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AB 32 & California's Cap-and-Trade Program for Greenhouse Gases – 2013 Update

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Topics

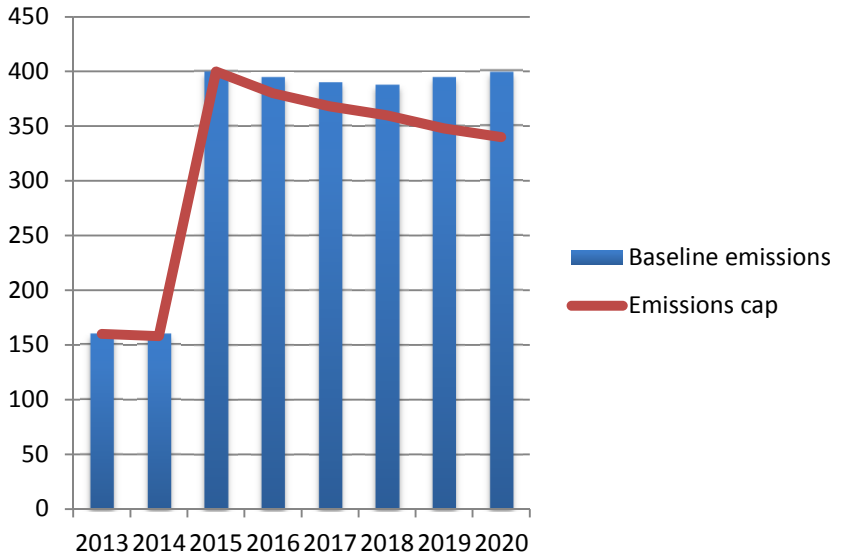
*GHG – Greenhouse Gases
*PEAR – Power & Energy Analytic Resources, Arlington, VA
*APCR – Allowance Price Containment Reserve
*ARB – California Air Resources Board
*UVA – University of Virginia

California's GHG Emissions and Allowance Allocation

California's Cap-and-Trade Program

- California's Cap-and-Trade (C&T) program is a market-based approach that caps overall GHG emissions from electricity, industrial, commercial, and residential sectors and transportation fuels.
- The declining cap requires GHG emission reductions.

Year	Million Allowances
~~2012~~	~~165.8~~
2013	162.8
2014	159.7
2015	394.5
2016	382.4
2017	370.4
2018	358.3
2019	346.3
2020	334.2



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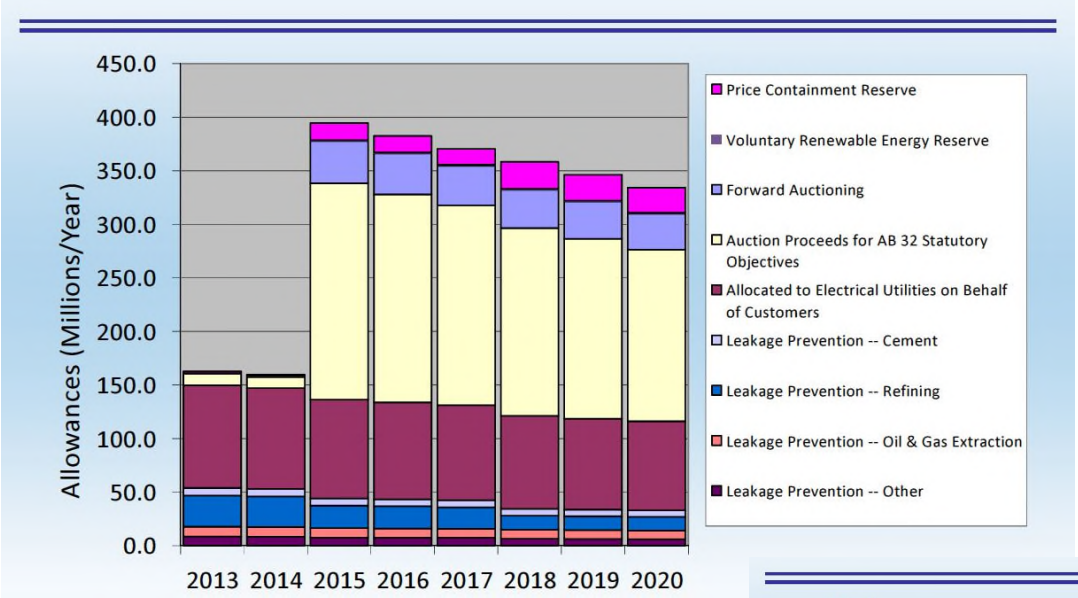
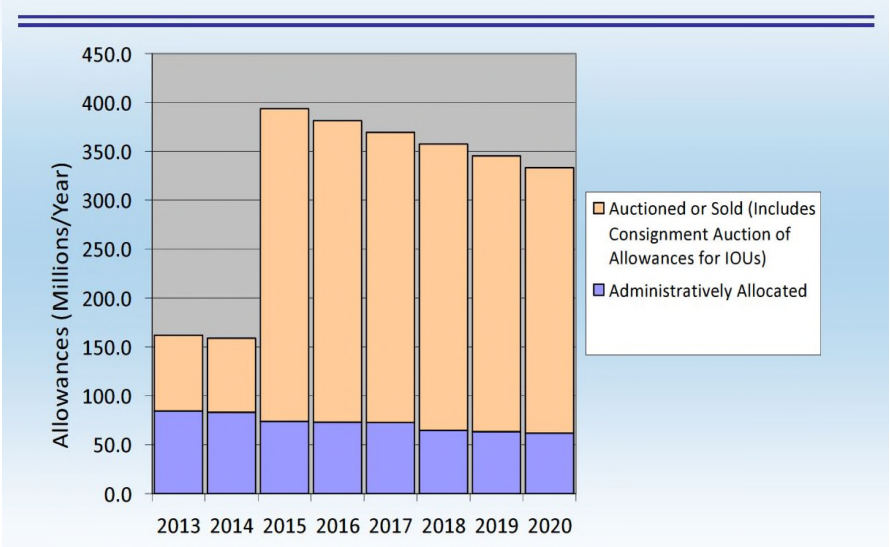
CA Carbon Allowance Disposition





