GE Gas Power – Hydrogen Update
BofA Securities 2022 Hydrogen Conference

December 13, 2022
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CAUTION CONCERNING FORWARD-LOOKING STATEMENTS: This document contains "forward-looking statements" – that is, statements related to future events that by their nature address matters that are, to different degrees, uncertain. For details on the uncertainties that may cause our actual future results to be materially different than those expressed in our forward-looking statements, see http://www.ge.com/investor-relations/disclaimer-caution-concerning-forward-looking-statements as well as our annual report on Form 10-K and quarterly reports on Form 10-Q. We do not undertake to update our forward-looking statements. This document also includes certain forward-looking projected financial information that is based on internal estimates and forecasts. Actual results could differ materially.

ADDITIONAL INFORMATION ABOUT GE: GE’s Investor Relations website at www.ge.com/investor and our corporate blog at www.gereports.com, as well as GE’s Facebook page and Twitter accounts, contain a significant amount of information about GE, including financial and other information for investors. GE encourages investors to visit these websites from time to time, as information is updated and new information is posted.
30 YEAR VIEW

Capacity vs. Generation

Wind and solar growth ...~80% of global net capacity additions

Coal generation down ~42%

Gas generation increases ~3% and will play a critical but changing role, as flexible, affordable, reliable and lower CO₂ power

Neither RENEWABLES nor GAS POWER are as effective alone at decarbonization* at the pace and scale needed to meet the goals of the Paris Agreement

*Decarbonization as used herein is intended to mean the reduction of carbon emissions on a kilogram per megawatt hour basis | Source: IEA WEO 2022 – Stated Policies Scenario
Multiple ways to decarbonize* existing and future gas power plants

**PRE-COMBUSTION**

Use a near zero or carbon neutral fuel
- Hydrogen (blue, green, pink)
- Synthetic (renewable) methane
- Ammonia (NH$_3$)
- Biofuels

**POST-COMBUSTION**

Remove carbon from the plant exhaust
- Carbon capture (liquid solvents)

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### Projects using hydrogen

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>Long Ridge Energy</strong> (USA)</td>
<td>Long Ridge Energy demonstrated hydrogen blending in their new <strong>7HA.02</strong> gas turbine.</td>
<td>5% Demo completed April 2022</td>
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<td><strong>NYP A Brentwood</strong> (USA)</td>
<td>New York Power Authority has demonstrated blending hydrogen and natural gas in an existing <strong>LM6000</strong> gas turbine.</td>
<td>43% Demo completed 1H 2022</td>
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<td><strong>Sharm El Sheikh</strong> (Egypt)</td>
<td>At COP27, demonstration of an Egyptian Electricity Holding Company (EEHC) <strong>LM6000</strong> gas turbine operating on a blend of hydrogen and natural gas.</td>
<td>Demo completed Nov 2022</td>
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<td><strong>Guangdong Huizhou</strong> (China)</td>
<td>Guangdong Energy Group intends to operate their new <strong>9HA.01</strong> gas turbines on a 10% blend of hydrogen and natural gas starting in 2023.</td>
<td>10% Target COD 2023</td>
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<tr>
<td><strong>Tallawarra B</strong> (Australia)</td>
<td>EnergyAustralia intends to begin blending hydrogen in their new <strong>9F.05</strong> gas turbine starting in 2025. Expected to be the first 9F gas turbine to operate on blends of hydrogen and natural gas.</td>
<td>5% Targeted COD Q42023</td>
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7HA HYDROGEN BLENDING AND OPERATION DEMONSTRATION
Long Ridge Energy Terminal, Hannibal, OH

Project highlight video available online
GE brings decades of experience developing plant level systems when using hydrogen fuels.
Data from 4/22/22 demonstration run
Nominal 5% (by volume) hydrogen blend
Stable operation on hydrogen for approximately 1 hour
No change in power plant performance with addition of hydrogen
This resulted in approximately 8MW of carbon free power being provided to the grid

Data is being used with permission of Long Ridge Energy.
LM6000 NYPA BRENTWOOD HYDROGEN DEMONSTRATION PROJECT

Brentwood Power Station, NY

Project highlight video available online
EPRI project executive summary available online
Project takeaways – operation & emissions
Gas turbine operation on blends ranging 5% to 43% hydrogen (by volume)

Summary:
• CO$_2$ emissions decreased as hydrogen fuel percentage increased
• At steady-state conditions, NOx and CO levels were controlled below the regulatory permit limits (based on the current NG fuel permit) with hydrogen cofiring
• CO levels decreased as much as 88% as the hydrogen fuel fraction increased during testing

EPRI project executive summary is available online

No significant changes to gas turbine operation were observed while maintaining current NOx emission levels
COP27 HYDROGEN DEMONSTRATION PROJECT
Sharm El Sheikh Power Plant, Egypt

The project was executed safely and successfully in <5 months by the Egyptian Electricity Holding Company, GE, Hassan Allam Construction, and PGESCO. Learnings from the Sharm El Sheikh experience will be studied and shared by EPRI, through the Low-Carbon Resources Initiative.

Project partners:
GE / Hassan Allam Construction / PGESCO / EPRI - LCRI

LinkedIn post & video highlighting the project available online
A significant milestone by many measures ...

**HYDROGEN FUEL VOLUME**

- ~1 ton of H2 blended;
- 600 m³/hour

**HYDROGEN STORAGE**

- 40 cylinders @ 2,900 pounds per sq inch

**GAS TURBINE**

- First LM6000 aeroderivative gas turbine to burn H2 blend in Africa

**EXECUTION SCHEDULE**

- <5 months from signature to first fire

**MANPOWER**

- Average localized manpower of 33 per day
HYDROGEN COMBUSTION TECHNOLOGY
Addressing technology challenge – advanced combustion systems

Today’s options for hydrogen:
• Diffusion combustion systems which require diluent injection to meet NO\textsubscript{x} requirements (lowering efficiency)
• Premixed combustion systems which are H\textsubscript{2} limited due to operability issues (flash back, flame holding)

Challenges for 100% H\textsubscript{2}:
• Flashback and flame holding
• Combustor operability
• Combustion system durability
• NO\textsubscript{x} emissions
• Plant safety

Next generation combustion systems are being developed to operate on high H\textsubscript{2} fuels while meeting stringent emission standards
External awards & collaborations

- **US Department of Energy** award for development of a retrofittable **F-Class** combustor module with capability from 100% natural gas up to **100% hydrogen**

- GE received letters of support for this proposal from **10 US utility companies** with an aggregate 240 gigawatts of total installed generation capacity serving approximately 81 million people across 39 states

- **Shell Global** collaboration to develop potential lower-carbon solutions aims to reduce the carbon intensity of Shell’s LNG supply projects around the world

- GE plans to accelerate development for the use of **100% hydrogen** as a low carbon fuel for **B&E class** gas turbines used in LNG and power generation applications

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CUTTING CARBON
A Conversation About Our Energy Future

Season 6 is now available for download!

www.gepower.com/ccpodcast