

International Renewable and Energy Efficiency conference (IREEE)

Session IV: Solutions to improve EE and integrate RE in buildings

Solutions for a more sustainable building sector in Mongolia

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Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

17. May 2024



Implemented by



GIZ Energy Projects

On behalf of German Federal Ministries and further donors



- Technical cooperation to improve frame work conditions with partners on different levels (makro, meso, micro)
- Renewable Energies (on grid & rural electrification)
- Energy Efficiency
- Fossile Phase-out/Fuel switch/H2

Europe

- Ukraine
- Bosnia and Herzegovina
- Greece
- Kosovo
- Moldavia
- Poland
- Serbia
- Western Balkan States

Asia

- ASEAN
- Bangladesh
- China
- India
- Indonesia
- Jordan
- Mongolia
- Nepal
- Pakistan
- Sri Lanka
- Thailand
- Vietnam

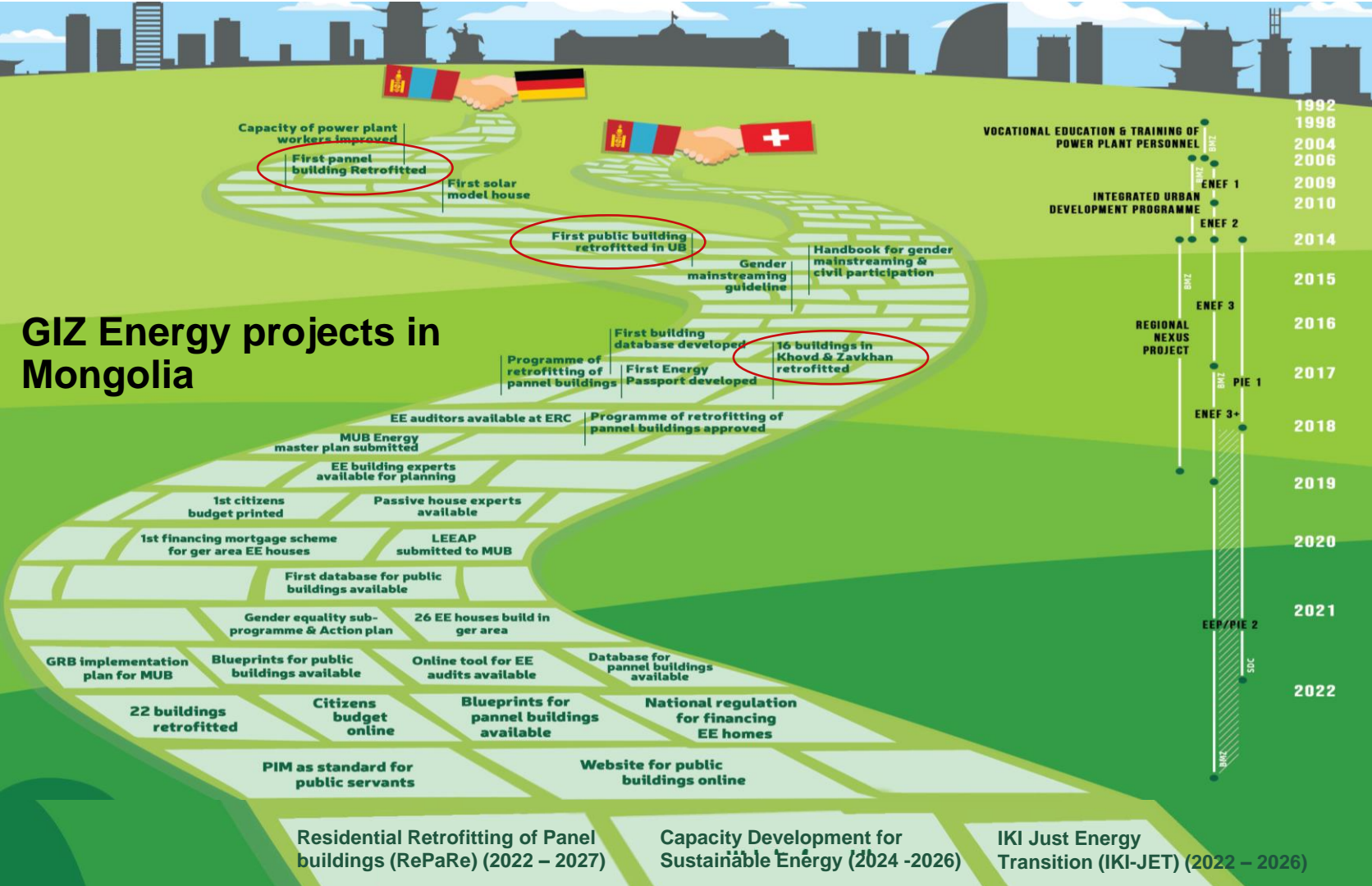
Americas & Caribbean

- Bolivia
- Brazil
- CARICOM
- Chile
- Costa Rica
- Columbia
- Dominican Republic
- Grenada
- Mexico
- Peru
- SICA

Africa

- Algeria
- Côte d'Ivoire
- ECOWAS
- Egypt
- Ethiopia
- Ghana
- Kenya
- Libya
- Madagascar
- Morocco
- Namibia
- Nigeria
- Senegal
- South Africa
- Sudan
- Togo
- Tunisia
- Uganda

GIZ Energy projects in Mongolia



PROJECT DETAILS

“Public Investment in Energy Efficiency Phase II (PIE 2)” SDC funded 2018 – 2021

Energy Efficient Building Refurbishment in Mongolia Project (EEP)

