



# Horizon Fuel Cell Technologies Industrial Applications

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# EMPOWERING OUR FUTURE WORLD WITH CLEAN ENERGY

## Horizon Fuel Cell Technologies

### About us

Horizon Fuel Cell Technologies was founded in Singapore in 2003 and currently operates 5 international subsidiaries with 14 offices around the world. Its mission is to change the game in fuel cells, by working globally on immediate commercialization, dropping technology costs, and removing the age-old hydrogen supply barriers.

Horizon started with small and simple products that require low amounts of hydrogen, while preparing for larger and more complex applications. By following a strict guideline and roadmap, Horizon quickly emerged as the world's largest volume producer of fuel cells below 1000W, serving customers in over 65 countries with what is the widest selection of commercial products in the fuel cell industry. Horizon is now preparing for launch of 5000W to 10,000W systems.

## A comprehensive technology platform

Horizon's technology platform is comprised of three main parts:

- 1) PEM fuel cells (micro-fuel cells and stacks) and their materials,
- 2) Hydrogen supply (electrolysis, reforming and hydrolysis) as well as
- 3) Hydrogen storage and pressure related devices.

From this powerful platform, stem several market-focused business units within the company, with their own lines of commercial products.

## Horizon today

Today, Horizon is a global and highly networked organization with regional teams in place and 4 distinct international centers of competence (automotive, telecom, defense/aerospace, and consumer products).

As a result of its shared platform, the company is able to produce the full spectrum of fuel cell products - from the world's most energy dense systems to industrial grade systems, from micro-fuel cells to multi-kW industrial-grade solutions. Horizon is also capable of supplying the right hydrogen storage or on-site hydrogen generation solutions.

## Horizon Fuel Cell Systems

Horizon Fuel Cell Technologies Industrial solutions are applicable for a wide range of applications that require off-grid continuous power or on-grid back-up power.

Applications include telecom sites, airfield lighting, rail signalling, temporary signage emergency lighting, security systems and more.

## Industrial Solutions

### ECOBIX RFC 120

The **ECOBIX RFC 120** fuel cell system is designed to detect and respond to any interruption indoor grid power - a reliable on-demand UPS backup system of 120W continuous power output for critical equipment.

The system is self-replenishing, using an integrated electrolyser to make hydrogen. An environmentally friendly and extremely energy efficient system that has a long life-time and self-discharge unlike batteries.



### ECOBIX MFC 150

The **ECOBIX MFC 150** fuel cell system is a portable industrial power solution of continuous power of 150W that can be configured to connect directly to your load for constant power, or connect to your battery to continuously monitor and maintain its charge level.



### MFC 3000

The **MFC 3000** is a high capacity fuel cell UPS system of 3kW power output that can be configured to connect directly to your load to provide constant, prime power, or connect to your battery to continuously monitor and maintain its charge level.



The MFC range of fuel cell systems includes an integrated fuel reformer that converts a blended mix of low-volatility liquid methanol-water (2:1) into hydrogen gas using an electro-chemical process, eliminating the need for stored hydrogen.



All Horizon fuel cell systems can also be combined with a solar system to reduce fuel consumption and provide even longer lasting autonomous power.



MFC3000 Fuel Cell

The MFC Fuel Cell range are high capacity Fuel Cell UPS Systems. They provide autonomous off-grid power for both indoor and outdoor environments and are able to power DC/AC inverter or an UPS module.

The system consists of

- \* Fuel Cell Stack
  - \* Fuel Reformer
  - \* Fuel Storage
- \* Electronic Control
  - \* Customer Interface Panel

Monitor and control the features on the MFC remotely anytime and anywhere.

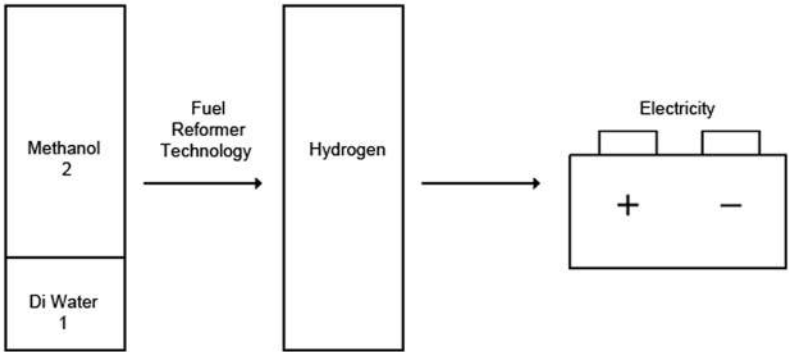


The MFC range of high capacity fuel cell based systems are available in 1kW, 3kW, 5kW and 10 kW configurations.

MFC	1000	3000	5000	10000
Nominal continuous power output	1000W	3000W	5000W	10000W
Run time on full load	222 Hours	74 Hours	44 Hours	22 Hours
Nominal Voltage (Typical DC)	48V DC			
Nominal Current	62.5A			
Voltage Range	43.2V DC to 57.6V DC			
Fuel Consumption	0.8L/kWh (63% Methanol - Di Water Mixture)			
Power Cabinet Dimensions (WXDXH)	600 X 600 X 1600mm			
Total Weight	180kg			
Enclosure Material	Galvanised steel plate, powder-coated ( IPS4 rated)			

