Methodological Problems in Baseline Determination for Energy Efficiency in District Heating

Vahram Jalalyan, Project Expert

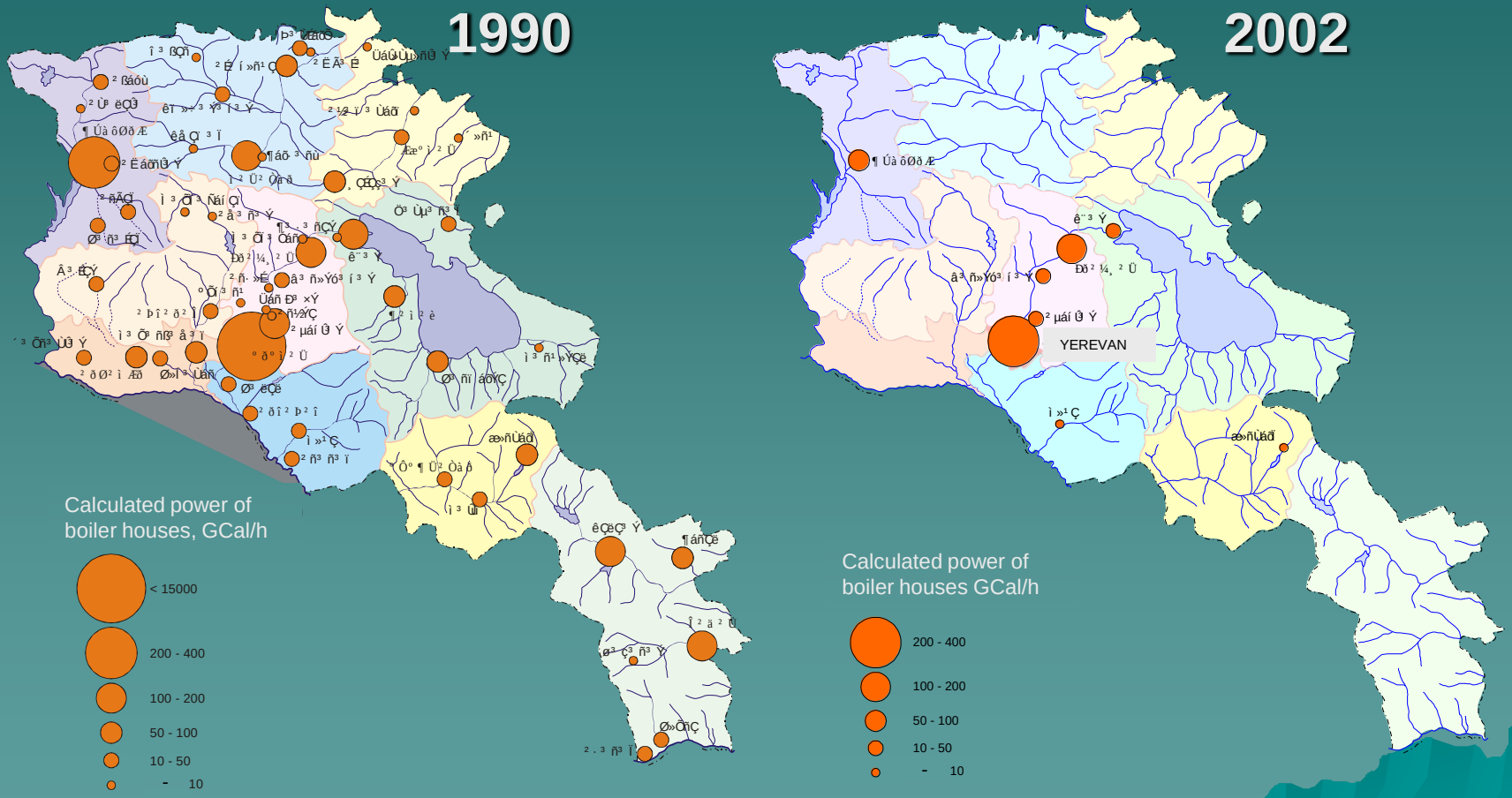
JI/CDM Project Presentation and Investors Forum
Leipzig, Germany
October 14-16, 2007

ARMENIA

UNDP/GEF "Armenia – Improving the Energy Efficiency of Municipal Heating and Hot Water Supply" Project

