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HPWH Market Barriers & Best Practices

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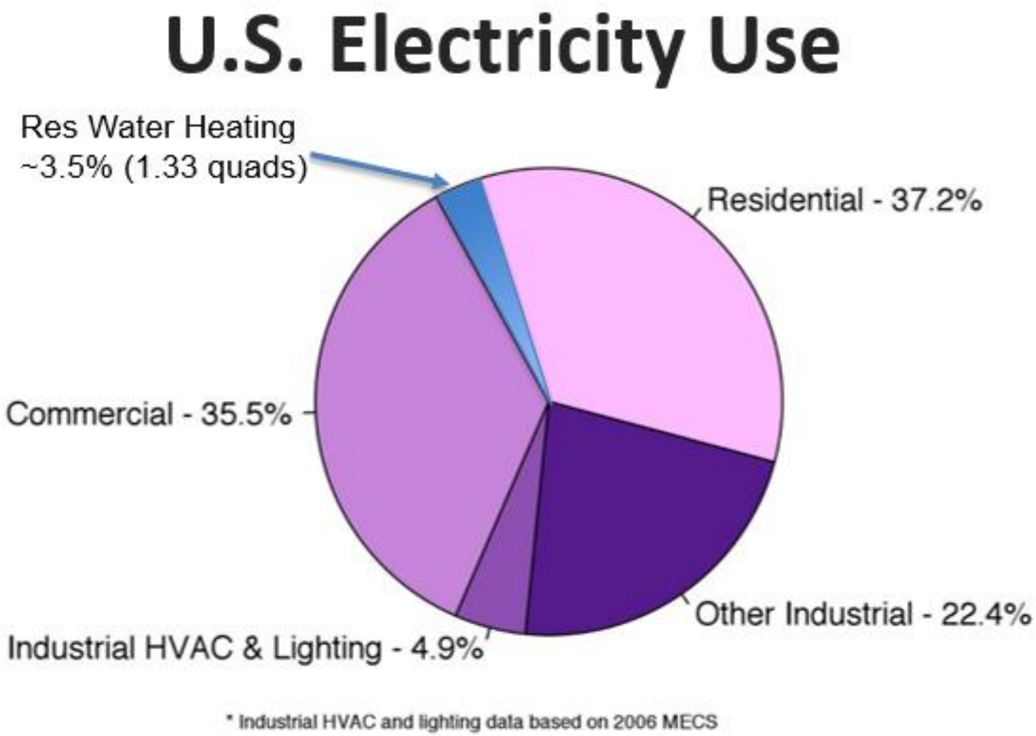
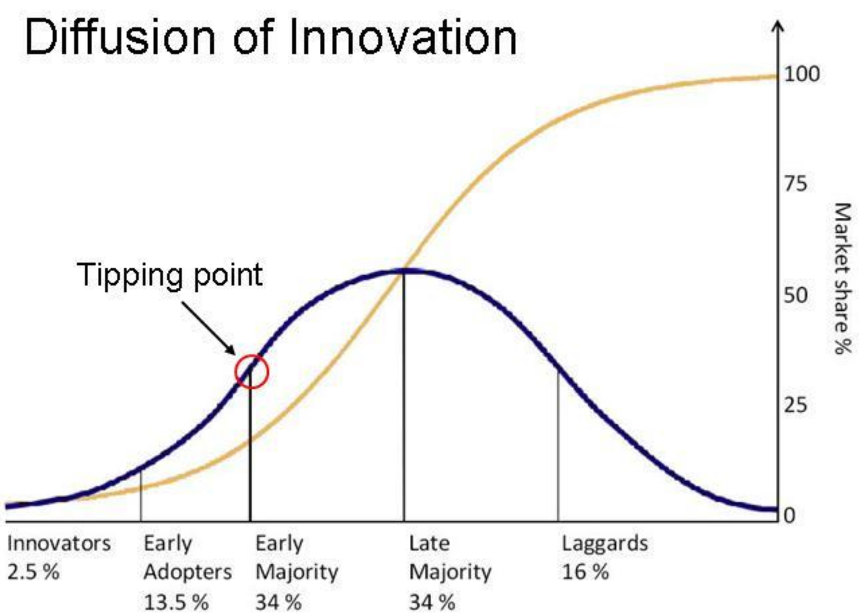
Background

