National Action Plan for Energy Efficiency

www.epa.gov/eeactionplan

Capturing Cost-effective Energy Efficiency: Progress, Challenges and Opportunities

ACEEE Energy Efficiency as a Resource Conference
September 29, 2009

Stacy Angel
Climate Protection Partnerships Division, U.S. EPA

Where We Started in 2005

- Challenging energy fundamentals
  - Demand growing
  - Supply costs increasing
  - Carbon policy uncertainty
  - Rising customer bills and CO2 emissions
- Opportunities for, benefits of, and barriers to energy efficiency not realized or broadly understood
  - Limited use of programs, despite proven models
  - Lack of stable and sufficient funding to reach potential
- Core state policies govern investment in efficiency
  - Regulatory barriers – roadblock between PUCs and utilities
  - Need for model policies and sharing of best practices
- Need to bring all parties together to advance efficiency

National Action Plan for EE

- Goal: Capturing all cost-effective EE by 2025
- Accomplishments
  - Recommendations on EE across diverse stakeholders
  - Policy framework for capturing all cost-effective EE and measuring progress
    - Vision 2025
  - New momentum for EE
    - Organization commitments -- more than 120
    - New EE institutions / investment
  - Suite of technical resources
    - Fact-based, standardized terms and “How-to” Guides
    - Used in PUC filings and cited in PUC and Congressional testimony
  - Strong technical assistance platform
    - Over 60% of states received technical assistance in 2009

Existing Resources

- Policy Framework / Measuring Progress toward Goal
  - Vision for 2025: A Framework For Change (’08)
- Guides
  - Understanding Cost-Effectiveness of EE Programs (‘08)
  - Model Efficiency Program Impact Evaluation Guide (‘07)
  - Guide on Conducting Potential Studies (‘07)
  - Guide on Integrating EE in Energy Resource Planning (‘07)
  - Aligning Utility Incentives with Investment in EE Paper (‘07)
- Other Resources
  - Utility Best Practices Guidance for Providing Business Customers with Energy Use and Cost Data (’08)
  - Resource Database (’07)
  - Communications Kit (’06)
  - Energy Efficiency Benefits Calculator (’06)
  - National Action Plan for Energy Efficiency Report (’06)

Additional Resources -- 2009

- Guides
  - Rapid Deployment Energy Efficiency (RDEE) Toolkit (Fall 2009)
  - State and Local Lead-by-Example Guides
- Issue Papers
  - Customer Incentives for EE through Electric and Natural Gas Rate Design
  - *Customer Incentives for EE through Program Design (underway)*
  - Customer Perspectives on Delivery of EE
  - Energy Efficiency as a Low-Cost Resource for CO2 Emissions Reductions
  - Efficiency Program Administrator Interactions with Codes
  - *Coordinating Demand Response and Energy Efficiency (underway)*
- Other
  - *Most Energy Efficient Economy (underway)*
  - *Forward Looking EM&V (underway)*

Action Plan Resources Assist Parties Advance the Vision Goals

Goal	In '06 Report	Technical Resource	Work In Process
1: Establish Cost-Effective EE as High-Priority Resource	✓	✓	
2: Develop Processes to Align Incentives Equally for EE & Supply Resources	✓	✓	
3: Establish Cost-Effectiveness Tests	✓	✓	
4: Establish EM&V Mechanisms	✓	✓	✓
5: Establish Effective EE Delivery Mechanisms	✓	✓	✓
6: Develop Related State Policies		✓	
7: Align Customer Pricing and Incentives	✓	✓	
8: Establish State of the Art Billing Systems		✓	
9: State-of-Art Information Sharing & Delivery Systems			✓
10: Implementing Advanced Technologies			✓

RDEE Toolkit

- Planning and implementation resource for states and local governments to help them deploy ARRA efficiency funding in successful, sustainable manner
- Documents proven efficiency programs with high potential for clear, measurable, and predictable energy savings and jobs
- Developed through a joint effort of EPA and DOE
  - Contractor support by ICF International
  - Technical input from the Action Plan Leadership Group

RDEE Toolkit

- RDEE Planning Guide
  - Released April 1
  - Key considerations for program planning and budget allocation
  - Snapshots for each program
- Implementation Guide
  - Includes templates /supplemental materials for each RDEE program
  - Available end of Sept. 2009
- Ongoing training and technical assistance
  - Help states implement RDEE programs
  - Hotline: (866) 602-7333, RDEE@icfi.com

Information Provided in Program Snapshots

- Program summary
- Target market
- EM&V
- Infrastructure requirements
- Training needs
- Staffing requirements
- Implementation timeline
- Energy savings
- Participation rates
- Total Budget
- Job creation estimates
- Cost-effectiveness
- Resources and assistance
- Leveraging opportunities

RDEE Programs
Illustrative Quantitative Metrics

	Program	Average Cost per Participant	Jobs per $1M	Per Unit Source MBtu Saved	**Source Mbtu saved per $1,000**
Residential	ENERGY STAR Products	$ 26	9	3	87
	Easy Audit and Direct Install	$ 990	21	5	5
	HPwES	$ 5,850	20	60	10
	Efficient Heating and Cooling	$ 290	14	25	85
C&I	Prescriptive	$ 3,610	9	400	110
	Custom	$ 20,000	16	1,500	123
	Retrocommissioning	$ 48,100	12	5,800	120
	Commerical Benchmarking and Performance	$ 40,000	12	2,900	72
	On-Site Energy Manager	$ 47,600	8	4,500	94
	Commerical Food Service	$ 1,400	7	60	40

RDEE Programs
Illustrative Qualitative Metrics

Program	Applica-bility	Simplicity & Lack of Risk	Sustain-ability	Leverage
RESIDENTIAL				
ENERGY STAR Products	High	High	Moderate	High
Easy Audit and Direct Install	High	Moderate	High	Moderate
HPwES	High	Moderate	High	Moderate
Efficient Heating and Cooling	High	High	Moderate	High
NON-RESIDENTIAL				
Prescriptive	Moderate	High	Moderate	High
Custom	Moderate	Moderate	Moderate	Moderate
Retrocommissioning	Moderate	Moderate	Moderate	Moderate
Commercial Benchmarking and Performance	Moderate	Moderate	High	Moderate
On-Site Energy Manager	Low	Moderate	High	Moderate
Commercial Food Service	Moderate	Moderate	Moderate	Moderate

National Action Plan
EM&V Technical Work Group

- Work Group diverse by geography and perspectives formed in Spring 2009
  - 3 Co-Chairs: Dian Grueneich (CPUC), Diane Munns (Mid-American), and Phil Giudice (MA DER)
  - 20 Work Group members: PUCs, energy offices, 3rd party program admin, IOU, public power, national EE organizations, ESCO, and FERC staff
- Considering EM&V in context of the new EE environment with:
  - Significantly larger EE funding, multiple sources and delivered by multiple entities;
  - Rising costs based on current methods; and
  - Increased reliance on collaborative, market transformation and/or public education

