



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

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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 CO₂e)
- **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 MtCO₂e of the 427 Mt CO₂e target in 2020.



Gov. Arnold
Schwarzenegger
California

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

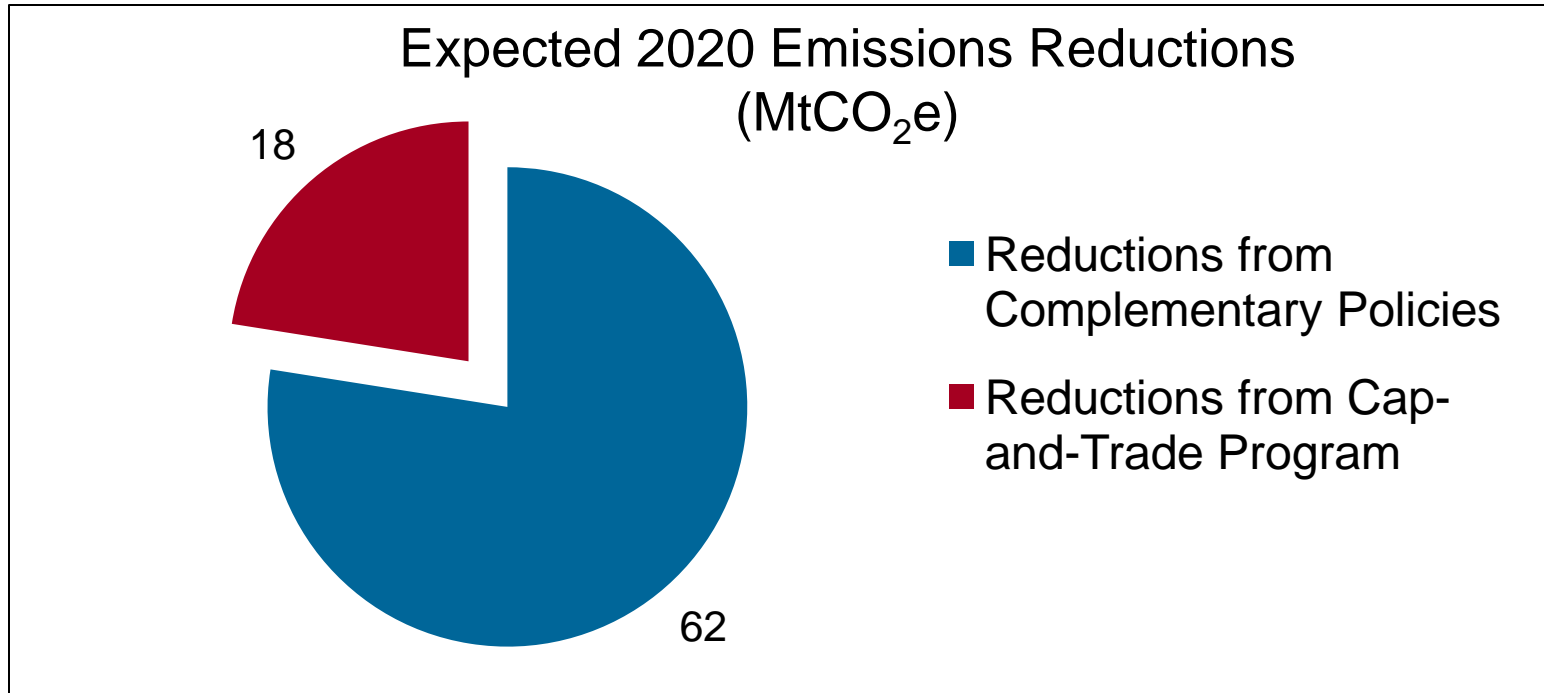
- ~4% AVG of allowances over time = ~122 MtCO₂
- Allowances not sold at auction added to the reserve.
- Reserve allowances can be sold only to entities with compliance obligations at fixed prices
 - Three fixed-price tiers (2013: \$40, \$45, and \$50/tCO₂e).
 - Price levels escalate 5% plus inflation annually.
 - 2020 reserve prices: \$60, \$65 and \$70/tCO₂e.

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)

