



## SMRS and Advanced Reactors

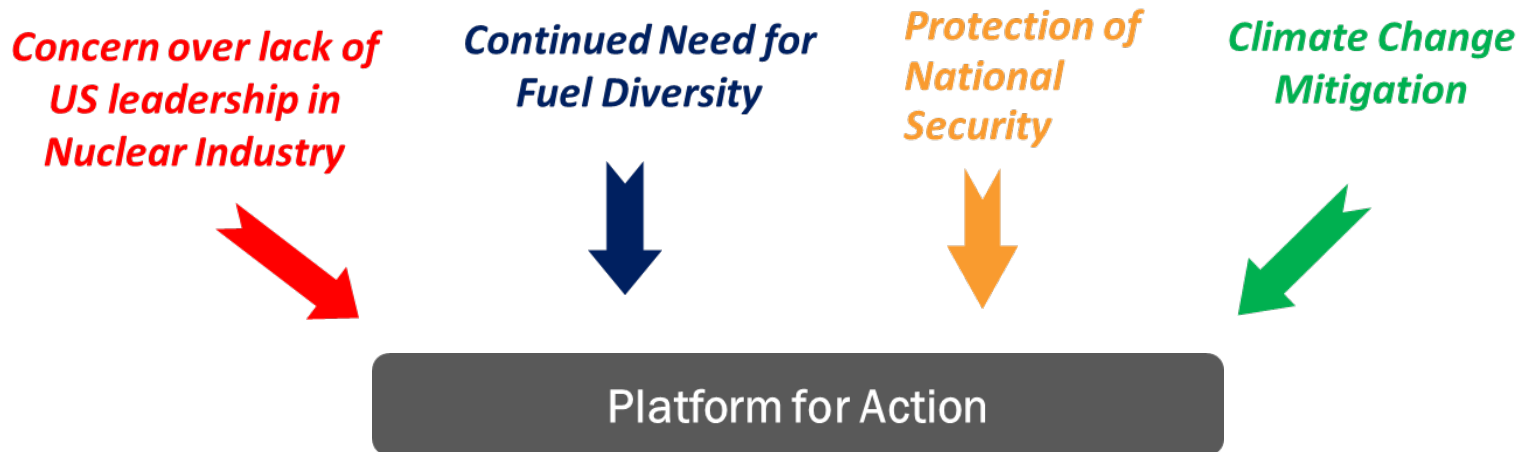
Briefing to PA Climate Change  
Advisory Committee

August 23, 2022

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Vice President, Nuclear Business  
Development

# Current Scenario



## GOVERNMENT RESPONSE

- Federal legislation
- DOE funding, GAIN, ARDP
- NRC funding and actions

## INDUSTRY RESPONSE

- Increased activity by technology developers
- Availability of venture capital funding
- Coordination of industry initiatives

**Current drivers present a platform for action related to Advanced Reactors, thus prompting actions by both government and industry**

