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Docketed Date:	4/13/2021

California Energy Commission
Business Meeting
April 14, 2021
10:00 a.m.

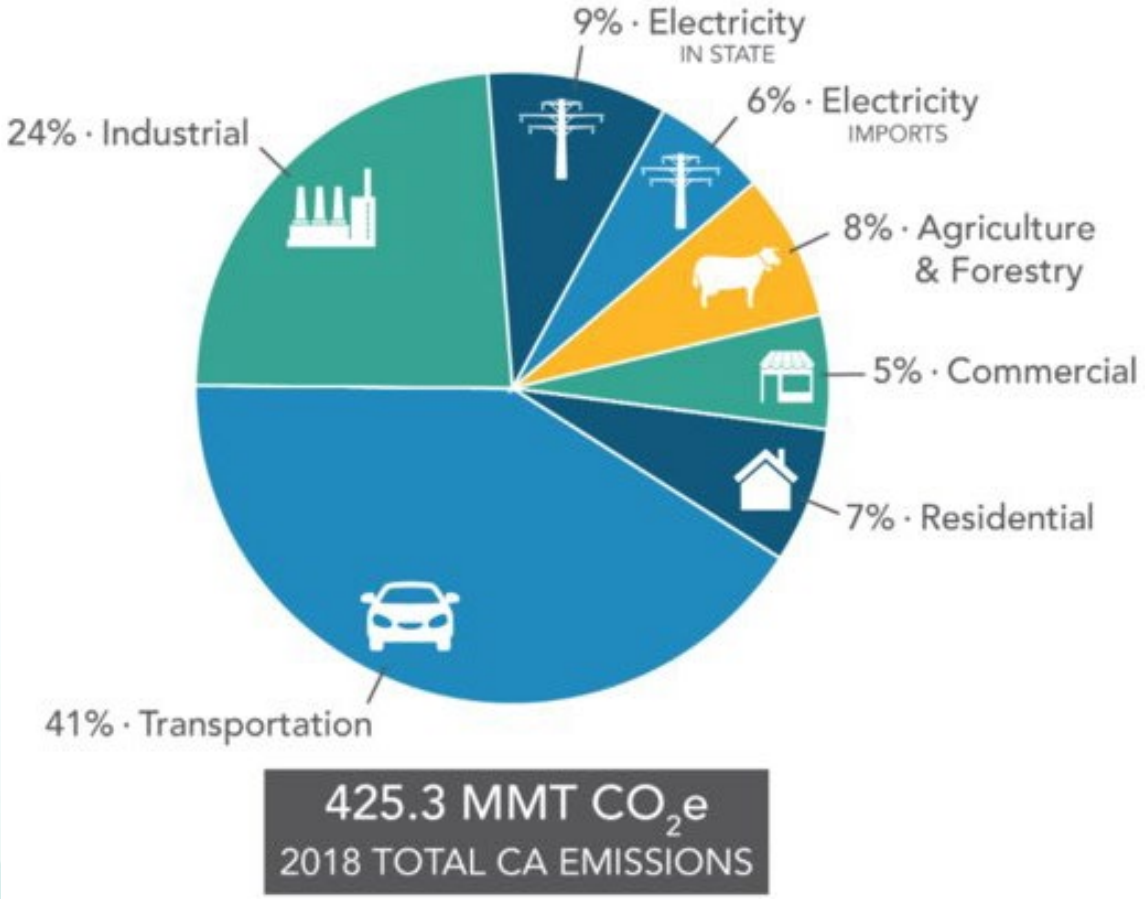
Item 12: Developing and Demonstrating Advanced Combustion Systems for The Industrial Sector – GFO-20-501

April 14, 2021 Business Meeting

Ilia Krupenich, Electric Generation System Specialist I
Research and Development, Energy Efficiency Research Office

Benefits to Californians

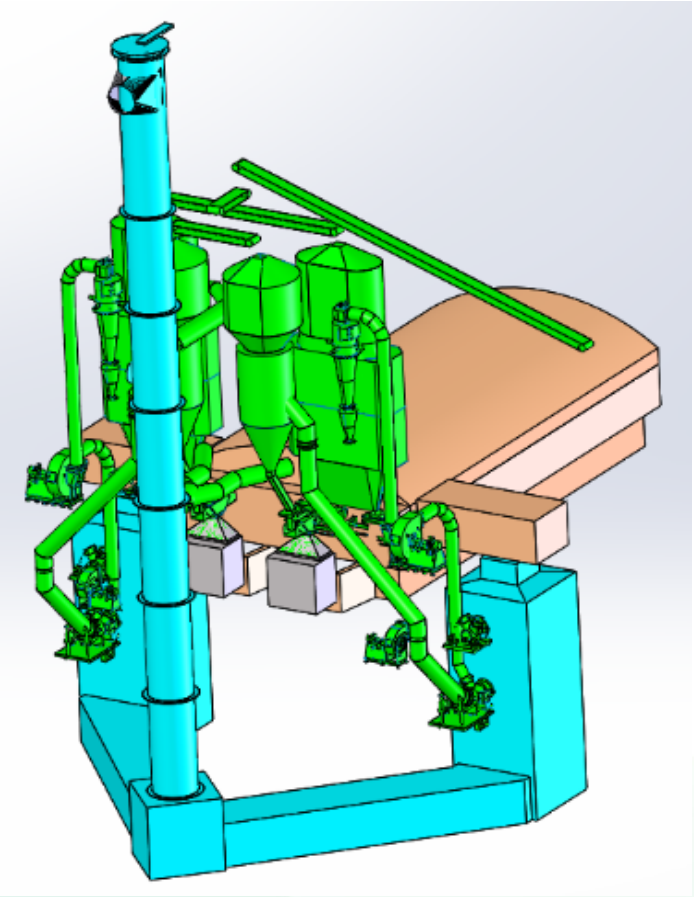
- Help industries decarbonize by reducing natural gas use
- Reduce greenhouse gas and other air emissions



Item 12a - Gallo Glass Company

Commercial demonstration of an economically viable advanced oxy-fuel combustion glass melting process to decrease natural gas consumption and reduce NOx and CO2 emissions

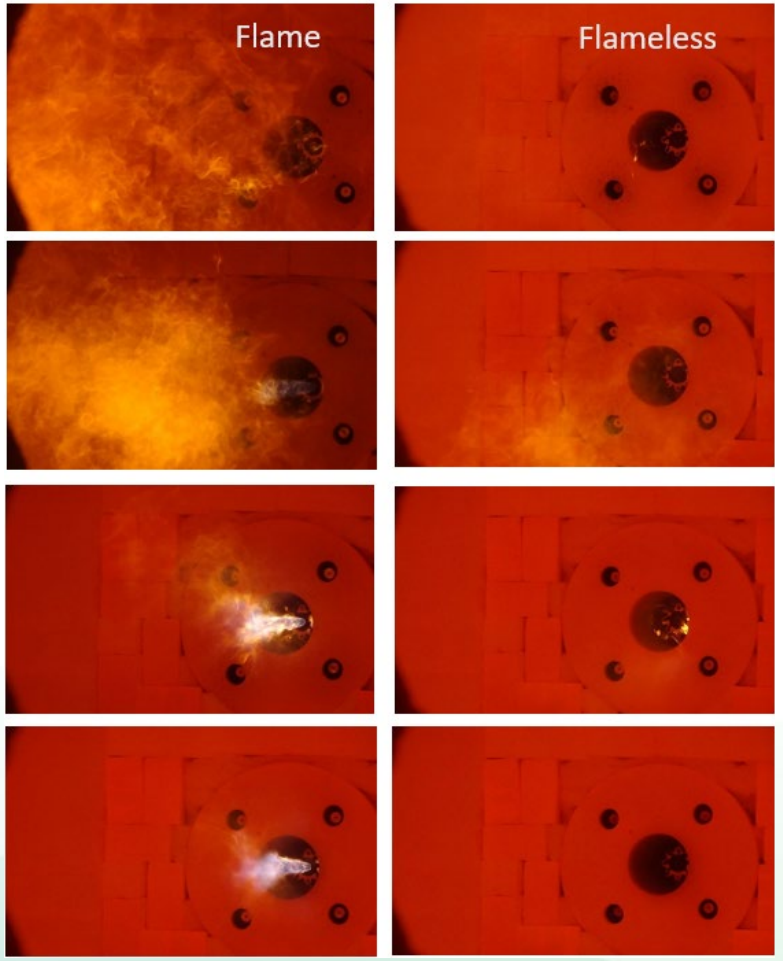
- 25% reduction in natural gas consumption and greenhouse gas emissions
- $6,414,800 match funds
- Project is in Modesto



Item 12b - Institute of Gas Technology DBA Gas Technology Institute

Demonstration of advanced oxygen combustion for the metals industries

- 20% savings of natural gas and carbon dioxide reductions at oxygen content of 60 percent
- $500,800 match funds
- City of Industry, CA



