# Serbia

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**6,652** MWth
Total installed District Heating capacity

**1,975,000**
citizens served by District Heating

**57**
District Heating systems

## 1 DISTRICT HEATING

### Key figures

| | 2009 | 2011 | 2013 |
|---|---|---|---|
| Total installed District Heat capacity (in MWth) | 6,050 | 6,390 | 6,652 |
| Trench length in km for transport and distribution network (one way) | 1,970 | 2,040 | 2,085 |
| Estimation of the total investment in District Heating and Cooling in Euro (excluding operational and maintenance costs)* | 47.47 M | 53.9 M | 50 M |
| Average $CO_2$ emissions per GWh of district heat generated | N/d | N/d | 256 |
| Number of District Heating systems** | 57 | 57 | 57 |

*Euro exchange rate used (annual average):113.08 (2013), 101,97 (2011), 93.9 (2009)
**District Heating system is a heat distribution network with its own heat source, technically independent from other networks, regardless of transmission connections

### District heating sales to customers (in GWh) by sector

| | 2013 | 2011 | 2009 |
|---|---|---|---|
| Residential sector | 5,107 | 4,900 | 4,638 |
| Industrial sector | 1,021 | 980 | 927 |
| Services and other | 255 | 244 | 230 |
| **Total sales** | **6,383** | **6,124** | **5,795** |

### District heating sales to customers (in GWh) by sector

### District heating development - trench length

### District heating development - total sales

### Average district heating price in EUR/MWh*

| | 2009 | 2011 | 2013 |
|---|---|---|---|
| EUR/MWh (Excl. VAT) | 52.2 | 64.1 | 74.9 |
| EUR/MWh (Incl. VAT) | 56.9 | 69.8 | 81.4 |
| Euro exchange rate used (annual average) | 93.9 | 101.97 | 113.08 |

* Defined as national average weighted by delivery and excluding and including cutting output taxes (VAT) and including transmission and distribution charges and other taxes if applicable.

### Heat sales turnover

| | 2013 | 2011 | 2009 |
|---|---|---|---|
| Total District Heat Sales (in GWh) | 6383 | 6124 | 5795 |
| Average District Heating Price (in EUR/MWh excl. VAT) | 74.9 | 64.1 | 52.2 |
| Heat sales Turnover (in Million EUR) | 478.0867 | 392.5484 | 302.499 |

### Energy supply composition of district heat generated

| | 2009 | | 2013 | |
|---|---|---|---|---|
| **Source** | **In GWh** | **In %** | **In GWh** | **In %** |
| **In cogeneration** | | | | |
| Coal and coal products | 301 | 5.2 % | 308 | 4.8 % |
| Oil and petroleum products | 204 | 3.5 % | 0 | 0.0 % |
| **Renewables (direct use)** | | | | |
| Combustible renewables* | 22 | 0.4 % | 26 | 0.4 % |
| **Others** | | | | |
| Coal and coal products | 583 | 10.1 % | 603 | 9.4 % |
| Natural gas | 3,515 | 60.7 % | 4,397 | 68.9 % |
| Oil and petroleum products | 1,170 | 20.2 % | 1,048 | 16.4 % |
| **TOTAL** | **5,795** | **100.0 %** | **6,382** | **100.0 %** |

* Includes wood pellets, wood chips, biomass and firewood

'Recycled heat' includes surplus heat from electricity production (CHP), waste-to-energy cogeneration plants and industrial processes independently of the fuel used (renewables or fossil) for the primary process. Two-thirds of the energy delivered by heat pumps is also considered as recycled heat.
'Direct use of renewable' covers the use of renewable energy in heat-only boilers and installations other than CHP.
'Other' covers heat-only boilers, electricity and one-third of the heat originating from heat pumps.

### Fuel use for district heating over the last ten years

Until 2000, numerous projects were carried out with the goal to switch to natural gas – as a more environmentally acceptable energy source – from coal and crude oil used in certain plants. Due to the high price of natural gas, this trend has taken significantly slower steps. As a result, the share of the different energy sources in the last ten years has not significantly changed and it has maintained the following figures:

- Natural gas – 65 to 70%;
- Oil and petroleum products – 15 to 20%;
- Coal – 15 to 20%;
- CHP – 5 to 10%.

### The role of district heating in delivering the EU 2050 climate and energy objectives

Serbia introduced the necessary legislative framework in order to reach the 20-20-20 targets. Serbia also signed the protocol with the European Energy Community on increasing the part of renewable sources in energy production from 21 to 27% by the year 2020.

To reach this goal, District Heating systems have to achieve a 30% increase in the use of renewable sources for energy production. The greatest potential for reaching the goal in the District Heating sector lies in the use of biomass. However, the application of financial incentives must become more efficient.

The implementation of regulations on energy efficiency in buildings has led to the situation that all new buildings connected to the District Heating system have energy consumption lower than 65 kWh/m², while the law on efficient energy use imposed an obligation for all District Heating plants to bill customers according to their energy consumption. This measure has been adopted in approximately 40% of District Heating plants so far and the result is a decrease in energy consumption of about 10%. All District Heating plants must transfer to consumption-based billing until the beginning of the heating season 2015/2016.

In 2015, there is a plan to activate the energy efficiency budget fund which is to be used for renovating old buildings. These actions are expected to lead to the decrease in heat consumption by 30-40%, at a cost of 7 billion Euro.

A project for District Heating system modernisation is in progress in twenty Serbian towns, financed by a credit from the German KfW bank. The plan is for another twenty Serbian towns to begin the District Heating system modernisation in 2016, through a KfW programme.

