



# Spring Review Panel Briefing

*Flexible Plant  
Operations &  
Generation*

## LWR Thermal Energy Extraction Pre-conceptual Design Studies

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March 18 & 19, 2025



# Sargent & Lundy (S&L) Areas of Support 2023 - 2024

- **Area 1: Preconceptual Design / Integration of 500MW HTSE Facility with LWR NPPs**  
**(Completed Q2 2024 – Q3 2024)**
  - ❑ **PWR Focus Areas**
    - NPP – H2 Thermal & Electrical Integration
    - 500MW<sub>DC</sub> H2 Facility Design
  - ❑ **BWR Focus Areas**
    - NPP – H2 Thermal Integration (BWR-specific)
- **Area 2: High Volume TPD Analysis from Generic PWR**  
**(Completed Q2 2023 – Q1 2024)**
  - ❑ **Focus Areas (30%, 50%, and 70% TPD)**
    - Heat Balance
    - Plant Impacts
    - Equipment Evaluations

# Area 1

## **Preconceptual Design and Integration of 500MW H2 Facility with LWR NPPs**

# PWR Design and Integration with 500MW SOEC Facility



Thermal / Electrical  
Energy

Focus  
Area



Focus  
Area

- **NPP Reference Plant**

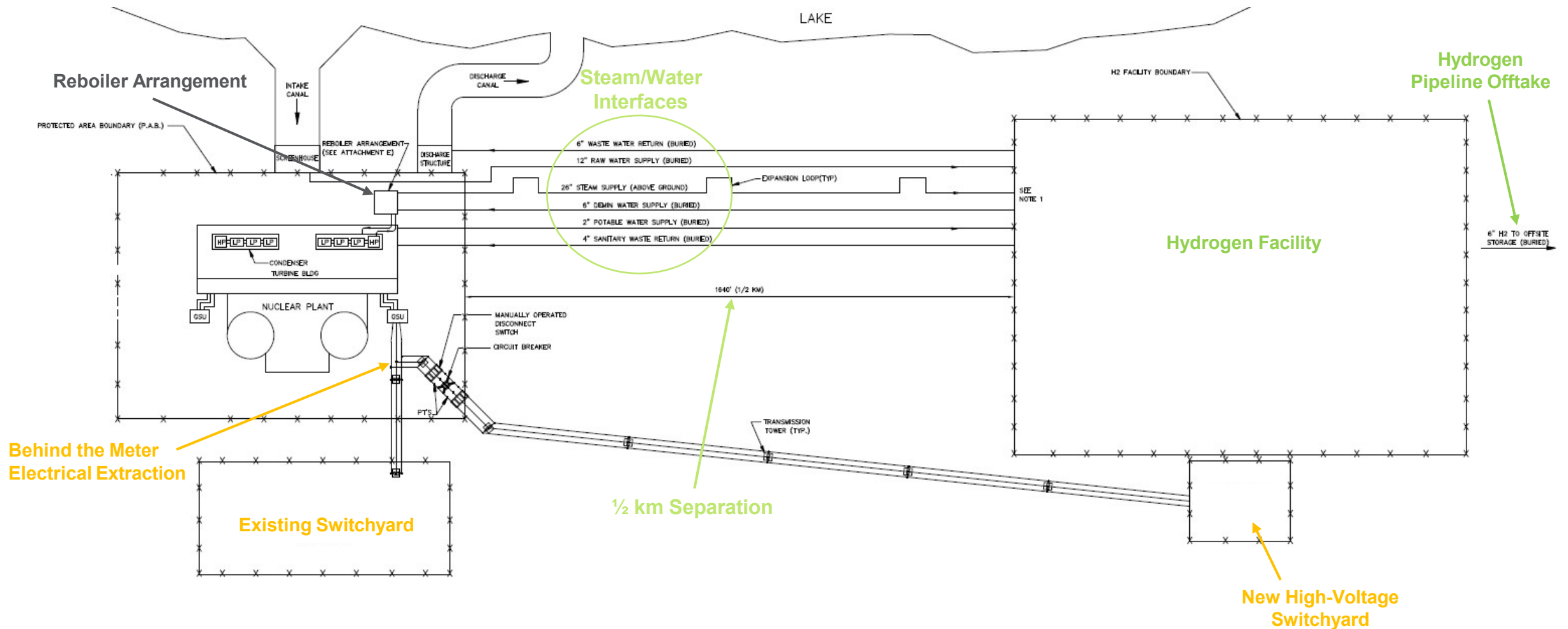
- Based upon typical US designs
  - Westinghouse 4-loop PWR (1/3 of US fleet)
  - 1,200 MW<sub>e</sub> / 3,700 MW<sub>th</sub> / SWYD: 345 kV

