

Utility Energy Efficiency Programs and Prospects for Heat Pumps: View from the Southwest

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Southwest Energy Efficiency Project

- Non-profit public interest organization, founded 2001
- Advances policies and programs to stimulate greater energy efficiency in six western U.S. states
- Advances energy efficiency in the buildings, transportation, industrial and utility sectors



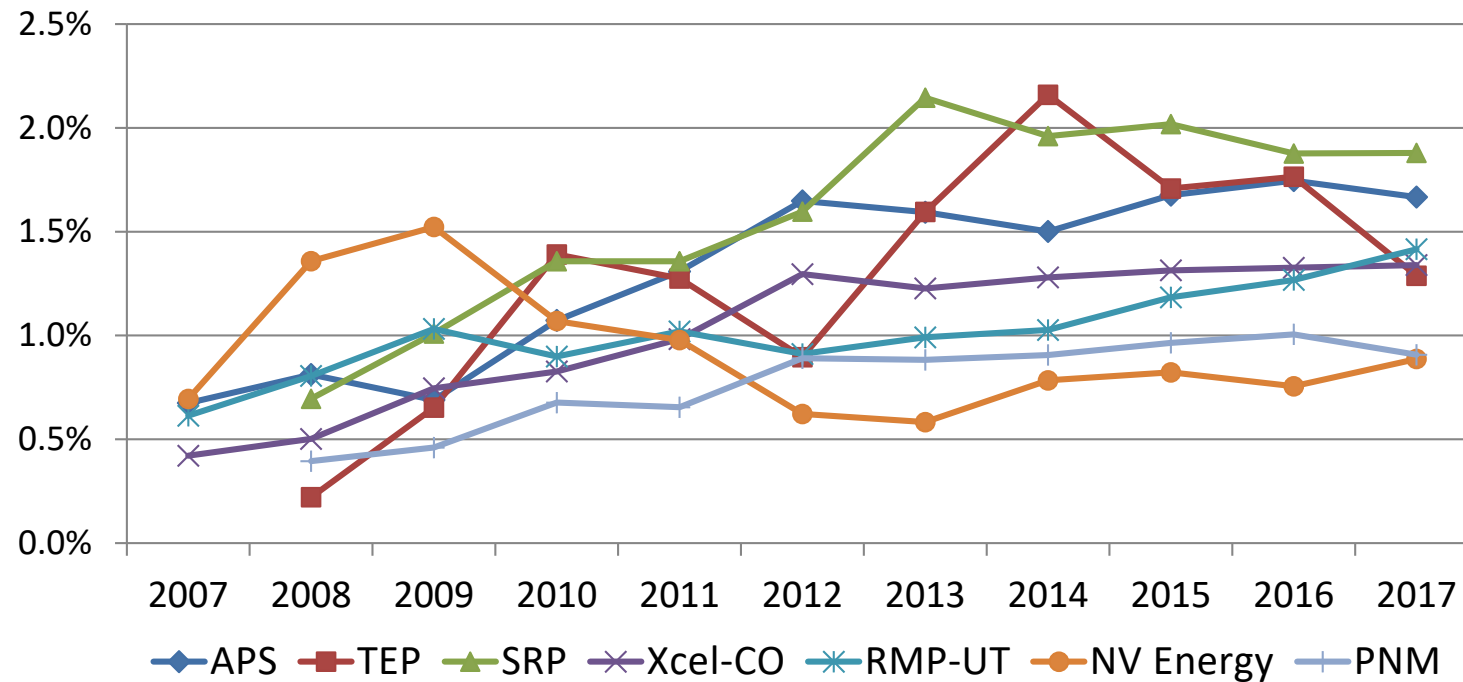
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Electric Utility DSM Program Spending Trends in the Southwest

State	Electric DSM Program Spending (million \$ per year)								
	2004	2006	2008	2010	2012	2014	2016	2017	2018 (est.)
AZ	4	19	45	94	130	126	127	117	107
CO	21	18	28	66	96	96	106	114	124
NV	11	30	55	46	39	52	49	50	51
NM	1	1	10	24	27	34	40	39	41
UT	16	27	36	51	47	82	60	56	60
WY	~0	~0	~0	3	4	5	8	10	11
Region	54	95	174	284	343	395	390	386	394

