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California's Cap-and-Trade Market After the 2nd Auction



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Topics

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Other Cap-and-Trade Market Issues:

- Resource Shuffling & Safe Harbor Transactions
- Linkages with Other Cap-and-Trade Markets
 - Quebec, WCI states & Canadian provinces, and
 - International information exchanges.
- Specified Sources & Asset-Controlling Suppliers
- Complementary Measures - LCFS, RPS, EE
- Allowance Allocations & Revenue Allocation
- Emissions Leakage by Energy Intensive, Trade-Exposed Industries
- Legal Challenges to AB 32
- Power Market Adaptations
 - Legacy contracts & lack of standardized contracts
 - "But for" CHP exemptions
 - Holding costs incurred between allowance purchase & submission





The PEAR/UVA Study

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 are William Shobe and Charles Holt.
- Project sponsors are 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.



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

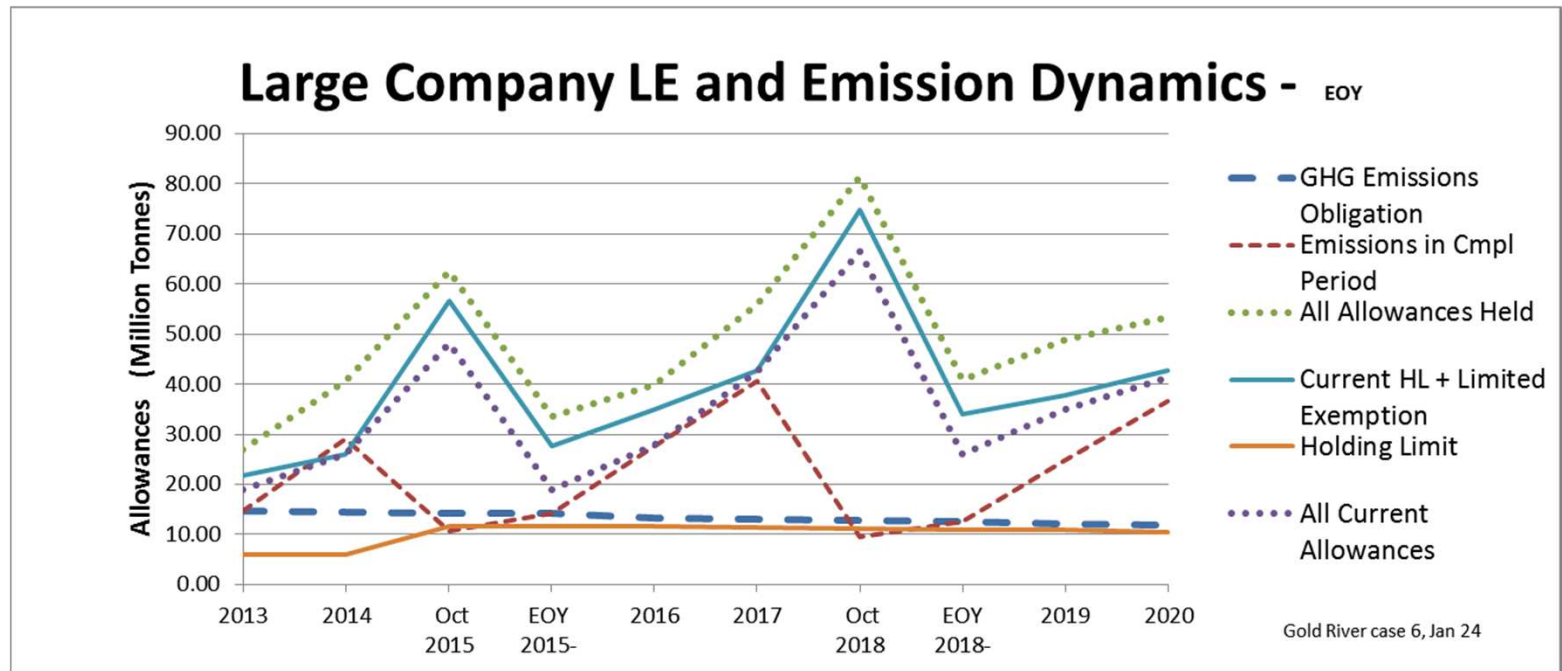
- Firms with annual emissions above the ARB Holding Limits shown here will need to manage their Limited Exemptions each year in order to comply.