GEF

District Heating in the Republic of Armenia (RA), 1990 and 2002



District heating capacity in Armenia 7785 Gcal/h including HOBs 5576 Gcal/h

Study background

The Avan DH project Baseline Methodology development was undertaken by the assistance of the:

- UNDP MDG Carbon Facility

  Subcontractor Factor Consulting+Management AG,

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

  National expert team

Existing registered methodologies

Listed below approved methodologies can be applicable for District Heating type projects:

ACM0009 - Consolidated baseline methodology for fuel switching from coal or petroleum fuel to natural gas

AM0044 - Energy efficiency improvement projects: boiler rehabilitation or replacement in industrial and district heating sectors (no registered projects available yet)

AMS I.C. - Thermal energy for the user with or without electricity

AMS II. B. - Supply side energy efficiency improvements – cogeneration

AMS III. B. - Switching fossil fuels

Current Situation

- Former district heating system is not operational since 2002 (low efficiency, outdated network, high losses). Actually is difficult to justify as baseline according to the existing methodologies ;

- Comfort level provided by the existing residential heating appliances (gas and electric heaters) in Avan is currently very low.

- 31% of the consumers in the district are connected to the gas distribution network;

  Gasification level is increasing dynamically, and people tend to switch from the electricity to gas for the covering their heating and hot water needs.

- 83% of heating and HTW demand today are covered through electric devices, and the rest (17%) through gas-fired single-room heaters, or apartment level boilers;

Baseline General Observations on the case of Avan DH project

Baseline selection includes two critical elements:

1.Service level: Evaluate the amount of heat and electricity consumption in the absence of the project.

Normative heat demand coverage:

Resistance heating and HTW – about 15%

Gas heating and HTW (gas appliance) – about 69%

2.Emissions amount uncertainty: How heat and electricity demand will be covered, and what will be the associated CO2 emissions?

Baseline General Observations

Potential scenarios:

- A proportional expansion of the existing individual heating devices (i.e. mix of electric and gas-fired heating devices maintained, but higher demand coverage levels);

- Switch to a district heating system without cogeneration units (HOB);

“Avan” Project Area

- Area - 1.5 km2, elevation- 1250 m
- Population – 37 000
- Number of residential buildings – 218
- Number of apartments – 10 172
- Number of public buildings– 32
- Heat demand – 78,5 MW

Problems with application of approved methodologies

The existing methodologies either large scale or small scale, can't be applied to Avan case without modification / combination.

Main reasons are that existing methodologies assume:

- fuel switch from coal/liquid fuels to gas
  - *in case of Avan switch is from existing "gas-electricity-heat" system to "gas-heat" system*
- operational non-efficient DH system in the baseline
  - *in case of Avan switch from "mix of individual various heating options" to the "efficient DH system"*

Option 1: Develop Single Large-Scale CDM Project

Currently no approved large-scale CDM methodology is available to fit Avan project.

5 methodology proposals for DH projects have been submitted to the UNFCCC to date. 4 of them were rejected by the CDM EB.

The methodology, once approved by the CDM EB, would also be applicable to similar projects elsewhere.

Disadvantages of Option 1

- The statistical probability of getting a large-scale CDM methodology approved by the EB is rather low, i.e. there is a high risk of failure, and high cost
- The time required for obtaining the EB decision on the methodology is at least 6 months from the time of submission. Taking into account the additional time required for developing the methodology, this leads to a serious delay.
- An additional disadvantage of large scale projects is, that the crediting period for the project as a whole starts at one single date. This implies especially for step by step implemented projects, that project parts implemented last are “losing” CERs since the crediting period will end shortly after their commissioning.

Option 2 – Application of SSC Methodologies

Break down the overall DH project into smaller activities or "sub-projects" meeting the small-scale CDM limits.

Option 2 allows to use existing small-scale methodologies. Two methodologies are relevant for our case:

- **AMS III.B** (fossil fuel switch) is assumed to be relevant for case of switch from electric heating devices to district heating;
- **AMS II.B** (supply side efficiency in generation) can be applied for the co-generation of electricity at the DH station.

