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AB 32 Update: Allowance Auctions, Effects of Market Rules, Findings and Recommendations



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Topics

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The draft research paper accompanying these slides is:
"California's Cap-and-Trade Market for Greenhouse Gases:
AB 32 Auction Update, Effects of Market Rules and Policy
Recommendations." Van Horn Consulting Working Paper.
September 2014. Available on *Documents* tab at
www.vhcenergy.com





California's Cap-and-Trade Program

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.
- C&T requires allowances (CCAs) to be acquired, banked & surrendered for each metric tonne of emissions from facilities with CO₂e emissions over 25,000 tonnes/yr.



California's Cap-and-Trade Program

- Electric power and industrial facilities are the focus of the first cap-and-trade compliance period (CP1: 2013-2014).
- In 2015, natural gas suppliers and fuel distributors will also be covered by California's economy-wide C&T approach, encompassing about 80-85% of California's statewide total GHG emissions.

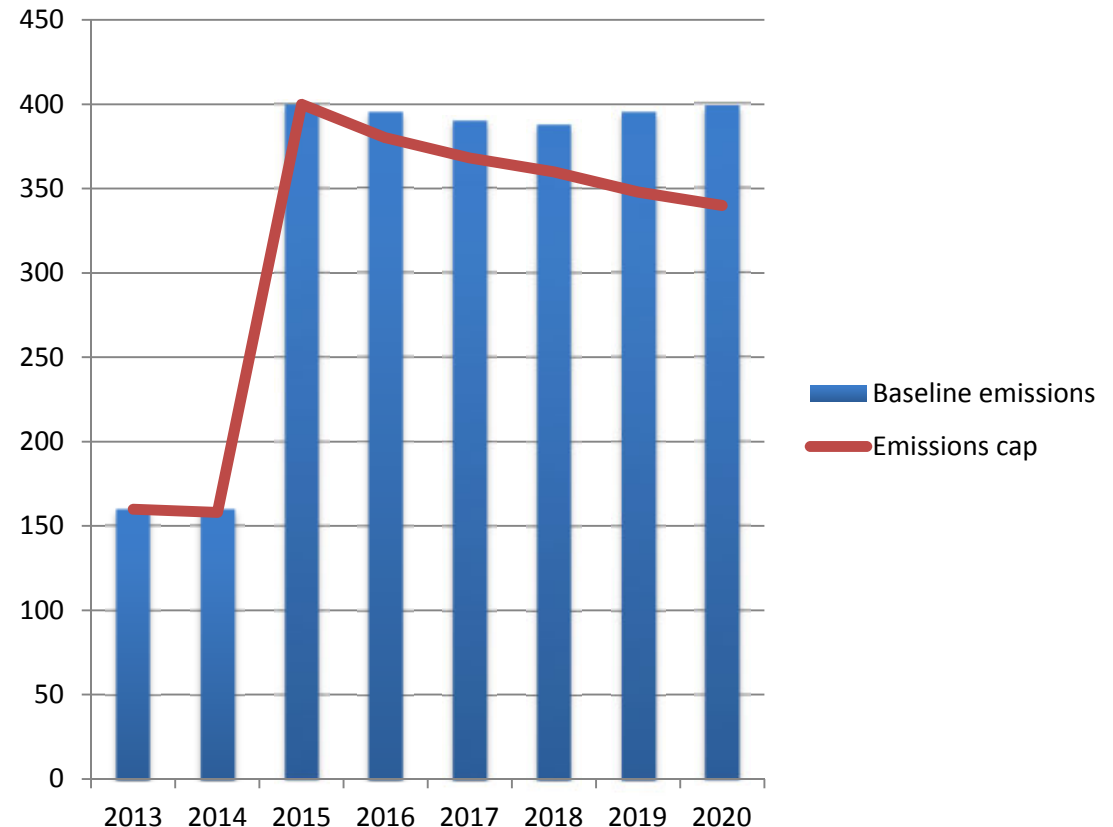


California's Declining Emissions Cap

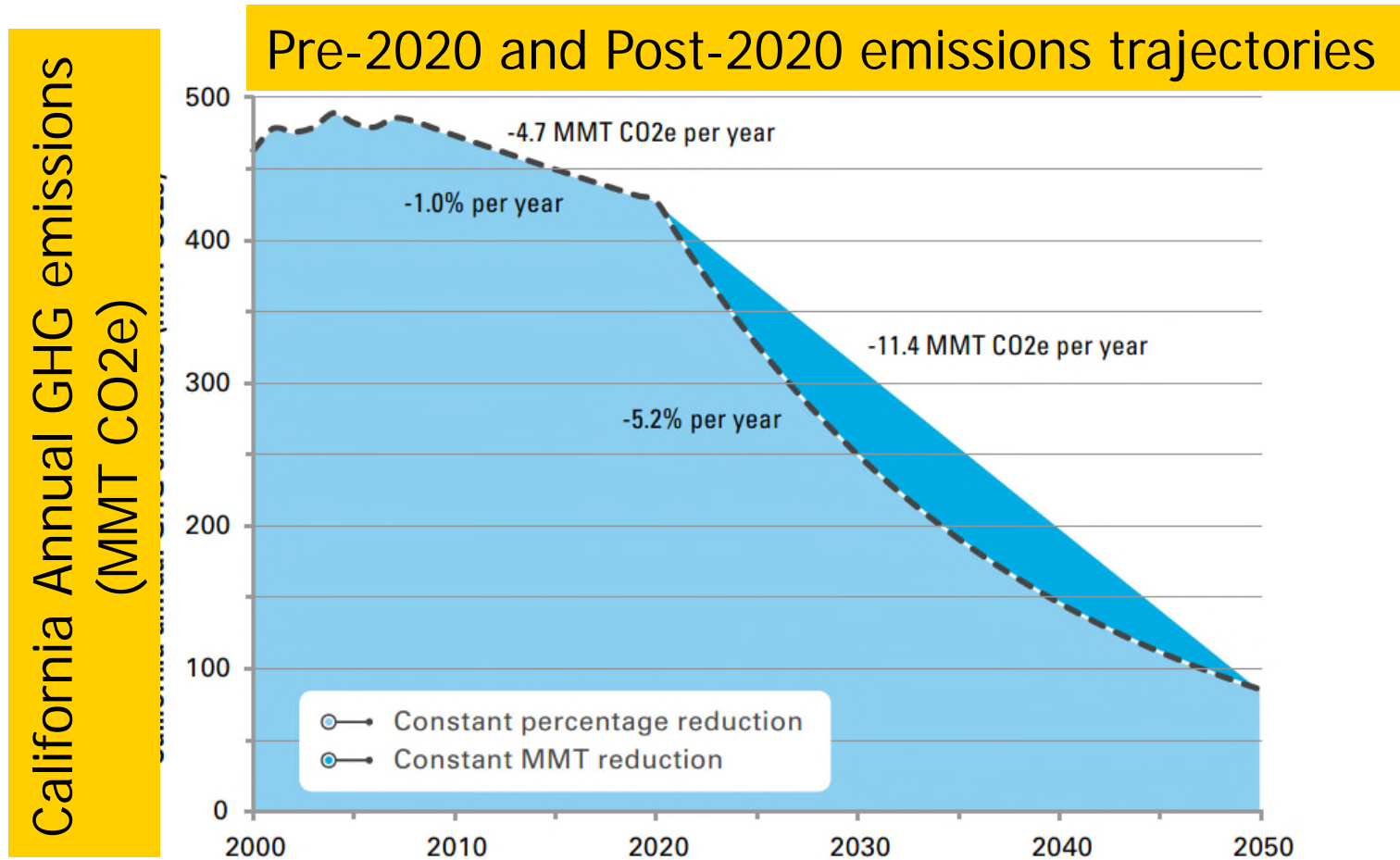
- The 2020 C&T emissions cap will be adjusted to reach the overall statewide GHG goal, depending on reductions achieved by complementary programs.

