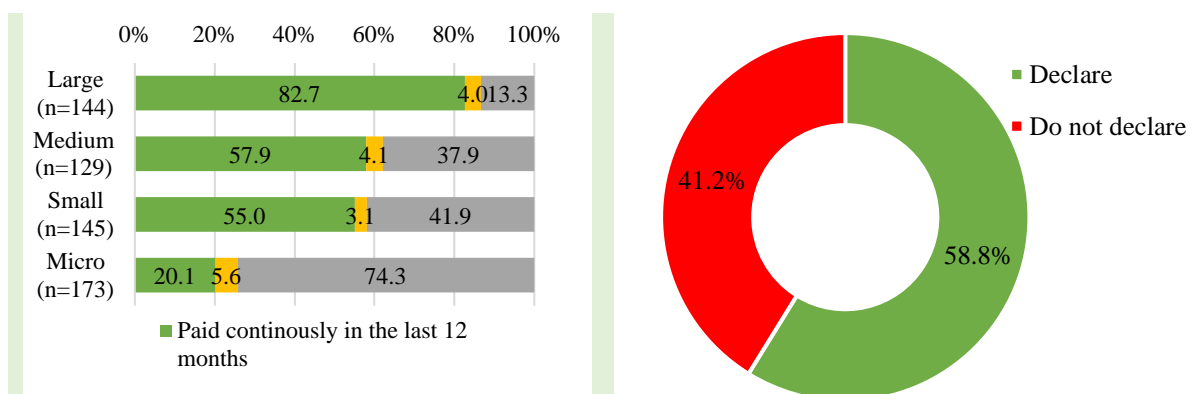
The figure below shows that the percentage of personal income tax payment is even lower compared to SIC. Specifically, only 15.2% (12 individuals) of temporary workers pay PIT. Among permanent employees, 66% make PIT payments, whereas 21.2% of self-employed individuals make PIT payments.

**Figure 13. PIT payment, by employment status**



There is a clear pattern where tax payment for salaried employees is lower and less consistent in smaller organizations. This can be attributed to the cost-saving objectives of small organizations, which try to keep expenses as low as possible, including taxes. Furthermore, it can be seen that Figure 15 that individuals have a low tendency to declare PIT through tax system. In particular, out of total of 420 individuals who pay PIT from their labor income, only 58.8% submit electronic report for PIT.

**Figure 14. PIT payment of salaried employee, by size of organization**      **Figure 15. Declaration of PIT through tax system (n=420)**



*Box: From focus group interviews conducted with employees of commercial banks: Commercial banks classify tax-guaranteed income as official income in accordance with the regulations set by the Bank of Mongolia. Currently, the verification of borrowers' income for salaried employees is done through the SIP. As for self-employed individuals, they can provide proof of income through bank statements. However, PIT can be proof of income, it is not currently utilized by the banks.*

Overall, the low tax payment rate suggests that they face challenges in providing proof of income when applying for loans from financial institutions. This is especially evident among self-employed individuals and those involved in seasonal or temporary employment, where tax payment and reporting are notably low.

#### 4.1.2.2. Households' financial capabilities

In this section, the results of households' financial indicators are reported. For instance, we first presented the statistics of households' income, expenditure, savings, loans, and property. Then, based on the statistics, we calculated the financial margin and default probabilities among households surveyed.

#### Households' properties

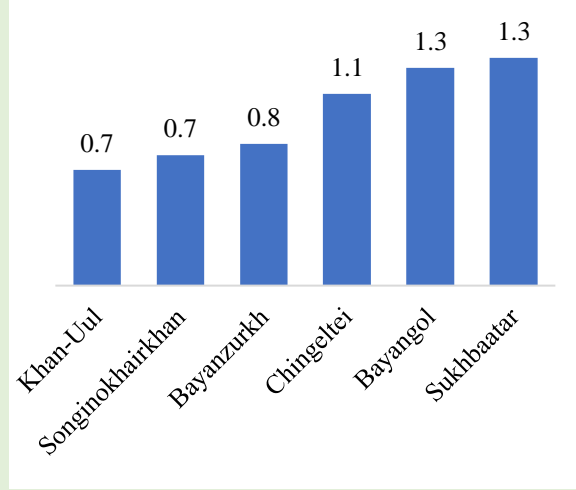
The properties statistics of households surveyed are presented in the Table 13. The average valuation reported in the table below may be higher than the market price or commercial banks' evaluation due to the self-reporting bias.

**Table 13. Households' physical properties, by type**

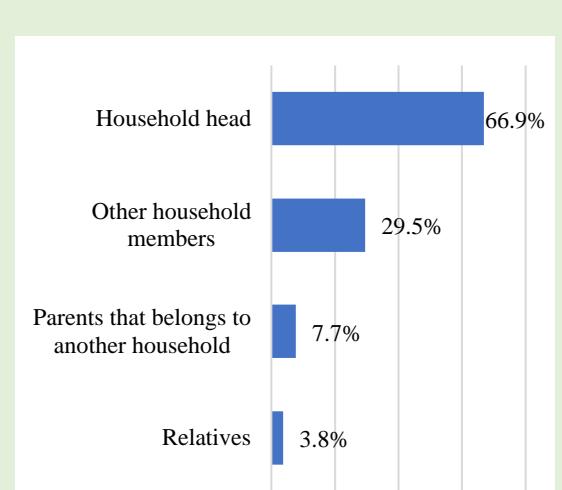
		Detached house	Land	Automobile	Other real state
Possession of formal ownership document, percentage share		83.2% (n=500)	95.8% (n=500)	67.6% (n=500)	12.8% (n=500)
Average size		60.5 m.sq (n=499)	0.057 ha (n=432)	-	-
Average valuation, MNT	Mean	56,400,000 (n=416)	51,700,000 (n=329)	17,900,000 (n=299)	58,600,000 (n=55)
	Median	45,000,000 (n=416)	30,000,000 (n=329)	15,000,000 (n=299)	20,000,000 (n=55)
Whether currently used as loan collateral, percentage share		18.3% (n=416)	12.1% (n=479)	17.8% (n=338)	-
Period left until the release from loan collateral, months		17 (n=75)	19.3 (n=55)	13.2 (n=60)	-

Out of all the households surveyed, 83.2% or 416 households possessed real estate certificates. Among households with real estate certificates, the median valuation of their houses was MNT 45 million. When looking at the average price per square meter by district, it is observed that households in Khan-Uul, Songinohairkhan, and Bayanzurkh districts valued their detached houses below MNT 1 million per square meter. In contrast, households residing in districts with redevelopment areas like Sukhbaatar, Chingeltei, and Bayangol tended to value their homes slightly higher, particularly those located near the redevelopment zones. Furthermore, 18.6% of households with real estate certificates had utilized their houses as collateral for loans, and they had an average remaining duration of 17 months until the complete repayment of their loans.

**Figure 16. The average valuation per square meter of the detached house, by district (million MNT)**



**Figure 17. Land official owner, relationship to household head (n=478)**



When examining the land ownership status, it was found that 95.8% of households surveyed held ownership rights. Regarding the owner, 66.9% of the ownership rights were registered in the name of the head of the household, 29.5% in the name of another household member, and 11.5% in the name of a parent or relative who is not part of the household. In other words, approximately one in every ten households required permission from external individuals to use their land as collateral for loans. Out of the surveyed households, 432 reported their land size, which was 0.057 hectares on average. The valuation of houses and land among households tends to be approximate. The median reported land valuation was about MNT 30 million. In other words, 50% of all households valued their land at less than MNT 30 million. Additionally, 12.4% of households with land ownership rights used their land certificate as loan collateral, with an average duration of 19.3 months remaining until the loan is fully paid off.

Among the surveyed households, 67.6% of them owned their own cars. The average value of a car among these households was found to be MNT 17.9 million. Furthermore, 17.8% of households with cars had taken car loans with their vehicles used as collateral, and on average, these loans were expected to be paid off within 13.2 months.

Additionally, 12.8% of all households reported owning other real estate with official documents that could be utilized as collateral for loans. The average market value of these properties was MNT 58.6 million, although the median value stood at MNT 20 million.

### Households' income and expenditure

The income grouping utilized in our study is based on the Bank of Mongolia's Household Sample Survey. The table below illustrates the distribution of households surveyed across different income groups. In the lowest income group, referred to as the "poor" group, households with a daily income

per capita of less than USD 2 comprised 5.6% of the total surveyed households. Additionally, the lower middle-income group, which includes households with income levels above the poverty line but still with relatively lower income, accounted for 44.8% of all households included in the survey.

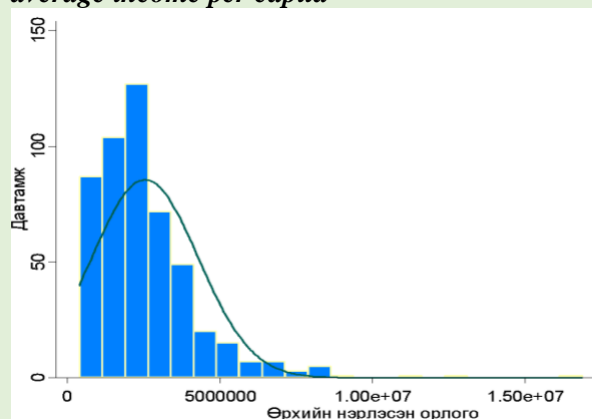
**Table 14. Households' income group**

	Income group	Income per capita (MNT)	Frequency	Percentage share %
1	Poor	Less than 223,013	28	5.6
2	Lower middle	223,014 – 557,533	224	44.8
3	Middle	557,534 – 1,115,065	179	35.8
4	Upper middle	1,115,066 – 2,230,130	63	12.6
5	Rich	More than 2,230,131	6	1.2
	<b>Total</b>		<b>500</b>	<b>100.0</b>

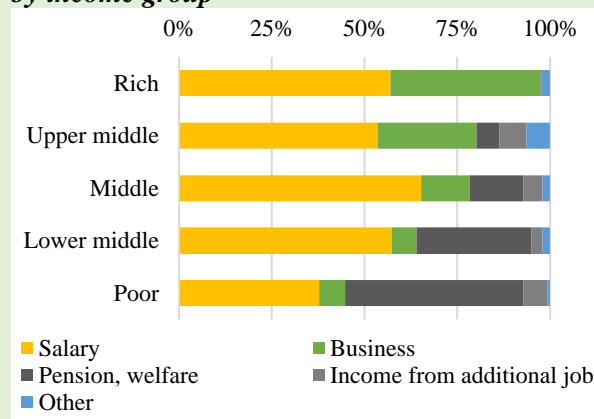
Source: Bank of Mongolia, 2023

Figure 18 illustrates the distribution of nominal total income of the surveyed households. The average monthly income of the households surveyed was MNT 2.5 million, which is 20% higher than the nominal average gross income reported by the NSO for the first quarter of 2023 (MNT 2.08 million). The median household income was MNT 2.2 million, indicating that 50% of all households had an income below MNT 2.2 million, while the remaining 50% had an income exceeding MNT 2.2 million. The lowest income recorded among the surveyed households was MNT 400,000, while the highest income was MNT 16.9 million.

**Figure 18. Distribution of households' monthly average income per capita**



**Figure 19. Households' income decomposition, by income group**



The structure of the average monthly income of the participating households reveals that the largest portion, 58.6%, is derived from salary income (Figure 19). Income from pensions contributes to 22.4% of the total monthly income, while business income constitutes an average of 12%. When looking by households' income group, the share of salary income in the total income is highest among households in the middle-income group, amounting for 65.2%. In contrast, for households in the poor-income group, pension income constitutes nearly half of their total household income, at 48%.

For households in the upper middle and rich groups, the proportion of business income in the average monthly income is slightly higher. Specifically, business income accounts for 48% of the average monthly income for wealthy households and 31% for upper-middle income households. The table below provides a detailed breakdown of total household income for each income group.

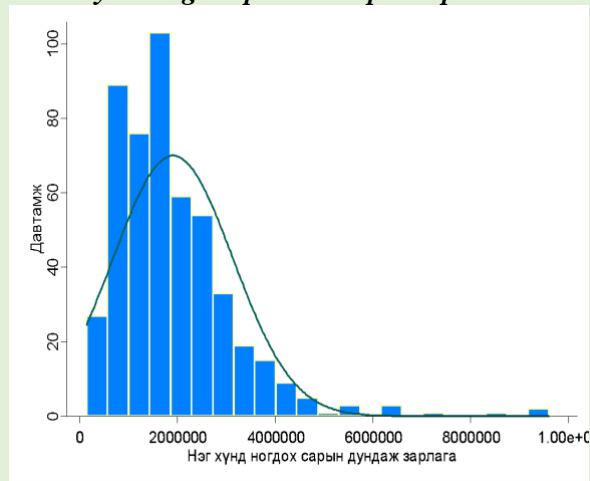
**Table 15. Households' income decomposition, by income group (thousand MNT)**

	Poor	Lower Middle	Middle	Upper Middle	Rich
Monthly average income	868.7	1,751.3	2,882.5	4,833.6	6,579.0

Salary	327.2 (37.7%)	1,003.6 (57.3%)	1,878.5 (65.2%)	2,590.9 (53.6%)	3,744.4 (56.9%)
Business	60.8 (7.0%)	116.6 (6.7%)	379.4 (13.2%)	1,283.7 (26.6%)	2,667.3 (40.5%)
Pension and welfare	417.0 (48.0%)	540.8 (30.9%)	412.8 (14.3%)	293.7 (6.1%)	13.0 (0.2%)
Income from additional job	57.5 (6.6%)	54.9 (3.1%)	153.7 (5.3%)	361.6 (7.5%)	0.0 (0.0%)
Other	6.2 (0.7%)	35.3 (2.0%)	58.1 (2.0%)	303.7 (0.0%)	154.3 (2.3%)

Figure 20 illustrates the distribution of average monthly expenditure of the households surveyed. The nominal average monthly expenditure was MNT 1.91 million, with a median value of MNT 1.68 million. In terms of expenditure structure, food accounted for the largest portion at 36.9% of the average monthly expenses. Loan payments constituted 14.3% of the household monthly average expenditure, followed by fuel at 9.1%, heating expenses at 7%, telecommunications at 5.8%, and other non-food expenses making up the remaining 26.7%.

**Figure 20. Distribution of households' monthly average expenditure per capita**



**Figure 21. Households' expenditure structure, by income groups**

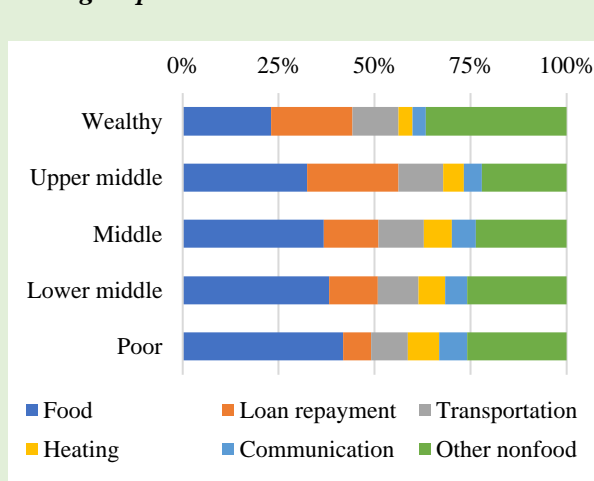


Table 16 provides a breakdown of households' monthly expenditure by income group. The data reveals that the distribution of expenses varies according to the household's income group. In households with lower income, a higher proportion of expenditure is allocated to food, while in households with higher income, a greater share is devoted to loan payments (Figure 21). For instance, in the lowest-income or poor group, food expenditure account for 41.9% of the total monthly expenditure, and heating expenses make up 8.1%. In contrast, in the wealthy group, food expenditure constitutes 23% of the total monthly expenditure, while heating expenditure comprise 3.6%. These findings suggest that households with lower income primarily allocate their resources to meet basic needs. However, as income levels increase, the share of expenses allocated to loan payments becomes more significant. This can be attributed to lower income households facing difficulties in obtaining loans due to not meeting the requirements set by financial institutions.

**Table 16. Households' expenditure structure, by income group (thousand MNT)**

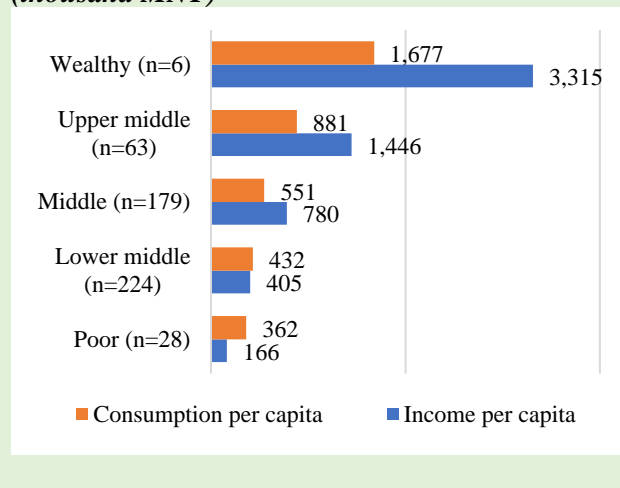
	Poor	Lower middle	Middle	Upper middle	Wealthy
Households' monthly average income	595.8	655.0	721.0	893.4	859.0
Food	101.4	215.7	279.7	655.2	792.2

	(41.9%)	(38.2%)	(36.7%)	(32.4%)	(23.0%)
Loan repayment	138.1 (7.1%)	181.8 (12.6%)	234.2 (14.2%)	319.4 (23.8%)	446.7 (21.2%)
Transportation	115.9 (9.7%)	121.5 (10.6%)	142.2 (11.9%)	148.6 (11.6%)	134.2 (12.0%)
Heating	103.6 (8.1%)	97.1 (7.1%)	124.3 (7.2%)	126.9 (5.4%)	133.6 (3.6%)
Communication	368.3 (7.3%)	444.9 (5.7%)	464.3 (6.3%)	610.6 (4.6%)	1,366.0 (3.6%)
Other nonfood	595.8 (25.9%)	655.0 (38.2%)	721.0 (23.6%)	893.4 (22.2%)	859.0 (36.6%)

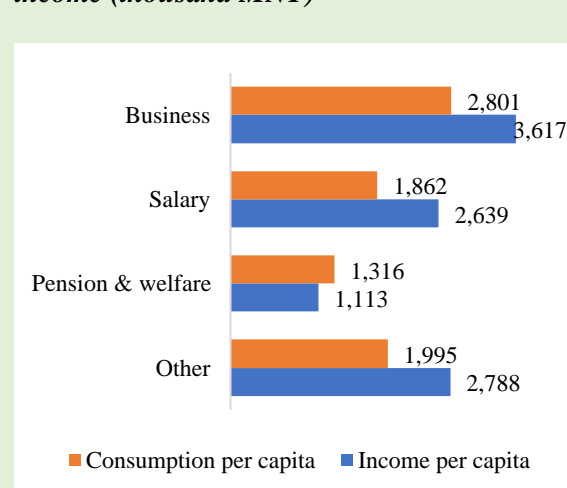
Figure 22 illustrates a clear pattern where lower standards of living correspond to lower income adequacy. This implies that households with lower living standards face difficulties in achieving sufficient income to meet their needs adequately.

When decomposing by the primer source of income, Figure 23 demonstrates that households relying on business income tend to have higher overall incomes. However, it is important to note that households dependent on pension income not only experience lower income levels but also exhibit poor income adequacy.

**Figure 22. Monthly average income and expenditure per capita, by income group (thousand MNT)**



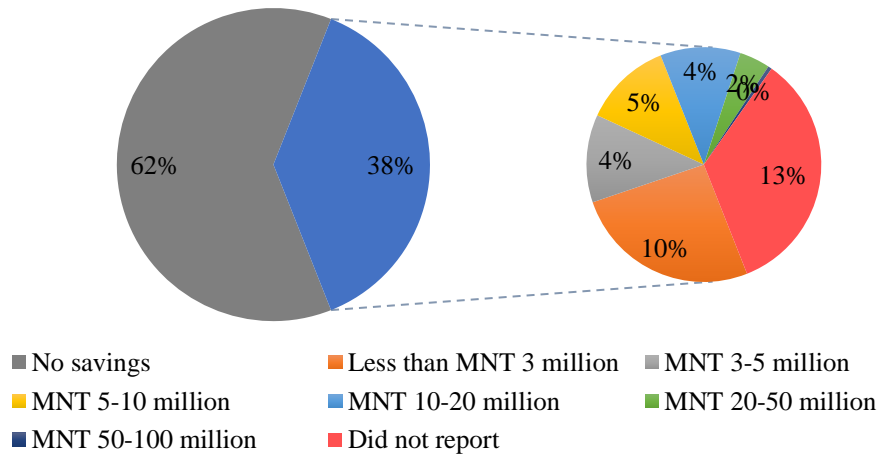
**Figure 23. Monthly average income and expenditure per capita, by primer source of income (thousand MNT)**



## Savings

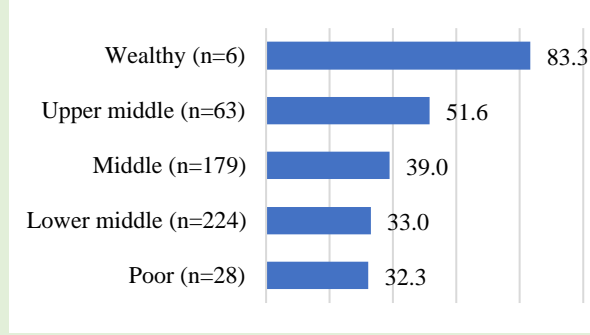
Among the surveyed households, 38% (190 households) reported having savings, as depicted in Figure 27. However, 65 households refused to report the amount of their savings. Among the households that reported their savings amount, 50% had savings totaling less than MNT 10 million. While 4% (21 households) reported savings ranging between MNT 10 million and MNT 20 million, while only 2% had savings exceeding MNT 20 million.

**Figure 24. Household savings, by amount**

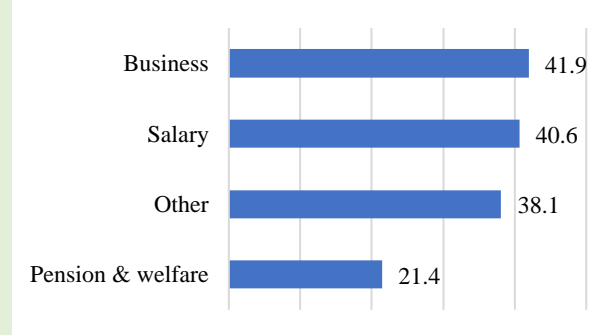


As shown in the Figure 25, households with higher income tend to have higher levels of savings. Moreover, households with business income as their main source of income exhibit a higher percentage of households with savings, which can be attributed to their relatively better income sufficiency. Conversely, households relying on pension income have the lowest percentage of households with savings at 21.4%. This suggests that households primarily dependent on pensions face challenges in accumulating savings due to their inadequacy of income.

