RAP Energy solutions for a changing world

Energy Savings Obligations

Global Experience, Lessons Learned

Richard Cowart

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The Regulatory Assistance Project

48 Rue de Stassart
Building C, BE-1050
Brussels, Belgium

Phone: +32 2-894-9300
web: www.raponline.org

The Regulatory Assistance Project (RAP)

RAP is a global, non-profit team of experts providing technical and policy assistance to government officials on energy and environmental issues. RAP has advised governments in more than 30 nations and 55 states and provinces.

Richard Cowart is the Director of European Programmes for RAP, based in Brussels.

A member of the IEA DSM Executive Committee, he served 12 years as Chair of the Vermont PSB (utilities regulator), Chaired the NARUC Committee on Energy & Environment, and the National Council on Competition and the Electric Industry. He now also serves as Chair of the US Department of Energy's Electricity Advisory Committee.

Contacts : *rcowart@raponline.org*

www.raponline.org

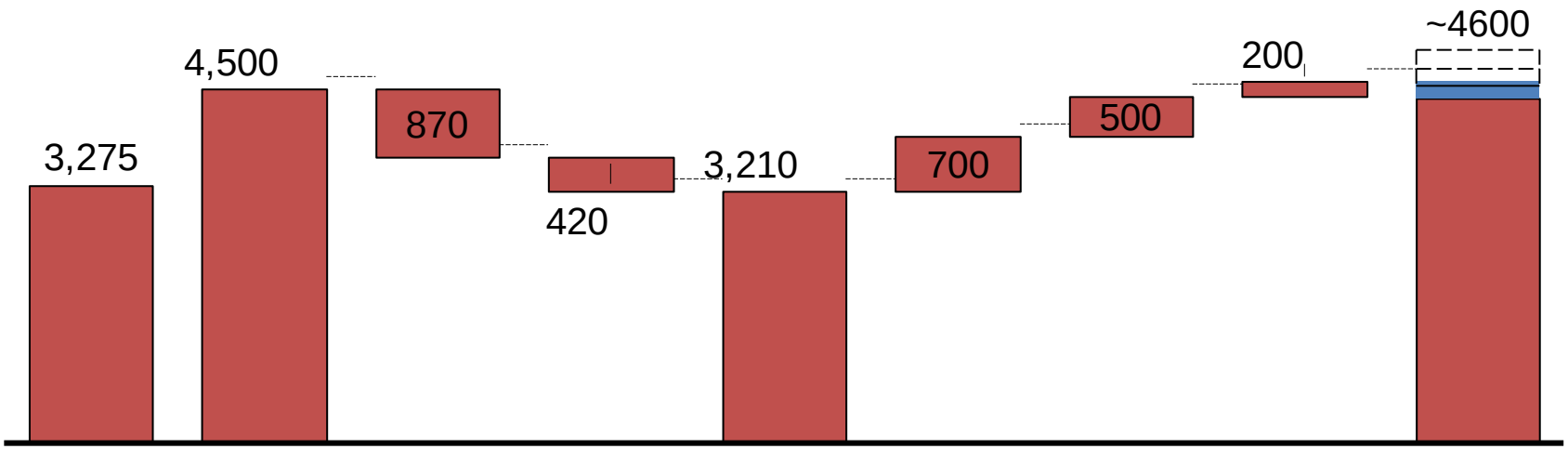
Major points today

1. **“Efficiency First” -- Energy efficiency resources deliver multiple benefits** – to power systems, the economy, consumers, and the environment
2. **Energy savings obligations/white certificates** are powerful tools to deliver efficiency benefits
3. **A variety of structures and approaches are working** well in the US, EU, China, elsewhere -- but in any structure, quality control & design details matter
4. **Key features: Clear obligation, reasonable incentives, stable finance, quality control**

Roadmap 2050: Deep energy efficiency makes room for new electric uses esp. heat pumps and EVs

EU-27 possible net power generation in 2050

TWh per year



1 Assumption: electrification of 100% LDVs and MDVs (partially plug-in hybrids)

2 Assumption: 95% of remaining primary energy demand converted to electricity usage in Buildings for heating/cooling from heat pumps; assumed to be 2.5 times as efficient as primary fuel usage; lower case: electric heat pumps assumed to be 4 times as efficient as primary fuel usage

