Emerging Technologies Summit

MAKING THE CONNECTION:
From Energy Efficiency Innovation to Delivery

April 19 – 21, 2017
California’s Energy Innovation Ecosystem
ERIK STOKES, SHERRI PITMAN, JEFF ANDERSON, JEFF MACON, AMANDA SABICER, MARTY TUROCK
California’s Energy Innovation Ecosystem

Emerging Technologies Summit
April 20, 2017
OPTIMIZING THE ENERGY TRANSITION

Sherri Pittman, Managing Director

ETCC Summit Presentation – April 2017

California Clean Energy Fund
Optimizing the energy transition

100%+ clean energy economy for the 100%
100%+ clean energy economy for the 100%

Support Entrepreneurs in the clean energy economy

Drive innovation

Build equitable outcomes
We provide human and financial capital to entrepreneurs
Our funds, programs and networks work across the entire business lifecycle
CalSEED

Investing in California Energy Entrepreneurs

$24MM to ~100 entrepreneurs over 5 years
The California Sustainable Energy Entrepreneur Development initiative grants up to $600,000 to early stage clean energy concepts and provides professional development resources.

**Concept Award**
- $150,000
- Concept Development & Assistance
- Mentorship from entrepreneurial experts and industry leaders
- Introduction to resources to advance the concept

**Prototype Award**
- $450,000
- Successful Concept Awardees prepare for Commercialization
- Business Plan Competition to push awardees to think in a commercialization area

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CALIFORNIA ENERGY COMMISSION

CalSEED powered by California Clean Energy Fund
CalSEED Awardees will access benefits to develop a concept and prepare for the Prototype Award Business Plan Competition.

<table>
<thead>
<tr>
<th>Program Benefits</th>
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<tr>
<td>Grant dollars</td>
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<tr>
<td>A powerful network</td>
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<tr>
<td>Mentorship</td>
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<td>Operational and technical resources</td>
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<tr>
<td>Online training</td>
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<tr>
<td>Legal counsel</td>
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<tr>
<td>Regional Innovation Clusters</td>
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<tr>
<td>Cleantech Open Accelerator</td>
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<tr>
<td>A community</td>
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</table>
Our Partners

An innovative public-private partnership between the State of California and a diverse group of leaders leading California’s energy transformation.
CalSEED – First Call for Applications

326 Applications!

How Did You Hear?

- Referral: 59%
- Email: 15%
- Event: 13%
- Media: 8%
- Other: 5%
CalSEED – First Call for Applications

**Innovation Stage**
- Applied R&D: 13%
- Basic Prototype: 40%
- Basic Research: 47%

**Applicant Type**
- Corporate/LLC: 24%
- Sole Proprietorship: 72%
- Individuals: 4%

**Top Innovation Categories:**
- Energy Generation: 15.9%
- Energy Efficiency: 14.1%
- Energy Storage: 11.7%

Total: 41.6%
Contact Us

info@calseed.fund
Investing in California Energy Entrepreneurs
Bay Area
Regional Innovation Cluster
A program of Cyclotron Road

Emerging Technologies Summit
Ontario, CA
April 20, 2017
Today, our highly optimized, venture-capital-driven innovation system is simply not structured to support complex, slower-growing concepts that could end up being hugely significant—the kind that might lead to disruptive solutions to existential challenges in sustainable energy, water and food security, and health.

- L. Rafael Reif
  President, MIT
The Cyclotron Road Experiment

1. **Spin-in** top entrepreneurial scientists
2. **Support** with world class facilities, expertise, and mentorship
3. **Position** people and technology for market

Angel investors

Venture capital

Corporate partners

$J = Ae^{-t}$
Support

WHAT YOU GET

Runway
• Up to 2 years of living stipend, health insurance, and travel allowance (Fellowship)

Labs
• Cross-cutting access as a Berkeley Lab affiliate and $100k toward initial Lab work. Innovators retain ownership of their IP.