BMZ funded 2019 – 2022

Total 8.3 Mio EUR



MACRO-MESO-MICRO LINKAGES



POLICY AND PROCESS CONSULTING

Energy Conservation Law,
Financing arrangements, Tariffs



CAPACITY DEVELOPMENT

Institutions, Service providers,
Credit facilities



TECHNOLOGY TRANSFER

Piloting, Market take-up,
Replication

Overview of GIZ Energy projects in Mongolia

LEVEL OF ACTIVITY

PROJECTS

AREA OF ACTIVITIES

GLOBAL

IKI JET

JUST ENERGY TRANSITION IN COAL
REGIONS INTERREGIONAL PLATFORM
JET-CR PLATFORM

International exchange

NATIONAL

JT-ICEJ

JUST TRANSITION AND IMPROVING THE
CAPACITY OF AN EFFICIENT JUDICIARY

Policy support + Law

MUNICIPAL

CDSE

CAPACITY DEVELOPMENT FOR
SUSTAINABLE ENERGY

Capacity development

DISTRICT

REPARE

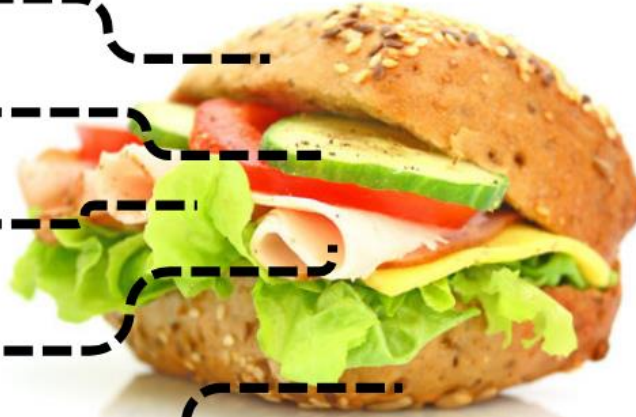
ENERGY PERFORMANCE
CONTRACTING FOR RESIDENTIAL
RETROFITTING

Financing models +
Technical implementation

IKI JET

JUST ENERGY TRANSITION IN COAL
REGIONS INTERREGIONAL PLATFORM
JET-CR PLATFORM

Model region





Energy Performance Contracting for Residential Retrofitting in Ulaanbaatar City

2022-2027 = 5 years

~18 Mio. EUR Mitigation Action Facility

+ co-funding

MCUD 8 Mio EUR

MUB 6,5 Mio EUR

+ private sector contribution



MINISTRY OF CONSTRUCTION
AND URBAN DEVELOPMENT



Implemented by



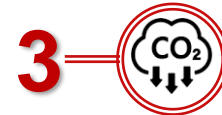
PROJECT GOALS



„Jump-start“ a large-scale thermo-technical retrofitting (TTR) program and create the market conditions to scale up investments in energy efficiency



Establish revolving funding mechanism to help cover the upfront costs of the TTR and mobilize funding from both the public and private sectors to scale up retrofitting of 375 + building blocks



Reduce Greenhouse gas emissions by reducing heating demand of residential panel buildings

Components of RePaRe Project

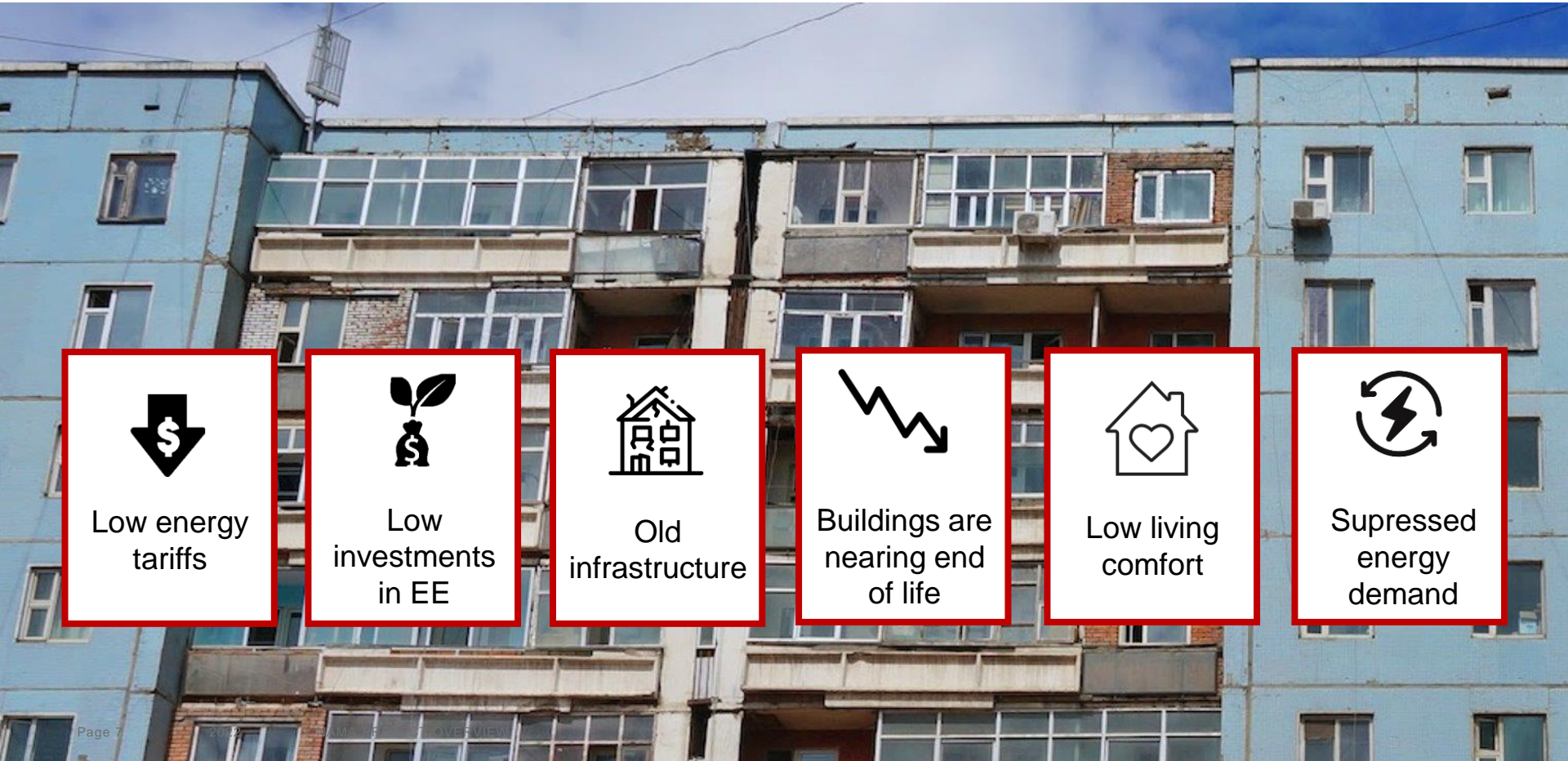
1. **Policy support** to develop a roadmap targeting towards a consumption based and cost covering tariff
2. **Capacity development** to support private and public sector stakeholders to improve knowledge and know-how on how to
 - Implement high quality refurbishment providing energy saving
 - Implement policies and framework to improve sector
 - Establish a sustainable financing mechanism
3. **Technological implementation** of refurbishment of 375 building blocks
 - Implementation of heat meters
 - Development of refurbishment plans and tender documentation
 - Securing quality of implementation
4. **Public Relation** to
 - Inform and convince consumers about their chances and obligations
5. **Financing models**
 - Develop On-Bill-Repayment Mechanism
 - Development of Monetized Energy Saving mechanism