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

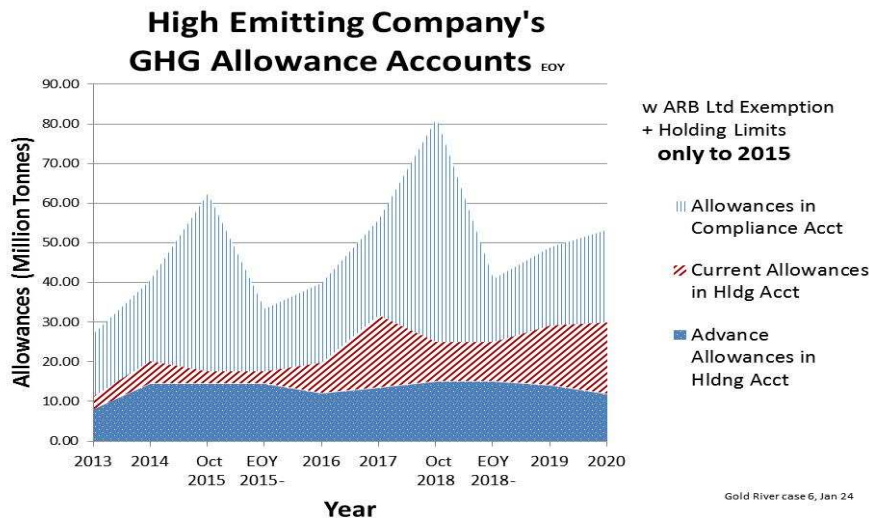
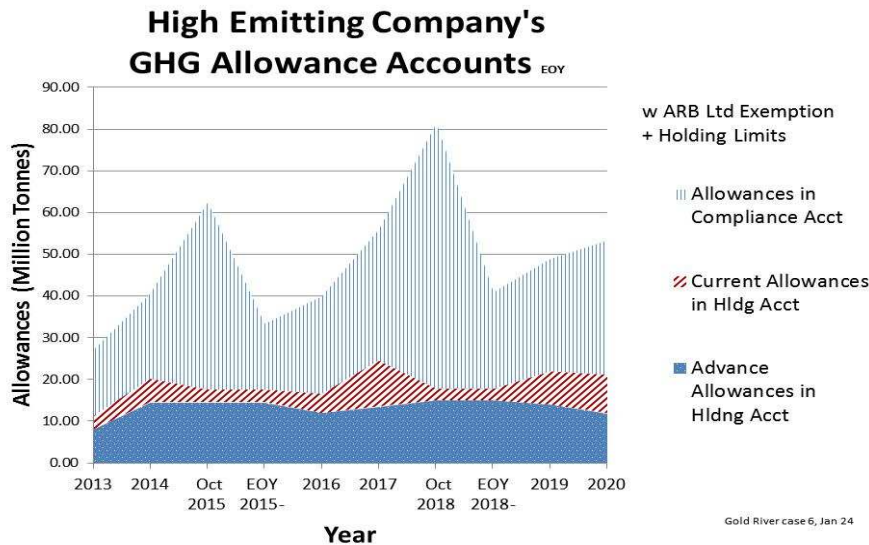


Limited Exemptions Will Be Needed by High Emitting Companies to Keep within ARB's Allowance Holding Limits

- 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.