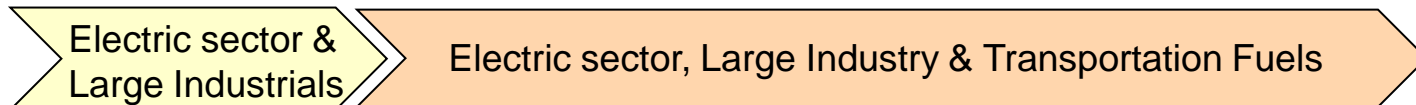
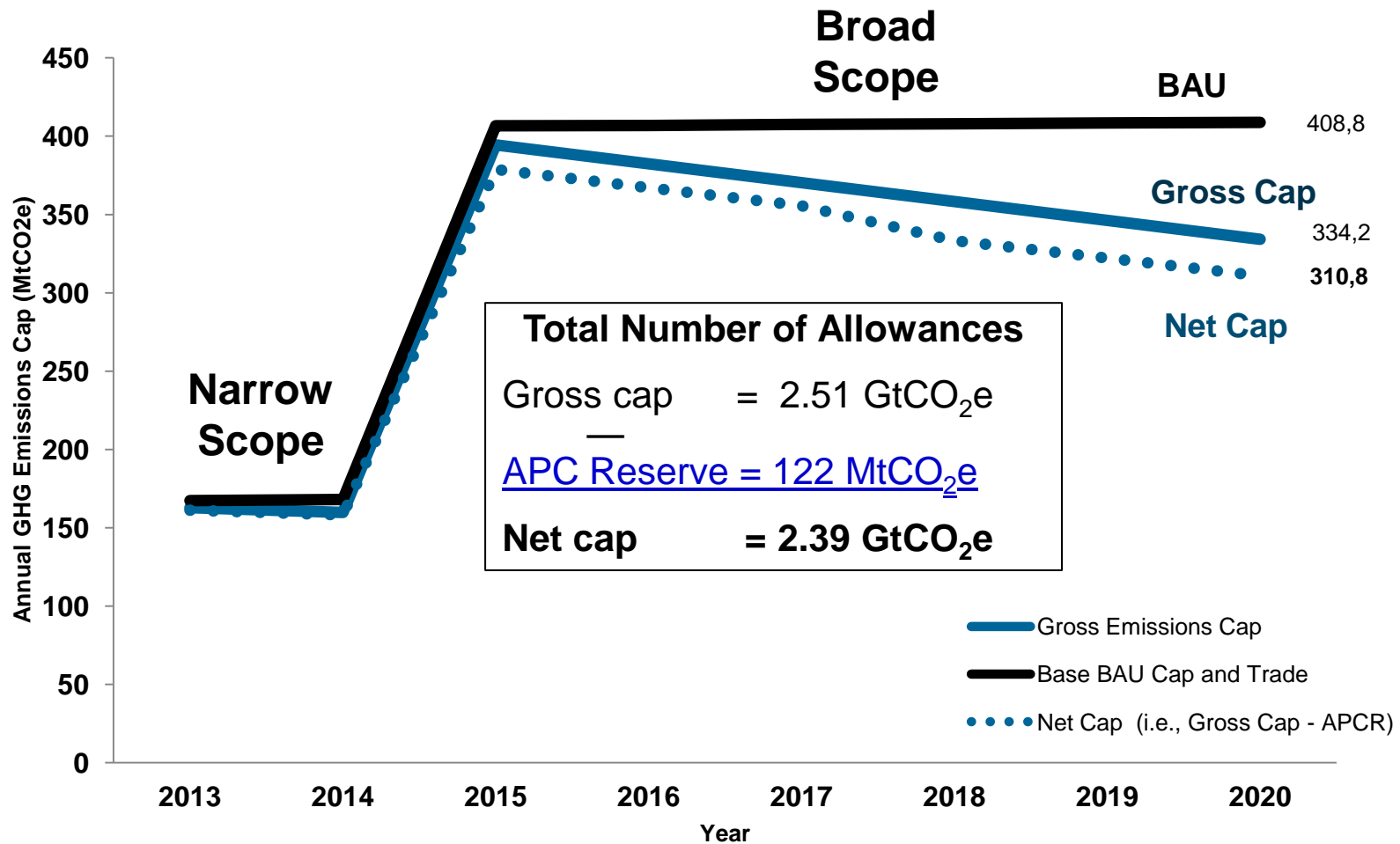
Note: Total emissions reductions from covered sector CPs shown here = 45.1 Mt. ARB estimates emissions reductions from CPs = 49 Mt. The additional 3.9 Mt are derived from miscellaneous programs, including tire pressure program, ship electrification, heavy duty aerodynamics, high-speed rail and million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

