Serbia: “Rehabilitation of District Heating Systems“ (Phase I – IV) - update & outlook

June 1st 2016 , Vienna

Bank aus Verantwortung

KFW

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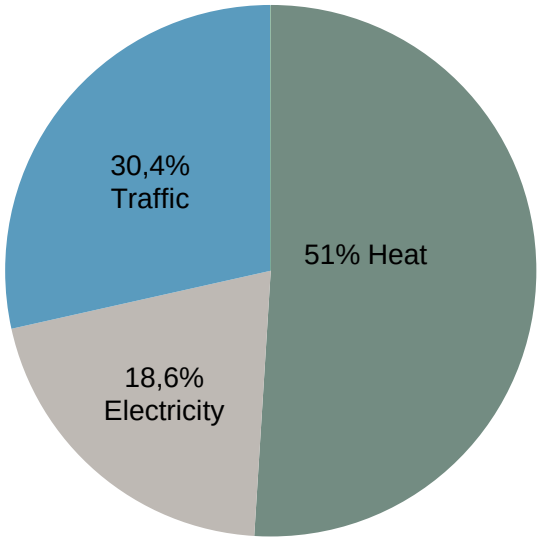
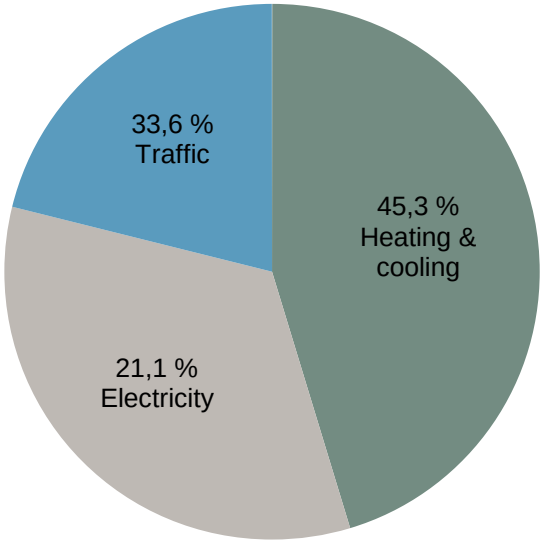
The Energy Market in Germany and in Serbia

