

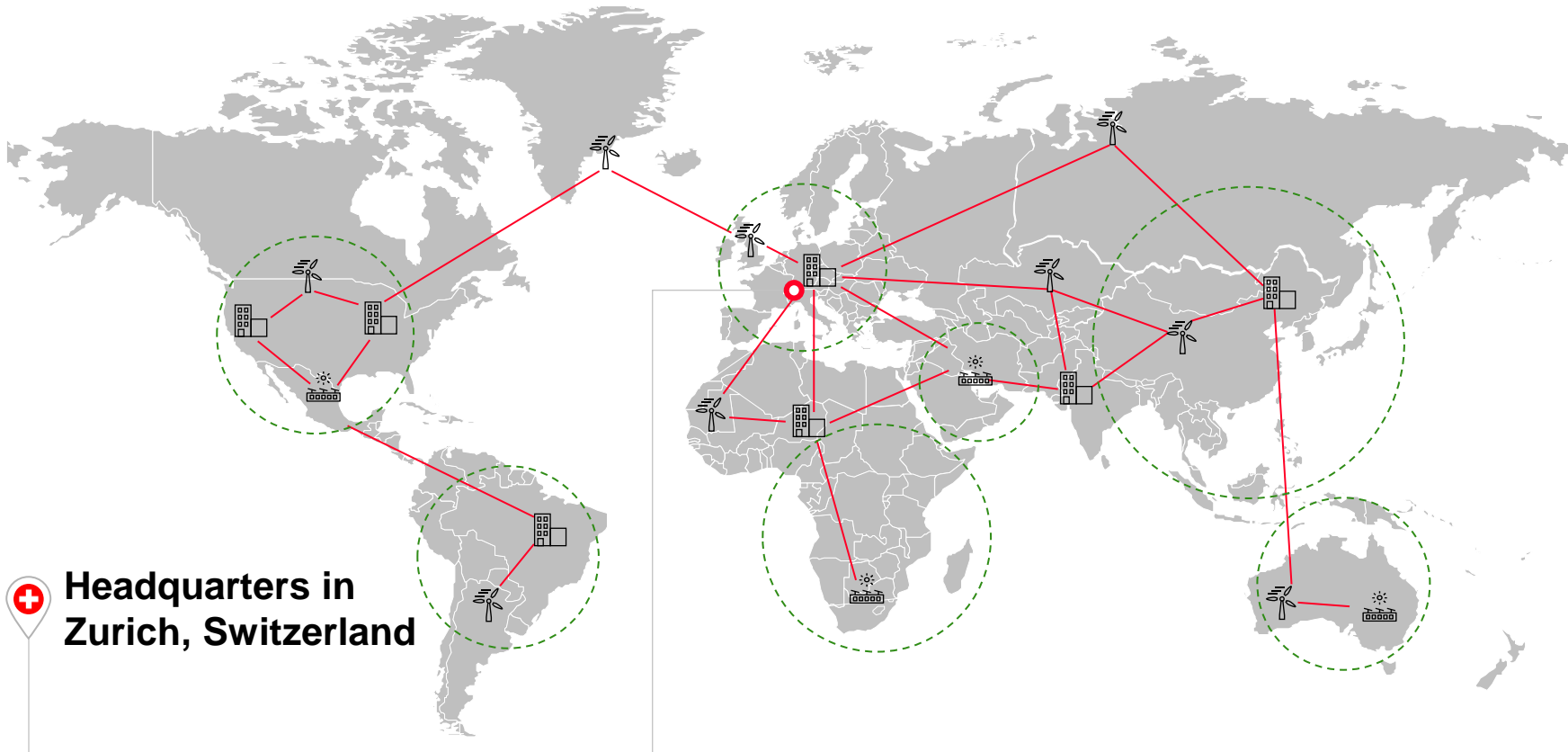


Opportunities and challenges for green hydrogen

Power And Control Electronics for Hydrogen Technologies (H2-PACE) Workshop

Panel 4: Commercial Systems Development & Qualification

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38,000 employees

90+
countries with
200 offices

~250
years' heritage
combined

5,500
sales employees
& field engineers

2,000
engineers &
scientists in R&D

4 Business Units

**Grid
Automation**

**High Voltage
Products**

Grid Integration

Transformers

Customers



Offering



Geographies



Grid Automation

50%

of the top 250 global electric utilities supported by our leading portfolio

Grid Integration

Technology HVDC

leader in power quality and grid connection solutions and services

High Voltage Products

1 in every 4

high-voltage switchgear installed in the world

Transformers

World's largest

installed base of power, distribution, traction transformers

~\$4 trillion

