

Alkaline fuel cell (AFC)

Relatively low operating temperature (60-80 Celsius) and one of the oldest designs for fuel cells, used in the United States space program since the 1960s. AFCs require pure hydrogen as fuel.

Annual General Meeting (AGM)

AGM is a yearly gathering of our interested shareholders where our executive team present our AR about the Ceres' performance and strategy.

Advanced Propulsion Centre (APC)

APC provides funding for a range of different technologies that are able to help the UK transition to net zero emissions vehicles. APC funding in 2016 supported progress towards a 30kW range extender for electric buses in China.

Annual Report (AR)

The AR is a document that public corporations provide annually to shareholders and other interested stakeholders to describe their activities, strategy, and financial and operational conditions.

Biofuel

A fuel derived from biomass, rather than by the very slow geological processes involved in the formation of fossil fuels. Most common biofuels include bio-ethanol (from sugar or starch crops) and biodiesel (from oils and fats).

Carbon dioxide equivalent (CO₂e)

CO₂e is a comparative measure of the global warming potential (GWP) of various greenhouse gases by converting amounts of the mixture of GHGs to the equivalent amount of carbon dioxide (CO₂) with the same warming potential.

GWP accounts for the difference in the effects of GHGs, namely the efficiency they absorb energy and how long they stay in the atmosphere. The time period usually used for GWP is 100 years.

Carbon Disclosure Project (CDP)

CDP is a not-for-profit organisation that runs a global disclosure system for investors, companies, cities, states and regions to report and benchmark their environmental impacts.

Chief Executive Officer (CEO)

The CEO implements the goals, targets and strategic objectives of the company as overviewed by the board of directors. The CEO reports the status of the company to the board of directors, motivates employees and drives change within the organisation.

Chief Financial Officer (CFO)

The CFO is responsible for managing the company's financial operations and strategy. Reporting to the CEO, the CFO has a substantial say in the companies investments, capital structure, and long term business strategy.

Control of substances hazardous to health (COSHH)

COSHH is the law that requires employers to control substances that are hazardous to health.

Combined heat and power (CHP)

A unit that generates electricity while at the same time capturing usable heat that is created during this process. This heat can then be used to provide hot water or central heating for example, improving the efficiency of the device.

Diversity, Equity, Belonging and Inclusion (DEBI)

Ceres' diversity and inclusion programme.

Decarbonisation

The process of lowering the amount of greenhouse gas emissions (mostly carbon dioxide, CO₂) produced by the burning of fossil fuels.

Department of Energy and Climate Change (DECC)

DECC leads the UK Governments efforts to counter the risks of climate change and the shortfall of safe, reliable, and affordable energy. Ceres secured DECC Energy Entrepreneurs funding of £1m in 2012.

Department of Trade and Industry (DTI)

DTI was responsible for trade and business development and was replaced by Department for Business, Enterprise, and Regulatory Reform (BERR) and the Department for Innovation, Universities and Skills (DIUS) in 2007. The DTI grant enabled the first full system prototype.

South East England Development Agency (SEEDA)

Responsibility for economic development and regeneration in England has passed from SEEDA onto successor bodies, including Local Enterprise Partnerships (LEPs) and central Government departments. SEEDA grants of £560k facilitated the move into our current headquarters at Viking House in Horsham.

Efficiency, electrical/thermal

The amount of electricity/heat that is produced by a process for every unit of energy supplied to the process, often expressed as a percentage.

Efficiency, total

The amount of useful energy in any form that a process produces for every unit of energy supplied to the process, often expressed as a percentage.

Electric Vehicle (EV)

An EV is a vehicle that can be powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source.

Electric Vehicle Range Extender (EVRE)

An EVRE extends the range of EVs by supplying additional electricity to the electric powertrain, either through combustion or through fuel cells.

Electro fuel (e-fuel)

E-fuels, also known as synthetic advanced fuels or synfuels, are fuels in liquid or gaseous form, such as e-kerosene, e-methane, or e-methanol, that are made by synthesizing captured CO₂ emissions and hydrogen produced using renewable or CO₂-free electricity. They are a sustainable alternative to fossil fuels but often release CO₂ when combusted. E-kerosene is part of so-called Sustainable Aviation Fuels (SAF).

Electrolyser

A device that uses an electric current to drive a chemical reaction, the reverse process to that of a fuel cell. There are several types of electrolysis technologies:

Alkaline electrolysis (AEL): In use for more than 100 years, it uses a liquid alkaline electrolyte solution and operates at low temperature with liquid water. It is the largest scale and lowest cost technology today, but is not as efficient as other technologies.

Proton Exchange Membrane (PEM) Electrolysis: Uses a solid electrolyte that requires expensive rare metal catalysts. It can operate at high current densities at low temperature with liquid water and has a high dynamic response.

