# Fuel Cell Power Train & Hydrogen is the only pathway to ZERO EMISSION

Jel Cell Power Generator



ECO



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Company Presentation, non-deal roadshow, January 2024



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# Fuel Cell solves the problem, our technology will be a part of decarbonizing the world





Significant reduction of CO<sub>2</sub> emissions are required to achieve the 2°C Paris climate target

#### November 2023, World Premier – Producing Electricity One of the worlds most powerful hydrogen fuel cell





- Fuel cells is the next generation of engines and power generators, where hydrogen is the fuel.
- Operating one of this unit instead of a diesel generator, saves our planet from over 9000 tons of CO<sub>2</sub> emissions – during 35,000 hours of operations.
- Switch to fuel cells signifies a major step in supporting the clean transition targets under the European Green Deal, the U.S. Inflation Reduction Act and other frontrunner regions.



#### 2025 FUEL CELL **PRODUCTION CAPACITY**

1000 units

with an operating cycle of 7,000 hours per year equals to annual CO<sub>2</sub> emission reductions of approx.

1.85 million tons of CO<sub>2</sub>

#### 2030 FUEL CELL **PRODUCTION CAPACITY**

4000 units with an operating cycle of 7,000 hours per year equals to annual CO<sub>2</sub> emission reductions of approx.

7.4 million tons of CO,



VENICE

1.97 million tonnes of CO,

**ATHENS** 



LISBON

1.5 million tonnes of CO.

COPENHAGEN



PORTLAND

million tonnes of CO,

.85

million tonnes

of CO,

#### AMMAN

#### MADRID

#### ANNUAL GREENHOUSE GAS EMISSIONS

of CO,

Based on latest numbers from https://www.c40knowledgehub.org/s/article/C40-cities-greenhouse-gas-emissions-interactive-dashboard

### Historical development timeline 2020 - 2023





Fuel cell development project start

DNV approval in principle

FCS 100 stack built

FCM 400 Module in testbed



## Global fuel cell market, trillion-dollar market

#### FUEL CELL MARKET PREDICTIONS – HIGH DEMAND EXPECTED FROM 2024/25



#### **CITIGROUP and McKinsey forecast**

2025: 30 GW
2026: 32 GW
2027: 38 GW
2028: 45 GW
2029: 51 GW
2030: 56 GW

**TECO 2030 Giga Factory, Production Capacity** 

- From 2025 to 2030
- Capacity from 0,4 GW to 3,2GW

Source; McKinsey & Company, Hydrogen Counsel, Global Hydrogen Flows

# **A Global Problem**

TECO



#### DIESEL GENERATOR

# FUEL CELL POWER GENERATOR

TEC0

CO <sub>2</sub> , NO <sub>x</sub> , SO <sub>x</sub> , PM	POLLUTION	True Zero Emission
Cold start issues	RELIABILITY	Always available
High noise, vibration and fuel toxicity	ENVIRONMENTAL Impact	Low noise and no vibration
Costly maintenance and diesel fuel has a limited shelf life	COST	Low maintenance and twice as efficient as diesel generators



### **Our technology, opportunity and partners**

## **TECO 2030 Fuel Cell opportunities**



Maritime and heavy-duty applications (Retrofit, newbuilds, port applications)



Stationary power generation (Power Generators, Data Centers, EV Charging stations)







Mobility hydrogen fuel cell vehicles (Aviation, mining vehicles, trains & heavy-duty trucks)



Offer license agreement for local production (Stack Production, Module Production, Full factory setup)







### Remaining development timeline 2024 - 2025















Type Approval expected from DNV

800kW FC land-based demonstrator, TRL 7

2.4 MW FC maritime demonstrator, TRL 8

Mass production of FCS 100 TRL 9

Mass production of FCM 400 TRL 9

### Development partners, criteria for success





AVL is the largest independent company for the development of powertrain, incl. testing and simulation.