- **Water heating is the second largest energy use in U.S. residences**
- **National Perspective - Electric Water Heaters**
  - 47 million U.S. households have electric water heaters
  - On average, 4.2 million electric water heaters are shipped in the U.S. residential sector per year



Background

- **HPWH Energy Savings**
  - Consumes 60% less electricity than an electric-resistance water heater, amounting to 2,700 kWh, or $340, in savings per year
- **HPWH Market**
  - Only 55,000 shipments per year **(<u>1.3% mkt share for electric WHs</u>)**
  - Market share has been flat since 2009
  - Manufacturers offer more than 180 models in the U.S. market



Background

Barriers & Opportunities

- Which barriers are we trying to remove/ overcome?
- What are the points of market leverage?
- What are other market opportunities?

Interventions

- What are the interventions you believe will:
  - overcome those barriers?
  - exploit those points leverage and opportunities?

Outcomes (Progress Indicators)

- How will we know we're making progress toward our long-term objective?
- What do we need to observe to be confident that the MT theory and strategy are sound?

Source: Geoff Wickes, Northwest Energy Efficiency Alliance 2017

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Perspective

Electric water heaters in the U.S. – Regional Perspective

Census Region	Census Division	% HHs with Electric WH	# HHs with Electric WH	% of U.S. Electric WHs
South	South Atlantic	72.5%	16,100,000	34%
South	East-South Central	69.0%	4,900,000	10%
South	West-South Central	48.4%	6,200,000	13%
West	Mountain South	40.0%	1,600,000	3%
Midwest	West-North Central	34.6%	2,800,000	6%
Midwest	East-North Central	26.8%	4,800,000	10%
West	Pacific	26.0%	4,400,000	9%
Northeast	New England	25.5%	1,400,000	3%
Northeast	Mid Atlantic	24.2%	3,600,000	8%
West	Mountain North	23.1%	900,000	2%
Total			47,760,000	100%

Perspective

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- **Electric water heaters in the U.S. – Type of Home Perspective**

Residence Type	≤ 30 gal	30 < x ≤ 50 gal	50 gal <	Total
Mobile Home	3.9%	5.9%	1.5%	11.3%
Single-Fam Detached	7.1%	**30.8%**	**20.3%**	58.2%
Single-Fam Attached	1.0%	2.8%	1.1%	5.0%
Multi-fam 2-4 units	1.6%	3.4%	2.0%	7.0%
Multi-fam 5+ units	5.5%	8.1%	5.0%	18.6%
Total	19.1%	51.1%	29.8%	100%

Perspective

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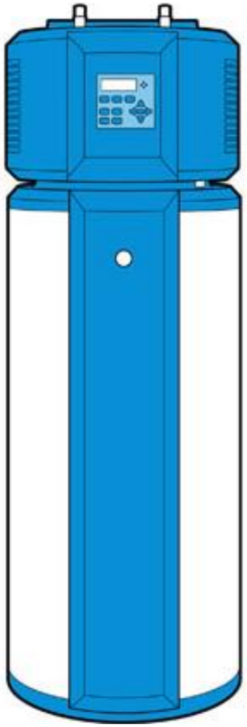
HPWH Technology

- Extracts heat from ambient air and transfers this heat to the water
- Supply of relatively warm air (40 ºF ≤)
- Condensate drainage

Timeline of Technology & Market Development

- First Generation
- Market-Optimized Integrated HPWH
- Current Generation
  - ENERGY STAR
  - NEEA Northern Climate or Advanced Specification
- Emerging Technology (for the U.S.)
  - CO_2 HPWH



Market Barriers and Best Practices

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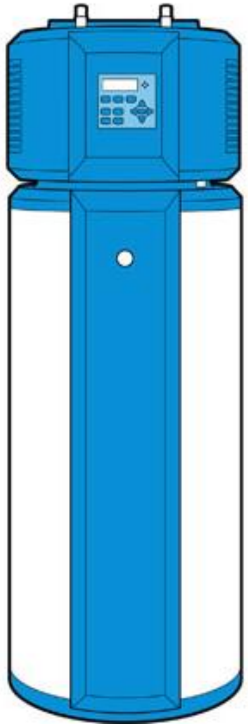
Market Barriers