Energy consumption by sectors in 2014

Germany
2402 TWh

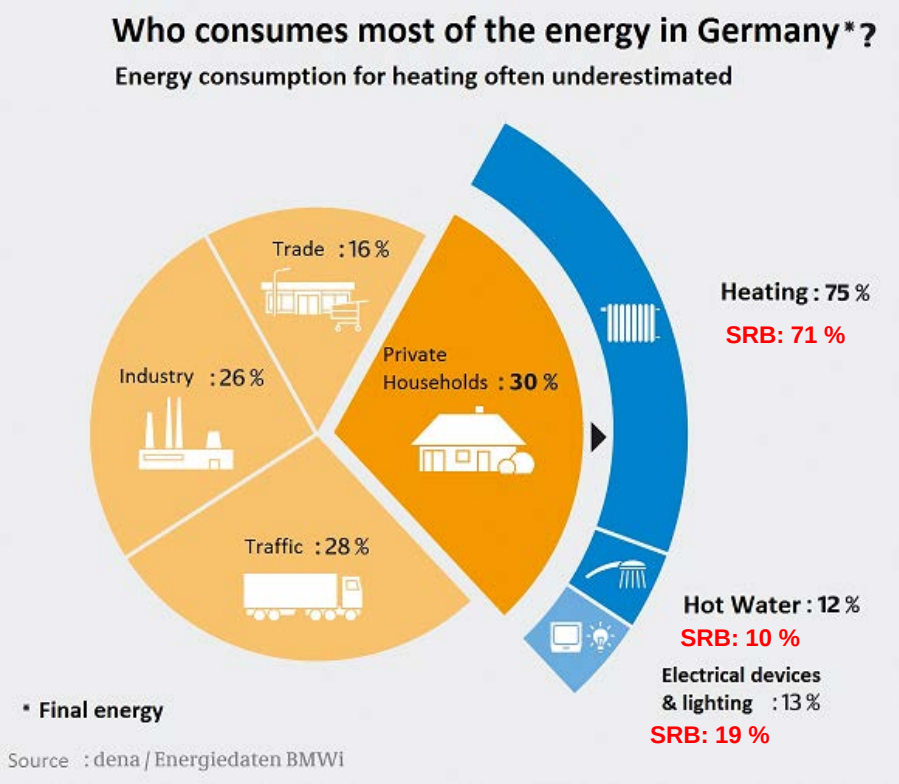


Serbia
120 TWh



The Energy Market in Germany and Serbia

The underestimated energy consumption of the heating sector

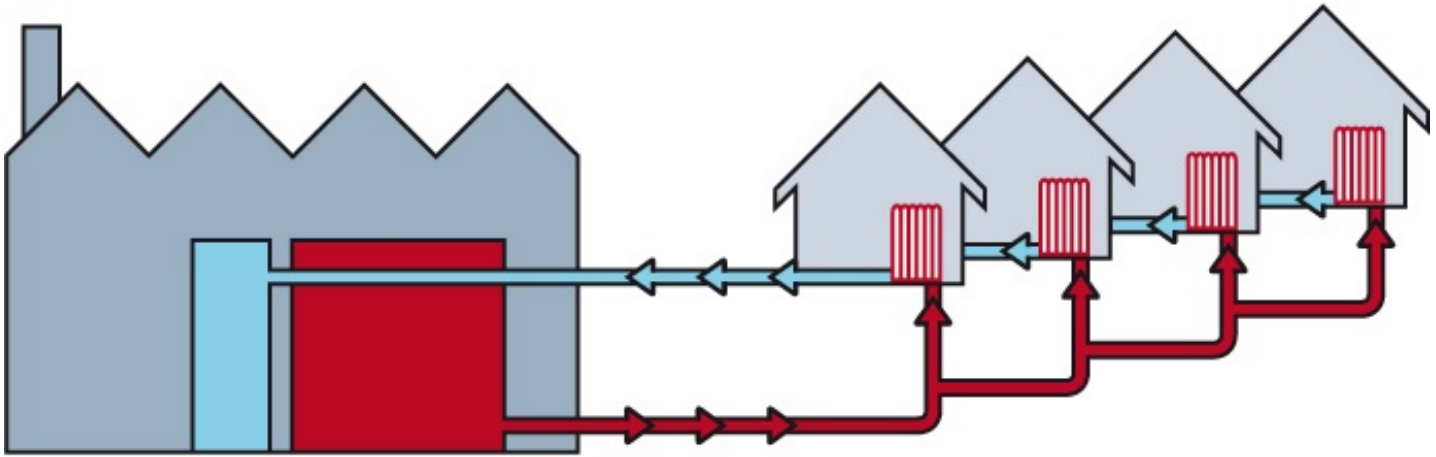


- Private households are the **largest energy consumer**
- **87%** of the final energy consumption of Private Households is caused by **heating** and **hot water** supply
- **Expenditures** of private households for heating (2013): **62 bn EUR**
- Private households in Germany spend about **3%** of their **net income** on heating (Serbia: 9,1%)

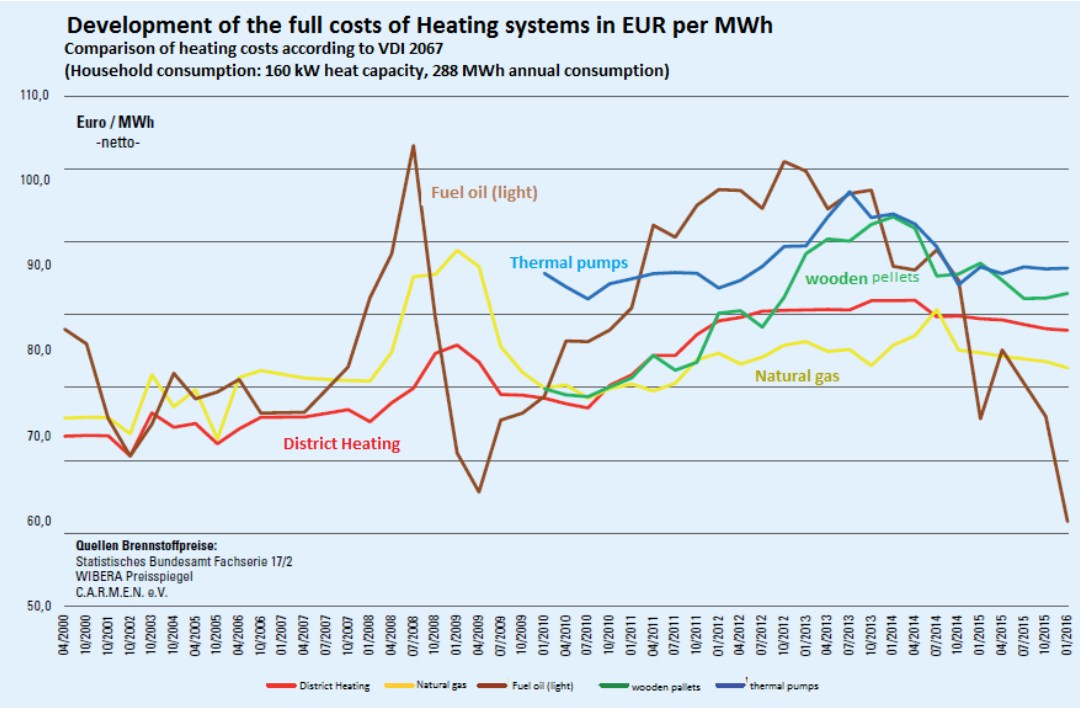
No energy transition without transition in the heating sector

››› Why District Heating?

