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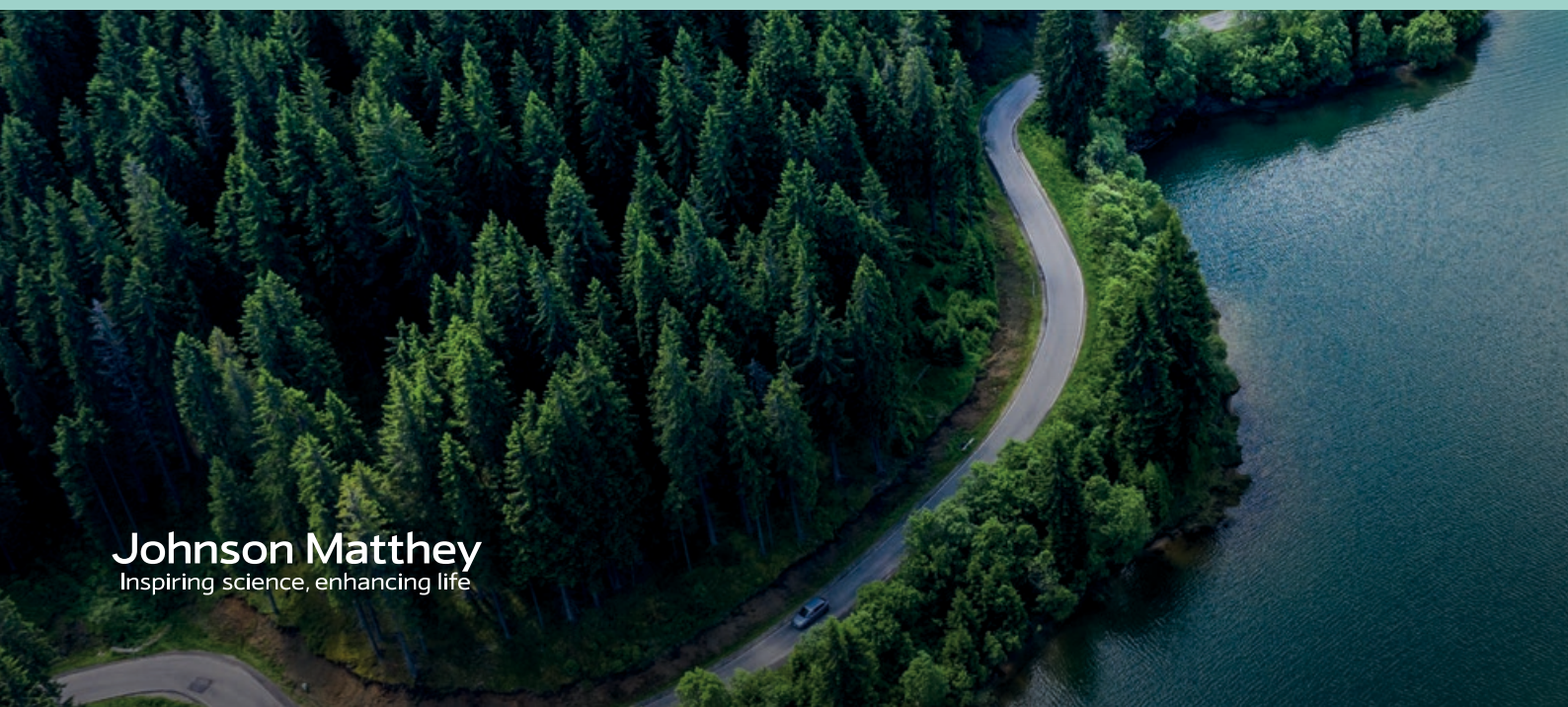
Catalyst coated membrane technology for PEM electrolysis

Driving scale and efficiency in the electrolysers of today and the generation of the future



Johnson Matthey
Inspiring science, enhancing life

Green hydrogen for decarbonisation

Green hydrogen is produced by the electrolysis of water using renewable electricity and generates only hydrogen and oxygen. It is very effective for decarbonisation in many different industries, either as an alternative energy carrier, for large-scale long-term energy storage, with 'or to decarbonise applications that cannot be electrified.

