



Energy Efficiency: A Low Cost Approach for Addressing Air Quality and Climate Change

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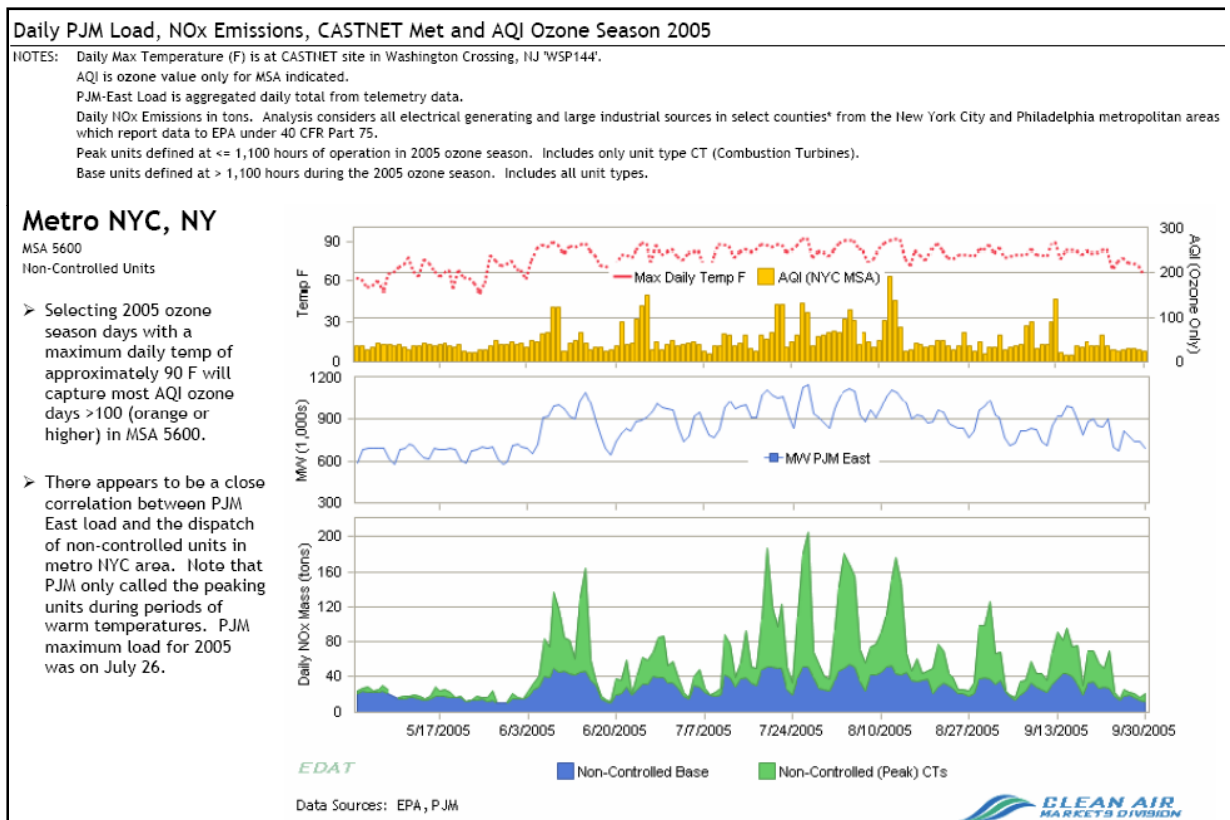


Overview

- Energy Efficiency (EE) as important low cost measure
 - Air quality (example HEDD)
 - Climate change
- Barriers limit adoption
- State level policies critical
- EPA EE-related activities
- New approaches

High Electric Demand Days (HEDD) Contribute to Poor Air Quality

- Air quality issues linked to peak electric demand on hot summer days:
 - High levels of NOx emissions from electric generating units (EGUs).
 - Meteorological conditions that contribute to ground-level ozone formation.
- Example -- Metro NYC – Summer 2005





Clean Energy Strategies Can Address HEDDs

- EPA 2006 analysis
- Examined states in Ozone Transport Commission
- Assessed clean energy strategies using streamlined IPM analysis – TRUM
- Developed scenarios for 4 clean energy strategies and 3 penetration rates (low, medium, and high):
 - Energy efficiency
 - 0.5 – 1 percent reduction in demand per year
 - Consistent with results from leading states
 - Being delivered cost-effectively – costing less than new generation
 - Demand response
 - 3 – 5 percent reduction in peak load as cited in FERC & DOE reports
 - Solar photovoltaic (PV) technology
 - Adoption of initial NJ/NY installation rates throughout the northeast
 - Combined heat and power (CHP) technology
 - Good engineering judgment
 - Consistent with results from EPA combined heat and power program
 - Cost-effective solution