Mentorship
• Hard tech entrepreneurship mentorship, training, and connections from Cyclotron Road team and network
Results

World-class Talent

• Highly selective: 5% acceptance rate

• Candidates from top research institutions

• Many would not have a home otherwise
Cohort 1 Outcomes

• 100% have built a demo prototype or are funded to do so

• $10M in follow-on grants and $5M in private investment

• All 6 teams funded for next stage of development, from a broad spectrum of $
Next steps

**Existing DOE Program**

- Attracting the very best *first-time* innovators
- 2 years in residence at Cyclotron Road and LBNL
- Berkeley Lab connectivity – access, expertise, credibility
- Dedicated seed funding
- High Touch 1:1 mentorship

**CEC Program Opportunity**

- Complementary program to serve the best *experienced* power sector innovators
- 1-year in residence at Cyclotron Road and LBNL
- Berkeley Lab connectivity – access, expertise, credibility
- Connection to Cyclotron Road cohorts
- No seed funds
- Lighter Touch focused mentorship
- Customized curriculum
### In-residence Programs

In-residence programs available to innovators based on eligibility requirements:

**DOE Program:**
*Intensive training program for first time innovators – applications open October 1*

**CEC Program:**
*Innovation accelerator for experienced entrepreneurs – rolling admission: apply now*

### Innovator Services

Innovator services available to all active program participants:

- Research labs and experts
- Curriculum & bootcamp
- Advisory network
- Demo day & events
- Staff office hours
- Resource library
- Manufacturing cost modeling & design
- Shared service provider resources
- Industry & investor liasing
- Financial support instruments

### Public Resources

Open source resources and best practices to support the broader hard energy tech ecosystem:

- Public resource library
- Public curriculum
- Public events
- Publications & blog
"the United States needs a more systematic way to help its bottled-up new-science innovators deliver their ideas to the world."

- L. Rafael Reif
  President, MIT
Backup Slides
Activation Energy, a registered 501(C)3 non-profit has partnered with Berkeley Lab to support Cyclotron Road.
People

ELIGIBILITY
• First timer w/ min 5 yrs R&D experience
• Focused on science innovation & DOE mission
• Have not yet raised private sector funding

SELECTION CRITERIA:
People (70%)
• Technical strength
• Outcome orientation
• Professional excellence

Concept (30%)
• Impact on U.S. energy
• Technical merit
• Cyclotron Road fit
Application Process

PROCESS OVERVIEW

<table>
<thead>
<tr>
<th>OCTOBER</th>
<th>NOVEMBER</th>
<th>DECEMBER</th>
<th>JANUARY</th>
<th>FEBRUARY</th>
<th>MAY</th>
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</thead>
<tbody>
<tr>
<td>Applications Submitted</td>
<td>External Reviews</td>
<td>Phone Screens</td>
<td>Semi-Finalist Visit</td>
<td>Finalist Visit</td>
<td>Cohort Start</td>
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<tr>
<td>Applicants</td>
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<tr>
<td>200+</td>
<td>50-75</td>
<td>20-30</td>
<td>15-20</td>
<td>10</td>
<td>6</td>
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Selection

- initial screening and scoring by program team
- reviewer input
- detailed screen for qualifications, motivation, and fit
- scoping and 1-1 interaction with LBL staff and program team
- selection committee recommendations and diligence

Deliverable

- intake summary and scoring
- review synthesis report
- semifinalist selection briefing
- begin drafting work plan for CRADA
- final selection memo and final statement of work

final approval by AMO
What do we provide?

**RESOURCES**
- Fellowship ($85k living stipend, $20k travel, insurance x 2 years)
- Research funds ($100k lab funds)
- Lab space (2 years)

**EDUCATION**
- Kick-off bootcamp (1 week, in development)
- Techno-economics course (10 week)
- Focused courses (ad hoc)

**MENTORSHIP**
- Quarterly Advisory Board meetings
- Monthly one-on-ones

**NETWORKING**
- Invited guests (> 300 per year)
- Invited speakers (weekly)
- Network events (yearly)
Networking

HIGH CONNECTIVITY TO INNOVATION ECOSYSTEM

Monthly Cyclotron Road Visitors

<table>
<thead>
<tr>
<th>Month</th>
<th>2015</th>
<th>2016</th>
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<tr>
<td>Jun</td>
<td>10</td>
<td>60</td>
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<td>Jul</td>
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<td>50</td>
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<td>Nov</td>
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<td>Dec</td>
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<td>Jun</td>
<td>10</td>
<td>0</td>
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<tr>
<td>Jul</td>
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</tbody>
</table>

