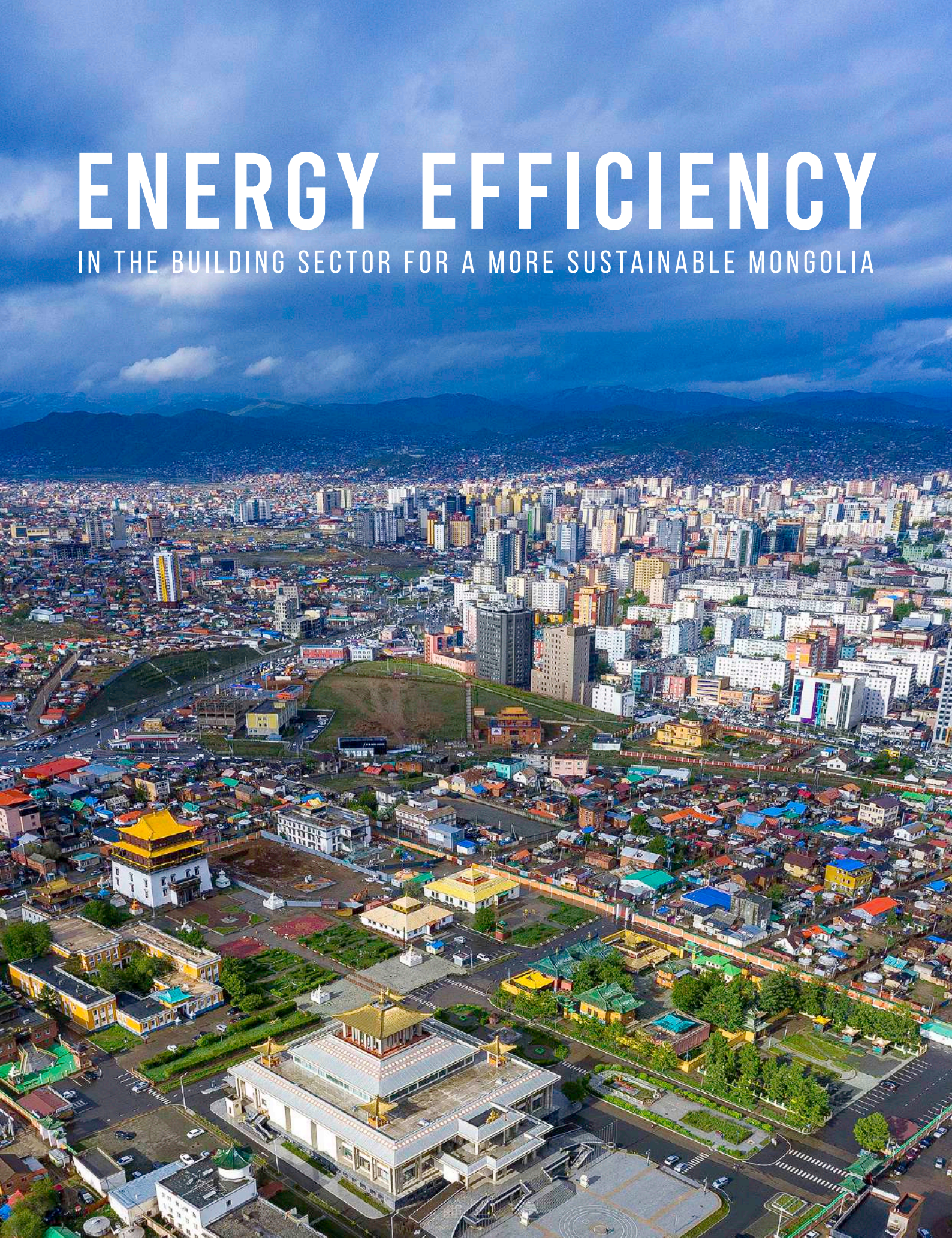
ENERGY EFFICIENCY

IN THE BUILDING SECTOR FOR A MORE SUSTAINABLE MONGOLIA



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DEUTSCHE ZUSAMMENARBEIT

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Swiss Agency for Development and Cooperation SDC

EDITORIAL

Dear reader,

In times of climate change and possible energy supply shortages globally, energy efficiency in the building sector is a much-discussed topic. However, in Ulaanbaatar, the coldest capital in the world, the topic has a bigger dimension. Without good insulation, winter times mean cold buildings and devastating air pollution. A problem that is most hazardous for children and elderly people, but harms everyone. Improving this and providing a better living environment is one of Ulaanbaatar's top priorities. Against this backdrop, a project was developed in close cooperation with the Municipality of Ulaanbaatar (MUB), and the Ministry of Energy (MoE). The project was financed by the Swiss Agency for Development and Cooperation (SDC) & the German Federal Ministry for Economic Cooperation and Development (BMZ).

This magazine seeks to document the results and outcomes of the work implemented between 2018 and 2022 by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ GmbH). As this cooperation was established on existing activities, two projects were merged: The SDC-funded "Public Investment in Energy Efficiency Phase 2" (PIE-2), and the German Government funded "Energy Efficiency Building Refurbishment in Mongolia" (EEP). The two projects joined forces, and worked together along with the MUB on four main topics on different implementation levels.

The work at different levels can be attributed to the fact that structural change does not happen at only one point, but has to be initiated from different angles and from all parts of society. This magazine is therefore addressed to the different stakeholders in this complex system. It not only demonstrates the results, but also gives ideas and tools on how to further develop this topic. This magazine has been enhanced with weblinks to offer additional readings and contacts, that could assist in training, and provides the ability for continued use of this document in the future.

The project team is happy to provide this magazine to you as a source of information on the topics of energy efficiency in the building sector, and public investment management.

Sincerely,

D. Hoff

Dr. Dunja Hoffmann & project team

CONTENT

ENERGY EFFICIENCY HELPS SOLVING SOME OF OUR MOST URGENT PROBLEMS

GREETING FROM SUMYAABAZAR DOLGORSUREN, GOVERNOR OF THE CAPITAL CITY AND MAYOR OF ULAANBAATAR

On behalf of the people of Ulaanbaatar, I would like to express my deep gratitude to the Government of Germany, and the Swiss Cooperation Development for their comprehensive support of Ulaanbaatar.

In recent years Ulaanbaatar has faced some very difficult challenges, such as smog and traffic congestion, which has hindered the achievement of the city's sustainable development goals. Financial and technical cooperation projects, and programmes of high socio-economic significance are being implemented in cooperation with international development partners. Results, such as proposed innovative solutions and pathways to more sustainability, play an important role in addressing problems in the city.

An example is the 'Energy Efficient Building Refurbishment in Mongolia' project implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), in cooperation with the Municipality of Ulaanbaatar.

Within the framework of the project's thermo-technical renovation, 22 school and kindergarten buildings in ger districts were renovated. This resulted in significant savings of heat energy, reduced air pollution, extended the life of the buildings, and improved the learning environment for students. It showed that energy efficiency helps in solving some of our most urgent problems.

In order to make budget expenditures more efficient and transparent, an investment information management system was introduced, regulations were updated, and supporting guidelines and manuals were developed and distributed. The work has significantly improved workflows, as well as internal communication and coordination between municipality institutions.

A number of documents were developed including the 'Capital City Budget Guideline', a planning guide that includes gender specific needs in investment planning and allows public accessibility to the city's budget information, and a 'Parent-Participatory Monitoring and Evaluation Methodology' to support major building renovations. Numerous training sessions have been conducted that have made a valuable contribution to the development of good governance practices.

Finally, the Local Energy Efficiency Action Plan (LEEAP) for Ulaanbaatar City was developed and submitted under this project. LEEAP has clearly defined short, medium, and long-term goals, and actions for the improvement of energy efficiency. In this regard, it has become a very useful document to systematically reflect certain funds in the capital city budget, create a stable investment environment, reduce greenhouse gas emissions, and fulfill our city's growing commitment to climate change. We plan to discuss and formalize this pioneering document in the near future, to help us meet our obligations under the Energy Conservation Law.

The aforementioned, as well as many other measures, good practices and solutions successfully implemented under this project have been compiled in this magazine and I am glad that it is available to you.

I would like to take this opportunity to thank the Swiss Development Cooperation (SDC), the German Ministry for Economic Cooperation and Development (BMZ), and the GIZ project team, for their support in implementing the project, and wish them success in their future endeavours.

We are glad that a new, large-scale project that focuses on energy efficiency of prefabricated panel buildings in Ulaanbaatar was approved. The aim of the project is to reduce the energy losses from the buildings, while increasing the comfort for the residents. We will sustainably incorporate the project results into our work, and provide full support towards achieving the project goals.

We are looking forward to continued cooperation between GIZ and the Municipality of Ulaanbaatar in the implementation of the project.

Thank you!

Sumyaabazar Dolgorsuren,
Governor of the Capital City and Mayor of Ulaanbaatar

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Swiss Agency for Development and Cooperation SDC

OUR COOPERATION HAS DEMONSTRATED THE HEALTH AND ENVIRONMENTAL IMPACTS OF ENERGY EFFICIENT TECHNOLOGY AS WELL AS THE BENEFITS OF GOOD GOVERNANCE AND TRANSPARENCY

GREETING FROM STEPHANIE BURRI, HEAD OF SWISS COOPERATION IN MONGOLIA

On behalf of the Swiss Agency for Development and Cooperation, it is my pleasure to share the impressive results of the Public Investment in Energy Efficiency (PIE-2) project implemented by the Municipality of Ulaanbaatar (MUB) and the GIZ and supported by the Swiss and German governments. The project successfully tackled the shortcomings in public investment management in Ulaanbaatar, demonstrated practical and replicable thermo-retrofitting models to reduce carbon dioxide (CO_2) to mitigate climate change, reduce air pollution, and—most importantly—had impressive positive impacts on the health of children and teachers.

We are impressed to see that because of the thermo-technical refurbishment of 22 kindergartens and schools in Ulaanbaatar, citizens—especially children in the city's ger areas—have better access to education facilities, leading to better air quality, health and reduced heating needs and costs. We can also see that children are healthier, and the livelihoods of poor and vulnerable households are improved through greater employability and savings on family health spending. Through our joint efforts, we have demonstrated that decreased energy consumption in public buildings leads to reduced public spending, air pollution, and CO_2 emissions. Through the work in facilitating good governance, the PIE-2 project contributed to the advancement of issues such as gender mainstreaming, gender-responsive budgeting, local budget and project investment transparency, public project planning and monitoring (with the involvement of citizens and parents), and asset management in Ulaanbaatar. Based on these results in the education sector, we are confident that MUB will replicate good Private Investment Management (PIM) and energy efficiency practices in health and other sectors in Ulaanbaatar.

PIE-2 also strengthened the capacity of private contractors on the thermo-technical retrofitting of buildings and raised public awareness about energy efficiency. Citizens are empowered by their participation in investment project planning and monitoring. At the global level, the Swiss government contributes to the multilateral Green Climate Fund (GCF), a fund established to assist developing countries in adaptation and mitigation practices to counter climate change. In Mongolia, we are very happy that Khas Bank is one of the selected partners for successful cooperation with GCF, providing green loans and improving the energy efficiency of private homes.

On behalf of the Swiss Agency for Development and Cooperation, I would like to thank the Municipality of Ulaanbaatar, the Government of Germany, and the GIZ project team. I do hope that our Mongolian partners sustain all project results by further upscaling them in other public sectors and share the good practices with other partners.

I wish you every success in this joint endeavour.
Thank you.

Stefanie Burri

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

OUR MONGOLIAN PARTNERS NOW HAVE SOLUTIONS AT THEIR HANDS FOR HIGHER ENERGY EFFICIENCY AND A HEALTHIER ENVIRONMENT

GREETING FROM DANIEL PASSON, COUNTRY DIRECTOR GIZ MONGOLIA

The end of a sustainable and impactful project is always the beginning and continuation of something bigger. Therefore, I am happily concluding the results of the EEP/PIE-2 project and the chances they provide for the future development of the city of Ulaanbaatar in energy efficiency for buildings. We have worked together with our valuable donors, the German Government and the Swiss Development Corporation to achieve results on many levels.

We demonstrated direct results for beneficiaries, for example, for families in the ger districts that were able to move into energy efficient homes without coal fired stoves. Our support in the thermo-technical refurbishment of schools and kindergartens allows children study in a healthier environment for many years to come. At the same time, we also worked intensely with institutions and public services to continue improving the quality of life of the residents of Ulaanbaatar.

We are grateful to celebrate the 30th anniversary of the Mongolian-German Development Cooperation in 2022. The project, "Vocational Education and Training of power plant personnel", agreed between the Federal Ministry of Economic Cooperation and Development of Germany, and the Ministry of Fuel and Energy of Mongolia in 1996, was the first project implemented within the framework of technical cooperation and highlighted the importance of the energy sector. At that time, Mongolia was in a challenging period of socio-economic transition, and was facing a shortage of electricity and heating supply, which lead to a negative impact on the country's economic growth. Since then, technical cooperation in the energy sector between Germany and Mongolia has continued uninterrupted.

With the results of this project handed over to the Mongolian partners, they have now different measures and solutions at their hands to take the next steps towards an energy efficient future. The reduction of energy demand in buildings and the efficient use of energy, make way for the possibilities of using renewable energies in a more efficient and integrated way. An immense potential for renewable energies in the land of the blue sky provides a chance for this beautiful country to implement more sustainable solutions in the energy sector.

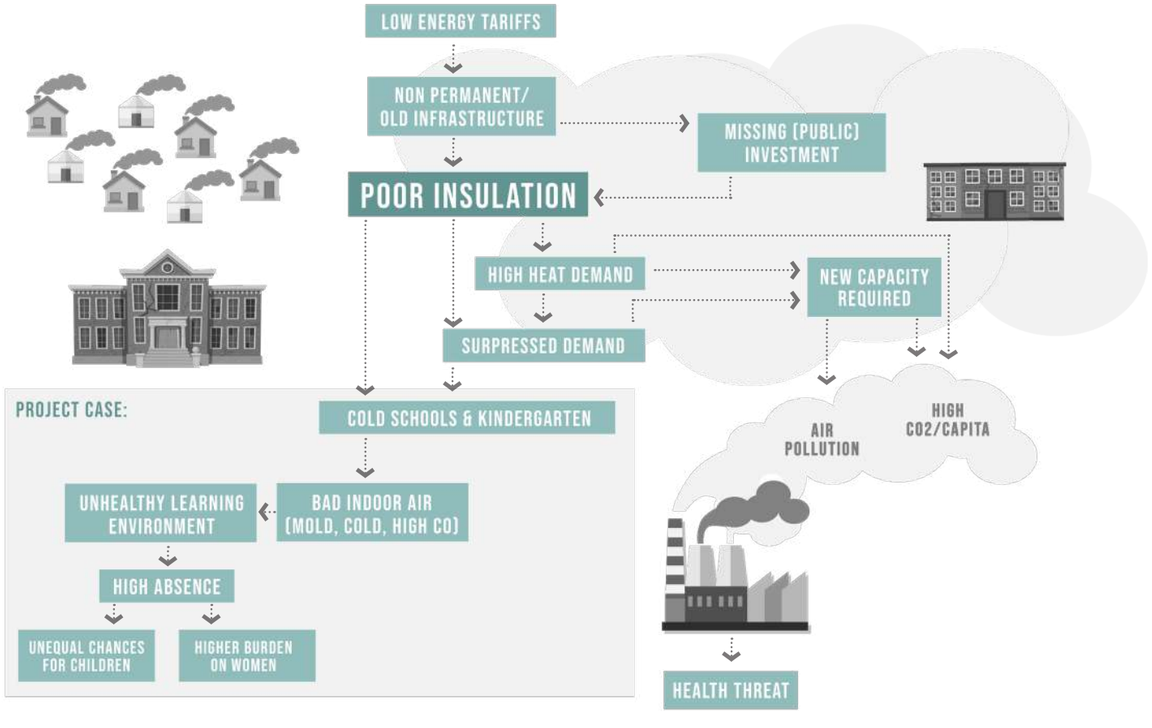
I am very grateful that GIZ was able to be supportive of the advancements and results presented in this magazine, and I am looking forward to continuing our excellent cooperation with our valuable partner institutions.

Daniel Passon

PROJECT OVERVIEW: A COMPREHENSIVE, MULTI-LEVEL APPROACH FOR A HEALTHY AND SUSTAINABLE CITY

Mongolia is characterised by extreme climatic conditions with short summers and long, cold winters. As of 2020, Ulaanbaatar is home to 411,000 households, 221,000 of whom live in informal settlements called ger districts.

The ger districts are mostly off-grid areas with limited access to electricity, water, sanitation, heat supply, and public transport. In their brick-and-mortar houses with high energy loss, households burn coal in stoves and use latrines in temperatures regularly dropping below –20°C. This makes the city a pollution hub, and exposes it to a public health crisis. Miscarriages are 3.6 times more likely to happen during coal burning months, and one in 10 deaths is attributable to air pollution, 80% of which is caused in the ger districts. Low room temperatures in public and private buildings are an additional acute health hazard during the winter season.



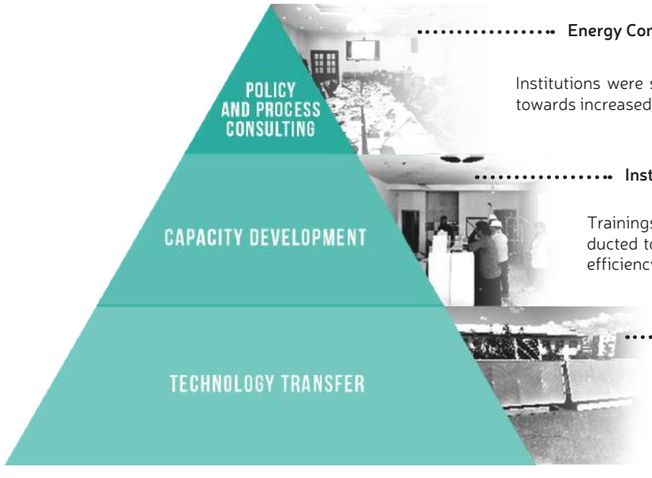
PRESENT CHALLENGES

The total economic costs associated with air pollution are estimated to be at least $645 million USD or 1.6 trillion MNT per annum. Solving the problem is a top priority for the Government of Mongolia, as can be seen by the financial measures taken in the past. Between 2008 and 2018, MNT 147.3 billion was spent annually from the state budget, and $60.7 million USD in foreign aid went into air pollution measures. The measures improved the situation to a certain extent but the air pollution still exceeds WHO thresholds frequently, and continues to have a very negative impact on people's health and general life quality.[1]

In order to achieve the projects overall objective to improve energy efficiency in the building sector in Ulaanbaatar and to contribute to the sustainable use of energy in Mongolia a comprehensive approach was required. Tackling the different challenges on their respective levels, four complementary components were implemented:

1	Transparent, effective and gender-sensitive public investment management in Ulaanbaatar was introduced through the case of energy efficiency in buildings.
2	Local Energy Efficiency Action Plan for the construction sector was adopted.
3	Private sector's capacity for energy efficiency was improved.
4	Energy efficiency technologies were introduced into ger neighbourhoods.

In the development and implementation of the energy efficiency measures the project followed a micro – meso - macro level approach:



Energy Conservation Law, Financing arrangements, (macro)

Institutions were supported in the development of new policies to have pathways towards increased energy efficiency and reduced energy consumption.

Institutions, Service Providers, Credit Facilities (meso)

Trainings on energy efficiency and governance were developed and conducted to improve the capacity of people working towards higher energy efficiency, better public spending and gender equality.

Piloting, Market take-up, Replication (micro)

Through the introduction of new technologies, it was possible to showcase possibilities and results of energy efficiency.

1 UNDP, 2019, Air Pollution in Mongolia: Opportunities for further Actions

MILESTONES OF SWISS- & GERMAN-MONGOLIAN TECHNICAL COOPERATION IN GOVERNANCE AND THE ENERGY SECTOR

In 2014, a significant strategic decision was taken when the Swiss and German donor institutions decided to join forces in their work in Mongolia in good governance (SDC) and the energy sector (BMZ). The Public Investment in Energy Efficiency Project (PIE) and the Energy Efficiency in the Grid Connected Energy Supply Project (ENEV) were combined to form the first co-financed pilot project, running from January 2014 to December 2018. The project demonstrated how newly decentralized public funds could be utilized for cruical investments in energy efficiency of public buildings in Khovd and Zavhkhan, two remote western provinces of Mongolia. The project empowered the local population to actively participate in planning and budgeting of priority investments. This resulted in improved well-being and living standards for rural citizens.

Due to the very positive results, as well as high partner satisfaction with the project and its approach, the SDC decided to finance a follow-up and the last phase of PIE, for a duration of four years from January 2018 to December 2021. The idea behind PIE-2, was to replicate and mainstream the positive experiences gained in the western aimags. This was to be achieved by introducing the governance-related procedures and the innovative technical knowledge developed, to the disadvantaged ger areas in the semi-urban belt of the capital city Ulaanbaatar.

Once ENEV 3+ project was terminated in 2018, GIZ started implementing the Energy Efficient Building Refurbishment in Mongolia Project (EEP), and PIE-2 on behalf of the two donors. Focusing on the ger areas of Ulaanbaatar was in line with the objective of the Swiss cooperation strategy 2018 – 2021: to contribute to the Government of Mongolia's efforts in mitigating the negative effects of the rapid urbanisation process in Ulaanbaatar, and in particular its impact on poor and vulnerable groups.

The engagement of the GIZ in the energy sector dates back even further than 2014. The GIZ has been active in Mongolia for the last 30 years, and has been involved in the energy sector for more than 25 years. The first financial support to the energy sector started in 1993, when the project "Ensuring the reliable operation of energy supply in Darkhan" was launched. Technical cooperation started in 1998, with the "Power Plant Employee Capacity Building" project.

Since then, numerous cooperation projects have been established in the energy sector, contributing significantly to the achievement of milestones crucial to reach the EEP/PIE-2 project goals. Good cooperation was always an important aspect of the relationship with the Mongolian partners. This included the Ministry of Energy as a political partner and main counterpart in the early years, and the Energy Regulatory Commission (ERC) to work on strategic energy topics and framework conditions. One of the milestones was to create a legal environment for energy savings. The Law on Energy Conservation was approved by the State Great Hural in 2015, and has been successfully implemented since then.

EXAMPLES OF MILESTONES REACHED WITH INPUTS OF GERMAN & SWISS COOPERATION IN MONGOLIA IN GOVERNANCE & THE ENERGY SECTOR

SUSTAINABLE DEVELOPMENT GOALS

The United Nations Sustainable Development Goals (SDGs) were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. There are a total of 17 interrelated SDGs: Action in one area will affect outcomes in others. All development must balance social, economic, and environmental sustainability.

The Project has contributed to thirteen SDGs in the following areas:
Some numbers show direct examples of the project's contribution. More can be seen in the relevant articles. Each chapter indicates the relevant SDG symbols that have been touched upon.

Better indoor air quality and higher room temperatures improve the health of teachers and students.

Less spending on medicine, less care work for sick children and improved learning conditions reduce poverty.

15000 places for children now have a better learning environment.

Indoor temperatures increase from 12-18 to 22°C

Better learning environment has a positive impact on education.

Up to 66% more attendance in school activities after refurbishment.

Less care work for sick children results in better economic opportunities for women and consequently more gender equality.

Up to 48% less absence days of children after refurbishment.

Energy efficient houses and the use of solar energy contribute to the reduction of coal firing.

26 EE pilot houses built without coal firing.

Increased capacities in the renewable energy and energy efficient housing sectors allow for more sustainable growth and well paid jobs.

583 people from construction sector capacitated.

Refurbishment protects existing infrastructure from harsh weather conditions and reduces the need for future spending.

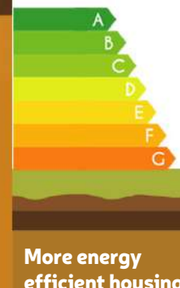
The lifetime of refurbished buildings is extended by 30 years.

Better learning conditions in public schools reduce the gap in opportunities between children from poor and rich families.

Since 2020 248 out of 399 schools & kindergartens have use the database to apply for improvements.

Pilot projects and long term planning helps to create a more sustainable and healthy capital city.

Blueprints for 1192 buildings in UB including planning and budgeting available.



More energy efficient housing results in less energy consumption and less burning of coal.

Refurbishment saves public buildings on average up to 55 % of coal based energy.

Less burning of coal results in lower CO_2 Emissions.

135.000 t of CO_2 saved during lifetime of pilot buildings

Less burning of coal results in less air pollution and a healthier environment in the capital city.

Each EE house can save 210 t of coal over lifetime.

Improved public investment management, higher transparancy and gender sensitive budgeting leads to more justice and prosperity.

3 publicly available online tools available to enhance transparency of public investments .

1 NO POVERTY

3 GOOD HEALTH AND WELL-BEING

4 QUALITY EDUCATION

5 GENDER EQUALITY

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

10 REDUCED INEQUALITIES

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

15 LIFE ON LAND

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

LOCAL ENERGY EFFICIENCY ACTION PLAN (LEEAP)

WHY ENERGY EFFICIENCY IS CRUCIAL FOR THE SUSTAINABLE DEVELOPMENT OF MONGOLIA

Buildings are responsible for 40% of global energy consumption, and 33% of greenhouse gas emissions. More than 80% of Ulaanbaatar's district heating is used to heat the city's buildings, which contributes to at least 50% of Ulaanbaatar's carbon emissions. The city consists of old building stock, which was mainly built during the socialist era. As a consequence, and due to a lack of refurbishment activities, the insulation of most buildings is poor.

It is critical to ensure that new buildings are sustainable, and energy-efficient, to reduce the energy demands of the building stock. However, given the thermo-technical refurbishment of a building is around eight times cheaper than constructing a new one, it is also crucial to widely refurbish old structures in the city, and across Mongolia. Reduced heating results in lower fine particle emissions, and lower CO_2 emissions.

Increased energy efficiency in the building sector results in reduced heating needs. This means that the available heat in the district heating system will be enough for more buildings. In times of suppressed demand and heat generation shortages, this is an essential factor for more energy efficiency. The heat demand in Ulaanbaatar increases by approximately 7% each year while the supply capacity is not increasing at that rate and therefore does not meet the demand. Instead of investing in new coal-based heat plants, there is the chance to lower the heat energy demand by about 50% with simple energy efficiency measures. This is a win on many levels compared to building new coal-based heat generating capacities:

1. lower investment costs
2. lower CO_2 emissions
3. running costs remain at the same level (instead of higher costs, due to the expense of more power plants)
4. increased temperatures, and living comfort for residents

Higher energy efficiency is also the basis for using clean renewable energies such as hydro, solar, and wind energy instead of fossil fuels. On the pathway to using higher shares of renewable energies, energy efficiency is a crucial step.

ENERGY PYRAMID ON THE EXAMPLE OF A THERMO-TECHNICAL REFURBISHMENT OF A KINDERGARTEN

In order to demonstrate the approaches used to gain an efficient and sustainable energy system for the City of Ulaanbaatar, the bottom-up approach of the energy pyramid has been used within the project's implementation.

