CX Posting No.: DOE-ID-INL-24-014

SECTION A. Project Title: CO2 Hydrogenation via Agile Methanol Production (CHAMP) Supporting DE-FOA-0002997

SECTION B. Project Description and Purpose:

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.

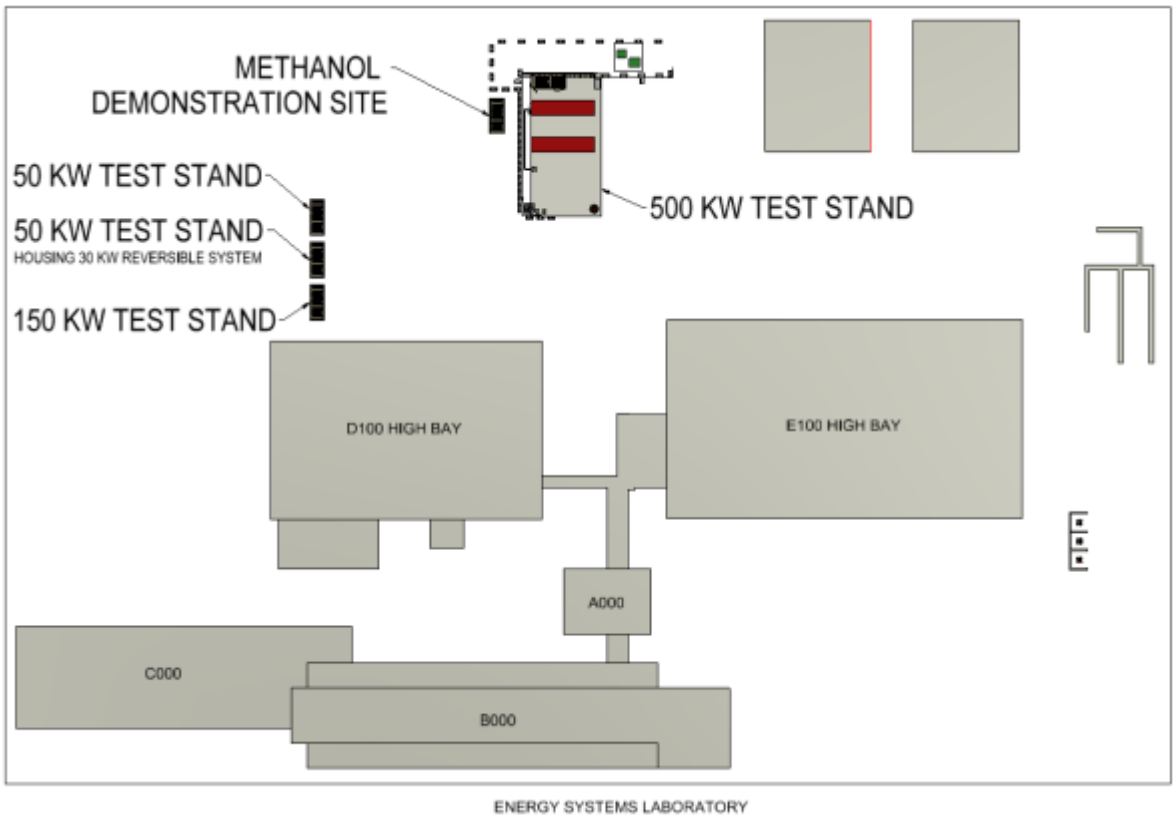

Figure 1. Methanol Demonstration Site.

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.

