

Alliance to Save Energy

Regional Heating Sector Policy Assessment

OUTLINE

Goals & Objectives

The Alliance together with USAID and selected experts will define, analyze and present an integrated, comprehensive assessment of district heating policies and programs in the Europe & Eurasia (E&E) region. The assessment will serve as a seminal reference document for USAID and other donors to understand the key issues related to district heating – now and into the future, and to factor those issues as appropriate into their respective donor strategies. The expanded audience for this assessment includes national and local governments, energy experts and project developers, non-governmental organizations (NGOs) and others who influence the development of the E&E region.

The *policies* examined will cover the range of legal and governmental measures taken during the last 15 years to address heat sector problems and needs, including energy policy strategies, laws and regulations, and institutional restructuring and reform. The *programs* examined will focus on the largely donor-funded technical assistance that aims to create an enabling environment for private investment and commercial viability in the heating sector while ensuring that social and economic needs of consumers are addressed. *Programs* presented in this assessment will also include *investment programs*, which sometimes have a technical assistance component and are related to policy strategies.

The assessment will focus on understanding and analyzing how the region's current policy and program frameworks have influenced the end-use of heat. It will explore how district heating has changed and where it is going in terms of heat price regulation, supplier-consumer relations, competition with other heat sources, affordability and long-term market viability. It will consider what the implications are for USAID's and other donors' programs supporting social, democratic and economic development in the E&E region and beyond. It will recommend steps and actions that donors, investors and other influential actors can take to address the most critical needs for reform, investment and/or intervention in the region's district heating sector.

Approach & Methods

The assessment will include statistical as well as policy analyses, cite best practices and success stories, and draw upon existing literature and research underway. Rather than begin by collecting new data, the Alliance will utilize information in the MUNEE Energy Efficiency Investment Strategy and case studies about private sector participation to describe the heat sector restructuring path and how some "pioneer" reformers managed to reach critical milestones while other still struggle mid-way on the reform process. Due to the "local" nature of district heating and the growing need to improve all municipal service sectors, the Alliance may include some analysis and recommendations regarding successful energy efficiency experience in the municipal water and lighting sectors to the extent it relates to district heating (e.g. Cherepovets case study in Russia; private sector participation in municipal water sector in Southeast Europe; and street-lighting projects in Latvia, Bulgaria and elsewhere).

Geographic Coverage

The scope of this work will encompass the entire Europe & Eurasia region, and countries within the region will be grouped according to their respective social transition issues. It will include countries that have a relatively high percentage of operational district heating, as well as those with limited and deteriorated systems and evolving decentralized heating. For the purposes of this assessment, the E&E region shall include the countries of Southeast Europe, Newly Independent States (NIS), the Baltics and Central Asia. Some countries will receive more detailed review than others due to the availability of data and the relevance of district heating in certain countries. The list of countries will be finalized, in consultation with USAID/E&E, based on their relevance and importance under the current scope.

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BACKGROUND: WHY DONORS AND INTERNATIONAL FINANCIAL INSTITUTIONS CARE ABOUT HEATING

The *Background* section of the assessment will define the significance and magnitude of the key problems in the E&E region's district heating sector, and describe how addressing these problems is an integral part of improving stability in the region. It will locate the major problems by countries or "sub-regions" (e.g. Southeast Europe, Caucuses, etc.) and describe the current state of district heating through an historical lens, so as to understand how things have and have not changed. It will aim to organize the complexity of heating sector problems into two broad areas of general interest to the international development community: institutional issues and socioeconomic issues.

It will identify trends in district heating based on key data points:

- technical structure and physical condition of the district heating networks and the buildings they serve;
- the efficiencies of energy generation, transmission and distribution in these networks;
- efficiencies of heat end-use;
- management and ownership of networks or parts of networks;
- regulatory and market policies for setting tariffs, managing debts and billing consumers;
- relative affordability of district heat for all consumer groups;
- level of municipal budget and policy autonomy;
- role of local governments in district heating, and capacity of local governments to meet the demands of that role;
- presence of a clearly defined and well executed social safety net program;
- role of housing associations, private housing management companies and energy service companies (ESCOs) or their equivalents in heat supply organization and management;
- availability of affordable, accessible financing; and
- other factors related to changing demographics and policies within the region.