Challenges for sustainable heat production in Mongolia

- Missing heating in winter at temperatures regularly below -35 C° is life threatening
- Heating is the most subsidized energy in Mongolia
 - Central grid
 - heating considered as by-product from electricity, billing based on m^2 not on consumption
 - Decentral Ger area is supplied by subsidized coal
 - causing very high air pollution
 - Electric heating limited by weak grid infrastructure
 - no easy switch to electricity based heating



Background for the majority of the buildings in Mongolia



Low energy
tariffs



Low
investments
in EE



Old
infrastructure



Buildings are
nearing end
of life



Low living
comfort



Supressed
energy
demand

UB district heating system and it's limits

- Connexion of Ger area buildings to the district heating grid is often seen as one solution for Ger-area residents to reduce air pollution
- At the same time district heating system is at it's limit and especially on the extensions not enough heat reaches consumers
- New coal fired CHP/heating plants will not contribute to the solution of the air pollution and significant international financing is not in sight
- New buildings are constantly connected to the heating grid 6-7% increase of demand per year

➔ **Use energy more efficiently to allow supply of more buildings with the same amount of energy**

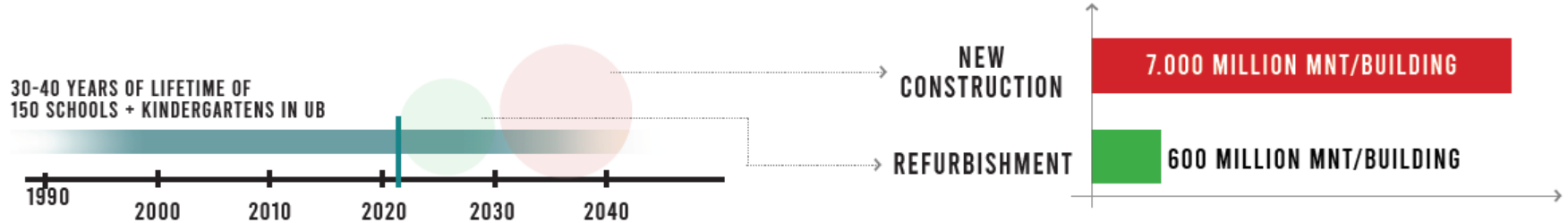


Public infrastructure needs investment

1. Many schools, kindergartens and panel buildings are build in the soviet and post soviet time
2. Lifetime is mainly 30-40 years
3. Decision to be taken now: **prolongue lifetime by thermo- technical refurbishment –**

- versus -

new construction in a few years



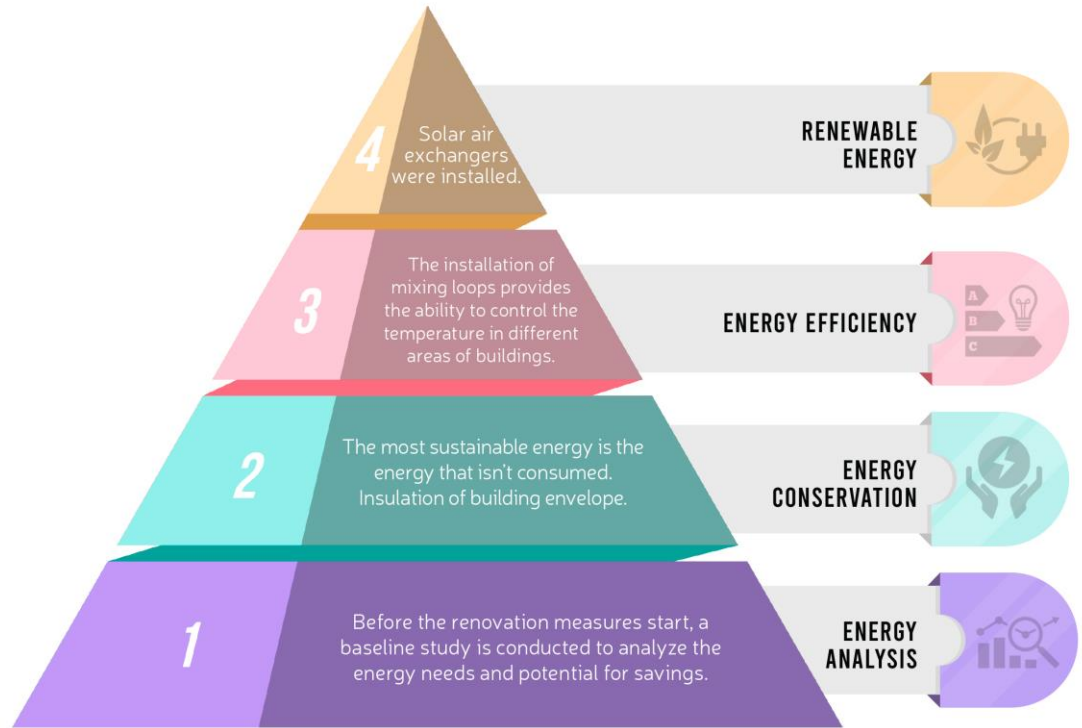
Challenge: High heat losses in old buildings

- Missing calculation of ventilation heat demand and missing capacities in the current systems provide high suppressed demand



Compared to their demand, old buildings often lose 70% of heat
 Refurbishment allows to be comfortably warm and save 40% of energy at the same time