# U.S. is Rapidly Decarbonizing



**25 STATES**

Have GHG targets or clean energy goals



**40 MILLION PEOPLE** OR **12% OF THE POPULATION**

Live in cities with climate action plans


Federal government will procure

**100%** carbon pollution-free 24/7 electricity by



**2030**

**2/3** of car sales will be electric by **2040**



**600** local governments have developed climate action plans



**60% of FORTUNE 500** companies have set climate and energy goals



**\$100B** per year needed in clean energy investment to reach

**90%** clean energy by **2035**



U.S. GHG Reduction Target of **50-52%** by **2030**

# Players Shaping Strategy



**Reactor Developers**



**HITACHI**



**Kairos Power**



**Utilities**



**NEI**  
NUCLEAR ENERGY INSTITUTE




**State Policy**




**CLEAN AIR TASK FORCE**



**third way**  
fresh thinking



**EPRI**  
ELECTRIC POWER RESEARCH INSTITUTE



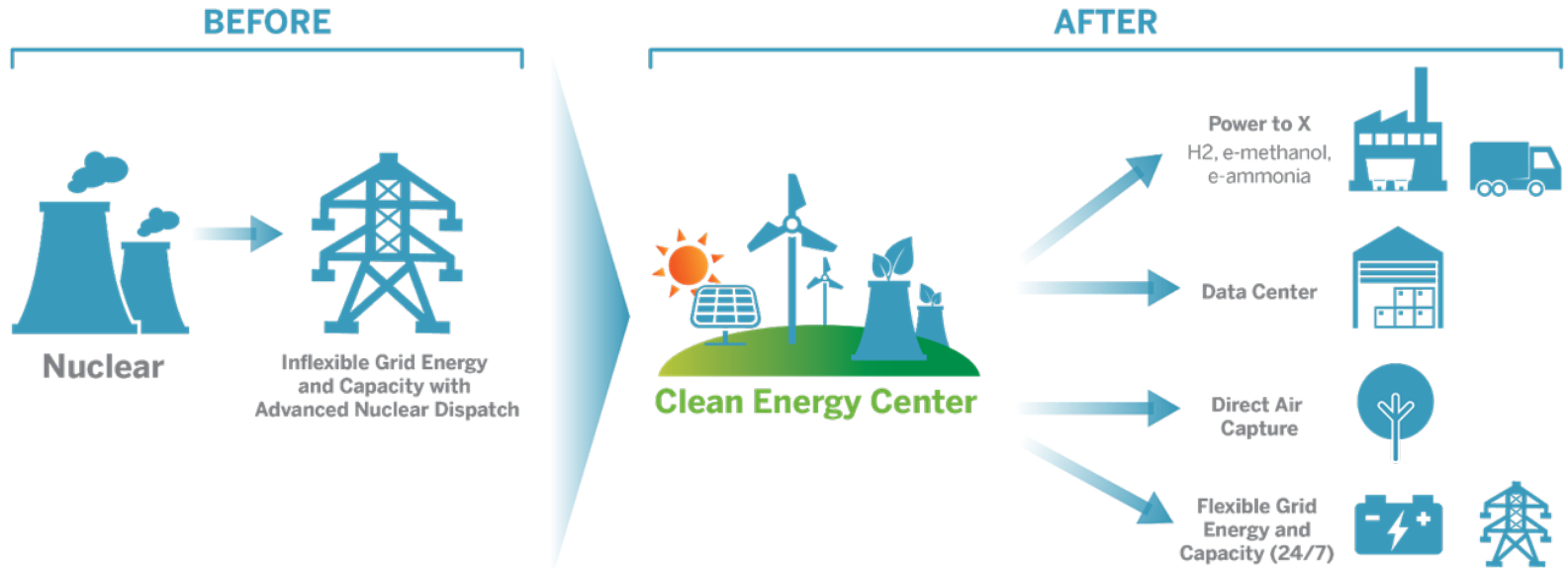
**AMERICAN NUCLEAR SOCIETY**



United States  
**NIC**  
Nuclear Infrastructure Council

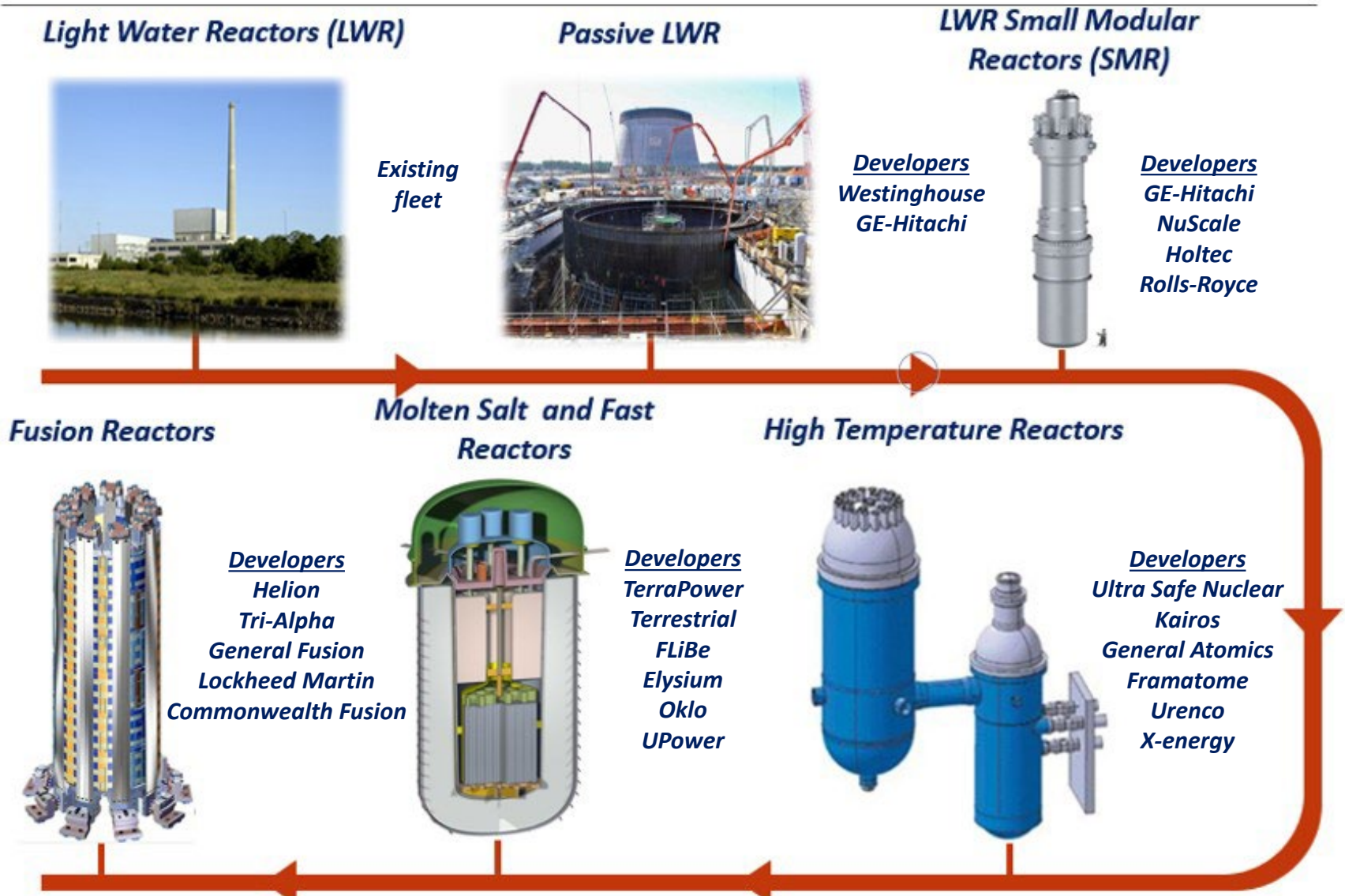


# Constellation's Pathway to Flexible Clean Energy Centers





# US Reactor Technology Evolution



# Key Considerations for SMRs and Advanced Reactors

## Wide Field of Developers

- Sizes range from startups to large corporations
- Experience ranges from new to original equipment manufacturers of existing fleet

