Overview of

Environmental and Energy Trading

RESNET Rater Audio Roundtable

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Introduction

- New opportunities for energy efficiency programs and suppliers to enhance financial viability
- Monetization of environmental and regional power market value of efficiency
  - What are finance mechanisms?
  - How do they work?

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Market #1

Greenhouse Gas (GHG) offset markets

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Key terms

- CO_2 – Carbon dioxide
- Greenhouse Gas (GHG) Offsets
- Compliance Markets: RGGI/Kyoto
- Cap and Trade vs. mandatory site based reductions
- NO_x – Nitrogen oxides
- Capacity Value
- White Tags/Green Tags
- Measurement, Verification, Accounting

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Why is this important?

1941

2004

Riggs Glacier, Glacier Bay National Park
2,000 feet thick

Photos: U.S. Geological Survey and Bruce Molnia

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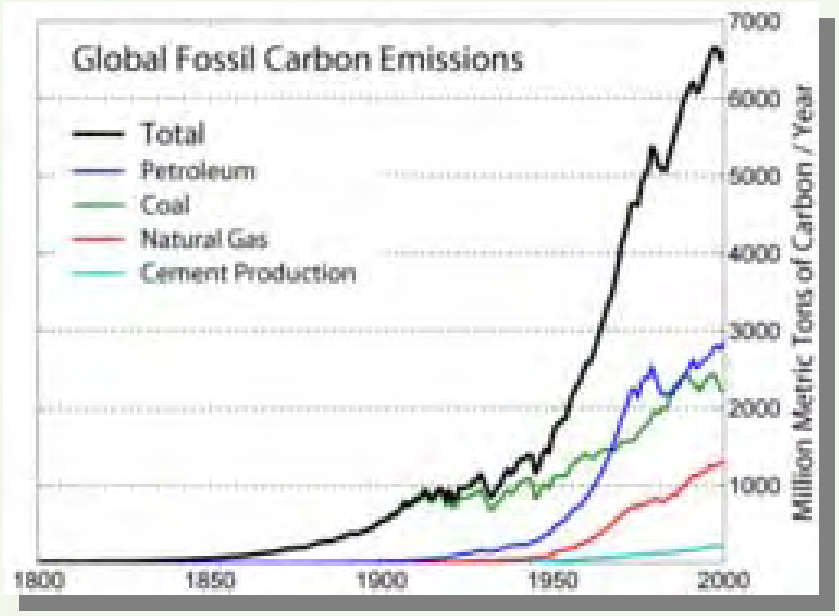
CO_2

- Since the start of the Industrial Revolution, atmospheric CO_2 concentration has increased by about 40% - most since 1945



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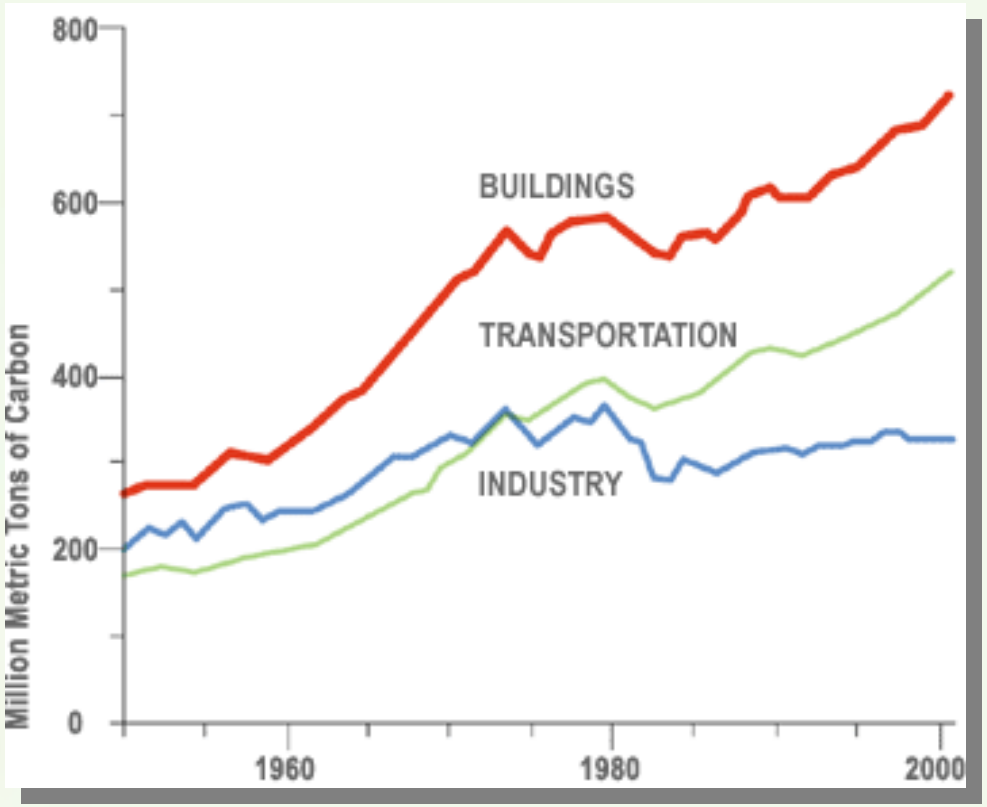
Buildings guilty of GHG emissions



