SIEMENS
Ingenuity for life

Heat ReCycle Solutions

The efficient water-free alternative

Siemens' Heat ReCycle solution is comprised of a gas turbine power plant with Organic Rankine Cycle-technology (ORC). The combination of proven gas turbine and ORC-technology for efficient recovery of the waste heat is a response to the market challenges which various regions of the world are facing today.

Developing remote areas

Heat ReCycle allows remote areas to be provided with highly efficient and reliable power generation. Unmanned operation in isolated regions enables deployment in desolate areas, supporting economic growth in these parts of the world.

Providing affordable electricity

Heat ReCycle offers electricity at the best possible cost over its lifetime while maintaining high efficiency. This means that both people and industries will have access to affordable energy for their daily needs.

Producing lower emissions

From an environmental perspective, highly efficient Heat ReCycle Power Plants produce lower emissions when compared to other technology that is typically used in remote areas, like diesel generators and reciprocating engines, resulting in lower NOx-, CO2- and UHC-emissions.

Offering water-free solutions

Heat ReCycle is a water-free solution. In many regions in the world, water is a scarce resource. Heat ReCycle power generation allows water to be used for people, not for power.

Key benefits

- A water-free solution
- Very attractive plant CAPEX
- Affordable electricity with the best LCoE for intermediate and base load
- Outstanding power density
- Full remote and unmanned capability
- High reliability and availability with proven technology
- Excellent part load efficiency over wide range
- Quality turbomachinery for high performance
- Lower emissions
- Less noise pollution

Our Heat ReCycle gas turbine portfolio

	Industrial gas turbines					Aeroderivative gas turbines	
							
GT model	SGT-300	SGT-400	SGT-600	SGT-700	SGT-750	SGT-A35 (DLE)	SGT-A65 (DLE)
GT power (ISO)	8 to 9	13 to 15	24 / 25	33 / 34	40 / 41	27 to 38	53 / 54
Configurations	1,2,3,4x1	1,2,3,4x1	1,2x1	1x1	1x1	1x1	1x1
Plant output	11 - 46 MW	18 – 68 MW	34 – 68 MW	~ 44 MW	~ 50 MW	35 – 50 MW	~ 65 MW

A perfect fit for decentralized power generation

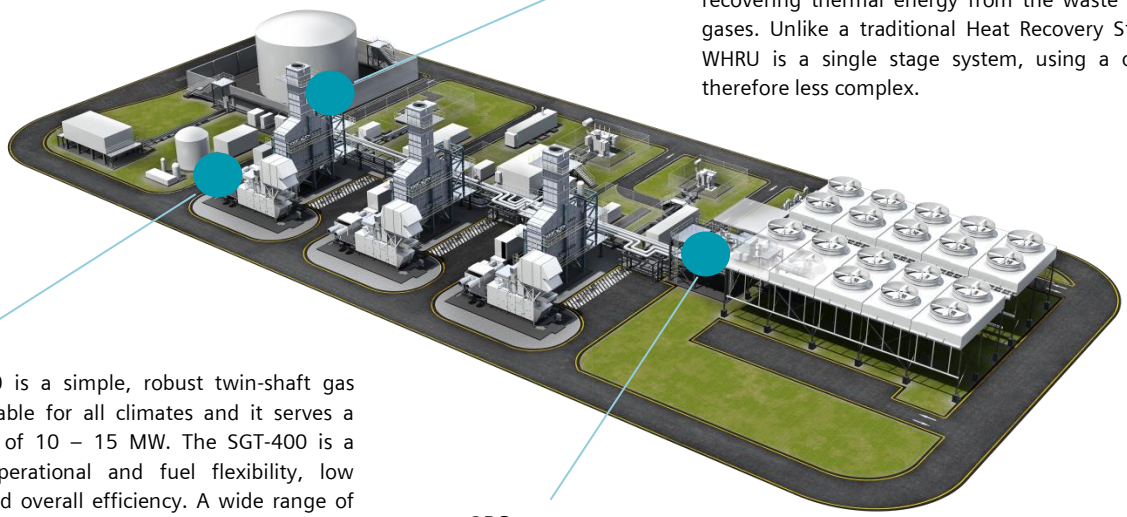
The Heat ReCycle range of power plants provides a wide choice of different industrial and aeroderivative gas turbines. The power plant can be customized for the required project-specific boundaries, such as power output and operating load regime. Heat ReCycle power plant configurations are possible from roughly 10 to almost 100 MWe capacity.

Multi-unit set-up for optimal flexibility

The 3 x SGT-400 Heat ReCycle reference configuration is used as an example for explaining this new power plant in further detail. Having a three-on-one (three gas turbines on one ORC-turbine) configuration in the typical 50 MW capacity size range enables operational flexibility. Especially for remote locations, the 50 MW size range has traditionally been served by reciprocating engines or simple cycle gas turbines. Now, Heat ReCycle offers a cleaner and more efficient alternative, while providing a great deal of flexibility through this multi-unit set-up.

WHRU

The Waste Heat Recovery Unit (WHRU) offers an efficient method for recovering thermal energy from the waste heat of gas turbine exhaust gases. Unlike a traditional Heat Recovery Steam Generator (HRSG), the WHRU is a single stage system, using a once-through principle. It is therefore less complex.



SGT-400

The SGT-400 is a simple, robust twin-shaft gas turbine, suitable for all climates and it serves a power band of 10 – 15 MW. The SGT-400 is a leader in operational and fuel flexibility, low emissions and overall efficiency. A wide range of fuel compositions can be burned while running efficiently at all loads.

Heat ReCycle-400 3x1 configuration	
Net plant output MW(e)	~ 52 – 58
Net plant efficiency (%)	~ 47 – 50
Fuel	Natural gas/liquid fuel/dual fuel/other
Frequency	50/60 Hz
Bottoming cycle	Organic Rankine Cycle
Heat transfer medium	Thermal oil/ Cyclopentane
NOx-emissions	≤ 15 ppmvd

ORC-system

The Organic Rankine Cycle's principle is based on a turbo-generator working as a conventional steam turbine to transform thermal energy into mechanical energy and finally into electric energy through an electrical generator. Instead of generating steam from water, the ORC-system vaporizes an organic fluid, characterized by a molecular mass higher than that of water, leading to a slower rotation of the turbine, lower pressures and no erosion of the metal parts and blades.

Organic Rankine Cycle-technology (ORC) provider

For ORC-technology, Siemens cooperates with Italian company Turboden. With about 380 ORC-installations in over 42 countries providing over 600 MW of power, Turboden is a globally leading company in the field of ORC-technology.

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