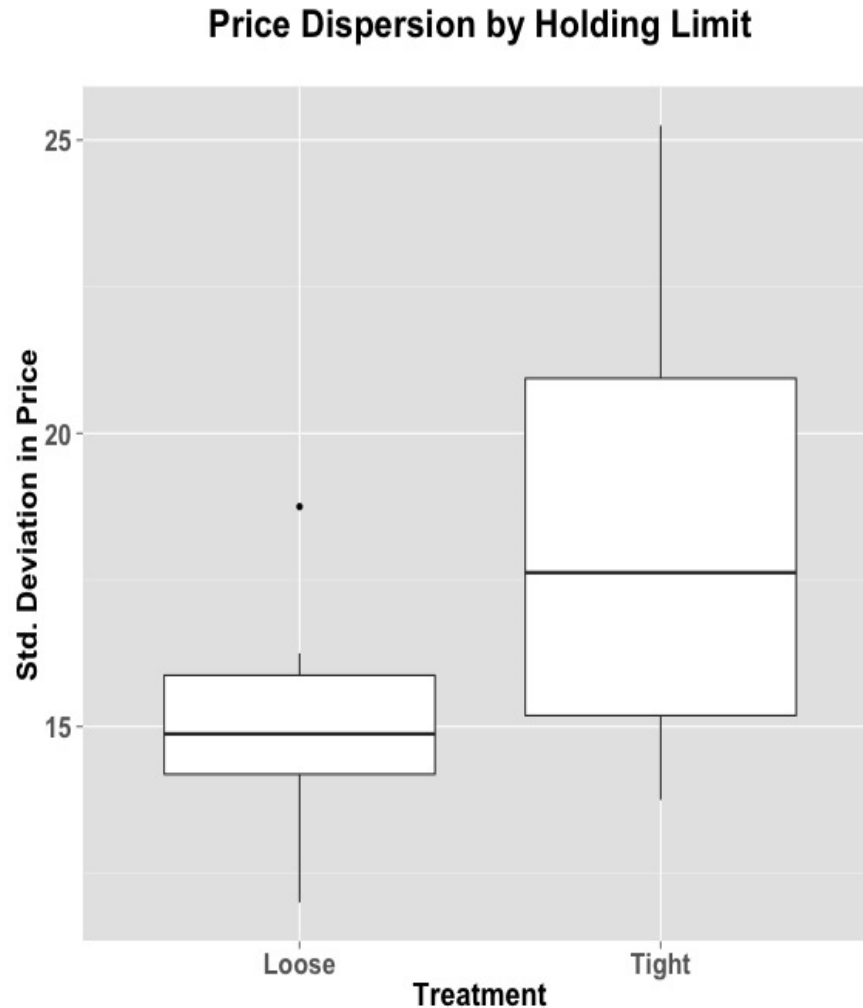


Allowances for Trading Will Be Reduced



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

Tight Holding Limits Increase Price Volatility



The PEAR/UVA Study Concludes

- 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 reduced banking & market liquidity, increased price volatility, lowered efficiency and delayed 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 Raises 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 holding limits and about the buffering ability of the 3-tier APCR.
 - Should a hard price cap be added?
 - Would the in-auction release of reserves reduce the likelihood of exhausting the APCR?
 - Would using “accountability levels” instead of holding limits be more effective for California?



When Is A Market Over-Regulated?

- Will CA GHG allowance prices reflect the behavior of a true market?
- Van Horn's rule regarding the regulation of competitive markets:

"A market is over-regulated when the number of rules and regulations exceeds the number of market participants."
- Several CA market design features could inhibit allowance trading's ability to keep prices down and lower costs of compliance.



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 or at the PEAR, Inc website:

<http://batten.virginia.edu/> or www.peartree.com or

http://www.batten.virginia.edu/sites/default/files/FINAL_REPORT_CA_Cap_and_Trade_Market%20imulation_Results_021813_0.pdf





CA GHG Auctions & Allowance Prices



California Allowance Auctions

- After 2012, auctions will be held in the second month of each quarter.