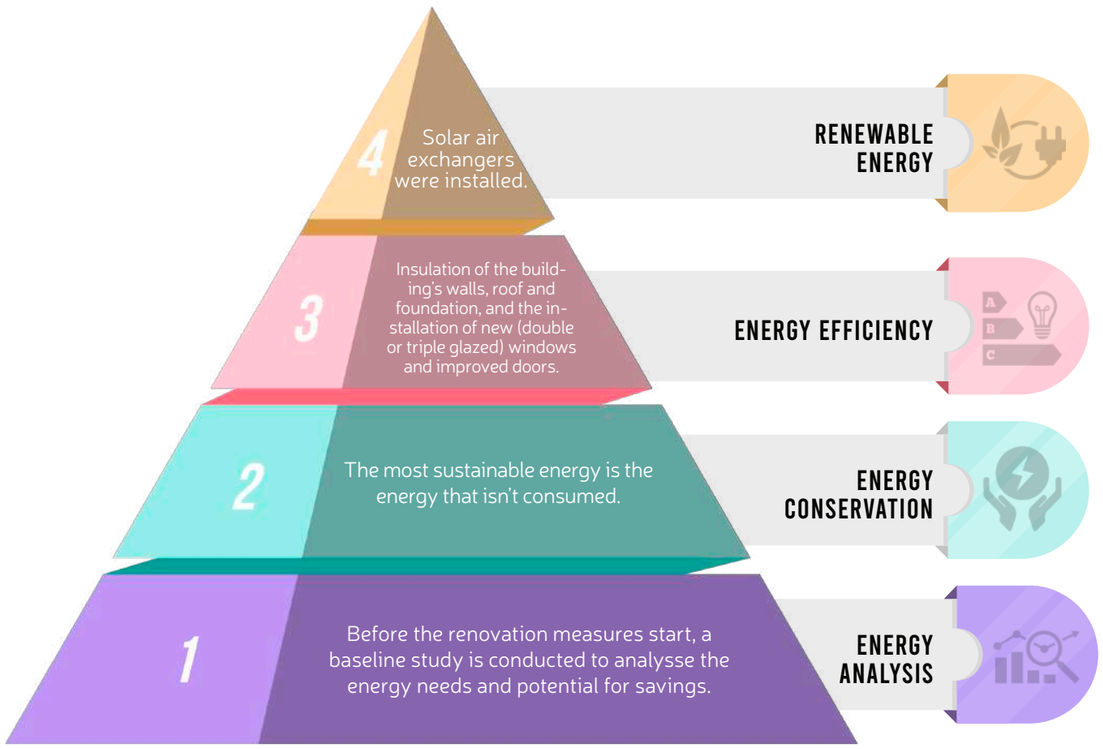
1. Energy Analysis: Before the renovation measures start, a baseline study is conducted to analyse the energy needs and potential for savings. Heat meters and mixing loops are installed in the buildings to find out how much (heat) energy is received per year. At the same time indoor air temperatures are measured at different locations of the building.

In many cases the heat received is not sufficient to meet the energy demand, and it remains cold in the buildings.

2. Energy Conservation: "The most sustainable energy is the energy that isn't consumed." Ways of conserving (not using) energy were analysed and implemented. For example, it is recommended to ventilate rooms briefly but intensively, instead of leaving windows open for longer periods of time. If heat regulators are installed, it is suggested to reduce the heating inflow, if temperatures are too high. In the case of schools and kindergartens, the temperature can be reduced on weekends.

3. Energy Efficiency: One of the main activities within the project was to conduct the thermo-technical refurbishment of 22 public buildings. This was achieved by improving the insulation of walls, roofs and foundations, and the installation of new (double or triple glazed) windows and improved doors. Further, the installation of mixing loops provides the ability to control the temperature in different areas of buildings, which is highly beneficial when it comes to saving energy as the south facing sunny side usually requires less heating.

4. Renewable Energy: Solar air exchangers were installed on several buildings, only after energy consumption was reduced. Since the energy consumption was reduced by between 40 – 55% it is possible to use a higher degree of renewable energies in the future to further reduce the emissions of the building.



ENERGY PYRAMIDE: BOTTOM UP APPROACH TO AN EFFICIENT AND SUSTAINABLE ENERGY SYSTEM

INTRODUCING A LOCAL ENERGY EFFICIENCY ACTION PLAN (LEEAP) IN ULAANBAATAR

Climate change and air pollution are two of the major challenges that Mongolia faces. Finding interventions aimed to improve energy efficiency, and reduce emission in the atmosphere has become imperative to safeguard the health of people.

The City of Ulaanbaatar's priority is to be a safe, healthy, and green city that is resilient to climate change. This will be achieved by providing a liveable environment for its residents through appropriate land use, planning, infrastructure, and housing. This target is challenging, and will need a great number of actions to demonstrate how the city can reduce greenhouse gas emissions from transport, electricity, heating, power generation and transmission within the city boundaries.

A first step to tackle this challenge is to focus on the building sector by introducing a Local Energy Efficiency Action Plan (LEEAP) for the City of Ulaanbaatar, with practical and immediately applicable actions. Between 2019 and 2020 a multi-stakeholder process took place to create the LEEAP. Through many workshops, along with the support and steering of international consultants and the GIZ, the plan was developed by the Municipality of Ulaanbaatar, the Ministry of Construction and Urban Development, the Energy Regulatory Commission and non-governmental organisations.

WHAT IS A LOCAL ENERGY EFFICIENCY ACTION PLAN?

The actions described in the plan enable a city to reach important energy efficiency targets, and also improve air quality. A LEEAP also includes monitoring and energy management actions, which will support the development of new climate and energy efficiency goals and plans in the future. It describes actions that will be decided by the councils of the city for reaching energy efficiency targets in the building sector. LEEAPs are the first step in the right direction for a safer, healthier, and greener city; establishing a common understanding of the starting point with an initial quantification of the scale of the problem, and the setting of short, mid, and long-term targets. A LEEAP shall be used as a guiding document and reference for budgeting programmes and operational planning to deliver building renovation programmes. The plan sets a boundary for planned interventions and includes a first attempt to quantify the size of the problem.

Tapping into energy saving and building renovation projects, requires policies and mechanisms to develop and deliver large numbers of relatively small projects, which are scattered amongst thousands of buildings in different sectors. As such, the energy efficient renovation of buildings often does not compete well against other opportunities for using up-front capital, such as capacity expansion of power plants or a new wind farm. Barriers and problems exist, such as high transaction perceptions. Unmet needs for technical expertise and lack of financial intermediation mean that much of the potential for saving energy will remain untapped and the existing building stock will dilapidate further. Institutional innovation is required to address these barriers, and to put in place efficient policies and programmes for identifying ways of delivering building renovation projects.

ULAANBAATAR'S WAY FORWARD

The initial actions for the city of Ulaanbaatar to consider are institutional capacity development, clear management structures and processes to deliver building renovation and energy efficiency. Only then do the proposed actions become more concrete, initially with pilot projects, then followed by market up-scaling. The boundaries of this LEEAP are the four building sectors: public buildings, multifamily buildings, single-family buildings in ger districts and new buildings.

In this initial period, it is suggested that the city will strive to gradually introduce cost recovery tariffs, which is an essential element for supporting energy efficiency programmes. With regards to new building construction, the City of Ulaanbaatar strives to introduce mandatory energy performance certificates and norms to ensure the energy efficient design of buildings. A priority of the City is to limit new sources of pollution, therefore evaluating and enforcing connection to the existing district heating system as part of this plan.

THE LEEAP WILL ENABLE ULAANBAATAR TO REACH IMPORTANT ENERGY EFFICIENCY TARGETS AND MOST IMPORTANTLY IMPROVE THE CITY'S AIR QUALITY. IT ALSO INCLUDES MEASURES IN THE FIELD OF MONITORING AND ENERGY MANAGEMENT, WHICH WILL SUPPORT THE CITY OF ULAANBAATAR TO DEVELOP NEW CLIMATE AND ENERGY EFFICIENCY GOALS AND PLANS IN THE FUTURE.

T.Kherlen, Head of Engineering Department of MUB

THE PURPOSE OF LEEAP IS TO INTEGRATE ENERGY EFFICIENCY INTO THE BUILDING SECTOR. WE WILL FOCUS ON IMPLEMENTING LEEAP NATIONALLY AND CREATING A COMPREHENSIVE DATABASE PLATFORM ON THE ENERGY CONSUMPTION OF BUILDINGS IN MONGOLIA.

D.Gantulga, Head of Department Cordination of implementation policy for building and construction material of Ministry of Construction and Urban Development (MCUD)

Download the LEEAP for UB and regional guidebook:

LEEAPS FOR THE MONGOLIAN REGIONS

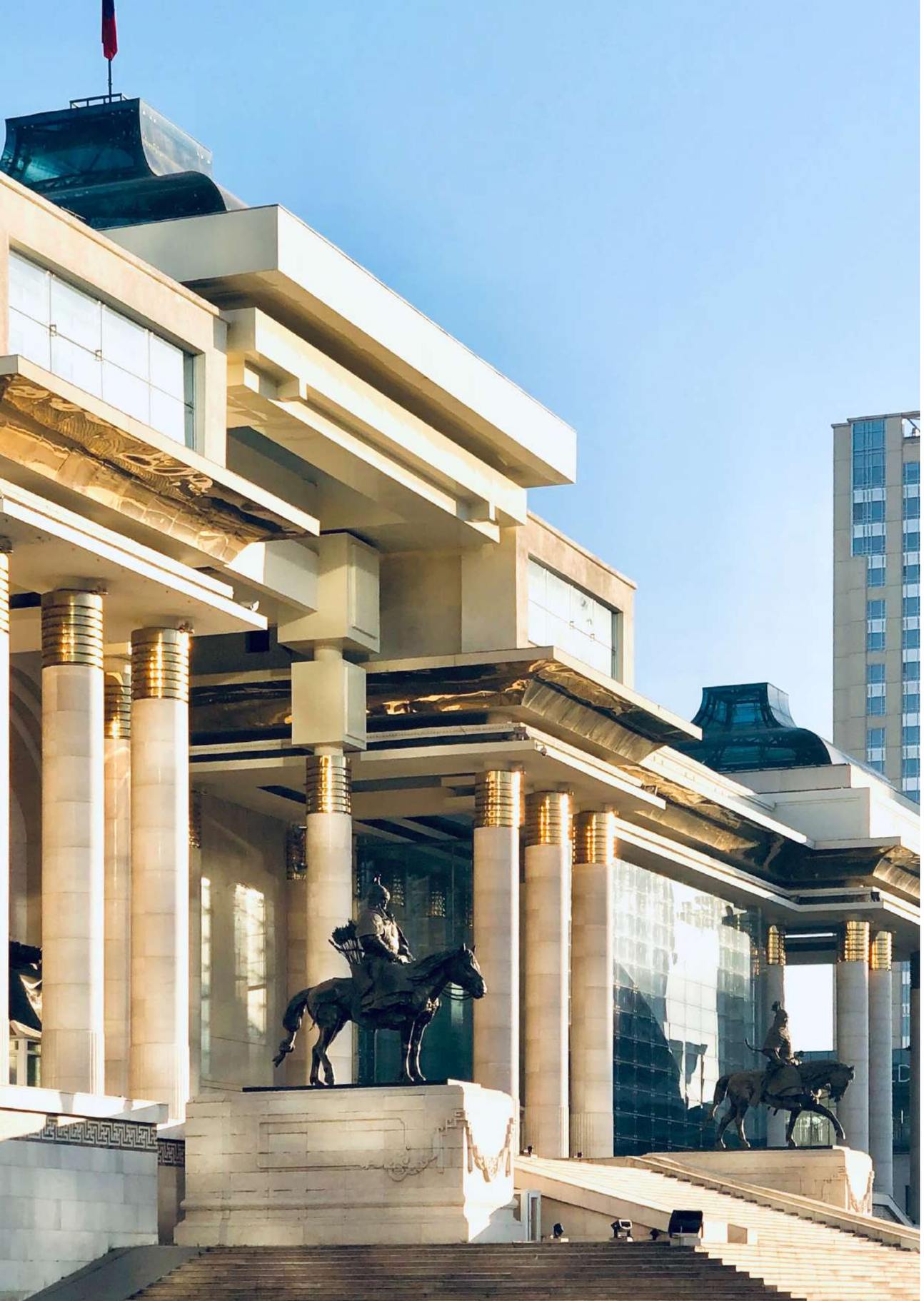
GUIDEBOOK NOW AVAILABLE FOR ALL AIMAGS

It is not only Ulaanbaatar that is struggling with an old building sector and poor air quality, so are most cities in Mongolia. The 2015 Energy Conservation Law requests all aimags to develop local policies on energy saving and to implement them in cooperation with relevant organisations culminating in regional LEEAPs. Developing the LEEAP in Ulaanbaatar with various stakeholders with at times opposing interests, was challenging but much was learned. The learned experiences are valuable for other Mongolian regions. GIZ will carry out five regional conferences to share good practices and possible obstacles, in Khovd, Orkhon, Tuv, Khentii and Ulaanbaatar.

To train local practitioners in developing LEEAPs, a guidebook has been developed. It gives more insights into the development stages and splits up the work into 11 easy-to-follow steps. Adhering to the steps will help local authorities developing and implementing their first LEEAP. It will help by saving energy and contribute to better air quality and improved living conditions.

1. MAPPING OF EXISTING POLICY DOCUMENTS AND STAKEHOLDERS
2. MAIN CHALLENGES FOR THE CITY OF ULAANBAATAR
3. ROAD MAP
   - FINANCIAL MODEL
   - SENSITIVITY ANALYSIS
4. OBJECTIVE AND TARGETS
   - SMART
5. SWOT ANALYSIS
6. IDENTIFICATION AND DETAILED PLANNING UNTIL 2050
7. PRIORITISATION AND CATEGORISING OF THE MEASURES
8. FINANCING OF LEEAP MEASURES
9. CREATING LOCAL INSTITUTIONAL AND ORGANISATIONAL CAPACITY
10. MONITORING AND REVIEW SYSTEM
11. APPROVE AND IMPLEMENT LEEAP BY THE CITIZENS' COUNCIL

RAISE PUBLIC AWARENESS



GOVERNANCE IN THE MUNICIPALITY OF ULAANBAATAR

Many public buildings, such as hospitals, schools, kindergartens, libraries, and dormitories were built several decades ago when standards were much lower than today. Low building standards and a lack of maintenance over the years are the main reasons for the significant increase in heat loss, and subsequently high energy consumption.

The comfort of those who study, work, or use services in cold buildings with high heat loss is low. On the one hand, this has a negative impact on their productivity, health and quality of life. On the other hand, it leads to a significant increase in energy consumption and operating costs, which places a strain on the budget and increases greenhouse gas emissions.

For all those reasons it was important to improve the management of public investments, and introduce new standards to improve energy efficiency through better planning, budgeting, financing, implementation and monitoring of project activities. As part of the cooperation between MUB and GIZ, the focus of the governance advisory work was therefore on enriching the core system with institutional quality and principles of good governance.

The project has contributed to the provision of accessible and high quality public services through the renovation of public buildings in the education sector.

Transparent criteria for the rating and selection of buildings for renovation measures have been developed, endorsed, and made public. A public investment guide has been developed and introduced to all relevant stakeholders. In addition, officials and staff were empowered through training and advisory services in order to support state organisations in creating an open, transparent, and people-centered environment.

The MUB has significantly improved the accessibility of services to meet the needs of its citizens. The efficiency of investments was increased, and the implemented policies deliver tangible results for the general public as well as specific target groups, such as the poor and vulnerable.

WE DID NOT EXPECT A REFURBISHMENT PROJECT TO HAVE SUCH A HIGH-SCALE POSITIVE IMPACT ON HEALTH

INTERVIEW WITH MRS. STEFANIE BURRI, HEAD OF THE SWISS COOPERATION OFFICE IN ULAANBAATAR

Good afternoon, Ms. Burri. You are in charge of many projects. What were the unique aspects of the PIE-2 project from the Swiss Agency for Development and Cooperation's point of view?

Here we are talking about one of our exemplary projects that demonstrates how bringing people, teachers, and parents together with representatives from public administration, and the planning sector can bring concrete results. In total, 22 schools and kindergartens in Ulaanbaatar were renovated with Swiss funding in order to improve the energy efficiency of buildings. We are proud to say that this experience entailed greater energy efficiency, and effective and efficient public investment management. We were impressed by the huge impact of the refurbished buildings on the health of children and teachers.

How does this impact translate into numbers?

Data clearly show that the number of sick children decreased by up to 48% and in this case teachers' sick leave was reduced by 78% compared to 2017. This was due to the improved air quality, and raising the indoor temperature from 15°C to 22°C after refurbishment in 2018. Another important impact of the refurbishment was that energy consumption was reduced by at least 40%. This means that the project contributed to reduced CO_2 emissions in Ulaanbaatar, given the heating systems of schools and kindergartens still function with coal.

Moreover, the buildings were given a longer lifetime which saves on state and city spending, reducing a major maintenance budget that accounts for around 10% of the annual investment budget.

So, the project tackled several important problems at once.

The retrofitted buildings serve as demonstrations of the financial, health and wellbeing benefits of better insulation. Of course, there are no easy solutions for complex problems, but some problems can be solved with focused projects. Refurbishing schools and kindergartens contribute to tackling problems such as greenhouse gas emissions, public health, and reducing parent absenteeism from work. The reduction of absenteeism is a highly relevant contribution as mothers who used to take two to three days off from work to look after sick children, are relieved of this burden and can therefore make greater contributions to household income.

To produce such tangible results, it is important to work in a systemic way, including not only engineers and construction companies, but also public servants, teachers and parents. For instance, the capabilities of public servants were strengthened through on-the-job training by combining theory and practice on public investment, project management, gender-sensitive budgeting, and energy efficiency. The training programmes are now institutionalised at the Training Research Centre of the Municipality of Ulaanbaatar city, and the National Academy of Governance. Parallel to these efforts, the project supported the improvement of the regulatory framework for public investment.

Were there aspects of the project that surprised you?

We did not expect a buildings' refurbishment project originally targeting energy efficiency to also have such a high-scale positive impact on health. This aspect makes such projects particularly interesting and relevant for poverty reduction, and also very cost-efficient.

Please elaborate on the social impacts of the project.

The project contributed to mainstreaming gender equality in municipal policy planning, as it created incentives for city officials to plan and implement investment projects that take into account the needs of different social groups through revised regulatory documents. The project also demonstrated how parents and the public could be involved in public investment monitoring to ensure the quality of construction work. With technical support provided by the project, parents and teachers learned to identify and implement solutions to the issues and problems at the schools and kindergartens. Because of this collaboration, they improved their waste management and planted vegetable gardens in outdoor areas of schools and kindergartens, showing that teachers and parents can make sustainable, meaningful changes in children's lives. The Swiss Agency for Development and Cooperation is very proud of the communities, teachers, and in particular, the children who made real change happen for a better future for Mongolia.

Can the refurbishment of the 22 schools and kindergartens serve as a model for more energy efficiency in other building sectors as well?

The Swiss Agency for Development and Cooperation is thrilled to see that the municipality is replicating the project's approaches to energy-efficient construction technology with the renovation of many other buildings. Additionally, loan schemes have been developed with the Mongolian Bankers Association, and several private banks are now providing loans for further energy efficient buildings' construction and/or refurbishment. Some of these Mongolian private banks have successfully applied for funding from the Global Green Climate Fund (GCF) - a fund established to assist developing countries in adaptation and mitigation practices to counter climate change - to continue such investments in the long run. Moreover, they have been successfully introduced to finance energy-efficient construction and are providing grants for ger area residents to build their own energy-efficient single-family homes. This was another surprising, unplanned result of the project which shows the sustainability potential of such projects, and also how important it is to invest in this sector.

What is your vision for Ulaanbaatar's future considering the project results?

The Swiss Agency for Development and Cooperation would like to see the municipality to continue refurbishing all remaining schools and kindergartens with energy-efficient technology, financially supported by Mongolian private banks and technically by national and international private companies. The refurbished schools and kindergartens consume at least 40% less energy and are eight times cheaper than constructing new buildings. The municipality has the tools and knowledge to select, plan, finance, and implement this work. Of course, all this should be done in partnership with the people, teachers, and parents of the communities impacted. They know their needs best and can make changes when they are empowered and equipped with the know-how. No child should be cold at school or in a kindergarten anymore. With reduced CO_2 emissions through the reduction of coal consumption for public buildings, Ulaanbaatar may pose less of a threat to its citizens and climate change.

NUMBERS OF SICK CHILDREN DECREASED BY UP TO 48% AND TEACHERS' SICK LEAVE WAS REDUCED BY UP TO 78%.

Swiss development cooperation is phasing out of bilateral cooperation with Mongolia in 2024 but regional projects will continue to be implemented. What do you take from this project as lessons learned that can also be relevant for other projects or countries?

Addressing governance and energy efficiency is a fruitful combination, which leads to significant health impacts, making such projects truly cost-efficient, impactful and interdisciplinary/intersectoral. This can be up-scaled for other sectors to improve the efficiency of public investments and contribute to the reduction of CO_2 emissions to reach SDG ambitions. Lessons learned from this project – the good and challenging lessons learned and experienced – will be up-scaled regionally. Technical solutions well tested here in Mongolia, such as refurbishment blueprints for buildings of the same type, and expertise, such as training materials and case studies, are useful approaches that could even be implemented in countries with a similar climate. At the global level, the Swiss government contributes to the multilateral GCF. This fund is not only a pot of money to be re-distributed, but it is also a treasure trove of experiences and information about best practices to be shared by participating donors and developing countries. In Mongolia, we are very happy that Khas Bank is one of the selected partners for successful cooperation with GCF, providing green loans and improving the energy efficiency of private homes.

Thank you.

WHY ENERGY EFFICIENCY IS ALSO A GENDER TOPIC

Difference groups in society have different needs. This includes boys, girls, children with disabilities, and teachers who are learning and teaching in public buildings. To fulfill their needs, public decision makers should ensure that studying and teaching is possible in a children friendly, safe, accessible and effective learning environment that provides comfortable air quality, cognitive & ecological education, hygiene, security and the oportunity to fulfill social needs.

If those needs are not considered children can for example, face the risk of falling ill due to low temperatures and unhealthy indoor air quality, traffic accidents due to missing safety measures and lacking behind their cohort fellows in learning, due to an unpleasant education environment. Taking care of sick children is still considered the task of a mother. As a consequence, it is mostly woman that suffer from lower economic posibilities if they have to take unpaid leave days, while caring for sick children and additionally spend money on medicine.

In parent and teacher monitoring groups the project supported these participants alongside the monitoring and construction process, to analyse their children's school and kindergarten environment conditions and developed solutions to fulfill the mentioned needs. Thermo-technical retrofitting improved the learning environment by creating higher indoor temperatures and better accessibility, working sanitary facilities and in some cases could also provide new learning spaces. In addition, the moderated process of the renovation monitoring group allowed the groups to identify other measures that often could be implemented without high costs but helped to fulfill the above mentioned needs of the children. Negative effects of sick children were reduced significantly.

GRB: ALLOCATE PUBLIC FUNDS WHERE CITIZENS NEED THEM MOST

To allow these positive effects to happen in all public processes, gender mainstreaming needs to be implemented in Public Investment Management (PIM) and public budgeting.

Budgets are the main tool by which governments translate their priorities and policies into monetary terms, defining how much, when and for which purposes money will be invested and spent. Thus, what characterizes budget planning is the social, political, economic and gendered view of what is worth spending money on, and this view can often be biased. Gender-Responsive Budgeting (GRB) aims to help overcome those biases and contribute to a more equal, efficient and sustainable investment in development. Therefore the project supported public institutions on different levels to include gender mainstreaming and gender responsive budgeting (GRB) into their processes and regulations.

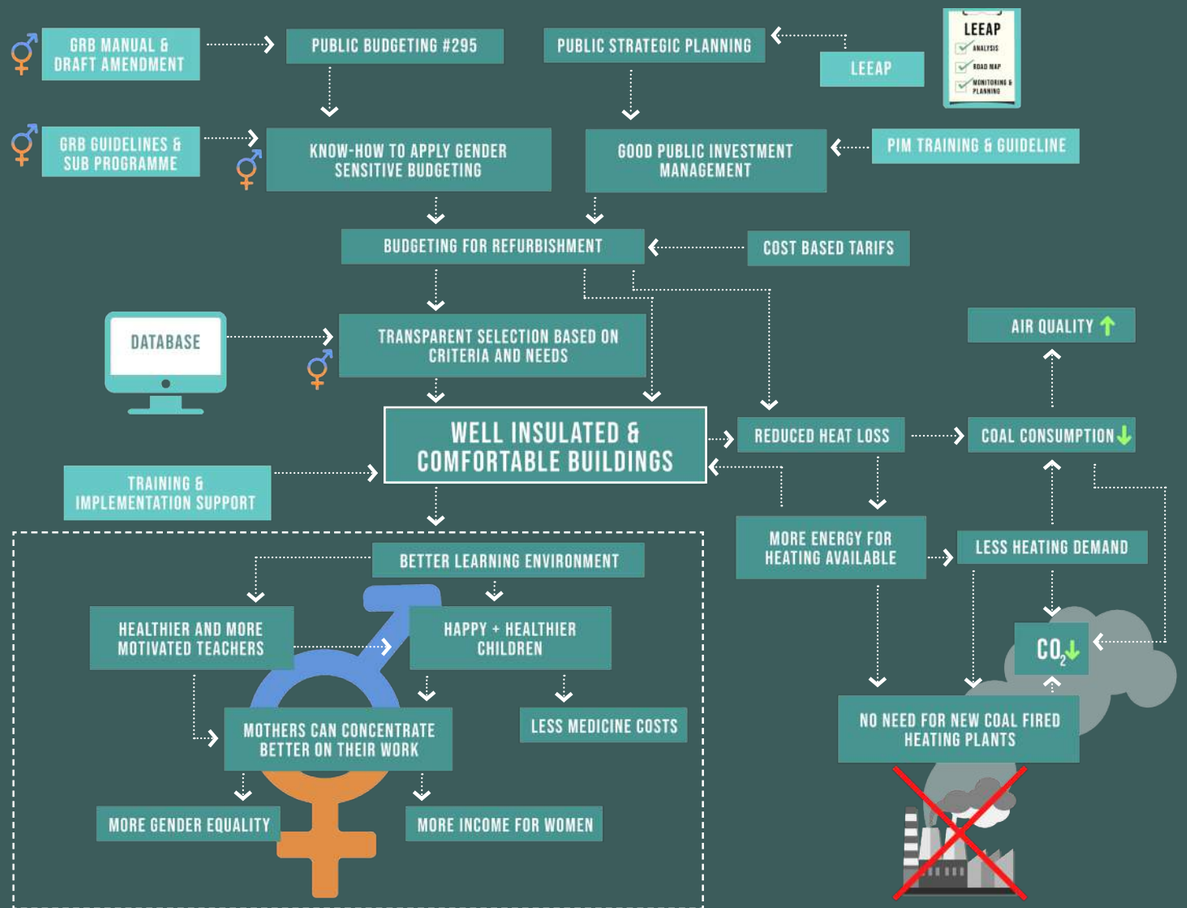
One of the main outcomes of the Governance component is the mainstreaming of GRB into the Public Investment Management (PIM) cycle at MUB. The project supported the Municipality of Ulaanbaatar (MUB) in conducting a gender equality situation analysis in the nine districts and to develop a guideline that allowed the creation of a gender equality sub-programme to provide the basis for introducing gender equality considerations throughout the local government budgeting process. The Ulaanbaatar City Gender Equality Sub-Programme was approved by the UB City Council on 31 March 2020.