- **Hydrogen Facility Plant**

- 500MW<sub>DC</sub> SOEC Capacity
  - Thermal Load – 100 MW<sub>th</sub>
  - H2 Production – 320 metric tons/day



# PWR – 500MW SOEC Facility Integration: Site Layout



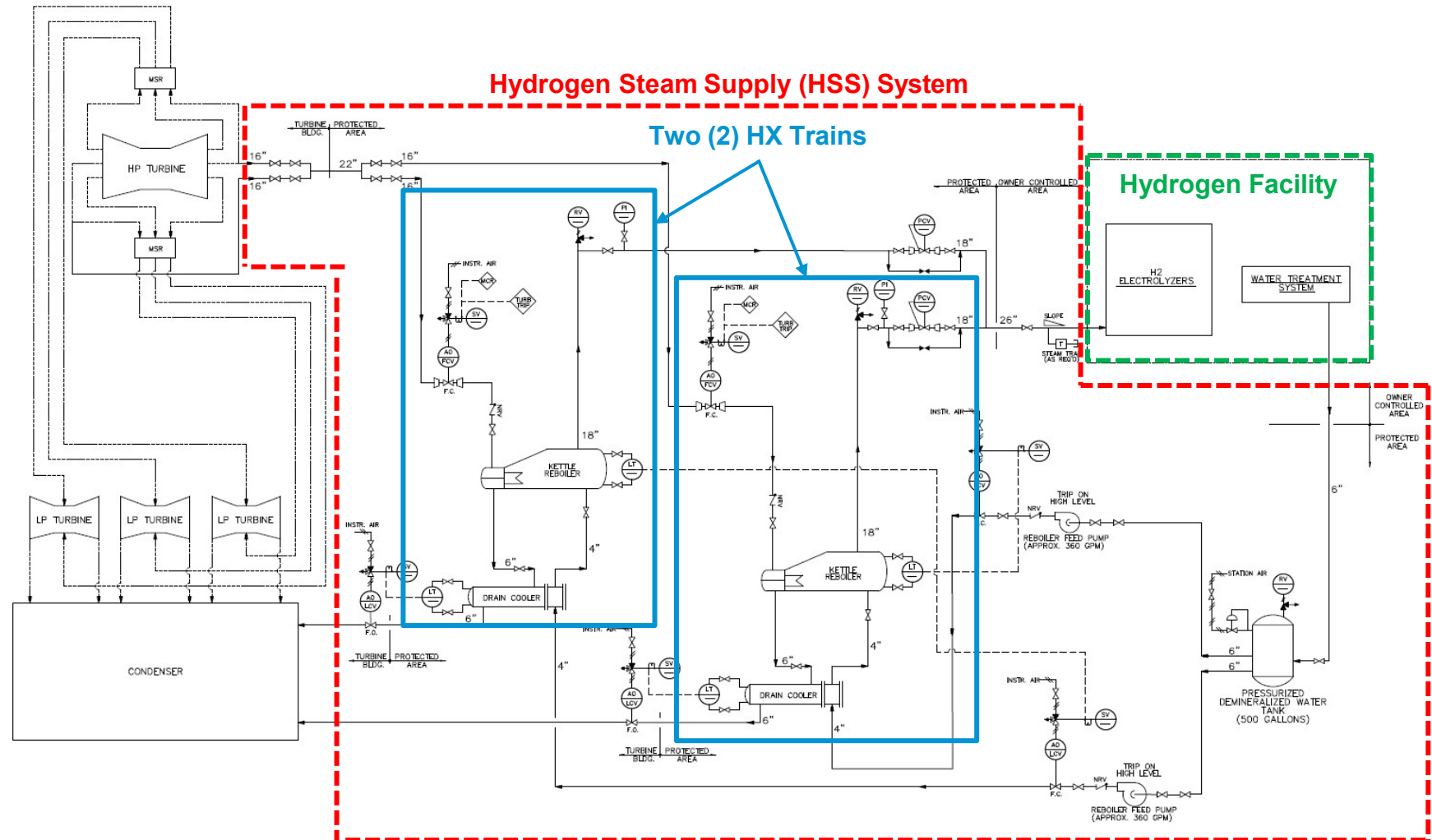
# PWR – 500MW SOEC Facility Thermal Integration