mission-critical infrastructure assets managed with our software solutions

Leader in HVDC* systems with

200 GW installed

More than

1M

circuit-breakers installed in the world

Technology

leader in transformer applications for HVDC, renewables and digitalization

Services

Maintaining and modernizing the **world's largest** installed base

More than **200** service centers and **1,500** field engineers worldwide



“
Electricity will
be the backbone
of the entire
energy system

01

Accelerated shift from fossil-based to renewable power generation

02

Growing electrification of Transportation, Industry and Buildings sectors

03

Sustainable energy carriers, complementary to direct electrification

Fast facts

“

Global electrification will be more than 50% of total energy demand

“

Electrification improves energy efficiency

“

All market sectors converting towards electrification

“

Energy sector-coupling beneficial

So what?

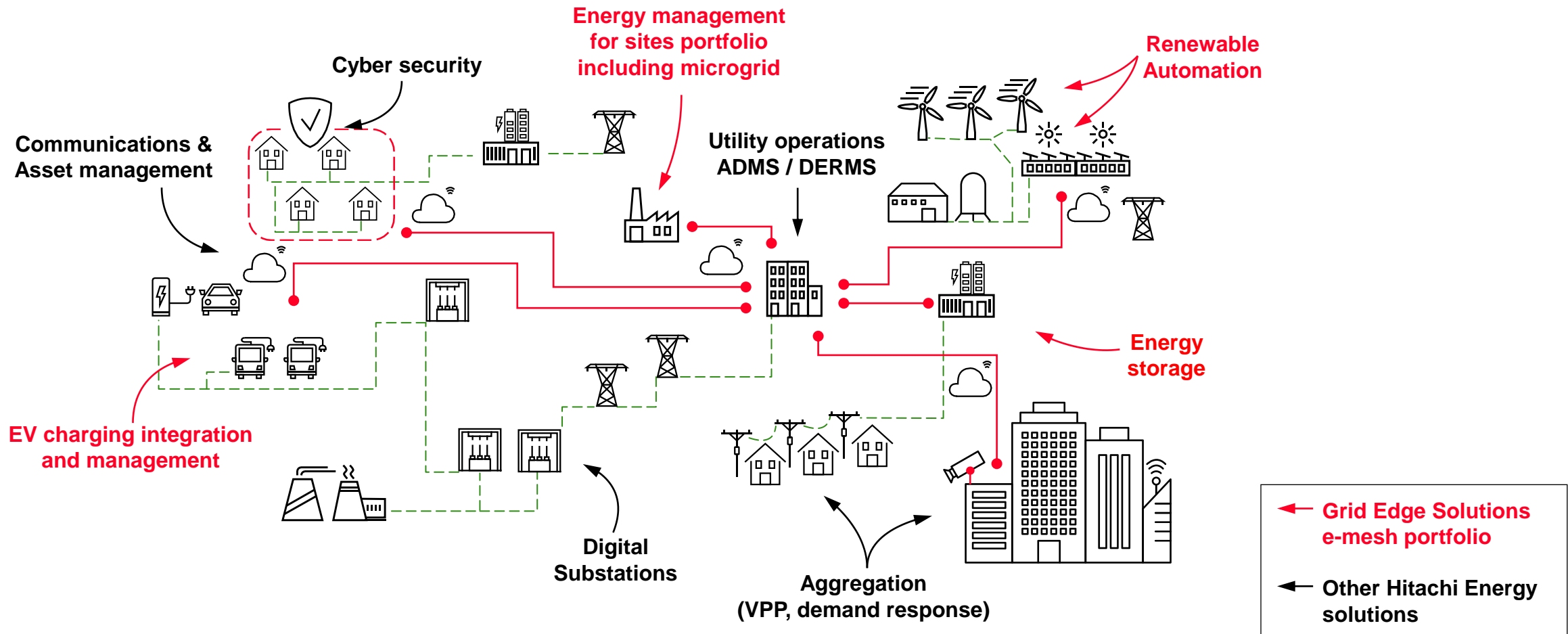
Digital and energy platforms are needed...