Michael J. Gibbs, CARB,
CA Climate Program,
EMA Roundtable, March 14, 2013

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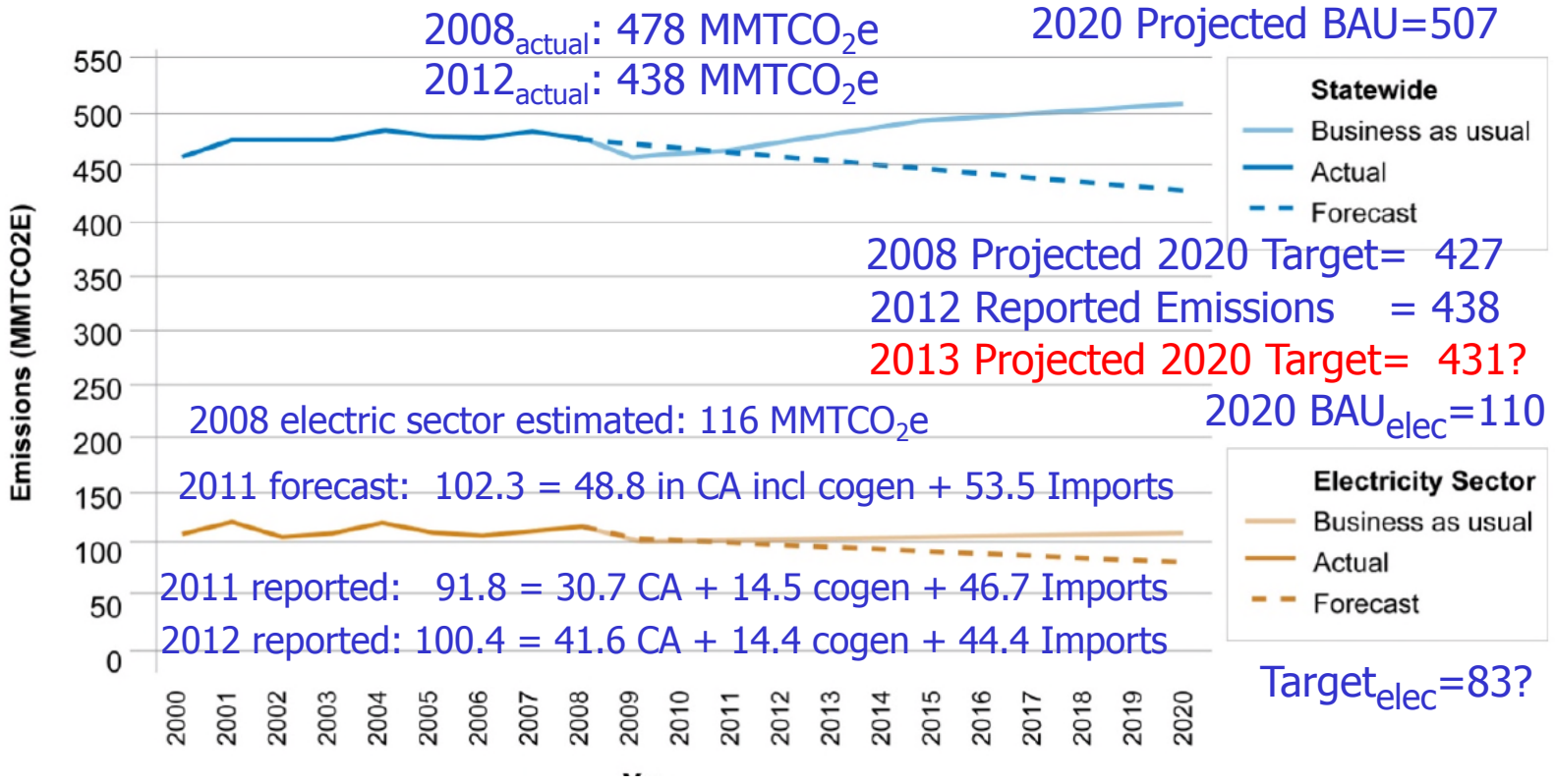
ARB Scoping Plan Projections: 2011 & 2013

- ARB 2011 Projections of GHG Emissions, 2000 to 2020



GHG 2010 projection based on 2009 CEC Demand Forecast, Mandatory Reporting Regulation (MRR) data, updated for measures approved as of October 2011, including Cap-and-Trade. ARB, Status of Scoping Plan Recommended Measures, 2011, and Final_ supplement to AB32 Scoping Plan Functional Equivalent Document, August 2011, p. 12

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ARB's Scoping Plan Update in 2013

- Every 5 years the AB 32 Scoping Plan is updated.
  - The plan updates the strategy to reach 2020 goals.
  - A new discussion draft was released October 1, 2013 with the Plan to be updated this November.
- CO_2e emissions in 2011 were ~~456~~~429 million tonnes, down from 495 million tonnes in 2004, while state population grew 10.5% between 2000 & 2011.
- Contributing to reductions were complementary measures, such as Energy Efficiency Standards, Low Carbon Fuel Standard (LCFS), Renewable Portfolio Standard, Advanced Clean Cars, High Speed Rail, CA Solar Initiative, Mandatory Commercial Recycling, Water Efficiency, plus Cap-and-Trade and a severe recession.

ARB's Scoping Plan Update cont'd

- Data and methodologies are being developed to assess the economic and health impacts of AB 32.
- A comprehensive energy plan will be prepared by the third compliance period (CP3, 2018-2020) to describe long-term GHG reduction goals, including
  - Post-2020 program elements and 2030 emission targets,
  - Integration and linkage with other geographic regions.
- Commenting parties have requested:
  - Quantification of progress achieved to date by programs,
  - Cost-effectiveness/efficacy of current measures & programs,
  - Stronger cost containment provisions before CP3.
- In late November a revised scoping plan and the CEQA Environmental Assessment will be released.

CA Auction Results & Allowance Prices

California Allowance Auctions

- California Carbon Allowance auctions are being held in the second month of each quarter.
- In 2014 expected CCA auction dates are:
  - February 19, May 16, August 18, and November 19.
- Allowance Price Containment Reserve (APCR) sales will be held six weeks after each auction, if needed.
- To date, no APCR sales have been requested. (In 2013, 40,611,000 CCAs have been offered quarterly in each of the $40, $45 and $50/tonne APCR tiers.)
- If needed, APCR allowances will be increased in each year's sale prior to November 1, starting in 2015.
- Revisions to the auction schedule, purchase limits and transparency of results are being evaluated.