National Action Plan
EM&V Technical Work Group (2)

- 3-phase process for exploring / developing improvements to current approaches over a 2-year period.
  - **PHASE 1:** Refine understanding of key EM&V purposes, needs and issues with existing approaches and prioritize areas for further work (2009)
    - Technical support from LBNL, Schiller, and Itron
    - *Product*: Technical summary report of findings, priorities, options and strategy for exploring options under Phase 2 (ETA: December 2009)
  - **PHASE 2:** Explore/Discuss/Develop new options or protocols as identified
    - *Product:* TBD based on Phase 1 (ETA: 2010)
  - **PHASE 3:** Draft product(s) and conduct stakeholder review
    - *Product:* TBD based on Phase 2 (ETA: January 2011)

Most Energy Efficient Economy (MEEE) Project

- Develop an assessment framework to:
  - Evaluate potential to improve energy efficiency of the economy
  - Develop sector energy, carbon and capital efficiency metrics
  - Evaluate relative performance of advanced technologies and practices
- Support integrated energy efficiency decisions at the utility level:
  - Natural gas and electricity
  - End-to-end, from generation to end-use
- Three-phase project
  - **PHASE 1:** Identify technologies / most efficient countries *Complete*
    - Informed by 10 member work group, including EPRI, GTI, NEMA, NCR, CEC, NYSERDA, ACEEE, WA UTC, CT Consumer Counsel, NJNG, Duke Energy, MEEA
    - Advanced energy efficiency in supply, T&D, and end-use
    - Also capturing demand response and on-site renewable generation
  - **PHASE 2:** Assess impacts from technologies using building simulations *(Dec. '09)*
  - **PHASE 3:** Develop/use broad assessment framework (for economy) *(Spring 2010)*
    - Kick-off call mid-October
    - To be informed by results of technology work group
- Technical support by ICF International

MEEE Project Overview

Country and Metric Analysis	Technology Assessment and Selection	Building Simulation	System Assessment
Metric approach for U.S. energy, carbon, & capital efficiency	Define sectors, building types, and broad technology scenarios (see chart)	Model building types with today's technologies to determine: - Energy use - Load factor	Define hypothetical system: - mix of building types - generation mix - emissions factor
Identify leading countries by key metrics	Research technologies and their performance from available sources and leading countries	Model technology bundle(s) to determine: - Energy use - Load factor	Conduct assessment for system metrics under broad scenarios - energy efficiency - carbon efficiency - load factor
	Technology selection consistent with broad scenarios		
	Bundle technologies into compatible collection(s)		

Additional Projects Underway

- Coordinating DR & EE Program Paper
  - Summarize existing research on EE/DR coordination and present new information, gathered through interviews with program administrators, customers, and service providers
  - Late Fall 2009 release
- Customer Incentives through Programs Briefing
  - Summary of options for motivating customers to invest in energy efficiency through programs
  - Useful to multiple parties with target audience of PUCs getting started with energy efficiency programs
  - Complement to Customer Incentives through Rate Design briefing
  - December 2009 release

State Technical Assistance Update

- Direct technical support to states
  - DOE assisted over 30 states on related efficiency policy and programs, to increase leveraging ARRA funding
  - Energy office program technical assistance through ARRA and RDEE Toolkit
  - EPA assisting energy and air regulators – new EPA State Climate and Energy Partner Network
- Action Plan resources play a key role
  - Offering neutral, fact-based guides and reports
  - Consistent terminology, definitions
- Additional technical assistance on current EM&V approaches
  - New training presentations to support implementation of existing guide
  - EM&V issues webinars – staring Fall 2009

Measuring Progress Update

Policy Step - Electricity	Additional Progress
Process in place, such as a state and/or regional collaborative, to pursue EE as a high-priority resource	17
Policy established to recognize EE as high-priority resource	9
Potential identified for cost-effective, achievable EE over the long term.	9
EE savings goals or expected energy savings targets established consistent with cost-effective potential.	9
Utility and other program administrator disincentives are removed.	6
Utility and other program administrator incentives for EE savings reviewed and established as necessary.	13
Cost-effectiveness tests adopted which reflect the long-term resource value of EE	9
Administrator(s) for EE programs clearly established	9
Programs established to deliver EE to key customer classes and meet EE goals and targets.	8
Strong public education programs on EE in place.	12
State appliance standards in place	27
Policies in place to remove barriers to combined heat and power.	6

Note: Reflects progress from Dec. 31, 2007 to Dec. 31, 2008
Source: Initial draft Action Plan Vision Measuring Progress, subject to final review

Measuring Progress Update (2)

Policy Step - Gas	Additional Progress
Policy established to recognize EE as high-priority resource	8
Utility and other program administrator disincentives are removed.	6
Utility and other program administrator incentives for EE savings reviewed and established as necessary.	8
Cost-effectiveness tests adopted which reflect the long-term resource value of EE	12
Administrator(s) for EE programs clearly established	6
Programs established to deliver EE to key customer classes and meet EE goals and targets.	11
Strong public education programs on EE in place.	11
Energy efficiency program administrator engaged in developing and sharing program best practices at the regional and/or national level.	5
State appliance standards in place	27

Note: Reflects progress from Dec. 31, 2007 to Dec. 31, 2008

Source: Initial draft Action Plan Vision Measuring Progress, subject to final review

Where Are We Today?