Cold Reheat  
Steam viable for  
500MW SOEC  
H2 Facility

Main Steam needed to  
support a > 500MW<sub>DC</sub> SOEC  
H2 Plant

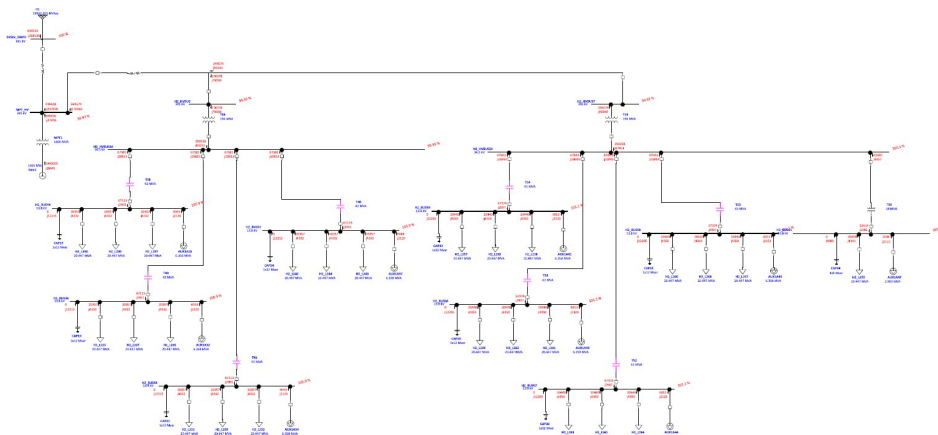
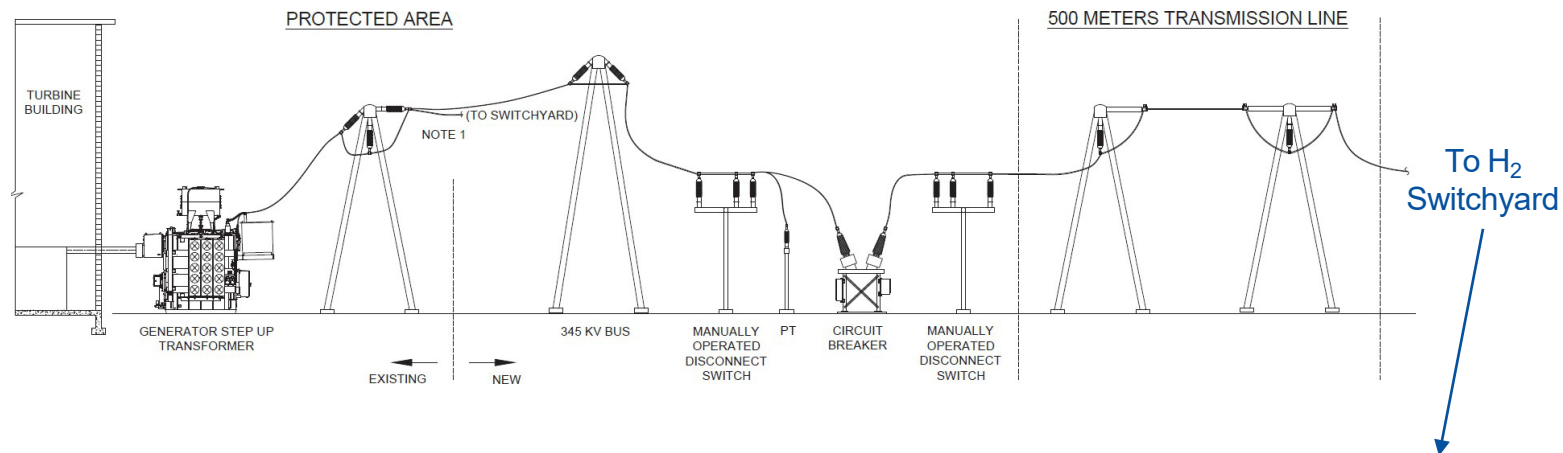
PEPSE – Thermal  
Extraction Analysis

