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California's Carbon Allowance Pricing and Offset Supply through 2020 and the Market Effects of Setting a 2030 Target

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December 3, 2013

Policy and Market Drivers in California's Cap-and-trade Market

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California Offset Supply Forecast through 2020

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Examining the Impacts of Establishing a 2030 GHG Reduction Target in CA AB32

Susanne Brooks, Environmental Defense Fund

Q & A

Asking questions

- Either during presentation or Q&A period at end
- Type questions into '**Chat**' box near bottom of your webinar pane or click hand icon to ask in person. Please include your name and organization.
- We will direct questions to the appropriate person during the Q&A period at the end
- We will try to answer all questions and will make our best effort to respond to any questions not addressed during the call via email

Webinar will be recorded

- Both the presentation and a link to the recording will be sent to all registered webinar participants



Policy and Market Drivers in California's Cap-and-trade Market

December 3, 2013

Introduction to ICF



EXPERIENCED

- Global consulting and professional services firm (NASDAQ: ICFI)
- 2012 revenue of \$937 million
- Over 40 years of experience—founded in 1969



GLOBAL

- More than 4,500 employees
- Global presence with 60 offices worldwide
- Headquartered in the Washington, DC area



DIVERSE

- Expertise across multiple sectors
- Diverse client base—U.S. federal, state, and local agencies, utilities, commercial clients

Select ICF Environmental Engagements



- Regulatory compliance strategy development and investment analysis
 - Analysis of coal plant retrofit projects and testimony in Minnesota, Arkansas, Indiana
- Allowance price projections and power market impacts under cap & trade
 - Regional Greenhouse Gas Initiative (RGGI) Program Review
 - Outlook for California CO₂ allowance supply and demand
- Development of regulatory and legislative proposals
 - NRDC study of CO₂ performance standards for existing plants
 - US Climate Action Partnership multi-sector GHG proposal
- Generation asset and power market impact assessments of regulations, including coal unit retirements and control decisions
 - EEI report on impacts of EPA rules (MATS, ash, water, CSAPR)
 - Bipartisan Policy Center report on EPA rules
- Pollution control technology penetration analysis
 - CCS retrofit potential
 - Activated carbon demand

Recent Developments in Policy and Market Drivers



- California's cap-and-trade program has now gone through five auctions, and the program has gained more confidence than in the past.
- Recent market trends and policy developments have led market analysts to lower their forecast for demand for emission reductions, and consequently their allowance price forecasts as well.
- This presentation will explore some of the major drivers behind allowance prices, and other recent developments in the program policy.
- Market Drivers
 - Lower energy demand
 - Performance of complementary measures
- Policy Drivers
 - Resource shuffling clarification
 - Addition of a new offset protocol



California Cap-and-trade: Brief Overview

California Cap-and-Trade Overview

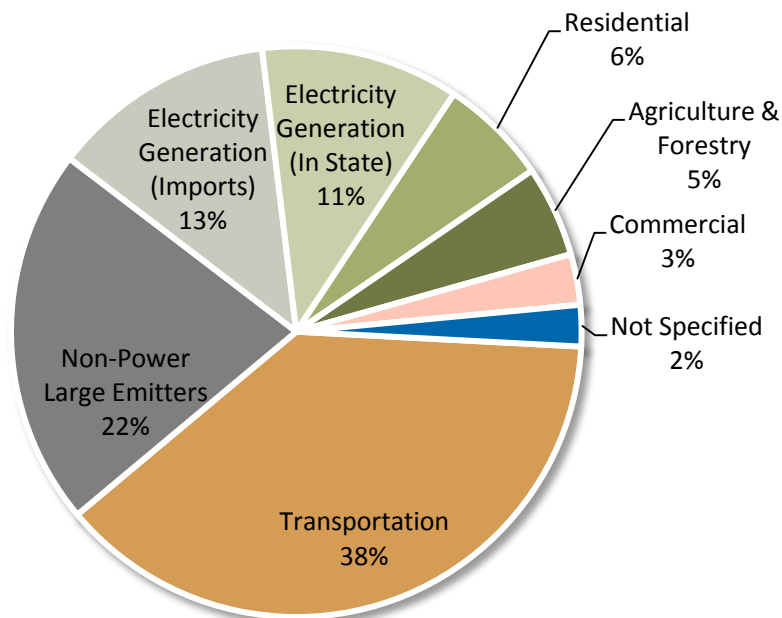


- California, through the Global Warming Solutions Act of 2006 - Assembly Bill 32 (AB 32) – requires California to reduce its greenhouse gas emissions to 1990 levels by 2020.
- The California Air Resources Board (ARB) has spent the last several years developing regulations to implement AB 32, which consists of a cap-and-trade program as well as a range of complementary measures to reduce GHG emissions.
- The cap-and-trade program will impact a wide spectrum of entities:
 - The power sector and other large emitters are faced with compliance obligations under the cap-and-trade program's initial period in 2013 and 2014.
 - The program expands in 2015 to cover natural gas and transportation fuel providers, encompassing over 80% of California's total GHG emissions.
- Entities that transact around power, fuel, and emissions markets in California—along with everyone who uses energy in the state—will be impacted to some degree by this legislation.