- First Cost
- Installer Expertise
- Availability
- Consumer Awareness and Education
- Performance Confusion and Dissatisfaction
- Installation Constraints

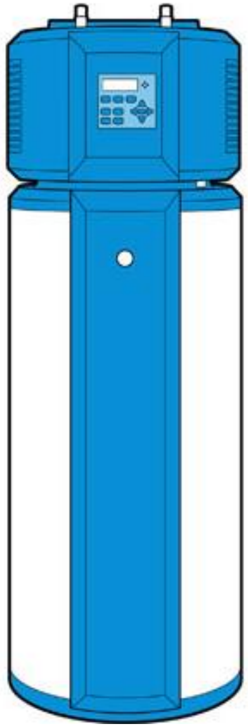
Best Practices

- Incentives
- Training and Certification
- Targeted Consumer Messaging
- Testing, Demonstration, & Validation
- Specification Requirements



Market Barriers and Best Practices

- **First Cost**
  - Emergency replacement = 85-90% of water heater purchases, Unbudgeted expense
  - Electric-resistance Retail Cost: $350 to $1,000
  - HPWH Retail Cost: $1,200 to $3,200 (~$1,000-$1,500 incremental cost)
    - Depends on model & tank size (50, 65, and 80 gallons)
  - Installation: $200 to $400
  - Typical Payback 3 to 5 years



- **Best Practices**
  - Incentives
    - Instant Rebates
    - Mail-in Rebates
  - Financing
    - Low-interest loans
    - On-bill financing
  - Tax credits
  - Leasing

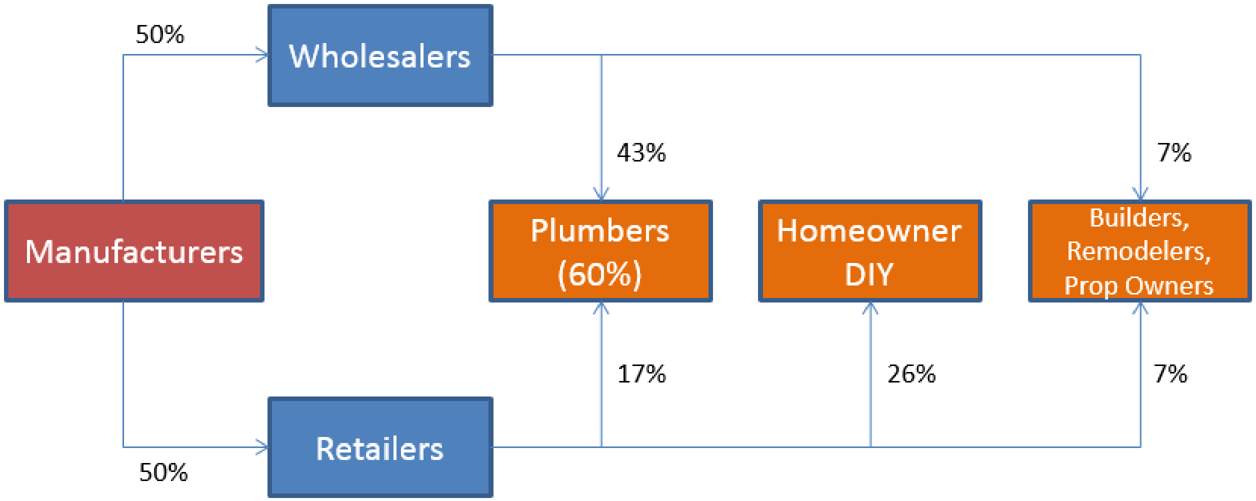
Rebate Programs by State (Top 10 in Reach)

