

Innovative investment plan

Subject:	Innovative investment plan: transition from coal fired boilers to renewable energies in district heating company – case study of Końskie
Description:	This study shows the innovative investment plan: transition from coal fired boilers to renewable energies in district heating company – case study of Końskie in Poland
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Summary description of the instrument

Region: Poland, city: Końskie, voivodship: Świętokrzyskie

Partners involved:

- Institute for Renewable Energy
- District Heating Company in Końskie

Short description of the measure.

This study shows the innovative investment plan presenting transition from coal fired boilers to renewable energies in district heating company, based on case study of Końskie municipality in Poland.

Initial situation

The Końskie - city with 20 ths. inhabitants - is located in Świętokrzyskie voivodship, in the northern edge of the Kielce-Sandomierz Upland. The city is well industrialised. There is a Special Economic Zone located partly within the city area and entirely within the commune of Końskie. The economic zone is covering the area of 64,2 ha which serves as industrial and trade centre of the region, with dynamic development of metallurgical industry and ceramic tile factories, representing high energy intensity demand and potential for waste heat for utilisation in district heating.

The Końskie District Heating Company (DHC Końskie Ltd) has been established in 1992. The scope of its activities covers generation, transmission and distribution of heat. Additional areas of activity of DHC Końskie are electricity distribution and trade (concessions issued by the national regulator and valid in both areas). 100% stakeholder of DHC Końskie Ltd. is Końskie municipality.

DHC Końskie LTD basic fuel is hard coal used in main unit in two main (central) coal boilers (86% of total heat generated). Secondary fuel is natural gas, used in four small, decentralised gas boilers for utility hot



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water preparation (14% of total heat generated). Detailed structure of the heat generation fleet is given in the table.

Heating plants	Capacity and boilers	Fuel	Heat sold	
The main heating plant	38 MW (15 + 23 MW)	coal	~115 000 GJ/y	86%
Local plant 1	1,75 MW (2x 0,7 + 0,35 MW)	natural gas	~9 500 GJ/y	7%
Local plant 2	1,15 MW (2x 0,575 MW)	natural gas	~1 700 GJ/y	1%
Local plant 3	1,4 MW (2 x 0,7 MW)	natural gas	~7 500 GJ/y	6%
Total	42,3 MW		~133 700 GJ/y	100%

Challenges and objectives

The transition from 86% of coal, based in two boilers only, supported with still marginal role of gas, to the minimum of 50% of RES (the medium-term 2023 target of the company and municipality) is a challenge, especially from the point of view of continuous heat supply and management of the temperature of heating medium in the district heating. Coal is not flexible enough and operates today at rather high temperature while renewables like solar thermal or wind power to heat as well as waste heat are weather dependent and fits better to heating systems with in the operating temperature is lower. The objective of this "factsheet" is to show coherent and integrated investment plan adopted by DH company based on application of innovations for moving, in a short time, from coal to renewables and emission free heat generation. The transition from coal fired boilers to renewable energies in district heating company indicates the main motivation factors and available technology solutions for development of renewable energies in Polish district heating companies.



Measures and actions

The first step was to analyze the overall situation in district heating company in Końskie including availability of local renewable energy resources and waste heat and the next - development of the new and replicable business model of the district heating operator. Analysis has shown that there is necessary employ several scalable



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generating technologies with short and seasonal storage of heat.

One of the main reasons of adoption of the plan were: 1. compliance the directive 2012/27/EU and improvement of efficiency of the system, by wider use RES in district heating, 2. fulfill the new and foreseen emission standards and reduce substainally emission of CO₂, 3. improvement of attractiveness of RES based district heating systems and development of innovative services addressed to new clients and target groups.

Barriers and opportunities

As the CAPEX innovative investment plan up to 2023 might cost 11 mln Euro, the biggest barriers were the access to the attractive credit financing, supported for the first time (full scale pilot project with first sessional storage in Poland and whether depended renewables and coal as a peak load) with initial subsidy, to reduce the business risk and perception of technical risk. The DHC Końskie work together (as a member) with Polish Chamber of District Heating for establishing relevant support programme in Poland. Finally the new subsidy programme for DH systems, devoted for RES and storage is actually prepared by National Fund for Environmental Protection and Water Management, so DH companies might develop more ambitious and more innovative investment plans.

Results

The innovative investment plan of DHC Końskie includes:

- Extending the share of renewables and waste heat from industry in the heat volume supplied to current and perspective end users, especially from housing sector (cohabitants);
 - centralised renewable heat generation: solar thermal system, green (wind) power to heat and biomass
 - decentralised introduction of solar thermal collectors (supported by gas) as a source of hot water in summer and integration of local generation with district heating in winter peaks
 - utilisation of waste heat from one or more ceramic factories located in the city
- Introduction of short (decentralised) and long term (centralised) storage systems into the district heating company operation
- Demonstration of a complete system long term storage, based on offering services to different types of final users, like excess industrial heat management, balancing of weather dependent RES (solar thermal and power-to-heat solutions) integrated with storage services
- Development of the new and replicable business model of the district heating operator as energy integrator on the community scale.

Lessons learned



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- Thanks to the innovative investment plan of DHC Końskie, another DHCs could replicate the investment plan.
- The largest amount for system heat is paid by customers connected to local gas boiler - the reduction of heat costs can be achieved by using solar collectors working for the needs of hot water.
- It is likely that due to the use of solar collectors, it would be possible to permanently delete some gas boilers, which would increase the usage of the installed capacity of local gas boiler. Reducing the oversizing of gas capacity relative to the needs would have a positive effect on the profitability of investment.
- The neighborhood of wind farms and the activity of DHC in Końskie in the field of electrical, create good conditions for implementing the Power-to-Heat concept in the DHC.

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