Nexus activities of UB City Government and presentation of the study on “Thermo-technical retrofitting of state-owned schools and kindergartens in Ulaanbaatar”

Resource Efficiency in Asian Cities: The Urban Nexus
Da Nang/Vietnam, 25-27 June, 2014
Nexus activities of UB City Government

- The Nexus Task Force created by the Resolution No. A/884, 18.9.2013 of the Mayor of the Capital city;
- Two Nexus project proposals submitted and agreed (MoU signed);
- A working group for the elaboration of a citywide “Thermo-technical retrofitting program for pre-cast panel apartment buildings in Ulaanbaatar city” installed (Resolution No.A/91, 2014 of Mayor of the Capital city);
- A project design document for “The thermo-technical retrofitting of public and apartment buildings in Ulaanbaatar” to be implemented in 16th Khoroo, Bayanzurkh district to reduce the thermal loss in pre-cast panel apartment buildings elaborated with support of GIZ;
- A study on public schools and kindergartens for implementation of TTR conducted with support of GIZ;
- Regular meetings of the Nexus Task Force have been held;
- Organizing and implementation of City benchmarking/city profiling and waste water survey mission of the Fraunhofer institute;
- Active support and facilitation from Nexus National coordinator.
Brief introduction

Thermo-Technical Retrofitting of State-owned Schools and Kindergartens in Ulaanbaatar, Mongolia

Preliminary study
The objective of this study is to analyse the situation and current conditions in state-owned school and kindergarten buildings in Ulaanbaatar city and to determine the need for thermo-technical retrofitting (TTR).
Rationale

- Population grows/migration and booming housing construction in last years;
- Facing heat energy capacity shortage in Ulaanbaatar;
- Programs of UB for reduction of thermal losses and saving of heat energy in existing old buildings;
- Acute shortage of schooling and kindergarten facilities in UB;
- Overcrowded classrooms in public schools and kindergartens (2-3 shifts);
- Need for improving of learning environment for children and students (implementation of TTR measures);
- Up to 80% of school and kindergarten buildings currently operating in Mongolia built between 1960-1980 (need for major overhaul);
- High expenses for heating supply, air pollution.
Study focused on: (For 6 core districts of Ulaanbaatar city)

- Location, capacity;
- Year of construction, current condition;
- Connection to infrastructure provisions;
- Heating supply quality, classroom temperature;
- Buildings deficiencies, damages;
- Heating budget;
- Feasibility of thermo-technical retrofitting.

The prefeasibility study on “Thermo-Technical Retrofitting of Ulaanbaatar State-owned Schools and Kindergartens” was conducted in March/April 2014, covering all state owned schools and kindergartens in the six core districts of Ulaanbaatar city.
203 Schools in Ulaanbaatar

- 115 public schools
- 76 non-public schools
431 Kindergarten in Ulaanbaatar

- 247 public kindergartens
- 168 non-public kindergartens
**Current situation**

- School and kindergarten buildings in generally demonstrate substantial thermal losses leading to condensation and mold grows inside of the building;

- Uncomfortable and unhealthy indoor conditions during the cold season in Ulaanbaatar (heating season lasts 8 months, outside air temperature up to \(-40^\circ\) C).

- Due to the lack of major overhaul the heating system is deteriorated (blocked heating pipes, broken valves, heating regulation is hardly possible, resulting in common excessive heat or cold indoor temperatures).

- High heating consumption (The average annual heating consumption of these buildings is over 400 kWh/m\(^2\))
In 19 kindergartens the lowest temperature varies between 5-10°C during the winter, sometimes it even falls down to -5°C. At 98 kindergartens it varies between 10-20°C, whereas in 51 buildings it is over 20°C respectively.
Type of heating supply and budget

Out of 168 state-owned kindergartens 118 kindergartens are connected to the district heating system, whereas 50 (29.8%) have standalone heating systems.

Out of 143 state-owned school buildings 105 buildings are connected to the district heating system, whereas 38 (27%) schools have standalone heating systems.

Schools and kindergartens in Ulaanbaatar are spending approximately 10 percent of total funding for fixed costs such as costs for electricity, heating, water, sewage and fuel transportation. Out of these 75-77.6 % of the fixed costs are costs for heating.
**Best practice**

GIZ retrofitting project financed by USAID has thermo-technically retrofitted three school buildings in Ulaanbaatar 2012.

School No.63 in Khan-Uul district, Yarmag

Solar collectors for warm water on roof of School No.63
Recommendations for selection of buildings for TTR

In the frame work of this study the following criteria for the selection of school and kindergarten buildings for TTR in Ulaanbaatar is recommended:

• The building is constructed after 1970 and has a standard design (limited standards solutions for TTR could be applied);
• Good physical condition of building main structure (wall, roof, foundation, resistant against earth quake impact);
• Examine the state of sanitation, electrical installation/wiring.

The year of the construction of the building is proposed as one of the main criteria hereby.
**TTR investment and savings**

- The total area of 42 schools and 50 kindergartens with standard design (built after 1970’s) is 259509.0 m². The expenditure for TTR of 1m² is USD **145.0**;
- Altogether an investment of USD **37’628’800** will be required;
- Ulaanbaatar city will annually save heat energy amounting to 38.35 million kWh or USD **2’550’000**;
- **28.380 tons** of CO₂ emission would be saved per year; (could be increased significantly by additionally using renewable energy sources).
**Impacts**

In terms of social and economic impacts:

- Demand on heat energy supply will be reduced setting free heat energy capacity to connect many newly built buildings to the district heating system of Ulaanbaatar.
- The need for construction of costly heat only boilers especially in *Ger* districts will be decreased (savings in state and local budgets);
- TTR will considerably prolong the lifetime of those buildings and will help to reduce running/heating costs.
- The heating quality and thermal comfort will be improved significantly and it will have a positive impact on the learning environment, hygienic conditions and health of children as well as students.
- The TTR will create new jobs in the construction sector of Mongolia.
Impacts on the city look:

- The TTR will improve the appearance/facade of buildings contributing to a more beautiful city.

Impacts on reducing air pollution of the city:

- Saving heating energy will reduce the fuel consumption of decentralized heating furnaces and so positively impact on reducing air pollution in the winter month as well as reducing the risk of respiratory deceases among the population.

Impacts on application of renewable energy sources

- The TTR of school and kindergarten buildings will create favourable conditions for the use of renewable energies (solar collectors for warm water and heating provision).
- The combination of TTR with renewable energy applications is most effective way to reduce fossil energy consumption.
Other related activities

- Elaboration of functional **financing mechanisms** for the implementation of a comprehensive investment program for the renovation of the existing housing building stock (one of the basic conditions for the successful implementation of the TTR program).
- Meeting with ADB “Climate Investment Fund” scoping mission to introduce the study on state-owned schools and kindergartens (in April, 2014);
- ADB expressed its interest to fund (matching funds) retrofitting of public schools and kindergarten/climate investment fund funding renewable energy devices for schools and kindergartens in the Gers districts of UB;
- The meeting with German KfW to introduce the study on state-owned schools and kindergartens (in May, 2014);
- Official Letter of Mayor of UB to KfW to support the project on “The thermo-technical retrofitting of public and apartment buildings in Ulaanbaatar”;
- The enacting of a comprehensive “Capital city housing program” by the City council in May 2014 including TTR of panel apartment buildings;
- Practical thermo-technical retrofitting of 2 Kindergartens in Uliastai and Khovd as practical pilot projects including on-job-training in collaboration with TVET schools.
- Structural reform of the Housing companies.
Thank you for your attention!