Overview of Carbon Mitigation Efforts & Possible Implications for Energy Efficiency

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Presented to CEE Program Meeting

San Francisco

2010 January 14

Recent carbon mitigation news

- **Bad news: physical effects**
  - **Emissions continue to increase**
  - **Observations of climate change show greater effects sooner than expected in 2004 IPCC Assessment**
- **Hope for the future: mitigation and adaptation**
  - **Local and state action**
  - **U.S. House and Senate are each considering draft legislation to address climate change**
  - **193 national governments met in Copenhagen in December 2009 and agreed that further mitigation is needed**

- ***That energy efficiency is a major part of mitigation is now widely recognized***

Copenhagen, 2009 (COP 15)

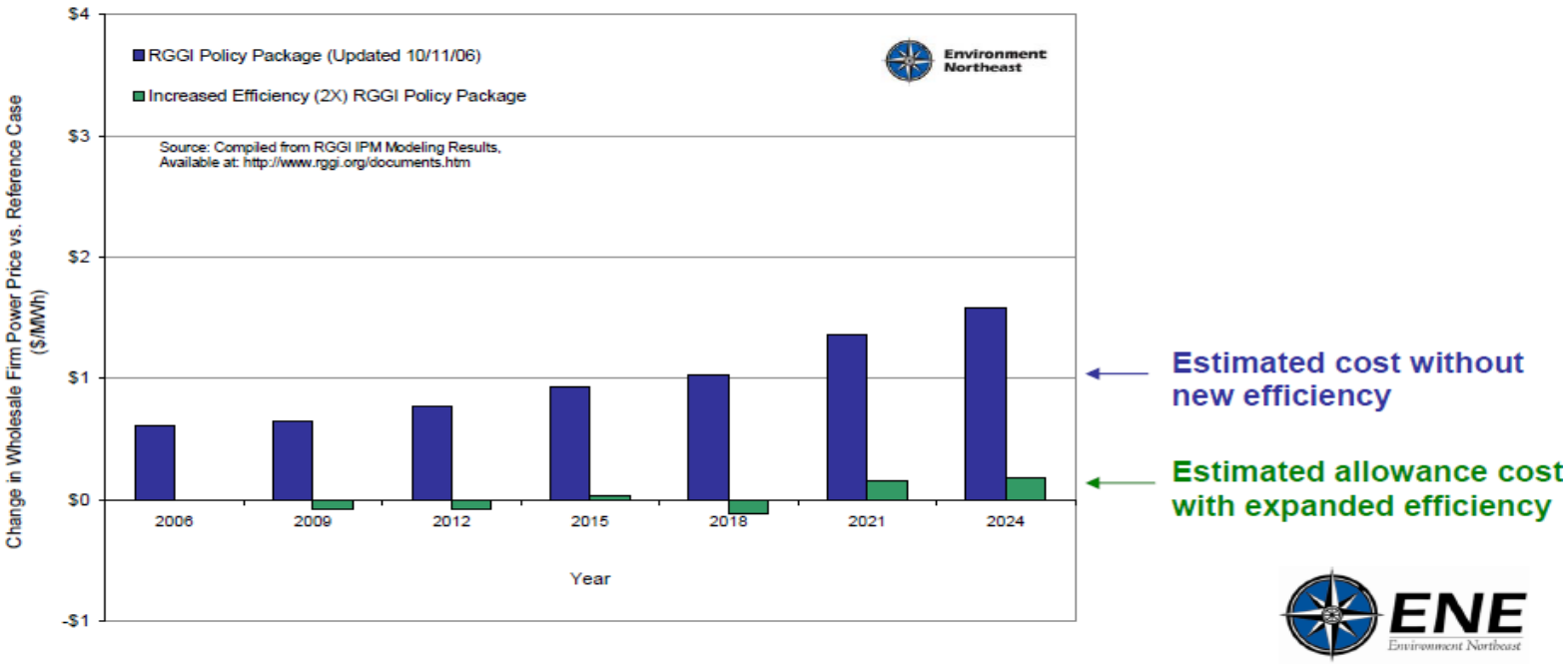
- **What didn't happen?**
  - **Binding international agreement to specific emission reduction targets**
- **What did happen?**
  - **Meaningful, historical step forward**
  - **Agreed target +2 degrees Celsius maximum**
  - **Approach changed from treating developing countries separately from industrial, to treating major carbon emitters (U.S., China, Brazil, India, South Africa) similarly**
    - **Each made non-binding commitments for 2020**
  - **U.S. will lead a push for $100 billion to developing nations to assist low-carbon development**
  - **U.S. Secretary of Energy announced Climate-REDI approach, including Super Efficient Appliances Deployment program**