11,500 employees, HQ, Graz, Austria. Revenue of 2,2 billion euro in 2022.

The company has 75 years of experience in the development and optimization of powertrain systems for all industries.



Tractor | Vehicle





**Power Plants** 







- Development Platform



Commercial Si

Simulation & Testing

All IP and PATENTS developed is owned 50/50 with TECO/AVL. All commercial right belongs 100% to TECO 2030 ASA Group of companies

Vehicle



World leader, thyssenkrupp is an international industrial and technology company employing around 96,000 people.

Across 48 countries it generated sales of €41 billion in fiscal 2021/2022.

Five segments: Automotive Technology, Decarbon Technologies, Materials Services, Steel Europe and Marine Systems



### Lighthouse projects





- Biggest ongoing hydrogen fuel cell retrofit as per information available in the world.
- To retrofit a 20-year-old bitumen tanker, will enter zero emission service late 2024/beg 2025.
- Funded by Horizon Europe and Shell with a total of MEUR 10,-
- A containerized, 350 bar, compressed hydrogen storage with 4000 kg capacity with type approval to perform hydrogen refuelling by swapping of containers using cranes.

- A 12 MW fuel cell system will be utilized for full propulsion onboard each of the six new build vessels, enabling 100% emission-free operations.
- Each vessel will be about 63,000-deadweight tons and the first vessel is targeted for delivery Q1 2027.
- The delivery for TECO 2030 includes a complete system of fuel cells installed on a skid solution as well as power and automation equipment, MEUR 23,- per vessel.
- Subject to successful financing, industry standard, process ongoing



- Zero Emission Construction site, Fuel cell power generator under construction for IMPLENIA. Delivery, summer 2024
- Implenia is a leading construction and real estate service provider. Operation many places in Europe. We are working with the Norwegian legal entity. They develop and build homes, workplaces and infrastructure for future generations. They also offer tunnelling and related infrastructure projects in various markets
- 0.8 MW, can be upgraded to 1.6 MW
- Suitable for any energy intense application





# Why hydrogen fuel cell technology



- The only feasible option for Zero Emission Heavy Duty applications
- Most efficient way to store energy as synthetic fuel and produce electric energy again
- Very strict local regulations regarding emission and bans of combustion engines in cities might come soon.
- Global considerations for heavy CO<sub>2</sub> taxations and limitations

Significant reduction of  $CO_2$  emissions are required to achieve the 2°C Paris climate target.



### Why TECO 2030 Fuel Cell Systems







#### FCM 400

- World most power dense fuel cell module for marine and heavy-duty application
- Class leading lifetime target
- Designed for various application segments
- State of the art safety concept and control concept
- Designed for series-production



### FCS 100

- Unique carbon bi-polar plate cell and stack design
- Specially made for heavy duty applications
- High power density
- Dynamic operation capable

### Fuel flexible











Unique fuel tank-fuel cell heat regulation system



estorade scolution

Eliminates the need for compression and makes it safer

Liquid hydrogen (LH<sub>2</sub>)

Maintains high efficiency with low H2 input pressure





Can operate on pressure ranges up to 700 bar



## **Our company**

## Building on 30 years of experience

- TECO 2030 is a spin off from the TECO Group ٠
- TECO Group has 30 years experience in ship repair, marine engineering, installation and • integration, automation and electronics, chemicals and logistics.
- Co-founded Scanship (now: VOW), converting waste into clean energy, world biggest • player in the cruise industry. Biggest shareholder from 2008 - 2017
- Total of approx. 150 employees in 14 countries, and ~250 external service specialists •





Clients from all over the world - some references.