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



ARB's Scoping Plan: A Path to 2050



2012 reported sector emissions

Electricity (~22%): 100.4 MMTCO₂e = 41.6 CA production + 14.4 cogen + 44.4 Imports

Transportation (~36%): 160 MMTCO₂e

2020 BAU_{electricity} = 110 MMTCO₂e from a Business-As-Usual projection published in 2010



Allowance Price Projections

- The CCA supply/demand balance resulting from fundamentals and liquidity in the cap-and-trade market will determine allowance prices.
- Although prices are currently near the price floor, important scenarios where the price ceiling could be exceeded should be considered in revising rules.
- Updated price projections by the Market Simulation Group (MSG) suggest that it is likely that CCA prices
 - Will remain near to the price floor, or
 - Will spike above the first tier APCR price in compliance period 3 (2018-2020).



“Report of the Market Simulation Group [MSG] on Competitive Supply/Demand Balance in the California Allowance Market and the Potential for Market Manipulation.”
Severin Borenstein, James Bushnell, Frank A. Wolak, and Matthew Zaragoza-Watkins.
June 2014

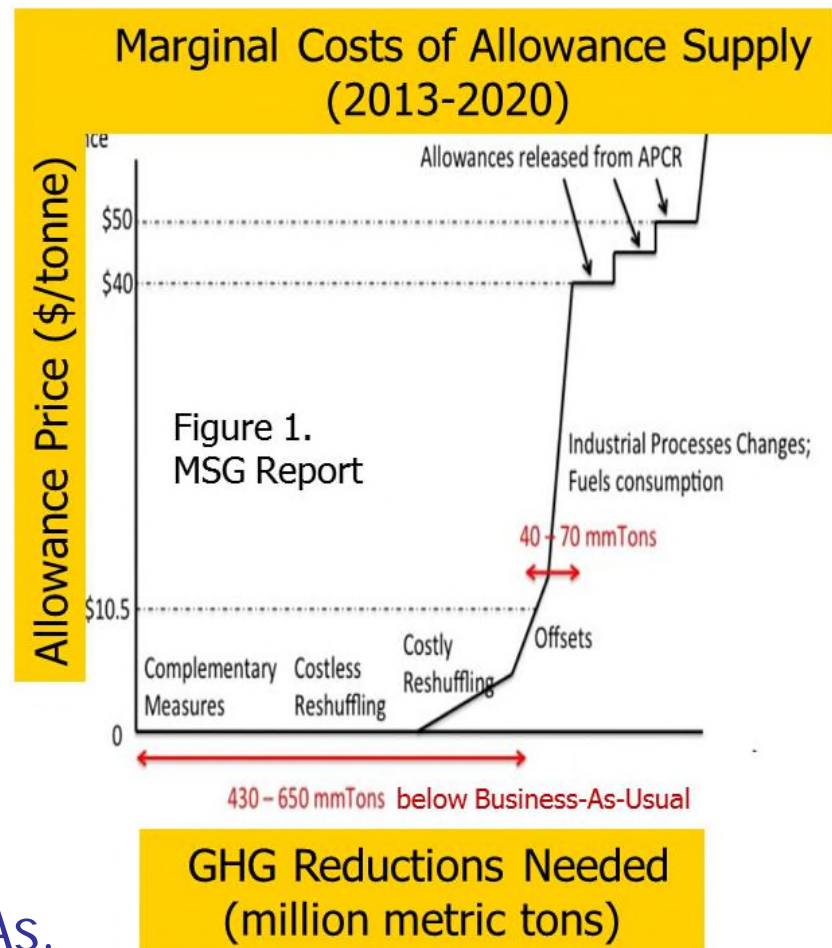
Supply & Demand Will Set CCA Prices

- 2013-2020 California Carbon Allowance Supply Curve Developed by the Market Simulation Group.

“Report of the Market Simulation Group [MSG] on Competitive Supply/Demand Balance in the California Allowance Market and the Potential for Market Manipulation.”

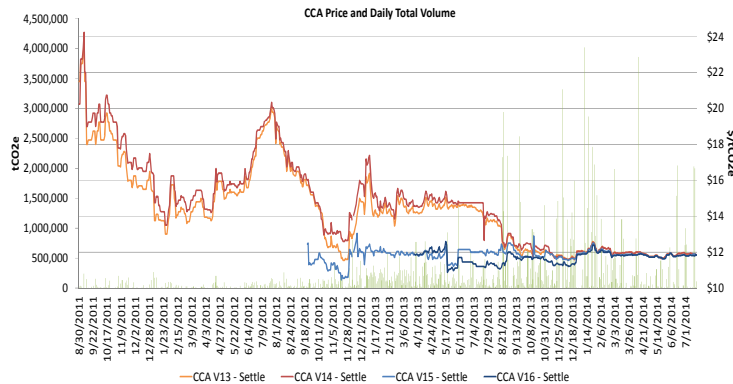
Severin Borenstein, James Bushnell, Frank A. Wolak, and Matthew Zaragoza-Watkins. June 2014

MSG’s analysis of market probabilities assumes perfect trading and no banking of CCAs.





