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<th><strong>Docket Number:</strong></th>
<th>21-IEPR-06</th>
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<tbody>
<tr>
<td><strong>Project Title:</strong></td>
<td>Building Decarbonization and Energy Efficiency</td>
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<tr>
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<td>239432</td>
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<tr>
<td><strong>Document Title:</strong></td>
<td>Presentation - The Role of Energy Efficiency in Building Decarbonization</td>
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<td>S13A_Steve Nadel_ACEEE</td>
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<td><strong>Filer:</strong></td>
<td>Raquel Kravitz</td>
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<td>American Council for an Energy-Efficient Economy (ACEEE)</td>
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**DOCKETED**
The Role of Energy Efficiency in Building Decarbonization

Steven Nadel, Executive Director
Presentation to CEC Commissioners Workshop
August 24, 2021
ACEEE

Research

Program and policy
TA and advocacy

Education
Energy efficiency can get us halfway to decarbonization...

57% reduction in CO2, 49% reduction in all GHG

Source: ACEEE, 2019, *Halfway There*
Allocation of Efficiency Savings

- Car and light truck efficiency: 18%
- Truck and bus efficiency: 12%
- Reducing driving: 5%
- Improving freight movement: 4%
- Aviation efficiency: 6%
- Electric distribution savings: 1%
- Appliances and equipment: 9%
- Zero energy new commercial buildings: 7%
- Zero energy new homes: 4%
- Smart buildings: 3%
- Smart homes: 2%
- Building retrofits: 3%
- Home retrofits: 3%
- Existing building electrification: 1%
- Existing home electrification: 2%
- Industrial current measures: 10%
- Industrial emerging technologies: 9%
Levelized Cost per kWh

More Expensive to Decarbonize Without Energy Efficiency

3 ton
5 ton

5 kW
7 kW
California Peak Demand Forecast

Figure ES-3: Statewide Baseline Annual Noncoincident Net Peak Demand

Peak Demand in Southeast: Aggressive Case

Source: Nadel, ACEEE, 2017
Comfort: Heat Transfer from a Person

Source: https://engineer-educators.com/topic/3-heat-transfer-from-the-human-body/
Efficiency and Renewables
Appliances and Equipment: Potential Savings from Updated Standards

Water heaters
Commercial/industrial fans
Furnaces
Light bulbs
Central AC/HP
Refrigerators and freezers
Commercial refriger. equip.
Clothes dryers
Electric motors
Distribution transformers
Showerheads
Commercial AC/HP
Others

Source: A Powerful Priority, ASAP & ACEEE, 2020
Code Goal
Zero Energy Home and Building Programs

Source: ACEEE, 2020, Programs to Promote Zero Energy Homes and Buildings
New and Existing Buildings as Share of Building Floor Area (Residential + Commercial)

Source: ACEEE calculations based on data in EIA AEO 2020.
Residential Retrofits

• Whole home retrofits
  • Hope for Homes retrofit incentives now before Congress
  • Multifamily programs

• Need improved retrofit techniques
Commercial Retrofit Programs

- Moving beyond lighting
  - Intelligent efficiency/GEB
  - Whole building retrofits
  - HVAC including ventilation
- Deep retrofits at time of building renovation
- ACEEE will be doing a study on commercial retrofit programs in 2021

GAO Deep Retrofit Project
Source: ACEEE, Mandatory Building Performance Standards, 2020
Addressing Equity Critically Important

Energy burden in largest metro areas

Metro energy burden by demographic*

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Energy Burden</th>
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<tbody>
<tr>
<td>Low-income (80% AMI)</td>
<td>7.2%</td>
</tr>
<tr>
<td>African American</td>
<td>5.4%</td>
</tr>
<tr>
<td>Low-income multifamily</td>
<td>5.0%</td>
</tr>
<tr>
<td>Latino</td>
<td>4.1%</td>
</tr>
<tr>
<td>Renters</td>
<td>4.0%</td>
</tr>
<tr>
<td>Total metro</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

*Based on median across selected cities.

Rural energy burden

By region

By demographic*

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<th>Energy Burden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-income</td>
<td>9.0%</td>
</tr>
<tr>
<td>Manufactured housing</td>
<td>5.8%</td>
</tr>
<tr>
<td>Elderly</td>
<td>5.6%</td>
</tr>
<tr>
<td>Renters</td>
<td>5.3%</td>
</tr>
<tr>
<td>Nonwhite</td>
<td>5.1%</td>
</tr>
<tr>
<td>Multifamily (2-4 units)</td>
<td>4.9%</td>
</tr>
<tr>
<td>Total rural</td>
<td>4.4%</td>
</tr>
<tr>
<td>Total US</td>
<td>3.3%</td>
</tr>
<tr>
<td>Total metropolitan</td>
<td>3.1%</td>
</tr>
</tbody>
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*Based on national figures.
Potential Building Efficiency Measures in Federal Infrastructure & Reconciliation Bills

- More money for WAP program
- HOPE for HOMES residential retrofit incentives
- ZEHA incentives for HP and other electrification measures
- GREAHT incentives for affordable multifamily retrofits
- Higher residential EE measure tax incentives (25C)
- Higher commercial building incentives, sliding scale 30-50% savings
- Higher new home tax incentives with Energy Star and Zero Energy Ready tiers
Contact Information

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