**Figure 25. Percentage share of households with savings, by income group**

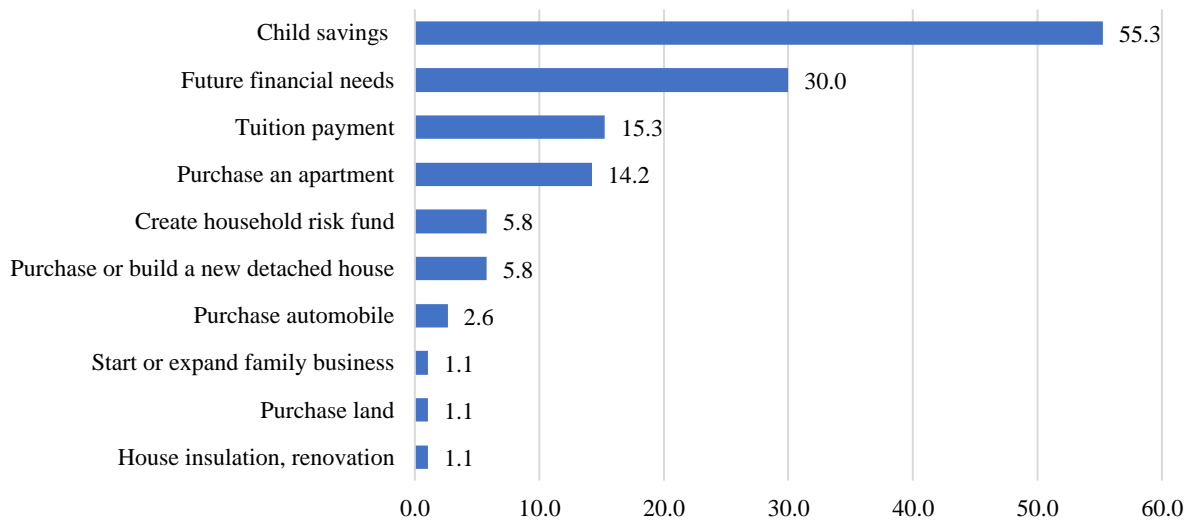


**Figure 26. Percentage share of households with savings, by primer source of income**



The top purphouseholds prioritizing this goal. Additionally, 30% of households saved to meet future financial needs, and 15.3% saved specifically for tuition fees. However, the number of households saving for housing investment was relatively low. For instance, only 14.2% of households were saving for the purchase of an apartment, while 5.8% were saving for the construction or purchase of a new detached house. Interestingly, only 1.1% of households were saving specifically for insulation and repair of their detached houses.

**Figure 27. Purpose of savings (n=190)**

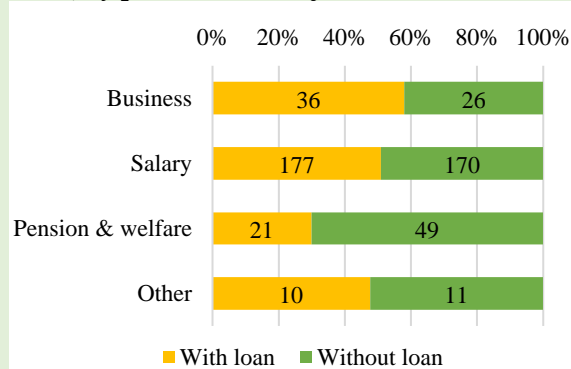


### Loan

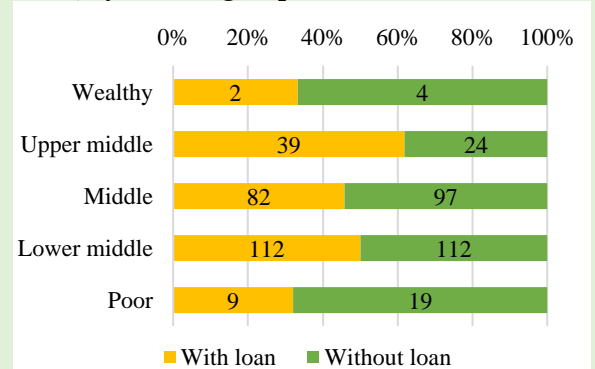
48.8% (or 244 households) of the households surveyed had loans. When examining the primer source of household income, 58% of households with business income had taken loans, while 51% of households with salary income had loans as shown in Figure 31. While 30% of households which rely on pension income had taken loan.

When decomposing by the income groups, the lowest income or poor group had the lowest percentage of households with loans, whereas the middle three income groups had the highest percentages of households with loans as depicted in Figure 29. This indicates that households in the lowest income group may not meet the credit requirements to qualify for loans. Whereas the households in the highest income group may not need to take loans as their income is adequate.

**Figure 28. Percentage share of households with loans, by primer source of income**



**Figure 29. Percentage share of households with loans, by income group**

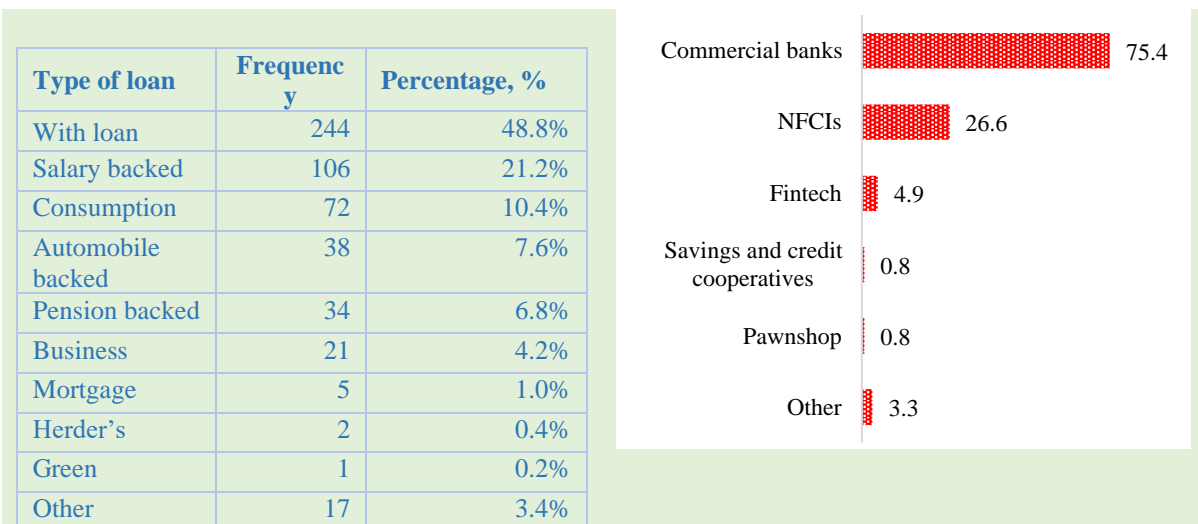


Among the surveyed households, it was found that 1 in every 5 households had a salary backed loan. Consumer loans and car loans were reported by 10.4% and 7.6% of the households, respectively. Only 1 household (0.2%) had received a green loan, indicating a relatively low uptake of such loans. When looking at the source of credit, it was observed that 75.4% of households with loans obtained them from commercial banks, while 26.6% received loans from Non-Bank Financial Institutions (NBFIs).

**Table 17. Percentage share of households with loans, by loan types**

**Figure 30. Percentage share of households with loans, by financial institutions (n=244)**



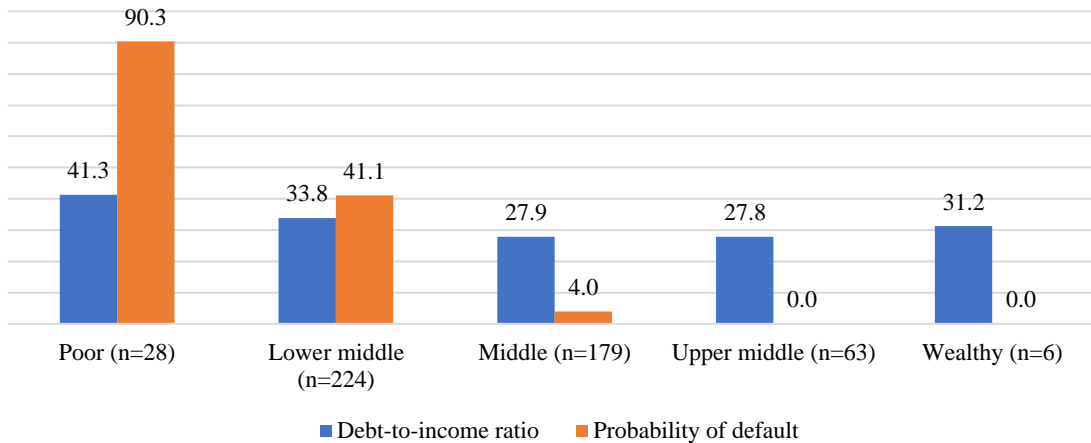


### Households' financial capabilities

In this subsection, we reported results of assessment of the financial capacities of the households included in our survey, utilizing the stress test analysis methodology introduced in the preceding section. As our survey covered the households residing in self-owned detached houses, we excluded rental costs from the calculation of their financial margin. In other words, we considered loan repayments and minimum subsistence level which was MNT 313,400 per capita as of first quarter of 2023. Consequently, if a household's financial margin yields a negative value, it signifies a challenging situation for the household in terms of loan repayment, posing a risk of default. In particular, we calculated the probability that, after meeting their basic needs with their income, the household may face difficulty in repaying the loan.

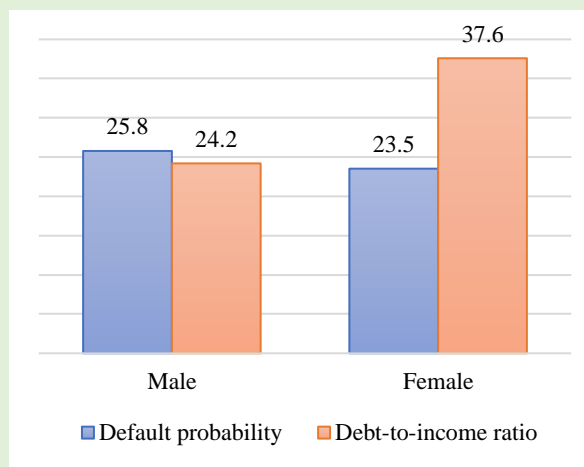
The figure below illustrates the percentage share of households at risk of default and the debt-to-income ratio of households surveyed, categorized by their income group. Overall, percentage share of households with default risk was 25.4%. For households categorized as poor or below-subsistence, a 90% were at risk of default. For lower-income households, the probability of default stood at approximately 41.1%, while for middle-income households, it was 4%. While households belonging to the upper-middle- and wealthy groups showed no likelihood of default. Additionally, Figure 31 depicts the loan burden faced by households, representing the proportion of loan payments in their total household income. On average, the households surveyed were allocating 31.2% of their monthly income towards loan repayment. Notably, this proportion was slightly higher among households categorized as poor and lower-middle income groups.

**Figure 31. Household probability of default and debt/income ratio, %**

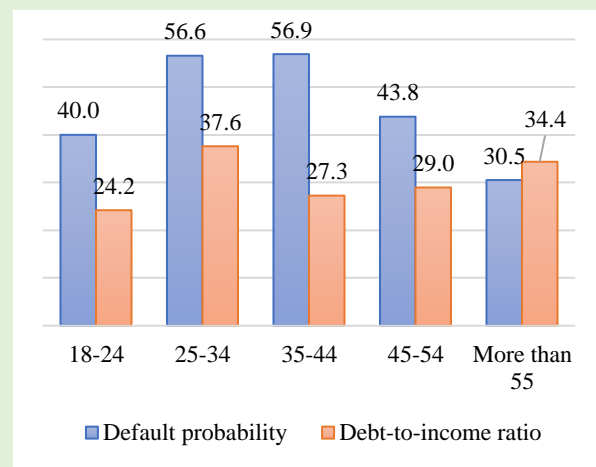


The financial burden of households varies based on household characteristics. Female-headed households tend to have a lower probability of default (Figure 32). This can be attributed to the fact that female-headed households typically take less loans, leading to a lower debt burden and, consequently, a reduced risk of default. Among different age groups, households with a head aged 25-34 face the highest debt burden and probability of default (Figure 33). On the other hand, households with a head aged over 55, particularly retirees, experience a high debt burden and probability of default. This can be attributed to the insufficient income streams available to pensioners, which make it challenging to meet loan repayment obligations.

**Figure 32. Probability of default, by household head gender (%)**



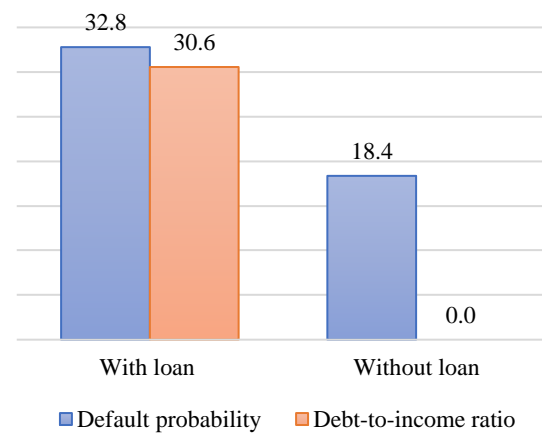
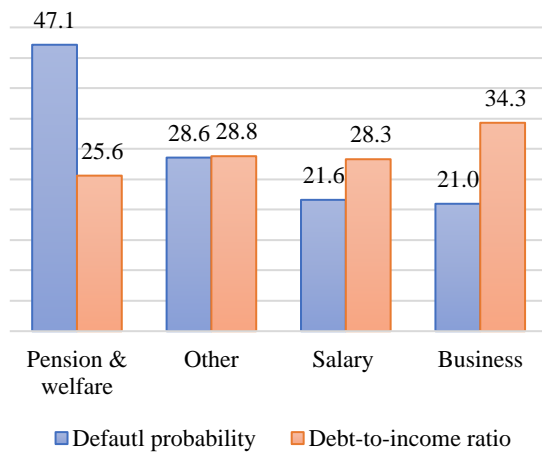
**Figure 33. Probability of default, by household head age (%)**



When looking at the primer source of household income, households that relied primarily on pension income faced the greatest probability of default or financial hardship. In contrast, households with income from salaries and businesses had lower levels of debt burden. Among households with loans, approximately 32.8% were at risk of default, meaning that about one in three households are experiencing challenges to afford their basic needs and loan repayment.

**Figure 34. Default probability, by primer source of income (%)**

**Figure 35. Default probability, whether have loans (%)**

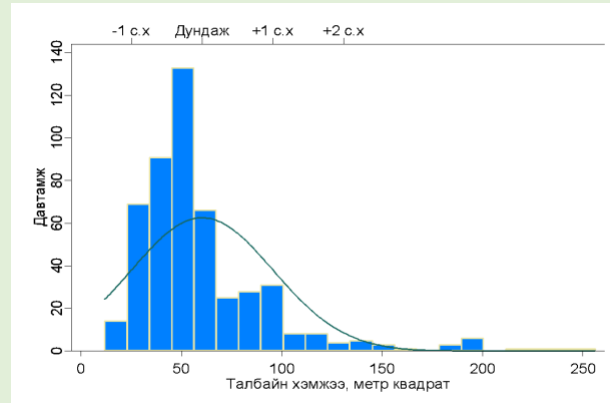


Overall, households led by individuals over 55 years of age, relying mainly on pension income, face the greatest financial burden. This finding suggests that households with pension income generally have lower income levels. Conversely, households with income from salaries and businesses, particularly those led by individuals aged 35-54, demonstrate relatively stronger financial capability.

#### 4.1.2.3. Household dwelling situation

The figure below shows the distribution of size of detached houses of households surveyed. The surveyed households had an average detached house area of 60.5 square meters. The smallest house area recorded was 12 square meters, while the largest was 256 square meters. Table 18 presents the distribution of detached house size by interval. As shown in the table, the majority of the surveyed households, accounting for 52.3%, reside in houses ranging from 31 to 60 square meters in size.

**Figure 36. Distribution of size of detached house area**



**Table 18. Size of detached house area, by interval**

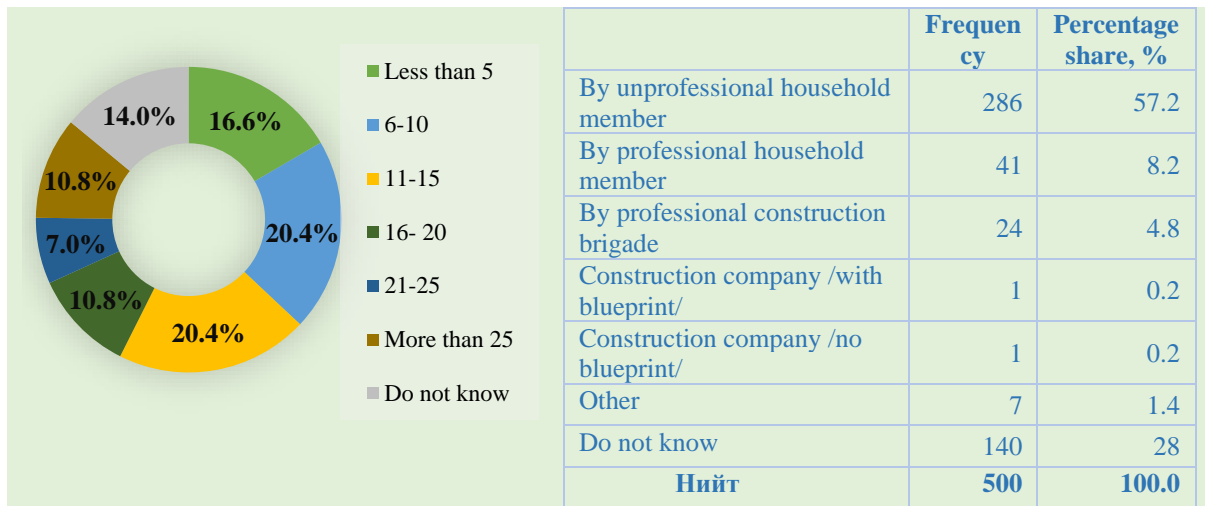
Size of area, sq.m	Frequency	Percentage share, %
Less than 30	65	13.0
31- 60	261	52.3
61-90	109	21.8
91-120	38	7.6
More than 121	26	5.2
<b>Total</b>	<b>500</b>	<b>100.0</b>

Regarding the age of detached houses, approximately 17% (85) of the surveyed households had houses less than 5 years old, built after 2018 (Figure 37). Another 20.4% (102) had houses that were 6-10 years old. However, over a quarter of all surveyed households, specifically 28.6% (143), resided in houses constructed more than 16 years ago. The median age of a residence is 12 years, meaning that half of the surveyed households live in houses that were built 12 or more years ago.

A majority of the households surveyed constructed their detached house by their own. According to Table 19, 57.2% (286) out of 500 households built their houses without the assistance of professionals. Additionally, 8.2% (41) received some help from professionals during the construction process. Only 4.8% of the households employed professional construction brigades, while a mere 0.4% (2 households) had their houses built entirely by professional construction companies.

**Figure 37. the age of the house**

**Table 19. Who built the house?**



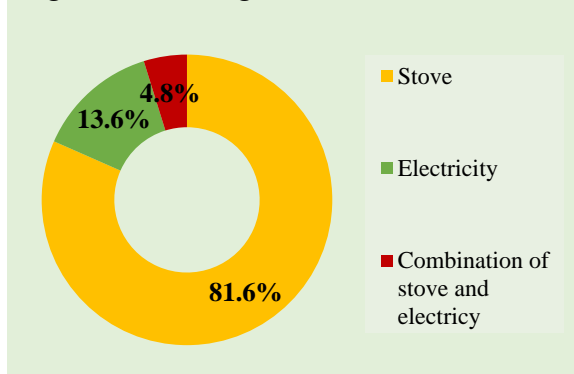
*Box. From an interview with a construction company:  
One of the main causes of substantial heat loss in houses is attributed to households constructing their own detached houses. Moreover, the non-standard construction of these houses poses challenges in terms of insulation and increases associated costs when considering insulation and green building practices. The prevalent mindset of "I can" or "I can build it myself" contributes to higher heat loss and further exacerbates air pollution in the ger area.*

The primary materials used for house walls were predominantly wood (35.6%), followed by blocks (28.2%), and bricks (25.6%). Among the surveyed households, 28 houses had walls made of wooden planks, with 20 of them being more than 15 years old. On the other hand, sandwich houses (6) and precast concrete houses (5) were all constructed within the last 10 years.

In terms of the electricity source, an overwhelming majority of households, specifically 98.5% (497 out of 500), obtained their electricity from the integrated power line. Only 3 households relied on small generators for their electricity needs.

As shown in the Figure 41, the distribution of surveyed households by home heating source is as follows: 95.2% (476) of all households use either fire or electric heating sources, while 4.8% (24) utilize a combination of conventional fire and electric heaters. Among the 476 households that rely on a single heating source, 85.7% (408 households) use ordinary fire for heating, while 14.3% (68 households) use electricity.

**Figure 38. Heating sources**



**Figure 39. Heating sources, by the size of the house**

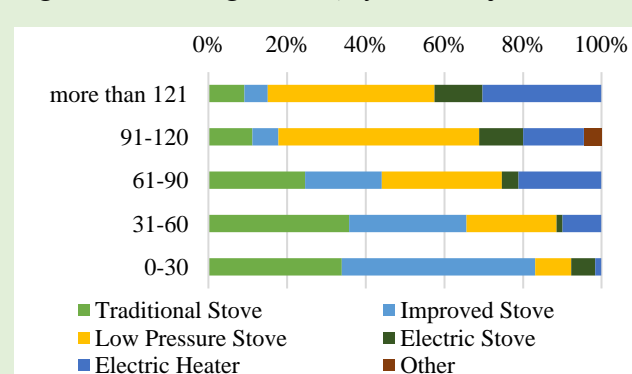


Figure 42 demonstrates that as the house size increases, there is a higher tendency to use low-pressure stoves and electric heaters. Larger houses are more likely to use more than one sources. Regarding

income groups, there is a positive correlation between income level and the usage of low-pressure stoves and electric heaters as households with higher income tends to have bigger houses (Figure 40). As income increases, households are more inclined to opt for these types of heating.