Buildings are responsible for almost half (48%) of all US greenhouse gas emissions annually

Source: Architecture 2030; U.S. Energy Information Administration statistics

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Greenhouse Gases

- Water vapor, carbon dioxide, methane, nitrogen oxides, and ozone contribute to global warming/climate disruption

- **Offsetting** = a way to mitigate damage in order to restore balance; a defined and measured amount of carbon emission reduction used in a voluntary or mandatory compliance system

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Site reduction vs. offsets

- Factory A - 10 tons emissions with a 9 ton allowance cap

- Options:
  - 1. Reduce emissions to 9 tons (may not be possible)
  - 2. Buy 1 ton of reduced emissions from another location (this 1 ton is an offset)

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Greenhouse Gas Offsets: Verification, Certification and Accounting

- Administered by
  - Non-profit voluntary programs: Chicago Climate Exchange, Environmental Resource Trust, Carbon Neutral network
  - Government voluntary programs: California Registry and U.S. Department of Energy
  - For Compliance with mandatory Cap and Trade programs -- Currently MA 7.29, RGGI for 2009; expected in California soon

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CO_2 – Primary source of GHG

- Human sources of atmospheric CO_2:

  fossil fuels burned for heating, power generation and transport

- Energy Efficiency can reduce the need for heating and power generation, thus reducing CO_2 and potentially creating offsets

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Greenhouse Gas Offsets

- Denomination is either “royal” English units tons CO_2 equivalent or consistent with Kyoto Metric Tonnes CO_2 equivalent
- Values in US voluntary markets: $3-$5
  Kyoto: $15+

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GHG reduction factors

- 1 kWh electric use reduction in NE ~ 0.8 lbs CO_2 based on Regional Power Generation mix
- 1 therm of gas use avoided ~ 11.5 lbs of CO_2 reduction

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Example of 1 ENERGY STAR Home

- "Laurelwood" - North Smithfield, Rhode Island
  - Increased insulation, advanced air sealing, ENERGY STAR appliances and lighting, efficient furnace
- Electricity annual savings*
  - 1559 kWh = 1247 lbs CO_2
- Natural gas annual savings
  - 236 therms = 2714 lbs CO_2

**average per unit, first 31 units*

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Carbon Cap and Trade: Creates a market for your offsets

- Regional CO_2 cap-and-trade programs
  - RGGI
  - Southwest Climate Initiative
  - Powering the Plains
  - West Coast Governor's Initiative
  - Oregon Climate Trust
  - Climate Action Plans
- National CO_2 cap-and-trade programs??