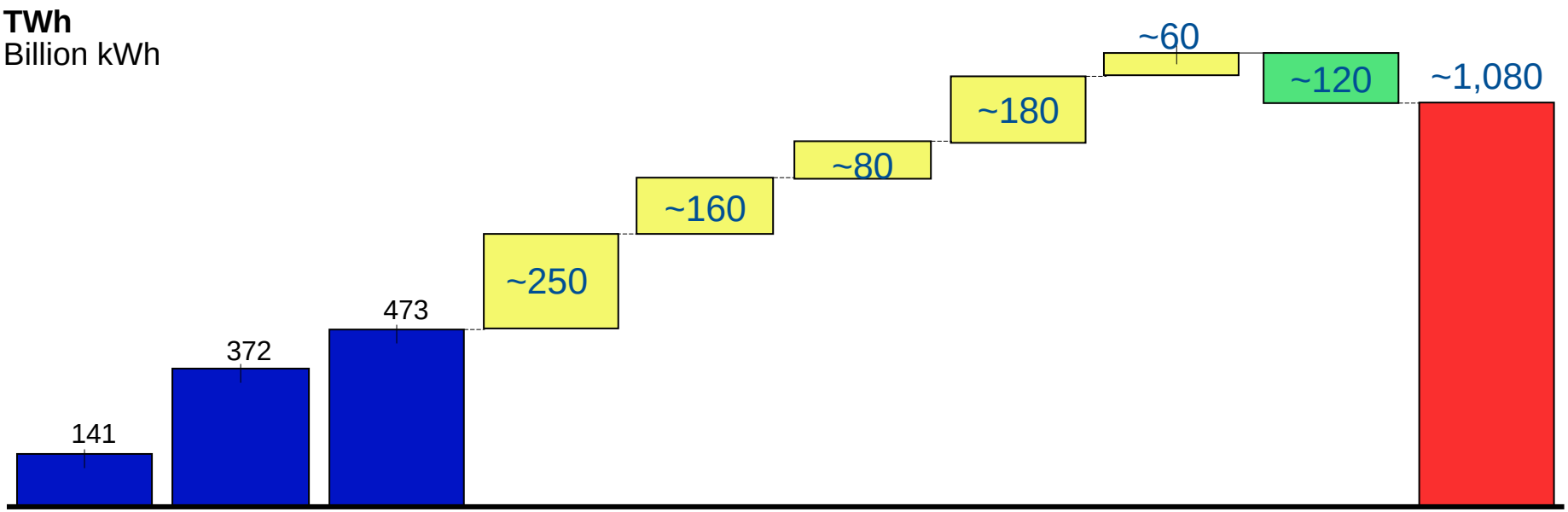
- Substantial progress on EE, but large cost-effective potential still untapped
  - Is EE competing as a resource?
- Key drivers have changed
  - New funding landscape with ARRA
  - Important emphasis on accountability / EM&V
  - Climate legislation passed House – EE provisions reduce cost of meeting carbon cap
- Still need to bring all parties together to advance efficiency

Large Potential for Cost-effective Energy Efficiency

- Studies
  - McKinsey: Unlocking Energy Efficiency in the U.S. Economy (July 2009)
  - EPRI: Assessment of Achievable Potential from Energy Efficiency and Demand Response (January 2009)
  - National Academy of Sciences: America's Energy Future (in process)
- Common findings
  - Energy efficiency offers a vast low-cost energy source for the U.S. – economic potential of 11-24% of total electricity consumption by 2020
  - Significant / persistent barriers to EE need to be addressed on multiple levels
  - New sources of no- and low-carbon energy generation necessary with EE as part of a portfolio of energy solutions.
- McKinsey-EPRI Results Similar for 2020 Economic Potential

Comparison between EPRI and McKinsey EE potential values, 2020

2020 Electricity Energy Efficiency Potential
(Relative to AEO 2008 Reference Case)

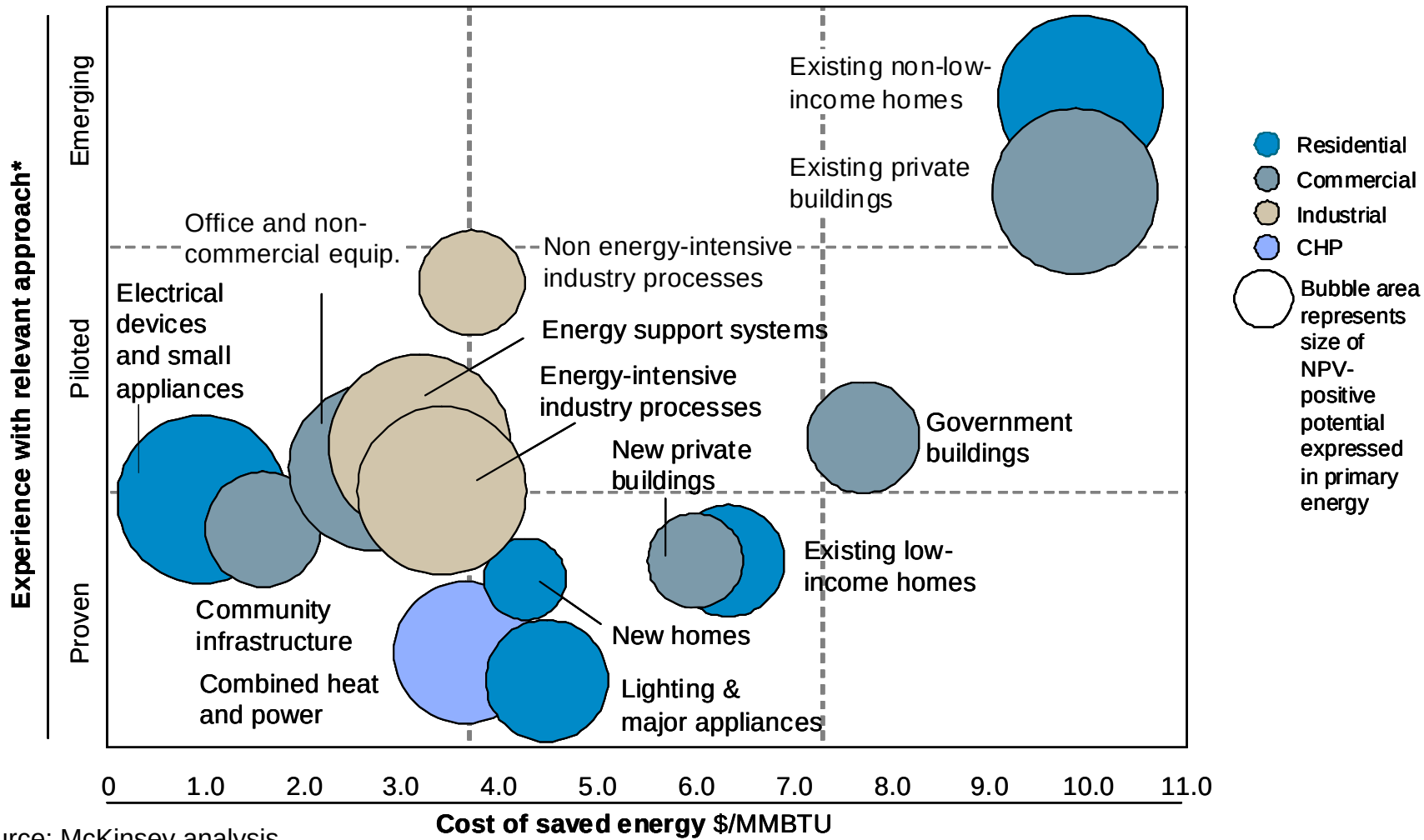


EPRI Realistic Achievable Potential	EPRI Maximum Achievable Potential	EPRI Economic Potential	McKinsey includes more types of electrical devices[1]	McKinsey includes wider set of technologies in selected end-uses[1]	McKinsey includes additional market segments	McKinsey allows accelerated equipment replacement (i.e. prior to end of life)	McKinsey assumes evolution of LED lighting technology & economics over time[1]	EPRI estimates greater heat pump and commercial lighting potential[1]	McKinsey NPV-Positive Potential