Clean Energy Strategies Address HEDDs

TRUM Analysis

<i>Clean Energy Strategies</i>	Impact on Energy Demand 2015 (measures starting in 2008)			NOx Reductions (tpd and percent reduction of EGU emissions)		
	Low	Medium	High	Low	Medium	High
Energy Efficiency (EE)	3.5% load reduction (3,900 MW at peak)	5.25% load reduction (5,900 MW at peak)	7.0% load reduction (7,900 MW at peak)	94 (13.2%)	136 (19.0%)	167 (23.3%)
Demand Response (DR)	4% reduction at peak hours (4,300 MW at peak)	5.5% reduction at peak hours (5,900 MW at peak)	7% reduction at peak hours (7,350 MW at peak)			
Solar PV, installed capacity	170 MW	340 MW	500 MW			
CHP, installed capacity	2,050 MW	4,600 MW	6,600 MW			



Clean Energy Strategies Address HEDDs

- By 2015, peak day emissions reductions of 13% to more than 20% could be achieved.
- EE and CHP showed the greatest emission reductions
- DR showed small net increase of emissions (with 20% of the DR in the form of backup generation, 65% curtailment/conservation and 15% load-shifting)
- Emissions reductions could be even greater with appropriate provisions to address increased emissions from the use of high-emitting back-up generators
- New policies/programs necessary to achieve these benefits

Best Practice Programs Available to Address HEDDs

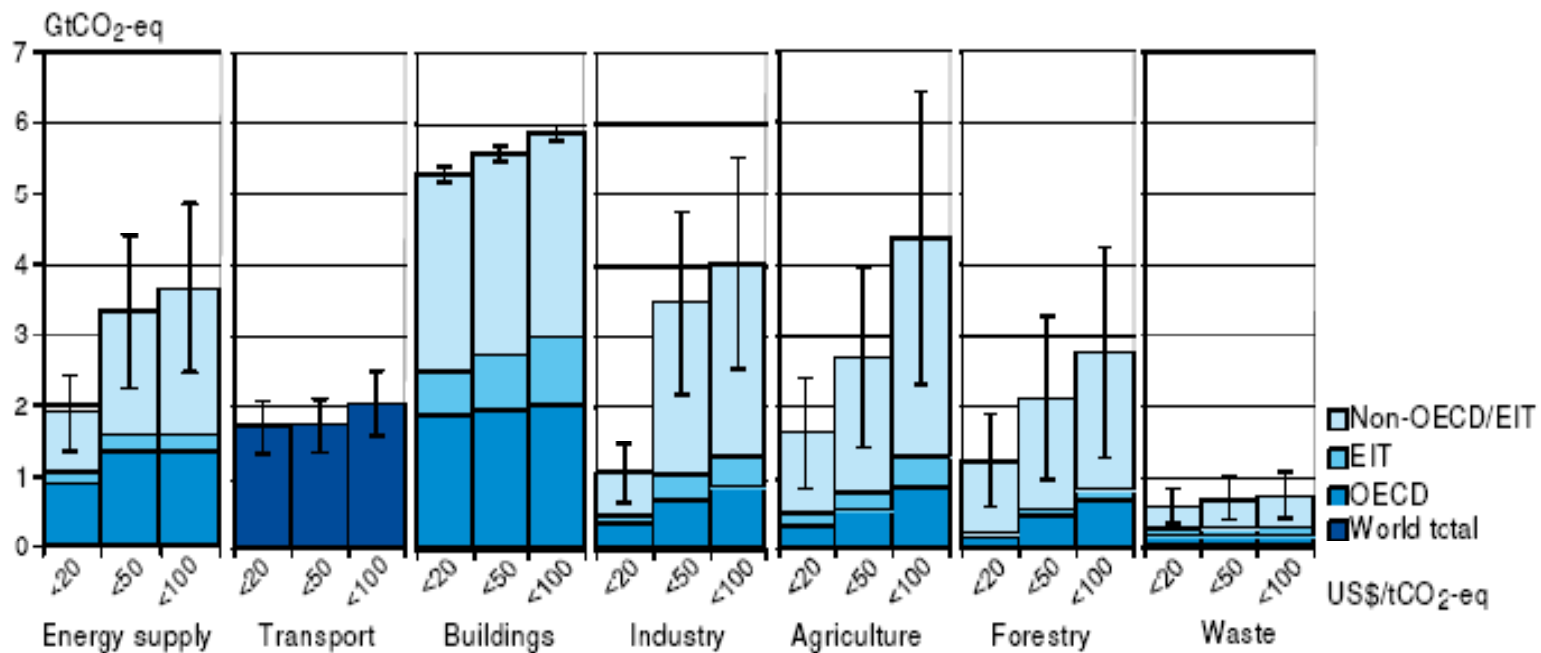
- Best practice programs detailed in the report "Clean Energy Options for Addressing High Electric Demand Days" include:
 - Energy Efficiency
 - ENERGY STAR New Homes
 - Home Performance with ENERGY STAR
 - Quality HVAC Installation & Maintenance
 - Appliance Retirement & Recycling
 - PC Power Management
 - Commercial Lighting, Cooling, & Refrigeration
 - Commercial Whole Building Performance
 - Cool Roofs
 - Demand Response
 - With NOx limits
 - Clean Distributed Generation
 - Combined Heat and Power
 - Solar

