

THE STRATEGY OF DEVELOPMENT AND  
MODERNIZATION OF HEAT  
DISTRIBUTION URBAN SYSTEM IN  
BUCHAREST

**Abstract**

The public service supply heat, generally, across the country and especially of Bucharest city, is a public service interest which belongs to the community utilities services, operating in a centralized system. In this study, we analyzed the main problems that encounters the heating system of Bucharest city, and the relationship between the issues that encounters RADET in terms of ensuring quality services and the options for rehabilitation of heating system in the Bucharest municipality . Was also studied the value of investments that should be done in order to implement the rehabilitation and modernization strategy of the entire heating system of Bucharest city.

**Keywords:** public service, centralized system, urban heating system, rehabilitation, modernization, strategy.

**JEL CODES:** O18, O33

**STRATEGIA DEZVOLTĂRII  
ȘI MODERNIZĂRII  
SISTEMULUI DE  
DISTRIBUȚIE A ENERGIEI  
TERMICE URBANE ÎN  
MUNICIPIUL BUCUREȘTI**

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**Rezumat**

Serviciul public de alimentare cu energie termica al municipiului Bucuresti si in general din intreaga tara, este un serviciu public de interes general ce se incadreaza in categoria serviciilor comunitare de utilitati publice, functionand in sistem centralizat. In lucrarea de fata, am analizat principalele probleme cu care se confrunta sistemul de termoficare al municipiului Bucuresti, precum si raporturile intre problemele cu care se confrunta RADET in ceea ce priveste asigurarea unor servicii de calitate si optiunile de reabilitare ale sistemului de termoficare la nivelul municipiului Bucuresti. De asemenea a fost studiat valoarea investitiilor care ar trebui sa se faca in vederea implementarii strategiei de reabilitare si modernizare a intregului sistem de termoficare al municipiului Bucuresti.

**Cuvinte cheie:** serviciu public, sistem centralizat, sistem de termoficare urbana, reabilitare, modernizare, strategie.



## 1. INTRODUCTION

One of the fundamental concerns of the urban planning is represented by equipping and technical-urban planning works. These works are doing at all levels: territorial, urban and rural. (Alpopi, 2009, p.181).

Urban-planning activity involves the complex design and organization of an urban area or a network urban areas, the subject of this activity consisting of socio-economic realities inquiry that occur in the urban space correlated with its surrounding area.

The equipping and technical-urban planning works are many and varied. Public utility services, are all the regulated actions and activities which provide the satisfaction of the utility needs and general public interest of local communities (Law no. 51/2006). The most important services, in terms of systematization are:

- water supply;
- sewerage and wastewater treatment;
- sanitation;- heat generation, transportation, distribution and supply in a centralized system;
- electricity supply;
- local public transportation;
- street lighting;
- construction of streets.

In terms of heat supply, for heating and hot water supply, a large part of Romania's urban population use this type of energy from district heating systems. This systems represent about 80% of energy consumption of the buildings. The district heating, through the low costs and quality services offered to the population, is currently the best and the most efficient solution (Alpopi, 2009, p.187).

The centralized district heating where the heat source is outside the buildings which feeds is, as shown Marian Mihai Ionescu (2011, p. 4), the most civilized, clean, safe and efficient way of heating supply of the areas with high population density.

The public service of heating supply of Bucharest municipality and generally across the country, is a general interest public service which belongs to the category of public community utilities, operating in centralized system. This service includes all activities of generation, transportation, distribution and supply of heat. The aim is to ensure the heat for heating and hot water supply for the population, public institutions, economic operators and social-cultural objectives (Law 325/2006).

In this study, it's analyze the main problems facing the heating system of Bucharest municipality, and the relationship between the issues facing RADET in terms of ensuring the quality services and the options of rehabilitation of district heating system in Bucharest municipality. It's also study the value of investments that should be done in order to implement the rehabilitation and modernization strategy of entire heating system of Bucharest.

