Case study

Turboexpander generator in ORC package for high-enthalpy energy recovery

ORegen, the Baker Hughes Organic Rankine Cycle (ORC) package, works with our turboexpander generators up to EG1002 frame size. These machines are designed to recover, at the highest possible efficiency, high-enthalpy waste heat from gas turbines and other heat sources to produce valuable power in virtually any type of industrial plant. They deliver reliable operation in any environment, ranging from extreme desert heat to rigid arctic winters (without freezing protection).

The Baker Hughes turboexpander generator design has two integrally geared stages, the largest of which has a 1,000 mm diameter impeller, that enable speeds up to 10,000 rpm within a much smaller machine size (less than 5 m wide by 12 m long).

Multilink inlet guide vanes (IGV) improve machine flexibility, and are manufactured with specially selected material able to withstand design temperature up to 315°C.

The package also has our patented dry gas seals that prevent process gas leakages into flare thereby decreasing CO_2 emissions.

While our compact solution is based on a standardized design, it still has the customization flexibility to improve overall efficiency and maintenance costs—for any size or type of industrial plant. Detailed dynamic simulation is used to tailor the expander generator to each plant's needs. There are a variety of features and options to fulfill any requirements for pressure, temperature, and flow.

The following three projects illustrate the package's versatility.

Whitecourt, Canada

This project includes our first and largest single ORegen for gas turbine waste-heat recovery delivered in 2012 . It increases efficiency of the pipeline station which is equipped with three of PGT25+ gas turbines. This solution is ideal for remote or unmanned stations.

Berakas, Brunei

This project has been possible thanks to the Sultanate "Green Brunei" initiative promoting energy efficiency and cleaner energy projects. The ORegen waste-heat recovery system delivered in 2015 increases the output of four of our LM2500 aeroderivative gas turbines in the 70-MW power plant.

Saiyok, Thailand

The ORegen system increasing this pipeline station's efficiency is our first in Thailand. It has been delivered in 2015. Waste heat is recovered from the exhaust gas of three PGT25 turbines which drive three of our BCL804 centrifugal compressors.

3 projects: heat recovery from gas turbine exhaust			
Application	Large pipeline station	70MW power generation plant	Medium pipeline station
Location	Whitecourt, Canada	Berakas, Brunei	Saiyok, Thailand
Climate	Cold	Tropical	Tropical
Inlet flow	415,000 kg/h	470,000 kg/h	375,000 kg/h
ORC maximum piping class rating	300	600	600
Inlet temp.	250°C	250°C	240°C
Power	17 MW	17 MW	14 MW

Baker Hughes