Siemens Energy Hydrogen Day
Christian Bruch, CEO
March 19, 2021
Disclaimer

INFORMATION AND FORWARD-LOOKING STATEMENTS This document contains statements related to our future business and financial performance, and future events or developments involving Siemens Energy that may constitute forward-looking statements. These statements may be identified by words such as “expect,” “look forward to,” “anticipate” “intend,” “plan,” “believe,” “seek,” “estimate,” “will,” “project,” or words of similar meaning. We may also make forward-looking statements in other reports, prospectuses, in presentations, in material delivered to shareholders, and in press releases. In addition, our representatives may from time to time make oral forward-looking statements. Such statements are based on the current expectations and certain assumptions of Siemens Energy’s management, of which many are beyond Siemens Energy’s control. These are subject to a number of risks, uncertainties, and other factors, including, but not limited to, those described in disclosures, in particular in the chapter “Report on expected developments and associated material opportunities and risks” in the Annual Report. Should one or more of these risks or uncertainties materialize, should acts of force majeure, such as pandemics, occur, or should underlying expectations including future events occur at a later date or not at all, or should assumptions prove incorrect, Siemens Energy’s actual results, performance, or achievements may (negatively or positively) vary materially from those described explicitly or implicitly in the relevant forward-looking statement. Siemens Energy neither intends, nor assumes any obligation, to update or revise these forward-looking statements in light of developments which differ from those anticipated. This document includes supplemental financial measures – that are not clearly defined in the applicable financial reporting framework – and that are or may be alternative performance measures (non-GAAP-measures). These supplemental financial measures should not be viewed in isolation or as alternatives to measures of Siemens Energy’s net assets and financial position or results of operations as presented in accordance with the applicable financial reporting framework in its consolidated financial statements. Other companies that report or describe similarly titled alternative performance measures may calculate them differently. Due to rounding, numbers presented throughout this and other documents may not add up precisely to the totals provided and percentages may not precisely reflect the absolute figures.
Today’s challenge: Green energy needs to travel from lowest cost regions to decarbonize demand centers

36 Giga tons
total energy-related emissions in 2019

- China: 10.2 Giga tons
- United States: 5.3 Giga tons
- India: 2.6 Giga tons
- Japan: 1.7 Giga tons
- Germany: 0.7 Giga tons

“Sector Coupling”
Key lever for decarbonization of all end-user sectors

Shares in global CO₂ emissions by sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>CO₂ Emissions Share</th>
<th>Renewables Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>9%</td>
<td>6%</td>
</tr>
<tr>
<td>Buildings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>42%</td>
<td></td>
</tr>
</tbody>
</table>

Leverage green electricity in other sectors
Share on CO₂ emissions: 58%
Share of Renewables: 11%

Successful integration of renewables in Power
Share on CO₂ emissions: 42%
Share of Renewables: 27%

Source: 2018-2019 data from IEA and own estimates
2021-03-19

The role of hydrogen – A versatile molecule

- Leverage green electricity in other sectors
- Share on CO₂ emissions: 58%
- Share of Renewables: 11%

- Power sector
  - Share on CO₂ emissions: 42%
  - Share of Renewables: 27%

- Successful integration of renewables in Power

- Sector Coupling

- Shares in global CO₂ emissions by sectors

Source: 2018-2019 data from IEA and own estimates
2021-03-19
Power-to-Fuel plants as missing link for electricity based fuels and utilization of existing liquid fuel infrastructure

Renewables  
(on-grid/off-grid)

- 200 MW wind farm producing 560 GWh\textsubscript{el}

Power-to-Fuel Plant  
Integrated plant

- Electrolysis
- Hydrogen storage
- Chemical synthesis
- CO\textsubscript{2}

Liquid fuel infrastructure

- 280 GWh green fuel equiv. to 28m liters Diesel

Air traffic  
Approx. 9 Mio. Km air mileage

Road transport  
Approx. 85 Mio. km road mileage

Heating  
25,000 flats in existing buildings

Numbers per annum derived from own assumptions

2021-03-19

Siemens Energy is a registered trademark licensed by Siemens AG.

© Siemens Energy, 2021
E-fuels required to reduce CO₂ emissions related to transport

Source: Siemens Energy, IEA WEO-2020

Global energy consumption in transport (2019)

2,920 Mtoe (~33,960 TWh)
Boundary conditions are changing
Major green initiatives drive hydrogen related initiatives and investments

GLOBAL
- Paris Agreement
- Clean Hydrogen Ministerial (CN, US, EU, NL, NO, IN, JP, SK, NZ, KSA)

UNITED STATES
- Biden Green Energy Plan
- various initiatives

EUROPE
- EU Green Deal
- European Clean Hydrogen Alliance (ECH2A)

CHINA
- 14th 5-year plan
- China Hydrogen Alliance

SAUDI ARABIA
- The 2030 Solar Plan und NEOM

QATAR
- Qatar Vision 2030

JAPAN
- Japan Climate Initiative
- Basic Hydrogen Strategy

SOUTH KOREA
- Green New Deal

GLOBAL INVESTMENTS
- €300bn investment expected through 2030
- €80bn thereof investment volume “mature”
- 228 announced projects

Strong growth in green hydrogen production drives cost competitiveness

Announced clean hydrogen capacity through 2030
Production capacity
Mt p.a.

