

Energy Efficiency in Residential Heat Supply System

Potential for Greenhouse Gas Emissions Reduction in Armenia

“Removing Barriers to Residential Energy Efficiency in Central and Eastern Europe”

February 6-7, Kiev

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“Armenia - Improving the Energy Efficiency of Municipal Heating and Hot Water Supply” UNDP/GEF/00035799” Project



Objectives of UNDP/GEF Project in Heating Sector

National Executing Agency – Ministry of
Nature Protection of Armenia

PDF-B stage - 1999-2001 -210.000USD
Full size project - 2005-2009 -2.950.000USD

Objectives

Environmental

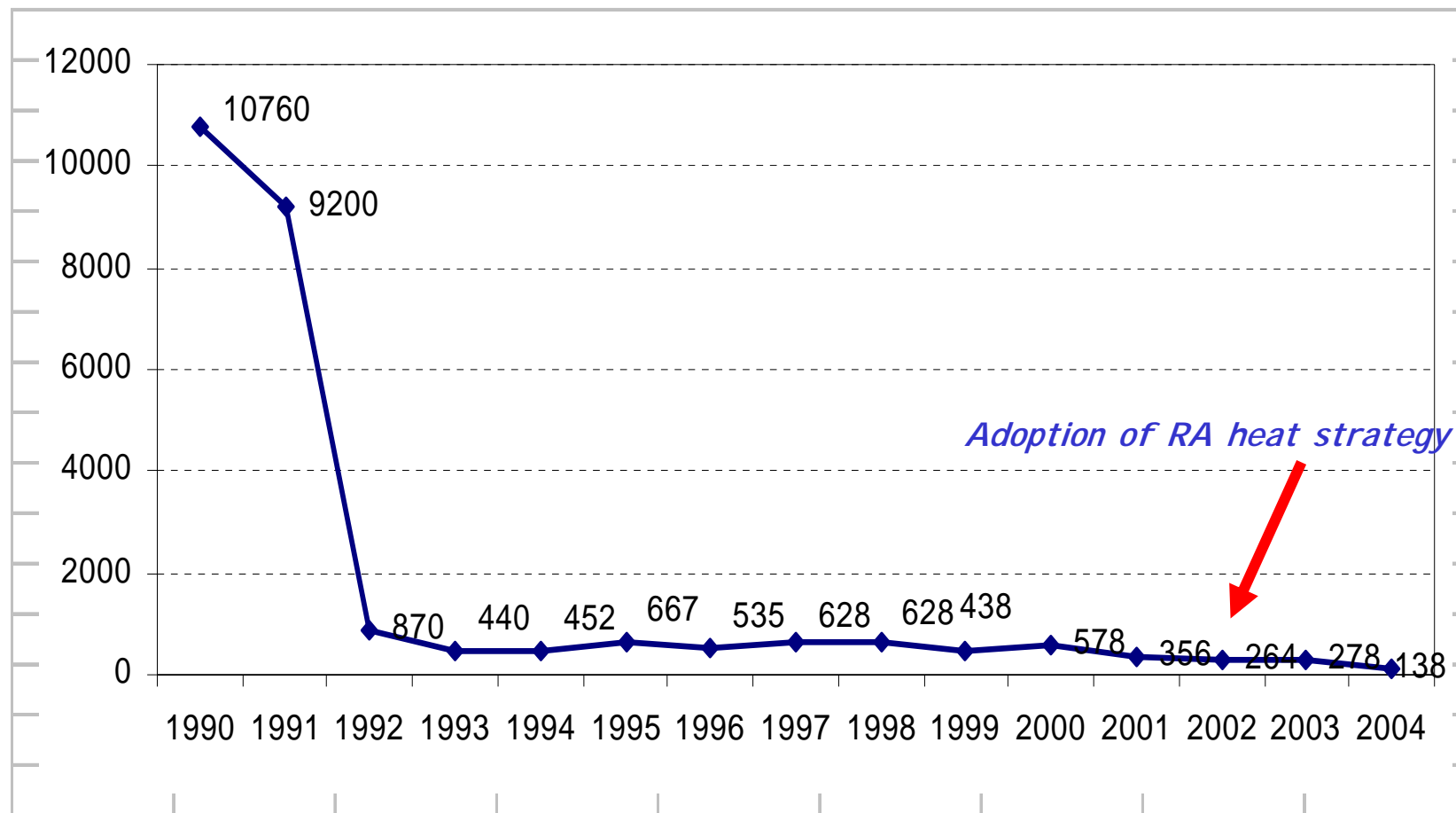
- GHG emission reduction (limitation)
- Reduction of pressure on forests - GHG sinks
- Capacity building for GHG reduction in long term context of sustainable development

