



Pecan Street Research Institute

Pike Powers Lab

Data-driven Insights from the Nation's Deepest Ever Research on Customer Energy Use



University-based research and commercialization -501(c)(3)

16 full-time employees



Center for Commercialization





Nation's deepest data on customer electric and gas use

89.5 million unique electricity use and voltage reads per day

World's first independent research meter network

Nation's highest residential concentration of electric vehicles



Residential Impacts

Correlations and findings

Unique use cases



Off-peak vs. On-peak load

by customer class

5:15 pm March 9, 2011 **31,262 MW**

August 3, 2011 68,416 MW





July 31, 2012 Daily electric use: smart meter

1 hour



Demand management tools

Green building

Behavior response

Appliance efficiency

Feedback systems



Source: Pecan Street Research Institute

Four Categories of Electricity Use Always On





Source: Pecan Street Research Institut

Four Categories of Electricity Use Thermal





Four Categories of Electricity Use

Always On Thermal Electric-gas substitute

Intentional





Electric - gas substitutes

12.00



Electricity used for a load of laundry – gas and electric dryers





Four Categories of Electricity Use Intentional





Seasonal variation by individual load

watts per square foot



Thermal





Thermal consumption is largest use category: cooling alone ~ 50 percent of total annual electricity use

Green built homes used 45 percent less electricity for cooling (per square foot) than nongreen built homes

Old homes with retrofits used 25.4 percent less electricity than non-green built homes

Gas appliances provide significant net energy reductions and operational cost savings

Thermal consumption correlated with higher ambient temps: Warmer climate will increase demand for thermal category



July 31, 2012 Whole home



Source: Pecan Street Research Institut

Summer day • Whole home + EV





Summer day • Whole home + pool pump



July 31, 2012 HVAC compressor • 8 homes • 1-minute interval





August 2011 average Solar PV generation and whole-home electricity usage (kW)



4 Transformers

"Normal" Transformer

"Loaded" Transformer



Power Comparison



Power Comparison



Source: Pecan Street Research Institute

Field trials assets

505 homes in Austin <u>300 + homes in Houston, Dallas-Ft Worth</u> ~ 65 homes with electric, gas, water 69 homes with EV's + Level 2 210 homes in one neighborhood with rooftop solar PV 225 + homes > 10 years old oldPublic school(s) High resolution transformer monitoring Multi-family (60-120 units) – Spring 2013 Small commercial

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