AFT Arrow & Fathom –  
Steam and Water Piping  
Analysis



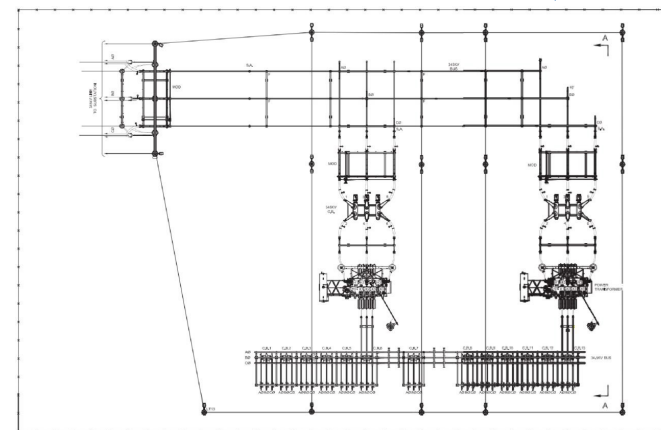
# PWR – 500MW SOEC Facility Electrical Integration

Full Generator  
Output viable  
without plant  
instability issues



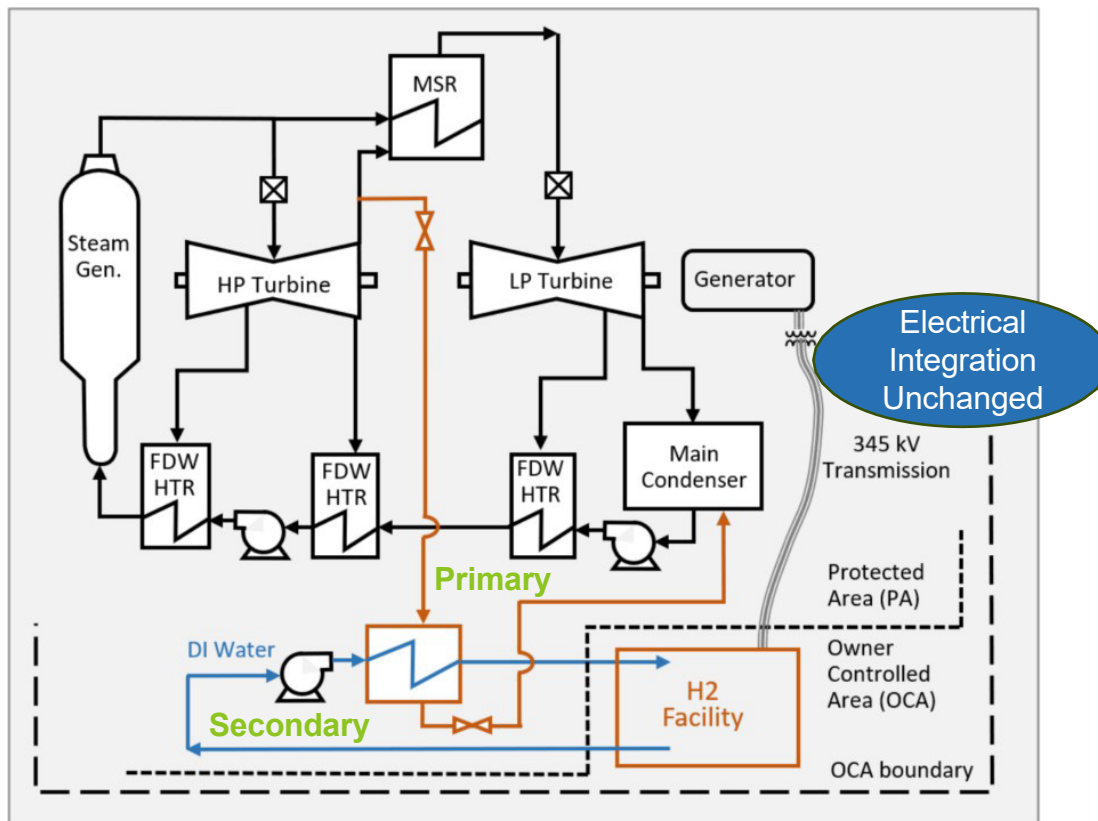
PSCAD - Electrical  
Transient Analysis

ETAP - Electrical  
Power Flow & Short  
Circuit Analysis

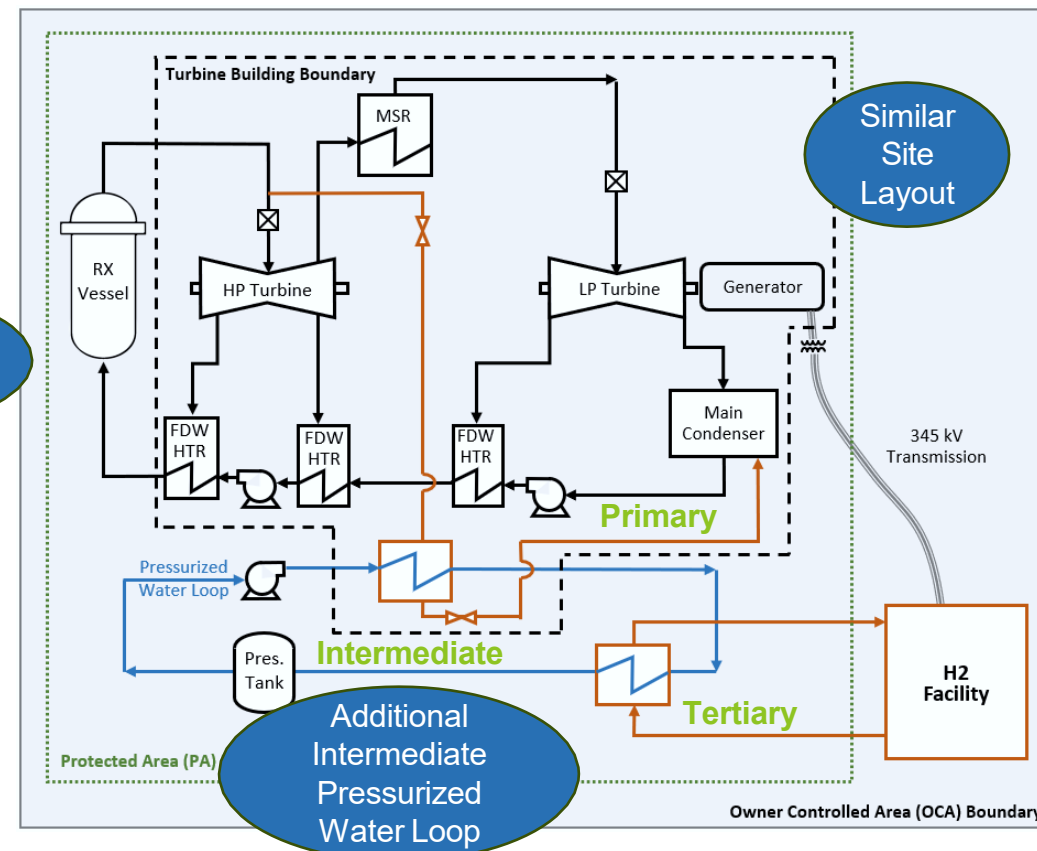


# 500MW SOEC Facility Integration: PWR vs. BWR

## PWR



## BWR





# BWR Design and Integration with 500MW SOEC Facility



Thermal / Electrical  
Energy

Focus  
Area



- **NPP Reference Plant**

- Based upon typical US designs
  - GE Type 4 BWR
  - 1,365 MW<sub>e</sub> / 4,000 MW<sub>th</sub> / SWYD: 345 kV

- **Hydrogen Facility Plant**

- 500MW<sub>DC</sub> SOEC Capacity
  - Thermal Load – 100 MW<sub>th</sub>
  - H<sub>2</sub> Production – 320 metric tons/day

