



## **Innovation and Transition in Market Transformation**

# ***Observations from the “Frontiers of Energy Efficiency”***

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# What are the next-generation energy efficiency approaches?

## “Next generation?”

- Near-term (1-3+ years)
- Commercially available technologies
- Programs at full-scale quickly
- Can be evolution of successful existing programs

- *[Hint: mostly NOT rocket science!]*



# Programs Included in Our Research

## Residential Programs

- Residential Lighting
- Residential Appliances
- Residential Plug Loads and Consumer Electronics
- Residential Mechanical Systems
- Low-Income Weatherization
- Residential Home Retrofit Programs
- Residential New Construction
- Manufactured Housing
- Multifamily Housing
- Behavior-based Energy Efficiency Programs

## Commercial , Industrial, Other Programs

- Commercial Lighting
- Commercial HVAC
- Commercial Building Operations and Performance Programs
- Commercial Major Retrofit and Renovation
- Commercial New Construction
- Small Business
- Industrial
- Agriculture
- Combined Heat and Power
- Distribution System Efficiency Improvements

## Additional Program Concepts

- Miscellaneous Energy Use in Commercial Buildings
- Commercial Sector Behavior Programs

# Residential Lighting Programs

- EISA standards: baseline efficiency will be higher.
- CFLs still will be a big part of the picture; ~70% of sockets still don't have them.

*CFLs are not going away*



# Residential Lighting Programs

- New technologies key part of the picture: LEDs, 2X halogens, advanced CFLs.
- Sharpen focus/marketing to certain markets and for certain products—also more customer education.
- Move “upstream” (e.g., “market lift”): paying incentives to retailers for increased sales.

*Lighting goes digital*



100 W equivalent

# Commercial Lighting

- EISA will have large impacts as T8s and similar high efficiency products become the standard.
- Still room for more advanced fluorescents and improved fixtures.
- New technologies like LEDs are entering the market in certain niches (linear LED lamps not yet ready for prime-time).
- Programs will look “beyond technology replacements” to integrated design, lighting quality, controls and use of daylighting.



# Commercial Retrofit/Renovation

- Goal is deep (20-50%) savings per building.
- Offer performance-based incentives.
- Focus on integrated designs—improve overall building performance and increase building value.
- Promote disclosure (energy use) data in commercial markets.
- Require building commissioning and provide training for building operators.



# Residential Retrofits



- Large potential remaining.
- No technological breakthroughs; emphasis on improving program design and delivery, and increasing participation through better marketing and financing options.
- Make things simple for homeowners—and improve administration.
- Make energy efficiency improvements integral to home improvements, demonstrate value to homeowners and home markets (e.g. home energy ratings).



# Multifamily Housing

- Historically an underserved market with large potential.
- Are good examples of effective program designs, characterized by:
  - Comprehensive approach.
  - Multi-fuel, integrated approach.
  - Collaboration among utilities, program providers, housing authorities and financing organizations.
  - Attractive terms (“one-stop” shopping), financial packages and project management.



# New Commercial Construction

- Building codes continue to advance.
- Leverage code changes; program operators involved in code development and compliance can receive credit.
- Whole building, integrative design is a successful, proven approach for large savings.



