



# TEDS-SOEC Non-Fired Boiler Repurpose

September 2024

*Changing the World's Energy Future*

T.J. Morton



#### **DISCLAIMER**

This information was prepared as an account of work sponsored by an agency of the U.S. Government. Neither the U.S. Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness, of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. References herein to any specific commercial product, process, or service by trade name, trade mark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the U.S. Government or any agency thereof.

# **TEDS-SOEC Non-Fired Boiler Repurpose**

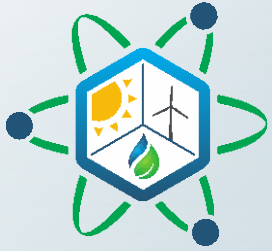
**T.J. Morton**

**September 2024**

**Idaho National Laboratory  
Idaho Falls, Idaho 83415**

**<http://www.inl.gov>**

**Prepared for the  
U.S. Department of Energy  
Under DOE Idaho Operations Office  
Contract DE-AC07-05ID14517**



# IES

Integrated Energy Systems

## Re-Purpose of TEDS-SOEC Non-Fired Boiler (DETAIL)

Prepared for: DOE-NE

LRS number: INL/xxx-24-xxxxx

Funding: Contract DE-AC07-05ID14517

Milestone Update

September 2024

Zach Sellers, T.J. Morton

# Purpose of the Project

## Context

- Xcel Energy and Bloom Energy will install a 240-kW electrolyzer at Xcel's Prairie Island Nuclear Generating Plant to demonstrate clean hydrogen production.
- Long lead times for boilers and other hardware led to a discussion about hardware that might be currently available.
- The non-fired boiler procured for DETAIL (TEDS-SOEC boiler) was found to be of a sufficient size to meet the requirements for the demonstration at Prairie Island.

## Objectives and Impact

- Identify interface boundaries and requirements.
- Alter boiler pressure ratings to meet applicable requirements.
- Build boiler skid to provide steam for electrolysis.
- Collaboration with Xcel and Bloom benefits INL and is in line with DOE's mission of addressing national energy challenges.

# Methodology

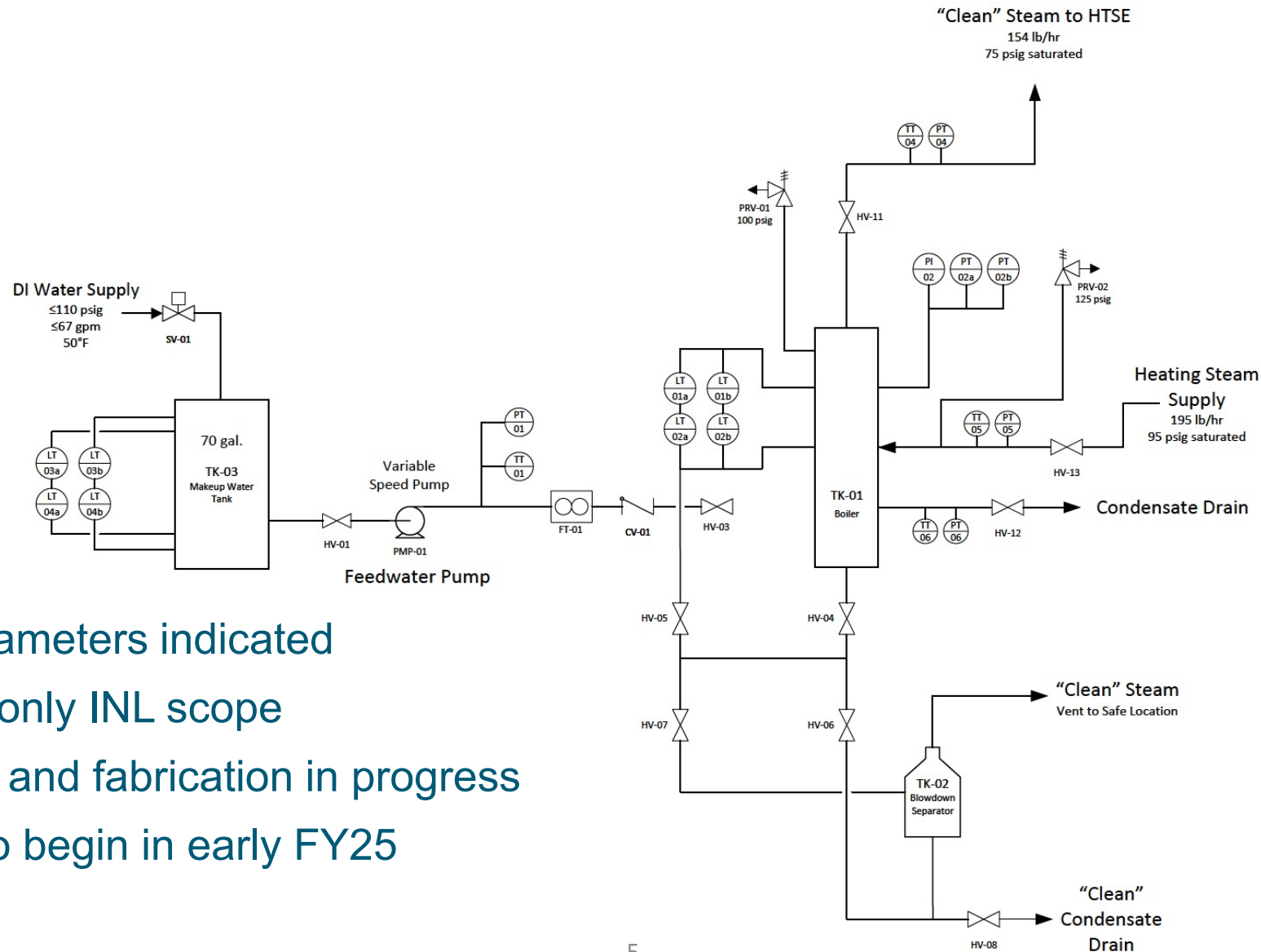
- Interface Requirements:
  - Provide “Clean” Steam
    - 154 lbm/hr at 75 psig saturated
    - Assume 100% steam quality
  - Receive Plant Heating Steam
    - $\geq 195$  lbm/hr at 95 psig saturated
    - Assume 100% steam quality
- Alter Boiler Maximum Allowable Working Pressures (MAWP)
  - The non-fired boiler procured for TEDS-SOEC originally rated for:
    - Tube side = 75 psig
    - Shell side = 100 psig
  - To meet interfact requirements, the MAWP needed to be higher
    - Tube side = 125 psig
    - Shell side = 100 psig
  - Boiler altered to new MAWP by vendor with ASME “R” stamp (“R” = repair)

# Methodology

## Remaining Items

- Initiate “Engineering Change” process
- Create interface requirements document and review with Xcel and Sargent & Lundy
- Create drawing and review with Xcel and Sargent & Lundy
- Procure parts
- Fabricate skid
- Prepare skid for shipment

# Boiler Skid P&ID



- Interface parameters indicated
- P&ID shows only INL scope
- Procurement and fabrication in progress
- Fabrication to begin in early FY25