1 Includes small differences in technology performance and cost assumptions, discount rates, and electricity rates between the two reports

Meeting U.S. Potential Requires Addressing All Sectors and Barriers

Illustrative Portfolio Representing Cost, Experience, and Potential with Specified Efficiency Strategies



Source: McKinsey analysis

Funding Picture

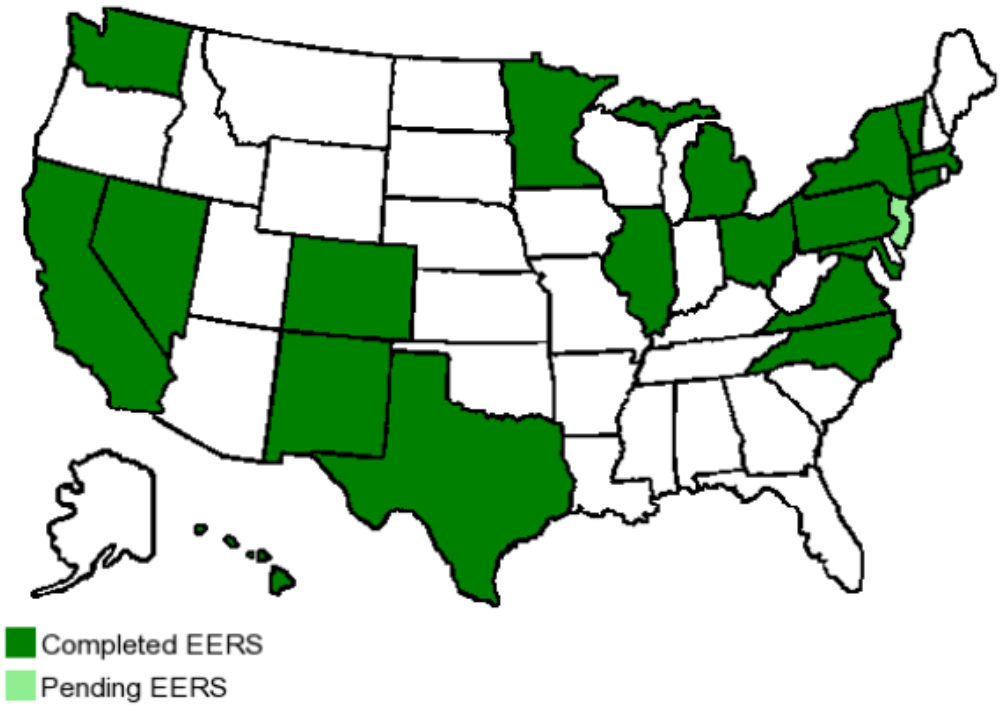
- McKinsey estimates need for 5 x current funding
- EE program funding at ~$2B* before stimulus
- Stimulus adds >$10 B
- EERS's drive funding
- Carbon policies

*Estimates based on best available data, differences exist in reported data for same across surveys and fillings

States, Legislation Setting Policy Direction for Energy Efficiency

- Several states have set policy direction by releasing energy efficiency savings goals
  - 18 states have adopted EERS which typically set goals for utilities with PUC oversight
  - IRP / DSM planning driving higher EE funding in many states
- ACES allows for EE to meet 25-40% of Renewable Energy Standard (RES)
  - 20% in 2020