Based on D. Kammen, SFGate.com, December 20, 1999 "Copenhagen becomes Hope-nhagen for the Earth"

Cap-and-trade Experience in the US: RGGI

- **Jan 01‘09 – RGGI Implemented (10 states)**
  - **CO2 Cap-and-trade**
    - **10% below 2009 levels by 2019**
  - **Power generators: 25MW & 50% fossil**
  - ***$433 M rev to date (65% to EE), $3.10 / ton CO2***
  - ***Issues: short enough, liquid enough?***

www.rggi.org



California: the next Cap &Trade?

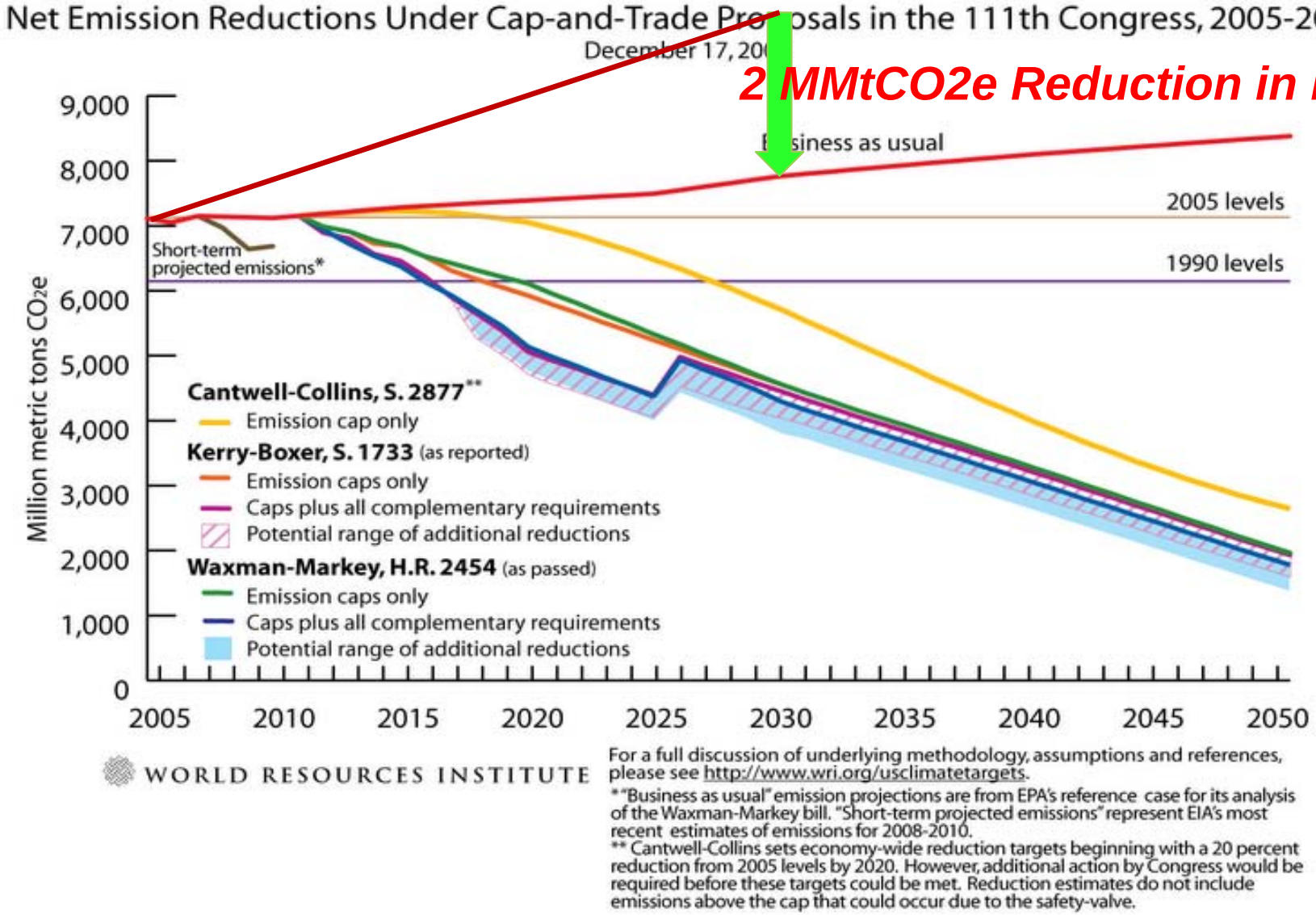
- **Jan 01, 2012 – California to implement**

