



**California Energy Commission
September 13, 2023 Business Meeting
Backup Materials for Agenda Item No. 06:
California Clean Energy Fund DBA CALCEF Ventures**

The following backup materials for the above-referenced agenda item are available in this PDF packet as listed below:

1. Proposed Resolution (attached below).
2. Project Summaries and California Environmental Quality Act (CEQA) Analysis for Proposed Concept Small Grant Awards Under the California Sustainable Energy Entrepreneur Development (CalSEED) Initiative, Agreement No. 300-15-007 (attached below)

STATE OF CALIFORNIA
STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: California Clean Energy Fund DBA CALCEF Ventures

WHEREAS, pursuant to Public Resources Code section 25710 et seq. the State Energy Resources Conservation and Development Commission (“CEC”) is authorized to establish and administer the Electric Program Investment Charge (“EPIC”) Program; and

WHEREAS, the CEC has recognized that California’s electricity ratepayers benefit from energy research, development and demonstration (“RD&D”) activities conducted by individuals, small businesses, academics and small non-profit institutions; and

WHEREAS, the CEC has created the California Sustainable Energy Entrepreneur Development (“CalSEED”) Initiative within the EPIC Program to provide funding for the aforementioned public interest RD&D activities; and

WHEREAS, New Energy Nexus dba California Clean Energy Fund or CalCEF Ventures (“CalCEF”) is the administrator of the CalSEED Initiative under CEC Agreement Number 300-15-007 and is responsible for soliciting grant applications, recommending grant awards to the CEC, and managing approved grant projects; and

WHEREAS, CalCEF, in compliance with its duties under Agreement Number 300-15-007, in Q1 2023 held an open application period, Solicitation 23-01, a competitive solicitation, and received 68 applications that passed initial screening, and as a result has proposed to CEC small grant projects for funding; and

WHEREAS, CEC staff has reviewed the small grant projects CalCEF has proposed, and recommends the following 27 small grant projects for funding:

1. \$150,000 is being requested for the Liquid Adsorbed CO2 Energy Storage (LACES) project with Activated Energy, LLC, a project to design and demonstrate a long duration energy storage system for urban environments; and
2. \$150,000 is being requested for the Low-Cost, Abundant, Ph-Neutral, Aqueous-Soluble Organic Redox-Active Electrolytes (redoxolytes) for RFBs project with BioZen Batteries, Inc., a project to further develop a low-cost, carbon-based electrolyte fluid for redox flow batteries; and
3. \$150,000 is being requested for the Project Phoenix- an Early Wildfire Detection and Mitigation System project with Ceja Engineering Solutions LLC, a project to develop a self-powered, line-mounted wildfire detection system

- that will employ embedded vibration, carbon dioxide, and infrared sensors to provide ultra-long range wildfire monitoring; and
4. \$150,000 is being requested for the Permanent Load Shifting Using Consumer Refrigeration as Renewable Energy Storage project with Conusant, Inc., a project to develop and implement a micro-controller in residential refrigerators to efficiently store thermal energy and shift load; and
 5. \$150,000 is being requested for the Next-Generation Cementitious Materials from Non-Carbonate Rocks project with C-Crete Technologies LLC, a project to develop a process that turns naturally-occurring, abundant “non-carbonate” rocks such as zeolite to cementitious binders with significant energy savings, affordability, flexibility, and emissions reductions while maintaining similar comfort level and performance for end users; and
 6. \$150,000 is being requested for the Ionocaloric Heat Pumping project with Calion Technologies, Inc., a project to develop a zero global warming potential carbon-negative heat pump using ionocaloric heat pumping technology that will provide a drop-in replacement for vapor compression technologies; and
 7. \$150,000 is being requested for the Carbon Blade: Renewable Energy, Self-Powered, Distributed Direct-Air Carbon Capture System project with Carbon Blade Corporation, a project to build a self-powered, distributed direct-air-capture system that uses commercial components combined with patent pending technology to reduce carbon dioxide concentrations in the atmosphere; and
 8. \$150,000 is being requested for the Flexible CO2 Based Thermo-Mechanical Energy Storage project with EarthEn, a project to develop a flexible energy storage solution that uses carbon dioxide in a closed loop to store energy cheaply and safely; and
 9. \$150,000 is being requested for the Electrifying Lithium Extraction: Transforming Unconventional Brines into Economically Feasible Sources project with EELI Technology, Inc., a project to develop an economical, efficient, and scalable direct lithium extraction platform technology using electricity rather than carbon-intensive reagent chemicals; and
 10. \$150,000 is being requested for the Empowering Affordable Home Electrification through Intelligent Load Management by ENAMP project with ENAMP Inc., a project to advance a distributed energy resources management and electric vehicle charging hub for residential buildings with limited utility power capacity; and
 11. \$150,000 is being requested for the Applied AI for EV Charger Reliability project with EnergizedAI, Inc., a project to increase EV fast charger uptime through the development of a predictive maintenance algorithm, allowing service to occur before failure; and
 12. \$150,000 is being requested for the Next-Generation Recycling/Upcycling of Lithium-Ion Batteries by Integrated Process project with ExPost Technology, Inc. a project to develop a reuse and recycling process for end-of-life lithium-ion batteries that is closed-loop, free from toxic substances, and uses little wastewater; and

