



Combined heat and power generation using Series 4000 engines

HEAT AND POWER FOR LUXURY HOTELS IN TURKEY

Who Kaya Palazzo Golf Resort Hotel, Cornelia
Diamond Golf Resort & Spa and Maxx Royal
Belek Golf & Spa Resort

What Combined heat & power generation plants
based on Series 4000 natural-gas engines

Where Belek/Antalya, Turkey

Lying directly on the Turkish Riviera, the luxury hotels in the region of Belek in Antalya offer first-class accommodation and service. To cover the power requirements of three of the biggest hotels, combined heat and power plants from Rolls-Royce with top energy efficiency have been in service at the resort since mid-2013. During this time, the power systems helped to conserve energy and to protect the environment at the same time.



A Rolls-Royce
solution

Belek/Antalya, Turkey – Since the eighties, Belek, a small village on the Turkish Riviera, and its surroundings, have never stopped growing. Within the span of a few decades, what was a 17-km stretch of coastal marshland some 40 kilometers east of Antalya underwent a transformation, becoming the hottest holiday tip among luxury-seeking tourists and golf enthusiasts. Today, over thirty four and five-star hotels offering first-class service in a stylish setting act are a magnet to holiday-makers.

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Ali Akkuş

Technical Director, Kaya Palazzo Belek Hotel

As the region became more urbanized and the number of visitors grew, so did the power requirement. Belek received its natural gas pipeline at the end of 2012. Since then, the number of combined heat and power plants (CHP) based on natural-gas engines has continually grown, reaching a total of twelve CHP plants.

Hotels the ideal candidates for cogeneration

The first to use CHP plants were the Riviera’s biggest luxury hotels: Kaya Palazzo, Cornelia Diamond and Maxx Royal. Since mid-2013, these have all been using fuel-efficient cogeneration plants to simultaneously produce electrical power and heat for their hotel operations. There are currently ten Rolls-Royce CHP plants in total, of which eight are already operating, and an additional two plants scheduled to be delivered. The company already has experience of building power generation systems for hotels in Turkey – Rolls-Royce

plants have been in service at the Bursa Hilton and Bursa Hilton Hampton in the north-west of the country for several years now.

“Hotels are the ideal candidate for on-site power generation using the CHP principle,” explained Ali Güzel, Sales & Marketing Director, MTU Turkey. “Their power requirement remains constant throughout the year and they use the heat and power they generate directly on the hotel site, without any distribution losses. That means that they almost completely utilize their primary energy source, which protects the environment and their wallet at the same time.” That is an important criterion for Belek’s hotel owners, who have committed themselves to responsible use of local natural resources.

Optimum use of heat for high overall efficiency

Rolls-Royce devised effective solutions for adapting the plants to the actual power requirements of the luxury hotels they are serving. Each hotel covers several hundred thousand square meters of space, with hundreds of rooms, heated swimming pools and spa areas, and diverse shopping facilities and entertainments. The power needed for smooth running is delivered by natural-gas CHP systems from Rolls-Royce based on MTU enhanced-power Series 4000 gas engines. Connected to a generator, and depending on the engine model, they deliver up to 2,145 kilowatts for electrical consumers in the hotel. A heat module is also deployed to extract heat from the exhaust gas, engine coolant (up to 90°C) and aftercooler (up to 45°C). That heat is then harnessed for other uses, such as generating steam for cleaning the hotels’ laundry.

With maximum use of the heat extraction potential, the plant achieves an overall level of efficiency that is exemplary at almost 90%. “By generating our own heat and power, we save energy costs and do not have to rely on the public grid,” explained Sinan Keleş, Technical Director, Maxx Royal Hotel. “For our guests, that translates into the best possible comfort – nothing stands in the way of their relaxation if everything is functioning as it should.”



At the heart of the CHP plants in Belek are MTU Series 4000 gas engines with 8, 12 and 20 cylinders. (Picture: Rolls-Royce).



The CHP plant in the Kaya Palazzo Belek Hotel delivers 1,286 kWe/h of electrical and 1,124,240 kcal/h of total thermal power. It also delivers 1,094,000 kcal/h of total cooling energy. (Picture: Rolls-Royce)

An important reason for deciding in favor of Rolls-Royce systems was direct local customer service. Rolls-Royce has its own team in Antalya that is on hand to take care of customers in Turkey, and, in this case, the hotel owners of the Turkish Riviera, when spare parts, repairs or other services are needed. "If system problems crop up, we have

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Technical Director, Maxx Royal Hotel

direct access to the manufacturer, without middlemen," says Ali Akkuş, Technical Director, Kaya Palazzo Belek Hotel. "Even if the worst comes to the worst, we can still keep downtimes to a minimum, leaving our guests free to enjoy their holiday undisturbed."

Additional benefits of combined heat, cooling and power

At the Cornelia Diamond and Kaya Palazzo hotels, the heat modules are additionally equipped with single or two-stage absorption refrigeration systems which use waste heat from the CHP plant to generate cooling energy. During the busy summer season, that cooling energy is used for the hotel air-conditioning. In the winter, when temperatures do not exceed 25 degrees and additional cooling is not required, the absorption refrigeration systems are taken off line and the heat discharge used to warm up, for example, indoor swimming pools and saunas. Connection of the absorption refrigeration system in summer makes for optimum heat consumption and enhances the efficiency of the plant as a whole. Together with heating costs, which are lower compared to the cost of electricity, significant competitive advantages are created. Kenan Saltabaş, Technical Director, Cornelia Diamond Hotel: "We use our CHP systems to exploit the energy-saving potential available to us in the best possible way, and all year round."

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Technical Director, Cornelia Diamond Hotel

