Accelerating excess heat recovery in Central Europe
CE-HEAT special session at International Conference of SZE 2019
Agenda

International Conference of SZE 2019, Grand Hotel Bernardin, Portorož, Slovenia, from 31 March to 2 April 2019.

Monday, 01th of April 2019 CE-HEAT Special Session (16.30 -18.50 h)

SECTION 2C - Accelerating excess heat utilization in Central Europe

1. *Waste heat utilization in Thuringia – strategy development and implementation process,* Anton Wetzel, Thuringian Energy and GreenTech Agency (ThEGA)

2. *A comprehensive tool to recover waste heat in Friuli Venezia Giulia (North-East Italy)*, Matteo Mazzolini, Anna Sappa, Agenzia per l'Energia del Friuli Venezia Giulia

3. *Development and use of an online assessment tool for excess heat recovery systems*, Boštjan Gregorc, Samo Fekonja, Aljaša Bravc, Dravske elektrarne Maribor d.o.o, Aleš Hribernik, Faculty of Mechanical Engineering, University of Maribor

4. *Simulating gasification of and energy production from sewage sludge from wastewater treatment plants*, Niko Samec, Filip Kokalj, Tomas Zadravec, Beno Arbiter, Faculty of Mechanical Engineering, University of Maribor

5. *Utilizing low-temperature heat sources from CHP gas engines*, Darko Goričanec, Jurij Krope, Danijela Urbancl, Faculty of Chemistry and Chemical Engineering, University of Maribor

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More information to CE-HEAT initiative you may find here (Link).

Partners

Lead Partner: E-zavod/E-institute

Waste heat utilization in Thuringia – strategy development and implementation process

Anton Wetzel, Thuringian Energy- and GreenTech- Agency (ThEGA), Germany

Abstract

The utilization of waste heat is the sleeping giant of the energy system transformation towards more energy efficiency and more renewable energy sources.

With approximatly 2,2 Mio. inhabitens, Thuringia is one of the smaller federal states, located in the cental part of Germany. The theoretical potential for waste heat utilization in Thuringia was estimated up to 4 TWh/a which could be used for supplying 500.000 housholds with heat and warm water. Beside showing the approach of the estimation of the potential the first part of the presentation focuses also on the development of the waste heat utilzation action plan for Thuringia and the connection with the Thuringian Energy Strategy. Within this, the implementation of a cadaster builds an important base. It depicts the sources of waste heat in Thuringia and acts as a resource for identifying candidates for waste heat projects.

In the second part some pilot projects will be presented. ThEGA has started to develop feasibility studies within the CE-HEAT project which is supported by Central Europe Program. These case studies are showing a high variability regarding the available waste heat sources, the distance to an existing district heating network and potential heat demand of end users.

The first pilot will provide a feasibility study of a project where the waste heat of a textile manufacturing company could supply heat to neighbouring consumer markets through a new district heating pipeline.

In a second case a wood manufacturing company has the waste heat available. The feasibility study shows under which criteria the project can be realised and which steps need to be undertaken to

achieve that. The implementation of this project seems to be best suited for a citizen cooperative business model.

In a third project example ThEGA will describe the development of the external use of waste heat in a steel mill. This process has started some month ago. The presentation gives an overview about the first technical end economic estimations and the complex structure of stakeholders which have to be integrated into project development and delivery.

A comprehensive tool to recover waste heat in Friuli Venezia Giulia (North-East Italy)

Matteo Mazzolini, Anna Sappa, Agenzia per l'Energia del Friuli Venezia Giulia, Italy

Abstract

Many industrial processes generate a lot of waste heat, which is lost in many cases. Waste heat recovery can lead to many advantages, first of all for the environment: a better use of energy can reduce fossil fuel consumption for power generation and the related emissions in the atmosphere. It can be also an opportunity for enterprises which will spend less money for buying energy, increasing their competitivity or, if the waste heat cannot be re-used in the process, it can represent a new income source by selling it to other companies (managing district heating networks for example). The European Energy Directive (2012/27/EU) underlines the importance and opportunity to reuse waste heat: *(35) High-efficiency cogeneration and district heating and cooling has significant potential for saving primary energy, which is largely untapped in the Union. Member States should carry out a comprehensive assessment of the potential for high-efficiency cogeneration and district heating and cooling. These assessments should be updated, at the request of the Commission, to provide investors with information concerning national development plans and contribute to a stable and supportive investment environment. New electricity generation installations and existing installations which are substantially refurbished or whose permit or licence is updated should, subject to a cost-benefit analysis showing a cost-benefit surplus, be equipped with high-efficiency cogeneration units to recover waste heat stemming from the production of electricity. This waste heat could then be transported where it is needed through district heating networks. [...]*