Social

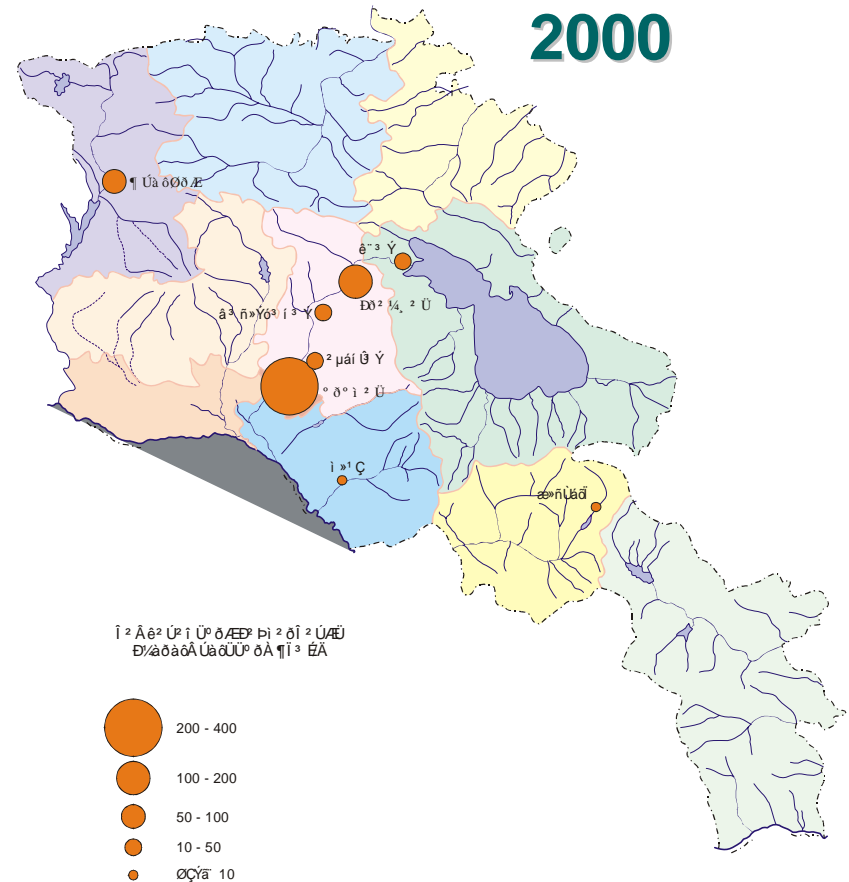
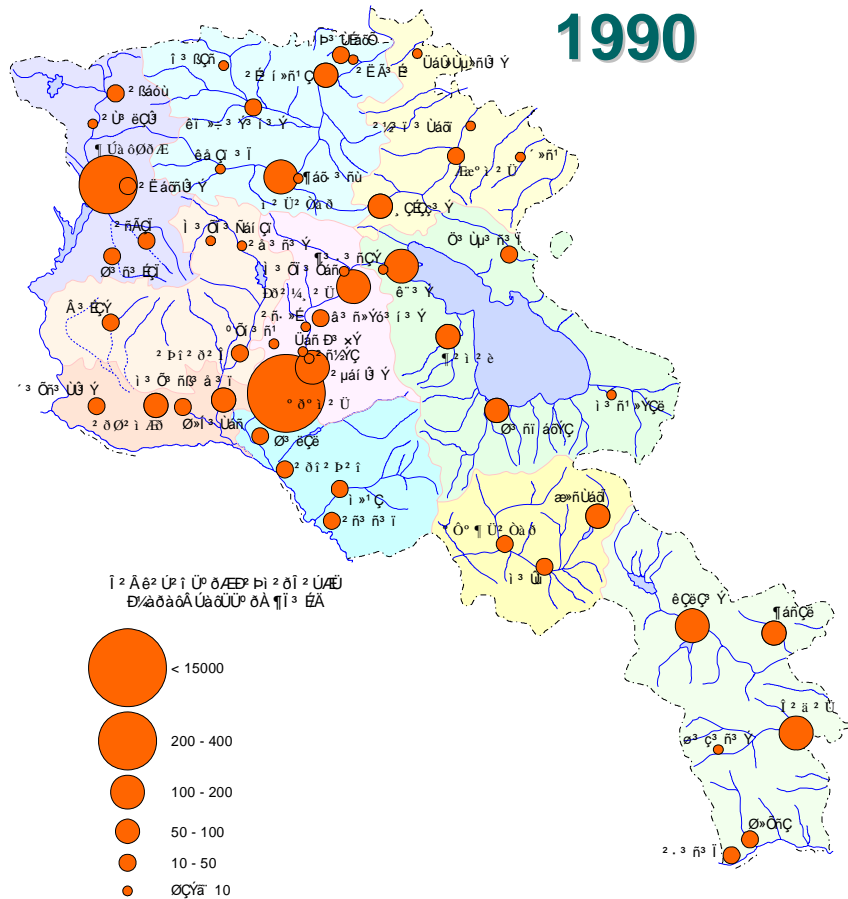
- Ensure affordable heat supply services