**Figure 40. Heating sources, by income group**

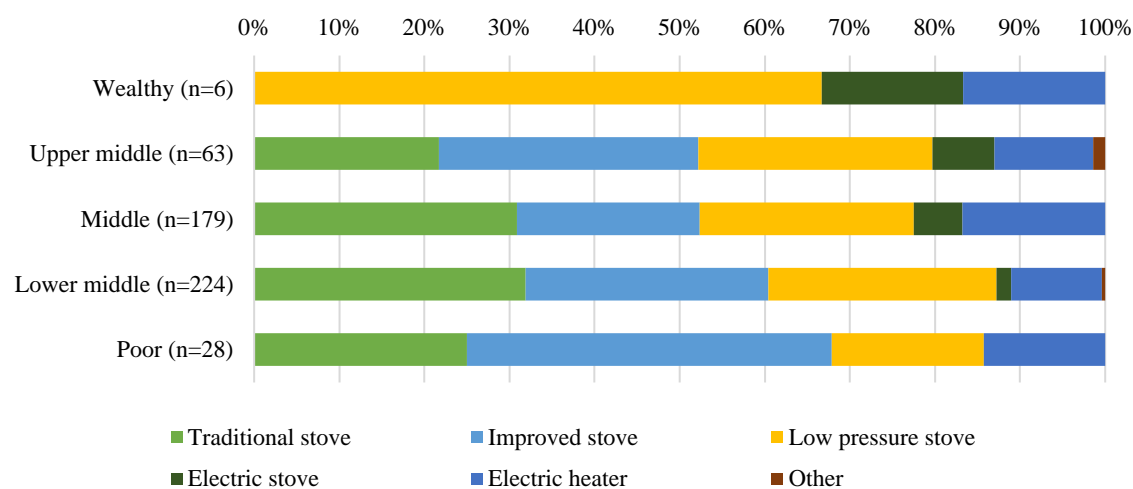
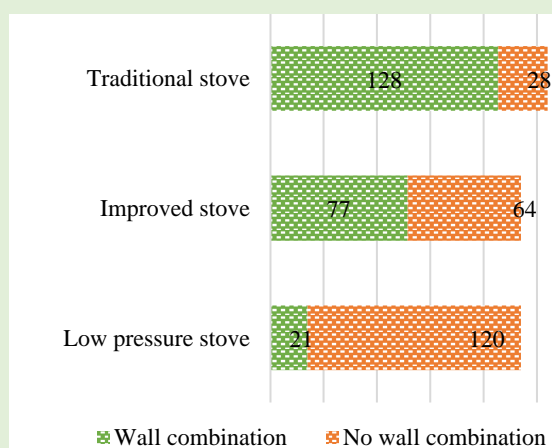


Figure 41 illustrates that households using both traditional and improved stoves often had wall combination. Specifically, 81.3% of households with traditional stoves and 54.2% of households with improved stoves utilize wall combination for heating.

During the coldest period of the winter season, which is January, households utilizing stoves typically light fires three times per day, on average (Figure 42). When considering the type of heating source, households relying on low-pressure stoves and traditional stoves tend to have the highest frequency of fire-lighting per day. Moreover, households that use a combination of stove and electric heaters makes the fire more frequently. This indicates that due to significant heat loss, households often resort to using a combination of two heating sources. In contrast, households with improved stoves tend to light fires less frequently, with an average of 2.7 times per day.

**Figure 41. Heating source, by type of stoves**



**Figure 42. Household frequency of lighting the stove, by heating source**

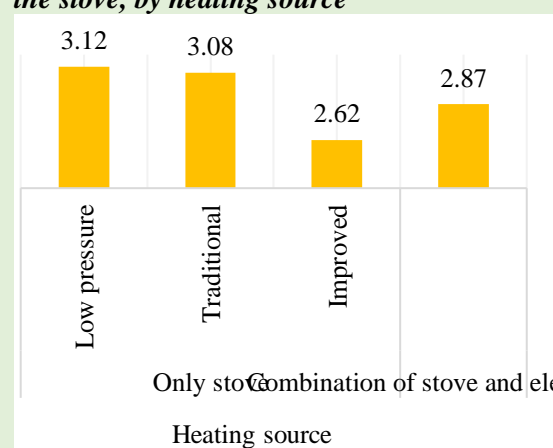


Table 20 presents the average amount of improved briquettes consumed per winter by households by types of stoves. In UB, households with stoves consume improved fuels and wood. The price of one sack of improved fuel is MNT 3,750. As for wood, a large sack costs MNT 8,860, a small sack costs MNT 7,260, and a forter wood costs MNT 126,000.

Households that utilize low-pressure stoves consume the highest amount of briquette coal. For instance, households solely relying on low-pressure stoves consume, on average, 14% and 10% more improved

briquette compared to households with improved stoves and traditional stoves, respectively. Specifically, households using only low-pressure stoves consume an average of 210.4 sacks of briquette coal per winter, while households with improved stoves consume 184.2 sacks per winter and households with traditional stoves consume 190.9 sacks per winter.

Moreover, households that combine stoves with electric heaters tend to consume more briquette coal than households using stoves alone. Particularly, households utilizing a combination of low-pressure stoves and electric heaters consume an average of 262.6 sacks of improved fuel per winter, equivalent to 2-3 sacks of briquette coal per day in winter. This consumption is 33.6% higher than the average of all surveyed households, which is 196.5 sacks.

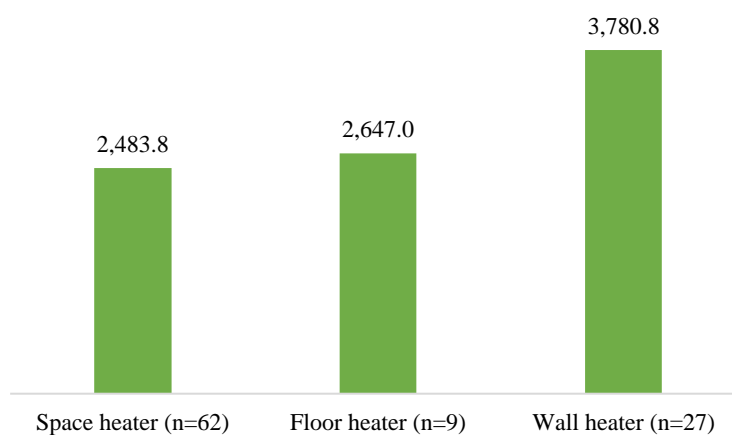
It is observed that the households with larger houses often have low-pressure stoves resulting higher consumption of briquette coal. Additionally, there were cases where households with larger houses opted to use electric heaters at night and fires during the day, as heating solely with electricity is more expensive than consuming briquette coal.

**Table 20. The amount of briquette coal per winter by the heating source (sack)**

Type of stove	Only stove	Stove and electric heater	Difference (%)
Traditional stove	190.9	178.9	-6.3%
Improved stove	184.2	209.9	14.0%
Low pressure stove	210.4	262.6	24.8%

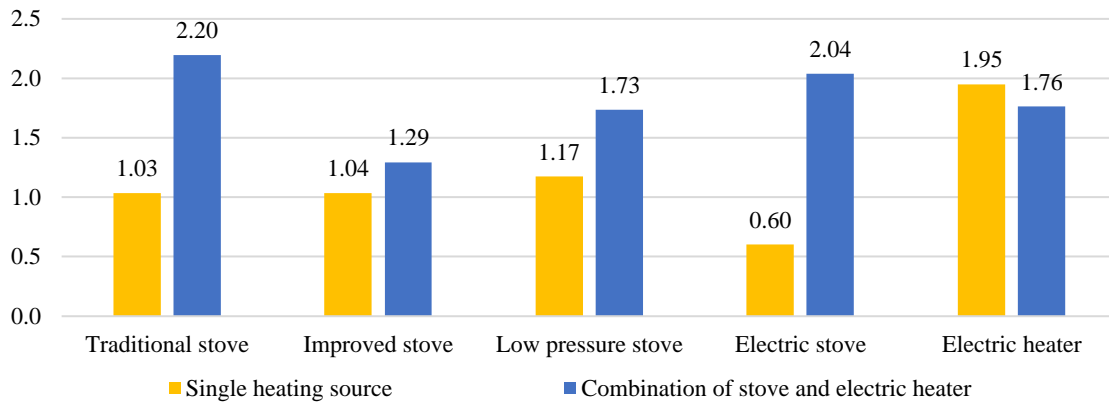
As shown in Figure A4 in Appendix 4, among the 93 households that utilized electric heating, approximately two-thirds (62 households) had a space heater. Around 29% (27 households) had wall heating, and 9.7% (9 households) had floor heating systems. When considering the average cost of installing electric heating systems, the installation cost of a space heater was the least (Figure 43).

**Figure 43. Electric heater installation cost, thousand MNT**



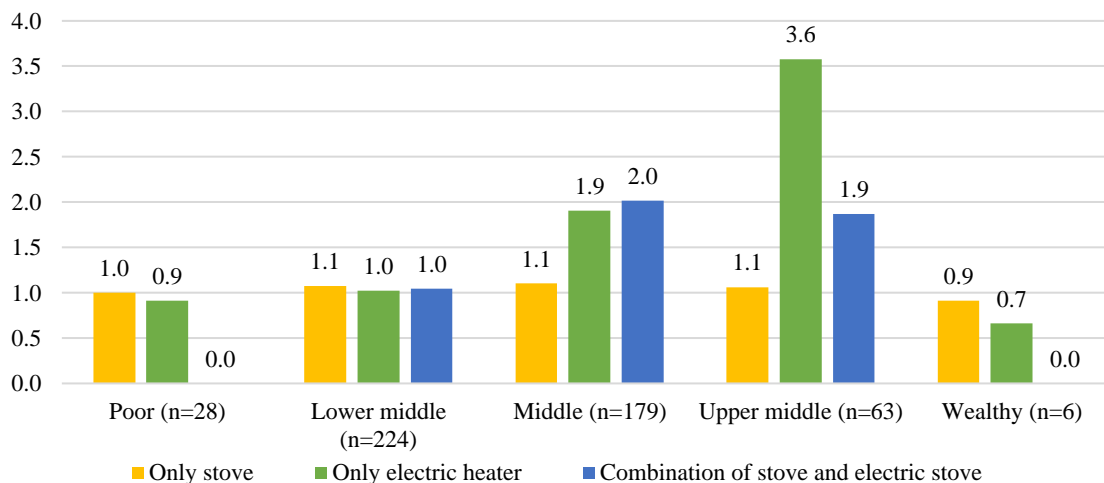
When examining the heating costs of households by heating sources, it was found that households with a single heating source generally had lower costs compared to those using a combination of fire and electric heaters (Figure 44). Among households with a single heating source, the operating costs were lowest for those using improved and traditional stoves, while electric heaters incurred the highest utility costs.

**Figure 44. Heating cost per winter, by type of heating source (million MNT)**



The following figure shows the heating costs per winter for households categorized by both the type of heating source and income group. It reveals that, for households in the middle and upper middle income groups, the utility costs of electric heating alone are higher compared to those using single heating source. However, it is worth noting that among the wealthy group, six households reported relatively low expenditures on electric heater.

**Figure 45. Heating cost per winter, by income group (million MNT)**

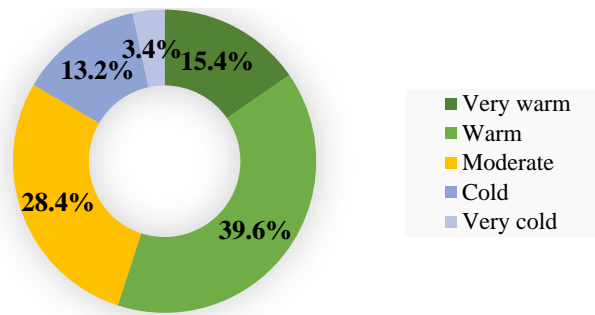


In general, when considering heating costs across different income groups and heating sources, it is observed that higher-income households tend to have larger detached houses and consequently require a greater consumption of improved briquette for heating. This suggests that higher-income households are benefiting more from government incentives and exemptions, such as enhanced fuel subsidies and concessions on night electricity rates, compared to lower income households.

Moreover, although there is a standard provision of 7 sacks of improved fuel per week per household, there are instances where households with low-pressure stoves and larger detached houses consume 2-3 sacks of fuel per day, which is 2-3 times higher than the standard weekly norm. Furthermore, the decision of low-income households to transition to electric heaters is influenced by two key factors. Firstly, the installation costs associated with electric heaters play a role in determining their adoption. Secondly, the higher utility costs of electric heaters compared to burning improved briquette serve as a deterrent for households to make the switch.

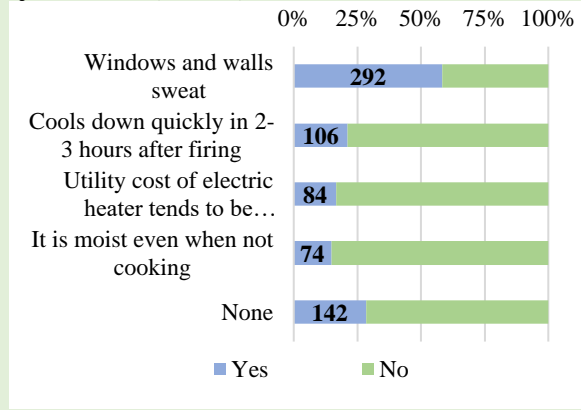
During the survey, households were asked to evaluate the level of warmth in their detached houses during winter. The results showed that 15.4% (77 households) responded that they could stay very warm, while 39.6% (198 households) reported feeling warm. However, 13.2% (66 households) stated that they felt cold, and 3.4% (17 households) reported experiencing very cold conditions during winter.

**Figure 46. Whether your household stay warm during winter**

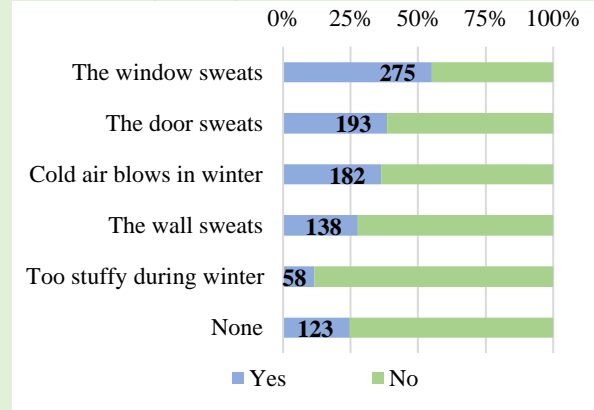


When assessing the presence of symptoms related to heat loss and poor ventilation within the houses, it was found that 71.6% of households exhibited symptoms of heat loss, while 75.4% of households experienced symptoms of poor ventilation. Among these symptoms, the most commonly reported issues included the presence of sweaty windows, walls, and doors, experiencing coldness within 2-3 hours of lighting a fire or turning on heating sources, and observing high electricity bills due to the usage of electric heaters.

**Figure 47. Whether your house have any signs of heat loss (n=500)**

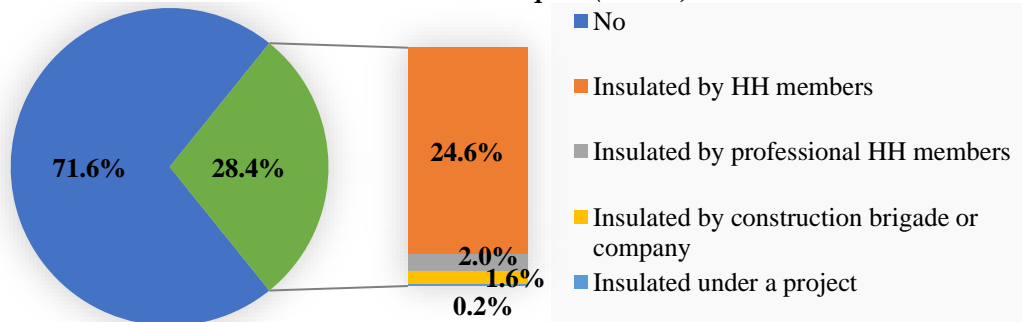


**Figure 48. Whether there are any signs of poor ventilation (n=500)**



To gain insights into the insulation practices of the surveyed households, we gathered information regarding their insulation history. As shown in the figure below, among the households surveyed, it was discovered that 28.4% (142 households) had taken measures to insulate their homes in the past. Notably, most of these households (90%) insulated their detached house by themselves, demonstrating a preference for “do-it-yourself” insulation methods. In contrast, a small proportion, accounting for only 6% (9 households), sought the assistance of professional construction brigades or enterprises to carry out the insulation process.

**Figure 49. Whether insulated the detached house in the past (n=500)**

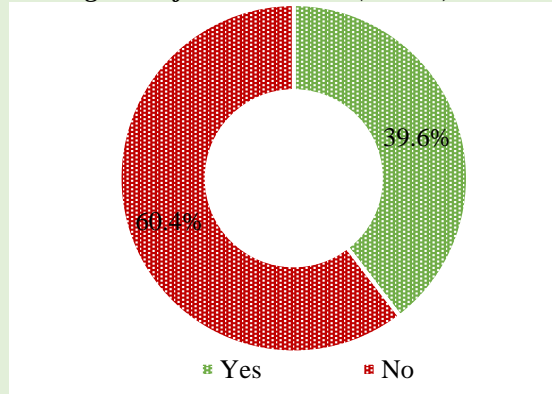


It was observed that households often proceed with insulating their houses without conducting heat loss measurements, resulting in inefficient and subpar insulation. Specifically, out of the total 500

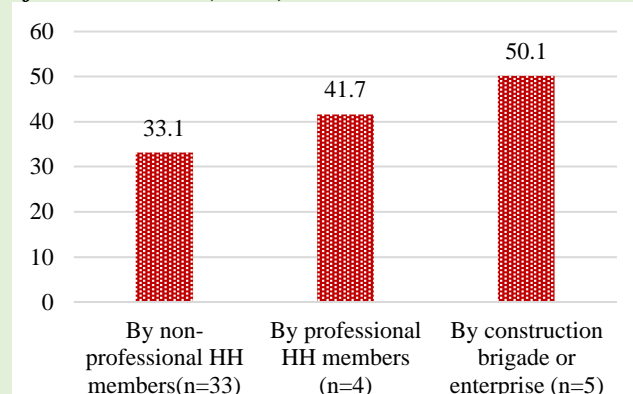


households that participated in the study, only 18 households, equivalent to 3.6%, had undertaken heat loss audit in their houses. Furthermore, among the 142 households that had previously insulated their houses, approximately 60.4% (87 households), or 3 out of 5 households, reported that their heating costs did not decrease even after insulation was implemented (Figure 50).

**Figure 50. Whether noticed a reduction in heating cost after insulation (n=142)**

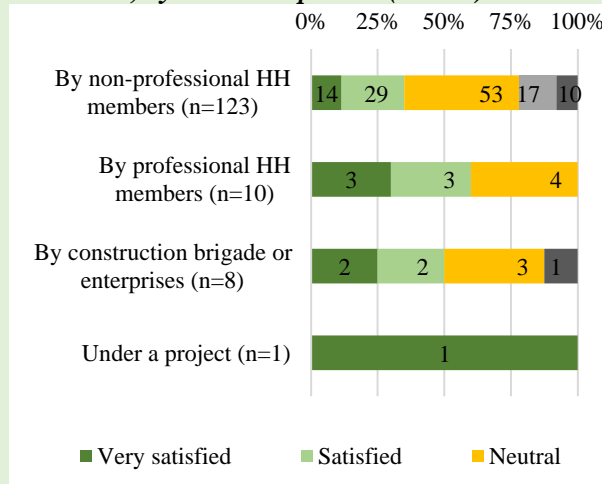


**Figure 51. Percentage reduction in heating costs after insulation (n=55)**

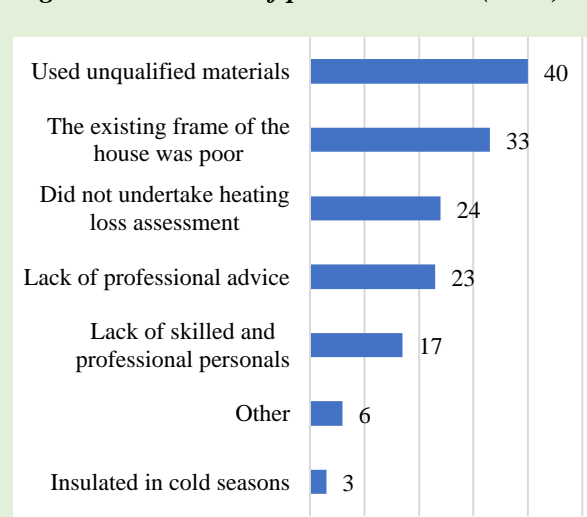


Moreover, it was found that a majority of households that had undergone insulation measures expressed dissatisfaction with the results. Figure 52 illustrates this trend, with the lowest satisfaction reported among households that performed the insulation themselves without seeking professional advice. Out of a total of 123 household members, 43.1% (53 members) reported being moderately satisfied with the insulation, 13.8% (17 members) expressed barely satisfaction, and 8.1% (10 members) indicated being not satisfied at all. These findings suggest that households may face challenges and limitations when attempting to insulate their houses without the guidance and expertise of professionals, leading to lower levels of satisfaction with the insulation outcomes.

**Figure 52. Households' satisfaction after insulation, by insulated person (n=142)**



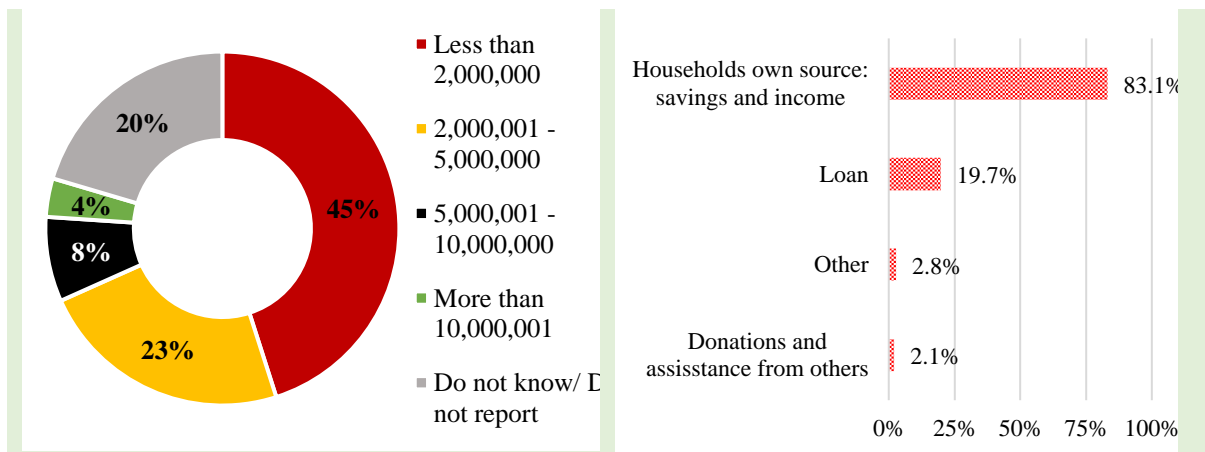
**Figure 53. Reasons of poor insulation (n=88)**



The average cost of insulation for the 142 households that underwent insulation measures was 3.9 million MNT. Among these households, 75% spent costs of 10 million MNT or less for their insulation of detached houses. Furthermore, 45% of the households reported insulation costs below 2 million MNT. However, it is worth noting that 20% of the households either did not know or refused to report the cost of their insulation (Figure 54).

