Welcome!

Greg Wikler
Executive Director
California Efficiency + Demand Management Council
Pre-Meeting Safety Procedure

Best Practice:
- Assign someone to call 911.
- Assign someone to inform the guard of the emergency.
- Ask who is CPR certified.
- Participants, please take note of who is sitting on both sides of you.

Evacuation:
- Exit the doors at the rear of the room.
- Go straight through the lobby out the front doors to Howard St. turn right.
- Proceed down Howard St. to the gathering spot at 4th St.
- OR
- Exit the doors near the windows (east wall).
- Turn right, down six steps and exit to the alley (Tehama St.) behind the PEC, go straight down Gallagher, left on Clementina, left on 4th.
- Proceed on 4th to the gathering spot at 4th St. and Howard St.

Gathering Spot:
- On the corner of 4th and Howard Streets at the Carrousel.
- Check to see if the persons that were sitting next to you are present. If not, immediately inform a PEC staff member.
- Await further instructions.

Earthquake:
- "Duck - Cover - Hold". Get under a table to protect yourself from falling objects.
- Stay under the table until the shaking stops.
- Stay away from windows.
- Do not leave the building until instructed to do so.
Thanks to our wonderful sponsors!

Opinion Dynamics

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Guidehouse

DNV·GL

sbw
Thanks to our amazing staff!

Mary Dockter

Kimber West

Megan Meyers

Serj Berelzon

Luke Tougas
About Today

• A few words about our program...
• Today’s audience participation opportunities...your input matters!
  – Live Q&A will be available for all sessions
  – If you have a questions, you must speak into a microphone
• Attendee survey ... your input matters... we will send a link by email today... please complete the online survey!
The Council’s Strategic Approach

• Our Mission
Accelerate the evolution of clean energy markets and expand the impact of distributed energy resources vital to California’s future

• Our Goals
1. Firmly establish EE and DR’s place in the DER market and strengthen the role of DERs in the implementation of California’s clean energy goals.
2. Strengthen the Council’s finances and organization capabilities.
3. Provide members with timely and relevant services so their businesses can thrive.
Our Current Policy Universe

- Building Decarb
- IEPR
- SB350
- Cost Effectiveness
- EM&V
- DEER
- Fuel Substitution
- MT
- Custom Review Process
- NMEC
- CAEEEC
- Cal TF
- Monitoring & Advocating
- Building Coalitions
- Wildfire Cost Recovery
- PG&E Bankruptcy
- Solicitation Process
- ADR
- Click Through
- DRAM
- Business Plans & ABALS
- RA
- New RA OIR
- ESDER 3 & 4
- RA Enhancements
- DIDF
- ACC Updates
- IRP
- IDER
- DRP
- Cost Recovery
- Wildfire
- Didf
A Key EM&V Issue: Cost-Effectiveness

• As part of our partnership with E4TheFuture, The Council developed a white paper that outlines the current state of California’s cost-effectiveness framework and lays out a potential pathway for realizing much-needed improvements.

• We are now socializing our paper with key decision-makers and stakeholders as we attempt to secure important reforms to California’s CE framework.

• Copies of our white paper can be found on the back tables. Please let us know if you’d like to receive an electronic version of the paper.
SESSION 1: Real-time/Third Party M&V

Alison Erlinback, PG&E

Brain Maloney, SCE

Erin Brooks, SoCalGas

Athena Besa, SDG&E

Moderator: Coby Rudolph, CPUC
CEDMC EM&V Forum
Session 1: Real-Time/Third Party M&V Plans

Coby Rudolph
Senior Regulatory Analyst, CPUC Energy Division
Coby.Rudolph@cpuc.ca.gov
February 12, 2019
NMEC Rulebook

• NMEC Working Group 2019 activities focused on Population-level rules.

• NMEC Rulebook 2.0 adopted via ruling in January – available on CPUC Rolling Portfolio webpage.

• Updates focused on Population-level NMEC Programs.
NMEC Rulebook Applicability

• Rulebook applies to NMEC programs.
• Each NMEC program requires a Program-level M&V Plan.
• Use the Rulebook version that’s current when an RFP is issued… and adapt to new Rulebook requirements when feasible and appropriate.
Population-level Rules

• Pre-set methods for measuring savings that will apply uniformly to each site in the population.
• FSU Threshold: 90% / 25%.
• Pay-for-Performance Threshold: 50%.
• Limited process for seeking exceptions via advice letter.
2020 NMEC Work

• NMEC on-the-ground: Monitoring new / continuing NMEC programs to identify lessons learned.
• Continued stakeholder engagement – later in 2020.
• Possible launch of first NMEC program impact evaluations.
• Currently working on NMEC PA reporting and claims processes.
Thank you!

Coby Rudolph
Senior Regulatory Analyst, CPUC Energy Division
Coby.Rudolph@cpuc.ca.gov
February 12, 2019
Session 1
Discussion
Audience: please step up to one of two microphones to ask your questions
Morning Break
Sponsored by CLEAResult®
SESSION 2: Cost-Effectiveness Reform

Adam Scheer, Recurve

Olivia Patterson, Opinion Dynamics

Mohit Chhabra, NRDC

Moderator: Annette Beitel, FutEE
Making Cost-Effectiveness Work for Demand Flexibility and the Grid.
The Current Cost-Effectiveness Conversation
Our Challenge
Focus on Principals

A cost effectiveness test should:

1. Have symmetry between benefits and costs
2. Take into account policy goals
3. Be supported with up-to-date documentation and tools
Experiment: Estimate the TRC of an EV Rebate

**Costs**

- **EV Price** $40,000
- **Rebate** $2,000

Customer Cost = $38,000

**Benefits**

- 114 Tons Avoided CO₂ x $27 / Ton + $20,500 avoided gas = $23,500

TRC = \[ \frac{\text{Benefits}}{\text{Total Costs}} \] = \[ \frac{$23,500}{40,000} \] = 0.59

References, assumptions, and math given in the Appendix. This analysis assumes no Free Ridership
“Americans who are likely to buy an electric vehicle would do so out of concern for the environment (74%), lower long-term costs (56%), cutting edge technology (45%), access to the car pool lane (21%).”
So this Analysis is Not Symmetric - Missing Benefits or Over-Counting Costs

References, assumptions, and math given in the Appendix. This analysis assumes no Free Ridership.
EE Analogy: Why Do People Retrofit their Homes?

EUC participants: Value of their retrofit

1PG&E Whole House Program: Marketing and Targeting Analysis. ODC, 2014. CALMAC ID: PGE0302.05
Same Story Different Resource

Why would we treat Energy Efficiency differently than Electric Vehicles?