Current Situation in Heat Supply Sector

Heat Power Production and Heat Load in the District Heating System in Armenia, 1990 - 2004



Settlements of Armenia Having District Heating Supply, 1990, 2000



Main Barriers to Energy Efficiency in DH Identified in PDF-B stage

- Lack of strategies, concrete implementation plans and special economic policy for reconstruction of public services
- Weak institutional and regulatory framework
 - Slow progress in opening the market for private investors
 - Inadequate legal framework for regulating relations between suppliers and consumers.
 - Lack of incentive mechanisms for producers and consumers to implement energy efficiency and energy conservation means
- Low level of organisation of the apartment owners and low solvency of the population
- Non favourable conditions for long term investments

CHALLENGES

INSTITUTIONAL/SOCIAL

- Complete privatized housing stock without traditions of ownership responsibility for real estate assets
- Excessive government involvement in housing services in past, which is reversed by complete withdrawal of state from sector management
- Weak capacity of multi apartment building management institutions; lack of economic/financial knowledge and skills of property management
- Absence of social support schemes of heating services for poor house owners

CHALLENGES

ECONOMICAL/FINANCIAL

- Deficient legislative/institutional framework enables application of crediting schemes
- Short term and high interest rate credits, and strict collateral requirements
- Absence of competitive market for building maintenance and management services
- Low affordability of the population and barriers for necessary unanimous decisions on building level

Pilot Projects

Implementation 2001-2002

Monitoring 2002-2004

Overall objective

Investigation of:

- technical and organisational/institutional feasible solutions for the reconstruction of municipal heating system
- actual heat supply and consumption parameters in operating district heating systems
- possibility of billing by metering and payment collection by collective responsibility contracts through condominiums.
- actual barriers in legal and regulatory field
- possibility of cooperation between different stakeholders and donor assistance programs

Pilot Site Selection Criteria

2001-2004

- The pilot sites covered by “Urban Heating Strategy for Armenia”
- Buildings connected to operating district-heating
- Internal heat networks in the buildings are in working technical conditions
- Consumers are organized in a condominium or another kind of a management body
- Building must be typical for the city and quantity of “empty apartments” must be minimal
- House owners and condominiums must confirm their interest to collaborate, and make all necessary arrangements for signing a contract with the heat supply company