The principles of District Heating



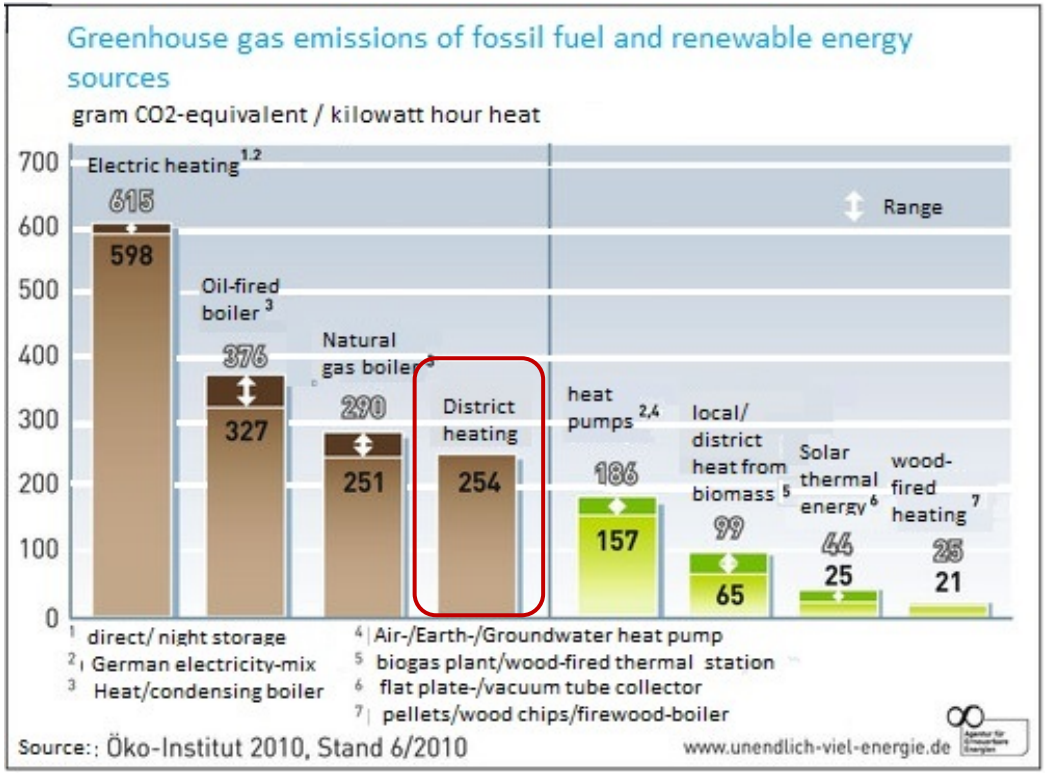
The economic dimension



District Heating:

- Centralized maintenance
- Easier fuel switch (to renewables)
- Low price volatility
- High generation efficiency and cost efficiency
- Potential to use locally available, renewable resources

The ecological dimension



District Heating:

- Significant reduction of CO2 emissions through the optimisation of heat supply
- Less emissions in residential areas
- High Flexibility for future heat-generation technologies (esp. Renewable energy sources)

››› KfW Engagement in District Heating Serbia

KfW focus areas in the Energy sector in Serbia

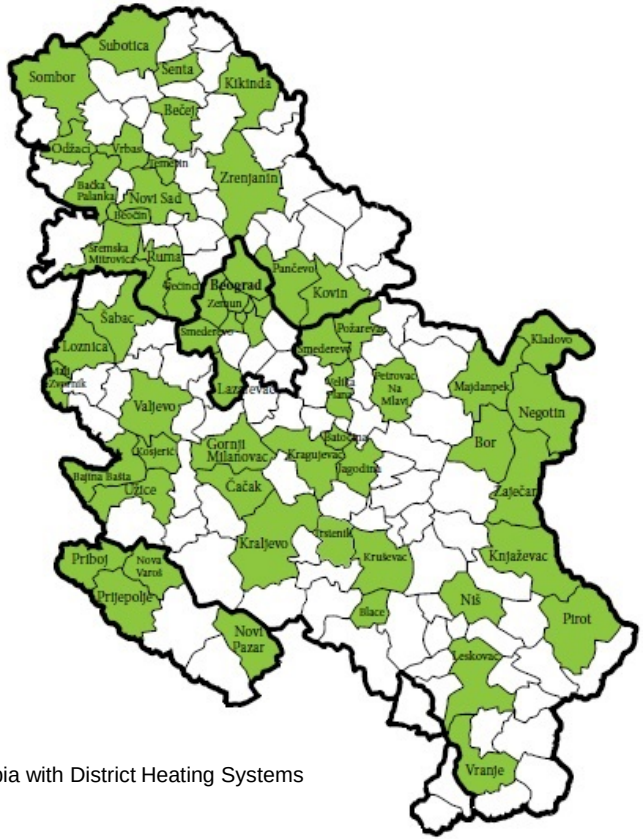
Transmission

Energy efficiency in public buildings

Change towards renewable energy sources

Rehabilitation of District Heating Systems

The District Heating in Serbia



Municipalities in Serbia with District Heating Systems
Source: CeSID

- 24,5 % of households connected to DH system
- 55 cities dispose of DH system
- 6.180 MW installed capacity (60 % of which in Belgrade, Novi Sad, Nis, and Kragujevac)
- 1.289 km distribution network
- 15.902 substations
- Consumers:
  - 80% private households
  - 20% companies, social and public institutions