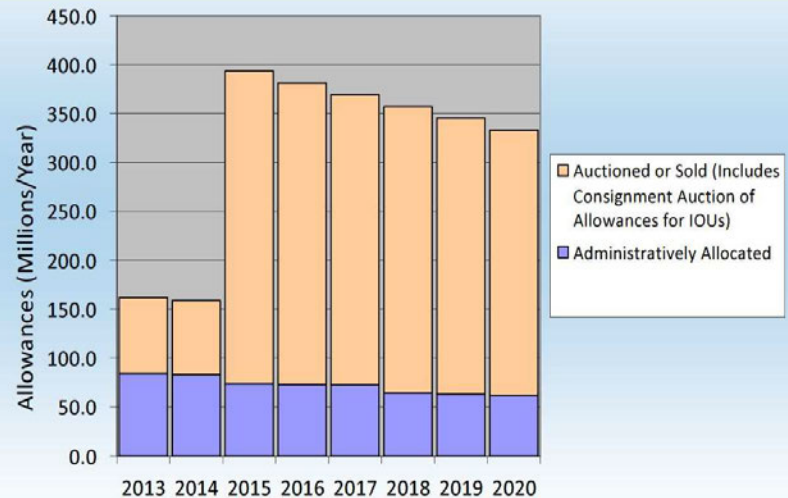
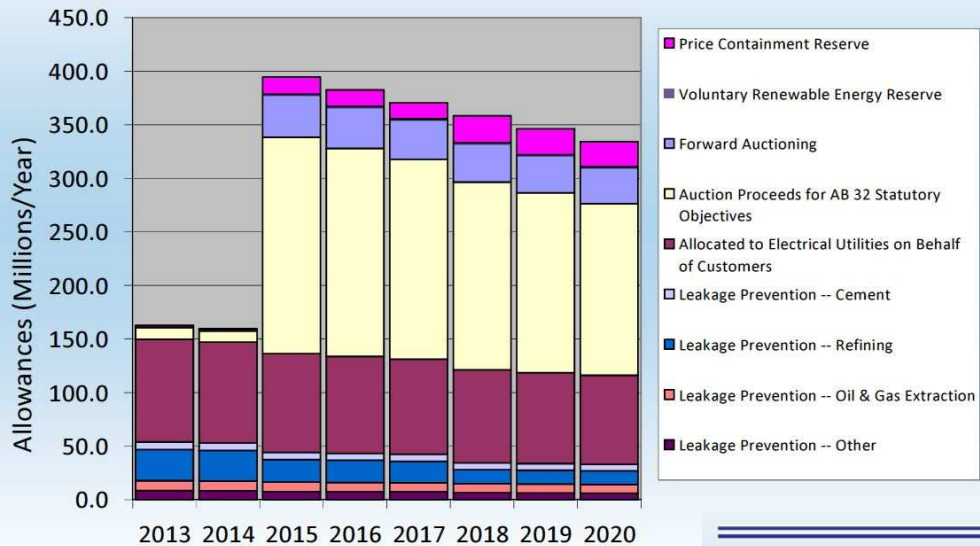
Table 2: 2013 Quarterly Auction Critical Dates

Auction Consignment Due Date for EDUs	Auction Notice Posting Date	Auction Application Due Date	Auction Dates
12/6/2012	12/21/2012	1/22/2013	2/19/2013
3/4/2013	3/18/2013	4/16/2013	5/16/2013
6/3/2013	6/17/2013	7/17/2013	8/16/2013
9/5/2013	9/20/2013	10/21/2013	11/19/2013

- Revisions to the auction schedule, purchase limits and transparency of results are being evaluated by ARB staff.



