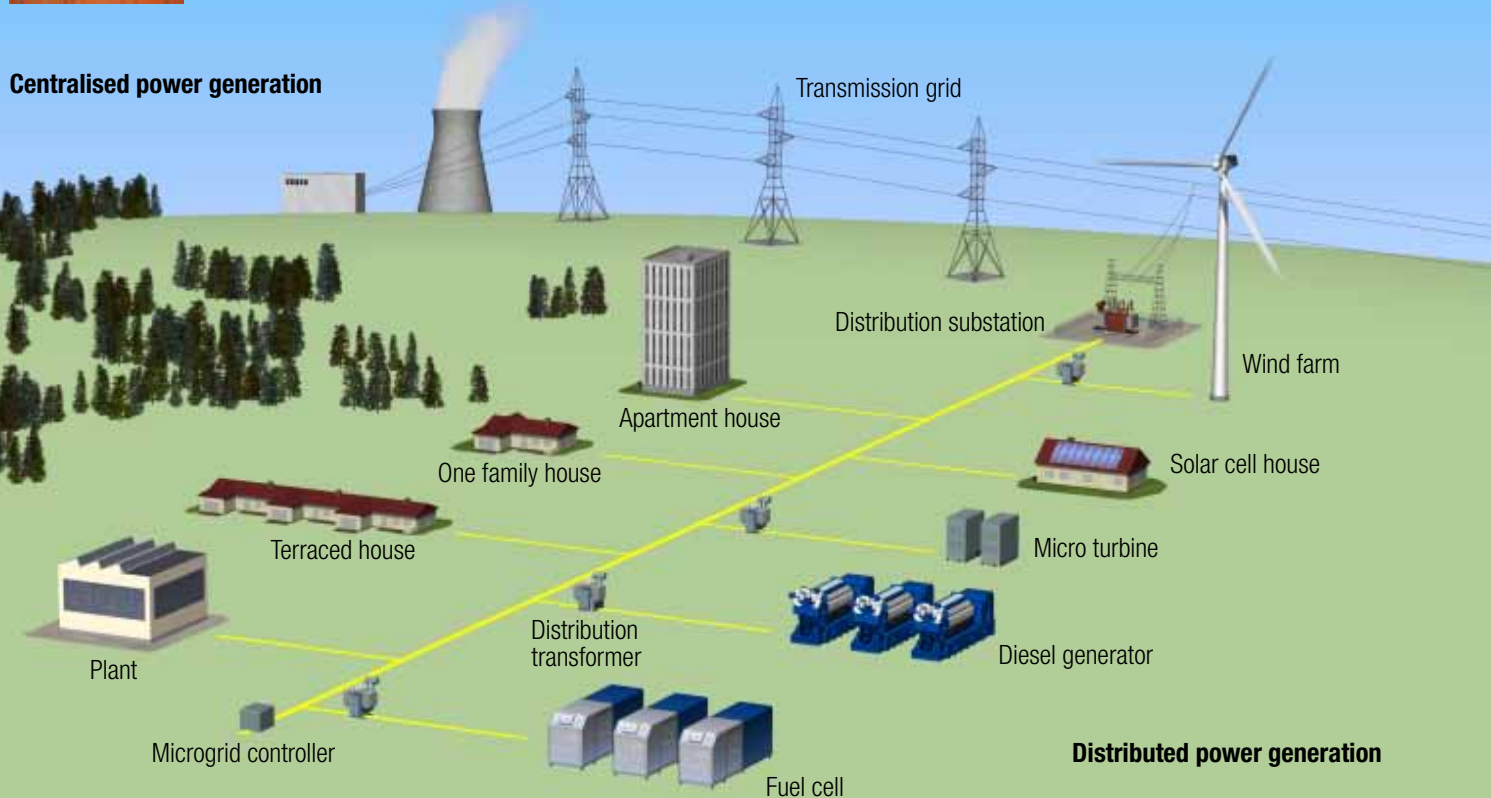


ENERGY  
ENVIRONMENT  
ECONOMY

# WÄRTSILÄ FUEL CELLS FOR STATIONARY APPLICATIONS

## Centralised power generation



Wärtsilä is one of the leading Solid Oxide Fuel Cell (SOFC) system developers providing highly efficient and clean power solutions to its customers. The fuel cell development program will commercialise fuel cell technology based power solutions for distributed power generation and marine markets.