State	HHs with Access to Rebates	Weighted Avg Rebate	¢/kWh	% State HHs Electric WH
California	11,200,000*	$310	18.2	11%
New York	4,500,000	$525	18.1	17%
Massachusetts	3,000,000	$260	19.9	20%
Wisconsin	3,000,000	$300	14.7	30%
New Jersey	3,000,000	$500	15.7	13%
Tennessee	2,900,000	$200	10.7	75%
North Carolina	2,800,000	$350	11.2	78%
Pennsylvania	2,800,000	$330	14.4	41%
Georgia	2,300,000	$540	11.9	66%
Washington	2,100,000	$520	9.6	51%

*California IOUs offer HPWHs to all homes in territory, but home must have electric water heater

Market Barriers and Best Practices

Availability – Supply Chain Chicken v Egg Issue



Best Practices

- Instant rebates – Wholesaler and Retailer level
- Mail-in rebates – Retailers
- Lower rebate fulfillment data requirements
- Targeted consumer education – emphasize planned replacement

Market Barriers and Best Practices

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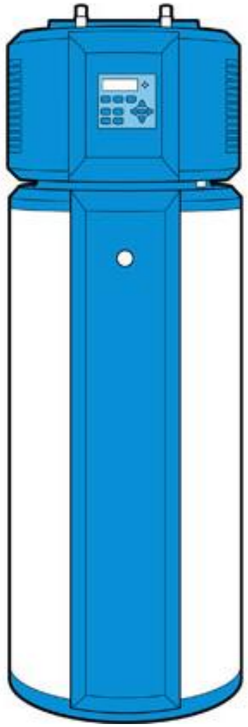
- **Installer Expertise – Promotion and Installation**
  - Call Center & Retail Sales Associates
    - Making HPWHs the “first ask”
    - Promoting HPWH savings & cost effectiveness (tailored to region)
    - Understanding location constraints
    - Understanding proper HPWH sizing
  - Installers
    - Promotion – savings & cost effectiveness
    - Selection – sizing to load
    - Installation – size constraints, inlet/outlet locations, condensate drainage, intake/exhaust venting



- **Best Practices**
  - Pictures of existing water heater – smartphone
  - Installer training, certification, and branding
  - Instant rebates
  - Rebate fulfillment data requirements
  - Giveaways/contests

Market Barriers and Best Practices

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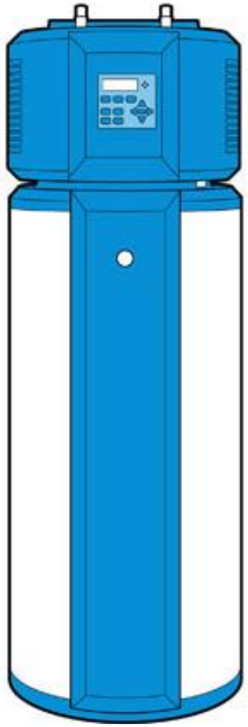
- **Consumer Awareness and Education**
  - Water heaters are a low-interaction end use
  - ~12 year purchase cycle
  - Prevalence of emergency replacements

- **Best Practices**
  - Targeted consumer education
    - Age of housing stock – identify homes with 10+ year old water heaters
    - Property values
    - Permits for new construction and renovation
  - Point of purchase displays
  - ENERGY STAR and NEEA messaging

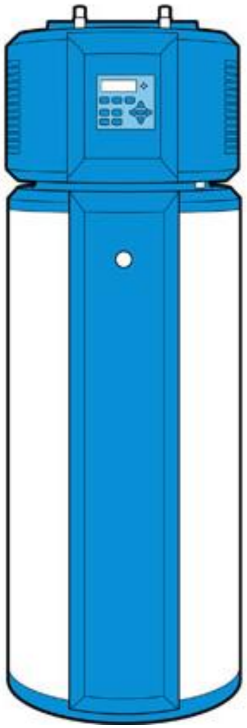


Market Barriers and Best Practices

- **Performance Confusion**
  - Noise
  - Cool-air exhaust & HVAC impacts

- **Installation Constraints**
  - Mobile homes, multifamily homes, townhomes, homes with electric water heaters in small closets
  - HPWH size
  - Ventilation requirements
  - Condensate drainage

- **Best Practices**
  - Specification requirements
  - Testing and studies
  - Training of installers and retail sales associates
  - Consumer education

