Difficulties of applying CDM methodologies in the building sector: overview of previous activities/efforts made and lessons learnt

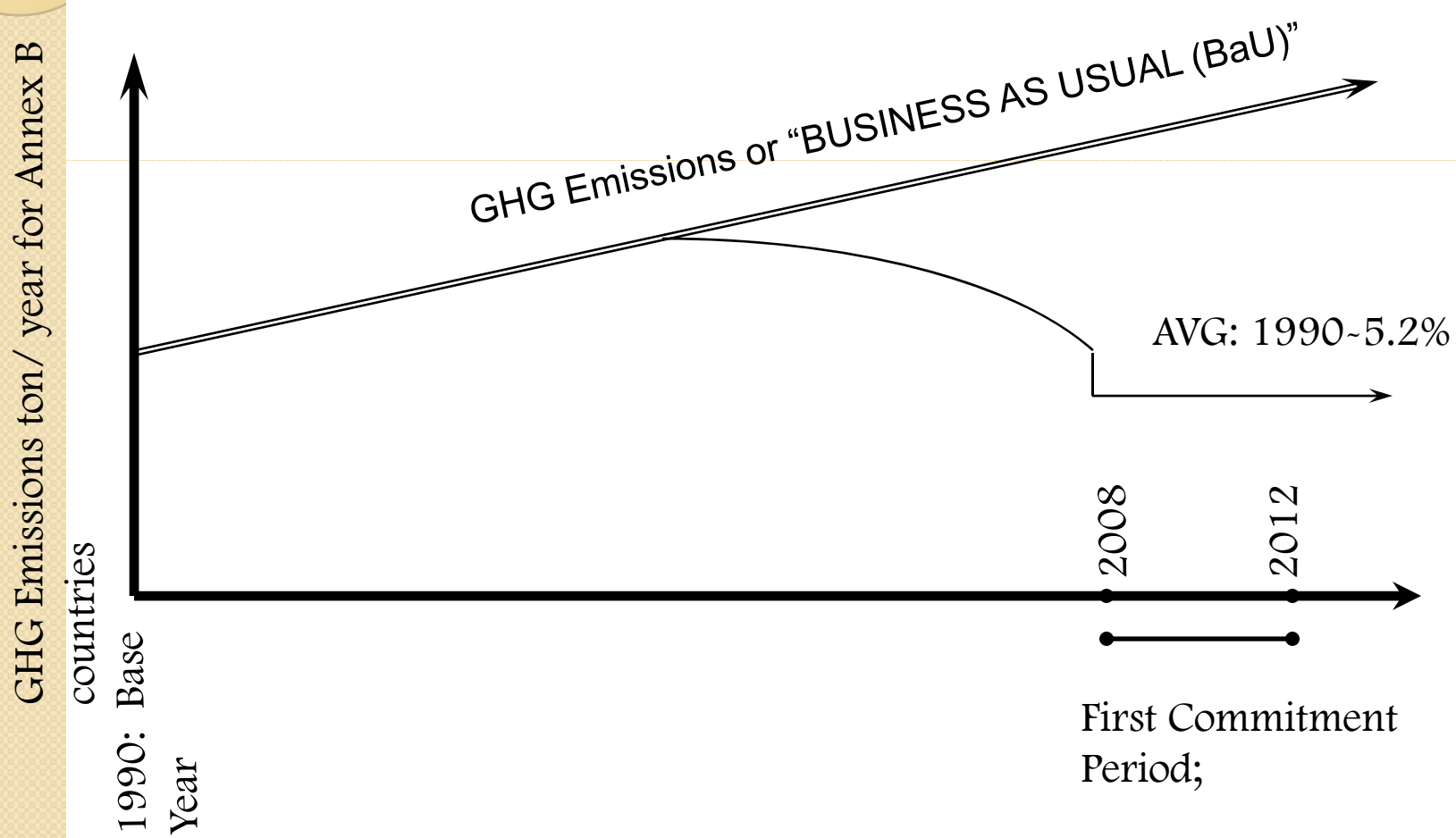
BEEP PROJECT

ULAANBAATAR 2013

United Nations Framework Convention on Climate Change (UNFCCC)