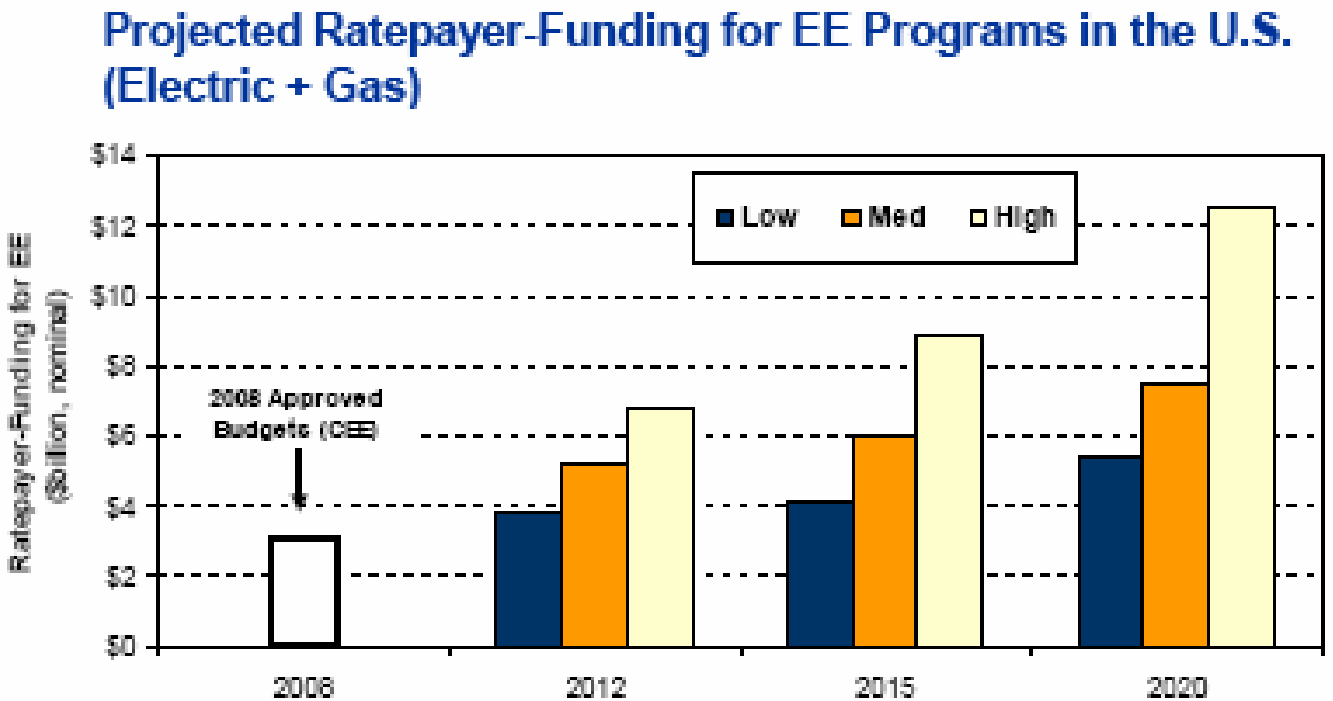
Energy Efficiency Resource Standards



Source: Map from Pew Center for Climate Change, updated August 6, 2009

U.S. On Path to Increased EE Program Funding

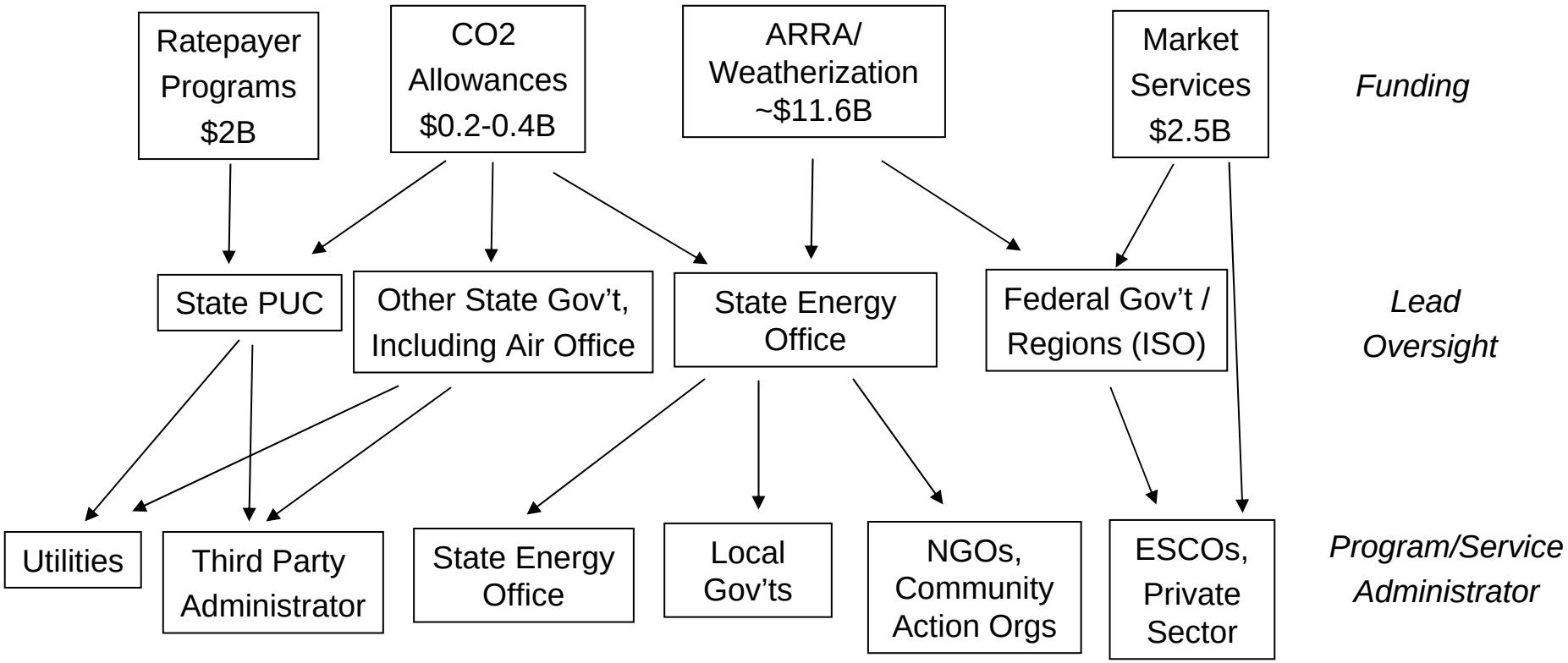
- LBNL projects 2020 EE funding at 2.5x current funding in medium case (4x high)
  - All cases exclude stimulus funding
  - Leading state funding increase, while greater portion of total estimated to occur outside of the top-10 markets by 2020 (i.e., 42-45%, compared to 22% today)
- EPA estimates ACES CO2 allowance value for EE (to States and Gas LDCs) @ $4B+/yr (2012-2050)



Source: LBNL's The Shifting Landscape of Ratepayer-Funded Energy Efficiency in the U.S. (2009) by Galen Barbose, Charles Goldman, and Jeff Schlegel

ARRA, Carbon, and Markets Bringing New Funding & Savings

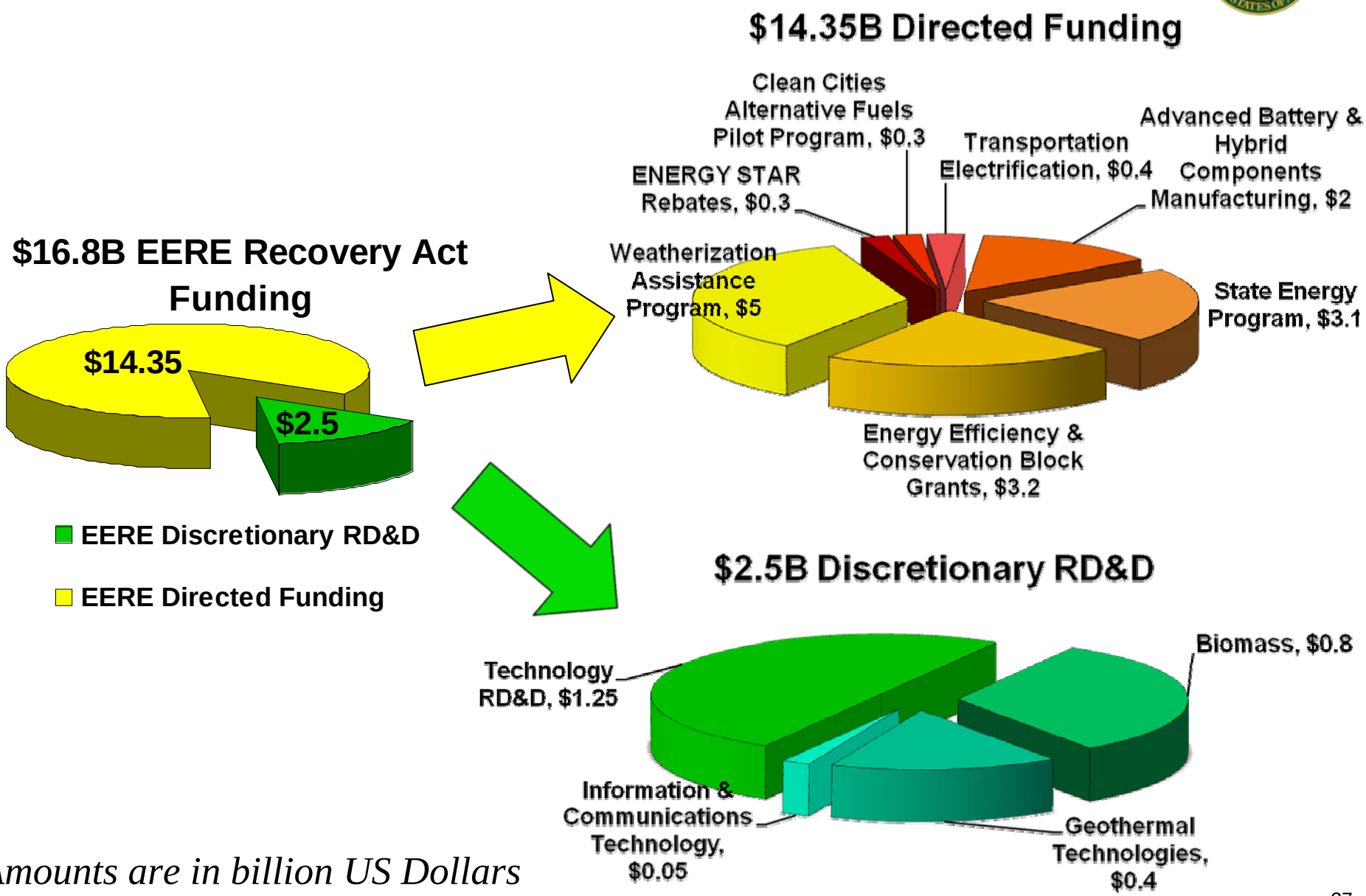
Illustrative Flow Chart of Today's Energy Efficiency Program/Services Landscape