Based on the past and current situation of district heating in E&E countries, the Alliance research team will also use this section to present the goals of an efficient heating system, and to outline the needs, problems and opportunities for achieving those goals.

Evolution of Heating as a New Market Sector – Assessing and Rising to the Challenge

Most of the problems in the E&E region's heating networks arise from the stress of change – market change, political change, social change, technological change. Change presents opportunities for those who are ready, able and willing to rise to the challenge; change destabilizes the status quo and can take an unpredictable amount of time to finish. Over the last 15 years, donors have sought to ease the pain of this change in the E&E region through numerous technical assistance and investment programs.

With the benefit of hindsight, this sub-section will examine the importance of the heating sector in the market transition process. It will describe the heating problems as they were understood at the beginning of the transition, and as we understand them now, 15 years into the transition. It will also suggest the target groups that were considered most "ripe" for assistance, and which target groups were most receptive and able to absorb donor assistance.

At this stage in the research, the E&E region’s heating sector problems seem to fall into two broad categories: institutional and socioeconomic. Other issues such as geopolitical considerations also affect heating, but an in-depth discussion of fuel sources and energy is beyond the scope of this assessment. In any case, if other categories emerge as more appropriate through the research and evaluation process, they may be amended accordingly:

INSTITUTIONAL ISSUES	SOCIOECONOMIC ISSUES
Local governments – role in DH; capacity to fill that role	Affordability – of DH to consumers in various income classes at current tariff levels
National governments – role in DH; capacity to fill that role	Affordability – of suppliers to cover operation and maintenance costs at current tariff levels
Regulatory agencies – how independent are they from other influences; what is their role and capacity to fill that role	Affordability – of governments to subsidize heating; to what extent heating is subsidized; structure of subsidies
Market institutions – what corporate structures exist and function? Are stock markets and shareholders mature?	Does everybody have heating; who does and does not receive heat: residential, public/institutional, commercial, industrial consumer sectors
Legal institutions – what legal resource to heat suppliers and consumers have in regard to their rights as consumers and suppliers?	Social safety net – does it exist; and how is heating covered by that net
Housing institutions – how is housing organized; role in DH and capacity to fill that role	Overall economic impact of DH on municipalities
Lending institutions – what local banks or other lenders or investors exist? Do they have a role in DH?	Environmental protection – how DH fares in terms of environmental performance vs. other heat options in a given country
Consumer organizations – do they exist? Role in DH?	How to determine if a DH system is worth modernizing from a (socio)economic point of view
Availability of energy efficiency products and services – do institutions and market conditions provide for this availability	How has the quality (or lack thereof) of DH affected the quality/safety/comfort/value of the buildings and facilities that receive DH (i.e. schools, hospitals, residences, etc.)?

This list of issues is not exhaustive but covers the range of challenges faced by countries in transition and by the donors who aid them. From the donors’ point of view, a big challenge is to identify the best (most appropriate and receptive) recipients of aid in the region, and then to determine what kind of aid is most beneficial and in line with donors’ objectives. The following two subsections will summarize trends observed in the heating sector over 15 years, and suggest some benchmarks that donors and donor recipients might use for determining what their objectives should be with regard to energy efficiency and other indicators.

Observing Trends

This sub-section will present some trends in the heating sector – emphasizing trends in district heating, and map out those trends according to each region within Europe & Eurasia. One of the broader terms used in reference to these trends is “restructuring,” and this sub-

section will provide a working definition of “restructuring” as well. A number of trends are already known, such as the move toward: energy sector deregulation, liberalized pricing, fuel switching, CHP, increased customer-orientation, awareness of energy efficiency (varies widely), incentives to reduce operation costs, tariff and subsidy reform, private sector participation, increased technological advances – computerization and automatic regulation of heat supply and end-use, environmental regulation and compliance with that regulation, social tariffs, and many others. The possible causes and effects of those trends will be discussed in the following chapter, in terms of what donors have done and still can do.