- Ultimate objective of stabilizing global greenhouse gas concentrations in the atmosphere
- Industrialized countries (Annex I countries) *aim to restore* GHG emissions below 1990 levels
- Support capacity building in, and facilitate technology transfer to developing countries to mitigate, and to adapt to climate change

Kyoto: Planned impact



CDM Projects in Building sector

- There has been a specific buildings focused CDM Small Scale Methodology AMS II.E available since 2005
- But only around 0.5% of CDM projects are for buildings
- Only India Kolkata Sheraton hotel project has CERs issued - under 2000 CERs/year for 2006-2008, not cost effective
- Even successful lighting and SWH CDM projects are rare

“Baseline Monitoring Study Report – Final Draft”

“CDM Baseline Study for Thermo Technical Rehabilitation of Pre-Cast Panel Buildings in Ulaanbaatar”

“Baseline Monitoring Study Report – Final Draft”

Frank Pool (New Zealand)

With assistance of Tsogt A. (Mongolia),

Narantsatsral Ch. (Mongolia),

Munkhbayar B. (Mongolia)

Why Panel Buildings Were Chosen:

- Around 500 pre-cast panel buildings in Ulaanbaatar
- Major replication potential, incl. in other countries
- High ratio for energy savings, At least 50% energy / GHG savings expected
  - higher U value
- Panel bldgs standard designs with limited variations
  - 5, 9, 12 store
- Panel buildings will continue to be used for decades

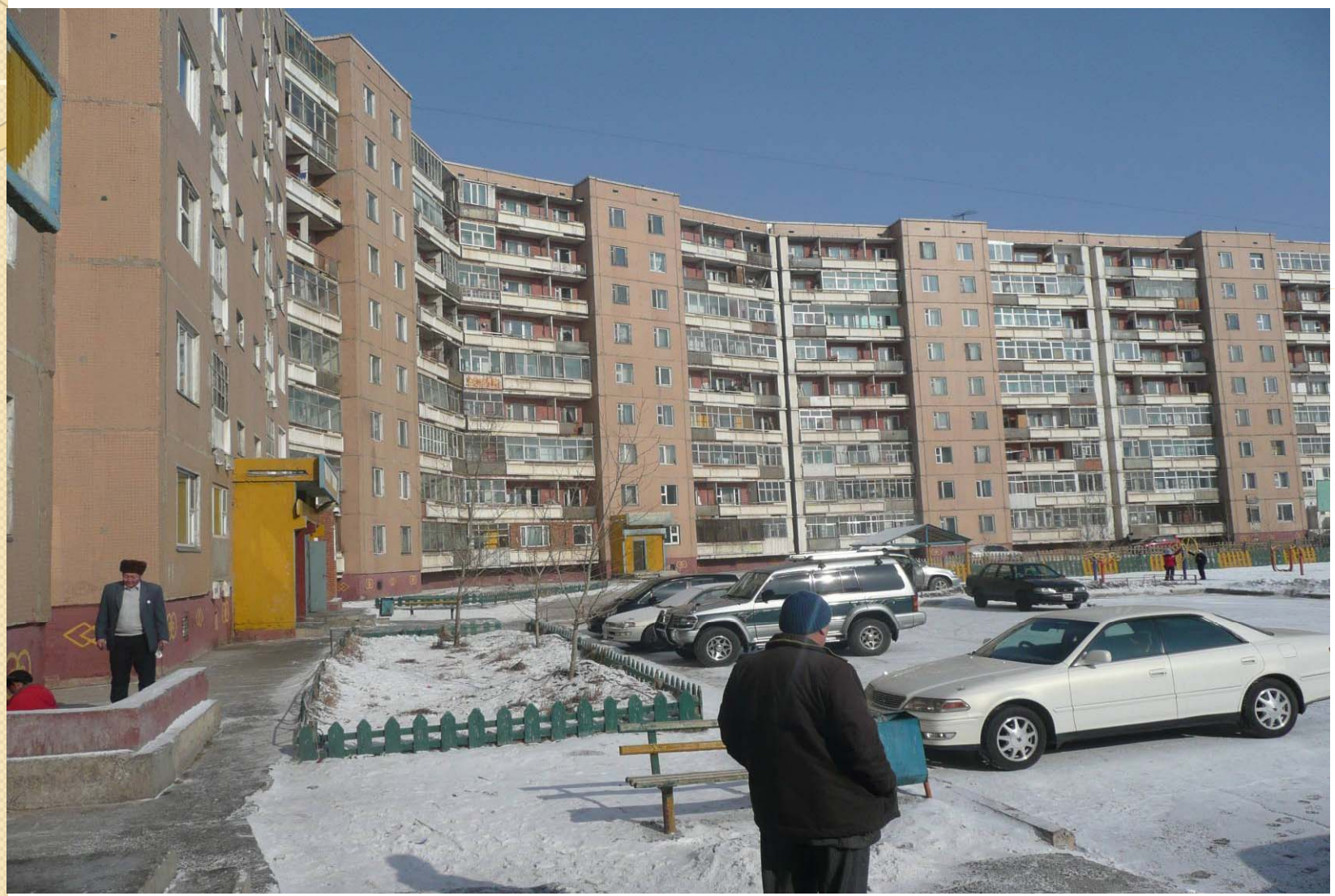
CDM Baseline Monitoring Study Results -Thermo-Technical Rehabilitation of Pre-cast Panel Buildings in UB