...to manage the enormous power system energy transition challenges:

increased complexity
additional capacity

for reduction of CO₂ emissions

Accelerating the transition to a carbon-neutral energy system requires adapting and adopting policies and regulations to enable technology and new business models to support Scalable, Flexible and Secure energy systems



Enabling new business opportunities while improving reliability and performance

Applications

SaaS Apps for improved performance



e-mesh Analytics



e-mesh Optimizer



e-mesh Service



e-mesh Premium

Monitor

Cloud enabled remote monitoring and control



e-mesh Monitor

EMS

On-premises energy management solution

SCADA

On-premises plant automation solution



e-mesh EMS op



e-mesh SCADA

Control

Intelligent and efficient power management



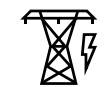
e-mesh Control

PowerStore

Smart battery energy storage solution



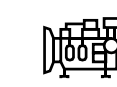
e-mesh PowerStore



Network



Feeder



Traditional Generator



Solar



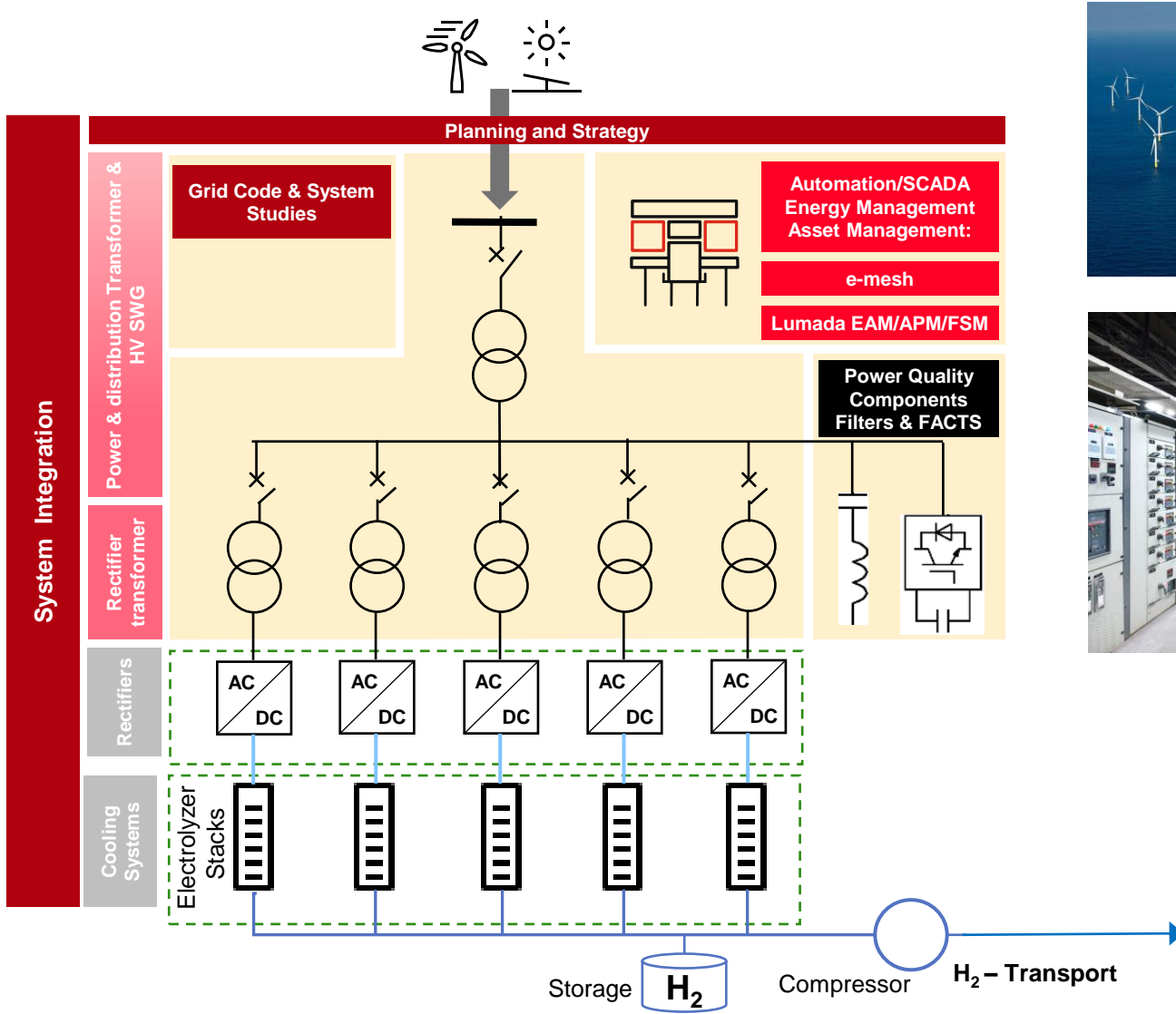
EV Charging

Real Time Communication

In the cloud

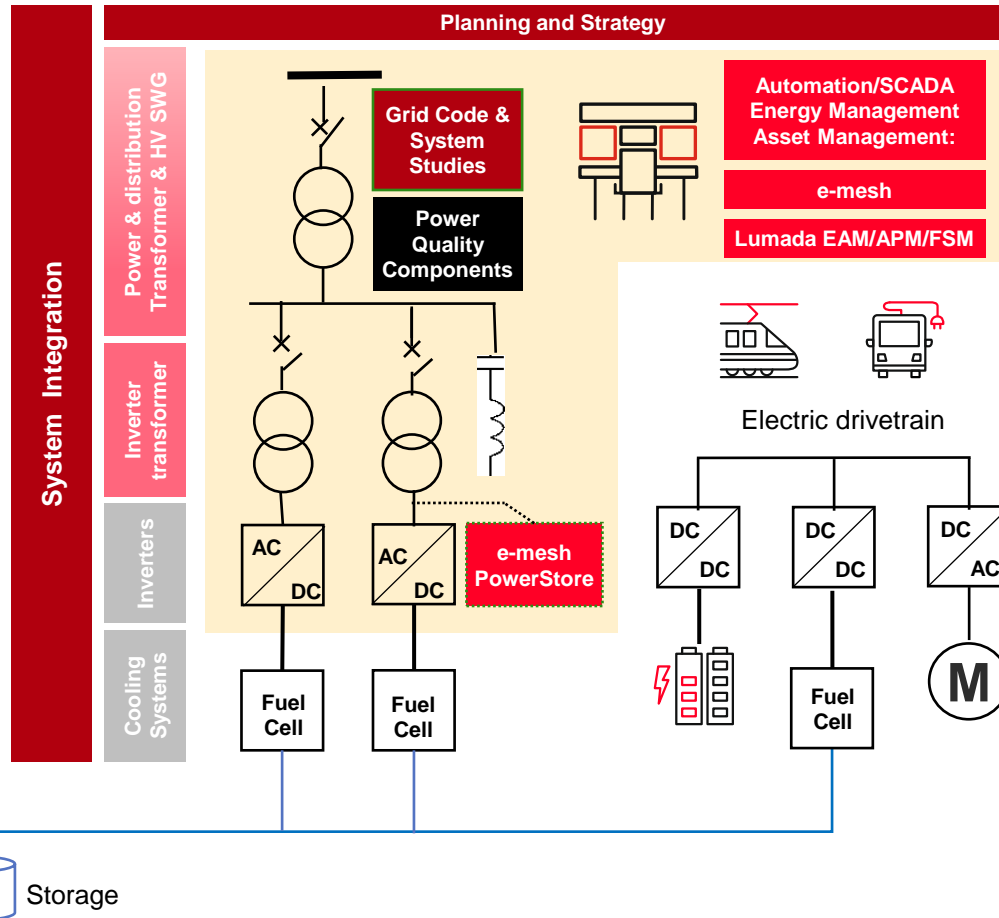
- Energy forecast, production and optimization planning
- Business KPI dashboards and reports
- Improved productivity and profitability
- Monitoring and control
- Bi-directional data flow
- Remote access
- Monitoring & control
- Optimal energy production
- Operational & maintenance cost reduction
- Renewable power generation grid code compliance
- Network voltage control
- Feeder & Load demand management
- Smart battery energy storage solution
- Support for various applications including islanding, seamless transition, black start, spinning reserve, etc.