CA Carbon Allowance Disposition

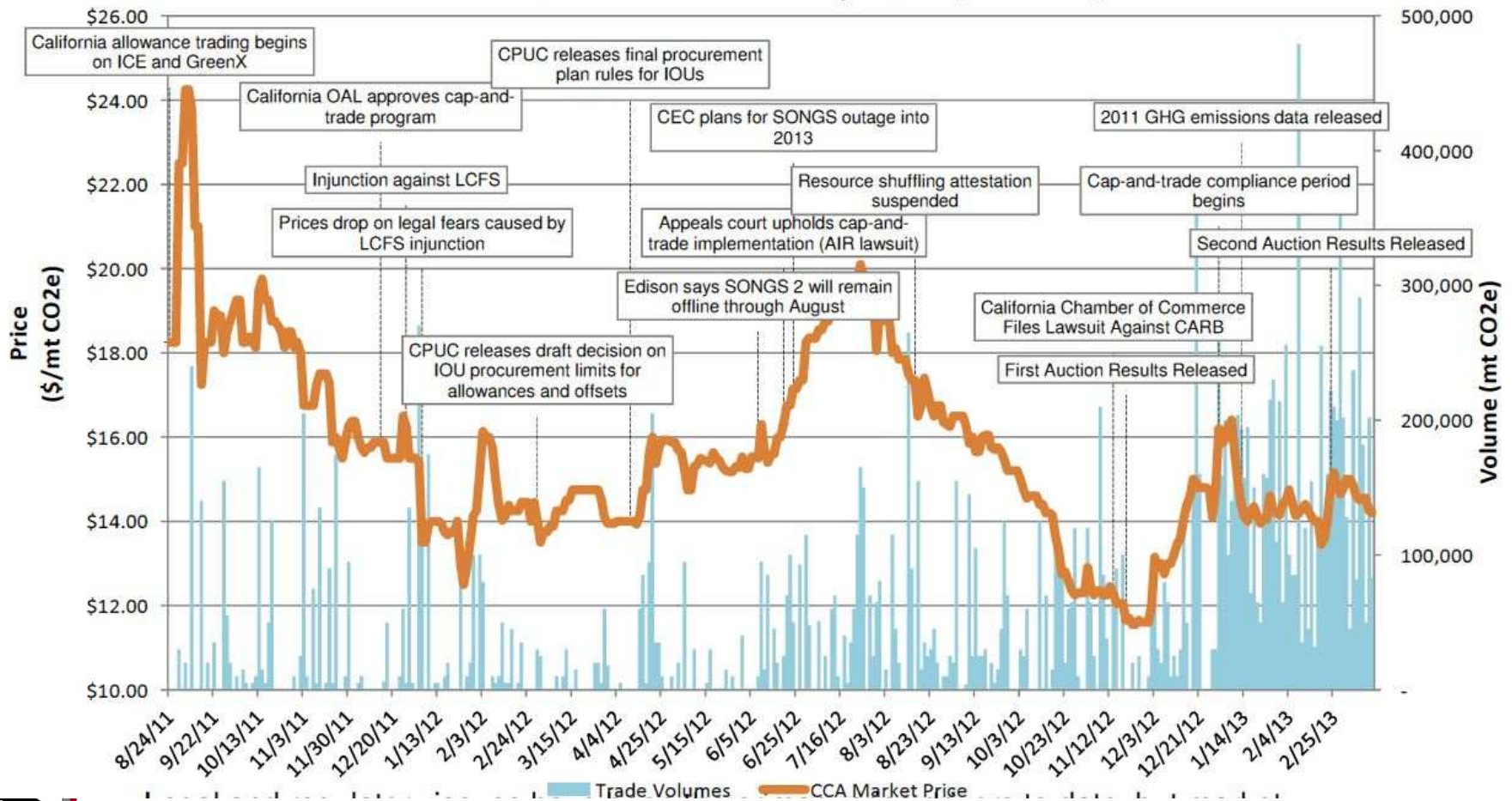


Michael J. Gibbs, CARB,
CA Climate Program,
EMA Roundtable, March 14, 2013



Events, Behavior & Fundamentals All Drive Future Allowance Prices

California Carbon Allowance Market History - Prices, Volumes, and Events



Paul Augustine, SCE, Market Fundamentals in the CA Cap-and-Trade Market, March 14, 2013