2009-2010 Mongolian winter to examine the actual thermal characteristics and actual heating:

A. Location-District -1. building 8, 9

- Heating from CHP No 4, so no heat shortage
- 2 nine-storey buildings = 792 apartments
- 2 Sukh Associations involved
- Replicable to 2 same clusters.
- Lower rehabilitation cost

District-1, building 9



District-1, building 8

CDM Baseline Monitoring Study Results - Thermo-Technical Rehabilitation of Pre-cast Panel Buildings in UB

- Б.Location- District-10. building connected to substation 13
  - 5-storey (building 40 with 58 apartments) ,
  - 9-storey panel building (building 14 with 144 apartments)
  - comprising 1014 apartments across 14 buildings in the whole cluster
  - 3 Sukh Associations involved
  - Most of PP Buildings 5, 9 story building

District-10, 9 story building

District-10, 5 story building

examine the actual thermal characteristics and actual heating energy supply

- Commissioned structural and condition reviews of the four applicable panel buildings.
- Installed and calibreted heat meters and done measurement:
  - Purchase a new 100 mm heat meter to monitor the space heating supply to District 1's buildings 8 and 9
  - Buy new 40 mm heat meters and reuse some existing heat meters to measure the heat supply to the individual heating system risers in the 5-storey (building 40) and a 9-storey panel building (building 14)