## Benefits of SMRs/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 of SMRs/Advanced Reactors

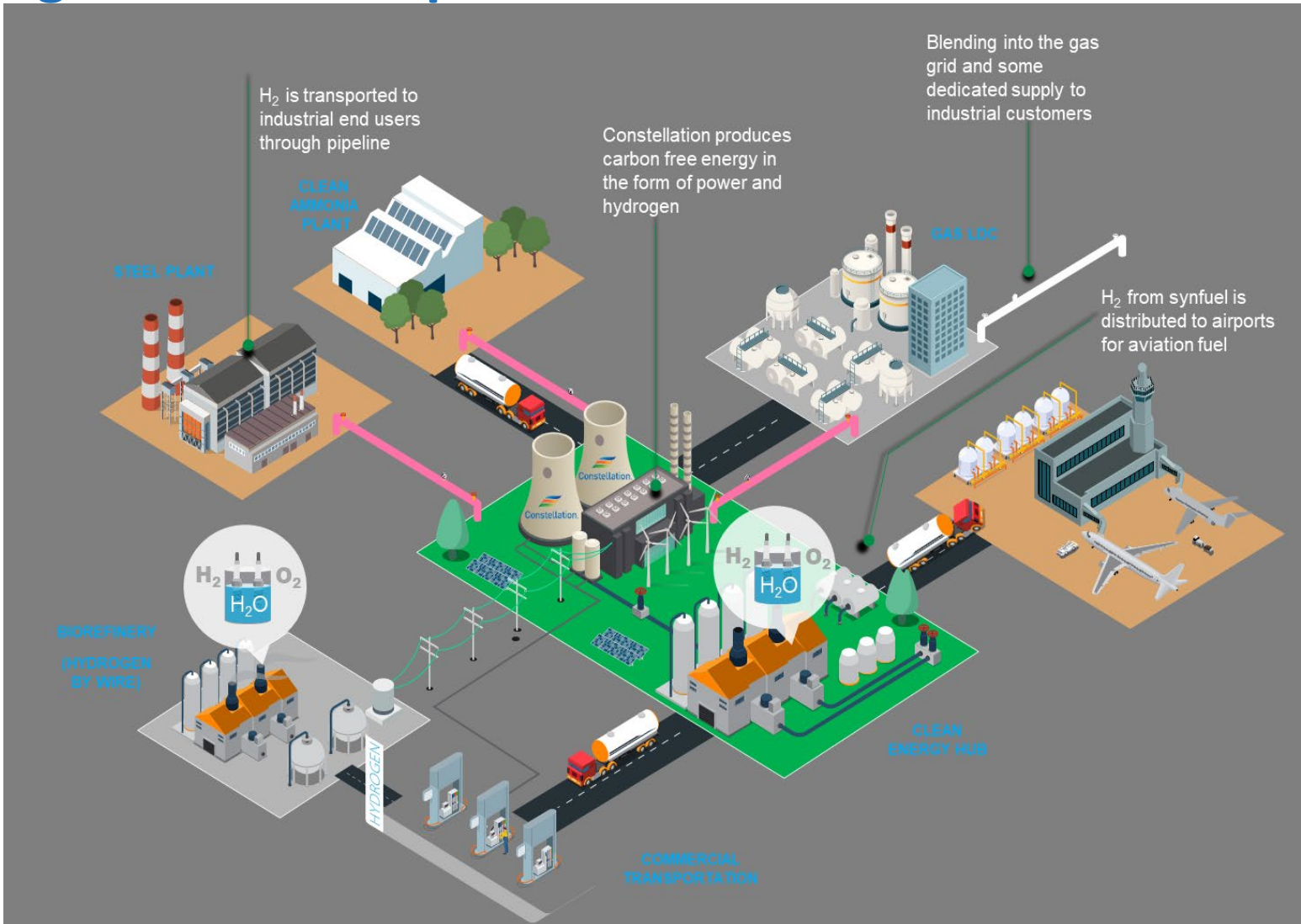
- Immature designs do not yet enable accurate cost estimates
- Regulatory approval timeline uncertain, especially for advanced designs
- Funding streams for developers to finalize designs

# Constellation Activities with SMRs and Advanced Reactors

- Immediate focus is on sustaining existing fleet
- Motivation for SMR 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



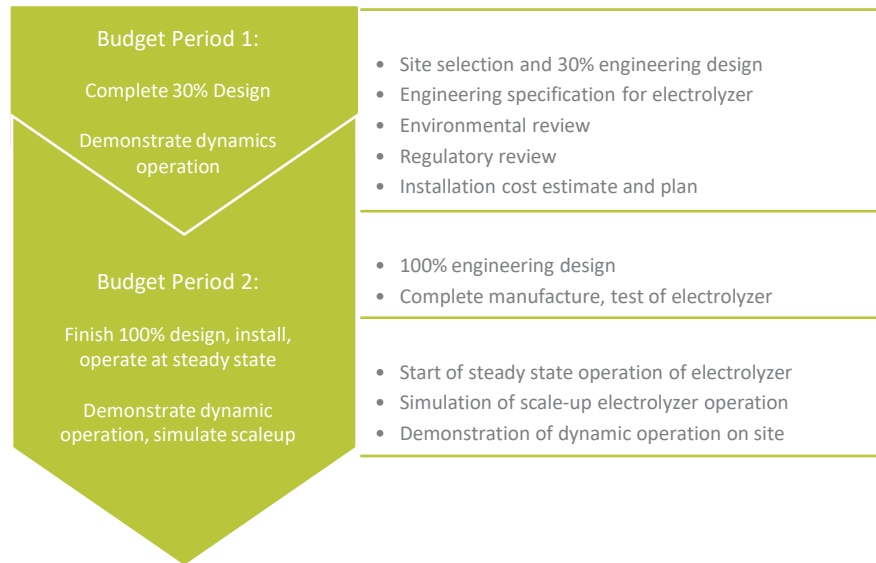
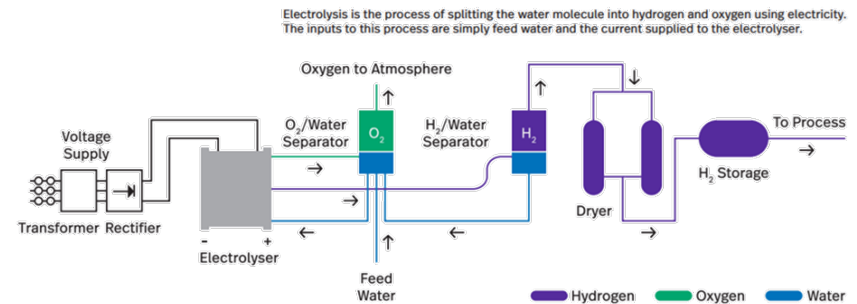
# Hydrogen Hub Concept