Pilot Project Design

Technical Measures

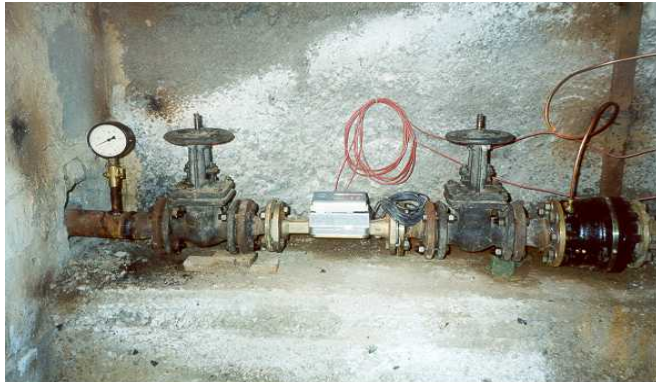
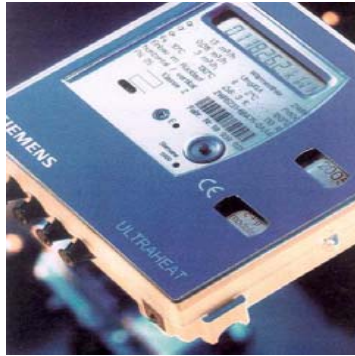
- Metering of heat consumption on the level of the building
- Individual regulation of consumption
- Control of individual consumption

Organizational

- One building –one contract with supplier
- New contract forms for households
- Billing according to the consumption level

Capacity Building

Equipment Installed in Pilot Project Sites






Pilot Project Data

Indices	Gumri	Yerevan
Average outdoor t, °C	-5.1	-2.6
Ratio of illegal discharged water heat energy, to the total consumed, %	35.3	4.3
Daily discharged water, liter/apartment	162	12
Ratio of actual supplied heat to normative, %	67.4	54
Heat energy tariff per season (Yerevan 90 days, Gumri 120days), AMD/sq.m		
<input type="checkbox"/> Adopted by regulatory commission	2573	1651
<input type="checkbox"/> Subsidized by municipalities	1100	1100
Ratio of actual collected heat bill to the metered amount, % (by condominium)	70.1	89

Outcomes

- Actual heat supply >54% (Yerevan) and 67% (Gyumri) from the contracted normative supply (by sq. m.) including illegal hot water discharge
- The temperature in some apartments is 4-50C less as compared to the normative one (+180C).
- Heat energy distribution in the building is not balanced. Most apartments on the lower storey are under heated.
- Payment level in pilot sides makes >70-89% in case of average level of collections in district heating companies >40%.
- The residents are ready to pay for a quality service and express positive attitude towards new consumption based billing system