13. \$150,000 is being requested for the Hydrogen-Fueled and Nimble with Recycled Fines: Modular Cement Plants for the 21st Century project with Furno Materials Inc., a project to produce carbon-neutral Portland cement using hydrogen fuel and recycled concrete fines; and
14. \$150,000 is being requested for the AI Value Targeting to Accelerate DER project with Grid Science, LLC, a project to determine the value of behind-the-meter DER such as battery storage using supply and demand conditions, load capacity, and reliability of the local utility circuit; and
15. \$150,000 is being requested for the Intelligent Adaptive Heat Pump Controller for Space Heating and Cooling project with Helios Climate Industries Inc., a project to develop a variable-speed heat pump controller to maximize comfort, minimize operating costs, and provide demand response capabilities; and
16. \$150,000 is being requested for the Integrated Reluctance Motor with Carbon Fiber Flywheel Energy Storage System project with Kinetix Energy Storage Corporation, a project to engineer an integrated reluctance motor with a carbon fiber flywheel energy storage system to fit two complete 500 kW/1 MWh flywheel energy storage systems inside a 20 foot shipping container for short-duration energy storage applications; and
17. \$150,000 is being requested for the Microwave-Assisted Manufacturing of Battery Cathode Materials project with Leeta Materials, Inc., a project to develop and demonstrate a microwave-assisted manufacturing process for battery cathode materials; and
18. \$150,000 is being requested for the Smart Algorithm for Greenhouse Energy and Food Production project with Mirai Solar Corp., a project to develop, implement, and test a self-learning control logic for enhancing the energy use efficiency of greenhouses through the automation of retractable photovoltaic shade screens; and
19. \$150,000 is being requested for the K4LE: Potassium (K)-Ion Batteries for Lithium-Free, Low-Cost, Long-Lived, Large-Scale, Energy-Efficient Energy Storage project with Project K Energy, Inc., a project to develop a potassium-ion battery that replaces lithium, cobalt, nickel, and copper with inexpensive and ubiquitous potassium, iron, and aluminum for grid-scale energy storage; and
20. \$150,000 is being requested for the Data-Accelerated Sodium-Ion Cathode Manufacturing for Domestically Resilient and Affordable Batteries project with Root 121, Inc., a project to demonstrate a high energy density sodium-ion cathode manufacturing technology; and
21. \$150,000 is being requested for the Fully Modular Drive System for Medium and Heavy-Duty Vehicles project with Scalvy Inc., a project to design and demonstrate a fully modular drivetrain system for medium- and heavy-duty vehicles; and
22. \$150,000 is being requested for the Lynx MPower project with Sea Dragon Energy, Inc., a project to develop an energy management system for homeowners to monitor and control circuits using their existing circuit breaker panel; and

23. \$150,000 is being requested for the Solar Thermal Absorption Cooling for a Warming World project with Solar Ice LLC, a project to build a prototype of a solar thermal-powered air conditioning and hot water heating system using high efficiency solar collectors, modern absorption chillers, and state-of-the-art phase change material storage; and
24. \$150,000 is being requested for the Nano Filters for the Precision Separation of Critical Metals project with Sunchem LLC, a project to develop and scale up a low-cost nano-filtration device that can continuously capture critical metals used for the clean energy transition from complex water mixtures; and
25. \$150,000 is being requested for the Thermoshade project with ThermoShade Solutions Inc., a project to develop a passive cooling panel that can be installed above outdoor spaces, creating a shady space that feels up to 20°F cooler without requiring electricity or water; and
26. \$150,000 is being requested for the Repurposing Desalination Salt for Thermal Energy Storage in Pilot Scale project with Waste Salt Technologies LLC, a project to demonstrate a process that repurposes unseparated and minimally processed salt from desalination for use in thermal energy storage; and
27. \$150,000 is being requested for the Advanced Manufacturing for Aerogel Technologies project with Westwood Aerogel Co., a project to incorporate aerogel technology into energy efficient window designs and provide a retrofit solution for single-pane windows; and

WHEREAS, CEC staff has reviewed the projects and determined that each project is exempt from the California Environmental Quality Act, as described in CEC staff's "Project Summaries and California Environmental Quality Act (CEQA) Analysis For Proposed Concept Small Grant Awards Under the California Sustainable Energy Entrepreneur Development (CalSEED) Initiative, Agreement No. 300-15-007" Memorandum ("Memorandum") dated September 1, 2023, a document that is included in the backup materials to this Business Meeting item.

THEREFORE, BE IT RESOLVED, that the CEC adopts CEC staff's CEQA findings contained in the Memorandum for the 27 small grant projects; and

FURTHER BE IT RESOLVED, that the CEC approves the 27 small grant projects for a total of \$4,050,000; and

FURTHER BE IT RESOLVED, that the CEC directs CalCEF to execute grant agreements with the approved awardees pursuant to the requirements of Agreement Number 300-15-007.

CERTIFICATION

The undersigned Secretariat to the CEC does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the CEC held on September 13, 2023.

AYE:
NAY:
ABSENT:
ABSTAIN:

Dated:

Kristine Banaag
Secretariat

Memorandum

To: Chair David Hochschild
Vice-Chair Siva Gunda
Commissioner Noemi Gallardo
Commissioner Patty Monahan
Commissioner Andrew McAllister

Date: September 01, 2023

From: Josh Croft

Telephone: (925) 452-7638

Subject: **PROJECT SUMMARIES AND CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS FOR PROPOSED CONCEPT SMALL GRANT AWARDS UNDER THE CALIFORNIA SUSTAINABLE ENERGY ENTREPRENEUR DEVELOPMENT (CALSEED) INITIATIVE, AGREEMENT NO. 300-15-007**

New Energy Nexus dba California Clean Energy Fund or CalCEF Ventures (CalCEF) is the administrator of the Energy Commission's CalSEED Initiative under Agreement No. 300-15-007. The CalSEED Initiative awards small grants and provides access to business and technical services to entrepreneurs seeking to develop a technical feasibility case for their technologies.