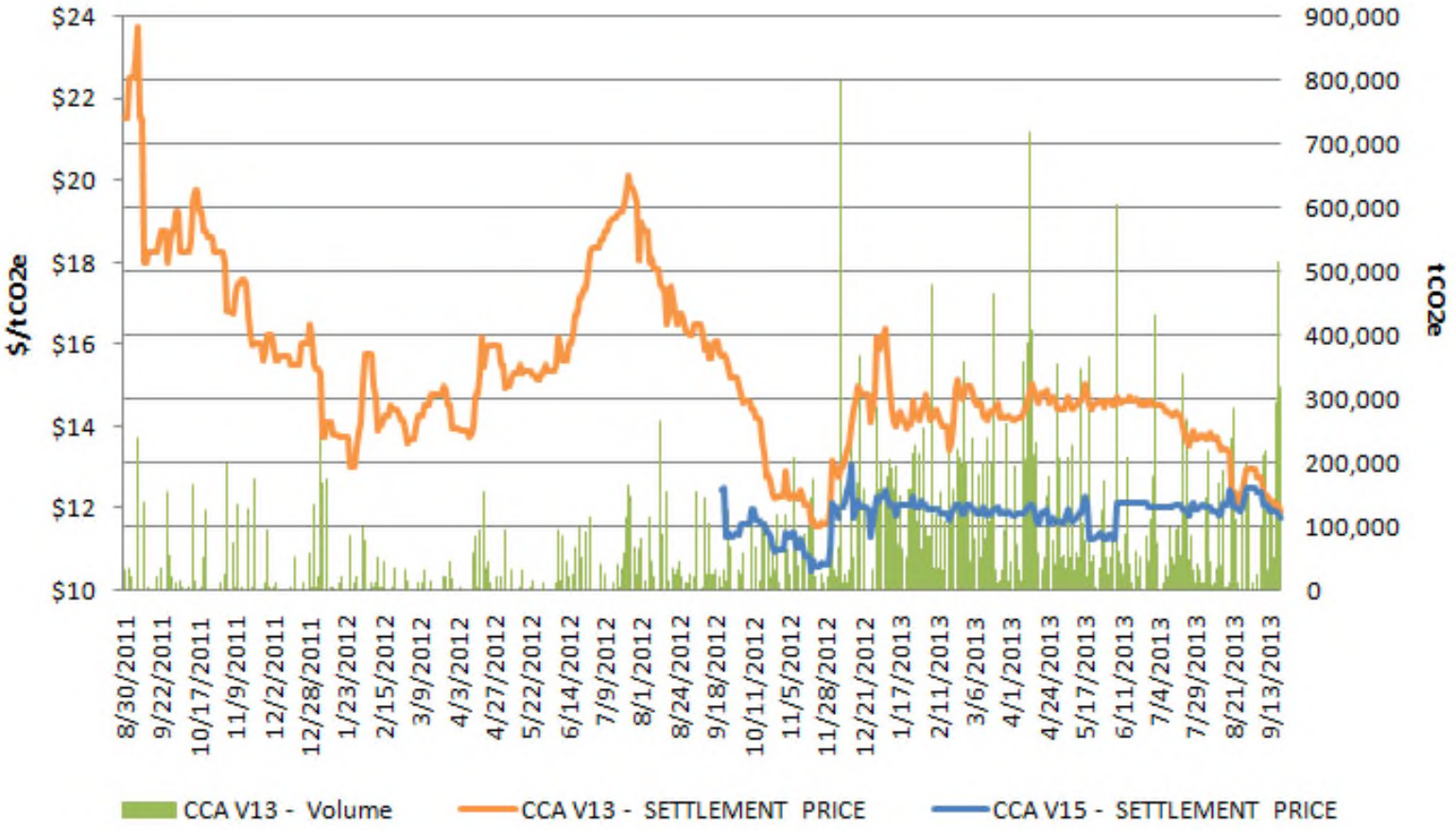
California Allowance Auction Results

CA Carbon Allowance (CCA) Auction Results

Auction Date	Vintage Year	# Offered	# Sold	# Qualified Bids/ # Available	Reserve Price ($/tonne)	Clearing Price ($/tonne)	Bought by Covered Entities	# Qualified Bidders
November 14, 2012	2013	23,126,110	23,126,110	1.06 (3.10)	10.00	10.09	97.0%	73
November 14, 2012	2015	39,450,000	5,576,000	0.14	10.00	10.00	91.0%	
February 19, 2013	2013	12,924,822	12,924,822	2.47	10.71	13.62	88.2%	91
February 19, 2013	2016	9,560,000	4,440,000	0.46	10.71	10.71	100.0%	
May 16, 2013	2013	14,522,048	14,522,048	1.78	10.71	14.00	90.2%	81
May 16, 2013	2016	9,560,000	7,515,000	0.79	10.71	10.71	86.5%	
August 16, 2013	2013	13,865,422	13,865,422	1.62	10.71	12.22	95.5%	79
August 16, 2013	2016	9,560,000	9,560,000	1.69	10.71	11.10	96.3%	
November 19, 2013	2013	16,614,526			10.71			
November 19, 2013	2016	9,560,000			10.71			

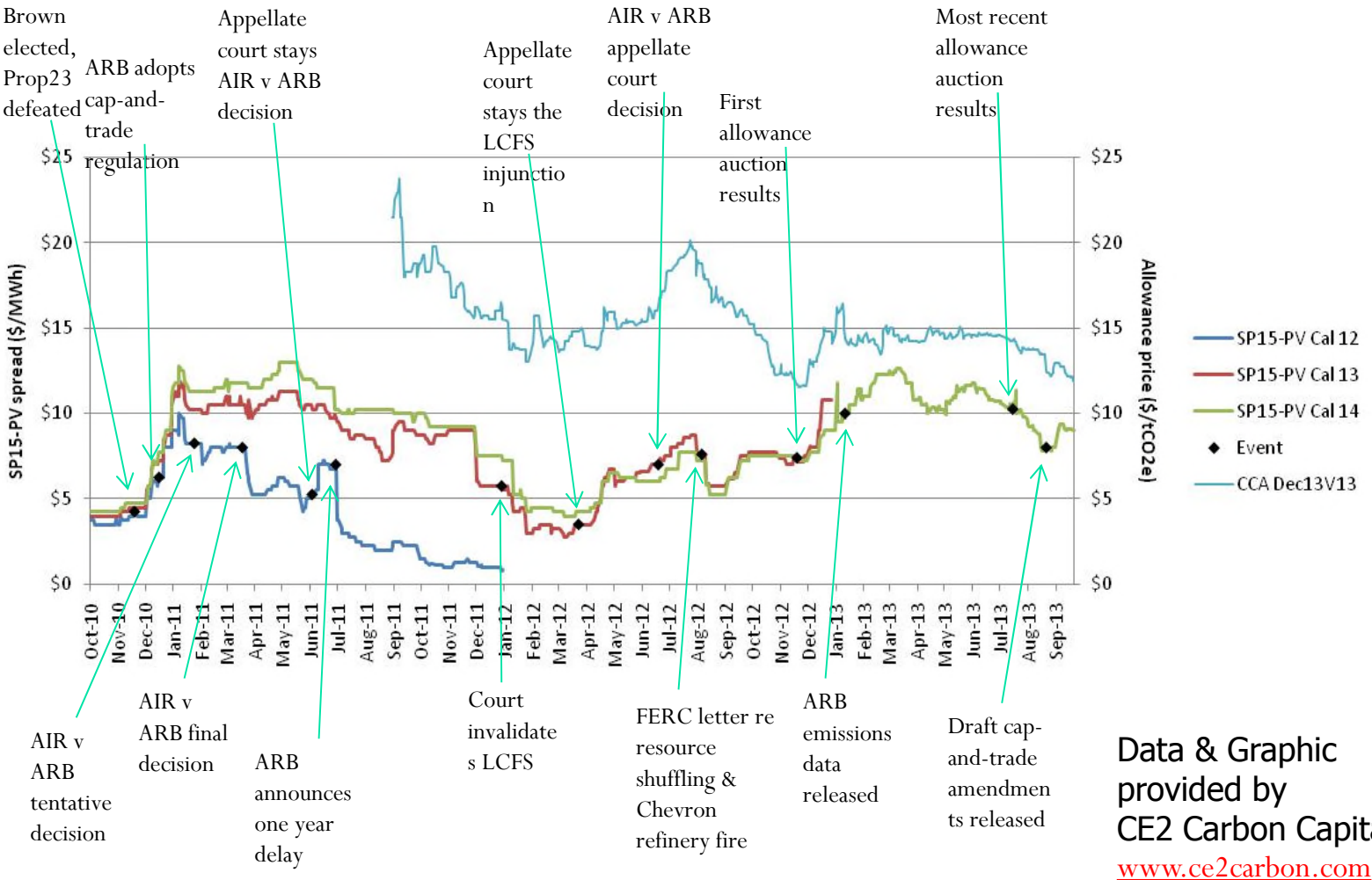
- Only about 100 of the 359 covered entities in CP1 have bid into the ARB's quarterly allowance auctions.
- Over 700 entities are reporting their GHG emissions.
- Revenues to CA for GHG reduction: $396 million, so far.

CCA Prices



Source of Data: Intercontinental Exchange (ICE).
Graphic provided by Morgan Hagerty, CE2 Capital Partners, Solana Beach, CA.

Volatility and Spreads Are Driven by Market Fundamentals and Events



Data & Graphic provided by CE2 Carbon Capital
www.ce2carbon.com

Sources: Intercontinental Exchange (ICE) as of 9/20/13, California Air Resources Board (ARB), Clean Energy Report.

Market Participation Will Increase

- Auction & secondary market activity will increase in 2014, but many factors affect market volumes, prices and volatility.
  - Industrials will no longer "wait and see,"
  - High-emitting entities must cover short-falls in free allocations and, then, transfer allowances to Compliance Accounts to take advantage of the ARB's Limited Exemption.
  - Financial firms are likely to become more active,
  - EDUs can elect how and when to consign all their allowances across the four quarterly auctions,
  - Utilities reduced their 2011 emissions substantially below 2008 levels, due to increased renewables and economic recession.
  - 2012 emission levels were greater than in 2011.
  - Going forward: hydro generation, SONGS shutdown, emission rates for asset controlling suppliers, and offset availability will affect the CCA supply and demand balance.

Allowance Price Projections

- Recent price projections suggest that it is more likely that prices will remain nearer to the price floor than prior projections. However, there are important scenarios where the price ceiling could be exceeded.