California Auction Results & Allowance Prices



California Allowance Auctions

- California Carbon Allowance auctions are held in the second month of each quarter during a 3-hour window.
- Upcoming 2014 CCA auction dates are:
 - 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. (If requested CCAs will be made available for auction in each of the escalated \$40, \$45, & \$50/tonne tiers.)
- Starting in 2015, APCR allowances will be increased in each year's sale prior to November 1, if needed.
- Revisions to the auction schedule, purchase limits and transparency of results are being evaluated.



California Allowance Auction Results

Auction Date	Vintage Year	# Offered	# Sold	# Qualified Bids/ # Available	Reserve Price (\$/tonne)	Clearing Price (\$/tonne)	Bought by Qualified Compliers	# 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	16,614,526	1.82	10.71	11.48	96.2%	77
November 19, 2013	2016	9,560,000	9,560,000	1.64	10.71	11.10	91.3%	



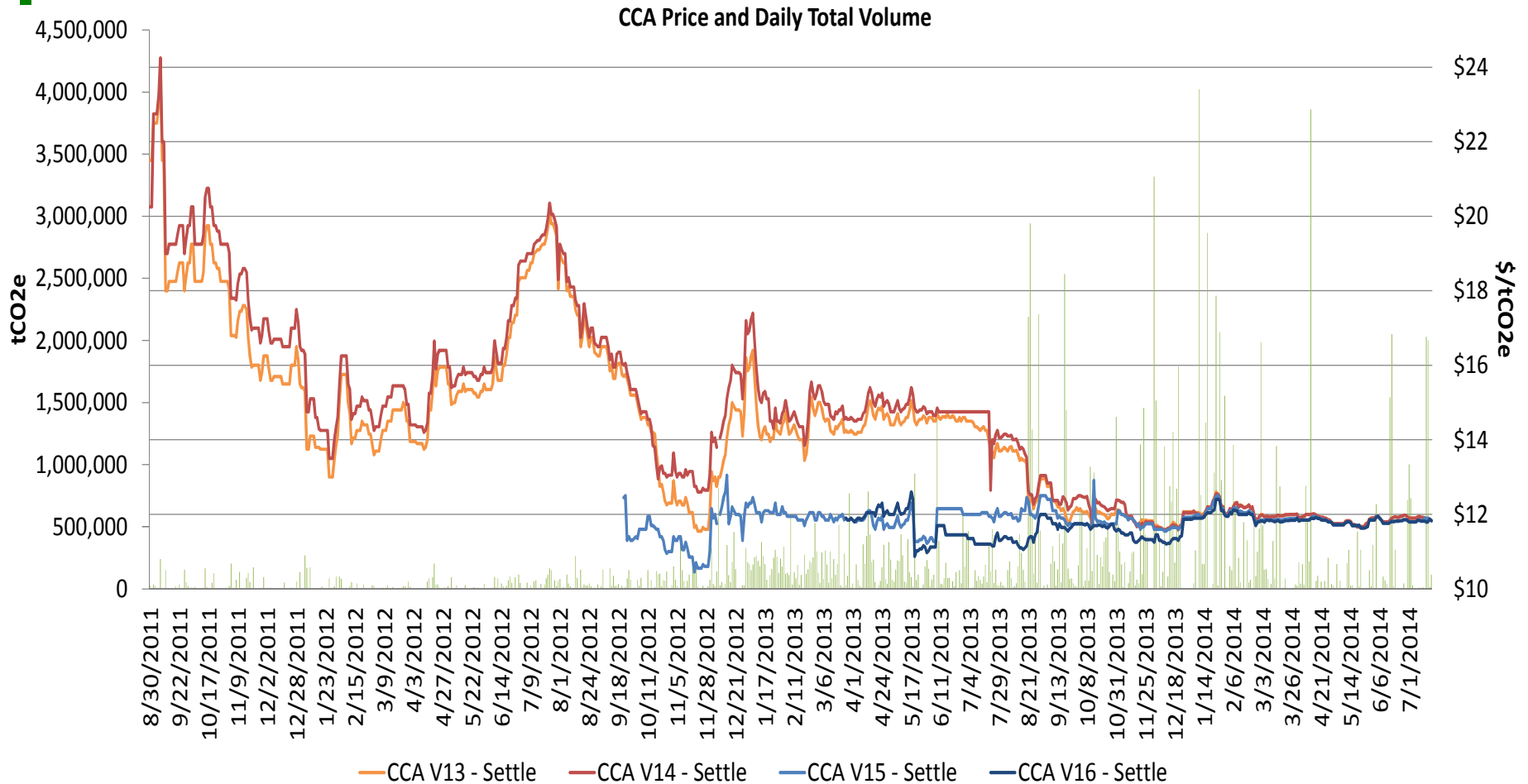
California Allowance Auction Results

Auction Date	Vintage Year	# Offered	# Sold	# Qualified Bids/ # Available	Reserve Price (\$/tonne)	Clearing Price (\$/tonne)	Bought by Compliers	# Qualified Bidders
February 19, 2014	2014	19,538,695	19,538,695	1.27	11.34	11.48	84.5%	71
February 19, 2014	2017	9,260,000	9,260,000	1.11	11.34	11.38	83.5%	
May 16, 2014	2014	16,947,080	16,947,080	1.46	11.34	11.50	89.5%	74
May 16, 2014	2017	9,260,000	4,036,000	0.44	11.34	11.34	100.0%	
August 18, 2014	2014	22,473,043	22,473,043	1.14	11.34	11.50	87.7%	71
August 18, 2014	2017	9,260,000	6,470,000	0.70	11.34	11.34	89.2%	
November 19, 2014	2014				11.34			
November 19, 2014	2017				11.34			

- Only about 100 of the 360 covered entities in CP1 have bid into the ARB's quarterly allowance auctions.
- Over 700 entities are reporting their GHG emissions.
- Not all offered "advance" allowances have been sold.