Need new policies to spur programs/practices

(The report will be posted in October 2008 at <http://www.epa.gov/cleanenergy/energy-programs/state-and-local/state.html>)

EE in Buildings / Industry Offer Significant Low Cost GHG Reductions

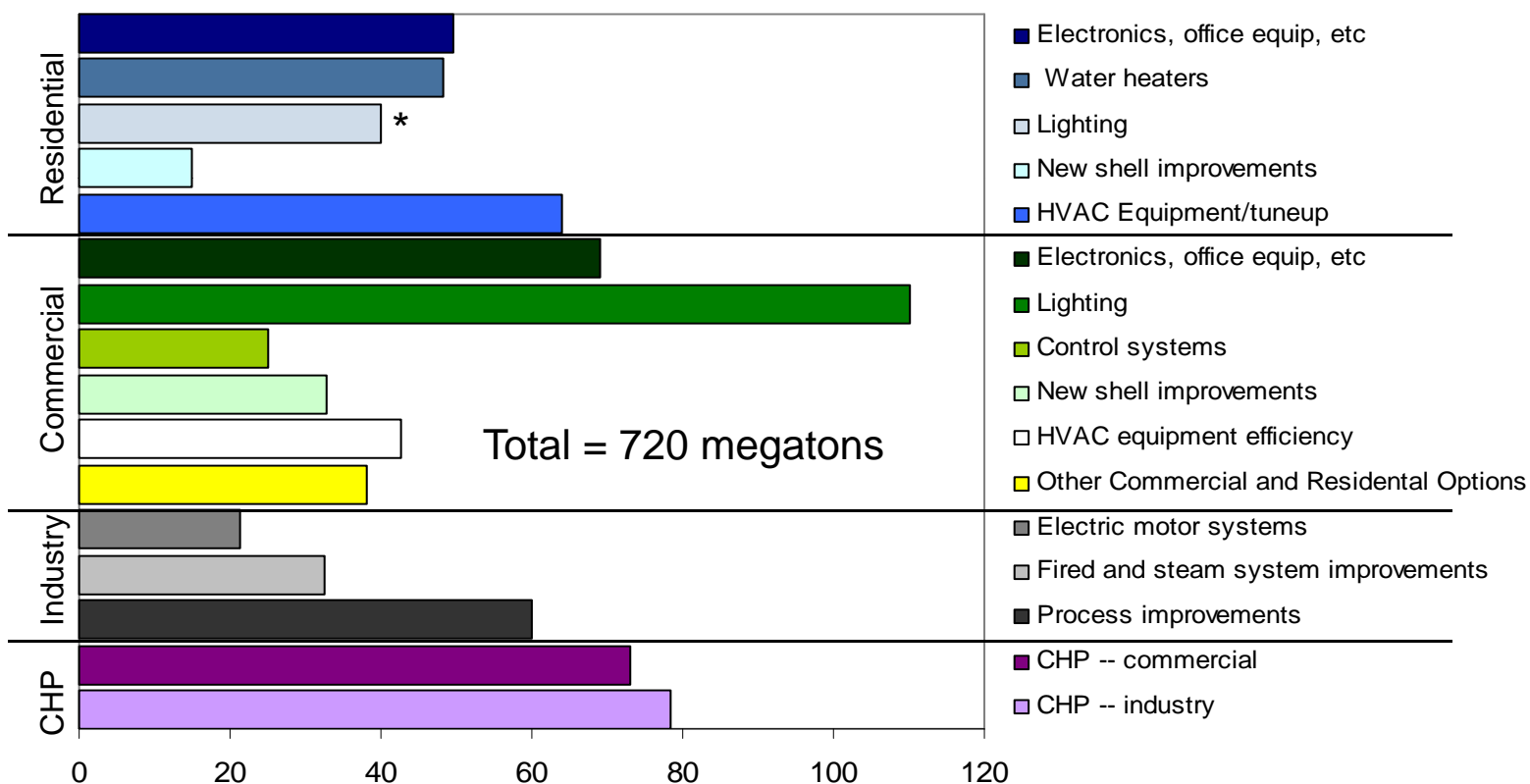
IPCC, 4th Assessment Report Working Group III (2007)
 Summary for Policymakers Fig. SPM.6



Estimated economic potential for global mitigation by region and carbon price -- takes into account social costs and benefits and social discount rates, assuming that market efficiency is improved by policies and measures and barriers are removed.