Hydrogen production pathways, including carbon costs
Production cost of hydrogen
USD/kg

Key assumptions:
- Gas price: 2.5–6.8 USD/Mmbtu
- Cost USD/Ton CO2: 30 (2020), 50 (2030), 150 (2040) and 300 (2050)
- LCOE USD/MWh: 25 – 73 (2020), 13 – 37 (2030) and 7 – 25 (2050)

Attractive use cases for hydrogen by 2030

- **Close to commercialization**
  - Trains: 5.1 USD/kg
  - SUVs: 4.4 USD/kg
  - Trucks: 2.8 USD/kg
  - Mid-Size Vehicle: 2.3 USD/kg

- **Policy driven**
  - Steel (DRI): 4.6 USD/kg
  - Ammonia: 2.2 USD/kg
  - Refinery: 2.2 USD/kg
  - Planes (syngas): 1.0 USD/kg

- **Required for net-zero**
  - Power Generation: 1.4 USD/kg
  - Building Heat: 1.2 USD/kg

Source: Hydrogen Council, Hydrogen production cost for breakeven, with 100USD/t CO₂e

Increased commercial viability

Commercial viability only w/ deep decarb targets

Siemens Energy is a registered trademark licensed by Siemens AG.
Three pillars to support our strategy

- Low- or zero-emission power generation
- Transport of electricity and storage
- Reducing CO$_2$ footprint and energy consumption in industrial processes
Decarbonization is a core component of our ESG Targets

WE ENERGIZE SOCIETY

RESPONSIBLE OPERATIONS

DECARBONIZING OUR BUSINESS

SOCIAL IMPACT

Announcement
Coal ramp down

Blue Portfolio
170kV Circuit Breaker

High density $H_2$
Turbo compression

100% $H_2$ fired
gas turbine

FY21
Sustainability Report

FY23
100% Renewable Electricity
(own consumption)

FY25
25% Women in Top
Leadership Functions

FY30
Climate Neutral

SOCIETAL IMPACT

RESPONSIBLE OPERATIONS

DECARBONIZING OUR BUSINESS

SOCIAL IMPACT

WE ENERGIZE SOCIETY
We are a unique player in the hydrogen value chain

Siemens Energy AG

Gas and Power (“GP”)

- Generation
- Central
- Distributed
- H₂ enabled generation

- Industrial Applications
- H₂ compression and storage

- Transmission
- Renewable connection and integration

- New Energy
- H₂ Electrolyzer Systems

Siemens Gamesa Renewable Energy (“SGRE”)

- 67% owned
- Onshore
- Offshore

- Power-to-X Solutions
- Hybrid Solutions

- 5 HVDC connections to offshore wind parks realized
- PEM electrolysis installed base
- First e-Gasoline project Haru Oni
- HYFLEXPOWER the power-to-X-to-power cycle

>50 Gas Turbines with high hydrogen content in operation
~1500 compressors for H₂ duty or H₂ rich syngases delivered
## Our system competence makes us a partner of choice in development projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Application</th>
<th>Product</th>
<th>Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haru Oni (Patagonia, Chile), 2021</td>
<td>E-fuel for passenger cars</td>
<td>e-Fuel (rising to &gt;550m litres/a)</td>
<td>AME, Porsche, Federal Ministry of Economic Affairs and Energy Germany</td>
</tr>
<tr>
<td>H₂Future, voestalpine (Linz, Austria), 2019</td>
<td>Steel</td>
<td>1,200 Nm₃ of H₂ for the steel plant gas grid</td>
<td>VERBUND, voestalpine, APG, TNO &amp; K1-MET, EU funding</td>
</tr>
<tr>
<td>Braskem (Sao Paulo, Brazil), 2021</td>
<td>Steam and Electricity</td>
<td>160 tons of steam per hour and 38MW power output</td>
<td>“Energy-as-a-service” approach with BOO model</td>
</tr>
</tbody>
</table>

- **Application**: E-fuel for passenger cars, Steel, Steam and Electricity
- **Product**: e-Fuel (rising to >550m litres/a), 1,200 Nm₃ of H₂ for the steel plant gas grid, 160 tons of steam per hour and 38MW power output
- **SE scope (select.)**: Siemens Energy Electrolyzer, Silyzer 300 (12 modules, 6MW), 2x SGT-600 in combined cycle application and H₂ co-firing (60%)
- **Partners**: AME, Porsche, Federal Ministry of Economic Affairs and Energy Germany, VERBUND, voestalpine, APG, TNO & K1-MET, EU funding, “Energy-as-a-service” approach with BOO model
Technology expertise in Electrolysis
Our electrolyzer portfolio scales up by factor 10 every 4 – 5 years

<table>
<thead>
<tr>
<th>2011</th>
<th>2015</th>
<th>2018</th>
<th>2023+</th>
<th>2028+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silyzer 100</td>
<td>Silyzer 200</td>
<td>Silyzer 300</td>
<td>Silyzer 300 plant</td>
<td>Co-Development with partners in <em>verticals</em></td>
</tr>
<tr>
<td>Lab scale demo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0.1 MW  1 MW  10 MW  100 MW  1,000 MW
Our current focus

Early projects in Reference Applications

Establish partner network in hydrogen

Automation of fabrication and development of supply chain

Technological improvements