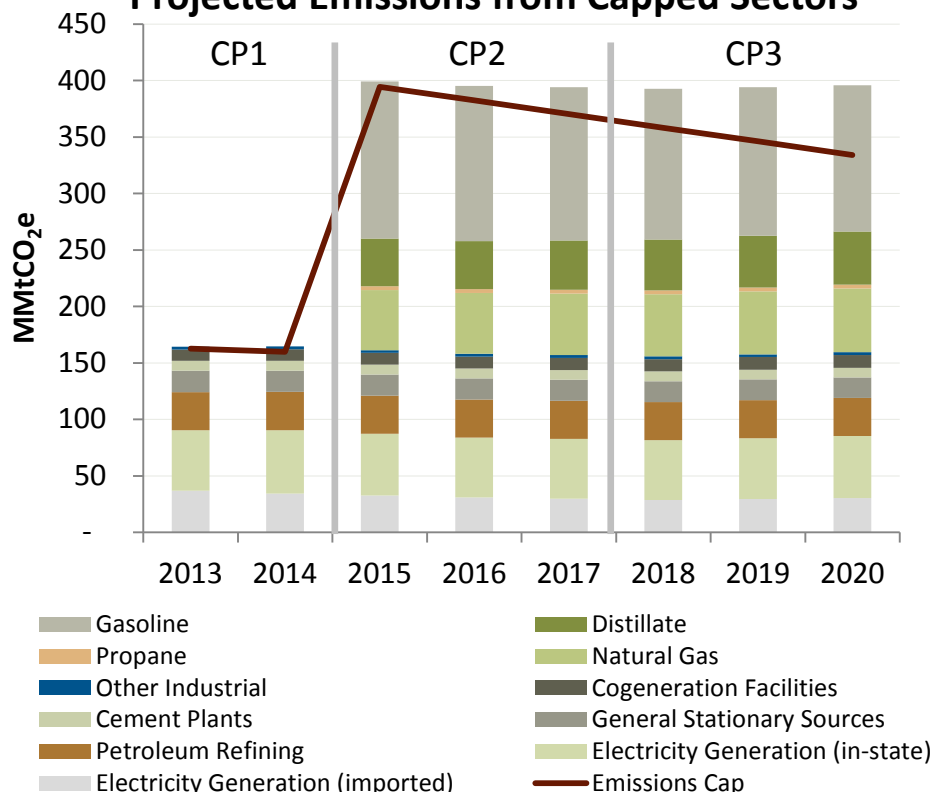
California's Baseline Emissions Projected – Covered Sectors

- Since 2000, California's GHG emissions, including those associated with imported power, have ranged from about 430 to 480 MMtCO₂e.

California GHG Emissions (2000-2008 Average)



Projected Emissions from Capped Sectors



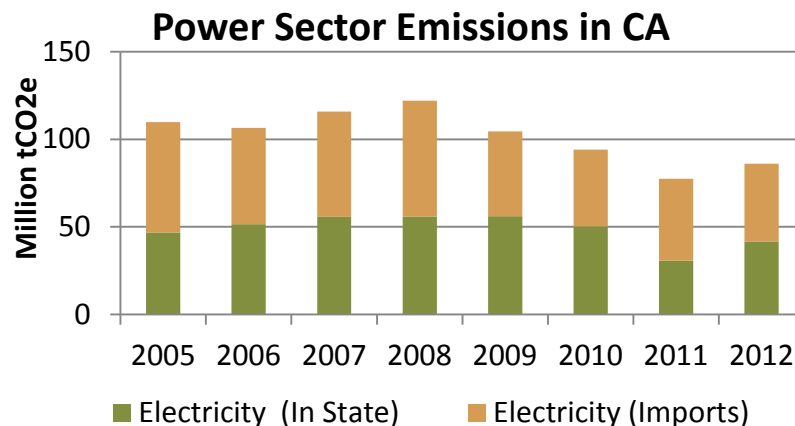
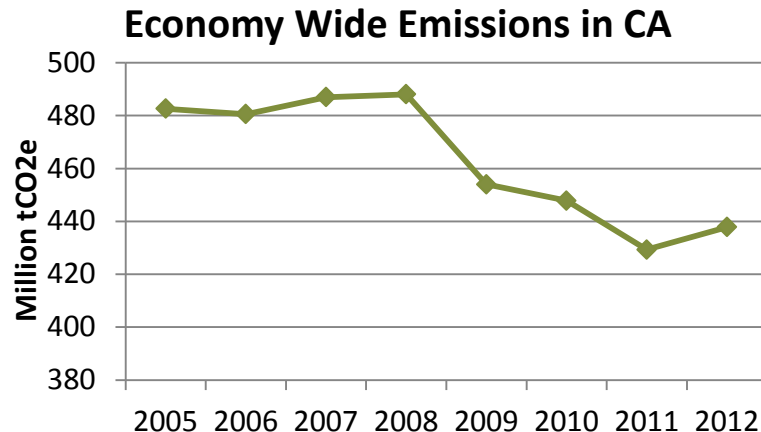
Note: Baseline includes reductions due to 33% RPS and Pavley I standard
Source: ARB (October 2010), ICF



Market Drivers

California's emissions have generally been falling

- Between 2005 and 2008, California's GHG emissions, including those associated with imported power, have generally ranged from about 480 MMtCO₂e.
- Emissions fell sharply from 2009, much of it owing to the economic recession.
- 2012 emissions were higher, mostly due to increased gas generation, which was used to replace the lost generation from nuclear, and lower generation from hydro resources as well.