It focuses on changing the behaviour of officials and the general public and supports the adoption of the principles of gender equality on the local level. It takes into account the different impact of laws, policies and programmes on men and women and gives equal weight to different knowledge, experiences and needs. It mobilises sufficient financial and human resources, supports family development, and promotes best practices and experiences of international and local businesses and organisations.

The aim of this sub-programme is to push forward the implementation of laws and legislation to ensure gender equality. This will be actioned by mainstreaming gender concepts into community development planning and programmes, introducing a gender-sensitive approach to planning, budgeting and monitoring, and changing gender stereotypes or negative attitudes towards gender at all levels. Public servants, such as investment officers have been trained on how to implement the programme. The topic of GRB will be implemented in the regular programme for Public Investment Management of the National Acacemy of Governance and the UB Research and Training center.

Please find the Gender Sub programme here:

ENERGY EFFICIENCY & GENDER EQUALITY



NEXT STEP: GENDER RESPONSIVE BUDGETING IN ALL NATIONAL INVESTMENTS

The Ministry of Finance is planning to introduce GRB to the public investment procedure Nr. 295. Based on the work done with MUB on this topic, the project was invited to evaluate the actual investment regulation and to provide a draft amendment to the public investment procedure. In addition, a manual on the proposed amendment has been developed. This will be widely used by budget investment officers at national and local levels as it provides general knowledge on gender mainstreaming and gender-responsive investment. The manual also presents key indicators such as citizen participation, addressing the different needs of women and men, as well as the needs of persons with disabilities, and energy efficiency.

GRB

Gender-responsive budgeting (GRB) means a gender-based assessment of budgets, incorporating a gender perspective at all levels of the budgetary process and restructuring revenues and expenditures in order to promote gender equality. This also entails changing the ways in which activities are carried out, and incorporating practices that support the financing of gender mainstreaming.

THE CURRENT PLANNING IS GENDER BLIND. THEREFORE, IT NEEDS TO BE CHANGED.

INTERVIEW WITH V. DANAASUREN, GENDER EXPERT AND CONSULTANT

Good afternoon, Ms. V. Danaasuren. Why is it important to think about gender topics when planning public investments?

Beside its infrastructure and major economic projects, the government aims to provide quality education for all children, promote employment and address social issues through its public investment. The money spent on investment needs to be economical, effective and ensure equality among different social groups with differing needs. However, the current public investment often lacks these requirements. As budget money is collected through taxes from citizens and companies, its spending should be beneficial for both genders. Unfortunately, the current planning is gender blind, therefore, it needs to be changed.

What was required to enable the incorporation of gender aspects into public investment management?

Traditionally, the public investment project proposals have been planned by assuming beneficiaries as homogeneous. An investment officer assumed that a project is for adults and children. However, there are different needs and problems for a man and woman, for a boy and girl, and for a person with disability. If the government wants to address social issues, promote employment and assure gender equality, then the public investment management should move away from gender blindness and be more responsive to different needs of those groups in our society. Therefore, public investment management needs to be participatory, responsive and effective. In order to do that, a gender analysis needs to be conducted at the beginning of the planning stage to identify issues and gender gaps. The investment project shall aim to fill those gaps by incorporating relevant policies, programmes and other investment projects. To ensure gender responsive investment, there needs to be indicators included in the selection process of the public investment management system. Training of these methods

> THE PILOT SHOWED US THAT MAKING BUILDINGS MORE ENERGY EFFICIENT LEADS TO MORE GENDER RESPONSIVENESS.

for conducting appropriate participatory and gender responsive planning and effective use of the indicators, can then be provided to all investment officers and other relevant staff.

What were the projects main results from a gender point of view?

Through energy efficiency, the project enabled girls and boys to study in a comfortable school/kindergarden, to get necessary facilities depending upon their differing needs (for example toilets, accessibility for children with a disability etc.) and to be protected from cold related sickness. For mothers and fathers, they can work without worry for their children, have less sickness leave to take care of their children, save money previously spent on medicine and hospital treatment, and they are less stressed.

For schools/kindergardens, they provide a more favorable working environment for their teachers and staff, most of whom are women. Warmer classes enable them to work without getting cold. As a result, there is less sickness leave and salary reductions for their teachers and staff. Moreover, the schools/kindergardens can save some money on heating costs. All these results are relevant to gender aspects and gender equality.

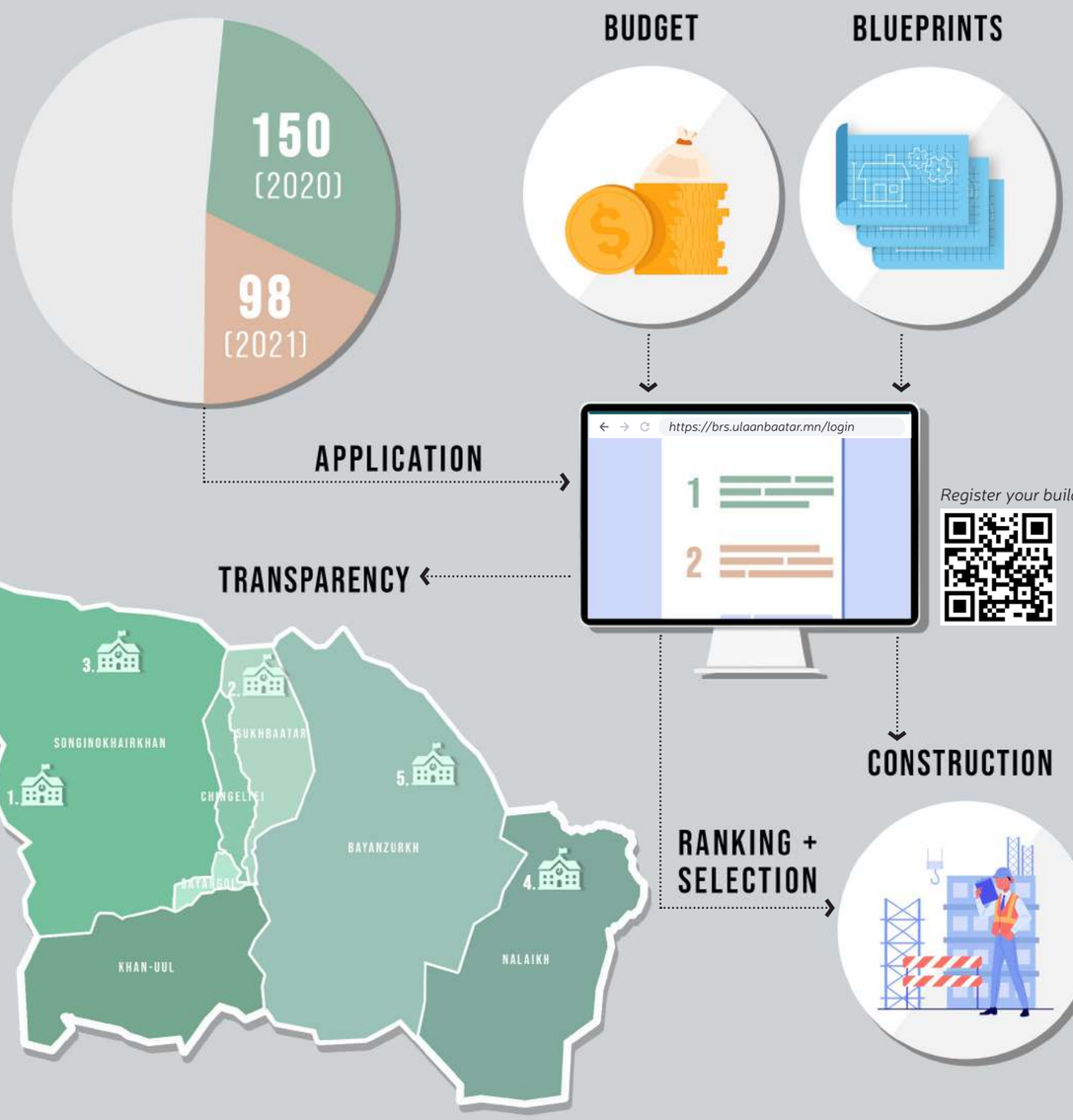
How will the project results change the life of people in Mongolia?

I see it as a good pilot project. It showed us that making buildings more energy efficient leads to more gender responsiveness. As the warmer schools provide a more comfortable environment for children to study. Their mothers and fathers can work without taking sickness leave to take care for their children, and spend their household income on more useful items and saving, rather than medicines.

There are many large and small impacts for schools, kindergardens, children and households. Although some results may seem minor, their combined direct and indirect benefits for children and households, especially for women are valuable. In this respect, this project showed us that if public investment is done in a participatory and gender- responsive way, it can change reality for the better.

Thank you for your valuable contribution.

> PUBLIC INVESTMENT MANAGEMENT NEEDS TO BE PARTICIPATORY, RESPONSIVE AND EFFECTIVE.



YEARLY FIVE BILLION MNT INVESTMENTS IN PUBLIC BUILDINGS MANAGED MORE TRANSPARENTLY

NEW PROCEDURE AND SYSTEM FOR PLANNING OF RENOVATION PROJECTS IN EDUCATION SECTOR INTRODUCED

Since public budgets are scarce, the limited resources should be allocated in a fair and transparent manner. This is also the case when it comes to deciding which schools and kindergartens receive a budget for refurbishment works.

Previous funding decisions were not transparent for the decision makers, nor for the beneficiaries. Instead, they were based on non-standardised processes, with non-standardised paper forms.

As a result, a procedure for the "Planning of Renovation Projects in the Education Sector" and a "Building and Investment Data Management System" were developed. These were established in close cooperation with the Municipal Education Department, the Property Management Department of Ulaanbaatar City, the Investment Agency and the Policy Planning Department of the Governor's Office. Both the procedure, and the system, were approved by the Governor's Administrative Committee on 13th of June 2020, and were put into effect by a Governor's decree on 25th of June 2020.

With this measure, the previous paper-based procedures for investment applications and project appraisals were streamlined. Additional functions, such as a panel for collecting investment applications and a ranking option were integrated into the system. Requests are now collected directly from schools and kindergartens through the online system, and the most urgent projects are prioritised based on transparent project selection criteria.

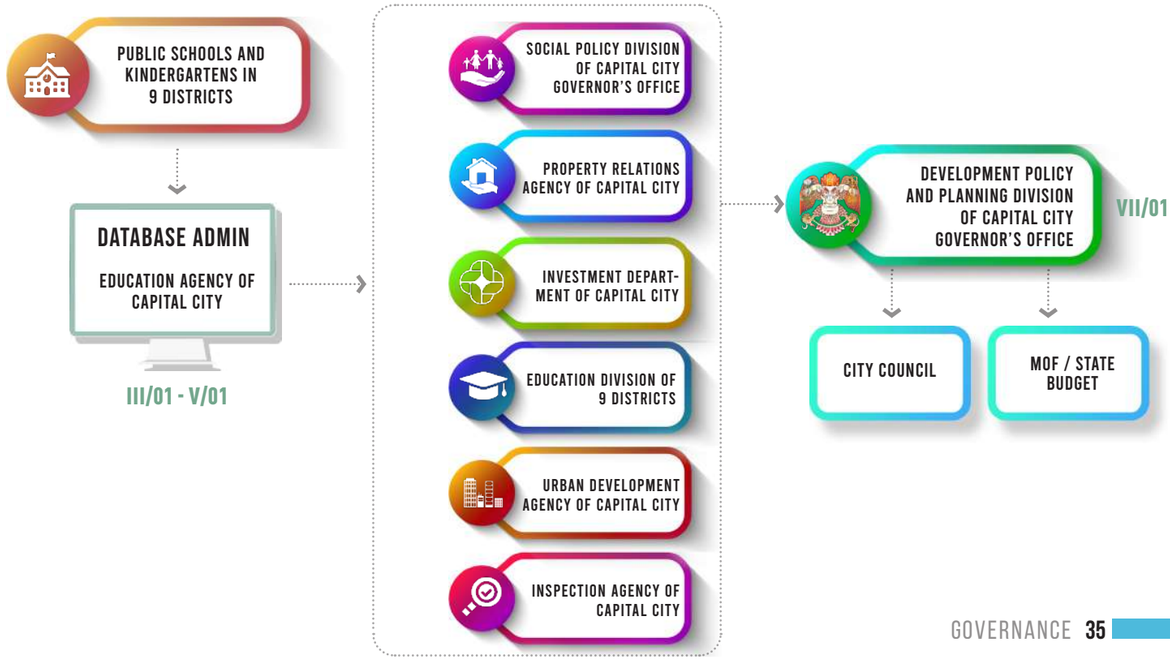
The process improves the effectiveness of the five billion MNT allocated each year for renovation projects in the education sector in Ulaanbaatar.

Main users of the system are the Municipal Education Department, the Property Management Department of Ulaanbaatar City, the Investment Agency and the Policy Planning Department of the Governor's Office.

DATABASE FOR PANEL BUILDINGS

Due to the practicality of the system for public buildings, a similar one has been developed for registering panel buildings in Ulaanbaatar City.

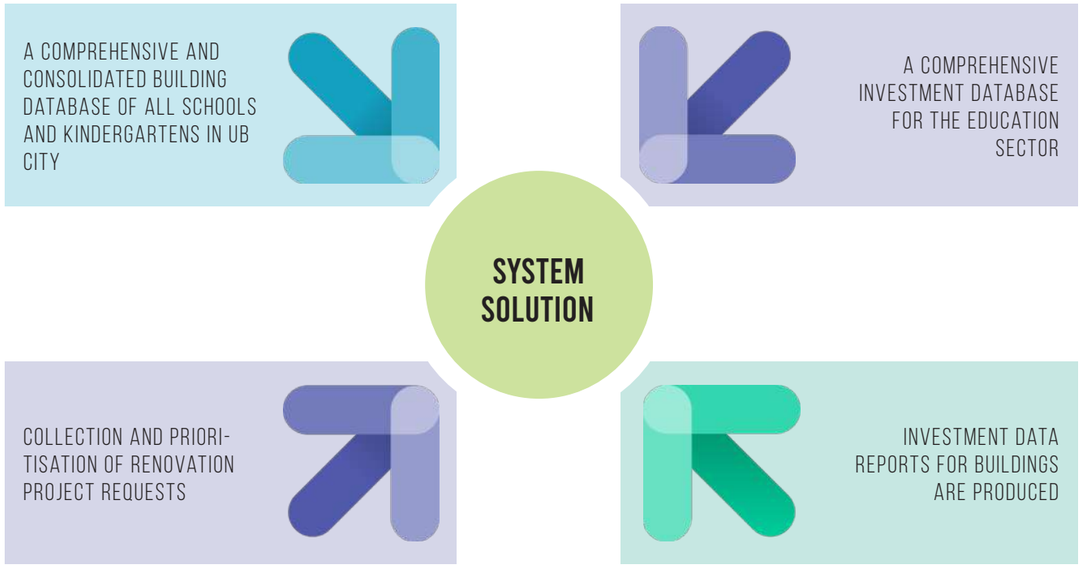
БББХОМС (pbrs.ulaanbaatar.mn)



TRANSPARENT DECISION MAKING

The system contains general information of 509 schools and kindergartens in the capital. 144 of those schools and kindergartens have submitted proposals for renovation projects in 2020 and 96 schools and kindergartens in 2021. The applications were evaluated and ranked according to the methodology, and the corresponding investments were included in the state budget and the municipal budget.

The questionaire contains a number of questions to be answered, considering existing or non existing infrastructure, availability of access for people with disabilities. Each of the criteria is annotated with a certain number of points mentioned in the system, allowing a transparent ranking.



MAIN FUNCTIONS OF THE SYSTEM

1. Registration of buildings
2. Registration of energy consumption
3. Registration of investment projects
4. Collection of applications for investment projects and reporting on investments
5. Energy consumption and building data

BENEFITS OF THE SYSTEM

1. Supports informed decision making
2. More efficient public finance management
3. Reduces redundant project requests made by different organisations for the same building
4. Improves planning & management of assets & investments in the education sector
5. Simplifies creation of annual reports & investment planning
6. Less work for MUB departments due to online project appraisal process

WHAT IS THE STATUS OF YOUR PUBLIC OR PANEL BUILDING?

A new web-based system shows the status of all registered buildings, such as amounts and types of investments received in the past, required investments and status of priority for future investments.

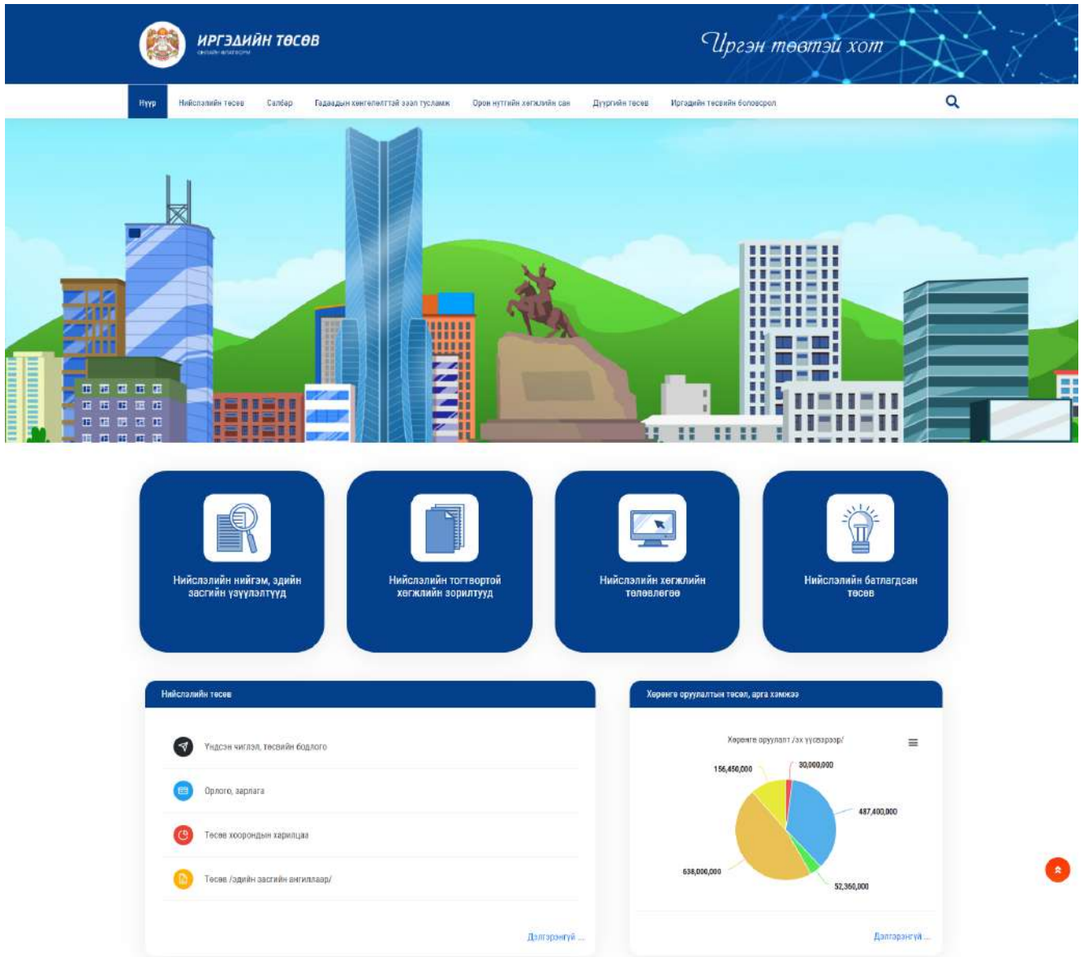
ulaanbaatar.mn

WHERE DOES YOUR MONEY GO TO?

Transparency in public budgeting improves citizens' trust in politics. People have the right to know what the government does with their money. In making processes and expenditures transparent, the public has the ability to see how government officials handle public spending, and can hold them accountable.

Since 2019 the project has supported the City of Ulaanbaatar to publish the "Capital City Citizens' Budget Manual", with the aim of disseminating the city's budget information in an open, transparent, and simple way. The manual helps Ulaanbaatar residents understand revenue collection, expenditure allocations, UB city's development priorities, and public investments for key sectors such as education, health, energy, air pollution and public transport. In addition, the manual contains information about the district budgets, and public services.

In 2022, the citizens' budget will be even more valuable: The project supported the MUB in developing a web-based interactive version of the participatory budget manual. Now more citizens can access the data at any given time, which will increase their awareness and engagement. This will also help to increase the efficiency of public spending in the long term.



APPLYING EE & GRB TO FUTURE INVESTMENTS

PUBLIC INVESTMENT MANAGEMENT GUIDELINE

Following a thorough review of the existing Public Investment Management (PIM) system at the Municipality of Ulaanbaatar (MUB), including desktop research and interviews, the project developed a comprehensive 150-page PIM guideline for all stakeholders at the MUB. This handbook aims to provide an overview of key investment considerations, relevant laws and regulations, and examples and applications of laws, rules, and regulations. This guide further addresses planning, financing, procurement, monitoring and reporting processes and has closely considered existing structures and assessments of the current PIM system. In addition, the guide also presents GRB concepts and how they can be integrated into the PIM system.

Since the research showed that there is only very limited information available for local levels, the guide addresses public investment at aimag, capital, soum and district levels. For example, it includes how to select projects, and allocate funds for the implementation of investment projects with limited government and non-government funding.

For more information please visit:
http://ulaanbaatar.mn/

LEARNING FROM OTHERS AND GETTING INVOLVED

PARENTS COUNCILS NOW STANDARD METHOD FOR ALL REFURBISHMENT PROJECTS IN UB

Each school and kindergarten that were to undergo rehabilitation work, was supported in setting-up a joint parent-teacher representative group. One of the tasks of the group was to be involved in the renovation work. The participation in and monitoring of the construction sites by teachers, parents and citizens are a crucial success factor to reach a high quality of renovation work.

The compulsory basic training programme covers topics such as social responsibility, participatory monitoring and energy efficiency (e.g. training about technical aspects in retrofitting). In addition to that, the groups were encouraged to participate in seminars and workshops in which, among other things, experiences from previous years were shared.

As a result, the joint groups developed action plans to address identified issues (e.g. related to facilities/health and safety environments) and implemented these action plans in addition to regular construction monitoring. Specific results include feedback from parents on construction monitoring to contractors and the implementation of small landscaping projects to address the identified issues. All groups worked actively to improve the environment in and around the school and kindergarten facility with overwhelming results.

A total of 19 events such as workshops, seminars, field trips, online trainings and discussions were organised from 2018 to mid-2021, as part of the parent's council support which was attended by 1262 individuals.

The "parent participation and results-based monitoring and evaluation" methodology developed in the project has served as the main tool for realizing all initiatives and results. Therefore, the Municipal Education Department has approved the methodology and transferred it into a practice-oriented training program for strengthening the capacities of parents and teachers in investment projects. Since then, it is common practice in UB's schools and kindergartens to involve teachers and parents in all investments and renovations and to monitor and evaluate the activities according to this method.

Best practices & experiences can be found here: http://dulaalga.ulaanbaatar.mn/

I WANT TO BECOME A QUALIFIED ENGINEER AND HELP MONGOLIA TO BECOME A HIGHLY DEVELOPED COUNTRY

THE SCHOOL REFURBISHMENT PROJECT CHANGED O. OYUNTUGS LEARNING ENVIRONMENT – AND HER PERSONAL CAREER PLANS, TOO.

O.Oyuntugs is a 10th grade student in a school situated in the Songinokhairkhan district of Ulaanbaatar, one of the poorest quarters of the Mongolian capital. She lives in one of the coldest capital cities in the world, with average temperatures of around -20°C in winter. To defy those adversities, the Mongolian population uses coal to heat the traditional yurts, called gers; unfortunately, this leads to considerable air pollution, and health risks. The GIZ project "Energy Efficient Building Refurbishment in Mongolia" tries to tackle this problem.

> **BEFORE, WE OFTEN SAT IN CLASS IN THICK CLOTHES AND JACKETS AND DIDN'T FEEL LIKE WRITING ANYTHING WHEN OUR HANDS WERE COLD.**

The project comprises the construction of energy efficient buildings, and the improvement of the framework conditions for the energy-saving construction sector in Mongolia. Furthermore, the project team advised the city administration in the drafting of a local energy efficiency plan and trained companies of the construction and finance sector to consider the subject of energy efficiency in their activities. The project also renovated 22 public buildings in the two poorest quarters of Ulaanbaatar, to reduce the all-important energy and heating losses.

One of those buildings is Oyuntugs' school. The project team values the participation of all those concerned. Oyuntugs was one of the members of the monitoring team that comprised of teachers, staff, students, and parents who were involved in the renovation process. The monitoring team received the necessary training to supervise the refurbishment, and was able to learn about energy efficiency. Given this, Oyuntugs was empowered to take responsibility in the renovation process, and to express her opinion which was valued by the adults.

Previously, the cold in the school was so intense that high-quality learning was restricted. Oyuntugs describes the effects of the building refurbishment on the education situation as follows:

"Before, we often sat in class in thick clothes and jackets and didn't feel like writing anything when our hands were cold. So we put our hands in our sleeves. It was clear what attendance was like under such conditions. However, thanks to extensive renovation and insulation work, children's attendance and extracurricular activities have increased significantly, so they spend more time in school."

A teacher adds: "It is obvious that no one can learn and develop well in an unpleasant, cold environment. Students are not emotionally calm, and everything is ineffective when they have frequent colds".

In this way, the building refurbishment was able to create an improved environment in which students fall sick less often and are able

> **I WANT EVERYONE TO FEEL THE BENEFITS OF ENERGY EFFICIENCY.**

to participate better in class. The money saved by the improved energy efficiency can be invested in the development of Mongolia. The experience in the monitoring team motivated Oyuntugs to study engineering to help improve energy efficiency in her country. She considers energy efficiency as a subject that everyone should care about:

"I want to become a qualified engineer, who uses her mind and energy, to help Mongolia to become a highly developed country that makes good use of energy. I want everyone to feel the benefits of energy efficiency."

I WAS ABLE TO LEARN FROM OTHERS, AND DISCOVERED OUR OWN STRENGTHS TOO

TS.GANTSETSEG VOLUNTEERED FOR THE THE PARENTS - TEACHER - COMITEE OF SCHOOL NO. 88 IN BAYANZURKH DISTRICT. THE BEST-PRACTICE-SHARING-EVENT INSPIRED HER TO STAY ENGAGED.