3 Assumption: 15% fuel switch of remaining primary energy demand converted to electricity in industry for heating from heat pumps; assumed to be 2,5 times as efficient as primary fuel usage; lower case: electric heat pumps assumed to be 4 times as efficient as primary fuel usage

SOURCE: Team analysis

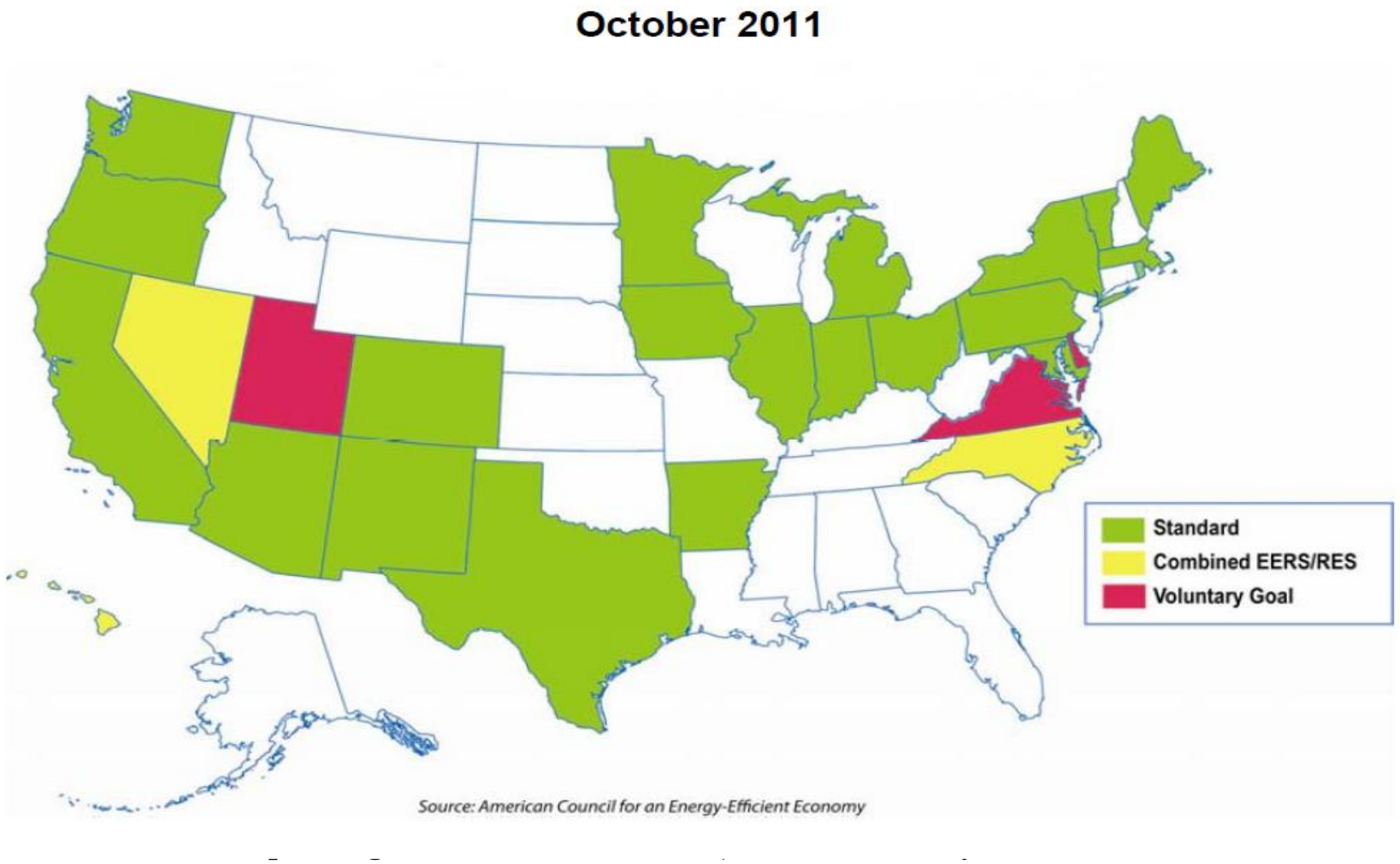
Why Energy Savings Obligations (ESOs)?