The “map” showing how trends compare across the E&E region is organized below in a table (as a starting point). The chronology of the trends will also be presented as we identify and map out the trends country by country, and sub-region by sub-region.

TRENDS	COUNTRIES							
	Armenia	Bulgaria	Czech Rep.	Romania	Russia	Serbia	Ukraine	Other countries to be added
Tariff reform								
Private sector participation								
Private Housing Management/HOAs								
Depreciation of DH network assets								
Technology Conversion – demand-side								
Technology conversion – supply-side								
Introduction of metering, HCAs & TRVs								
Introduction of CHP								
Municipal Autonomy								
Subsidies								
Environmental compliance								
Financing mechanisms								
ESCO development								
Other trends will be added; trends above will be amended based on findings								

Energy Efficiency is Key

Building on the presentation of problems and trends, this sub-section will discuss the empirical role that improvements in energy efficiency have played in the evolution of district heating supply and end-use in Europe & Eurasia. It will highlight the energy efficiency aspects of the sector's transformation, drawing from case studies and available data from international partners. The main objective of this sub-section is to determine what the goals are of an energy efficient district heating system, and what the path is to achieving the optimal level of efficiency in each major end-use sector: residential, commercial, public/institutional and industrial.

This section will also introduce the idea of energy efficiency benchmarks for district heating in the E&E region, based on any existing benchmarks and the historical observation of how the sector has evolved. The World Bank's benchmarking tool for water utilities will be used as a model for this particular exercise. If appropriate, some benchmarks will be proposed here and used throughout the remainder of this policy analysis.

POLICIES AND PROGRAMS – A PROGRESS REPORT: HAVE THEY ADDRESSED THE PROBLEMS OF DISTRICT HEATING?

Donor-funded technical assistance and investment programs have sought to encourage policy reforms and appropriate investments that will place communal infrastructure on a sustainable path in an increasingly market-oriented world. One of the greatest challenges to reaching that sustainable path has been the question of how to improve commercial viability of district heating in a way that is affordable. This section will review the range of interventions funded by donors, and in some cases other partners (i.e. private investors), to understand which problems and issues related to district heating have been addressed and what conclusions can be drawn from those experiences. Where applicable, private sector participation will also be reviewed as part of “donor interventions” in district heating.

This chapter will also comment on the relationship and interaction between and among the partners of these donor-funded interventions. Partners generally include the donor(s), the host government, local institutions (NGOs or quasi-governmental organizations), companies (from more advanced countries and/or local companies), project beneficiaries (e.g. schools, hospitals, residential communities, etc.), and others (e.g. project managers and implementers). While an in-depth study of the nature and complexity of these relationships is beyond the scope of this assessment, these relationships will be observed and presented as part of the analysis – esp. in terms of conclusions and recommendations.

Instead of a program-by-program review, this section will be organized according to the problems, issues and trends described in the first chapter of the assessment. Since many of the problems encountered in district heating are closely related, most donor efforts have sought to address multiple problems at once. Thus, the organization of this assessment is a bit more complex than a mere listing of problems and efforts to address them. Therefore, the problems related to district heating will be grouped into the following four areas:

- Policy Frameworks: Laws, Regulations and the Institutions Responsible for Them
- Heating Infrastructure: Technical Capacity of District Heating Supply and Demand
- Finance and Investment: Paying for Improvements in District Heating

➤ Market Transformation, End-Use Energy Efficiency, and the Role of Consumers in District Heating

The findings about which donor-funded – and any non-donor funded – interventions have addressed which problems in district heating will be presented in a series of matrices, country by country, and then sub-region by sub-region, depending on the level of detail and accuracy in which we are able to obtain information. The following table is an example of how our findings could be presented, and the problems/issues and donor programs sections will reflect the situation in each country studied. The boxes within each matrix (currently empty in this example) will most likely be marked only if the corresponding program has addressed the issue.