Note, Graphic is purely illustrative for discussion purposes, customer cost share often required in addition to program funding.

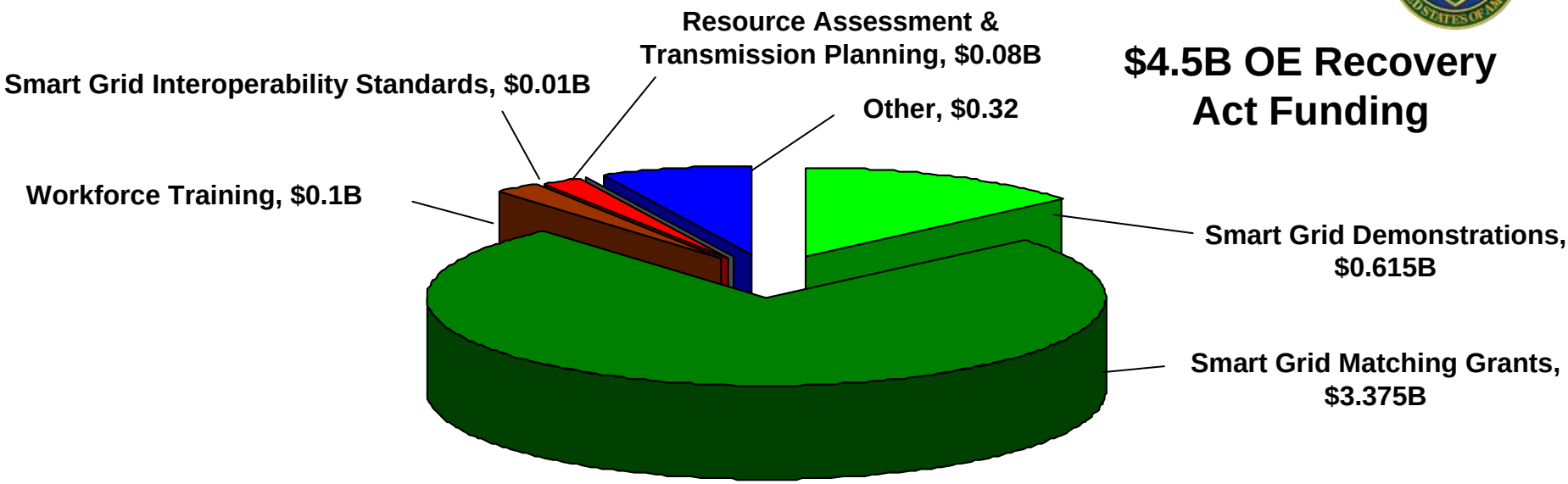
Sources: Ratepayer funding estimate based on Action Plan Vision measuring progress, CO2 allowance revenue for RGGI states based on EPA analysis, Market Services funding reflects revenue from ISO capacity markets and ESCO industry revenue from EE estimated by LBNL for the year 2006.

EERE Recovery Act Funding



Amounts are in billion US Dollars

DOE – OE Recovery Act Funding



- Assistance to State Electricity Regulators
  - Funding to PUCs; can be used to hire/retain staff to accelerate reviews of the large number of electric utility dockets expected under ARRA
  - $44M awarded Sept 21 to 47 PUCs
  - Additional large increase technical assistance to PUCs pending
- Utility Workforce Training
  - Funding to support training of utility workers in a number of key high demand/need areas, including utility energy efficiency program staff
  - $1OOM available thru competitive bids. Bids due Nov. 30

Northeast Carbon Market (RGGI) Also Funding EE Programs Today

- All Regional Greenhouse Gas Initiative (RGGI) states to devote significant auction proceeds to EE
- $187-356 million (43-82%) of the $433 million raised in RGGI auctions will be spent on various energy efficiency programs
  - Member states independently determine how to allocate allowances and how to spend the proceeds of the allowance auctions
  - Use of EE funds subject to state agency decisions
  - Funding resulted from 5 quarterly regional auctions of more than 141 allowances
- Range of players implementing program and providing oversight