- **Market barriers and market failures:** modern economies underinvest in end-use efficiency
- **Consumers need help to invest –** technical, financial, delivery
- **Energy providers are a logical and stable source of revenues:** **ESOs put the responsibility for efficiency on the actors in the sector directly connected to the purchase and sale of energy**
- **Energy providers also have key roles in other parts of an EE policy package –** codes and standards, consumer education, financing, smart metering and tariff reform.
  - Similar to environmental obligations in energy markets, such as Carbon Certificates or Renewables Obligations
- **ESOs lower system costs and lead to LOWER BILLS :**
  - **eg, in the EU, 20% energy savings by 2020 saves (net) 78 Billion Euros per year** (Ecofys-Fraunhofer 2010)

Global Experience with Energy Savings Obligations

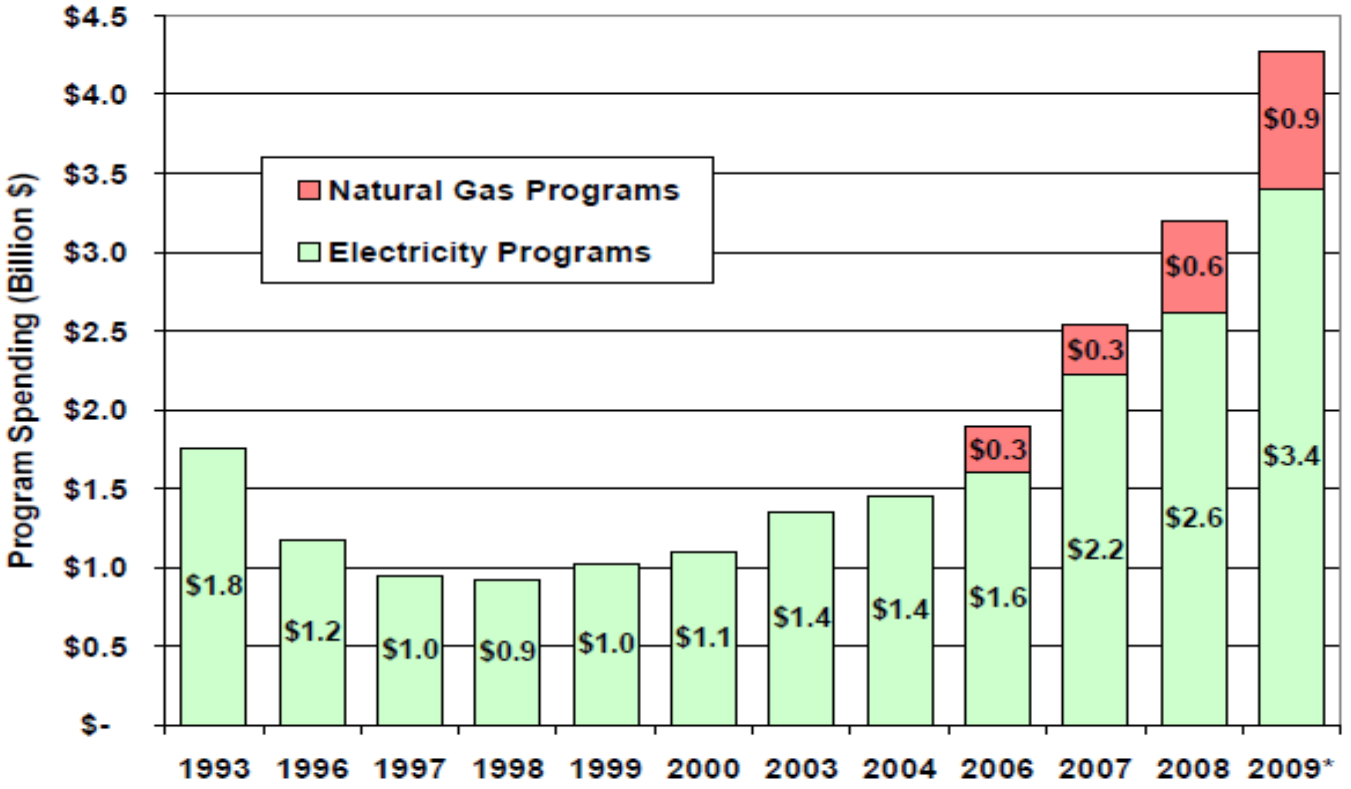
- Europe: 5 Member States or Regions
- 24 US States ("EE Resource Standards")
- Australia: 3 States -- New South Wales, Victoria, South Australia
- China: "Efficiency Power Plants"
- Brazil: 1% for public purposes, ½ for EE
- Other nations acting: Canada, India

