

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_{DC} 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

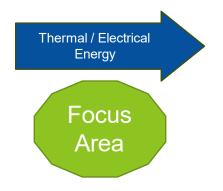


Area 1 Preconceptual Design and Integration of 500MW H2 Facility with LWR NPPs



PWR Design and Integration with 500MW SOEC Facility







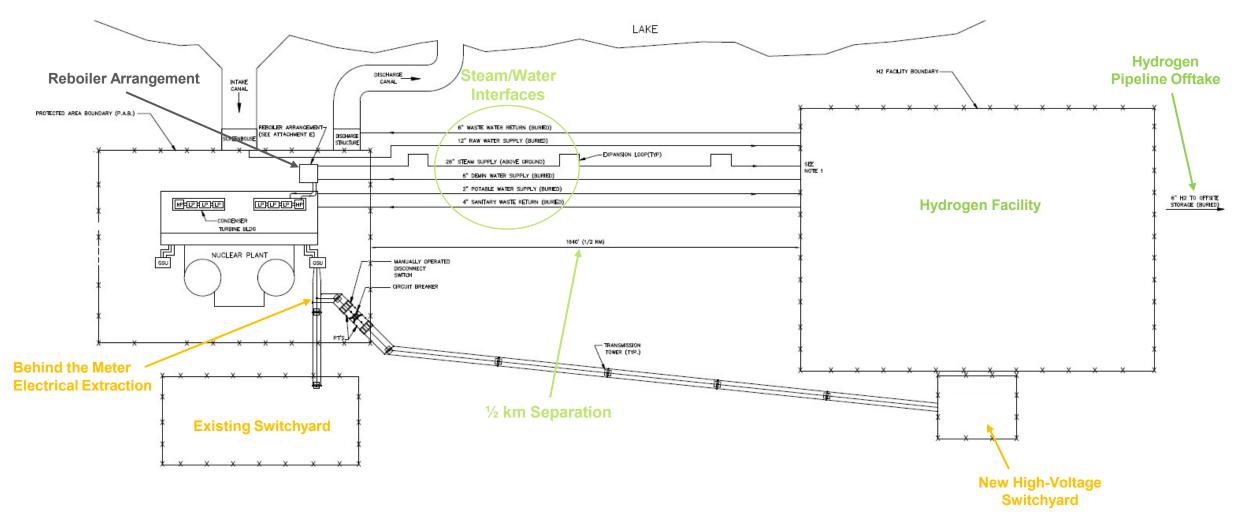
- NPP Reference Plant
 - Based upon typical US designs
 - Westinghouse 4-loop PWR (1/3 of US fleet)
 - 1,200 MW_e / 3,700 MW_{th} / SWYD: 345 kV

- Hydrogen Facility Plant
 - 500MW_{DC} SOEC Capacity
 - Thermal Load 100 MW_{th}
 - H2 Production 320 metric tons/day





PWR – 500MW SOEC Facility Integration: Site Layout





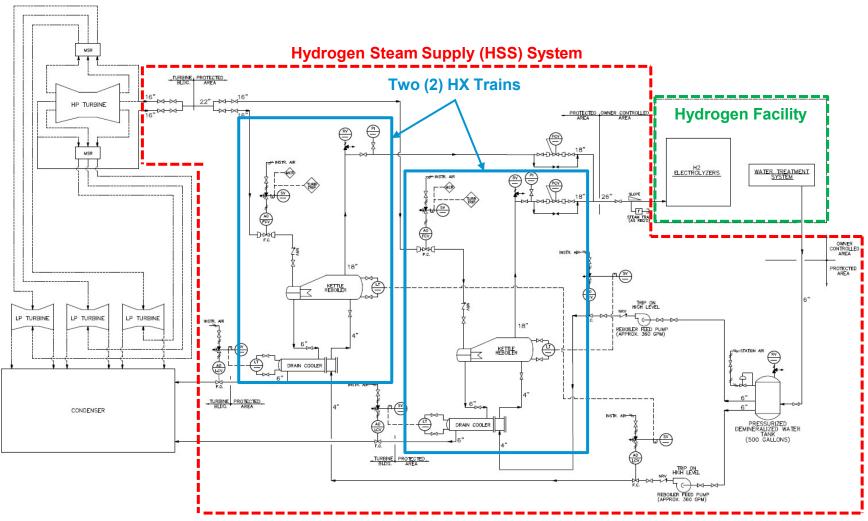
PWR – 500MW SOEC Facility Thermal Integration