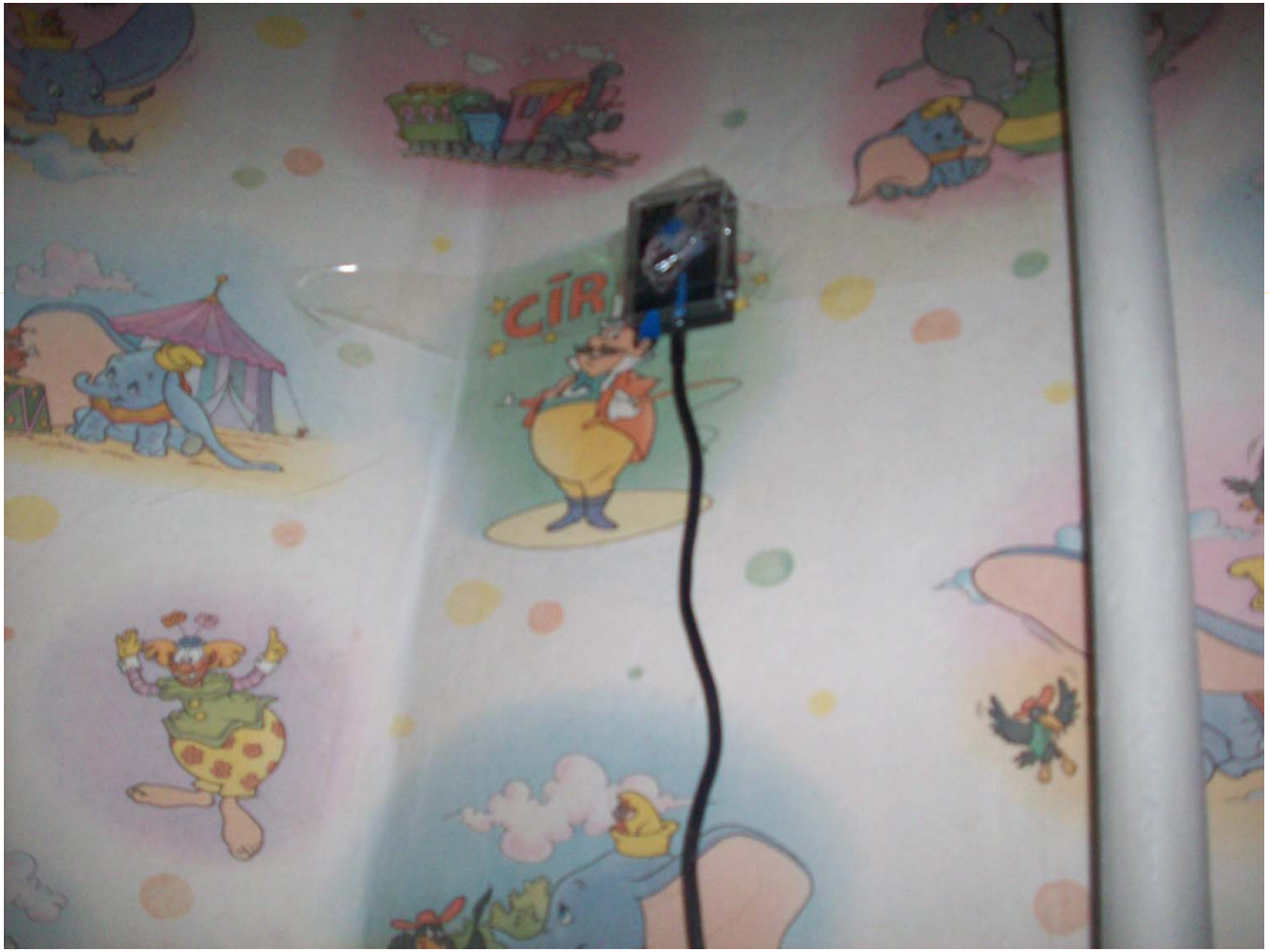
examine the actual thermal characteristics and actual heating energy supply

- Ventilation rates were measured by Blower door.
- Measured heat transfer coefficient of walls and windows
- Measured inside air temperatures and humidity.
- Made infra photos to check heat loss.