Carbon Pricing Provides “Backup” for “Complementary” GHG Policies

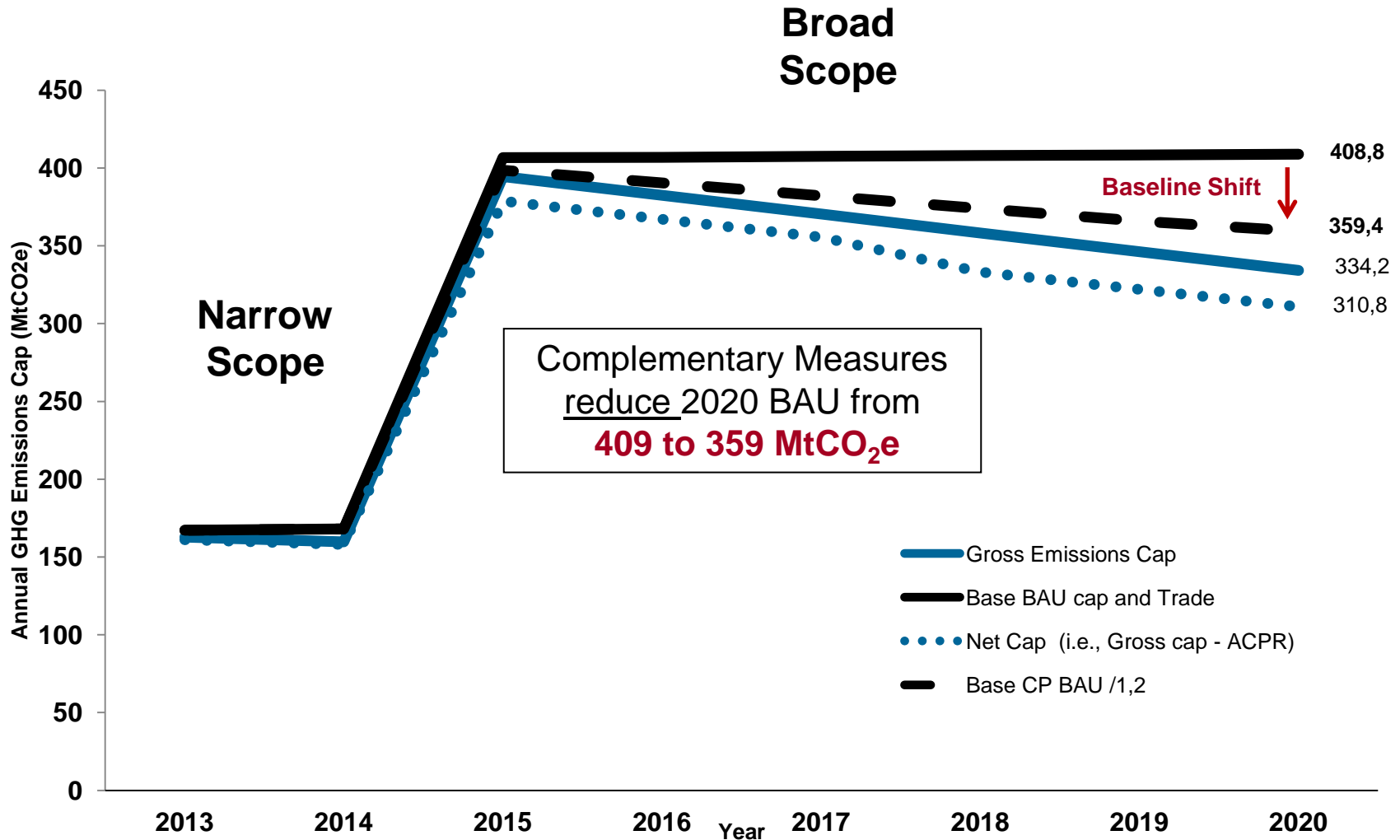


- In 2020, complementary policies are expected to account for 77.5% of emissions reductions, while the cap-and-trade is expected to account for just 22.5%.
- The CA Cap-and-Trade Program is considered to be the “backup” program or “insurance” policy that guarantees the emissions reductions mandated by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