On the way to a renewable heat supply



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



LEEAP 23

Local Energy Efficiency Action Plan (LEEAP) for Ulaanbaatar

&

Guidebook for Mongolian Regions

“

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

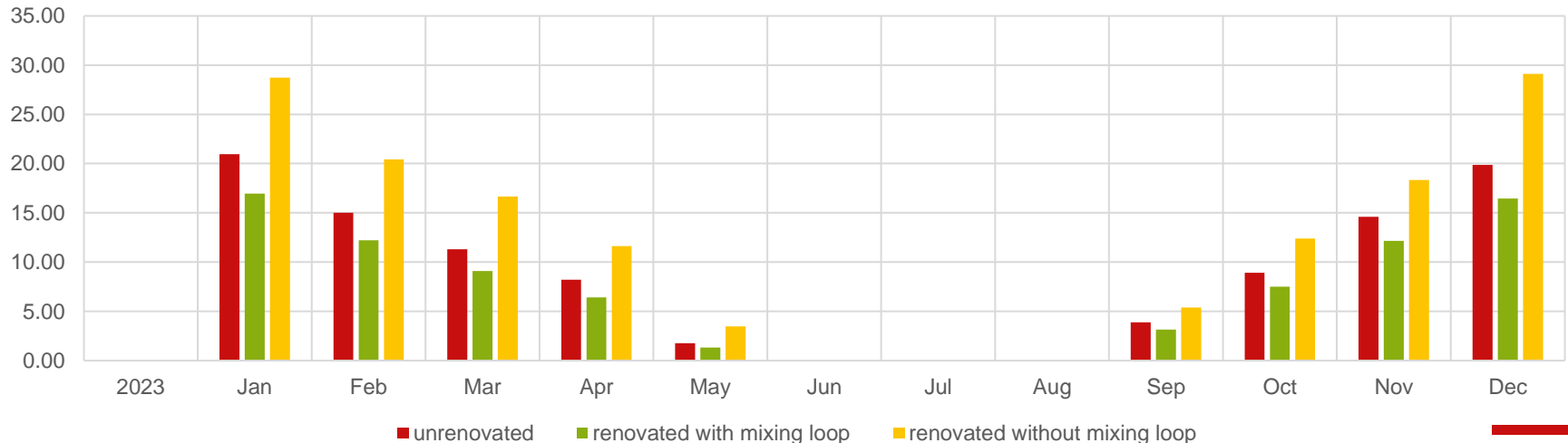
D.Gantulga, Head of Department Coordination of implementation policy for building and construction material of Ministry of Construction and Urban Development (MCUD)



Target of the solution: reduce energy consumption of the buildings

- Not all measures on insulating buildings are contributing to reduce energy demand!
 - Facade Insulation without any other measures does not reduce major energy demand!
 - **Comparison of building blocks without refurbishment vs „simple“ refurbished buildings (only facade, no mixing loop) show a that the heat consumption is often higher than before refurbishment!!**

Heat consumption of comparable 9-storey prefabricated buildings



Mixing loop and heat meters: crucial for real saving of energy

Mixing loop allows to reduce the incoming heat if temperatures in the building is high enough

- Without Mixing loop HH have to open the window to regulate the temperature in the building

Measurement before and after insulation is crucial to monitor and verify savings of energy

- RePaRe: Grant agreement between GIZ and Mayor's Office of MUB to install heat meters in 289 building blocks

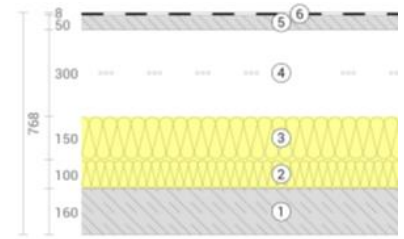


Scope of refurbishment under RePaRe-Project



Facade insulation

Optional: Window-replacement



Roof insulation (blow in technique)



Installation of Mixing loop

Installation of Heat meters

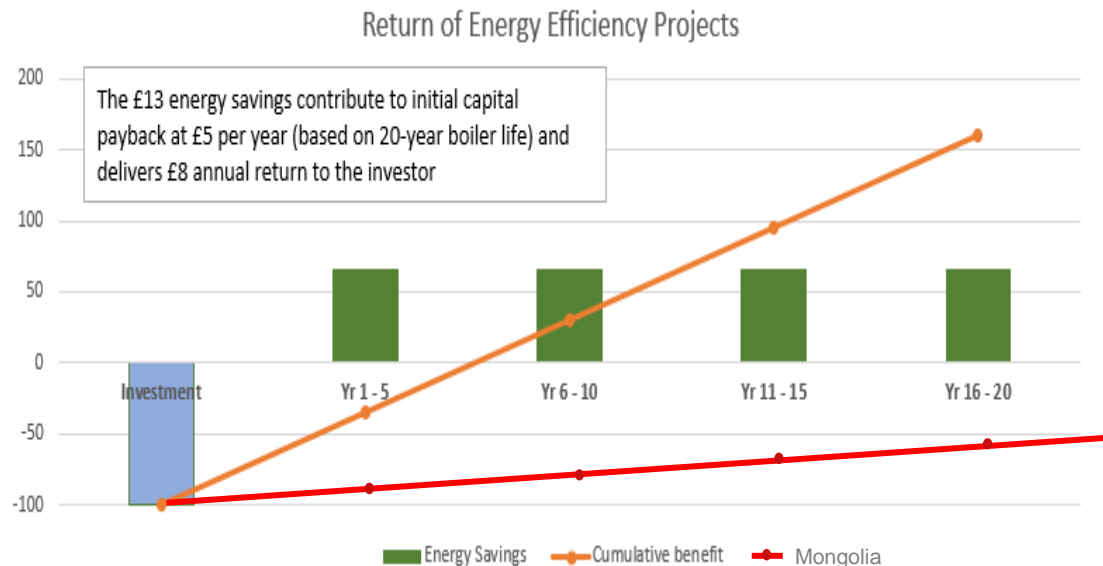


Model building RePaRe project

- 2 building blocks in one building in Bayanzurkh district (Jukow Museum area)
- Roof leaking
- Mold problems in various HH
- Insulation material: Basalt wool
- Budget: 716 Mio, MNT (MUB financing)
- Active HOA
- 100% of HH have signed consent list
- Tender completed
- Signing of contracts with HH in process for HH contribution of 50% of investment
- Construction to start soon
- Inclusion of Energy Efficient pump in one block for comparison