California Carbon Allowance Prices



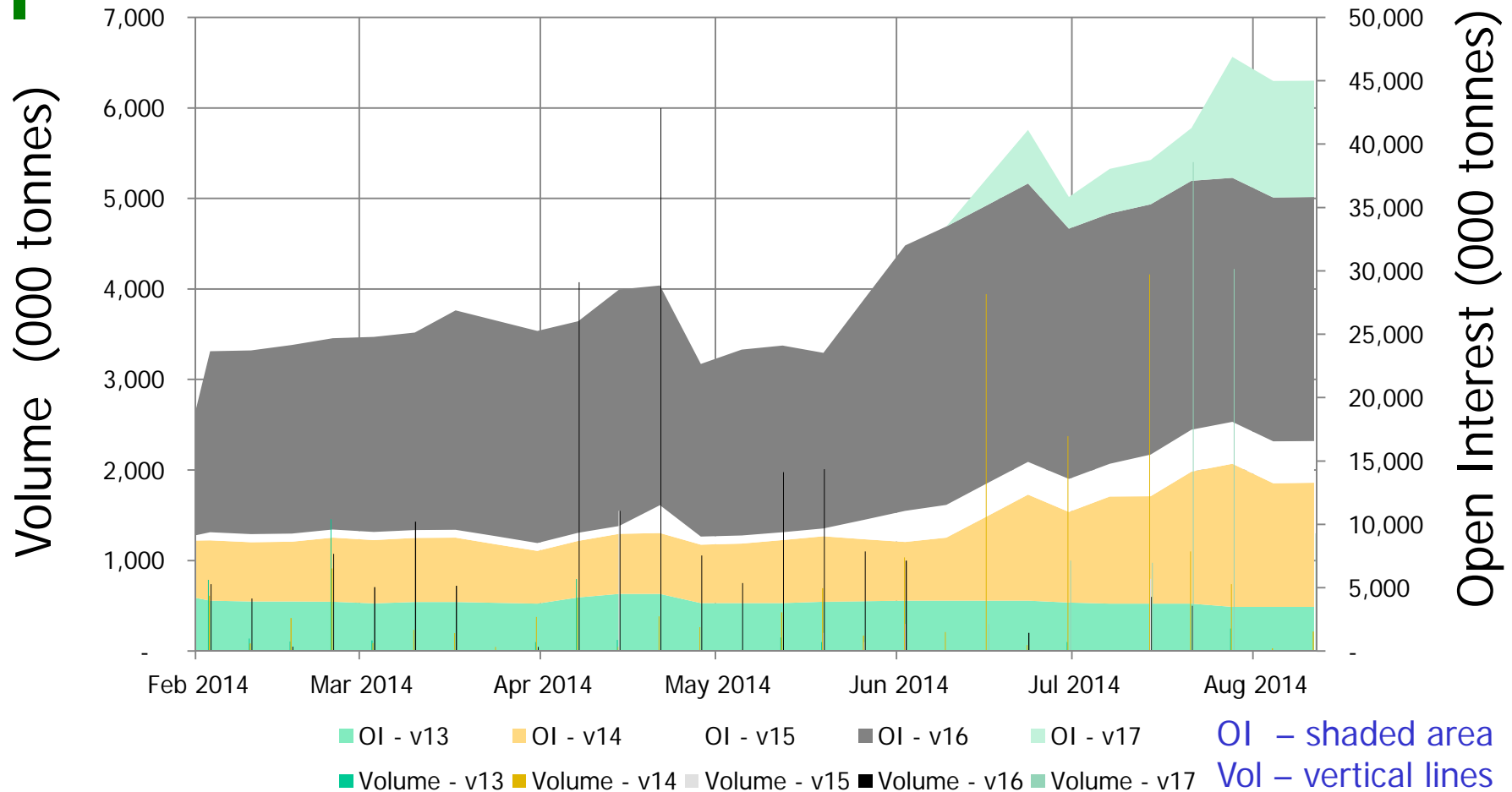
Mid-August prices: V2014 (Dec '14 delivery) \$11.85/tonne, V2015 (Dec '14) \$11.85, V2016 (Dec '14) \$11.65, V2016 (Dec '15) \$12.25, V2017 (Dec '14) \$11.65.

Source of Data: Intercontinental Exchange (ICE).

Graphic provided by Morgan Hagerty, CE2 Capital Partners, Solana Beach, CA.



CCA Trading Volumes & Open Interest



- Data from Intercontinental Exchange
- Graphics provided by jan.frommeyer@icis.com
ICIS – <http://analytics.icis.com>






Stop the Hidden Gas Tax!

On January 1, 2015, a new hidden gasoline tax will go into effect. With prices already around \$4.00 per gallon, this new tax is expected to increase the cost of gas between 16 cents and 76 cents per gallon, according to the California Air Resource Board. There is still time to stop it, but we must act now. Contact state officials today and urge them to put the brakes on this new hidden gas tax!

Sign the Petition

 www.CaliforniaDriversAlliance.org



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What will Cap and Trade cost you?

\$

Will the Cap-and-Trade Market Function Efficiently?

Complicated Rules

- Some of ARB's market design rules were developed to prevent market manipulation.
- Unfortunately, some rules are too complex and may have unintended consequences.
 - "One-way" Compliance Accounts,
 - Holding Limits + Limited Exemptions.
 - These may
 - Encourage, rather than prevent, market manipulation
 - Reduce the flexibility needed for a well-functioning market.



Status of CCA Compliance Accounts

- As of July 1, 2014, 43.5 million V2014 CCAs were also in “one-way” Compliance Accounts.
 - Allowances in Compliance Accounts can’t be sold!
- Allowances are placed in Compliance Accounts to:
 - Prepare for CCA surrender to comply, or
 - Create Limited Exemptions from each year’s Holding Limit for “current” CCAs.
- No offset allowances (ARB Offset Credits) were in Compliance Accounts as of July 1.



ARB's Allowance Holding Limits

- Firms with annual emissions above the ARB Holding Limits shown here will need to manage their Limited Exemptions carefully in order to comply with (Holding Limits + Limited Exemption) rules.