Principal: A C/E Test Should be Symmetric Between Benefits and Costs.
Focus on Principals

A cost effectiveness test should:

2. Take into account policy objectives (ex. safety and health)
Focus on Principals

A cost effectiveness test should:

3. Be supported with updated documentation and tools

CET Updates Needed to:

- Integrate DERs
- Enable Load Shifting
- Metered Load Shapes
The Targeting Opportunity

Random Program
- Cost Ineffective
- *Can Predict*: 40% who will save nothing

Targeted Program
- Competitive Resource
- *Can Predict*: 20% who will drive 2/3 of Benefits

---

What Can You Do?

Get up-to-speed on the issues

Organize advocacy around core principals

Make your constructive voices heard
Gasoline Car Lifecycle Emissions =
200,000 miles / (30 miles / gallon) x 19.4 lbs CO₂/gallon¹ x 1 ton / 2,000 lbs = 129.3 Tons CO₂

Electric Car Lifecycle Emissions (CA) =
200,000 miles / (4 miles / kWh)² * 1 MWh / 1000 kWh * 0.312 tons CO₂ / MWh³ = 15.6 Tons CO₂

129.3 Tons CO₂ - 15.6 Tons CO₂ = 113.7 Tons CO₂ Savings

¹Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel, US EPA, EPA420-F-05-001, 2005
²https://cars.usnews.com/cars-trucks/what-is-mpge
$27/MWh is the average avoided cap-and-trade + GHG Adder benefit from 2020 - 2029, taken from the 2019 CPUC Avoided Cost Calculator, discounted at an annual rate of 7.5%. (This discount rate is close to the historical utility weighted average cost of capital)

Avoided cost of gas = 200,000 miles / (30 miles / gallon) * $3.50 / gallon\(^4\) = $20,500*

*This value is figured by discounting the avoided gas costs by 3% per year over 10 years, and assuming the customer drives 20,000 per year

The EV cost of $40,000 is well below the 2019 average EV cost\(^5\)

\(^4\) [https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/retail_gasoline_prices2_cms.html](https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/retail_gasoline_prices2_cms.html) The Average cost of a gallon of gas in California is about $3.50

\(^5\) [https://qz.com/1695602/the-average-electric-vehicle-is-getting-cheaper-in-the-us/](https://qz.com/1695602/the-average-electric-vehicle-is-getting-cheaper-in-the-us/) (the average cost of an EV in 2019 is reported to be $55,600)
Hypothetical EV Rebate Program: Calculate the TRC

**Costs**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>EV Price</td>
<td>$40,000</td>
</tr>
<tr>
<td>- Rebate</td>
<td>$2,000</td>
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Customer Cost = $38,000

**Benefits**

114 Tons Avoided CO$_2$ x $27 / Ton + $20,500 avoided gas = $23,500

TRC = \( \frac{\text{Benefits}}{\text{Total Costs}} = \frac{$23,500}{$40,000} = 0.59 \)
An evolving industry landscape needs new evaluation solutions

- DSM increasingly reflects a suite of integrated flexible DERs
- Decarbonization, distributed generation, and emergent policies, mean that not every kWh is created equal
- Industry needs to evolve cost-effectiveness test and evaluation inputs
- Quantification of these value streams, resource or policy driven, will become increasingly complex
What needs to change and why?

- Current EE evaluations value annual impacts compared to avoided cost of operating a power plant.
- Existing CE inputs have unintended program design consequences.

- Current measured benefits and costs do not:
  - Measure time dependent locational value of energy.
  - Support emergent policy (e.g., GHG/NEIs).
  - Spur market innovation (e.g., participant costs).
  - Intentionally optimize program design.
Is the tail wagging the dog? An existential question

- Policy objectives should inform programs and how we measure success; CE is a tool to measure policy objectives
  - Resources have market value
  - Programs have policy value
  - Some focus on longer-term outcomes

- Evaluation should be in sync with program objectives, thus there is no one size fits all

- Evaluation isn’t just summative, it is also about formative program optimization
Refresh current CA Evaluation Framework and Protocols

- 15-year old evaluation framework and protocols do not support the changing policy and grid landscape

- We need to:
  - Address DERs consistently and comparably in an integrated fashion
  - Advance metrics, and associated research inputs, to appropriately value resource and policy goals and support program innovation
  - Develop integrated and flexible measurement approaches that are supportive of increasing complexity and continuous change

- Best case scenario is to develop integrated DER framework, second best alternative is a refresh of existing protocols (EE+DR)
Address DERs consistently and comparably

- Develop a level playing field for all DERs
- Establish **integrated** evaluation framework that:
  - Quantifies multiple value streams across continuous and integrated interventions (EE + DR co-benefits, NWA, etc.)
  - Uses time and location-dependent measurement to shift from energy reductions to multi-directional and time-dependent changes in consumption
Develop integrated and flexible measurement approaches

- Develop revised Framework and Protocols that:
  - Quantifies DERs as a resource:
    - Evaluates energy changes (positive and negative) in consumption 8760
    - Develops our order of operations (PEMDAS for DSM)
  - Reflects reality:
    - Moves from an average customer to a targeted customer (load shapes, impacts)
    - Incorporates new research inputs (NEIs, measure costs, load shapes)
    - Employs principles of symmetry for evaluation inputs (whether NEIs, costs)
We have started this process, what are the next steps?

- Existing resources:
Energy Efficiency Program Cost Effectiveness Framework and Related Metrics

Mohit Chhabra
Senior Scientist – Natural Resources Defense Council
February 12th 2020
A Two Part Presentation

I. The correct cost-effectiveness test for choosing distributed energy resources (DER), including energy efficiency (EE), through Integrated Resource Planning in California is a modified PAC

II. Total EE benefits should be measured in dollars; annual kWh savings is (now) a metric of limited meaning
Part I. The Correct Test for Resource EE in California is a Modified Program Administrator Cost test (PAC)
EE Programs have Various Asks

- Meet load growth
- Research on emerging technologies
- Administer low- and middle-income
- Workforce training
- Long-term market transformation efforts
- Codes-and Standards
- Other recent policy requirements (SB350, SB100, AB793, AB802...)
These Asks Come From Differing Policy Objectives

- Meet load growth
- Research on emerging technologies
- Administer low- and middle-income
- Workforce training
- Long-term market transformation efforts
- Codes-and Standards
- Other recent policy requirements (SB350, SB100, AB793, AB802...)

EE as a system resource
Market development
Equity
Market transformation through workforce training
Market transformation
Market transformation - Final Stage
EE Programs can be Grouped by Three Policy Objectives

- Resource Energy Efficiency Programs
- Market Transformation Programs
- Equity Programs

Each require their own policy aligned c/e, planning, and evaluation metrics.

