

ENERGY STAR and Multi-family



ACEEE Presentation
April 14, 2003

Multi-Family Presents Opportunities for ENERGY STAR



- M.F. program can combine E* products and appliances with HVAC and shell improvements for improved energy efficiency
- Energy efficiency is important in affordable housing
- M.F. program can educate renters about ENERGY STAR
- M.F. is at the intersection of several E* programs

Where does Multi-Family fit in ENERGY STAR?



- **An ENERGY STAR Qualified New Home?**

- Some ENERGY STAR Partners have applied the HERS rating system to residential structures greater than 3 floors. Modeling poses problems
- Not clear whether multi-family owners are motivated to reduce energy costs. E* New Homes incentive not clear

- **A Commercial ENERGY STAR Qualified Building?**

- Databases are not available to create a benchmark for a multi-family program similar to office buildings. E* cannot create a benchmark
- Furthermore, the turnover rate for multi-family is 50% a year. Renter energy consumption will vary.

The Definition for Multi-Family Varies



- **Residential Energy Codes (ASHRAE 90.1, IECC 2000)**
 - Low Rise is 3 floors or less. High Rise is 4 floors or more
- **Commercially Accepted Definition (Energy Information Agency, Department of Labor)**
 - Five units or more
- **Various State and Local Definitions**

Which Definition Captures Larger Number of Units?



Definition	Number of Units (in millions)	Percent of Multi-Family Units
1 to 3 Floors	15.1	71%
5 or more units	15.7	74%
1 to 3 Floors and 5 or more units	9.9	47%

Source: 1997 EIA/DOE RECs Table HC1-4a

What are the Pollution Savings Potential?

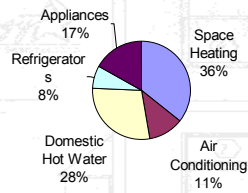


	Annual Energy Consumption	Annual Energy Cost	Annual Carbon Potential
Multi Family (5 units or more)	796 Trillion Btus	\$12.3 billion	7-8 mmtce
Multi-Family (3 floors or less)	770 Trillion Btus	\$ 12.3 billion	7-8 mmtce
Single Family Detached	8,402 Trillion Btus	\$ 110 billion	70 mmtce

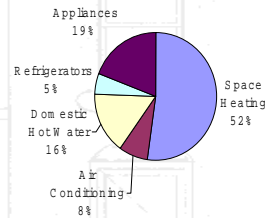
What is the Energy Budget for Multi-Family?



Multifamily (5+ Units) Energy Consumption



Single Family Energy Consumption



Appliances including water heating dominate the load in multi-family

How can ENERGY STAR improve Multi-Family Units?



	New Multi-family Unit	New Multi-Family Unit	Existing Family Unit
Upgrades	(Current New Homes Program) Window, infiltration, water heater, HVAC and insulation upgrades	(Current New Homes Program plus ENERGY STAR appliances) envelope, central heating and cooling, lighting and appliances	ENERGY STAR lighting, windows, appliances including window A/C
Percent Efficiency Improvement	23%	30% to 35%	15% to 20%
Cost to Upgrade per Unit	\$730	\$1,132	\$567
Savings per Unit	\$117	\$203	\$156
Pay Back Period	6.2 years	5.6 years	3.6 years

Modeled a hypothetical multi-family apartment building, four floors high, in three climate zones (hot, mild and cold) in the United States to determine cost-effective energy savings. For each of the three climate zones, modeled six unique apartment configurations within this hypothetical, four-floor structure, estimating a baseline and upgrade impact. These upgrades included shell and HVAC improvements as well as appliance upgrades. National estimates are weighted results across the three climate zones, fuel type and apartment configuration

Carbon Savings for Program Options



Program Options	Annual MMTCe Savings for 2007	Annual MMTCe Savings for 2012	Issues
Apply E* New Homes Approach (3 floors or less)	.003	.08	Business as usual
Apply E* New Homes Approach plus E* appliances (3 Floors or Less)	.01	.15	Accounts for total energy usage
Apply E* New Homes Approach plus appliances (all floors)	.01	.22	Includes all multi-family units Modeling difficult for tall buildings
Special Recognition for upgrading unit to E* appliances (5 units or more)	.22	3.69	Largest national carbon savings of all options Need to develop an alternative to the building label

New Units

Existing Units

Conclusions and Next Steps



- ENERGY STAR could play a significant role in Multi-Family
- The biggest opportunities are with existing units. Appliances are key.
- However, other ENERGY STAR programs potentially yield more carbon savings
- What would "special recognition" look like?
- Modeling for large Multi-Family must be refined