California Allowance Prices

- November 2012 & February 2013 auction clearing prices for CA GHG allowances:
 - 2013 vintage - \$10.09 (Nov), qualified bids/offered=1.06;
 - 2013 vintage - \$13.62/tonne (Feb), qualified bids/offered=2.47
 - 2015 vintage - \$10.00/tonne, qualified bids/offered=0.14 (cleared at the November 2012 reserve price)
 - 2016 vintage - \$10.71/tonne, qualified bids/offered=0.46 (cleared at February 2013 reserve price)
 - 73 Qualified Bidders in Auction 1; 91 in Auction 2.
- April 2013 futures prices:
 - 2013 vintage CCAs --\$14/tonne (deliver 4/13)
 - 2013 vintage CCAs --\$14.25/tonne (deliver 12/13)
 - 2015 vintage CCAs --\$11.50-12.00/tonne (12/13)
 - 2014 vintage CCAs --\$14.00-\$15.00/tonne (12/14)



Market Participation Will Increase

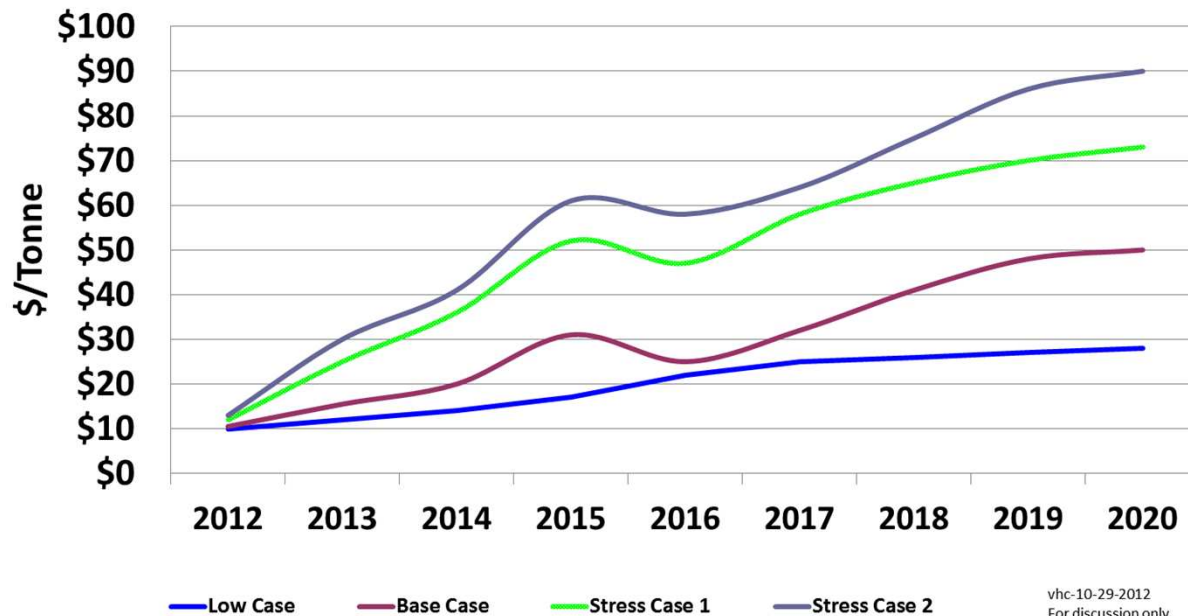
- Auction & secondary market activity will increase in 2013, but many factors will affect market volumes, prices and volatility.
 - Industrials will no longer “wait and see,”
 - High-emitting entities must cover short-falls in free allocations and, then, transfer allowances to Compliance Accounts to take advantage of the ARB’s Limited Exemption.
 - Financial firms are likely to be more active,
 - However, EDUs can elect how and when to consign all their allowances across the four quarterly auctions,
 - Many utilities have reduced 2012 emissions substantially below 2009 and 2010 levels.



Allowance Price Projections

- California GHG allowance prices could vary widely, depending on future market conditions.