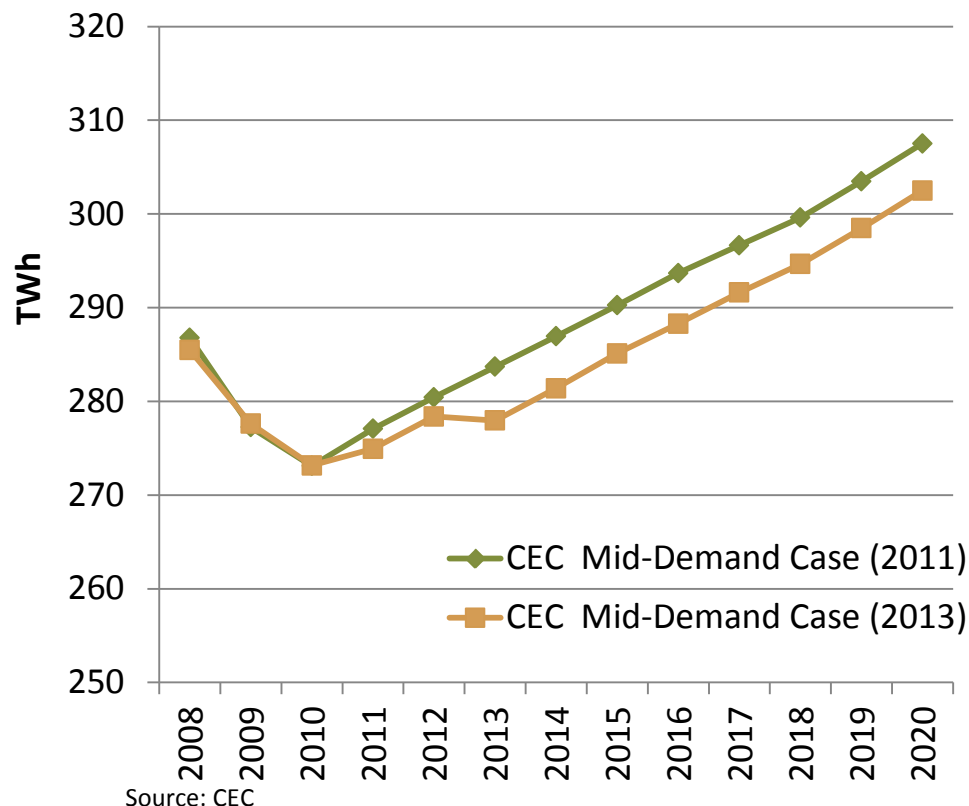


Source: ARB

Forecasts for electricity demand have also been revised downwards

- Forecasts for electricity consumption in CA have been revised downwards several times in the past few years.
- According to CEC's latest electricity demand projections, demand from 2014-2020 is roughly 1.7% lower than their previous projections in 2011. The lower demand is mostly attributed to slower economic growth than previously expected.
- The lower energy demand roughly equates to a little over two million tonnes of reduced emissions every year, as compared to the 2011 forecast.

Electricity Consumption Projection in CA



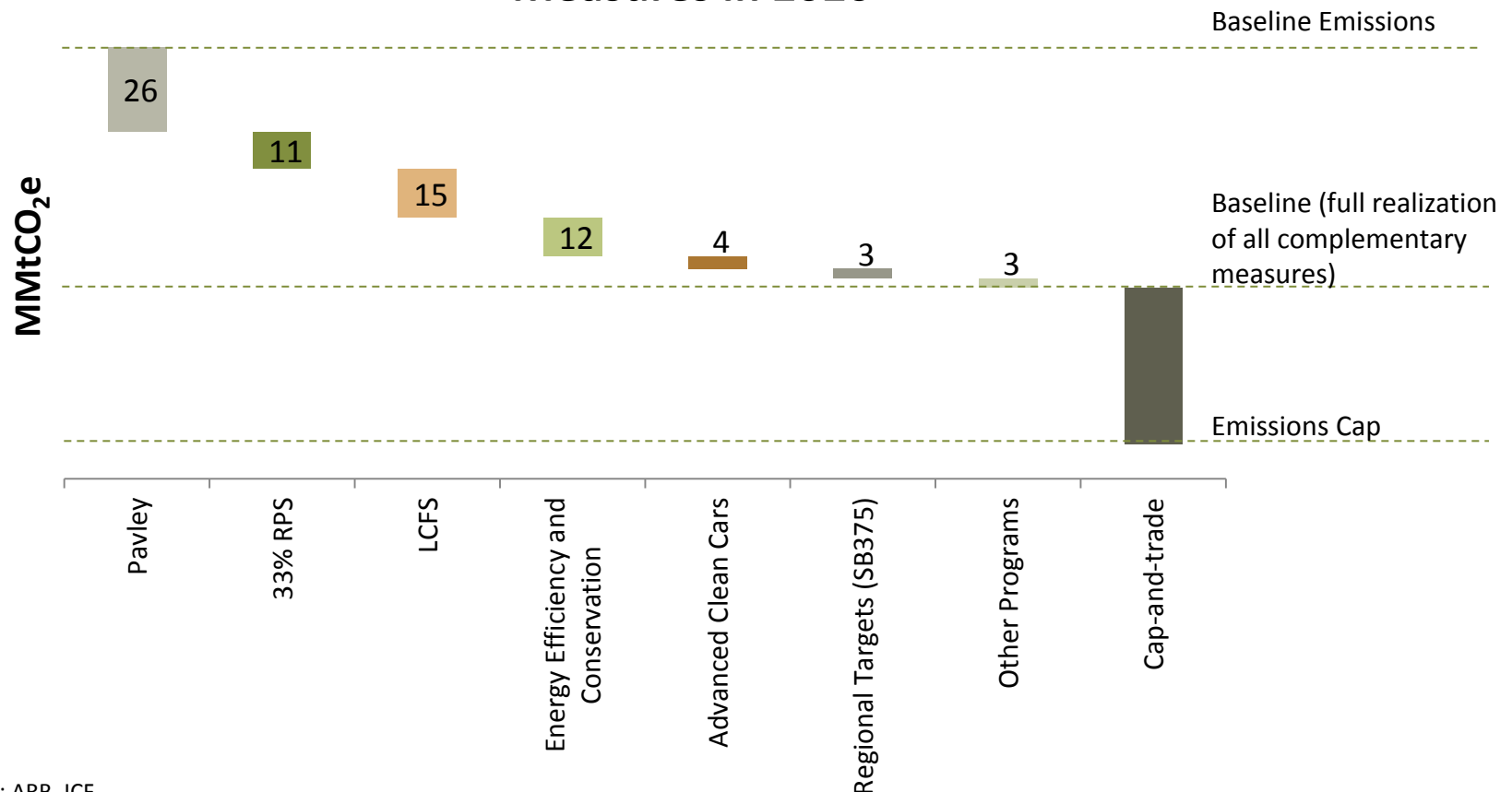
Complementary Measures in California

Measure	Sector	Expected Reductions in 2020 (MMtCO ₂ e)	Description
Pavley I	Transportation	26	Requires ARB to adopt cleaner vehicle standards (reduce GHG to the maximum extent technologically feasible) through 2016.
Renewable Portfolio Standard	Electricity	11	Achieve 33% renewables by 2020 (some portion will be achieved by Tradeable RECs, and will not reduce emissions in California).
Low Carbon Fuel Standard	Transportation Fuels	15	Target is to reduce carbon intensity of transportation fuels in California by at least 10% by 2020.
Energy Efficiency and Conservation	Electricity, Commercial and Residential	12	Various energy efficiency measures to reduce electricity and natural gas consumption.
Advanced Clean Cars	Transportation	4	Also referred to as Pavley II, or the Zero Emission Vehicles (ZEV) program, will require even more stringent standards for vehicles with model years from 2017 through 2025.
Regional Targets	Transportation	3	Also commonly referred to as, SB 375, it establishes mechanisms for the development of regional targets for reducing emissions from passenger vehicles.
Other Programs	Transportation	3	Vehicle efficiency standards, Goods movement system wide efficiency, Heavy Duty Aerodynamics, High Speed Rail, Medium/Heavy duty vehicle Hybridization