CE-HEAT project has developed a number of outputs in order to raise awareness concerning the existence of waste heat and its potential.

The cadastres, developed for several European regions, provide relevant information concerning the sources of waste heat. These data allow the user to understand the amount of recoverable energy, the geo-localization facilitates to match demand with supply and also enables policy makers to understand the available opportunities on their territories and to include them in future development strategies.

Investors can easily evaluate the economic and technical potential of recovering waste heat using information from waste heat cadastres as input data for the Decision Support System (DSS) developed by the project and included in the CE-HEAT toolbox. The DSS is designed both for investors and policy makers: the user is asked to provide basic data concerning waste heat sources of potential interest,

data that can be taken directly from the cadastre. The output of the DSS is a pre-feasibility study where the relevant technologies for waste heat recovery are compared on the basis of environmental and financial parameters. This tool allows also policy makers to define what incentive schemes could be developed to make waste heat recovery an attractive investment.

These tools have been tested and validated within technical and policy pilot projects in order to optimize them and to increase their reliability.

In Friuli Venezia Giulia, north-eastern part of Italy, the regional waste heat cadastre has been included in 24 local energy action plans. Moreover, on the basis of the information available through the cadastre, a regional strategy has been developed to increase waste heat recovery over time. This strategy is going to be included in the next regional energy plan.

Finally, the CE-HEAT toolbox has been tested on a pilot case dealing with waste heat recovery from a co-generation plant supplied with biogas and run by an agricultural company. Economic and technical feasibility has been investigated to evaluate the sustainability of a new malt production line accounting for a total investment of around 1.5M€.

Development and use of an online assessment tool for excess heat recovery systems,

Boštjan Gregorc, Samo Fekonja, Aljaša Bravc, Dravske elektrarne Maribor d.o.o, Slovenia

Aleš Hribernik, Faculty of Mechanical Engineering, University of Maribor, Slovenia

Abstract

The CE HEAT project partnership, funded by European Regional Development Fund, has amongst others, invested its efforts and capacities, towards the development of an interactive online tool, titled Waste Heat Energy Calculator.

The tool is directed at investors looking for business opportunities in applying systems for waste heat utilization. The calculator enables it users to project a preliminary economic assessment and define the viability of a given waste heat recovery project with key economic parameters. The calculator software is based on an algorithm driven by the technical and economic models of waste heat utilization in various settings, developed by DEM and University of Maribor.

The Faculty of Mechanical Engineering at the University of Maribor and DEM developed an optimal business model for using low-temperature excess heat on hydroelectric power plants. The model and projected results were tested on the pilot case of utilization of excess heat for heating of the complex of the HE Fala Museum, where the source of excess heat represents the heat of the generator.

With an appropriate way of using excess heat, it is possible to increase the total efficiency of the aggregate to 1.5%, while at the same time reducing the consumption of the energy needs for heating the hydroelectric plants. So far electric heaters were used for heat supply at museum premises, with the built-in equipment providing only the minimum required room temperature in the winter.

For the exploitation of excess heat, the installation of a suitable water / water heat pump was planned, with the system using the source of excess heat of the cooling system of the generator on the primary side. On the secondary side, we predicted, via an intermediate heat storage room, the supply of a hot water heating system. According to the input data and temperature requirements of + 18oC in the museum complex, the final energy savings will be 144,946.5 kWh / year, which confirms the viability of excess heat recovery in this specific case.

The use of excess heat on hydropower plants and other industrial plants, in particular, is an opportunity for investors, both within the new and existing energy facilities, since the heat power of excess heat often exceeds 500 kW.