U.S. Department of Energy
Office of Nuclear Energy
National Environmental Policy Act
Determination

NEPA Identification: DOE-ID-INL-24-014 R1

Proposed Action Title: CO2 Hydrogenation via Agile Methanol Production (CHAMP) Supporting DE-FOA-0002997 R1

Location(s) (City/County/State):

Proposed Action Description:

Revision 1:

The purpose of this revision is to update four items as follows:

- Update the location for the project from the proposed demonstration location to the adjacent "500 kw test stand".
- Eliminate the Conex Container enclosure.
- Change the disposition of methanol that is produced from a waste product to a product that is used for another purpose on the INL.

The goal of this project is to enable nuclear methanol synthesis by demonstration of a novel, high yield and deactivation resilient catalyst in an agile methanol synthesis process that converts carbon dioxide (CO2) with the variable hydrogen gas (H2) offtake from a nuclear driven electrolyzer using real-world dynamic power profiles.

Work will be done at Energy Innovation Laboratory (EIL) and the Energy Systems Laboratory (ESL) backyard. The catalyst research using the TAP reactor system will be done in EIL, and the Solid Oxide Electrolysis Cell will be done at ESL. There are no facility modifications planned for this project. The project will use existing space on the hydrogen concrete pad in the ESL backyard. The project will connect to utilities and feeds located on the pad.

Key materials and equipment include:

- Purchase of a compressor, valves, piping, and connectivity hardware. Other equipment will be short-term rentals.
- Gases for experiments: oxygen, nitrogen, hydrogen, carbon dioxide, argon (1 standard cylinder each).

The project will generate the following waste streams at the respective locations:

- EIL - Less than 1 kg/week of PPE.
- ESL
    - Mixed waste - Approximately 10 cubic feet/year of mixed waste comprised of piping components, wiring, fittings, remnants, etc.
    - Municipal waste - Approximately 10 cubic feet/year of insulation remnants disposed of in trash receptacles.
    - Empty gas cylinders - 40/year Returned to vendor.
    - Methanol produced during demonstration will be utilized at the CFA bus shop as windshield washer fluid.
    - Used catalyst will be returned to the collaborator for characterization analysis.

Through the generation of synthesis of methanol and the use of gases for experiment, the project will produce emissions to the air.



Figure 1: Google Map showing ESL and the ESL backyard. The red X is the planned location.

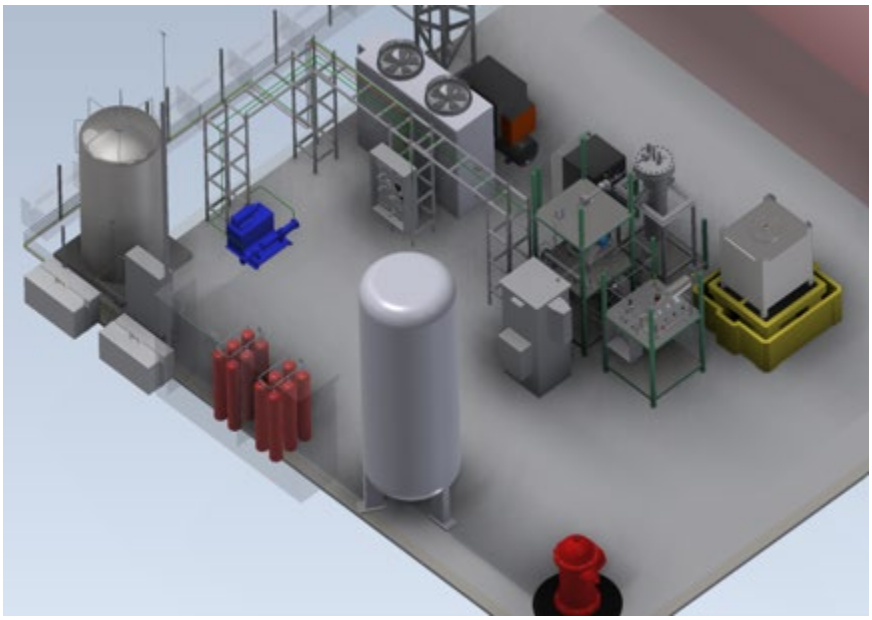


Figure 2: CHAMP project layout on pad located on the red X area in Figure 1.

Original ECP:

The goal of this project is to enable decarbonized methanol synthesis by demonstration of a novel, high yield and deactivation resilient catalyst in an agile methanol synthesis process that converts carbon dioxide (CO2) with the variable hydrogen gas (H2) offtake from a renewable-energy driven electrolyzer using real-world dynamic power profiles.

The work will be done at Energy Innovation Laboratory (EIL)- Lab C111 and Energy Systems Laboratory (ESL) backyard. The catalyst research using the TAP reactor system will be done in EIL and the Solid Oxide Electrolysis Cell will be done at ESL.

Waste will be associated with this project, refer to the Aspects and Impacts section for further information. The samples will be disposed of as municipal waste.