Our green hydrogen technology builds on decades of experience in the development of fuel cell components and the scientific and technological expertise supporting it, by focusing on the manufacture of catalyst coated membrane (CCM) technology for proton exchange membrane (PEM) electrolyser systems.

The challenge

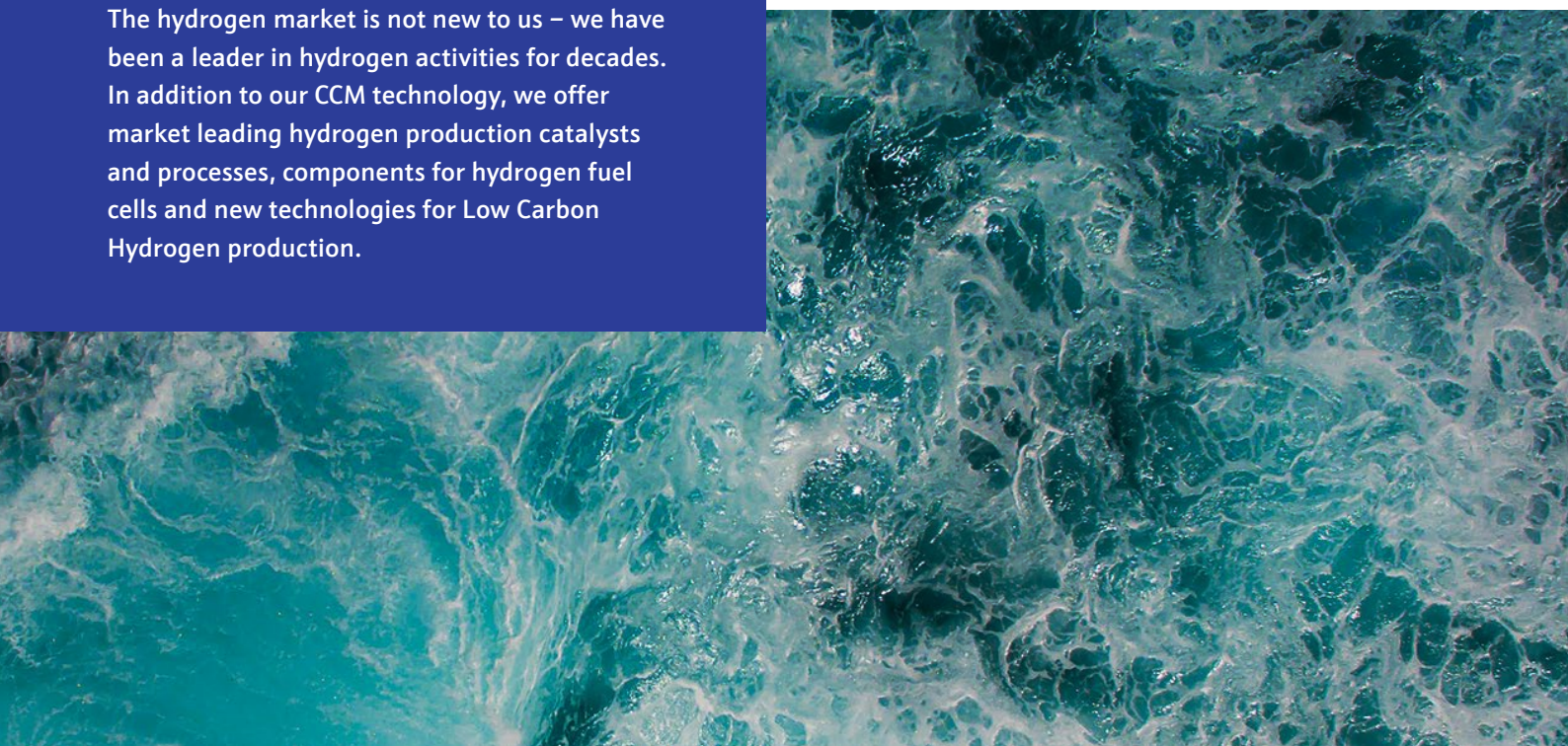
- The mitigation of global warming is being addressed globally but achieving an energy transition on the scale required will be a decades-long challenge
- We need to find a way to reduce the emissions of hard-to-abate technologies such as shipping, chemicals synthesis and steel making
- We cannot immediately stop doing the things today that emit carbon dioxide.

