

GE Energy Supports Czech Republic's Tipsport Arena Launch 2009 FIS Nordic World Ski Championships

GE's Jenbacher Cogeneration Plant Boosts Energy Efficiency of High-Tech Sports Complex

The Czech Republic's support of European Union goals to expand the region's use of cogeneration to improve local energy security and reduce greenhouse gas emissions will be on display in Liberec, where the 2009 (International Ski Federation) FIS Nordic World Ski Championships are being held February 18- March 1. The event will feature some of the world's top men and women in ski jumping, cross-country skiing and nordic combined.

Liberec's Tipsport Arena, which is hosting the event's opening ceremonies February 18, is showcasing its advanced combined heat and power (CHP) plant powered by two of GE's Jenbacher gas engines. The plant supports the arena's onsite heating, power and cooling requirements while delivering any surplus electricity to the local grid and surplus heat to the city's central heat-distribution network. The power plant further enhances local energy security by supplying crucial backup power to the city during local power outages.

The two GE Jenbacher cogeneration units have operated at the arena since late 2004 and will have together surpassed the 60,000 operating hours-milestone as of February 2009. The plant has produced 16,170 megawatt-hours (MWh) of electricity and almost 21,700 MWh of heat, which would be enough to heat about 2,200 average EU households for one year. Cogeneration, or CHP, is a much more energy efficient solution than relying on separate sources, achieving significant primary energy savings compared to separate power and heat equipment. As a result, these systems produce overall lower levels of GHG emissions during the generation process.

"I am very happy that Tipsport Arena has become a part of such an event as the Liberec 2009 World Nordic Ski Championship. It's an opportunity for us to present the efficiency of our energy system based on GE's energy-saving Jenbacher units. We have been using these modules for five years already to our utmost satisfaction and we do believe they will continue to serve us greatly in the future," says Ing. Jiří Lenkvík, Director of Warmnis, the company having implemented and operating the energy infrastructure of Tipsport Arena in Liberec.

The arena's commercial CHP system is a clear example of how the Czech commercial sector is embracing the use of cogeneration to increase production efficiency while also reducing site emissions.

Between 2006 and 2009, the country implemented a national plan to improve energy management as well as the use of renewable energy sources of energy. A key goal of the plan was to increase national energy effectiveness by 2.6 % a year and energy savings by some 11 Petajoule (about 3,056 gigawatt-hours (GWh)) a year.¹ The project also supported a 2004 EU directive calling on member countries to expand the role of cogeneration to help meet their energy security and environmental targets.²

Building the Tipsport Arena: Preparing for Energy Efficiency

In 2004-2005, the Liberec municipal ice-hockey stadium was dramatically reconstructed and converted into an ultra-modern, multi-use facility. The high-tech Tipsport Arena was added as a new wing to the complex.

The arena was designed to meet the highly demanding energy efficiency goals of the arena's management and municipal representatives, who were the project's investors. While planning the arena project, the management decided to install a cogeneration plant to serve not only Tipsport Arena, but also benefit residents in the surrounding city of Liberec.

The Tipsport Arena officially opened in September 2005, and the CHP plant began operating in late 2004 to support the site's redevelopment. During the stadium's reconstruction, the engines supplied heat for the workers at the site, while the CHP plant's electricity was fed into the public power grid.

Energy system's outcome

Plant's Electricity

The arena complex uses up to 84% of the electricity produced by GE's Jenbacher gas engines. The electricity is used to drive the engines of the facility's heat pumps and cooling compressors while any surplus power is sold into the public grid. GE's Jenbacher gas engines at the Tipsport Arena also serve as an emergency source of energy in case a local blackout occurs.

Plant's Heat

As for thermal power produced by GE's gas engines, 71% is used to support the sports complex. The produced heat of 50°C is used to provide heat and water-heating not only in the arena but other adjacent buildings as well, including a multifunctional building that houses a gym, bowling

¹ <http://www.energyagency.at/enercee/cz/energypolicy.htm>

² <http://europa.eu/scadplus/leg/en/lvb/l27021.htm>

hall, shooting range, restaurant, indoor sports hall, regeneration centre, old ice-hockey hall and the arena's hotel. Surplus heat is sold into Liberec's central heat-distribution network.

Plant's Cooling

In the cooling machine room, three cooling compressors have been installed and use ammoniac as a primary cooling medium. The condensers then cool the secondary medium, ethylene glycol which serves as a cooling medium in the three ice-hockey rinks. The heat generated by ammonium vapours, both evident and condensational, is then collected and further used at the site. The heat recovery machine room has been equipped with two big heat pumps, with heating power of 1,200 kW and cooling power of 920 kW. The heat pumps serve, at the same time, as the cooling engines for air-conditioning.

Thanks to the meticulously detailed design of the whole energy management solution, including optimization calculations, a technical solution has been implemented that is exceptionally efficient under the right operation. The return of investment for the project owners – with all the costs included – was three years.³

GE Energy's Jenbacher gas engine business has been operating in the Czech Republic since 1992, supplying more than 60 Jenbacher CHP units throughout the country via its authorized local distributor Klor GmbH.

Other examples of GE's successful Jenbacher CHP projects in the Czech Republic include:

- The same type of GE's Jenbacher cogeneration unit used in Liberec's Tipsport Arena has been working for over a year in the Kněžice biogas station, where it burns renewable biogas from agricultural waste, supplying heat and electricity to Kněžice's inhabitants.
- WARMNIS also completed a similar cogeneration project in 2008 in České Lípa. The local sports arena, which features in-house swimming pool and an ice rink, is equipped with one of GE's Jenbacher type JMS 208 GS-N.LC CHP units with the same parameters as the Liberec. Also here, the energy management system proves highly efficient results with a total efficiency level of 89%.

###

³ This was calculated as if all the energy (heat and electricity) were bought from the public distribution networks.