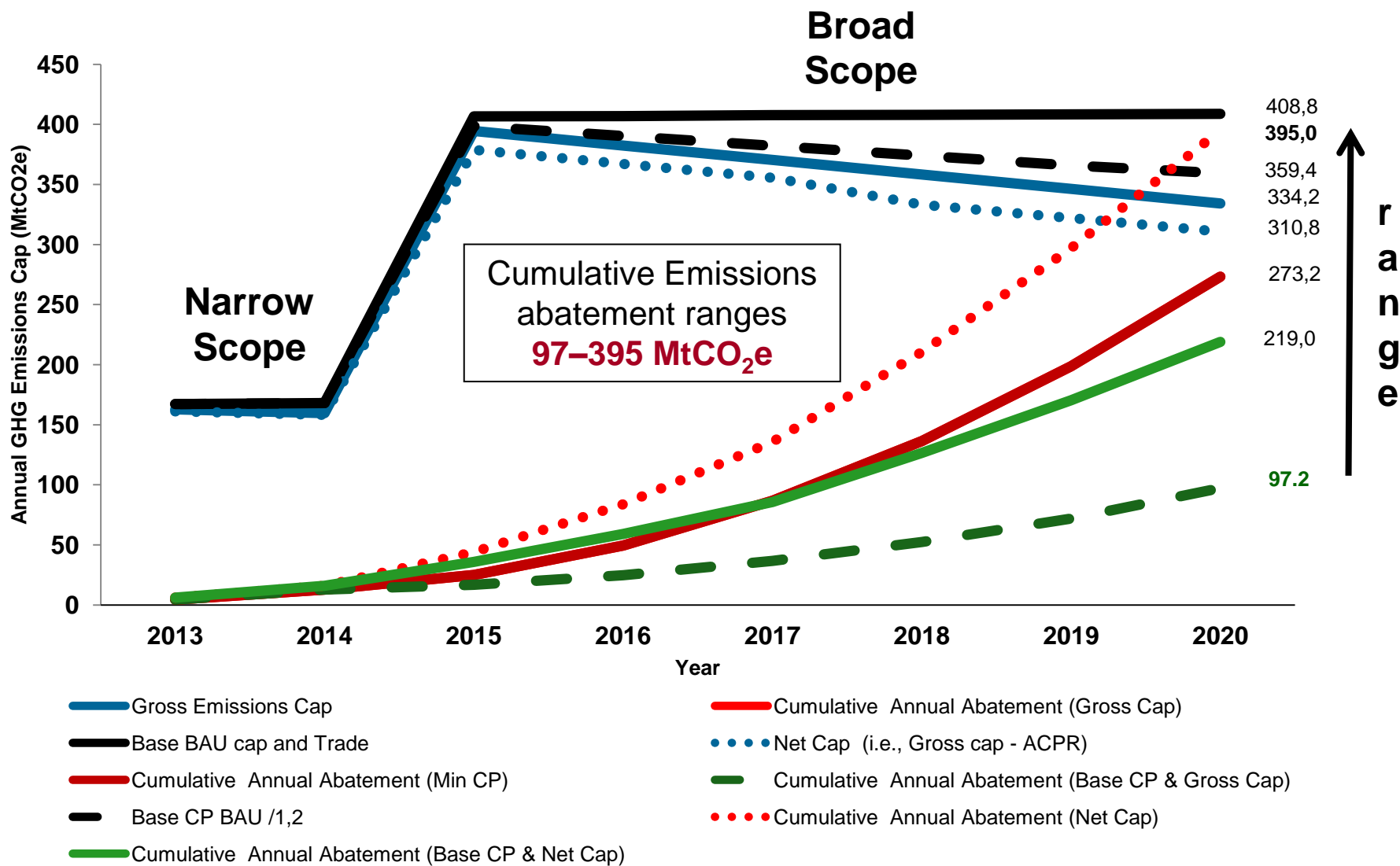
CA GHG Allowance Supply 2012-2020



Complementary Measures Reduce Expected 2020 BAU Emissions

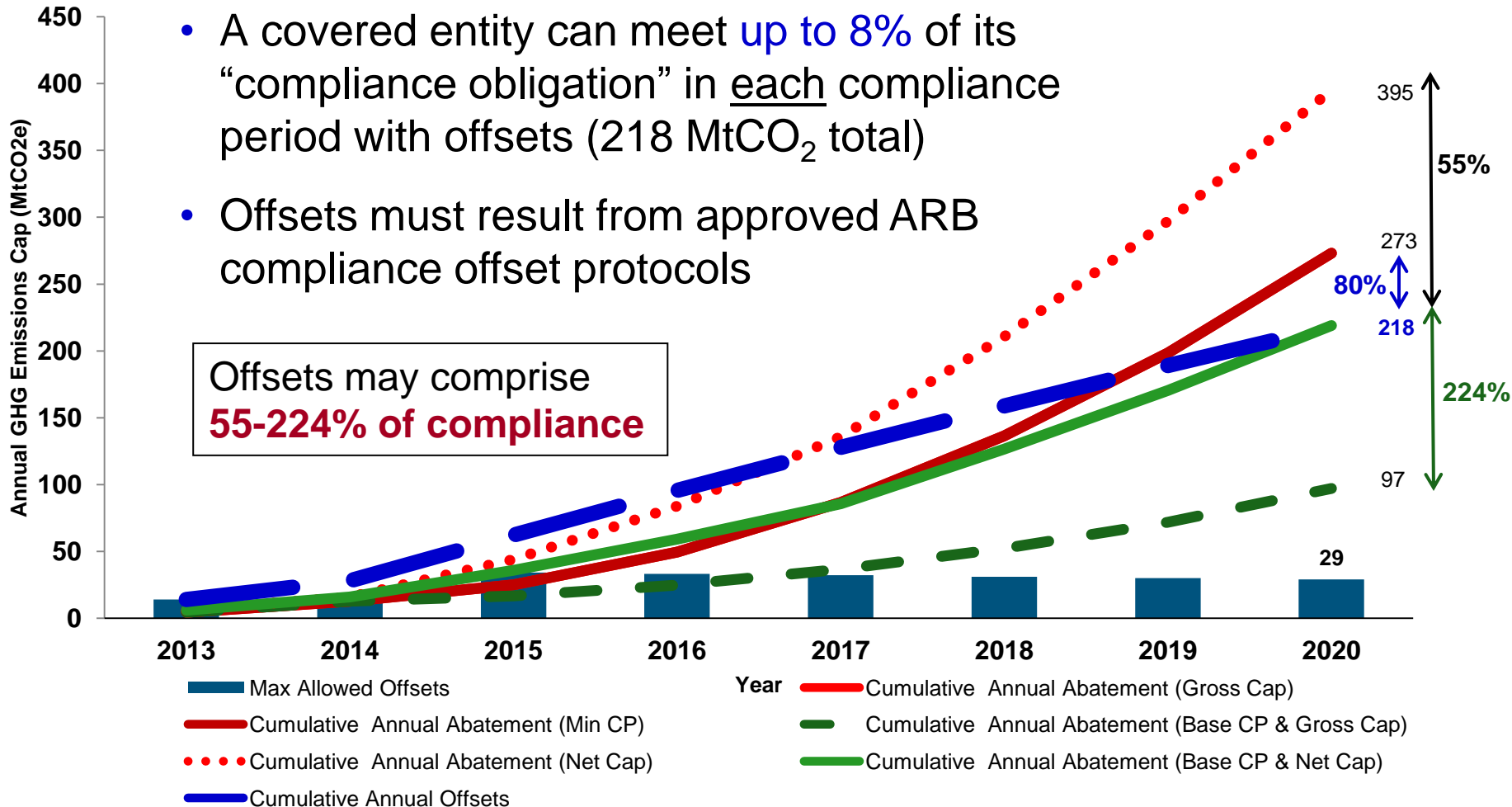


Required Emissions Abatement Under the C&T Programs is Highly Uncertain



Offsets can Achieve Most of the Required Cumulative *Emissions Reductions**

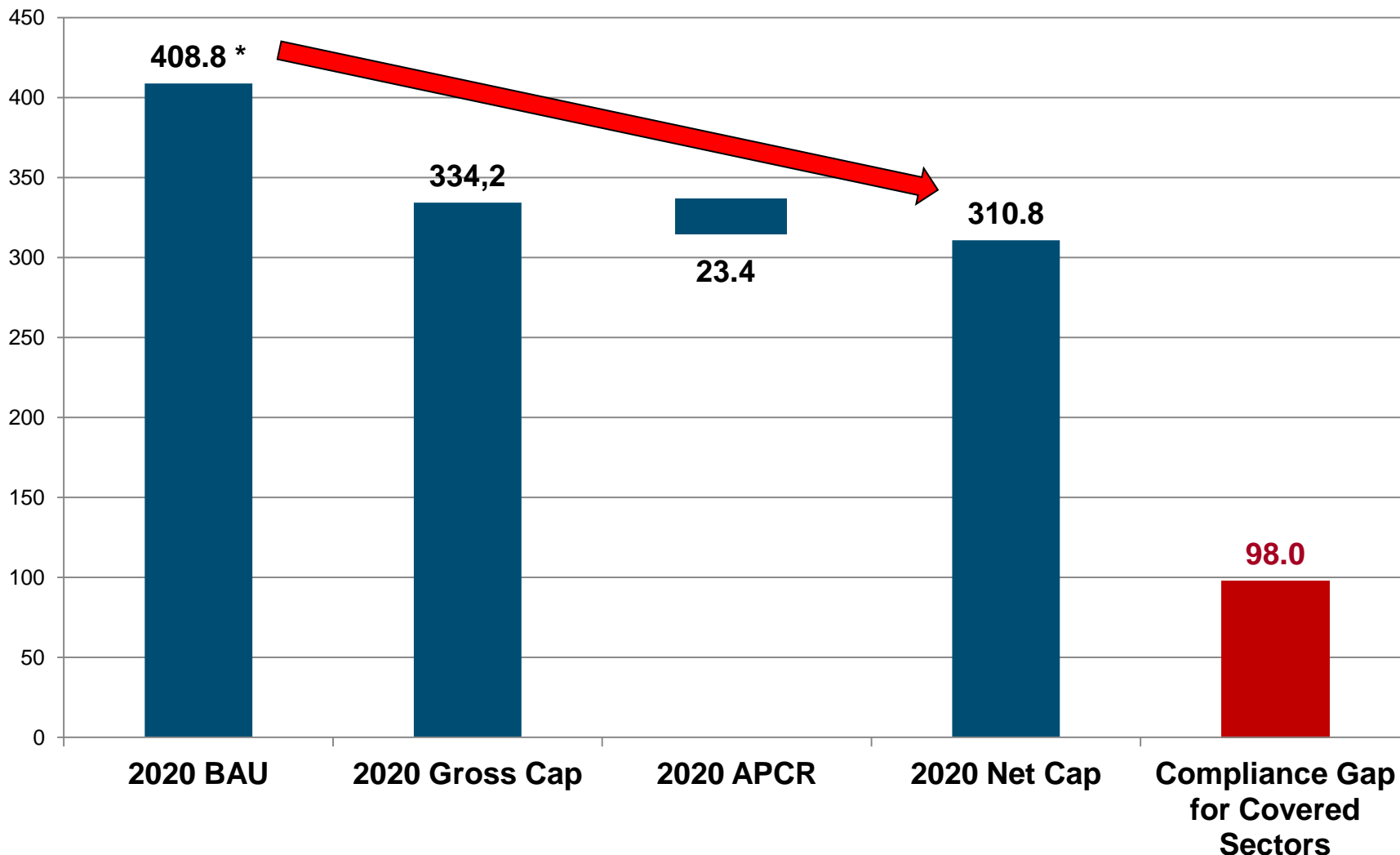
- A covered entity can meet up to 8% of its “compliance obligation” in each compliance period with offsets (218 MtCO₂ total)
- Offsets must result from approved ARB compliance offset protocols



*Refers to “residual” emission reductions to be achieved by the CA Cap and Trade Program beyond emission reductions achieved by the CPs.