It is known that the design, implementation, and operation heating system of Bucharest municipality is due to:

- macro-economic and social situation of Romania before 1989, when the state was the only investor and administrator;- Romania's energy strategy, on the one hand, which aims the save of primary resources, and the increasing of the demand for heat and electricity, on the other hand;- the expectations regarding the reduction of the value of total energy invoice for the consumer's services, such as: heat, electricity, fuel and water consumption;
- the large number of houses in Bucharest municipality and their continuous growth and the development too of some integrated industrial platforms, including various industrial companies consuming a lot of electricity and heat;
- the existence of a natural gas network of medium pressure for Bucharest city supply ([www.radet.ro](http://www.radet.ro)).

## 2. THE STRATEGY OF DEVELOPMENT AND MODERNIZATION OF ELECTRIC CENTRAL HEATING

After 1990 the actions undertaken by RADET tracked the modernization of district heating, using technologies, new equipments and materials in the instalations of transportation, distribution and consumption of the heat. These actions and measures are still ongoing, following:

- the increase of safety in the operating system;
- the increase of energy efficiency;

- the reduction of heat loss.

Besides the upgrading of the heating system, were also made rehabilitation and modernization works of the equipments in order to improve their functioning and to enlarge their lifetime."National Strategy of Sustainable Development ", approved by the Romanian Government in 1999, which corresponds to an EU member country, aims the development of heating sources and heating system, being in agreement with the reform of the electricity and heat and with the public sector units.

The perspective policy to supply heat of Bucharest municipality, as public policy, will be synchronized with the community, whose requirements are:

- safety;
- efficiency;
- environmental protection;
- consumer rights.

These requirements are in fact the four strategic directions of development of the heating system of Bucharest municipality.

Thus, for the safety increas in the heating supply, like public service in the interests of consumers, are required:

- the eliminate current deficit of heat;
- the replacement of primary and secondary networks, with ages exceeding the normal duration of life, with new networks installed by the most modern technologies;
- the organization of management through automation;
- the use of advanced automation systems, for intake, transmission on distance and processing of informations ([www.radet.ro](http://www.radet.ro)).

In order to increase efficiency of heating system, is necessary to be taken measures that will lead to reducing the heat loss or to ensure the saving heat.In terms of environmental protection, there are no problems with heating district system, this one being recognized as even the least polluting system in the world.

Regarding the protection of consumer rights, the future development of district heating system will have to answer the full satisfaction of customer's needs, first to ensure acceptability of heat tariffs from consumers (in advantage of the others proposed heating systems) ([www.radet.ro](http://www.radet.ro)).

### 3. THE STRATEGY OF REHABILITATION OF THE DISTRIBUTION AND TRANSPORT SYSTEM OF THE HEAT IN BUCHAREST MUNICIPALITY

Current status of district heating system of Bucharest municipality is unable to ensure the necessary conditions to satisfy the costumers's needs of heat. Therefore, their needs, from this point of view, aren't yet fully satisfied. Thus, the main problems facing the Bucharest municipality's heating system are:

- discrepancy between low production's capacity on the heat compared to ever increasing needs of consumers's heat. This is explained primarily by the mismatch of the installed capacity of heatind district system with the dynamic of the city and secondly by the degradation of technical installations and equipment in the heating system and inadequate composition of fossil fuels;
- downtime to perform best in terms of thermal and hydraulic of the heating's district system, leading to some negative aspects, such as:
  - a disadvantage of the consumers by delivering heat at lower temperatures up to 70-80%;
  - a decay of the hot water pipes, due to internal and external corrosion, which increased in the last years;
  - a disadvantage of some consumers in certain areas of the city, especially those from the upper floors of buildings by not ensuring the necessary pressure at hot water and due to the concentration of the consumption during peak hours;
  - a lack of automation of the heating district system;
  - an appropriate untightening of the pipes, leading to their breaking and hence at the heat loss;
  - a lack's dispatching of the heating district system.

Creating of the centralized heating district system, that being reliable, flexible too, ensuring the continuity of the delivery service of the heat and their optimization, it's the aim of upgrading, modernization and development of the centralized heat supply system of the capital (Geana, 2006).