# A Euronext listed Norwegian public company, co-traded in the US on the OTCQX: TECFF



- Approx. 60 people employed at present, increasing
- Approx. MUSD 75,- in market cap
- Approx. MUSD 60,- raised in equity, CBL and grants
- HQ in Oslo, Gigafactory in Narvik, Norway
- Sales offices in Miami, Dubai & Singapore
- Approx. 120 active fuel cell projects ongoing
- Funding support from Horizon Europe, SHELL, Innovation Norway, ENOVA and The Research Council of Norway













### **Latest News & Market Opportunities**

#### **KEY MILESTONE – PRODUCING POWER** Latest News: Graz, Austria – November 23<sup>rd</sup>, 2023



Key milestone for one of the worlds most powerful hydrogen fuel cells, TECO 2030 on schedule for first customer deployment H1 2024



A fuel cell is the next generation of engines and power generators, where hydrogen is the fuel. Operating one FCM400 unit instead of a diesel generator, saves our planet from over 9000 tons of  $CO_2$  emissions - or consuming over 3.5 million liters of diesel - during 35,000 hours of operations.

By 2030, the target is to produce a capacity of 4.000 units per year at TECO's giga factory in Northern Norway. In that way, TECO wants to potentially reduce the amount of  $CO_2$  emissions similar to the number of annual emissions from countries like Sweden or Portugal and cities like Berlin or Toronto according to the C40 Knowledge Hub.

TECO's fuel cell technology offers a compelling alternative to traditional diesel machinery, addressing critical environmental concerns, while also relieving the pressure on port- and city grid capacity, and the use of critical materials. The switch to fuel cells signifies a major step in supporting the clean transition targets under the European Green Deal, the U.S. Inflation Reduction Act and other frontrunner regions.





#### Latest News: Lysaker, Norway, & Tokyo, Japan – November 1, 2023

#### TECO 2030 and Yokogawa Sign Partnership and Investment Agreement for the Utilization of Hydrogen Fuel Cells in Industrial Applications

TECO 2030 ASA ("TECO 2030", OSE: TECO, OTCQX: TECFF, ISIN: NO0010887516) and Yokogawa Electric Corporation ("Yokogawa Electric", TOKYO: 6841) announce that they have signed a strategic partnership and investment agreement regarding the development of technology for utilizing hydrogen fuel cells in industrial applications. Under this agreement, Yokogawa Electric has invested in TECO 2030 by way of acquiring treasury shares, and the two companies will collaborate on optimizing hydrogen fuel cell technology and exploring business opportunities for distributed power sources in the maritime transportation and other industrial sectors.

Tsuyoshi Abe, a Yokogawa Electric senior vice president and head of the Marketing Headquarters, said, "As we mention in our whitepaper *Reweave the World*<sup>\*</sup>, energy conversion systems are going to play an important role in the transition from the fossil fuel era to a renewable energy era. Yokogawa firmly believes that fuel cells are one of the pathways to net-zero emissions in the maritime and industrial sectors, and we are confirming this by embarking on a journey with TECO 2030 as a strategic partner for a sustainable future." Yokogawa Electric Corporation, <u>Reweave the World—Energy</u> <u>Systems Convergence leads to global resilience and sustainability in energy, food, and water</u>, 2023

#### About Yokogawa

Yokogawa provides advanced solutions in the areas of measurement, control, and information to customers across a broad range of industries, including energy, chemicals, materials, pharmaceuticals, and food. Yokogawa addresses customer issues regarding the optimization of production, assets, and the supply chain with the effective application of digital technologies, enabling the transition to autonomous operations. Founded in Tokyo in 1915, Yokogawa continues to work toward a sustainable society through its 17,000+ employees in a global network of 129 companies spanning 60 countries. For more information, visit <u>www.yokogawa.com</u>.

# US Hydrogen initiatives & funding programs





U.S. Department of Energy funding program

- Total of \$ 9.5 billion funding by DOE
- Inflation Reduction Act
- \$ 3 tax credit per kg hydrogen produced with renewable energy
- "1 1 1"  $\rightarrow$  \$1 for 1 kg clean hydrogen in 1 decade





# Worldwide hydrogen initiatives & funding programs **TE**



#### Germany's energy strategy

- Greenhouse gas Neutrality 2045
- Hydrogen Strategy Action Plan
  - Hydrogen Production
  - Transport
  - Industrial Sector
  - Heat
  - Infrastructure/supply
  - R&D
- International collaboration to ramp up hydrogen activities across the EU.



