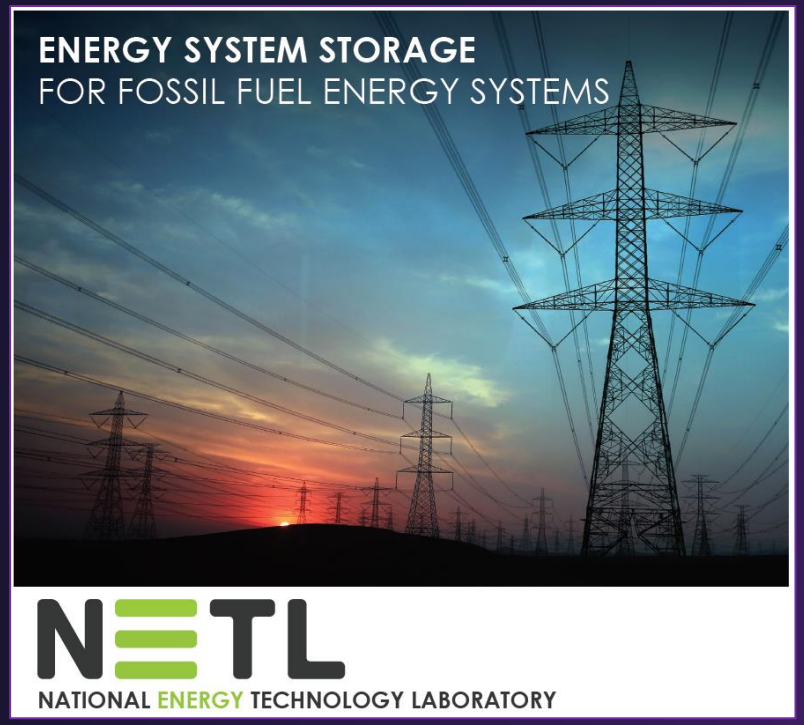
Cooperation
Hydrogen Storage Systems

SIEMENS energy DUKE ENERGY CLEMSON UNIVERSITY

H_2-Orange

Clemson Hydrogen Combined Heat and Power Storage System

Siemens Energy – Thomas Koeppe
April 6th 2021



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Clemson Hydrogen Combined Heat and Power Storage System

Project

DOE Project: DE-FE0032006
Prime Recipient: Siemens Energy Inc
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Sub-Recipients: Duke Energy,
Clemson University
Locations: Siemens Energy - Charlotte, NC / Orlando, FL
Duke Energy – Charlotte / Raleigh, NC, Tampa, FL
Clemson University – Clemson / Charleston, South Carolina
Funding: DOE: $199,874
Cost Share: $74,980
Total: $274,854

Objective

- develop a conceptual design of an approx. 50 MWh hydrogen energy storage system for the Clemson University campus
- optimally size, design and integrate the hydrogen energy storage system with the existing 15 MW gas turbine fossil asset for various stages of decarbonization and pilot application
- perform technoeconomic evaluations comparing various concepts considering key KPIs such as CAPEX and OPEX

Our visions

We
energize
society

by supporting our customers in transitioning to a more sustainable world, based on our innovative technologies and our ability to turn ideas into reality.