Source: ARB

Complementary Measures in California

Projected Emissions Reductions from Complementary Measures in 2020



Source: ARB, ICF

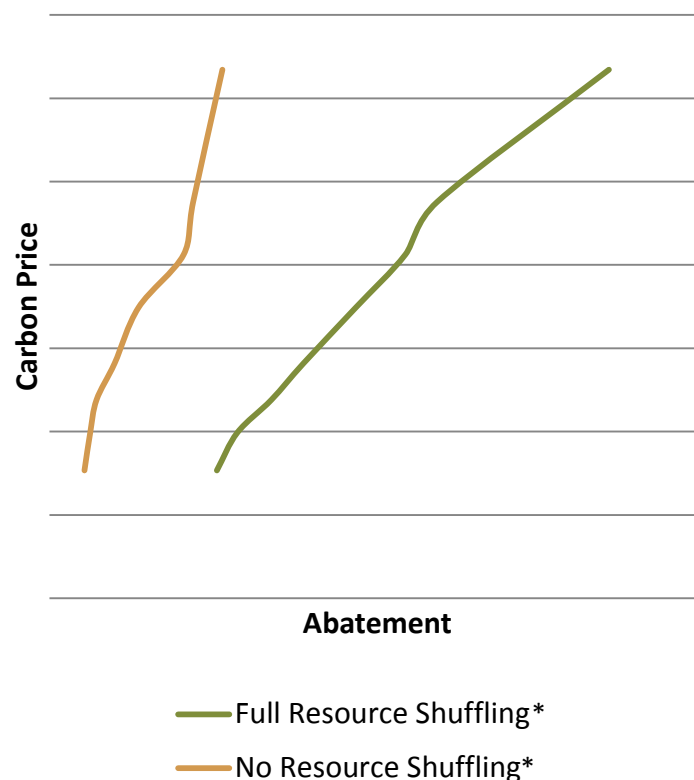


Policy Drivers

Power Sector Resource Shuffling in California

- California imports a third of its power, representing approximately half of its power sector emissions.
 - If left unchecked, emissions leakage would be counted as a reduction against the emissions cap, even as overall regional emission levels are unchanged.
- ARB addressed this issue by extending its carbon regulations to imported power, and by adding policies that would prevent covered entities from Resource Shuffling.
- The original definition of resource shuffling raised numerous questions, and ultimately led the ARB to revise these provisions earlier this year.
- The newly proposed regulations offer much more clarity by specifically defining activities that would not constitute as resource shuffling.

2020 Power Sector MACC



*As defined in the original cap-and-trade regulations in 2012.

Safe Harbor provisions regarding Resource Shuffling

- According to ARB's recent proposed regulations, the following activities are **NOT** considered as resource shuffling:

Compliance with policies

- RPS Compliance
- Emission Performance Standard (EPS); other federal and state policies

Grid operations

- Grid reliability
- Operation emergencies or T&D constraints
- Deliveries necessitated due to “must-take” or “must-run” provisions
- Deliveries to make up for transmission losses

Contracts

- Substitutions for contract termination, divestiture for reasons other than to reduce compliance
- Early termination of contract, due to EPS rules
- Contract expirations

Other reasons

- Substitutions in short-term contracts less than 12-months for economic decisions (not including GHG costs)
- Short-term transactions from CAISO day-ahead or real-time market settlements resulting from economic bid or CAISO cleared self-scheduling
- Compliance with judicial settlements (except for to meet GHG requirement)
- Substitutions for specified power resources that are retired

Availability of Offsets and Linkage with Quebec



■ Offsets

- Up to 8% of an entity's compliance obligation is allowed to be met with offsets.
- Currently, four offset protocols are eligible to generate offsets: forestry, urban forestry, livestock, and ODS.
- The newly proposed regulations also call for the inclusion of an additional protocol: coal mine methane.
- Supply of offsets from these protocols will be essential in lowering compliance costs, as will the potential for additional protocols, such as from rice cultivation, etc.

■ Linkage with Quebec

- Joint auction to take place in 2014.
- Quebec has a more aggressive target, but the program size is much smaller compared to that of California.
- Allowance prices in a joint CA-QC market will probably be close to what allowance prices would have been in CA in an unlinked market. Although, Quebec's program could see a larger impact owing to the linkage.

- Lower-than-expected baseline emissions are a major driver for lower allowance prices. Reductions expected from complementary measures are equally important.
- New policy developments have also made it easier for covered entities to comply:
 - More clarity in Resource Shuffling provisions
 - Potential addition of new offset protocol (Coal Mine Methane)
- Other important factors to consider when looking at market forecasts:
 - Total offset supply
 - Linkage with Quebec
 - Policy beyond 2020
 - The role of California's cap-and-trade under a national CO2 policy, specifically the upcoming NSPS for existing power plants