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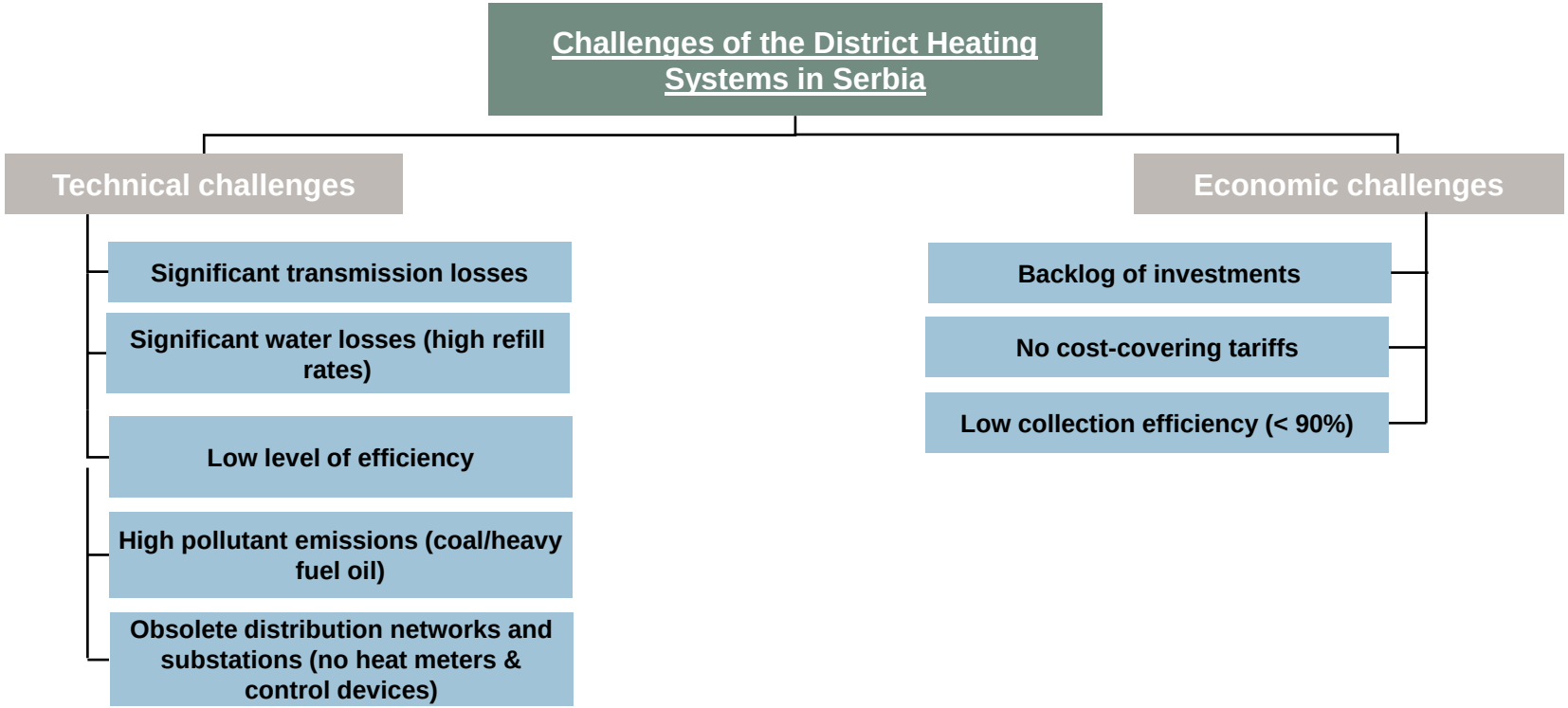
Why KfW Engagement in the District Heating sector in Serbia?



››› Project „Rehabilitation of District Heating Systems“: Phase I - IV

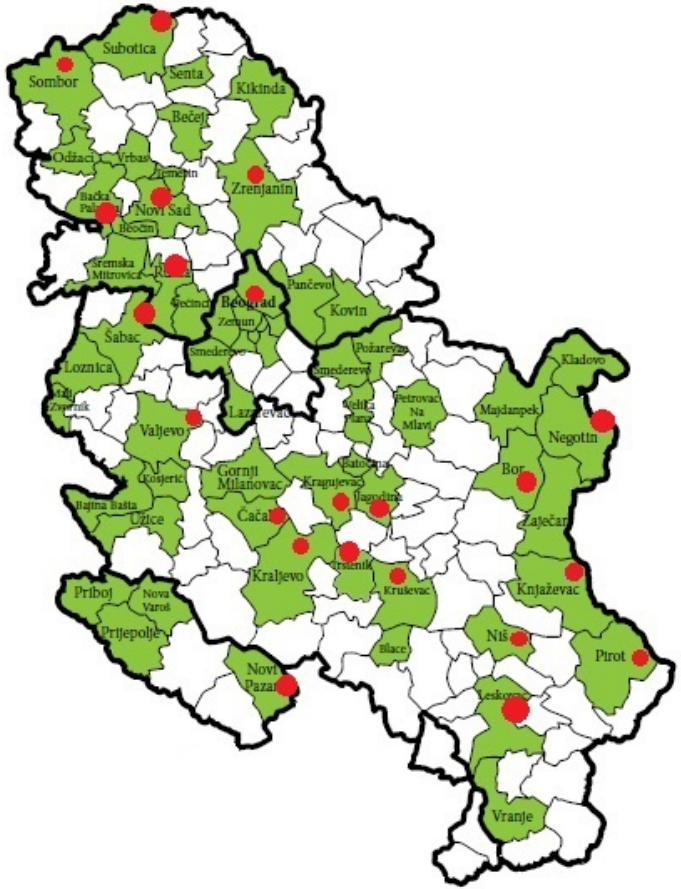
Rehabilitation of District Heating Systems in Serbia

Project overview

Project	Rehabilitation of the District Heating System in Serbia (Phase I –IV)
Objective	› Investment in **sustainable** and **efficient** heat generation and distribution facilities › Support **energy efficiency** utilisation by customers › **Security** of supply
Facts and Figures	› Project period: since 2001 › Volume: **101,42 m EUR** › Instrument: Loans, Dept swap funds, grants › Partner: Ministry of Mining and Energy › Scope: 22 out of 53 DH companies **(41,5%)** › Beneficiaries: **450.000** households (14,3% of the Serbian population), **30.000** industrial consumers

Rehabilitation of District Heating Systems in Serbia

Regions and cities



1. Backa Palanka
2. Belgrad
3. Bor
4. Cacak
5. Jagodina
6. Knjazevac
7. Kragujevac
8. Kraljevo
9. Krusevac
10. Leskovac
11. Negotin
12. Nis
13. Novi Pazar
14. Novi Sad
15. Pirot
16. Ruma
17. Sabac
18. Sombor
19. Subotica
20. Trstenik
21. Valjevo
22. Zrenjanin

