

**Serbia: Rehabilitation of District Heating Systems in Novi Sad, Niš and Belgrade
(Phases I and II)**

Ex post evaluation

OECD sector	23010/energy policy and administrative management	
BMZ project ID	(1) 2001 40 509 (Phase I) (2) 2002 65 322 (Phase II)	
Programme executing agency	Municipal district heating firms in Novi Sad, Niš and Belgrade	
Consultant	Energieconsulting Heidelberg GmbH, Stadtwerke Leipzig, DECON	
Year of ex-post evaluation report	2010 (1:sample 2010, 2: parent population 2010)	
	Project appraisal (planned)	Ex-post evaluation (actual)
Start of implementation	(1) Q 2 2001 (2) Q 2 2002	(1) Q 2 2001 (2) Q 3 2002
Period of implementation	(1) 18 months (2) 18 months	(1) 18 months (2) 38 months
Investment costs (without complementary measure)	(1) EUR 11.79 million (2) EUR 14.50 million ¹	(1) EUR 11.99 million (2) EUR 13.59 million ¹
Counterpart contribution	(1) EUR 4.12 million (2) EUR 4.50 million	(1) EUR 4.35 million (2) EUR 3.80 million
Financing, of which Financial Cooperation (FC) funds	(1) EUR 7.67 million (2) EUR 9.90 million ¹ Complementary measure for (2), BMZ ID 2002 70 157: EUR 0.26 million	(1) EUR 7.64 million (2) EUR 9.79 million ¹ Complementary measure for (2), BMZ ID 2002 70 157: EUR 0.26 million
Other institutions/donors involved	None	None
Performance rating	2	
• Relevance	2	
• Effectiveness	Phase I: 2/Phase II: 3	
• Efficiency	2	
• Overarching developmental impacts	2	
• Sustainability	2	

¹ (2) including funds from the Study and Expert Fund (SEF) of EUR 0.25 million (planned) and EUR 0.20 million (actual).

Brief description, overall objective and programme objectives with indicators

The FC programme for rehabilitating district heating systems in Novi Sad, Niš and Belgrade comprises several phases, the first two of which were due for ex post evaluation. Both of these programme phases comprised replacement investments and rehabilitation measures for generation, transmission and distribution in the district heating systems of Novi Sad, Niš and Belgrade. The overall objective of the programme was to contribute to increased electrical and thermal energy savings at the programme locations. This in turn was to improve the basic living conditions of the local population and the economic environment for industry and trade. The programme objective was to improve district heating supply to consumers and raise energy efficiency. Moreover, support was to be given to legal and institutional reforms in the district heating sector and in the supply companies. In Phase II, greater emphasis was placed on achieving environmental benefits through improved supply efficiency. This was flanked by a complementary measure for strengthening corporate planning and operational capacities within the supply companies. The achievement of the programme objective was to be measured by the following indicators:

- Room temperature at district heating users in the selected regions has increased from an average of 15°C to between 18°C and 20°C.
- Water losses in the district heating grids in the target regions have decreased by at least 10%.
- Heating supply has improved without any large change in fuel use (Phase I) and the efficiency of the converted boilers has increased by at least 3% after the switch to gas (Phase II).

The target group comprised the consumers connected to the district heating systems at the three above-mentioned programme locations. These included private households, public facilities, administrative authorities and enterprises.

Programme design/major deviations from original planning and main causes

Under the overall programme (Phase I and II), rehabilitation included distribution networks, substations and pumps in the distribution grid and in thermal power stations at the three implementation locations. As a pilot project, thermostat valves and heating cost meters in houses and flats as well as measures for the institutional development of the executing agencies and consultancy services were financed.

The investment measures were principally geared to reduce water and heat losses in the distribution grids, to improve the efficient use of fuel and the quantity and quality of district heating supply to consumers. The complementary measure for Phase II aimed to support the cost-effective operation of district heating supply through the institutional development of the district heating companies. Altogether, the programme design was appropriate and aligned to the company needs. Also the investment measures was adequate and consistently designed to remove the major sector problems at the time of implementation.

Procurement was carried out in compliance with KfW guidelines. The first supplies were already delivered and installed in Phase I before the first heating period 2001/2002 started. The subsequent deliveries were also timely, so that the activities of Phase I could be completed before the 2002/2003 heating period. To speed up the measures in Phase II, the consultant was financed with SEF funds amounting to EUR 0.2 million for the starting period of his assignment. However, Phase II was considerably delayed largely due to external factors (bankruptcy of programme

enterprises, personnel changes in the municipalities and companies, delayed technical execution due to lack of documentation of the district heating systems) compared to the original time schedule.

Servicing and maintenance of the financed facilities appear to be adequately assured. The condition of those facilities inspected was largely sound at the time of ex post evaluation and the companies have not reported any serious technical problems.

Key results of impact analysis and performance rating

Despite the comparatively small financial programme volume and although the funds were divided up among the three largest Serbian district heating firms, tangible improvements were achieved in the indicators set. Higher room temperatures were already largely achieved after the completion of the first phase (improved fuel supply certainly playing a role) and the reduction of water losses is stated to range between 10% (Belgrade) and 40% (Niš). The target (3%) for higher efficiency in heat generation was also met or surpassed (Belgrade and Novi Sad 6%, Niš 9%). This progress is also confirmed by significantly higher customer satisfaction since programme appraisal as recorded in representative surveys. The improvement of heating supply in the target locations and the beneficial effects on the living standards can be considered as a contribution to political and social stabilisation in Serbia at a time of political and economic changes. Industry and trade also benefited, which is expected to have supported economic stability and development.