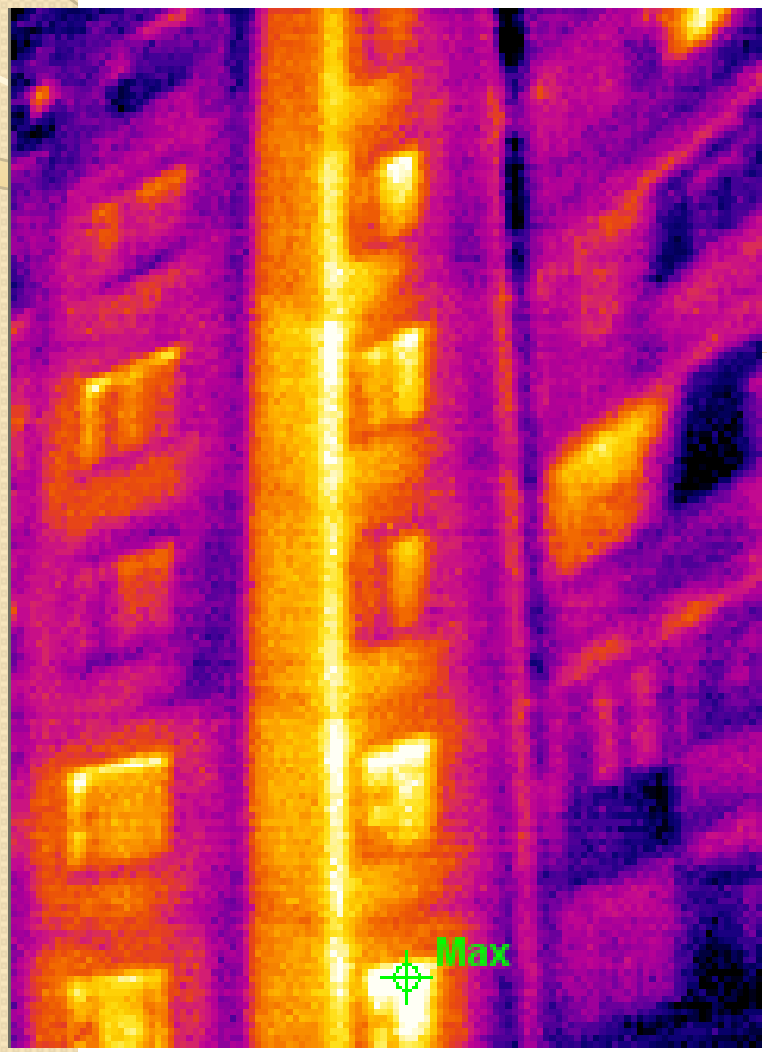
Measuring inside air temperatures and humidity

Monitoring Air Tightness

Measuring heat transfer coefficient



Infra photo



Draft CDM PDD for District 1

CONTENTS

A. General description of the small scale project activity

B. Application of a baseline and monitoring methodology

C. Duration of the project activity / crediting period

D. Environmental impacts

E. Stakeholders' comments

Draft CDM PDD for District 1

Annex 1: Contact information on participants in the proposed small scale project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring Information

Draft CDM PDD for District 1

- Facade view will impuved.
- Heat loss will decrease.
- Increase the price of buildings.
- Will save around 70 percent heat. actual 50 percent.

Before insulation. GIZ project

After insulation. GIZ project

Heat loss and payment calculation insulated building by GIZ project

No	Name	Heat load κW	Energy consumption κWh /year	square	
1	Insulated building 8	69.5	200160	1080	
2	Noinsulared building 19	116.6	335808	1080	

Payment for Heating

No	Name	By square		By heat meter	
		Unit price ₮/m^2	Sum ₮/8 months	Heat price ₮/Gcal	Sum ₮/8 months
1	Insulated building 8	304	2626560	10.32	2065651
2	Noinsulared building 19	304	2626560	10.32	3465539

The following technologies/measures will be deployed in the project:

- Fitting EPS (Expanded Polystyrene) wall insulation to the outside of the external pre-cast concrete walls, roofs, changing windows. U value should meet existing building code.
- Reducing uncontrolled ventilation .
- Changing the current single vertical pipe series heating radiator pipe work to a horizontal two pipe parallel hot water supply and return system serving the radiators of each individual apartment.
- Install for all heating risers balancing valves.