Rehabilitation of District Heating Systems in Serbia **Phase IV**

Steps I - III

Step I
January 2012 – September 2012

- Investment and Procurement Plans for 19 Toplanas
- Needs Assessment
- Training and Assistance Plan

Step II
October 2012 – January 2016

- Procurement and implementation of rehabilitation measures for 20 Toplanas
- Accompanying and institutional measures

Step III
January 2016 – January 2018

- Completion of the rehabilitation programs, Toplana of Belgrade is joining the KfW IV program

Rehabilitation of District Heating Systems in Serbia

System components

District Heating Pipes

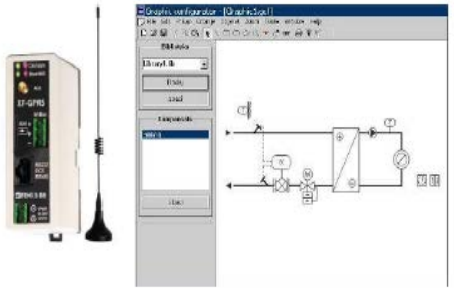
Boiler Rehabilitation

Substations/heat meters

CHP Novi Sad

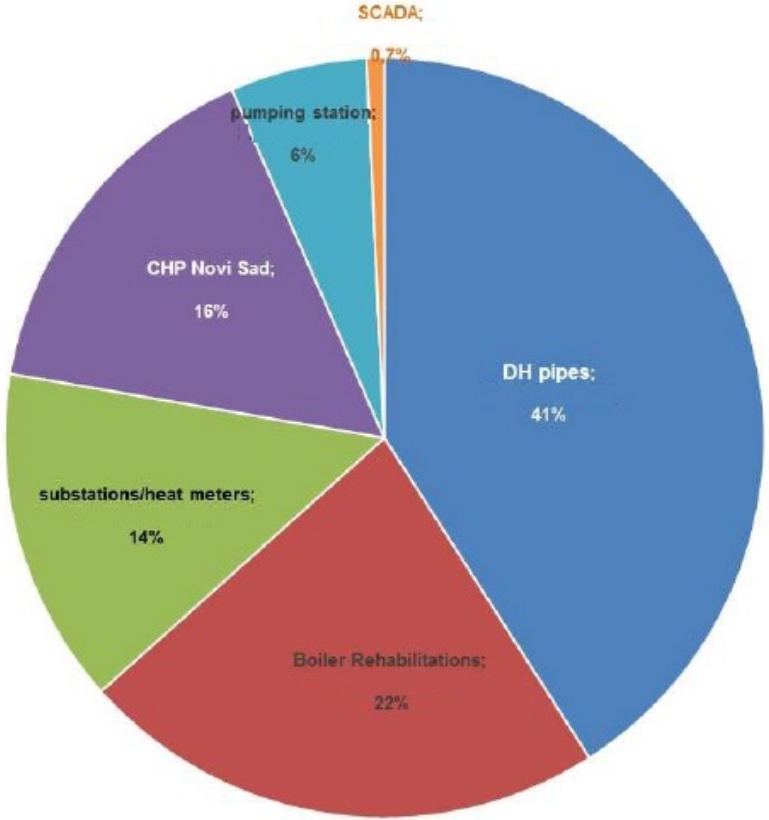
Pumping Stations

SCADA



Rehabilitation of District Heating Systems in Serbia (ongoing Phase IV)

System components - Investment costs



- **Total supplies and works: ~40 Mio. EUR**
- > 35% domestic content
- 14 international procurements successfully implemented
- 65 individual supply and work contracts concluded

Rehabilitation of DH circulation pumps in the Boiler station “Istok” of the JKP Novosadska Toplana, Novi Sad

Old

New

Design and Construction of an up to 9,9 MW CHP plant in the BH “Zapad” of the JKP Novosadska Toplana

››› Results – What did we achieve?

Rehabilitation of District Heating Systems in Serbia (ongoing Phase IV)

System components and achievments

District Heating Pipes

- 42 km of pipes in 18 cities are rehabilitated

Boiler Rehabilitation

- 7 boilers have been newly installed (with an installed capacity of 97,3 MW)
- 2 boilers have been rehabilitated (with an installed capacity of 118 MW)

Substations/heat meters

- 1.086 heat meters were installed in 11 Toplanas (relevant for consumption based billing)
- 463 compact substations were supplied and 307 were installed

CHP Novi Sad

- Design and Construction of a 9,9 MW CHP plant in the BH "Zapad" of the JKP Novosadska toplana
- 12 years full service contract

Pumping Stations

- New DH circulation pumps in the Boiler station "Istok" of the JKP Novosadska Toplana, Novi Sad

SCADA

- Supply and installation of SCADA systems for substations in Serbian DHCs– in the final stage of the contract preparation

Rehabilitation of District Heating Systems in Serbia (ongoing Phase IV)