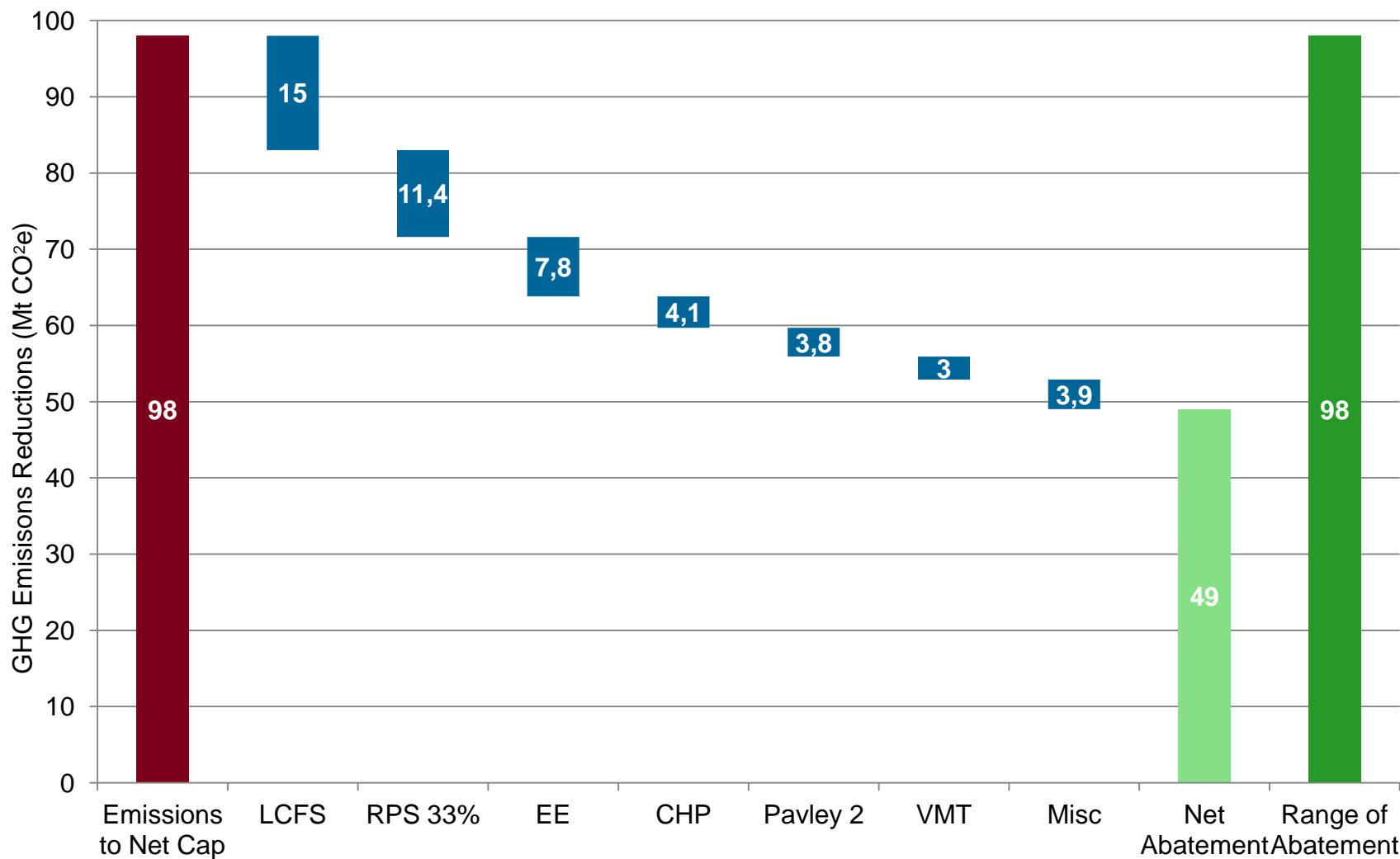
Estimated C&T Compliance Shortfall in 2020

Emissions-to-Net Cap (MtCO₂e)



Source: http://www.arb.ca.gov/cc/inventory/data/tables/2020_ghg_emissions_forecast_2010-10-28.pdf

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



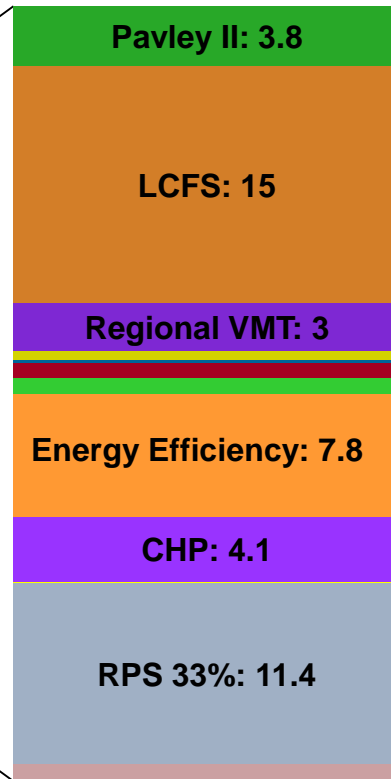
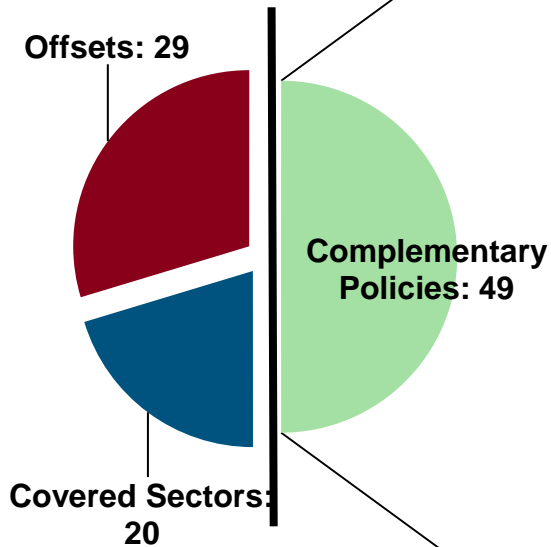
Interaction of Complementary Policies and Cap-and-Trade Program

- 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)