#### **REPowerEU Plan**

- European Commission
  - Independence from Russian fossil fuel imports
  - Support investments/reforms worth € 300 billion
  - € 3 billion of frontloaded projects under the Innovation Fund
  - Hydrogen accelerator for 17.5 Gigawatt electrolysers by 2025 → production of 10 million metric tons renewable hydrogen within EU
- Fit-for-55
  - Reduction of greenhouse gas emission by 55% till 2030
  - Make EU climate neutral by 2050



#### Japan's energy strategy

- Hydrogen key role besides Ammonia
- Green Innovation Fund → JPY 2 trillion (~ \$ 13.5 billion)
  - By New Energy and Industrial Technology Development Organization (NEDO)
- Hydrogen consumption forecast
  - 2030 → 3 million metric tons
  - 2050 → 20 million metric tons
- Fuel cell vehicle (FCVs) forecast
  - 2025 → 200,000 FCVs
  - 2030 → 800,000 FCVs



2030

# **Some ongoing projects**

### Some ongoing projects/prospects







- Bulk carrier, newbuild
- Multi megawatt size
- Fully Hybrid
- Up to 100% emission reduction



- Container vessel, 1000 TEU
- Multi megawatt size
- Fully hybrid
- Up to 100% emission reduction



- Passenger ferry
- Multi megawatt size
- 100% emissions-free
- 300 pax



- Signed Supply Frame Agreement
- 50 Tugboats and 120 barges
- Up to 200 MW
- Waiting EU funding



# Giga Factory, Narvik, Norway

### Striving to be Europe's 1st Giga Producer of PEM Fuel Cells

#### FUEL CELL GIGAFACTORY

TECO 2030 is building up a factory and innovation center for the production of hydrogen PEM Fuel Cells.

#### 1.6 GW OF FUEL CELLS

The factory is planned to start automated production in 2025, and to have an annual output of 400 MW, increasing to 1,600 MW of fuel cells by 2030.





#### **UP TO 400 NEW JOBS**

TECO 2030 expects to have 100 employees at the factory before the end of 2025, and up to 350 – 400 by 2030.

Production	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Output Capacity	test/dev	test/dev	test/dev/ first stack	First Module	Manual production	400MW	800MW	1200MW	1600MW	1600MW	1600MW



## World Leader thyssenkrupp, to deliver production equipment





Year: Test, dev, produc Max. Output Cap

Fuel cell

Fuel cell

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
iction apacity:	test/dev	test/dev	test/dev/ first stack	First Module	Manual production	400MW	800MW	1200MW	1600MW	1600MW	1600MW



# Appendixes

Potential projects representing approx.; Billion Euro 1,35 in quotes as of October 2023



#### **PROSPECTS ACCUMULATED IN EURO**



### Potential Production Capacity



Year of Production	2025	2026	next level	next level
Planned production output (MW)	400	800	1 200	1 600
Hypothetical price indication per kW sold in EUR	950	800	650	600
Hypothetical sales per year MEUR	380	640	780	960
Hypothetical gross margin 30%, MEUR	114	192	234	288
Hypothetical EBITDA margin of 18%, MEUR	68	115	140	173

#### **Capital Needs**

- Continuation of the fuel cell development program with AVL, test bed and balance of plant.
- Part payment of raw materials for the first 10, 400 KW modules.
- Preparing and ramp up in our factory building.
- Marketing, exhibitions, travelling.
- General corporate purposes.

To be updated

### Standby Equity Distribution Agreement

TECO Group AS, TECO 2030 ASA biggest shareholder has borrowed out 20 000 000 shares to TECO 2030 ASA which TECO 2030 ASA can sell to potential investors over night.