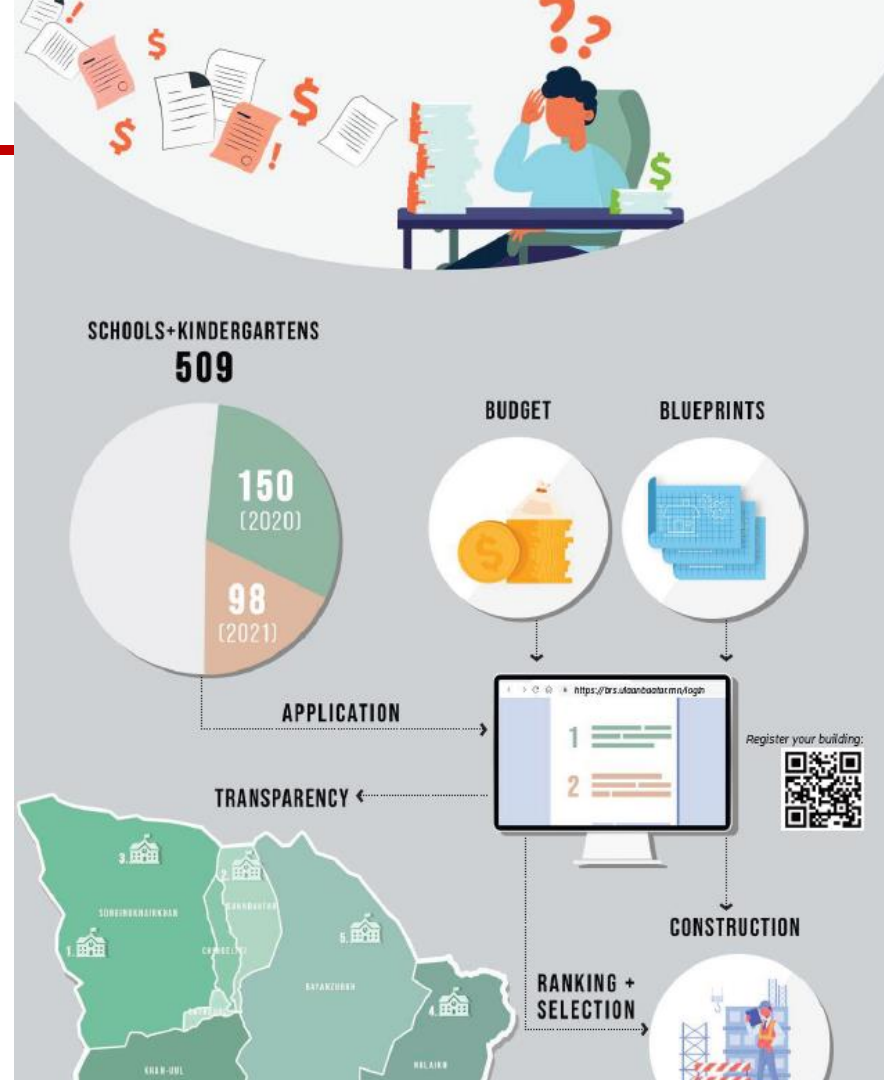
Financing for EE in buildings



- At present investment mainly comes from public budget
- Limited public budget can not solve the problem
- Required:
 - Strategically planned and target oriented allocation of budget
 - Gender responsive public budgeting should already be obligatory
 - Include private stakeholders to share the investments
 - Provide incentives and stable investment conditions

Database for public buildings

- Database created within EEP project
- Allows transparent selection of buildings in demand
 - Public funding can be planned properly
 - Additional support can be allocated more efficiently



REFURBISHED SCHOOLS & KINDERGARTENS IN UB*

Funding: 40% MUB, 60% EEP-Donors (Swiss + German Development cooperaton)



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



Public budgets made available for thermo-technical refurbishment

2020

29 proposals amounting to **MNT 3.1 billion** were approved and funded by the state and municipal budgets



2021-2022

48 proposals amounting to **MNT 4.4 billion** are approved and included in the budget

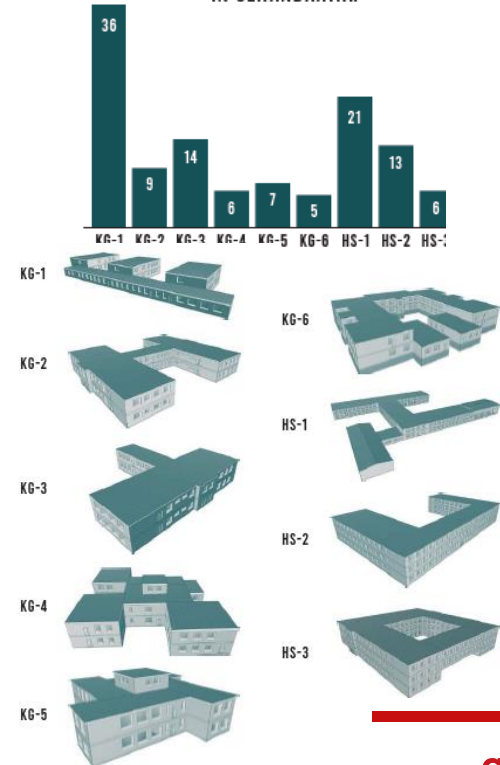


Thermo-technical refurbishment avoids investment in new power plants

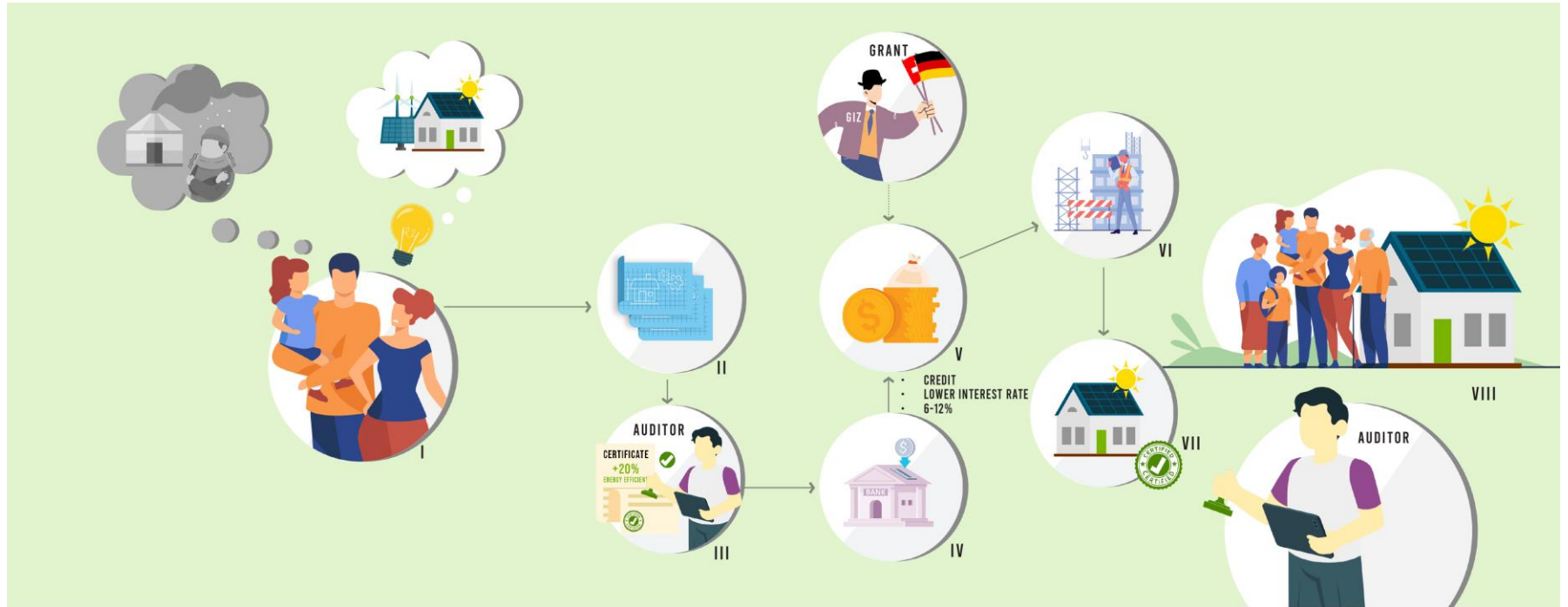
Investment for
126 energy efficient schools and kindergartens
supersedes the investment in a
20 MW coal fired HOB plant!