## STATIONARY FUEL CELL

Wärtsilä is developing fuel cell technology for distributed power generation in the power range of 50 kW to 5 MW. Current development focuses on commercialisation of Wärtsilä FC50 and introduction of Wärtsilä FC250 in the 250 kW power range, followed by bigger units later on. The units are optimised for distributed power generation at sites located near the end-users. Decentralised power generation provides a secure, reliable, efficient and independent way of energy production. Grid independent operation

is possible, securing the customer's power supply in all circumstances.

## BENEFITS OF DECENTRALISED POWER GENERATION

- On-site energy, reduced transmission losses
- Reliable energy supply and operation
- Grid independence: Grid parallel or island mode operation

## BENEFITS OF FUEL CELLS FOR STATIONARY POWER GENERATION

- High electrical efficiency above 50%
- High thermal efficiency
- High part load efficiency
- Co-generation and tri-generation
- Fuel flexibility and possibility to use CO<sub>2</sub> neutral renewable fuels
- High reliability and availability
- High exhaust gas temperature above 400 °C gives high grade heat availability
- Ultralow NO<sub>x</sub> and no SO<sub>x</sub> emissions
- Low noise level
- No vibrations

## APPLICATIONS

Wärtsilä Fuel Cells can be installed flexibly in a number of applications that need both electrical power and heat at high efficiency, or produce suitable fuels (such as biogas) in their processes. The power range and quality of Wärtsilä Fuel Cells are sufficient for a broad variety of applications. Potential applications include:

- Biogas applications: Farmhouses, sewage treatment plants, landfills
- Premium power, backup applications: Telecom industry, data centers, hospitals, banks
- Commercial buildings and industries that need power and heat: Hotels, malls, offices, industries



WÄRTSILÄ



### CASE WFC20 AT NEW ENERGY SITE

With the New Energy project, Wartsilä has delivered the world's first SOFC power plant using low heat quality landfill gas. The WFC20 demonstration unit is located in the Vaasa housing fair site on the West Coast of Finland. The unit is designed as a CHP system, providing the site with a 20 kW nominal electrical output and a district heat thermal output of 14–17 kW. Wartsilä's partners in the project include Sarlin Oy, Mateve Oy, Suomen Lämpöpumpputekniikka Oy and Sonera, as well as the City of Vaasa, Vaasan Sähköverkko Oy, Vaasan Sähkö Oy and Vaasan Vesi.

The landfill gas contains extensive amounts of N<sub>2</sub> together with normal biogas compounds, CH<sub>4</sub> and CO<sub>2</sub>. The low heat value of the fuel together with a strongly fluctuating CH<sub>4</sub> content presents great challenges to process control and system design. Under the challenging circumstances, in this installation the WFC20 power unit has proven a solid performance and competitive advantage to conventional power generation technology both in terms of availability and efficiency.

To mitigate the risk performance degradation due to impurities in the landfill gas, the unit has been equipped with a gas cleaning system, effectively removing gas impurities.

### MEASURED PERFORMANCE:

Net electrical efficiency .....	over 43%
Contaminant levels of all impurities .....	< 100 vol-ppb
Emissions. NO <sub>x</sub> .....	0 pmm
SO <sub>x</sub> .....	0 pmm
particles.....	0 mg/m <sup>3</sup>
Noise .....	< 70 dB
Degradation.....	Less than 1%

During its operation the WFC20 unit has shown a state of performance with low system degradation, stable operation, high efficiency and ultra low emissions.