

# Accelerating the utilisation of fuel cells through networking

Fuel Cell Finland Industry Group





# New Business Opportunities through Sustainable Fuel Cell Applications

The environment and the maintenance of a high quality of life call for clean, safe, secure, efficient and sustainable energy systems. Part of the solution to this lies in fuel cells.

Fuel cells are electrochemical devices that combine fuel and oxygen from the air, to produce electricity and heat. This kind of fuel is converted into energy without combustion, allowing for a highly efficient, quiet and clean process. Ideally, fuel cells operate on hydrogen, the only by-products being water and heat. However, a fuel cell system may include a fuel reformer that can extract hydrogen from a hydrocarbon fuel for use in the fuel cell. In such a case, harmful emissions can be kept to a minimum.

There are several types of fuel cell technologies, each with its own characteristics and application areas. Such versatility enables fuel cell systems to be used in a wide range of applications, from microwatt to megawatt ones.

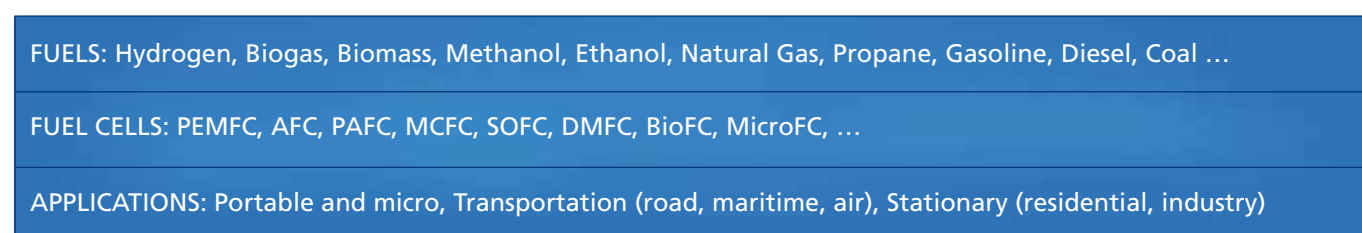
The fuel cell market has three commonly defined application segments; portable, transportation and stationary. The first steps of commercialisation have been taken in all of these segments, but further research, development and demonstrations are needed to expand the fuel cell market.

A deep understanding of market requirements is a prerequisite to accelerating the adoption of fuel cell products. To fulfil a customer's needs competitively, the final application usually needs to be adapted for the fuel cell, while the related codes and standards must be developed. Finally, without a solid value chain, there is no business. Within a generic fuel cell industry value chain, there is the potential to be active in many areas. The basic fuel cell technology requires materials and components as well as full fuel cell systems. Fuel cell products may be distributed as such, or integrated with various applications and devices. A large number of activities therefore exist, offering the possibility of participation and the generation of new, sustainable business.

## Fuel Cell Industry Value Chain



## Fuel Cell Technology Environment



## Fuel Cell Finland Industry Group

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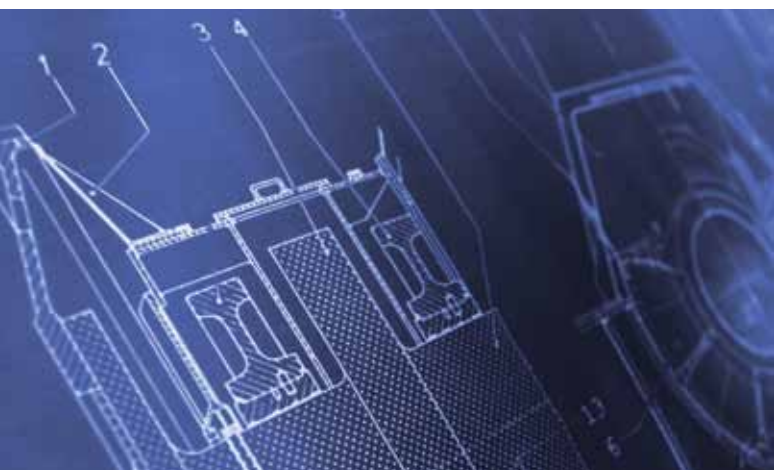
The Fuel Cell Finland Industry Group is a branch group of The Federation of Finnish Technology Industries. Through networking, this group is striving to accelerate the utilisation of fuel cells. Members include both fuel cell developers and fuel cell application developers, accompanied by other fuel cell value chain actors and stakeholders.

