

<b><u>Hydrogen Index (H2X) - Component</u></b>	<b><u>Theme</u></b>	<b><u>Sector</u></b>	<b><u>Activity</u></b>
5E Advanced Materials	Boron, in storing hydrogen, also used in fuel cells.	HS	USA
Abalance	H2 storage, also has Birdy Fuel Cells group, Japan.	HS	JAPAN
Abb	Electrification systems and engineering for green H2.	HS	SWITZER.
Aker Horizons ASA	Decarbonizing, diverse sustainable energy themes.	GH	NORWAY
Ballard Power Systems Inc	Fuel cells, H2 in buses, trucks, trains, backup power etc.	HT	CANADA
Bloom Energy Corp	Fuel cells, SOFC high temps can use variety of fuel sources.	FC	USA
Brookfield Renewable Energy	Teaming to produce green hydrogen from hydroelectricity.	HI	USA
Bumhan Fuel Cell	Fuel cells in submarines, H2 fueling. Offshore cables.	HT	S. KOREA
Ceres Power Holdings PLC	Fuel cells, high SOFC temperature allows variety of fuels.	FC	UK
China Datang Renewables Corp	Wind & hydro in China, that's developing H2 projects.	HG	CHINA
Chung-Hsin Electric	Fuel cells. Hydrogen, methanol reformers.	HG	TAIWAN
Compagnie Plastic Omnium SE	H2 storage in high pressure tanks for vehicles, fuel cells.	HT	FRANCE
Corp. Acciona Energias Renov.	Green H2, new GreenH2Chain to ensure green H2 origins.	HI	SPAIN
CropEnergies AG	Renewable H2 from ethanol, also a co-product, Europe.	HI	GERMANY
Dae Myoung	Wind energy, solar, energy storage, green H2.	HI	S. KOREA
Doosan Fuel Cell	Fuel cells, high temperature for a variety of fuels.	FC	S. KOREA
Fuelcell Energy Inc	Fuel cells, high temperature so over range of fuel sources.	FC	USA
Gevo Inc	Biofuels, energy dense net-zero carbon liquid fuels.	HG	USA
Greenvolt Energias	Biomass to hydrogen without need for combustion.	HG	PORTUGAL
Hyosung Advanced Materials	Advanced composite materials for hydrogen tanks.	HS	S. KOREA
Iljin Hysolus	Compressed hydrogen tanks for fuel storage.	HS	S. KOREA
ITM Power PLC	Fuel cells, PEM; also electrolyzer manufacturing green H2.	GH	UK
Linde PLC	Industrial gases production, including hydrogen.	HG	UK
Lotte Fine Chemical	Green hydrogen production launch, ammonia.	GH	S. KOREA
Mcphy Energy SA	Hydrogen production, use, and storage; H2 in industry.	HI	FRANCE
Montauk Renewables	Captures methane, CH4 from landfills, biogas RNG uses.	HG	USA
Navitas Semiconductor	GaN showing more-efficient carbon-free H2 production.	GH	USA
Nel ASA	Electrolysis for H2 from water, using alkaline and PEM.	GH	NORWAY
Neoen SA	Water Electrolysis and renewable energy for green H2.	HG	FRANCE
NFI Group	Hydrogen fuel cell electric power in buses,	HT	CANADA
OCI N.V.	Green Ammonia, building up from biogas, hydrogen.	HG	NETHER.
Orsted A/S	Green hydrogen directly from wind power, early stage.	GH	DENMARK

Plug Power Inc	Green hydrogen, and fuel cell systems in development.	FC	USA
PNE AG	Power-to-X, wind power directly to make green H2.	GH	GERMANY
Powercell Sweden AB	Fuel cell systems, both clean H2 and fossils for fuels.	FC	SWEDEN
Proterra	Heavy Bus electrification systems, early H2.	HI	USA
Scatec ASA	Green Hydrogen produced by solar power.	GH	NORWAY
Schneider Electric SE	Gas analysis, automation for advanced H2 storage.	HS	FRANCE
SFC Energy AG	Direct methanol and H2 supplied small fuel cells.	FC	GERMANY
SGL Carbon SE	Polymer electrolyte membrane in PEM fuel cells.	FC	GERMANY
SK IE Technology	Converts low-purity 60% H2 to high-purity 99% H2.	HI	S. KOREA
SKF AB	Advanced bearings, for H2 by compressed transmission.	HS	SWEDEN
SMA Solar Technology	Electrolyzer converters, green H2 from renewables.	GH	GERMANY
Spie SA	Hydrogen in mobility, H2 production, distribution.	HT	FRANCE
Toray Industries	Membranes for H2 purification, generation, fuel cells.	HI	JAPAN
Varta AG	Hydrogen gas generating cells, ultrapure.	HG	GERMANY
Verbio Vereinigte Bioenergie AG	H2 from biomethane, biofuels, agriculture.	HG	GERMANY
Vinatech	Supercapacitors, fuel cells, membranes.	FC	S. KOREA
Wacker Chemie AG	Green H2 from water using renewables, into methanol.	GH	GERMANY
Weichai Power	Hydrogen uses in forklifts, fuel cell buses, Asia.	GT	CHINA
Wolfspeed	High power fuel cell systems, SiC, GaN.	HT	USA
Workhorse Group	H2 fuel cells work on electric trucks.	HT	USA
Yara International	Green hydrogen catapault, aims for H2 <\$2/kg.	GH	NORWAY

## **H2X For Latter Q4 2022 - 53 Components**

4 Deletes: Advent, Archaea, Hyzon, JL Mag.

5 Additions: Dae Myoung, NFI, Spie, Vinatech, Wolfspeed

### **Weight each component:**

**100/53 = 1.8867924**

### **Hydrogen Index H2X Sector**

**FUEL CELLS (FC)**

9

**GREEN HYDROGEN (GH)**

11

<b>HYDROGEN GENERATION (HG)</b>	10
<b>HYDROGEN INNOVATION (HI)</b>	8
<b>HYDROGEN STORAGE (HS)</b>	7
<b>HYDROGEN in TRANSPORTATION (HT)</b>	8
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	53