SIEMENS energy

Cut carbon emissions by at least
50%
by 2030

Attain
net-zero
carbon emissions by 2050

DUKE ENERGY

Net-Zero Goal

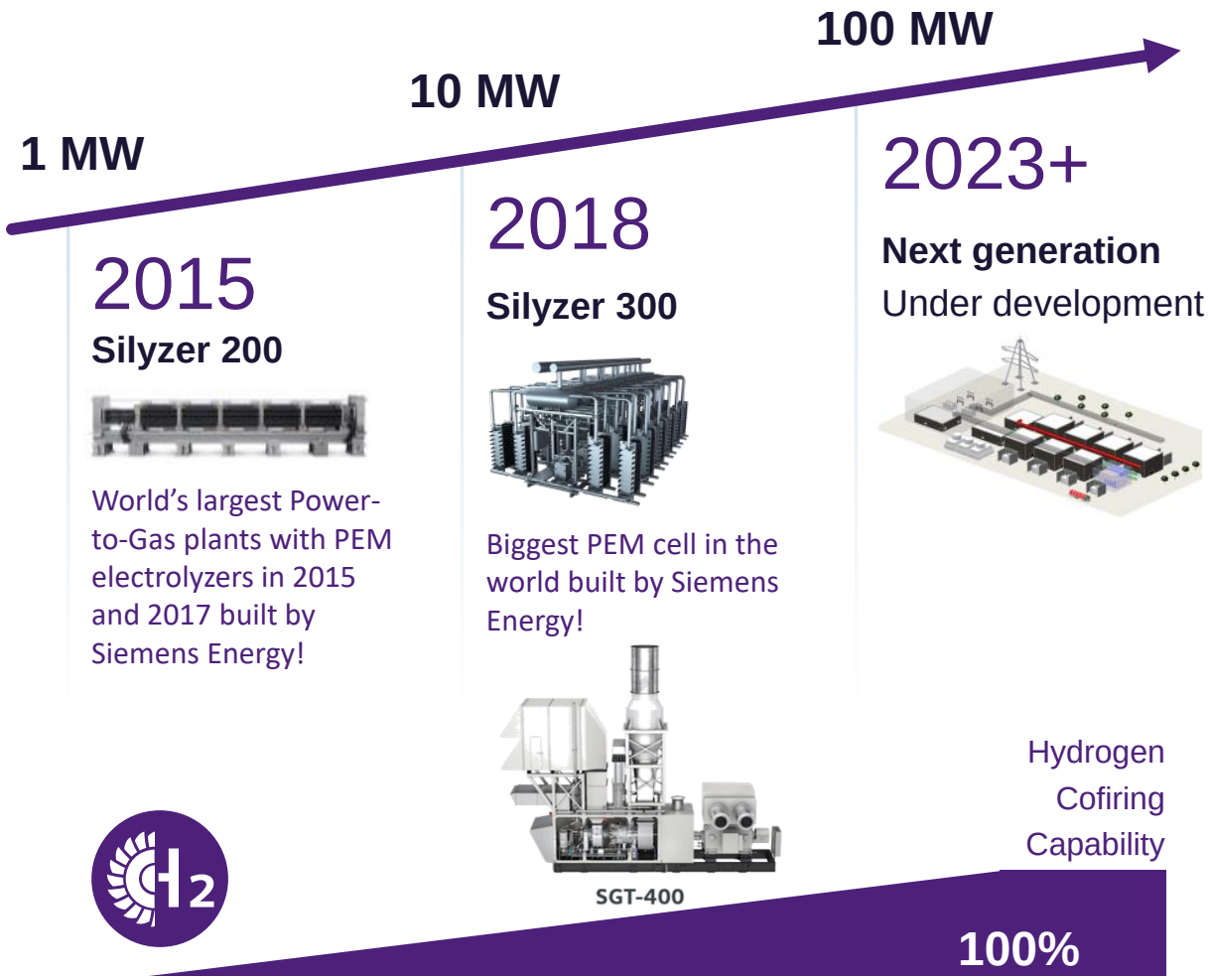
The ultimate goal of the Sustainability Action Plan and the Clemson University Commission on Sustainability is to make the University carbon neutral by the year 2030.