- Focus - Resource Energy Efficiency Programs
Cost Effectiveness is a Tool for Developing and Implementing Policy Decisions

Is this energy efficiency investment the best way to achieve California’s policy (environmental, energy system, and other) objectives?

• Do the benefits outweigh the costs?
  
or
• Is there a cheaper way of getting to our objective(s)?
IRP-Related Statutory Requirements

(All references are to the Public Utilities Code)

- Identify a diverse and balanced portfolio (454.51)
- Meet state GHG targets (454.52(a)(1)(A))
- Comply with state RPS (454.52(a)(1)(B))
- Ensure just and reasonable rates for customers of electrical corporations (454.52(a)(1)(C))
- Minimize impacts on ratepayer bills (454.52(a)(1)(D))
- Ensure system and local reliability (454.52(a)(1)(E))
- Strengthen the diversity, sustainability, and resilience of the bulk transmission and distribution systems, and local communities (454.52(a)(1)(F))
- Enhance distribution system and demand-side energy management (454.52(a)(1)(G))
- Minimize air pollutants with early priority on disadvantaged communities (454.52(a)(1)(H))
In Summary: The IRP Needs to Maximize Returns on Program Administrator Spending

Utility sector resource investments should cause the most incremental
• Grid benefits: energy, capacity, transmission & distribution, ancillary services, etc.
• Carbon emissions reduction
while minimizing impact on electric rates
...But What About the Customer?

Yes, this modified PAC does not consider the customers perspective.

Breathe easy! Customer protection is built into the CPUC processes. There is extensive review of program budgets, program design, followed by evaluation.
Part II. Measure EE and Set EE Goals in Dollars, not Annual kWh Savings
Annual kWh Savings is an Incomplete Metric

It does not capture:

• Temporal and locational benefits of energy savings
• Contributions to system reliability and resilience
• Greenhouse-gas reductions

Setting goals in terms of annual kWh savings introduces distortions for all actors (including evaluators) in the EE ecosystem.
Valuing EE’s Total System Benefits in Dollars

Varying policy objectives have made it hard to choose one intuitive metric for demand side management programs.

Luckily, the CPUC has developed time-varying monetary values of all electric system benefits.
Many Advantages of Valuing EE in Dollars

• Alignment with policy goals

• Accuracy: better measures total benefits of EE

• Transparency: makes behind the scenes calculations more visible

• Integrate DERs: all DER benefits can be defined in terms of dollars

_Evaluators: this change will require you to measure the very impacts of EE that drive it’s total benefits as opposed to an annual kWh realization rate._
Last Words: A Haiku On Cost Effective EE Programs

Much carbon savings

Avoid costly investments

Lowest bill impact
Session 2
Discussion

Audience: please step up to one of two microphones to ask your questions
Lunch Break
Sponsored by

DNV·GL
SESSION 3: Decarbonization Update

Abhilasha Wadhwa, CPUC

Snuller Price, E3

Candis Mary-Dauphin, BayREN

Brian Maloney, SCE

Moderator: Jarred Metoyer, DNV GL
The World of Building Decarbonization at CPUC

CEDMC; EM&V Forum
February 12, 2020

Abhilasha Wadhwa
Team Decarb: Rory Cox, Joy Morgenstern, Nate Kinsey, Erik Johnson, Nick Zanjani
<table>
<thead>
<tr>
<th>Legislation</th>
<th>Entity/ Proceeding</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SB 100</strong>: Requires electric retail sales to be zero carbon by 2045</td>
<td>CEC, CPUC, ARB</td>
<td>Modeling Inputs workshop in Feb 2020</td>
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<td></td>
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<tr>
<td><strong>AB 3232</strong>: CEC sets goals and targets to reduce buildings emissions by 40% by 2030.</td>
<td>CEC, CPUC</td>
<td>Scoping Workshop held in Dec, 2019</td>
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<tr>
<td></td>
<td>Docket 19-DECARB-01</td>
<td></td>
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<tr>
<td><strong>SB 1477</strong>: Allocates $200 m for pilot programs.</td>
<td>CPUC, CEC</td>
<td>Decision expected in Q1 2020</td>
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<tr>
<td></td>
<td>R-19-01-011</td>
<td></td>
</tr>
<tr>
<td><strong>SB 1013</strong>: Low-GWP refrigerants; strategies and programs</td>
<td>CPUC, CEC, CSD</td>
<td>CPUC Proceeding expected to start in August 2020</td>
</tr>
<tr>
<td><strong>SB 700, AB 1144 (2019)</strong>: Self-Generation Incentive Programs (Energy Storage, Equity Resilience)</td>
<td>CPUC</td>
<td>Jan 2020 SGIP Decision voted. $40m for market rate, $4m for Low Income HPWHs</td>
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## Building Decarbonization Policy Roadmap

<table>
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<tr>
<th>Legislation</th>
<th>Entity/ Proceeding</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td><strong>SB 1383 (2016): HFC Reduction targets</strong></td>
<td><strong>ARB</strong>&lt;br&gt;CCR Title 17 Sec. 95371-95377</td>
<td>Draft workshop for prohibiting high GWP in all end uses held Jan 2020</td>
</tr>
<tr>
<td><strong>SB 49: Appliance Standards for Load Management</strong></td>
<td><strong>CEC</strong>&lt;br&gt;Docket: 19-OIR-01</td>
<td>Draft Scope + Workshop in Jan 2020</td>
</tr>
</tbody>
</table>
Other related proceedings

• **SB 350 + R-13-11-005**: $1 billion annually IOU Energy Efficiency portfolios, including $250 million over 5 years for Market Transformation Initiative (via RFP)

• **ESA Proceeding**: Energy Efficiency in Low-income and Disadvantaged Communities. ~ $500m annually

• **SOMAH Program; D.17-12-022**: Solar on Affordable Multifamily. $100 million annually, applications opened mid-2019.

• **SB 350/ Transportation Electrification R-18-12-006**: TE Pilots and reporting requirements set in 2018. Staff proposal for statewide TE rates and infrastructure released Feb 3, 2020

• **CEC 2022 Title 24 Codes and Standards Rulemaking**: Building Decarbonization measures for 2022 code
What keeps us up at night

• Incentives: kindling? Or steroids?

• Cost-effectiveness: Pandora’s box

• Customer wrath: Remember CFLs?

• Refrigerants: How to get ahead of the curve but not trip over ourselves

• EM&V/ metrics: the moving baseline, inter-agency goals, bill savings, ‘pruning’ strategically

Electrification without load management is..............!??
What keeps YOU up at night?

