



Maximizing Energy Efficiency in Existing Homes

AESP Technology Symposium

Presented by:

Mark Dyen
Conservation Services Group
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Conservation Services Group



CSG

- Founded in 1984
- Nonprofit corporation
- More than 300 staff
- 14 offices nationwide
- Over 1.2 million homes and facilities served
- Manage the delivery of over \$250 million in energy efficiency and renewable energy programs and projects per year



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Comprehensive Home Treatments

These involve:

- Treating the house as a system – looking at all energy uses and offering complete retrofits.
- Bringing together insulation, air sealing, high efficiency heating and air conditioning systems – preferably in one comprehensive package.





Comprehensive Home Treatments

-- Are the most difficult approach to saving energy.

- Rebates for efficient light bulbs or appliances are so much easier.
- How about public education? – Everyone loves that and it makes you look good, too.





Comprehensive Home Treatments

- Comprehensive treatments reduce all fuel use, but electric companies and gas companies have different metrics and regulatory regimes, and face different price and market problems.
- Electric companies have short, spikey peaks, and trouble siting new plants, and gas companies are often trying to boost market share.





Comprehensive Home Treatments

- Furthermore – there is no infrastructure to deliver comprehensive treatments – insulators and HVAC people rarely talk, let alone cooperate.
- From what we've seen, HVAC installers don't even communicate with the duct installers.





Comprehensive Home Treatments

- Finally, not only is...
 - no one selling comprehensive home energy treatments;
 - no one is buying them either.

There is no visible demand for comprehensive home energy makeovers.





Comprehensive Home Treatments

- On the other hand, a year ago there wasn't a demand for a phone that would play music and movies either.





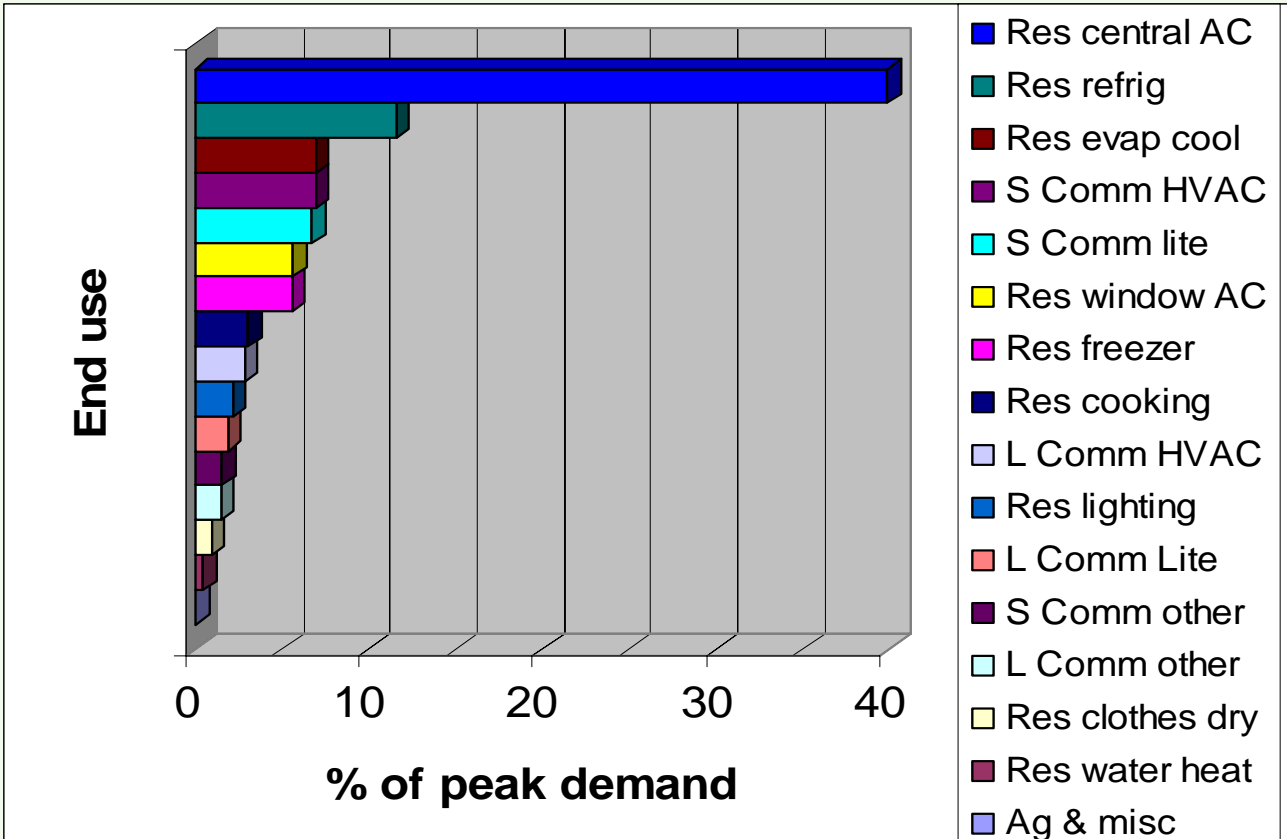
Why go to all the trouble of a “whole house approach” to save energy?