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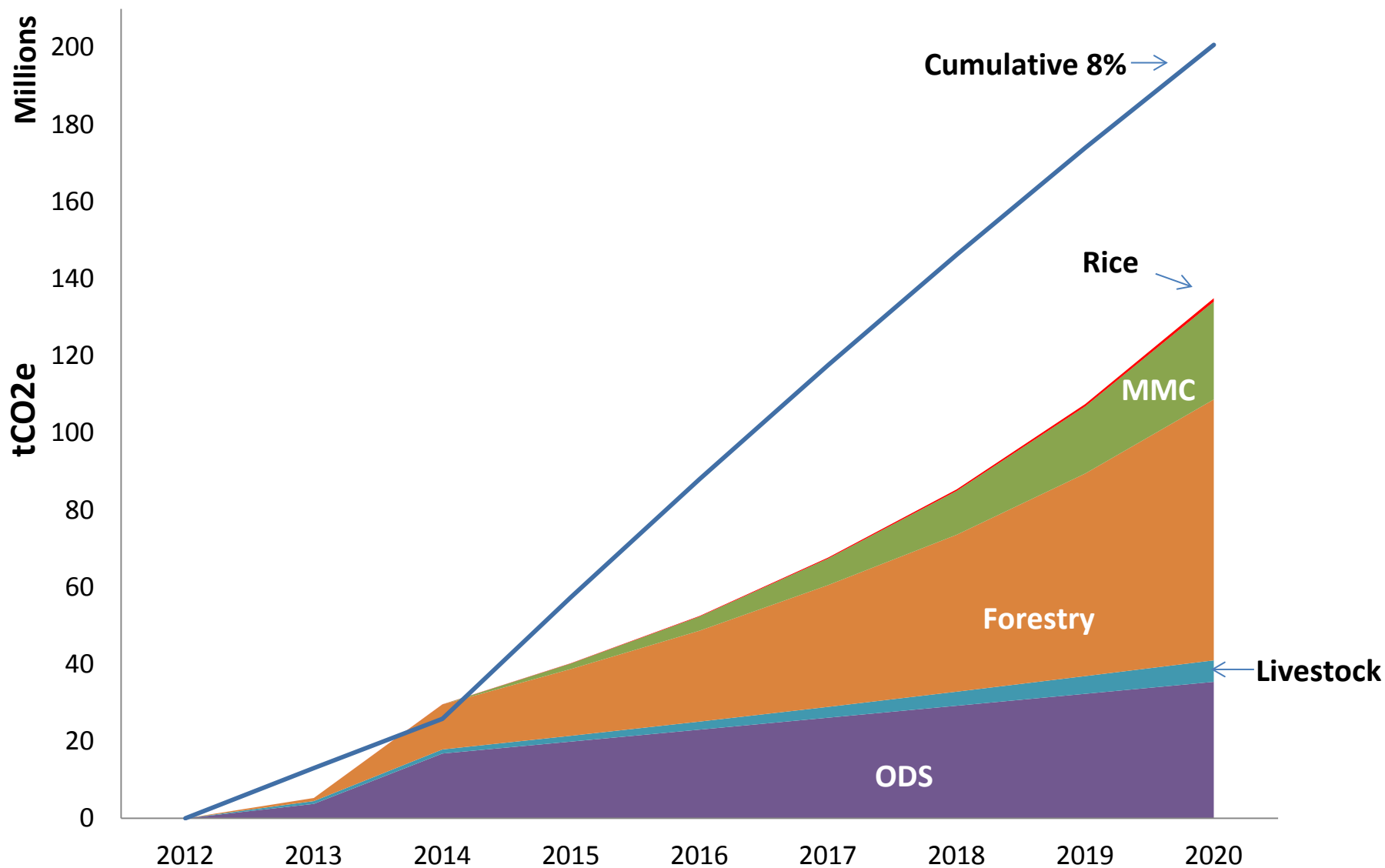
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California Offset Supply Forecast through 2020

Belinda Morris
American Carbon Registry

CA Offset Supply Forecast



Examining the Impacts of Establishing a 2030 GHG Reduction Target in CA AB32

“California is well on its way to meeting its 2020 emission goals, but it will need to continue and expand current programs to accelerate progress and achieve another 80 percent emission reduction by 2050.”

“Many other jurisdictions are beginning to develop 2030 and 2050 GHG targets and plans, and now is the time for California to begin considering the longer-term as well.”

Air Resources Board
Draft Scoping Plan Update

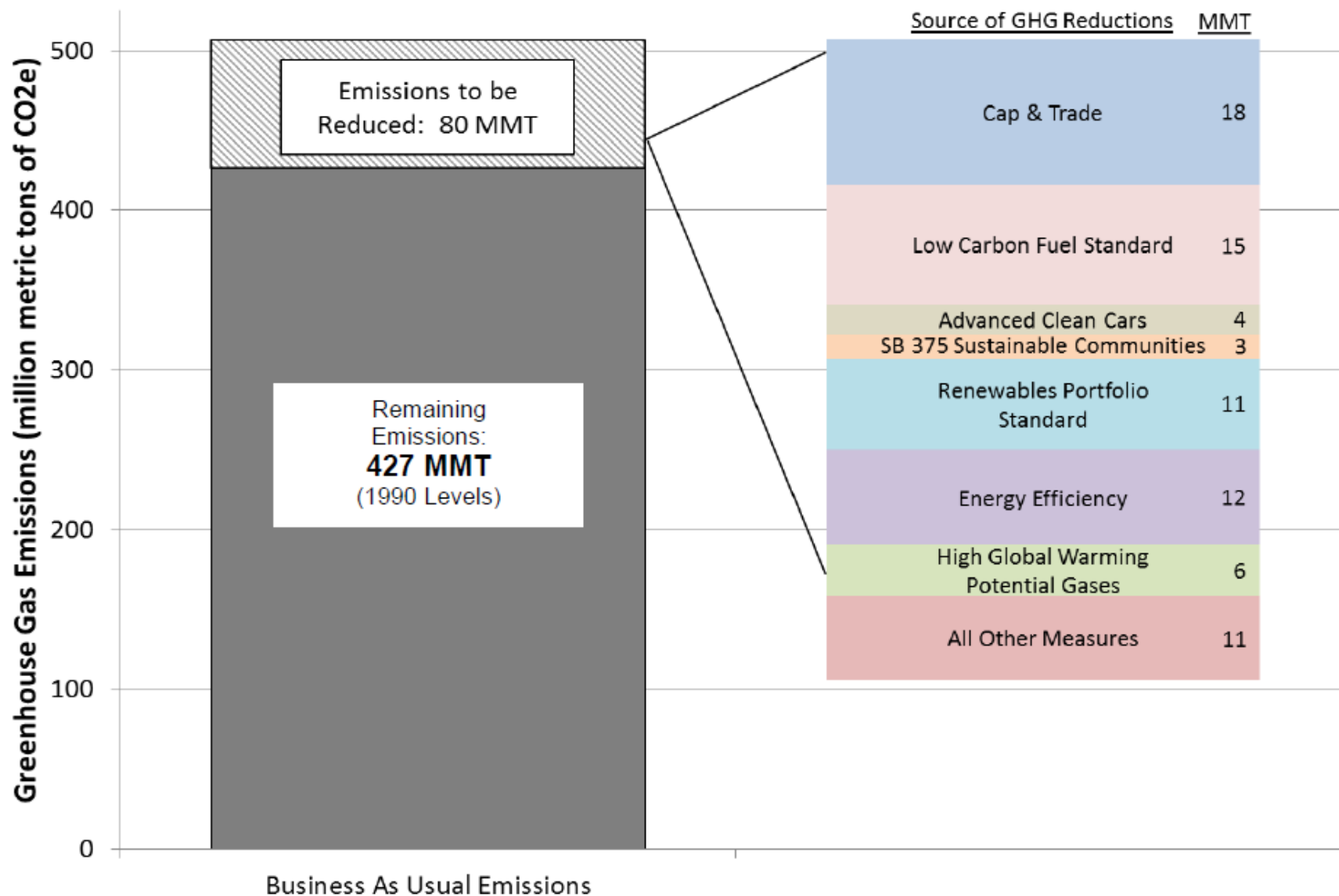


“[A]chieving deep emission reductions by 2050 will require that the pace of reductions increase over the coming decades. Decisions made today are critical in shaping these conditions for the future. Therefore, the state needs a midterm emission reduction target to provide a goalpost to guide near-term investment and policy development.”