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Carbon Cap and Trade

- A mandatory program administered by a governmental entity
  - Government issues (“mints”) allowances up to the Cap for each compliance period, up to total amount of emissions from regulated entities
  - Initial allowances may be given to regulated entities or auctioned to them (major policy issue)

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Carbon Cap and Trade

- Regulated entities (generally large resources) must conduct business operations such that they have an allowance for each ton of GHG emitted during a compliance period
- Entities can trade among themselves to achieve mandated result

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Carbon Cap and Trade

- Non-regulated entities – such as EE projects at locations not owned by regulated entities – can verify the reductions of emissions to the satisfaction of the program administrator
- These non-regulated entities will receive a GHG offset (see above) that can be sold to regulated entities, which they can use for compliance

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Example: Trading in voluntary program

Property owners transfer legal title to resulting CO_2 offsets to The Climate Trust

City of Portland assists property owners in improving energy efficiency

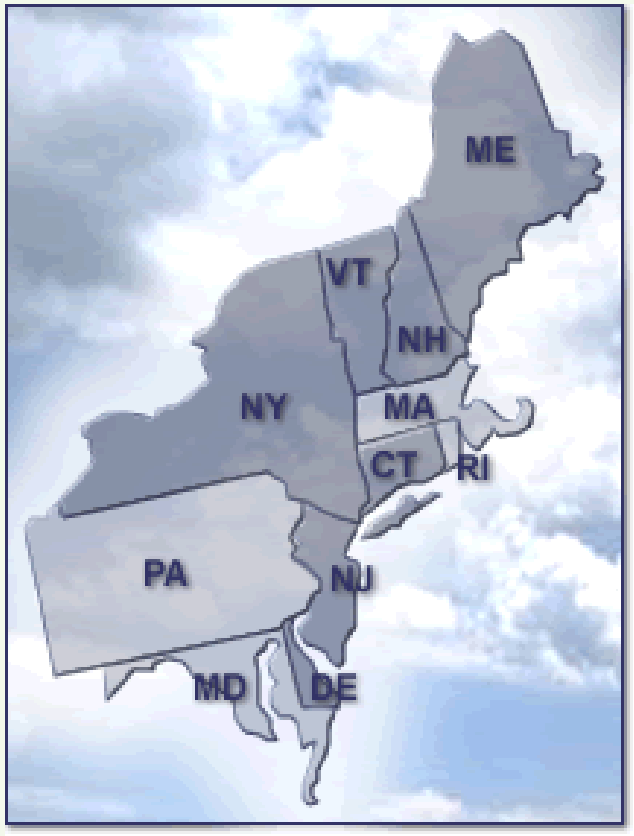
The Climate Trust

Climate Trust funds City of Portland program

CITY OF PORTLAND

OFFICE OF SUSTAINABLE DEVELOPMENT

Regional Greenhouse Gas Initiative



- First mandatory Cap and Trade in U.S.
  - MA, RI, & MD have joined 7 original states
  - Minimum of 25% of allowances auctioned for Public Benefit (EE)
  - NY, VT, & MA have committed to 100% auction

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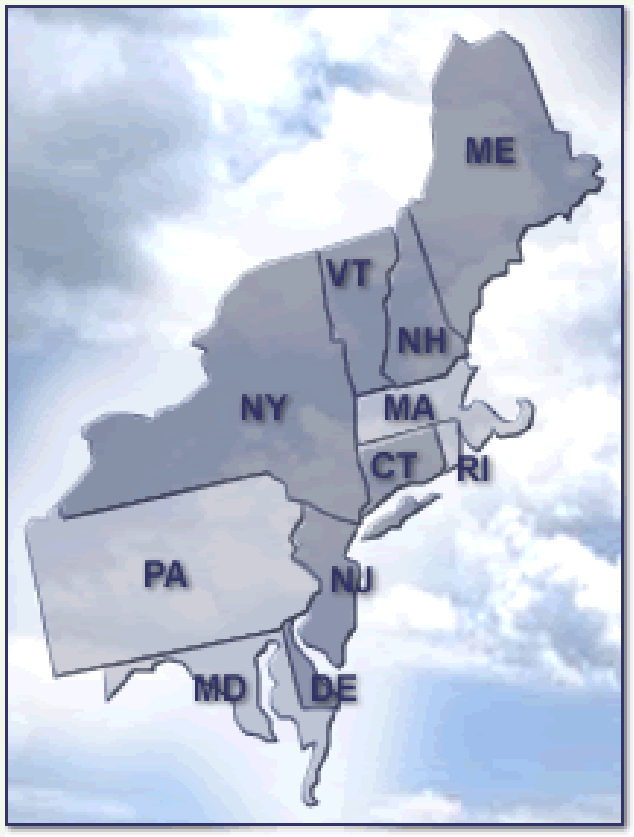
Regional Greenhouse Gas Initiative