The following technologies/measures will be deployed in the project:

- Install for each radiators thermostat valves.
- Install for each apartment heat meters.
- Changing apartment space heat billing from an area based heat tariff to a measured actual heat supply based heating tariff

Single Pipe Heat Radiators

The crediting period will start on 15 September 2012 and apply for 7 years (renewable).

Years	Annual estimation of emission reductions in tonnes of CO_2e
15 September 2012 – 15 May 2013	12,988
15 September 2013 – 15 May 2014	12,988
15 September 2014 – 15 May 2015	12,988
15 September 2015 – 15 May 2016	12,988
15 September 2016 – 15 May 2017	12,988
15 September 2017 – 15 May 2018	12,988
15 September 2018 – 15 May 2019	12,988
Total estimated reductions (tonnes of CO_2e)	90,916
Total number of crediting years	**7**

Difficulties encountered

- All precast panel building apartments privatized. Owners interested to implement this project. But no financial sources
- Insulation work is high cost.
- Heat price for apartment is lower
- Construction season in short.

PROJECT IDEA NOTE (PIN)

Energy Efficiency Building

- OBJECTIVE OF THE PROJECT:

To reduce air pollution caused by coal and wood burning in the informal dwellings in Ulaanbaatar city and other population centers.

These houses are poorly insulated, resulting in large heating losses. The objective of the project is to replace existing dwellings with well-insulated houses, and thus reducing energy costs and reducing greenhouse emissions.

PROJECT IDEA NOTE (PIN)

Energy Efficiency Building

- PROJECT DESCRIPTION AND PROPOSED ACTIVITIES:

Replacement of 7000 existing houses with super-insulated buildings, thus reducing coal costs. The super insulated airtight houses that will be built use domestically available materials like Polysterene Foam Board insulated Light Weight Concrete, Rockwool insulated Timber Framed Houses, Structural Insulated Panels and etc. A 35m2 house in the ger district requires about 7.4 tons of coal per year for heating in the baseline, and a 65m2 house requires about 11.5 tons of coal/year. By introducing super-insulated buildings, the annual consumption will be reduced to 3.1 respectively 5.3 tons of coal per year.

PROJECT IDEA NOTE (PIN)

Energy Efficiency Building

We plan to replace and built 7.000 of Energy Efficient houses with following schedule.

Year 1 - 1000 superinsulated houses will be built

Year 2 - 1000 superinsulated houses will be built

Year 3 - 1000 superinsulated houses will be built

Year 4 - 1000 superinsulated houses will be built

Year 5 - 1000 superinsulated houses will be built

Year 6 - 1000 superinsulated houses will be built

Year 7 - 1000 superinsulated houses will be built

PROJECT IDEA NOTE (PIN)

Energy Efficiency Building

Schedule of emission reductions:

Year	Houses under construction	Total finished houses at start of year	tCO_2 emission reductions
2011	1000	0	0
2012	1000	1000	7,850
2013	1000	2000	15,700
2014	1000	3000	23,550
2015	1000	4000	31,400
2016	1000	5000	39,250
2017	1000	6000	47,100
2018	0	7000	54,950
2019 and later	0	7000	54,950

Suggestion for further projects

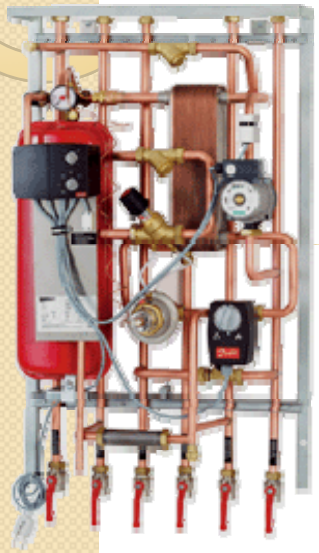
- Improvement heating supply system with heat only boilers: /examples: Yarmag-63, heat load (233.4/134.8)kW, Shar khad -79 schools/
  - Insulation.
    /wall, roof, ploor, basement, changing windows /
  - Changing heating system. /instaling thermostat and balancing valves, heat meters…etc/
  - Install domestic hot water system.
  - Renewing district heating network.
  - Renewing heat only boilers. /boilers, pumps …etc/
  - Automatization