Conditionality

CDM rules limit the possibility of breaking down large projects into smaller sub-projects. A project will be considered a de-bundled component of a larger activity if there is a registered SSC CDM activity, or an application to register another SSC activity, fulfilling all of the following conditions:

- With the same project participants;
- In the same project category and technology / measure;
- Registered within the previous 2 years;
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point;

Based on these rules, de-bundling of large projects into smaller parts is possible under the condition that the different parts are owned by different parties (project participants).

Most recommended AMS II B and AMS III B

- For Type II projects (energy efficiency), energy savings must not exceed 60 GWh_e of electrical energy or 180 GWh_{th} of fuel equivalent on input per year;

- For Type III projects (other project activities), the emission reductions must not exceed 60 kt CO2e per year.

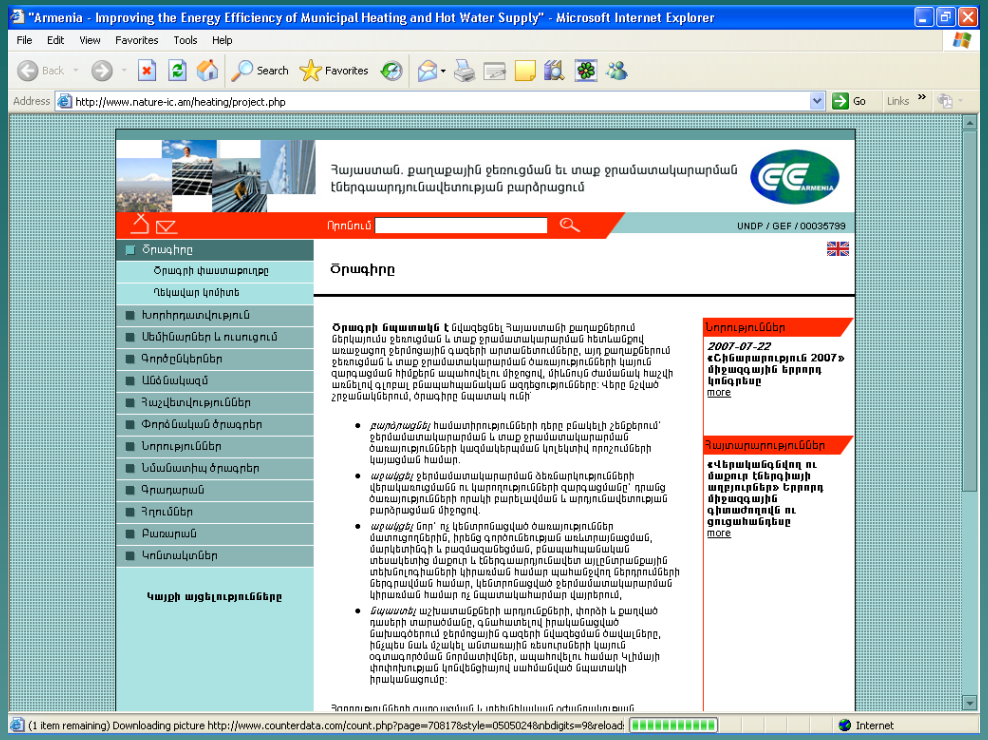
- It is important to note that the two methodologies AMS II.B and AMS III.B can be applied to the same project in the same PDD.

Accordingly project may save up to 60 GWh/yr of electricity through co-generation (Type II limit) plus reduce up to 60,000 tCO2/yr by switching from electric heating devices to district heating.

Conclusions

- District heating energy efficiency potential is high in the countries with transition economies
- Most CIS countries have the opportunities to perform a CDM projects in DH on the base of CHPs (to bring heat cost down and improve service quality and efficiency)
- Approval of an appropriate methodology by CDM EB will facilitate development of DH rehabilitation projects under CDM in CIS and Eastern Europe.
- Introduction of DH systems will allow replacing inefficient, environmentally unfriendly and unsafe gas heating individual appliances use in multi-stored apartment buildings.
- It will also lead to decrease of electricity consumption for heating and HTW purposes; thus, contribute to reduction of GHG emissions into atmosphere.

THANK YOU!



www.heating.nature-ic.am

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

Ministry of Nature Protection, Governmental Building #3, room # 533, Yerevan, Armenia

Tel.: (+37410) 583920, Fax: (+37410) 583933 E-mail: heating@nature-ic.am