

## **“EEQ2” new heating & power station connected to building and district network - Görlitz, Germany.**

### **Summary:**

---

The “EEQ2” project is an initiative from the public utilities and energy provider of the city of Görlitz, SWG. A similar project had already been previously achieved in 2011, with the construction of an efficient energy district, “EEQ1”. This successful experience led the regional energy supplier to develop another project of urban energy efficiency.

The project was then triggered by the need to replace the heating installation in the detention center. Located in the city center, this area gathers several important potential heat customers, such as a bank, firms, and SWG’s headquarters. Furthermore the heating plants of many of these buildings also needed to be replaced in the immediate future. From these findings, the first elements of the project’s concept were determined.

The next stages of the project concerned winning new customers, to expand the heating network, the technical conception of the plant, and the adaptation of the project’s characteristics to the limitations imposed by the site. In fact, in this dense urban area, little place was available, and the safety measures surrounding the detention center had to be taken into account.

All in all, the construction time only took four months, and the heat delivery to the detention center was assured throughout the construction phase, thanks to reverse delivery from the old heating installation in the SWG building.

The achieved power station is composed of three components. The CHP unit, powered by natural gas, produces yearly 1,431 MWh of electricity and 945 MWh of heat, which represents 53% of the total heat generated onsite. The remaining heat demand is covered by two condensing gas boilers adding 1,280 MWh per year to the heat injected onto the grid. The last element is the hot water storage unit, which enables to balance supply and demand.

Finally the system achieves to avoid the emission of 314 tons of CO<sub>2</sub> and helps to expend the use of cogeneration for heat and power production. The project also succeeded in adapting itself to the restrictions imposed by the site, and could meet the deadlines and respect the initial budget.

# Project creation

---

The “EEQ2” project is an initiative from the public utilities and energy provider of the city of Görlitz, SWG. For the energy producer, subjects such as “sustainability”, “climate protection” and “CO<sub>2</sub> footprint” were commonly used and taken into account in the many undertaken projects. For example, in 2006, 20% of the electricity generated was already produced thanks to cogeneration, and the energy provider aims at increasing that fraction to 30% by 2020.

Furthermore, the regional energy supplier had already achieved a project about an energy efficient district, “EEQ1” in 2011, which proved to be a success, and was thus willing to reiterate the adventure. For the project to be achievable, it had to be located in an area with a dense heating need, to optimize the system and the heat distribution, reducing in the same time the heat losses. It is against that background that the firm considered the areas near the city center, where important heat consumers could be found.

The project really began when the need to replace the heating equipment in the detention center arose. At this occasion, the first elements of the concept were discussed. It turned out that many other heating installations in the neighboring building also needed to be renovated within short time. Most of these old installations were powered by heating oil, which means that a noticeable improvement could be achieved by changing to a less carbon-emitting fuel.

Based on the previously acquired experience and the potential of the area, it was decided to implement a cogeneration unit connected to a local heating network. The detention center was chosen as the site where the plant would be installed, since it was central, and a certain customer. However, this location imposed many limitations, due to the safety measures surrounding the access to the detention center and the lack of space available. For these reasons, the prospect of building a wood pellets boiler was abandoned in favor of a condensing boiler running on natural gas. In fact, it turned out that a connection point to the medium pressure gas network could be found near the SWG buildings, which perfectly suited the project. The technical conception that took place was based on these considerations.

From the earliest stages, apart from the environmental aspects, the economic considerations were deemed essential to the success of the project; that is to say that additional costs in comparison with the initial budget had to be limited. Another term of the contract was to ensure that the heat delivery to the detention center would be assured during the construction phase.

The neighboring firms who chose to become customers of the local heating network were offered long-term contracts for heat delivery. Apart from them, other potential customers from the area have already expressed their interest and may be connected as well in the near future, thus expanding the network.

# Energy production

---

The plant is located in the administrative buildings of the detention center. The heat and power station is composed of three main components:

- The CHP unit, for the base load;
- Two condensing gas boilers, as peak-load and reserve;
- The hot water storage.

The cogeneration unit is powered by natural gas. It has an electric capacity of 140 kW<sub>el</sub> and a thermal capacity of 210 kW<sub>th</sub>. The cogeneration unit is running 6,750 hours per year, and produces yearly 1,431 MWh of heat and 945 MWh of electricity. The heat production is equivalent to the annual needs of 93 households, and the power production reflects the needs of 236 households. It can alone cover 53% of the heating needs of the network.

The heat generation is completed by two condensing boilers, powered by natural gas, and with a thermal capacity of 900 kW<sub>th</sub> each. Unlike more common boilers, these two units condense the gas formed during the fuel combustion, which enables to recover more energy from the gases and by extension from the fuel. The combination of the two boilers produces 1,280 MWh of heat per year.

The last component is the hot water storage unit. It is composed of two water tanks of 5 m<sup>3</sup> each. They enable to balance supply and demand: when the heat production exceeds the demand from the network, the excess heat is stored and later reinjected in the network to cover the daily peaks. In this regard, the heat storage unit helps keep the other components in their nominal capacity, ensuring the best yields out of the fuel into energy.

# Energy distribution

---

The local heating network connects the detention center and the other customers of the network: the administrative buildings of the public utilities of the city of Gornitz, SWG, and the neighboring bank. The network distributes 700 kW heat to the detention center, 300 kW to the public utilities and about 360 kW to the bank.

The piping network was installed within short time, since the construction phase only lasted 4 months. Furthermore, to ensure the continuous heat delivery to the detention center during the works, the heat was produced in the old facility of energy provider, and delivered over the new network, forming a system of reverse delivery.

Moreover, there is a potential for expansion of the network, with the near district court and two other firms located in the same area.

# Conclusion

---

The “EEQ2” project achieved to create a local heating network in an urban and dense area, despite the lack of space available and the security measures surrounding the detention center. The heat and power station provides the neighboring buildings with electricity that comes with 100 % from cogeneration, and the cogenerated heat accounts for 53% of the total heat produced. The electricity production amounts 945 MWh and the total heat production is of 2711 MWh per year.

The plant replaces several old installations running mostly on heating oil, enabling to save 314 tons of CO<sub>2</sub>. This avoided CO<sub>2</sub> quantity is the equivalent to the amount that would be emitted by a truck driving 41 times around the earth, which represents 1.7 million km.

Finally, the initial budget was respected, the construction phase only lasted 4 months, and the heat delivery to the detention center was assured continuously, using the new network and thanks to reverse delivery from the old heating plant in the SWG headquarters.