I am an ordinary mother who runs a small shop. In 2021, my daughter's teacher called and asked whether I was able to work with them on a project being implemented at their school. When I heard that the project was about insulation work, I immediately agreed. In fact, I had been concered for quite some time about the fact that my daughter's school was cold and uncomfortable, and that the children often caught colds. The school environment was very bad during the winter season; the windows froze in the cold, the walls and ceilings were constantly dripping and mouldy, the children had to sit in their outer coats but still had cold hands and feet, as the classroom averaged 14°Celsius. I always had to dress my children in multiple layers of clothes, but even that didn't help, and they often caught a cold.

After accepting the offer, I went to the school and attended the first meeting. I have had four trainings since then, and I have participated in the process of evaluating the schools external and internal environment, and monitoring the renovation work. A total of 455 million MNT was spent to complete the in-

> **I REALISED HOW MUCH TEACHERS NEED THE PARTICIPATION AND SUPPORT OF THE PARENTS TO IMPROVE THE LEARNING ENVIRONMENT.**

sulation of the base and external facades, to replace 104 windows and five doors, to completely cover and insulate the roof, and to renovate three parts of the school into classrooms. In addition, the support team monitored the start, progress, and completion of the refurbishment and were able to make specific demands of the contracting company.

Due to the large scale of the renovation, I was almost like a teacher at the school, frequently meeting and working with the principal, teachers and staff. The use of a checklist after each evaluation was very effective, as we had to sit down together and discuss the next steps. In our case, in addition to overhauling and insulating, we placed five road signs leading to the school, built eight parking lots, and 200 metres of sidewalk. I really enjoyed visiting six other newly renovated and insulated schools and kindergartens, at the best practice sharing event. At this event I was able to learn from others, and I discovered our own strengths, too. Most importantly, I realised what an important institution the school is. I understood how hard teachers work to educate our children, and I recognised how much they need the participation and support of the parents to improve the learning environment.

OVERALL RESULTS

271 parents, teachers and school staff members have participated in refurbishment activities, 1126 persons have received trainings in project monitoring and advocacy during the project. Most of those groups keep working and implement additional activities to create a better educational environment for the children.

ADDITIONAL ACTIVITIES

Educational school gardening, implementing recycling strategies, building paved access roads, fences for safe playing, renovation of classrooms, organize training and advocacy activities for students, parents and other community members.

PARENTS KNOW BETTER THAN ANYONE ELSE ABOUT THEIR CHILDREN'S LEARNING ENVIRONMENT

SH.GANZORIG, FATHER OF EIGHT, BECAME A MEMBER OF THE MONITORING GROUP OF KINDERGARTEN 147. WHAT STUCK WITH HIM WAS THE IMPORTANCE OF UNDERSTANDING THE REASONS FOR A PROBLEM AND TAKING ACTION INSTEAD OF JUST CRITICISING.

Sh.Ganzorig, one of many busy fathers in the capital city, tries to manage his life and raise his children in a healthy way by racing against time. He is the head of a large family, two of whom currently attend Kindergarten No. 147 in Ulaanbaatar's Bayanzurkh district. He and his wife, a professor and doctor at the Mongolian National University of Medical Sciences, are a young family who are aware of their parental responsibilities. They try to be as engaged as possible in their children's kindergarten and school activities as they recognize the importance of early childhood development.

In April 2021, Ganzorig received an invitation from Kindergarten No. 147 to participate in a joint group which comprised of six members including teachers, parents and administrators. The aim of the group was to carry out "additional" monitoring during the construction process, in order to assure a high quality of the refurbishing work. The director of the kindergarten explained that the joint group would identify issues and problems related to different facilities, with a particular focus on the health and safety of the environment.

BEING A PART OF THIS PROJECT, I UNDERSTOOD THE VALUE OF COOPERATION BETWEEN PARENTS AND KINDERGARTEN TEACHERS, AND ITS POSITIVE CONSEQUENCES.

Ganzorig accepted the offer and put his efforts into this work to create a better learning environment for his children. Thus, he and the fellow members of the joint group participated in a series of capacity building training sessions, where they were introduced to participatory monitoring, and joint problem-solving tools. Additionally, they contributed to the creation of a child-friendly environment, that included the construction of small greenhouses, child-safe parking lots, and waste collection points.

Ganzorig reflects: "As I became engaged in this activity, I realized that my initial thoughts and perceptions about citizens' monitoring was very different from reality. I was ashamed of my previous behaviour, when all I did was criticize things that seemed wrong whenever I met with my children's kindergarten teachers and administrators. In fact, we as parents know better than anyone else about our children's learning, developing, and growing environment. Therefore, by getting involved and by being a part of this project, I recognise the value of cooperation between parents and kindergarten teachers, and its positive consequences. Most of all, I really appreciate the fact that I got a chance to learn the importance of understanding the reasons of the problem before criticizing it."

WE ARE ALL WORKING TOGETHER TOWARDS THE SAME GOAL.

THE REFURBISHMENT OF PRINCIPAL CH. KHISHIGMAA'S SCHOOL NO. 65 SOLVED ITS HEATING PROBLEMS AND TURNED IT INTO A PLEASANT PLACE FOR LEARNING. BUT THE PROJECT'S SOCIAL IMPACT WAS JUST AS IMPORTANT.

When I was appointed principal of School No. 65 in 2010, there were more than 3500 children from 3rd, 4th, 26th and 36th sub-district of Songinokhairkhan who studied in three shifts and 82 classes. The school's external and internal environment was poor, especially the 1st block of the school, which had not been renovated since the opening of the school in 1985. All windows were wooden, the school had no paved access road, and no fences. It was not connected to clean water, and it was heated by a boiler. During the winter season, teachers wore thick clothes and boots, and the children had to attend class in their overcoats. 20-25% of children, and 10-15% of teachers were regularly ill during the winter.

In 2018, I heard the good news that the GIZ and the MUB were beginning to implement the "Energy Efficient Building Refurbishment in Mongolia". This project aimed to help kindergartens and schools of the capital city to save energy, reduce their building heat loss, and carry out major repair and insulation work. We identified all the existing technical problems and heat loss conditions of our buildings and facilities and forwarded our request to the relevant organisations and officials.

20-25% OF CHILDREN, AND 10-15% OF TEACHERS WERE REGULARLY ILL DURING THE WINTER.

Unfortunately, we were not able to get the funding as the budget cost for that year was already high, and our application submission was late.

In 2020, we resubmitted our request, and this time we were able to receive a total of 750 million MNT for our 1st building. With this funding we were able to replace eight doors and 229 windows, improved the 1930 m^2 roof, performed full insulation and overhaul work of 4056 m^2 of the facade and 560 m^2 of the foundation of the building. The renovation and insulation of our school has resulted in energy savings of up to 43%. It significantly reduced our CO_2 and fine particle emissions, and the lifetime of our school building has been extended by at least 30-years.

Another beneficial feature of the project was that it provided us with a supervising engineer who checked the quality of work. He also supported us by conducting capacity building training for our support team that consisted of school administrators, teachers, staff and parents. When the support team was completing the monitoring and evaluation process, we realized that the external environment of our school was very polluted, and that we needed to create a habit for properly disposing of our waste.

To address this situation, we used the "parents monitoring and evaluation methodology" which helped us to develop and implement a recycling upgrade training and advocacy plan. For example, we placed 174 bins in classrooms, and 24 bins in corridors. We provided training to 58 groups of parents, and we conducted nine types of advocacy activities.

THE LIFETIME OF OUR SCHOOL BUILDING HAS BEEN EXTENDED BY 30-YEARS.

As a consequence, the relationship between parents and school administration has greatly improved so that we are all working together towards the same goal. We were very happy as our initiative was also supported by the 3rd sub-district of Songinokhairkhan. In line with this, we are adding to our school policy, legal documents and plans to show our contribution in trying to meet the Global Sustainable Development Goals. For example we are now working together with the residents of our subdistrict to raise awareness, of the importance in sorting out their garbage. As part of this work, we studied the standards of waste sorting procedure, consulted with professionals, and showed a play titled "Garbage Monster" to more than 2100 primary school children, which greatly helped them to learn more about sorting garbage at their early ages. I am especially proud that we achieved all of this together, and now every class within our school sorts their garbage, and this practice is passed on to their families.

THE EEP PROJECT WAS VERY DIFFERENT FROM OTHER PROJECTS

N.ENKHTSETSEG, PRINCIPAL OF THE 63TH KINDERGARTEN, BAYANZURKH DISTRICT

The kindergarten educates in two shifts within a 24 hour period. It is is attended by children who live in remote places, as well as children from vulnerable groups. Some of them are orphans, some have parents with disabilities or parents who work in rural areas or abroad. The kindergarten is 30 years old, which led to the deterioration in the quality of the building.

The roof, walls, and windows continually lost heat, and ceilings were damp and mouldy. The second floor of the kindergarten was most affected. The room where they have two groups of the 24-hour care was often cold and uncomfortable in the night. In winter, children's morbidity reached up to 40-45%, which made parents concerned, and they complained about the cold classrooms. Every year, the kindergarten applied foam to the walls, sealed the windows, and used electric heaters, but it was not effective. Parents with sick children had to stay home and could not go to work, often for several weeks. This resulted in major income losses for those parents who are already economically and mentally challenged, due to their work outside of the city away from their children.

I presented the situation to the relevant people and finally had the good news in 2018. The news was that the kindergarten met all of the requirements for the "Energy Efficient Building Refurbishment in Mongolia" project, and that the renovation and insulation work would be carried out in 2019. As a result of our hard work we were able to improve the environment of the kindergarten, and create a comfortable learning situation for the children. In the year following the project, a 24-hour kindergarten with a capacity of 100 children was built with UNICEF funding, which also helped the kindergarten to expand its operation.

> IN WINTER, CHILDREN'S MORBIDITY REACHED UP TO 45%.

The EEP project was very different from other projects as it helped us to create a support team consisting of kindergarten administration, staff and parents. The project trained them to increase their knowledge and ability, by using parents monitoring methodology during the renovation process, which not only helped to improve the quality of the renovation, but also contributed to commissioning of the new building.

OVERALL RESULTS

Due to better indoor air quality and higher room temperatures in the project schools, health related absence of teachers could be reduced by up to 78% and up to 47% for children. This leads to reduced medicine costs for families and higher availability for economic activities (mainly women would stay home to take care of sick children) in the most vulnerable families of the Ger districts.

> PARENTS WITH SICK CHILDREN HAD TO STAY HOME AND COULD NOT GO TO WORK, OFTEN FOR SEVERAL WEEKS.

WE BUILT OUR DREAM HOUSE THAT IS ENERGY EFFICIENT AND LOW IN OPERATING COSTS

S. MUNKHTSETSEG, MOTHER OF THREE, WORKS AS A TREASURER AT KINDERGARTEN #80. SHE VOLUNTEERED FOR THE MONITORING GROUP, AND AFTER THE REFURBISHMENT OF THE KINDERGARTEN WAS COMPLETED SHE USED HER EXPERIENCES TO BUILD HER OWN EE HOUSE.

My name is S. Munkhtsetseg. 49 years old. I live in Songinokhairkhan district of the capital city with my husband and 3 children. I often told my husband that I would build a house on our land and live well. In 2015, I poured 12,000 bricks for an 8 x 9 house. However, due to medical problems I had to go to the hospital for a long time. During this time, I spent all my money on treatment and almost gave up my dream of building a house.

I was lucky enough to recover and work as a treasurer in the 80th kindergarten. After working in our kindergarten for a year, our director informed me that our kindergarten was to be undergoing an overhaul and insulation, a support team was to be set up to monitor the refurbishment process, and that I should join the support team.

Since agreeing to that proposal I have participated in all the trainings, coaching, and monitoring activities organized by the project. The one-time training provided by the project was on building insulation technology, material norms and standards, and all processes. The walls, roof, floor, windows, and cladding insulation that are necessary to insulate a building were explained in detail.

In fact, my husband and I had planned to build a house with 38 cm thick brick walls, a bird's-eye view roof, and a reasonably priced window. But we had no idea how to conserve heat well and save energy. In particular, there was no calculation of efficiency and how to store and protect heat well. The night I took a class on how to do all those things I talked to my husband and we changed everything that we had currently planned.

I learned that exterior walls, roof and floor should be insulated, that the walls should be blocks instead of bricks, the site should be insulated with 20 cm thick foam material, the roof and floor with 10 cm thick foam, insulate the cradle, have 3 double glazed windows and at least 5-6 cameras. So from that knowledge we have changed our plan entirely. As a result of this project, our kindergarten has become more comfortable and warm, and we have been able to transform our long-dreamed-of house into an energy-efficient and low-cost operation.

ON-THE-JOB TRAINING FOR THE INSULATION OF A GER AREA HOUSE

S.Munkhtsetseg provided her house as a model for an on the job-training to demonstrate technology of insulation for ger area houses. 23 students from the Construction Polytechnic College and the Technological College attended the training, where they received hands on experience and information materials provided by the Switch Off Air Pollution project, implemented by GERES. Insulation materials were provided by World Bank's Clean Air project.

CAPACITY BUILDING & FINANCE

CAPACITIES FOR BUILDING EFFICIENCY

Reaching Energy Efficiency in the building sector is a challenge, that requires the integration of know-how in many different areas that must come together. Therefore, the building of capacities in institutions of the public and private sector has to be strengthened on different levels. The project had its main focus on the city level and therefore worked closely with the Municipality of Ulaanbaatar (MUB). Nevertheless, the intention of working with the MUB as the biggest city in Mongolia was also to set examples that could then be transferred to the national level as well. This target was reached as different national entities were able to include the know-how developed, into national institutions and regulations.

To sustain knowledge in a system it is important to not only train its stakeholders once, but to continue the process of passing it onto the next generation of employees and civil servants. This is especially important in the public sector, where a high frequency of job turnover takes place. As a result of this, the project trained a large number of stakeholders from different institutions, and focused on establishing long term implementability by training the trainers of academies and training centres. This included the Municipal Research and Training Center, the National Academy of Governance, and the Mongolian Construction and Designers Association. Basic trainings, tools and databases were also developed to allow interested stakeholders to freely access the information online.

It was also important to include the new ways for implementation into the standard processes of public institutions, such as how to select the buildings to be renovated by public investment, and which planning procedures and blueprints are to be used to calculate such investments.

The following chapter gives an overview of the sustained results that were reached by capacity development activities, and trainings on different levels to different stakeholders. These are relevant in order to take the first steps towards change in Ulaanbaatars building sector to become more energy efficient, acting as a model for the rest of the country.

CAPACITY BUILDING ON DIFFERENT LEVELES

NATIONAL ACADEMY OF GOVERNANCE (NAOG)

Adoption of courses on public policy, public investment, gender responsive budgeting, financial investment EE project experiences in case studies included in chapters

MUB RESEARCH & TRAINING CENTER

Established system to train & specialize MUB staff in "Public Investment Management" & Gender responsive budgeting (600 participants)

MoF

Introduce GRB to new budget law

Amended draft to investment procedure #295 & manual to include GRB in new budgeting law

MCUD

Green Building Council

GBC

Green building development concept

ERC

Energy auditor + EE appraisal on building designs!

Training for energy auditors & energy conservation managers (395 participants)

Financing scheme for EE house in ger area developed & implemented

Training of building EE experts (26 participants)

AUDITORS & ENERGY EXPERTS

CERTIFICATE +20% ENERGY EFFICIENT

BUILDING CERTIFICATION PASSPORT

MCDA training program

NATIONAL LEVEL

Database for selection of building investments

GRB implementation plan and checklist

Citizens budget (2019-2021) & training

Blue prints for public buildings & pannel buildings

MUB

CCHC

MOODLE platform

Green Building Standards

EDGE

Training for the construction sector in 7 Modules (309/169 participants passed)

EE basic knowledge:
- training for banking sector to develop financing scheme for EE buildings in ger areas (106 participants from 10 banks)

BUILDING DESIGNERS

CONSTRUCTION SECTORS

BANK

CITY & INTERMEDIARY LEVEL

BASIC TRAINING
Energy efficiency in buildings

ONLINE TRAINING
Energy efficient design & EDGE practical application (193/72 participants passed)

UB-Parents monitoring guideline

INTERESTED PUBLIC & INSTITUTIONS

CIVIL SOCIETY
- parents
- teachers
- staff

BASIC TRAINING
Energy efficiency
Social responsibility
Participatory monitoring
(1262 participants)

SCHOOL

On the job training for insulation of ger area houses

EDGE AUDITOR

1ST GREEN BUILDING EDGE CERTIFIED

26 EE HOUSES BUILD

BENEFICIARY LEVEL

PUBLIC INVESTMENT MANAGEMENT TAKEN TO THE NEXT LEVEL

REGULAR TRAININGS FOR CIVIL CERVANTS AT THE NATIONAL ACADEMY OF GOVERNANCE

The role of the policy planning and investment officers is important in all stages of policy and public investment planning, development, budgeting, and implementation. Therefore, there was a need to train capital and district officials to improve their capacity and acquire more practical skills. The newly established Training and Research Centre of the Municipality of Ulaanbaatar (MUB) worked closely with the project under the Capacity Building Programme for Local Capital Administration Workers to establish a system for building, preparing, training, retraining, and specializing staff in the MUB. With an overall theme of "Public Investment Management", various training modules such as public investment management, methodology for developing strategy documents, project management and life cycle costings were developed, updated, and expanded. As a result, over 600 capital officials from nine districts, 33 agencies and departments of the MUB were trained and promoted during the project period.

To institutionalize the capacity building programmes and the training modules, it was important to integrate the modules and the results of the project into the training package for civil servants across the country. For this reason, and to safeguard the results, the project partnered with the National Academy of Governance (NAOG) in order to support civil service reform, to strengthen the capacity of civil servants in the long term, to enrich their training content and methods with relevant documentation, and to support a multidisciplinary and research-based training system. NAOG provides in-service training, retraining, professional development and research in public administration and management nationwide. It advises government officials on technical and methodological issues of public policy and development.

The training programmes are targeted at different positions and levels, and include various topics relevant to the effective planning and implementation of public investments, such as gender-sensitive budgeting or public financing. The experiences from the project regarding energy efficiency in public buildings served as case studies throughout the programme.

The actual programmes can be found under the following links:

https://hrds.ulaanbaatar.mn/ *http://naog.gov.mn/*

HUMAN RESOURCES, KNOWLEGDE AND SKILLS ARE CRUCIAL TO IMPROVE ENERGY EFFICIENCY IN BUILDINGS

STATEMENT BY TS. ATARJARGAL, DIRECTOR OF ENERGY CONSERVATION DEPARTMENT OF ENERGY REGULATORY COMMISION.

This is the seventh year that the Law on Energy Conservation has been adopted and implemented in Mongolia. I am pleased to emphasize the importance of GIZ's technical assistance and cooperation in developing and approving the Energy Conservation Law and supporting its implementation. More than 50% of Mongolia's greenhouse gases come from the energy and construction sectors. Mongolia's greenhouse gas emissions account for a very small percentage of global emissions. However, calculated per capita or per GDP, Mongolian emissions are above the global and regional averages, especially in the field of construction energy efficiency. The "Energy Efficient Building Refurbishment in Mongolia" project is a real support to the effective implementation of an emissions saving policy in the construction sector.

Human resources, knowledge and skills are most important for the effective implementation of measures to further strengthen the achieved results and improve the energy efficiency of buildings. The Energy Regulatory Commission is organizing a step-by-step training of energy managers and auditors to work in this field. The ERC, in cooperation with the Ministry of Energy of Mongolia and GIZ's Energy Efficiency Project, first developed a training programme for energy auditors and energy saving managers in line with EU standards in 2016. 30 engineers from construction sector have been certified as building energy auditors. The building energy auditors trained in the past were capacitated mainly to conduct energy audits on existing buildings, with a focus on so called 'designated entities'. Thus, the energy efficiency appraisal of building designs was not enforced. In order to include the capacities to conduct those appraisals for buildings as well as for heating, ventilation and air conditioning/HVAC systems, and to issue energy efficiency certificates on buildings and blueprints, 26 construction professionals from governmental institutions and the private sector were trained to become building energy efficiency experts. Across 26 trainings, 395 energy managers and energy auditors have been certified.

In addition, the procedure for issuing construction energy certificates was developed in cooperation with the Ministry of Construction and Urban Development, and approved by the joint order of the Minister of Energy and the Minister of Construction and Urban Development. Within the framework of this work, we have started to make calculations and issue construction energy certificates in accordance with the norm "Thermal protection of buildings", which was approved in 2020.

In the future, it will be necessary to define criteria for energy efficient, green buildings and passive buildings, create financial incentives to support energy saving activities in the construction sector, improve energy efficient planning and performance monitoring systems, and strengthen human resource capacity. It is important to identify the buildings that need to be insulated first, and to implement projects to improve the thermal insulation of old buildings and reduce heat loss.

BUILDING KNOW-HOW FOR THE BUILDERS

SEVEN MODULE TRAINING PROGRAMME AT THE MONGOLIAN CONSTRUCTION DESIGNERS ASSOCIATION

The construction stakeholders play an important role in integrating energy efficiency in the construction sector. For the introduction of energy efficiency measures in public and private buildings, the municipality of Ulaanbaatar must be in a position to draw on know-how and energy efficiency technologies provided by the private sector. However, the capacities of relevant actors in the private sector to introduce energy efficiency measures were still inadequate at the beginning of the project.

The Mongolian Construction Designers Association (MCDA) took over the training and implementation of a seven module training programme for the construction sector stakeholders into it's long term programme. The programme gives "Credit hours" to successful participants within the professional degree issuing activity. In 2020 and 2021, eight online trainings were conducted for construction stakeholders, involving 309 trainees, 169 of whom passed the test.

For more information about this programme, please visit: https://learning.macd.org.mn

МОНГОЛЫН БАРИЛГЫН ЗУРАГ ТӨСӨЛ ЗОХИОГЧДЫН ХОЛБОО

BASIC TRAINING ON BUILDING ENERGY EFFICIENCY AND EDGE

E-LEARNING PLATFORM ESTABLISHED BY GIZ DEVELOPMENT ADVISOR WERNER HABERZETTL

The Capital City Housing Corporation (CCHC) and the GIZ EEP signed a Memorandum of Understanding in November 2019. The main focus of this cooperation was capacity building, advisory services, and support in the field of Energy Efficiency in Buildings as well as in the field of Green Building Standards and in particular the "EDGE" Excellence in Design For Greater Efficiencies. (see page 66 for more about EDGE).

Within this cooperation an e-learning platform for the Basic Energy Efficiency for Buildings and practical application of the International Green Building Standard of EDGE was created by Werner Haberzettl, a GIZ Development Advisor at CCHC. In 2020 and 2021, 196 participants from 18 different organisations of the MUB and the construction sector have enrolled in the free online-training of whom 72 passed the test in total.

For more information about this programme or to enroll, please visit: http://eco.buildersasso.mn/

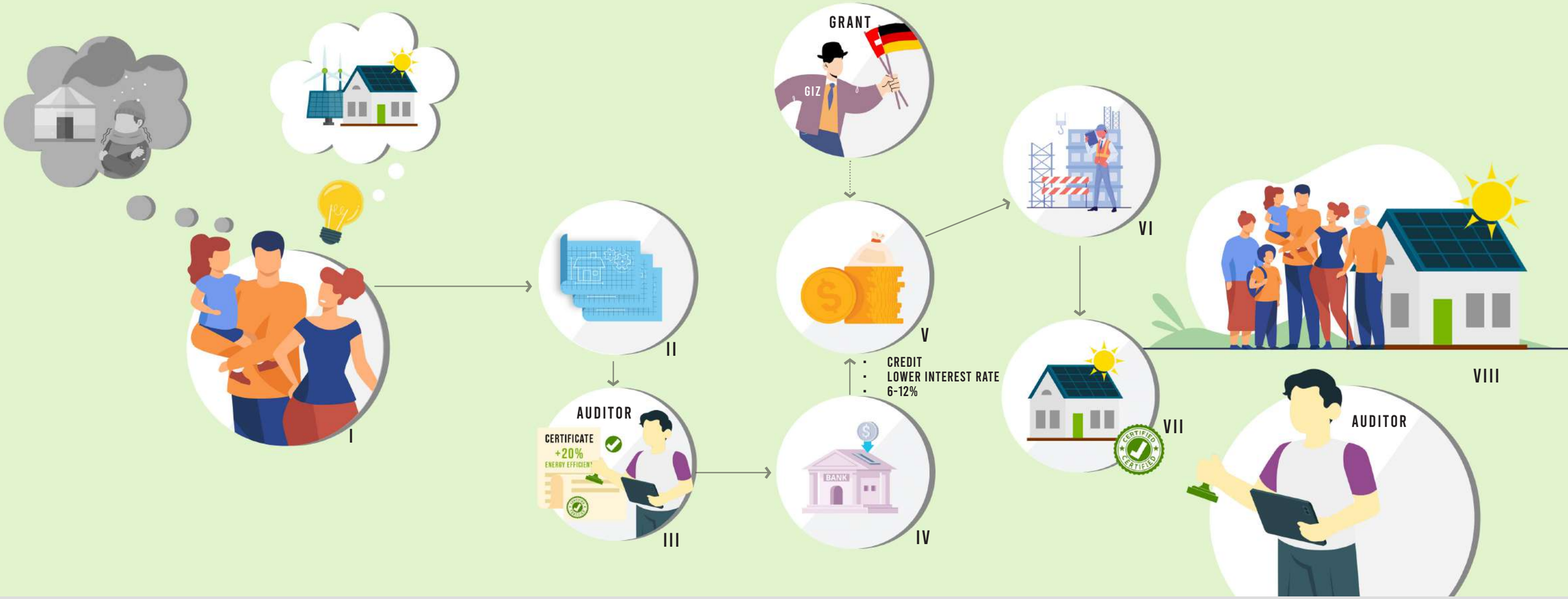
FINANCING ENERGY EFFICIENT BUILDINGS

SIX MODULE TRAINING FOR BANKS

The Mongolian Banking and Finance Academy (BSA) has been capacitated to provide training on the Financing of building energy efficiency for employees of the banking sector. The objective was to develop training modules and deliver trainings to improve the professional expertise and skills of financial institutions committed to contributing to EE housing financing and its enhancement of inclusiveness, scope and impact, as well as Mongolia's fight against climate changes.

The training consists of six modules covering Policy Support and Incentives to Financing EE Projects (1), Potentials of EE projects and Risks (2), Technical Indicators to Recognize EE Projects (3), Drafting Institutional Procedures and Developing In-house Processes to Recognize and Assess EE projects (4), Financing Models of EE Projects and Pre-requisites (5), as well as Business and Marketing Strategy development of EE financing (6). So far, 106 employees from more than 10 banking institutions have participated in the training and received a certificate.