Summary of RGGI Funding to Energy Efficiency

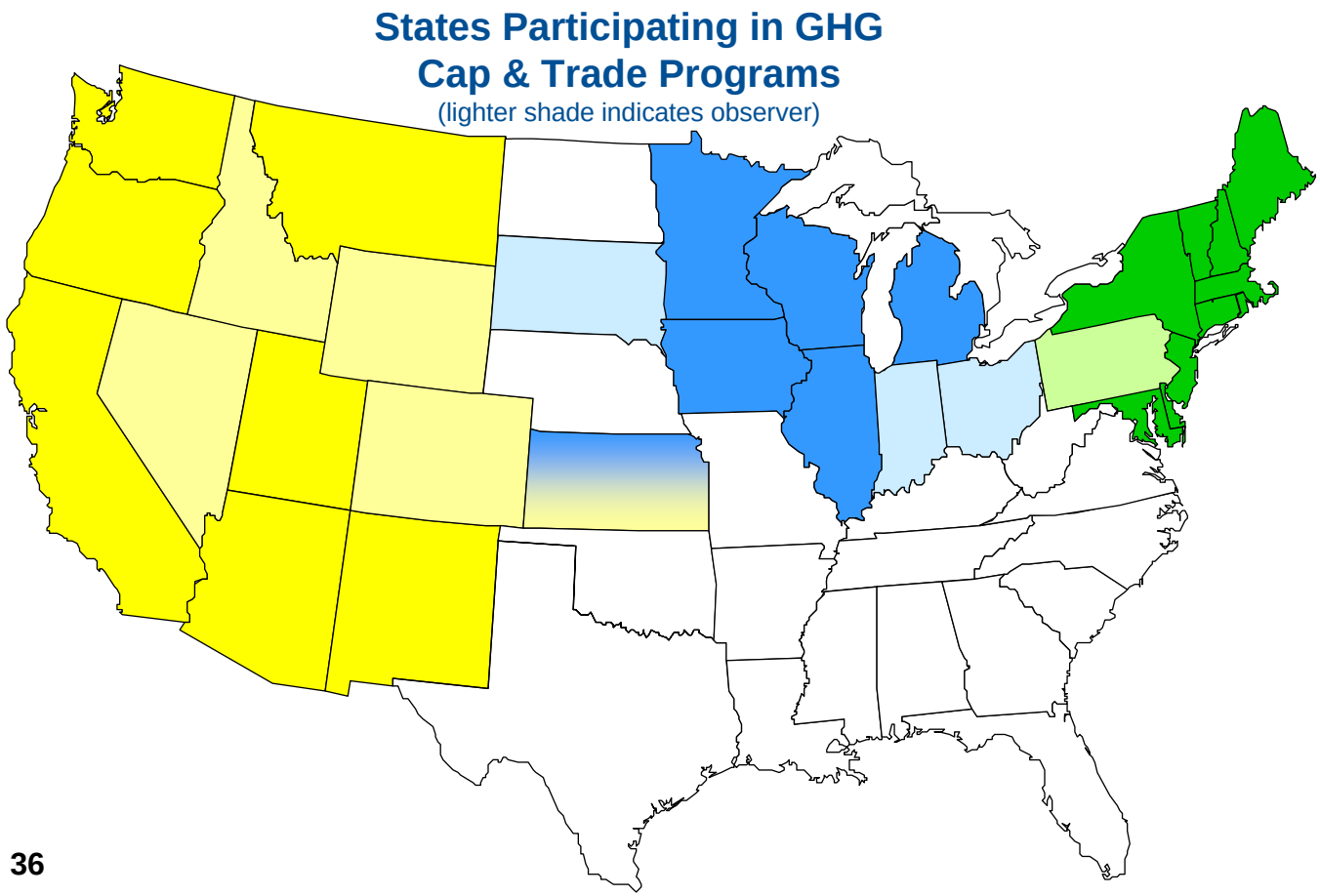
RGGI State	Million Dollars	% of total allowances	State agency oversight of EE programs funded by allowance auctions	Program Administrator(s)
CT	$15.8	53%	Energy Conservation & Management Board	IOUs & Muni
DE	$7.4	45%*	Sustainable Energy Utility Oversight Board, State DHSS	Sustainable Energy Utility, weatherization program
ME	$13.5	96%	Public Utilities Comm., Energy & Carbon Savings Trust	Efficiency Utility, winners of a grant competition
MD	$39.0	39%	State Energy Administration	State Energy Administration
MA	a % of $69.0**	**	Dept. of Env. Protection / Dept. of Energy Resources	Utilities, DOER, weatherization program
NH	$13.7	63%*	Public Utilities Commission	Winners of a grant competition
NJ	$30.9	60%*	Economic Development Authority	Winners of a grant competition
NY	a % of $155**	**	NYSERDA, Dept. of Env. Conservation, PSC	NYSERDA
RI	$7.0	100%*	Office of Energy Resources, Dept. of Env. Mgmt., EE and Resources Mgmt. Council	IOU
VT	$3.2	100%*	Public Service Board	3rd party provider through competitive solicitation

* = renewable energy & low-GHG energy is eligible

** = specific breakdowns were not specified in the authorizing legislation/rulemaking and are determined by the oversight agency