Each table will be either preceded or followed by several explanatory paragraphs about the contents of the matrix. For instance, if a USAID program addressed some or all of the policy framework issues, *how* did the program do so and what were the outcomes? Or, if a USAID, International Finance Corporation (IFC) or European Union (EU) program addressed the financing issues, what was the specific issue and response or mechanism used (e.g. loan guarantees at a favorable rate, Development Credit Authority, etc.), and what was the outcome? In some cases, E&E country governments themselves have initiated a program or policy to address district heating problems, and those interventions will be presented in their own table.

ARMENIA

	USAID Urban Heat Program	World Bank Project	UNDP/GEF	EU	Etc.
PROBLEM / ISSUE	DONOR PROGRAMS				
Policy Frameworks –					
lack of clear legislation for DH					
Institutional capacity – state & local levels					
Affordability					
Heating Infrastructure					
Generation capacity inadequate					
T&D network obsolete and inoperable					
Finance & Investment					
Financing mechanisms ¹ unavailable or too expensive					
Lack of “bankable projects”					

¹ Many mechanisms will be described in the explanatory paragraphs and will include among others: loans, concession agreements, leasing agreements, vendor credits, municipal bonds, DCA, etc.

Heat supply companies not creditworthy					
End-Use Efficiency					
Lack of consumer awareness about EE					
No incentives for end-use EE					
Billing transparency					

The specific programs and relevant problems or issues will be adjusted for each country studied and presented in a separate table for each country. In cases where there are regional programs, the information will be presented for the region or sub-region.

Policy Frameworks: Laws, Regulations and the Institutions Responsible for Them

In this section, the Alliance team will describe the range of donor-supported efforts to address problems related to: policies and regulations governing heat suppliers and consumers; legal frameworks for energy policy and energy sector investment (specific to heating if applicable); authority and capacity of governmental institutions responsible for district heating – the role of local, regional and state levels of government in heating; heat pricing (for heat suppliers to purchase fuel, and for heat consumers to purchase heat services); end-use heat consumption; and many other issues. The existence or lack of clear laws for private sector participation, ownership and management of district heating, and municipal authority in district heating and budgeting will also be examined in this section. A summary of the donor interventions to address policy framework issues will be provided, and conclusions will be drawn from actual experience.

Conclusions will aim to answer the questions:

- What specific problems did the intervention aim to address?
- What do donors and beneficiaries say they learned from the intervention?
- What, if anything, changed as a result of the intervention? In other words, how can we characterize the impact of the intervention?
- What would parties involved in the intervention do differently, knowing what they know now?

The presentation of conclusions here will be the first step in the evaluation to be covered in the following chapter of the assessment.

Heating Infrastructure: Technical Capacity of District Heating Supply and Demand

This section will examine which problems in the technical and physical infrastructure of district heating networks have been addressed by donor-funded programs and investments over the last 15 years. It will also present findings about how the consumer base of district heating networks has changed in various countries – e.g. whether population density in areas supplied by district heating is sufficient to warrant district heating. Conclusions will aim to answer the same questions listed above, and provide experience-based insights about the economic viability of existing district heating systems in various countries.

Finance and Investment: Paying for Improvements in District Heating

Many governments and district heating enterprises claim that lack of financing is one of the major problems in the heating sector, and there are many reasons why financing for district

heating investments is not readily available. This sub-section will describe the types and origins of financing and investments that have been used to modernize and/or replace district heating networks and the buildings or facilities consuming district heating. It will also aim to show how the financing problem has or has not been addressed by donors, and draw conclusions about the experience with investments in the sector to date.

Since there are reportedly numerous opportunities for cost-effective energy efficiency improvements in district heating, the role of energy efficiency in heat sector financing will be observed. For example, the Alliance research team will uncover and present any instances where energy cost savings resulting from improved energy efficiency on supply and demand sides helped make financing and investment in district heating more affordable and attractive. The team will also conclude to what extent donors have included (implicitly and explicitly) energy efficiency improvements as part of an overall investment and financing program for district heating. Although the assumption is that most financing for district heating has come from donors in some form or another, the team will include any non-donor-funded investments that it can find and that warrant presentation in this assessment.