Potential California Carbon Allowance Prices





Linkage with Quebec – An Update



April 8 Letter from Gov. Brown to ARB

- Finding 1 under SB 1018: Quebec has GHG program reduction requirements, including reporting & offsets, that are equivalent to or stricter than those required by CA for linkage.
- 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 WCI will not impose any significant liability on the state or any state agency.
- ARB shall report by November 1, 2013 on the progress of linkage efforts and any impediments to linkage on January 1, 2014.





Comparison with the European Union Emissions Trading Scheme



CA Market Features vs. EU ETS

Design feature	CA	EU ETS
Caps imported electricity	Yes	No
Bans resource shuffling	Yes	No
Holding limits	Yes	No
Allowance reserve	Yes	No
Offset buyer liability	Yes	No
Allows CDM	No	Yes
Allows REDD	Yes	No

Source: Jan Mazurek, PhD, Duke University, Nicholas Institute, April 2012, now with ICF, Inc.

- Differences in price containment mechanisms, allocations, contracts and political situations could inhibit linkage with the EU ETS.



EU ETS Lessons Learned

- European allowance prices have been driven by over-allocation of allowances and to some extent by local market power exerted in various EU countries.
 - Phase 1 (2005-2007) EUAs expired at the end of 2007, so prices had to go to zero.
 - Phase 2 (2008-2012) EUA prices declined from a high of €32/tonne in 2008 to ~€7/tonne at the end of 2012, when Phase 2 of the Kyoto Protocol ended.
 - CERs typically traded at 20% and greater discounts to EUAs.
 - Phase 3 (2013-2020) modifications are in progress.
- The EU ETS has resolved many problem areas.
- California's market design features and allocations address its ongoing concerns about potential market manipulation, over-allocation and leakage.





The Availability of ARB Carbon Offsets



Carbon Offsets Will Help Reduce GHG

- There are currently only four adopted offset protocols under CA's cap-and-trade programs:
 - U.S. forest projects,
 - Ozone depleting substances (ODS),
 - Urban forests, and
 - Livestock manure (digesters).
- Two more protocols are being considered:
 - **Coal Mine Methane (CMM)**, ~~Low-bleed Pneumatic Valve~~, **Rice Management** and ~~Fertilizer Management~~.
- Early action credits may be given for qualifying projects begun after December 31, 2006.
- Two crediting periods:
 - Non-sequestration projects (7-10 years, two renewals),
 - Sequestration projects (10-30 years, unlimited renewal)



ARB Offsets Status

As of March 28, 2013:

- Four compliance offset projects listed with verification underway.
- First ARB offset credits likely to be issued by summer.
- Twenty-five ARB early action offset credits issued.
- First ARB early action offset credits may be issued this spring.
- Two additional protocols and improvements to offset processes to be considered by the Board this fall.
- A technical working group has been created with comments due by April 22.
- ARB will try to devise consistent credit invalidation requirements. Liability remains an issue.