Key Efficiency Opportunities Identified by McKinsey

Annual 2030 GHG reductions from McKinsey Study (megatons CO2)



Note: Does not include operational and behavioral changes

Source: McKinsey (2007)

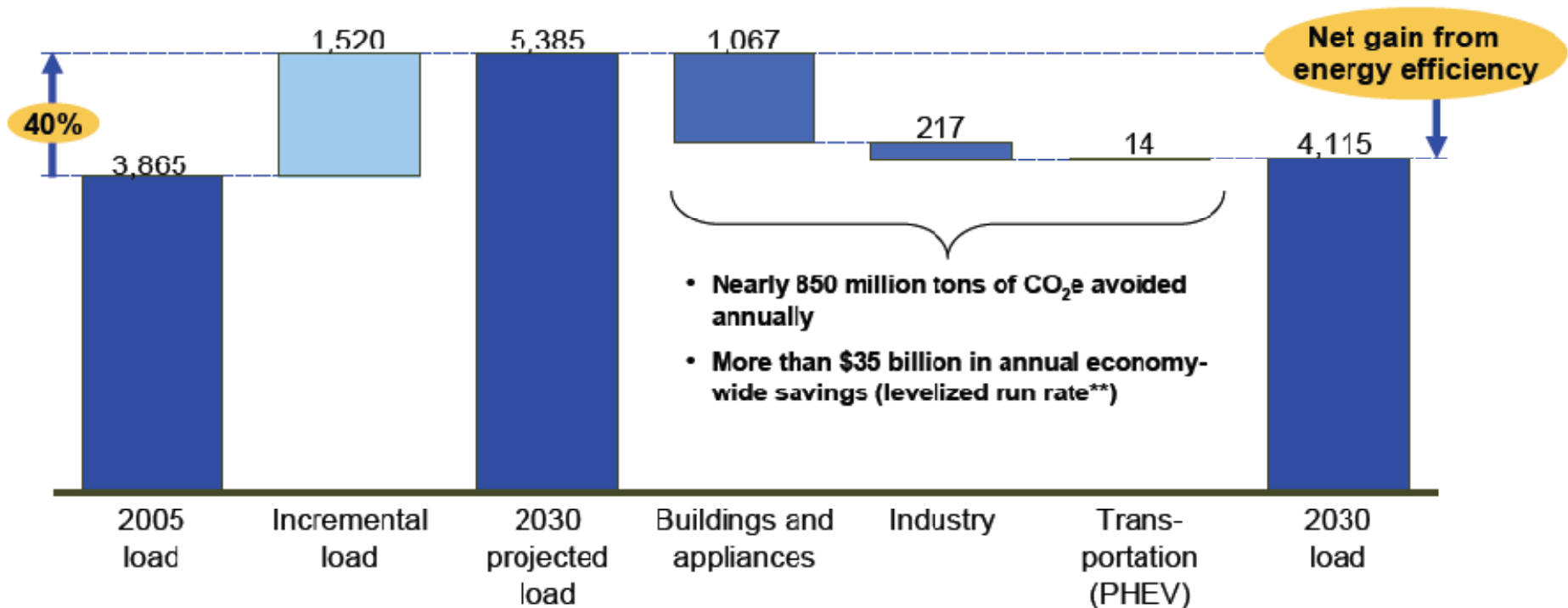
* Modified due to EIAS standard

DRAFT - September 17, 2008

Energy efficiency has potential to offset majority of projected new-build through 2030*

MID-RANGE
CASE – 2030

Terawatt-hours

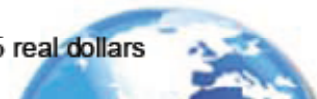


- Opportunity set represents the realistic potential (adjusted for economics, behavioral, and structural issues), not a forecast
- Capturing a significant portion of this will require policy change
- Timing and magnitude of capture will have significant implications on product markets, asset planning and development strategies

* Energy efficiency would not completely offset the need for new construction, as additional power plants will be required to replace current facilities nearing retirement