Long term hydrogen hub could decarbonize numerous end-users

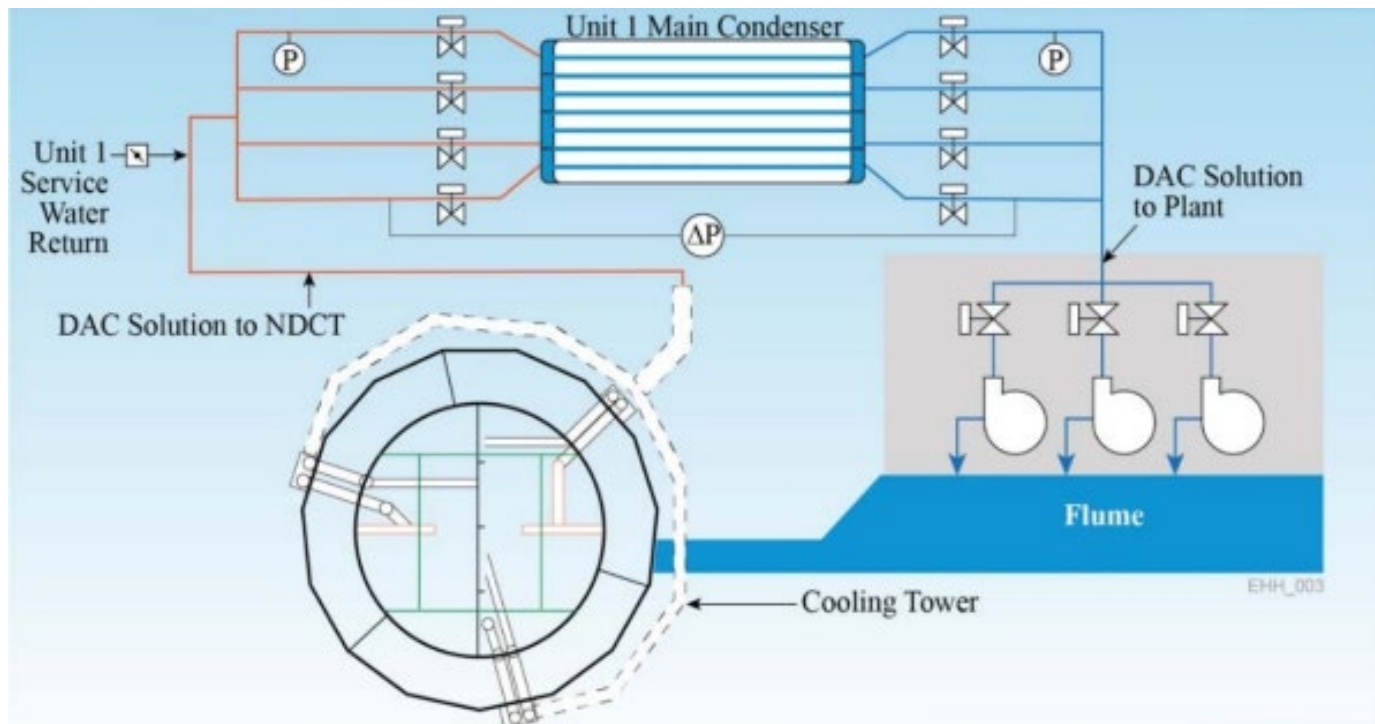
# Nine Mile Point Hydrogen Pilot

- Constellation has been awarded a DOE grant in partnership with Nel Hydrogen and 3 national laboratories to demonstrate an integrated hydrogen production strategy
- Nine Mile Point was selected as the site to install a Proton Exchange Membrane (PEM) electrolyzer
- Budget Period 1 concluded in August 2021



# Byron Direct Air Capture Project

- DOE demonstration project to capture 250,000 tons of CO<sub>2</sub> per year
- \$2.5M Award announced April 2022 to conduct a Front-End Engineering Study
- Partnering with 1PointFive Inc., Worley Group Inc., Carbon Engineering Ltd., PNNL and University of IL Urbana-Champaign
- Study to conclude in 2023



# 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