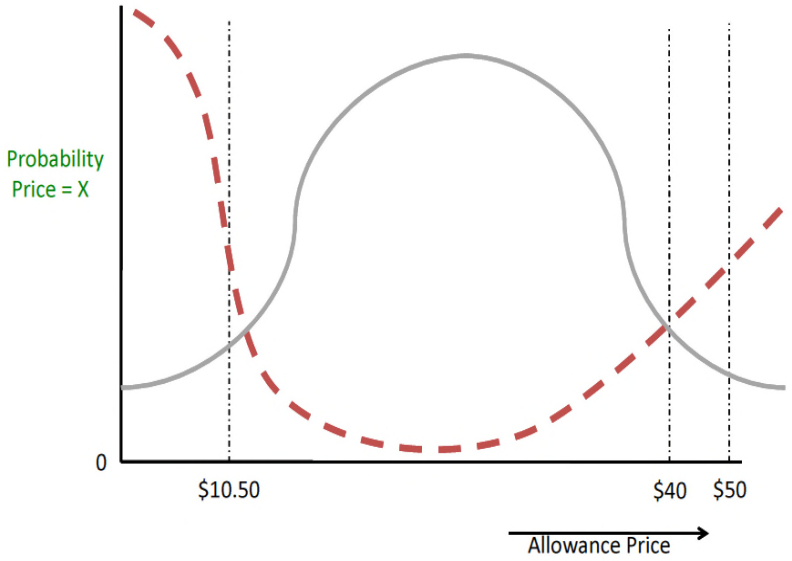
Forecasting Supply and Demand Balance in California's Greenhouse Gas Cap and Trade Market

by

Elizabeth M. Bailey, Severin Borenstein, James Bushnell, Frank A. Wolak and Matthew Zaragoza-Watkins[1]

March 12, 2013

Figure 3
Possible Density Functions of Allowance Price



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Allowance Price Projections cont'd

- Market fundamentals drive longer-term prices, while behavior affects shorter-term liquidity, volatility and prices.
  - A "Timing Impact Model" applied in Europe by ICIS demonstrates the importance of modeling the behavior of key market segments in order to project short-term prices.
  - According to Jan Frommeyer, ICIS, in Karlsruhe, Germany:
    - If an utility decides to buy its CCAs over 3 years, 2/3 of the needs will bought in the market BEFORE the CO2 is released,
    - If an industrial decides to sell its excess CCAs only after it is sure about its needs in a given year, these CCAs will enter the market only AFTER the long position is realized physically,
    - If an offset seller wants to hedge his portfolio, CCOs will be sold prior to the issuance of the credits.
- In California similarly situated market participants are likely to display similar patterns of behavior.

Allowance Market Linkages with Quebec & Others

Steps in Linking California and Quebec

- In April 2012, as required by SB 1018, Governor Brown made the following findings:
  - Finding 1: Quebec has GHG program reduction requirements, including reporting & offsets, that are equivalent to or stricter than those required by CA.
  - Finding 2: Linkage will not limit CA enforcement.
  - Finding 3: Enforcement by CA or Quebec will be equivalent to or stricter than CA requirements under Division 25.5 of the CA Health & Safety Code.
  - Finding 4: The proposed linkage with Quebec and related participation in the Western Climate Initiative (WCI) won't impose any significant liability on CA or any state agency.
- In September 2013, a formal Linkage Agreement was signed between CA and Quebec with linkage to be effective January 1, 2014.

Linking Allowance Markets

- Quebec facts:
  - Covered GHG emissions ~82.5 million tonnes in 2010, w 2020 target of 69.7 MMT, BAU emissions in 2020 ~ 84 MMT.
  - 95 % hydro-electric generation.
- Elements of the CA-Quebec linkage agreement include:
  - Completely fungible GHG allowances,
  - Linked allowance auction floor prices,
  - Provisions for termination of the agreement.
  - Different offset location and liability/risk requirements from CA,
  - Like CA, Quebec allowance holding limits lower than annual allowance needs of some large emitters.
- In July and Sept., CA signed MOUs of cooperation with Australia and w China's National Development and Reform Commission.
- In October, the governors of CA, British Columbia, Washington and Oregon agreed to align policies. Manitoba & Ontario may follow. Linking with RGGI states poses difficult fungibility issues.

Carbon Offsets

Carbon Offsets Will Help Reduce GHG

- Up to now, there are only four adopted ARB offset protocols: U.S. forest projects, Ozone Depleting Substances (ODS), Urban forests, and Livestock manure (anaerobic digesters).
- Mine Methane Capture (MMC) abatement from active underground mines, active surface mines & abandoned underground mines will be approved in late 2013.
- Rice cultivation is to be added in 2014.
- Two crediting periods:
  - Non-sequestration projects (7-10 years, two renewals),
  - Sequestration projects (10-30 years, unlimited renewal)
- Verification, invalidation and liability are ongoing concerns.

Offsets Are Needed to Keep Costs Down

- Offsets (CCOs or ARBOCs) will be cheaper than CCAs because of
  - Verification risk,
  - Invalidation and Liability risk,
  - Non-standard transactions (but IETA has a proposed contract),
  - Timing relative to market demand,
  - The usual uncertainties.
- In September & October 2013, fully compliant California Carbon Offsets (CCOs) are valued at a discount to the prevailing price of California Carbon Allowances (CCA futures.)
  - CCOs vs. CCAs ($9/tonne vs. ~$12/tonne, 2013 vintage)
  - Non-guaranteed California eligible protocol offsets @ ~$7-8.50/tonne,
  - Voluntary offsets @ ~$0.50-$0.80/tonne.
- Along with new protocols, the ARB is expected to improve processes for implementing the offset program.

The First ARBOCs Have Been Issued

- In September 2013, ARB issued the first ARB Offset Credits (ARBOCs) to 5 ODS project owners ~600,000 ARBOCs.
- Three of these ODS projects were early action projects that generated over 300,000 credits.
  - Early action credits may be given for qualifying projects begun after December 31, 2006.
  - 300,000 credits are the CO_2e of ~34,204,596 gallons of gasoline.
- ARBOCs are now being issued on the 2nd and 4th Wednesdays of each month.
- As of November 1, about 1.1 million ARBOCs have been issued.

ARB Offset Status Depends on the View

As of September 2013, CE2 Carbon Capital estimates:

- Only 14.3 million potentially eligible offsets to date.
- The estimated offset quota (8% of emissions) for the first compliance period would be nearly double this.
- Existing offset volumes have accumulated over 8 years, but there are only 2 years left before CP1 true-up.

Offset Type	10^6 tonnes Issued	Retired or Converted	Net	%
EAOCs (CRTs, ERTs)	15.6	2.1	13.5	
ROCs (from CAR & ACR)			0.2	
ARBOCs (CCOs)			0.6	
Total			**14.3**	55%
Est. CP1 Quota			25.8	

CP1 – Compliance Period 1 (2013-2014)
EAOC – Early Action Offset Credit
CRT – Climate Reserve Tonne
ROC – Registry Offset Credit

ROCs and CRTs are not convertible. ROCs can be traded between Offset Project Registry accounts.

EAOCs & ROCs must be converted to ARB Offset Credits (ARBOCs) to be used for AB 32 compliance.

As of September 2013, the Climate Action Reserve estimates that 40.9 million CRTs have been Registered and 7.8 million CRTs have been retired.

Data Sources: California Air Resources Board, Climate Action Reserve, American Carbon Registry; as of 9/24/2013.