Staff Recommendation

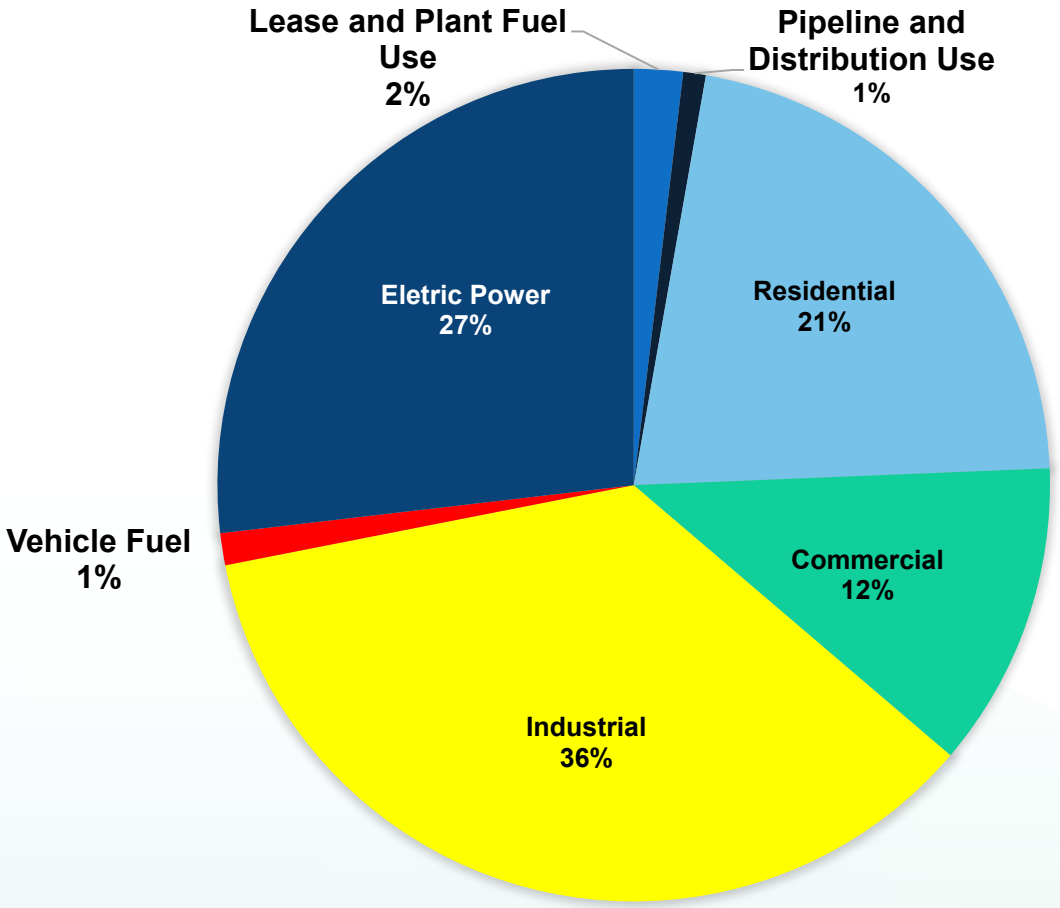
- Approve grant agreements with Gallo Glass Company and Gas Technology Institute
- Adopt staff's determination that projects are exempt from CEQA

Item 13: Solar Heating, Cooling and Power for Industrial and Commercial Applications (GFO-20-502)

April 14, 2021 Business Meeting

Baldomero Lasam, Mechanical Engineer
Energy Research and Development Division
Energy Generation Research Office

Natural Gas Consumption By End Use: California



Source: U.S. Energy Information Administration. 2019.

https://www.eia.gov/dnav/ng/NG_CONS_SUM_DCU_SCA_A.htm

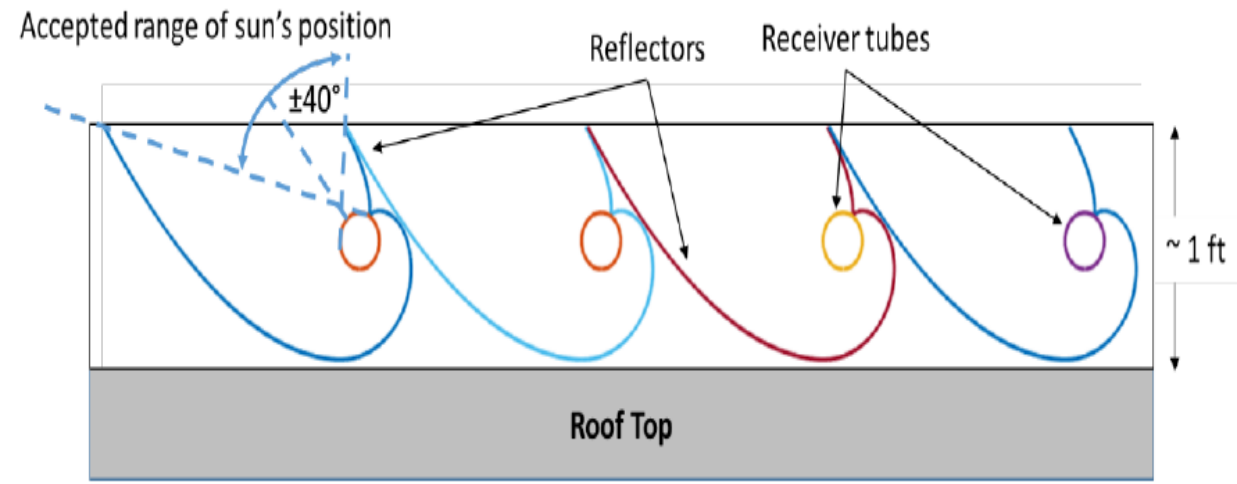
Benefits to Californians

- Reduce natural gas consumption in industrial and/or commercial sectors
- Reduce greenhouse gas emissions
- Inform future deployment strategies

Winston Cone Optics, Inc.

Low Cost Nontracking Asymmetric Shadeless Solar Thermal Collector for Industrial Process Heating

- Develop and demonstrate low-cost, high efficiency system
- Innovation design increases annual generation
- Reduce GHG emissions and dependence on NG infrastructure



Staff Recommendation

- Approve grant agreement with Winston Cone Optics, Inc.
- Adopt staff's determination that project is exempt from CEQA

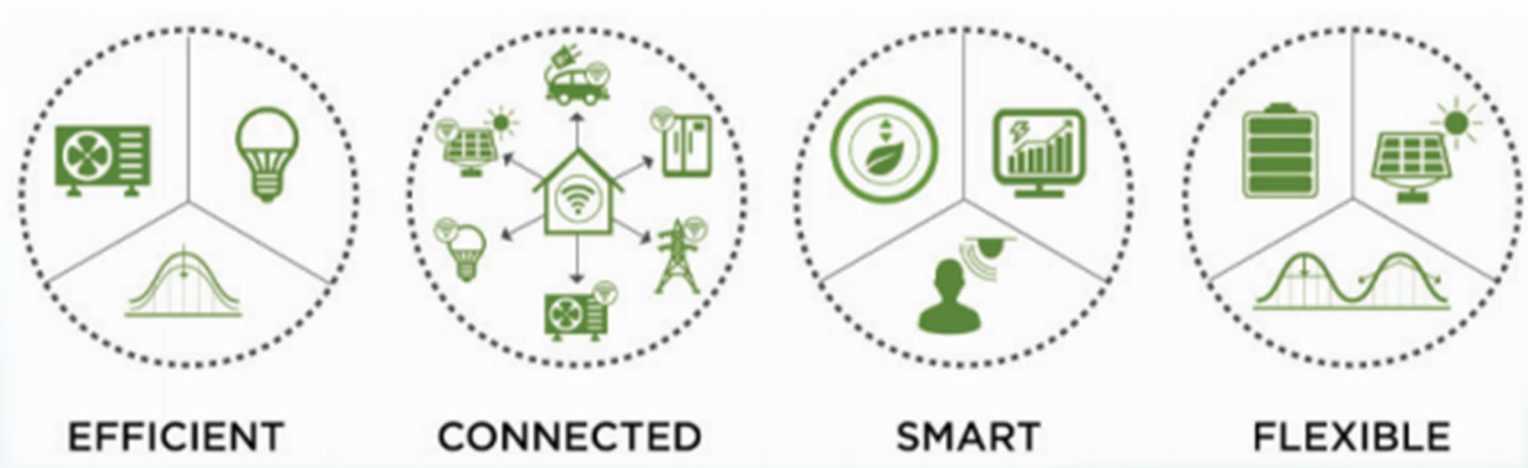
Item 14: Lawrence Berkeley National Laboratory – California Flexible Load Research and Deployment Hub (EPC-20-025)

April 14, 2021 Business Meeting

Matt Fung, Mechanical Engineer
Energy Research and Development Division
Energy Efficiency Research Office

Benefits to Californians

- Improve grid stability and reliability
- Reduce costs to ratepayers
- Facilitate integration of renewable generation
- Increase use of non-fossil resources