9 Blueprints work for 117 buildings in UB
5 Blueprints work for 1077 panel buildings

NUMBER OF BUILDINGS PER TYPE
IN ULAANBAATAR



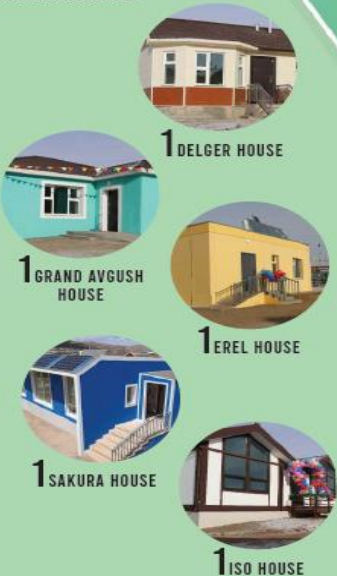
24 approved designs and mortgage loan for Ger-area houses available



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 public on weekends to visit. These houses built within the framework of the GIZ Building energy efficiency project have a floor area of around 50 m² 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



7 HYBRID HOUSES



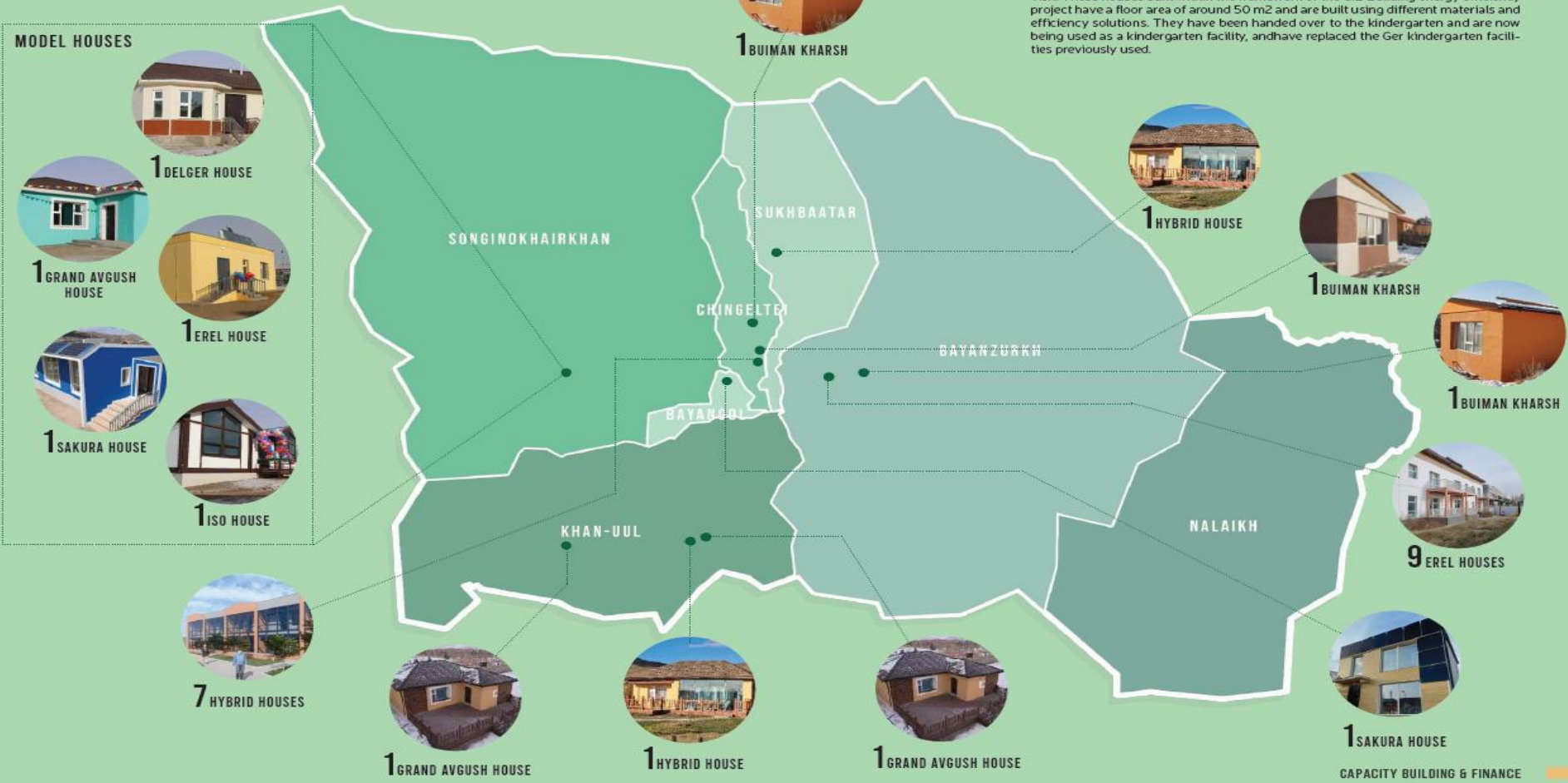
1 GRAND AVGUSH HOUSE



1 HYBRID HOUSE



1 GRAND AVGUSH HOUSE



1 BUIMAN KHARSH

1 HYBRID HOUSE

1 BUIMAN KHARSH

1 BUIMAN KHARSH

9 EREL HOUSES

1 SAKURA HOUSE

THIS CERTIFIES THAT
Sakura Property & GIZ Energy Efficiency Project Pilot House
1 Units