About the Technology

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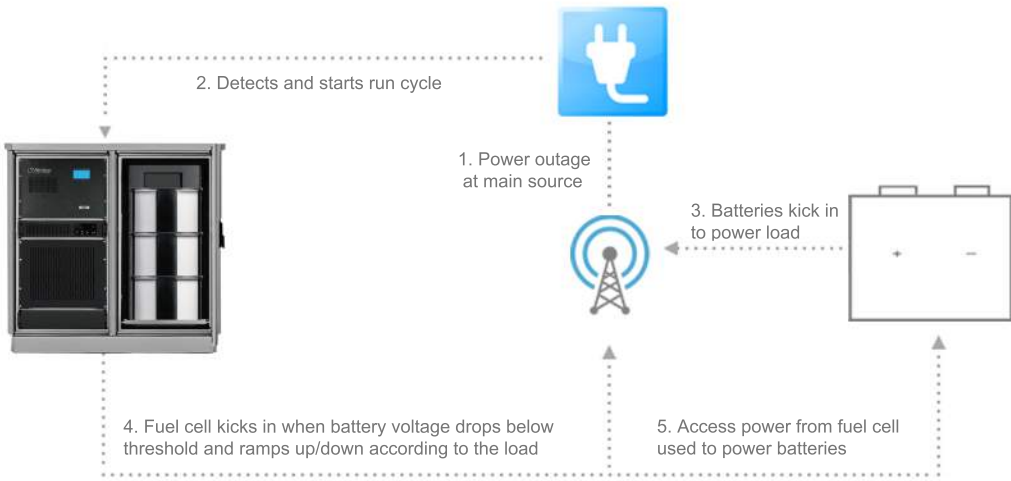
Benefits of Methanol as fuel vs. other hydrocarbons

- ✓ Biodegrades rapidly in air, soil and water
- ✓ Made partially from renewable resources
- ✓ Consistent high quality
- ✓ Lower reforming temperature meaning
  - Faster startup
  - Improved system efficiencies
  - Lower fuel processor capital costs
  - Longer fuel processor life
- ✓ Widely distributed and cost competitive
- ✓ Significant lower sulphur content
- ✓ Reduces risk of fuel cell damage
- ✓ 5 x more energy than compressed hydrogen
- ✓ Significant smaller footprint

Methanol is an ideal source of hydrogen for fuel cells.

MFC as Backup System

The MFC system is designed to detect power outages by monitoring for voltage sag on the DC power bus.



Benefits at a glance

- High reliability
- Long autonomy
- Minimal maintenance
- Few moving parts
- No degradation during standby periods
- Uses low-volatility fuel
- Near silent operation

Maintenance made simple

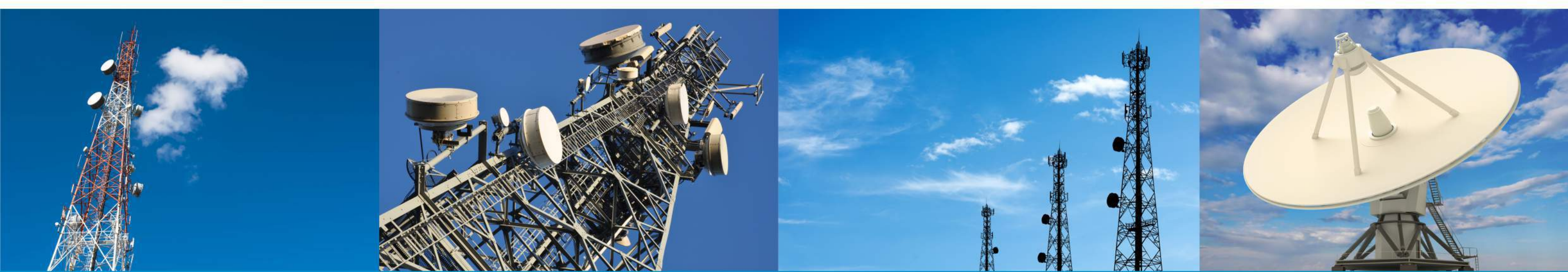
- Equipped with system self test features with time cycles that can be set by the operator on-site or remotely
- Able to verify overall fuel cell stack degradation over time by monitoring the state of health of the stack
- Only one annual visit by technician required to clean or replace air filters
- Automatic air filter warnings

Built with safety in mind

- Protected with over current and over voltage
- Designed to avoid any hydrogen emission in atmosphere at all times
- Equipped with hydrogen leak test during startup and shutdown phases
- Verify proper air ventilation inside cabinet to ensure safety avoiding any hydrogen gas concentration above safety limits

High Efficiency

“200 litres of fuel provides 222 kWh of electrical power.”



### Telecom Solution: MFC 3000

For Telecom applications where “footprint” space is a premium, such as rental tower sites or rooftops, a Telecom grade cabinet is available which encloses the complete system with an internal 280 litre fuel tank. With this cabinet configuration, the MFC requires less than 1m² of floor space and offers the smallest system footprint in the market.

The increased run times with the Telecom Cabinet configuration :

MFC System	Load kW	Run Time
MFC 1000	1kW	311 Hours
MFC 3000	3kW	104 Hours
MFC 5000	5kW	62 Hours
MFC 10000	10kW	31 Hours

48V DC System with  
280-Liter Tank in Telecom Cabinet



### Case study: Telecom backup power application

**Application:** Telecom Site in remote area  
**Problem:** Experiencing 40 hours a month outage  
**Load:** 5kW



### Benefits of using a Fuel Cell System for backup Telecom Power

High reliability

Smaller footprint

Remote Access

Replaces Genset completely

Environmentally friendly

Longer period of autonomy

Reduce chances of fuel theft associated with gensets

Reduced periodic maintenance costs, parts substitution, logistics related to fuel delivery

- ### Other Applications
- Telecom Sites
  - Telecom Rooftop
  - Wireless Base Stations
  - Secure Communication Networks (TETRA)
  - Wire-line Remote Terminals
  - Broadband
  - Airfield Lighting
  - Rail Signalling





**14 offices around the world.**  
**65 countries using Horizon Fuel Cells .**



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