Willie Sutton was asked why he robbed banks –
“Because that’s where the money is.”





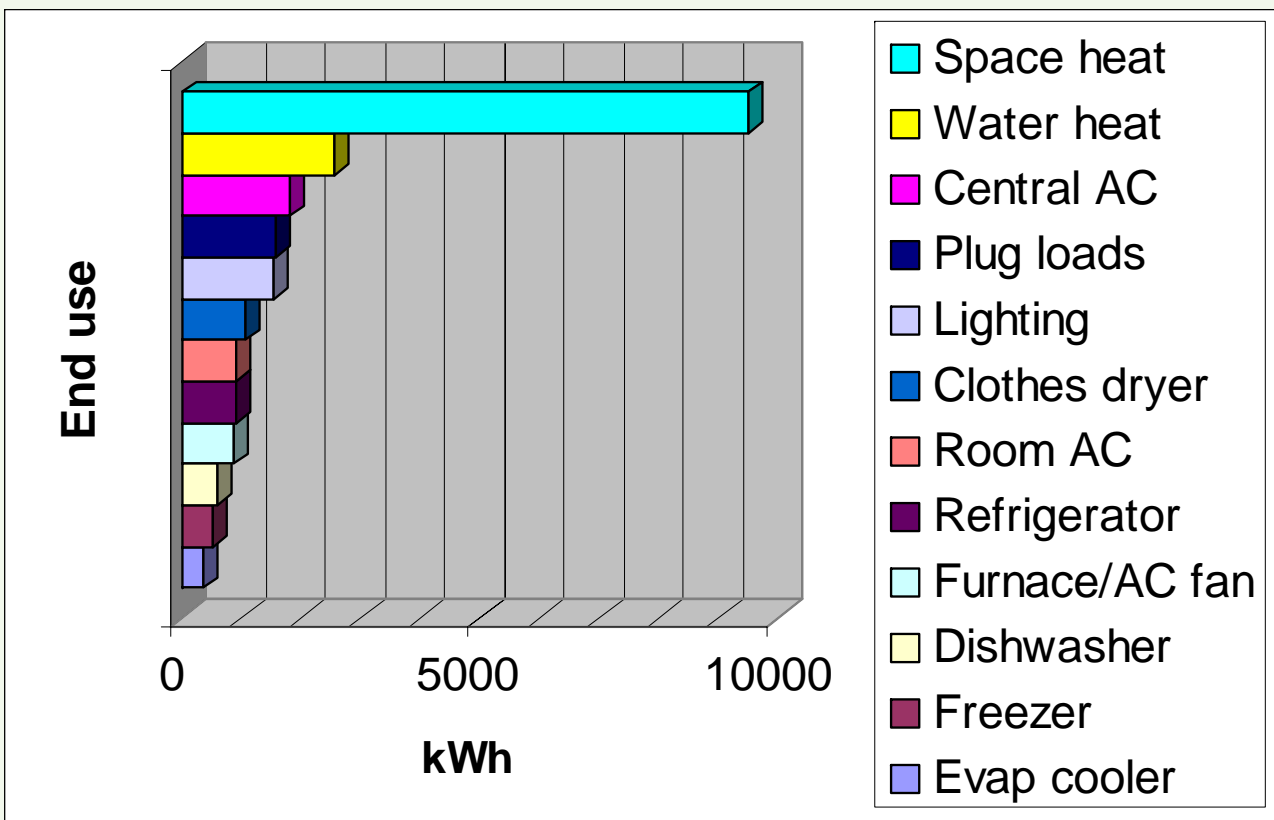
Disaggregation of Peak Demand



Source: Proctor Engineering



Disaggregation of Residential End-Uses



Source: KEMA



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Most home energy is used heating and cooling the home

- More than half of home energy is used to heat or cool the house – peak demand for electricity, and energy (electric, gas, oil) for overall use.
- Efficiently heating and cooling the house to comfortable levels involves:
 - The heating system
 - The cooling system
 - The walls and ceiling insulation
 - Air tightness
 - Fresh air ventilation
 - Capturing or rejecting solar gain
 - Window tightness and u-value





Components Interact

- The Building Shell works as a whole –
Air sealing, insulation, windows
work together, fail separately.





Components Interact

Heating & cooling systems

- A leaky, uninsulated shell requires a larger, more energy- & demand-intensive heating/cooling system.
- A leaky, uninsulated distribution system demands more energy for comfort – undermines building shell.





Components Interact

- Black, heat-absorbing roofs overheat AC units in the attic, cook the ducts.
- Solar gain absorbing windows demand bigger AC units – Bigger units mean shorter run times, reducing dehumidifying.





Interactivity requires comprehensive treatments

- To get maximum savings, you have to improve the entire house system.
- In some cases, if you don't improve the entire system, single measures won't work – attic insulation is defeated by air leaks or leaky duct work.