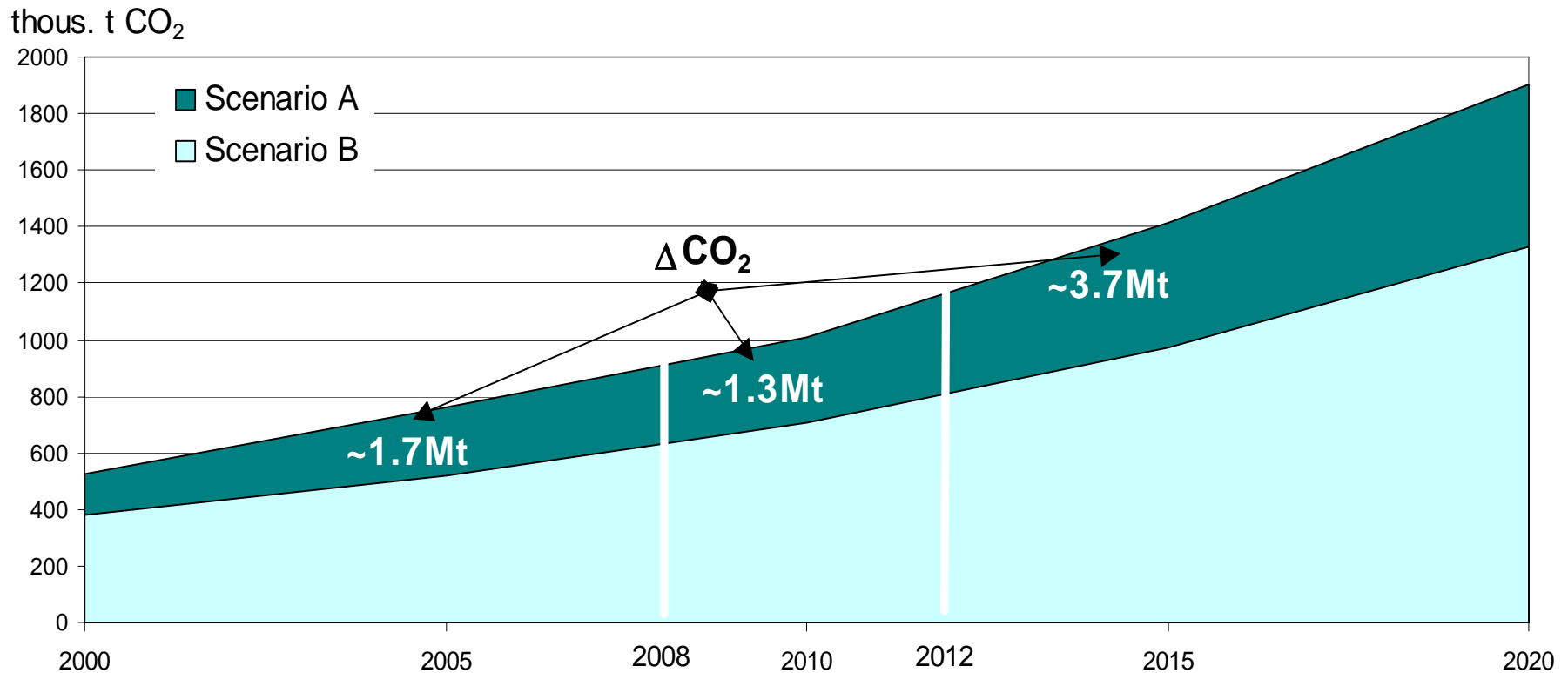
UNDP/GEF Project as a Part of Other Assistance Programms in RA Heating Sector

<i>Timeframe</i>		
2005-2009	2005 - 2010	2005-2008??
		
<i>Funding</i>		
2.95 MUSD	15 MUSD	>10 MUSD
<i>Assistance Directions</i>		
Technical Assistance Grant in demo project	Technical Assistance Credit line	Technical Assistance Credit line???