Contact: info@bfa.mn



FIRST EVER ENERGY EFFICIENT HOUSING FINANCING SCHEME FOR GER AREA HOUSES ESTABLISHED

24 CERTIFIED ENERGY EFFICIENT HOUSE DESIGNS AVAILABLE

Saving heat through energy efficiency (EE) is a top priority investment for local communities as it benefits not only the environment but also the quality of living and public health, especially that of children. Despite the demand for housing improvements, banks offered no financial product to insulate existing housing or build EE homes. This was due to a lack of sectoral standards and quality assurance systems, as well as a general dearth of affordable, long-term funding suitable for developing economies.

As part of the project, the first ever energy efficient housing mortgage programme was developed and tested in Mongolia in 2020/2021. The housing financing scheme was piloted in cooperation with the Mongolian Bankers Association (MBA) and the Mongolian Sustainable Finance Association (MSFA/ ToC).

The association brought together seven of the 12 banks in Mongolia to design a new financial product which offered mortgages with verified energy efficiency, for low-income households living in the ger districts. Through this project, households in off-grid areas were enabled to switch from burning coal, to living in energy efficient standalone houses with up to 80% less (heat) energy consumption.

HOW DOES IT WORK?

I. Interested customer: A ger area family decides that they want to live in an energy efficient house, that is warm without burning coal and polluting the environment.

II. Selection of design with construction company: The interested customer reaches out to a) eligible construction companies that have already approved energy efficient building designs, or b) a bank that provides information about eligible companies and designs.

III. Certification of design: The construction company applies for a certification of their building design. Newly developed and certified design provides the planning documents for a family house that consumes a minimum of 20% less energy compared to the Mongolian standard.

IV. At the bank: The staff at the bank are aware of the EE housing scheme and know that certain EE houses were and can be certified. Given the customers wish to buy one of the 24 certified designs, they receive a mortgage loan at a special rate.

V. Finances: The customer pays 10% of the building prices upfront. 30% of the building price (30% or up to 18 Mio. MNT) was covered by GIZ during the pilot project. For the remaining 60% the customer receives a loan with a special low interest rate of between 6% and 12% that needs to be repaid in 15 years.

VI. Construction: With the signed contract between customer and construction company, and the financing of the bank in place, the construction of the house starts. The contracted energy auditor visits the construction site to inspect EE relevant issues such as insulation work, and materials and to advise.

VII. Energy efficiency auditing: Once the house is built, it is audited by an EE audit to assure that 20% energy savings can be achieved.

VIII. Happy family: The customer moves into the new energy efficient house and enjoys the new comfort of a warm and comfortable home without emitting smoke.

HOW TO FINANCE ENERGY EFFICIENCY?

INTERVIEW WITH M.NOMINDARI CEO OF THE MONGOLIAN SUSTAINABLE FINANCE ASSOCIATION (MSFA) AND L. AMAR EXECUTIVE DIRECTOR AND SECRETARY GENERAL OF THE MONGOLIAN BANKERS ASSOCIATION (MBA)

Good afternoon, Ms. Nomindari and Mr. Amar. We want to talk about financing energy efficiency in Mongolia today. Mortgage loans for housing were already available in Mongolia. Tell us why there was a need to develop a new scheme for energy efficient (EE) houses?

Nomindari: We saw that there is a high demand for affordable housing loans. Most previous housing projects supported the relocation of ger district residents to apartment buildings. However, the existing loan programmes did not often meet their financial situation and their preferences for individual open spaces where they have more freedom to plant trees or have a safe playground for their children. On the supply side, there is a strong interest from financial institutions to explore new financial products as a way to tackle new markets, progress on their sustainable finance commitments, make contributions to solving the air pollution crisis, and eventually also be able to access alternative, lower-cost green funds from outside of Mongolia.

What was the objective of the pilot?

Amar: MBA, together with MSFA and GIZ, initiated this pilot project in order to improve the energy efficiency in the "ger" areas of Ulaanbaatar city. The objective was to establish a 'buy-down facility' to provide grants to residents who want to buy newly built, pre-approved, energy efficient houses.

Nomindari: The main objective of this pilot project was to integrate EE requirements in housing developments, and offer financial solutions for low-income households planning to switch to an EE lifestyle and housing.

> THERE IS A STRONG INTEREST FROM FINANCIAL INSTITUTIONS TO PROGRESS ON THEIR SUSTAINABLE FINANCE COMMITMENTS

What were the challenges faced?

Amar: This project was designed and piloted to provide the first ever financing of energy audited mortgages in Mongolia, so we faced many challenges.

Nomindari: There is a huge discrepancy between what householders can afford, the actual cost of the houses, and the terms of financial institutions. Many households have unstable or seasonal income, a lack of collateral, or they don't have any income track history. As a result, they end up unable to meet the loan requirements of financial institutions. On the other hand, due to the lack of building norms and standards for individual houses, the ger district residents are used to substandard inefficient houses, which also created lower price expectations in the market for a long time.

Amar: Interest rates in Mongolia are among the highest in the world. Therefore, we needed to link the project with the state-run mortgage loan programme, which has an annual interest rate of 6% to make the pilot project more accessible for individuals. However, the state-run subsidized mortgage loan programme had extremely high requirements for the borrowers, as well as the properties which could be purchased with mortgage loans. Eventually, we have been successful in convincing the Central Bank of Mongolia to help finance the project houses.

Since the project designed the first ever financing of energy efficient houses, everything was new for us. Banks also had to adjust their internal procedures and faced technical requirements to issue the loans to finance private houses in Mongolia. It was important to standardize the technical requirements and the quality verification processes for energy efficient homes.

What were the special outcomes of the pilot?

Nomindari: With the help of this GIZ-project we were able to try out the entire supply chain of the EE housing scheme, and understand challenges and best practices. This was a valuable practical experience which cannot be replaced by any study or knowledge exchange.

> INTEREST RATES IN MONGOLIA ARE AMONG THE HIGHEST IN THE WORLD.

Amar: We provided down payment subsidies for 26 household mortgage loans with verified energy efficiency of 20% or more through this pilot project.

Thanks to the project, over 20 construction companies were trained in drawing energy efficient designs using the following new criteria: alternative heating and cooking solutions instead of a traditional stove, regulated air temperature and ventilation, thermal insulation, clean sanitation facilities, and an ex-post verification by an independent energy auditor.

Nomindari: From a financing point of view, we tested a new type of subsidy providing down payment with an interest rate as low as six percent, which is not common for the mortgage market, thus making the loan more affordable and acceptable for low-income households. In total we had eight of our member banks participate in the project and through them 26 EE houses were financed at a rate of 6-12%. In total approximately 1.12 billion MNT was loaned to the recipients.

Amar: We also had extensive discussions with the Mongolian Mortgage Corporation (MMC) and the Central Bank of Mongolia regarding the provision of banks. We wanted to ensure that with the continuation of the existing mortgage program, MMC would accept these energy efficient houses as valuable collateral.

Nomindari: We were able to include the single housing finance in the current mortgage regulation which previously had only applied to apartment buildings. Before the pilot project, only three banks offered mortgages for individual houses with high-interest rates. After the implementation of the pilot project, several banks introduced dedicated EE housing mortgage green products. Other new frameworks for green building standards, technical specifications, and certification are in process because of the needs we uncovered through this pilot project. We hope that policymakers will further approve these frameworks as national standards for green buildings.

Last, but not least, the mortgage program resulted in the construction of the first ever IFC (International Finance Corporation) EDGE (Excellence in Design for Greater Efficiencies) certified green building in Mongolia.

What were the lessons learned from this pilot?

Nomindari: The project was an exceptionally complex process facing a huge array of technical and programmatic challenges. In this process, however, we learned critical lessons that will now improve the EE mortgage policy, and financial products in our country.

Amar: The project brought together policy makers, regulators, low-income households, financial institutions and construction companies to one table for the first time. Together, we discovered and sought to understand the challenges and barriers we face in solving our city's largest problem.

Nomindari: Finally, we realized that capacity building is needed at all levels, starting with buyers, construction companies, financial institutions, policymakers, energy auditors, and the general public. This need will not be met by a one-off training. We need a consistent approach to train a new generation of workers that can roll out large EE housing schemes.

Amar: The pilot achieved its goals perfectly, demonstrating that energy efficient housing mortgages can be accessible for low-income households with the appropriate construction sector standards.

How will the pilot develop in the future?

Nomindari: Building on these lessons and to develop EE houses at a larger scale, we need to identify new EE housing designs and find ways to further reduce construction costs and housing prices. We also have to increase the operations and maintenance efficiency of both construction companies and financial institutions, to make the verification process easier by exploring digitization. Furthermore, we must introduce a sustainable policy framework and subsidy scheme, to reduce the financing costs for buyers and developers in the long term.

Our future planning includes scaling up the EE housing financing scheme in several ways. From the policy side, this includes continuing to advocate to involve the financing of EE houses versus regular houses in the mortgage regulations, and working in close contact with the central bank to see whether we can add specific clauses around financing EE houses in the mortgage regulations. It also includes providing incentives for people opting for EE houses rather than regular houses. On top of this, we are expanding the Green Taxonomy to include technical specifications for activities related to the financing of EE buildings, and are working on the introduction of a National Sustainable Finance Strategy. This strategy will include specific recommendations, and action plans to scale up EE housing financing.

From the product side, the Mongolian Green Finance Corporation (MGFC) is to become operational within 2022.

> IN THIS PROCESS, HOWEVER, WE LEARNED CRITICAL LESSONS THAT WILL NOW IMPROVE THE EE MORTGAGE POLICY AND FINANCIAL PRODUCTS IN OUR COUNTRY.

This will not only further scale up the financing of EE housing, but the insulation of houses as well. The MSFA will also continue to engage with our member banks to help them introduce and scale up EE housing financing products, to ensure that all new houses will better suit and align with EE standards in the future.

Thank you.

ENERGY EFFICIENT PILOT HOUSES IN ULAANBAATAR

Five EE model houses for demonstration purposes have been built by local construction companies in the premises of the Kindergarten No.188 in Khoroo 33 of Songinokhairkhan district of UB City and are accessible for the public to visit on the weekends. These houses were built within the framework of the GIZ Building energy efficiency project. They have a floor area of around 50 m^2 and are built using different materials and efficiency solutions. They have been handed over to the kindergarten and are now being used as a kindergarten facility, and have replaced the ger kindergarten facilities previously used.

MODEL HOUSES

1 DELGER HOUSE

1 GRAND AVGUSH HOUSE

1 EREL HOUSE

1 SAKURA HOUSE

1 ISO HOUSE

1 BUIMAN KHARSH

1 HYBRID HOUSE

1 BUIMAN KHARSH

1 BUIMAN KHARSH

9 EREL HOUSES

7 HYBRID HOUSES

1 GRAND AVGUSH HOUSE

1 HYBRID HOUSE

1 GRAND AVGUSH HOUSE

1 SAKURA HOUSE

SONGINOKHAIRKHAN

SUKHBAATAR

CHINGELTEI

BAYANGOL

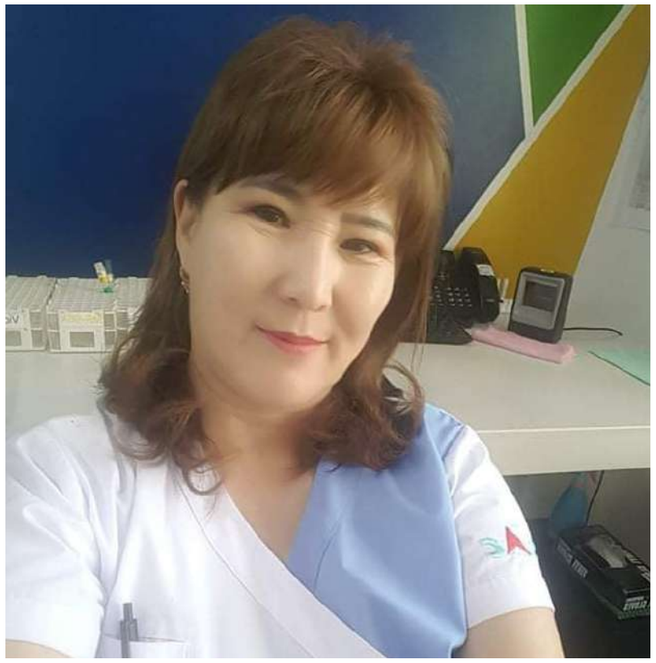
BAYANZURKH

KHAN-UUL

NALAIKH

WE HOPE THAT THERE WILL BE MORE GREEN HOUSES AND BUILDINGS LIKE THIS IN MONGOLIA.

MINI-DOCUMENTARY PRODUCED WITHIN THE BBC STORY WORKS "HUMANIZING ENERGY" SERIES



The BBC documentary shows a short story of a family living in the ger district of Ulaanbaatar city who decided to move to an EE house to be built within the GIZ pilot project. The story is told by Ms. L.Undarmaa.

Shifting into energy efficient housing has many indirect benefits for the household. Family members do not have to get up at 6AM in the morning to rekindle the fire, spend hours weekly buying coal and wood, getting dirty (furniture, clothes) to discard the ashes, experiencing temperature fluctuations with burning coal, and most importantly, improved indoor air quality, which significantly reduces the probability of respiratory diseases and PM2.5 related health risks such as asthma, heart disease, stroke, and lung cancer.

See here the BBC Story Works "Humanizing Energy" documentary:

DEVELOP YOUR OWN CERTIFICATE

ONLINE TOOL FOR "BUILDING ENERGY CERTIFICATION SYSTEM" (BECS) DEVELOPED

Based on the project experiences, and in cooperation with another GIZ project "Strategical Alliance in the Construction Sector", a web-based digital system for certification of buildings energy consumption and demand was developed. This tool will be placed on a website of the Ministry of Construction for open use.

It allows private home owners as well as professionals to aply their own building data in order to learn more about the energy demand of their building. The tool provides the ability to detect the heating demand of buildings, including the adjustment of building plans during the early stage of planning, to fulfill the energy demand building standard requirements.

In addition to providing this basic information for home owners, it also enables building energy experts to examine building plans for energy efficiency, and to generate an official energy efficiency building certificate. This energy performance certificate can be used as a quality certificate for potential buyers and building users, and it serves as a basic tool for the inventory of CO2 emissions in the building sector. This tool provides an important step towards transparency of energy consumption which is one of the main reirements to allow energy efficient planning and investment.

BETTER LIVING CONDITIONS FOR GER AREA RESIDENTS

By the end of 2021, a total of 26 EE houses were built through the subsidized pilot. It demonstrated the possibility of EE homes which require almost no heating during the winter, which prompted the Minister of Construction and Urban Development to create a mortgage regulation for financing EE homes through the national mortgage programme. Moreover, within the pilot project 24 EE house designs of 17 construction companies have been approved and provided with EE certificate.

For more information, please visit: https://m.facebook.com/toc.mn/

TECHNICAL CRITERIA & CONDITIONS:

- Building EE 20% higher than in the building code
- Conduct Energy audit
- House < 70.0 m^2
- Cost < 80.0 million MNT

FINANCING SCHEME

- 30% - Financial subsidy (up to 18 million MNT)
- 10% - Down payment
- 60% - Mortgage loan (interest rate: 6-12%)

THE FIRST OFFICIALLY CERTIFIED GREEN BUILDING IN MONGOLIA

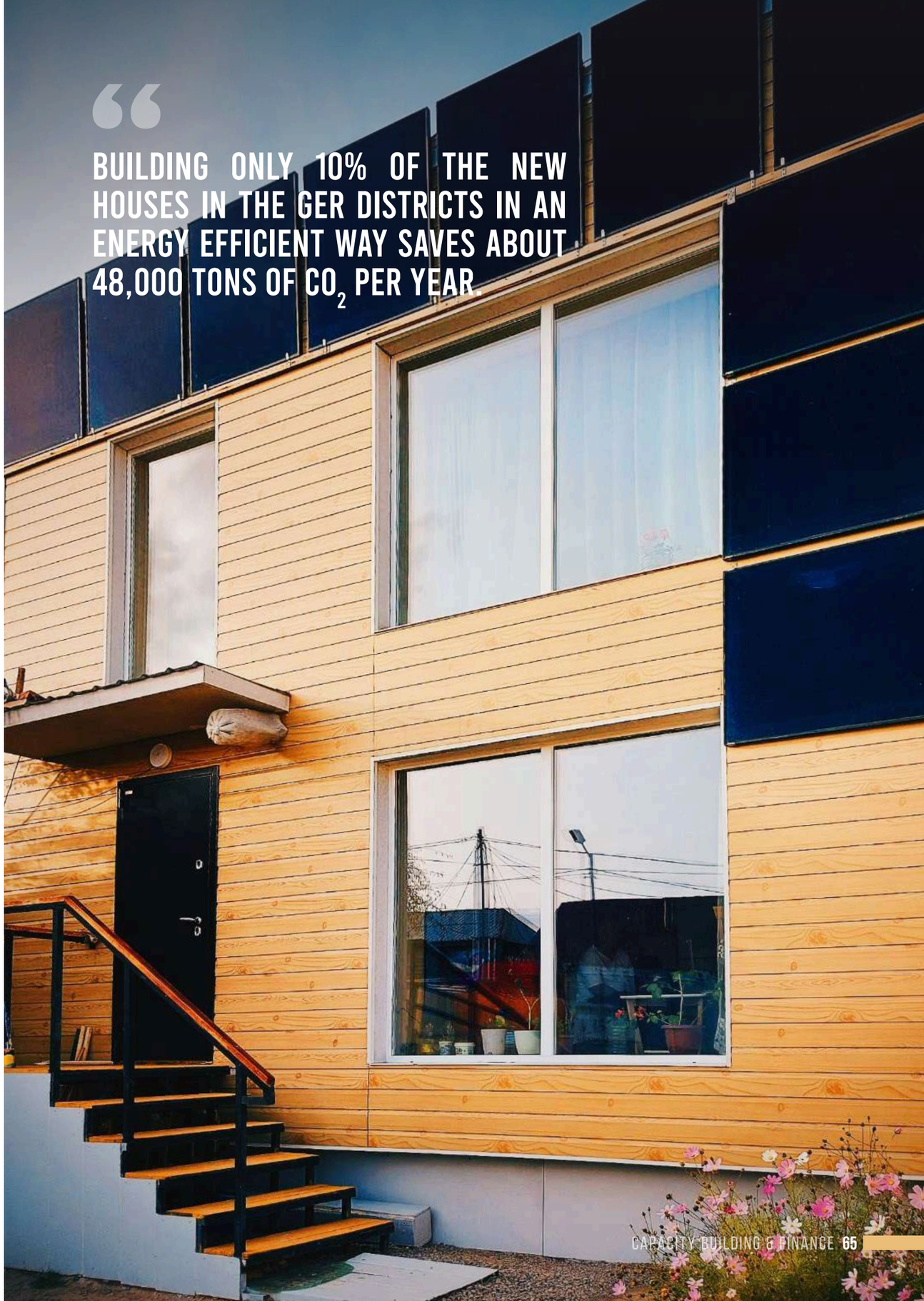
As one of the largest energy consumers, the construction and housing sectors play a critical role in reducing greenhouse gases in Mongolia. In September 2021, one of the houses developed in the projects pilot to develop and implement mongolias first financing scheme for energy efficient ger area houses, was audited and certified by the EDGE (Excellence in Design for Greater Efficiencies) system, becoming the first certified green building in Mongolia. EDGE is an internationally recognized system for assessing and validating the environmental performance of green buildings, developed by the International Finance Corporation (IFC), a member of the World Bank Group. The 70m^2 private house was bought by a family through a financing scheme that was developed with the help of GIZ to promote energy-efficient housing in the ger districts of Ulaanbaatar. After the construction of the building the project also financed, and assisted in the energy efficiency assessment and audit, which is part of the EDGE certification process.

The innovative "passive" house technologies and measures used in the house, helped to reduce heating energy demand to practically zero, while the remaining small demand can be met by renewable energy sources. Additional green building measures included the installation of water-efficient appliances, the elimination of heavy and energy-intensive building materials such as concrete and brick, and the general use of lightweight building structures. 57% energy, 27% water, and 42% embodied energies were saved here, which qualified this house for an "EDGE advanced" certificate.

The greenhouse gas reduction potential of such small houses can have a large impact on both a national and international scale. Nearly 4,000 of these houses are located in Ulaanbaatar's ger districts, and if converted to EE houses could cover the entire CO_2 emission reduction commitment of Mongolia's construction sector. If only 10% of the new houses built in the poor neighbourhoods of Ulaanbaatar were built in an energy efficient way, this

would result in a saving of about 48,000 tons of CO_2 per year (the same amount of CO_2, that is saved by operating a 32 MW wind farm in Germany with 10 large wind turbines). Therefore, the construction of this green building, as well as the first official certification, is an important step towards a cleaner and more energy efficient Mongolia of the future.

Awarding of the EDGE certificate and plaque on 13.10.2021 (from left to right): Dr. Dunja Hoffmann, GIZ Project Manager EEP Project, E. Zolboo, Deputy Minister of MCUD, the homeowners Tumurbaatar and Gandulam, H.E. Ambassador Jörn Rosenberg, N. Ganbaa, CEO of Sakura Property and his mother Ms.L.Yadamsuren.



EDGE: STANDARD FOR THE FUTURE

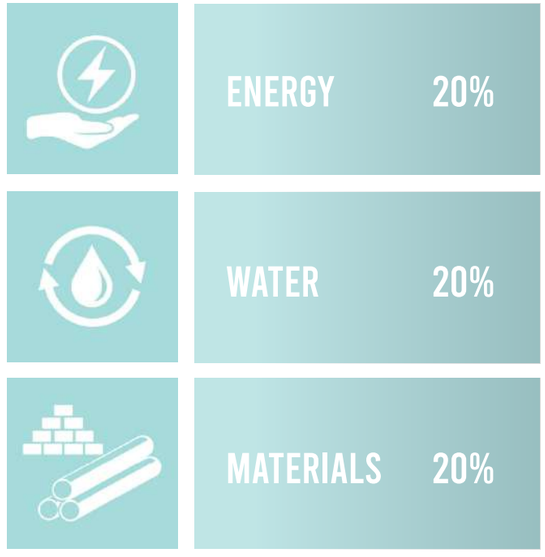
INTERNATIONAL GREEN BUILDING CERTIFICATION PROCESS INTRODUCED IN MONGOLIA

ABOUT EDGE

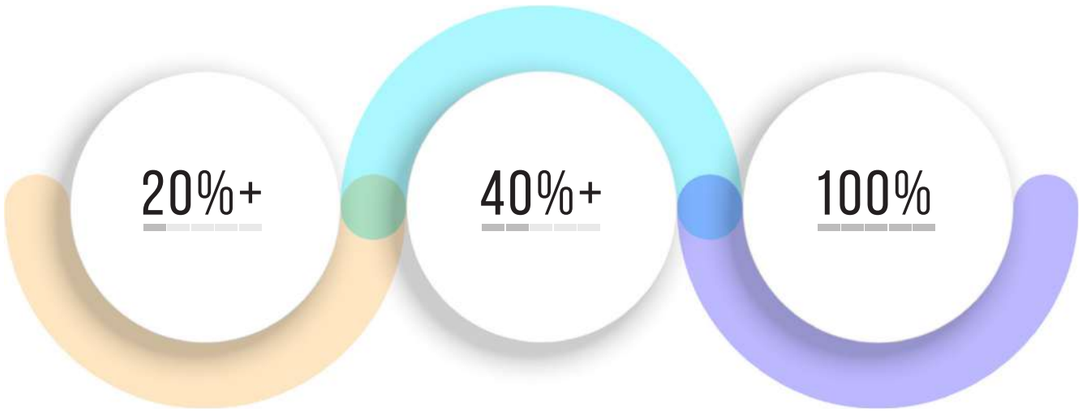
As an innovation of the International Finance Corporation (IFC), a member of the World Bank Group, EDGE ("Excellence in Design for Greater Efficiencies") is an online platform, a green building standard, and a certification system for over 140 countries. It was especially designed for developing countries. The EDGE application helps to determine the most cost-efficient options for green design within a local climate context.

EDGE can be used for buildings of all vintages, including new constructions, existing buildings and major retrofits. The issuing of the first green building certificate marks a first step into the broader introduction of EDGE and other green building standards in Mongolia. This is especially relevant for aquiring green financing for a more sustainable development of the mongolian building sector.

For more information please visit:
www.edgebuildings.com



THREE LEVELS OF EDGE CERTIFICATE



1. EDGE CERTIFIED

Achieve the minimum standard of 20% in energy, water and embodied energy in materials.

2. EDGE ADVANCED

Earn 40% or more energy savings for a higher level of recognition, with at least 20% savings in water and materials.

3. ZERO CARBON

Go all the way to carbon neutral with 40% or more energy savings on-site, achieving 100% through renewables or topping off with carbon offsets.

INDEPENDENT GREEN BUILDING COUNCIL ESTABLISHED

WHAT IS THE GREEN BUILDING COUNCIL (GBC)?

Improving energy efficiency and the introduction of green technologies in the construction sector are important goals of the Green Development Strategies of Mongolia. In many countries a Green Building Council (GBC) promotes energy efficient and green technologies, certification schemes, and standards in the construction sector. As stated in the ''State Policy for the Construction Sector' , Mongolia was planning to introduce a green building rating system which required a broadly accepted institution such as the GBC. GBCs are instrumental in capacity building, raising public awareness and promoting green building technologies, promoting and introducing green building certification ratings and progressive norms, as well as creating standards for energy efficiency in the construction sector.

Once established, the GBC Mongolia will be a valuable professional NGO with a strong agenda relying on its members' creativity, participation and willingness to take action. It will become a reputable platform for sharing scalable solutions and implementing these into everyone's daily work through concrete actions and campaigns. To support the GBC Mongolia with the implementation of its mission, the Ministry of Construction and Urban Development (MCUD) is intending to transfer the functions for green building evaluation and certification.

In 2020 a GBC development concept was submitted to the MCUD and the private sector. As a result of the project's advisory service the MCUD decided to establish the GBC as an NGO. In February 2021 a working group was created by the order of the Minister of Construction and Urban Development (Order No23, Feb 01, 2021) with the aim to support the establishment of the GBC Mongolia. This working group is represented by MCUD officials and private sector stakeholders. The preparation work for the GBC is expected to be completed with the start of operation in the second quarter of 2022.

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THE RENOVATION OF SCHOOL AND KINDERGARTEN BUILDINGS SET A BENCHMARK FOR REHABILITATING OLD PUBLIC BUILDINGS.

INTERVIEW WITH E.ZOLBOO, DEPUTY MINISTER,
MINISTRY OF CONSTRUCTION AND URBAN DEVELOPMENT

Good afternoon, Deputy Minister Zolboo, thank you for being available for our interview today. Your ministry has shown a high interest in the establishment of a Green Building Council for Mongolia. What are the most relevant tasks of this council from your point of view?

Indeed, the sector's green development policy required us to establish and strengthen a Green Building Council (GBC). I am very pleased that thanks to the good working relationship with GIZ and their support, we advanced in this respect. We established a Mongolian GBC with a status of a non-governmental organisation, which is in line with international practices.

A working group has been established by Decree of the Minister of Construction and Urban Development and we are intending to transfer some functions to the GBC to support its sustainable function and development. The GBC will be responsible for the evaluation and certification of green buildings, provision of professional consulting services for the sector's green development strategies and policies and raising public awareness. It will also be authorized to provide training activities.