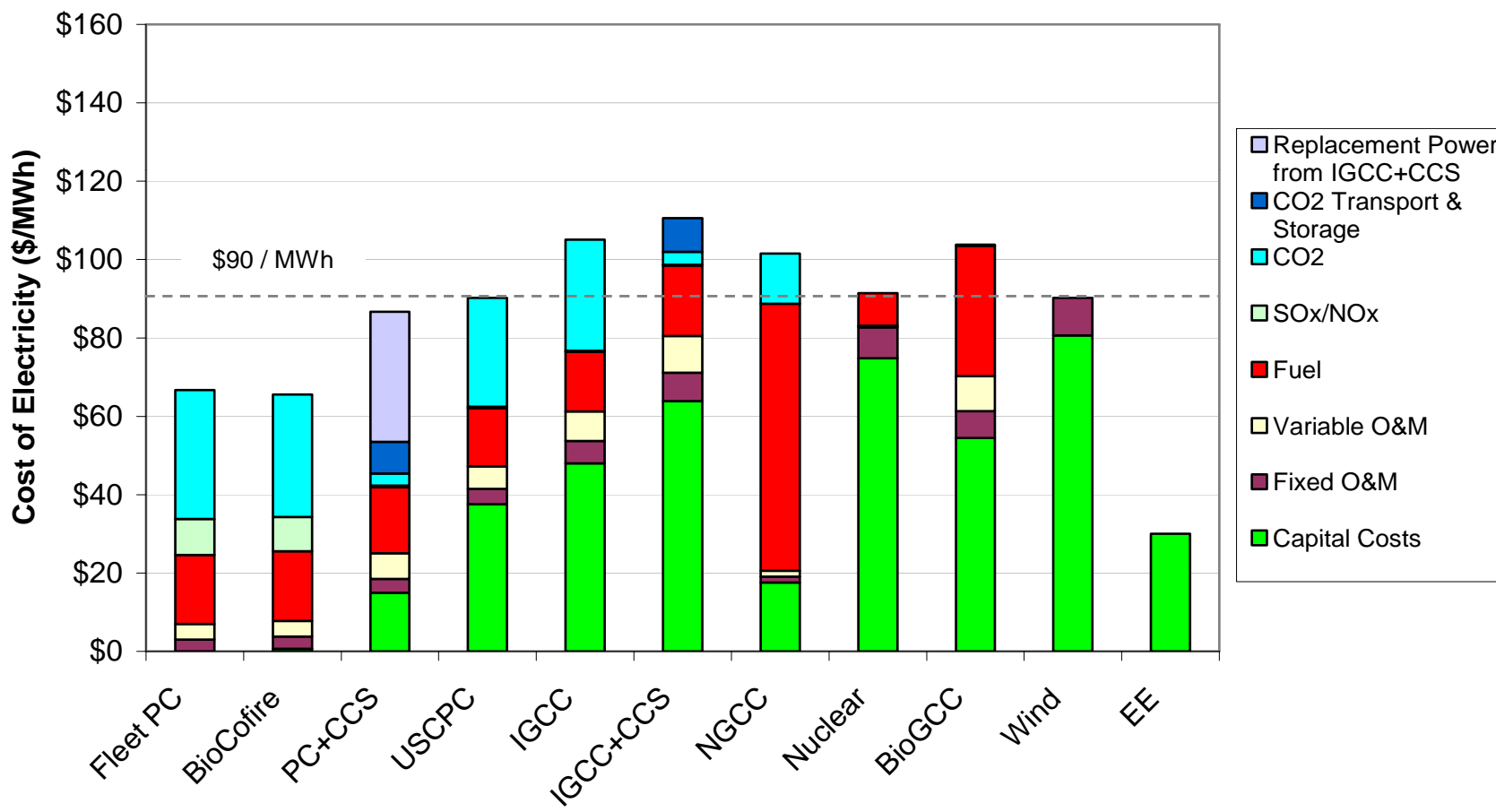
** Savings (capital and operating expense) levelized at 7% real discount rate over the lifetime of a measure; 2005 real dollars

Source: U.S. EIA Annual Energy Outlook (2007) "Reference case;" McKinsey analysis



EE Highly Cost Competitive -- More So When Carbon Is Included

Cost Components Vary for Enabling Technologies
 Current Cost Basis (2008\$) at CO₂ = \$35/tonne



Barriers to Cost-effective EE

- Market barriers
 - Principal/agent problems (aka, “split incentives”)
 - Architect/engineer/developer vs. buyer
 - Landlord vs. tenant
 - Unpriced externalities (GHG emissions, pollutant health effects)
- Customer barriers
 - Inadequate information (e.g., EE measures, energy services)
 - Limited access to capital
 - Behavior/organization failures:
 - High transaction costs, large numbers of small savings
 - Fractured organizational accountability for energy
 - Inflated perception of risk
- Public policy barriers
 - Utility incentives for increased sales and rate base
 - Disconnected utility, state, and regional energy planning
- EE program barriers
 - Lack of knowledge about effective EE programs, portfolios, and strategies
 - Inadequate energy services workforce (training QA/QC)

- Barriers exist across all key market players
- Many barriers can be cost-effectively addressed
- **Barriers not substantially addressed by price**
- Doing so reduces economic cost of climate policies



State Policies Critical

- Air quality rules
 - CHP
 - Backup generation
- Utility regulation
 - Level of investment in EE, DG
 - Quality of and benefits from these investments
 - Time of day pricing
 - Interconnection standards for DG
- Building codes
 - Training
 - Enforcement
 - Verification
- Low income assistance

Overview of EPA Activities

- National Action Plan for Energy Efficiency
- Technical assistance to States / PUCs
- Climate protection programs
 - ENERGY STAR
 - Clean Energy-Environment State/Local Programs
 - Green Power Partnership
 - CHP Partnership
 - Climate Leaders
 - Climate Technology Initiative