First Year Energy Savings as a Fraction of Retail Electric Sales

Annual Energy Savings as a % of Retail Sales,
by program year



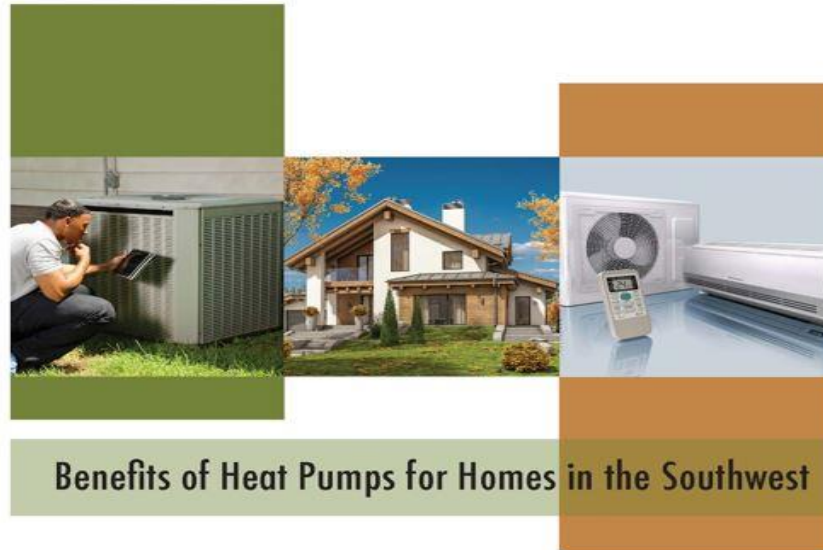
Innovative Program Strategies— Residential Sector

- Shift to midstream incentives
 - HVAC (NV Energy, initial stages)
 - Water heating (strong prospect)
 - Indicator from commercial unitary HVAC—Xcel Energy increased sales 350% after shift
- Integrate EE and DR efforts
 - Smart thermostats with HVAC Optimization
 - NV Energy program savings: ~3kW peak reduction and 450 kWh/yr savings per home; ~70,000 installed
- Utilize smart meter data for remote home assessments, EE program targeting and energy savings evaluation

Cost-Benefit Analysis Reform

- Colorado PUC doubled non-energy benefits adders for Xcel Energy-CO
 - 20% for residential and C&I programs
 - 50% for low-income programs
- 2017 Nevada legislation
 - Cost effectiveness at portfolio level rather than program or measures level
 - Valuation of non-energy benefits in cost effectiveness analysis – NV Energy used an adder value of 15% in 2019-21 DSM Plan

SWEEP Heat Pump Study



By Neil Kolwey and Howard Geller
June 2018

SWEEP Heat Pump Study: Objectives

- ❑ Do heat pumps save energy, lower GHG emissions and save consumers money in homes in major cities in the Southwest?
- ❑ Compares natural gas space and water heating to electric heat pumps and heat pump water heaters (HPWHs) in Denver, Phoenix, Salt Lake City (SLC), Las Vegas & Reno
- ❑ Considers both new homes/ductless heat pumps and existing homes/ducted heat pumps

SWEEP Heat Pump Study:

Methodology

- ❑ Considers lifecycle cost from perspective of homeowner, using actual variable costs for electricity and natural gas in each city
- ❑ Analyzes primary energy use and CO₂ emissions
- ❑ Uses projected average CO₂ emissions factors for the major electric utility in each city
- ❑ Assumes ENERGY STAR rated equipment
- ❑ Existing homes: install HP when either furnace or CAC system needs replacing
- ❑ Denver, SLC and Reno: cold-climate HPs

SWEEP Heat Pump Study: Results

Do Heat Pumps Save Money? Energy? Greenhouse Gas Emissions?



Ductless Heat Pump in New Home

Ducted Heat Pump in Existing Home

Heat Pump Water Heater in New or Existing Home

Denver



Las Vegas



Phoenix



Reno



Salt Lake City



SWEEP Heat Pump Study: Results

- ❑ Ductless HPs provide about 30% energy savings, 20-45% GHG emissions reductions, and 15-30% life cycle cost (LCC) savings in new homes
- ❑ Ducted HPs provide 5-20% energy savings, 2-35% GHG emissions reductions, but 5-30% LCC penalty in existing homes (except in Phoenix)
- ❑ HPWHs provide 50-65% energy savings and GHG reductions but LCC penalty (except in Phoenix)

SWEEP Heat Pump Study: Recommendations

- Provide incentives or attractive financing for HPs:
 - Homes with electric resistance heating
 - Ductless HPs for new homes
 - HPWHs in all homes based on large energy and GHG benefits
 - Targeted existing homes (e.g., Phoenix)
- Offer Time-of-Use (TOU) electric rates which should improve the consumer benefit-cost picture
- Educate/train consumers, builders, HVAC contractors
- Establish a regional Heat Pump market transformation initiative in the Southwest

SWEEP:

Dedicated to More Efficient Energy Use in the Southwest

Resources available online at:

www.swenergy.org

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