**Figure 54. Insulation cost, MNT (n=142)**

**Figure 55. Financing source of insulation (n=142)**



Regarding the financing sources, a significant majority of the 142 households (83.1% or 118 households) financed their insulation projects through their own source (income savings) (Figure 55). Additionally, 19.7% (28 households) took loans to cover the expenses, while 2.1% (3 households) received donations or assistance, and 2.8% (4 households) financed from other sources. Among the 28 households that obtained loans for insulation, 20 households received loans from commercial banks, 4 households received loans from non-bank financial institutions, and 4 households secured loans from individuals.

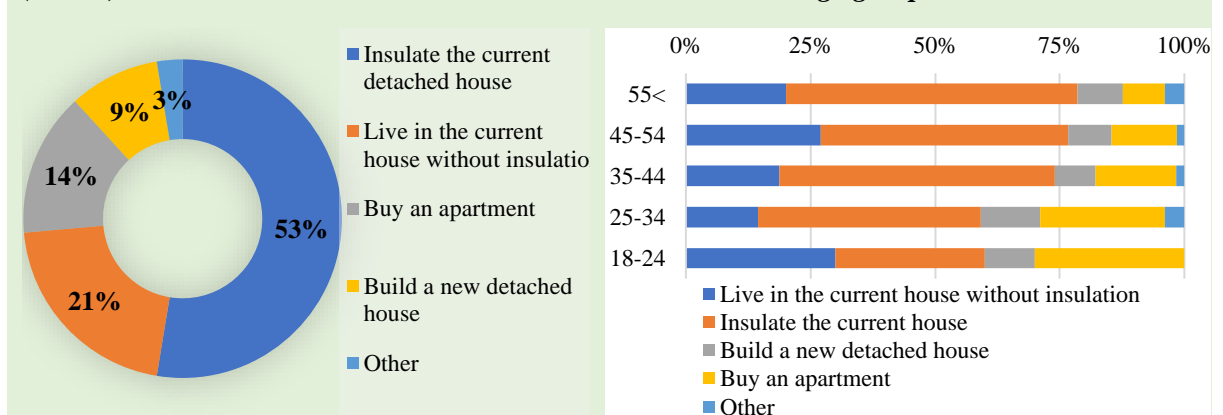
### Households' housing plan

When examining the housing plans of households surveyed in the near future, 53% (263 households) expressed their plan to insulate their houses, 14% (70 households) planned to move into an apartment, and 9% (45 households) intended to construct a new detached house. While 21% (105 households) of the respondents stated that they currently live in an apartment without insulation, indicating a need for insulation improvements in their dwelling (Figure 56).

Analyzing the age group of the household head, a notable trend emerges. The younger the age of the head of the household, the higher the likelihood of planning to move into an apartment (Figure 57). On the other hand, older heads of households are more inclined to remain in their current apartments and prioritize insulation measures. This suggests a generational difference in housing preferences. Indeed, the higher inclination of younger individuals to plan for moving into an apartment could be attributed to factors such as eligibility for mortgage loans with longer repayment periods.

**Figure 56. Housing plan for the next 2 years (n=500)**

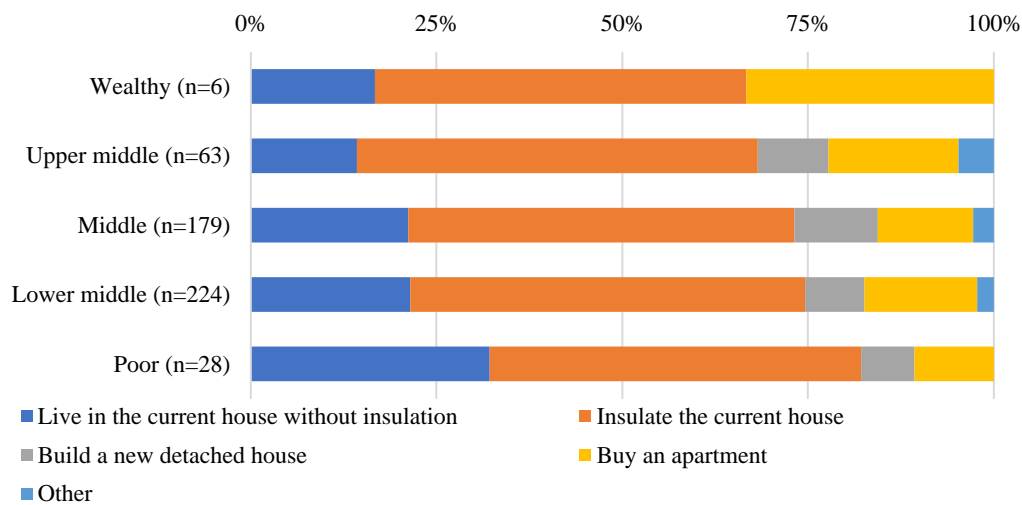
**Figure 57. Housing plan for the next 2 years, by household head age group**



From the figure below, the housing plans and insulation decisions of households are often influenced by their income levels. By income group, the higher the income level, the higher the percentage of households planning to move to an apartment. Higher-income households are more likely to consider purchasing and moving into higher-quality apartments. On the other hand, lower-income households

face financial constraints that limit their ability to make significant changes to their housing situation. These households are planning to live in the current detached house without insulation or renovations.

**Figure 58. Housing plan for the next 2 years, by income group**



Based on the figure presented above and considering the demographic and social indicators of the target group, it becomes evident that relatively young households with the financial capacity to meet the requirements for bank loans are either already moved to apartments or have intentions to do so. This trend can be attributed to the influence of mortgage loan programs and redevelopment program. These initiatives have facilitated access to financing options for younger households rather than older households.

### **Demand for Housing Green Loan**

We assessed the demand for Green Loan for housing based on three criteria:

1. Intention to insulate current detached house or construct energy-efficient houses,
2. Household's financial capability, and
3. Tax-secured income.

We evaluated the financial capability of households by assessing two factors: (i) positive financial margin and (ii) debt-to-income ratio of less than 60%. Positive financial margin refers to households having a surplus of income over expenses, indicating their ability to meet loan repayment obligations. Those criteria aimed to identify households that prioritize energy efficiency, possess the financial capacity to meet loan obligations, and have a stable and reliable income source.

The insulation loan demand analysis, based on the aforementioned criteria, is presented in the following table. Out of the 500 households surveyed, 263 households expressed interest in insulating their detached houses. Among these, 110 households (41.8%) indicated their interest in taking a loan for insulation. Out of these 110 households, 45 households (9% of all households) were found to have the necessary financial capacity, with a debt-to-income ratio below 60% and no probability of default. Furthermore, 22 households (48.9% of households with financial capacity and credit needs) had at least one member with a tax-secured income or continuous social insurance contributions in the last 12 months. In short, out of the total surveyed households, 22 households (4.4%) able to request green loans for insulation.

**Table 21. Green loan demand analysis: Insulation**

	Primer source of household income				Total
	Salary	Business	Pension & welfare	Other	
Total number of households	347	62	70	21	500
Planning to build a new detached house	178 (51.3%)	38 (47.1%)	38 (54.3%)	9 (42.9%)	263 (52.6%)
Willing to finance by loan	82 (23.6%)	15 (24.2%)	10 (14.3%)	3 (14.3%)	110 (22.0%)
No default risk	61 (17.6%)	12 (19.4%)	4 (5.7%)	2 (9.5%)	79 (15.8%)
Debt/income ratio < 60%	37 (10.7%)	8 (12.9%)	0 (0.0%)	0 (0.0%)	45 (9.0%)
Income secured by Social Insurance Premium	21 (6.1%)	1 (1.6%)	0 (0.0%)	-	22 (4.4%)

Table 22 presents the findings of the demand analysis conducted for energy-efficient green loans. Out of the total 500 households surveyed, 24 households (4.8%) expressed interest in obtaining a loan for a new detached house. Among these households, 17 were identified as having no risk of default, accounting for 71% of those interested in borrowing for new detached houses, and representing 4.3% of all surveyed households. Furthermore, there were 11 households with a debt-to-income ratio below 60%, constituting 2.2% of all households surveyed and 45.8% of households interested in borrowing. However, only 6 households had official tax-guaranteed income, equivalent to 25% of households interested in borrowing. This represents 1.2% of all households surveyed.

**Table 22. Green loan demand analysis: Energy-efficient housing**

	Primer source of household income				Total
	Salary	Business	Pension & welfare	Other	
Total number of households	347	62	70	21	500
Planning to build a new detached house	38 (11.0%)	2 (3.0%)	3 (4.3%)	3 (42.9%)	46 (14.3%)
Willing to finance by loan	21 (6.1%)	1 (1.6%)	1 (1.4%)	1 (4.8%)	24 (4.8%)
No default risk	15 (4.3%)	1 (1.6%)	0 (0.0%)	1 (4.8%)	17 (4.3%)
Debt/income ratio < 60%	9 (2.6%)	1 (1.6%)	0 (0.0%)	1 (4.8%)	11 (2.2%)
Income secured by Social Insurance Premium	6 (1.7%)	0 (0.0%)	-	0 (0.0%)	6 (1.2%)

Based on the demand analysis presented in the two tables above, it can be observed that households with business income encounter difficulties in accessing loans due to the absence of tax-guaranteed

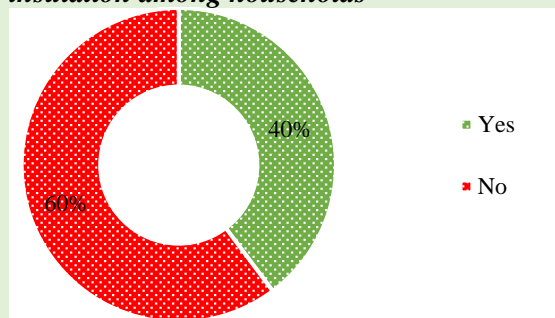
income, despite having financial capacity. Pensioner households, on the other hand, may have a formal income but face challenges due to their financial incapability and lower income adequacy. Salaried households, although relatively financially capable compared to other groups, have high debt-to-income ratios or have already obtained loans for other purposes, which affects their eligibility for additional loans.

Among the total of 28 households in demand for housing green loans, when asked about their readiness to make upfront payments, 13 households indicated that they currently do not have available cash. Meanwhile, 13 households expressed their willingness to make upfront payments ranging from MNT 700 thousand to 4 million for insulation loans, and 2 households intending to acquire energy-efficient housing loans stated their readiness to pay MNT 6 million and 30 million respectively. Among the households in demand for insulation loans, 22 households reported being able to make an average monthly payment of MNT 418,000, while the 6 households seeking energy-efficient housing loans indicated an average monthly payment capability of MNT 600,000.

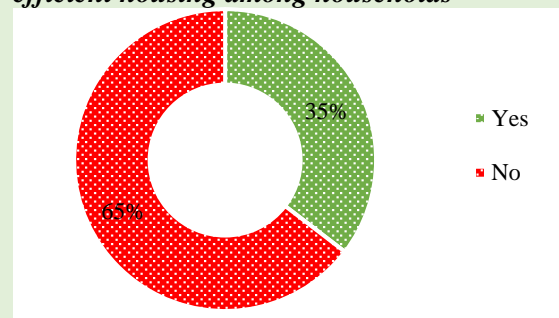
### Awareness of Green Loan for Housing among households

In this subsection, we reported survey results on the awareness and perceptions of surveyed households regarding housing green loans. It was found that 40% of all households surveyed reported having heard or being aware of green loans for insulation, while 35% of households were aware of green loan for energy-efficient housing.

**Figure 59. Awareness of green loan for insulation among households**



**Figure 60. Awareness of green loan for energy-efficient housing among households**

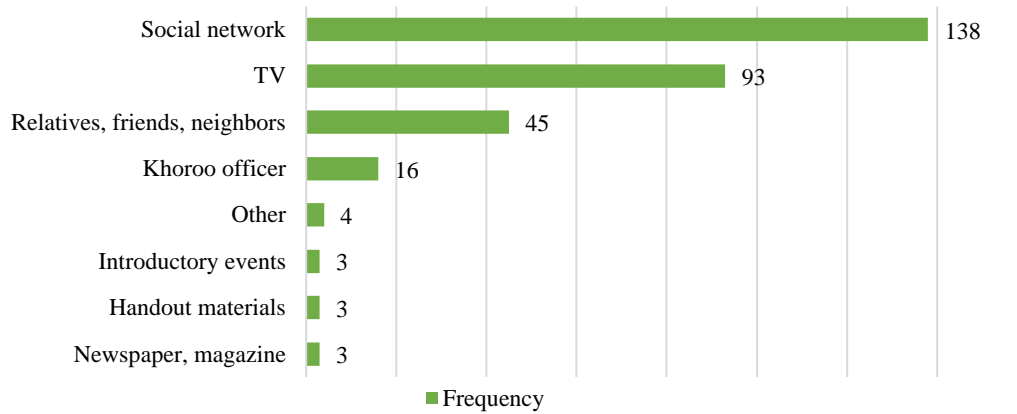


When examining the sources of information about green loans, it was found that the majority of households obtained information through social networks, particularly platforms like Facebook. Additionally, 93 households reported receiving information from television, while 45 households reported sources such as relatives, friends, and neighbors. While a smaller number of households, specifically 16, obtained information directly from khoroo staff (Figure 61).

During the survey, only one household was identified as having received a green loan. However, it should be noted that this household obtained the green loan from the State Bank specifically for their greenhouses, not for insulation purposes. According to the perception of the household, green loans offer several advantages, including low interest rates, favorable terms, and manageable repayment conditions. However, it was highlighted that the opportunities for accessing these loans are limited. The interviewee suggests that due to the limited number of loans available, those households who can access information about the loans early on tend to be the ones who can benefit from these advantages.

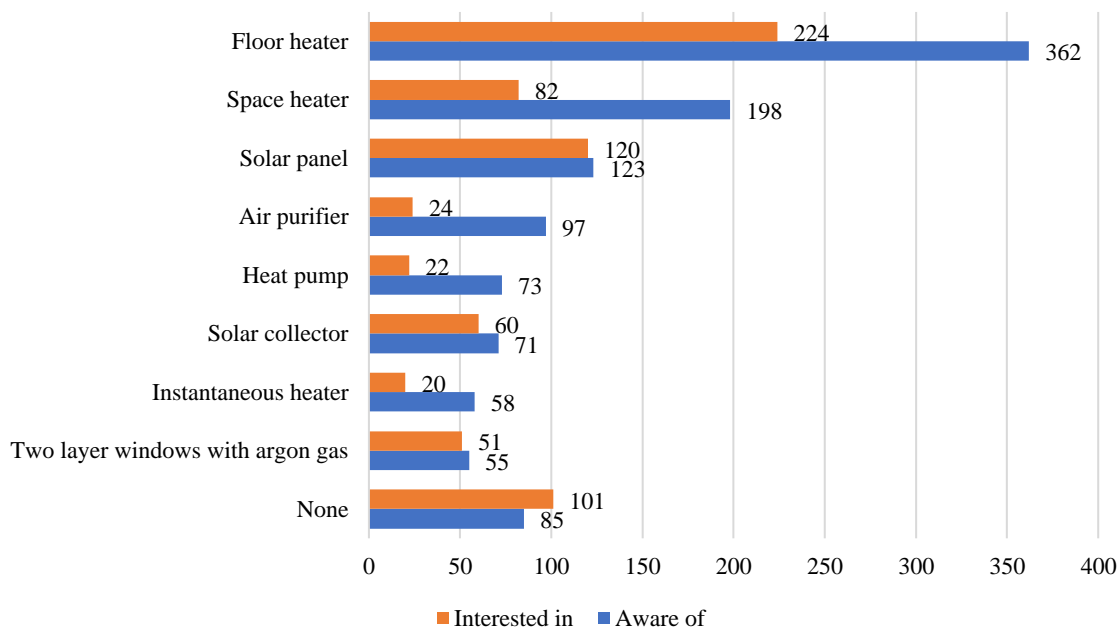
When assessing the level of interest among households in obtaining insulation green loans and energy-efficient housing loans, it was found that 44.8% of the households expressed a greater interest in taking insulation green loans, while 50.6% reported interest in energy-efficient housing loans. Among these interested households, the primary factors they considered when seeking a green loan were the lower interest rates, flexible loan terms, and the absence of collateral requirements. These factors were deemed the most crucial in their decision-making process regarding the acquisition of green loans.

**Figure 61. Sources of Information on Green Loan**



In terms of citizens' knowledge about energy-efficient technologies, the findings indicate that the most widely recognized solutions are floor and other types of space heaters, as depicted in Figure 62. Additionally, the survey results suggest that households exhibit a preference for implementing solutions that they are more familiar with. Another factor of the preference for familiar solutions may be availability of those energy-efficient products.

**Figure 62. Households' awareness of energy-efficient technology solutions for detached houses**



In general, the information about green loans is spread moderately among surveyed households. It appears that households generally prioritize the financial benefits and incentives associated with green loans, such as discounted loan options. However, there seems to be limited awareness or understanding among households regarding the broader environmental benefits and importance of reducing ecological and air pollution through qualified and professional insulation. This lack of awareness may be attributed to a lack of information dissemination on the ecological and health aspects of energy-efficient solutions.

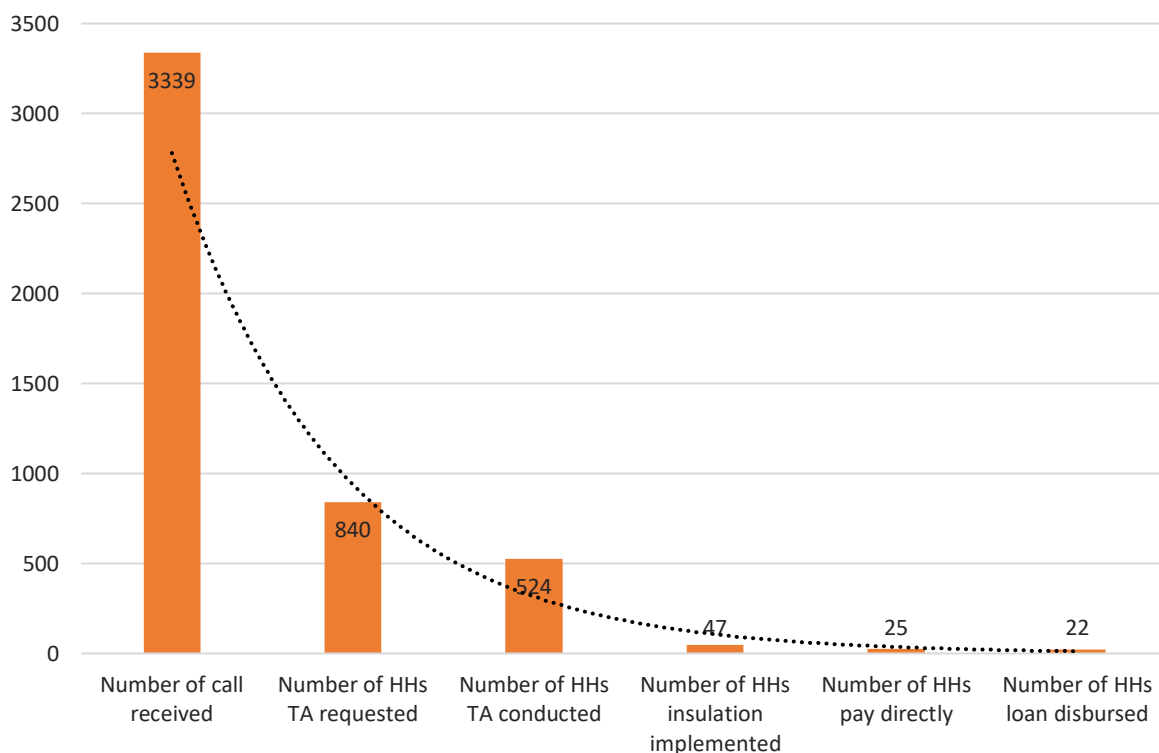
## 4.2. Challenges in the supply chain

The ADBI Working paper series on “Energy efficiency finance programs: Best Practices to leverage green finance” set out a framework for EE finance programs, to help in the assessment of individual existing schemes and act as a guide to the necessary elements to include when designing such programs. The purpose of the Green Loan Market Demand Study is not to assess the effectiveness of the SOAP-II project green loan scheme, but rather to identify internal or external challenges that the market players face to implement the scheme and whether new financial products need to be developed should there be any unaddressed financial challenges. Therefore, although not to assess but for a holistic overview of the issues the supply chain faces, the following framework questions and were used as guidance for this report.

1. What is the target market?
2. Are there drivers for action?
3. Is there a supply chain?
4. What are the barriers across the supply chain?
5. What solutions can address the barriers?

Based on the summary of year 1 results of the SOAP-II project (Figure 62), we see that 75% of the households who received information from the call center don’t proceed to technical assessments, and of the 25% that proceeded to households, 38% of the households couldn’t receive technical assessments by the brigade due to their unavailability and was cancelled. Approximately 9% of the households who had the TA conducted end up having insulation done by brigades, which consist of 4.8% of households insulated by their own funding, and 4.2% by FI loans respectively. In other words, when it comes to insulation implementation, 91% of the households who had the TA conducted are lost.

**Figure 62. Summary of Year 1 of SOAP-II**



*Source: Annual marketing report of SOAP II*



In order to identify challenges to issuing a green loan, the market drivers and supply chain stakeholder challenges were determined.

### **Drivers for action in the EE financing market**

After defining the target market, our approach was to identify the drivers, or the counterproductive drivers for action in the EE financing market. The ADBI framework noted that it's imperative to analyze whether the existing market and policy drivers undermine or support the business case for EE in the target market and the goals of a finance program. If such actions that weaken the case for EE persist and concerted efforts cannot mitigate such counterproductive drivers, creating a sustainable market will prove to be problematic and the program might rather focus on narrowly targeting emission reductions for a fixed period (Retallack et al, 2018).

Therefore, based on the desk review of existing policy measures and projects, and stakeholder interviews, the following policy and regulation are identified as drivers and counterproductive drivers to operating the ger district housing insulation and its green loan mechanism according to the market principle.

#### *Market drivers*

1. **MET subsidized green loans:** Starting from 2019, the MET started issuing green loan interest rate subsidies, alleviating the debt burden for households and businesses. This program reduced the interest rate of green loans from 12-24% (depending on the FI) to 3% for households, and 12-18% to 8% for businesses (Annex).
2. **Banks' green loan incentives:** Banks have provided their own incentives for green loans, such as decreasing loan fees and removing certain requirements.
3. **NBFIs' green loan incentives:** Through support from Geres, 50% of paid interest rate cashback options are available for loans below five million MNT.
4. **Discounted insulation materials:** The project suppliers lowered their prices by 20% on average.