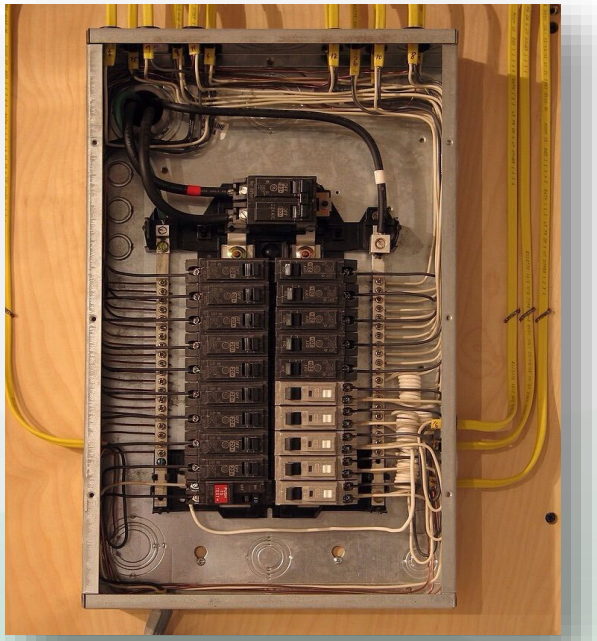


Overview

- Create price and GHG signal communication system
- Develop and deploy technology solutions
- Follow most successful efforts
- Facilitate technology market adoption

Project Examples

- Heat Pump Load Flexibility
- Energy Storage and VGI for Building Flexibility
- Other Load Flexibility Research



Staff Recommendation

- Approve grant agreement
- Adopt staff's determination that project is exempt from CEQA.

Item 15:
EPC-20-005 (GFO-19-305)
Technology & Investment Solutions, LLC

April 14, 2021 Business Meeting

Robin Goodhand, Electric Generation Systems Specialist I
Energy Research and Development Division
Energy Systems Research Office

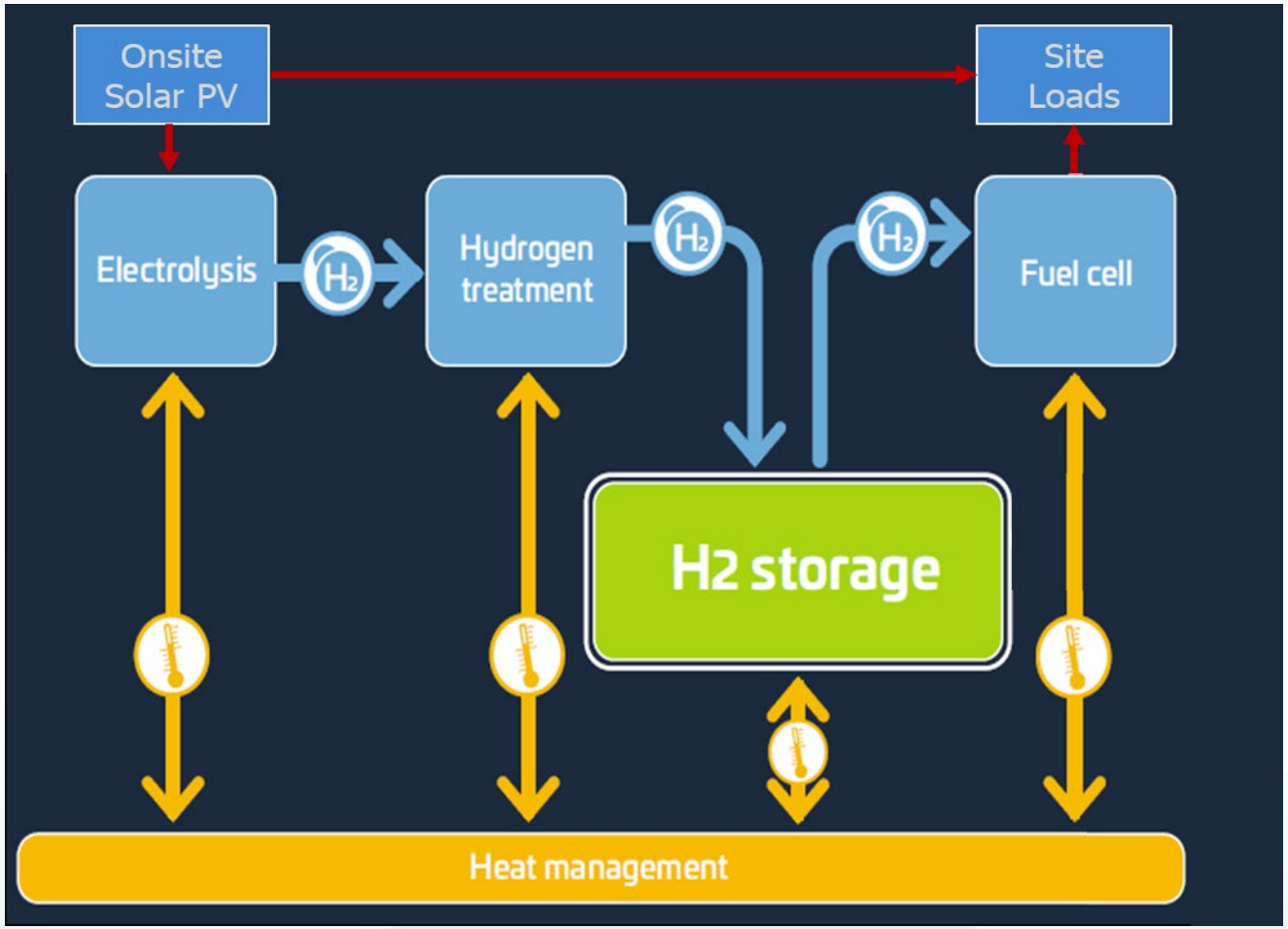
Benefits to California

Validates performance of metal hydrides

- Safe smaller volume hydrogen storage
- Green electrolytic hydrogen
- Customer electricity savings
- Long duration energy resiliency

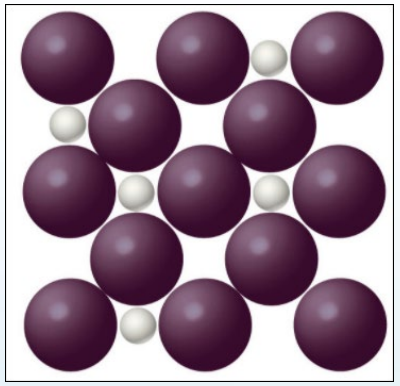
Project Overview

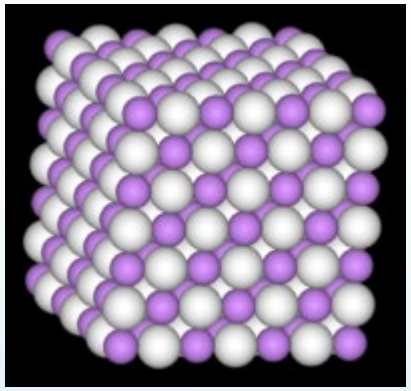
- Electrolyzer up to 10 kW
- Fuel cell up to 8 kW
- Metal Hydride storage for up to 67 kg of hydrogen
- Theoretical capacity over 100 hours