National Action Plan for Energy Efficiency Addresses Utility Barriers

- Released on July 31, 2006 at the National Association of Regulatory Utility Commissioners meeting
- Goal: To create a sustainable, aggressive national commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organizations
- 60 member public-private Leadership Group developed five recommendations and commits to take action
- Commitments to energy efficiency by 120 organizations
- Released its Vision for 2025 in November 2007

National Action Plan for Energy Efficiency Recommendations

1. Recognize energy efficiency as a high-priority energy resource.
2. Make a strong, long-term commitment to implement cost-effective energy efficiency as a resource.
3. Broadly communicate the benefits of and opportunities for energy efficiency.
4. Provide sufficient, timely and stable program funding to deliver energy efficiency where cost-effective.
5. Modify policies to align utility incentives with the delivery of cost-effective energy efficiency and modify ratemaking practices to promote energy efficiency investments.



Vision for 2025

- Released November 12, 2007
- Long-term Aspirational Goal
 - To achieve all cost-effective energy efficiency by the year 2025
 - Equivalent to more than 50% of expected growth over next twenty years
- Framework for implementing Action Plan recommendations
 - Puts the 5 recommendations into Action
 - Is a plan – need to know where you want to go in order to get there
 - A challenge for new thinking
 - Is a living document; open to new ideas; will be refined
- 10 Implementation Goals
 - Action needed over next 10-15 years to help lay policy foundation by 2025
 - Highlights need for new technology
- Offers initial approach to measure progress
 - Currently being refined by Leadership Group
- Not a mandate; respects state processes – not one size fits all



Vision 2025

10 Implementation Goals

1. Establish Cost-Effective EE as a High-Priority Resource
2. Develop Processes to Align Utilities Incentives Equally for Efficiency & Supply Resources
3. Establish Cost-Effectiveness Tests
4. Establish Evaluation, Measurement, and Verification Mechanisms
5. Establish Effective Energy Efficiency Delivery Mechanisms
6. Develop State Policies to Ensure Robust Energy Efficiency Practices
7. Aligning Customer Pricing and Incentives to Investment in Efficiency
8. Establish State of the Art Billing Systems
9. Implement State of the Art Efficiency Information Sharing and Delivery Systems
10. Implement Advanced Technologies



Clean Energy State Utility Commission Assistance

- Key areas of interest include:
 - Integrating clean energy resources into resource planning
 - Aligning utility incentives with energy efficiency investment
 - Developing and delivering a portfolio of clean energy programs
 - Conducting studies of clean energy potential
 - Evaluating, monitoring, and verifying clean energy program impacts
 - Interconnection standards
 - Rate design for distributed generation, such as standby rates

- EPA assistance:
 - Supporting focused workshops on key topics
 - Providing training to commissioners and staffs
 - Linking commissions with other related federal resources
 - Fostering peer exchange amongst state commissions