The answer is low carbon hydrogen

- If hydrogen is to serve net-zero aims, it must be produced in a sustainable way which emits as little carbon dioxide as possible
- Green hydrogen is expected to play a major role in decarbonisation efforts to 2050

At Johnson Matthey, our vision is for a world that's cleaner and healthier, for today's and future generations.

The hydrogen market is not new to us – we have been a leader in hydrogen activities for decades. In addition to our CCM technology, we offer market leading hydrogen production catalysts and processes, components for hydrogen fuel cells and new technologies for Low Carbon Hydrogen production.



Innovative CCM technology

CCMs are the heart of PEM electrolysers, facilitating the electrochemical reactions to take place and enabling hydrogen to be produced.

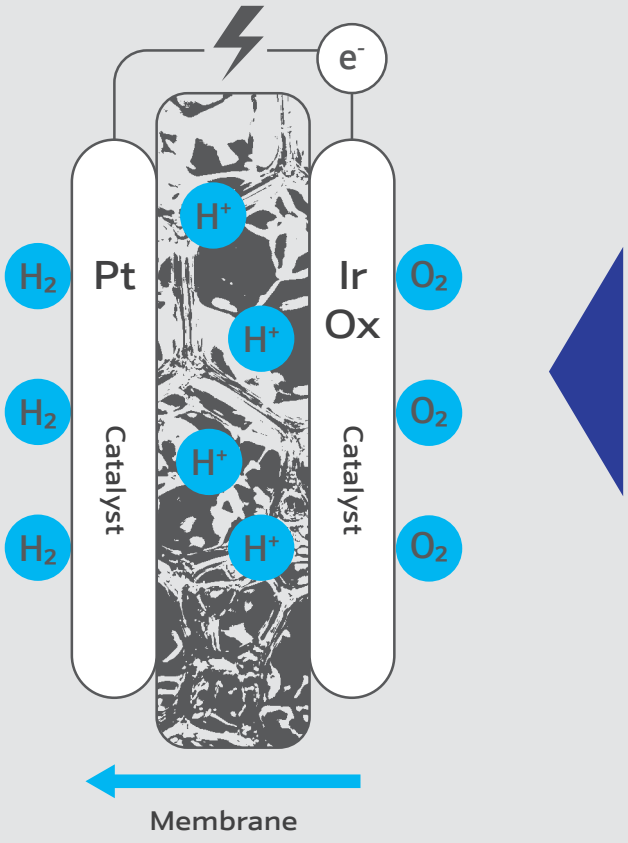
At Johnson Matthey, we develop and manufacture high-performance CCM technology at scale. Working closely with our customers, we deliver a design that meets their needs both today and in the future.

In addition, as the world's largest secondary refiner of platinum group metals, we are committed to the creation of an efficient recycling system to help unlock future capacity and support a sustainable energy transition.

How do CCMs work?

CCMs consist of precisely structured catalysts typically platinum (cathode) and iridium (anode) that are applied to solid membranes in a way which maximises hydrogen production.

Water flows into the CCM, where an iridium catalyst uses electrical energy to break water molecules into oxygen, protons and electrons. The electrons are driven through the external circuit and protons then cross the membrane. A platinum catalyst puts the protons and electrons back together to form hydrogen.



CCM

Optimised system designed to meet customer requirements using tailored formulations and commercial scale manufacturing processes.

Membrane technology

A range of solid membranes designed to achieve a wide range of performance criteria using different additive packages.

Catalyst

Catalyst optimisation and layer formation enables high-quality catalysts in optimised layers for cathode (Pt/C) and anode (IrOx) catalysts to be produced.

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