Climate Action Reserve Offset Projections

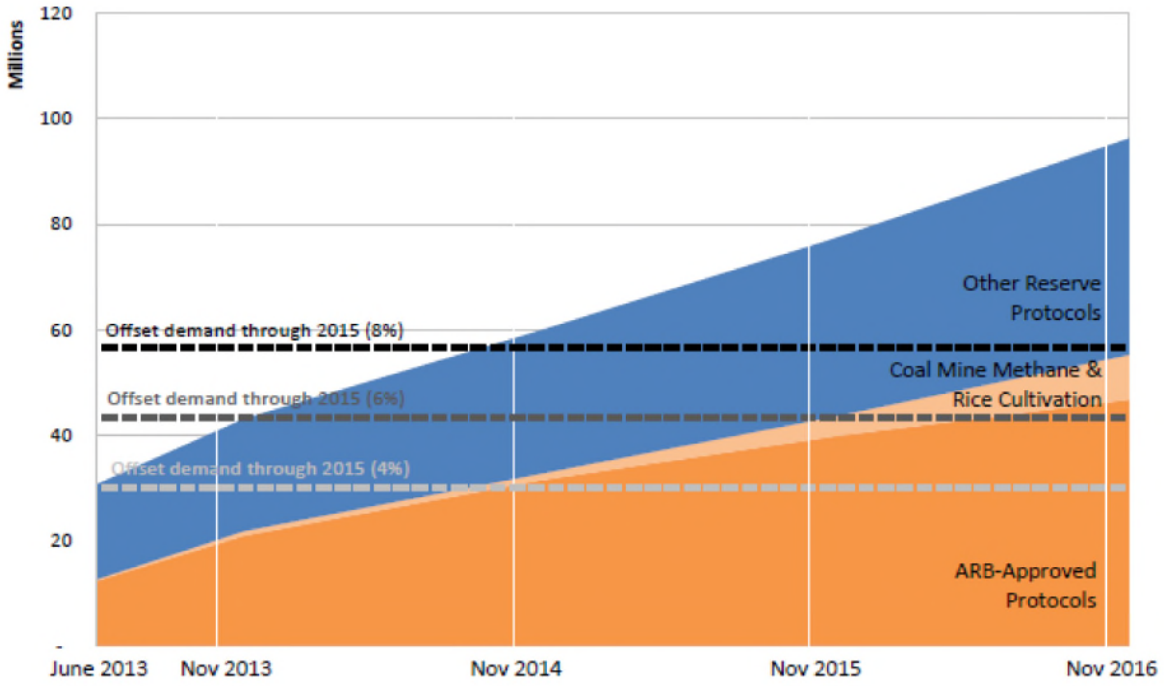
- CAR projects adequate supply in CP1, but a shortfall in CP2, reaching 134 million tonnes by 2020.

Projections of Future Combined CRT & ROC Issuance
May 20, 2013

CLIMATE ACTION RESERVE

CRT – Climate Reserve Tonne

ROC – Registry Offset Credit



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The Low Carbon Fuel Standard

The LCFS Program

- California's transportation sector contributes about 40 percent of California's GHG emissions.
- The Low Carbon Fuel Standard (LCFS) is intended to reduce the carbon intensity of fuels sold in California by ten percent by 2020, under Health and Safety Code Sections 38500-38599 (AB 32).
- In 2010, the LCFS was projected to achieve ~15 x 10^6 tonnes per year of GHG emission reductions.
- Any shortfall in LCFS reductions will increase the reductions required by the cap-and-trade program, which in 2010 were projected to be about 18 million tonnes per year in 2020.

The LCFS Program

- LCFS covered fuels must have approved lifecycle carbon intensity pathways, which generate credits or deficits compared to declining carbon intensity targets.
- Tradable credits can be generated and banked by
  - Biofuel blending – corn, sugarcane, and cellulosic ethanol, biodiesel, renewable diesel and renewable gasoline.
  - Biofuels should account for 60% of LCFS credits through 2020.
  - Advanced vehicles – electric, natural gas (CNG, LNG, biogas), and hydrogen.
- LCFS credit prices rose from about $12/tonne in August 2012 to about $\$65^{+}$/tonne CO_2e in September 2013. Credits may be short in 2017-2018.

ARB's October 2013 Regulatory Amendments

Summary of ARB Regulatory Amendments

2013 Regulatory Amendments Summary

- Resource Shuffling
- Legacy Contracts
- Combined Heat and Power
- Emissions Leakage
- Universities
- Offset Program Implementation
- New Offset Protocols
- Cost Containment
- Product-based benchmarks
- Allowance Allocation
- Waste-to-Energy
- Renewable Energy Credits
- Auction and trading Requirements
- CITSS and Information Disclosure
- Market Rules for Auctions & for CCA and CCO Transfers

Air Resources Board

*CITSS – Compliance Instrument Tracking System Service

ARB Amendment Items for Board Approval

ARB Amendments intended to take effect January 1, 2014, are now expected to be approved at ARB Board meetings in either December 2013 or in 2014.

- Mine Methane Capture will be added to the four existing offset protocols,
- Reporting requirements modified to track increases in criteria and air toxics pollutant emissions,
- New record keeping and GHG Monitoring Plan requirements for facilities >25,000 tonnes CO_2e that will also apply to biomass-derived CO_2 emissions, geothermal emissions, and fuel suppliers.
- Reporting by generating unit or system for multiple electricity generation and cogeneration units with multiple dedicated end-users.

ARB October 2013 Board Meeting Items

Other expected amendments affecting the reporting of electric power emission rates are intended to:

- Clarify that sellers of specified power must warrant or guarantee that the power sold was actually acquired as specified source power, not re-marketed unspecified power,
- Add supporting documentation requirements for specified source busbar claims not using the transmission loss factor,
- Clarify the existing requirement that asset-controlling supplier (ACS) power must be reported as unspecified, when not acquired as a specified source,
- Add a requirement that purchasers of system power with a carbon content above the default emission factor must report using a system power emission factor rate determined by ARB, instead of the unspecified rate, in order to better reflect system power carbon content.

ARB October 2013 Board Meeting Items cont'd

Additional amendments will also:

- Change refinery reporting calculations to "complexity weighted barrel (CWB)" requirements for refineries, in order to support the allocation of C&T allowances,
- Enable separate reporting for refinery GHG emissions and transportation fuels,
- If needed, make 10% of future vintage allowances available to the Allowance Price Containment Reserve for the reserve sale immediately prior to November 1 each year after 2014. November 1 is when allowances must be surrendered.
- Clarify reporting requirements for operators of intrastate pipelines and utilities delivering natural gas,
- Further delineate Resource Shuffling safe harbor transactions and remove the attestation requirement.

ARB October 2013 Board Meeting Items cont'd

More proposed amendments would:

- Extend industry assistance factors for allowance allocation to Emissions Intensive Trade Exposed (EITE) industries and provide transition allowances to entities with legacy contracts throughout the second compliance period, 2015-2017.
- If an industrial facility is now receiving an allowance allocation, the generator will be allocated allowances for the life of the existing legacy contract.
- Exempt the emissions from Combined Heat and Power (CHP) facilities that would not otherwise be covered entities in the C&T program "but for" their investment in CHP.
- Exempt waste-to-energy facilities in CP1.
- Retire equivalent allowances from exempted CHP and waste-to-energy facilities, in order to maintain the environmental integrity of the C&T program.

ARB October 2013 Board Meeting Items cont'd

Issues raised by stakeholders for further consideration:

- Revise method for default "unspecified" system power emission rates that create an incentive to reclassify higher emitting power,
- Adopt more robust long-term cost containment measures to avoid price spikes, such as a *hard allowance price cap, more offset protocols, and an increase in the 8% offset use limit,*
- Exempt specific legacy contracts (e.g., Crockett cogen),
- Allow designation of particular allowances to be retired to enable free allowances to be distinguished from purchased allowances,
- Reduce scope of personal information to be disclosed & updated,
- Retain jobs at California refineries and other businesses,
- Ensure that ARB rules are coordinated with requirements of other agencies, are consistent with current electricity market operations, and facilitate future flexibility.

Legal Challenges

Is AB 32 an Illegal Tax or a Fee?