ENERGY STAR

Comprehensive Energy Efficiency Program



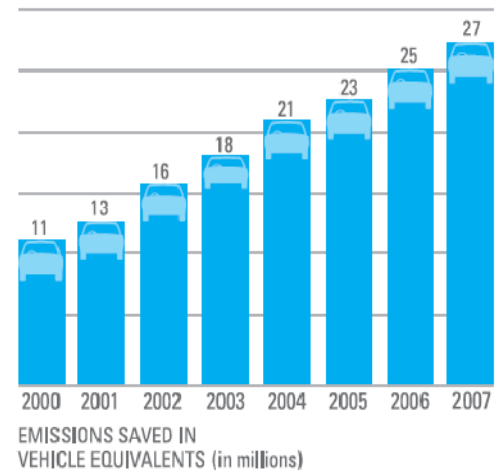
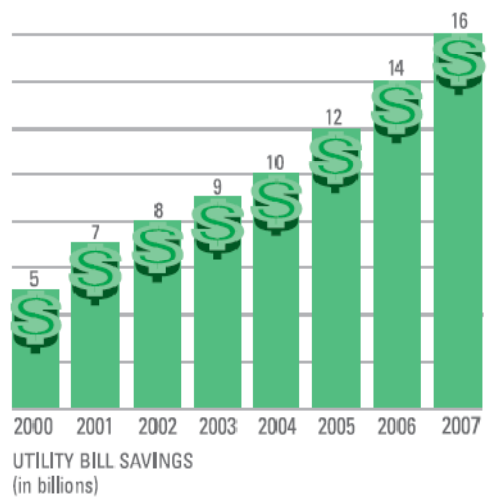
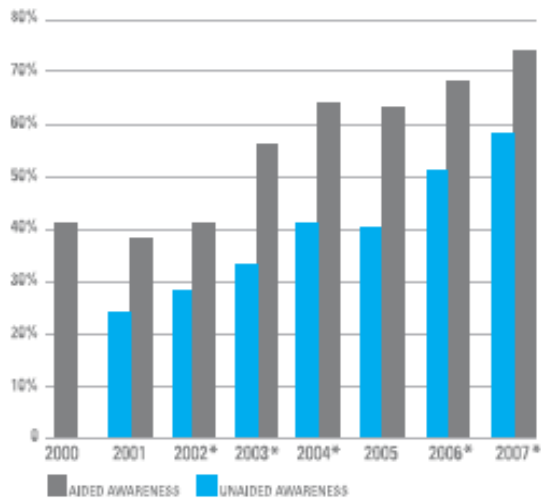
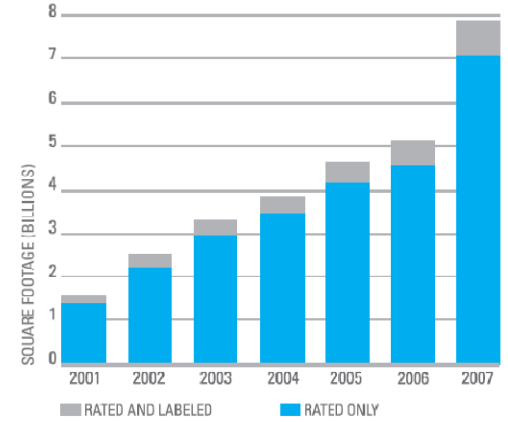
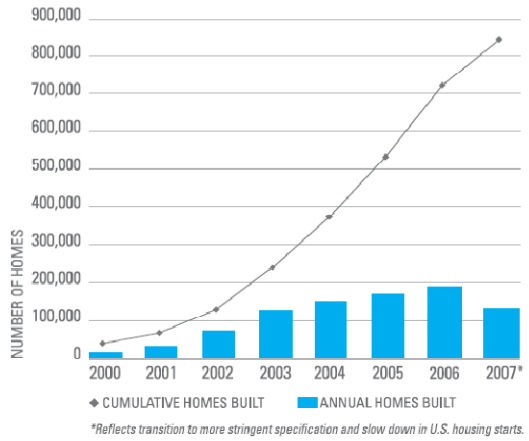
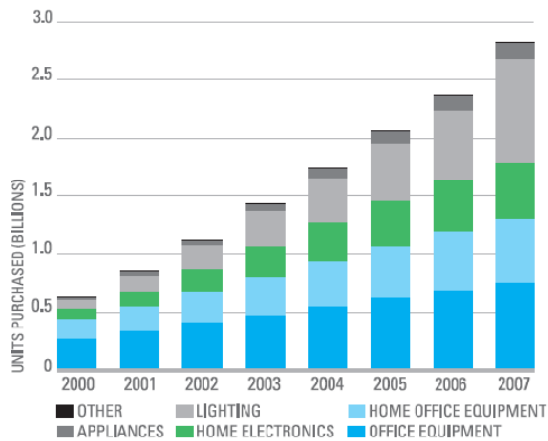
- Credible national label on cost-effective, efficient products
 - 50 plus product categories
 - 70 percent public awareness of the label
 - 2,000 manufacturers; hundreds of retailers
 - Engaged with hundreds of utilities, other energy efficiency program administrators, state and local governments
- Program for new home construction
 - Label on homes that are 20 to 30 percent more efficient than code
 - 10% market share nation-wide; greater than 20% in many markets
 - Almost 1 million ENERGY STAR homes
 - 5,000 engaged builders and hundreds of utilities and other energy efficiency program administrators
- Program for improving efficiency of commercial buildings
 - Offer proven approaches for improved corporate energy management
 - Standardized measurement – mpg rating for buildings
 - Recognition of efficient buildings – more than 5,000 ENERGY STAR labeled buildings including office, schools, hotels, hospitals, groceries, etc
 - ENERGY STAR buildings using 35 to 40 percent less energy than average buildings
 - Engaged utilities, other energy efficiency program administrators, state and local governments
- Program for improving efficiency of industrial sectors



10 industrial sectors engaged; 40 industrial facilities have earned the ENERGY STAR



Growing Results





Key Resources

- Quick start guide to energy efficiency programs
- Residential Sector
 - Energy efficiency campaigns
 - Best practices in development of new homes programs for program sponsors
 - Financing Guidebook for Energy Efficiency Program Sponsors: Residential Sector
 - Guide to Implementing Home Performance with ENERGY STAR
- Commercial and Industrial
 - National campaign to benchmark and improve buildings
 - Customer outreach tools
 - Standardized building energy rating system
- Integration with broader environmental issues
 - Addressing energy and water efficiency objectives
 - Achieving efficient & green buildings

