



Cogeneration and waste heat utilisation in district heating

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„Clean Air Regions Initiative“ (CARI)

Air quality improvement with a district heating focus - workshop

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Vital Management Kft.

- A consultancy established in 2003 – development policy, project management
- Total value of projects prepared and managed: over EUR 170 million
- Over 100 grant contracts prepared and executed
- Key sectors: Healthcare, information technology and energy
 - Construction of a public building database to foster energy efficiency
 - Coordination of energy consumption audits of more than 550 public institutions
 - Energy efficiency improvement projects in healthcare
 - Creation of an energy management manual
- WGBC „Flexheat“ project in Serbia: DH energy efficiency, air quality, renewable energy (grid) integration – project workshop in Subotica on 16 May, 2022. If interested, please write to: kubinyi.adrienn@v-m.hu



Definition of efficient district heating and cooling

- Energy Efficiency Directive (EU): „a district heating or cooling system using
 - at least 50 % renewable energy,
 - 50 % waste heat,
 - 75 % cogenerated heat or
 - 50 % of a combination of such energy and heat“



Air quality in the Western Balkans region

- Air quality - a major problem due primarily to the combustion of (low quality) coal (in power stations, households, some DH plants (being phased out in DH, partly in households too due to new municipal gas networks based on the gas pipeline)
- High sulphur-content coal is a particular problem, e.g. in Bosnia-Hercegovina, Serbia.
 - The largest emitter: Ugljevik coal power plant near Bijeljina, close to Serbia. 50x specific (/GWh) SO₂ emission as compared to the Polish plant with the highest value in the EU. (Desulphurisation equipment is now installed but it has a negative impact on the profitability of the plant ...)
 - EUR 50 million Chinese investment was announced in November 2021 using gypsum, a by-product of flue-gas desulphurisation. This way, Chinese investment ensures the long-term operation of the coal power plant, similarly to the Kolubara coal PP and the Kostolac lignite PP near Belgrade.



District heating (DH) in Serbia

- In Serbia Belgrade, Bor, Niš, Novi Sad, Subotica, Pancevo, and Kragujevac have >10,000 flats connected to their district heating network (beyond industrial and municipal users).
- Belgrade has one of the largest district heating systems in Europe.
- Major European assistance projects – e.g. for decreasing grid losses, install metering, new heat sources
- An existing nearby major coal power plant (waste heat) will supply the majority of district heating in Belgrade once the new connecting pipeline is prepared in the project financed by China.



Cogeneration opportunities

- Natural gas, biomass, biogas, landfill gas and bio-methane based opportunities
- Lower the cost of heat and / or decrease overall carbon and other emissions
- Facilitate the integration of wind and solar energy in the electricity grid
- Widely used in Europe, e.g. natural gas based cogeneration (e.g. in Vienna and Budapest), biomass-based in Pécs (HU), landfill gas / biogas, etc. based
- EUR 120 million ongoing natural gas based district heating cogeneration project in Zagreb, financed by the EIB and EBRD, to be completed in 2022.
- Gasification of some cities (new networks) creates a new competitive environment for DH
- Given the major drive to establish WWTP-s (with EU funds) an integrated energy (generation and utilisation) optimisation of WWTP-s and DH is a great opportunity. This can be valid for municipal solid waste treatment too.



Wastewater, municipal solid waste (treatment) synergies

- WWTP biogas or biomethane or waste heat utilisation – e.g. Innsbruck, Amsterdam
- Wastewater (low grade) heat utilisation (heat pumps) – e.g. Budapest, Kalundborg (DK)
- Municipal solid waste incineration (heat utilisation) – e.g. Budapest, Vienna, Linz
- Municipal solid waste biogas (heat utilisation, CHP) – e.g. Ljubljana
- Using solid waste to enhance WWTP biogas production – frequently
- Combustion of landfill gas (waste deposits) – e.g. Miskolc, Vienna
- Industrial waste heat utilisation – e.g. Ljubljana (Lek/Novartis pharmaceuticals)



Novi Sad DH – a regional air quality improvement opportunities

- Second largest DH system in Serbia, $\approx 900 \text{ MW}_{\text{th}}$ (peak) heat need, about 1 TWh p.a. heat sales, >100.000 households supplied.
- No bigger DH systems in Austria, Hungary, and Balkans countries except for certain capital cities (Belgrade, Budapest, Ljubljana, Sofia, Vienna, Zagreb). Over twice as big as the DH systems of Sarajevo. Podgorica has no DH.
- New natural gas pipeline - lower cost natural gas (uncertain what will happen after the sanctions following the Russian invasion of Ukraine)
- Flexible generation technology - enable renewable electricity grid integration
- Reducing energy poverty (heat cost)
- Major opportunity: potential energy synergies with WWTP to be built



District heating in Romania – an illustration of threats

- Municipalities with DH is <40% compared to 20 years ago
- Consumers switching to individual heating – high DH costs (high cost of heat, major grid losses, poor metering, overstaffing, etc.) being the most important reason for it
- Remaining DH systems decreased dramatically too.
 - Example: Cluj-Napoca, a key city in Transylvania, which had 84,000 households on DH in the mid 2000s and lost about 60% of those.
- In October 2021, in Timisoara (a key city) DH was shut down to 56,000 households due to debts to the gas company.
- Bucharest DH system is the largest in the EU, serving 1.2 million inhabitants.



Best practices in the Western Balkans

- Natural gas based cogeneration (gas engines): Novi Sad
- Biomass combustion: Banja Luka (EBRD finance, Veolia technical assistance)
- Geothermal: Sarajevo - planned switch from heating oil, with EBRD finance
- Solar heat: Pancevo
- DH grid energy efficiency improvement, measurement improvements, some renewable DH sources with EU funding
- WWTP in Subotica meeting EU standards, including biogas plant (EU funding)