



### **Improvements in district heating systems need to start with the substations**

Partners of the InnoHeat project are on the home stretch, trying to finish remaining activities before the end of 2014, and the end of the project. MEC Kolobrzeg has decided to focus on a pilot project related to the functioning of substations and on the overall structure of the grid.

#### **A close partnership has been developed for improvements in MEC Kolobrzeg**

Improvement of the system has been an effort fraught with some disappointment for MEC Kolobrzeg. Before InnoHeat a Swedish consulting company was assigned the task of analyzing the efficiency of the grid and coming up with ideas for improvements, but neither did they come up with satisfactory results, nor concrete improvement activities. As the InnoHeat project has gone on it has become increasingly obvious that the analysis capacity that is needed by MEC Kolobrzeg has been built up among the people who have become connected to the project.

Through the project a close partnership between ESS and Krafringen in Lund has been developed. The research facility ESS will supply heat to the grid operated by Krafringen, which supplies heat to the municipalities of Lund, Eslöv and Landskrona. Through the cooperation between InnoHeat partner ESS and Krafringen, the district heating engineer at Krafringen, Holger Feurstein has become connected to the project. Now, MEC Kolobrzeg has appointed Holger head of an improvement team that is analyzing a number of important aspects of the Kolobrzeg grid in order to suggest improvement measures. The team also includes Jörgen Persson, an energy expert at ESS, and one of the partners of InnoHeat, and a few other resources.

### **Identifying improvement opportunities in substations and develop a plan**

To their help in this endeavour the team has received a report containing data that has been compiled by Polish consultants. The report contains technical data for almost 200 substations and an analysis of improvement opportunities in the grid overall. Based on this it is the team's task to identify improvement opportunities in substations and develop a plan and a method for improvements.

Within the InnoHeat project we have gradually come to the conclusion that improvements in district heating systems need to start with substations. When substations are optimized in terms of energy efficiency, heat demand in the grid is reduced and the need for boiler and pumping capacity decreases. Similar conclusions have been drawn by Kraftringen and this company has several examples from the past few years where they have reduced the size of heat exchangers and valves in substations and achieved substantial improvements in terms of efficiency. For this reason the team has started with a thorough analysis of substations. This includes the design of stations, and the selection of equipment in these.

### **A list of the ten least energy efficient substations is to be made**

This analysis has rendered a number of ideas for improvements that need to be verified and discussed with representatives from MEC Kolobrzeg. The efficiency of a number of substations can be improved. These improvements will change the parameters of the overall network and the overall heat needs will be reduced.

The second step of the analysis will be a training activity for employees of MEC Kolobrzeg with technical responsibilities. The training will consist of a number of different aspects. The first part will be a method that is used by Kraftringen. This method is based on the monthly development of a list of the ten least energy efficient substations in the network. Each month the causes of inefficiency are analyzed by a team of representatives from heat production, distribution, and services. This team meets once every month to go through the fresh Top 10 list and assign the responsibility to go to the bottom and analyze the reasons for inefficiency of each of the substations on the list.

### **Detective work and raw analysis important**

In many cases these analyses lead to on-site visits and meetings with the customers who own and operate the substations. Reasons for the inefficiency may vary. Sometimes it has to do with hardware failures and sometimes it is due to changes of control settings in substations. Regardless of the reasons, through detective work and raw analysis, the person responsible will get down to the root causes.

A further part of the training will be related to the design of substations, and how the various components need to be connected. Through personal visits and studies of drawings team members have identified differences between the way substations are designed in Sweden and in Poland. At a second visit, these differences need to be highlighted and discussed. MEC Kolobrzeg will be able to realize energy savings by re-connecting the equipment in some of their substations.

### **Alfa Laval to drill participants in dimensioning heat exchangers and valves in substations**

As the final step of training Alfa Laval will drill participants in the noble art of dimensioning heat exchangers and valves in substations. At the Alfa Laval plant in Ronneby, Kolobrzeg employees will also be treated to a visit to their laboratories and view examples of installations, in addition to experiencing a programme packed with valuable training and information.

Once substations have been optimized and work under optimal conditions it will be time for MEC Kolobrzeg to analyze the overall structure of the network. The large peaks in the morning, caused by the spa hotels in Kolobrzeg, can probably best be tackled through the installation of an accumulator

tank. The need for this tank, and the dimensioning, has to be determined once the re-design of substations has been finished. The same is true regarding the dimensioning of pumping capacity. The need for pump capacity will change as well when substations become optimized. Most likely existing pumps can supply the necessary capacity without a problem.

Overall, the analysis and training activities will contribute a number of new areas of competence for the already knowledgeable technicians in Kolobrzeg. The knowledge about the optimal ways to run district heating systems is developed at a rapid pace in most countries and there are many new tools that need to be added to the tool chest of district heating engineers. InnoHeat has contributed new insights for partners and there is a need to incorporate these experiences into everyday routines in the participating district heating companies.



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