Clean Energy-Environment State Program



Clean EnergyEnvironment
STATE PARTNERSHIP

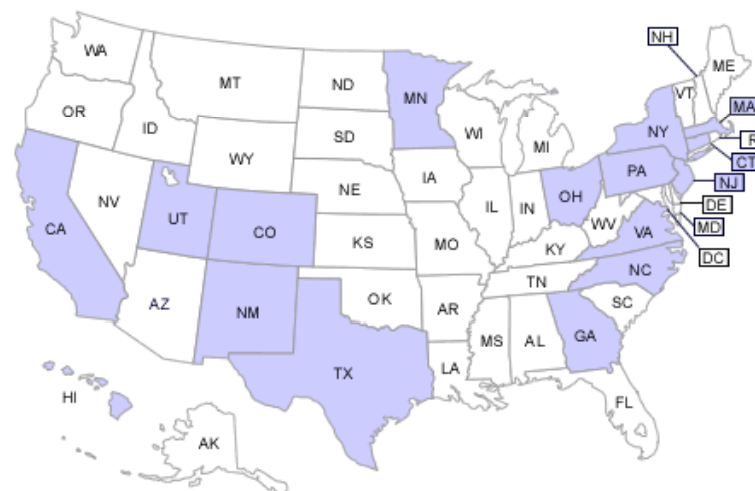
A voluntary state-federal partnership with leading states to advance clean energy policies to achieve economic, public health, and environmental goals

Partners take action:

- Foster collaboration among state agencies
- Establish 1 or more clean energy goals
- Conduct analyses, evaluate options and measure benefits
- Develop and implement clean energy-environment action plan

EPA provides:

- Technical assistance evaluating options
- Targeted guidance and analysis
- State-to-state peer exchange support
- Information about funding opportunities and related clean energy resources
- National recognition



Participating States (16):

CA, CO, CT, GA, HI, MA, MN, NC,
NJ, NM, NY, OH, PA, TX, UT, VA

These States Represent More Than...

- 52% of U.S. population
- 48% of U.S. energy consumption
 - 6 of 10 highest energy consuming states
- 55% of total U.S. GSP
- 46% of total U.S. CO₂ emissions from fossil fuel combustion



Key Resources

- Guide to Action
 - Assistance on 16 clean energy policies
- Tech Forum Calls (7 - 9 per year)
 - RECs
 - Understanding the Grid
 - Water and Energy
- In development
 - State Lead by Example Guide
 - Guide to Action for Local Governments
 - Guide on Urban Heat Island Mitigation
 - Guide on Calculating Co-benefits of Clean Energy Policies
 - Municipal Network of Information

Policy
State Planning and Incentive Structures
Lead by Example
State and Regional Energy Planning
Determining the AQ Benefits of Clean Energy
Funding and Incentives
Energy Efficiency Actions
Energy Efficiency Portfolio Standards
Public Benefit Funds for Energy Efficiency
Building Codes for Energy Efficiency
State Appliance Standards
Renewable Energy and Combined Heat and Power
Renewable Portfolio Standards
Public Benefit Funds for Clean Energy Supply
Output-Based Environmental Regulations
Interconnection Standards
Fostering Green Power Markets
Utility Planning and Incentive Structures
Portfolio Management Strategies
Utility Incentives for Demand-Side Resources
Emerging Approaches: Removing Rate Barriers to Distributed Generation

Clean Energy Support



Green Power Partnership

- Works with organizations to buy green power as a means to reduce the impacts associated with conventional electricity use by addressing common market barriers
- Includes more than 850 partners buying more than 11 billion kilowatt-hours of green power each year
 - 60+ colleges/universities participating in a College & University Challenge
 - Fortune 500 Green Power Challenge with a goal to double the green power purchases by Fortune 500 companies from 2.5 billion kWh to 5 billion kWh
- Policy: protecting integrity of voluntary market

Combined Heat and Power Partnership

- Works with companies and organizations to promote the economic, environmental, and energy infrastructure benefits of CHP
- Assisted in the development of more than 4,450 MW of new capacity
- More than 240 partners

Climate Leaders



- Announced Spring 2002
- Encourages corporate leadership
- Key requirements
 - Complete GHG inventories using established protocols
 - Develop inventory management plan
 - Establish aggressive GHG reduction goal
 - Report on progress toward goal
 - Allow site visits
- Now
 - More than 200 companies – from diverse industries representing 8% of US emissions
 - 80 have announced aggressive goals (50/50 absolute vs intensity-based)
 - 11 have met their goals and are renegotiating
- Goals add up to 13 MMTCE above business as usual
- Approaches being incorporated into mandatory GHG reporting



Using EE for Emissions Reductions in RGGI

- States must auction a minimum 25% of their allowances for “consumer benefit or strategic energy purposes,” including energy efficiency
- Several states will auction 100% of their allowances for this purpose.
- A University of Maryland study shows that using EE for emissions reductions can offset the increase in electricity prices that would otherwise occur in the RGGI region.



Next Steps

- Climate Change / Air Quality is energy
- EE important part of the solution
- Many state policies hinder / help adoption of EE
- Assist in adoption of state policies that promote EE
 - Endorse Vision 2025
 - Review regional progress
 - Review impact of RGGI
- Support EE/CE programs
 - Peak energy focused
- New state-level partnerships on energy planning/issues
 - How can EPA help