Renewable energy to green hydrogen

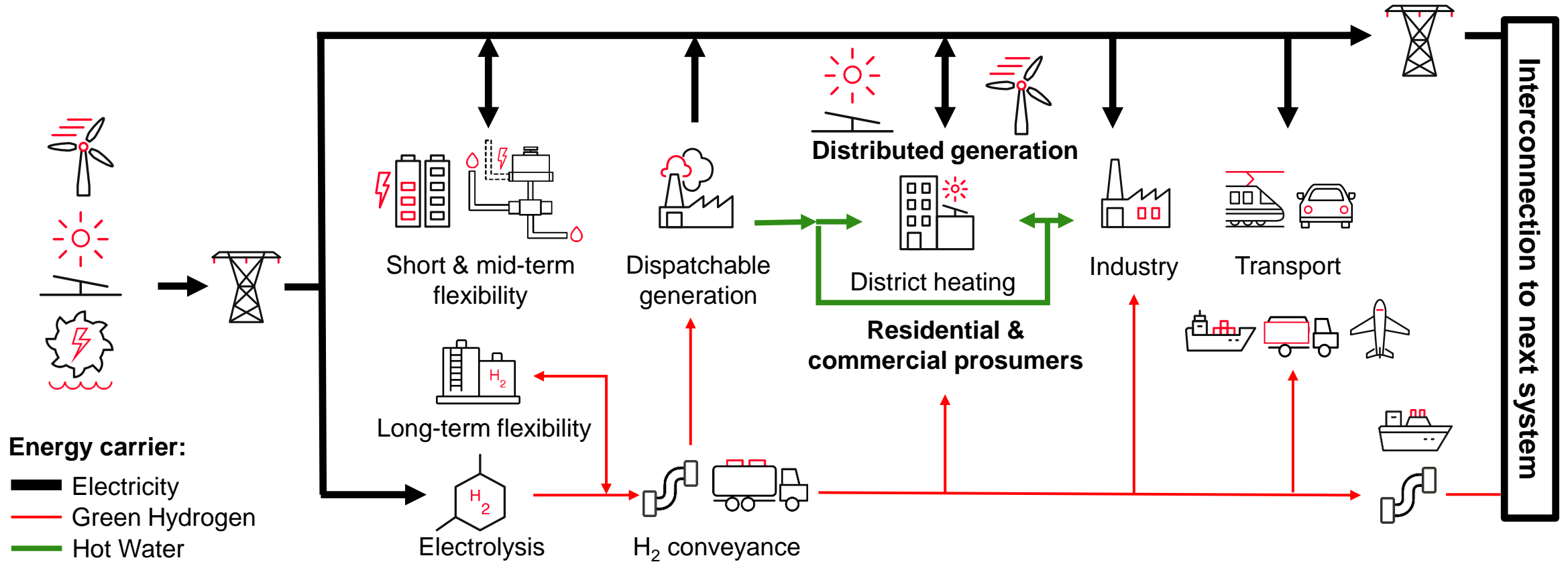


Stationary applications
(Data centers, back-up power)

Mobility applications
(marine, rail, road, off-road)



Towards a carbon-neutral energy system



Any energy unit will have been electrical at least once – electricity will be the backbone of the entire energy system.