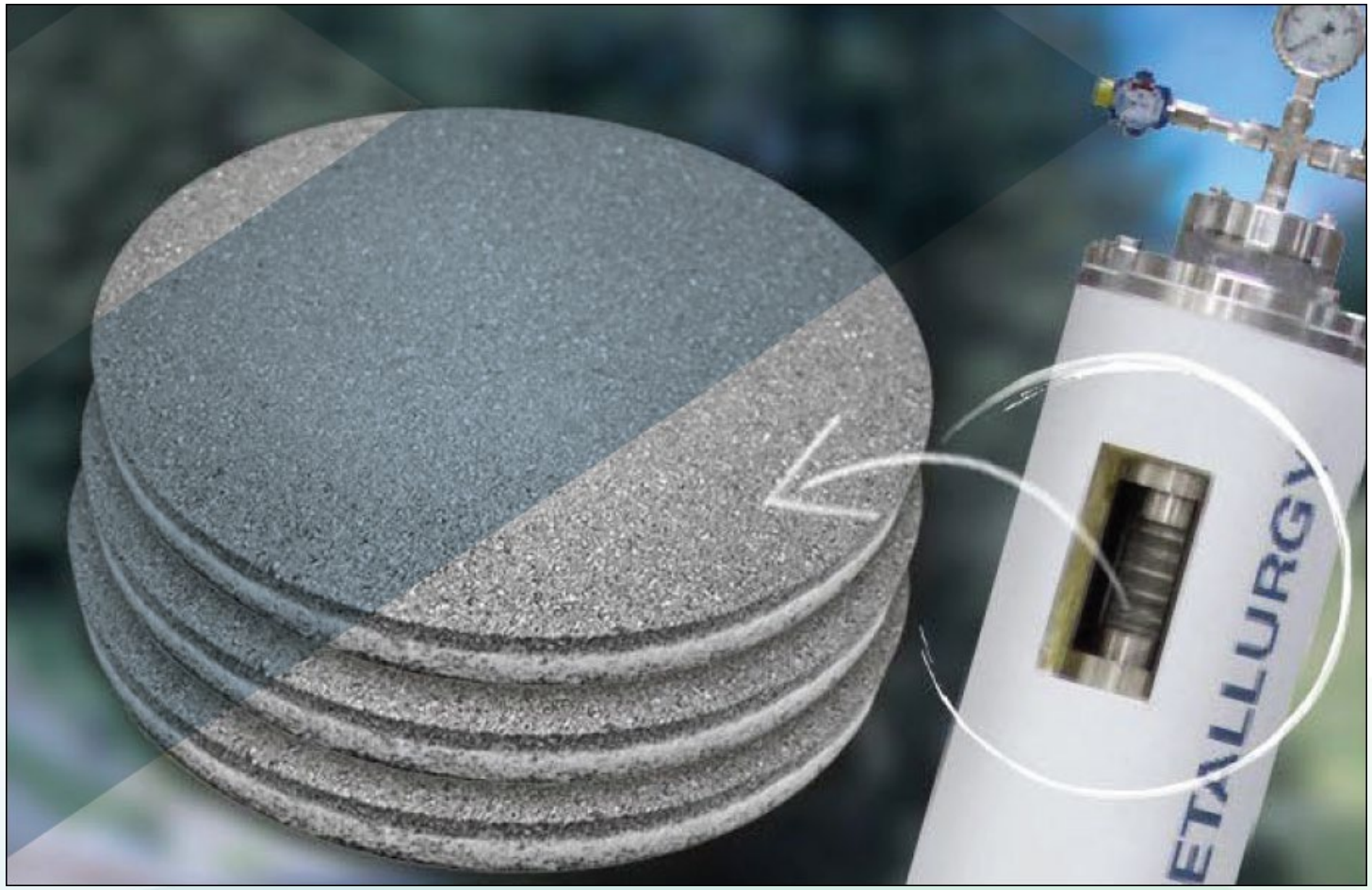


Technology Overview

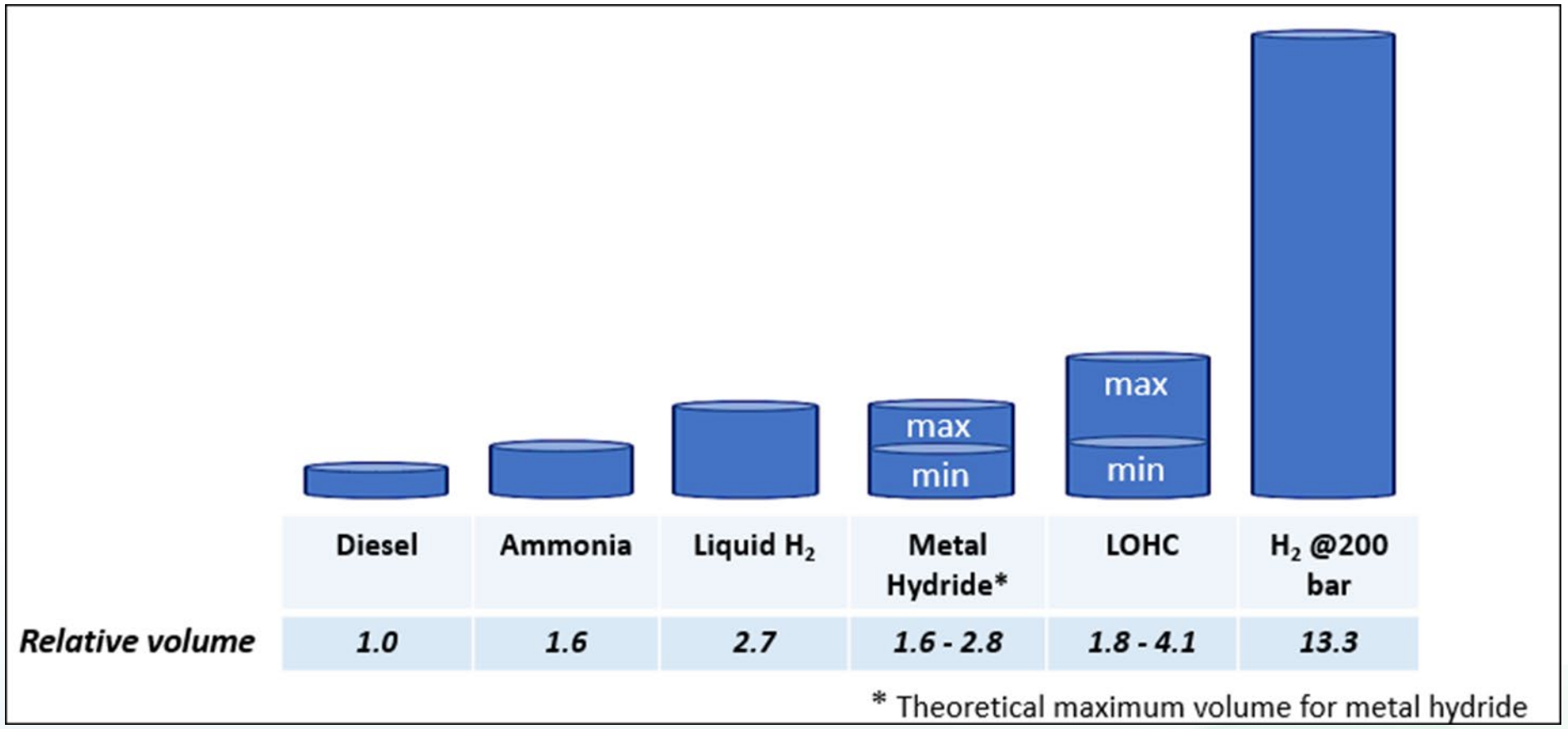
- Metal Hydride storage
  - Hydrogen stored in metal powder
  - Low pressure
  - High energy density
  - Safety benefits







Hydrides and hydrogen storage



	Diesel	Ammonia	Liquid H_2	Metal Hydride*	LOHC	H_2 @200 bar
Relative volume	*1.0*	*1.6*	*2.7*	*1.6 - 2.8*	*1.8 - 4.1*	*13.3*

* Theoretical maximum volume for metal hydride

Staff Recommendation

- Approve agreement EPC-20-005 Technology & Investment Solutions, LLC
- Adopt staff's determination that action is exempt from CEQA

Item 16: Scaling Zero Emissions Retrofits in California and Beyond – (EPC-20-023)

April 14, 2021 Business Meeting

Karen Perrin, Energy Commission Specialist II
Energy Research & Development Division
Energy Efficiency Research Office

Project Benefits to Californians

Develop and test pre-fabricated mechanical pods:

Establish Advanced Building Collaborative:

Overview

Department of Energy awarded $5.5 Million to Rocky Mountain Institute.

The proposed agreement for CEC cost share awards Rocky Mountain Institute up to $1,312,500.

