SCE Emerging Technologies Overview

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May 10, 2018 – UCSB EEI Technology Update
About SCE

Southern California Edison

We are modernizing the power grid to enhance system reliability, support consumer use of clean energy technologies, and help California meet its clean energy goals.

- One of the nation’s largest investor-owned utilities
- Providing electric service in the region for more than 120 years
- Serving nearly 14 million people in a 50,000-square-mile service area
- Generate about 16% of electricity with the remaining 84% purchased from independent power producers
- Investing more than $12 billion over three years (2015-17) to expand and prepare our electric system infrastructure for new technologies (PV, storage, electric vehicles)
SCE strategy

Build the next generation energy company that delivers superior value to customers and enables a clean energy future, focusing on four areas:

- Cleaning the power system
- Strengthening and modernizing the grid
- Helping customers make cleaner energy choices
- Achieving operational and service excellence
California’s greenhouse gas emissions must decline

In order to decrease greenhouse gas emissions 40% by 2030 and 80% by 2050 (below 1990 levels), dramatic steps must be taken.

Source: Air Resource Board
SCE’s Clean Power and the Electrification Pathway

• Southern California Edison’s integrated blueprint for California to reduce GHG emissions and air pollutants.

• Realizing the blueprint will reduce the threat of climate change and improve public health related to air quality.

• It is a systematic approach and each measure is integrated with — and depends upon — the success of the others.

• To be successful, California must approach implementation as an integrated package, applying resources across the board where most effective.
Goals to improve

- California set a goal to reduce emissions 40% below 1990 levels by 2030, and 80% by 2050.

If we want to get to zero emissions, eventually we have to replace many of the things we rely on today that require combustion.
SCE’s integrated solution

- Decarbonize the electric sector
- Electrify the transportation sector
- Electrify buildings

Clean the power grid. And electrify.
The Need for New Energy Technologies

- Our utility grids are getting more complex
- Our customers are expecting more choices & more support
- Markets & technologies are moving faster than in the past
- DERs (Distributed Energy Resources) are coming in a wave
- Utilities & customers have resource challenges & cost pressures
So how do we find these technologies for our customers?

- We want to tap into the tech “market wisdom”
- In CA we utilize our Emerging Technologies Programs to identify and support new customer-side technologies.
- We leverage 3rd-parties extensively to make these programs successful.
What kind of 3rd-parties are we working with?

- Entrepreneurs & Start-up firms
- Technology developers
- Universities & other laboratories
- Manufacturers
- Engineering Firms
- Consultants
SCE Emerging Products (EP) Group and Core Activities

- Emerging Technologies Program looks at new EE (Energy Efficiency) technology
- Emerging Markets Program looks at new DR (Demand Response) technology
- Many EP projects combine both; all of them focus on our program core competencies
  - Assessment and validation of technologies and solutions
  - Demonstrations, Scaled Field Placements, and Showcases of potential new solutions
California Demand Side Mgmt Framework

EP, EE & DR programs bridge “The Chasm.”

R&D Programs
(Universities, CEC EPIC, etc.)

EE Programs
(Deployment & Dissemination)

ET Programs
(Screening)

C&S Programs
(CASE Initiatives)

Codes & Standards
(Federal and State)

The stage where this interface occurs will vary.

BASIC RESEARCH
Scientific Suggestion, Discovery, Recognition, New Concept

DEVELOPMENT

APPLIED RESEARCH
Laboratory Verification

Technology Adoption Rate

Innovators
Early Adopters
Early Majority
Late Majority
Laggards

Commercial Introduction
Commercial Growth
Commercial Maturity
Commercial Decline

Time

Energy Efficient Technology Commercialization Process

Energy Efficient Technology R&D Process

New technologies and applications may cycle between Product Engineering and Commercial Introduction several times until the correct mix of features, performance, price, availability, etc. are reached. Degree of failures and risk are high.
Technology Influence and Adoption Life Cycle – Conceptual
California Drivers for Utility Grid Load Management
About the SCE Technology Priority Maps (TPM)

**Need**
- To create an outcome-based, long-term vision for Emerging Technology (ET) efforts at SCE

**Goals**
- Strategically guide SCE’s ET research efforts in the most efficient manner over the next 8 years
- Align our ET focus with key SCE priorities such as GHG reduction
- Increase the effectiveness of SCE’s development of new technologies into viable measures
- Optimize internal resources and identify opportunities for strategic partnerships
Development Process

SCE Emerging Products group developed a comprehensive vision for 6 technology areas:

• Lighting and Controls
• HVAC
• Water and Agriculture
• ProcessLoads
• Whole Buildings
• Plug Loads

• These were further broken down into 45 technology families and 200+ individual technology types or areas of focus
Development Process

For each of the 200+ technologies, the ET team outlined:

• Current state of the technology
• Desired end state and time to achieve end state
• Marketplace drivers
• Barriers to widespread adoption
• Technology milestones and specific ETP interventions to achieve those milestones
• Strategic SCE alignment
• Technical potential
• Collaboration strategy
Development Process

• Data and analysis went through a peer review process

• 16 industry leaders and subject matter experts
  – 8 peer reviewers from Edison, 8 external reviewers
Sample EP Project – Energy Efficient Refrigeration Supporting GHG Reduction
Cold Storage Facility – South Gate

Key Electric Technologies/Features
• 6 Highly efficient Low Charge Ammonia System (GWP of <1)
• ~15-20% more efficiency than baseline system
• Replaces R-22 refrigerant system with GWP equivalent to 1810
• Facility also includes electric plugs for tractor trailer rigs to connect refrigeration units

Packaged Low Charge Ammonia Units
Sample EP Project – Whole Building Demonstration
Low Income Multi Family ZNE New Construction in Pomona

Key Electric Technologies

- Ultra efficient Ductless mini split heat pumps
- All electric kitchens – Energy Star Appliances
- 34 KW PV array / space for up to 90 KW
- 30kW-60kWh Lithium Ion Battery
Sample EP Project – Building Electrification

Representative electric water heating products:

**Typical New**
Example: Rheem electric resistance storage water heater

**High Efficiency**
Example: AO Smith Vortex HPWH

**Ultra-High Efficiency**
Example: Sanden residential (43 gal) CO₂ split HPWH

Representative electric space heating/cooling products:

**Ultra-High Efficiency**
Example: Carrier Infinity 20 ducted split heat pump

**Residential ductless heat pump (mini- or multi-split)**
Example: Daikin ductless mini split – ideal for residential

**Commercial ductless variable refrigerant flow (VRF) space conditioning**
Example: LG VRF climates
Sample EP project – Proof of Concept Lab Demo

- **ET14SCE1180 – Energy Channel 2.0**
  - One of 3 projects with the CalPlug Lab
    - Other projects include SIM Home and Strategic Roadmap of PlugLoads
  - Follow up to the Set-Top Box project
    - Further explore the additional opportunities of displaying real-time consumption data to the customer
  - Project Intended to:
    - To expand the capability and availability of Smart Meter consumption data to the customer
    - Expand the reach beyond the TV to mobile devices via an app
    - Integrate additional energy information
    - Improve user interface
    - Reduce the reliance on specific media providers
Energy Channel 2.0 Methods

Requirements: Easy access (1) + real-time data (2) + Comparison (4)

Devices in use - (left) Intel stick with windows 10 and (right) MK809 stick with Android 5.1.
Thank you! Questions?

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