HAS ACHIEVED AN
EDGE ADVANCED CERTIFICATE
CERTIFICATE NUMBER
GP1-MNG-21040810105876-1

EDGE ADVANCED

Exemplifying achievement in the following areas:

57%
Energy Savings

27%
Water Savings

42%
Less Embodied
Energy in Materials

1.23 tCO₂/unit/year
Operational CO₂ Emissions
19.56 tCO₂/unit/year
Operational CO₂ Savings



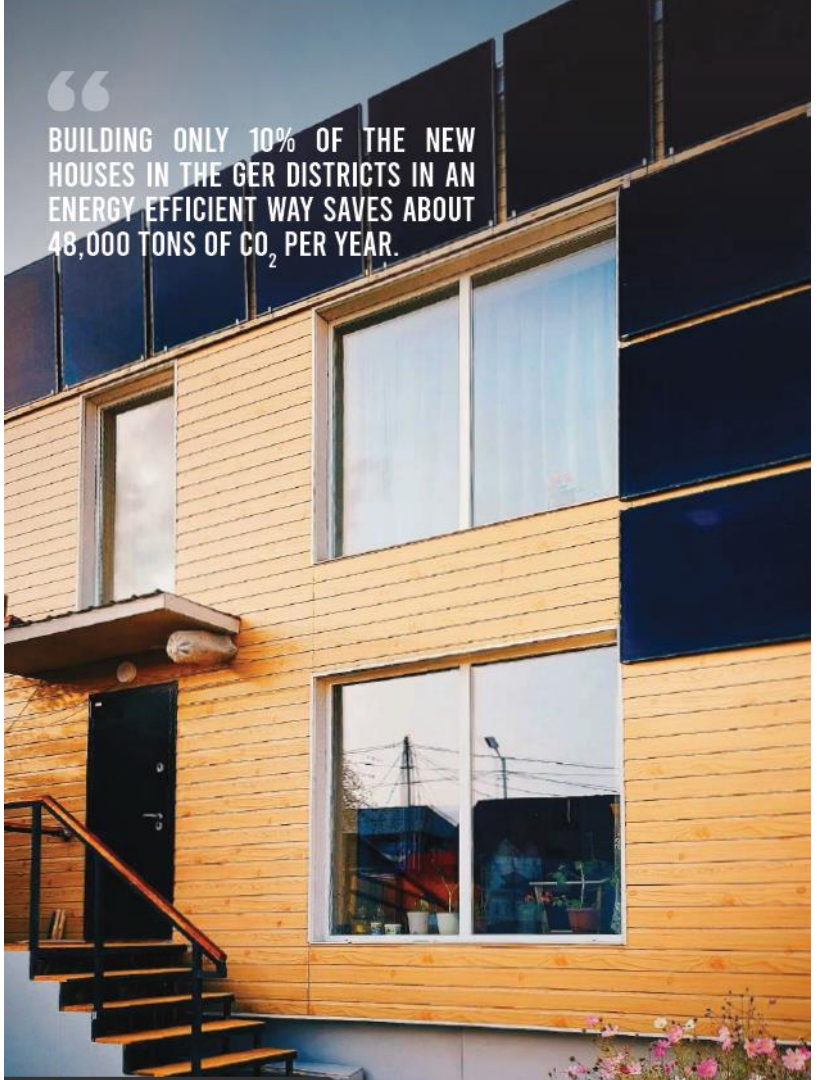
DEVELOPED BY
Sakura Property Co.Ltd

CERTIFIED BY
Sintali-SGS

Thomas Saunders, Managing Director
DATE OF ISSUE: 13-SEP-2023



**First
officially
certified
green
Building
in
Mongolia**



“
BUILDING ONLY 10% OF THE NEW
HOUSES IN THE GER DISTRICTS IN AN
ENERGY EFFICIENT WAY SAVES ABOUT
48,000 TONS OF CO₂ PER YEAR.
”



26 Energy Efficient Ger area houses constructed



24 certified designs for EE houses available

Savings per homes:
~ 9 t CO₂/ year

Saving per 30 years lifetime:
~ 270 t CO₂

3.500* newly built family homes that follow GIZ requirements would save **945,000 t of CO₂ in a 30-year lifetime.**

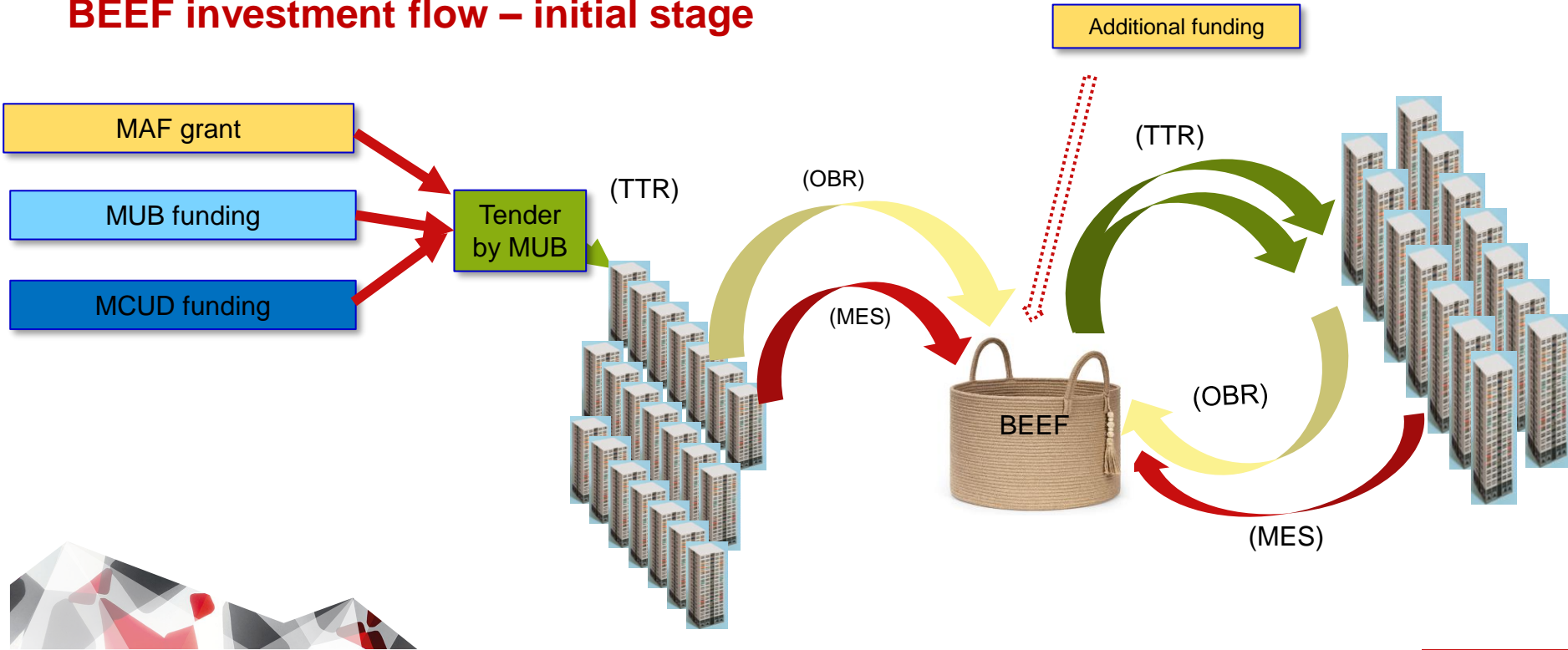
Reference:
10 MW Windpark with 23 Windmills in Germany reduces ~ 48.000 t/year or ~ 960.000 t over lifetime of 20 years