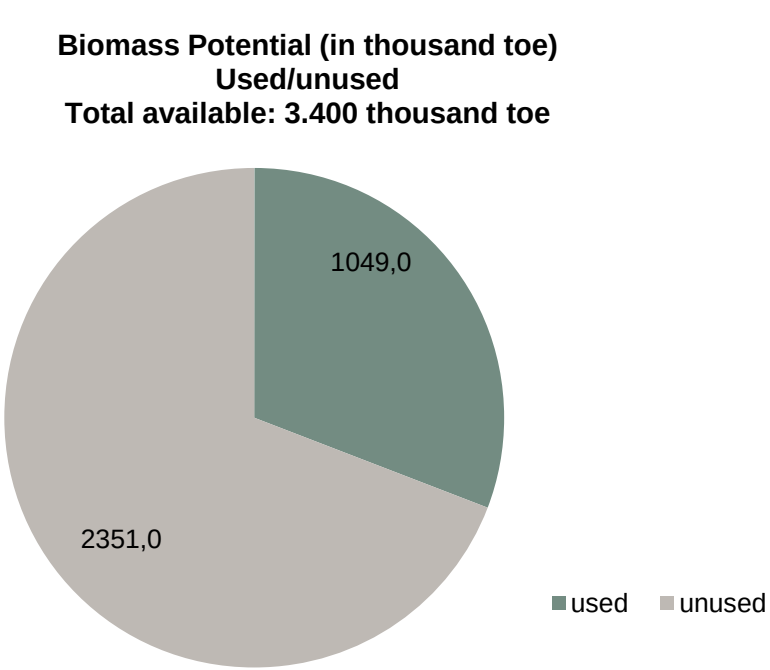
Achievements of the Program objective

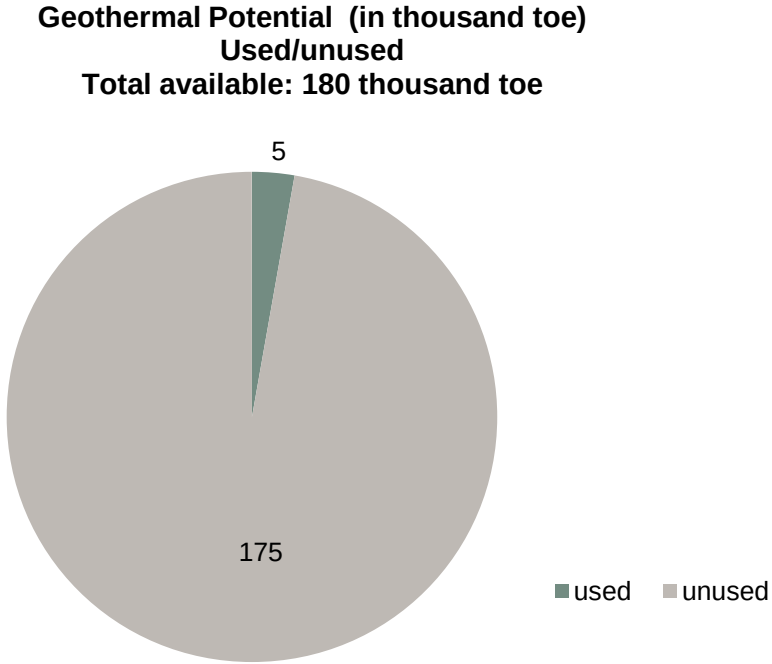
Reduce Heat losses < 10%	Heat losses could be reduced from 14% in 2012/13 to **10%** in 2014/15	
Reduce Refilling rate < 10 p.a.	The refilling rate of the boilers could be reduced from 18 in 2012/13 to **14** in 2014/15	
Improve overall boiler efficiency by > 3% to 90% overall	The overall boiler efficiency could be improved to **92%** in 2014/15	
Heat metered (installed in every DH system)	In 11 out of 20 Toplanas heat meters were supplied and installed, which supports heat metering for CBB (in total: 1.086 heat meters)	
Heat billed (CBB introduced in every DH system)	5 out of 20 Toplanas installed consumption based heat billing (CBB)	
Total Collection efficiency (>90%)	99 %	
Coverage rate of operational costs (> 90%)	17 out of 20 Toplanas meet the indicator of a coverage rate of at least 90%. The coverage rate improved to 115% (average) in 2014/2015.	

››› Outlook – What‘s next?