The activities of the Fuel Cell Finland Industry Group concern all major application areas, whether they be portable, transportation and stationary, as well as the supportive infrastructure, research and education areas. To promote these areas of activity in Finland, the group:

- networks nationally and internationally
- exchanges information and contributes
- follows development trends and activates development work

### Member list by company name

BigMan Ltd  
Cargotec Finland Oy  
Gasum Oy  
Oy Hydrocell Ltd  
Konecranes Plc  
MSc electronics Oy  
Neste Oil Corporation  
Outotec Oyj  
Patria Land & Armament Oy  
Prizztech Oy  
Salcomp Oyj  
Sandvik Mining and Construction Oy  
Savox Communications Oy Ab  
The Switch Engineering Oy  
Tampereen Teollisuusosa Oy  
VTT Technical Research Centre of Finland  
Wärtsilä Finland Oy



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## BIGMAN

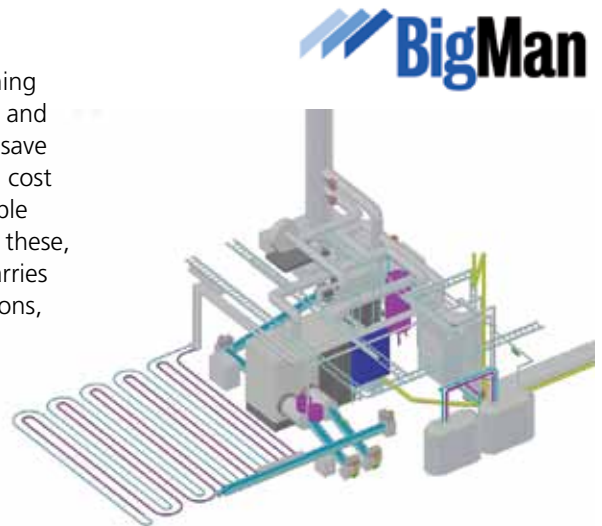
BigMan operates in the building sector. Its business is focused on planning and other expert tasks related to building technology. HEVAC-planning and energy reviews are the two main services it provides. BigMan strives to save energy and money searching and provide user friendly technology on a cost effective basis to, its customers. Fuel cell technology and other renewable energy sources in buildings offer new business opportunities. Based on these, the company seeks to identify the best ways of saving energy. It also carries out overall inspections of buildings covering reviews of basic constructions, building technology and long-term planning.

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## CARGOTEC

On a global basis, Cargotec is the leading supplier of container and load handling equipment and services in ports and terminals. In 2008, Cargotec launched the Pro Future™ concept, encompassing environmentally friendly equipment. To gain the Pro Future™ marking, equipment is rated against five criteria: energy efficiency, power source, emissions, noise pollution and recyclability. With the help of Pro Future™ solutions, customers can genuinely develop environmentally sustainable operations and reduce fuel consumption. Recently, Cargotec has developed an electric straddle carrier utilising hybrid technology. Such hybrid technology cuts straddle carriers' annual carbon dioxide emissions by 50 tonnes per straddle carrier. Other Pro Future™ products include the variable speed rubber tyred gantry (RTG) crane, as well as the variable speed straddle carrier, automatic stacking crane, battery driven forklift truck and ship-to-shore crane with a regenerative energy source. Cargotec has begun researching PEM fuel cell technology, focusing on the application of this technology in Kalmar equipment. Fuel Cell technology is already under testing in the Kalmar 5.5 ton electric FLT, in close co-operation with VTT Finland as part of the Tekes-funded Working PEM project.

