<table>
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<tr>
<th><strong>Docket Number:</strong></th>
<th>19-IEPR-06</th>
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<tr>
<td><strong>Project Title:</strong></td>
<td>Energy Efficiency and Building Decarbonization</td>
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<tr>
<td><strong>TN #:</strong></td>
<td>227577</td>
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<tr>
<td><strong>Document Title:</strong></td>
<td>Electrification of California Households of Modest Means</td>
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<tr>
<td><strong>Description:</strong></td>
<td>Presentation by Sean Armstrong of Redwood Energy</td>
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<tr>
<td><strong>Filer:</strong></td>
<td>Raquel Kravitz</td>
</tr>
<tr>
<td><strong>Organization:</strong></td>
<td>Redwood Energy</td>
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<tr>
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<td>Public</td>
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<td><strong>Docketed Date:</strong></td>
<td>4/9/2019</td>
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Electrification of California Households of Modest Means
60+% All-Electric in the South in 2018

All-Electric Leads Market Growth Since 2010
Methane Delivery Costs More to Build at Every Step: $25,000-$30,000 per New California Home in PG&E Territory, Leaks at 2.5% to 5%

- **Furnace**: $1,000-$3,000 (Navigant, 2018)
- **Dryer**: $100+ (Navigant, 2018)
- **Water Heater**: $0 (Navigant, 2018)
- **Stove**: $120+ (Navigant, 2018)

Costs are the marginal cost ($) of gas over all-electric

*see analysis in Appendix B

**Domestic hot water – heat pump water heater equal in cost to on demand gas water heating

***Aliso Canyon leaked 4.62 Billion cubic feet and alone cost $1.014 billion shared by 5.6 million meters - $181/meter (Reuters, Aug 6, 2018)

- **Extraction leak**
  - 0.02% leak, not including Aliso Canyon (Wentworth, 2018)

- **Gas Piping**: $500/Fixture, $2000/House (SEA, 2017)

- **Meter + Lateral**
  - 0.3% - 0.9%
  - 0.31% leak residential meter (Wentworth, 2018)

- **$141-$156/ foot; $7000-$8000 per 50 feet of 2” Low Pressure Distribution developed per Lot (CPUC, 2016)

- **$16,567**

- **$7 million per well (EIA, 2016)

- **$85.4 million/mile 10”-42” Very High-Pressure Transmission (CPUC, 2018)

- **$7 million per well**

- **$3.2+ million/mile 6”-24” High Pressure Transmission (CPUC, 2016)

*lf = linear foot

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Energy Guide

Water Heater - ELECTRIC
Tank Size (Storage Capacity): 59 gallons
Uniform Energy Factor: 3.7

Estimated Yearly Energy Cost

$161

First Hour Rating
(How much hot water you get in the first hour of use)

very small     low     medium     high

75 Gallons

Cost Range of Similar Models

$225 - $732

The estimated yearly energy cost of this model was not available at the time the range was published.

Estimated Yearly Electricity Use

- Your cost will depend on your utility rates and use.
- Cost range based only on models fueled by electricity with a high first hour rating (75 gallons and over)
- Estimated energy cost is based on a national average electricity cost of 12.00 cents per kWh.
- Estimated yearly energy use: 1341 kWh

www.ftc.gov/energy

Part No. AX425R

U.S. Government
Federal law prohibits removal of this label before consumer purchase.

Energy Guide

Water Heater - Natural Gas
Tank Size (Storage Capacity): 46 gallons

Estimated Yearly Energy Cost

$231

First Hour Rating
(How much hot water you get in the first hour of use)

very small     low     medium     high

87 Gallons

Cost Range of Similar Models

$225 - $297

Estimated Yearly Energy Use

- Your cost will depend on your utility rates and use.
- Cost range based only on models fueled by natural gas with a high first hour rating (75 gallons and over)
- Estimated energy cost is based on a national average natural gas cost of $1.09 per therm.
- Estimated yearly energy use: 212 therms

www.ftc.gov/energy

Part No. AX425R

U.S. Government
Federal law prohibits removal of this label before consumer purchase.
Affordable, Quiet and Efficient Heat Pumps

$3,000/Zone

$6,000/Zone

$14,000/Zone
Large Energy Savings from Using Individual Tanks for Hot Water
Retrofit-Ready Heat Pump Water Heaters are 1 Year Away
## Induction and Radiant Are Cost-Effective

<table>
<thead>
<tr>
<th>Brand</th>
<th>Price</th>
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<tbody>
<tr>
<td>Kenmore Elite</td>
<td>$1260</td>
</tr>
<tr>
<td>Frigidaire Gallery</td>
<td>$1,100</td>
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<tr>
<td>General Electric</td>
<td>$2,000</td>
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<tr>
<td>Kenmore Radiant</td>
<td>$500</td>
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<tr>
<td>Electrolux</td>
<td>$1,800</td>
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