#### *Counterproductive market drivers*

1. **Subsidized energy:** The production of improved coal is subsidized, and during COVID, it was given to households at a 50-75<sup>7</sup> percent discounted rate. The energy tariff is also subsidized at night by 100<sup>8</sup> percent for ger district residents, which support the usage of electric heaters. However, obtaining subsidized heating prevents households' incentive to reduce heat loss and insulate their houses.
2. **Subsidized or free insulation programs:** The World Bank UB Clean Air Project-2 provided households insulation materials with 80% discount whereas some khoros in Songinokhairkhan and Bayanzurkh districts received free insulation from the state budget, nearing election season. Such measures distort the market, setting unrealistic expectations, and urging people to wait until election, in case they get free insulation.
3. **Lack of regulation in ger district houses:** No legislation, including the Law on Construction, regulates housing in the ger district. Drawing for the houses are not required and quality assurance is not conducted, but they can still obtain a real estate certificate. Such unregulated houses are built cheaply with poor quality (93% needs insulation), have high maintenance costs, are more prone to deterioration due to fire, flood, and mold risks, and create more air and soil pollution. The fact that ger district houses are unregulated, also discourages the issuance of EE housing mortgages as it's much cheaper and easier to build a substandard house, without any regulatory consequences.

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<sup>7</sup> Municipality of Ulaanbaatar, [www.ulaanbaatar.mn](http://www.ulaanbaatar.mn), Sep 2022. “Нийслэлийн зүгээс сайжруулсан шахмал түлшний агуулах, тээвэрлэлт, борлуулалтын цэгийг хариуцаж байна”

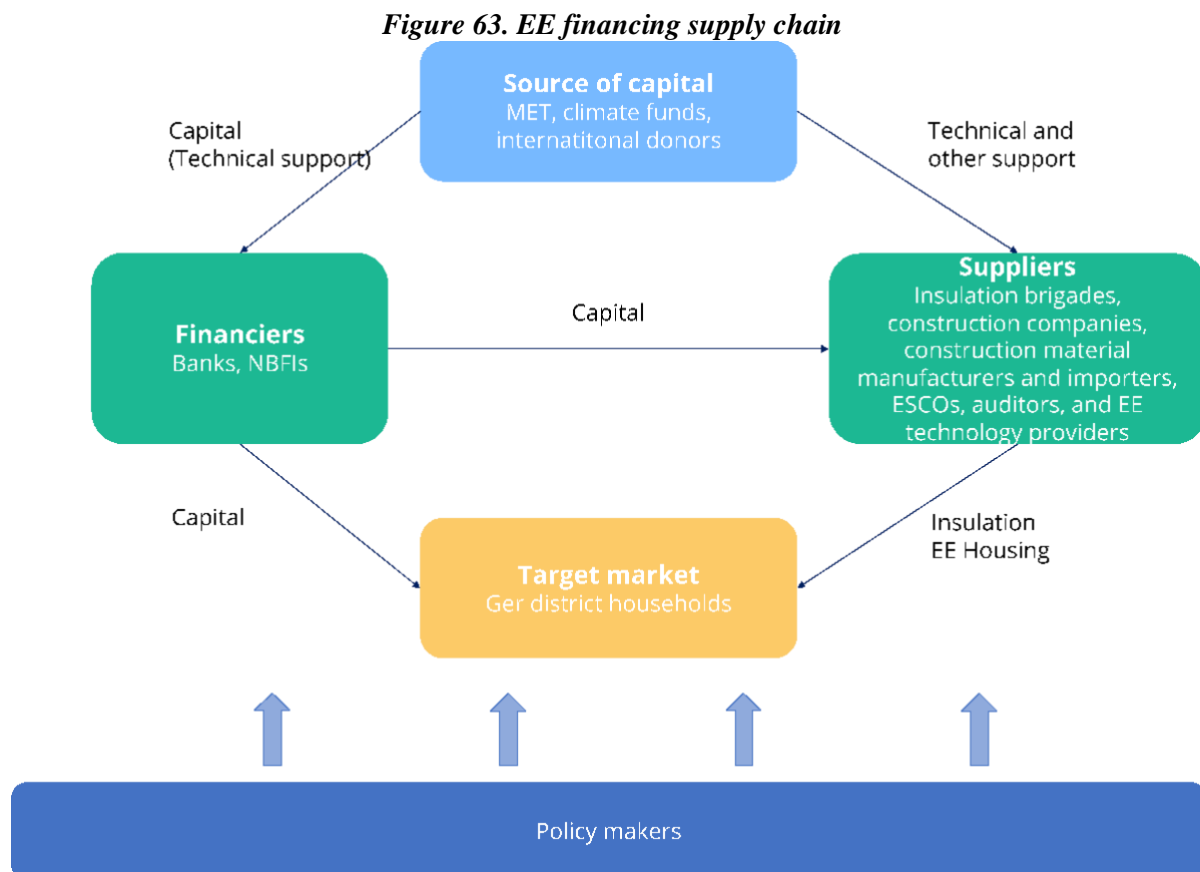
<sup>8</sup> The Government of Mongolia, Order #199, 2017.



4. **“Canadian” houses are not issued a “real estate certificate”:** Although there’s no written regulation, construction companies noted that houses built using “Canadian” wooden technology is considered lightweight, EE, and affordable, but the State Registration Authority considers such technology houses a movable property and therefore doesn’t issue real estate certificates. Some companies note that they have gotten real estate certificate, but only on a case by case basis.
5. **Lack of incentives for official labor:** The product itself needs to be affordable as it’s targeted towards low-income households who are extremely sensitive to price modalities. Although it’s important to officialize the labor, doing so will increase the product prices. A strong market incentive is required to convert informal market participants to become entities and access formal financing options.

### Supply chain of financing energy efficiency in detached houses

Based on the SOAP I, II projects and Energy efficient housing pilot program, the energy efficiency financing supply chain for detached houses were mapped in a broader sense and later, in a more in-depth way to display the challenges. As described in Figure 63, we identified four types of supply chain players and to each of them, give an overview as well as statements presented during the FGDs and interviews.



### Commercial banks

Currently, 5 commercial banks provide green loans specifically for the construction of EE in detached housing and 2 provide green loans for detached housing insulation, all personal green loans with a requirement of achieving minimum EE of 20% verified by an energy auditor (Detailed table in Annex). They are 3% p.a. loans up to 30 months in tenor, with a ceiling of 40-50 million MNT. The three interviewed banks noted that having a common green taxonomy and requirements is important. Despite this common definition, as the sources of capital vary by each institution, two banks noted that as each investors’ requirements and the FIs’ own regulations and target markets differ, it’s not possible to

standardize green lending processes. Developing green credit products depend on the FI's experience of green lending, and one bank noted developing products within 1-2 months.

For the 3 providing insulation loans, two banks have loan products through brigades by the SOAP II project, one bank has insulation loan to be conducted by the lender themselves, and one bank has a loan for the purchase of insulation products. Compared to other loans, these green loans are made concessional through blended financing within the FIs and interest rate subsidies from the Ministry of Environment and Tourism. In addition, all banks have lifted their loan processing and transaction fees, and as collateral requirements are set by the bank, XacBank allows the collateral of a trusted third party rather than that of a co-lender, and State Bank is considering taking the house as collateral for duration of the insulation loan. A pension insulation loan was also newly introduced in the market by Khan Bank through the SOAP project.

The interviewed banks noted that despite the obvious need for EE loans, they're unable to create demand. Three banks believe the reason of low disbursement for insulation loans is the market's interest in conducting insulation themselves rather than through a brigade, with a large focus on pricing. Another aspect is public awareness. The interviewed banks believe that as insulation is a new type of product, awareness raising efforts are still crucial, where the benefits of insulation need to be communicated more. While the target market is not interested in paying the brigade's labor costs or unaware of such opportunities, banks also noted that these individuals are also unable to meet the Central Bank's regulatory requirements. Bank officers' rough estimate is that 1 or 2 in 10 who ask for a loan is eligible for such loan, mainly due to the target market's lack of awareness and inability to fulfill the debt-to-income ratio, validate their business income, or meet other regulator mandated requirements. As banks don't measure the number of individuals who visit a bank branch and have an oral examination checking their loan eligibility, and believe it will be extremely cumbersome to measure or report such number, this lack of data prevents the analysis of reasons behind low loan disbursement.

If the client fulfills all requirements, banks are able to approve the loan in 2 days on average. Among the few loans disbursed, banks haven't reported non-performing loans. According to one bank, the subsidized green loan interest rate affects the market immensely, so that consumers no longer respond to the market for other green loans at 8% or 12% p.a. Two banks have noted that, considering the policy green ambitions, we could lift some regulatory requirements such as loan tenor only for green loans that are measured and verified. Banks noted that so far, they've had no problem with the energy audits.

In terms of providing loans for other players in the supply chain, the carrying out of insulation work cannot be qualified as green loan but other options such as "micro business loans" are made available by the State Bank, with 19.2%-24% p.a. The interviewed banks noted that many construction material manufacturers and importers have already accessed their green business loans, with the requirement that their end products are considered "green".

### **Non-bank financial institutions**

At the time of the interview being conducted, one NBFI, namely Transcapital, was issuing green insulation loans through SOAP project. Transcapital and another NBFI that doesn't provide insulation loan were interviewed. For the SOAP-II project, Transcapital is providing 28.8% - 36% p.a. loans up to 24 months in tenor, with a ceiling of 200 million MNT, with a cashback of 30% of loan repayment up to 3 million MNT.

Transcapital has not raised any green capital but has had extensive experience issuing micromortgage loans for detached houses, with support from Triple Jump, an impact-focused investment manager operating in developing economies. The FI's loan officers (called "financial advisers") were trained to advise on the construction and insulation of detached houses through the previous micromortgage trainings, and therefore, are well suited to give the clients necessary knowledge and trust to conduct insulation through a brigade. They noted however, that due to the pricing of the brigades' work, it's sometimes hard to sell the insulation product with confidence, and suggested that a market price

evaluation be conducted. The NBFIs also believe the market's interested in carrying out the insulation by themselves for cost-saving purposes, and that despite the cashback incentive, people would rather get a consumer loan for insulation materials. Transcapital mentioned that it'd be easier if they could provide loans to individuals themselves with some guidance/advisory, but accepts the project's goals of developing MSMEs. Generally, they believe that there's a large demand in insulation loans.

The loans, considering all requirements are met, are approved within 8 hours. Their loan officers believe the loan process (until fund disbursement) is long, lasting 2 weeks to more than one month, which doesn't get count in their monthly sales quota. Although this is discouraging for the loan officers, the NBFIs has increased their sales commissions to promote issuance of insulation loans.

The two NBFIs noted their biggest challenge as having no access to interest rate subsidies by the Ministry of Environment and Tourism, and that there needs to be more resources to verify according to the green taxonomy, in order to develop new green loan products. More commitment and capacity building is required from the other NBFIs to dedicate resources to develop and issue green loan products, such that they can raise green sources of capital.

### **Construction material manufacturers and importers**

The four interviewed construction material manufacturers and importers noted the environmental footprint of their product as one of their selling points, and had obtained and adhered to all necessary voluntary and mandatory standards when manufacturing the products. The importer also made sure that the construction product was not harmful to human health and was eco-friendly. Three of the four had green business loans at commercial banks, and considered the loan rate concessional enough. Despite this, they weren't aware of the specific environmental metrics measured and its amount.

In relation to the SOAP II project, the manufacturers had provided on average 20% discount to their products. Despite this, the manufacturers noted that their individual consumers preferred buying the materials at a higher price and carrying out the insulation work themselves than have it done by brigades, as they deemed it more costly. They believe that the project is doing well to promote and market them, but the brigades cost pose a real challenge.

On the other hand, two manufacturers noted that they get requests from construction companies building EE housing neighborhoods to buy insulation products in bulk but face working capital challenges, and usually asks to barter for a house or with the promise of payment after initial orders are placed. The manufacturers suggested setting up bulk-buying options, such as a set of insulation related materials for 50 houses.

The interviewed parties noted some issues irrelevant to the issuance of insulation loans. The manufacturers association believed that there needed to be incentives for the building material manufacturers who had conformity licenses. They also believed other tax incentives would be beneficial to manufacturers, as many construction materials are allegedly unaccounted for and untaxed at customs. The interviewed importer didn't note any issue with customs but rather, that they had difficulty with other state agencies such as the General Authority for Specialized Inspection (recently dissolved) and the National Emergency Management Agency for their allegedly antiquated technology in giving fire ratings. Although it doesn't affect the project, two manufacturers noted that human resources were pressing barriers to increasing their supply.

### **Insulation brigades and construction companies**

The six interviewed insulation brigades believe the reasons why households don't get insulation is due to lack of awareness and financial capacity. One noted that households commonly believe it's only through green loan that they can get insulated, but they know that they can't satisfy the loan requirements or they seem slow/not committed about getting the necessary materials for a loan; they also think the insulation price is too high.

Two brigades believed that those on pension are not provided enough information, as they're the most affected at home, they're usually the ones initiating conversations and affecting decisions about insulating their homes. According to the experience of three brigades, pensioners account for 40% of the total insulation technical assessment that they do. One noted that households are usually not aware of conducting roof insulation in the winter.

Brigades conduct the technical assessment between 50,000 – 80,000 MNT depending on the location. Three noted that they also receive many calls asking for insulation advice via a phone call. They're not interested in giving advice over a call because the households don't ask for a site visit technical assessment, but just disappears and ends up doing it themselves. People are not very responsive to their comments about the benefits of insulation, economic or environmental, they said.

Four brigades preferred doing insulation when the household paid themselves, as they believed bank processes elongated the process. One also noted that it's risky if they undertake more than 3 green loan clients, in which case they'd require 15-30 million MNT upfront costs depending on the type of insulation.

All said they did insulation out of "good will" and that in the low-season or months that they're not already occupied by other professional work, they use insulation work to maintain their workers. But the low-seasons coincide with the halt in insulation loan subsidy from the MET.

The two interviewed energy auditors who are authorized by the ERC didn't report any problems when conducting audits, and that financially or operationally, there are no issues. One noted that for EE housing construction, only energy audits were conducted for the drawing, rather than the full building assessment. This proved problematic on-site, when the engineers used sub-standard materials and didn't follow specific construction practices. She noted that she had to overstretch herself and do more than just energy audits.

The three interviewed companies which built EE houses believed that the idea of EE houses were being ruined by poor market players and that individuals were getting the wrong idea. One also believed that energy auditors were too biased, and undervalued the EE they had achieved, even when their house used no electric heaters during the winter. Another mentioned that they weren't able to access financing because the factory building that they had built for more than 1 billion MNT was valued at less than 200 million MNT, making it impossible to use as collateral for working capital loans.

## **Households**

Out of the 5 interviewed who got insulation loans, and 2 who insulated with own financing, said they would, or are already recommending the insulation product to others. Six out of 7 said the insulation work was carried out on time, and one said it was delayed by almost one month. She attributed the delay to only 1 engineer carrying out the work, with the brigade leader reportedly scolding the engineer over the phone but not coming at the site. She stressed that the brigade lacked work ethic, had communication issues, and it took 3 weeks longer than promised, but she was impressed by the insulation work, noting that their electricity costs went down by 60% - 70% and much more comfortable. She said she would recommend people to have it done, just that they need to monitor the brigade work.

Four out of 5 said obtaining a green loan was super easy, while the remaining one struggled to obtain the land permits for 2 weeks as loan collateral. All noted the low interest rate as a deciding factor and one of the biggest advantages of this product. If interest rates were higher, two said they would've rather done it themselves or hired a freelancer, two said they would've delayed the insulation by another year as they had an existing loan, and one said that the insulation was so high priced that they wouldn't consider paying it themselves or through a non-green loan.

When asked for potential improvements, the households noted that more public awareness efforts need to happen, loan requirements needed to be eased, and two said more material options (siding and roof) needed to be provided/discussed by the brigade.

Out of the 5 interviewed households who got mortgages for EE housing, four were satisfied with their housing, with low/no need for heating costs and increased comfort. Everyone noted the immense support that the down payment subsidy offered them, with three saying they wouldn't have bought a house because they had no chance of saving for the down payments of the house. Three noted that they had no comments about the loan, as they had already expected mortgages to be a time-consuming process, and also noted that they were able to refinance the loan to the 6% p.a. mortgage program. Three were satisfied with the energy audit and the bank monitoring process, while 2 thought the audit process could've been better, especially with more supervision from banks. Overall, all 5 communicated they were satisfied with the economic and health benefits, as well as smell and other comforts.

### Challenges in the supply chain

We identified four types of supply chain players (Figure 63), and within that, six categories of stakeholders in the supply chain as outlined in the methodology: (i) financial institutions, (ii) insulation brigades, (iii) insulation product manufacturers and importers, (iv) households who insulated their house through SOAP project, (v) energy auditors, and (vi) policy makers, regulatory bodies, and other relevant parties. In addition to public awareness and counterproductive market drivers elaborated before, the thematic analysis identified three dimensions of challenges for the supply chain stakeholders, listed by order of magnitude:

1. Financial constraints
2. Human resource & Capacity constraints
3. Operational issues

#### Financial constraints

Out of the six types of stakeholders interviewed, all except energy auditors and material manufacturers reported facing some form of financial constraints, outlined below. Energy auditors had other main sources of income and conducting the few audits caused no problem, while the insulation material manufacturers and importers already had satisfied their funding needs by accessing green business loans and considered the interest rate concessional enough.

#### *Stakeholder: Target market*

According to the interviews with households who have financed their insulation through a green loan, all reported that the process was easy and smooth. However, for households who couldn't finance through loans, three households reported the following challenges:

1. **High loan requirements (for insulation):** Three households weren't able to validate their income, despite having enough income. They were individual business owners. One household noted that they had the "Simple solution" done, and wanted a green loan but the land permit was not on their name and asked whether it could be alleviated.
2. **Perceived high price of insulation:** One manufacturer mentioned that they urged their buyers to consider having insulation done by the SOAP project, as they had announced a 35% price discount only for this project. However, the buyers said they considered the insulation labor cost too high and bought the materials at full price from them. One household noted that they didn't have the insulation done in their summer home because the labor cost was considered too high. They had bought the materials and couldn't find the time to put them up, and according to that individual, "25,000 MNT per sq.m for just putting up materials, however detailed, seemed too expensive so I did it myself".
3. **High loan requirements (for housing):** One household noted that because the EE housing pilot program was implemented during COVID, they were laid-off and changed their job. This didn't satisfy the stable income requirements for the mortgage program.

### *Stakeholder: Financiers*

1. **Half-year delay in interest subsidies:** The Ministry of Environment and Tourism provides interest subsidies for green loans, which is a real support for citizens and financial institutions. However, due to regulations, the program has to reset every year, meaning that the provided sources of capital are sent back to the state budget, and the accounts and contracts have to be evaluated and renewed every year between the Ministry and banks. According to three banks, this process takes 6 to 8 months, which means households wait to get subsidized insulation loans only in the remaining 4 to 6 months of the year. This, in turn, reduces the already short window of time available for conducting insulation, compressing the work of brigades into a shorter time frame.
2. **Limitations to EE housing interest subsidies:** The subsidies also apply to EE housing, but only for loans below 50 million MNT. This requires that the buyer has most of the advance payment accumulated, as average housing loans are worth 100 million MNT according to banks.
3. **Non-bank financial institutions are excluded from government interest subsidy program:** The MET interest subsidy is not available to non-banking financial institutions, however financially capable and responsible. Since the target market for insulation loans are people who cannot meet the high requirements of the bank, they take loans from NBFIs at 36% p.a. interest rates (as opposed to 3% p.a. for banks), which in turn increases clients' debt burden.
4. **NBFIs lack green sources of capital to issue green loans:** For NBFIs that did not participate in the project, they haven't raised green capital/project financing, and lack the product development capacity to participate in green loans possible to increase the number of NBFIs that will provide insulation loans.

### *Stakeholder: Technical suppliers*

1. **Limited access to formal financial instruments:** Two brigades noted and four agreed, that although they have entities incorporated, they officially registered the income depending on the context. They noted that when some insulation work costs above 20 million MNT without taxes, they believed that additional taxes such as VAT, CIT, and social insurance of their workers, would drive up the total insulation cost to approximately 30 million MNT. They believe households are not in a financial situation to pay for tax added services. Their workers also asked them to not pay their social insurance, to have more cash on hand. Such cases further exacerbate the informal nature of the insulation work, limiting both brigades and individuals from being able to access formal financial services, such as a working capital loan.
2. **Suppliers' financial capacity:** For a brigade conducting insulation for households who got a green loan, by design, they shall cover all but construction material expenses from their own finances until the work's approved by the bank. One brigade noted that for instance, once five green loan orders came in at once, it required upfront capital of 15-30 million MNT (this amount ranges depending on the types of insulation orders). This delays the insulation work in some cases, as they don't have the financial capacity or management to cover such expenses. When asked if they can provide private leasing options to clients, they noted that they at least need a financial reserve of 100 million MNT, that can revolve and they're unable to accumulate such amount. One construction company asked the materials company to sell their products in bundle, at a neighborhood scale.
3. **Lack of perceived business case for MSMEs:** The interview revealed that brigades didn't consider insulation as a viable business option, but that they did it out of "good will". The pricing for insulation has a low profit margin, as the works are done separately, over a wide geographical area, in a sporadic, on-demand basis. In other words, there isn't certainty or predictability of demand, or the prospect of economies of scale.
4. **Capital valuation:** One construction SME noted that they couldn't access green working capital loan, despite having built a factory that they spent more than 1 billion MNT establishing, banks

valued the factory building for less than 200 million MNT and didn't value their factory equipment.

### **Case: EE supply-chain financing products for businesses in addition to households**

The cooperating green loan preparation supplier submitted formal and informal loan requests aimed at increasing the supply of green loan products of the State Bank. For example, loan requests from Hybrid House LLC and Sakura Properties LLC and similar suppliers tend to increase.

In line with this, a pilot project was implemented to finance the supply chain by providing business loans to suppliers of green loans and supporting the sale of products increased with loan financing through EE loans, and other loan products with interest support, and then to increase the portfolio of green loan products. Based on the results, proposals were made to increase the range of Green Loan products.

### **Human resource and capacity issues**

The following human resource issues were identified for the brigades and insulation material manufacturers, although the issues aren't directly affecting the issuance of green insulation loans. Such human resources and capacity constraints will be alleviated according to the market principle, but sufficient training needs to be available when the project scales to fulfill the 1,000 green loan target by 2026.

#### *Stakeholder: Technical suppliers*

**Lack of skilled workforce:** Within the supply chain, insulation brigades and construction material manufacturers face the most human resource related challenges. Out of the 15 interviewed, 2 construction material manufacturers, 5 brigades, and 3 construction companies (10) reported that they face challenges finding and maintaining labor force. Two construction material manufacturers noted that they were unable to work at full technical capacity because they had trouble hiring skilled workers to work at the factory. BEEC noted that the level of brigades being trained vary greatly, which ultimately reflects the quality of the insulation.

**Employee retention:** Five insulation brigades noted that it's hard to maintain trained workers, due to lack of consistent income and predictable demand for insulation, as well as other competing high paying, low-skill labor options that become available during insulation season, such as coal truck drivers. The brigades also noted some cases where the hired workers leave the city to work or travel in the countryside, and if they can't find other people to work for them, their operations become idle in those months. MNCA notes that some brigades are also unable to retain talent due to lack of leadership and management skills.