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## GASUM

Gasum is responsible for importing natural gas, operating, maintaining and extending the natural gas pipeline in Finland, and for marketing and selling natural gas to wholesale customers such as industrial plants, energy companies and local distribution companies. Gasum seeks to be at the forefront of innovation in the natural gas market in Finland. The company is interested in fuel cells that use natural gas as a direct source of energy.

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## HYDROCELL

Hydrocell is a leading European developer and producer of fuel cells. Associated products include components for use in environmentally friendly energy applications and a range of high-specification air cleaners. Hydrocell's highly advanced technology is used in manufacturing alkaline-gel fuel cells for portable and stationary applications. In addition to the HC-100, HC-200 and HC-400 portable fuel cells, different sizes of metal-hydride hydrogen storage containers, fuel cell materials, regenerative CO2 scrubbers and heat exchangers are also available.

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## KONECRANES

Konecranes is a world-leading lifting equipment manufacturer serving shipyards, ports, terminals and the manufacturing and process industries, with productivity enhancing lifting solutions and services. Being a forerunner entails responsibility in terms of productivity, and in the safety and environmental performance of products and services. Konecranes offers a host of efficiency improving solutions and features, which improve environmental performance in various product segments. The company is also continuously seeking new possibilities for sustainable and energy efficient solutions. Konecranes' activities in the fuel cell sector are focused on the integration of fuel cell systems with Konecranes' products and services.

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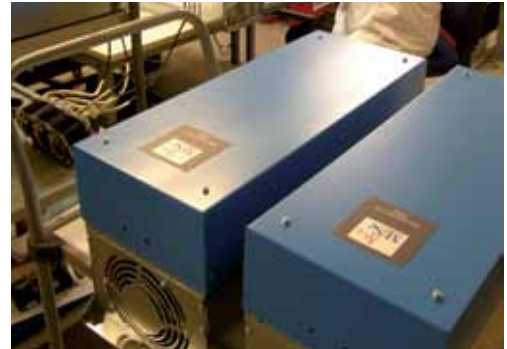
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## MSC ELECTRONICS

MSc electronics is a designer and manufacturer of power converters in the power range 1-500 kW. The company's mission is to improve the energy efficiency of its customers' products and solutions, and to help them save energy and produce it from renewable energy sources. Its product portfolio consists of power converters for a range of applications. In the main, such applications include hybrid drive converters for heavy machinery and electric vehicles, energy storage converters and the grid-tie, and off-grid converters and inverters for various renewable energy solutions.

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## NESTE OIL

Neste Oil Corporation is a leading independent northern European oil refining and marketing company. We focus on high-quality traffic fuels and other high value-added petroleum products with a reduced environmental impact. We have three business areas: Oil Products, Renewable Fuels and Oil Retail. Neste Oil is developing clean traffic fuels and their production technologies. The company has a particular focus on premium-quality, second-generation biodiesels. The basis of our work lies in developing products and production technologies that are safer and less harmful to users and the environment.

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**NESTE OIL**



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## OUTOTEC

Outotec is a leading global provider of process solutions, technologies and services for the mining and metallurgical industries. The firm designs and delivers plants, processes and equipment and provides engineering, project and support services globally. For several years now, Outotec has been interested in various fuel cell and hydrogen systems and technologies. As a potential technology and process supplier and developer, Outotec keeps abreast of the future possibilities of fuel cells, especially hydrogen production technologies.

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**Outotec**



## PATRIA LAND & ARMAMENT

Patria develops and delivers the world's most technologically advanced armoured wheeled vehicles, as well as 120 mm mortar systems and their life cycle support services. Decades of experience and substantial investments in product development have created the foundation for the latest solutions – the Patria AMV vehicle, Patria NEMO and AMOS mortar systems. Patria is the leading supplier of armoured wheeled vehicles and turreted mortar systems in Europe. The firm cooperates extensively with leading R&D organisations and development partners providing advanced solutions for PEM/SOFC technology-based APU (Auxiliary Power Unit) systems.