Project 1: Mechanical Pods

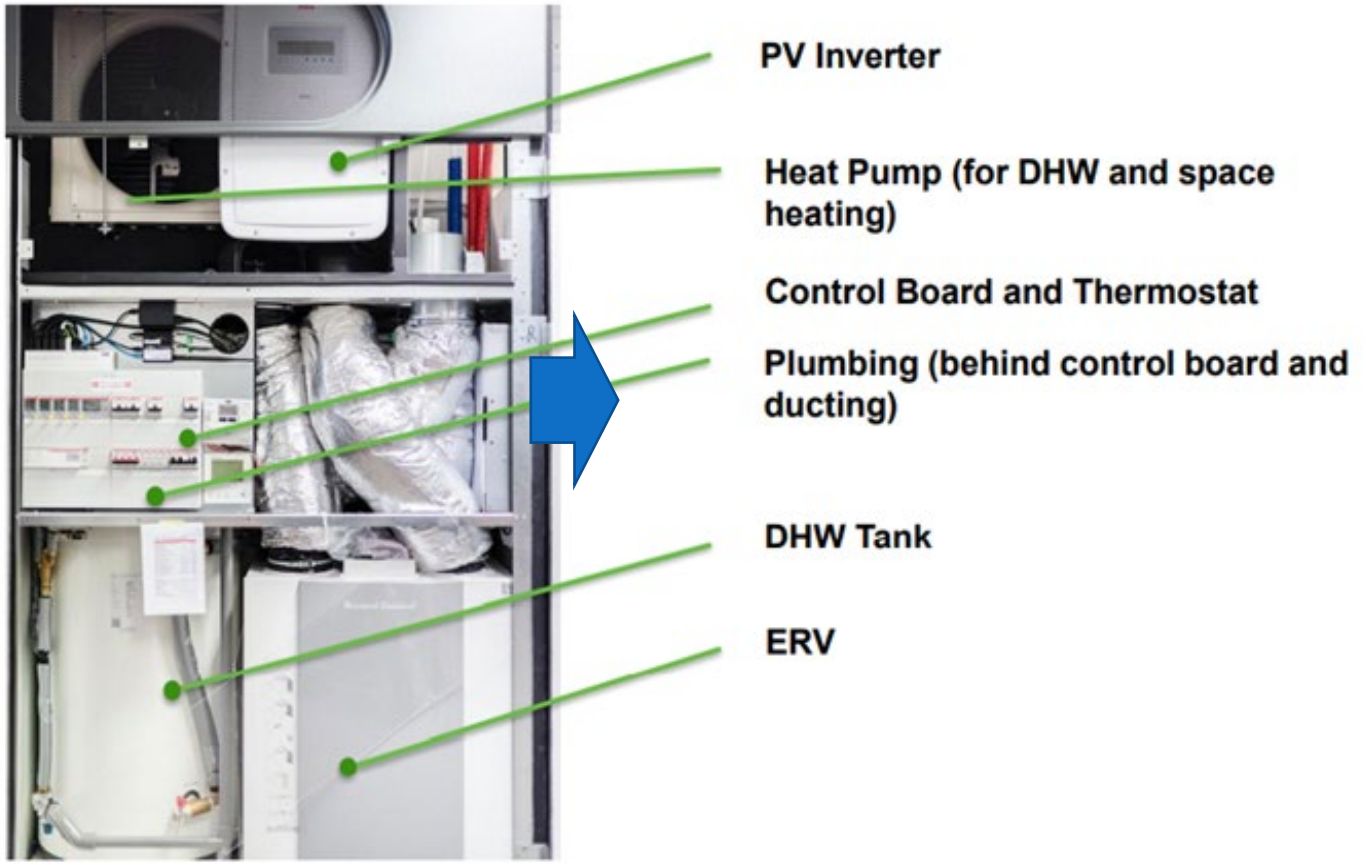


Photo Credit: Rocky Mountain Institute

Project 2: Nationwide Advanced Building Construction Collaborative

- Recruit stakeholders
- Promote CA-based manufacturing
- Expand statewide pipeline
- Create a sustainable Collaborative governance sustainable structure

Funding Overview

Element	DOE	CEC	Other Match
Project 1, Phase 1: Prototype Integrated Mech Pods	$ 500,000	$ 62,500	$ 62,500
Project 1, Phase 2: Demo of Integrated Mech Pods*	$5,000,000	$625,000	$625,000
Project 2: Advanced Building Construction Collaborative	$5,000,000	$625,000	$625,000
Total	$10,500,000	$1,312,500 *	$1,312,500

* Contingent on future CEC and DOE funding. Approval is for entire $1,312,500; Phase 2 is contingent on future CEC funding.

Staff Recommendation

- Approve agreement
- Adopt staff's determination that projects are exempt from CEQA

Item 17: Accelerated Deployment of Irrigation Pumping Demand Flexibility (EPC-20-019)

April 14, 2021 Business Meeting

Dustin Davis
Energy Research and Development Division
Energy Efficiency Research Office

Benefits to California

Polaris technology uses software and automation that integrates price and signals from the grid with irrigation to…

- Lower electricity costs
- Increase grid reliability
- Reduce greenhouse gas emissions

Project Overview

- Enhance technology developed and tested under previous EPIC grant
- Deploy technology in PG&E and SCE territory
- Enable 25-40 MW of grid responsive peak load reduction
- $576,982 in match funds

Source: Polaris

Staff Recommendation

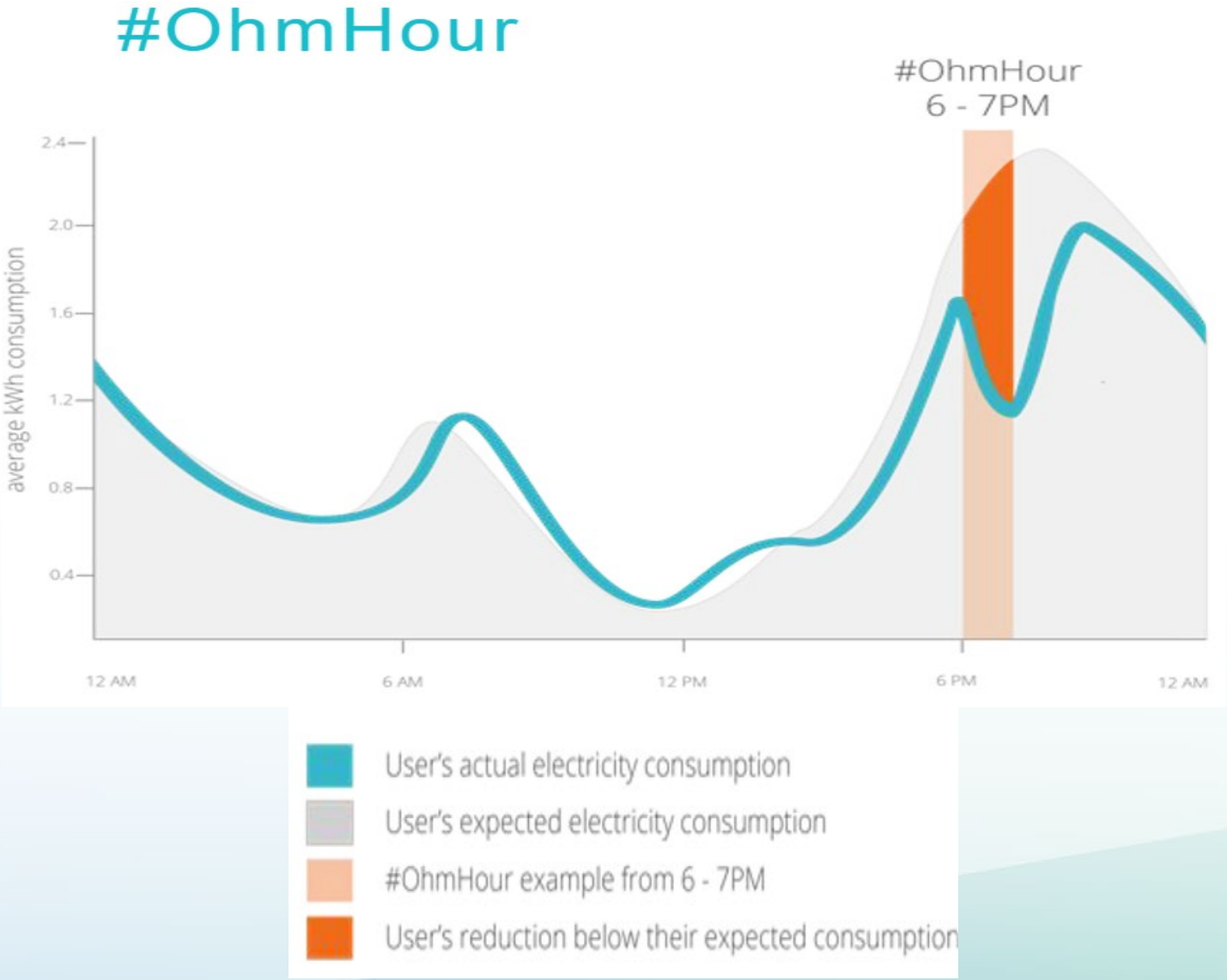
- Approve grant agreement
- Adopt staff's determination that action is exempt from CEQA

Item 18: EPC-20-034 Building Resiliency from Within Ohm Connect, Inc

April 14, 2021Business Meeting

Brad Williams, Project Manager
Energy Research and Development Division
Energy Efficiency Research Office

Benefits to Californians



- Address state's electric grid reliability shortages.
- >25MW demand response availability by 9/30/21.
- Approx 40,000 new users, at least 30% from under-resourced communities.

OhmConnect Project Overview

Goal: Increase residential load reduction

Work elements:

- Expand user participation
- Increase smart device adoption
- Optimize platform performance

Staff Recommendation

- Approve agreement with Ohm Connect, Inc
- Adopt staff's determination that action is exempt from CEQA

Item 19: Bringing Rapid Innovation Development to Green Energy (BRIDGE) 2020 (GFO-20-301)

April 2021 Business Meeting

Michael Ferreira
Energy Deployment & Market Facilitation Office
Energy Research & Development Division

BRIDGE 2020 Benefits to California

- Advances clean energy economy
  - Support clean energy entrepreneurs
  - Quicker transition from fossil fuels
- Improves grid resilience and reliability
- Lowers costs of electric vehicles and supporting infrastructure

All Power Labs

EPIC Funding: $3,287,890

Development and Demonstration of Distributed Biomass CHP Microgrid Systems

- Integrated inverters, battery and controller components for simpler grid interconnection
- Scalable design to match application
- Provides reliable power using biomass waste streams

ALL POWER LABS

Caban Systems

EPIC Funding: $1,095,264

Increasing Advanced Energy Storage for California's Critical Infrastructure Project

- Li-ion battery plus hydrogen fuel cell, long-duration storage system
- Meets CPUC 72 hour backup requirement for wireless carriers
- Safer, emission free alternative to existing fossil fuel generators

Cuberg

EPIC Funding: $3,499,525

High Performance Battery Systems to Power the Rise of Electric Mobility

- Li-metal battery – 80% more energy dense than Li-ion
- Enables commercialization of clean, electric aviation
- Can be produced using existing Li-ion production lines

Cuberg's nonflammable battery technology packs more power and more energy into less space.