CalCEF held an open application period, Solicitation 23-01, in Q1 2023 and received 68 applications that passed initial screening. As a result of the open application, 27 projects are being proposed for \$150,000 in grant funding at the September, 13 2023 Energy Commission Business Meeting.

I am an Energy Commission Specialist II in the Energy Research and Development Division of the California Energy Commission. I have reviewed the CEQA compliance forms submitted by each applicant. Below is my CEQA analysis for each proposed project:

Concept Awards

1. PROJECT TITLE: LIQUID ADSORBED CO2 ENERGY STORAGE (LACES)

Applicant: Activated Energy, LLC

Principal Investigator: Cullen Quine

Subcontractors and Vendors: TBD

Project Summary: The project technology is a long duration energy storage system using low pressure compressed gases in a small mobile footprint. The innovation lies in the low-pressure gas storage and system design, using solid state technology to reduce size and pressure requirements. During the CalSEED project, the team will develop a working technology demonstration of the improved low-pressure storage system, and will work towards development of a fully integrated small-scale technology demonstration on a mobile trailer. Additional data will be collected using benchtop measurement tools to provide metrics to determine system performance and efficiency. The system will be constructed on a mobile

skid trailer, to permit offsite remote testing and characterization. The project team does not foresee any development of, or accumulation of hazardous materials. No permanent structures are necessary for construction of the prototype. The working fluid for energy storage is nontoxic and nonflammable. Most testing will be conducted using benchtop characterization techniques (mass flow controllers, pressure gauges, temperature sensors) with other measurements (such as power/round trip efficiency) performed at properly permitted existing test sites.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 15 CCR 15311 “Minor Structures”

Reason Why Project is Exempt: This project is exempt under CEQA because the project will not impact the environment with permanent structures, hazardous waste, or excessive noise or odors. The projects physical activities during CalSEED are centered around a mobile platform, with minimal long term effects on the land or environment. Existing facilities will be used along with temporary, mobile structures.

2. PROJECT TITLE: LOW-COST, ABUNDANT, pH-NEUTRAL, AQUEOUS-SOLUBLE ORGANIC REDOX-ACTIVE ELECTROLYTES ("REDOXYLYTES") FOR RFBS

Applicant: BioZen Batteries, Inc.

Principal Investigator: Nate Kirchhofer

Subcontractors and Vendors: TBD

Project Summary: During the CalSEED agreement, BioZen will optimize and chemically manufacture its redoxolyte materials at lab scale, test prototype redoxolyte RFBS at lab scale and with industrial partners, and validate performance metrics in collaboration with industry partners and customers. This includes fume-hood-based chemical synthesis efforts, physical buildout of small redox flow battery test cells in the laboratory and partner facilities/devices, machine learning and AI chemical discovery algorithms, voltage cycling, electrochemical testing of redoxolyte properties, codified legal partnerships, and patents and other intellectual property to protect the innovation. The project team expects minimal change or impact to the environment because the project will use a laboratory facility and all activities will be completed in compliance with standard operating procedures for waste disposal emissions, and any emissions will be controlled with appropriate HVAC and filtration systems to prevent environmental exposure.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because the prototyping and testing will be conducted in a controlled laboratory environment, or within the facilities of a partner organization, isolated from the environment. This falls under 14 CCR15301 “Existing Facilities”.

3. PROJECT TITLE: FLEXIBLE CO₂ BASED THERMO-MECHANICAL ENERGY STORAGE

Applicant: EarthEn

Principal Investigator: Manas Pathak

Subcontractors and Vendors: TBD

Project Summary: EarthEn’s flexible thermo-mechanical energy storage uses CO2 in a closed loop to store 4-100+ hours of energy at a low cost & highly scalable manner. The team will use CalSEED funds to conduct techno-economic studies and various simulations such as fluid, process & computational fluid dynamic simulations to optimize our power cycle’s round-trip efficiency & minimal capital expenditure, which will allow for thermal & mechanical energy storage. Since project activities include only paper studies, no significant effect on the environment is expected.

CEQA Exemption Status: 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because the project team will not be building or changing anything that affects the environment – instead activities include working from computers and traveling to meet with customers.

4. PROJECT TITLE: ELECTRIFYING LITHIUM EXTRACTION: TRANSFORMING UNCONVENTIONAL BRINES INTO ECONOMICALLY FEASIBLE SOURCES

Applicant: EELI TECHNOLOGY, INC.

Principal Investigator: Mert Akin

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to develop an economical, efficient, environmentally friendly, and scalable electrochemical-based direct lithium extraction platform technology to produce lithium from unconventional domestic sources using electricity rather than carbon-intensive reagent chemicals. During the CalSEED program, the team will use customer and supplier feedback to adjust the reactor design, tailor electrodes according to source properties, and optimize process parameters of our lab-scale, benchtop TRL 3 prototype with a 1-tonne/year capacity. The project does not involve any construction activities, changes to land or buildings, generation of excessive noise or odors, or handling and disposal of hazardous materials. The project’s activities primarily revolve around implementing electrochemical-based extraction techniques without any significant physical alterations. Throughout the project, laboratory research will be conducted by collaborating with Lawrence Berkeley National Lab and UC Berkeley.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because the proposed project does not involve any construction activities, changes to land or buildings, generation of excessive noise or odors, or handling and disposal of hazardous materials. All physical laboratory activities will occur at existing laboratory facilities equipped for this type of work.