Contact:
Abhilasha.Wadhwa@cpuc.ca.gov, 916-823-4774
Decarbonization Planning and the CPUC Fuel Substitution Test

February 12, 2020

Snuller Price, Senior Partner
California’s Carbon Emissions by Sector: Data from 2015

- Buildings in California represent 20-25% of the state’s total GHG emissions
- Natural gas use in buildings represents 10% of total state GHG emissions

Source: Author’s estimates based on E3’s California PATHWAYS model v.2.3.2.
Strategies to Decarbonize Buildings

- **Energy efficiency & conservation**
  - Smart-growth: higher density housing in transit-oriented communities
  - Energy efficiency retrofits & new construction codes
  - Electric heat pumps displacing resistance heat

- **Electrification**
  - Heat pump HVAC
  - Heat pump water heaters
  - Induction stoves
  - Electric clothes dryers

- **Low-Carbon Fuels**
  - Zero-carbon electricity
  - Biomethane
  - Renewably produced hydrogen
  - Zero-carbon synthetic natural gas

- **Reduce non-combustion emissions**
  - Prevent methane leaks in homes and gas pipelines
  - Replacement of high global warming potential gases (“F-gases”) in air conditioners and heat pumps
Fuel Substitution Test replaces former three prong test

E3 developed estimates of long-run emissions and long-run source energy factors for use in the new Fuel Sub test

- Emissions intensity based on 2017-2018 Reference System Plan
- Source energy measures natural gas consumed in electric generation (per kWh delivered)

Use of annual factors accounts for supply-side response to load changes

- Hourly emissions factors still used for cost-effectiveness

Emissions and Source Energy Trajectory
Additional Slides
Achieving carbon neutrality by 2045 will likely require going beyond “80x50”

Energy efficiency & conservation

- Faster and broader energy efficiency?

Electrification

- Faster and broader electrification?

Low-Carbon Fuels

- 100% zero-carbon energy by 2045?

Reduce non-combustion emissions

- 100% reduction in non-energy GHGs by 2045?

Building electrification reduces GHGs today, savings will increase as the grid gets cleaner.

Greenhouse Gas Savings
1990s vintage Single-Family Home (Sacramento)

SB32 Sets a Statewide Goal of 40% GHG reduction below 1990 by 2030

IRP adopted a 2030 Statewide 42 MMt CO2 goal after testing various sensitivities in IRP modeling in 2017-2018 Reference System Plan

- 42 MMt Preferred System Plan goal reflective of specific scenario assumptions

CARB’s Sectoral GHG Emissions Estimates

<table>
<thead>
<tr>
<th>Sector</th>
<th>1990</th>
<th>2030 Proposed Plan Ranges</th>
<th>% change from 1990</th>
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</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>26</td>
<td>24-25</td>
<td>-4 to -8</td>
</tr>
<tr>
<td>Residential and Commercial</td>
<td>44</td>
<td>38-40</td>
<td>-9 to -14</td>
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<tr>
<td>Electric Power</td>
<td>108</td>
<td>42-62</td>
<td>-43 to -61</td>
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<tr>
<td>High GWP</td>
<td>3</td>
<td>8-11</td>
<td>167 to 267</td>
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<tr>
<td>Industrial</td>
<td>98</td>
<td>77-87</td>
<td>-11 to -21</td>
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<tr>
<td>Recycling and Waste</td>
<td>7</td>
<td>8-9</td>
<td>14 to 29</td>
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<tr>
<td>Transportation (Including TCU)</td>
<td>152</td>
<td>103-111</td>
<td>-27 to -32</td>
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<tr>
<td>Net Sink*</td>
<td>-7</td>
<td>TBD</td>
<td>TBD</td>
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<tr>
<td>Sub Total</td>
<td>431</td>
<td>300-345</td>
<td>-20 to -30</td>
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<tr>
<td>Cap-and-Trade Program</td>
<td>n/a</td>
<td>40-45</td>
<td>n/a</td>
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<tr>
<td>Total</td>
<td>431</td>
<td>260</td>
<td>-40</td>
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</table>

Core Scenarios Evaluated
+ Default Case
- Reflects 50% RPS Compliance
+ 42 MMt Case
- Low end of CARB Proposed Scoping Plan range for electric sector
+ 30 MMt Case
- CARB Proposed Scoping Plan “Alternative 1” (more stringent GHG constraint)
Proposed Approach for Intensity

**Calculation summary to estimate long-run emissions and source energy**

- **Step 1:** Adding load will increase GHG emissions at the short-run marginal rate
  - Same in all proposed choices from E3
- **Step 2:** RPS portfolio responds by adding more renewables to hit target
  - Proposal that RPS portfolio responds to hit IRP intensity trajectory over time
- **Step 3:** Target intensity defines the renewable response

---

** Electric Emissions (tonnes)**

Adding load through fuel substitution increases GHGs at short run marginal emissions rate

Re-optimized RPS portfolio reduces emissions to hit SB32 & SB100 goals

Net effect is the long run emissions

Cost of these increases is in the ACC (allowance price)

Cost of these reductions is in the ACC (GHG or RPS Adder)

Set by intensity of reference system plan
Calculating the GHG Intensity

+ **The 2017-2018 Reference System Plan results specify the generation and GHG emissions in each year of the planning horizon to 2030**
  - Results are publicly available from the CPUC website RESOLVE results viewer
  
  + **2017/2018 IRP Reference System Plan**
    | 2017/2018 IRP Reference System Plan | 2018    | 2022    | 2026    | 2030    |
    |-------------------------------------|---------|---------|---------|---------|
    | Load GWh                            | 239,107 | 245,583 | 251,286 | 255,038 |
    | Total Retail Sales GWh               | 209,331 | 207,692 | 205,654 | 202,710 |
    | Total CAISO Emissions MMtCO2         | 42.3    | 36.1    | 41.3    | 34.0    |

+ **Beyond 2030, we use SB100 statute to define emissions by 2045**
  - We assume that the interpretation of this is the same as the RPS statute and that 100% of retail sales must be generated with zero carbon
  - Therefore, there is a small amount of room for thermal generation (7.25%)

+ **Assumption for intensity in 2045 is as follows:**
  - Percent losses of 7.25% (Based on Avoided Cost Calculator)
  - Emissions intensity of natural gas generator of 0.398 tonnes/MWh delivered
  - Annual intensity factor of 0.029 tonnes/MWh = 0.398 tonnes/MWh * 7.25%
Long-run GHG Emissions Factors

2017 / 2018 IRP Reference System Plan
CAISO Projected Emissions Intensity

<table>
<thead>
<tr>
<th>Year</th>
<th>Emissions Intensity (short tons/MWh)</th>
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<tr>
<td>2019</td>
<td>0.215</td>
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<tr>
<td>2020</td>
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Emissions Intensity (Short Tons CO₂/MMBtu) 0.0585
Emissions Intensity (Metric Tons CO₂/Therm) 0.00531
Source Energy (Btu/Therm) 100,000
The source energy definition that we propose measures the natural gas consumption in the electric generation to deliver to load.

