

### Efficiency and Markets: US Experience and Lessons Learned

Market-based instruments (MBIs): Policy choice and design of Energy Efficiency Obligations and auctions

### Richard Cowart Director, European Programmes

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The Regulatory Assistance Project (RAP)®

## **Major points today**

- 1. US Context for EEOs, Standard Offers & Auctions
- 2. Lessons learned from EEO administration
- 3. Efficiency bidding in US Capacity Markets



### MBIs in the US – context

- Regulation of power and gas delivery lies mostly with the states, acting largely through state energy regulators (PUCs or PSCs)
- Thus, EEOs in the US are mostly **state-based**, not federal programs
- 1980s and 1990s –regulators required "least-cost integrated planning" including end-use efficiency. Many utilities launched efficiency programs.
- 1990s and later: When competition ("restructuring"/liberalisation) arose in about half of the states, many states built on this history to continue EEOs in the new market structures.
- The federal regulator (FERC) now includes demand-side solutions in its regulation of wholesale power markets
- Thus US has decades of MBI experience in both traditional and competitive markets.



## 1. EE Benefits larger than we thought



- Production Energy
- Production Capacity
- Avoided Emissions
- Transmission
  Capacity
- Distribution Capacity
- Line Loss Reduction
- Avoided Reserves
- Lower Risk
- Non-Energy Benefits
  - Environment, Air, Water
  - Building durability, comfort,
  - Health & safety

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Demand reduction has reduced US carbon emissions almost as much as renewables and natural gas combined

Panel C. Carbon dioxide



Source: The Sources of Decreasing US Electricity Sector Emissions Joshua Linn, Kristen McCormack (Posted at Resources for the Future, Jan 3, 2017)

### 2. Design the Program to Work for Customers: EEOs Must Overcome Stubborn Market Barriers

#### **Market barriers**

Lack of information

**Upfront costs** 

Payback periods - high implicit discount rate

Consumer inertia: Hassle factor, timing mismatches

Split incentives – eg, Builder/buyer Tenant/landlord

**Unpriced external costs** 

Uncompensated benefits –eg, system reliability

Key Lessons, 20+ years Experience:

- **Barriers are same** in both traditional utility systems and liberalised markets (EU & US have both)
- Single-barrier attempts don't work (pricing alone, financing alone, etc.)
- Consumers need trusted information, quality assurance, and financial help
- Public investment (from gov't or all consumers) is needed to remove barriers & leverage sufficient private investment in EE.

### 3. Who Should Be Obligated? – No Single "Best" Model. A Variety of Successful Approaches:

- 1. Obligation on regulated distribution utility Italy; Denmark; most US states, including California; Ontario
- 2. Obligation on competitive retail suppliers Great Britain, France, Ireland; 3 Australian states
- 3. Obligation funded by levy on distribution companies but borne by a state agency *Oregon, & New York (partially)*
- 4. Funded by levy on sales but obligation is on an independent "Energy Efficiency Utility" under a performance contract Efficiency Vermont; Efficiency Maine
- 5. Performance Contracting with 3<sup>rd</sup> parties (other than the obligated entities) *Texas, New Jersey*



# 4. Strong programs can add 2% incremental savings per year

- Energy savings add up, can become one of the largest energy resources in the economy.
- Some obligations now in place:
  - New York -2% per year by 2015
  - ✤ Arizona: -2% annually, over 20% in 10 years
  - Illinois: -2% annually, 2015-2022
  - Massachusetts: -2.3% per year through 2020
  - ✤ New South Wales: growing to save 34% in 11 years
- Leading programs spend 3% to 5% of system revenues on energy savings (.... and save more )



### 5. Quality Control, M&V, and Continuous Improvement are Needed

- Strong, independent oversight is needed usually via independent regulators and transparent reviews
- Down side: Without oversight, programs see cream-skimming, poor quality control, slow learning curves
- Plus side: Ambitious programs benefit from economies of scale, market transformation, and good quality oversight

### 6. Stable & Adequate Funding is Essential

Challenge: how to finance EE programs that must be much larger and cross fuel types?

- **Public FUNDING** = 25-30%; **Private FINANCE** = 70-75%
- Adequate and stable not annual appropriations
- Utility sector funds are not Treasury receipts !
- Benchmark level ? -- at least 3% to 5% of annual system revenues
- *Revenue collection* and *program administration* can be different.
- **Numerous Funding Options** are available Many options are *competitively-neutral*

#### **Competitive example:**

**EE & DR Bidding in Regional Capacity Markets** 

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- Issue: Seeking to ensure reliable capacity on a forwards basis
- Generator proposal: Pay for Generator capacity in advance, for 10-year forward period
- Better solution: allow demand-reduction to bid alongside supply to meet reliability needs
  - First auction (New England ISO) 2007: demand resources including EE won 2/3rds of the bids for new capacity & lowered the clearing price
  - PJM auction (for 2012/2013) DSM bids lowered the clearing price by 90% --Consumers saved \$12 Billion in one auction period alone.
  - Contrast: 1<sup>st</sup> UK auction (2014) limited DR access & got almost nothing from demand response
- RAP's view: Capacity market not the best approach, but if it exists, include DR and EE in it.

### **EE Presence in ISO-NE Capacity Market**

## EE in NE Capacity Market has more than doubled since 2008, now over 1500 MW



Source: George & Rourke, 2012.



