



New Horizons for Energy Efficiency

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NCSL Capitol Forum: Energy Supply
Task Force

December 9, 2015

American Council for an Energy-Efficient Economy

- ACEEE is a 501(c)(3) nonprofit that acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors
- 50 staff; headquarters in Washington, D.C.
- Focus on end-use efficiency in industry, buildings, and transportation
- Other research in economic analysis; behavior; energy efficiency programs; national, state, and local policy

Consumer resources: smarterhouse.org and greenercars.org



www.aceee.org

ACEEE New Horizons Study

Objective: identify and profile a set of emerging but market-ready and cost-effective efficiency measures that could result in substantial future energy savings

Includes 18 measures w/the greatest potential to cost effectively reduce total annual electricity sales by 1% or more by 2030

Total savings potential:

- 22% of projected electricity use in 2030
- Opportunities in residential, commercial, and industrial sectors
- No single dominant measure; range of individual measure savings: 0.5% to 3.4% savings (mean=1.1%)

Top Ten Measures by Savings Potential

Large reductions in miscellaneous plug loads	3.4%
Conservation voltage reduction	2.1%
New construction programs 	1.9%
Comprehensive commercial retrofits 	1.7%
Smart manufacturing 	1.6%
High efficiency residential air conditioners and heat pumps	1.5%
Combined heat and power systems 	1.3%
Advanced commercial lighting design and controls	1.3%
High efficiency heat pumps replacing electric resistance furnaces	1.2%
Smart commercial buildings 	1.2%

Savings as a percentage of total electricity demand in 2030

 = Measures with significant natural gas savings potential

Other Measures by Savings Potential

Residential LEDS in current incandescent applications	1.1%
Residential retrofits 	1.0%
Advanced commercial rooftop units	0.9%
Strategic energy management for large facilities 	0.8%
Real-time energy use feedback and behavioral response 	0.8%
Residential appliances 	0.7%
Heat pump water heaters and other advanced systems	0.6%
Residential smart thermostats 	0.5%
Energy performance labels for C&I equipment	0.5%

Savings as a percentage of total electricity demand in 2030

 = Measures with significant natural gas savings potential

Trends: Technological Innovation

Residential LEDs

Very dynamic market, prices dropping

Rapid growth: 84% market share by 2030



Heat pump technologies

Cold-climate and ductless systems

Clothes dryers

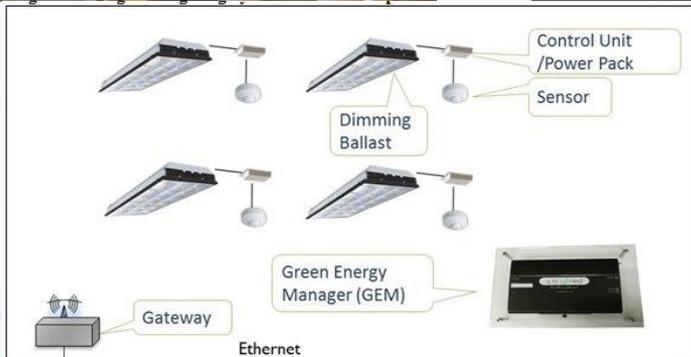
Water heaters

Smart products/buildings/manufacturing



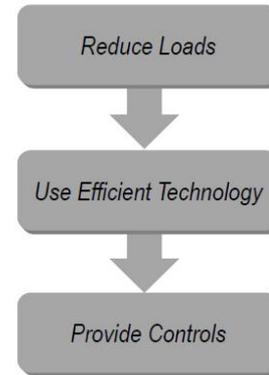
Trends: Systems Solutions

Advanced lighting design



Comprehensive retrofits

Taking the right steps in the right order ensures loads are minimized prior to investigating expensive new equipment or controls.



SOLVE THE RETROFIT PUZZLE BETA

See how taking the right steps, in the right order, makes all the difference

STEP 1: REDUCE LOADS (3 projects)

The first step in any retrofit project is to determine how large a reduction can be made in the amount of energy that a building needs to provide its most essential services.

Drag and drop the projects below onto the building. Try to select the ones that you think will reduce energy loads.

building windows	tent energy management	air handling units	demand control ventilation
daylighting, lighting & plugs	direct digital controls	chiller plant retrofit	radiators barriers

Trends: Behavior Change

Real-Time Energy Use Feedback & Behavioral Response

- Opower averaging about 2% electric savings
- In-home displays saving from 0-19%, with average so far of 4%
 - Much of the savings comes from a limited number of “cyber-sensitive” customers
 - Amount of savings correlates to intensity of feedback
 - Savings persist with some decline
 - Dynamic pricing can boost results

Intelligent Efficiency

INTEGRATED, RELIABLE, and SMART.