Non-depletable resources such as solar, wind, and hydro should be counted at 0 Btu/kWh, energy factor = zero.

With this definition, source energy aligns directly with GHG emissions and there is a constant factor to convert from one to the other:
- 18.84 MMBtu per tonne CO₂.

Effectively collapses the two metrics into a single test, since they will always have the same Fuel Substitution Test result.
Long-run Source Energy Factors

CAISO Projected Source Energy (Source Btu / kWh delivered)

Annual Source Energy Factors

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Emissions Intensity (Short Tons CO₂/MMBtu)

Emissions Intensity (Metric Tons CO₂/Therm)

Source Energy (Btu/Therm)

Constant over the years:

- 0.0585
- 0.00531
- 100,000
1. **Calculate the lifecycle increase (decrease) in electricity**
   - For each year of the EUL of the Fuel Substitution Measure multiply the annual kWh increase or decrease times the intensity target

2. **Calculate the lifecycle increase (decrease) in natural gas**
   - For each year of the EUL of the Fuel Substitution Measure multiply the annual therms increase or decrease times the intensity of natural gas

3. **Calculate the difference**
   - If the measure results in a savings it passes the Fuel Substitution Test

   + **Passing the Fuel Substitution Test** means that the measure will lower economy-wide GHG emissions and support the SB32 40% GHG reduction goal

   *Note: Given the definition proposed for GHG emissions and source energy this will produce the same results for both metrics*
Why Not Marginal Emissions?

+ If we use the hourly marginal emissions factors to estimate either GHG emissions or source energy, we will be excluding the ‘supply side response’ to a change in load.

+ Without the additional renewable generation accounted for, we would significantly overestimate both the additional emissions and source energy that result from fuel substitution.

+ The difference depends on which measures, and the shape of their load, but for most measures probably at least 2x too high.

+ Example;
  - In 2030, our GHG intensity target is 0.17 tonnes/MWh
  - If we add load during nighttime hours, using the marginal emissions factors would be approximately 0.4 tonnes/MWh, which is more than twice as high.
  - The difference is that if we add nighttime fuel substitution load, the supply side response would have to add \( \frac{.23}{.40} = 58\% \) zero carbon generation to achieve the 0.17 target.
The increase in direct emissions from a change in load (without a corresponding change in the supply-side) is estimated using the hourly marginal emissions rates for cost-effectiveness assessment.

However, supply-side planning is designed to achieve annual targets. Therefore, if we assume we hit these targets then we can use them directly.

The annual factors reflect the net effect of the hourly direct emissions increases as well as the supply side response consistent with the target.

### 2019 ACC Emissions Rates for 2020 (Average by Month & Hour)

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Potential Adjustment to ACC

Using the intensity framework, there are two potential implications in the Avoided Cost Calculator for the IDER proceeding:

- **How it is now**
  - Currently, the ACC would apply the GHG Adder to the whole length of the additional emissions as the cost or these reductions.
  - Emissions from electricity and natural gas are valued differently.

![Diagram](https://via.placeholder.com/150)

**Electric Emissions (tonnes)**

- **Current ACC**
  - Adding load through fuel substitution increases GHGs at short run marginal emissions rate
  - GHG Adder: $A/tonne
  - Residual Emissions: $X/tonne
  - Same value for residual emissions as reductions?

- **Modified ACC**
  - GHG Adder: $A/tonne
  - Harmonize with cost of natural gas emissions?

Cost of these increases is in the ACC (allowance price).
Key Factors Considered

+ There are two main factors in developing these factors that are not specified in the CPUC Decision on the Fuel Substitution Test that we have considered and where we have proposed a path forward

1. What do we mean exactly by the ‘long run’?
   • For both GHG and source energy we want the factors to reflect the change in direct emissions and energy use as well as the generation investment changes due to an increase (or decrease) in load from fuel substitution. We call this ‘long run’ because it includes the change in the capital investment.
   • We propose a tight link with the intensity trajectory in the CPUC IRP Reference System Plan

2. What do we mean exactly by ‘source energy’?
   • Source energy is the energy consumed on the site and upstream to generate and deliver the energy. Historically, the heat rate of the fossil powerplant plus losses.
   • We propose to define source energy as the depletable, fossil resources and not the non-depletable source energy of renewables such as sunshine, wind, or hydro potential energy. In some circles, the ‘energy factor’ of renewables is zero.
The 42 MMt goal is informed by the IRP sensitivity analysis

- Increasing electric load beyond the assumptions included in that analysis may have increased the sector target, but would also decrease emissions from other sectors

<table>
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<th>Sensitivity</th>
<th>Description</th>
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<td>Reference</td>
<td>Reference Case</td>
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<td>High EE</td>
<td>Increased adoption of EE, consistent with <strong>SB350 EE doubling goal</strong></td>
</tr>
<tr>
<td>Low EE</td>
<td>Decreased adoption of efficiency, consistent with <strong>CEC 2016 IEPR Mid AAFE projection</strong></td>
</tr>
<tr>
<td>High BTM PV</td>
<td>Increased adoption of BTM, corresponding to cumulative adoptions of <strong>21 GW by 2030</strong></td>
</tr>
<tr>
<td>Low BTM PV</td>
<td>Decreased adoption of BTM, corresponding to cumulative adoptions of <strong>9 GW by 2030</strong></td>
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<td>Flexible EVs</td>
<td>All new electric vehicle loads treated as flexible within the day (load can be shifted between hours subject to constraints on vehicle availability)</td>
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<td>High PV Cost</td>
<td>High projections of future solar PV cost</td>
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<tr>
<td>Low PV Cost</td>
<td>Low projections of future solar PV cost</td>
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<tr>
<td>High Battery Cost</td>
<td>High projections of current &amp; future battery storage costs</td>
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<tr>
<td>No Tax Credits</td>
<td>All new renewables assumed to be developed assuming no <strong>long-term federal tax credits</strong> (no PTC; 10% ITC for solar PV)</td>
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<tr>
<td>Gas Retirements</td>
<td>An additional <strong>12.7 GW of gas generation assumed retire by 2030</strong>, reducing gas fleet to 13 GW</td>
</tr>
</tbody>
</table>

*Partial list of sensitivities tested in IRP modeling*
Resulting Views on GHG emissions

**Short-run hourly emissions impact**

- Marginal change in emissions in each year from delivering an additional kWh in a specific hour.

