

# Ex post evaluation – Serbia

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**Sector:** Energy policy and administration (CRS Code 23010)  
**Programme/Project:** Rehabilitation of District Heating Systems III  
 BMZ No. A) 2003 65 304 (investment)\*  
 B) 2004 70 336 (complementary measure/CM)  
**Implementing agency:** Ministry of Mining and Energy



## Ex post evaluation report: 2016

		Project A (Planned)	Project A (Actual)	Project B (Planned)	Project B (Actual)
Investment costs (total)	EUR million	30.00	36.44	2.00	2.00
Counterpart contribution	EUR million	10.00	15.45	0.00	0.00
Funding	EUR million	20.00	19.98	2.00	2.00
of which BMZ budget funds	EUR million	20.00	19.98	2.00	2.00

\*) Random sample 2016

**Summary: Investment (A):** New constructions as well as rehabilitation and replacement measures in the largely gas-powered heat generation, transmission and distribution systems of district heating grids in the city of Niš with roughly 260,000 inhabitants and the smaller towns of Zrenjanin, Sombor, Kragujevac, Kraljevo and Pirot. Kragujevac alone has some 150,000 people; the other towns have between 40,000 and around 75,000 inhabitants. **Complementary measure (B):** Institutional reinforcement of district heating companies (DHC) to make the operation of district heating more market based and cost covering.

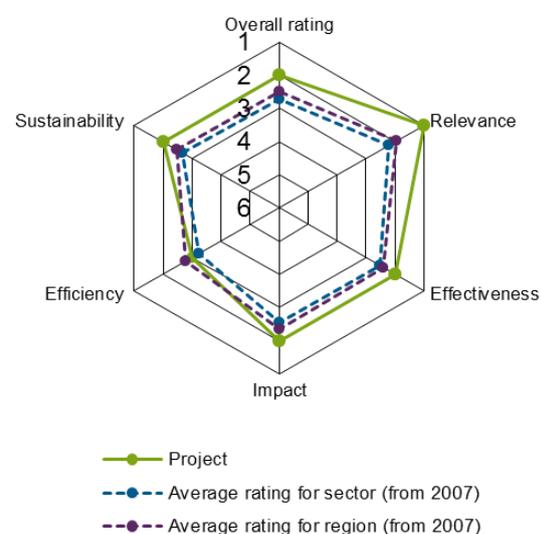
**Objectives: The development objective** ("impact") was to contribute to improved living conditions for the population and to environmental and climate protection; the **programme's objective** ("outcome") was to ensure a sustainably efficient and more environmentally friendly supply of district heating to consumers connected to the network.

**Target group:** Consumers in the above mentioned towns and cities connected to the district heating systems.

## Overall rating: 2

**Rationale:** The targets were met or exceeded for all DHCs.

**Highlights:** The improved heating supply in the target areas and the associated positive effects on living standards for the population affected can also be considered as a contribution to political and social stability in a time of upheaval. Trade and industry benefited as well, which is likely to have bolstered economic stability and development.



## Rating according to DAC criteria

### Overall rating: 2

#### General condition and classification of the project

The Serbian Ministry of Mining and Energy lists a total of 60 municipal district heating companies (DHC) for Serbia, which have a combined installed capacity of 7,700 MW; this is greater than the installed capacity for the national electricity supply (7,000 MW).

The Serbian Energy Efficiency Act of 2013 calls for heat consumption bills to be moved from the flat-rate billing of all connected apartments according to their respective living areas to the installation of heat meters at the distribution stations and the billing of only the apartments connected to the respective heat meter (even if this generally continues to be measured by living area). The timeline for this move is until the end of 2015. The installation of heat meters in individual apartments – with billing according to individual heat consumption – is required by law only for new buildings. However, this concept is also supported by some of the DHCs. This provision is mainly implemented in the municipalities involved in the programme or, e.g. as in the case of Kraljevo, is technically and organisationally prepared in such a way that it can be introduced as soon as the city council decision has been issued. Only in Niš did the city reintroduce the option of flat-rate billing, following strong protests from the population. The 400-500 customers (out of nearly 30,000 connected households) who opted for this type of billing live in buildings that have very low energy efficiency, but still pay 20% more than the current average invoice price per customer. This is a first indicator that the installation of heat meters in the distribution stations has influenced consumer behaviour in such a way that heat consumption has decreased substantially.

As was the case in the first two phases, the DHCs underwent frequent politically induced changes at the upper management level. However, the impression emerged that, in most cases, this only concerned the heads of the companies, who largely work in the political sphere.

A further problem – albeit one that was less serious than anticipated – is the fact that electricity prices in Serbia are heavily subsidised, so there is an incentive to disconnect from the district heating network and heat using electricity instead. This option is indeed used by some customers, predominantly by the long-term unemployed and elderly people with larger apartments, who no longer use – and thus have no need to heat – all living areas. In most municipalities, however, the proportion of this group connected to terminals is in the low single-digit percentage range.