- In November 2012, CalChamber and tomato processor, Morningstar, represented by Pacific Legal Foundation, sued ARB about the legality of AB 32 allowance auctions, alleging AB 32 imposes an unconstitutional tax on business.
  - New state taxes require a 2/3 majority vote in both the Senate and Assembly. Fees are o.k.
  - See the 1997 California Supreme Court ruling in the case *Sinclair Paint Co. v. State Bd. of Equalization*, 15 Cal. 4th 866, 876 (1997).
- On August 27 Judge Timothy M. Frawley of the Superior Court of California, County of Sacramento, issued a preliminary decision allowing GHG allowance auctions. His final ruling on Nov. 12, 2013 affirmed ARB's authority to distribute allowances.

Low Carbon Fuel Standard Litigation

- The measurement of lifecycle carbon intensity was alleged to violate the dormant commerce clause of the U.S. Constitution by imposing a different requirement on out-of-state fuels.
- On December 29, 2011 a U.S. District judge in Fresno ruled that ARB's method for assigning a higher carbon intensity (CI) value to ethanol produced in the Midwest and to crude oil from Canada infringes on Congress's constitutional authority over interstate commerce.
- On January 6, 2012 the state appealed, arguing that the LCFS does not discriminate based on the geographic location of the seller.

LCFS Litigation contd

- On January 24, 2012, U.S. District Judge O'Neill denied ARB's motion, stating that the LCFS program is unconstitutional and violates the Interstate Commerce Clause. ARB appealed.
- In September 2013, the 9th U.S. Circuit Court of Appeals upheld the LCFS program, but remanding the decision back to the District Court.
  - The court found that LCFS is neither facially discriminatory in violation of the Commerce Clause nor does it impermissibly regulate extraterritorial activities.
  - This state appeals court decision keeps the current LCFS targets in place through 2014.
  - Ultimately, this case could go to the U.S. Supreme Court.
- Program amendments will be made in 2014.

U.S. EPA & State GHG Regulatory Authority

- A 2011 Supreme Court decision allowed EPA to require permits to meet Prevention of Significant Deterioration (PSD) standards for GHG under §111 of the Clean Air Act.
- On October 15, 2013, the U.S. Supreme Court agreed to hear *UARG v. EPA* on the question:
  - Does EPA's authority to regulate GHG emissions from mobile sources under Title II, which was upheld in *Massachusetts v. EPA, 2007,* extend to stationary sources under Title I?
  - The court declined to review EPA's finding that GHG emissions endanger the public health and safety.
- On October 17, 2013, the Ninth Circuit ruled that plaintiffs could not establish the causality of damage from GHG emissions or prove that redress would reduce damages to them, if the state of Washington regulated GHG emissions from five oil refineries under its State Implementation Plan. (*Washington Environmental Council v. Bellon* (9th Cir. No. 12-35323).

U.S. EPA's Proposed GHG Emissions Performance Standards

New Source Performance Standards

- In September the U.S. EPA issued proposed NSPS for fossil-fired electric generating units under §111(b).
  - Large natural gas units: 1,000 lb CO_2/MWh
  - New coal & small gas units: 1,100 lb CO_2/ MWh.
  - Coal units may average emissions over 7 years, if they meet a standard between 1000 and 1050 lb CO_2/ MWh.
- California's AB 1368 performance standard for contracts of 5 years or more is 1,100 lb CO_2/MWh.
- EPA assumes partial Carbon Capture & Sequestration (CCS), ~40% removal, is an adequately demonstrated Best System of Emission Reduction (BSER) for coal, but not for natural gas.
- EPA concludes CCS costs are reasonable for coal-fired plants, but not for natural gas.

New Source Performance Standards

- The EPA's technology forcing approach regarding CCS under §111(b) is different from prior NSPS applications, when baghouses and FGD were demonstrated BACT in the 1977 and 1990 Clean Air Act (CCA) amendments.
- If CCS systems fail, new coal plants could not operate nor recover their costs.
- For many reasons, very few coal plants are now being built, so GHG emissions reductions from NSPS would be relatively small.
  - Since year 2000, more than 150 proposed coal plants have been cancelled.
  - No current or foreseeable coal-fired power plants could meet the proposed NSPS limits without carbon capture.

Existing Source Performance Standards

- Existing plants are the highest CO_2 emitters.
  - Before existing facilities can be regulated, new plants must be regulated under NSPS.
  - Standards for existing fossil-fired facilities will be proposed in June 2014, under §111(d), where each state would adopt a state-specific, "tailored" permitting process to comply with the Prevention of Significant Deterioration (PSD) regulation.
  - Potential standards for reducing GHG from existing plants might involve system-wide bubbles, energy efficiency and measures beyond individual plant boundaries.
- RGGI states' and California's cap-and-trade program are expected to comply straight away with EPA's approach to regulate CO_2 emissions from existing stationary sources.

The PEAR/UVA Study of Allowance Auctions & Market Behavior

Testing AB 32's Market Design

- Power & Energy Analytic Resources (PEAR, Inc.) in Arlington, VA and the University of Virginia simulated allowance auction behaviors under varying market conditions.

VeconLab

  - UVA's Vecon Lab combined with EPA's ET-Sim software and PEAR electric power modeling of the WECC simulated California's GHG allowance auctions using UVA student subjects and, separately, professional traders, market experts, regulators and academics.
  - In the auction simulations experimental auction participants managed and traded hypothetical portfolios of assets and allowances.
  - The PEAR Team that conducted the study: Thad Huetteman, Andy Van Horn, John Melby, Kedin Kilgore and Jan Mazurek.
  - UVA economics professors were William Shobe and Charles Holt.
- Project sponsors were Pacific Gas & Electric Company, Sacramento Municipal Utility District, Southern California Edison Company, Chevron, NRG Energy, Northern California Power Authority, Southern California Public Power Authority, and the Los Angeles Department of Water and Power.

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PEAR Power & Energy Analytic Resources

Testing AB 32's Market Design cont'd

- The PEAR and UVA auction experiments, market modeling and analysis examined:
  - Auction Pricing and Banking behaviors,
  - The Role of the Allowance Price Containment Reserve,
  - Allowance Holding Limits & the Limited Exemption, and
  - CPUC Allowance Purchase Limits,

  for their effects on:
  - Auction purchases and allowance banking,
  - Allowance price discovery, efficiency and volatility,
  - Market flexibility and liquidity.
- Three different approaches were applied to assess market constraints and behavior.
- Stress case scenarios included conditions likely to lead to high allowance demand, such as low hydro conditions and high electric load growth.