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



California's High-Emitting Firms

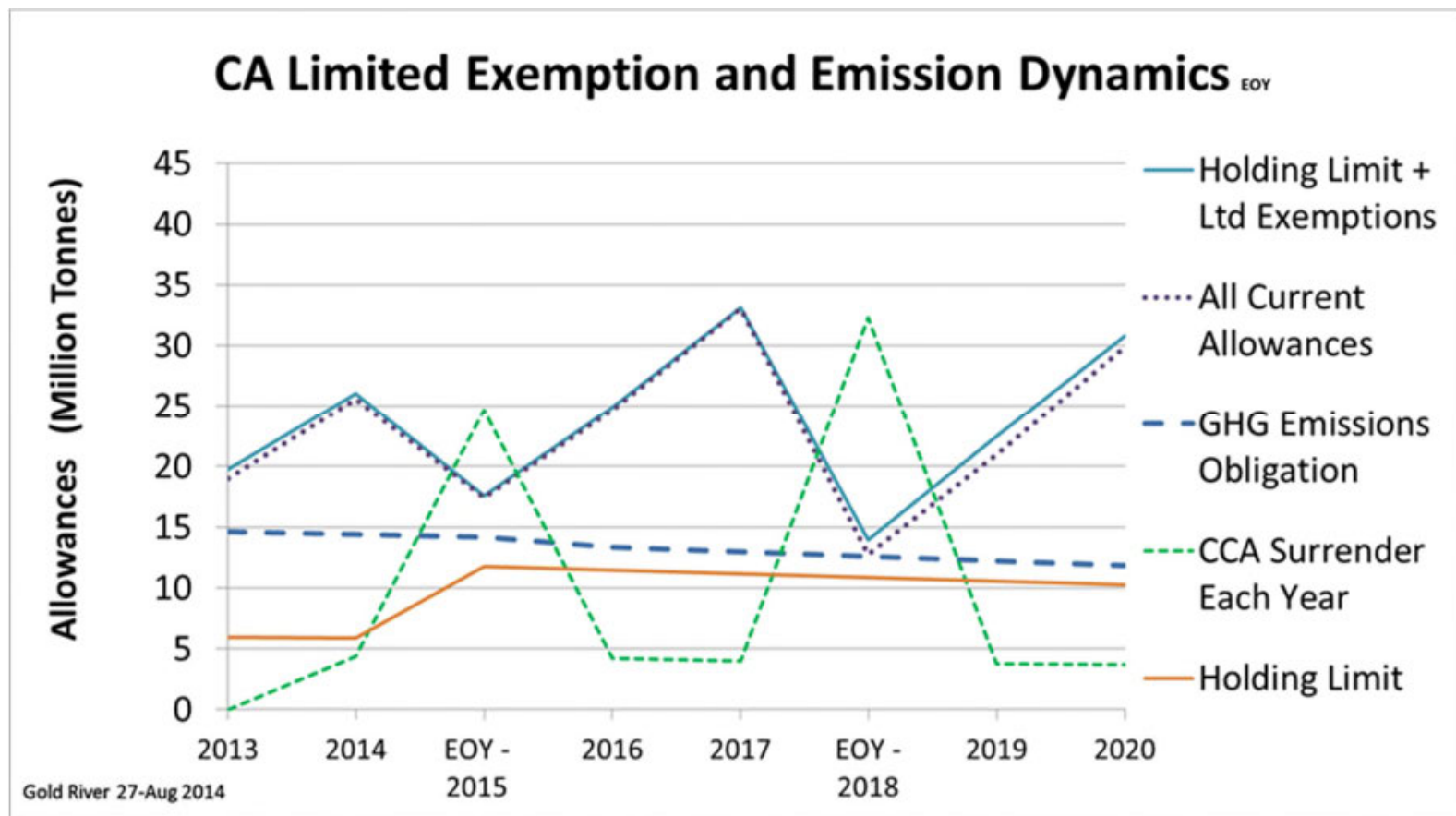
2012 CO2e Emissions from the Largest Emitters

Firm	Approximate 2012 (MMT)		
	Narrow Scope Emissions	Broad Scope Emissions	Total
Chevron U.S.A. Inc.	9.74	32.16	41.90
Tesoro Refining & Marketing Co.	8.10	26.71	34.81
BP West Coast Products		23.88	23.88
Phillips 66 Company	4.52	18.91	23.42
Southern California Gas Co.	0.17	22.55	22.71
Pacific Gas and Electric Co.	3.36	18.90	22.26
Valero Marketing and Supply Co.	3.73	14.00	17.73
Shell Energy North America	4.24	10.71	14.95
LADWP	12.91	0.00	12.91
Exxon Mobil Co.	3.39	8.61	12.00
Southern California Edison Co.	9.96	0.00	9.96
Calpine Energy Services	9.41	0.00	9.41



Limited Exemptions Are Needed by High-Emitting Firms to Comply w Holding Limits

- Limited Exemptions will decrease each November 2, after allowances are surrendered on November 1.