### 3.1. Technical rehabilitation of the heating district system

In the last 10 years, based on experience of RADET and due to the ongoing of some projects, it was decided the starting of rehabilitation and modernization of the entire heating district system of Bucharest municipality. Through these works was wanted:

- rehabilitation of primary heating network;
- rehabilitation of secondary heating network;
- rehabilitation and modernization of the heating points and the heating district system;
- metering the blocks.

These works were intended the gradually replace of the transportation pipelines of hot water, and the overall improvement too, introducing some performance control systems. They had to have equipments enabling to save energy and reducing losses in the system. Also, was wanted the increasing of the system performance, up to a level comparable with the performance of modern systems of other countries.

Currently however, to the Bucharest municipality, 95% of the heating points are upgraded.

The implementation of the rehabilitation and modernization strategy of the heating district system of Bucharest, in the year 2010, was followed ([www.radet.ro](http://www.radet.ro)):

- the increase the lifetime of the transportation network up to 30-40 years;
- the reduction of water loss by over 85%;
- the reducing of heat loss by over 70%;
- the increasing of the available heat up to 90%;
- the reducing of primary energy pumping by 50%;
- the reducing the loss of the transport system and domestic hot water recirculation by over 90%;
- the adequate maintaining of transport and distribution equipment of the heat;
- the increasing of energy efficiency in compliance with EU directives on the environment (Geana, 2006).

The solutions to the problems facing RADET, in terms of providing quality services and opportunities for rehabilitation of heating district system are presented in Table 1.

TABLE 1. - THE REPORT OF PROBLEMS AND SOLUTIONS AT RADET

Solutions Problems	Introduction of control equipment	Improvement of transport and distribution networks	Installation of superior components	Construction of new networks	Lowering the supply temperature	Direct supply
Short life of networks						
Big watter losses						
Big heat losses						
High costs of heat						
High consumption of electricity						
Defective maintenance of equipment and networks						
Loss of hot water						

Source: www.radet.ro

Total investment required to implement this strategy are estimated at 1000 million \$ and are distributed according to Table 2.

TABLE 2. - TOTAL INVESTMENTS NEEDED TO IMPLEMENT THE STRATEGY

Investments	mill. \$
Primary and secondary piping system	506
Upgrading networks (primary and secondary)	335
New components	171
Heating points modernization (automatization, heat exchanger, electrical and pumping installation)	68
New transport networks	7

Source: www.radet.ro

For all types of work performed during 2000-2004, financial resources were provided by the state budget, local budget and own funds of RADET. Table 3 shows the value of investments in the period 2000-2004 (www.pmb.ro).

TABLE 3. - THE INVESTMENTS VALUE IN THE PERIOD 2000-2004 (MILLION \$)

Year	2000	2001	2002	2003	2004
<b>Sources</b>					
Repair own sources	13,51	6,76	10,95	5,30	1,26
Investments own sources	4,41	3,36	2,67	2,54	0,29
Investments budget	9,25	16,87	17,09	10,29	10,07
Loans	10,30	10,70	9,15	2,76	0,43
<b>TOTAL</b>	<b>37,47</b>	<b>37,69</b>	<b>39,86</b>	<b>20,89</b>	<b>22,05</b>