Cold Reheat Steam viable for 500MW SOEC H2 Facility

Main Steam needed to support a > 500MW_{DC} SOEC H2 Plant

PEPSE – Thermal Extraction Analysis

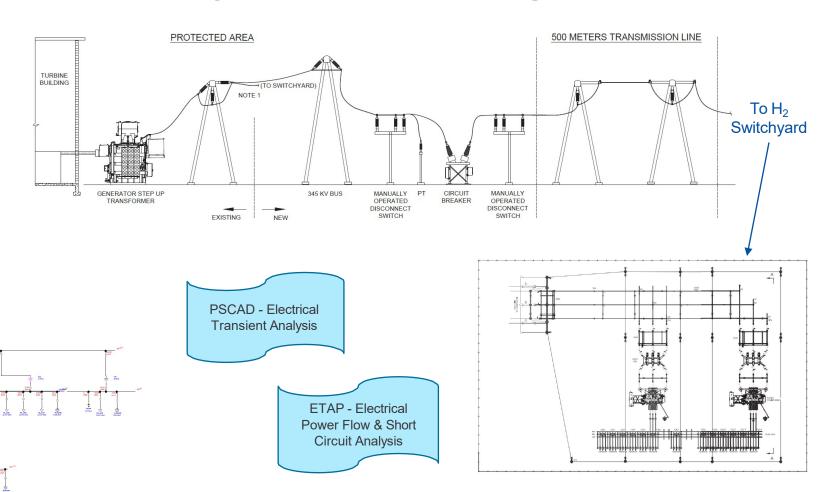
AFT Arrow & Fathom – Steam and Water Piping Analysis





PWR – 500MW SOEC Facility Electrical Integration

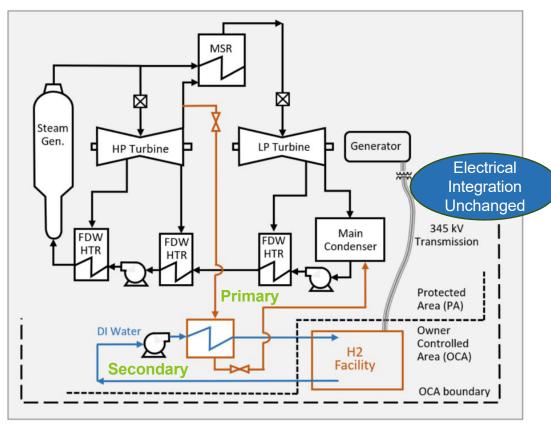
Full Generator
Output viable
without plant
instability issues

