

POSITIVE IMPACTS ON HEALTH, EMISSIONS TO AIR, AND BUDGET SPENDINGS THROUGH ENERGY EFFICIENCY

Project overview

The Energy Efficiency Project has several goals. One is to demonstrate how decentralised public funds can be utilised for much-needed investments in Energy Efficiency in public buildings in two remote western aimags in Mongolia; Khovd and Zavkhan. Another goal is to support the implementation of the Energy Conservation Law which was promulgated in November 2015. The project is also providing advice how to move the energy tariffs to a more market oriented system.

Duration

2014 – 2016

Budget

Total 7,700,000 EUR
Co-financing by SDC
3,800,000 EUR

Objective

Long-term improvement of private and public action with respect to energy efficiency on the supply and demand side.

In cooperation with

Ministry of Energy
Cabinet Secretariat of the Government of Mongolia

Implementation partner

Energy Regulatory Commission
Governor's office in Khovd and Zavkhan

Local universities and vocational education and trainings schools
Local procurement agencies

1 EUR ≈ 2,200 MNT (May 2016)

Is it possible to estimate how much cold indoor environment in a kindergarten affects children health?

Is it possible to estimate how much parents in a kindergarten would benefit in direct economic terms if their children get sick more seldom?

Is it possible to estimate how investments to create warmer kindergartens would pay off related to public budgets and individuals?

The answers are yes! The results from a study accomplished during winter 2016 indicate substantial monetary savings for parents as well as for government budgets added to the significantly reduced illnesses among children and staff.



Kindergarten in Khovd under renovation

TEMPERATURE IMPROVEMENTS

Two kindergartens in each aimag with similar climatological conditions and social situations for the parents were chosen for a study in order to allow for non-biased comparisons. In one set of two kindergartens the project had accomplished thermo-technical renovations bringing the buildings to modern standard; in the other set no energy efficiency measures had been taken. All kindergartens were of standard Soviet type and built some 20 – 30 years ago.

ENERGY SAVINGS

The energy savings in the renovated buildings were estimated to be up to 50 %. Through direct measurements of fuel consumption the level was confirmed.

In the renovated kindergartens, the indoor temperatures stabilized around 22°C regardless of outdoor temperatures. In the not renovated buildings the children had to wear winter clothes indoors to stand a freezing 10 – 18°C with a clear correlation with the outdoor temperatures.

TARIFF SYSTEM DRAWBACKS PREVENTS GOVERNMENT SAVINGS

This big energy saving is only partly reflected in the government budgets. If the public building has its own boiler system, the reduced costs for fuel (coal or wood) is directly measurable. Provided a flexible budget system, the saved costs can be allocated to other needs.

Regretfully, if the building is connected to a district heating system, the energy savings are not directly reflected in cost reductions for the government who owns and runs the operations.

This negative fact is due to a **tariff system that totally lacks incentives to save energy.** The tariffs are based on volume of the building; not on the actual consumption of energy.

SAVINGS FOR THE INDIVIDUAL

Large savings for the individuals were recorded in the warm kindergartens. **The number of days the children and staff were absent due to illness was reduced to around 1/3** compared to the year before the renovations.

The same reduction of around 65 % was noticed in the direct costs for medical care and lost working opportunities. In the buildings that were not renovated the high ratio of illnesses remained as before.

The benefits in terms of **significantly improved learning environment and physical development for the children** are difficult to estimate in direct monetary terms, but they are surely very high for the individual as well as for Mongolia as a society.



Struggling to kindergarten in the cold.

HEALTH ISSUES RELATED TO AIR POLLUTION

Since the heat is produced mainly by burning coal, and sometimes wood, the air pollution and related CO₂ emissions will be reduced proportionally. Despite the difficulties to directly estimate the positive effects on health from reduced air pollution, it is most likely that this will further reduce illnesses.

COSTS FOR THERMO-TECHNICALLY RENOVATED KINDERGARTENS

To construct a new kindergarten following high and current Mongolian standards would cost at least 600,000 EUR.

To renovate a standard Soviet type kindergarten built some 20 – 30 years ago to high standard will cost around 130,000 EUR. **To renovate to a cost-effective level would cost around 90,000 EUR.** This latter level might not lead to 50 % energy savings, but the saving per invested amount naturally decreases once the most effective measures have been accomplished.

TOTAL SAVINGS AND DEPRECIATION TIME

On the family level, the direct savings, as described earlier, vary between 100 to 200 EUR per year depending on their social and economic status. (The average yearly income for a family in the aimag is around 2,500 EUR with large variations.) The number of children at each kindergarten is around 250, so the total savings on the family level are in the order of 35,000 EUR per year – for one kindergarten!

In addition, the energy supply needs were reduced by up to 50 % in the renovated buildings. The costs for heating vary a lot between different types of buildings and heat supply systems. Average savings can be estimated at 3,000 to 30,000 EUR per year for different types and sizes of the public buildings.

Heat-only boiler	Grid-connected
Examples <ul style="list-style-type: none"> Health centre in Duut (440 m²) and Erdenekhairkhan (490 m²) School in Zavkhanmandal with 500 m² heated area 	Examples <ul style="list-style-type: none"> Kindergarten in Khovd: 230 children; 800 m² heated area Kindergarten in Uliastai: 300 children; 800 m² heated area
Energy savings <ul style="list-style-type: none"> Average 250 kWh/m² and year 	Energy savings <ul style="list-style-type: none"> Average 130 kWh/m² and year
Cost savings <ul style="list-style-type: none"> Average 50 % of the previous year's heating budget Direct and immediate savings through purchasing less coal 	Cost savings <ul style="list-style-type: none"> Average 10 % of the previous year's heating budget Possible depending on heat supply contract
Small	Large

These direct monetary savings, added by the socio-economic benefits, must then be compared to the average retrofitting cost for this kind of buildings. **If the total savings for the individuals and the government are added, the economic depreciation time for a thermo-technical retrofitting is less than half of the technical life time for the building (more than 20 years) depending on size, type, heating system, tariffs, etc.** Once the renovation costs are depreciated, the remaining life time of the building would provide just pure returns on investments.

LARGE CROSS CUTTING BENEFITS

Large cross cutting benefits are achievable and related to improved health, energy savings, and reduced air pollution and CO₂ emission.

Extrapolating these figures and benefits to not only another individual kindergarten but to all kinds of public buildings like schools, clinics and hospitals, government offices, etc. open instead of show striking consequences.

The limiting factor is, of course, investment funds, but the convincing facts from this study should be considered when the allocations of government funds, and in particularly the Local Development Funds, are made. Also foreign donors should consider where large socio-economic benefits are reached.

A detailed assessment of the optimized renovation measures in public buildings is needed. This will allow for a feasible project proposal.

BRINGING DONORS TOGETHER WITH THE MONGOLIAN GOVERNMENT WILL CREATE A POSSIBILITY TO FINANCE THIS WIN-WIN SITUATION.

Published by the
Deutsche Gesellschaft für
Internationale Zusammenarbeit
(GIZ) GmbH

Registered offices
Bonn and Eschborn, Germany

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Content and design

GIZ Mongolia / ENEV Project

ENEV Project is responsible
for the content of this
publication

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Layout and printed by

Interpress LLC

On behalf of the
German Federal Ministry for
Economic Cooperation and
Development (BMZ)