Office of Planning and Research
Draft Environmental Goals and
Policy Report

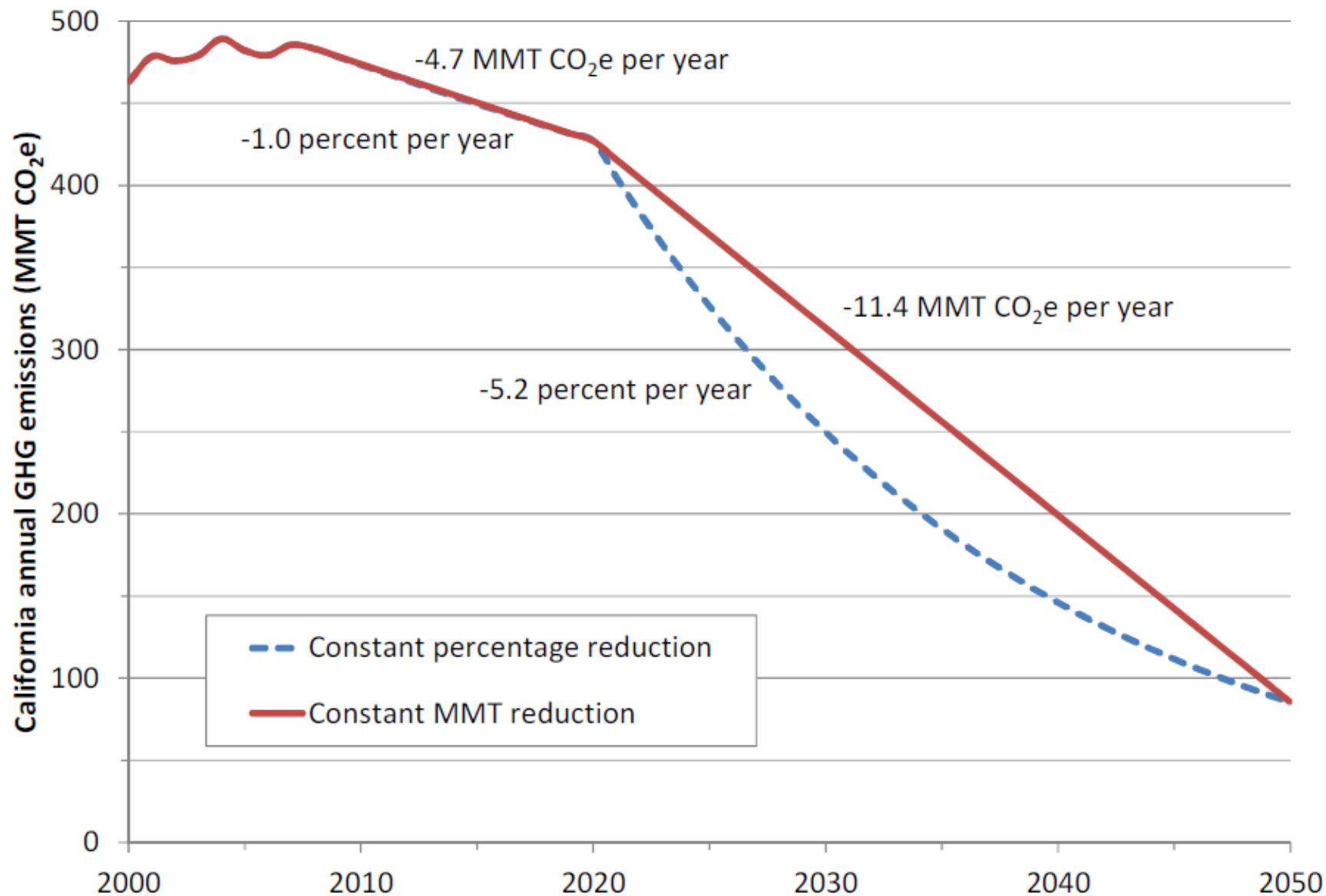


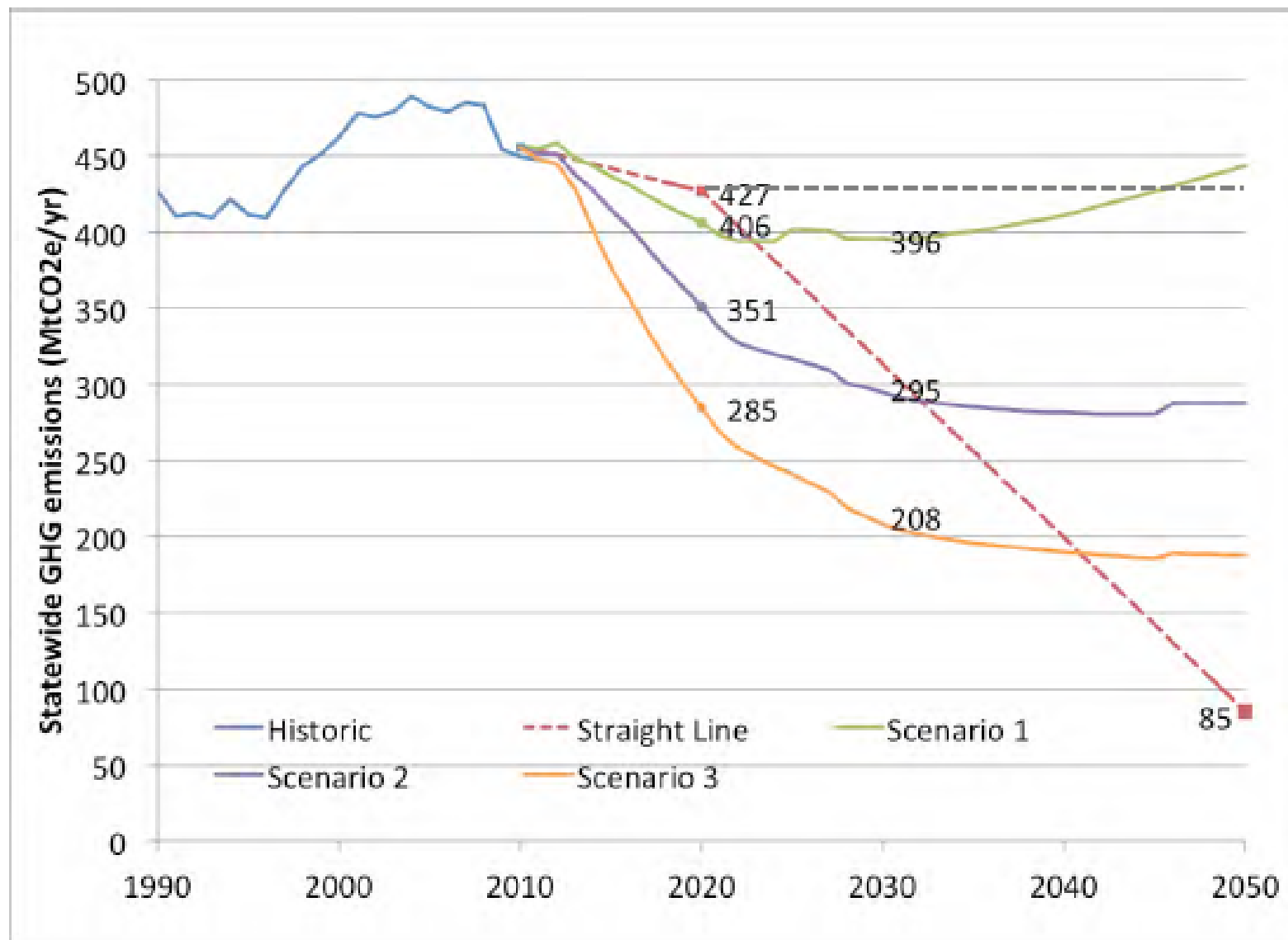
2020 Greenhouse Gas Emissions and Reductions



From ARB Semi-Annual Report to
The Joint Legislative Budget Committee on AB 32

Pre-2020 and Post-2020 emissions trajectories





Comparison of GHG emissions by Scenario, along with historical and “straight-line” connections between 2020 and 2050 policy targets.

EDF Modeling Scenarios

- Baseline Scenario: flat cap beyond 2020
 - Policy Scenarios: 2030 reduction target
 - include 2030 target in line with linear reductions to 2050 goal
 - 2030 target established in 2013, 2015, 2017 and 2019
 - Low and high offsets scenarios
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Model & Key Assumptions