  - —**GHG (1990 levels by 2020, -80% by 2050)**
  - —**Entire state economy**
  - —***Market-based mechanisms (cap & trade)***
    - ***and regulations and other policies***
  - —***Possible links to RGGI, EU, others***

www.arb.ca.gov

OR - will U.S. legislation supersede states?

Recent Draft Legislation, U.S.



2010-2050 APGR CO2e

+1.2% 2006

+0.3% 2009

TARGET

-4.0%

Source: Larsen, John and Robert Heilmayr. 2009. Emission Reductions Under Cap-and-Trade Proposals in the 111th Congress. Washington, DC: World Resources Institute. Available online at: http://www.wri.org/publication/usclimatetargets

Energy Efficiency as Renewable Energy

- **House Passed Waxman-Markey Bill (HR. 2454)**
  - American Clean Energy and Security Act
  - Pass House floor vote 219-212 on June 26, 2009
  - 20% RES by 2020 with up to 40% met with EE by petition
  - Only REC trading (no EE trading), 2.5¢/kWh ACP, FERC

- **Senate Bingaman Bill (S. 1462)**
  - American Clean Energy Leadership Act
  - Cleared Energy Natural Resources committee June 16, 2009
  - 15% RES by 2021, with up to 27% efficiency
  - REC and energy efficiency trading by 2011
  - 2.1¢/kWh ACP, 3 RECs for renewable DG, DOE admin

ACP = Alternative Compliance Payment; DG=Distributed Generation
REC=Renewable Energy Certificate; RES=Renewable Energy Standard

Based on: Presentation to DOE EERE, NREL Lori Bird, January 7, 2010 (shading added)

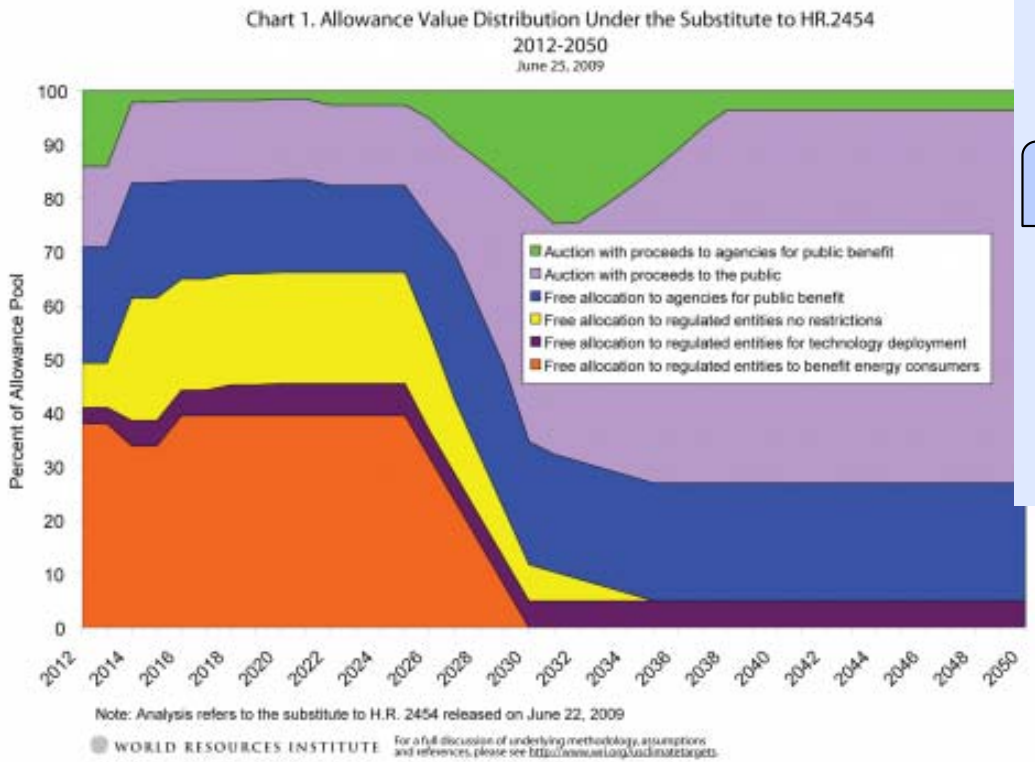
Energy Efficiency is part of Renewable Electricity Standard