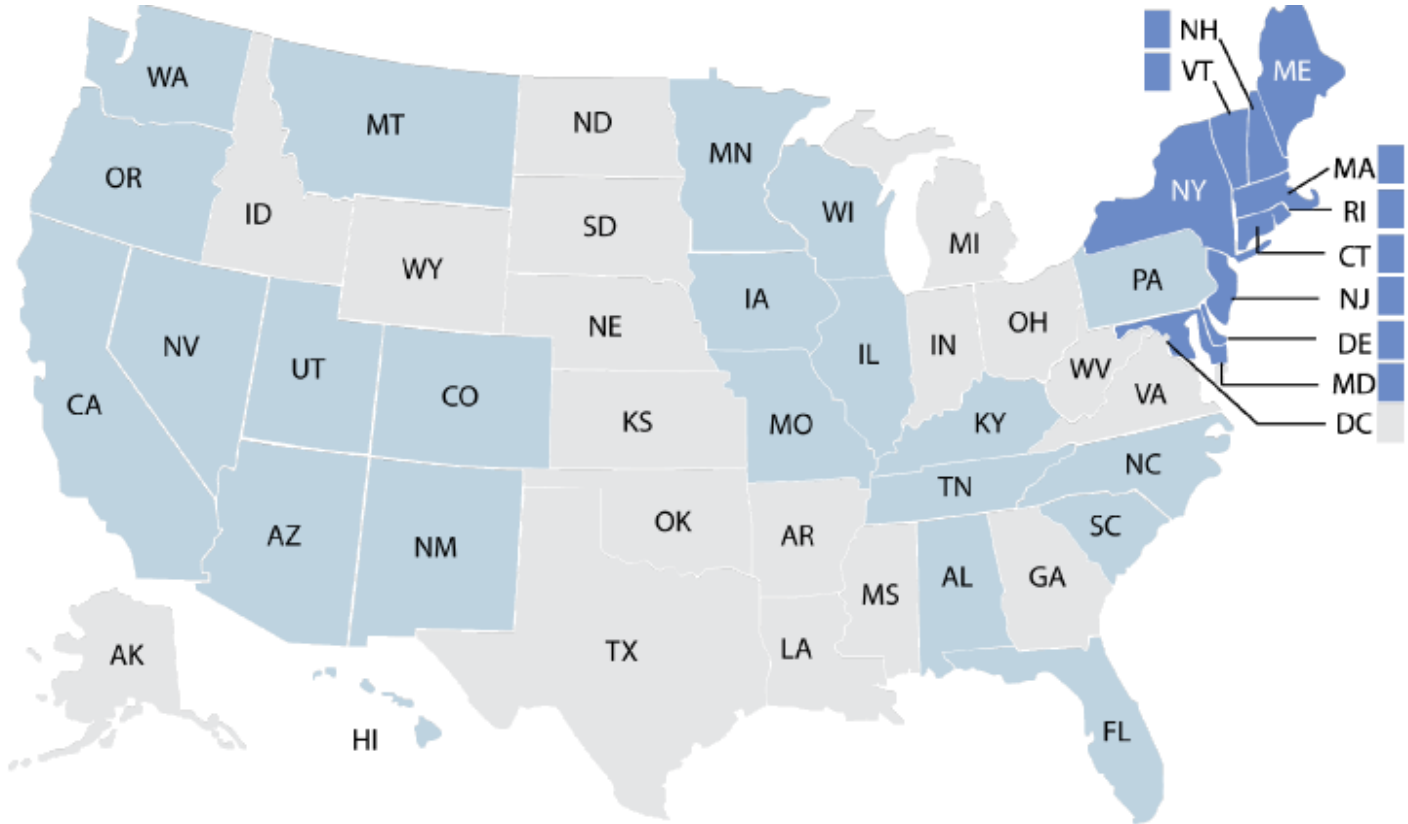
Source: Preliminary EPA staff analysis

Additional States Are Advancing GHG Cap & Trade Programs



Source: EPA http://epa.gov/climatechange/wycd/stateandlocalgov/state_actionslist.html

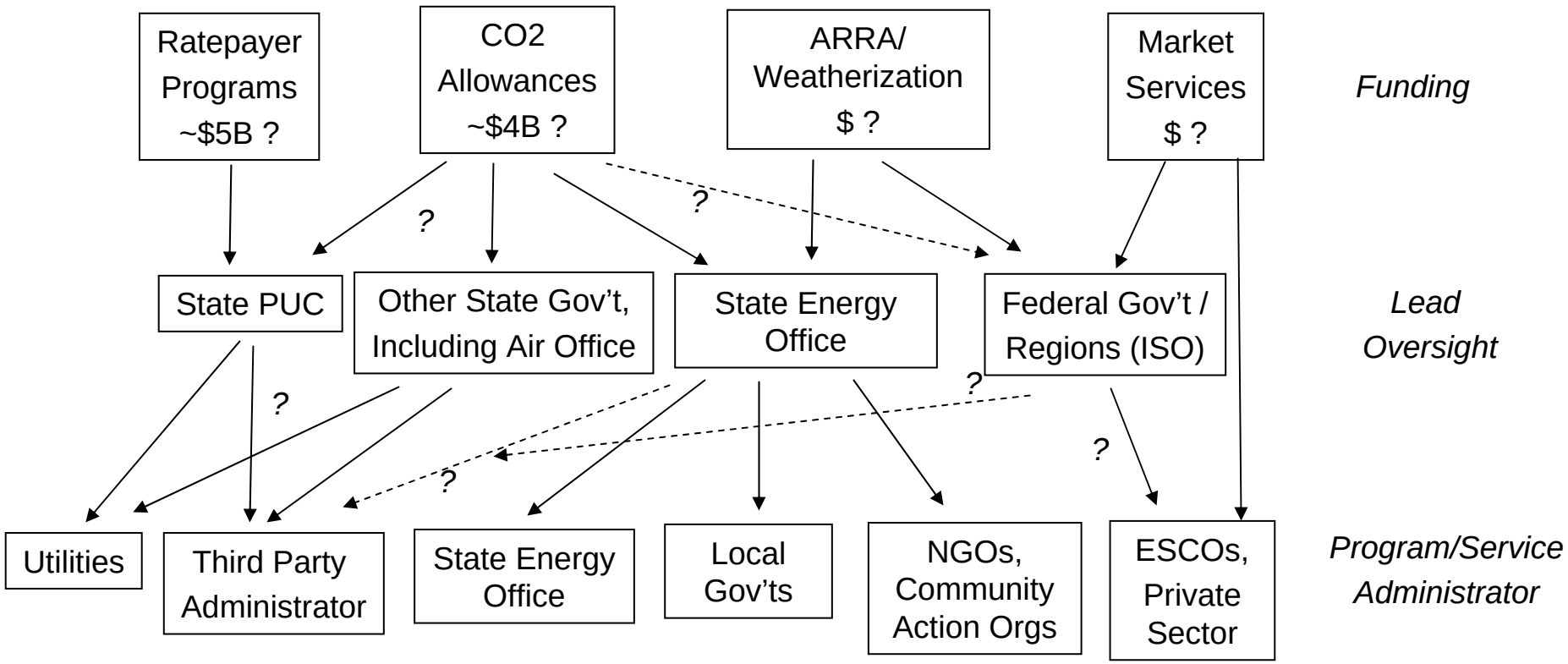
State Climate Action Plans Also Leveraging Energy Efficiency



Source: National Action Plan for Energy Efficiency "Energy Efficiency as a Low-Cost Resource for Achieving Carbon Emissions Reductions" (2009)

Future for Efficiency? Changing Roles and Funding?

Uncertainty Exists in Future Landscape for Energy Efficiency Programs



Note, Graphic is purely illustrative for discussion purposes, customer cost share may be required in addition to program funding.
Sources: Ratepayer funding estimate based on LBNL analysis, CO2 allowance revenue for EE based on EPA analysis of ACES

Other Important Issues To Achieving All Cost-effective EE

- Is the U.S. workforce ready to meet the need?
  - EE Services Sector study (LBNL and Research in Action, 2009)
    - Workforce needs could easily increase by four-fold by 2020
    - Current workforce small, challenged to meet near-term needs
    - New skill needed in existing fields and new specializations developing
  - 10+ states and several cities have issued Green Jobs initiatives, capturing energy efficiency
  - Regional energy efficiency organization activity
- Is EE being used as a resource at state / regional levels?
  - ISO capacity markets
  - Regional resource planning
  - Transmission planning

Key EE Themes From Across Parties / Regions

- Still work to do to achieve all cost-effective efficiency
  - States are in different places
  - Even leading states have technical assistance needs
- Coordination across funding, services, and players critical
  - More state players need to be engaged
  - Consumer engagement
  - Leveraging private sector funding
- Making energy efficiency resources work for everyone
  - EM&V discussions are key
  - Cost-effectiveness may need refining
  - Solid program design

How to Get Involved

- Compare your state to Action Plan Vision steps
- Explore options for making additional progress
  - Action Plan reports and guides
  - Search Resource Database for more
- Participate in energy efficiency activities
  - Coordinate
  - Collaborate
  - Comment
- Commit to take action
- Spread the word

For More Information

- Join the Action Plan Listserv
  - eNewsletters, announcements
  - Join at www.epa.gov/eeactionplan
- Contact
  - Stacy Angel, US EPA

    angel.stacy@epa.gov
  - Larry Mansueti, US DOE

    lawrence.mansueti@hq.doe.gov