US -- 24 US States with EE Resource Standards



EE program spending in the US has increased significantly over the past decade

Figure ES-3. State-Level Energy Efficiency Program Spending or Budgets by Year, 1993–2009



*All values actual program spending except for 2009, which are budgets.
Notes: Includes ratepayer-funded programs. Natural gas efficiency program spending is not available for 1993–2004.
Sources: Nadel et al. (2000); York and Kushler (2002), (2005); Eldridge et al. (2008), (2009)

Source: *ACEEE 2010 State EEE Scorecard* and *Key Findings from ACEEE's 2010 State EE Scorecard*

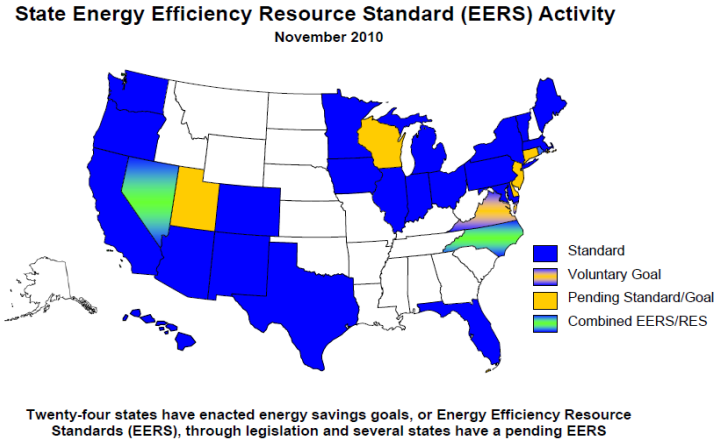
China's New DSM Rule

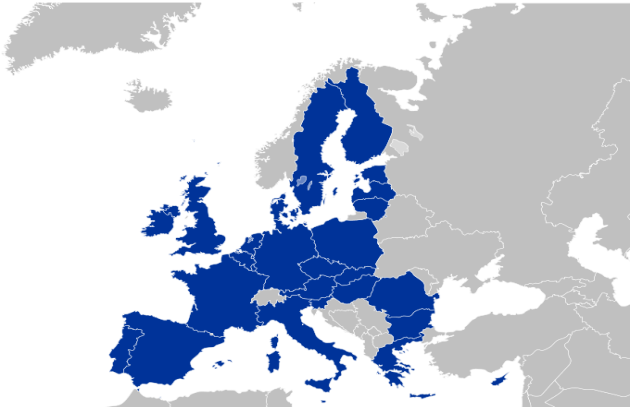
- Issued by National Development and Reform Commission (NDRC) in November 2010
- Took effect January 1, 2011
- Requires grid (distribution) companies to meet
  - 0.3% of annual energy and 0.3% of annual peak demand -- **with EE**
- Mandated 0.3% based on previous year's sales and demand figures
- NB: Chinese power companies have had very robust load management programs for many years

Broader context – EE in China

- China's 12th Five Year Plan (2011 – 2015) calls for
  - **16% reduction in energy intensity over five years**
  - Expansion of "Top 1000" program to "Top 10,000" energy consuming enterprises
  - **17% reduction in carbon intensity**
  - Major pollutants emission reduction of 8-10%
- Energy intensity, carbon, and pollutant reductions are *mandatory*
- China spending on EE: between 3% and 4% of total system revenues (about 1.2% is through utilities, rest is direct government spending)