Solid Oxide Electrolysis Cell (SOEC): Least mature technology, it works at high temperature on steam, giving it significantly higher efficiency and lower operating costs than other technologies when using waste heat, and when integrating it with existing processes such as steel, ammonia and synthetic fuel.

Energy

In physics, the capacity for doing work. It may exist in potential, kinetic, thermal, electrical, chemical, nuclear or other various forms. Measured in Joules or Watt-Hours.

Environmental, Social and Governance (ESG)

ESG investing is a framework to assess companies on their environmental and social issues within a corporate governance structure to encourage companies to act responsibly, often driven by shifting regulations, prioritising long term sustainability or political agendas as opposed to purely immediate returns. ESG enforces or recommends company disclosures related to the impacts on and because of the environment, social impacts such as employee satisfaction and human rights, and governance processes and structures.

Engineering and Physical Sciences Research Council (EPSRC)

EPSRC is a British Research Council that provides government funding for grants to undertake research and post graduate degrees in engineering and physical sciences. Prof. Brian Steel received a grant to develop his ground-breaking SOFC research.

European Union (EU) Taxonomy

Classification system established by the European Commission to clarify which investments are environmentally sustainable.

Financial Conduct Authority (FCA)

The FCA is a financial regulatory body in the United Kingdom, but operates independently of the UK Government and is financed by charging fees to members of the financial services industry. It aims to protect consumers from bad conduct in financial services firms as well as ensuring financial markets operate fairly.

Flow battery (or Redox Flow Battery)

An electrochemical method of storing and generating electricity with flexible storage capacity and flexible discharge electricity rate. A flow battery may be used like a fuel cell or a rechargeable battery, with the electrolyte stored outside of the cell. Unlike a battery, the storage capacity is de-coupled from the cell and the electrolyte can be fed at different rates to generate varying amount of electricity.

A device for converting chemical energy (fuel) directly into electrical energy without the need for combustion. There are several fuel cell technology families, classified by their operating temperature and the type of electrolyte used. These include:

Polymer exchange membrane (PEM) fuel cell: relatively low operating temperature (60-80 Celsius). The low operating temperature means that it doesn't take very long for the fuel cell to warm up and begin generating electricity. Requires pure hydrogen as fuel.

Phosphoric acid fuel cell (PAFC): operate at around 200 Celsius, mature technology and most often used in stationary power generation

systems. It has relatively low efficiency and so is typically only used in CHP systems.

General Data Protection Regulation (GDPR)

GDPR is regulation in European Union (EU) law that sets guidelines on collecting and processing data of individuals who live within the EU or outside of it.

Greenhouse Gases (GHG)

GHG are gases in the Earth's atmosphere that absorb infrared radiation energy and reemit it back, trapping heat radiated by the Earth's surface in the atmosphere. The most common GHGs are water vapour (H₂O), carbon dioxide (CO₂), methane (NH₄), nitrous oxide (N₂O), ozone (O₃), and various synthetic chemicals.

Excess GHGs produced by human activity, or anthropogenic GHG emissions, can amplify the greenhouse gas warming effect in the atmosphere which can lead to instability in the Earth's climate system.

Health, Safety and Environment (HSE)

HSE implements the practical aspect that protect the environment and maintain health and safety in occupation.

Hydrogen (H₂)

A highly abundant naturally occurring gas commonly cited as a fuel for the future as it has a high chemical energy content for its mass and creates no harmful emissions when it is burned to release this energy. Hydrogen is currently used as a feedstock for a number of industrial processes (such as metal smelting or fertiliser production) and is commercially defined by its method of production and the treatment of the waste gases produced:

Brown: produced by using coal where the emissions are released to the air

Grey: produced from natural gas where the associated emissions are released to the air

Blue: produced from natural gas, where the emissions are captured using carbon capture and storage

Pink: produced from electrolysis powered by nuclear energy

Green: produced from electrolysis powered by renewable electricity

Innovate UK

Innovate UK is the United Kingdom's innovation agency, which provides support and funding to organisations that make new products and technologies. It is a non-departmental public body operating at arm's length from the Government as part of the United Kingdom Research and Innovation organisation.

Intellectual property (IP)

An asset that is created by the innovative activities of people and businesses. IP can be in the form of inventions, literary and artistic works, designs and symbols, names and images used in commerce. In business, unique IP is often the basis of competitive advantage and is therefore closely protected for example by calling out a copyright, registering a trademark, or filing a patent. Intellectual Property Rights are protected by law and allow the holder to assert control over how they are used through contracts and licences.

International Chamber of Shipping (ICS)

ICS is concerned with all technical, legal, employment and trade policy issues that impact on international ship operations.

International Energy Agency (IEA)

The IEA is an autonomous intergovernmental organisation based in Paris that provides policy recommendations, analysis and data on the global energy sector. The member countries and associated countries represent 75% of global energy demand.

International Organization for Standardization (ISO)

ISO is a nongovernmental standard development organisation comprising of individuals from national standards organisations from more than 160 member countries.

