NGA Nuclear Learning Collaborative Series
Advances in Nuclear and Future Uses

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Current State Overview

- Exelon Objectives:
  - Preserve the current fleet
  - Foster the development and commercialization of advanced designs

- Expanding role of nuclear plants
  - Critical to decarbonization goals
  - Flexible generation (load following)
  - Integration with energy storage
  - Desalination and district heating applications
  - Hydrogen production
  - Behind-the-meter co-location with large loads

Current fleet of reactors is needed to sustain the momentum of the manufacturing supply chain and the pipeline of human resources in order to usher in the next generation of reactors

Exelon Activities with Advanced Reactors

- Motivation for advanced reactor strategy
  - Influence future designs by providing operational perspectives
  - Ensure available technology alternatives for the future
  - Create business opportunities to provide operational services to new entrants in nuclear ownership
  - Communicate our long-term commitment to nuclear to employees and external stakeholders
  - Uphold our role as an industry leader
- Engaging with multiple reactor developers
- Leading industry forums

Exelon sees advanced reactors as critical for decarbonization and as the enabling foundation for the deployment of renewables

Advanced Reactor Key Considerations

Wide field of Advanced Reactor developers

- Sizes range from startups to large corporations
- Experience levels range from new to original equipment manufacturers

Benefits of Advanced Reactors

- Lower overall cost
- Reduced construction risk due to modularization
- Enhanced safety features
- Ability to produce more than electricity
- Greater agility on grid
- Flexible operations to serve as enabling foundation for renewables

Challenges with Advanced Reactors

- Immature designs do not yet enable accurate cost estimates
- Regulatory approval timeline uncertain, especially for advanced designs
- Funding streams for developers to finalize designs

Overview of Nine Mile Point Hydrogen Project

Goals/Objectives

- Install a 1MW Polymer Electrolyte Membrane (PEM) electrolyzer and supporting infrastructure at an Exelon nuclear power plant
- Provide economic supply of in-house hydrogen consumption at the plant
- Simulate a scale-up operation of a larger electrolyzer participation in power markets

Timeline and budget

- Conditional award: 10/01/2019
- Removal of condition: 04/01/2020
- Completed Go/No-Go: 07/30/2021
- Project End Date: 04/01/2023
- Total Project Forecast: $13.8M

Questions, challenges

- Site Selection
  - What are the criteria for site selection?
- Regulatory
  - What are the relevant regulations that affect nuclear H2 production?
- Market-related
  - What is the effective electricity price that the electrolyzer pays?