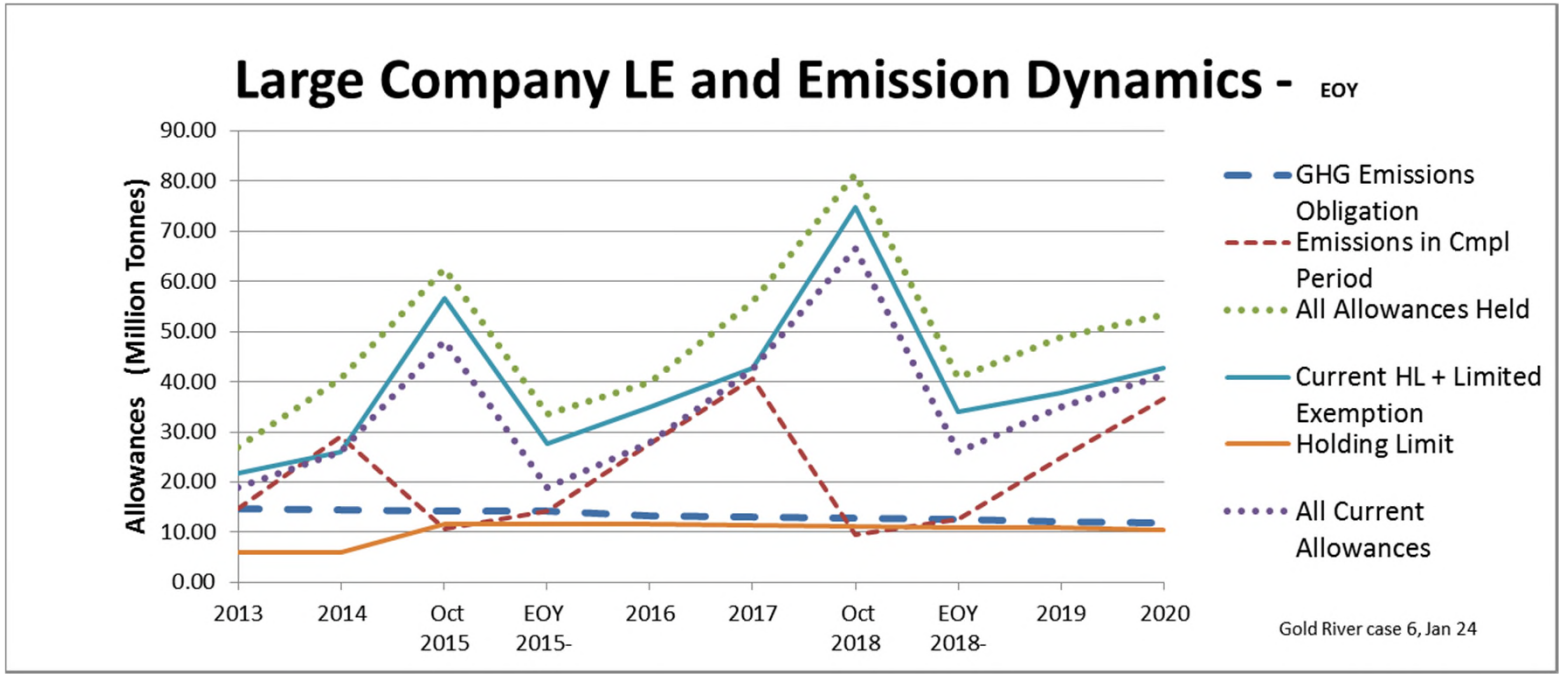
ARB's Allowance Holding Limits

- Firms with annual emissions above the ARB Holding Limits shown here will need to manage their Limited Exemptions each year in order to comply.

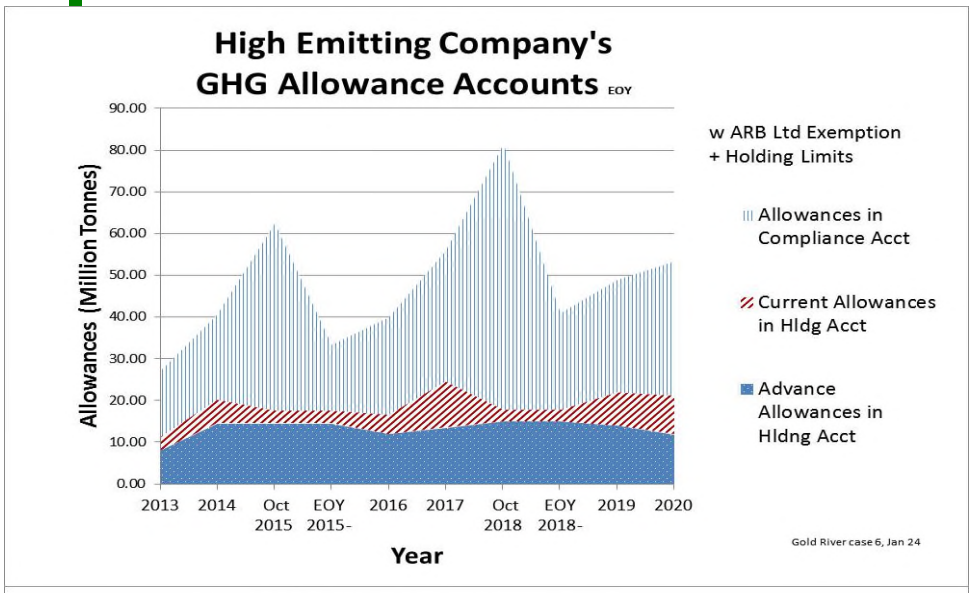
Year	Holding Limit (million tonnes)
2013	5.945
2014	5.868
2015	11.738
2016	11.435
2017	11.135
2018	10.833
2019	10.533
2020	10.230

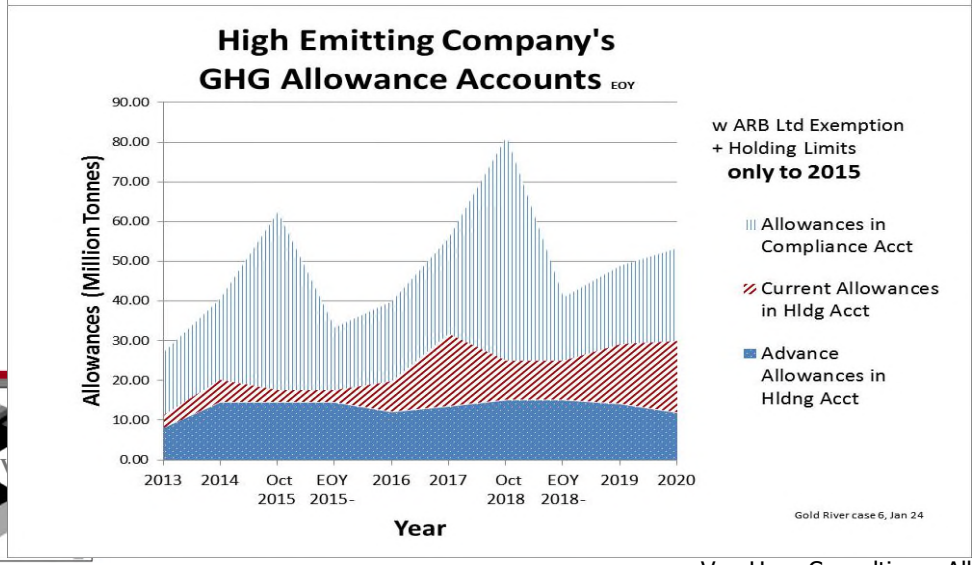
Limited Exemptions Will Be Needed by High Emitting Companies to Keep within ARB's Allowance Holding Limits

- Only Current (including prior year) allowances in the Compliance Account can be counted toward each year's Limited Exemption (LE).
- Developing a strategy will be complex for large firms.