HITACHI
Inspire the Next 

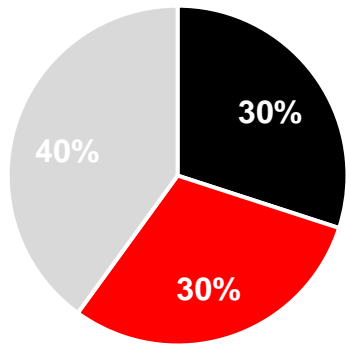
Extra Slides

INDICATIVE

Impact on CO₂ emissions

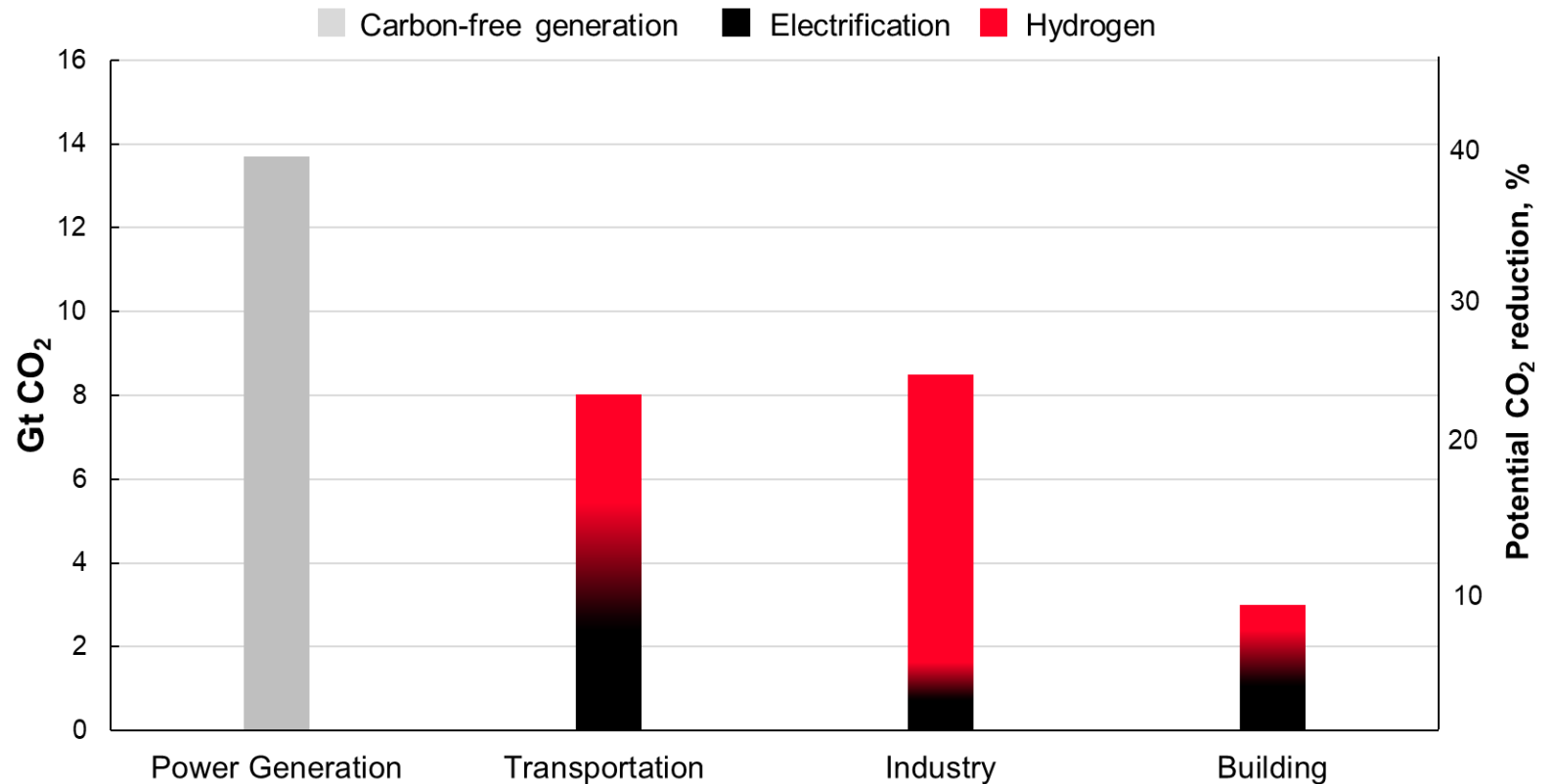
- Electrification of many processes is feasible in most industrial sectors, cutting sectors' emissions by 30%
- Green H₂ used as industrial feedstock or fuel for shipping and aviation can further reduce the emissions with 30%

CO₂ emissions reduction¹



■ Electrification ■ Hydrogen ■ Carbon-free generation

How electrification and H₂ can reduce CO₂ emissions across sectors



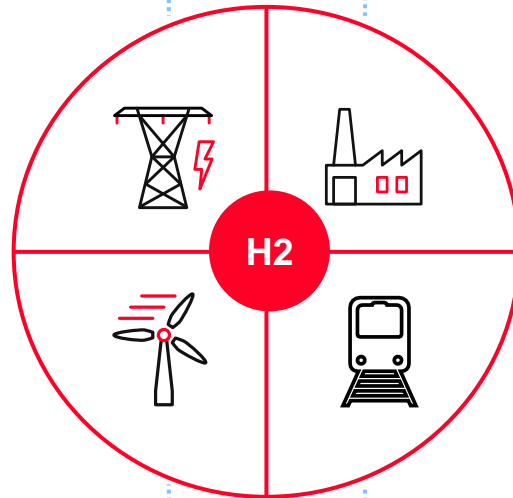
Electricity alone might not be enough to fully decarbonize all sectors

Utilities

- Energy access – world coverage going from 90% to 100% in 2030
- Clean Energy Transition – worldwide sustainable energy mix planned from present 20% to 45% in 2050
- Some utilities want to decarbonize their operations and footprint by 2030, H2 an important part of it

Renewables

- The true source for decarbonization the energy sector
- Renewables the cheapest form of energy production
- H2 as energy storage for grid stabilization or byproduct sold on the energy markets



Industry

- CO2 footprint reduction, better management of pollutants for sustainability
- Social responsibility
- Digitalization in search of productivity
- H2 as green feedstock for industrial processes
- H2 as green fuel to power industrial sites or new market segments

Transportation

- Fast urbanization, increasing demand of mobility
- Need for efficient and reliable transportation solutions
- Need to reduce and even eliminate emissions (CO2, noise, etc.)
- H2 as possible green fuel for long distance and heavy transport

H2 touches major energy sectors, with potential to decarbonize footprints and operations of many companies