**Long-run emissions impact**

- Emissions intensity consistent with state policy of SB32 and SB100 that includes the ‘renewable supply response’.
NREL has published source energy factors with an ‘energy factor’ of one for solar, wind, and hydro. This is the equivalent to a definition of 3,412 Btu/kWh source output from renewable generation.

For our purposes, this looks like a conflation between source and site energy. The ‘source energy’ for these resources is sunshine, wind, and potential energy. Therefore we propose 0 Btu/kWh, or energy factor of zero.

Cost-effectiveness, Not Source Energy

- The implication is that adding electricity load during times when renewable generation margin will not have an energy ‘cost’, but it will still have a financial cost.
- Similarly for energy efficiency, as we reduce energy consumption we will primarily save energy supply and delivery costs and not source energy. Once the system is fully renewable we will no longer save additional emissions.
Toward Decarbonization

February 12, 2020
Candis Mary-Dauphin
What we’ll cover

1. BayREN Overview
2. BayREN Values & Vision
3. Decarbonization Activities & Program Components
4. Evaluating Success
State Policy Objectives

1. Doubling Energy Efficiency Savings by 2030
2. Expanding EE in Low-Income & Disadvantaged Communities
3. Decarbonizing Buildings
BayREN Vision

- RENs are a critical part of the solution for the State’s reliable and sustainable energy future that considers water, greenhouse gases, and resiliency.

- By uniting and coordinating multiple efforts at a regional level and delivering these integrated solutions, the RENs will help the State meet our aggressive goals related to climate change.
Regional HPWH Market Development

- Design Midstream Incentive
- Engage Local Energy Providers
- Multifamily Incentives
- Cross-promotion & Homeowner Education
- Workforce Development
- Supply Chain Engagement

Market Readiness
# Clean Heating Pathway Incentives

## BayREN Single and Multifamily Incentive Adders

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<th>In-unit heat pump water heater</th>
<th>$1000/unit</th>
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<td>Electric cooking (induction or standard)</td>
<td>$350/unit</td>
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<tr>
<td>Heat pump space heating</td>
<td>$1000/unit</td>
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<td>In-unit Laundry Dryer</td>
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<tr>
<td>Central HPWH</td>
<td>$800/apartment served (2-18 apartments) $15,000 (19+ apartments)</td>
</tr>
<tr>
<td>Heat pump space heating</td>
<td>$800/apt. served</td>
</tr>
<tr>
<td>Heat pump HVAC – Common Area</td>
<td>$1000</td>
</tr>
<tr>
<td>HPWH – Laundry Room/ Common Area</td>
<td>$1000</td>
</tr>
<tr>
<td>HPWH - Pool</td>
<td>$1500</td>
</tr>
</tbody>
</table>

## Local Energy Providers (CCAs & POUs)

- Additional $1,000 for HPWH incentives
- Layered with BayREN single-family
Implications for Evaluation

- Accounting for decarbonization
- Local government value streams
  - Local government policy support
  - Co-benefits (health, resilience)
  - Reaching harder to serve populations
  - Coordination and layering of offerings
Southern California Edison Carbon Neutrality

Greenhouse Gas Emission Reduction Strategy

February 12, 2020
Clean Power & Electrification Pathway 2045

2017- Clean Power Electrification Pathway

2019- Pathway 2045 Update
Carbon Pilot- Clean Energy Optimization Pilot Overview

Background:
Part of SCE’s pathway to enabling a clean energy future, focuses on helping our customers make cleaner energy choices. SCE is continuing to explore the development of programs that specifically focus on GHG emissions reduction that will allow customers to choose and implement technology solutions that best suit their needs, while helping California achieve its aggressive environmental goals.

Objective:
Through this pilot, SCE will demonstrate how a utility can facilitate offerings that directly incent and accelerate on-site behind the meter GHG emissions reduction opportunities with large customers through a performance based GHG incentive.

GOALS
- Pilot an incentive framework to encourage customers to reduce GHG emissions
- Determine the effectiveness and impacts of a performance based GHG incentive program
- Determine customer preferences of technology using performance based GHG incentive

BENEFITS
- Alignment with the State’s and customers aggressive GHG reduction goals
- Allows the flexibility to focus on multiple technologies
- Incentive payouts are performance based
- Allows for scalability of opportunities across multiple industry sectors

Background:
Part of SCE’s pathway to enabling a clean energy future, focuses on helping our customers make cleaner energy choices. SCE is continuing to explore the development of programs that specifically focus on GHG emissions reduction that will allow customers to choose and implement technology solutions that best suit their needs, while helping California achieve its aggressive environmental goals.

Opportunity:
Incent and accelerate on-site, behind the meter opportunities.

Behind the Meter Opportunities (On-site)
- Energy Efficiency
- Cogeneration Efficiency
- On-Site Renewables
- Smart Load Growth
- Clean Transportation
- Energy Storage/DR

Pilot Customer: UC Office of the President and California State University System
Timeline: 4 years
Funding: GHG Cap and Trade Auction Revenues (D. 14-10-033)
On December 19, 2019, the California Public Utilities Commission (CPUC) approved pilot projects in twelve disadvantaged communities (DAC) in the San Joaquin Valley (SJV) who currently do not have access to natural gas.

SCE will implement the pilot in the (3) communities; California City, Ducor, and West Goshen.

- **Authorized Budget:** $15,652,675
- **Homes Treated Goal:** 449 homes
- **Scope:** Replacement of propane and wood burning appliances
  - Space & Water Heat Pumps
  - Induction Cooktops
  - Electric Dryers
  - Core EE Measures and Weatherization Services
EE Programs - Building Electrification Measures

2020 Distributor Level Incentives for Space & Water Heat Pumps

- **Simple Streamlined Approach.** Utilizes *upfront incentives* to enable contractors to procure heat pumps at a discounted rate and pass the savings on to consumers.

- **Partners with Supply Chain** to coordinate contractor recruitment and training, collaborate on promotional activities.

### Technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>Unit</th>
<th>Rebate (SFM/DMO)</th>
<th>Rebate (MFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Pump HVAC Split System SEER&gt;=15 and HSPF&gt;=8.7</td>
<td>Ton</td>
<td>$300</td>
<td>$400</td>
</tr>
<tr>
<td>Ductless Mini-Split Heat Pump (SEER 15 HSPF &gt;=8.5)</td>
<td>Ton</td>
<td>$300</td>
<td>$400</td>
</tr>
<tr>
<td>Ductless Mini-Split Heat Pump (SEER 16 HSPF &gt;=8.8)</td>
<td>Ton</td>
<td>$400</td>
<td>$500</td>
</tr>
<tr>
<td>Ductless Mini-Split Heat Pump (SEER 17 HSPF &gt;=9.4)</td>
<td>Ton</td>
<td>$500</td>
<td>$600</td>
</tr>
<tr>
<td>Ductless Mini-Split Heat Pump (SEER 18 HSPF &gt;=9.8)</td>
<td>Ton</td>
<td>$600</td>
<td>$700</td>
</tr>
<tr>
<td>Heat Pump Water Heater &gt;=50 Gal UEF&gt;=3.31</td>
<td>Unit</td>
<td>$1,000</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

Energy for What’s Ahead®
Upcoming: Income Qualified Programs

2021-2026 IQP Application: BE Retrofits & Pilots

**Tier 2 – Enhanced Retrofits ($67M).** Low-income households with electric resistance water heaters and/or and central air conditioning with gas furnaces may now be eligible for space and/or water heat pump retrofits.

**Single-Family BE Retrofit Pilot ($47.5M).** Whole home BE retrofit approach targeting homes located in DACs with high cooling loads. Direct installation of space and water heat pumps, induction cooking equipment, and potentially other BE technologies; includes electrical panel upgrades and other required plumbing and electrical upgrades.

**New Construction BE Pilot ($12M).** Technical Assistance, Incentives, and End-User Education to assist developers to overcome the barriers with building all-electric, affordable housing developments; prioritizes multifamily and DACs.
Summary of De Carbonization Vision

SCE Long Term Plans

**Clean Energy Electrification Pathways** provides visions for SCE to support the states ambitious GHG reduction goals

**Building Electrification** - High level summary of initial efforts, work is ongoing in this space.

Questions: Brian.Maloney@sce.com
Session 3
Discussion
Audience: please step up to one of two microphones to ask your questions
SESSION 4: Custom Review Process

Scott Fable, PG&E
Shayne Holderby, Honeywell
Spencer Lipp, TRC
Rich Sperberg, Willdan

Moderator:
Joanne O’Neill, CLEAResult
Session 4
Discussion

Audience: please step up to one of two microphones to ask your questions
Afternoon Break
Sponsored by

Califonia Efficiency + Demand Management Council
Advancing Our Clean Economy

sbw
ENERGY + WATER + EFFICIENCY
SESSION 5: Demand Response Evaluation

Sam Borgeson, Convergence Data Analytics
Damon Franz, Tesla
Stefanie Tanenhaus, EBCE

Moderator: John Anderson, OhmConnect
Convergence Data Analytics (CDA)

Here today because we were the only company foolish enough to perform a 3<sup>rd</sup> party evaluation last year, a full LIP-compliant evaluation in 8 weeks between the CPUC decision and the filing deadline.

- CDA is a utility data consultancy
  - Vast majority of our projects involve interval meter data
    - Academic research into “energy behaviors”, the classification of load patterns, and using metered data to predict program outcomes
    - Program potential and “targeting potential” based on metered consumption
    - Estimating EV charging timing and magnitude
    - Estimating TOU rate impacts
    - Program evaluations
Lessons from applying the LIPs where their authors never dreamed

• The DR LIPs (2008) specify a process with well defined deliverables
  • They do not dictate methods
  • They give latitude to evaluators and CPUC staff to make defensible choices
  • There are conventions around how they are applied to IOU programs
• The roles and processes assumed or defined in the original are all mixed up in 3rd party DR
  • Written well before CCAs or 3rd party DR
  • Chicken and egg: LSEs are supposed to file, but by definition, they can’t be under contract until the resource has been given QC values
  • Cannot presume access to utility customer data
  • Cannot presume representation on DRMEC
  • Filing dates now moving toward better synching with RA contract dates
Some additional issues to consider

• Silent on RA calculations and their transformation into QC
• Silent on growth forecasts (many 3rd parties have plans for rapid growth)
• By definition 3rd parties are making first time submissions
• 3rd parties more likely to have proprietary info they are shielding from competitors
• Lots of gray area – interaction with CPUC staff is mandatory to succeed
Resiliency and Optimization: DERs can fight climate change while helping customers adapt

Damon Franz
Sr. Policy Advisor, Tesla Inc.

April 25, 2019

San Diego, CA
Mission

Accelerate the world’s transition to **sustainable energy**
A Sustainable Future

- Generation
- Storage
- Transport
WILDFIRES AND OUTAGES: A new CA Reality

- Catastrophic wildfires are becoming the norm in California
- Increasingly, utilities are shutting down power lines to deal with the risk
- Solar and storage are an obvious solution for customers to maintain reliability
- This private resiliency value can be leveraged as part of a “value stack” to drive utility, ratepayer and GHG benefits
Utility Dive

Teslas batteries save $500K for Green Mountain Power through hot-weather peak shaving
The utility said its residential battery storage project implemented in Vermont last year reduced peak demand and saved half a million dollars during the July heat wave.

Google News

Batteries vs. Blackouts: 1,100 Homes Powered Through Vermont Outage With Storage
Home batteries proved their resilience value during Vermont’s Halloween blackout. A major rain and wind storm struck the state at the close of October, knocking out power to some 115,000 customers. Among those affected, 1,100 homes managed to keep the lights on thanks to pilot programs specific

Utility Dive

Green Mountain Power pilots Tesla batteries as meters
The technology uses Powerwall battery packs to measure energy use for 18 months, with plans to test other systems as part of their vision to have batteries in every home.
GMP ENERGY TRANSFORMATION PILOT

- 2000 Powerwall 2 batteries (5 kW/13.5 kWh) deployed at homes across Vermont
- Owned by GMP and leased to customers for $15/Mo or $1500 up front per Powerwall
- Backup power to customers, capacity and energy cost reduction to GMP (performance guarantee)
- **Customer resiliency benefit “buys down” the cost** to the utility of the capacity/energy resource
- Future wholesale market value revenue shared
GMP VPP Overview (12 MW)

- System peak load reduction
- Autonomous backup power

Forecasting

- Multiple load forecasts to account for uncertainty

Optimization

- Aggregate discharge
- Aggregate charge

Automated Dispatch

- Control Service
- Powerwall
Example Behavior

- Increases effectiveness of energy-limited resources by targeting dispatch
- Decreases battery duty cycle, increasing system life and reducing impact on customers
- Enables charging quicker after a peak event, making for more effective backup
COSTS AND BENEFITS SHARED BETWEEN UTILITY AND CUSTOMER

**Reliability**
Customer pays $15/month or $1,500 upfront for backup power

**Capacity Market**
GMP saves about $3,000 in capacity cost by reducing peak demand in ISO-NE.

**Transmission Service**
ISO transmission charges are based on peak demand. Reduction in peak saves roughly $4,000 per battery
CALIFORNIA POLICY CHALLENGES