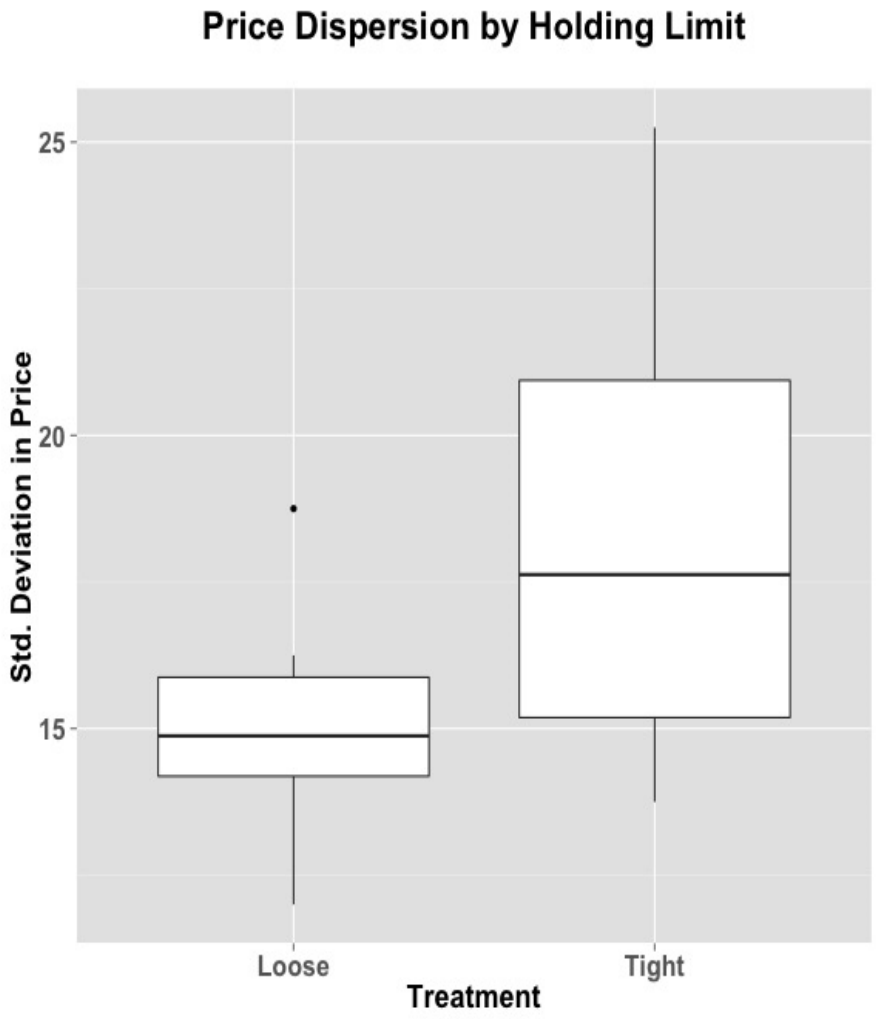
Allowances for Trading Will Be Reduced





- Allowances in the Compliance Account cannot be removed.
- The Holding Limit + LE requirement reduces the size of allowance banks that can be built to accommodate uncertainties and will reduce Current vintage allowances available for trading.
- Yet, a large entity must maintain its LE to hold sufficient allowances to comply.

Tight Holding Limits Increase Price Volatility



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The PEAR/UVA Study Concluded

- The 3-tier Allowance Price Containment Reserve serves as an effective "insurance mechanism" ("seller of last resort") and will help mitigate near-term price spikes by borrowing from future years' allowances.
- Improving the liquidity of the market is the best defense against market manipulation. High liquidity makes market manipulation more risky, harder to achieve and less profitable.
- Tight holding limits reduce banking & market liquidity, increase price volatility, lower efficiency and delay reductions in greenhouse gas emissions.
- Facing the prospect of future high allowance demand periods, participants benefited from market flexibility, and costs were lower when flexibility was maximized.

The PEAR/UVA Study Raised Issues

- Since ARB does not have authority over the futures market, it regulated holding of allowances instead.
  - This may mix up the concern about potential hold-ups by a dominant market player at compliance time with the concern over using derivatives to manipulate underlying asset prices during periods of low liquidity.
  - These concerns have different causes and different solutions.
- The quantum jump in allowance demand in 2015 increases concerns over the adverse effects of "one-size-fits-all" holding limits and about the buffering ability of the 3-tier APCR.
  - Would the in-auction release of reserves reduce the likelihood of exhausting the APCR?
  - Should a hard price cap be added?
  - Would using "accountability levels" instead of holding limits be more effective for California?

ARB Has Revised Its Cost Containment Rules, But Not Its Allowance Holding Limits

- Starting in 2015, in the last reserve sale prior to the November 1 compliance date, up to 10% of future vintage allowances will be made available to the Allowance Price Containment Reserve, whenever the number of allowances bid exceeds the number of available reserve allowances.
- Qualified bids will be satisfied at the price of the highest price tier.
- Current Holding Limits will cause problems in CP2.

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For Reference

- The UVA/PEAR, Inc. Report: *"Investigation of the Effects of Emission Market Design on the Market-Based Compliance Mechanism of the California Cap on Greenhouse Gas Emissions," February 12, 2013.*

  is available for download on the University of Virginia Frank Batten School of Leadership and Public Policy website:

  http://www.batten.virginia.edu/sites/default/files/FINAL_REPORT_CA_Cap_and_Trade_Market%20_imulation_Results_021813_0.pdf or

  http://www.peartree.com or

  http://vhcenergy.com/?q=publications

About Van Horn Consulting

www.vhcenergy.com

Van Horn Consulting

- Founded in 1987, Van Horn Consulting (VHC) helps its clients examine energy and environmental markets, technologies, regulations and contracts, evaluate competitive and regulatory issues, review projects, devise business strategies, prepare expert testimony and value assets.
- We have developed and analyzed strategies and conducted major studies for EPRI, EPA, electric and gas utilities & market participants, large and small.
- VHC provides independent reviews, evaluations, litigation consulting and expert testimony regarding electricity, fuels, technology and emissions markets, regulations and contracts.
- VHC advises utilities in soliciting and contracting for combined heat and power, renewables, conventional and demand-side resources, serves as an Independent Evaluator for electric utilities in California and analyzes the California GHG allowance market, e.g., in the 2013 PEAR/UVA study.

VHC Senior Consultants

- **Michael Katz, M.S., P.E.,** Senior Consultant, has over 25 years experience in electric and natural gas markets, risk management, strategic planning and operations of physical assets. Mike leads VHC's Independent Evaluator assignments for renewable, conventional and combined heat & power contracts for San Diego Gas & Electric and previously for Southern California Edison. At Pacific Gas & Electric Company (PG&E), he led PG&E's Power Generation Department and was Director of Generation Portfolio Management and Power Generation Business Planning, after holding positions in Electric Resources Planning. He provides analysis and advice regarding procurement, operations, planning, technologies and management.
- **Edward Remedios, Ph.D., MBA,** Senior Consultant, formerly worked for Chevron Research and for Pacific Gas & Electric Company (PG&E). While at PG&E, Ed coordinated long-range planning and was the head of the Economics and Forecasting Department with responsibilities for economic and sales forecasts and project evaluations, including financial, economic and technical assessments. Ed provides evaluations of projects, RFO offers, contract terms and analyses of markets, tariffs and regulations.
- **Andrew Van Horn, Ph.D.,** Managing Director, has 35 years experience evaluating electricity, natural gas, coal and emissions markets, regulations, technologies and contracts. He advises market participants and serves as an Independent Evaluator for utilities procuring power and natural gas. He developed EPRI's first Integrated Resource Planning model, provided a price for the first SO_2 allowance trade in 1992, analyzed the 1977 and 1990 Clean Air Act Amendments and projected impacts of greenhouse gas (GHG) policies from 2000 to 2050. He advises clients on electricity and natural gas procurement processes, SO_2 and GHG market design and behavior, technology cost and performance, R&D, price forecasting, plant valuation and strategic planning. He has testified before the FERC, state agencies and courts about power, natural gas, steam and emissions contracts, economic damages, resource planning, reasonableness reviews, tariffs and the impacts of regulations.

Selected Clients

Alberta Department of Utilities
American Electric Power
Amgen
Arizona Public Service Company
Cinergy
Cogeneration Association of California
Colorado Independent Energy Association
Consolidated Edison of New York
Consolidated Natural Gas Transmission
CIGNA Insurance
City of Huntington Beach
Drummond Coal
Duke Energy
Electric Clearinghouse (Dynegy)
Electric Power Research Institute (EPRI)
Harvard Management Corporation
National Acid Precipitation Assessment Program
Northern California Power Agency
Orinda Union School District
PacifiCorp Power Marketing
PPL Corp
Pacific Gas and Electric Company
Pacific Gas Transmission
Pinnacle West
Port of Long Beach
San Diego Gas & Electric Company
Sithe Energies
Southern Company
Southern California Edison Company
SeaWest Wind Corp
Tennessee Valley Authority
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U.S. General Accounting Office

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