District Heating Phase 4.5: Renewable Energies

Potential of Biomass and Geothermal energy

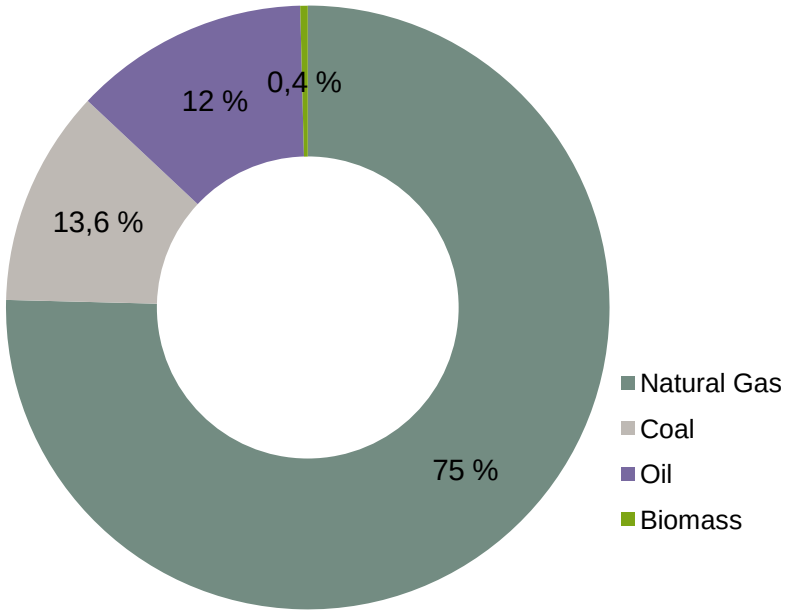




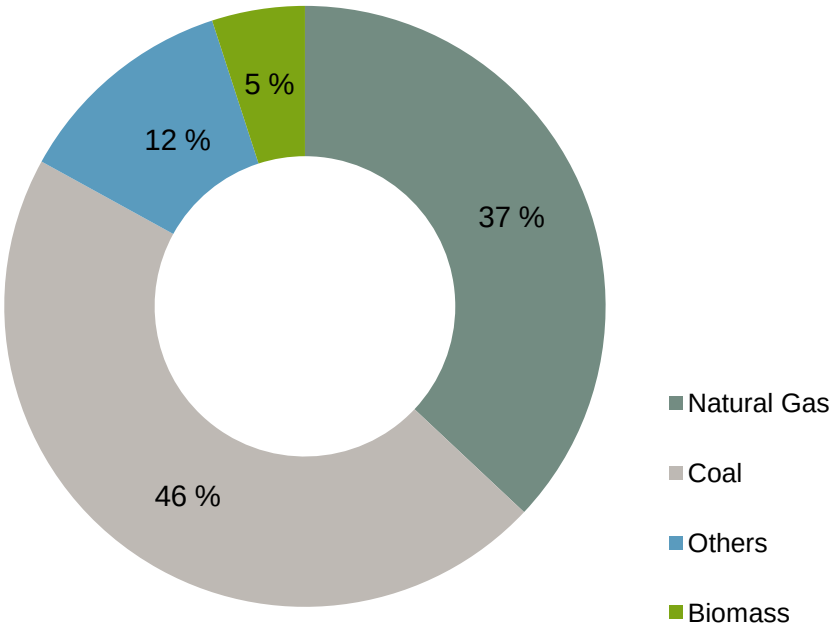
District Heating Phase 4.5: Renewable Energies

Energy sources used in DH in Serbia and Germany

Serbia*



Germany**



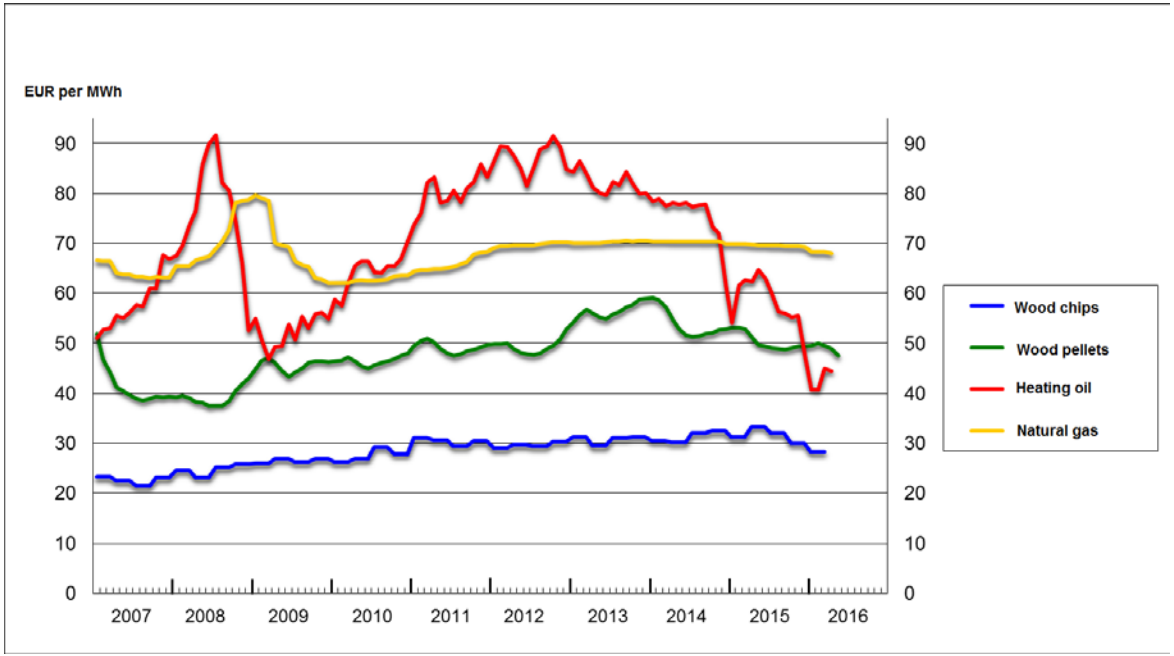
* Data based on DHC Association in Serbia- Report Y2014