# BWR – 500MW SOEC Facility Thermal Integration

Nuclear-Hydrogen  
Integration from a  
BWR is Feasible

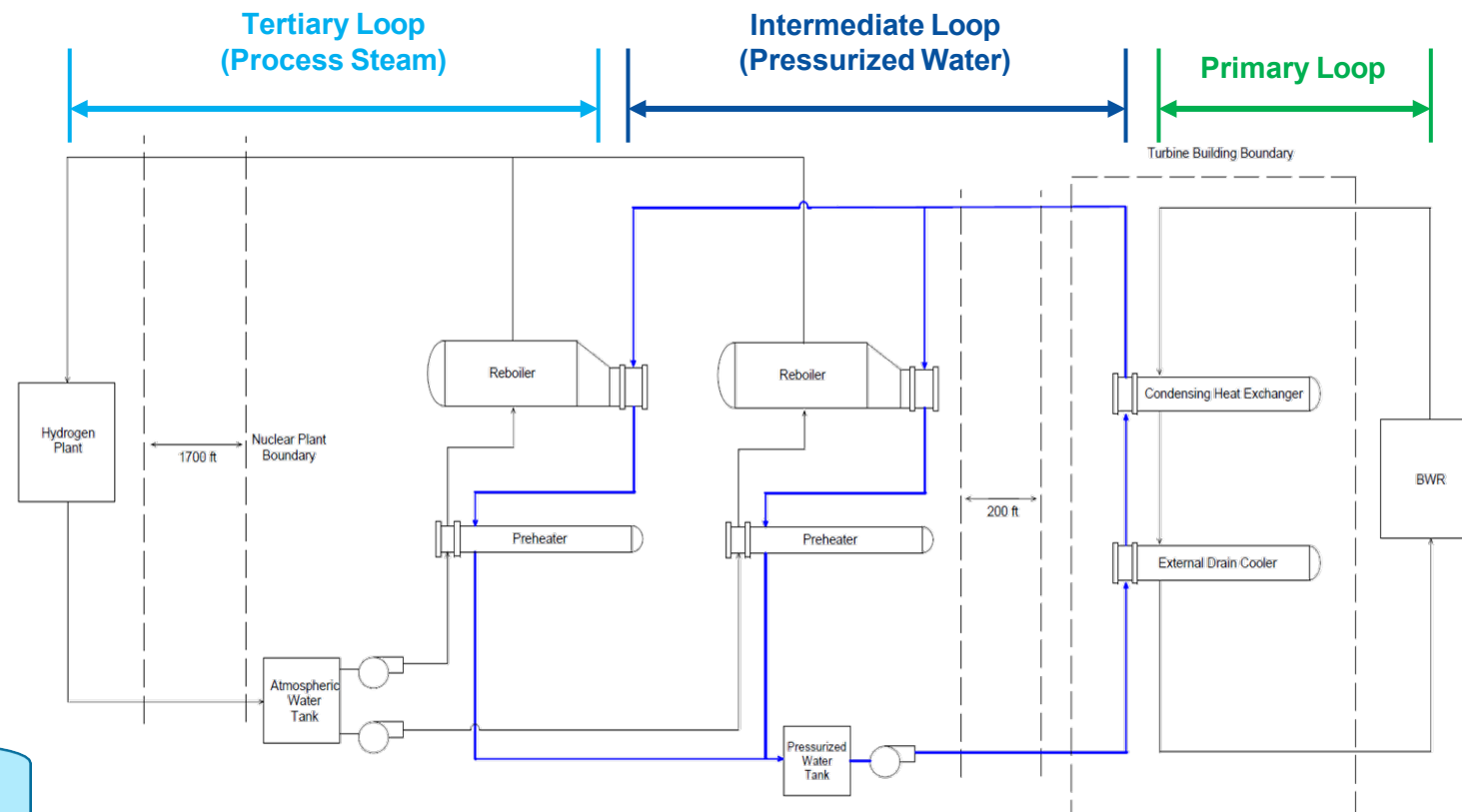
Limited Area  
in Turbine  
Building

Thermal and  
Electrical  
Transients  
Absorbed

BWR Radiological  
Challenges addressed  
via Intermediate  
Pressurized Water Loop

Thermal Extraction  
from Main Steam

Intermediate HXs in  
Turbine Building or New  
Shielded Building



# 500MW SOEC H2 Facility: General Arrangement