There will be emissions to the air.

Equipment purchases will include, but are not limited to, a compressor, valves, piping, Conex container, connectivity hardware. Facility modifications will add new concrete pad & Conex type enclosure (8' wide, 8' tall, and 20' long).

The potential identified areas for the work requiring facility modifications such as adding the new concrete pad and Conex enclosure is seen in Figure 1.

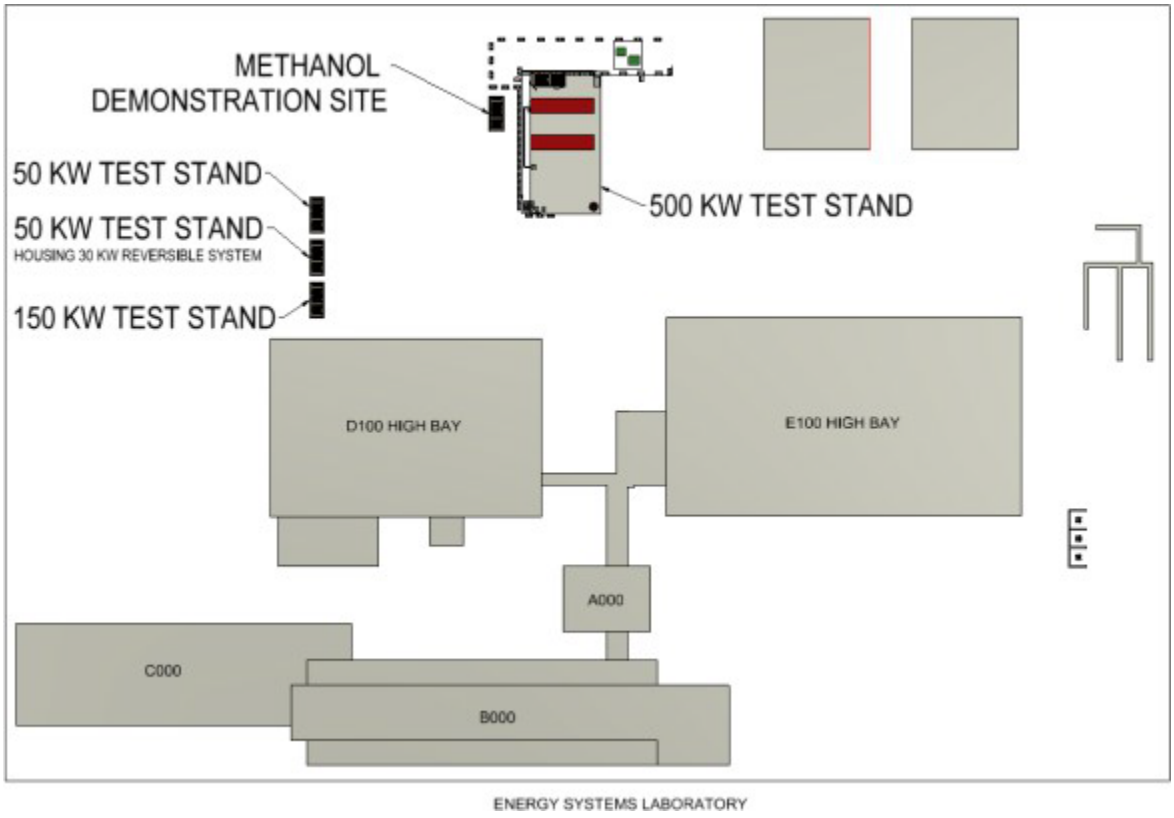


Figure 1. Methanol Demonstration Site.

The ESL backyard is displayed in Figure 2 for a better idea of how the layout looks with Figure 1's potential laydown areas. Figure 1 laydown area is positioned in work zone #1 in Figure 2.