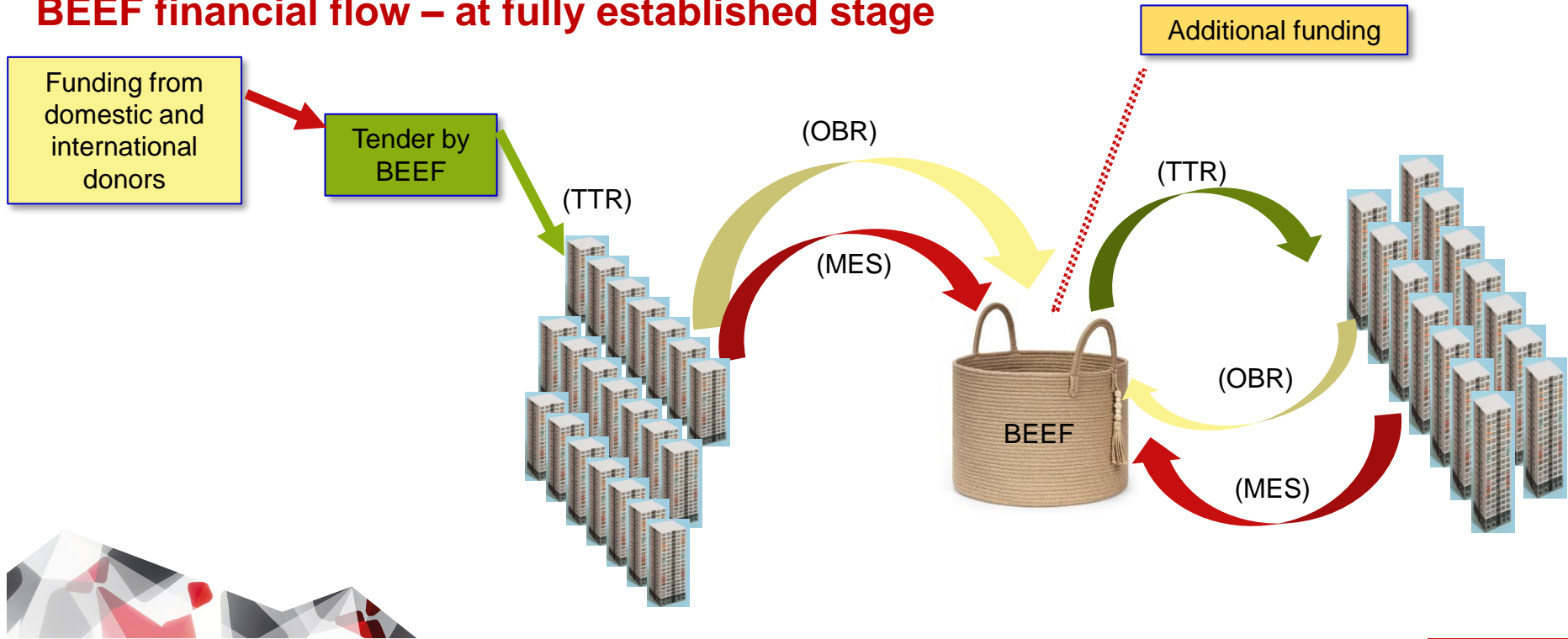
** Less than 2% of all families in the ger areas*

RePaRe Financing solution: Building Energy Efficiency Facility (BEEF)

BEEF investment flow – initial stage

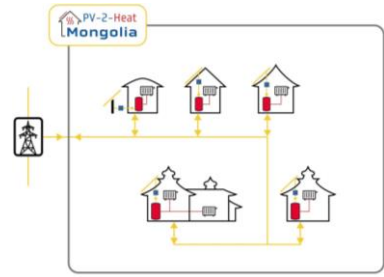
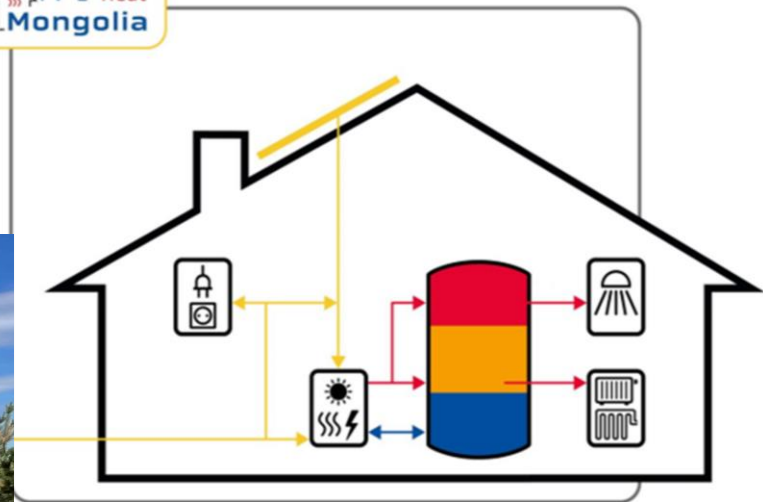


BEEF financial flow – at fully established stage



From Energy Efficiency to Renewable Energies

PV2Heat Project – Kindergarten Nr. 158



Let's get our buildings ready for future

Co-funding
welcome!



Extended expected useful life



Reduced heat consumption



Reduced CO₂ emissions



Increased living comfort



Beautification



Increased value of property



Superseding construction of new coal heating capacity

**THANK YOU FOR YOUR
ATTENTION!**

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