NexTech Batteries

EPIC Funding: $2,996,782

Bringing Lithium Sulfur Technology to Market

- Lithium sulfur battery system for utility-scale grid storage
- Lower $/kWh than Li-ion due to widely available, low-cost material inputs
- Validate 8-hour storage capability in real-world setting

NexTech Batteries

FreeWire

EPIC Funding: $3,468,490

FreeWire Boost 2.0 Development and Demonstration Project

- Ultra-fast DC charging for EVs + grid services
- Integrated battery charges during off-peak hours
- Reduces need for on-site utility upgrades

Staff Recommendation

- Adopt staff's findings that these projects are exempt from CEQA.

Item 20: RAMP 2020: Realizing Accelerated Manufacturing and Production for Clean Energy Technologies

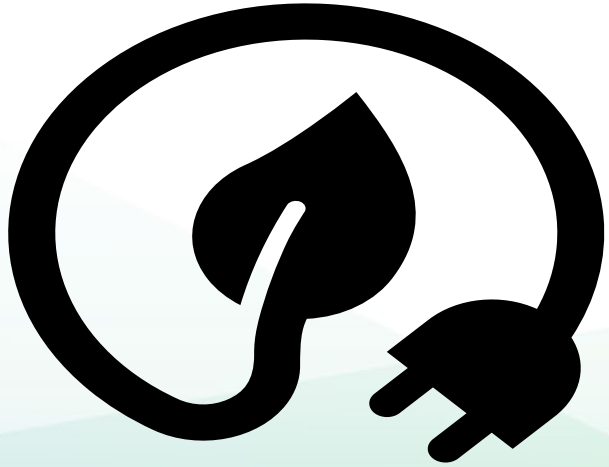
April 2021 Business Meeting

Benson Gilbert, Tech-to-Market Unit
Energy Research & Development Division
Energy Deployment & Market Facilitation Office

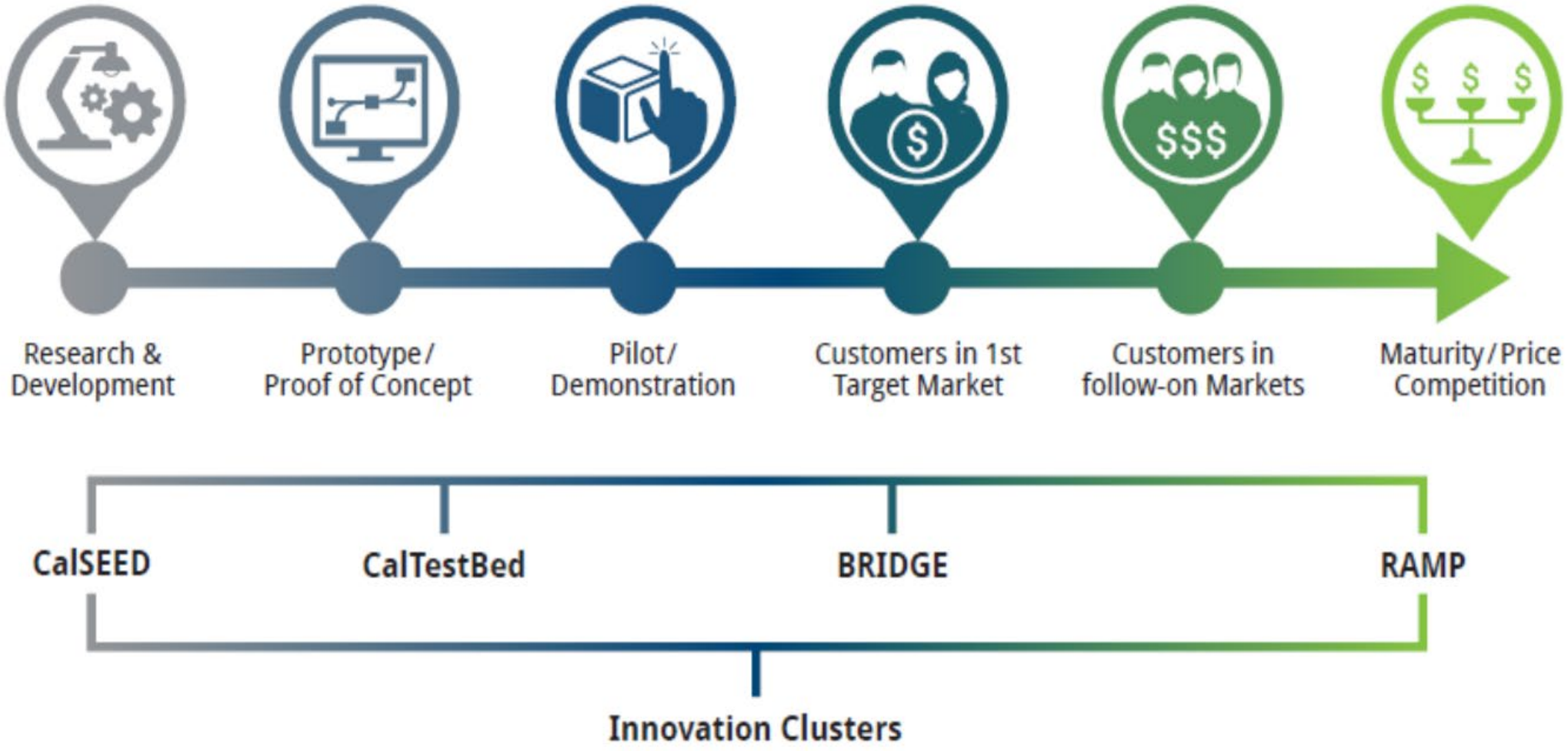
RAMP Benefits for Californians

- **Advances clean energy economy**
  - Supports entrepreneurs
  - Increases skilled labor opportunities

- **Accelerates California's clean energy goals**



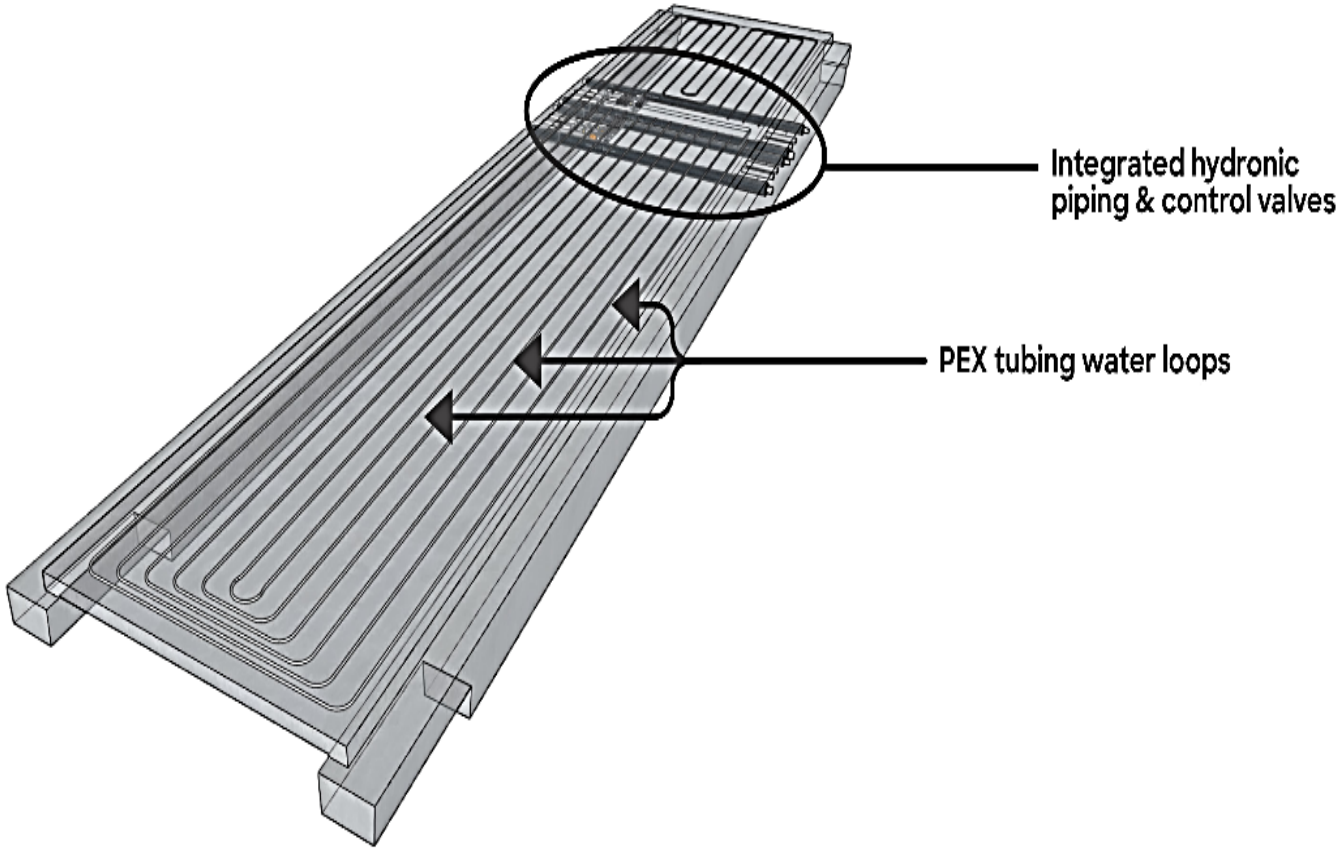
CEC's Entrepreneurial Ecosystem



Clark Pacific EPIC Funding: $3,000,000

Reduce Time and Expense of High Efficiency Prefabricated Radiant Heating and Cooling Systems