Cyclotron Road Visitor Type

- **Investors**: 27%
- **Industry**: 17%
- **Professional Services**: 13%
- **Entrepreneur**: 10%
- **Non-Profit**: 12%
- **Academia**: 9%
- **Government**: 7%
- **Other**: 9%

**FY2016 Total Visitors**: 242
For more information:

Jeff Anderson
Cyclotron Road
jeff@cyclotronroad.org
Central Valley Innovation Cluster
BlueTechValley Innovation Cluster

Ventures:
CA entities
Technology affecting energy
Technology Readiness Level (TRL) 1-9
**BlueTechValley (BTV)**

Water, energy, and ag tech

Local, regional, global innovators and entrepreneurs

Subject-matter experts, mentors, training, opportunities
Ventures

- Screening Services
- Incubator
- Third-party testing

Clusters

- Regional assets
- Training
- Collaboration

Execution

- Events
- Accelerator
- Funding
“For Entrepreneurs, By Entrepreneurs”

More than a theme...
## Cleantech Commercialization Process

### Entity Formation
- Market Assessment
- Business Model Creation
- Identity Creation
- Executive Team Recruiting

### Craft the Business Model
- Customer Discovery
- Foundational Knowledge
- Investment (Grants, Friends & Family, Angels)
- Beachhead Engagement

### Prove the Business Model
- Financial Projections / Planning
- Team Development
- Solution Refinement
- Professional Investor Engagement
- Repeatable Sales Engagement

### Optimize the Operation
- Business Process Scaling
- Operational Efficiency Systems
- Team Expansion
- Access to Working Capital
- Access to Growth Capital
- Supply Chain Efficiency
- Revenue Growth & Partners

### New Market Expansion
- Adjacent Products
- Geographic Expansion
- Channels Development
To Build Our Regional Economy, We’ve Started with What We Know...

- **Size**
  - Population of ~15M people (~10M in LA County); LA County GDP > Taiwan GDP

- **Research and Academia**
  - Foundational and Applied Research: 3 UCs, 7 CSUs, and private

- **National Logistics Hub**
  - 2 Ports handle 40% of inbound shipping containers for the U.S

- **Manufacturing Hub**
  - L.A. County = largest manufacturing center in the U.S. (more than Michigan)
...and then Identified Key Challenges our Clean Energy Entrepreneurs Face

• Lack of regional energy needs assessment and planning
• Hyper-local networks and services
• Uneven access to service and entrepreneurs across the region
• Lack of dialogue between innovators and customers
• Innovation gets “stuck”

*Entrepreneurs need access to the right resources, at the right time*
Vision

To create a regionally-inclusive, robust, entrepreneur-centric clean energy technology development and commercialization program that helps the region achieve the state’s statutory energy goals and benefits residents throughout the four-county region.
Opportunity to Build our Region’s Capacity

• Nurture a genuinely *inclusive regional clean energy cluster* to serve and represent ratepayers and entrepreneurs in all four Counties.

• Create a process to *efficiently allocate regional clean energy development and commercialization resources* in order to derive maximum benefit for IOU ratepayers, entrepreneurs, and the regional economy.
ASSESS
Energy Research

ENGAGE
Regional Hubs

SERVE
Business & Tech Services

LACI
Regional Hubs

- Santa Barbara – Community Environmental Council, UCSB
- Ventura County – California State University, Channel Islands
- Los Angeles County – LACI
- Orange County – Cleantech OC

Key Regional Activities:
- Assess and prioritize the region’s energy needs
- Create inventory of the region’s clean energy ecosystem stakeholders
- Create a pipeline of clean energy innovation
- Connect entrepreneurs with business and technical services
- Host and promote clean energy events
- Identify clean energy technology pilot sites
- Connect customers with new clean energy technologies and services solutions
Thank you!

Amanda Sabicer
VP Regional Energy Innovation Cluster
amanda@laincubator.org
Overview for 2017 Emerging Technology Summit – April 20, 2017
What do we do?
Position the greater San Diego region as a global leader in the cleantech economy.