ARB Offsets Workshop on March 28

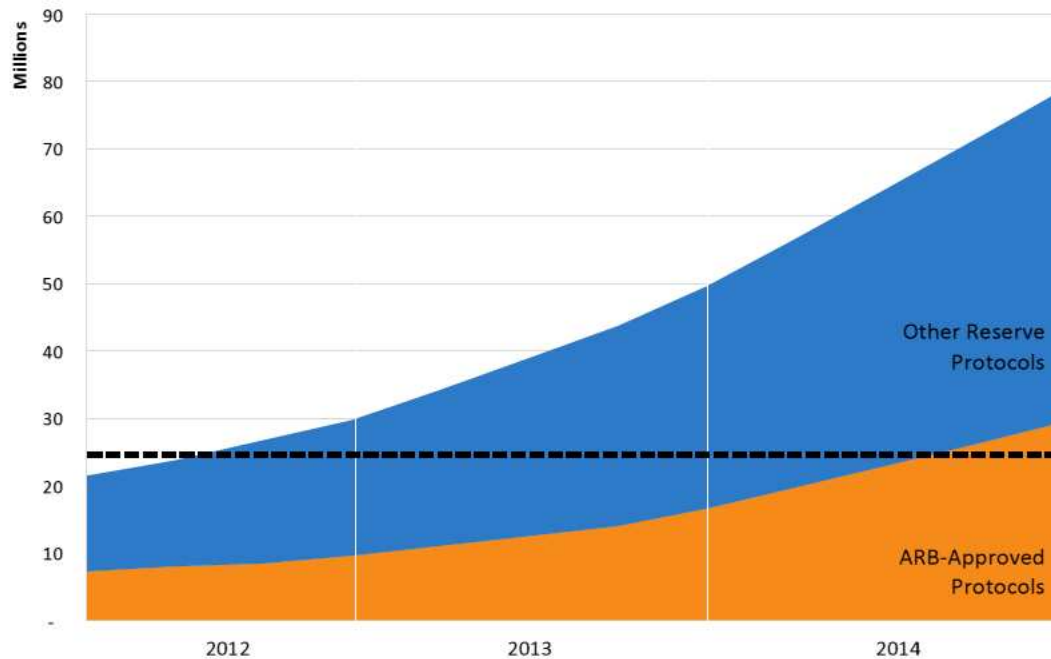
- Focused on the DeNitrification and DeComposition (DNDC) model to calculate baseline emissions and reductions for rice fields.
 - ARB estimated potential GHG reductions of 0.5-3 MMTCO₂e through 2020, which is not a large reduction in comparison to current ARB protocols.
- Considered coal mine methane abatement from active underground mines, active surface mines & abandoned underground mines.
- Plans to review the injection of coal mine methane into natural gas pipelines. The magnitude of potential methane offsets is substantial.



CAR Projection of Offsets

Projections of Future CRT Issuance

April 5, 2012



This chart illustrates estimated projections for cumulative Climate Reserve Tonne® (CRT) issuance through 2014. The orange area represents an estimate of CRTs to be generated under the four project protocols (Forest, Urban Forest, Livestock, and US Ozone Depleting Substances) that have been adopted for compliance use by the California Air Resources Board, including both currently-submitted projects and expected future projects. The blue area represents an estimate of CRTs to be generated under the remaining project protocols, including both currently-submitted projects and projected future projects. Note that actual issuances may vary widely depending on a range of factors, both political and economic. The dashed line represents the estimated total demand for offsets in the California cap-and-trade program through the end of the first compliance period (2013-2014). The estimated projections do not represent official statements by the Climate Action Reserve.



Will There Be Enough Carbon Offsets?

- Although the Climate Action Reserve estimates a sufficient supply of offsets, the American Carbon Registry's September 2012 report by Winrock: "Compliance Offset Supply Forecast" projects offset supply well short of demand.
 - If each covered entity tried to utilize up to 8% offsets to comply, the Compliance Period 1 shortage would be 29% (7.6MMTCO₂e), and the Compliance Period 3 shortage could increase to 67% (134 MMTCO₂e).
 - International forestry projects, such as Reduced Emissions from Deforestation and Forest Degradation (REDD), in Brazil, Mexico and Indonesia could reduce the offset shortfall.
- In April 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 (\$9.50-10.50 tonne vs ~\$14 tonne.)
 - Non-guaranteed California eligible offsets @ ~\$7-9/tonne,
 - Voluntary offsets @ ~\$0.10-\$8/tonne.



Why Cap-and-Trade Is Important



Toles, Washington Post, from the San Jose Mercury News 11-25-2012.





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 SO₂ 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, SO₂ 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 (Dynergy)
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
The Emissions Exchange
Utility Air Regulatory Group
Universal Studios
U.S. Environmental Protection Agency
U.S. General Accounting Office

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U.S. Natural Gas Consumption 1990-2050
(Quads per year)
Business As Usual - Reference Case