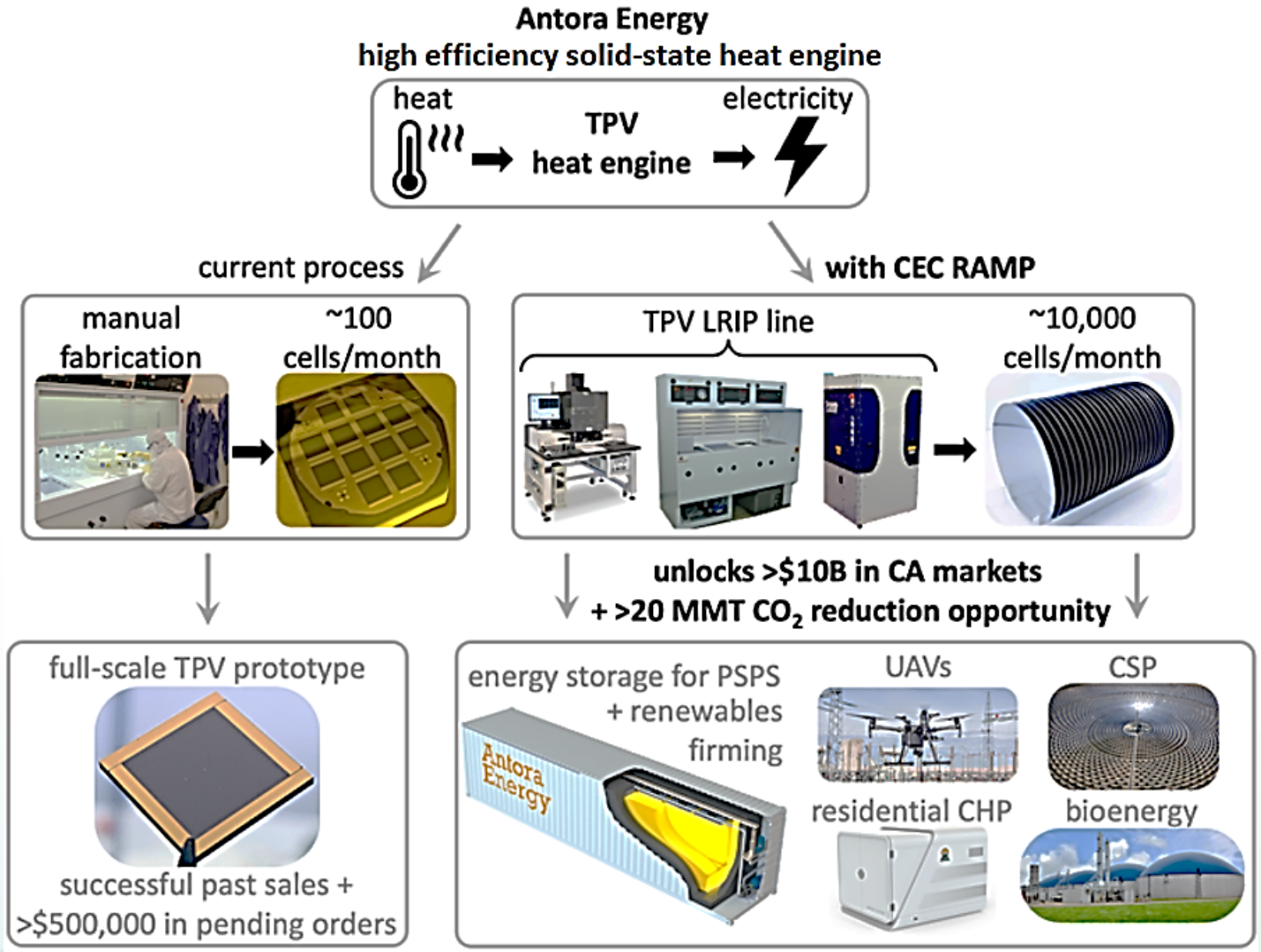
- Scaling production of high thermal mass radiant systems (HTMRs)
- HTMRs allow buildings to shift and shed load in response to dynamic grid conditions
- Leverages an innovative off-site, pre-cast, and cost-effective process



Antora Energy EPIC Funding: $2,999,695

Scaling Production on a Solid-State Heat Engine

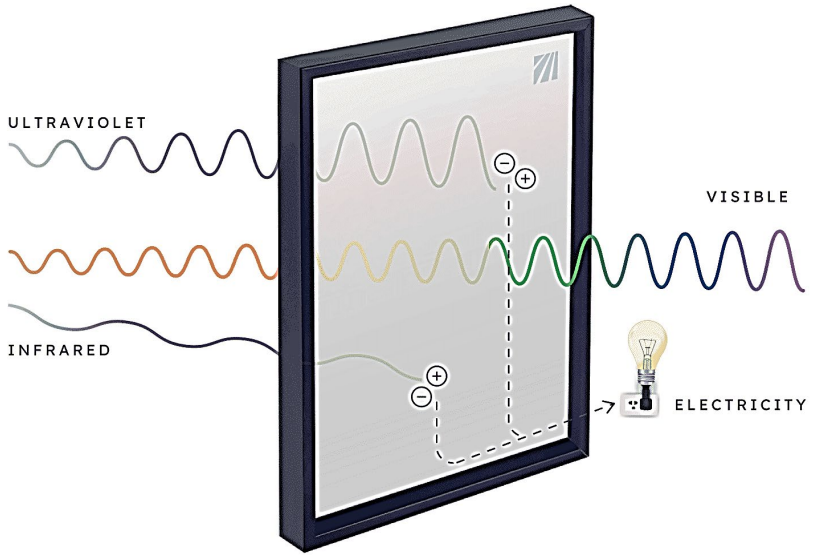
- Thermophotovoltaic (TPV) cells for a ground-breaking heat engine
- Up to 200 hours of dispatchable electricity
- Build pilot line with a nameplate capacity of 2 MW/year



Ubiquitous Energy EPIC Funding: $2,997,343

Ramping Production on Transparent Solar PV Windows

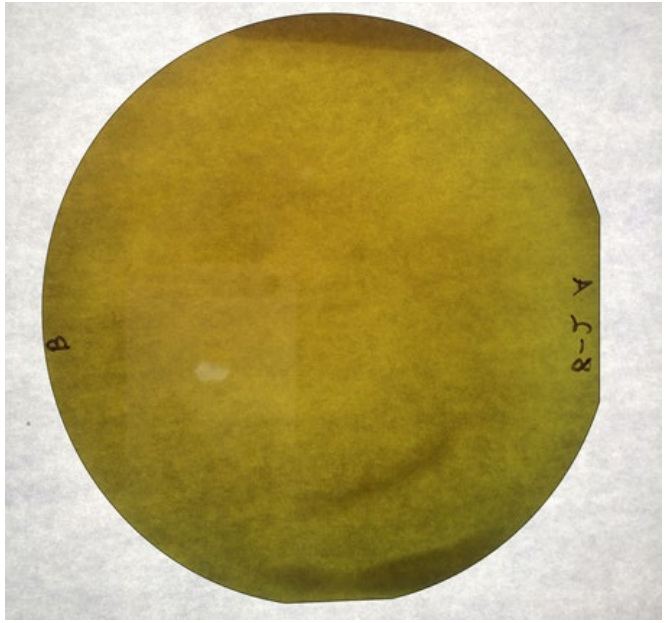
- Scaling production for transparent solar window technology
- Solar cell selectively transmits light visible to human eye while absorbing only ultraviolet and infrared light and converting it into electricity
- Window has dual benefit of reducing solar heat gain