LESSONS FROM GLOBAL EXPERIENCE



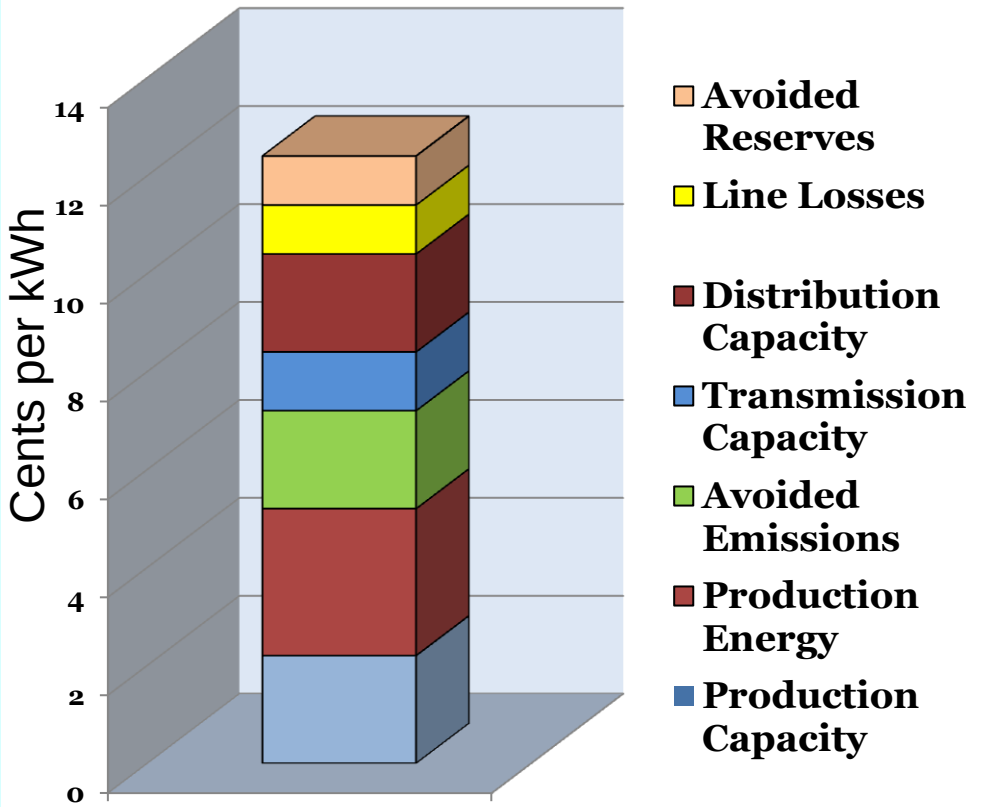


1. Energy Efficiency Has Many Power System Benefits

- Production Energy
- Production Capacity
- Avoided Emissions
- Transmission Capacity
- Distribution Capacity
- Line Loss Reduction
- Avoided Reserves

Plus "Non-Energy" Benefits including:

- Add'l resource benefits (water), building durability, health & safety



* Note: numbers presented in graph are Illustrative

Competitive example: EE & DR Bidding in Regional Capacity Markets

- **Issue**: Power system needs reliable capacity on a forwards basis (to avoid future capacity crisis)
- **Generator proposal**: Pay for Generator capacity in advance, for 10-year forward period
- **Better solution**: Let supply **and demand-reduction also** bid to meet growth 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%** (from ~$179MW/day to $16.46 per MW/day)
- Demand-side winners include utilities, ESCOs and state programs

2. Efficiency Myth: "Markets Alone Will Deliver" Reality: Market Barriers Block Investment

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's Obligated? -- Approaches Vary

At least 5 models have been used in US, AU, EU

1. **Obligation on regulated distribution utility**

   Belgium-Flanders, Italy; most US states, including California

2. **Obligation on competitive retail suppliers**

   Great Britain, France, Australian states: NS Wales, Victoria, South Australia

3. **Obligation borne by a state agency**

   Oregon, & New York (partially)

4. **Obligation on an "Energy Efficiency Utility"**

   Efficiency Vermont* is the leading case; *Efficiency Maine

5. **Performance Contracting with 3rd parties***

   , *(market actors other than the obligated entities)

   Texas, New Jersey

4. Savings Build Over Time

- **Energy savings add up, can become one of the largest energy resources in the economy.**
- **Some obligations now in place:**
  - **New South Wales: growing to save 34% in 11 years**
  - **New York -2% per year by 2015**
  - **Arizona: -2% annually, over 20% in 10 years**
  - **Vermont: -2% annually**
  - **Illinois: -2% annually, 2015-2022**
  - **Massachusetts: -2.3% per year through 2020**

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
- Positive signals: The most active, experienced jurisdictions – e.g.,California, Massachusetts, Vermont, UK, New South Wales, Germany – are seeking to EXPAND their programs.

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 !

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 Distribution-based 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**.
- **Carbon auction revenue** – a huge new opportunity

  (RGGI – 10 states; German carbon fund, AAU sales in Europe)
- Other ideas: **Capacity markets, Tax revenues**

Questions?

Richard Cowart, Regulatory Assistance Project
Posted at www.raponline.org
Email questions to *rcowart@raponline.com*