Sector focus – Data centres

Ceres solid oxide fuel cells: playing a critical role in powering data centres

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Supporting expanding data centre power needs with Ceres solid oxide fuel cells

Data centres are the backbone of the digital economy and their energy demands are growing exponentially, especially with the rise of AI workloads. Traditional power solutions often struggle to keep pace with these demands, requiring years to deploy, large footprints and with significant strain on the grid. Ceres offers a cost-efficient, faster and more sustainable alternative.

Ceres SOFC technology offers key infrastructure benefits

Rapid deployment

Solid oxide fuel cell (SOFC) systems can be manufactured and delivered on site to get power online in months not years, connecting data centres to power fast.

Modular and scalable

Ceres SOFC systems can grow with the data centre's power needs, providing flexible expansion and capable of achieving 'five nines' (99.999%) availability with only 10% over-sizing. Ultimately, minimising costs, maximising footprint and simplifying construction and maintenance.

Ceres SOFC technology is world-leading

Highly efficient

Ceres' fuel cell systems operate at 65% net efficiency, keeping fuel costs and emissions low.

Ramps fast

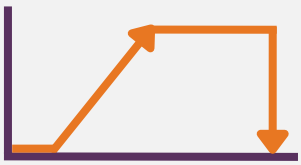
The steel-supported solid oxide electrochemistry facilitates ramping comparably to a battery when integrated into optimally designed systems, providing maximum performance for AI workloads and maintaining stability.

Computer grade power quality

Stable, clean and reliable.

Ideal for AI workloads

Can ramp from 0% to 100% in 20 seconds



and from 100% to 0% instantly

6x
Faster than an aero-derivative gas turbine

30x
Faster than a combined cycle gas turbine

Sustainable

Ceres SOFC systems enable carbon emissions reductions to meet regulatory and customer demands, strengthen brand reputation and future-proof operations.

- Recyclable - 85% steel
- Future fuel ready
- Low emissions - near zero NOx and SOx
- Carbon-capture ready, at low cost (no combustion)

Low Cost

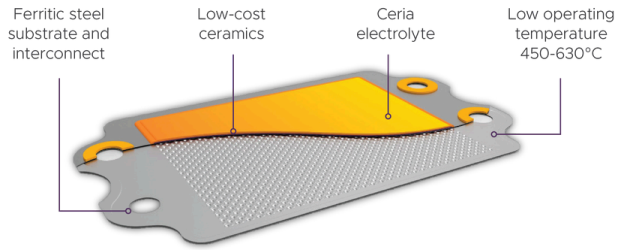
Comparable with conventional generation today, with significant economies of scale as production capacity increases.

Supporting expanding data centre power needs with Ceres solid oxide fuel cells

Delivering reliable power to new data centres is challenging due to already constrained grid capacity. Solid oxide fuel cells offer a compelling alternative for behind-the-meter power generation, offering significant efficiency benefits over alternatives. Effective integration with carbon capture offers further benefits to data centre operators.

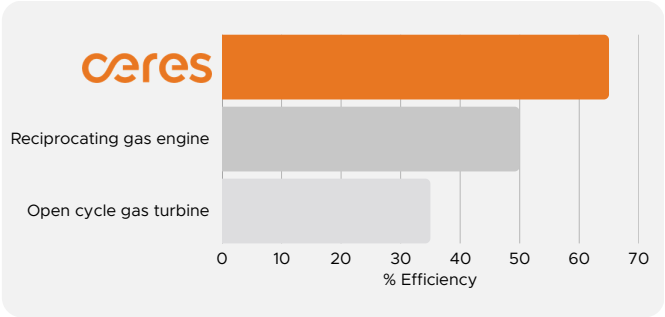
Revolutionary solid oxide technology

Ceres SteelCell® technology is designed around a steel backbone using mass market and widely available materials, with ceria as the electrolyte. The design results in class-leading robustness for ease of manufacturing, transport and operational resilience in addition to high-efficiency and low cost.



High efficiency drives down costs

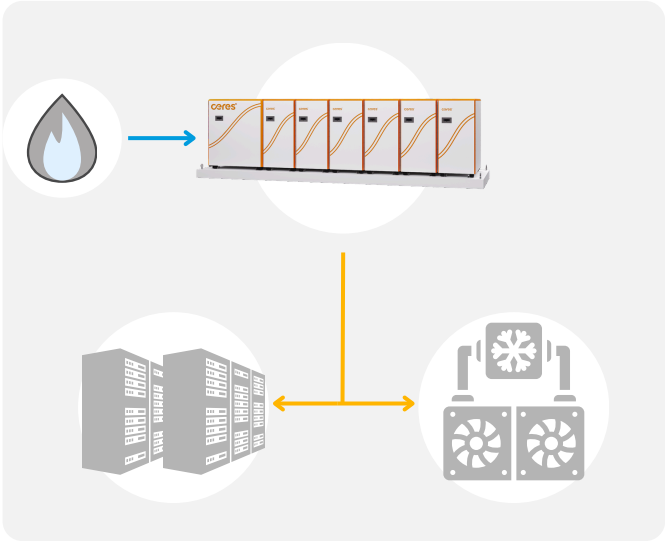
Solid oxide fuel cells are the most efficient method of producing electricity from natural gas: over 65% net electrical efficiency, with potential total efficiency of over 85% if utilising waste heat.



Modular power system architecture supports large scale power requirements.

Straightforward integration with data centre power systems

Scalable power generation using solid oxide fuel cells requires only a gas supply to provide robust, efficient power.



A practical power system, delivering reliable electrical power to data centre IT, cooling and utility loads with straightforward installation, control and integration.

Opportunity to integrate with varying IT load requirements for learning routines, utilising the ability to quickly vary SOFC system power output.

Reduced requirements for backup and UPS assets due to intrinsic reliability from modular systems delivering 99.99% reliability.

Opportunity to configure power output for AC or DC power delivery direct to racks, improving efficiency.

Outdoor installation and no significant cooling requirements support straightforward power system deployment.

Key specification targets

The concept power system is a standardised 500kW building block. The target specifications are shown below.

Please contact us to discuss how Ceres fuel cell systems can support your data centre project development.

Target specification*	Power system
Electrical power delivery (start of life)	570kW
Power delivery	Configurable for AC or DC delivery
Reliability	Up to 99.99% ready
Fuel	Natural gas, bio-gas, blended hydrogen
Efficiency (LHV)	65% (335g/kWh$_e$ CO_2)
System life	15-20 years
Footprint	~12m^2
Power density	~48kW/m^2 (5+1)
Water consumption	Zero
NOx and SOx	Near zero

* Specifications are shown as project targets, and may differ in final configurations

Contact us

About Ceres

Ceres is a leading developer of solid oxide technology: fuel cells for power generation and electrolysers for the production of green hydrogen. Based in the UK, we partner with multinational corporations to manufacture our technology for a wide range of clean energy applications across global industry.

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