05. PROJECT TITLE: NEXT-GENERATION RECYCLING/UPCYCLING OF LITHIUM-ION BATTERIES BY INTEGRATED PROCESS

Applicant: ExPost Technology, Inc

Principal Investigator: Weikang Li

Subcontractors and Vendors: TBD

Project Summary: The project technology focuses on next-generation lithium-ion battery direct recycling/upcycling with a highly integrated process. The subawardee will perform research and development activities, engage with potential equipment manufacturers, and conduct further testing and optimization of our technology. A defluorination prototype device with 1kg blackmass treatment capability will be designed as the bench scale verification. The project will not conduct construction activities, change land or a building, or generate excessive noise or odors. The project will generate a limited number of hazardous materials and comply with the University's policy of handling or disposing of waste. The estimated hazardous material weight will be less than 10 kg during the project.

CEQA Exemption Status: 14 CCR 15301 "Existing Facilities"; 14 CCR 15306 "Basic Data Collection"

Reason Why Project is Exempt: This project is exempt under CEQA because the estimated hazardous material generated will be less than 10 kg, which will not cause a significant direct effect on the environment. The generated hazardous wastes will be handled in the authorized chemical laboratory at UC San Diego as the collaborator, and the waste management and treatment will comply with the university policy. Additionally, work will be done in an existing laboratory facility already equipped for this type of work.

06. PROJECT TITLE: INTEGRATED RELUCTANCE MOTOR WITH CARBON FIBER FLYWHEEL ENERGY STORAGE SYSTEM

Applicant: Kinetix Energy Storage Corporation

Principal Investigator: Eric Martinez

Subcontractors and Vendors: TBD

Project Summary: The goal of this CalSEED project is to complete engineering design and define a streamlined manufacturing process for an integrated reluctance motor with carbon fiber flywheel energy storage system and its major components including the motor, flywheel, power electronics, housing structure, safety brake, electromagnetically assisted bearing structure, and container. No direct physical change to the environment is expected since this is an engineering and manufacturing design study that is limited to office work.

CEQA Exemption Status: 14 CCR 15301 "Existing Facilities"; 14 CCR 15306 "Basic Data Collection"

Reason Why Project is Exempt: This project is exempt under CEQA because project activities are limited to working on a computer in an existing facility as well as traveling by car to meet with potential customers. Therefore, no significant effect on the environment is expected.

07. PROJECT TITLE: MICROWAVE-ASSISTED MANUFACTURING OF BATTERY CATHODE MATERIALS

Applicant: Leeta Materials, Inc.

Principal Investigator: Kira Wyckoff

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to develop a laboratory process that uses advanced microwave heating technology, in combination with agile artificial intelligence process control, to produce high-quality and affordable battery materials at bench scale, while significantly decreasing energy consumption compared to traditional synthesis. During the CalSEED award, the team will establish our laboratory set-up in a university-based incubator space and procure equipment to begin developing the custom-designed heating process and process control system. Then, bench-scale trials that integrate these thrusts together will seek to test their combined effectiveness on the synthesis of battery cathode materials. There are no foreseeable indirect physical changes as a result of the project. The project will be carried out in existing university-based lab facilities and no construction activities will be required. The equipment required for the project will not generate excessive noise or odors compared to similar lab-based research projects. Because of the small scale of the project, waste generation will be minimal and the project team will work within the established university work-flow for appropriate waste handling and disposal through the EH&S department.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because project activities will be completed inside an existing laboratory already designed for this type of work. There will be no hazardous materials, noise, or other aspects that are expected to significantly affect the environment.

08. PROJECT TITLE: K4LE: POTASSIUM (K)-ION BATTERIES FOR LITHIUM-FREE, LOW-COST, LONG-LIVED, LARGE-SCALE, ENERGY-EFFICIENT ENERGY STORAGE

Applicant: Project K Energy, Inc.

Principal Investigator: Kevin Hurlbutt

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to develop a battery that replaces lithium with potassium, which allows us to use inexpensive electrodes and electrolytes that are less susceptible to degradation and with fundamentally more efficient transport properties. During the CalSEED project, the team will perform laboratory research to formulate electrolytes and engineer electrode materials with optimal properties for grid-scale energy storage. Physically, this project will involve purchasing and safely storing chemicals; synthesizing active materials in a fume hood; formulating electrolytes fabricating cells in an argon-filled glovebox; and testing materials and cells electrochemically using potentiostats and cyclers. Hazardous waste from the generation of battery cells will occur within a shared laboratory facility equipped to safely handle these chemicals.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15306 “Basic Data Collection”; 14 CCR 15311 “Accessory Structures”

Reason Why Project is Exempt: This project is exempt under CEQA because project activities will be completed inside an existing laboratory already designed for this type of work.

Hazardous waste will be properly disposed of using existing laboratory policies and there will be no noise, or other aspects that are expected to significantly affect the environment.

09. PROJECT TITLE: DATA-ACCELERATED SODIUM-ION CATHODE MANUFACTURING FOR DOMESTICALLY RESILIENT AND AFFORDABLE BATTERIES

Applicant: Root 121, Inc.