** Data based on AGFW (Der Energieeffizienzverband für Wärme, Kälte und KWK e.V.), 2015, Hauptbericht 2014

District Heating Phase 4.5: Renewable Energies

Economic dimension

Figure: Price development of different fuel types in Germany



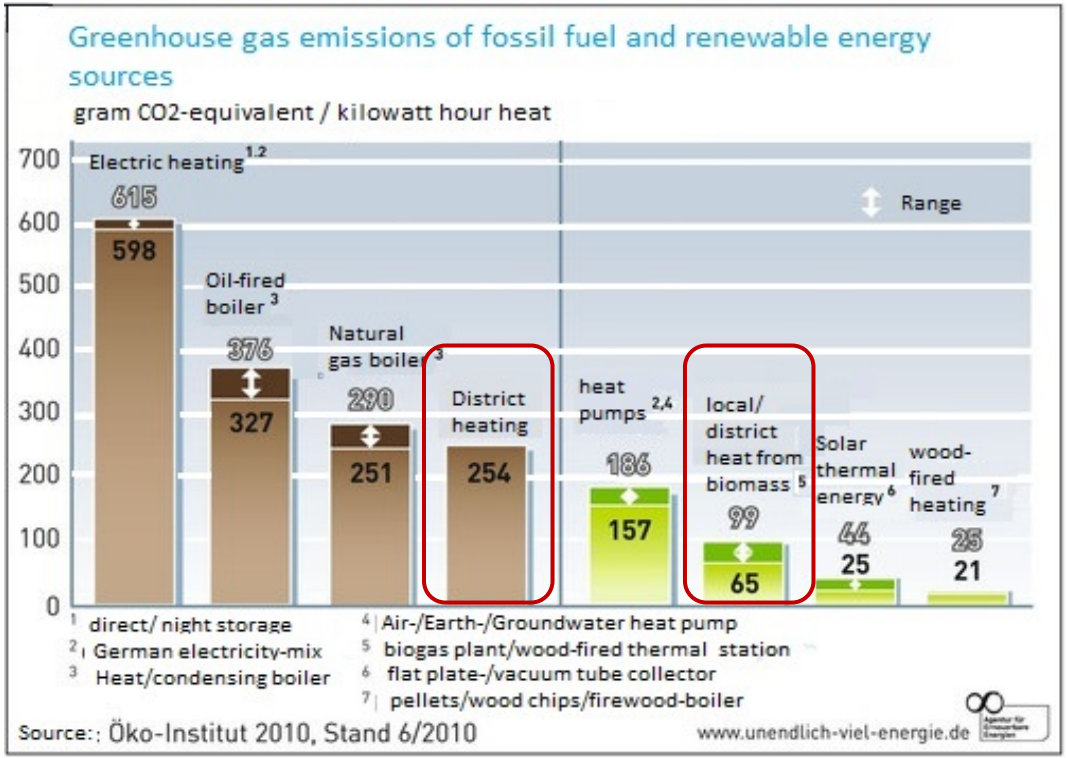
Source: Wood chips and pellet prices: C.A.R.M.E.N. e.V.; Heating oil and natural gas price indices: German statistical office

Advantages of wood chips

- **Low price volatility**
- **Low unit costs**
- **Import substitution**
- **Local value generation**

››› District Heating Phase 4.5: Renewable Energies

Ecological dimension



Advantages of Biomass

- **CO2 neutral**
- **SO2-reduction**
- **Reduction of environmental risks (e.g. through oil leakages)**

District Heating Phase 4.5: Renewable Energies

Project	Retrofitting of the District Heating System in Serbia to the use of **renewable resources** (Biomass, Geothermal energy)
Objective	› Investment in **climate-friendly technologies** and **efficient** heat generation and distribution facilities › Contribution to **national climate** and **energy targets** › Use of **local resources, local value generation** and **employment**
Facts and Figures	› Project start: 2016 › Volume: 107 m EUR › First Phase: 27 m EUR (incl. 5 Mio. co-financing from SECO) › Instrument: Loan, grant › Partner: Ministry of Mining and Energy › Participants: 5 Municipalities (Phase 1)

District Heating Phase 4.5: Renewable Energies

System components

Biomass Boiler

Biomass storage

Pipes

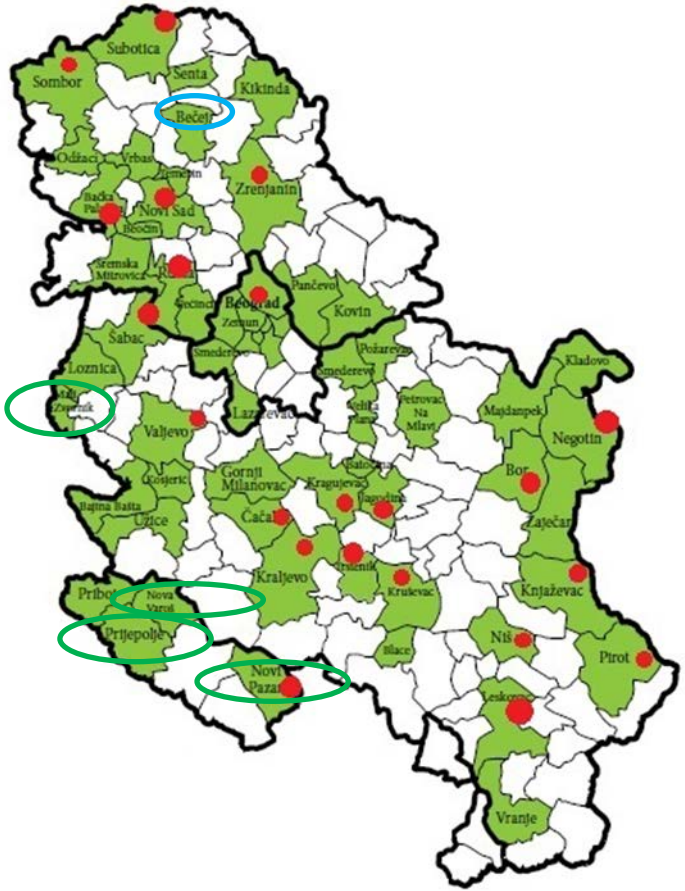
Substations / heat meters

Geothermal plant

Training measures

District Heating Phase 4.5: Renewable Energies

Project locations



- Geothermal energy:
  - Bečej
- Biomass
  - Mali Zvornik
  - Prijepolje
  - Novi Pazar
  - Nova Varoš

Rehabilitation of District Heating Systems in Serbia: **Phase V**

Project overview

Project	Rehabilitation of the District Heating System in Serbia V
Objective	› Investment in **sustainable** and **efficient** heat generation and distribution facilities › Support **energy efficiency** utilisation by customers › **Security** of supply
Facts and Figures	› Project preparation: 2016/2017 › Project start: 2018 › Volume: 31,5 m EUR › Instrument: Loans, grants › Partner: Ministry of Mining and Energy › Focus: Combination of DH IV and 4.5 No investments in coal!

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