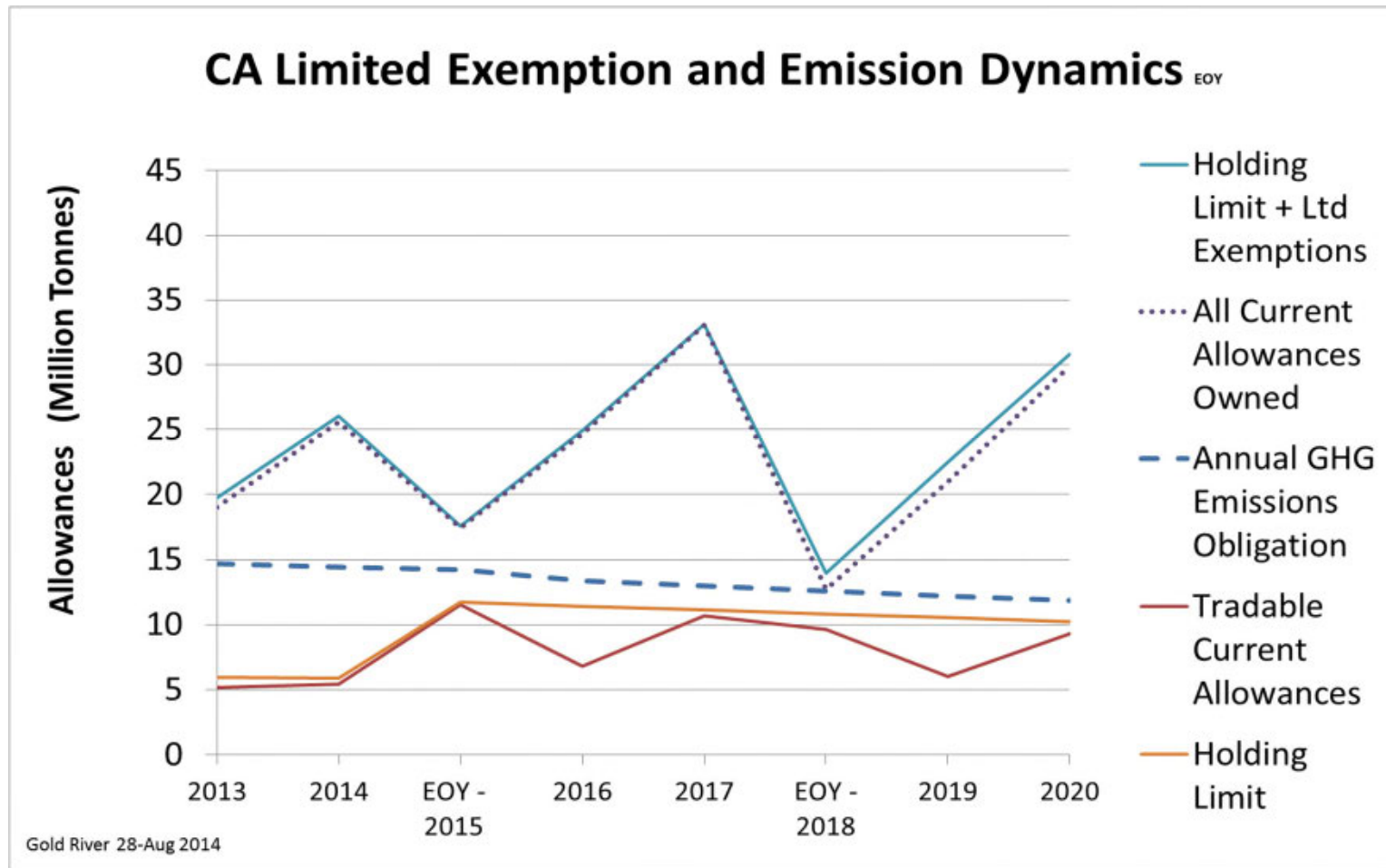


Hypothetical Electric Utility: Gold River Electric Company



Tradable CCAs Held by High-Emitters Will Be Limited in 2016 & 2019

- Only allowances in Holding Accounts can be traded.

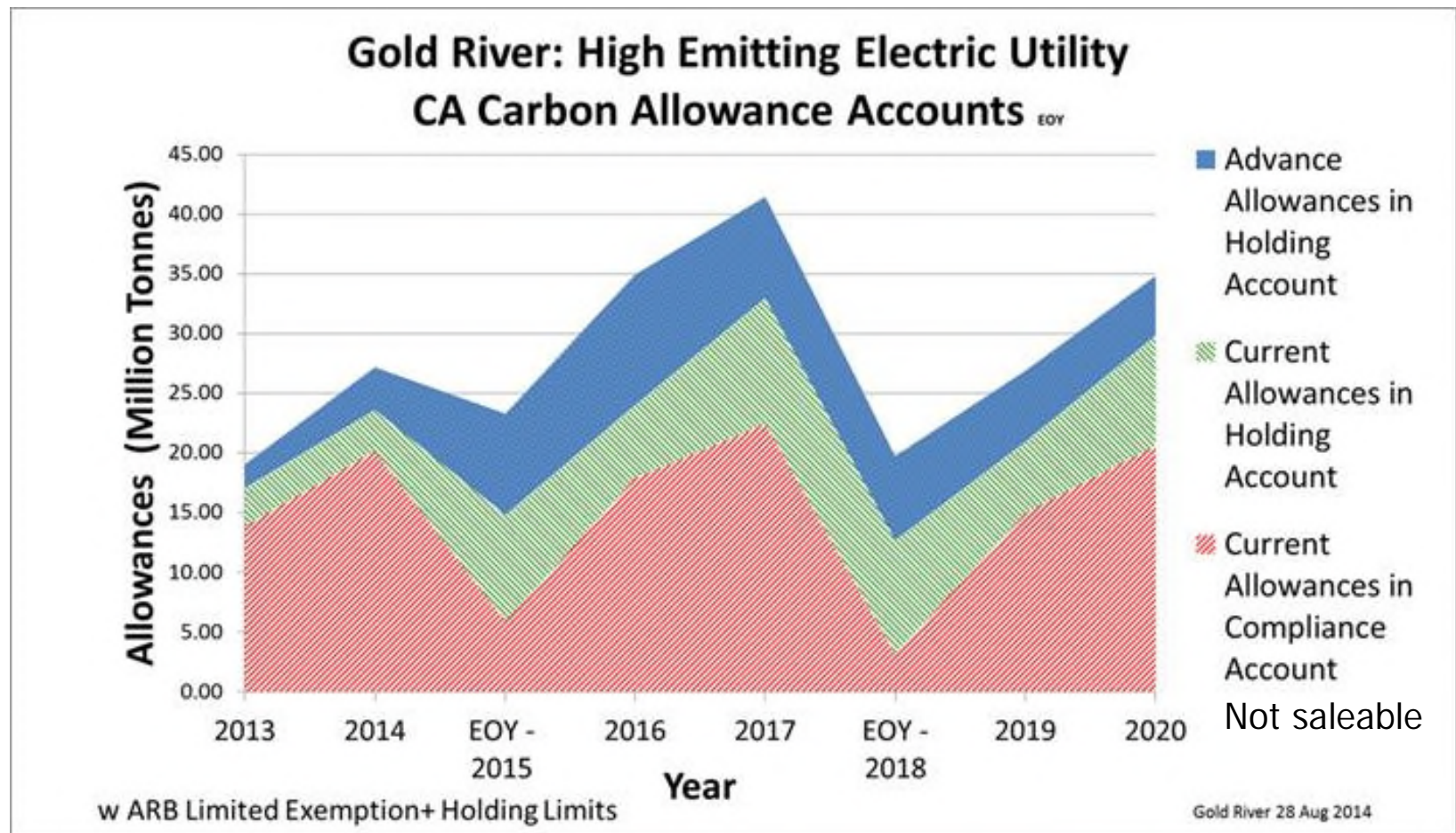


Hypothetical Electric Utility: Gold River Electric Company



High Emitters & Compliance Accounts

- Most allowances will be held in Compliance Accounts.