The Ministry of construction and Urban Development has been in close contact with the project. What are the most important results from the Ministry's point of view apart from the GBC?

Over the last 30 years, the energy efficiency issue was an important part of the agenda in the development cooperation between Germany and Mongolia. I would like to mention that the successful implementation of a number of technical cooperation projects and programmes have contributed significantly to the improvement of the legal environment. We introduced new technologies, and strengthened the capacity in the construction sector.

The Local Energy Efficiency Action Plan (LEEAP) for the construction sector, developed and submitted as part of the GIZ Energy efficiency project, is an important step towards the implementation of the policy documents and the improvement of the investment environment. The Ministry of Construction and Urban Development (MCUD) actively cooperated and supported the development of this comprehensive plan. In addition, in connection with the Paris Agreement, the MCUD must report on the implementation of the Nationally Determined Contribution (NDC)* for the construction sector every two years. Given this, we implemented an “Action plan for the reduction of greenhouse gas emissions in the construction and urban development sector” approved by decree of the Minister. Additionally, we are now working with the GIZ project team to develop a national energy consumption information system, and a consulting company has been selected for this task.

Moreover, the renovation of school and kindergarten buildings in ger districts of UB City was implemented within the GIZ project. This set a benchmark for rehabilitating old public buildings, and it has shown that there is a great potential for the reduction of greenhouse gas emissions by minimizing heat losses.

From the Ministry side, we supported the pilot project for the financing of energy efficient housing developments in ger districts of UB City, amended mortgage lending regulation and approved a regulation for the certification of building based on the energy consumption. Additionally, an online calculation tool and software for buildings' energy needs and consumption, was developed as part of this project. This will help us to introduce an energy efficiency online certification system for buildings.

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THE PROJECT PLAYED AN IMPORTANT ROLE IN THE RECOGNITION OF MONGOLIA'S COMMITMENT TO FIGHT CLIMATE CHANGE.

What are your plans for the further development of the building sector in Mongolia?

Implemented projects and programs demonstrated innovative ways and solutions for reducing greenhouse gas emissions in the construction sector. This played an important role in the recognition of Mongolia's commitment to fight climate change on the international stage, and it helped to receive support for future projects and programs. For instance, in line with the climate commitment, the MCUD has decided to co-finance GIZ's NAMA project for insulation of old panel apartment buildings. As a result of our joint efforts, the €18 million NAMA project was recently approved by the NAMA facility, which is a very positive signal to stepping up our efforts.

I would like to take this opportunity, on behalf of the MCUD, to express our full support and readiness to cooperate in future project activities, especially in the field of energy saving and energy efficiency in the construction sector. Thank you.

Thank you, Deputy Minister Zolboo, for this Interview!

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* Each Party to the Paris Agreement is required to establish an NDC and update it every five years. It is a climate action plan to cut emissions and adapt to climate impacts.

TECHNOLOGY & PILOTS

THERMO-TECHNICAL REFURBISHMENT OF SCHOOLS & KINDERGARTENS

An important aspect of the project was the possibility to work with all different levels of stakeholders. By implementing pilots in thermo-technical retrofitting at public schools and kindergarten buildings, there was the opportunity to generate real life experiences for stakeholders, data collection and complete training simultaneously. The project refurbished 22 school and kindergarten buildings. The work on those buildings allowed private construction companies to put their newly learned skills into practice, while the municipality could apply new management and budgeting processes.

To enable data collection and comparison of energy consumption, on all objects to be refurnished, before and after renovation, mixing loops and heat meters were installed prior to construction work. The collection of this data allows for the development of a baseline for heat consumption and supply, of public and private buildings in Mongolia. For the first time, theoretically calculated heat demands could be compared with the real consumption before and after renovation. This data showed that thermo technical retrofitting is not only serving the aim of the efficient use of energy, but also improving the learning conditions for children studying in those buildings.

In addition to the pilot buildings improving the current the situation, there were also planning and calculation documents created for many more buildings. Nine building designs blueprints were developed for 117 schools and kindergartens, as well as five design blueprints for 1077 panel buildings. These documents allow MUB to save costs in planning, and enables reliable cost calculations.

TEMPERATURE IMPROVEMENTS AND ENERGY SAVINGS

BE COMFORTABLY WARM AND SAVE 40 % OF ENERGY AT THE SAME TIME!

A conducted baseline study has shown that in non-renovated buildings the indoor temperature was as low as 10 – 18°C in wintertime with a clear correlation to the outdoor temperatures. Subsequently children had to wear winter clothes at school. In renovated kindergartens, on the other hand, indoor temperatures stabilized around 22°C regardless of outdoor temperatures.

While increasing the indoor temperature, the project's aim was also to reduce the heating consumption by at least 40% through energy efficiency measures. The measures were calculated and defined in advance by energy auditors, integrated into the planning and checked again after the refurbishments.

Generally, building energy efficiency can be compared by determining the energy consumption per heated volume / area by either measuring:

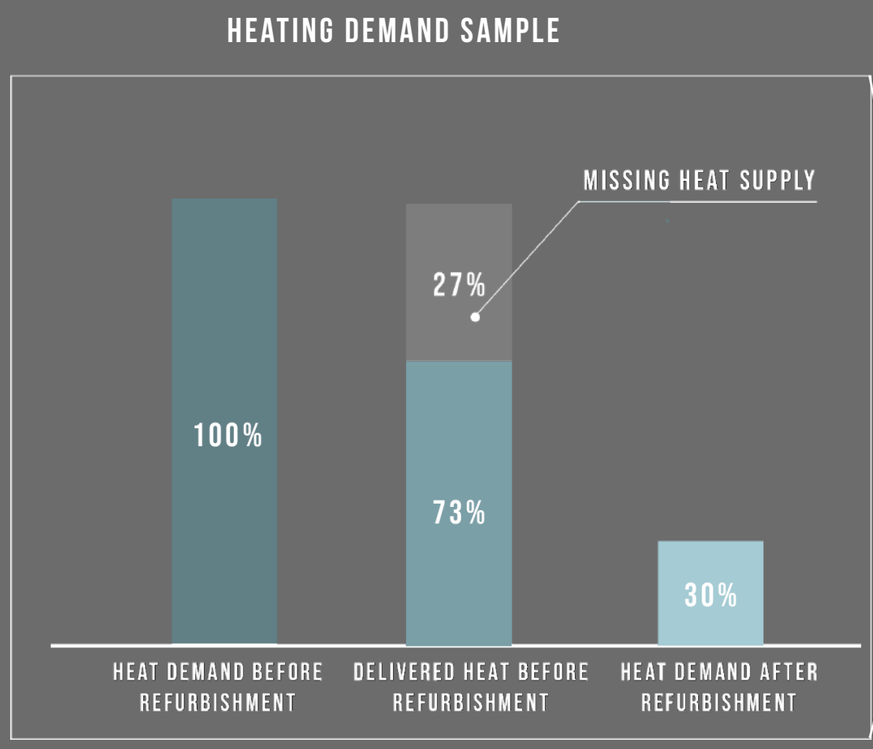
1. demand-related efficiency
2. consumption-related efficiency

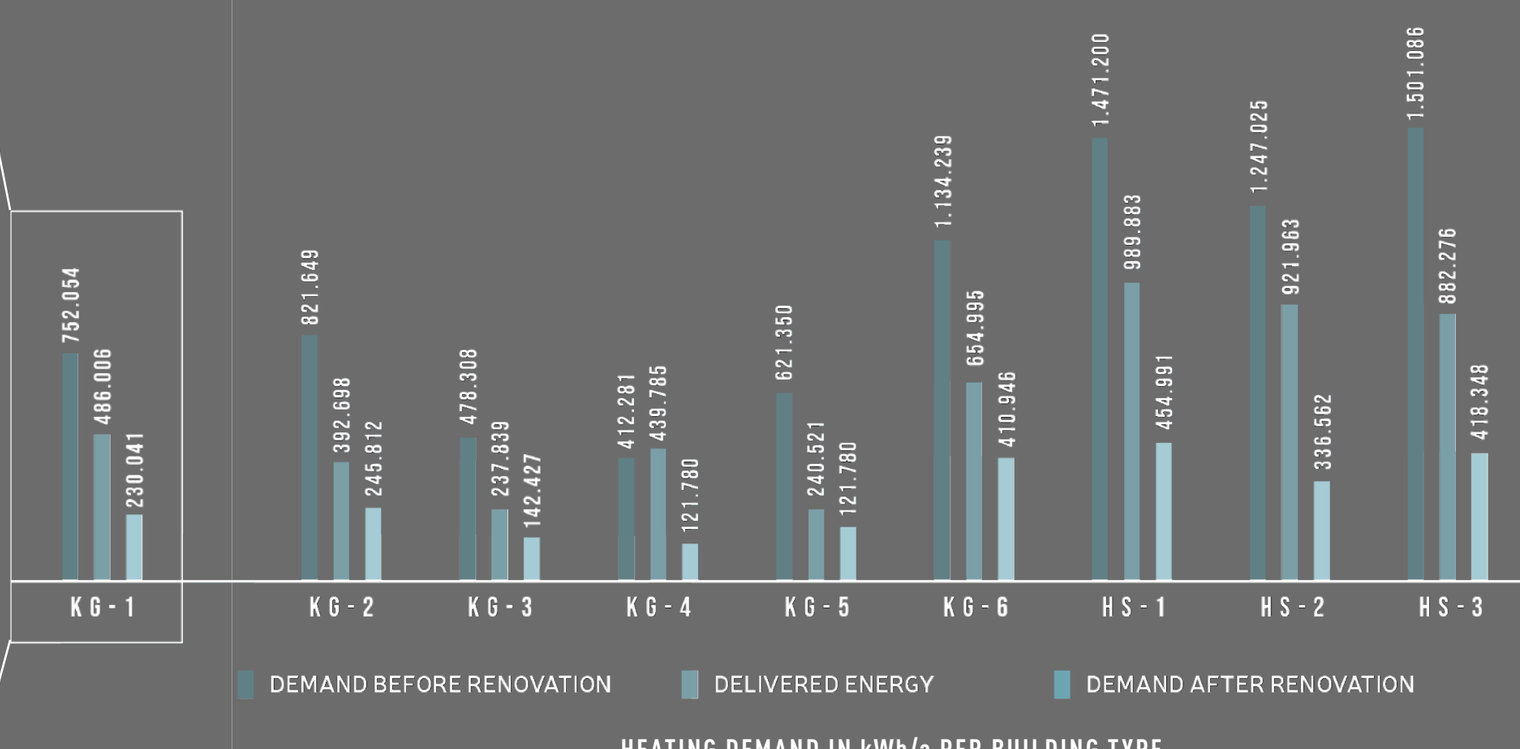
The energy auditing after the refurbishment has shown that by insulating the buildings (roof, top floor ceiling, exterior walls, exterior doors, exterior windows and floor, lower building closure) energy efficiency could be improved by up to 70% compared to the current demand.

This means that the heating energy demand of

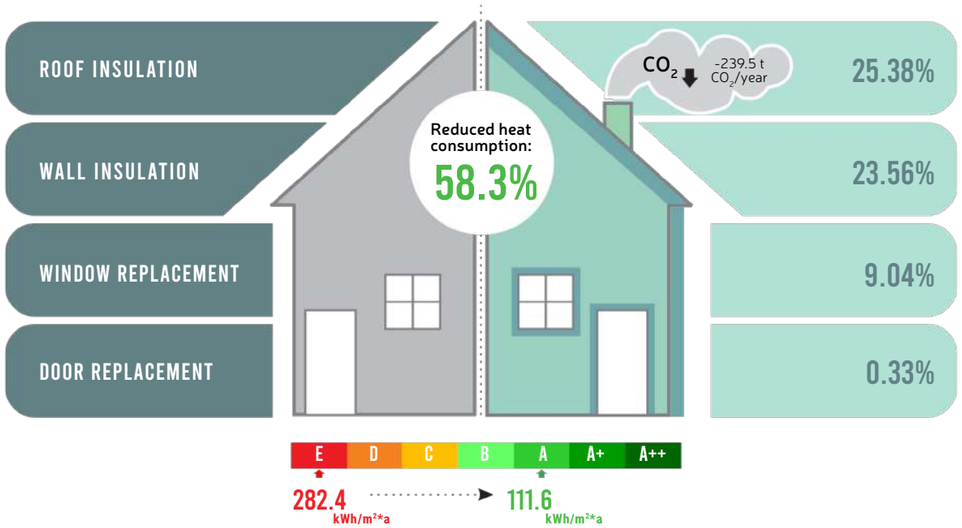
- the kindergarten could be reduced from 400 kWh/(m^2*a) to 120 kWh/(m^2*a)
- the school from 300 kWh/(m^2*a) to 90 kWh/(m^2*a)

As the measurements of the indoor air temperatures showed, the buildings did not recieve the amount of heat given in the calculated demand. After renovation the buildings recieved enough heat to create a comfortable learning condition and additionally save 40-55 % of heating energy in comparison to their consumption before renovation.





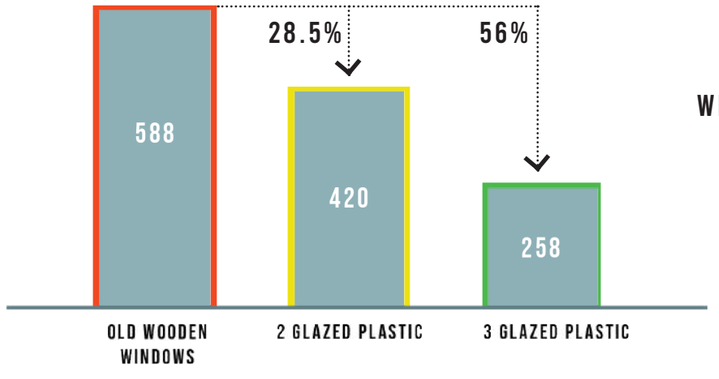
HEAT LOSS IN BUILDINGS & THE IMPACT OF REFURBISHMENT MEASURES



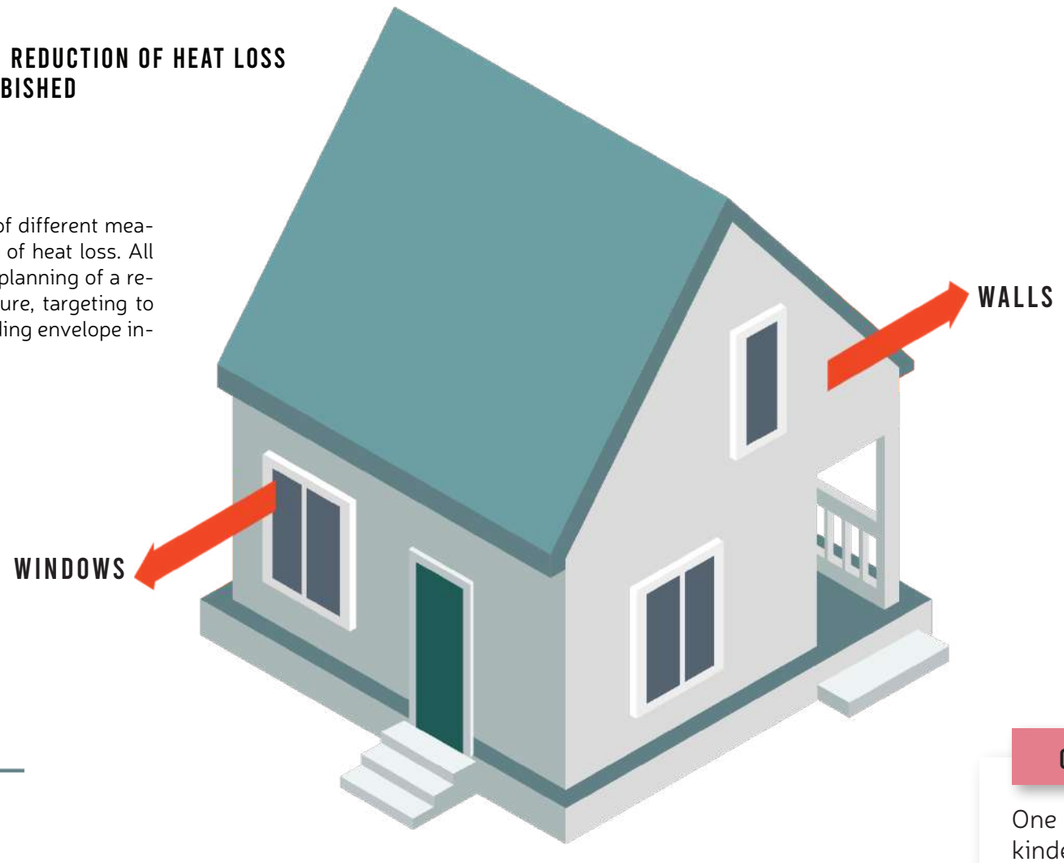
CONTRIBUTION OF REFURBISHMENT MEASURES TO REDUCTION OF HEAT LOSS OF ONE KINDERGARTEN REFURBISHED

HEAT LOSSES OF BUILDINGS ARE MULTIPLE

The refurbishment of older buildings is always a combination of different measures that has to be joined to achieve the maximum reduction of heat loss. All measures come with different costs and efforts. Therefore the planning of a refurbishment has to consider the cost-efficiency of each measure, targeting to insulate as much of the building envelope as possible. The building envelope includes the roof, outer wall, window, exterior door and floor.



REDUCED HEAT LOSS IN kWh/m²*a BY REPLACING WINDOWS



EXTERNAL WINDOWS

The windows have a basic task of letting the natural light into the building and thus reducing the use of artificial light. At the same time, the window is the least energy efficient part of the construction, while south windows can also contribute to the passive use of solar energy.

There are a number of different window types used in the Mongolian construction sector. The most common are the old wooden box windows, double and triple glazed plastic windows.

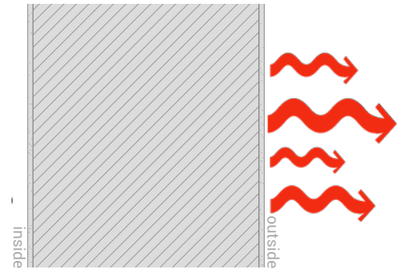
The specific heat loss through windows is four to eight times higher than that of the outer walls, so the optimal size and direction of windows is important.

EXTERNAL WALLS

Most of the heat losses go through the outer walls. Therefore, this is the first measure typically implemented in thermo-technical renovation.

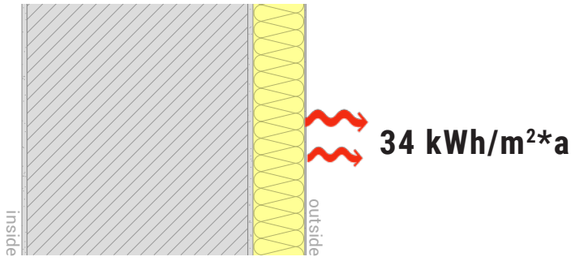
The heat loss through a typical 64 cm thick masonry is 149.4 kWh per m^2 and year. After the insulation with 15 cm thick insulation heat losses can be reduced by 70% to only 34.4 kWh/per m^2 and year.

Through the wall area of a non renovated kindergarten with 1.244 m^2 during one year 185.794 kWh of heating energy will be mendacious. After renovation, the heat loss will add up to only 42.843 kWh, leading to savings of 142.951 kWh per year, equaling to the reduction of 50t of coal per year.



BEFORE

70% LESS HEAT LOSS



AFTER

CO_2 SAVINGS

One refurbished average kindergarten saves 143.000 kWh or 50 tons of coal per year.

For more information please visit:

COSTS FOR THERMO-TECHNICALLY RETROFITTED SCHOOLS & KINDERGARTENS

INVESTING NOW IN REFURBISHMENT SAVES HIGH BUDGET FOR THE NEAR FUTURE

Mongolias extreme winter temperatures are a threat to all buildings. Penetration of moisture in the walls in the heating seasons combined with frost will deteriorate the building structure from the outside, as the expanding structure of freezing water blasts wall structures and low indoor air temperatures with low ventilation will support the growth of mould on the inner walls.

This occurs mainly due to the fact that cold air can hold less humidity than warmer air. Due to the difference of temperatures between inside and outside, the location of the dewpoint, where the air is not able to take more humidity, is a relevant factor for the humidity content of the wall. In non insulated walls, the dew point is located inside the wall structure, allowing frost to deteriorate the wall, while external insulation moves the dewpoint to a position within insulation but outside of the wall, so that extra humidity can not deteriorate the building structure.

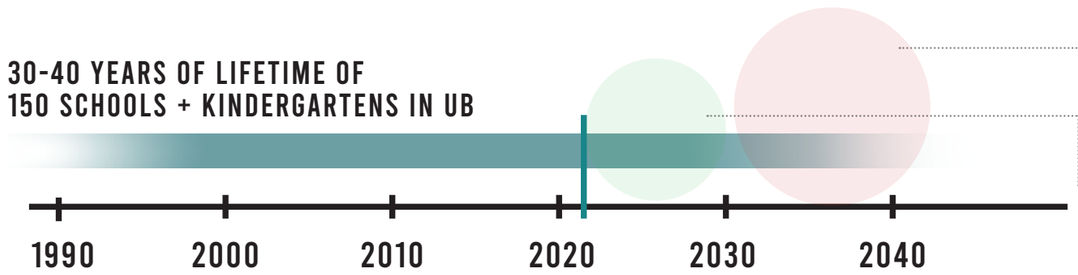
Most of the public buildings in Mongolia were built during the Soviet era, 20 to 30 years ago and do not have insulation. Therefore the average lifetime of masonry buildings in Mongolia is only between 30 and 40 years.

Thermo-technical retrofitting protects the outer wall from humidity, and as a result extends the building's technical lifetime by a minimum of 20 years after a professional refurbishment. If the insulation work is completed professionally, moisture can not enter the building structure and frost will be kept on the outside of the walls. Masonary buildings can be used for hundreds of years if frost is not able to enter the outer layers, as can be seen in examples from Euroean countries. Public entities will have to consider this when they make their decisions on how to proceed in their investment strategy.

Public entities will have to consider this when they make their decisions on how to proceed in their investment strategy.

The renovation of a building to a high standard costs on average 300.000 MNT/m^2. Given this, the costs for retrofitting a 2.000 m^2 kindergarten building would be 600 Mio MNT or approximately 193.000 EUR. This is very affordable when compared to the construction costs of a new kindergarten, for which costs per m^2 sum up to 3,5 Mio. A new kindergarten with 2.000 m^2 would cost 7.000 Mio MNT or 2,3 Mio. EUR. Therefore, it is up to 11 times cheaper to invest in the retrofitting of existing buildings than leave them in their current state, and have to invest into new buildings in 10 –15 years time when the building structure is unusable.

For more information please visit:



> THE MEASURED VALUE FOR CO_2 CONCENTRATION IN CLASSROOMS WAS UP TO FIVE TIMES HIGHER THAN RECOMMENDED

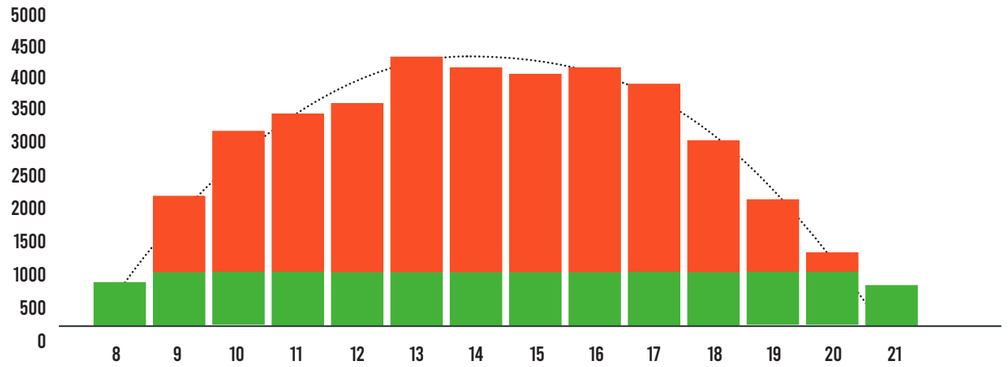
HEALTHIER CHILDREN HAVE A BETTER FUTURE

SOCIAL ASPECTS OF THE EEP/PIE-2 PROJECT

An upgraded environment has significantly benefited the health of the children, and employees of the kindergartens and schools. The largest benefits for the individuals were recorded in the warmer kindergartens.

Prior to the refurbishment works, indoor temperatures ranged between 10 and 18 degrees. This caused discomfort, and prevented relaxed play, and concentrated learning. Due to the harsh conditions outside and the low temperatures, teachers tended to seal the windows and ventilation inlets to prevent cold air coming in. Unfortunately, these measures prevented the ventilation and exchange of the indoor air. This led to high humidity, and high concentrations of CO_2 in the inside air. The standard for recommended concentrations of CO_2 in educative buildings is at 1.000 parts per million (ppm). The measured values in those rooms was up to five times higher than this value. High concentration of CO_2 leads to tiredness, and less ability to concentrate. Low ventilation rates, high concentrations of CO_2, and cold temperatures are good conditions for viruses, bacteria, and mould to spread in a room.

CO_2 CONCENTRATION IN PPM DURING ONE DAY (KG168 SOUTH)



Participating schools reported high absence rates of students, and teachers, on regular occasions throughout the year, prior to refurbishment. The air pollution in Ulaanbaatar, which is among the highest in the world, further aggravated this problem. Children, in particular suffer from lung and respiratory problems that often lead to pneumonia and other severe ilnesses, requiring medical treatment for many days or even weeks, each winter. This does not only lead to suffering and medical costs, but also requires parental care, and therefore produces high absence rates from economic activities.

Following the thermo-technical refurbishment, some beneficiaries stated that the direct costs for medical care, and lost work opportunity decreased by up to 65% (amounted to approx. 100-200 EUR depending on household social and economic status). According to a study to determine the social and health benefits of thermal refurbishment of schools and kindergartens, that was conducted in 2019 on the first refurbished buildings; the number of sick children had decreased by up to 48%, when compared to the previous year.

The survey also reported improvements in the children's behaviour and learning performance. Children in renovated schools showed higher motivation to attend classes and participated more actively in the lessons.

Due to the fact that the study was based on the results of surveys, interviews and one-on-one interactions, the data can not be generalized. General results in direct correlation with specific health benefits must be further investigated by scientific research. Since the closing of the schools at the beginning of the COVID pandemic in January 2019, there were no children in Mongolian schools for more than two years. The children gradually started to return in the fall of 2021, and full class activities have only resumed in spring 2022.

Even though the direct monetary terms are dificult to define, the study showed a significant impact of thermo-technical refurbishment in terms of reducing/preventing illnesses and improving learning environment and physical performance of the children. 83% of the beneficiaries have actively expressed their contentment with the improved conditions, such as a comfortable room temperature, a clean and renovated living space, and a safe and attractive external environment.