#### Relevance

The project is considered to be of high developmental relevance also from today's perspective. A considerable portion of the urban population and large parts of industry and trade are connected to the district heating systems, which are therefore an essential component of public services. The district heating systems (over 80% of which are operated by natural gas) were all outdated at the time of the programme appraisal (PA), and in some cases small plants using heavy oil were operating in the middle of the inner city, which had a considerable environmental impact for the city populations. The aim of the project was to eliminate the improper operation and environmental impacts, which was and continues to be in line with the developmental objectives of the Serbian government and of German-Serbian development cooperation. The fact that German FC is the only international partner of the Serbian government ready and able to engage in this detailed but very important area of public services is extremely relevant for both the Serbian government and the beneficiary population. This has also helped to improve German-Serbian relations, which had been strained by the Balkan war and Kosovo crisis.

The intervention logic and the objectives continue to be plausible and consistent from today's perspective.

### Relevance rating: 1

## Effectiveness

The achievement of the project objectives can be summarised as follows:

Indicator	Status PA	Ex post evaluation
(1) Ensure a room temperature of at least 18-20°C without additional electric heaters		achieved
(2) Reduce heating consumption	10%	20 to 30+%
(3) Reduce water losses in the rehabilitated networks by 10%	Too conservative for some projects, due to the potentially high initial losses	significantly > 10%, up to 68%
(4) Efficiency improvement of the rehabilitated boilers	at least 2 percentage points	roughly 6 percentage points
(5) Improve cost coverage of the DHCs taking part in the project		gradually improved
(6) Reduce CO <sub>2</sub> emissions <b>(NEW)</b>		14,375 t/year

The installation of the heat meters (see above), most of which is now completed, has also led to a clear change in awareness; a typical feature of this is the fact that while consumers previously complained about insufficient heating (when individual heat consumption was irrelevant to them), the complaints received today tend to be the opposite, namely that there tends to be too much heating. Overall heating consumption decreased by 20% to over 30%, and in general consumption fell by well over 10%. The reduction in CO<sub>2</sub> emissions mentioned above is also calculated on this basis.

Furthermore, it was possible to significantly reduce water losses in the district heating networks. Losses were cut by significantly more than 10% for most of the overall network, and by as much as 68% in Zrenjanin. In the rehabilitated sub-networks, the targeted 10% reduction in water losses was therefore far too conservative.

Since most of the DHCs replaced the old boilers – some of which were 30-35 years old – with new boilers featuring modern equipment (or built completely new boiler houses, as in the case of Piroć), the improvements in efficiency levels are significantly higher than anticipated, and come in at around six percentage points.

The approach to improving the heating account settlement process – which is anchored in the overall project design – with the purpose of promoting more efficient consumer behaviour amongst end customers has not yet been fully implemented. The municipalities are on the right track, however. This is to be seen as a clear success of the cooperation and the concerted efforts made since the start of the programme (including phases I and II) – and as a result of the political support provided by the Energy Efficiency Act.

Through the programme, significant improvements have been achieved for all target indicators. As described above, measurable success has also been achieved in the intended modification of the heating account settlement process, with the purpose of promoting more efficient consumer behaviour amongst end customers. According to all accounts, supply disruptions were not a problem at the PA, nor are they an issue at the present time.

**Effectiveness rating: 2**

## Efficiency

In terms of production efficiency, most of the equipment and assembly costs were below the PA estimates. However, the actual start of the project was delayed by more than two years compared to the original plan and, at 86 months, the actual implementation time lasted significantly longer than the 36 months initially estimated. The DHCs improved their production efficiency by lowering fuel input per heating unit and cutting back on loss of water.

The allocation efficiency was increased thanks to the changes in heating consumption settlements, which have largely already been implemented, along with the reinforcement of the polluter-pays principle (more precise allocation of consumption through the use of heat meters in the distribution stations). Improvements in the collection rate, which fluctuates between just under 80% and almost 100% depending on the location, were achieved only to a very limited extent.

The financial situation of some of the DHCs should be viewed critically: those in Kragujevac and Zrenjanin still have legacy debts on their books, for which they are not to blame. The DHC in Niš is having difficulties paying its energy carrier from the ongoing revenues that it receives during heating periods, and has to take out an expensive bank loan to bridge the gap. Here too, the conversion to consumption billing has generally had a positive impact, as customers now bear a higher share of the total annual costs during the heating period, whereas previously, billing occurred in twelve equal instalments. In the other three municipalities (Kraljevo, Pirot and Sombor) the situation is much less constrained. Almost all DHCs have to deal with the fact that some customer invoices are not settled. They take legal action in such cases, however, with varying degrees of success. The collection rate values differ significantly across the municipalities (see above). Overall, the DHCs can finance the operation and maintenance of the systems over the course of the year from current revenues, but further measures and investments are only possible to a limited extent and with the aid of funding from the municipalities or the FC district heating programme.