Comprehensive treatments produce non-energy benefits

- Even temperatures
- Reduced moisture/mold problems
- Improved durability
- *Comfort, health and safety*





To achieve significant results, our programs must offer significant savings

- Program designers/sponsors often look for magic bullet, quick fix or “appetizer”
 - Electric use trend is growth: 3-4% per year
 - If program reductions are only 1-2% . . .





Energy Efficiency must be sold

- Motivating homeowner to make change can be challenging.
- Customers who are offered an audit, take the audit, but don't follow through.
- Customers who do one measure think that's all they need to do to address energy issues.





Homeowners have a variety of motives

- Some want to cut high fuel bills
- Some want to replace an old furnace or air conditioner
- Some want improved comfort
- Some want a healthier home
- Some want to save energy for environmental reasons





Home Performance with ENERGY STAR®

- Captures Home Improvement Salesmanship for energy efficiency
- Sells to actual homeowners, not to evaluators
- Trains contractors to work with customer motivators





Home Performance works with different motivators

- You can turn a single measure interest into a comprehensive approach.
- Dealing with interactivity effects means you can address comfort/durability/health issues.
- The computerized assessment allows the contractor to quantify environmental benefits.





New York Home Performance Results

NYSERDA's Home Performance with ENERGY STAR® in New York is the most mature program in the country.