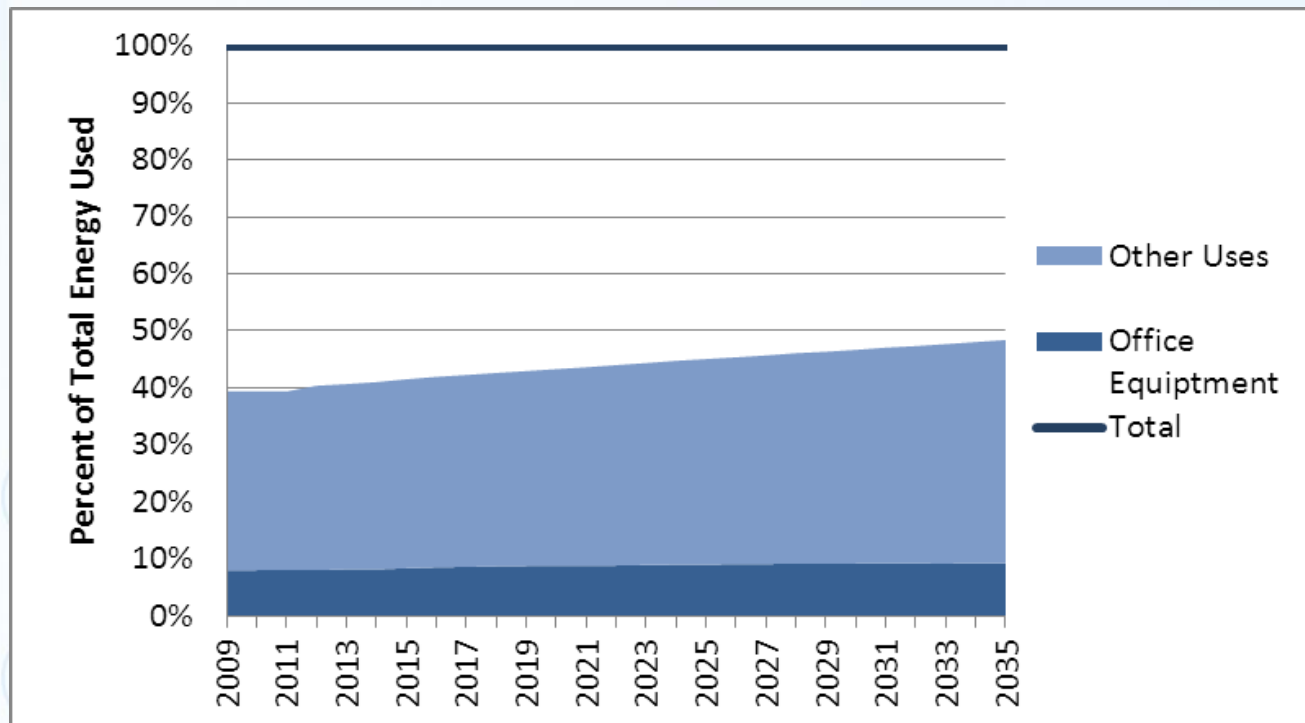
# New Commercial Construction

- Design, modeling and decision-making tools can be used to reach wide range spectrum of building types, sizes, owners.
- Emphasize advanced lighting, high efficiency HVAC systems, high efficiency envelopes; don't ignore plug-loads.
- Labeling and rating systems for green, high performance buildings are helping to drive market changes.



# Commercial Behavioral and Miscellaneous Use Programs

- A lot of potential, much more work needed to develop programs.



EIA Projection of Energy Use for Office Equipment and “Other” Uses in the Commercial Sector as a Percent of Total Commercial Energy Use

# Industrial Programs

- Biggest opportunities for energy efficiency in industry exist in improvements and optimization of processes.
- Traditional prescriptive approaches providing incentives for energy-efficient equipment (e.g. motors and HVAC) will not realize this potential (but still have a role to play in programs).
- Next generation industrial programs must evolve toward whole-system and customized approaches.



Pulp and paper mill, New Zealand © Greenpeace/Bosset.



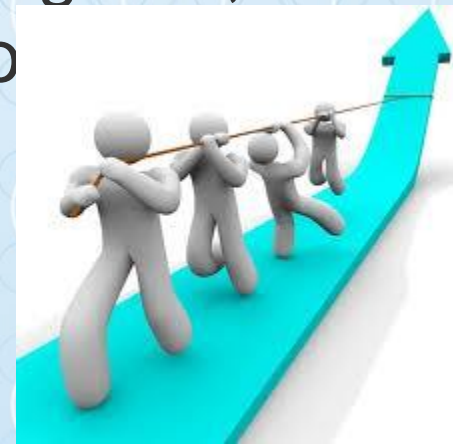
# Potential Savings by 2030

(ballpark estimate)

Savings Estimates by Sector	Electricity (TWh)	% of savings by Sector	Natural Gas (TBtu)	% of savings by Sector
Reference Case Delivered Energy for 2030 (AEO)	4,242		10,030	
Residential Programs	417	36%	997	53%
Commercial Programs	565	48%	770	41%
Industrial Programs	109	9%	119	6%
Distribution System Efficiency	70	6%	n/a	n/a
Total Energy Efficiency Savings	1,162	100%	1,887	100%
<b>Savings as % of Reference Forecast</b>	<b>27%</b>		<b>19%</b>	

# Overall Strategic Recommendations

- Foster the development and deployment of new, high efficiency technologies across the spectrum of customer types and end-uses.
- Promote systems approaches to realize the greatest energy efficiency potential.
- Promote the development and advancement of best practices among building designers, contractors and building operators to achieve high building performance.



# Overall Strategic Recommendations

- Use market research and data analytics to improve market characterization to better design and target customer energy efficiency programs.
- Target behavioral change of all customer types as a key part of overall program portfolios.





*Full details available in final report*

## ***Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings***

Dan York, Maggie Molina, Max Neubauer, Seth Nowak, Steven Nadel, Anna Chittum, Neal Elliott, Kate Farley, Ben Foster, Harvey Sachs and Patti Witte

<http://www.aceee.org/research-report/u131>