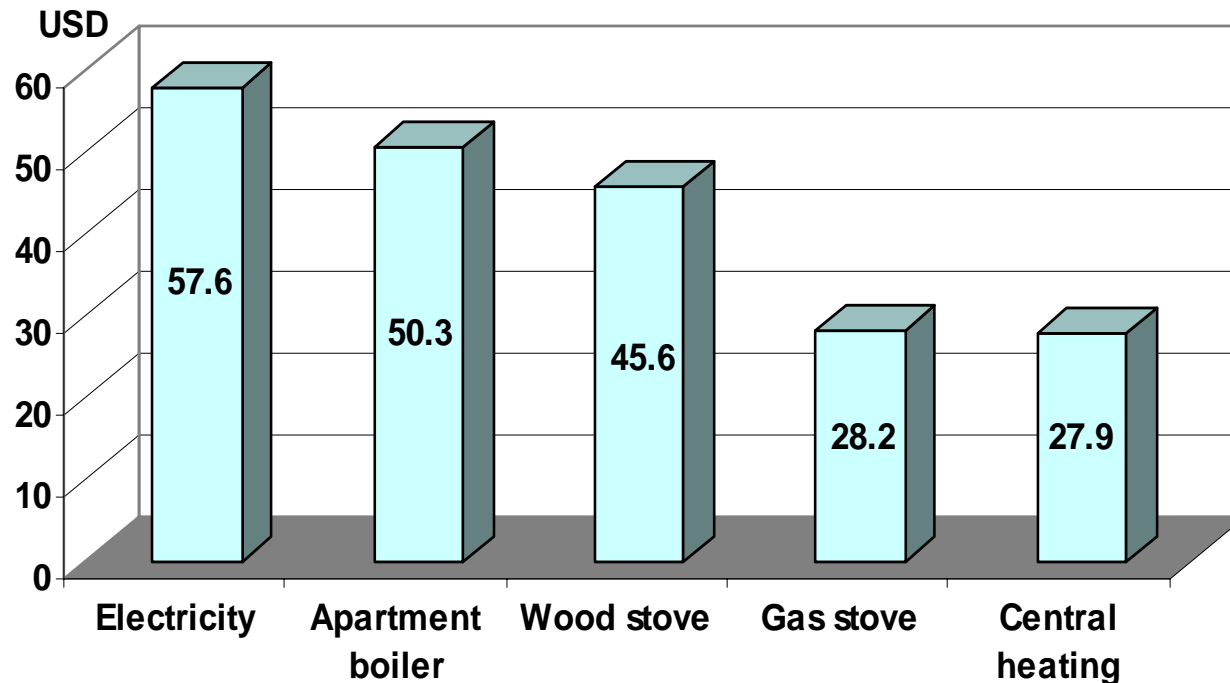
Forecast of Primary Heat Production and Potential of Energy efficiency

Scenario A - Conservation of the current structure of primary energy consumption and energy efficiency, ~ 0,46 toe/ Gcal

Scenario B - Rehabilitation and modernization of district heating system ~ 0,29 toe/Gcal



*The Cost of 1 Gcal of the Consumed Heat Energy in Different Systems, 2005
(including capital investments)*



Classification of Energy Efficiency According to the Capital Expenditures

Measures	Examples	Full size phase project strategy
No cost	<ul style="list-style-type: none"> • switch off when not required • repair leaks • reschedule loads/usage 	<ul style="list-style-type: none"> • Applicable in case of reconstruction of heating systems • Based on cost benefit assessment • Awareness and good practice examples • Using pilot project experience
Low cost	<ul style="list-style-type: none"> • maintenance • meters • M&T • simple controls • insulation • training end users 	<p>Pilot project strategy- Project PDF-B phase</p> <ul style="list-style-type: none"> • Installation of regulating and measuring devices • New institutional relations (condominium-supplier) • New approaches for calculation of heat energy bills
High cost	<ul style="list-style-type: none"> • combined heat and power • network reconstruction • energy management systems 	<ul style="list-style-type: none"> • Identification of different funding opportunities • Attraction of the investment in high cost technology • Promotional tariff and policy • Kyoto mechanisms

Energy Efficiency Measures to be Addressed in the Frames of UNDP/GEF Full Size Project

Category	Examples	Owner/ Stakeholder	Project support
Supply Side Energy Efficiency (Transportation & Distribution)	Reduction of power distribution losses Reduction of heat distribution losses	Municipality/private company shareholder? Network operator - main stakeholder	Technical assistance Support in developing new institutional setups for reduction of investment risks
Supply Side Energy Efficiency (Generation)	Increase of heat generation efficiency Cogeneration	Generation plant operator - private company Shared ownership/ State ownership	Technical assistance Investments in demo project Legislation and regulatory framework Investigation of the suitability for CDM
Demand Side Energy Efficiency	Insulation of buildings Regulation and balancing the internal network Efficient household appliances Training end users	Condominium = 1 stakeholder Households = many stakeholders!	Technical assistance Investments in demo project Public outreach

Funding Possibilities for Heating System Reconstruction

Category	Possible Funding Sources
Supply Side Energy Efficiency <i>(Generation)</i>	Private investments / leasing / Kyoto Mechanisms
Supply Side Energy Efficiency <i>(Transportation & Distribution)</i>	Co-sharing of investments (private investments + municipal funding) using WB credit
Demand Side Energy Efficiency	WB credit in combination with grant

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