A Standby Equity Distribution Agreement (SEDA) is a financial arrangement in which a company secures a commitment from an investor to purchase its shares over a specified period, allowing the company to raise capital as needed by selling shares to the investor at prevailing market prices.

This provides the company with flexibility in funding, enabling it to access capital when conditions are favorable.







### Annual TECO 2030 ESG Reports





https://teco2030.no/wpcontent/uploads/2021/05/TECO-2030-Sustainability-Report-2020.pdf



https://teco2030.no/wpcontent/uploads/2022/04/TECO2030 ESG2021 220428.pdf







11





14 LIFE BELOW WATER

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15 LIFE ON LAND

**4**~~~



**17** PARTNERSHIPS FOR THE GOALS

8



#### Team





#### Tore Enger Chief executive officer

Founded TECO Group and TECO Maritime Group in 1994. Tore is a true entrepreneur and has initiated a large number of products and services to the Maritime Industry throughout the last 28 years. He has an extensive network in the Marine Industry world-wide. Tore was the Executive

Chairman and major shareholder in Scanship Holding ASA (renamed VOW ASA), listed on the Oslo Stock Exchange for approx. 10 years, (2008 – 2017).



#### Tor-Erik Hoftun chief strategy officer

Holds a Bachelor of nautical science from the University of South-East Norway, combined with a specialization in artic ship operations from the university center of Svalbard been part of the TECO Group of companies for 12 years Last 4 years in various management positions at TECO 2030 prior to this, 7 years in various positions in (VOW ASA) Scanship. Last position project as development manager Tor-Erik Further, has from experience Oceania

experience from Oceania Cruises, sailing as deck officer.

#### Paal Christian Johnsen CHIEF FINANCIAL OFFICER

Holds a Bachelor of Commers (Hons) in Finance and Accounting from the Flinders University of South Australia. He has been part of the TECO Group of companies for 8 years, the last four years as CFO in TECO 2030.

Prior to this, he worked 6 years as CFO in AS Naturbetong.

Further, Pål Christian has 6 years' experience from the Norwegian Police force, whereof three years at the National Authority for Investigation and Prosecution of Economic and Environmental Crime. He has been a board member in various companies within the real estate and maritime sector.



#### Hans-Peter Klein CHIEF OPERATING OFFICER

Over 10 years of experience in project management and engineering at AVL. Leading project teams in Fuel Cell Systems, HV Battery Pack development an DE for various OEMs (e.g. DAIMLER, MAN, CAT, Ford, Maserati,).

4 years project management for fully automated intralogistics systems at SSI SCHÄFER.

2 years on-site project management in the US to develop logistics systems for Walgreens, Walmart, Amerisource etc.

MSc Automation Technology & Business from CAMPUS 02 University of Applied Sciences and Technical University of Dublin.



#### Bettina Nowak CHIEF EXECUTIVE OFFICER, USA

19 years of Maritime Experience.

She started working for Scanship (VOW ASA) and the Cruise Industry in 2004. In 2007 Bettina entered the position as Managing Director and for Scanship Partner Americas, a position she held in 11 years. She joined TECO in March 2018 as CEO in Miami responsible for US Operation. 15 years within The TECO Group of with strong companies connections to the Maritime Industry in the USA.



#### Rizkallah Abed managing partner middle east

Rizkallah demonstrates an impressive track record of more than 30 years' experience in international corporations as a regional executive leading multinational teams in multi-division matrix organizations. Set up and managed operations, local productions and service center's as well as sales channels all over the MENA geographical area. Building on this international exposure, Rizkallah has led profitably and successfully highly reputable and diversified GCC businesses.

Young Presidents' Organization (YPO) - MENA Gold Chapter - Board Member. Engaged in talents education and coaching as Supervisory Board Member in American University of Dubai and Canadian University of Dubai.





# Thank you for your attention