Principal Investigator: Spencer Gore

Subcontractors and Vendors: TBD

Project Summary: Root 121's sodium-ion electrode materials are substitutes for costly and scarce lithium-ion battery electrodes and can be dropped into existing lithium-ion battery production lines. During the project, the team will meet with and interview several key customers, document product requirements and validation timelines, and model the performance of our planned materials in their energy storage products. Performance modeling will include cost models and energy density/electrode stack models in excel, computation battery degradation models, and technoeconomic modeling to determine economic viability of various synthetic processes. Work will be done on a computer.

CEQA Exemption Status: 14 CCR 15301 "Existing Facilities"; 14 CCR 15306 "Basic Data Collection"

Reason Why Project is Exempt: This project is exempt under CEQA because project activities are limited to working on a computer in an existing facility as well as traveling by car to meet with potential customers. Therefore, no significant effect on the environment is expected.

10. PROJECT TITLE: REPURPOSING DESALINATION SALT FOR THERMAL ENERGY STORAGE IN PILOT SCALE

Applicant: Waste Salt Technologies LLC

Principal Investigator: Reza Baghaei Lakeh

Subcontractors and Vendors: TBD

Project Summary: Waste Salt Technologies LLC is developing a technology to reduce the cost of thermal energy storage by repurposing and packaging the desalination salt as a medium for grid-tied thermal energy storage applications and solar water desalination. During the project, salt will be removed from desalination concentrate by zero liquid discharge process. The desalination salt will then be processed and packed in a custom-designed thermal energy storage tank. The thermal storage tank will be integrated with Sephton Water Technologies Inc.'s facility and thermal storage in desalination salt will be demonstrated in a 50kWh scale. An existing pilot demonstration of this technology is being designed using low-grade geothermal source heat which has a temperature of around 100 C. CalSEED funding will be used to increase the storage temperature beyond the available heat at the site to demonstrate the performance of WST's system at higher temperatures.

CEQA Exemption Status: 14 CCR 15301 "Existing Facilities"; 14 CCR 15304 "Minor Alterations"; 14 CCR 15306 "Basic Data Collection"

Reason Why Project is Exempt: This project is exempt under CEQA because project activities are limited to minor alterations and additions to an existing evaporator system that is already permitted as a zero-liquid discharge desalination system. The system will remain the same except for being able to operate at higher temperatures due to the addition of a thermal energy storage system and will therefore have minimal impact on the environment.

11. PROJECT TITLE: PROJECT PHOENIX – AN EARLY WILDFIRE DETECTION AND MITIGATION SYSTEM

Applicant: Ceja Engineering Solutions LLC

Principal Investigator: Jose Ceja

Subcontractors and Vendors: TBD

Project Summary: The purpose of this project is to provide an early wildfire detection and mitigation solution by means of novel powerline monitoring technologies including atmospheric sensing, infrared radiation detection, powerline vibration analysis, and AI powered machine vision trained on fire recognition. During CalSEED, the team will continue developing the technology including the upgrading of existing initial concept hardware (micro controllers, sensors, and enclosure) and associated programming software closer to industry standard equipment as well as develop a from home/lab test bed and protocol for testing the system on low voltage lines. The physical test bed set of the project will include the mounting of the device on a low power (120/240v) consumer grade power cord, the assembly of simulated power line tower structures by use of raw materials such as wood and metal (no more than 6ft in height) from which to suspend the low voltage line which will be powered from a typical AC outlet of 120 or 240v in series with the line (on which the device is mounted) and an electronic relay at the AC source which will receive the trip signal from the device to simulate the circuit breaker trip. The project team will add no new physical infrastructure to the already existing CA power system infrastructure. There are no foreseeable direct or indirect physical changes to infrastructure, land or buildings, and will not generate any noise or traffic. There are no hazardous considerations with the project as far as handling or disposal.

CEQA Exemption Status: 14 CCR 15303 “Small New Facility”; 14 CCR 15304 “Minor Alterations”; 14 CCR 15306 “Basic Data Collection”; 14 CCR 15311 “Accessory Structures”

Reason Why Project is Exempt: This project is exempt under CEQA because only minor and accessory structures will be constructed and in a temporary manner. Electrical testing will be done at low voltage and no work will be done without significant effect on the environment.

12. PROJECT TITLE: PERMANENT LOAD SHIFTING USING CONSUMER REFRIGERATION AS RENEWABLE ENERGY STORAGE

Applicant: CONUSANT, INC.

Principal Investigator: Tim Lockwood

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to demonstrate a technology that will implement an algorithm in the residential refrigerators microcontroller to store excess renewable electricity during periods of over-generation as cold by lowering the temperature in the freezer compartment by 1 to 2 degrees Celsius below the customer set point. The CalSEED award will

be used to validate the manual testing results by creating, implementing and measuring the self-learning algorithm we have developed and patented using a major consumer refrigeration manufacturers device. Physical lab for a consumer refrigeration device and measurement devices will be procured from an existing residential location and business operations from existing business office space with no anticipated alterations required.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15306 “Basic Data Collection”;

Reason Why Project is Exempt: This project is exempt under CEQA because there are no reasonably foreseeable direct or indirect changes to the environment - all manual testing will be done at existing facilities, thus there are no expected construction activities, noise, odor, hazardous materials, or other direct or indirect changes to the environment from the project.

13. PROJECT TITLE: EMPOWERING AFFORDABLE HOME ELECTRIFICATION THROUGH INTELLIGENT LOAD MANAGEMENT BY ENAMP

Applicant: ENAMP Inc.