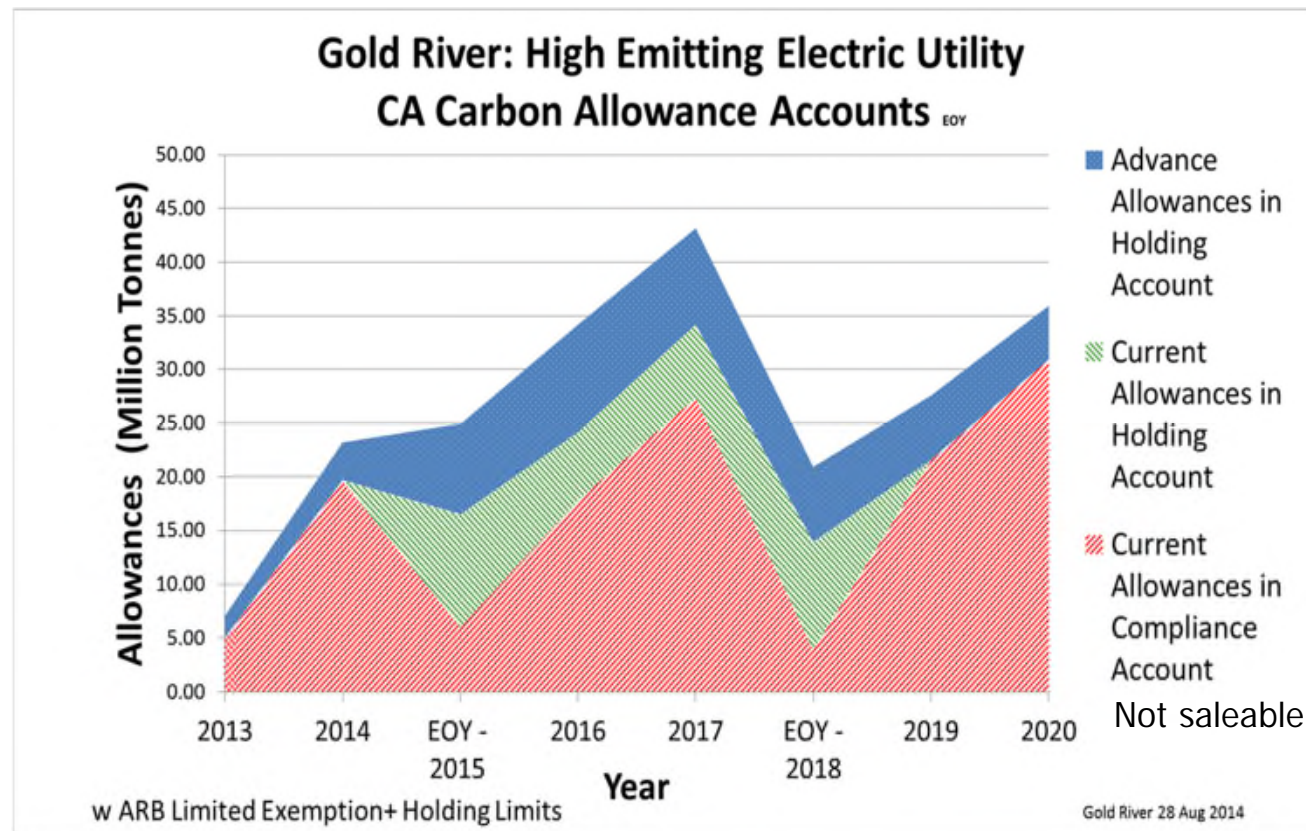


Hypothetical Electric Utility: Gold River Electric Company



Imperfect Foresight Can Prevent CCA Sales

- Tradable supplies will be reduced, when banks rebuild.
- A late start in acquiring CCAs may eliminate the ability to sell allowances in some years.

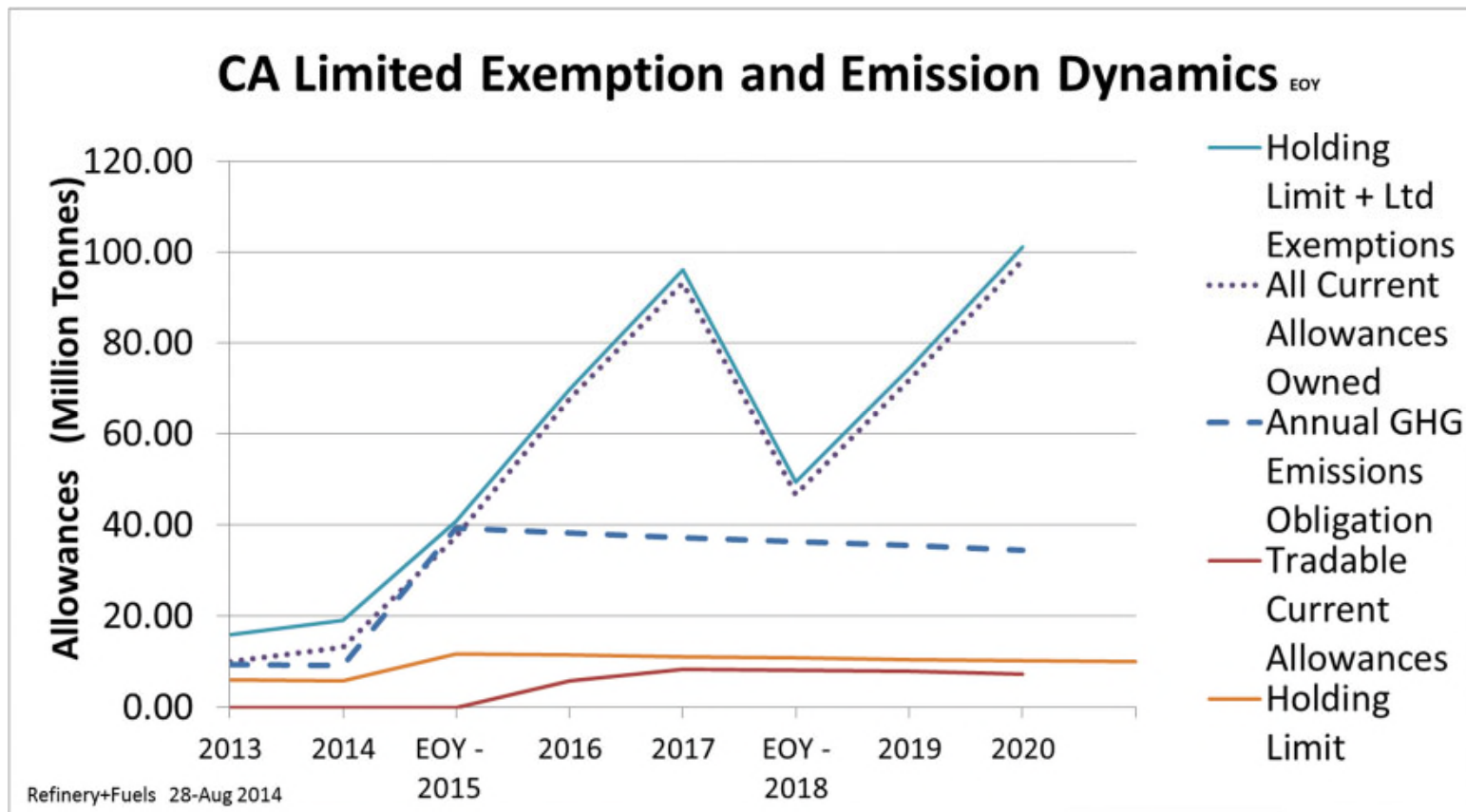


Hypothetical Electric Utility: Gold River Electric Company



Restricted Sales = Restricted Trading

- Compliance Account rules & Holding Limits will restrict trading by the largest emitters and tighten CCA supplies available for trading around the ends of CP2 and CP3.