- **HR2454 creates a renewable electricity standard (RES) that would require large utilities in each state to produce an increasing percentage of their electricity from renewable sources**
  - **—Requires 6 percent of electricity to come from renewables by 2012**
  - **—Requires 20 percent of electricity to come from renewables by 2020**
    - Up to 5 percent can actually come from efficiency improvements
    - If a state determines that its utilities cannot meet the target, the efficiency component can be increased to 8 percent and the renewable component decreased to 12 percent

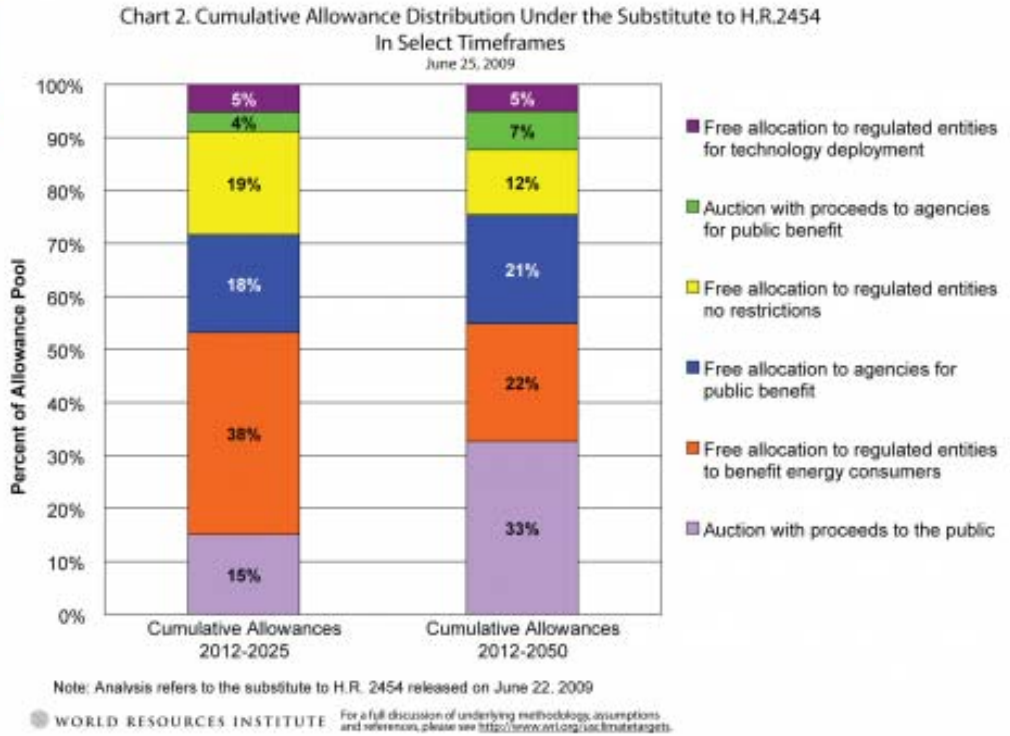
HR2454 to cost $80-175/household/year and suspend states' trading programs