Potential projects

- Improvement heating supply system with district heating. /UB, Darkhan citys/:
  - Insulation.
    /wall, roof, ploor, basement, changing windows /
  - Changing heating system. /instaling thermostat and balancing valves, heat meters…etc/
  - Install domestic hot water system.
  - Renewing district heating network.
  - Renewing heating substations. /heat exchangers, pumps, heat meters...etc/
  - Automatization

Heating substation with plated heat exchangers

Standard product



-ordering number
-without changes
-series production

Configuration (CPS)

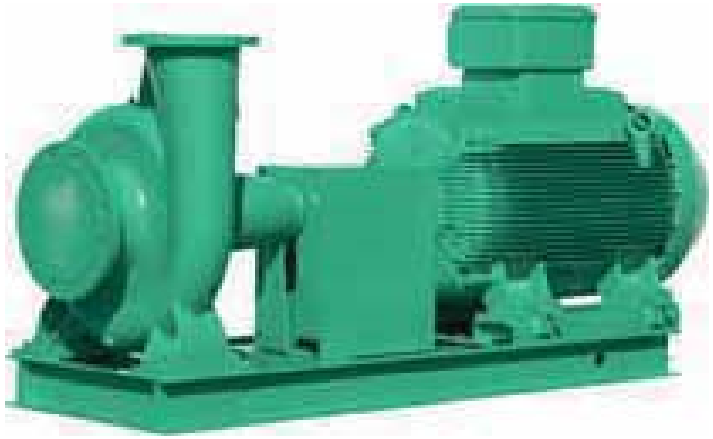
-one common platform
-pre-configurable modules
-series production

Customized

-special design
-stand/nonstand components
-custom-made production

DIRECTION OF DEVELOPMENT

pumps



Various regulators

Temperature regulator Armatur
Diameter 15-200
Temperature: max 150C
Pressure: PN 10/16/25/40

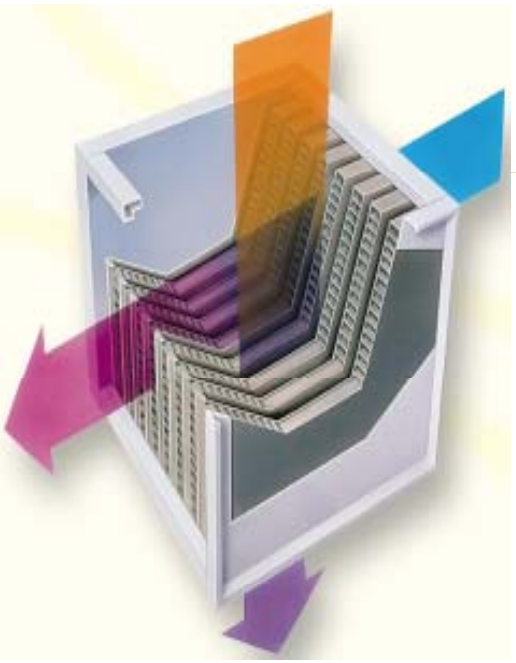
Pressure, зарцуулалт тохируулах хаалт Арматур
Diameter 15-200
Temperature: MAX150C
Pressure: PN 10/16/25/40

Monitoring screen

Heating equipment

Heat recovery from ventilation

- Air to air heat exchangers



Thank you

Ministry of construction and urban development, UNDP

“BEEP” Project

31 January 2013

Ulaanbaatar