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New York progress thus far

- 16,100 projects completed since 2001
 - Comprehensive whole house audits
 - Building shell & distribution system improvements
 - Appliance & lighting, heating & cooling system, & DHW replacements
 - Health & safety measures





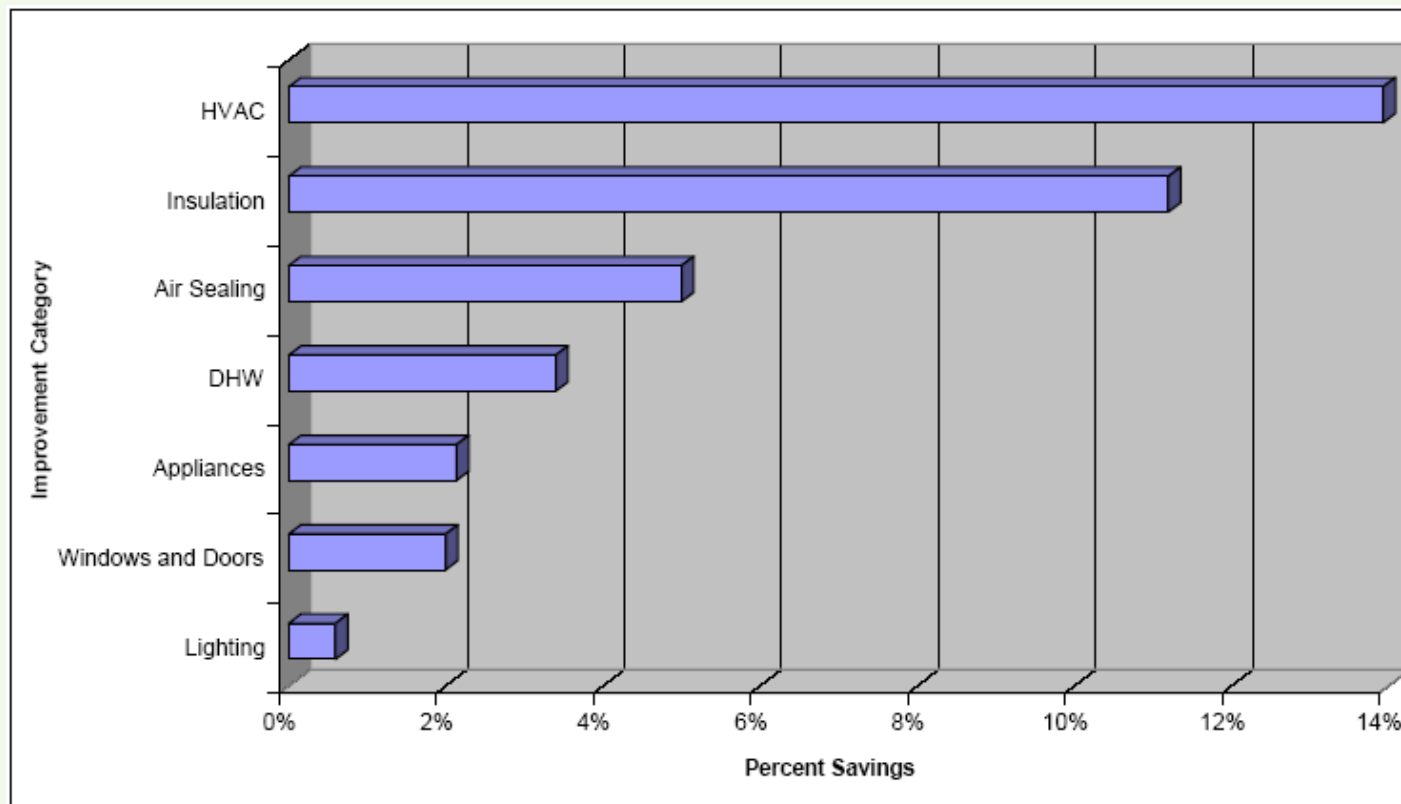
New York progress thus far

- Per contract savings:
 - Average annual kWh savings:
approx. 717
 - Average annual MMBTU savings:
approx. 49
 - Average annual dollar savings:
\$750/Household





NY Home Performance with ENERGY STAR Energy Savings as a Percent of Total Pre-Improvement Energy Usage by Improvement Category





New York progress thus far

- New York Contractors have adopted the Home Performance approach into their business models, and in doing so, have expanded their businesses to thrive in the transformed market.





For additional information:

Mark Dyen

Senior Vice President

(508) 836-9500 x13215

mark.dyen@csggrp.com

www.csggrp.com



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