For three construction medium-sized companies, retaining talent is hard, despite having invested a lot in training. Their workers were mediated to work in Korea last year through the Ministry of Labor and Social Protection.

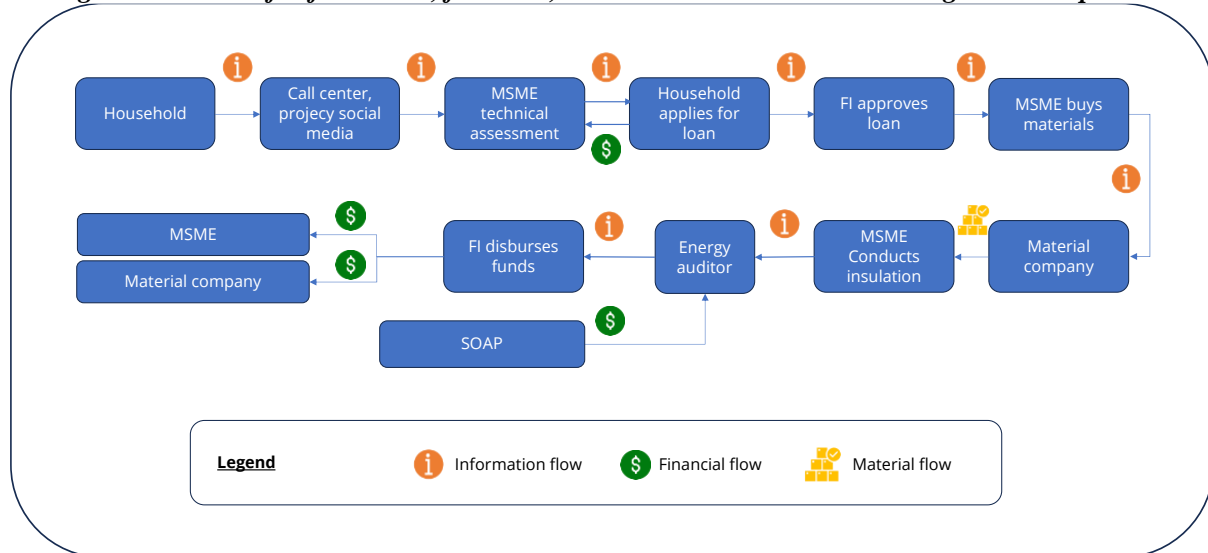
**Sales and communication capacity:** In some cases, this high turnover creates miscommunication between the client and the brigade. The message perceived by two clients was that the brigade consisted of 3-5 people, who would all participate in the insulation process while in reality, only two showed up.

### **Operational issues**



The information, finances, and material flow in the supply chain was mapped (Figure 65). The map was elaborated into a detailed process table, which describes all issues revealed during the interview, however uncommon (commonality is not able to be measured with the information provided or gathered). Most operational issues were identified for the brigades by both the brigades and households, while other stakeholders, such as banks, auditors, and material companies, didn't report operational issues. The challenges show that despite its unlikelihood, the biggest operational issue lies in business communication between the MSME and the client.

**Figure 64. Flow of information, finances, and materials in the insulation green loan process**



*Stakeholder: Technical suppliers*

**Division of labor:** According to three households who got insulation loans in 2022, the insulation brigades left mid-insulation activity to go conduct a technical assessment on different households, losing 2-3 days in total. Brigade heads have the responsibility to conduct the technical assessment (in other words, generate leads) and also lead the insulation work, which creates conflicting priorities and responsibilities for one person. Two brigades suggested that it would be ideal to train somebody for sales and lead generation, separately from training to conduct insulation.

**Communication issues:** Depending on the communication skills of the brigade leader, four households reported differences in expectations during and after the insulation work. In addition to such expectation difference, one client noted that the brigades expected the household to cook for them, which they considered inappropriate and mismanaged. One household who had a technical assessment conducted in 2020, noted that the insulation brigade told them they will contact them back with the offer but didn't, and that they were contacted a year later by a different brigade, and the price had increased. From a client in 2021, they had the understanding from the brigade, that the project only conducted half insulation and had gotten the loan on the half insulation. They suggested that the project should start doing full insulations, which indicates that the brigade, instead of forwarding it to another capable brigade, they spread misinformation.

**Quality of insulation or EE house construction:** Among the interviewed households, four insulated households and three who had built EE housing expressed challenges in the quality of the technical work, such as roof leaks and mold formation. The four insulated households reported that they communicated it to the project, and the insulation brigades have promised to fix such errors. Despite the promise of fixes, the households still expressed disdain and the consultant concluded that this posed a small risk of negative information spreading about insulation quality in the market.



**Table 23. Process map, with step-by-step challenges**

#	Process activity	Stakeholder	Challenges
1	Disseminate project information via various channels	Geres	Despite social media, TV, radio, messaging, and even physical outreach activities, according to the quantitative survey, 40% of the surveyed indicated knowledge about insulation green loan.
2	Household contacts SOAP project via FB/Call center	Household	N/A
3	MNCA connects the MSMEs with the household to conduct technical assessment	MSME, MNCA	Sometimes, the brigade doesn't contact back for a few days and the client has to follow-up.
4	During the cold months, if the MSME doesn't own a thermal camera, they register and get the camera from MNCA	MSME, MNCA	Two brigades said they queued for a thermal camera last year, given the few cold months that the camera can be used, and clients were delayed a technical assessment.
5	The MSME gets the thermal camera and schedules a time with the household	MSME, Household	Weather is a limiting factor in the timing and usage of the thermal camera.
6	The MSME will assess the heat loss and determine areas of heat loss, and a cost estimation of the insulation.	MSME	<ul style="list-style-type: none"> <li>Depending on the location, the assessment costs 20,000-80,000 MNT.</li> <li>The cost of insulation is higher than expected.</li> <li>Once households know where to insulate and how much it will cost, there's a common understanding that the household prefers to do it themselves or deem professional insulation unnecessary. Two who had technical assessments decided to do it themselves.</li> </ul>
7	Household will contact MSME to have insulation done.	Household, MSME	<ul style="list-style-type: none"> <li>One case reported that the brigades mismanaged their time, so declined, and it took a long time (7 months during COVID lockdown) to be connected to another brigade.</li> <li>Another case mentioned that the brigade couldn't conduct a comprehensive insulation, but communicated to the client that the project doesn't conduct such insulation, which potentially prevented a higher amount of insulation loan sales.</li> </ul>
8	MSMEs introduce financing options for the household.	MSME	N/A
9	Household chooses financing option.	Household	N/A
10	Household contacts FIs, and if they don't satisfy bank requirements, they'll either choose to fund it themselves or not have it done.	Household, FI	
11	If they satisfy the loan requirements, the household will undergo due diligence and have the loan approved.	Household, FI	The biggest challenge to satisfying the loan requirements is income validation, debt-to-income ratio, and collateral.
12	The brigade will obtain the insulation material from the manufacturers in advance (without payment), and pay upfront for other auxiliary materials and labor costs.	Brigade, insulation material company	<ul style="list-style-type: none"> <li>FIs can't measure/consider green financial options to conduct labor for green products, such as for the carrying out of insulation work.</li> <li>When the insulation is done through a loan, the brigade has to cover all upfront</li> </ul>

#	Process activity	Stakeholder	Challenges
			costs which the brigades reported that it causes financial strain in some cases.
13	Insulation will be conducted	MSME	<ul style="list-style-type: none"> <li>• The brigade delayed the insulation work, to conduct technical assessment elsewhere.</li> <li>• Communication related issues were reported by two households, such as leaving the dirt and rubble for the household to clean, and requiring the household to cook for them.</li> </ul>
14	In the case of a loan, the FI will transfer remaining funding to the material providers and MSMEs.	FI, MSME	If insulation related issues arise, the brigades will use their own funding to fix the issue.

## 5. Conclusions

The first objective of the study was to evaluate the demand for green loans specifically intended for insulation and energy-efficient houses within the ger areas of UB city. Secondly, we aimed to investigate the operational, financial, and other challenges encountered by stakeholders involved in the value chain of detached house insulation, energy-efficient houses, and green loans. To accomplish these objectives, we employed a mixed-methods research approach, combining quantitative and qualitative methods. The quantitative research phase focused on gathering numerical data to determine the extent of the demand for green loans among the households surveyed. To complement the quantitative findings and gain deeper insights into the challenges faced by stakeholders engaged in the supply chain of green buildings and green loans, we conducted focus groups and in-depth interviews.

The target group for insulation and energy-efficient green loans, which are not connected to the central heating system, exhibited distinct characteristics when compared to other household groups. Specifically, the households in this target group had a higher average age of the household head and a financial capability that was higher than the national average but lower than that of households living in apartments. Based on the demographic and socio-economic indicators of the target group, it becomes evident that relatively young households with the financial capacity to meet the requirements for bank loans are either already moved to apartments or have intentions to do so. This trend can be attributed to the influence of mortgage loan programs and redevelopment programs which have been implemented consistently over the past 15 years. These initiatives have facilitated access to financing options for younger households rather than older households.

Moreover, it is worth noting that certain groups within the target group of households display a high sensitivity to price shocks. Specifically, when the inflation rate rose by 5% to 10%, there was an observed increase of 3% to 6% in the default probability of these households or facing difficulties in covering their expenses with their current income. The findings indicate that the possibility of price increases in insulation services can have significant implications for reducing the demand for such services.

Most households within the target group resided in non-professionally constructed, self-built houses that exhibited high levels of heat loss. Notably, as the size of the house increases, the heat loss became more significant, leading to the adoption of heating solutions that consume significant amounts of improved briquette. Furthermore, larger houses tended to employ a combination of stove and electric heating, which resulted in higher heating costs. This observation suggests that households with relatively higher incomes and larger houses are benefiting from government incentives such as improved briquette and discounted night electricity tariffs. Furthermore, due to the higher costs associated with electric heating compared to conventional heating methods, households often exhibit reluctance to transition to electric heating solutions.

It was observed that households often insulate their houses without conducting heat loss measurements, leading to inefficient and inadequate insulation outcomes. Furthermore, construction brigades have highlighted the that these non-standard constructions of detached houses pose challenges in the insulation process, leading to increased costs and, in certain cases, making insulation impossible.

The survey findings indicate a significant demand for insulation and energy-efficient housing among the households surveyed. However, the actual demand for green loans was low due to the financial constraints of households. For instance, when assessing the demand for Green Loans based on three specific criteria – (i) the intention to insulate or construct energy-efficient house, (ii) the household's financial capability, and (iii) the presence of tax-secured income - only 4.4% of the total households surveyed met the requirements for green loans for insulation. This is in line with the current Geres report which shows that 4.2% of households who had TA conducted had insulated via a green loan. Moreover,

among households surveyed, only 1.2% (or 6 households) were in demand of green loan for energy-efficient housing.

When we investigate challenges faced by households in meeting banking requirements by primer source of income, the following findings were observed. Households with business income encounter difficulties in accessing loans due to the absence of tax-guaranteed income, despite having financial capacity. Pensioner households, on the other hand, may have a formal income but face challenges due to their financial incapability and lower income adequacy. Salaried households, although relatively financially capable compared to other groups, have high debt-to-income ratios, or have already obtained loans for other purposes, which affects their eligibility for additional loans.

From the focus group discussions, financial, human resources, and operational challenges were analyzed, with financial constraints being the most prominent. Each stakeholder noted mainly two reasons as the biggest reason that 91% of the households who had TA's conducted don't proceed to the insulation implementation stage: (i) high loan requirements, and (ii) high brigade labor price.

According to the SOAP II marketing report, 83% of the 77 prospective clients would rather obtain green loan financing, but they don't satisfy the debt-to-income ratio or that they're in retirement. As mentioned above, it's not preferable to target or provide incentives for green loan for pensioner households (16.5% of the population). Rather, when it comes to loan requirements, the lower-hanging fruit is the households with business income who would benefit from removing the barrier of "validated income" requirement of the bank. It can be indicated that 8.4% of the total population (business owners) will be able to access green loans if FIs didn't require or households started paying their social insurance payment, whereas 8.8% of the total population can be accessed if PIT requirements were alleviated. Financial literacy education and fiscal-policy alleviation may solve this issue (VAT cashback). The next potential target market is to alleviate "debt-to-income ratio" barrier for salaried households, such as by elongating the loan tenor and offering attractive payback period.

The current insulation prices are priced fairly, but for the brigades, the sporadic, few insulation jobs lead to unpredictable demand and profit margins are dispersed along time, limiting business growth. (Luke Gooding, 2016) noted that lack of certainty of supply prevents MSMEs from investing and generating increased capacity, creating economies of scale, and decreasing the impact of hidden transaction costs. Because economies of scale isn't created, the brigades can't reduce the costs of their service, creating a positive feedback loop of insulation perceived as expensive in a market extremely sensitive to price, which makes it harder to create demand.

Alternatively, in addition to improving loan conditions, the number of people interested in conducting insulation could be increased, despite their financial conditions. This could be achieved through increasing user testimonials about the benefits of conducting insulation by themselves, the comfort and other benefits that the beneficiaries feel. In general, the information about green loans is spread moderately among surveyed households. It appears that households generally prioritize the financial benefits and incentives associated with green loans, such as discounted interest rates. However, there seems to be limited awareness or understanding among households regarding the broader environmental benefits and importance of reducing environmental impacts and air pollution through qualified and professional insulation. This lack of awareness may be attributed to a lack of information dissemination on the environmental and health aspects of energy-efficient solutions. In addition to increasing general awareness, measures can be taken to eliminate competing choices such as choosing apartments or building new houses, which are both long term solutions with high initial capital requirements.

More than the operational and human resources issues, counterproductive policy drivers and financial constraints were issues relevant to the most number of stakeholders. Counterproductive market drivers discourage EE related action, such as conducting insulation. Market players other than banks aren't incentivized and a lack of commitment from the brigades were observed from the interviewed brigades. Material companies are supportive of the project, and don't face significant challenges.

## 6. Recommendations

Based on the research findings, the research team proposes the following recommendations:

### At the policy-making level:

- To support green buildings and stimulate the demand for green loans, it is recommended to segment tariffs and discount policies to vulnerable household groups. Rather than offering these discounts to all households, targeting the improved briquette discount and night tariff discount specifically to low-income households with small-sized houses can be more effective. The budget saved from the energy tariff can be reinvested towards expanding energy and heat sources or expanding financing source of loans for green housing. Such an approach will ensure the efficient allocation of resources and aligns with the long-term goals of promoting energy efficiency and sustainable practices within the housing sector.
- Implement more incentive policies to encourage the declaration and officialization of individuals' labor income. Intensify efforts to expand the use of e-tax systems, making it more accessible for individuals to report their income accurately and efficiently. Encourage increased tax compliance and reporting of PIT and SIC, particularly from seasonal employment, by implementing measures such as providing incentives or rewards for timely and accurate tax payments or other fiscal policy incentives such as tax exemption for EE related work, to prioritize income validation and increased accessibility to finance.
- Provide legal and policy incentives to enterprises and projects introducing green buildings and energy-efficient houses to the market. For example, including quality and EE regulation for commercially built detached housing, introduce EE related valuation increases for real estate certificates, incentivize domestic material manufacturers or informal brigades with fiscal policy measures, and remove other related counterproductive drivers.
- Include NBFIs in the MET green loan subsidy program, with the same requirements for banks.

### At the SOAP II project level:

- Advertising campaigns can be undertaken to increase awareness among target households regarding the benefits of energy-efficient technologies and insulation provided by professional construction teams. These campaigns should emphasize the positive impact of such measures, including the reduction of air pollution, improvement of indoor air quality, and long-term cost efficiency. It is crucial to provide clear and comprehensive information about the environmental advantages of energy-efficient solutions and highlight the availability of professional installation services. By doing so, households can make informed decisions that prioritize both long-term ecological and financial benefits rather than immediate financial gains of the green loan.
- Marketing with branding of individuals and customer satisfaction valuation of the brigade could be conducted to increase trust in the supply chain. MNCA expressed that they will be updating the web with information on the brigades, to increase accountability, and this can be marketed further by the project and the brigades. In developing economies such as in Mongolia, personal branding is the most effective form of marketing. Households knew the other green technologies such as EE housing and electric heaters more than the 4 year project has done, and it can be attributable to the number of various private sector players in that space. Currently, all interviewed brigades don't advertise insulation on their social media, and they could be doing the marketing.
- A collaborative initiative with commercial banks can be implemented to explore effective methods for proving the income of self-employed households and addressing households' distinct financial situations. This may involve the implementation of measures such as

decreasing the debt-to-income ratio and extending the loan terms for payday loans and pension backed loans, specifically targeting households seeking green loans.

- Working with banks to identify potential green loans instruments for the construction related MSMEs, rather than for households. Upfront capital support for construction MSMEs aids and prevents the reduced quality from frugality. Such instruments can include aggregate loans for construction companies to buy materials in bundles, syndicate loans between neighboring households/ in close proximity/, credit card systems for brigades, and carbon credit opportunities through professional energy audits.
- Currently, the technical assessment is not seen as a separate product, but it can developed as such in order to value the brigades' time and increase commitment of households. One option could be to increase the upfront cost of technical assessment to 200,000 MNT, with the promise that if the household chooses to order insulation, 150,000 will be paid back/reimbursed. This creates a steady stream of predictable income for brigades.

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## Appendix

### Appendix 1. Household Survey Questionnaire

# " A Survey on the Demand for Green Loans for Energy-Efficient Dwellings: Insulation and Construction Practices"

## HOUSEHOLD QUESTIONNAIRE

ERI is conducting this survey at the request of the SOAP II Project.

This survey aims to assess the demand for Green Loans for insulation of current dwellings and construction of energy-efficient dwellings in ger areas which are not connected to district heating system.

The data gathered from this survey will only be used for research purposes and its confidentiality will be protected under the Statistics Law of Mongolia.

Survey information:	Survey duration:
Surveyor:	
Survey ID:	
GPS Coordinate:	
Indoor temperature:	

### A. KEY QUESTIONS

A1. Does your household own this dwelling that you are currently living in?

1. Yes
2. No /No need to survey this household/

A2. Type of dwelling

1. Detached housing
2. Other /No need to survey this household/

A3. Has your land been redeveloped?

1. Yes
2. No /No need to survey this household/

### B. GENERAL BACKGROUND OF THE HOUSEHOLD

B1. Household address:

District:	Khoroo, Bag:
Street number:	Door number:
Phone number:	

### C. HOUSEHOLD INFORMATION

№	Questions	Answers
<b>HOUSEHOLD HEAD INFORMATION</b>		



C1	Gender:	<ol style="list-style-type: none"> <li>1. Male</li> <li>2. Female</li> </ol>
C2	Age:	<ol style="list-style-type: none"> <li>1. 0-17</li> <li>2. 18-24</li> <li>3. 25-34</li> <li>4. 35-44</li> <li>5. 45-54</li> <li>6. 55 and above</li> </ol>
C3	Marital status:	<ol style="list-style-type: none"> <li>1. Single</li> <li>2. Married: Registered</li> <li>3. Married: Unregistered</li> <li>4. Separated</li> <li>5. Divorced</li> <li>6. Widowed</li> </ol>
C4	Education level:	<ol style="list-style-type: none"> <li>1. Masters and higher</li> <li>2. Bachelors</li> <li>3. Diploma</li> <li>4. Specialized secondary</li> <li>5. Vocational</li> <li>6. Secondary</li> <li>7. Basic</li> <li>8. Primary</li> <li>9. None</li> </ol>
<b>INTERVIEWEE INFORMATION</b>		
C5	Relationship to household head:	<ol style="list-style-type: none"> <li>1. Household head,</li> <li>2. Spouse</li> <li>3. Child</li> <li>4. Parent</li> <li>5. Sibling</li> <li>6. Parent-in-laws</li> <li>7. Son or daughter-in-law</li> <li>8. Grandparent</li> <li>9. Grandchild</li> <li>10. Other relative</li> <li>11. Non-relative</li> </ol>
C6	Gender:	<ol style="list-style-type: none"> <li>1. Male</li> <li>2. Female</li> </ol>
C7	Age:	_____
C8	Education level:	<ol style="list-style-type: none"> <li>1. Masters and higher</li> <li>2. Bachelors</li> <li>3. Diploma</li> <li>4. Specialized secondary</li> <li>5. Vocational</li> <li>6. Secondary</li> <li>7. Basic</li> <li>8. Primary</li> <li>9. None</li> </ol>

### HOUSEHOLD INFORMATION

C9 Household size: \_\_\_\_\_

C10 Please report about household members

Age group	Number of people
0-17	
18-24	
24-34	
35-44	
45-54	
More than 55	

Gender	Number of people
Male	
Female	

Education level	Number of people
Masters and higher	
Bachelors	
Diploma	
Specialized secondary	
Vocational	
Secondary	
Basic	
Primary	
None	
	Number of people
Number of disabled members	

### D. EMPLOYMENT

*\*This section is intended for household members who are 18 years of age and older.*

Please report about your main job.

ID codes of household member aged 18 years and above.	D0. Relationship to household head?	D1. What is your current employment status? <i>Use codes in table below</i>	D2. What sector and what position do you work in?			D3. How much salary did you get within last month from your main job? /MNT / <i>If did not earn any salary, fill as 0/</i>	D4. How much bonus or equivalent income did you get within last 12 months from your main job? <i>If did not earn any salary, fill as 0/</i>
	1. Household head, 2. Spouse 3. Child 4. Parent 5. Sibling 6. Parent-in-laws 7. Son or daughter-in-law 8. Grandparent 9. Grandchild 10. Other relative 11. Non-relative		A. Sector?	B. Position 1. Manager 2. Executor 3. Officer 4. Assistant	C. Size of organization : 1. Micro (1-10 employees) 2. Small (10-50) 3. Medium (50-200) 4. Large (above 200)		

*D1 – answer codes*

Employed (paid)

1. Permanent employment
2. Temporary employment
3. Occasional employment
4. Intern

Self-employed – Employer:

5. Enterprise ▶ D5
6. Market oriented family enterprise ▶ D5

Self-employed – not employer:

7. Enterprise ▶ D5
8. Market oriented family enterprise
9. Contributing family member ▶ D5
10. Unemployed ▶ D5
11. Student ▶ D5
12. Retired ▶ E1
13. Disabled
14. On maternity leave

Please report about your additional job in the following table.