- EDF Global Carbon Market Tool applied to CA & Quebec joint market
 - Explicitly accounts for banking
- CA abatement cost curves & BAU based on data from ARB; for Quebec, from POLES model
- Current imported electricity mix
- Complementary policies: “medium availability” in Bailey *et al* 2013 through 2020 (assume same annual availability through 2030)
- Offsets estimates (low and high) from 427 Consulting report (2013)

Caveats & Limitations

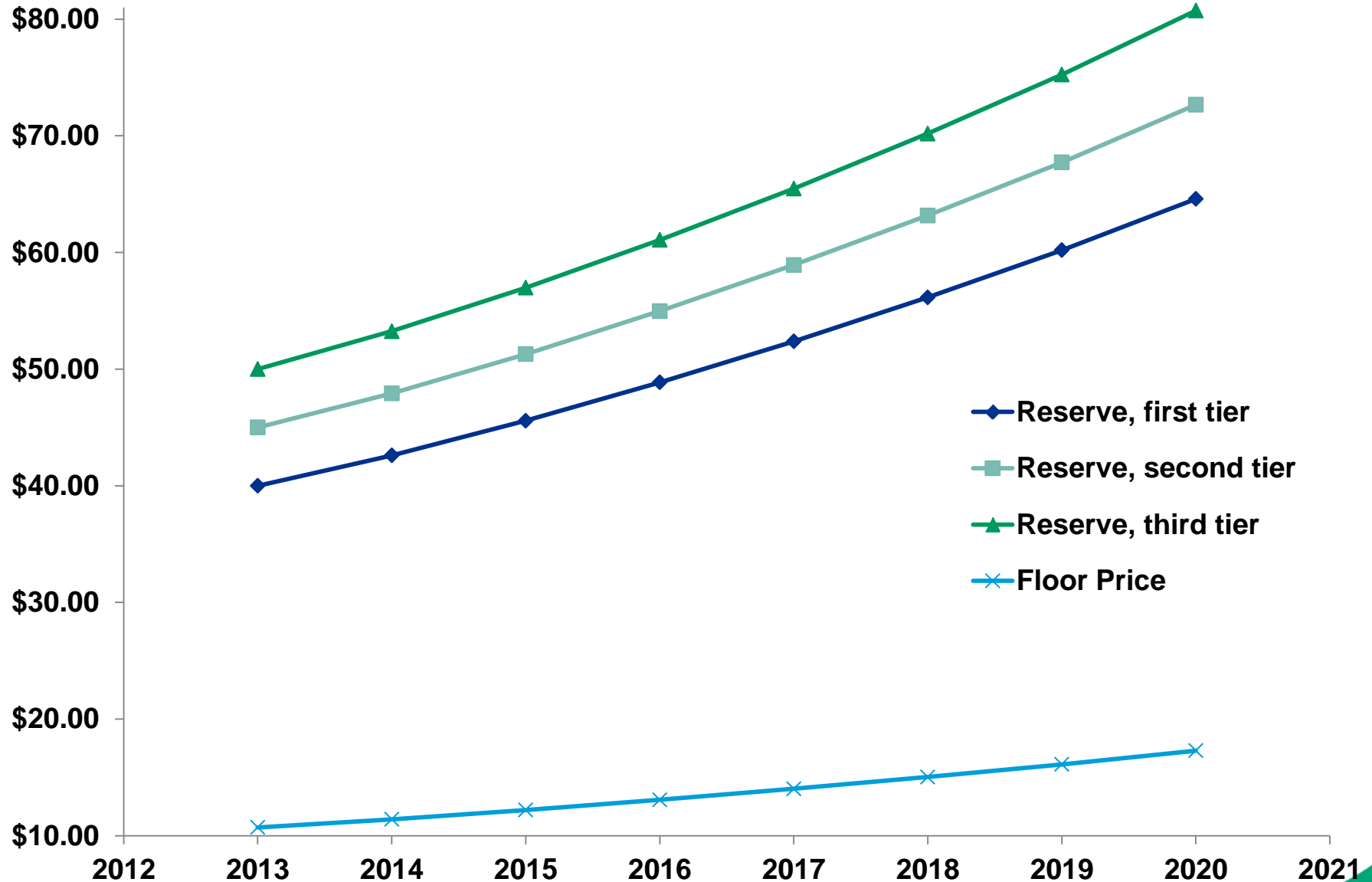
- We are focused on examining trends and directional impacts on the market of establishing a 2030 target, rather than projecting allowance prices or other specific point estimates
- Other benefits of setting a 2030 target cannot be fully captured by this model