CLEMSON UNIVERSITY

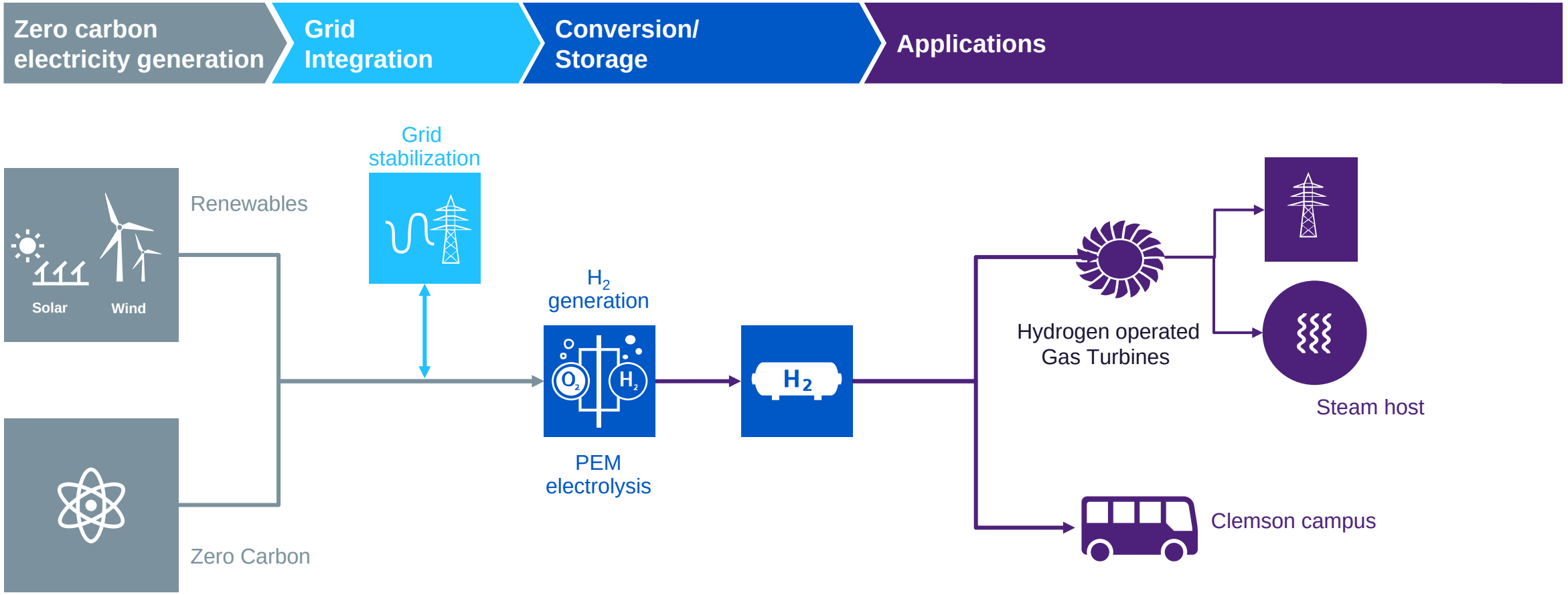
H2-Orange: focus and scope

Focus of our Conceptual Study

- **Feasibility study to set the stage for subsequent site-specific projects**
- **Integrating relatively mature combinations of energy storage technologies with fossil fueled assets**
- **Scale of the energy storage technology suitable to provide at least 50 MWh of storage**
- **Complementary technoeconomic analysis and commercialization for potential broad deployment.**



Hydrogen from Zero Emission resources enables long-term storage for Industry, Mobility and Energy



14.3 MW

output from SGT-400

33 MW

peak Campus steam demand

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Project

Cooperation:	Siemens Energy Duke Energy, Clemson University
Location:	Clemson, South Carolina
Product:	Hydrogen Storage System

Use cases

- Steam
- Re-electrician of hydrogen
- Mobility / Public transportation

Challenge

- Decarbonization of the 110,000 lbs/hr of peak campus steam demand and electrical output of the SGT-400
- Economics of zero emission hydrogen production
- Regulatory process for hydrogen pilot projects in the Carolinas
- Regulation, safety, and perception with hydrogen production and usage in proximity to the campus and community

Solutions

- Conceptual study to understand economics between technology owner, asset owner and off-taker
- Explore scope and economic requirements for a pilot demonstration of the Clemson CHP system

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