Market Transformation, End-Use Energy Efficiency, and the Role of Consumers in District Heating

This section will pay particular attention to the efforts of donors and international financing institutions to address problems related to heat end-use: inefficiency of heat consumption, lack of metering and thermostatic controls, lack of awareness and/or incentives about energy efficiency, uncomfortable buildings – either too cold or too hot, lack of affordable products and services for energy efficiency, lack of organization within sectors receiving district heat (residential, commercial, industrial, public/institutional), poverty levels of consumers and inability to pay for heat at market prices, and other issues. The emergence of competition in the heating sector – e.g. between district heating and gas – will be discussed in terms of its short- and long-term on energy end-use, affordability, environmental protection, and other socioeconomic developments. As in the previous sub-sections, it will offer some conclusions about lessons learned, impacts of the intervention and recommendations. Further analysis will be presented in the following chapter.

The desired outcome of this chapter is to determine and present a comprehensive picture of how much “restructuring” has already occurred in district heating, and what remains to be done in various sub-regions of the E&E region. The conclusion to this chapter will show how the sector has evolved in the key countries of each “sub-region” (i.e. Southeast Europe, the Baltics, and NIS), so that a comparative analysis and evaluation of the donor-funded interventions will be described in the next chapter.

EVALUATION OF THE FEASIBILITY AND IMPACT OF INTERNATIONAL AID IN DISTRICT HEATING

The purpose of this chapter is to present the *integrated, comparative (multi-country) analysis* of the Alliance research team’s findings about what district heating problems still exist, what donor interventions have been most effective and why, and what we recommend for further interventions. This comparative analysis will aim to identify the elements of donor efforts – and the conditions (political, market-based, etc.) surrounding those interventions – that

enabled and/or led to desired change in the heating sectors of some countries. The findings in this comparative analysis will also be used to suggest whether and how the experience in one country or sub-region may apply to the other countries that are in need of help with their heating situation.

The main criteria that the research team will use to assess which types of interventions would be most appropriate for certain countries or sub-regions of Europe & Eurasia are:

- Demonstrated impact in the past – specifically, demonstrated benefits related to improvements in energy efficiency, environmental protection, affordability, economic development, building comfort, and other benefits.
- Feasibility in the countries where intervention is needed – specifically, an assessment of the conditions that are demonstrated to be necessary and/or influential in order for the intervention to be effective.

The research team will also use the following questions to evaluate the impact and feasibility of donor intervention. While these questions will have already been answered to some extent in the previous chapter on a country-by-country basis, this chapter will answer them within the context of a comparative analysis. The research team will address these questions based on primary and secondary resources, as well as input from the expert advisory group to this project, which will include known and respected experts in the region.

- (1) Have subsidies (“heat compensation” payments to consumers) been reduced and are heat services affordable for the vast majority of households and other end-user sectors receiving district heating?
- (2) What has been the impact of district heating systems on municipal budgets – what percentage of a municipal budget is spent on heating (from district heat and other sources if relevant)? And what is the general state of district heating company budgets (are they subsidized, are they operating at cost-recovery levels, etc.)?
- (3) How much restructuring of district heating companies has already occurred, and what if any financing and investments have been used to modernize or replace these restructured heat companies including CHPs? What are the prospects for private sector participation in the sector and where has private sector participation been most successful?
- (4) Has the efficiency and environmental performance of these systems (including end-use) improved and are they competitive with direct natural gas applications?
- (5) What conclusions can be made about the economic viability of district heating systems, and the implications in cases where they are not sustainable?

The answers to these and other questions will be quantified where possible to reflect the milestones reached and degree to which restructuring has been completed, in comparison to other countries. The research team will make every effort to develop constructive recommendations for each geographical region within Europe & Eurasia, and highlight real examples of how countries (with or without donor assistance) can best tackle their district heating problems given their respective socioeconomic and institutional conditions. Some indicators proposed for evaluating the restructuring process in a comparative analysis are presented in the table below.