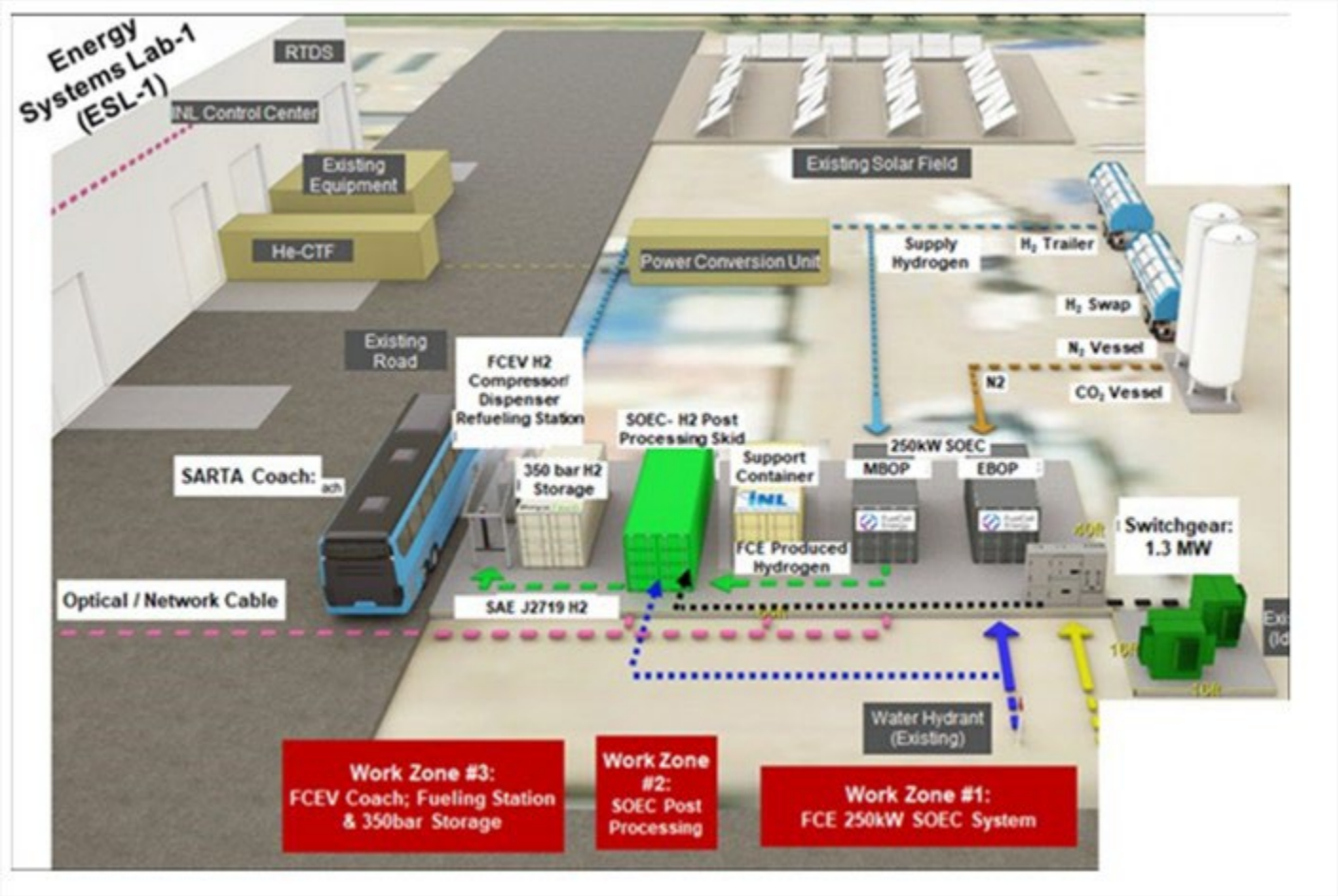


Figure 2. ESL Backyard Layout.

Environmental Aspects and Impacts:

Air Emissions

Gases used for experiments are: oxygen, nitrogen, hydrogen, carbon dioxide, argon (1 standard cylinder each).

Discharging to Surface, Storm, or Ground Water

NA

Disturbing Cultural or Biological Resources

A Section 106 review was completed under CRMO project number (BEA-24-035) and resulted in No Historic Properties Affected.

Generating and Managing Waste

When wastes are generated, how they are disposed can adversely affect the environment. Managing wastes appropriately and responsibly and implementing recycling or reuse practices, where feasible, during project activities can reduce the potential impact on the environment.

Releasing Contaminants

When chemicals are used during the project there is the potential for spills that could impact the environment (air, water, soil).

Using, Reusing, and Conserving Natural Resources

Project description indicates materials will need to be purchased or used that require sourcing materials from the environment. Being conscientious about the types of materials used could reduce the impact to our natural resources.

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References:

B1.15 "Support buildings", B3.6 "Small-scale research and development, laboratory operations, and pilot projects"

For Categorical Exclusion Determinations:

The proposal fits within the classes of actions listed in Appendix B to 10 CFR Part 1021 or Appendix B and C of DOE's NEPA Implementing Procedures and satisfies the conditions that are integral elements of the classes of actions therein. The proposal does not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Appendix B.

There is no extraordinary circumstance related to the proposal that is likely to cause a reasonably foreseeable significant adverse effect or for which DOE does not know the environmental effect. Extraordinary circumstances are unique situations presented by specific proposals, including, but not limited to, scientific controversy about the environmental effects of the proposal; uncertain effects or effects involving unique or unknown risks; and unresolved conflicts concerning alternative uses of available resources.

The proposal has not been segmented to meet the definition of a categorical exclusion. Segmentation can occur when a proposal is broken down into small parts in order to avoid the appearance of significance of the total action. However, segmentation does not include proposals that are developed and potentially implemented over multiple phases where each phase results in a decision whether to proceed to the subsequent phase.

Based on my review of the proposed action, I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer

Signed by: Robert Douglas Herzog, NEPA Compliance Officer

Date Signed: 9/30/2026