- Public pressure increasing to auction allowances with revenues to be used for EE projects

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Market #2

- Environmental/Emissions Markets

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Environmental/Emissions Markets

- NO_x emissions reductions
- EPA mandated cap on emissions to eliminate smog
- State Implementation plans required when emissions exceed the cap: “non-attainment”

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NO_x – Nitrogen oxides

- General term for oxygen compounds of nitrogen
  - Nitric oxide, nitrogen dioxide, Dinitrogen monoxide, nitrous oxide, nitrogen (III) oxide, Dinitrogen tetroxide, Dinitrogen pentoxide
  - Produced during combustion
  - Reactions can produce acid rain, smog, and ozone
  - Aggravate asthmatic conditions

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NO_x – Public Benefit Set Aside

- Ability to claim allowances that a state has "set aside" for Public Benefit
- Administered state-by-state
  - MA is example of early action
- Denominated in Tons (royal)

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Example: Massachusetts

- 1996 & 1997 DEP regulations developed to create a set aside of NO_x allowances for energy efficiency – 5%
- CSG was primary intervener
- Set asides essentially lowered cap by 5%; allowances would revert to polluters in the event that Clean Energy providers could not claim

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Example: Massachusetts

- 2004 – first year for NO_x set asides
- 687 tons of allowances available
- DOER could claim on behalf of efficiency programs
- ESCOs and customers could claim
- Measures assumed to last 7 years
- 5/12 rule applied
- No double dipping

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Valuing offsets (Mass.)

- NO_x: 1 MWh during 5 month season = 1.5 lbs emissions or .00075 tons

  1 allowance = 1 ton = $2,000

  1 MWh = $1.50 per year ($.0015 per kWh)

- CO_2: 1 MWh = 1,236 lbs reduction = .62 tons

  1 ton = $.50-$20

  1 kWh = .00062 tons x $2 = $.0012 per year

  x $20= $.012 per year

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CAIR & CMRA

- Under new EPA guidelines, similar Public Benefit set asides may be included in multiple states for different pollutants including:
  - NO_x
  - SO_x
  - Mercury

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Market #3

- Capacity Markets

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Capacity Supply

- Capacity = amount of electricity available from a generating unit or needed by users at any moment in time
  - Measured in kilowatts (energy = that amount over time or kilowatt-hours)
- Power Markets and System Operators need both kW and kWh

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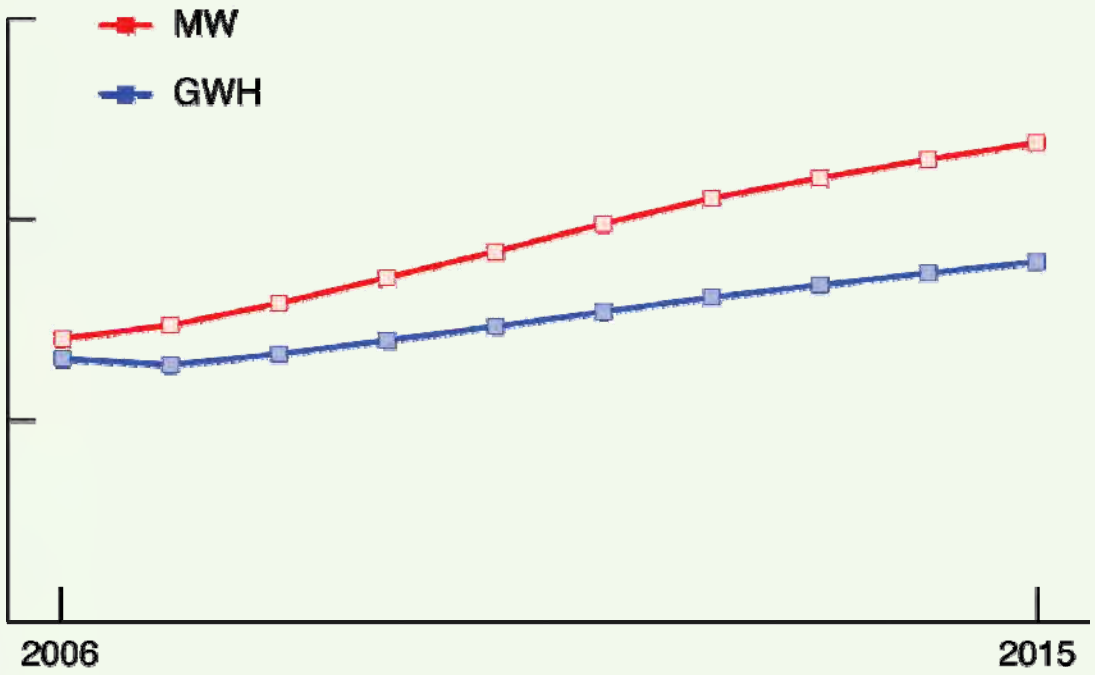
Peak vs Average energy growth



