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<tr>
<td><strong>Project Title:</strong></td>
<td>Building Decarbonization and Energy Efficiency</td>
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<tr>
<td><strong>Document Title:</strong></td>
<td>Presentation - CEC – IEPR Commissioner Workshop - Scale of Building Decarbonization in Calif, Equipment, and Supply Chain</td>
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<tr>
<td><strong>Description:</strong></td>
<td>Presentation by Josh Greene, VP, Govt and Industry Affairs, A.O. Smith</td>
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<td><strong>Filer:</strong></td>
<td>Raquel Kravitz</td>
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<tr>
<td><strong>Organization:</strong></td>
<td>AO Smith</td>
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CEC – IEPR Commissioner Workshop

Scale of Building Decarbonization in
California, Equipment, and Supply Chain

(Heat Pump Water Heaters)

Joshua C. Greene
June 22, 2021
Overview

• A. O. Smith
• Market-Ready Technologies
• Supply Chain
• Market Projections
• Future State
A. O. Smith - Vision

Vision

To be a leading provider of innovative and energy-efficient products used to heat, treat and conserve water, providing value to our residential and commercial customers.

We will create long-term value for our stakeholders in a socially responsible manner and drive profitable growth by:

- Living our values
- Taking care of our customers
- Leading through innovation
- Investing in people
- Supplementing organic growth with strategic acquisitions
A. O. Smith - Values

Handed down from founding Smith family and embraced by all employees worldwide

*We do business with uncompromising honesty and integrity*

- A. O. Smith will achieve profitable growth
- A. O. Smith will emphasize innovation
- A. O. Smith will preserve its good name
- A. O. Smith will be a good place to work
- A. O. Smith will be a good citizen
Market Ready Technologies - Heat Pump Water Heaters

- Standard Residential 240V HP
- Multifamily
- Residential New Construction
- Residential Retrofit
- Heat Pump Technology
- Commercial Split System
- Commercial
- Light Commercial
- Commercial
- Unitary Commercial
- Plug-in 120V
Standard Residential – 240V

- High Efficiency – 3.45 UEF
  - Reduce water heating costs up to 73% compared to a standard electric
  - Reduce CO₂ emissions by more than 50% compared to a standard gas
- 50, 66, and 80 gallon models
- NEEA Tier 3 qualified
- Quiet Operation – 51 dBA
- Confined Space Capable – Accessory ducting kit
JA13 Certified Residential – 240V

• Wi-Fi and Bluetooth connectivity

• Connect through free A. O. Smith app

• Time-of-use Schedules
  • Easily find your utility and push rate schedule to water heater in the app
  • Reduces operating costs by heating during low-cost periods and limiting operating during peak rate periods

• Demand Response Capable
  • OpenADR 2.0b VEN certified
Unitary Commercial

- ENERGY STAR® Qualified
- High Efficiency – 4.2 COP
- Integrated design for easy installation
  - 119-gallon tank enables heat pump to operate more frequently than backup electric elements to improve system efficiency
- 150 gallon First Hour Delivery
- HP + 12kW backup elements = 20 kW total heating capacity
- Multiple operating modes to balance efficiency and hot water delivery
Commercial Split Systems

- Packaged system solutions
- Air and Water Source Split System Heat Pumps
- Sized for Commercial and Multifamily Applications
  - 25,000 to more than 2,000,000 BTU/h heating capacities
  - Modular design
- Suitable for indoor and outdoor applications
- Double wall stainless steel condenser for potable water applications
- Compatible with Single-Pass or Multi-Pass systems
Residential – 120V Plug-In Applications

• Designed for homes that currently have a gas water heater

• Common challenges
  • Limited space
  • Home’s electric panel may not have 30A available for a water heater
  • Expensive to hire an electrician to run a 240V dedicated circuit for a water heater and upgrade electric panel if necessary

• Homes upgrading from a standard electric water heater should use the standard 240V heat pump models
Residential – 120V Plug-In HPWH

• Designed to meet NEEA AWHS v7.0 Plug-In specification

• Plugs into standard residential outlet (120 volt 15 amp shared circuit)
  • Work within a home’s existing electrical system
  • One-trade or DIY instantiation

• 40-80 gallon model sizes
  • Options to fit within existing gas water heater installation footprints

• First Hour Ratings in line with UPC sizing requirements

• JA13 and CTA-2045 Capable
  • Time-of-use Rate Scheduling
  • Utility Demand Response ready
Supply Chain

• Materials
  – Steel
  – Compressors & Components
  – Electronics
  – Refrigerant Transition

• Manufacturing Capacity
  – Current demand covered
  – Additional capacity available
  – Broader HP adoption will place strains in global supply chains
  – 1M HPWHs in the installed base in CA by 2025?
Market Projections – Trends (Energy Star Units)

ENERGY STAR UNITS 2019

- Tankless
- Gas Tank
- HPWH

ENERGY STAR Tot. Industry
Market Projections - Trends

• CA New Construction – 2019 T24 Code
  - 53,000 tankless units 2020 (SF)
  - 3,000 unitary HP units 2020 (SF)

• CA New Construction – 2022 T24 Code
  - 110-120k new housing starts in 2023 (SF + MF)
  - 16,000 HPWH annually (2024) (SF + MF)

• CA Retrofit & Replacement (2020)
  - 147,000 tankless (SF)
  - 4,800 unitary HPWHs (SF)

• CA Retrofit & Replacement (2022 – 2024 annually)*
  - 132,300 tankless (SF)
  - 19,500 HPWHs (SF + MF)

* = TECH, BUILD, SGIP incentives

Annual Residential Construction Starts in California

Chart update 05/18/21

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<thead>
<tr>
<th>Year</th>
<th>SFR Starts</th>
<th>Multi-family Starts</th>
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<tr>
<td>2020</td>
<td>59,000</td>
<td>47,000</td>
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<tr>
<td>2019</td>
<td>58,600</td>
<td>51,600</td>
</tr>
<tr>
<td>2018</td>
<td>58,800</td>
<td>54,700</td>
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<tr>
<td>2005 peak</td>
<td>154,700</td>
<td>50,300</td>
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Data courtesy of the U.S. Census
Future State - Needs

- **New Construction Programs**
  - Easiest time to install a HPWH
  - Products already commercially available

- **Instant Rebate Programs**
  - Up-front cost is largest barrier for many customers
  - Downstream mail-in rebates have shown that they do not influence the purchase decision
  - Upstream or midstream programs for BOTH wholesale and retail channels to reach all potential customers

- **R&R Incentive Programs**
  - TECH, BUILD, SGIP ~ $250M in funding over next two years, but needs to be sustained

- **Advertising**
  - Drive proactive replacements when consumers can understand the value prop before an emergency

- **Contractor Training**
  - Stakeholder engagement with installer network, industry best practices
  - Demonstrate that HP operating costs in CA are lower than natural gas (may require TOU pricing)

Business certainty on regulations
Bespoke local natural gas bans
Air Districts