Opening Statement of David Cohn, Vice President,
Sargent and Lundy at PSC December 12, 2023 Technical Conference

I. Hydrogen

Today we are going to hear discussion about biofuels, renewable natural gas (RNG), and carbon capture on the first panel, hydrogen on the second, and advanced nuclear on the third. It is our view that all of these alternatives, individually or collectively, are viable, will aide in the achievement of CLCPA objectives, will become increasingly competitive with continued innovation, and should be deemed a dispatchable emissions free resource (DEFR) under the law/regulation. It is our view that DEFRs should be defined and adopted sooner rather than later, so that the repurposing of conventional infrastructure and advancement of nuclear is placed on equal footing with other alternatives, very much in the interest of policy objectives, the environment, system reliability and the NY ratepayer.

The production of hydrogen is being promoted by the United States Department of Energy's initiatives for seven "hydrogen hubs" in several areas of the country and using a diverse range of production methods. Phase 1 FEED studies are expected to begin in 2024 for these hubs. $7 billion in potential funding could be made available over the next several years. Clean hydrogen can be produced by electrolytic means using intermittent renewable energy or nuclear power. Electrolysis is the process by which water is split into its component parts, i.e., hydrogen and oxygen, using electricity. If site geological conditions are amenable, hydrogen can be stored on-site for use in dispatchable generation when needed using technologies designed for hydrogen fuel.

Such a concept is planned as part of the Advanced Clean Energy Storage project in Utah where solution mined salt caverns will store up to 300 GWh of energy.

Nuclear power resources are well suited for creating zero-emissions hydrogen production via electrolysis given their uninterrupted supply of zero-emissions power. There are currently three demonstration hydrogen projects at nuclear plants, one of which is located in Upstate New York.

- A low temperature electrolysis system at Nine Mile Point nuclear plant in Oswego, New York started generating hydrogen in February 2023.
- A low temperature electrolysis system at the Davis-Bessie Nuclear Power located in Ohio is scheduled to produce hydrogen by 2023.
- A high temperature electrolysis demonstration project at the Prairie Nuclear Generating Station located in Minnesota scheduled to begin production in 2024

Hydrogen storage and transport

Conveyance of hydrogen is viable. Hydrogen has been transported by pipeline since 1938. Approximately 1,600 miles in the United States, 1,200 miles in Europe, and 125 miles in Korea are in operation. Widespread distribution would require expenditures to retrofit facilities. Technical challenges for blending hydrogen up to 100% through new or existing pipelines include fatigue crack growth and fracture resistance of the piping systems, operating pressure, leakage, and safety. Older gas lines will need to be inspected to evaluate if they can be modified for hydrogen.

Hydrogen Usage

Hydrogen represents a zero-emissions fuel that can used to generate dispatchable power. The fuels can currently be used in conventional boilers and some current combustion turbine models with currently available modifications to firing systems, burners, combustors, and control systems. For advanced class combustion turbines, partial firing of hydrogen with natural gas is currently possible. Significant activity in product development is occurring in combustor design to enable 100% firing of hydrogen in advanced class combustion turbines. The target date for completion of this development for all vendors is approximately 2030. These combustors will also be available as retrofits for existing combustion turbine installations. Nitrogen oxides (NOx) generated during combustion can be controlled using long-established, widely used technologies, such as, for example, selective non-catalytic reduction (SCR).

Additionally, a “follow-on” project to the aforementioned electrolyzer at Nine Mile Point, Constellation, with the aid of a New York State Energy Research and Development Authority (“NYSERDA”) grant, is pursuing a zero-emission fuel cell project run entirely on clean hydrogen. The fuel cell is being designed as a DEFR suited to ramp up on short notice to meet peak electric demand and is expected to commence operations in 2026.

Conclusion

It is technically feasible for hydrogen to be generated without carbon emissions and to be used subsequently to generate dispatchable electric power.

II. RNG

RNG is gas collected from sources that would produce and release bio-derived methane if not captured, thus eliminating the release of the potent greenhouse gas, methane, into the atmosphere. Methane’s climate impact is far greater than carbon dioxide, so the alternative combustion of RNG results in lower GHGs emissions.

RNG Generation

The technology is mature with 84 landfill RNG projects and 109 agriculture RNG projects operating in 2022. For example, landfill gas (LFG) was recovered and processed into high Btu RNG and directly injected into the National Grid pipeline (474,119 MMBtu/yr.) for over 30 years at the Fresh Kills Landfill in Richmond, New York prior to landfill closure in 2002.

Some RNG sources, such as anerobic digestion from livestock farms and other facilities generating methane that is not flared, can achieve a negative GHG footprint by eliminating the CH_4 emissions. Other sources such as landfill or wastewater treatment facilities, which currently collect and flare CH_4, would represent a benefit through generating dispatchable energy from methane that is currently flared.

RNG Transportation

Advanced treatment of the LFG removes impurities and compresses the gas to a high-Btu gas (RNG) that can be injected into a natural gas pipeline. About 16% of currently operating LFG energy projects are creating RNG.

RNG Usage

RNG can be used directly in existing facilities that utilize pipeline natural gas. A key benefit of RNG is its ability to be a “drop-in” fuel capable of decarbonizing electrical generation applications currently served by conventional natural gas.

With 50% of the Achievable Deployment from Anaerobic Digestion and Thermal Conversion used to fuel gas turbines, it could provide an estimated 5.80% of the dispatchable generation needed for the 27 GW NYISO Outlook case and 3.5% for the 45 GW NYISO Outlook case.

Conclusion

RNG can be used as a dispatchable source to maintain grid reliability and complement renewable facilities and battery storage that cannot meet electric demand.

III. Carbon Capture, Usage and Storage (CCUS)

Carbon capture, usage and storage is an emerging solution in the portfolio of strategies for decarbonizing dispatchable electricity generators. Major global corporations are advancing the innovation of these systems at record speed.

This technology potentially could remove on the order of 98% of the CO_2 emissions. Achieving broader implementation necessitates investments in expanding the network of pipelines to transport the captured CO_2 to appropriate geologic formations, including oil and gas reservoirs, non-mineable coal seams, and deep saline reservoirs, and/or transport to an application or applications for use.

Direct air capture could be used to offset CO_2 emissions for electricity generation that must be located in specific load pockets, especially if that generation is used in peaking fashion.

CCUS should be considered alongside other lower or zero-emission technologies and renewable resources in an integrated approach.