**Efficiency rating: 3**

## Impact

The improved heating supply in the programme cities has had a positive impact both with regard to the supply quality in a narrower sense (reliability and temperature level) and in relation to the improved environmental situation thanks to the reduction in pollutant emissions.

Indicator	Status PA	Ex post evaluation
(1) Cost reduction for the provision of district heating		“Proxy”: average drop in consumption of 7.5 million m <sup>3</sup> of natural gas per year
(2) Greater satisfaction of the population		Largely achieved

The improvements in efficiency made it possible both to improve the supply and to reduce the costs for the provision of district heating. The resulting annual CO<sub>2</sub> savings of around 15,000 tonnes per year (see “Effectiveness”) provide evidence of a contribution – however limited – to climate protection.

Some of the above results have led to a significant increase in customer satisfaction. The greater transparency in heating cost billing and the improvement of the heating supply in the target locations have had a positive impact on the living conditions of the affected population (an estimated 200,000 people in total); these factors are thus contributing to Serbia’s political and social stabilisation at a time when the country’s sluggish economic development – along with the consequences this entails, such as unemployment and poverty – continues to stagnate.

All things considered, consumers, the rest of the population and the environment all benefit from the more sustainable, more efficient and more reliable heating supply.

One significant consequence of the cooperation with regard to the district heating programmes – and this is quite obvious in the cities included in phase II – is that an energy efficiency law was introduced and adopted by the Ministry of Mining and Energy as an outcome of the political dialogue. This law requires all municipalities to switch district heating system charges from flat-rate to consumption-related billing. Considerable additional savings in energy consumption in areas where this change has already been implemented can already be observed.

**Impact rating: 2**

### **Sustainability**

The operating staff of the DHCs are well to very well qualified, the personnel is highly dedicated, and the facilities are operated and maintained with care. The changes in heating consumption billing have already had a positive effect on the economic situation of the DHCs; the collection rate is also likely to increase in the medium term.

From today's perspective, the district heating systems can be operated sustainably. This would be made much easier if the DHCs could be relieved of old debts in the municipalities where this applies. Another positive effect would be the adjustment of the electricity tariffs, which was announced by the Ministry of Mining and Energy for the period after the upcoming elections. On the one hand, this would involve an initial increase in the heating costs for consumers, but on the other it would, generally speaking, provide additional incentives for economical use of heating.

**Sustainability rating: 2**

### Notes on the methods used to evaluate project success (project rating)

Projects (and programmes) are evaluated on a six-point scale using the criteria of **relevance, effectiveness, efficiency** and **overarching developmental impact**. The ratings are also used to arrive at a **final assessment** of a project's development effectiveness. The scale is as follows:

<b>Level 1</b>	Very good result that clearly exceeds expectations
<b>Level 2</b>	Good result, fully in line with expectations and without any significant shortcomings
<b>Level 3</b>	Satisfactory result – project falls short of expectations but the positive results dominate
<b>Level 4</b>	Unsatisfactory result – significantly below expectations, with negative results dominating despite discernible positive results
<b>Level 5</b>	Clearly inadequate result – despite some positive partial results, the negative results clearly dominate
<b>Level 6</b>	The project has no impact or the situation has actually deteriorated

Rating levels 1-3 denote a positive assessment or successful project while rating levels 4-6 denote a negative assessment.

### Sustainability is evaluated according to the following four-point scale:

Sustainability level 1 (very good sustainability): The development effectiveness of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability): The development effectiveness of the project (positive to date) is very likely to decline only minimally but remain positive overall (this is what can normally be expected).

Sustainability level 3 (satisfactory sustainability): The development effectiveness of the project (positive to date) is very likely to decline significantly but remain positive overall. This rating is also assigned if the sustainability of a project is considered inadequate up to the time of the ex post evaluation but is very likely to evolve positively so that the project will ultimately achieve positive development effectiveness.

Sustainability level 4 (inadequate sustainability): The development effectiveness of the project is inadequate up to the time of the ex post evaluation and is very unlikely to improve. This rating is also assigned if the sustainability that has been positively evaluated to date is very likely to deteriorate severely and will no longer meet the level 3 criteria.

The **overall rating** on the six-point scale is compiled from a weighting of all five individual criteria as appropriate to the project in question. Rating levels 1-3 of the overall rating denote a “successful” project, while rating levels 4-6 denote an “unsuccessful” project. It should be noted that a project can generally be considered “successful” only if the achievement of the project objective (“effectiveness”), the impact on the development objective (“impact”) **and** the sustainability are rated at least “satisfactory” (level 3).