Of limited success was the approach to improve/change the heat billing procedures which intended to promote more economical consumption behaviour by end users. Although the necessary household equipment (thermostat valves and heating cost meters) were installed in the selected supply areas and pilot projects were also carried out in at least some enterprises, this did not lead to the intended introduction of consumption-based accounting. Only recently this aspect has been readdressed and two of the three heating supply companies have applied for permissions from the responsible municipal authorities to successively introduce consumption-based billing as of next year.

The complementary measure in Phase II for the institutional development of the supply companies was not successful due to politically motivated and frequent changes of trained staff at all senior levels which lead to a drain of Know-How..

A further critical point is that although the district heating firms are able to finance the minimum maintenance and operational needs from current income, only limited additional measures and investments are possible and only when co financed by local authorities.

The microeconomic benefit of the programme for district heating companies consisted primarily in reducing production costs by raising production efficiency and curbing technical losses. District heating is seen as a relatively cost-effective option in urban areas, which is generally superior in macroeconomic terms to supply through individual heating systems and electricity. This calls for efficient supply with acceptable losses, to which both phases of the programme have contributed.

The phases were geared to achieving general developmental impacts. No gender effects can be inferred. As planned at programme appraisal, they were also geared to participatory development and good governance, since strengthening service providers is an important secondary objective. Both phases contribute to good sectoral governance. The main beneficial environmental impacts are lower consumption of fuel

per unit of produced/delivered heat due to improved efficiency in generation and distribution. As a result specific CO₂ emissions have declined.

Since both phases of the programme were largely identical in terms of tasks, partner organisations and measures, they will be appraised together in the following consideration.

Relevance: The programme measures are still of developmental relevance. In larger towns in Serbia, such as Belgrade and Novi Sad, almost 50% of the population and large parts of the industry and commerce are connected to district heating systems. The difficult political and economic situation before and after the fall of the government in 2000 had negative impacts on the Serbian district heating sector. The programme primarily aimed to reduce this deterioration, which is still in line with the development-policy goals of the Serbian Government and German-Serbian development cooperation. The measures were aligned with those of other donors engaged in the sector (Subrating: 2).

Effectiveness: Despite the comparatively small financial programme volume and although the funds were divided up among the three largest Serbian district heating firms tangible improvements were achieved for all programme objective indicators. Less successful was the improvement/change of the heat billing procedure mostly in Phase II with the aim of promoting more efficient consumer behaviour by end users (Phase I - Subrating: 2; Phase II - Subrating: 3).

Efficiency: The programme measures brought an improvement in production efficiency, which resulted in lower fuel use per thermal unit and a reduction in water losses. They could reduce the production costs and improve the revenue for the heat supplying companies. The measures also had a macroeconomic benefit, since centralised heat supply is economically superior in densely populated urban areas to individual supply and less (inefficient) electric stoves are used. The restructuring of district heating tariffs over the last few years has also contributed to improve the allocation efficiency for heat. The restructuring intended to improve the cost recovery and a closer adherence to the user-pays principle of heat supply. The rates for industrial and commercial customers were raised to a relatively small extent so that private household cross-subsidies through this clientele could be reduced. Improvements were also made for the collection efficiency (Subrating: 2).

Overarching developmental impacts: Higher heating supply efficiency contributes to the cost-efficient operation of the district heating firms and leads to a reduction of macroeconomic costs of district heating provision. At the political level, we can expect that the sustainable improvement in heat supply to households and enterprises helps to stabilise the often tense economic and political climate during transition after the Milosevic era. Regarding to institutional impacts, the rehabilitation and improvement measures of the programme were further implemented by the district heating companies after completion of both phases and/or have been implemented in the sections not yet reached (Subrating: 2).

Sustainability: The results achieved are deemed to be sustainable. Both the good qualification especially of technical staff in the district heating companies and the interest of the heating firms to support the rehabilitation and modernisation with their own funds during and after the FC programme lead to a positive assessment. The local inspections carried out during the ex post evaluation conveyed the impression that the procured and installed facilities in the programme phases are professionally operated and maintained. While the tariff changes had a positive effect on the revenue, certain

risks remain due to the costs of fuel prices (mainly gas, which must be imported) (Subrating: 2).

Altogether, both phases are assessed with the overall rating of good (Rating: 2).

General conclusions

No general conclusions have been drawn from the programme.

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

Projects are evaluated on a six-point scale, the criteria being relevance, effectiveness (outcome), “overarching developmental impact” and efficiency. The ratings are also used to arrive at a final assessment of a project’s overall developmental efficacy. The scale is as follows:

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

A rating of 1 to 3 is a positive assessment and indicates a successful project while a rating of 4 to 6 is a negative assessment and indicates a project which has no sufficiently positive results.

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

Sustainability level 1 (very good sustainability)

The developmental efficacy of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability)

The developmental efficacy 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 developmental efficacy 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 developmental efficacy.

Sustainability level 4 (inadequate sustainability)

The developmental efficacy 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 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. A rating of 1 to 3 indicates a “successful” project while a rating of 4 to 6 indicates an “unsuccessful” project. In using (with a project-specific weighting) the five key factors to form an overall rating, it should be noted that a project can generally only be considered developmentally “successful” if the achievement of the project objective (“effectiveness”), the impact on the overall objective (“overarching developmental impact”) and the sustainability are considered at least “satisfactory” (rating 3).