International Maritime Organisation (IMO)

As a specialized agency of the United Nations, IMO is the global standard-setting authority for the safety, security, and environmental performance of international shipping.

Key Performance Indicator (KPI)

KPIs are quantifiable measure of performance to gauge progress for a specific objective over time.

Natural gas

A fossil fuel energy source that is formed deep beneath the earth's surface. The largest component of natural gas is methane, composed of carbon and hydrogen. When natural gas is burned or used in a fuel cell, it produces energy and waste carbon dioxide.

Nitrous Oxide (NO_x)

A gas that is often formed as an unwanted byproduct of combustion: the higher the temperature or pressure of the combustion, the more NO_x is formed. It is a significant cause of poor air quality.

Original Equipment Manufacturer (OEM)

A company that manufactures and sells products or part of a product to another company.

Platinum group metals (PGMs)

PGMs are a group of six metallic elements that have similar physical and chemical properties and that tend to occur together in the same mineral deposits. These elements usually play a vital role in many industries due to their extraordinary and unique properties.

Research and development (R&D)

R&D are any innovative activities undertaken by universities, corporations or governments to develop nascent services, products or technologies.

Ricardo

Global engineering services company Ceres has engaged to establish a science-based pathway to reduce greenhouse gas emissions in line with SBTi initiative.

RIDDOR

Reporting of Injuries, Diseases and Dangerous Occurrences Regulation.

Science Based Targets initiative (SBTi)

The SBTi is a partnership between CDP, the United Nations Global Compact, World Resources Institute and the World Wide Fund for Nature. SBTi defines and promotes best practice in emissions reductions and net-zero targets in line with climate science to meet the goals of the Paris Agreement – limiting global warming to well-below 2°C above pre-industrial levels and pursuing efforts to limit warming to 1.5°C.

Scope 1

Direct GHG emissions from operations that are owned and/or controlled by the organisation (source: Greenhouse gas protocol).

Scope 2

Indirect GHG emissions from energy imported from third parties, heating, cooling and steam consumed with the organisation.

Scope 3

All GHG emissions that occur as a consequence of the operations of the organisation but are not directly controlled or owned by the Company, such as the use of sold products.

Scope 4

The term Scope 4 emissions refers to emission reductions that happen outside of a product's life cycle or value chain, but as a result of the use of that product.

Solid oxide fuel cell (SOFC)

High operating temperatures (up to 950 Celsius) but highly efficient and able to generate electrical power from multiple fuel types including natural gas, biofuels, hydrogen blends and pure hydrogen. However, these cells are typically expensive as they are constructed from exotic (but fragile) materials resistant to the high operating temperatures.

SOFC system

An assembly that is made up of the fuel cell, fuel input handling components and components engineered to manage the electrical power output and waste heat and gases.

Stack

An assembly of individual fuel cells into a device that can deliver a large amount of electrical power. Ceres stacks are currently manufactured in 1kW and 5kW units. These can be connected in a modular manner to create higher power systems.

Sulphur Oxide (SOx)

The gaseous substance that is formed when sulphur compounds, such as those found in many fossil fuels, are burned. Before low-sulphur fuels were regulated, they were a significant cause of poor air quality from vehicles.

Sustainable Development Goals (SDG)

The United Nations' SDGs aim to call to action to end poverty and inequality, protect the planet, and ensure that all people enjoy health, justice and prosperity.

Sustainability Accounting Standards Board (SASB)

SASB, founded in 2011, is a non-profit organisation focused on independent standards setting (<https://www.sasb.org/>).

Taskforce on Climate-Related Financial Disclosures (TCFD)

TCFD (fsb-tcfd.org) is a new reporting requirement for UK Premium Listed companies publishing results from 2022.

Taskforce on Nature-related Financial Disclosures (TNFD)

Recently launched TNFD details the approach for Corporates to locate their interface with nature.

Technology Strategy Board (TSB)

TSB is now Innovate within Ceres.

The Paris Agreement

A legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016. Its goal is to limit global warming to well below 2, preferably 1.5 degrees Celsius, compared to preindustrial levels.

Total Recordable Incident Rate (TRIR)

TRIR is the percentage of incidents per 100 employees ($\text{Number of Incidents} \times 200,000 / \text{total number of hours worked in a year}$); Source: Occupational Safety and Health Administration (OSHA). Recordable Incident: All work-related deaths and illnesses, and those work-related injuries which result in: death, loss of consciousness, restriction of work or motion, transfer to another job, or require medical treatment beyond first aid.

Watt (W)

The unit by which power is measured. The amount of energy (measured in Joules) is delivered in a fixed amount of time, Joules per Second. Units are typically expressed in kilowatts (1kW = 1,000 watts); megawatts (1MW = 1,000kW); gigawatts (1GW = 1,000MW).

Zero emission

Refers to a vehicle, engine, motor, process or some other energy source, that emits no waste products that pollute the environment or disrupt the climate.