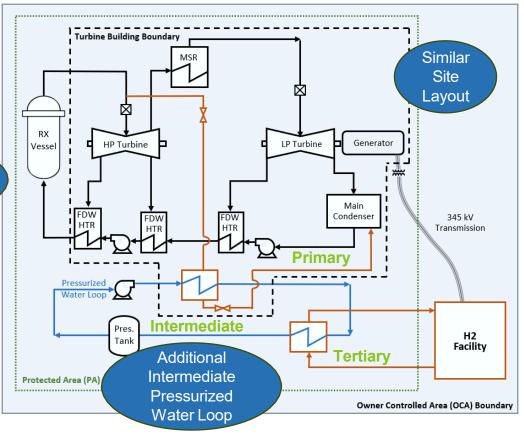




500MW SOEC Facility Integration: PWR vs. BWR

PWR BWR

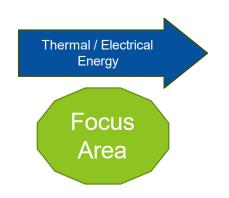






BWR Design and Integration with 500MW SOEC Facility





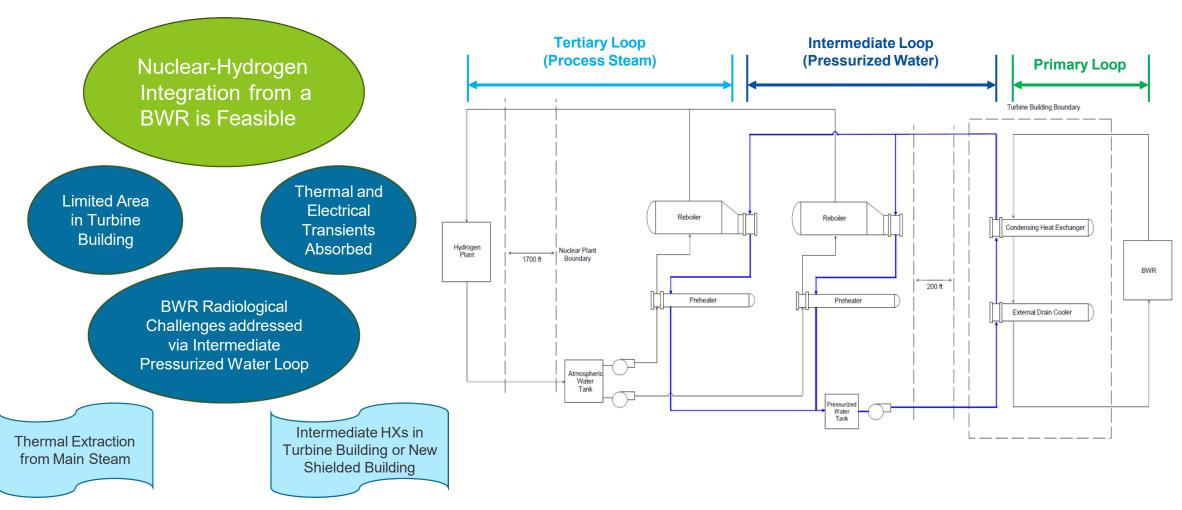


- NPP Reference Plant
 - Based upon typical US designs
 - GE Type 4 BWR
 - 1,365 MW_e / 4,000 MW_{th} / SWYD: 345 kV

- Hydrogen Facility Plant
 - 500MW_{DC} SOEC Capacity
 - Thermal Load 100 MW_{th}
 - H2 Production 320 metric tons/day



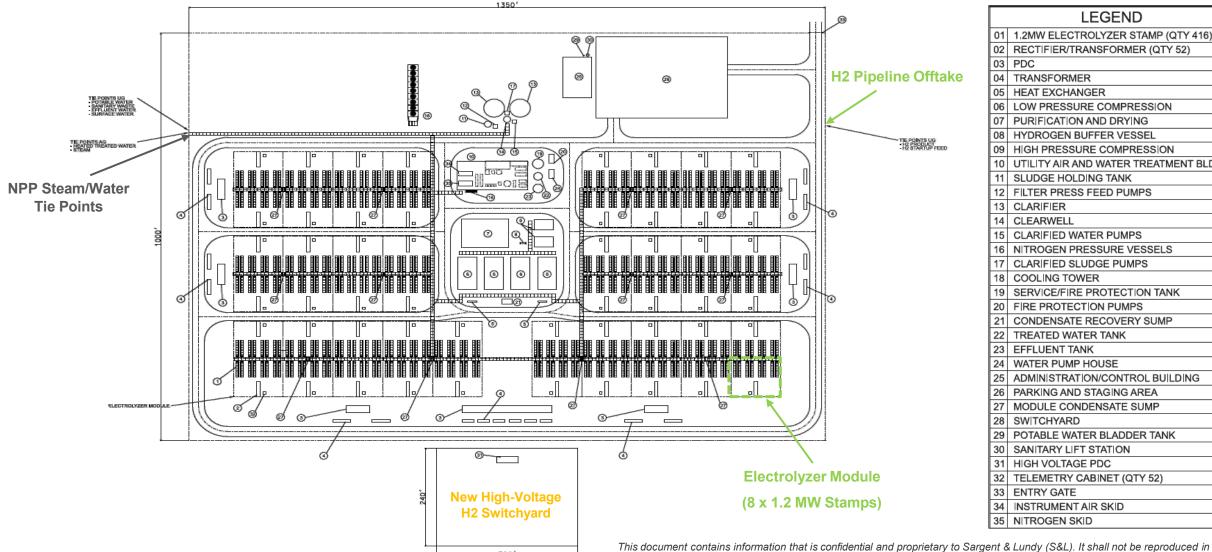
BWR – 500MW SOEC Facility Thermal Integration



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500MW SOEC H2 Facility: General Arrangement



	LEGEND
01	1.2MW ELECTROLYZER STAMP (QTY 416)
02	RECTIFIER/TRANSFORMER (QTY 52)
03	PDC
04	TRANSFORMER
05	HEAT EXCHANGER
06	LOW PRESSURE COMPRESSION
07	PURIFICATION AND DRYING
80	HYDROGEN BUFFER VESSEL
09	HIGH PRESSURE COMPRESSION
10	UTILITY AIR AND WATER TREATMENT BLD
11	SLUDGE HOLDING TANK
12	FILTER PRESS FEED PUMPS
13	CLARIFIER
14	CLEARWELL
15	CLARIFIED WATER PUMPS
16	NITROGEN PRESSURE VESSELS
17	CLARIFIED SLUDGE PUMPS
18	COOLING TOWER
19	SERVICE/FIRE PROTECTION TANK
20	FIRE PROTECTION PUMPS
21	CONDENSATE RECOVERY SUMP
22	TREATED WATER TANK
23	EFFLUENT TANK
24	WATER PUMP HOUSE
25	ADMINISTRATION/CONTROL BUILDING
26	PARKING AND STAGING AREA
27	MODULE CONDENSATE SUMP
28	SWITCHYARD
29	POTABLE WATER BLADDER TANK
30	SANITARY LIFT STATION
31	HIGH VOLTAGE PDC
32	TELEMETRY CABINET (QTY 52)
33	ENTRY GATE
34	INSTRUMENT AIR SKID
35	NITROGEN SKID

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