The application of the listed measures in the following few years is expected to lead to the decrease in heat consumption up to 50% and to $CO_2$ emission reductions of 2.5 million tonnes per year.

### National legislative framework having an impact on district heating

Serbia passed a set of legal and implementing acts such as the Energy Law (latest version issued in December 2014), the Efficient Energy Law (issued in 2013) and legislation on Energy Efficiency in Buildings (in 2012).

### Existing driving forces and/or opportunities that favor an expansion of district heating

- Companies dealing with District Heating receive significant support from the state and municipalities since they represent an important energy stability factor in Serbia;
- District Heating is seen as a reliable and safe heat supplier both in the eyes of the state and of the citizens (consumers);
- In all large cities, strategies for energy development and urban heat planning forecast the expansion and building of District Heating networks;
- The value added tax (VAT) for District Heating has a special (privileged) rate of 10%, while, for example, the VAT rate for electricity distribution is 20%;
- Companies dealing with District Heating have a satisfactory number of competent and higher educated experts capable of operating and developing the District Heating system;
- District Heating provides great opportunities for increasing energy efficiency, reducing $CO_2$ emissions and protecting the environment;
- The Serbian District Heating sector needs further development of CHP, which is a key element in the energy development strategy.

### Existing barriers to the expansion of district heating

- The price for electricity on the Serbian market is very low (average 4.8 Eurocents per kWh);
- Due to the increase in the price of natural gas, which is predominantly used in District Heating, District Heating prices have increased in the last few years. This has significantly reduced the competitiveness of District Heating on the energy market;
- Initial investment costs for the connection to District Heating are relatively high and mostly have to be financed by the future consumer prior to the connection and without the possibility of payment by instalments;
- Certain local municipalities that own the District Heating companies do not have enough financial means for investing in District Heating development;
- In a certain number of towns, consumers are still charged according to heated floor space (m²) and not according to their consumption;
- The measures implemented for energy savings in buildings reduce the demand for heat energy distribution.

### New technologies expected to be used for providing district heat in the future

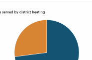
- The relatively low price of electricity enables large-scale heat pumps to work with small operational costs and enable a short investment pay-back period;
- Due to its geographic position, the use of solar energy has very high potential in Serbia and is expected to significantly increase in the near future;
- A great still unused potential lies in the link between Waste-to-Energy plants and District Heating systems. Certain steps have already been taken in order to use this important resource.

## 2 HEAT MARKET

**1,975,000**
Number of citizens served by District Heating

**7,200,000**
Total number of citizens

### Share of citizens served by district heating



### District heated floor space

| 2013 | 2011 | 2009 |
|---|---|---|
| 41.4 million m² | 39.8 million m² | 37.6 million m² |

### Share of energy sources used to satisfy heat demand in the residential sector in 2013

| Source | In % | New buildings built in 2013 only (in %) |
|---|---|---|
| District Heating | 27% | 50% |
| Natural gas | 10% | 15% |
| Electricity | 32% | 10% |
| Oil / Petroleum products | 1% | 0% |
| Coal | 10% | 10% |
| Renewables* | 19% | 9% |
| Heat pumps | 0% | 4% |
| Other | 1% | 2% |
| **TOTAL** | **100%** | **100%** |

* Includes wood pellets, wood chips, biomass, firewood, geothermal, solar thermal

Heat pumps using geothermal energy are becoming more and more a competitor for District Heating in multi-family buildings, especially due to the low price of electricity and the decrease of investment costs for installing a heat pump in individual buildings. A significant competition can be observed also from natural gas, although the connection to the District Heating system is still very common in the situations where both the District Heating system and the natural gas network are available.

In single-family houses, the most common is the use of woody biomass (pellets and wood chips), as well as air-to-air heat pumps. In this cases, there is less interest for connecting to the District Heating system.

## 3 DISTRICT COOLING

Due to the low price of electricity and a small share of waste heat used in Serbia, District Cooling is used to a very small extent since the investment payback period is very long. Regardless of the fact that attempts are being made to improve the framework conditions for District Cooling, the market is not expected to see a significant increase.

## 4 CHP IN ELECTRICITY GENERATION

### Fuel sources used for CHP in 2013

| | CHP/District heat |
|---|---|
| Source | (in TJ) |
| Coal and coal products | 1,084 |
| **TOTAL** | **1,084** |

### CHP over the last five years (2008 – 2013)

CHP has a share of 2.5% in Serbian electricity production. The preliminary CHP capacity is 300 MWe and 300 MWth. In the near future, there are plans to build a large coal-fired CHP plant. New projects concerning gas-fired CHP plants are more problematic due to the ratio between the very high price of natural gas and very low electricity price in Serbia.

## 5 CLIMATE CONDITIONS

**5,349/2,380 (Maximum and minimum)**
Number of heating degree days in 2013

### Description of the climatic conditions

Serbia is situated between longitude 19° and 23° east and latitude 41° to 45° north, being mainly influenced by continental climatic conditions.

Winter outdoor temperatures vary between -12°C and -17°C for urban areas, going down to -23.7°C in higher altitude areas. The average outdoor temperature during the heating season varies between 4°C and 6°C.

In Belgrade, the average outdoor temperature during the heating season is 5.6°C and the design outdoor temperature is -12.1°C. The heating season lasts for approximately 180 days.

### Average energy use of buildings per square meter in the year 2013

The average energy use for buildings connected to the District Heating system in Serbia is still very significant, reaching approximately 150 kWh/m²/y.

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