Copy ID codes of household member aged 18 years and above.	D5. Do you do additional jobs? 1. Yes 2. No ▶ D7	D6. What were your earnings from the additional job in the last 12 months? /MNT/

Copy ID codes of household member aged 18 years and above.	D7. Do you pay social insurance premium? 1. Yes 2. No ▶ D9	D8. Has she/he pay the social insurance premium continuously for last 12 months? 1. Yes 2. No	D9. Do you pay income tax? 1. Yes 2. No ▶ E1	D10. Has she/he pay the income tax continuously for last 12 months? 1. Yes 2. No	D11. Do you report your income tax through the tax system? 1. Yes 2. No

**E. GENERAL LAND & HOUSING SITUATION**

	Questions	Answers
<b>GENERAL INFORMATION ON THE DETACHED HOUSING</b>		
E1	What is the size of the house?	1. _____ sq.m
E2	When did the house was built?	2. _____ year /If do not know, please enter 9999/

E3	How did you build your house?	<ol style="list-style-type: none"> <li>1. By ourselves /unprofessional family member &amp; relatives/</li> <li>2. By ourselves, with help from professionals</li> <li>3. Hired professionals /brigade/</li> <li>4. Hired a construction company/without blueprint/</li> <li>5. Hired a construction company/with blueprint/</li> <li>6. Do not know /bought and derived/</li> <li>7. Other /specify/ _____</li> </ol>																									
E4	What's the structure of the building wall?	<ol style="list-style-type: none"> <li>1. Plank with plaster and clay</li> <li>2. Wooden frame</li> <li>3. Brick and mortar</li> <li>4. Concrete frame</li> <li>5. Steel frame</li> <li>6. Precast concrete</li> <li>7. Pre-fabricated building</li> <li>8. Mixed</li> <li>9. Other / Specify / _____</li> <li>10. Do not know</li> </ol>																									
E5	Where does your household get electricity?	<ol style="list-style-type: none"> <li>1. Central Grid</li> <li>2. Diesel Station</li> <li>3. Solar panel</li> <li>4. Small Generator Set</li> <li>5. No lightening</li> <li>Other /specify/ _____</li> </ol>																									
<b>HEATING</b>																											
E6	How do you heat your home?/Multiple choices allowed/	<ol style="list-style-type: none"> <li>a. Traditional cookstove</li> <li>b. Manufactured cookstove</li> <li>c. Low pressure stove</li> <li>d. Stove and electric heater ► E10</li> <li>e. Electric heater ► E10</li> <li>f. From the centralized heating system ► E14</li> <li>g. Others ► E14</li> </ol>																									
E7	Do you have stove combination?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>																									
E8	How many times do you make fire per day in winter?	_____ times																									
E9	How much coal and wood do your household use per winter/From October to the end of April/? ► E15	<table border="1"> <thead> <tr> <th></th> <th>Unit</th> <th>Amount</th> <th>Unit price</th> <th>Total cost</th> </tr> </thead> <tbody> <tr> <td>Briquette coal</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Wood</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Coal</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Other /specify_____</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Unit	Amount	Unit price	Total cost	Briquette coal					Wood					Coal					Other /specify_____				
	Unit	Amount	Unit price	Total cost																							
Briquette coal																											
Wood																											
Coal																											
Other /specify_____																											
E10	What type of electric heater does your household use?	<ol style="list-style-type: none"> <li>a. Space heater / aqueous, oily, dry/</li> <li>b. Wall heating</li> <li>c. Floor heating</li> </ol>																									
E11	How many electric heaters do you have at home?	_____ pieces																									

E12	How much did the electric heater cost for initial installment of purchase?	_____ MNT
E13	How much does your household spend for heating in total? ► E15	i. _____ MNT during winter /From October to April/ ii. _____ MNT during summer /From May to September/
E14	If your house has a heating source other than traditional cookstove or electric heaters, how much does it cost to heat in the winter?	_____ MNT

### INSULTATION

E15	Currently, can your household stay warm during winter?	1. Very warm /always feels hot/ 2. Warm 3. Moderate 4. Cold 5. Very cold /always chills/
E16	Does your house any of the following symptoms? /Multiple choices are allowed/	a. It is moist when not cooked b. Even if fired, it cools down quickly in 2-3 hours c. Charges due to the use of electric heaters are expensive d. Windows and walls are covered with sweat e. None
E17	Does your house any of the following symptoms? /Multiple choices are allowed/	a. Cold air blows in winter b. The walls sweat c. The window rattles d. It is too stuffy in winter e. The door slams f. None
E18	Has your household ever tried the energy audit?	1. Yes 2. No
E19	Do you think your house needs to be insulated?	3. Yes ► E21 1. No
E20	Why do you think not insulating your house? /Multiple choices are allowed/ ► E21	a. It is warm enough b. Our land is included the redevelopment area c. Plans to sell soon d. Build new detached house e. Plans to buy apartment f. Impossible to insulate because the house is too old g. Can not afford h. There is no time to insulate i. Other /specify/ _____
E21	Where exactly is your house losing heat? /Multiple choices are allowed/	a. Roof b. Floor c. Window d. Wall e. Door f. Base g. From the seams and edges h. Other, please specify _____

E22	Have you done any insulation in your house?	1. Yes i. No ► E27
E23	Who insulated the house?	1. By ourselves /unprofessional family member & relatives/ 2. By ourselves with guidance from a professional 3. By professionals, unrelated to an international project 2. By professionals related to an international project, /specify the project/ _____
E24	What part of the house was insulated? /Multiple choices are allowed/	a. Roof b. Floor c. Windows d. Walls e. Door f. Base g. From the seams and edges h. Other, please specify _____
E25	After the insulation, did you notice a decrease in your household's heating expense?	1. Yes 2. No ► E27
E26	Could you report your household's heating overall expense before and after the insulation in winter /October to April/?	i. Before: _____ MNT ii. After: _____ MNT
E27	How satisfied are you with the insulation?	1. Very satisfied ► E29 2. Satisfied ► E29 3. Neutral 4. Barely satisfied 4. Not satisfied
E28	If not satisfied, what do you think would've improved the insulation? /Multiple choices are allowed/	a. The existing frame of the house was better b. Conducting it in a different season c. Chose higher quality materials d. Chose more expensive materials e. Hired skilled workers f. Take professional advice g. Other /specify/ _____
E29	In total, how much did the insulation cost?	_____ MNT
E30	How did you finance the insulation?	1. Took a loan. 2. By own resources (savings, income) ► E32 3. Aided by relatives ► E32 4. By project /specify/ _____ ► E32 5. Other source /specify/ _____ ► E32
E31	Which source did you get the loan for insulation?	1. Commercial banks 2. Non-bank financial institution 3. Savings and loan association/Pawn shop 4. Individuals 5. Project 6. International organizations 7. Other /specify/ _____

E32	What are the biggest challenges you face to insulate your house? /Multiple choices are allowed/	<ul style="list-style-type: none"> <li>a. Financial hardship</li> <li>b. Shortage of capacity</li> <li>c. Did find suitable insulation method</li> <li>d. Other /specify/ _____</li> <li>99. Do not know</li> </ul>
<b>DETACHED HOUSING PLAN AND FINANCING</b>		
E33	What are your plans for housing over the next few years?	<ul style="list-style-type: none"> <li>1. Live current houses without insulation ► F1</li> <li>2. Insulate the current house</li> <li>3. Build a new house ► E40</li> <li>4. Move into an apartment ► F1</li> <li>5. Other, please specify _____ ► J1</li> </ul>
E34	If you plan to insulate your house, by whom?	<ul style="list-style-type: none"> <li>1. By ourselves /unprofessional family member &amp; relatives/</li> <li>2. By ourselves with guidance from a professional</li> <li>3. By professionals</li> <li>4. By professionals related to a project, /specify the project/ _____</li> <li>5. Other /specify/ _____</li> </ul>
E35	Pick three top factors to your decision to insulate of your house or build a new house? /Multiple choices are allowed/	<ul style="list-style-type: none"> <li>a. Whether it is affordable</li> <li>b. Warmth</li> <li>c. Stop burning coal</li> <li>d. Facilitate the home chores – save time</li> <li>e. Improve indoor air quality</li> <li>f. Improve ventilation</li> <li>g. Other /specify/ _____</li> </ul>
E36	How much do you expect the insulation would cost?	<ul style="list-style-type: none"> <li>a. _____ MNT</li> </ul>
E37	How do you plan to finance the insulation?	<ul style="list-style-type: none"> <li>1. By loan</li> <li>2. Own sources (savings, income) ► E40</li> <li>3. Donation from others ► E40</li> <li>4. By project /specify the project ► E40 _____</li> <li>5. Other /specify/ _____ ► E40</li> </ul>
E38	If you plan to finance the insulation by loan, from where? /Multiple choices are allowed/	<ul style="list-style-type: none"> <li>a. Commercial banks</li> <li>b. Non-bank financial institution</li> <li>c. Savings and loan association/Pawn shop</li> <li>d. Individuals, relatives</li> <li>e. Project loans</li> <li>f. International organizations</li> <li>b. Other /specify/ _____</li> </ul>
E39	Why are you choosing to insulate your detached house by loan? ► E48	<hr/> <p>Open answer</p>

***A household interested in building a new detached house should answer the following questions.***

E40	If you have plans to build a new house, where do you plan for construction?	<ul style="list-style-type: none"> <li>1. Build on this land, next to this house</li> <li>2. Build on this land, to replace this house</li> <li>3. Buy a different land with existing house</li> <li>4. Buy a different land and build new house</li> <li>5. Other /specify/ _____</li> </ul>
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E41	If you plan to build a new house, what kind of housing do you plan?	<ol style="list-style-type: none"> <li>1. Wooden frame</li> <li>2. Brick and mortar</li> <li>3. Concrete frame</li> <li>4. Steel frame</li> <li>5. Pre-fabricated building</li> <li>6. Energy-efficient house</li> <li>7. Other /specify/ _____</li> </ol>
E42	If you plan to build a new house, who will build it?	<ol style="list-style-type: none"> <li>1. By ourselves /unprofessional family member &amp; relatives/</li> <li>2. By ourselves with guidance from a professional</li> <li>3. By professionals, unrelated to an international project</li> <li>4. By professionals related to an international project, /specify the project/ _____</li> </ol>
E43	Pick the three most important factors for your household to consider when building a new detached house. /Multiple choices allowed/	<ol style="list-style-type: none"> <li>a. Warmth</li> <li>b. Stop burning coal</li> <li>c. Low heating costs</li> <li>d. Water and sewage must be decided.</li> <li>e. Be attractive.</li> <li>f. Improve indoor air quality</li> <li>g. Improve ventilation</li> <li>h. Be affordable.</li> <li>i. Have a bathroom (shower, toilet) inside</li> <li>j. Other /specify/ _____</li> </ol>
E44	How much is your household willing to spend on a new detached house?	_____ MNT
E45	How do you finance the new house?	<ol style="list-style-type: none"> <li>1. By loan</li> <li>2. Own sources (savings, income) ▶ E48</li> <li>3. Donation from others ▶ E48</li> <li>4. By project /specify the project/ _____ ▶ E48</li> <li>5. Other /specify/ _____ ▶ E48</li> </ol>
E46	If you plan to finance the new house by loan, from where? /Multiple choices are allowed/	<ol style="list-style-type: none"> <li>a. Commercial banks</li> <li>b. Non-bank financial institution</li> <li>c. Savings and loan association/Pawn shop</li> <li>d. Individuals, relatives</li> <li>e. Project loans</li> <li>f. International organizations</li> <li>g. Other /specify/ _____</li> </ol>
E47	Why are you choosing this source of loan?	_____ Open answer
<i>The following questions will be asked of the households looking to insulate and build a new house with a loan.</i>		
E48	If you get a loan, how much can you pay as down payment?	_____ MNT
E49	If you get a loan, how much can you repay monthly?	_____ MNT
E50	Do you know the following energy efficient solutions?/Multiple choices are allowed/	<ol style="list-style-type: none"> <li>a. Solar panel</li> <li>b. Solar collector</li> <li>c. Heat pump</li> <li>d. Heater</li> <li>e. Floor heating</li> <li>f. Instantaneous heater</li> </ol>



		<ul style="list-style-type: none"> <li>g. Air purifier</li> <li>h. Two-layer windows with argon gas</li> <li>i. Not interested in any of them.</li> </ul>
E51	Which energy-efficient solutions are you interested in installing in your home?	<ul style="list-style-type: none"> <li>a. Solar panel</li> <li>b. Solar collector</li> <li>c. Heat pump</li> <li>d. Heater</li> <li>e. Floor heating</li> <li>f. Instantaneous heater</li> <li>g. Air purifier</li> <li>h. Two-layer windows with argon gas</li> <li>i. Not interested in any of them.</li> </ul>

## HOUSEHOLD FINANCIAL CAPABILITY

### F. HOUSEHOLD TANGIBLE PROPERTY

DETACHED HOUSE		
F1	Do you have a real estate certificate for the house?	<ul style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ul>
F2	If you sell your house now, what would be the price of the house?	_____ MNT
F3	Is your house currently backed for any loan?	<ul style="list-style-type: none"> <li>1. Yes</li> <li>2. No ► F5</li> </ul>
F4	How long will it take to pay off a house loan?	
LAND		
F5	What's the land ownership status? (considering we're not interviewing sb who's leasing/renting the land)	<ul style="list-style-type: none"> <li>3. Ownership</li> <li>4. Possession</li> <li>5. Not certified ► F11</li> <li>6. Not our property ► F11</li> </ul>
F6	Whose name is on the land ownership/possession/use certificate? /If jointly owned, please select all owners/	<ul style="list-style-type: none"> <li>1. Household head</li> <li>2. Other household members: Personal ID_____</li> <li>3. Parents that belongs to independent household</li> <li>4. Relative, if so specify relationship _____</li> </ul>
F7	What is the size of your land?	_____ hectare
F8	If you sell your land now, what would be the price of the land?	_____ MNT
F9	Is your land currently backed for any loan?	<ul style="list-style-type: none"> <li>1. Yes</li> <li>2. No ► F11</li> </ul>
F10	How long will it take to pay off a land loan?	_____ months
CAR		
F11	Does your household own a car?	<ul style="list-style-type: none"> <li>1. Yes</li> <li>2. No ► F15</li> </ul>
F12	If you sell your car now, what would be the price of the car? (If there are more than 1, please plus the values)	_____ MNT
F13	Is your car currently backed for any loan?	<ul style="list-style-type: none"> <li>1. Yes</li> </ul>

		2. No ► F15
F14	How long will it take to pay off the car loan?	_____ months
<b>OTHER REAL STATE</b>		
F15	Do you have real estate in your household other than land or house?	1. Yes 2. No ► G1
F16	What is the total value of other properties? (If there are more than 1, please plus the values)	_____ MNT

### G. HOUSEHOLD INCOME

G1	What is the monthly average income of your household?	<ol style="list-style-type: none"> <li>1. Up to MNT 300'000</li> <li>2. MNT 300,001 – MNT 500,000</li> <li>3. MNT 500,001 – MNT 700,000</li> <li>4. MNT 700,001 – MNT 900,000</li> <li>5. MNT 900,001 – MNT 1,100,000</li> <li>6. MNT 1,100,001 – MNT 1,600,000</li> <li>7. MNT 1,600,001 – MNT 2,100 000</li> <li>8. MNT 2,100,001 – MNT 2,600,000</li> <li>9. More than MNT 2,600,001</li> </ol>
G2	Please report the breakdown of household income. Fixed income (monthly) <ol style="list-style-type: none"> <li>i. Wages and salary income (Sum of D3 and D4) ..... ₺</li> <li>ii. Pensions and allowance income (<i>the total of the table in appendix 1</i>) ..... ₺</li> <li>iii. Rental income ..... ₺</li> <li>iv. Other /specify/ _____ ..... ₺</li> </ol> Irregular income (last 12 months) <ol style="list-style-type: none"> <li>v. Business income (<i>net income</i>) ..... ₺</li> <li>vi. Part time/additional job income (<i>Sum of question D4</i>) ..... ₺</li> <li>vii. Remittance income ..... ₺</li> <li>viii. Interest/bond yield ..... ₺</li> <li>ix. Gifts, donations, aid ..... ₺</li> <li>x. Agriculture income ..... ₺</li> <li>xi. Other /specify/ _____ ..... ₺</li> </ol> <i>If there is no income, fill it as 0</i>	

### H. HOUSEHOLD EXPENDITURE

H1	What is the monthly average expenditure of your household? (deduct costs related to business)	<ol style="list-style-type: none"> <li>1. Up to MNT 300'000</li> <li>2. MNT 300,001 – MNT 500,000</li> <li>3. MNT 500,001 – MNT 700,000</li> <li>4. MNT 700,001 – MNT 900,000</li> <li>5. MNT 900,001 – MNT 1,100,000</li> <li>6. MNT 1,100,001 – MNT 1,600,000</li> <li>7. MNT 1,600,001 – MNT 2,100 000</li> <li>8. MNT 2,100,001 – MNT 2,600,000</li> <li>9. More than MNT 2,600,001</li> </ol>
H2	<p>Please report the breakdown of household expenditure.</p> <p><b>Fixed expenditure (monthly)</b></p> <p>i. Food expenditure ..... ₺</p> <p>Transportation cost</p> <p>ii. Fuel ..... ₺</p> <p>iii. Bus fare ..... ₺</p> <p>Utility cost</p> <p>iv. Electricity ..... ₺</p> <p>v. Water ..... ₺</p> <p>vi. Mobile phone, internet, cables and other communications ..... ₺</p> <p>vii. Other non-food costs ..... ₺</p> <p>viii. Loan payments ..... ₺</p> <p><b>Irregular expenditures (last 12 months)</b></p> <p>ix. Heating /coal, wood etc./ (...copy from the question) ..... ₺</p> <p>x. Durable goods ..... ₺</p> <p>xi. Clothes ..... ₺</p> <p>xii. Education (tuition fees, books, dormitory) ..... ₺</p> <p>xiii. Health ..... ₺</p> <p>xiv. Travel and vacation ..... ₺</p> <p>xv. Holiday expenses ..... ₺</p> <p>xvi. Other /specify/ _____ ..... ₺</p> <p><i>If there is no expenditure, fill it as 0.</i></p>	

## I. HOUSEHOLD SAVINGS AND LOAN

№	Questions	Answers
<b>SAVINGS</b>		
I1	Do your household members have savings?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No ► I1</li> </ol>
I2	How much is your household's total savings?	<ol style="list-style-type: none"> <li>1. Up to MNT 3 million</li> <li>2. MNT 3-5 million</li> <li>3. MNT 5-10 million</li> <li>4. MNT 10-20 million</li> <li>5. MNT 20-50 million</li> <li>6. MNT 50-100 million</li> <li>7. More than MNT 100 million</li> <li>99. Refused to answer / Do not know</li> </ol>
I3	What is the purpose of your household saving? / Multiple answers allowed /	<ol style="list-style-type: none"> <li>a. To buy a new apartment</li> <li>b. To buy a new detached house</li> <li>c. To build a new detached house</li> <li>d. To insulate detached house</li> <li>e. To renovate the current house</li> <li>f. To purchase land</li> <li>g. To buy a new car</li> <li>h. To start or expand household business</li> <li>i. To pay tuition</li> <li>j. To purchases of durables</li> <li>k. For children's future investment</li> <li>l. To meet future financial needs</li> <li>m. To prevent future risks</li> <li>n. Other /specify/_____</li> </ol>
<b>LOAN</b>		
I4	Do your household members have household loans?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No ► I6</li> </ol>
I5	What kind of loan does your household have? Please report details for each loan	

№	Copy personal ID of borrower	Type of loans /Multiple choices are allowed/ a. Salary backed loans b. Pension backed loan c. Consumer loans d. Business loan e. Tuition loan f. Automobile backed loan g. Credit card loan h. Herder's loan i. Green loan j. Morgage loan k. Other/specify/ _____ —	Source of loans /Multiple choices are allowed/ a. Commercial banks b. Non-bank financial institution c. Application loan d. Savings and loan association e. Pawn shop f. Individuals g. Other /specify/_____	Purpose of loan / Multiple choices are allowed/ a. Buy a new apartment. b. Build a new detached house c. Insulate detached house d. Phone leasing e. Electrical appliance/Furniture purchase f. Car leasing g. Land and house purchase h. Start/expand a business i. University tuition j. Go abroad k. Hospitalization l. Household expense m. Other /specify/ _____	Amount of monthly repayment /MNT/  <i>If you and your household members have more than one loan, please plus values.</i>	How long do you need to repay the loan? /months/  <i>If you and your household members have more than one loan, please select the loan with the highest balance and the highest repayment amount.</i>	Is it your first loan? 1. Yes 2. No
I6	Which one do you think the least burdensome loan repayment schedule?	1. Equal amounts every month 2. Equal amounts every quarter 3. Equal amounts every half year 4. Monthly interest rate payments, and one lump sum principal payment at the end of the loan 5. Principal payment waived for the first few months 6. Other, please specify _____					
I7	Were you and your household members late on any repayments?	1. No 2. Yes, if so, specify why _____					

**LOAN HISTORY**

I8	Are there any cases where your household members have requested for a loan but failed?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No ► J1</li> </ol>
I9	What was the reasons your request for loan were denied? /Multiple choices are allowed/	<ol style="list-style-type: none"> <li>a. Lack of collateral</li> <li>b. Collateral isn't valued high enough for the loan</li> <li>c. Lack of stable income</li> <li>d. Income not high enough for the loan</li> <li>e. Do not pay social insurance</li> <li>f. Social insurance payment period is shorter</li> <li>g. Couldn't get more loans (Previous loan payment was high)</li> <li>h. Other / specify/ _____</li> </ol>
I10	Does this issue persist?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>

## J. INFORMATION ABOUT GREEN LOAN

J1.	Have you ever heard of the insulation green loan?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No ► J10</li> </ol>
J2.	Have you ever heard of an energy efficient house green loan?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No ► J10</li> </ol>
J3.	Where did you get the information? /Multiple choices are allowed/	<ol style="list-style-type: none"> <li>a. Social media</li> <li>b. TV</li> <li>c. Newspapers</li> <li>d. Handout materials</li> <li>e. Relatives</li> <li>f. Friends</li> <li>g. Neighbors</li> <li>h. Khoroo staff</li> <li>i. Introductory workshops organized by insulation projects</li> <li>j. Other /specify/ _____</li> </ol>
J4.	Has your household ever get a green loan?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No ► J10</li> </ol>
J5.	Where did you get green loan?	<hr/> Please fill as 99 if respondent do not know
J6.	What business services have you received through a green loan?	<hr/> Please fill as 99 if respondent do not know
J7.	What kind of heating solutions have you installed in your house through green loan?	<hr/> Please fill as 99 if respondent do not know
J8.	What are the three advantages of green loans?	<ol style="list-style-type: none"> <li>i. _____</li> <li>ii. _____</li> <li>iii. _____</li> </ol>
J9.	What are the three disadvantages of green loans?	<ol style="list-style-type: none"> <li>i. _____</li> <li>ii. _____</li> <li>iii. _____</li> </ol>
J10.	Do you interested in getting a green insulation loan?	<ol style="list-style-type: none"> <li>1. Very interesting.</li> <li>2. Interested</li> <li>3. Moderate</li> <li>4. Not intested</li> <li>5. Not at all</li> </ol>
J11.	Do you interested in getting a green loan for the construction of a new energy-efficient house?	<ol style="list-style-type: none"> <li>1. Very interesting.</li> <li>2. Interested</li> <li>3. Moderate</li> <li>4. Not intested</li> <li>5. Not at all</li> </ol>
J12.	Pick three top factors to getting a green loan? /Multiple choices are allowed/	<ol style="list-style-type: none"> <li>a. Lower interest</li> <li>b. No requirement on collateral</li> <li>c. Lower down payment</li> <li>d. Flexible repayment schedule /pay in lump sum or in installment /</li> <li>e. Longer loan term</li> <li>f. Other /specify / _____</li> </ol>

*Thank you for your participation.*

## Appendix 2. Qualitative assessment and focus group discussion/interview stakeholders

*Table A 1. List of stakeholders who participated in the focus group discussions and interview*

Focus group discussions		No. of attendees
1	Brigades	6
2	EE construction companies	4
3	Banks	5
Individual interviews		No. of attendees
0	Project IPs	5
1	Bank	1
2	NBFI	2
3	Insulation material manufacturer	4
4	Association of material manufacturers	1
5	Green technology importers	2
6	EE auditor	3
7	Policymaker/regulator	3
8	Households	14
	<i>who got insulation loan</i>	5
	<i>who got EE housing loan</i>	5
	<i>who declined insulation</i>	2
	<i>who built EE housing through own financing</i>	2
9	Relevant international projects	2

### Focus group interview questions

#### Citizens who built energy-efficient houses and received insulation green loans

- What made you decide to build an EE house and/or to insulate it?
- Would you have insulated your home or have built an EE home if it weren't for the green loan interest rate discount? Why?
- What services have you received through Green Loans?
- Which financial institution did you get your green loan from?
- What services did you receive from which construction brigade or company?
- What energy-efficient solutions have you implemented in your home as part of a green loan?
- Did the construction brigade or company complete the services within the time frame specified in the contract? What were the problems during implementation?
- What difficulties did your household have in getting a green loan? How was it resolved?
- Are you able to repay your loan on time?
- By what percentage did your home's heat loss decrease after the insulation/construction work?
- Did your household heating costs go down?
- Are you satisfied with your insulation/service?
- Would you recommend Insulation and Green Loans to others?
- Name 3 advantages of green loans.
- Name 3 disadvantages of green credit.
- Has insulating your home affected the economy, health, leisure and comfort of household members, etc.?