Principal Investigator: Mahsa Nicknam

Subcontractors and Vendors: TBD

Project Summary: ENAMP is a secure, scalable, replicable, and affordable solution that controls loads at physical and application levels, predicts appliance failure using AI, and promotes the shareability of chargers, ensuring load flexibility and enabling future retrofit planning. During the project, the team will scale up the ENAMP software platform by integrating various electric demands and adopters’ behavioral data, such as energy system performance and daily travel schedules, and meeting data integration and security requirements. The plan involves building a minimum viable product and installing it in two ENAMP single-family homes in San Ramon and Los Angeles as lab locations, generating data for certifications, lab validations, field testing with utilities and customers, and ultimately commercializing ENAMP. All the software development will be implemented indoors and does not make any direct or indirect environmental changes. The lab and field demonstration involves the installation of a 20 by 20 inches metal box and flexible metal piping holding the 2,4 and 6 wire gauges on the exterior of the existing single-family home exterior wall within the allowable distance from the existing electric meter.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15304 “Minor Alterations”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because project activities are limited to minor alterations on two existing residential structures. These alterations are contained in a 20 by 20 inch metal box container which will not further affect the environment.

14. PROJECT TITLE: AI VALUE TARGETING TO ACCELERATE DER

Applicant: Grid Science, LLC

Principal Investigator: Byron Kaufman

Subcontractors and Vendors: TBD

Project Summary: Grid Science uses real time distribution load data to determine the location value of distributed energy resources. This project uses data regarding the distribution feeder power load conditions. The physical activities of this project are carried out in the company's office and involve online data collection, simulation, modeling and analytics using digital software, as well as drafting reports on a computer.

CEQA Exemption Status: 14 CCR 15301 "Existing Facilities"; 14 CCR 15306 "Basic Data Collection"

Reason Why Project is Exempt: This project is exempt under CEQA because project activities are limited to working on a computer in an existing facility as well as traveling by car to meet with potential customers. Therefore, no significant effect on the environment is expected.

15. PROJECT TITLE: INTELLIGENT ADAPTIVE HEAT PUMP CONTROLLER FOR SPACE HEATING AND COOLING

Applicant: Helios Climate Industries Inc.

Principal Investigator: Jeremy Osborne

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to create and test a heat pump control algorithm with a simulation and prototype installation in an existing workshop and three households. The team will measure the value of the controller to the homeowners and electricity network operator. This project will involve a small amount of typical residential HVAC contracting to install three heat pumps and our novel controller. The heat pumps will be typical off-the-shelf commercially available systems.

CEQA Exemption Status: 14 CCR 15301 "Existing Facilities"; 14 CCR 15304 "Minor Alterations"; 14 CCR 15306 "Basic Data Collection"; 14 CCR 15311 "Accessory Structures"

Reason Why Project is Exempt: This project is exempt under CEQA because project activities are limited to modification of existing heat pump technology already approved to be installed on homes. All work completed to install demonstration systems will be done using EPA-certificated technicians to ensure the safe handling of refrigerant used in the systems. Modifications are only to the control algorithm which will not cause physical effects on the environment.

16. PROJECT TITLE: LYNX MPOWER

Applicant: Sea Dragon Energy, Inc.

Principal Investigator: Stefan Sillen

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to perform benchtop development of a technology designed to use existing circuit breaker panels to allow the user to remotely control each individual circuit. During the CalSEED agreement, the team will develop the integrated firmware and software to control the circuit management system, including communication

protocols with standard inverters and batteries. The development will take place inside the awardees premises and is a bench-top development project that will connect the circuit management system to a separate circuit breaker panel that is separate from the panel to the premises.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15304 “Minor Alterations”; 14 CCR 15306 “Basic Data Collection”;

Reason Why Project is Exempt: This project is exempt under CEQA because the project will not cause a significant direct effect on the environment as no construction activities or physical alterations to the premises will take place. The work will take place within an existing facility without need for major alterations that would affect the environment.

17. PROJECT TITLE: NEXT-GENERATION CEMENTITIOUS MATERIALS FROM NON-CARBONATE ROCKS

Applicant: C-Crete Technologies LLC

Principal Investigator: Rouzbeh Savary

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to turn naturally-occurring abundant “non-carbonate” rocks to cementitious binders, rivaling ordinary Portland cement (OPC) in performance while up to 97% of the binder is the non-carbonate rocks and the rest are eco-friendly additives. This award will be used to scale-up lab processes, perform standard characterization and pilot testing. All physical activities will be done inside the building in a laboratory in San Leandro, CA. There are no anticipated impacts to the environment including no construction or changes to land or structures. Handling of solid waste is done through a third party professional company.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because project activities are limited to activities within the existing lab building and therefore fits under the ‘existing facilities’ CEQA exemption.

18. PROJECT TITLE: IONOCALORIC HEAT PUMPING

Applicant: Calion Technologies, Inc.

Principal Investigator: Drew Lilley

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to develop a zero global warming potential and carbon-negative heat pump using non-vapor compression ionocaloric heat pumping technology. The experiments will take place at Lawrence Berkeley National Labs, and all safety and environmental compliance protocols at the lab will be followed. The team will work with water-based materials that are non-toxic and non-corrosive, and waste will be disposed of through the proper chemical management system administered at Lawrence Berkeley National Labs.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because all work will be done in an existing laboratory already designed for this purpose and the waste products are non-toxic and will be disposed of properly.