• California lacks a clear pathway through which aggregated battery storage can realize capacity value at the residential level

• DRAM and PDR are not suitable for residential storage aggregation due to export limit
  • Storage for resiliency is 5kW – 10 kW; Typical residential minimum load is 1 kW
  • That means we can only realize 10% - 20% of capacity value

• Non-CAISO integrated “event-based” DR is not considered for capacity value
• Definitions, rules and categories for new DR models are generally unclear
  • Not clear if dispatched storage aggregation falls into storage aggregation is an “event-based” program or whether it can be considered “permanent load shifting”
  • Not clear if permanent load shift allows credit for exported energy
  • The load impact protocols are not a suitable venue to decide these issues
Load Impact Protocols

• **LIPs: Statistical tools designed to estimate something that cannot be directly measured**
  • To what degree did a DR event reduce energy demand?
  • What would energy demand have been were it not for the DR event?
• **Storage dispatch can be directly measured**
  • Energy output can be directly measured by the meter or inverter
  • Thus: Sampling, regression analysis, weather modelling are not needed
• **In a storage aggregation program, the quantity of RA capacity is simply the aggregated sum of the capacity of the batteries**
  • Thus, “load impact” is not relevant, because a storage aggregator is not providing load reduction – they’re providing battery output
• **The timing of the LIPs – once per year – does not allow LSEs to flexibly add capacity**
  • Requiring the LIPs as a means to get capacity for load-modifying programs in CEC load forecast effectively creates a 2-year delay
POSSIBLE FIXES

• **Short Term**: Battery capacity directly recognized in CEC Load Forecast
  • EM&V is reported to the CEC to verify and adjust in subsequent years
  • Load Impact Protocols are not required

• **Long-Term**: Modify DRAM/PDR or create a framework and program rules to realize RA value from aggregated storage outside of the DR paradigm
  • Capacity value based on sum of batteries’ power output
  • Performance based on direct measurement of battery output
  • Battery dispatch treated similarly whether BTM or exported to the grid
  • Streamlined interconnection for stand-alone storage that can export
  • New rules for compensating energy for exporting standalone storage
QUESTIONS?
CONTENTS

• EBCE Background
• DER Procurement & Resilience Activities
• Challenges and Potential Solutions to Valuing BTM Batteries for RA
WHAT IS EBCE?

- East Bay Community Energy (EBCE) is the Community Choice Aggregator (CCA) for Alameda County
- Electric utility serving 560k meters/1.3M residents
- Annual load of 6TWh
- Board oversight by elected officials
- EBCE reinvests earnings back into the community to create local green energy jobs, local energy programs, and clean power projects

EBCE Electricity Products
EBCE APPROACH TO EVOLVING GRID

• EBCE has contracted for 550 MW of new solar and wind with 137 MW of storage
• EBCE has over 250 MW of existing BTM solar & 15 MW of BTM storage
• New stationary storage and battery electric vehicles must play a role in addressing emerging RA constraints
  – By 2025 electric vehicles will have >10x EBCE peak load in battery capacity
• PG&E PSPS events will increase appetite for behind the meter storage
• New models to build community resilience and stabilize the grid will be lead by CCAs and public private partnerships
EBCE PSPS IMPACTS

- PSPS events impacted over 50,000 EBCE accounts
- Over 1,000 medical baseline customers impacted
- ~300 customers not on shutoff list exhibited load reduction similar to impacted customers (yellow)
- >1,300 accounts that expected a shut-off did retained power (green)
EBCE RESILIENCE ACTIVITIES

• Solar + Storage RFP for Resilience and Resource Adequacy
  – Solicitation for 32.7 MW of RA from distributed storage across 4 LSEs

• Solar + Storage for critical facilities
  – BAAQMD supported grant to identify critical facilities in Alameda and San Mateo Counties and issue solicitation for installation services

• Medical Baseline Resilience Program
  – Develop resilient power solutions for medical baseline customers endangered by PSPS events
DELIVERING RESILIENCE AND RA WITH DISTRIBUTED BATTERIES
DISTRIBUTED BATTERIES AND PDR

Administrative constraints undervalue behind the meter (BTM) batteries for Resource Adequacy and will delay deployment:

1. PDR does not compensate for exports, so RA value is limited to customer load, up to 80% of battery capacity in residential applications.

2. The Load Impact Protocol, which requires a year of operating history and is set annually is not applicable to smaller, rapidly scaling technologies, like batteries.
1. LIMITING EXPORTS LIMITS VALUE

- BTM batteries are not like traditional Demand Response (turning off lights, reducing manufacturing load, managing cooling loads) which can only reduce onsite energy demand.
- On hot days when the grid needs energy and batteries have energy to give, we say “No thanks, no exports!”
- Residential load is ~1kw, batteries are ~5kW => 80% reduction in capacity value.
2. LIP WILL DELAY BATTERY DEPLOYMENT

- D19-06-026 requires new IOU and 3rd party DR to go through Load Impact Protocol (LIP)
- 3rd parties have reported significant reductions in Qualifying Capacity (QC) from the value recommended by independent evaluators
- LIP is a black box process with no recourse to understand methodology or dispute results
- The PUC appears to be freezing QC based on past enrollment, not accounting for program growth, for up to three years
  - This would dramatically constrain participation in the Joint LSE procurement if a growing portfolio of new batteries would not be eligible for RA value for years
CHALLENGES AND SOLUTIONS

Problem: Electricity service has become unreliable and customers are demanding resilient solutions. In addition, resource adequacy markets are constrained. Behind the meter batteries solve both these issues simultaneously, but the current PDR rules will limit Solar + Storage deployment for Resilience and RA.

Potential Solutions:

Solution 1 - CEC: Submit contracted BTM batteries as permanent load shift in annual CEC Load forecast, reducing LSE RA obligation
Solution 2 - CAISO: Modify PDR rules to allow for energy exports
Solution 3 – CPUC: Recognize RA value of exports from BTM batteries enrolled in PDR
Solution 4 – CPUC: Modify LIP to promote flexible BTM assets
Session 5
Discussion

Audience: please step up to one of two microphones to ask your questions
OPEN FORUM: Recapping what we learned and where we need to go

Moderators:

Sharyn Barata, Opinion Dynamics

Greg Wikler, CEDMC
Complete the survey by February 20th and be entered into a raffle for a chance to win an Ecobee All New Smart Thermostat with Voice Control!

Look for an email from CEDMC Admin that has the survey link!
Join us for The Council’s Upcoming Events

**Spring Symposium**
April 15, 2020
David Brower Center
Berkeley, CA

**Fall Conference**
October 22, 2020
Location TBD
Bay Area, CA
Sponsored by Opinion Dynamics