How do we do it?
Foster collaborations across the private-public-academic landscape, leading advocacy efforts to promote cleantech priorities, and encouraging investment in the San Diego region.

Who's with us?
More than 100 local businesses, universities, governments, and nonprofits committed to advancing sustainable solutions for the benefit of the economy and the environment.
Private Sector Members

- GE
- GreenCharge
- CHUBB
- EDF Renewable Energy
- Bank of America Merrill Lynch
- PRimoWIND
- OSIsoft
- RENOVATE AMERICA
- BARNEY & BARNEY
- QUALCOMM
- MEASURABL
- ORISON
- PERKINS Coie
- Sullivan Solar Power
- Solar Turbines
- Black & Veatch
- IBERDROLA Renewables
- OPTERRA Energy Services
- Itron
- Baker Electric Solar
Public Sector Members

- The City of San Diego
- City of Carlsbad, California
- Port of San Diego
- City of Chula Vista
- University of San Diego
- San Diego State University
- Scripps Institution of Oceanography
- SDG&E
- UC San Diego
2016 U.S. Clean Tech Leadership Index

SAN DIEGO, CA

KEY FACTS

- $828M in VC funding in the last 3 years
- #2 in installed solar per capita
- 14,366 EVs (680% more than in 2012 Index)
- #1 in Leadership Index all 7 years (and #1 in Policy)
- 1 of 3 cities in Index with a 100% renewable electricity pledge
- #3 OVERALL in Metro Index (Top 5 in 3 of the 4 Index categories)
- 1000+ LEED and Energy Star buildings
- 14,366 EVs (680% more than in 2012 Index)

All data is from Clean Edge’s 2016 U.S. Clean Tech Leadership Index. Data sources include U.S. Green Building Council, Energy Star, the Renewables 100% Policy Institute, IHS Automotive, Environment America, U.S. Census Bureau, and Cleantech Group.
Helping entrepreneurs bring their energy innovations to market
WHO ARE WE SUPPORTING?

Innovative entrepreneurs developing solutions to the region’s energy needs
EPIC GRANT GOALS

Accelerate the commercialization of innovations that are strategically focused on overcoming barriers to meeting state energy goals

Provide benefits to ratepayers:

- SDG&E
- Southern California Edison
- San Diego Regional Energy Innovation Network
# San Diego Regional Energy Technology Priorities

<table>
<thead>
<tr>
<th>Energy Efficiency &amp; Demand Response</th>
<th>Clean Generation/Renewables</th>
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<tbody>
<tr>
<td>• Envelope Efficiency</td>
<td>• Hydroelectric</td>
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<tr>
<td>• Lighting Efficiency</td>
<td>• Wind</td>
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<tr>
<td>• HVAC Efficiency</td>
<td>• Solar</td>
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<tr>
<td>• Pump/Other Equipment Efficiency</td>
<td>• Geothermal</td>
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<tr>
<td>• Energy Management Software</td>
<td>• Wave</td>
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<tr>
<td></td>
<td>• Related Technologies</td>
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<table>
<thead>
<tr>
<th>Smart Grid &amp; Energy Services</th>
<th>Clean Transportation</th>
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<tr>
<td>• Mechanical Energy Storage</td>
<td>• Battery Electric Vehicle Technologies</td>
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<tr>
<td>• Electrochemical Energy Storage</td>
<td>• Hybrid Electric Vehicle Technologies</td>
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<tr>
<td>• Electrical Energy Storage</td>
<td>• Electric Vehicle Charging Infrastructure</td>
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<tr>
<td>• Thermal Energy Storage</td>
<td>• Software Platforms</td>
</tr>
<tr>
<td>• Smart Grid/Metering Hardware, Software, Data Analytics</td>
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<tr>
<td>• Microgrids</td>
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</table>