19. PROJECT TITLE: CARBON BLADE: RENEWABLE ENERGY, SELF-POWERED, DISTRIBUTED DIRECT-AIR CARBON CAPTURE SYSTEM

Applicant: Carbon Blade Corporation

Principal Investigator: Josh Franklin

Subcontractors and Vendors: TBD

Project Summary: Carbon Blade is a renewable energy powered direct-air-capture (DAC) hardware solution for carbon dioxide removal (CDR) that combines innovative patent pending technology with commercially available components to reduce CO₂ concentrations in the atmosphere. During the project, the team will assemble a temporary pilot unit and collect data on performance. There will be no changes to the physical environment associated with the pilot study of the technology. The containerized pilot unit will be sited in a area that is covered by concrete or asphalt and currently being used for parking.

CEQA Exemption Status: 14 CCR 15303 “Small New Facility”; 14 CCR 15304 “Minor Alterations”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because structures will be temporary and constructed on existing concrete or asphalt that is currently used for parking. No significant noise, emissions, waste, or other effect on the environment is expected.

20. PROJECT TITLE: APPLIED AI FOR EV CHARGER RELIABILITY

Applicant: EnergizedAI, INC.

Principal Investigator: Adam Mandel

Subcontractors and Vendors: TBD

Project Summary: EnergizedAI decreases operating costs and increases the uptime of electric vehicle fast chargers through an enhanced corrective service and predictive maintenance tool. During CalSEED the project team will continue developing and commercializing the EnergizedAI algorithm. The work does not have any physical set-up, other than existing computers and workstations.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because project activities are limited to working on a computer in an existing facility as well as traveling by car to meet with potential customers. Therefore, no significant effect on the environment is expected.

21. PROJECT TITLE: HYDROGEN-FUELED AND NIMBLE WITH RECYCLED FINES: MODULAR CEMENT PLANTS FOR THE 21ST CENTURY

Applicant: Furno Materials Inc.

Principal Investigator: Gurinder Nagra

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to use hydrogen (as a fuel) and recycled cement fines (as raw material) to produce Portland cement. During the project, the team will demonstrate cement recycling leveraging H₂ as a fuel using raw materials sourced from multiple concrete recycling facilities across California. The team will source and analyze raw materials and modify these materials to test them. No major change to the environment is expected as a result of this project. Work will be done in a pre-existing laboratory with no additional construction, changes to land, excess noise or disposal of any hazardous material.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because project activities will be completed inside an existing laboratory already designed for this type of work. There will be no hazardous materials, noise, or other aspects that are expected to significantly affect the environment.

22. PROJECT TITLE: SMART ALGORITHM FOR GREENHOUSE ENERGY AND FOOD PRODUCTION

Applicant: Mirai Solar Corp.

Principal Investigator: Michael Salvador

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to further develop a self-learning control logic (hardware and software) that enhances the energy use efficiency of greenhouses. This technology will allow an optimal timing to open and close screens, balancing the light requirements for the crops with the photovoltaic energy generation while the screens are extended. All technical features necessary to acquire relevant input parameter for the machine learning algorithm will be implemented in a lab-scale model system. There is no reasonably foreseeable direct or indirect physical change that would yield environmental impacts as a result of this project. The real-world validation will be done inside an operating greenhouse and only impact the timing of opening and closing the shading system that protects the growing plants from harsh sunlight conditions.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15304 “Minor Alterations”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because the physical activities of the project will only impact the timing of opening and closing an existing shading system within a commercial greenhouse. No new noise, pollution, waste, or other effects on the environment is expected.

23. PROJECT TITLE: FULLY MODULAR DRIVE SYSTEM FOR MEDIUM AND HEAVY-DUTY VEHICLES.

Applicant: Scalvy Inc

Principal Investigator: Mohamed Badawy

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to develop modular electric drive systems for medium- and heavy-duty vehicles. During the project, the team will demonstrate a lab-bench prototype at a 100 kW level using a lab dyno to validate the system design and showcase the technology to potential medium- and heavy-duty OEMs. The physical set-up of the project will take place in the company's lab space. Physical activities will result in an electronic prototype that will be used to demonstrate the system to potential clients. Circuit boards will be fabricated in a local fabrication house. Finally, the team will collect data to share it in the project report as well as with potential customers and partners.

CEQA Exemption Status: 14 CCR 15301 "Existing Facilities"; 14 CCR 15306 "Basic Data Collection"

Reason Why Project is Exempt: This project is exempt from CEQA because all activities will occur within an already existing facility equipped to test this prototype system. There will be no hazardous waste and no significant effect on the environment is expected.

24. PROJECT TITLE: SOLAR THERMAL ABSORPTION COOLING FOR A WARMING WORLD.

Applicant: Solar Ice LLC

Principal Investigator: Steven Goldstein

Subcontractors and Vendors: TBD

Project Summary: This project aims to create an efficient, low-cost, sustainable solar thermal-powered absorption AC and refrigeration system utilizing cutting-edge solar collectors, modern absorption chillers and Phase Change Material (PCM) storage. During the CalSEED agreement, the main tasks will include designing and prototyping the system, conducting testing and analysis, and demonstrating its feasibility in real-world settings. During the project, two demonstration systems will be constructed: one system that displays a practical thermal solar powered air conditioning system and a second that demonstrates turning the sun's heat into ice. The team will install solar thermal collectors on the roof of a shipping container, and use interior of container for installation, testing and monitoring of absorption chiller unit. The team does not anticipate inducing direct or indirect changes to the environment.