INDICATORS (to be used where appropriate and data are available)	COUNTRIES						
	Bulgaria	Czech Republic	Romania	Poland	Serbia	Ukraine	Others - to be added
Tariff as a % of market price							
Subsidies as a % of tariff (if applicable)							
MW installed heat energy generation capacity							
% of heat supply by ESCOs							
% of heat end-use metered (within each consumption sector if possible: residential, commercial, public, industrial)							
% of heat end-use paid according to m ² of heated space							
Average % losses in distribution systems							
% Savings achieved over past 10 years							
% reduction in energy required to heat one m ² of heated space							
% of billed fees collected							
% heat consumers not receiving heat bills							
% consumers needing heat subsidies							
% Low-income heating costs covered by social safety net							
% of housing stock in HOAs							
% of housing stock served by private maintenance co's							
# of DH company employees per MW heat energy produced							
GHG emission reduction potential							
\$ price of reduction of one ton of CO ₂							
% of heat supplied by CHPs							
% municipal ownership							
% of heating costs in municipal budgets							
% interest rate for heating projects/ ESCO financing							
Average IRR (or range) in							

heating projects							
Average payback (or range) on heat sector investments							
Total \$\$ invested in heat sector over past 10 years							
% - Average efficiency of generating capacities							

If the findings and conclusions of this assessment deem it appropriate, this chapter will also revisit the benchmarks for district heating suggested at the end of the first chapter. If benchmarking would be a useful and appropriate method for setting goals and measuring progress in district heating, this section of the assessment will outline some next steps toward a benchmarking program and suggest donor roles in that process.

FUTURE DIRECTIONS: SUMMARY OF RECOMMENDATIONS

This closing chapter will summarize the most important findings of the research and workshops that the Alliance team will convene over the course of the project. It will recap the options for addressing current and anticipated future needs related to heating in the E&E region. It will present the research team’s opinion about whether or not the heat sector should be a priority for international donors and investors, and recommend short- and long-term actions for donors, investors and other stakeholders to take.

The outline of this chapter includes recommendations about international aid in the following areas:

- Identified gaps and unfinished processes to be pursued in further international assistance efforts
- Public policy reforms and strategy development
- Technical assistance programs and/or investment projects
- Countries and their respective heating problems that aid programs should prioritize.

A partial list of published and unpublished reference sources that will be used in this research include:

- *Coming in from the Cold -- Improving District Heating Policy in Transition Economies*, International Energy Agency
- Carol Gochenauer's report for the World Bank.
- *Coping with the cold: space heating and the urban poor in developing countries*, a report by Xun Wu, Julian Lampietti and Anke Sofia Meyer
- Lessons learned from heating sector projects in the Countries with Economies in Transition – *Individual Country reports on UNDP/GEF PDF-B program on Removing Barriers to Efficient Heating and Hot Water Supply*
- *Regulating District Heating and Cogeneration in Central and Eastern Europe*. The World Energy Council
- *Heating Strategy for Urban Multi-Family Buildings*. Moldova Heating Sector Development Project (Phase I) by Bernd Kalkum
- Final Report On *Inventory Of Sectoral Greenhouse Gas Emissions (District-Heating Sector Of Ukraine)* of PNNL and Arena-Eco
- Russia: Energy Subsidies and "Right Prices"
- *Policy Priorities for National Governments: IEA District Heating Roundtable Outcomes*
- Irkutsk, Russia: Renovation of District Heating System
- *Findings of the DHC sector - challenges and opportunities in CEE countries* (part of the OPET CHP/DHC cluster project financed under FP5) of the Euroheat & Power
- District Heat in Europe country by country Survey 2003, as well as the DHCAN project: Generic Guides and Case Studies of the Euroheat & Power
- *Armenia: Review of Residential Heating Pilot Efforts*, by the Alliance to Save Energy
- USAID's Social Safety Net Country Reports.
- *Maintaining Utility Services for the Poor*, a World Bank report.
- Proceedings of District Heating Rehabilitation Project of the Republic of Estonia. World Bank.
- National Strategy of District Heating and Proceedings of District Heating Project of Bulgaria. World Bank.
- Numerous Alliance to Save Energy reports in MUNEE countries (Alliance staff and EE centers) on energy efficiency, housing sector, low-income issues and district heating.
- Reports by USAID consultants in the regions, such as PA Consulting, Nexant and IRG.