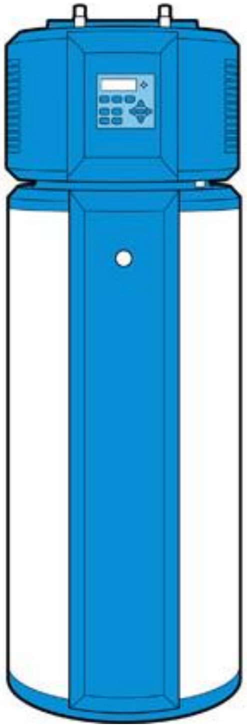


National HPWH Energy Efficiency Potential

Target Household Profile for HPWH Adoption:

Low-hanging Fruit

- Single-family Home
- 31+ Gallon Electric-resistance Water Heater
- Early Adopter
  - $50k+ in Gross Income
  - Associates Degree or Higher in Education



National Target Market (Potential HPWH Shipments)

- 624k to 760k Annual Shipments
- 15 to 20% of Electric Water Heater Market
  - Energy Savings Potential of 15.7 to 21.1 TWh/year (after stock turnover)

National HPWH Energy Efficiency Potential

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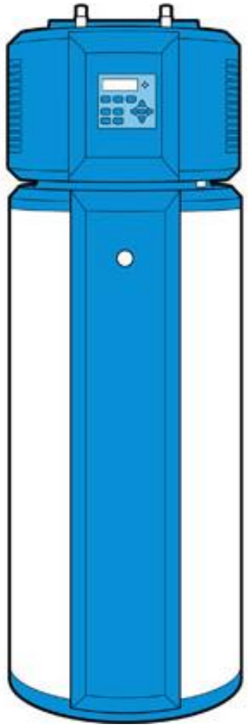
- **Ideal State or Region Profile for Targeted Market Adoption**
  - High Saturation + New Home Growth for Households with Target Profile Characteristics
  - Presence of HPWH Programs & Incentives
  - Presence and Engagement of Supply Chain Partners

- **States with Large Target Markets and Significant Incentive Coverage**
  - SE: North Carolina, South Carolina, Georgia
  - NW: Washington, Oregon
  - MW: Ohio
  - SW: Arizona
  - Mid-Atlantic: Pennsylvania, Maryland, DC (Replacement)
  - California (New Construction)



National HPWH Energy Efficiency Potential

States with Large Target Markets but Few Incentives

- **Florida**
  - #1 Replacement Market, #2 New Construction Market
  - Target Households: ~94,000 electric water heater installations per year
  - Few HPWH programs
- **Texas**
  - #2 Replacement Market, #1 New Construction Market
  - Target Households: ~52,000 electric water heater installations per year
  - New Construction Upside: ~22,000 Additional Installations to Target HHs
  - Only one HPWH program statewide

National HPWH Energy Efficiency Potential

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FLORIDA	Households	Natl Rank
Replacement Market Opportunity		
HHs with 31+ Gal Electric WHs	4.4 million	1st
Single-fam HHs with 31+ Gal Electric WHs	3.2 million	
Target: Single-fam HHs with 31+ Gal Electric WHs, $50k+ gross income, Assoc Degree+	970,000	
Installations in Target Replacement Market	76,000 per year	
New Construction Market Opportunity		
New Single-fam HHs in 2017	82,000	2nd
Target: New Single-fam HHs with 31+ Gal Electric WHs, $50k+ gross income, Assoc Degree+	18,000	1st
Total Installations in Target Market	94,000	1st

Potential National Strategy

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- **National Promotional Campaign**
  - Efficiency Programs, Manufacturers, Wholesalers, Retailers, **<u>Installers</u>**, and Consumers
  - Brand & Supply Chain Recognition/Support
  - Focus on Installer Education and Awareness

- **Regional Initiatives**
  - Regional activities could tie back into the national promotional campaign
  - Facilitate improvement of existing HPWH efficiency programs
  - Assist in the launch of new HPWH efficiency programs
  - Customize best practices to regional market
  - Leveraging supply chain program certification and branding
  - Emerging incentive structures (e.g., midstream rebate)

Questions

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