2020

Compliance gap for covered sectors = **98 Mt**

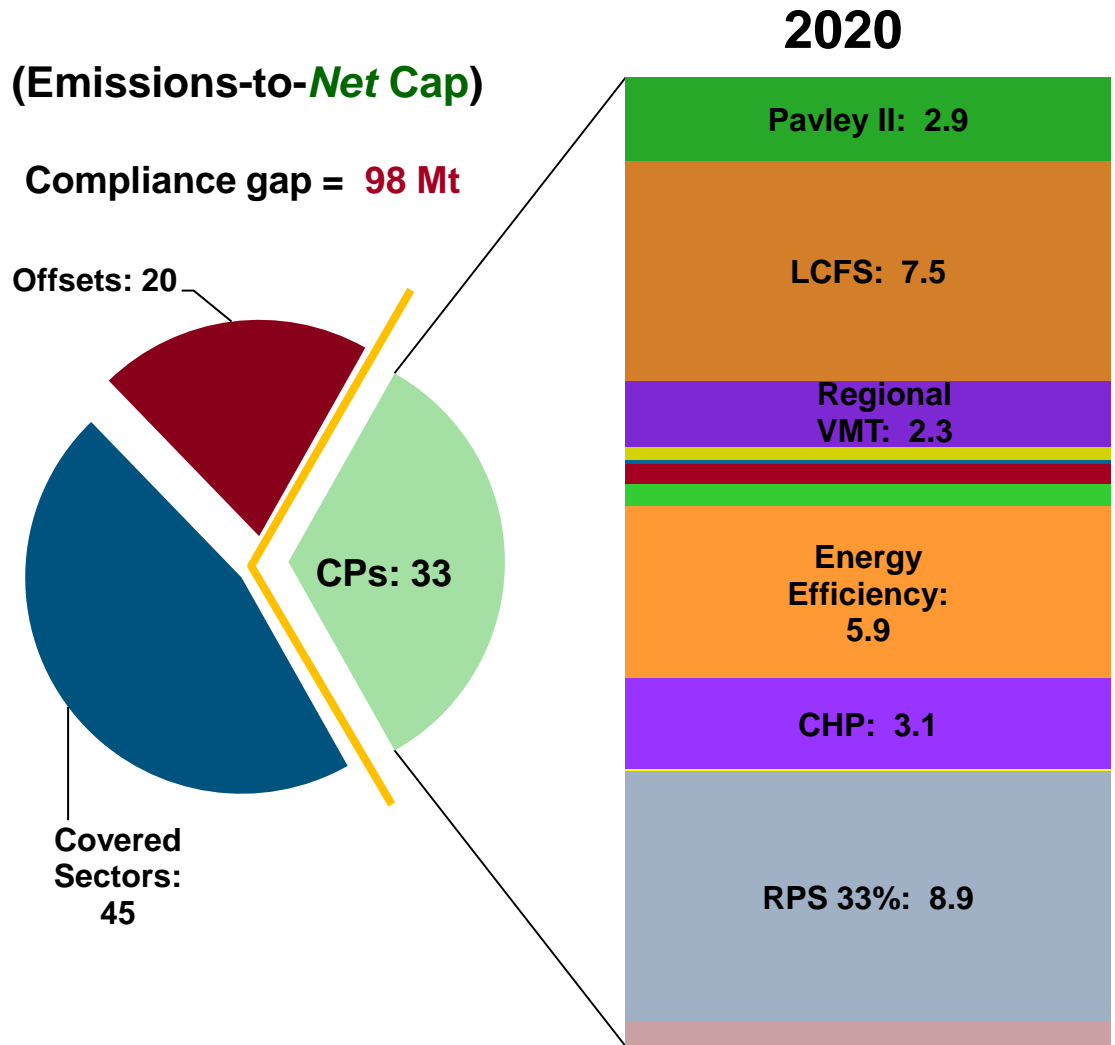


- Pavley II
- LCFS
- Regional VMT Targets
- Tire Pressure Program
- Ship Electrification
- Heavy Duty Aerodynamics
- High Speed Rail
- Energy Efficiency and Conservation
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- Solar Hot Water
- Renewable Electricity Standard (20%-33%)
- Million Solar Roofs

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

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



- 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

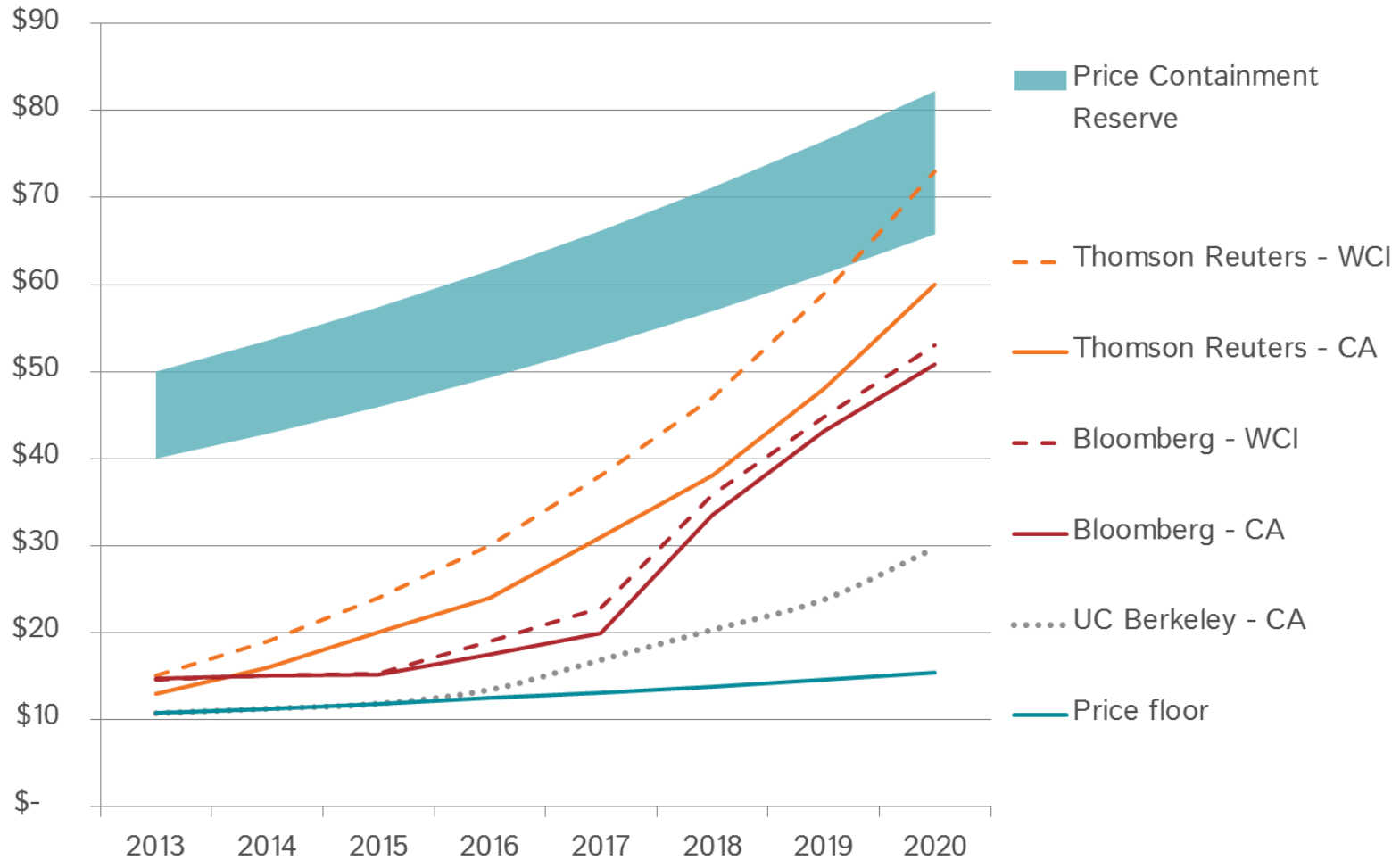
Current CA Offset Prices (as of Mar 29, 2013)

