The Role of Carbon Pricing in California’s New Greenhouse Gas Cap-and-Trade Program

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May 22, 2013
• EPRI is a non-profit “501(c)(3)” scientific research consortium founded in 1973 to perform objective research and development relating to the generation, delivery and use of electricity for the benefit of the public.

• EPRI has 450+ participants in more than 40 countries around the world.

• In the U.S., EPRI participants generate more than 90% of electricity delivered.

• Principal locations — Palo Alto, CA, Charlotte, NC and Knoxville, TN
California’s GHG Mitigation Program

- Global Warming Solutions Act of 2006 (AB-32)
  - 1st economy-wide mandatory statewide GHG emissions cap adopted in the U.S.
  - 1990 statewide GHG emissions by 2020 (427 Mt CO$_2$e)

- Direct regulatory measures, also known as “complementary policies” (CPs), target emissions from key sectors, including transportation, electricity and industry (e.g., LCFS, RPS, EE)

- Mandatory GHG cap-and-trade program (C&T) with offsets
  - Cover ~85% of the state economy by 2015.
  - Compliance obligation began January 1, 2013.
  - The “cap” accounts for 334 MtCO$_2$e of the 427 Mt CO$_2$e target in 2020.
California’s Approach is not Unique

- Other regions and nations also have combined CP’s with a C&T programs, including:
  - Quebec
  - Australia
  - European Union (EU)

- The very large overlap between covered sectors and complementary policies does appear to be unique to CA.

- Previous U.S. legislative proposals (e.g., Waxman-Markey legislation – HR 2454) included EE standards and an RPS along with the C&T program

- If the U.S. adopts comprehensive climate policy in the future, it could use a similar approach as in CA
Key Differences Between CA and Other GHG Emissions Cap-and-Trade Programs

- Comprehensive, economy-wide emissions cap that covers electricity, industry, and transportation & household fuels
- Overlap between sectors covered by complementary policies and GHG cap-and-trade program.
- Covers “1st deliverers of electricity” to avoid regional leakage
- Free allocation to electric consumers not asset owners
- International offsets by direct linkage and sectoral; no CDM
- “Buyer” liability for offsets used for compliance
- Cost containment reserve with price “tiers”
- Complex holding limits for asset owners and auction rules
- Compliance – Annual “deposit” plus three-year “true up”
Allowance Price Containment Reserve

- ~4% AVG of allowances over time = ~122 MtCO$_2$
- Allowances not sold at auction added to the reserve.
- Reserve allowances can be sold only to entities with compliance obligations at fixed prices
  - Three fixed-price tiers (2013: $40, $45, and $50/tCO$_2$e).
  - Price levels escalate 5% plus inflation annually.
  - 2020 reserve prices: $60, $65 and $70/tCO$_2$e.
Complementary Policies and Estimated GHG Emissions Reductions in 2020*

- **Electric sector (23.3 Mt)**
  - Energy efficiency (7.8 Mt)
  - Combined Heat and Power (4.1 Mt)
  - 33% Renewable Portfolio Standard (11.4 Mt)

- **Transportation sector (21.8 Mt)**
  - Light-duty vehicle GHG emissions standards (3.8 Mt)
  - Low Carbon Fuel Standard (15 Mt)
  - Regional vehicle miles traveled (VMT) program (3.0 Mt)

- **“Non-covered” sectors (13 Mt in 2020)**
  - High Global Warming Potential (GWP) gases (5 Mt)
  - Sustainable forests (5 Mt)
  - Miscellaneous (3 Mt)

Note: Total emissions reductions from covered sector CPs shown here = 45.1 Mt. ARB estimates emissions reductions from CPs = 49 Mt. The additional 3.9 Mt are derived from miscellaneous programs, including tire pressure program, ship electrification, heavy duty aerodynamics, high-speed rail and million solar roofs.
Carbon Pricing Provides “Backup” for “Complementary” GHG Policies

- In 2020, complementary policies are expected to account for 77.5% of emissions reductions, while the cap-and-trade is expected to account for just 22.5%.
- The CA Cap-and-Trade Program is considered to be the “backup” program or “insurance” policy that guarantees the emissions reductions mandated by AB-32 will occur.
CA GHG Allowance Supply 2012-2020

**Total Number of Allowances**

- Gross cap = 2.51 GtCO₂e
- APC Reserve = 122 MtCO₂e
- Net cap = 2.39 GtCO₂e

**Gross Emissions Cap**

- Narrow Scope
- Broad Scope

**Base BAU Cap and Trade**

- 408,8
- 334,2
- 310,8

**Electric sector & Large Industrials**

- Electric sector, Large Industry & Transportation Fuels
Complementary Measures Reduce Expected 2020 BAU Emissions

Complementary Measures reduce 2020 BAU from 409 to 359 MtCO$_2$e
Required Emissions Abatement Under the C&T Programs is Highly Uncertain