- **Reduce aggregate GHG emissions 17% below 2005 levels in 2020, and 83% below 2005 levels in 2050**
  - **In the initial years of the cap and trade program, approximately 20 percent of allowances are auctioned. This percentage increases over time to about 70 percent by 2030 and beyond.**
- **State trading programs would be put on hold from 2012 – 2017 to give the federal system a chance to get started.**
- **Congressional Budget Office's (CBO) analysis of the bill concluded that it would impose *costs of $175 per household and that households with incomes in the lowest 20% would receive a net benefit of $40 annually*.**
- **EPA's analysis of the bill estimated that it would *cost households between $80 – 111 per year*. None of these estimates include the savings that would result from reducing the damages that would be caused by climate change.**
  - **Low and moderate income households will also receive a refundable tax credit or rebate**

Allowance Value Distribution (2012-2050) HR2454



Auction with proceeds to agencies for public benefit.
For example deficit reduction.
Auction with proceeds to the public.
For example, low-income consumer assistance.
Free allocation to agencies for public benefit.
For example, state programs for energy efficiency.
Free allocation to regulated entities with no restrictions. For example, allowances to trade exposed industries.
Free allocation to regulated entities for technology deployment.
For example, payments for carbon capture and storage of CO2.
Free allocation to regulated entities to benefit energy consumers.
For example, allocations to local distribution companies for ratepayer benefit.



Source: http://www.wri.org/publication/usclimatetargets
Author: John Larsen

Distribution – Unregulated Industries

- **Some of the permits would be given to entities that are not covered under HR2454, which would sell them and use the proceeds for specific purposes**
  - 30 percent would be given to local electricity distribution companies, with giveaways phased out from 2026 through 2030; the companies, which are generally regulated by states, would be required to use the proceeds to help keep consumer electricity prices low
  - 10 percent would be given to state governments, which would be required to use the value to support renewable energy, energy efficiency**, t**ransportation planning, and transmission projects *(SEED fund)*
  - 9 percent would be given to local natural-gas distribution companies, with giveaways phased out from 2026 through 2030; the companies would be required to use the proceeds for energy-efficiency projects and to help keep consumer prices low
  - 3 percent would be given to the automobile industry from 2012 and 2017, scaling back to 1 percent through 2025; the value would be used for the development of clean car technologies.

Energy Technology Investment

- **By 2025, HR2454 would direct an estimated total of $190 billion (cumulative) to energy technologies and efficiency measures:**
  - **—$90 billion to energy-efficiency and renewable-energy technologies**
  - —$60 billion to carbon-capture-and-sequestration technology
  - —$20 billion to electric vehicles and other advanced automotive technologies
  - —$20 billion for basic scientific research and development
- **The bill also creates a Clean Energy Deployment Administration within the federal government that would provide loans and loan guarantees to spur more private investment in energy technology**

Energy Efficiency Standards

- **The bill would set new energy-efficiency standards for lighting products, commercial furnaces, and other appliances**
  - **The draft establishes a "best-in-class" appliance deployment program, with incentives to retailers and a prize ("golden carrot") program for manufacturers of super-efficient appliances. Early retirement bounties also have been added.**
- **New energy-efficiency standards for buildings would require 30 percent improvement by 2010 and 50 percent improvement by 2016**
- **New standards for industrial energy efficiency would be set**
  - ***Industrial energy efficiency*. The draft authorizes DOE to make awards for innovative energy recovery methods, such as efficient motors, combined heat and power, and process engineering. The awards can be as much as one fourth the value of the energy projected to be recovered or generated during the first 5 years of a facility's operation.**
  - ***Investments in clean vehicles*. The bill adds a new manufacturing retooling incentive to defray up to 30 percent of the retooling cost for facilities to manufacture advanced technology vehicles and components.**
- **Households could receive $3,000 in financial support to make their residences at least 20 percent more energy efficient**
- **Commercial buildings would also get financial support for weatherization**