Instrument	Bid	Ask
CCA Price	14.10	14.30
PC Golden CCO	10.50	11.50
PC 3 year Liability CCO	9.00	10.00
PC CARB CRT Assessment		
ODS	7.00	8.80
Ag Methane	7.00	8.80
Forestry 3.1	7.00	8.50
Forestry 2.1	4.50	5.50

Source: PointCarbon, "California and WCI market report."
 Accessed online 4/23/13



Price Forecasts for California / WCI



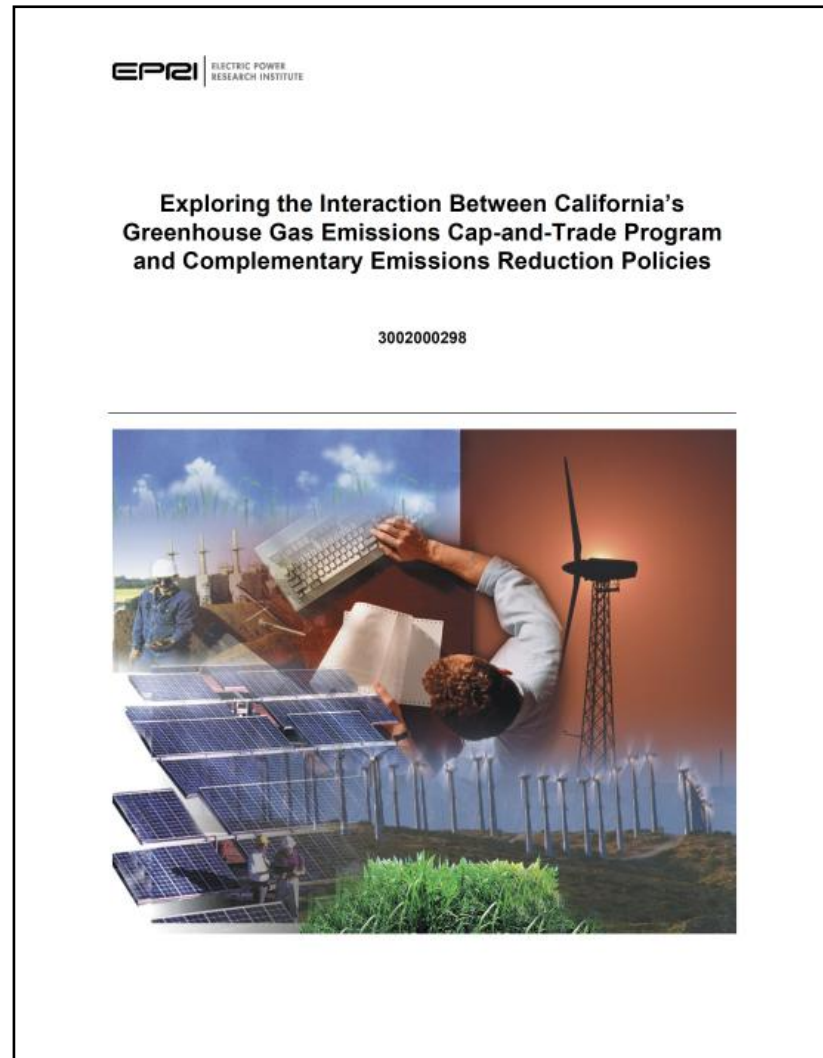
- Sources: Bloomberg New Energy Finance, Thomson Reuters Point Carbon, Energy Institute at Haas (UC Berkeley)
- Note: We charted the weighted average of the estimates provided in the UC Berkeley paper for illustrative purposes. The paper only estimates the probability that a given outcome would happen: 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.

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 result 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
- Available free online:
http://my.epri.com/portal/server.pt?Abstract_id=000000003002000298





Thank You

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