People-Centered Efficiency

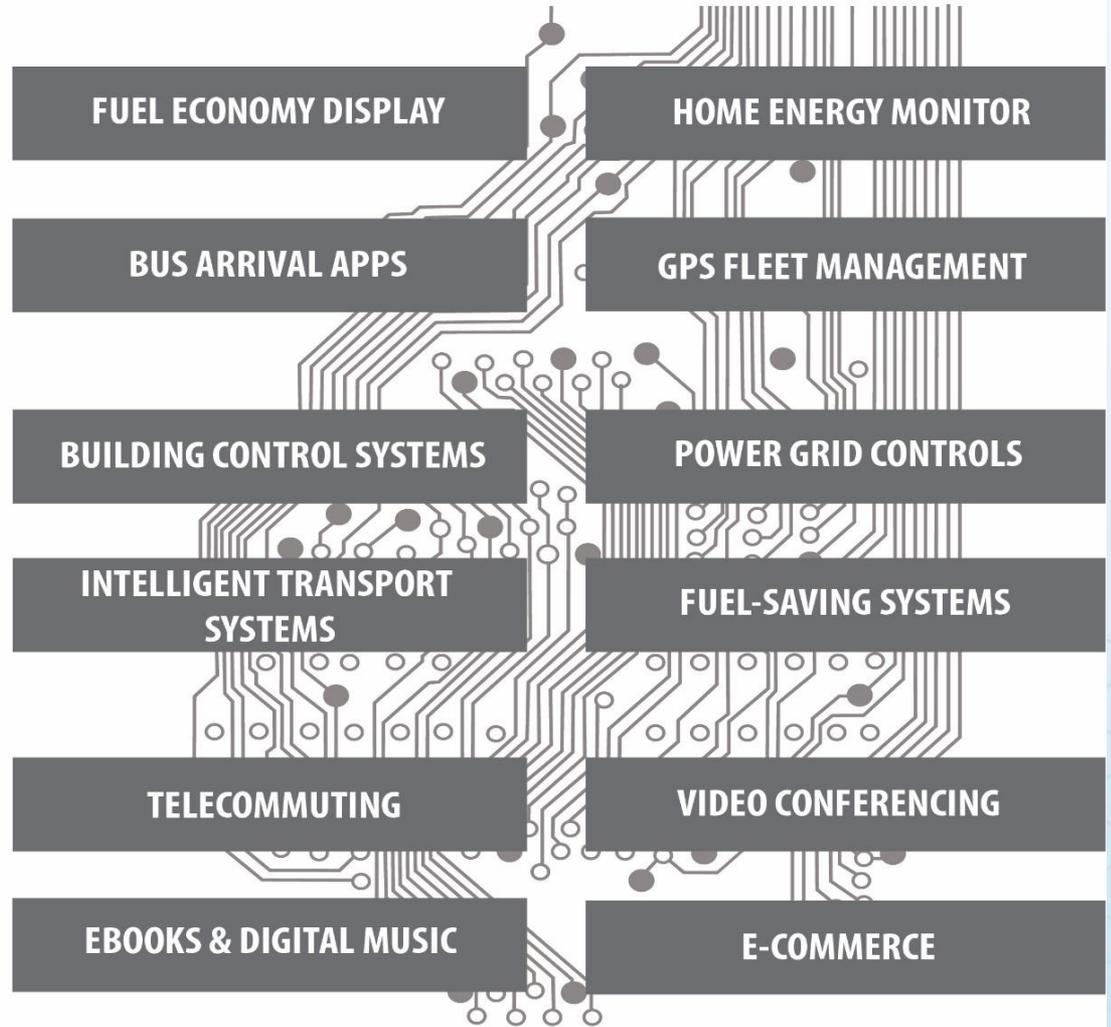
Providing real-time information and management tools that enable users to lower energy consumption in response to changing information

Technology-Centered Efficiency

Using sensors, controls, and software to automate and optimize energy use

Service-Oriented Efficiency

Shifting behavior and organizational structures to reduce energy-intensive activities



Cost Effectiveness

- Most of measures in our study yield savings at 7.5 cents/kWh or less (TRC perspective; = cost/kWh of a new combined cycle plant per EIA)
- A few of them are a little higher:
 - High efficiency appliances, residential feedback, residential retrofits, heat pump water heaters, some misc. plug loads, commercial roof-top A/C and advanced commercial lighting.
 - Expect costs to decline – programs can encourage this
 - In near-term may need to focus some on regions or customers where cost-effective
 - Implement pilot programs/projects to get experience

Policy supports

- Strong energy savings targets (EERS)
- New utility regulatory frameworks
 - Possibly including new utility business models and rate structures to support aggressive savings goals
- Building energy codes
 - Regularly updated to keep up with advances
- Appliance & equipment efficiency standards
 - Opportunities for state and federal standards
- Building energy use transparency
 - Labeling and disclosure programs and policies
- Public sector lead-by-example

Takeaways

- A diverse set of efficiency measures can yield significant electricity savings—on the order of **20% of total U.S. electricity use by 2030!**
- Savings will come from a mix of opportunities in the residential, commercial and industrial sectors—**no silver bullet**
- Utility and other customer programs will deliver the savings, but important **policy supports are crucial for success**

New Horizons for Energy Efficiency: Major Opportunities to Reach Higher Electricity Savings by 2030

Dan York, Steven Nadel, Ethan Rogers, Rachel Cluett, Sameer Kwatra, Harvey Sachs, Jennifer Amann, and Meegan Kelly, September 15, 2015

Available at: <http://aceee.org/research-report/u1507>

Thank you!

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