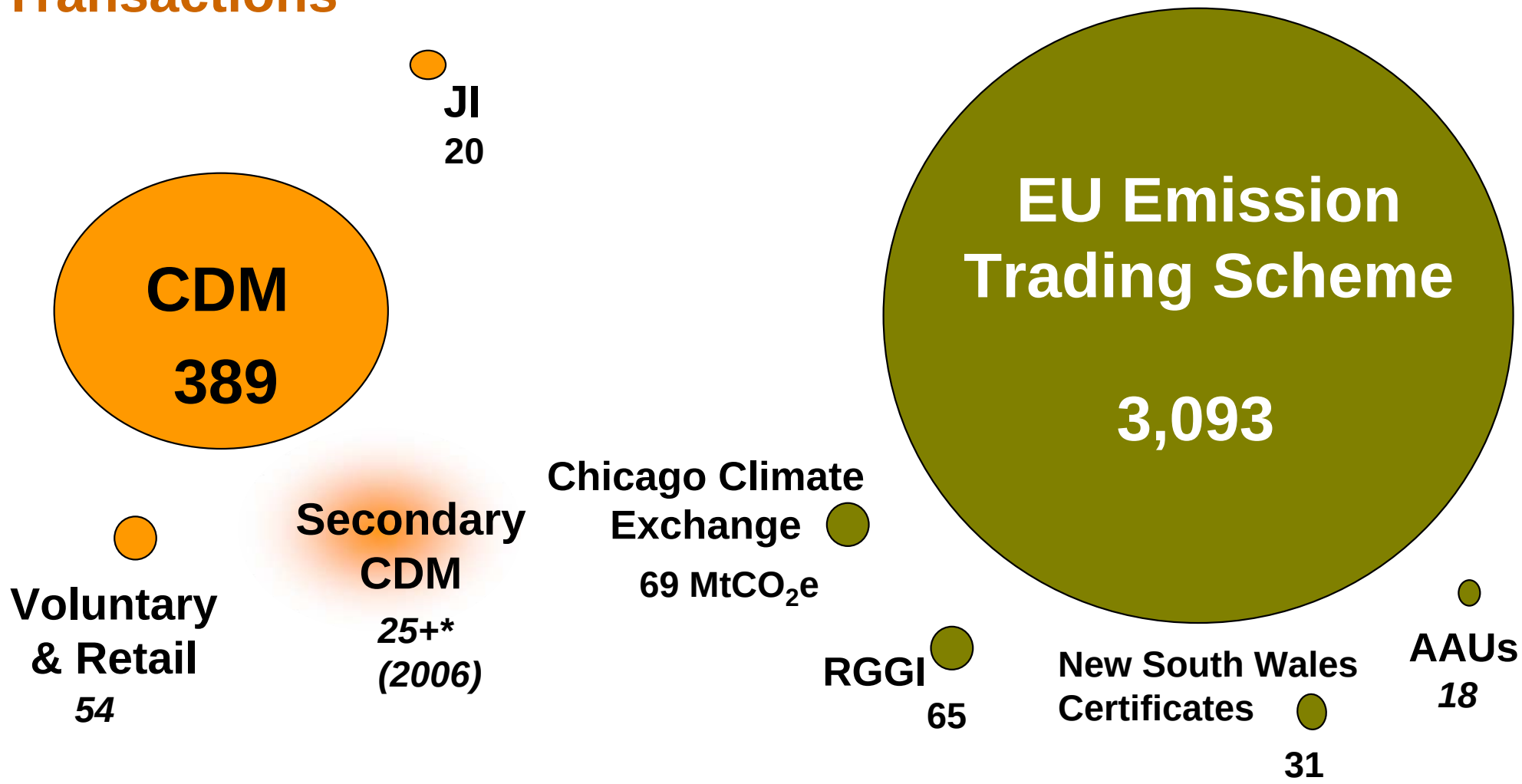
Global Carbon Market: $126B 2008 - doubling each of last 3 years

Volumes transacted in 2008 (total 4,811 $MtCO_2e$)

Source: Karan Capoor, Philippe Ambrosi, The World Bank, Washington D.C. 2009

Project-Based Transactions

Allowance Markets



Conclusions

- **Carbon policy is in place or in development**
  - **—in Northeast U.S. (RGGI) and Europe (EU ETS)**
  - **—planned for California in 2012**
  - **—draft U.S. legislation for national cap & trade**
  - **—international non-binding agreements**
- **Carbon markets are already $126 Billion/year**
  - **—doubling annually**
- **Energy efficiency will play a large role**