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RAP has advised governments in more than 30 countries and 50+ provinces and states, and now has major programmes in the US, China, India and Europe. Our European offices and staff are in Brussels, Berlin, Warsaw, and the UK.

Richard Cowart is the Director of European Programmes, based in Brussels. Richard is a member of the IEA DSM Executive Committee, served 12 years as Chair of the Vermont PSB (utilities regulator), and Chaired the US regulators' Committee on Energy & Environment and the National Council on Competition and the Electric Industry. He is an advisor to the New York Independent System Operator, and past Chair of the Electricity Advisory Committee of the US Department of Energy.

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## EEOs in the US – context

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- 1980s and 1990s States pushed vertically-integrated utilities to conduct "least-cost integrated planning" including end-use efficiency. Many utilities launched efficiency programs.
- 1990s and later: When competition reforms ("restructuring"/liberalisation) arose in about half of the states, many states built on this history to continue EEOs in the new market structures.
- The US has decades of EEO experience in the <sup>16</sup>

# 1. Who's Obligated? – A range of successful approaches are in place

- 1. Obligation on regulated distribution utility Most US states, including California; Ontario, Italy, Denmark;
- 2. Obligation on competitive retail suppliers Texas (via 3<sup>rd</sup> parties under performance contracting) Great Britain, France, Ireland; 3 Australian states
- 3. Obligation funded by levy on distribution companies but borne by a state agency

Oregon & New York (partially)

4. Obligation funded by levy on distribution companies but borne by an independent "Energy Efficiency Utility" *Efficiency Vermont*; *Efficiency Maine* 





# 5. Quality Control, M&V, and Continuous Improvement are Needed

- Strong, independent oversight is needed usually via independent regulators and transparent reviews
- Down side of EEOs: Without oversight, programs see cream-skimming, poor quality control, slow learning curves
- Plus side: Ambitious programs benefit from economies of scale, market transformation, and good quality oversight
- Positive signals: The most active, experienced jurisdictions – e.g., California, Massachusetts, Vermont, New South Wales – are seeking to EXPAND their programs. (Exception: UK 2014-15)

## "Learning curve": over time, annual NEW savings



### However, national mandate needed to overcome slow progress and underperformance in many states

Figure 7 U.S. Electric Program Budgets per Capita by State, 2009, Energy Efficiency Only (Excludes Load Management)



\* Information from at least one known electric program administrator is missing from this state.

\*\* Includes aggregated data from Idaho, Montana, Oregon, Washington, the Northwest Energy Efficiency Alliance and the Bonneville Power Administration.

<sup>†</sup> A portion of this state's budget is incorporated into Tennessee Valley Authority's regional budget.

### 4. EE savings grow over time; utility programs are *in addit to* other public policies (California example)



\*and then were expanded

### 6. Stable & Adequate Funding is Essential

- Challenge: how to finance EE programs that must be much larger and cross fuel types?
- Public FUNDING = 25-30%; Private FINANCE = 70-75%
- Adequate and stable not annual appropriations
- Utility sector funds are not Treasury receipts !

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- FUNDING side : Benchmark level -- at least 3% to 5% of annual system revenues
- *Revenue collection* and *program administration* can be different.
- Numerous Funding Options are available
- Many options are *competitively-neutral*, do not interfere with competition

# 7. Paying for Energy Efficiency – several options for the "public" portion

- Supplier Obligation Rolled into energy costs (UK, France, Texas)
- Supplier Obligation Paid for via a Distributionbased tariff (Italy, Denmark, Vermont, California)
- Funding in rates or through wires/pipes charges in North America is considered part of providing safe and reliable energy services
  - Regulator authorizes collections for service, as for transmission, meters, reserve costs, etc. – these are NOT public Treasury receipts.
- Other ideas: Capacity markets, Tax revenues
- Carbon auction revenue a huge new opportunity (RGGI – 9 states; German carbon fund, Alberta)



### About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power sector. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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## EE savings grow over time; utility programs are in



California efficiency investments lowered demand by 25% over 25 years\*

\*and then were expanded

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- 1990s and later: When competition reforms ("restructuring"/liberalisation) arose in about half of the states, many states built on this history to continue EEOs in the new market structures.
- The US has decades of EEO experience in the "laboratories of democracy" in both traditional and restructured markets.
- The federal regulator (FERC) has now embraced demand-side solutions in its regulation of wholesale power markets

3. Who Should Be Obligated? – No Single "Best" Model. A Variety of Successful Approaches: RAP

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### EE Presence in PJM's CM

Energy Efficiency MW Cleared (in UCAP) in RPM Base Residual Auctions



Source: Esterly, 2013.



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- Carbon auction revenue a huge new opportunity (RGGI – 9 states; German carbon fund, AAU sales in Europe)
- Other ideas: Capacity markets, Tax revenues

### 4. Strong Programs Can Add 2% Incremental Savings Per Year

- Energy savings add up, can become one of the largest energy resources in the economy.
- Mandates should be: Clear, growing, long-term
- Some obligations now in place:
  - ✤ New South Wales: growing to save 34% in 11 years
  - ✤ New York save 2% per year by 2015
  - ✤ Arizona: save 2% annually, over 20% in 10 years
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