Source:www.radet.ro

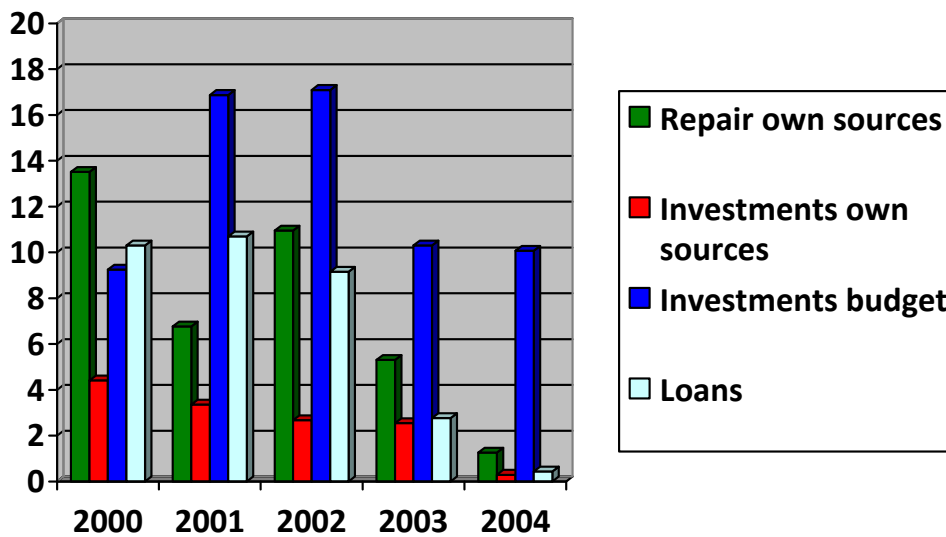


CHART 1 - RESOURCES ALLOCATED IN THE PERIOD

Looking at the previous chart, it's notice the reduction of the internal resources, and investments from the budget too. This situation leads to the necessity of finding alternative solutions by RADET, to attract financing sources, in order to carry out the own rehabilitation program of the heating district system of Bucharest municipality. The transport and distribution of heat system in Bucharest municipality includes, according to the Table 4:

TABLE 4 - LENGTH OF HEATING SYSTEMS NETWORKS AND NUMBER OF POINTS AND SUBSTATIONS OF HEAT

Current number	Name	Unit of measurement	In operation
1.	Primary heating network (P.H.N)	Km. pipeline	1063
2.	Secondary heating network (S.H.N)	Km. pipeline	2819
3.	Heating point (H.P)	pieces	878
4.	Heating substation (H.S)	pieces	231

Source: www.radet.ro



#### 4. CONCLUSIONS

To present efficiency, is necessary that the thermal rehabilitation of the heating district system to be made with thermotechnics rehabilitation of buildings connected to the centralized heating supply. On the other hand, "public-private models for heating district systems are already implemented in Europe and have potential to be efficient solutions in Romania too" (General Council of Bucharest, 2006).

Few years ago it was been supported the idea that the disconnection from the centralized system of heat supply is an extreme and short term solution. An explanation for this phenomenon was the relatively low price of natural gas, which caused the people to adopt the solution of individual plants flat mounting, this being at that time a convenient solution in terms of relation price/quality, but soon proved unprofitable in terms of technical and economic and in terms of environmental conditions (www.anrsc.ro), which results from Table 5, which shows the number of apartments reconnect during 2007-2011. Other arguments against this solution were:

- existence of a great danger in use (use of own central heating apartment of low quality, has generated serious accidents, affecting people's lives while also leading to damage the entire condominium);
- high degree of pollution (if the number of own central heating apartment will grow, it will be more difficult to respect the national standards on environmental protection);
- the own central heating apartment have a low yield than the centralized electricity supply.

TABLE 5 – THE STATUS OF DISCONNECTION/RECONNECTION OF FLATS DURING 2007-2011

	TOTAL	2007	2008	2009	2010	2011
<b>Total number of apartments</b>	1.488.293	1.658.238	1.647.881	1.595.175	1.550.402	1.488.293
<b>Disconnection</b>	243.991	41.878	40.064	32.582	59.035	70.432
<b>Reconnection</b>	28.544	4.299	5.329	5.894	3.009	10.013

The own central heating apartment are used improperly because the buildings not allow concurrent use of two heating systems. The activity of providing heat is efficiently conducted only under a single operator. (www.consiliulconcurrentei.ro). On the other hand, the European legislation provides the use of a single heating system for all the apartments of a building (www.radet.ro).

Having in view that the existing housing fund in Romania, is executed in different phases, with different structural and architectural solutions, and with different degrees of thermal protection, will be necessary in the near future to begin actions of thermotechnics rehabilitation and possible architectural and

functional modernisation, for ensuring the high quality, indoor comfort, reduce of energy consumption, reduce the emissions that affect the environment and improve the external appearance of buildings.

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