## **Households**

- How much did your household insulation cost?
- How did you finance this expense?
- How did you choose your insulation company?
- How reliable was the company you chose? What problems did you encounter during the contract period?
- What kind of heating solution have you installed in your house? Why was this solution chosen?
- What kinds of EE solutions, other than heating, have you implemented in your home?
- How much has the heat loss of your house decreased?
- How well insulated and energy efficient is your home?
- How satisfied is your household with insulation?
- Did you know about green loans for home insulation? If so, what is the reason for not getting the loan?

## **Commercial banks**

- Does your organization provide green loans to citizens and enterprises for building insulation and energy-efficient houses? If not, why?
- From what source? (From international organizations, loans, aid, cooperation, government subsidies, etc.)
- When did you start distributing loans?
- How many borrowers and how much has been loaned so far?
- How good is the loan repayment? Are there loans classified as non-performing? If so, what factors do you think contributed to the deterioration of credit quality?
- What is the availability of loans?
- How much time and manpower does it take to develop and introduce a new green loan product? Please share your specific experience.
- Do you think it is important to have a common standard for green credit throughout the banking system? Why?
- What is your bank doing in terms of the Sustainable Finance Roadmap's goal of increasing the green loan portfolio to 20 percent of total loans by 2030?
- Have you introduced a system that measures, reports and proves the environmental, social and economic impact of green loan? If so, for which product? If not, why?
- Compared to other loans, are there any special requirements for applying for a green loan?
- What percentage of people who have applied can get a green loan?
- What do you think are the biggest barriers to getting a green loan?
- What are the main issues with green loan repayments?
- How does your organization assess the loan worthiness of applicants for green loans? Are there any special discounts to consider for these types of loans compared to other loans? Did you research?
- How does your organization check if they are using the green loan as intended?
- Is there a common trend for people applying for green loans to insulate their homes and build new energy-efficient homes?
- What regulatory or policy changes do you think need to be made to make it easier and more convenient for people to get green loans? What kind of support is okay?
- How can financial institutions work with policymakers to implement these changes?
- What is the biggest challenge for banks in making green loans? Please share your experience.
- How are bank executives responding to green loans?
- Is there anything else you'd like to share about your organization's approach to green lending and the challenges and opportunities facing the industry as a whole?
- Do you have any additional requests from the project?
- Are there any suggestions for this type of green loan product that does not currently exist but could be implemented or should be implemented in the future? Have you started researching?

### **Non-bank financial institutions**

- Has your organization raised green funds?
- When raising green resources, did you mention the creation of energy efficiency and the creation of green loans in the construction industry? Is there research or a plan?
- If so, do you plan to provide green loans to citizens and enterprises for the insulation of residential buildings and the construction of energy-efficient houses? What conditions are you planning to issue financial products?
- Please share your experience with green loans before. What was the most difficult challenge?
- Is there an interest in introducing green loans if it has not been issued yet? What are the reasons for not being implemented and what are the most difficult things to implement?
- What support does your organization need to make it easier and more convenient to launch green loan products?
- What regulatory or policy changes do you think need to be made to make it easier and more convenient for people to get green loans? What kind of support is okay?
- How can financial institutions work with policymakers to implement these changes?
- Anything else you'd like to share about your organization's approach to green lending and the challenges and opportunities facing the industry as a whole?
- Do you have any additional requests from the project?
- Are there any suggestions for this type of green loan product that does not currently exist but could be implemented or should be implemented in the future? Have you started researching?

### **Manufacturers and traders of building materials**

- Duration of operation
- Number of employees
- What inventory is supplied?
- Where do you get your raw materials and inventory?
- What types of energy efficient building materials does your company offer? What makes it different from other products on the market?
- When buying your products, do you consider green products that are safe for the environment and health?
- Compared to similar products on the market, how green (low greenhouse gas emissions) is your production? What quality standards do you follow in your production? Is it ISO9001? Is it ISO14001?
- Do the products you manufacture/sell have a certificate of conformity? How do you ensure that products are non-flammable, safe for human health and meet all relevant regulatory standards?
- If you do, how do you prepare the customs documents for the product? How difficult is it to complete the paperwork?
- Are the products you buy duty-free at customs?
- How does your company measure and monitor the environmental impact of the insulation and building materials you manufacture and sell, and do you have specific metrics you use to measure this impact?
- In order to stabilize the price of construction materials, what measures do you think are appropriate for the government, business, banks, and your company? Does your company have anything planned for this? If so, please share.
- Do you present your products to designers? Where do you sell your products? Where is the most effective channel?
- What organizations/individuals are your regular clients and customers?
- What are the recent trends in demand for insulation and building materials? Notice the change?
- Are you up to date on the latest global trends in green building materials products?
- As a supplier of construction materials, do you receive requests and orders from construction companies and citizens to supply green or environmentally friendly, energy saving, and harmless products?

- What is the knowledge and attitude of construction companies and citizens in this field?
- What are the regular financing needs of your company? How do you solve that need? What are irregular financing needs? What is the current funding needed?
- Are you raising a closed bond? Please share your experience. (Purpose, conditions, when, difficulties encountered, etc.)
- Have you taken loans from banks, if so what loan? Got a line of credit? Please share your experience. (From which bank, purpose, conditions, how many months, difficulties encountered, etc.)
- Have you heard or researched about green bank loans? If you have looked into getting a green loan, please share your experience, whether you got it or why you didn't.
- What are the current challenges facing the insulation and building materials industry?
- What role do you think insulation and building materials play in combating climate change, and how is your company contributing to this effort?
- Does your company work with any projects to ensure access to insulation and building materials needed for energy efficiency projects?
- Are there any barriers to working with the project?
- Are there supporting loans or subsidies in the production of insulation materials for energy efficiency projects?
- For you, what terms and conditions would be considered favorable for creating a new loan product? (terms, interest, collateral requirements, etc.)
- Is there a need for government support in terms of laws, regulations, standards, and other areas for the production and trade of green building materials that do not have a negative impact on the environment or health? If so, please specify.

#### **Building energy auditor, Insulation appraiser**

- Is it a business, and if so, what is its main business activity? What services do you provide?
- Have you received an auditor's certificate from the energy regulatory commission, and if so, in what year? Experience in the field
- Are the auditing methods and equipment proprietary? If not, where do you get it and use it?
- Workforce Information (Employee Information)
- Is there a cooperative, contract project, enterprise or construction brigade?
- How many homes have been thermally assessed/audited?
- Which part of the house usually loses a lot of heat? What causes high heat loss?
- What are some of the most common reasons why thermally assessed homes do not insulate?
- What roles are involved in both stages of a green loan?
- How effective are audits after insulation/AOS construction?
- How are the rates for audit services determined?
- Common issues when working with brigades/construction companies
- Common problems with banks?
- Has the schedule of funding received under the energy efficiency project caused you financial difficulties or difficulties in performing your duties?

#### **Insulation brigade, construction company /SMEs/**

- Is it a business, and if so, what is its main business activity? What services do you provide?
- Experience in the field
- What is the license? Are you working on getting a new license?
- What are the problems with obtaining a license?
- Workforce information (number of employees)
- What insulation products and services do you provide? Information on prices and fees for products and services
- Approximately how many families were provided the service?

- Whether insulation/AOS construction services were provided to households through green loans?
- Information on products and services offered to households with green loans
  - Types of products and services
  - Price of products and services
  - Duration of insulation service
  - What percentage of heat loss is reduced?
- How do you carry out your design for new insulation/AOS construction?
- Are you able to use recent new advanced methods?
- Challenges in building insulation and energy-efficient green buildings?
  - Knowledge, skills, financing, building materials, legal framework support, etc
- How suitable is the green loan financing schedule mechanism for your brigade/company?
- What is the attitude of households using green loans? – before and after
- What are the most difficult problems in new insulation/AOS construction?
- Where do you buy your construction materials and equipment?
- Do you use imported or domestic products?
- How do you decide on human resources?
- What is the customer demand? In what channels are you promoting your products and services?
- How big are your financing needs in 1 year? What is the need to raise funds for?
- How to easily meet your financing needs? (From where and how many months and under what conditions do you get funding)
- Ever raised a closed bond? Please share your experience. (Purpose, conditions, when, difficulties encountered, etc.)
- If you took a loan from the bank, what kind of loan did you take? Got a line of credit? Please share your experience. (From which bank, purpose, conditions, how many months, difficulties encountered, etc.)
- Does your organization offer share leasing? Ever researched giving?
- Can your organization provide guarantees to financial institutions? Have collateral?
- What kind of non-financial support does your organization need for insulation/new AOS construction?
- What are the difficulties in working with the bank?
- What are the difficulties in working with the family?
- What kind of support is expected from the project?
- Do you need any support from the government regarding policies, laws, regulations and standards?
- Are there any problems caused by the government in carrying out its activities?

### Appendix 3. Overview of green loan products on the market

Figure A 1. Review of EE related green loans, for households and business

Financial Institution	Loan name	Down payment	Interest rate	Duration, month	Loan amount limit, million MNT	Commission fee
<b>Khan Bank</b>	<b>Concessional green loan:</b>	0%	3%	Up to 30	Up to 40	0
	<b>Concessional green pension loan:</b>	0%	3%	Up to 12	Up to 15	0
	<b>Green family loan:</b>	0%	12%	Up to 30	Up to 40	0
	<b>Green loan:</b>	0%	14.4%	Up to 30	Up to 20	1% or 1.5 million MNT
<b>XacBank</b>	CHIP package project loan /50-70% subsidies for target groups*/		16.8%	Up to 30	3.2	1%
	<b>Personal eco loan</b>		16.8%	Up to 30	Up to 50	1%
	<b>Insulation eco loan:</b> <ul style="list-style-type: none"> <li>• "SOAP" project brigade to conduct insulation</li> <li>• Household to conduct insulation</li> </ul>		16.8%	Up to 30	Up to 50	1%
	EE housing mortgage (construction of housing)	20%	12%	From 6 to 240	Up to 180	If down payment is up to 20%, it is 0.5%, if no down payment, there's no commission fee
	EE housing mortgage (PURCHASE OF A NEIGHBORHOOD HOUSE )				Up to 200	
<b>State Bank</b>	Purchase of heaters	-	3%	Up to 30	Up to 10	It does not exceed 1% of the granted loan or 3 million MNT
	Purchase of insulation materials	-	3%		Up to 15	

Financial Institution	Loan name	Down payment	Interest rate	Duration, month	Loan amount limit, million MNT	Commission fee
	Purchase of improved stove	-	3%		Up to 3	
	Purchase of renewable energy source	-	3%		Up to 15	
	Purchase of gas thermal power	-	3%		Up to 20	
	Purchase of EE housing	20%	3%	Up to 60	Up to 50	
	Construction of EE housing					
	Connecting detached housing to the grid		3%			
	EE housing mortgage	20%	14.4% (20% - 40% EE)	Up to 180	Up to 100	
13.2% (41% - 60% EE)						
12% (+61% EE)						
<b>Trade and Development Bank</b>	Green detached housing	+30%	16.2%	Up to 240	Up to 1 billion MNT	0.8% (until 1 million MNT)
	Green loan	0%	16.8%	Up to 30	Up to 10	0
<b>Golomt Bank</b>	EE housing mortgage (construction of housing)	20%	EDGE Certified: Policy rate + 4%.	Up to 240	Up to 300	1%
	EE housing mortgage (PURCHASE OF A NEIGHBORHOOD HOUSE )	30%	EDGE Advanced Carbon Zero: Policy rate + 2%	Up to 120	Up to 160	

<b>Business green loan</b>						
Financial Institution	Loan name	Down payment	Interest rate	Duration, months	Limit, million MNT	Commission fee
State Bank	Purchase of renewable energy source		8%	Up to 30	Up to 100	It does not exceed 1% of the granted loan or 3 million MNT
	Purchase of insulation materials		8%	Up to 30	Up to 100	

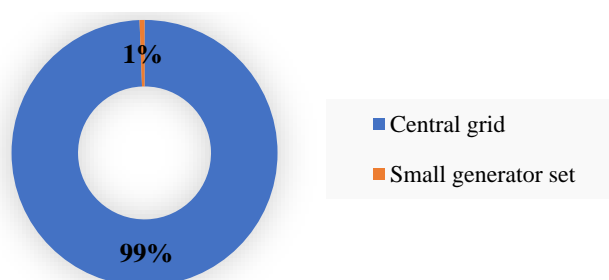
	Purchase of heaters		8%	Up to 30	Up to 50	
	Purchase of improved stove		8%	Up to 30	Up to 100	
	Purchase of gas thermal power		8%	Up to 30	Up to 50	
Golomt Bank	Sustainable, green business loan (Investment loan)		14.4% - 16.8%	Up to 84	Up to 1 billion MNT	0.50%
	Sustainable, green business loan (Working capital loan)		14.40% - 16.80%	Up to 30	Up to 500	0.10%

## Appendix 4. Results of Household Sample Survey

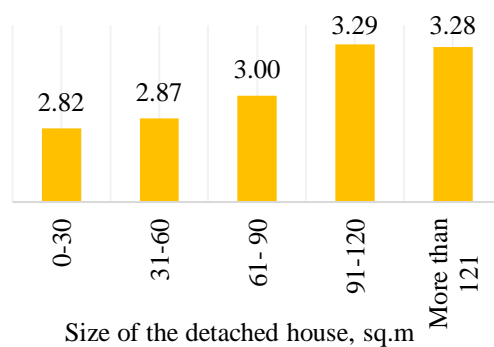
*Table A 1. Main material of wall*

	Давтам ж	Хувийн жин, %
Plank	28	5.6
Wooden frame	178	35.6
Brick	141	28.2
Concrete frame	128	25.6
Steel frame	5	1.0
Prefabricated building	6	1.2
Mixed	9	1.8
Do not know	5	1.0
<b>Total</b>	<b>500</b>	<b>100.0</b>

*Figure A 1. Electricity source*

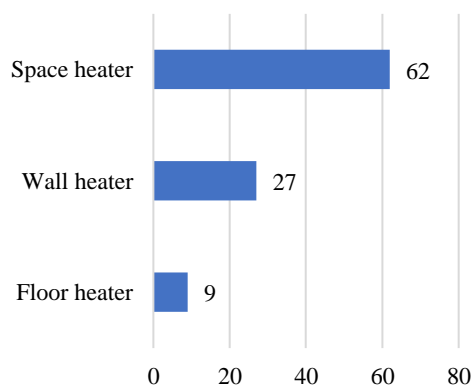


*Figure A 2. The average number for setting a fire per day, by the size of the house*



*Figure A 3. Number of households with electric heater, by type of the heater*





**Table A 2. Households' satisfaction on previous insulation**

	Frequency	Percentage share, %
Very satisfied	20	14.1
Satisfied	34	23.9
Neutral	60	42.3
Barely satisfied	17	12.0
Not at all	11	7.8

**Table A 3. Employment status of household head**

	Өрхийн тоо	Хувийн жин, %
<b>Salaried employee:</b>		
Permanent employee	217	43.4
Temporary employee	41	7.2
<b>Employer:</b>		
Enterprise	12	2.4
Market oriented family enterprise	8	1.6
<b>Not employing workers:</b>		
Enterprise	18	3.6
Market oriented family enterprise	31	6.2
Contributing household member	19	3.8
Unemployed	23	4.6
Student	2	0.4
Retired	113	22.6
Disabled	16	3.2
<b>Total</b>	<b>500</b>	<b>100</b>

**Table A 4. Number of paid employees, by size of enterprises**

	Frequency	Percentage share, %
Micro (1-10 employees)	38	6.4
Small (11-50)	156	26.4
Medium (51-200)	264	44.7

Large (more than 201)	133	22.5
<b>Total</b>	<b>591</b>	<b>100.0</b>

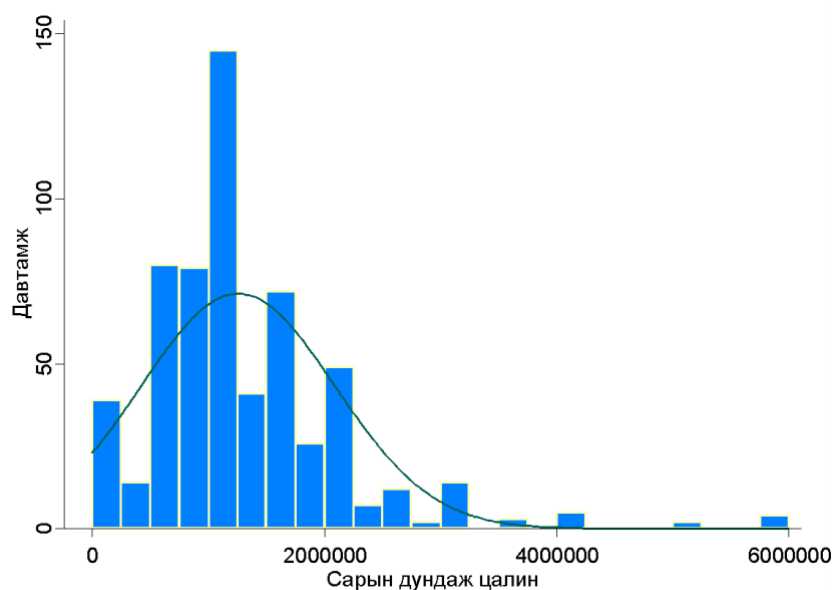
*Table A 5. Number of paid employees, by position*

	Frequency	Percentage share, %
Manager	145	24.4
Executive	131	22.1
Officer	145	24.4
Assistant	170	29.1
<b>Total</b>	<b>591</b>	<b>100.0</b>

*Table A 6. Number of paid employees, by sector*

	Frequency	Percentage share, %
Service	167	28.3
Construction	81	13.7
Trade	76	12.9
Education	59	10.0
Mining	53	9.0
Health	42	7.1
Bank and finance	31	5.2
Defense	19	3.2
Energy	18	3.0
Other	13	2.2
Manufacture	12	2.0
Information and communication	9	1.5
Arts and culture	6	1.0
Agriculture	4	0.7
Do not know/ did not answer	1	0.2
<b>Total</b>	<b>591</b>	<b>100.0</b>

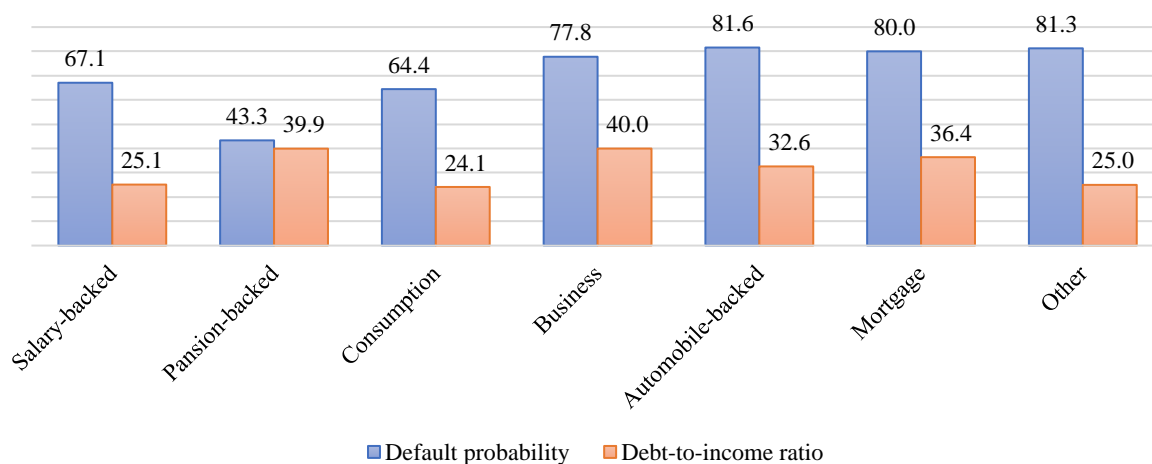
*Figure A 4. Distribution of monthly average wages of paid employees*



**Table A 10. Whether report PIT payment on e-tax system**

	Frequency			Percentage share, %		
	Yes	No	Total	Yes	No	Total
Permanent employee	207	131	338	61.2	38.8	100.0
Temporary employee	7	5	12	58.3	41.7	100.0
Self-employed	12	12	24	50.0	50.0	100.0
Contributing household member	1	7	8	12.5	87.5	100.0
Unemployed	4	2	6	66.7	33.3	100.0
Outside of the labor force	16	16	32	50.0	50.0	100.0
<b>Total</b>	<b>247</b>	<b>173</b>	<b>420</b>	<b>58.8</b>	<b>41.2</b>	<b>100.0</b>

**Figure A 5. Default probability, by type of loan (%)**



**Figure A 6. Most important factors for loan requirement, frequency**