Cumulative Emissions abatement ranges 97–395 MtCO₂e
Offsets can Achieve Most of the Required Cumulative Emissions Reductions*

- A covered entity can meet up to 8% of its “compliance obligation” in each compliance period with offsets (218 MtCO₂ total)
- Offsets must result from approved ARB compliance offset protocols

Offsets may comprise 55-224% of compliance

*Refers to “residual” emission reductions to be achieved by the CA Cap and Trade Program beyond emission reductions achieved by the CPs.
Estimated C&T Compliance Shortfall in 2020 Emissions-to-Net Cap (MtCO$_2$e)

Required GHG Emissions Reductions and Key Role of Complementary Policies in 2020

- Emissions to Net Cap: 98 Mt CO₂e
- LCFS: 15 Mt CO₂e
- RPS 33%: 11.4 Mt CO₂e
- EE: 7.8 Mt CO₂e
- CHP: 4.1 Mt CO₂e
- Pavley 2: 3.8 Mt CO₂e
- VMT: 3 Mt CO₂e
- Misc: 3.9 Mt CO₂e
- Net Abatement: 49 Mt CO₂e
- Range of Abatement: 98 Mt CO₂e
Interaction of Complementary Policies and Cap-and-Trade Program

• Potential for all CPs to achieve estimated emissions reductions is **uncertain**

• If CPs targeting emissions in covered sectors achieve **fewer** emissions reductions than ARB estimated…
  – Covered sector emissions will be **higher**
  – Allowance prices may **increase**
  – Dynamic is reinforced if offset supply or hydro/nuclear generation is lower than estimated, or if economic growth is higher than expected

• If these CPs achieve **more** reductions than estimated…
  – Covered emissions will be **lower**
  – Allowance prices may **decrease** (but, total social costs may increase)
  – Dynamic is reinforced if offset supply or hydro/nuclear generation is higher than expected, or if economic growth is lower than expected
C&T Base Case Compliance Scenario (Emissions-to-Net Cap)

Compliance gap for covered sectors = 98 Mt

Covered Sectors: 20
Offsets: 29
Complementary Policies: 49

2020
Pavley II: 3.8
LCFS: 15
Regional VMT: 3
Energy Efficiency: 7.8
CHP: 4.1
RPS 33%: 11.4

Base case assumptions:
- The allowance reserve is not used
- CPs achieve their targets (49 Mt of reductions) (some small reductions not labeled in stacked bar)
- The maximum volume of offsets (29 Mt in 2020) is available
- Covered sector abatement address the remaining gap = 20 Mt
- CPs account for 50% of compliance

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C&T Compliance Scenario 1B: CPs Underachieve & Lower Offsets*

(Emissions-to-Net Cap)

Compliance gap = 98 Mt

Offsets: 20

Covered Sectors: 45

CPs: 33

2020

- Pavley II: 2.9
- LCFS: 7.5
- Regional VMT: 2.3
- Energy Efficiency: 5.9
- CHP: 3.1
- RPS 33%: 8.9

- CPs deliver 33 Mt
- Only 20 Mt of offsets is available
- Covered sectors must deliver ~45 Mt (126% more than base case)
- Allowance prices increase; up to reserve level?
- CPs account for 34% of compliance

* Scenario assumes APCR is not used
Current CA Offset Prices (as of Mar 29, 2013)

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Price Forecasts for California / WCI

- Sources: Bloomberg New Energy Finance, Thomson Reuters Point Carbon, Energy Institute at Haas (UC Berkeley)
- Note: We charted the weighted average of the estimates provided in the UC Berkeley paper for illustrative purposes. The paper only estimates the probability that a given outcome would happen: 80% chance that prices would stay at the floor, 8% that prices would be within the Price Containment Reserve, 11% that it would be above the PCR, and 1% that it would be between the floor and the reserve.

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Key Insights

• CA has a “hybrid” climate policy that includes direct regulatory measures along with an economy-wide cap and trade program.

• Most emissions reductions in CA are expected to results from direct measures. The Cap and Trade Program is designed to guarantee emission reductions are achieved.

• The combination of CPs with C&T is not unique to California, but the large overlap between sectors covered by both approaches is unique.

• Expected GHG emissions abatement in the C&T program is highly uncertain, and depends on: (i) APCR; (ii) offset usage, (iii) success of complementary policies; and (iv) other factors (e.g., economic growth).

• The relative success of CP’s in reducing GHG emissions will impact the amount of abatement required to achieve the cap and allowances prices.

• CP’s may increase net social cost of achieving AB-32 goals, as compared to a “pure” cap-and-trade program, but is likely to lead to lower “visible” CO₂ allowances prices.
EPRI Analysis of “Complementary Policies”

- EPRI report published March 2013 (EPRI Doc. #3002000298)
- Describes “complementary policies” adopted in CA, and potential impact of these policies on the operation of the GHG cap-and-trade program
Thank You

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