INVESTMENT

Preliminary Results

Floor and Allowance Price Containment Reserve (APCR) Prices Through 2020



Results: Baseline Scenario (flat cap post-2020)

- No banking
 - Allowance prices remain at the floor
 - ~15% of auctioned allowances are not sold by 2020
 - If there was an expectation of a 2030 target, more banking would occur
 - In real world, expectations are complicated
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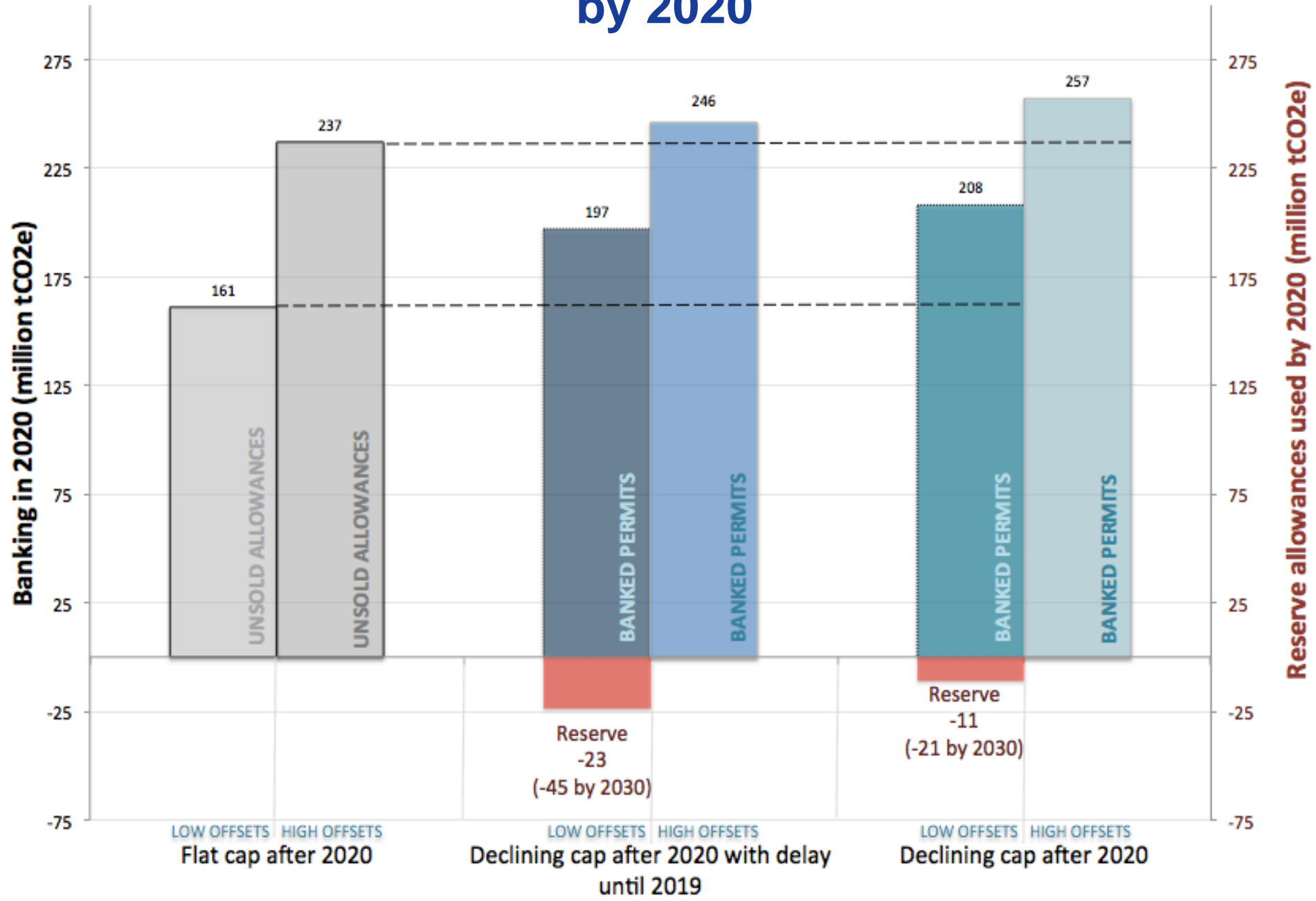
Results: Low Offset Availability Scenarios

- Policy scenarios assuming 2030 cap set in 2013, 2015, 2017, 2019 with “low” offsets availability
- Significantly more allowances are banked than in baseline
 - Amount of banking is higher by 4-5 MMT for every 2 years of avoided delay
- A small amount of the first tier of APCR is needed when target is set later in 2017 and 2019


Results: High Offset Availability Scenarios

- Policy scenarios assuming 2030 cap set in 2013, 2015, 2017, 2019 with “high” offsets availability
- Again, significant banking compared to baseline, and more than low offsets cases
 - Amount of banking is higher by about 2 MMT for every 2 years of avoided delay
- Allowance prices rise above floor price when 2030 target is set but remain relatively low (lower than in low offsets case)
- The APCR is not needed at all

Results: Unsold allowances, banking, and reserve used by 2020



Summary & Conclusions

- Establishing a 2030 target means emission reductions earlier due to banking
 - The APCR & offsets provide cost containment as intended – even with low offsets; but establishing a 2030 target earlier means using less reserve allowances
 - A 2030 target would encourage innovation not captured by model which could keep costs even lower – the earlier the better
 - Setting a 2030 target can provide environmental & market benefits – now is the right time to have this discussion and move forward
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Questions?



Thank You!