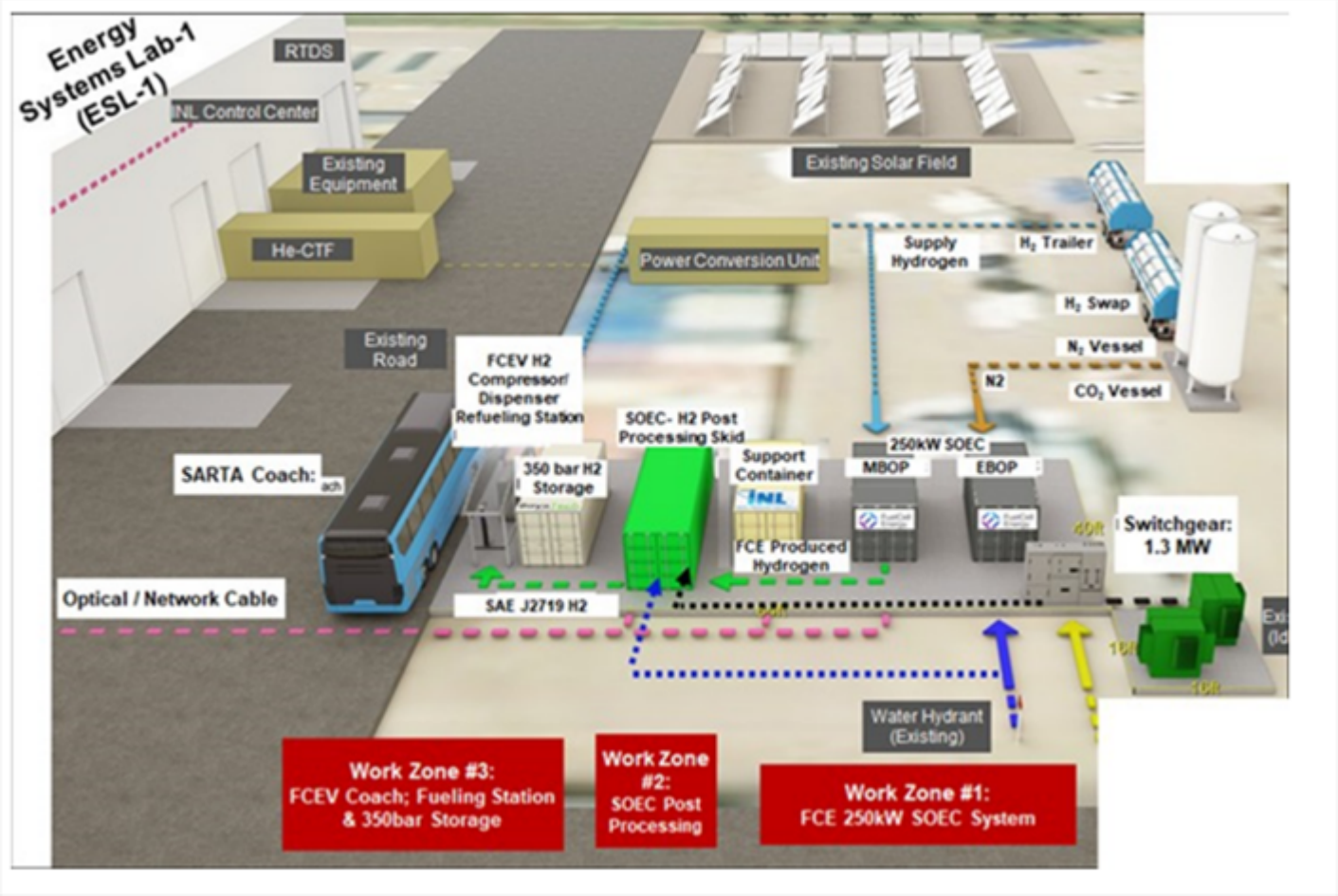

Figure 2. ESL Backyard Layout

SECTION C. Environmental Aspects or Potential Sources of Impact:

Air Emissions

Gases used for experiments are: oxygen, nitrogen, hydrogen, carbon dioxide, argon (1 standard cylinder each). Fugitive emissions from construction of concrete pad and connex box.

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. Please refer to the Cultural Resource Review (CRR) (BEA-24-035) for details or Hold Points and Project Specific Instructions of the ECP.

Generating and Managing Waste

Waste generated at EIL:

Less than a kilogram a week of PPE.
Used Catalyst Samples < 1 kilogram of industrial waste.

At ESL:

Mixed waste will be--Recycling: Piping components, fittings, remnants, etc. ~10 ft^3/year.
Insulation Remnants: trash receptacles, 10 ft^3/year.
Empty Gas Cylinder: return to vendor, 40/year.
Hazardous waste generated will be 50 gallons of methanol.

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.

Environmental Justice

This activity will generate approximately 55 gallons of hazardous waste at an REC location near a census tract designated as disadvantaged community by the Council on Environmental Quality's Climate and Economic Justice Screening Tool. Assuming that procedures for the handling and disposal of hazardous waste are followed, there is little to no anticipated impact to environmental justice associated with the proposed activity.

SECTION D. Determine Recommended Level of Environmental Review, Identify Reference(s), and State Justification: Identify the applicable categorical exclusion from 10 Code of Federal Regulation (CFR) 1021, Appendix B, give the appropriate justification, and the approval date.

For Categorical Exclusions (CXs), the proposed action must not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, or similar requirements of Department of Energy (DOE) or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment or facilities; (3) disturb hazardous substances, pollutants, contaminants, or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources (see 10 CFR 1021). In addition, no extraordinary circumstances related to the proposal exist that would affect the significance of the action. In addition, the action is not “connected” to other action actions (40 CFR 1508.25(a)(1) and is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1608.27(b)(7)).

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

Justification: B1.15 Siting, construction or modification, and operation of support buildings and support structures (including, but not limited to, trailers and prefabricated and modular buildings) within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible). Covered support buildings and structures include, but are not limited to, those for office purposes; parking; cafeteria services; education and training; visitor reception; computer and data processing services; health services or recreation activities; routine maintenance activities; storage of supplies and equipment for administrative services and routine maintenance activities; security (such as security posts); fire protection; small-scale fabrication (such as machine shop activities), assembly, and testing of non-nuclear equipment or components; and similar support purposes, but exclude facilities for nuclear weapons activities and waste storage activities, such as activities covered in B1.10, B1.29, B1.35, B2.6, B6.2, B6.4, B6.5, B6.6, and B6.10 of this appendix.

B3.6 Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) ☐ Yes ☒ No

Approved by Robert Douglas Herzog, DOE-ID NEPA Compliance Officer on: 4/25/2024