CEQA Exemption Status: 14 CCR 15301 "Existing Facilities"; 14 CCR 15304 "Minor Alterations"; 14 CCR 15306 "Basic Data Collection"

Reason Why Project is Exempt: This project is exempt under the California Environmental Quality Act (CEQA) because it falls under the category of "Existing Facilities" (Class 1) and "Minor Alterations to Land" (Class 4) categorical exemptions.

Existing Facilities (Class 1): This category includes the operation, repair, maintenance, or minor alteration of existing public or private structures, facilities, or mechanical equipment,

involving negligible or no expansion of use beyond what is currently existing. Our project involves modification of an existing cargo container situated adjacent to our current workshop/offices. This modification does not expand the current use of the premises or the capacity of our operations significantly.

Minor Alterations to Land (Class 4): This category includes minor public or private alterations in the condition of land, water, and/or vegetation which do not involve the removal of healthy, mature, scenic trees. The project involves minor alterations to the land for placing the modified cargo container. No removal of significant vegetation or alteration of water bodies is involved.

Furthermore, the project will not have any significant impact on an environmental resource of hazardous or critical concern where designated, precisely defined, and officially adopted pursuant to law by federal, state, or local agencies. All operations will be carried out in strict compliance with federal, state, and local environmental regulations, including the safe handling and disposal of any potentially hazardous materials.

25. PROJECT TITLE: NANO FILTERS FOR THE PRECISION SEPARATION OF CRITICAL METALS

Applicant: Sunchem LLC

Principal Investigator: Dana Hernandez

Subcontractors and Vendors: TBD

Project Summary: Sunchem's Nano Filter technology is compact, rapid, and selective for precious metal recovery, requiring 40x less material than the conventional approach for gold extraction. During CalSEED, the project team will synthesize a new material for the extraction of critical metals, build a continuous-flow reactor for large-scale synthesis of material, and build a scaled-up Nano Filter for the capture of 1 gram of gold. They will also visit mines across California to develop partnerships and test real waste-streams with our Nano Filter. The project team will conduct all work at the Molecular Foundry at LBNL within an allocated lab space of 10' by 25' for Sunchem with proper bench space and a 36" to 96" fume hood. All of the waste streams being processed will be fully characterized beforehand, and the team will follow standard operating procedures for handling waste at LBNL which will be approved by our facilities building and safety manager. All team members are trained according to rigorous safety practices at the Molecular Foundry which are also established by the Environment, Health and Safety (EH&S) division.

CEQA Exemption Status: 14 CCR 15301 "Existing Facilities"; 14 CCR 15306 "Basic Data Collection"

Reason Why Project is Exempt: This project is exempt under CEQA because most of the milestones will be reached with work conducted within the Molecular Foundry at LBNL where rigorous safety protocols for human health and the environment are in place. The work that is not conducted on site at the Molecular Foundry will be to visit mining sites in California. None of these activities in this project will cause a significant direct effect on the environment.

26. PROJECT TITLE: THERMOSHADE

Applicant: ThermoShade Solutions Inc.

Principal Investigator: Emily Dinino

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to develop a “passive cooling” panel, which will create an outdoor shady space that feels up to 20°F cooler than the outside air without using any electricity or water. During the CalSEED agreement, the project team will expand an existing prototype into a full-scale ~120 square foot shade structure and install it at an affordable housing site pilot location in South Los Angeles. The team will retrofit the panels onto an existing outdoor structure or onto the side of the building to serve as a roof, providing a cool, shady space for the tenants. The team will then measure ThermoShade’s cooling impact, determine optimal design, and develop a manufacturing process. There will be minimal construction activities as it will be a minor addition to an existing structure and the ThermoShade panels are manufactured off-site. With regard to hazardous materials, the team will use an adhesion promoter to apply a cool coating to the topside of the panels. This material is a flammable liquid paint that is commonly used in the manufacturing of fiberglass and plastics. This material will be properly handled and disposed of safely.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15304 “Minor Alterations”; 14 CCR 15306 “Basic Data Collection”; 14 CCR 15311 “Accessory Structures”

Reason Why Project is Exempt: This project is exempt under CEQA because physical activities of the project are minor, involving small alterations to an existing building. This addition, a panel added to the wall or roof, is not expected to cause significant effect to the environment.

27. PROJECT TITLE: ADVANCED MANUFACTURING FOR AEROGEL TECHNOLOGIES

Applicant: Westwood Aerogel Co.

Principal Investigator: Patricia McNeil

Subcontractors and Vendors: TBD

Project Summary: The goal of this project is to build a first-generation manufacturing line to produce aerogel materials. The team will use CalSEED funding to assemble the line by slightly modifying existing manufacturing equipment and to validate the performance of our aerogel material for insulating window and EV battery thermal management applications. The project team will be operating out of an existing lab space at Lawrence Berkeley National Lab and does not expect to be responsible for physical changes on the surrounding environment. The project team will be installing standard small-scale machinery into the national lab research environment and will be in close contact with lab personnel to ensure compliance with safety protocols. Hazardous chemical reagents will be handled and disposed of in accordance with national lab protocol.

CEQA Exemption Status: 14 CCR 15301 “Existing Facilities”; 14 CCR 15304 “Minor Alterations”; 14 CCR 15306 “Basic Data Collection”

Reason Why Project is Exempt: This project is exempt under CEQA because the project is contained within an existing laboratory designed for this scale research and development and will not cause a significant direct effect on the wider environment. This project will have minimal effect on the lab infrastructure and will handle and dispose of hazardous waste materials in accordance with national lab protocol.