OVERALL RESULTS

The implementation of the pilot buildings showed that the learning environment and physical conditions can significantly be improved by investing into retrofitting instead of postponing decisions to a later stage.
Overall, large cross-cutting benefits have been achieved with regards to improved health, energy savings, reducing air pollution, and CO_2 emissions.

NINE DRAWINGS WORK FOR 117 BUILDINGS

PLANNING & BUDGETING BLUEPRINTS AVAILABLE

One of the existing problems in the renovation of public buildings is the lack of officially approved construction drawings and cost calculations, which must be present in the budget application when requesting refurbishment.

Most of the public buildings in Ulaanbaatar have been constructed in the Socialist time using the base of the same type of construction drawings that depended upon the use of space and number of people to be provided for public service. Ulaanbaatar has around 150 schools and kindergartens built on the base of this type of blueprints.

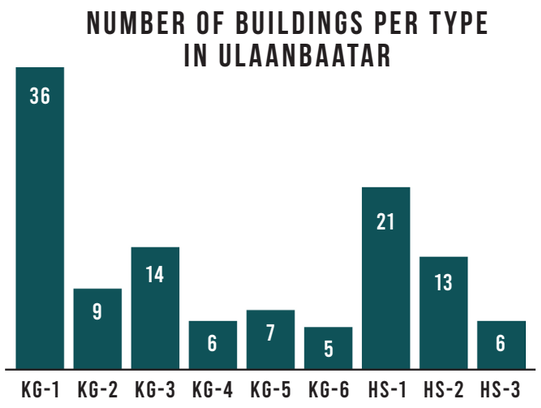
The 22 pilot buildings were implemented with differing variations of those blueprints. Based on this information, the project conducted an analysis of the most common building types and was able to produce repeatable thermo-technical renovation plans and cost calculations, for 117 schools and kindergartens with nine building types. Handing over these plans to the Municipality of Ulaanbaatar and the integration into the database system allowed a saving of cost and time during the application process, and during planning and budgeting.

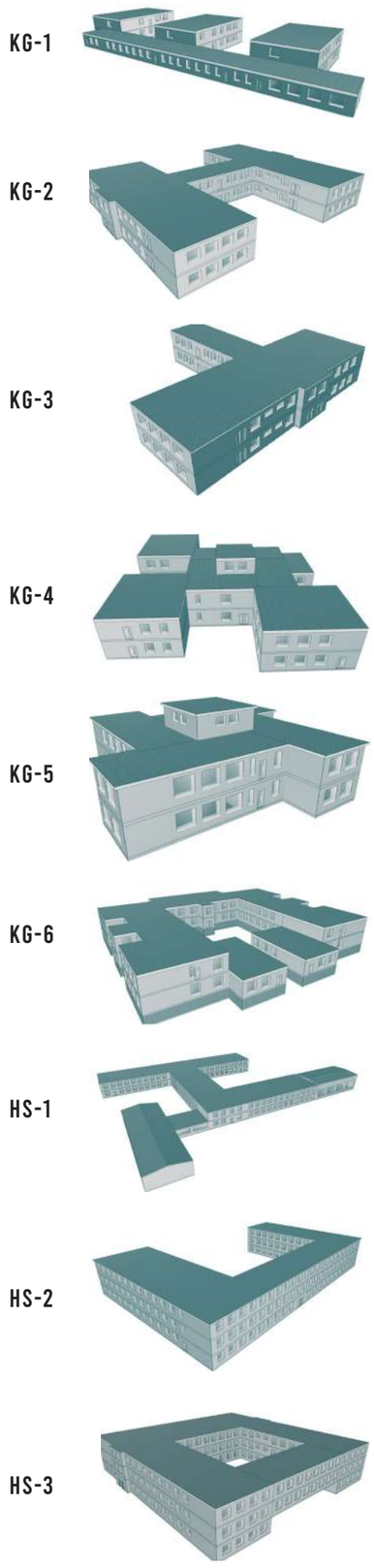
By continuing activities with the officially approved plans, reduction of heating demand, improved indoor air quality, the following benefits can be procured:

- protection and saving of the school and kindergarten stock
- reduction of greenhouse gas emissions
- reduction of air and environmental pollution
- reduction of heating costs
- savings in investment costs for new buildings

This can also be used as a good example of how the systematic approach to reducing air pollution at the local level, and the reduction of CO_2 emissions at the global level should look like.

This effect is multiplied if the five blueprints suitable for over 1000 panel buildings in Ulaanbaatar and other regions are used for thermo-technical refurbishment to reduce their energy consumption. For this endeavor a new project "Energy Performance Contracting for Residential Retrofitting in Ulaanbaatar City" has recently been approved under the NAMA facility.





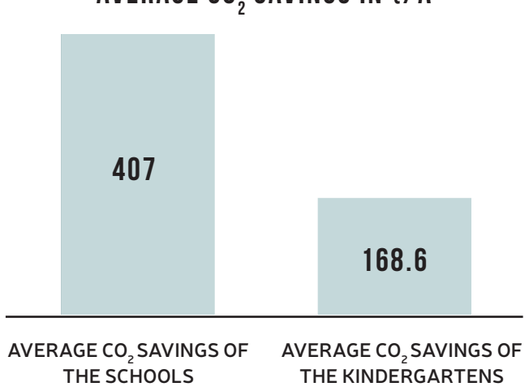
CO_2 REDUCTION CONTRIBUTION

127.000 TONS OF CO_2 ALREADY SAVED BY PILOT

Through the implementation of the thermotechnical measures, the heating consumption of the buildings has been sustainably reduced, leading to a significant reduction in heating costs in the national and local budgets and also to a strong reduction in CO_2 emissions, which serves as an example of how to achieve a positive impact against climate change.

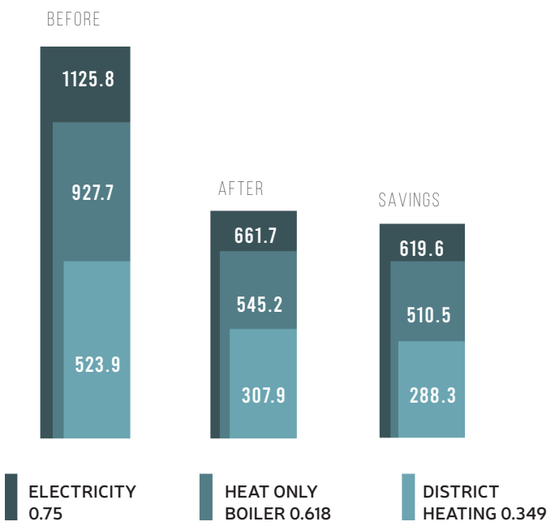
By implementing the refurbishing measures, the project shows that an average of 400 tonnes of CO_2 could be saved in an average school, and 170 tonnes in an average kindergarten. Across all 18 buildings renovated until the end of 2021, a total of 4,227 tonnes of CO_2 is saved every year.

If the lifetime of the measures implemented is assumed to be 30 years, a total of 127.000 tonnes of CO_2 will be saved. If the results of the project are implemented in all 117 schools for which planning documents are available, CO_2 emissions reduction can reach 8,300,000 tonnes of CO_2. This number equals the obligation of Mongolias NDC commitments for reduction contribution in the building sector.



126 REFURBISHED BUILDINGS SUPERSEDE 20MW COAL HEATING PLANT

The project has shown that EE buildings can liberate heating energy, desperately needed in the fast growing City of Ulaanbaatar. Based on the existing energy system new coal plants are planned to be installed every few years. With thermo-technical refurbishment of old buildings, energy can be used more efficiently so that the construction of new coal based heating plants can be superseded. The thermo-technical retrofitting of just 126 public buildings, such as schools and kindergartens, can replace the new construction of a 20 MW coal heat only boiler.



LESSONS LEARNED

Due to the current heating system, the energy saving is only partly reflected in the state budget. In cases where public buildings have their own boiler system, the reduced costs for fuel (coal or wood) can be directly measured. If a flexible budget system is provided for these buildings, the saved costs can be allocated to other needs and can be spent more effectively to further promote learning conditions and a child friendly environment.

Unfortunately, in the case of the buildings connected to the centralized district heating system, the energy savings are not presently directly reflected in the government expenditures. This negative fact is due to a tariff system that lacks any incentive to save energy. The tariffs are based on the volume of the building, not on the actual consumption of energy. Therefore, measures need to be undertaken to support energy-saving actions for speedier results.

Each building requires a heat regulating system to allow better control of energy consumption at all levels. This will make the thermo-technical renovation more effective and enhance its cost saving results.

By the end of the implementation of the project, a total of 22 buildings will be thermo-technically refurbished, seting the base for a strategical implementation of energy efficiency in buildings of Ulaanbaatar and the whole of Mongolia.

THE SCHOOLS & KINDERGARTENS

MODELS TO BE IMPLEMENTED THROUGHOUT MONGOLIA

Happy and healthy children who study in a positive and supportive learning environment are the most future oriented "output" of the project. Thanks to the initiative of the Swiss Agency for Development and Cooperation (SDC), the funding of construction work was implemented into the project concept at the initial phase of PIE. The project activities in refurbishing schools and kindergartens in Khovd and Zavkhan created very positive experiences. The stakeholders were able to demonstrate changes in conditions on real buildings, that could be monitored before and after refurbishment. They generated real time data, and experienced the improvements in air quality and comfort first hand.

All those experiences were included in the planning of the new project, combining PIE-2 and EEP. Thanks to the commitment and active cooperation of the Municipality of Ulaanbaatar (MUB) a shared financing for the construction work of 22 schools and kindergartens could be developed and implemented. 60 % of the costs of the construction work was covered by the SDC, and 40 % by the MUB.

The following pages show the results reached in each of the school and kindergarten buildings; including reductions in heat loss, energy savings, savings in future investment, and the number of beneficiaries receiving improved learning and teaching environments.

The experiences, measurements, and data that were acquired were used in an analysis on how to adopt them to other public buildings. As a result, the planning and budgeting blueprints for nine different building types were created. They can now be used in 117 schools and kindergartens in Ulaanbaatar, and in other regions.

Each of the buildings is therefore an example for many more to be implemented in the near future in Ulaanbaatar, and other cities throughout Mongolia.

REFURBISHED SCHOOLS & KINDERGARTENS IN UB*

*4 more School buildings to be terminated in 2022: School Nr. 42 (2 Buildings), School Nr. 95, Amgalan School


KINDERGARTEN 158


KINDERGARTEN 91


KINDERGARTEN 127


KINDERGARTEN 147


SCHOOL 74


KINDERGARTEN 115

SCHOOL 69


KINDERGARTEN 63


KINDERGARTEN 80

SONGINOKHAIRKHAN

SUKHBAATAR

CHINGELTEI

AMGALAN SCHOOL


KINDERGARTEN 62

BAYANZURKH


SCHOOL 65

BAYANGOL


SCHOOL 88


KINDERGARTEN 148

KHAN-UUL

NALAIKH


KINDERGARTEN 152

SCHOOL 42


KINDERGARTEN 81


KINDERGARTEN 90


KINDERGARTEN 79

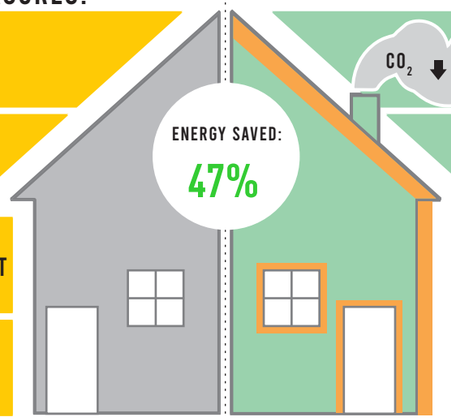

SCHOOL 55


SCHOOL 53

THERMO-TECHNICAL REFURBISHMENT OF SCHOOL 53

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT



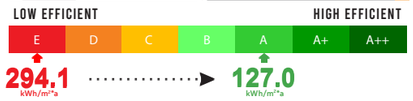
SAVINGS:

CO_2 -274.4 t CO_2/year — 16.35%

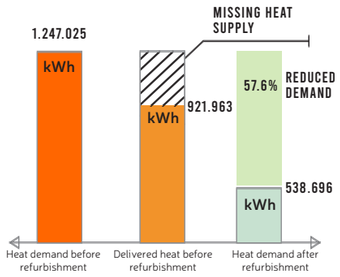
19.57%

10.98%

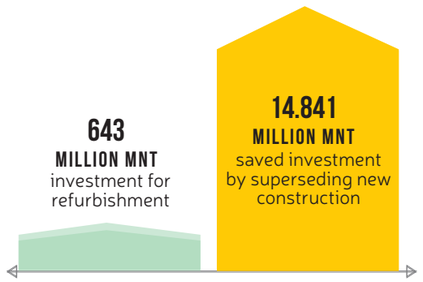
0.19%



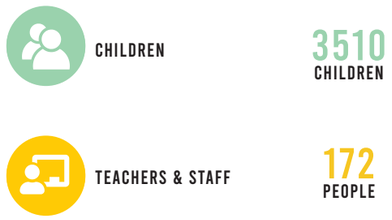
HEAT DEMAND:



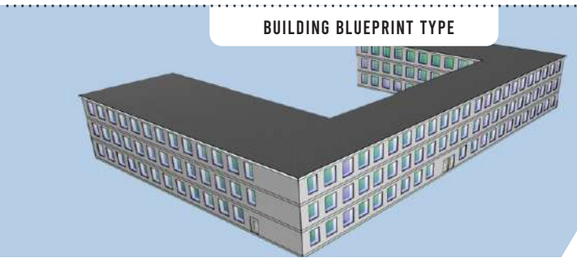
INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



AMOUNT OF DIRECT BENEFICIARIES:



BUILDING BLUEPRINT TYPE

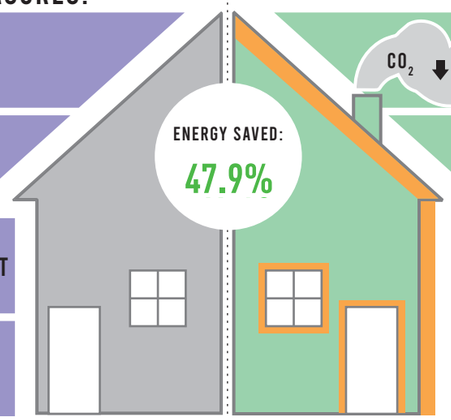


BEFORE REFURBISHMENT

THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 90

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT



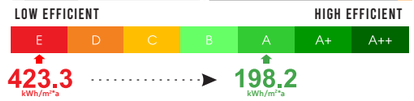
SAVINGS:

CO_2 -274.4 t CO_2/year — 17.96%

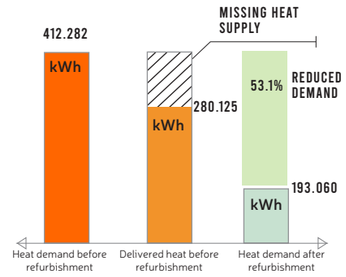
21.93%

7.34%

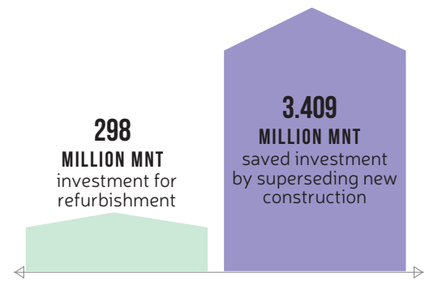
0.68%



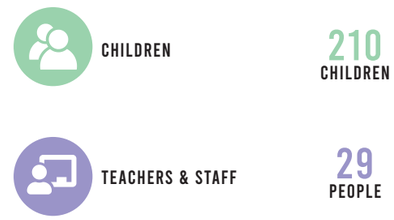
HEAT DEMAND:



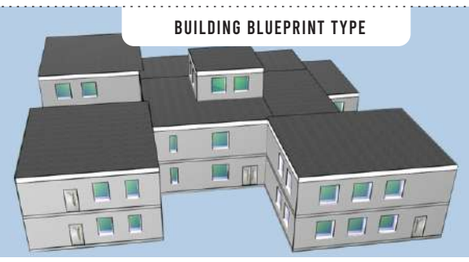
INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



AMOUNT OF DIRECT BENEFICIARIES:



BUILDING BLUEPRINT TYPE



BEFORE REFURBISHMENT

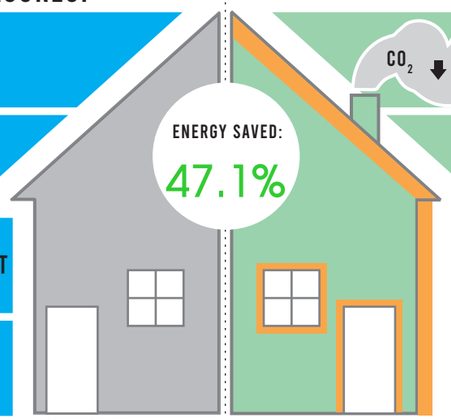
THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 127

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT

SAVINGS:

- 19.0%
- 20.47%
- 6.38%
- 1.26%

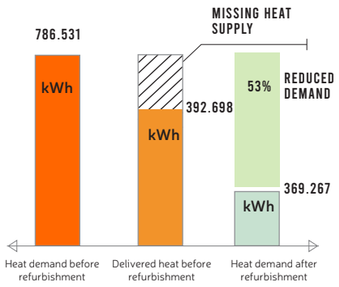


LOW EFFICIENT — HIGH EFFICIENT

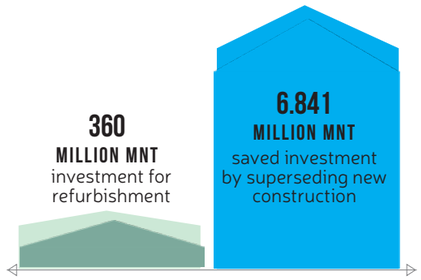
E D C B A A+ A++

402.4 kWh/m²a ▶ 188.9 kWh/m²a

HEAT DEMAND:



INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



AMOUNT OF DIRECT BENEFICIARIES:

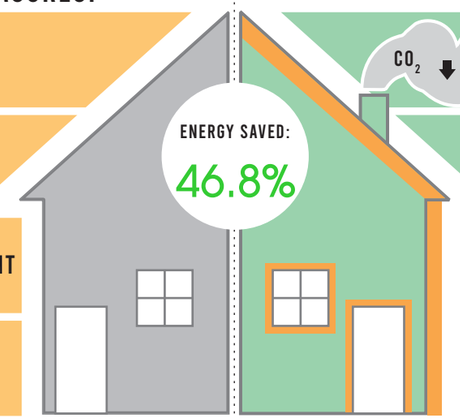
THERMO-TECHNICAL REFURBISHMENT OF SCHOOL 55

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT

SAVINGS:

- 17.67%
- 21.47%
- 7.35%
- 0.31%

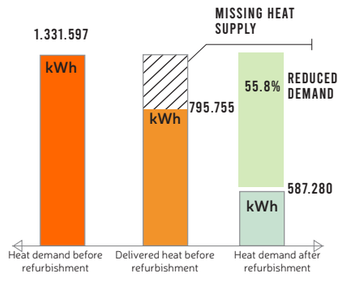


LOW EFFICIENT — HIGH EFFICIENT

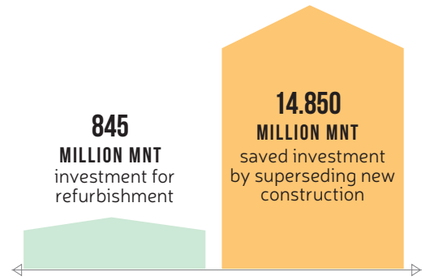
E D C B A A+ A++

313.8 kWh/m²a ▶ 138.4 kWh/m²a

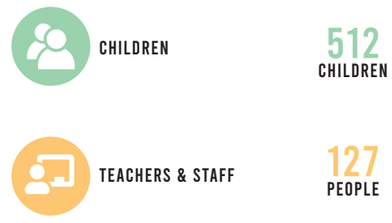
HEAT DEMAND:



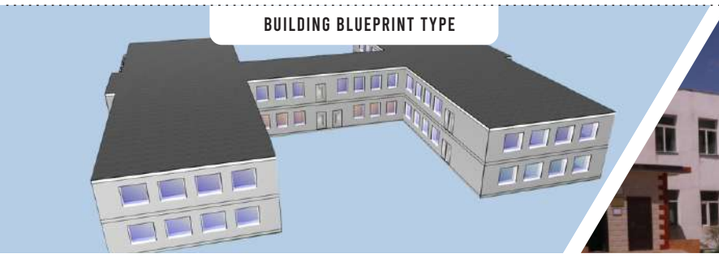
INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



AMOUNT OF DIRECT BENEFICIARIES:



BUILDING BLUEPRINT TYPE



BEFORE REFURBISHMENT

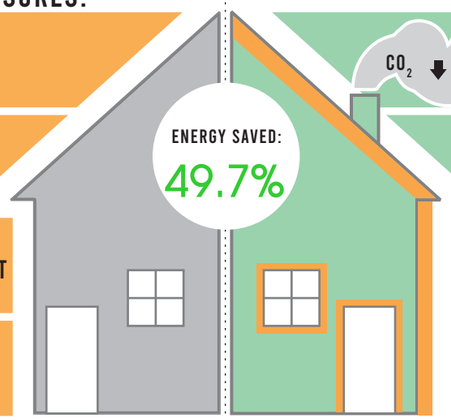
BUILDING BLUEPRINT TYPE

BEFORE REFURBISHMENT

THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 62

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT



SAVINGS:

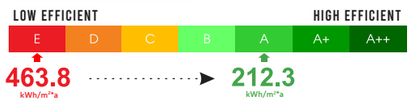
CO_2 -274.4 t CO_2/year

17.73%

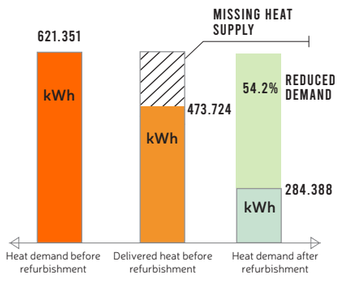
25.59%

5.88%

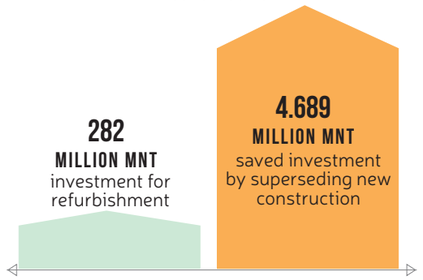
0.53%



HEAT DEMAND:



INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:

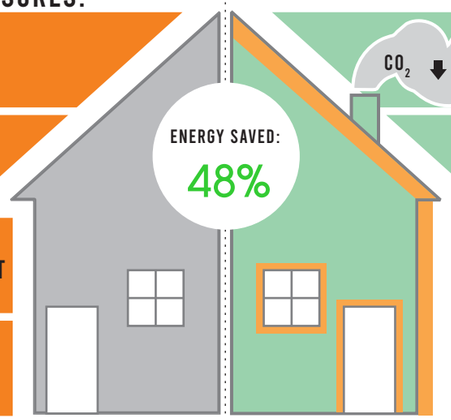


AMOUNT OF DIRECT BENEFICIARIES:

THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 63

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT



SAVINGS:

CO_2 -274.4 t CO_2/year

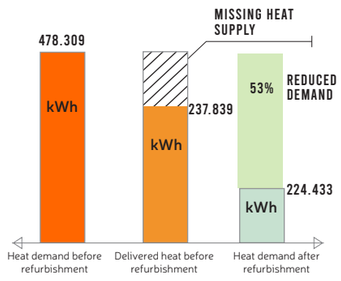
18.95%

21.58%

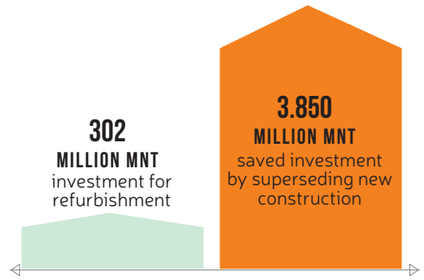
6.27%

1.28%

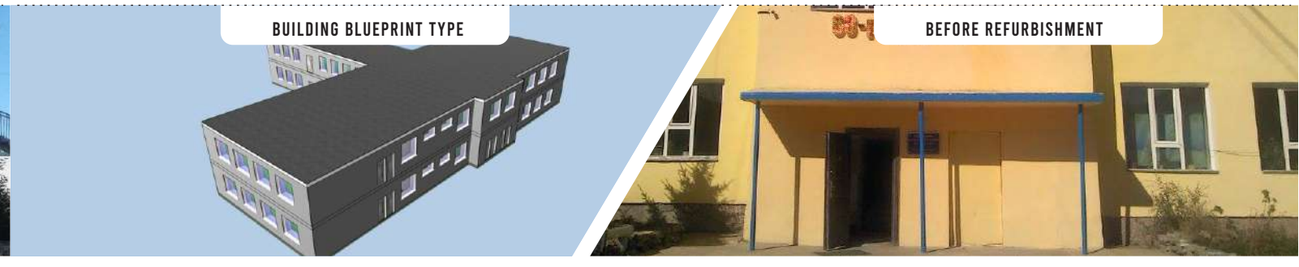
HEAT DEMAND:



INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



AMOUNT OF DIRECT BENEFICIARIES:



THERMO-TECHNICAL REFURBISHMENT OF SCHOOL 74

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT

SAVINGS:

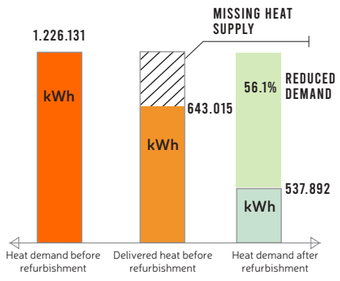
- CO_2 -274.4 t CO_2/year
- 20.10%
- 19.65%
- 7.07%
- 0.10%

ENERGY SAVED: 46.9%

LOW EFFICIENT — HIGH EFFICIENT: E | D | C | B | A | A+ | A++

357.6 kWh/m²*a ▶ 156.9 kWh/m²*a

HEAT DEMAND:



INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:

713 MILLION MNT investment for refurbishment

12.000 MILLION MNT saved investment by superseding new construction

AMOUNT OF DIRECT BENEFICIARIES:

CHILDREN — 525 CHILDREN

TEACHERS & STAFF — 61 PEOPLE

THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 91

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT

SAVINGS:

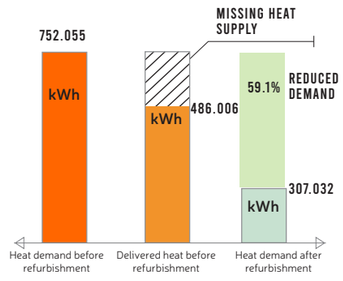
- CO_2 -274.4 t CO_2/year
- 23.21%
- 23.51%
- 7.36%
- 0.31%

ENERGY SAVED: 54.3%

LOW EFFICIENT — HIGH EFFICIENT: E | D | C | B | A | A+ | A++

407.5 kWh/m²*a ▶ 170.5 kWh/m²*a

HEAT DEMAND:



INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:

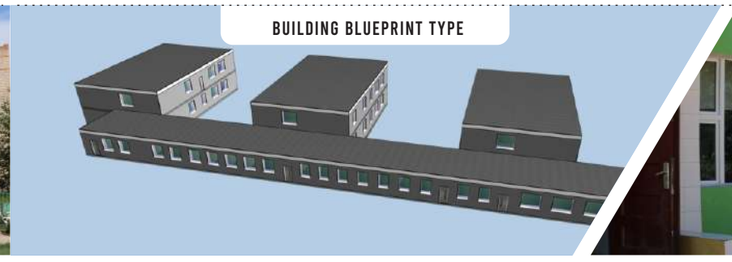
463 MILLION MNT investment for refurbishment

6.304 MILLION MNT saved investment by superseding new construction

AMOUNT OF DIRECT BENEFICIARIES:

CHILDREN — 720 CHILDREN

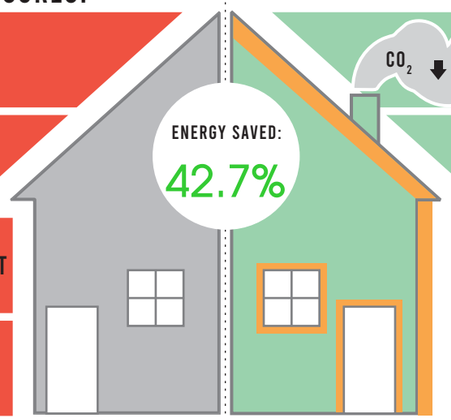
TEACHERS & STAFF — 56 PEOPLE



THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 158

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT



SAVINGS:

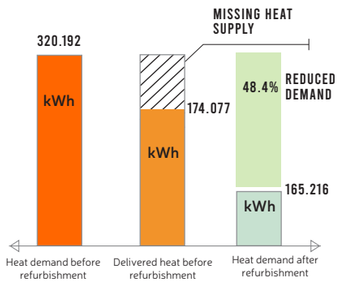
- 30.48%
- 5.99%
- 5.72%
- 0.57%

LOW EFFICIENT — HIGH EFFICIENT

E | D | C | B | A | A+ | A++

368.9 kWh/m²a ▶ 190.3 kWh/m²a

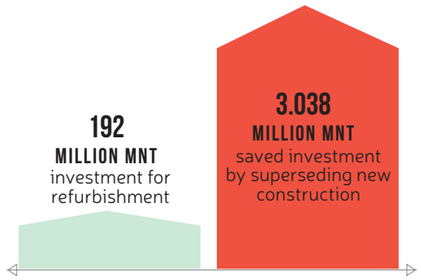
HEAT DEMAND:



INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:

192 MILLION MNT investment for refurbishment

3.038 MILLION MNT saved investment by superseding new construction



AMOUNT OF DIRECT BENEFICIARIES:

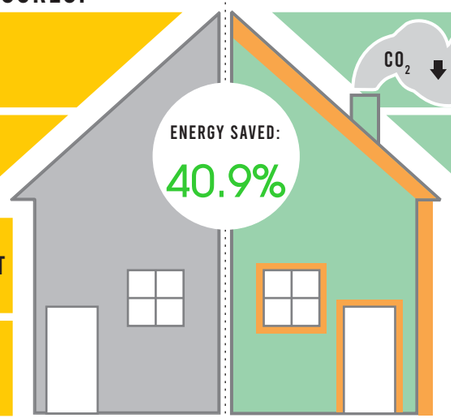
CHILDREN — 175 CHILDREN

TEACHERS & STAFF — 39 PEOPLE

THERMO-TECHNICAL REFURBISHMENT OF SCHOOL 88

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT



SAVINGS:

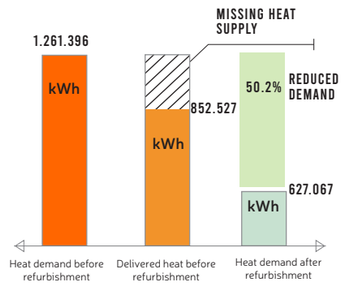
- 28.78%
- 8.24%
- 3.78%
- 0.12%

LOW EFFICIENT — HIGH EFFICIENT

E | D | C | B | A | A+ | A++

629.6 kWh/m²a ▶ 313.0 kWh/m²a

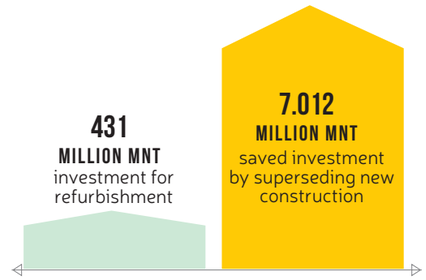
HEAT DEMAND:



INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:

431 MILLION MNT investment for refurbishment

7.012 MILLION MNT saved investment by superseding new construction



AMOUNT OF DIRECT BENEFICIARIES:

CHILDREN — 468 CHILDREN

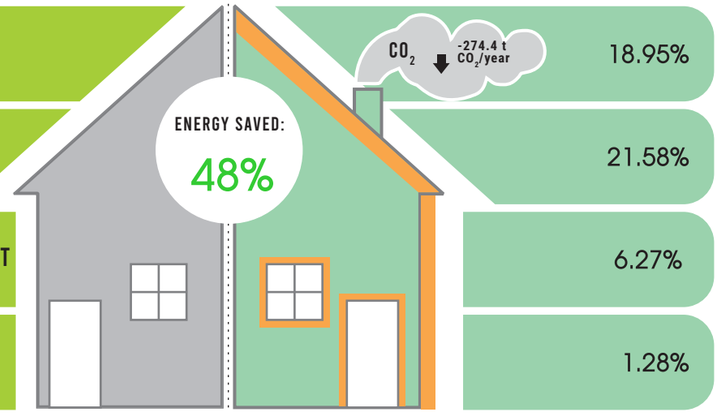
TEACHERS & STAFF — 54 PEOPLE

THERMO-TECHNICAL REFURBISHMENT OFTHE KINDERGARTEN 115

IMPLEMENTED MEASURES:

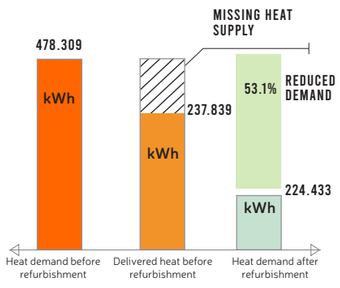
- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT

SAVINGS:

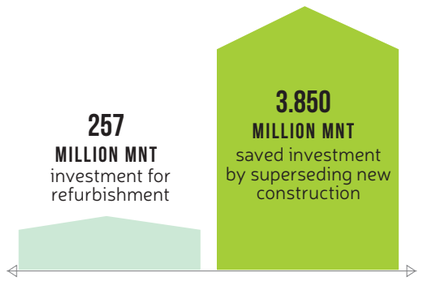


- 18.95%
- 21.58%
- 6.27%
- 1.28%

HEAT DEMAND:

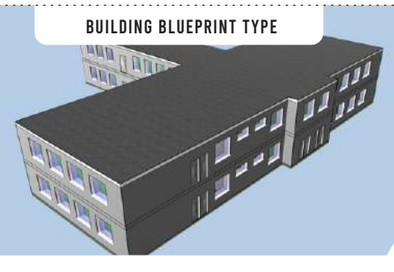


INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



AMOUNT OF DIRECT BENEFICIARIES:

BUILDING BLUEPRINT TYPE



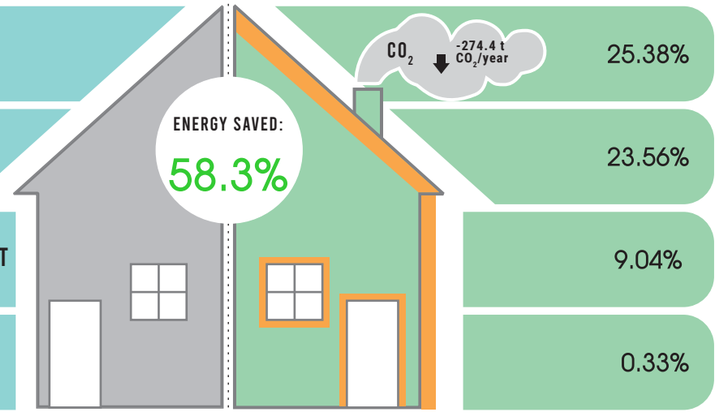
BEFORE REFURBISHMENT

THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 147

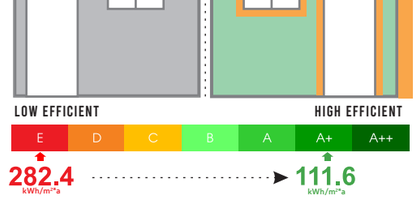
IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT

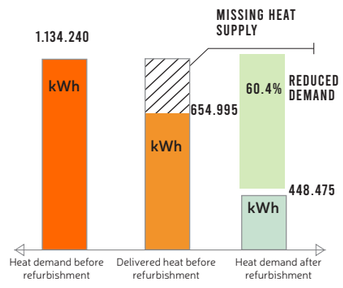
SAVINGS:



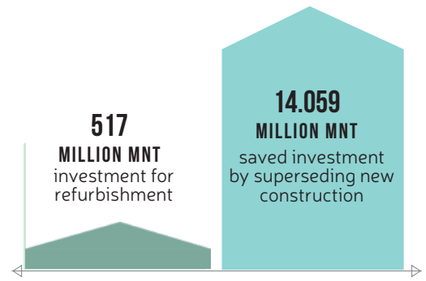
- 25.38%
- 23.56%
- 9.04%
- 0.33%



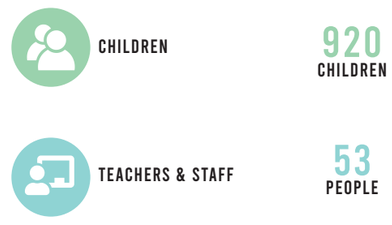
HEAT DEMAND:



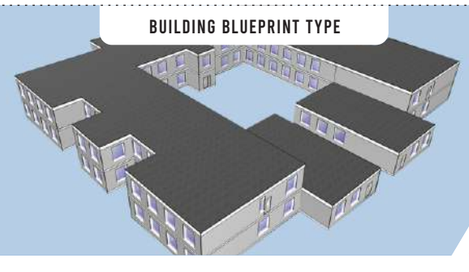
INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



AMOUNT OF DIRECT BENEFICIARIES:

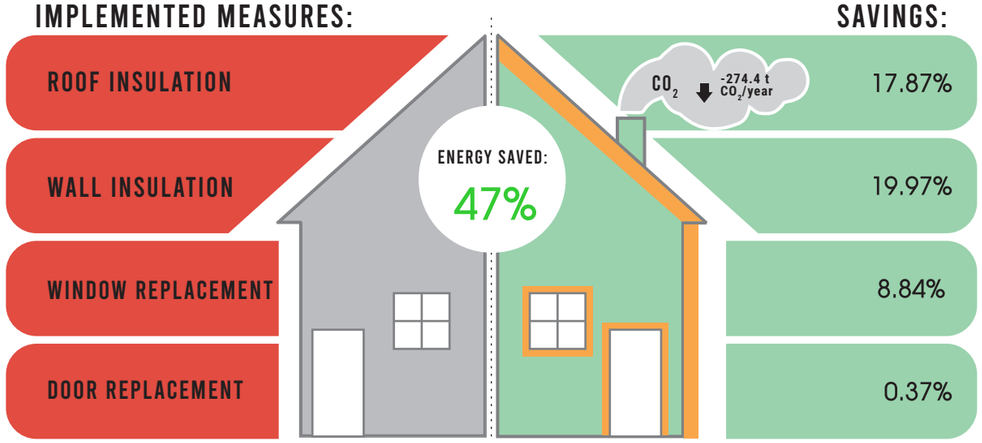


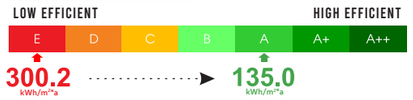
BUILDING BLUEPRINT TYPE



BEFORE REFURBISHMENT

THERMO-TECHNICAL REFURBISHMENT OF SCHOOL 65





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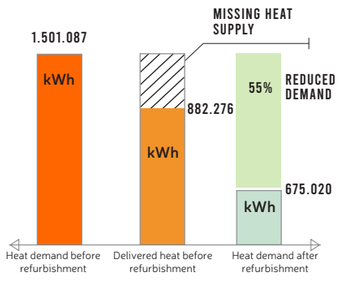
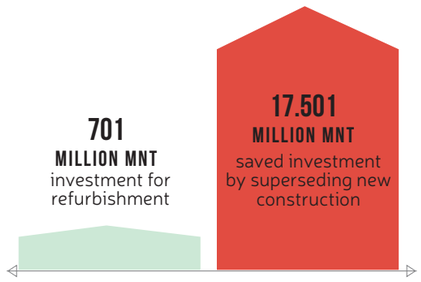
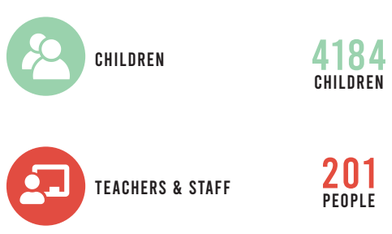
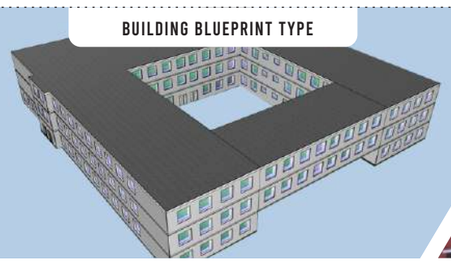


INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:

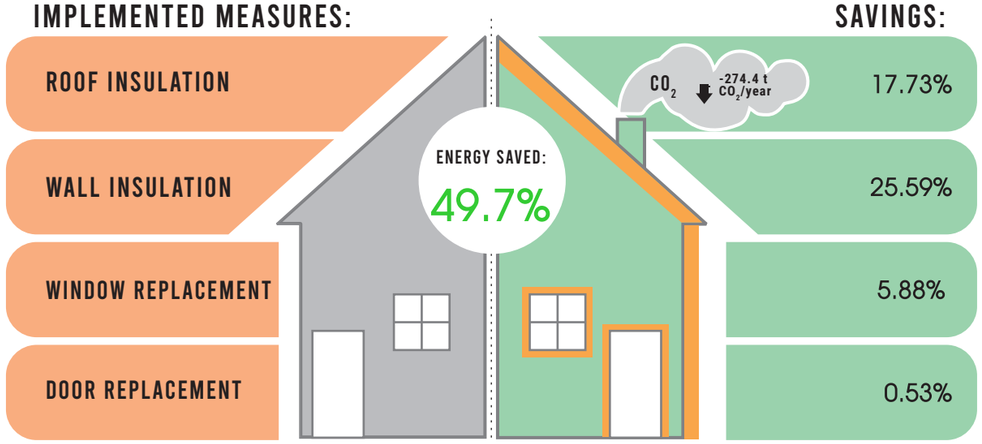


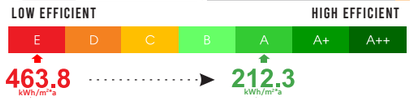
AMOUNT OF DIRECT BENEFICIARIES:





THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 79





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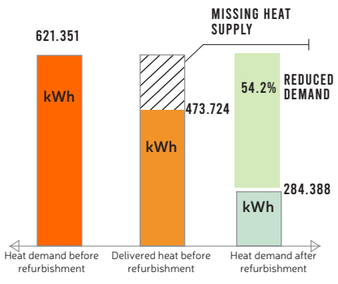
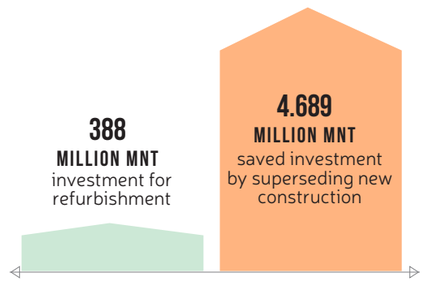
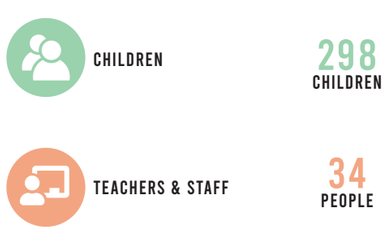
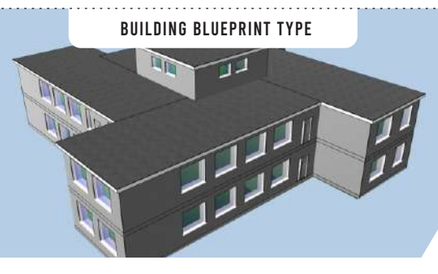


INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



AMOUNT OF DIRECT BENEFICIARIES:

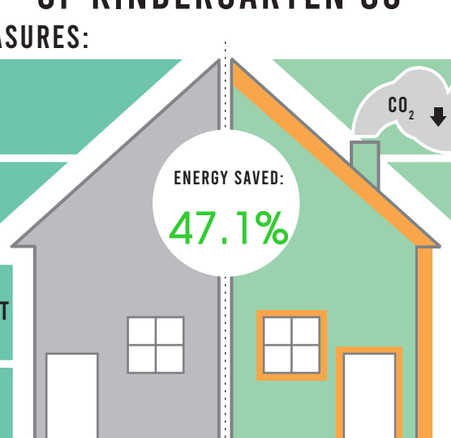




THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 80

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT



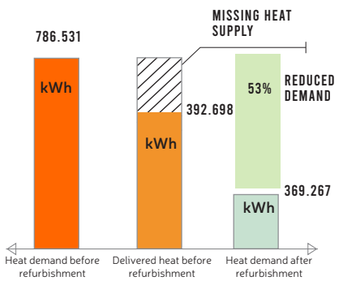
SAVINGS:

- 19.0%
- 20.47%
- 6.38%
- 1.26%

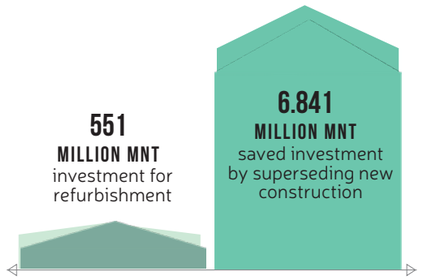
LOW EFFICIENT — E | D | C | B | A | A+ | A++ — HIGH EFFICIENT

402.4 kWh/m²a ⟶ 188.9 kWh/m²a

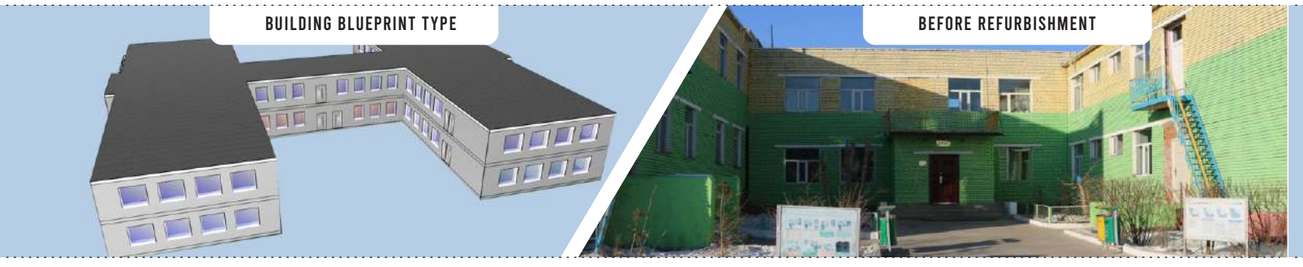
HEAT DEMAND:



INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



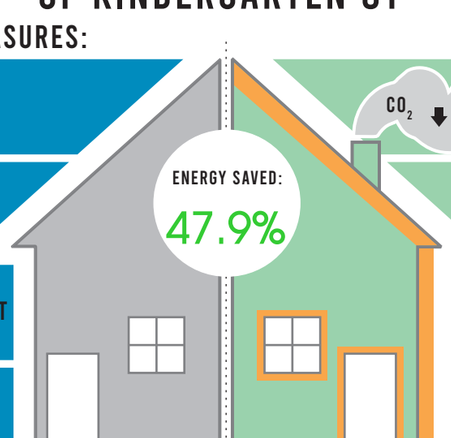
AMOUNT OF DIRECT BENEFICIARIES:



THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 81

IMPLEMENTED MEASURES:

- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT



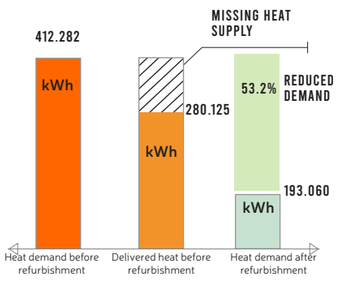
SAVINGS:

- 17.96%
- 21.93%
- 7.34%
- 0.64%

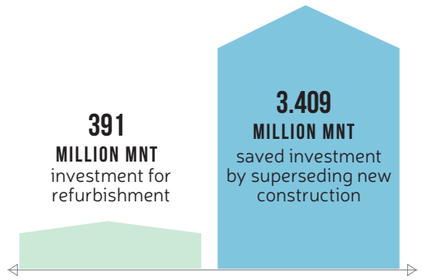
LOW EFFICIENT — E | D | C | B | A | A+ | A++ — HIGH EFFICIENT

423.3 kWh/m²a ⟶ 198.2 kWh/m²a

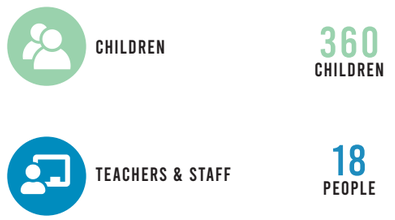
HEAT DEMAND:

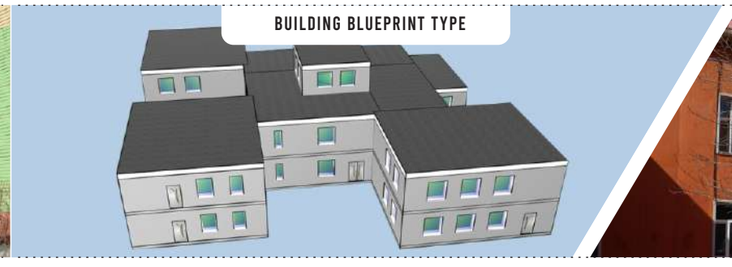


INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



AMOUNT OF DIRECT BENEFICIARIES:



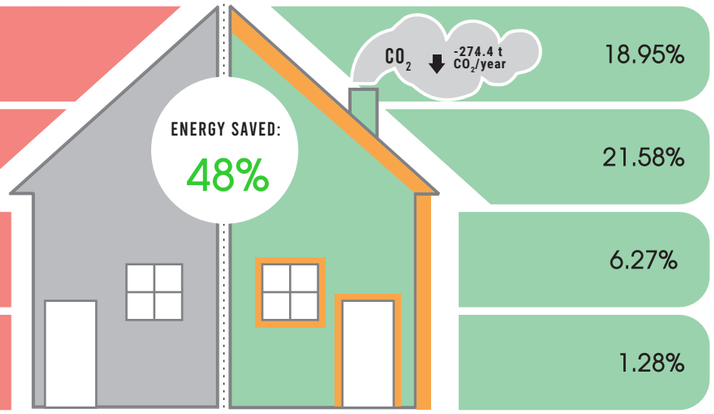


THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 148

IMPLEMENTED MEASURES:

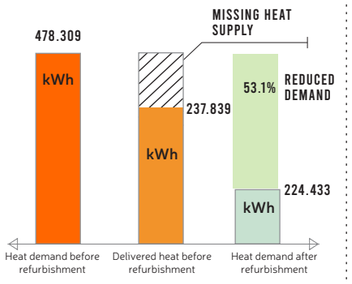
- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT

SAVINGS:

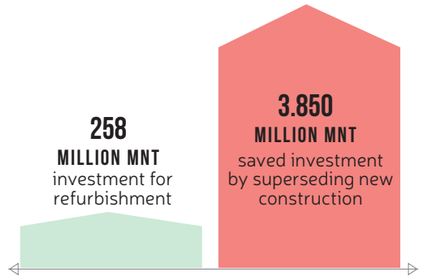


- 18.95%
- 21.58%
- 6.27%
- 1.28%

HEAT DEMAND:



INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



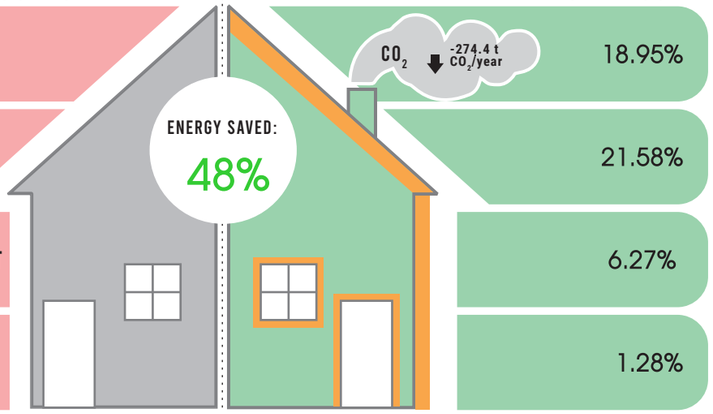
AMOUNT OF DIRECT BENEFICIARIES:

THERMO-TECHNICAL REFURBISHMENT OF KINDERGARTEN 152

IMPLEMENTED MEASURES:

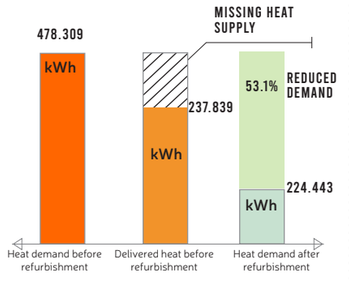
- ROOF INSULATION
- WALL INSULATION
- WINDOW REPLACEMENT
- DOOR REPLACEMENT

SAVINGS:

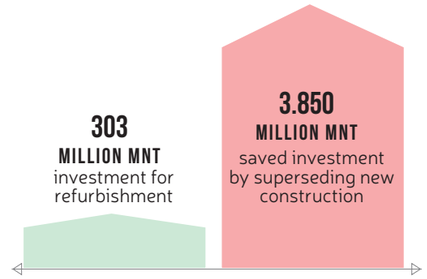


- 18.95%
- 21.58%
- 6.27%
- 1.28%

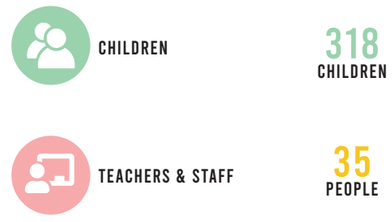
HEAT DEMAND:



INVESTMENT FOR REFURBISHMENT VS NEW CONSTRUCTION:



AMOUNT OF DIRECT BENEFICIARIES:



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