- Related Technologies
- Wave
- Wind
- Solar
- Geothermal
- Battery Electric Vehicle Technologies
- Hybrid Electric Vehicle Technologies
- Electric Vehicle Charging Infrastructure
- Software Platforms
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<tr>
<th>Outreach</th>
<th>Technology/Market Support</th>
<th>Policy/Regulatory Guidance</th>
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<tr>
<td>Inland Empire Economic Partnership</td>
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<tr>
<td>Imperial Valley Economic Development Corporation</td>
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<tr>
<td>FLOW</td>
<td>San Diego State University</td>
<td>Center for Sustainable Energy</td>
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<td>San Diego Venture Group</td>
<td>UC San Diego</td>
<td>University of San Diego</td>
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<td>Tech Coast Angels</td>
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<td>Business Acumen</td>
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<td>Program Management</td>
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<td>Connect</td>
<td>EvoNexus</td>
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<td>San Diego</td>
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TECHNICAL ADVISORY COMMITTEE

TOTAL: 62 PARTICIPANTS

- Academic
- Public/Government
- Service Providers
- Energy/Technology Companies
- Capital Providers
- Utilities
- Other
## CUSTOMIZED SERVICE PLANS

<table>
<thead>
<tr>
<th>CONNECT</th>
<th>CSE</th>
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<tbody>
<tr>
<td>Springboard</td>
<td>Market intelligence</td>
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<tr>
<td>Consideration for CapitalMatch</td>
<td>Policy briefings</td>
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<tr>
<td>CorporateMatch</td>
<td>Energy policy education series</td>
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<tr>
<td>Frameworks Workshops</td>
<td>Connections to key San Diego public clients</td>
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<tr>
<td><strong>SDSU</strong></td>
<td>Guidance on state energy programs &amp; incentives</td>
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<tr>
<td>Imperial Valley Proof-of-Concept Center</td>
<td>Tech &amp; knowledge transfer activities</td>
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<tr>
<td>Defense Innovation Cluster</td>
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<tr>
<td>795 MBA Capstone Program</td>
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<tr>
<td>SDSURF Tech Transfer Office</td>
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<tr>
<td><strong>USD</strong></td>
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<tr>
<td>SMSE: Business Development Services</td>
<td>Proof-of-Concept Lab Testing</td>
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<tr>
<td>SMSE: Rapid Prototyping Facilities</td>
<td>Field Scale Pilot Testing</td>
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<tr>
<td>USD-EPIC: Regulatory &amp; Policy Assessments</td>
<td>Center for Energy Research</td>
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<tr>
<td>USD-EPIC: One-On-One Expert Advising</td>
<td>Provide referrals for pilot projects</td>
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<tr>
<td><strong>EvoNexus</strong></td>
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<tr>
<td>Consideration for admission to incubator</td>
<td>Provide referrals for capital providers.</td>
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<td><strong>IEEP</strong></td>
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<td><strong>IVEDC</strong></td>
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<td><strong>SDVG</strong></td>
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Partner Advisory Committee & Technical Advisory Committee Referrals

• Provide Contacts for Market/Technology Validation

• Provide Contacts for End-User, Third Party Validation Trials

• Provide Contacts for Advisory/Financial Support
CUSTOMIZED SERVICE PLANS

Accelerated path to commercialization

• Advisory Support
• Mentoring
• Workshops/Training
• Testing Facilities
• IP and Export Assistance
• Market Intelligence

• Proof-of-Concept Pilots
• End-User Pilots
• Networking Forums
• Access to Capital
• Technology Commercialization
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<td>CORRELATE</td>
<td>PRiMOWIND</td>
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<tr>
<td>EVOLUTIONARY ENERGY SOLUTIONS</td>
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<tr>
<td>An Energy Efficiency Firm</td>
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<td>SenseOps</td>
<td>NUVVE</td>
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<tr>
<td>CLEANSPARK</td>
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QUALIFICATION REQUIREMENTS

WHO IS ELIGIBLE:

• Must have a business office in California
• Must have a business presence in San Diego, Imperial, Riverside, or San Bernardino County
• Must have a breakthrough “electric” energy technology that fulfills regional and/or state strategic needs
• Technology Readiness Levels 1-9
• Company must ultimately deliver benefits to California electric ratepayers
IF YOU QUALIFY AND ARE INTERESTED IN PARTICIPATING

Applications are accepted on a rolling basis

ENERGY ENTREPRENEURS: APPLY NOW

Online forms at:
cleantechsandiego.org/SDREIN
Helping entrepreneurs bring their energy innovations to market