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# Patria



## PRIZZTECH ÄETSÄ HYDROGEN VILLAGE

Äetsä Hydrogen Village aims to position itself on the boundary between equipment manufacturers and research institutes, by providing its customers with high-class support services for the laboratory-based and full-scale testing of hydrogen technologies and systems. The firm's collaboration network has been expanded by its membership of the IFRF (International Flame Research Foundation) and Sentre (Centre for Sustainable Energy).

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# PRIZZTECH



## SANDVIK MINING AND CONSTRUCTION

Sandvik Mining and Construction is a business area within the Sandvik Group and a world-leading manufacturer of drilling and excavation machinery, and tools and services, for the mining and construction industries. In its product offering for the Underground Mining customer segment, Sandvik has highly efficient, automated longhole and face drilling rigs, as well as rock support and loading and hauling machines. Since mining and construction are sensitive areas of activity, we develop new solutions that minimise the environmental impact of operational processes.

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# SANDVIK



## SAVOX COMMUNICATIONS

Savox Communications is a leading provider of advanced communications solutions for safety apparel and equipment used in hazardous tasks. In addition to our portfolio of Savox® Communications products, we offer comprehensive product development, design and manufacturing services. Savox designs and manufactures rugged Control units, Push-To-Talk units, Remote speaker microphones and various headset platforms for use by fire fighters, the military, the police and industry. Savox's role in the fuel cell industry is primarily as an integrator and application developer.

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## THE SWITCH ENGINEERING

The Switch is a leading supplier of megawatt-class permanent magnet generator and full-power converter packages for wind power and other New Energy applications. Our solutions help to combat climate change and conserve energy resources. The Switch's fuel cell inverters are used alongside PEM and SOFC type fuel cells. The availability of stand-alone as well as grid-tie mode means that the fuel cell can also operate as an off-line UPS, greatly enhancing the market opportunities of our customers.

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## TAMPEREEN TEOLLISUUSOSA

Tampereen Teollisuusosa is a subcontracting machine shop offering CNC-machining. Based on our versatile machinery and cooperation network, we are able to offer our customers extensive and flexible delivery solutions.

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## VTT

VTT is a multidisciplinary expert organisation in the field of technology and technology-based business research. The energy technology focus area encompasses technological development and applications in energy production, distribution, applications and systems. Here, the key areas are renewable energy including bioenergy, biomass gasification, liquid biofuels, fuel cells and wind energy. Fuel cell R&D is centred around applications such as portable and micro fuel cells (MFC), power sources for speciality vehicles (PEFC) and stationary applications (SOFC).

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## WÄRTSILÄ

Wärtsilä enhances the business of its customers by providing them with complete lifecycle power solutions. Continuous development of more efficient, clean and sustainable power solutions is an essential part of Wärtsilä's strategy. Fuel cell technology development supports this strategy by providing ultra clean and highly efficient solutions to customers. Wärtsilä is a leading developer of fuel cell systems for stationary CHP and selected marine applications. These products are based on Solid Oxide Fuel Cell technology, whose high operating temperature provides excellent electrical and thermal efficiency, allowing co-generation and tri-generation in various applications for distributed stationary power generation and marine markets. Wärtsilä plans to be among the key suppliers of commercial SOFC power units in the power range of 50 kW to 5 MWe.

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**The Federation of Finnish Technology Industries** strives to ensure that the Finnish Technology industries have what they require to be competitive in the global marketplace by

- promoting a favourable business environment
- enhancing cooperation
- providing services.

The Federation of Finnish Technology Industries has approximately 1,500 member companies that operate in the electronics and electrotechnical industry, mechanical engineering industry, metals industry and information technology industry. This industrial sector, Finland's largest, accounts for about 60% of total Finnish exports, 75% of total industrial R&D investments and employs around 255,000 persons directly.

**The Branch Associations and Branch Groups** within The Federation of Finnish Technology Industries form a wide cooperation network. They produce solutions meeting specific challenges in their own fields and takepart in international activities, as well as implementing common projects across subsectors.