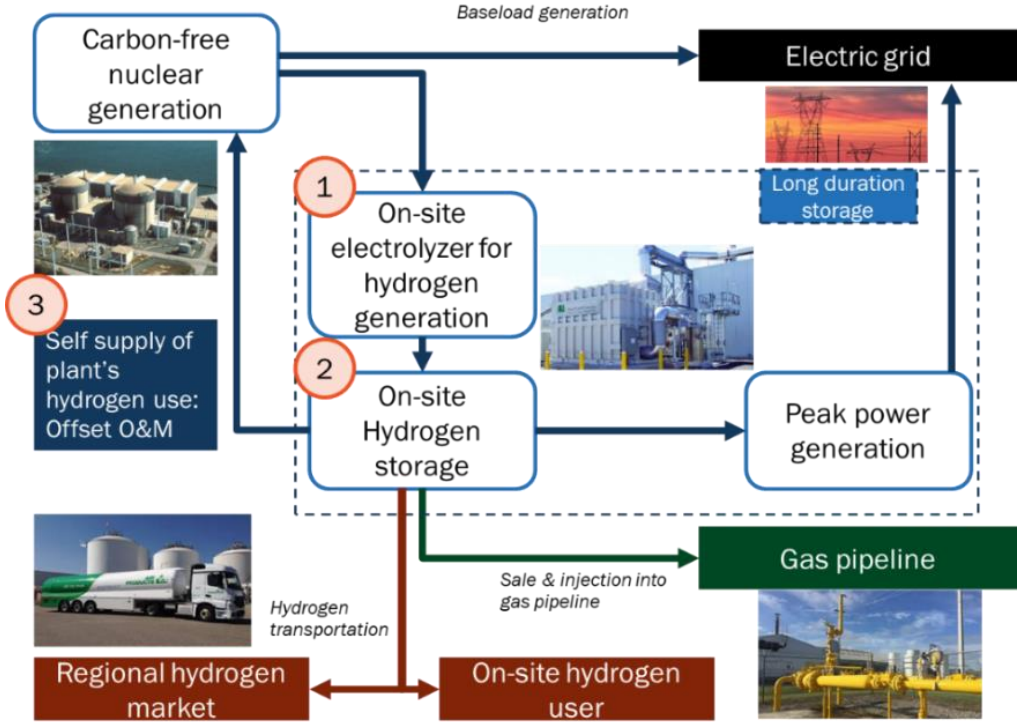
Partners

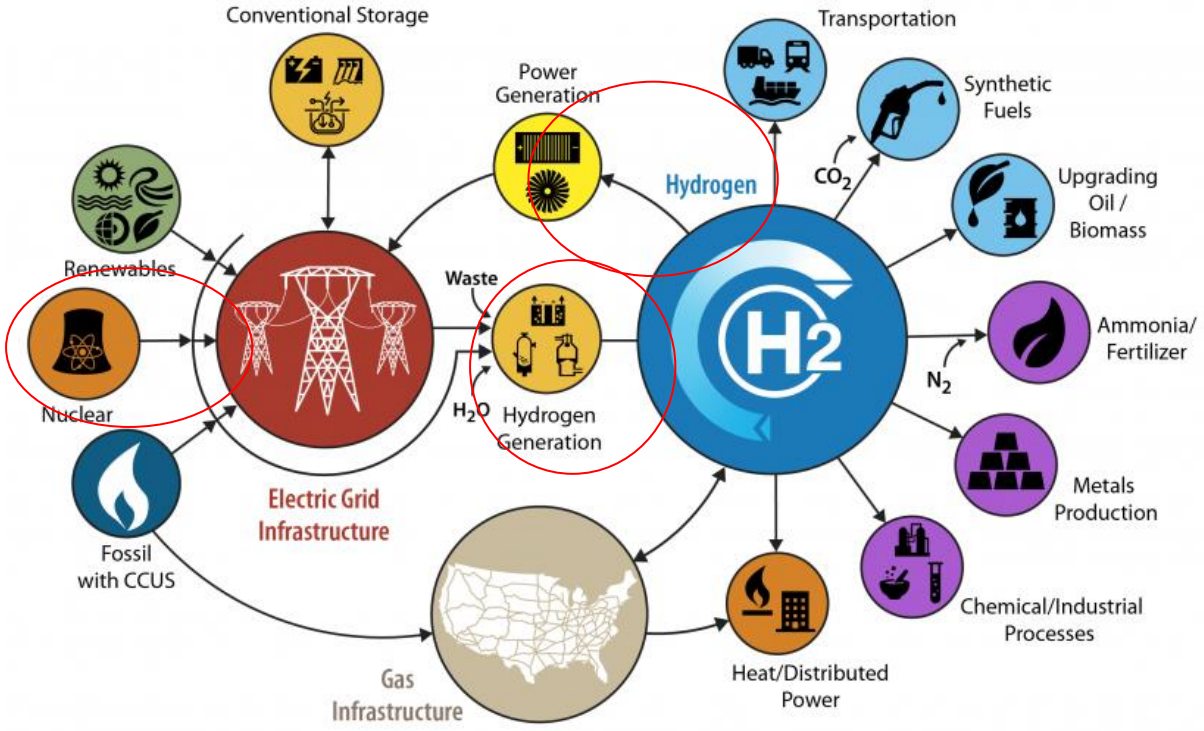
- Exelon Corporation
- Idaho National Laboratory
- National Renewable Energy Laboratory
- Argonne National Laboratory
- Nel Hydrogen

Nine Mile Point Hydrogen Project

Technical Goals and Objectives

- Install a 1MW PEM electrolyzer and supporting infrastructure at an Exelon nuclear power plant
- Provide economic supply of in-house hydrogen consumption at the plant
- Simulate a scale-up operation of a larger electrolyzer participation in power markets





Exelon

State Policy Initiatives Supporting Nuclear Power

- Clean Energy Legislation, Zero Emission Credits (ZECs) and Carbon Mitigation Credits
  - Illinois
  - New Jersey
  - New York
- Clean Energy Standards and Carbon Reduction
  - Pennsylvania Joining Regional Greenhouse Gas Initiative (RGGI)
- Small Modular Reactor Initiatives
  - Montana and Nebraska Legislation Providing for Siting and Tax Incentives
- Repealing Nuclear Moratoriums
- Hydrogen Development Opportunities