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Approaches to power market needs

- Traditional:
  - Build new power plants by regulated utilities
  - Establish a new market to buy additional power plant capacity in competitive markets
- New Capacity Market:
  - New England ISO and Power Pool proposed new capacity market based on traditional model
  - CSG intervened in settlement negotiations

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Advantages of Demand Resources

- Avoid reserve requirements - 15%
- Avoid T and D losses 6-12%
- Clean (efficiency, renewables, DR) or cleaner (CHP) than traditional fossil fuel generation
- Reduce market clearing prices for energy
- Local resource - higher employment and economic multiplier benefits
- Quicker deployment as a rule
- Less price volatility of fuel source
- Let's not forget national security and oil addiction

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Settlement: Agreement to incorporate Demand Resources into market

- Committees charged with writing the rules to:
  - Qualify Demand Resources for transitional payments (done)
  - Qualify and incorporate Demand Resources into FCM auctions (completed 2-15-07)

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Transition period

- Fixed payments for all qualifying resources
  - Dec. 1, 2006-May 31, 2007 $3.05/kW-month
  - June 1, 2007-May 31, 2008 $3.05/kW-month
  - June 1, 2008-May 31, 2009 $3.75/kW-month
  - June 1, 2009-May 31, 2010 $4.10/kW-month
- Demand resources qualify during transition

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Settlement Agreement

- Forward Capacity Auction
  - Three years forward
  - Existing capacity gets one year commitment
  - New capacity to select 1 to 5 year commitment
  - Opportunities to de-list or retire by bids
- Demand resources fully participate and have special treatment
- Measurement and Verification required

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Capacity payments

- Must be secured by participation in the Capacity market
- Denominated in $ per kW/month winter or summer season
- State programs can participate
- Independent (merchant) suppliers can participate

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Value potential

- 2 year round kW of load reduction in an ENERGY STAR Home through reduced AC, appliances, lighting etc. =

  $36 (transition) to $100 ($8 clearing price) per year for 20 years or a NPV of up to $1,000 or more

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Market #4

- White Tags

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White Tags

- A term of art for verification that one MWh of electricity was not used during a specified time period as the result of an approved energy efficiency measure
- Administered:
  -- CT first state with an official program
  -- Sterling Planet launched initiative to create a voluntary market
- Denominated in MWh in a specific month and year

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Use of White Tags

- Compliance Markets such as Renewable Portfolio Standards
- Voluntary Markets where a MWh of reductions can be sold as part of “green power” products
- Need similar measurement; verification and accounting to offsets and capacity values

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Challenges to all these markets

- Complex participation requirements
- Minimum size to participate
- Measurement and Verification Standards
- Aggregation and balancing needed
- Trading and sales needs specialists

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CSG experience

- $12 million per year in “green tag” sales.
- $200,000 in NO_x allowance sales
- First voluntary carbon sales starting
- $2.4 million in early “pilot” capacity sales
- Just received first check for new capacity market
- Staff of 7 to manage emissions and tag trading

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NEPOOL Alternative Resource Sector

- FERC orders creation of sixth sector within NEPOOL to represent EE, DR, DG, and Renewable Generation
- CSG intervention at FERC in 1999 and later dockets paved the way (along with others)
- Equal governance power to these resources compared with generation, transmission etc.
- This sector controls 15% of voting power in the region; CSG votes 40% of this sector - single largest voting bloc

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Closing thoughts

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Thank you!

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