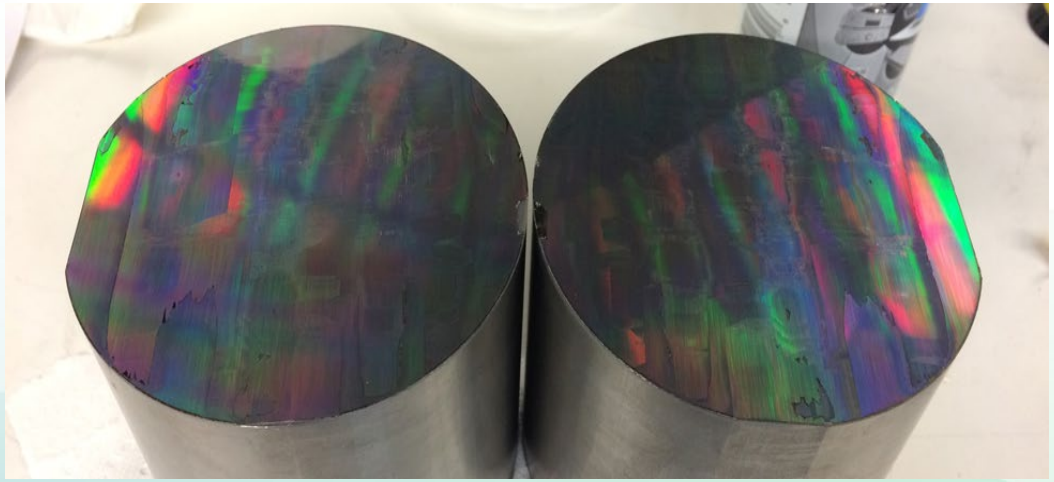


Halo Industries EPIC Funding: $3,000,000

High Quality Silicon Carbide Wafers at Lower Cost for Advanced Power Electronics

- Scaling laser-based manufacturing system to produce silicon carbide (SiC) wafers
- Lowers price and increases quality of SiC
- SiC-based electronics have shown improved device efficiency over electro-mechanical devices
- Power electronics are embedded in switches, inverters, plug-loads, EV chargers, EV drivetrains, transformers and circuit breakers

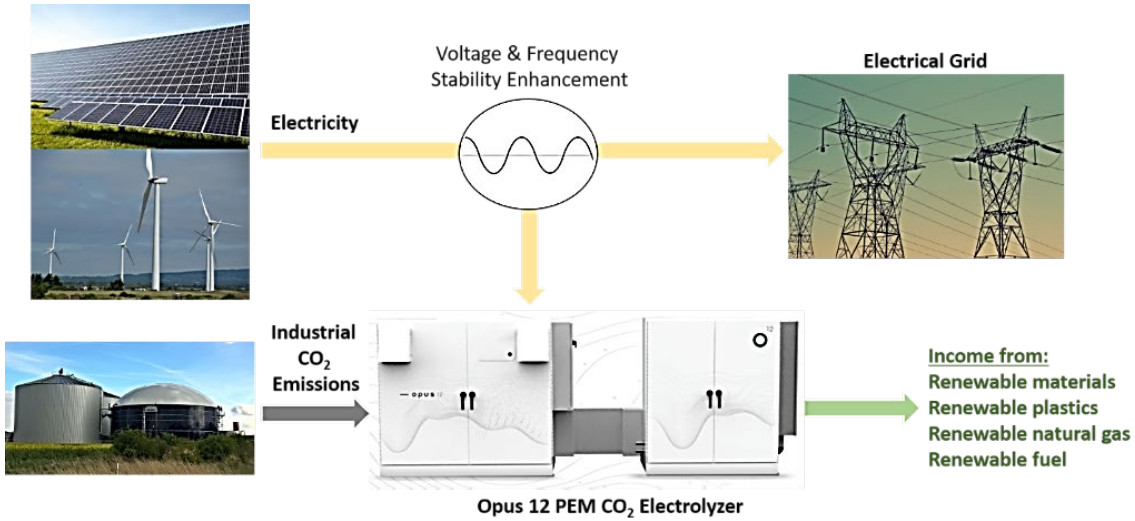




Opus 12 EPIC Funding: $3,000,000

Converting Carbon Dioxide Industrial Waste and Renewable Electricity into Valuable Products

- Scaling production of Opus 12's polymer-electrolyte membrane
- Novel membrane electrode assemblies combine CO_2, water, and electricity to produce higher-energy carbon-based products
- Pathway to electrify and decarbonize production of chemical and industrial products



Staff Recommendation

- Adopt staff's findings that projects are exempt from CEQA.

Item 21: Advanced Plug Load and Smart Exterior Lighting, GFO-20-30

April 14, 2021 Business Meeting

Adel Suleiman, Sr. Electrical Engineer
Energy Research and Development Division

Project Benefits for Californians

- Significant energy and cost savings
- Boost reliability and safety during grid emergencies
- Address community needs for better/safer lighting

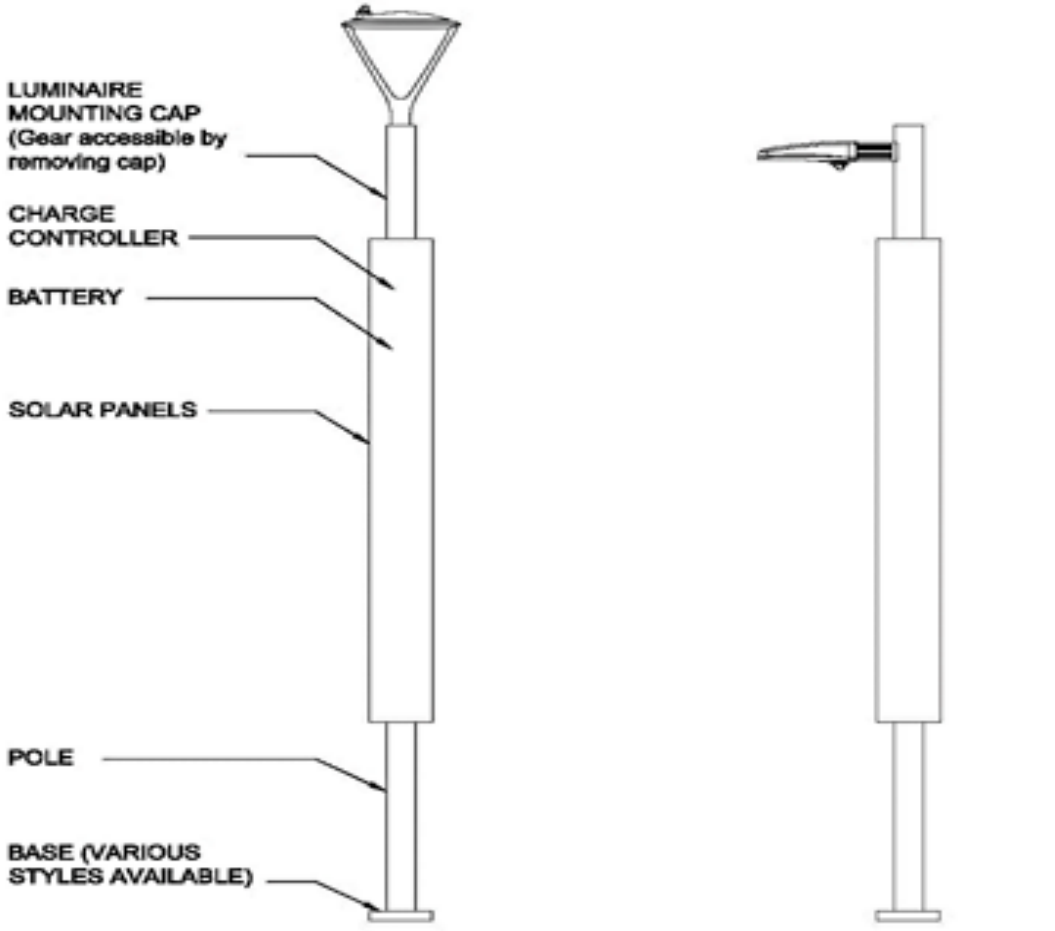
Electric Power Research Institute

Technology

- Solar/ hybrid LED lighting
- Innovative wrap-around solar panel design
- Interactive capabilities
- Intelligent controller

Demonstrations

- 100 locations
- 6 low-income or disadvantaged communities



Potential Designs (EPRI and Hubbell)

Regents of The University of California, on Behalf of the Davis Campus

Technology

- Solar/ hybrid LED lighting
- Integrated solar panel, batteries, controller
- Artificial Intelligence Power Management

Demonstrations

- 200 locations
- 7 low-income or disadvantaged communities

Staff Recommendation

- Approve grant agreements
- Adopt staff's determination that projects are exempt from CEQA

Item 25: Public Advisor's Report

April 14th, 2021 Business Meeting

Nominations due June 25

Visit:

www.energy.ca.gov/about

IDEA Initiative Update

IDEA-In(ternal)

- 23 Task Force Recommendations
- Reviewed by Exec Office, Personnel

IDEA-Ex(ternal)

- Equity framework
- 5 Equity & Enviro Social Justice Roundtables
- Technical Assistance Task Force