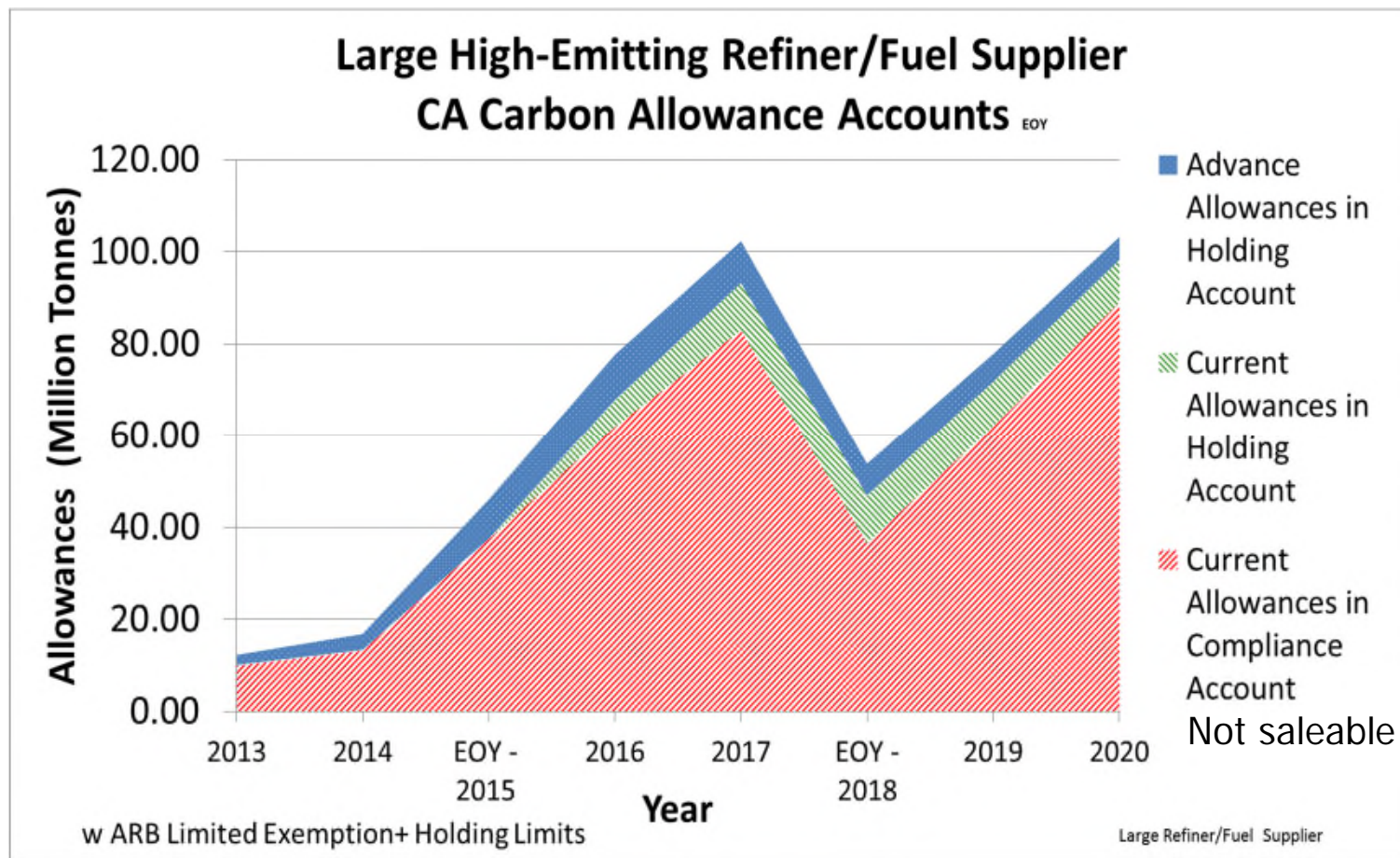


Hypothetical Oil Refiner



High Emitters Entering in CP2 Will Buy Allowances, But Can Sell Only A Fraction

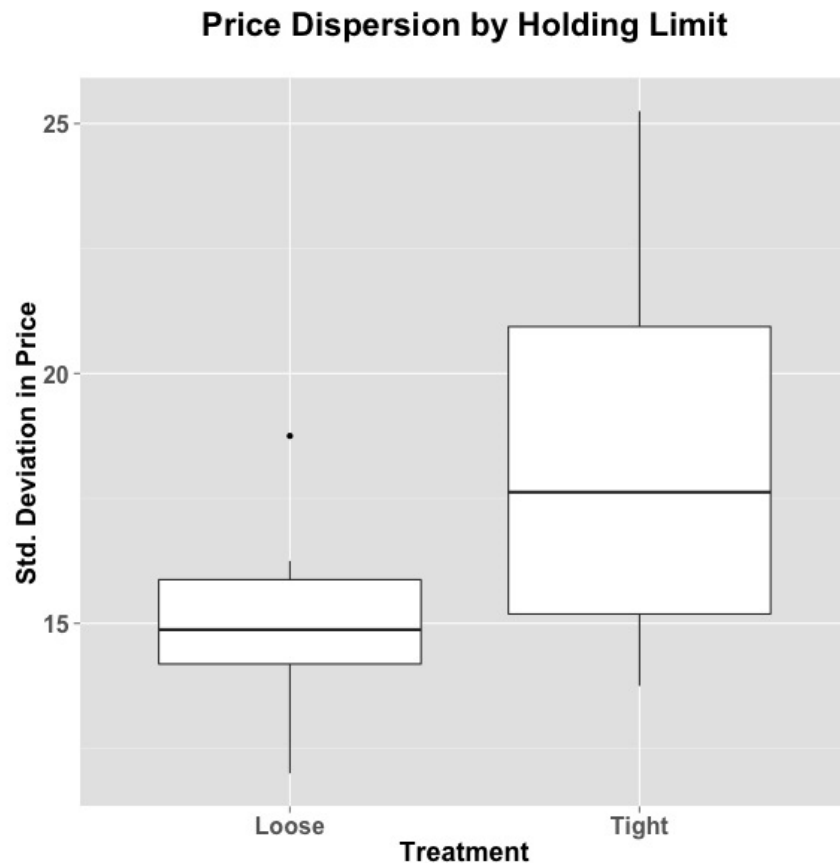
- Firms with the greatest allowance supplies should be allowed to sell surplus CCAs.



Hypothetical Oil Refiner



Tight Holding Limits



- Reduce allowance market liquidity,
- Increase price volatility,
- Lower efficiency,
- Restrict prudent banking of allowances, and
- Delay reductions in greenhouse gas emissions.

Shobe, Wm, Holt, C. & T. Huetteman. "Elements of Emission Market Design: An Experimental Analysis of California's Market for Greenhouse Gas Allowances." *Journal of Behavioral Economics*. JEBO-3346, 2014.



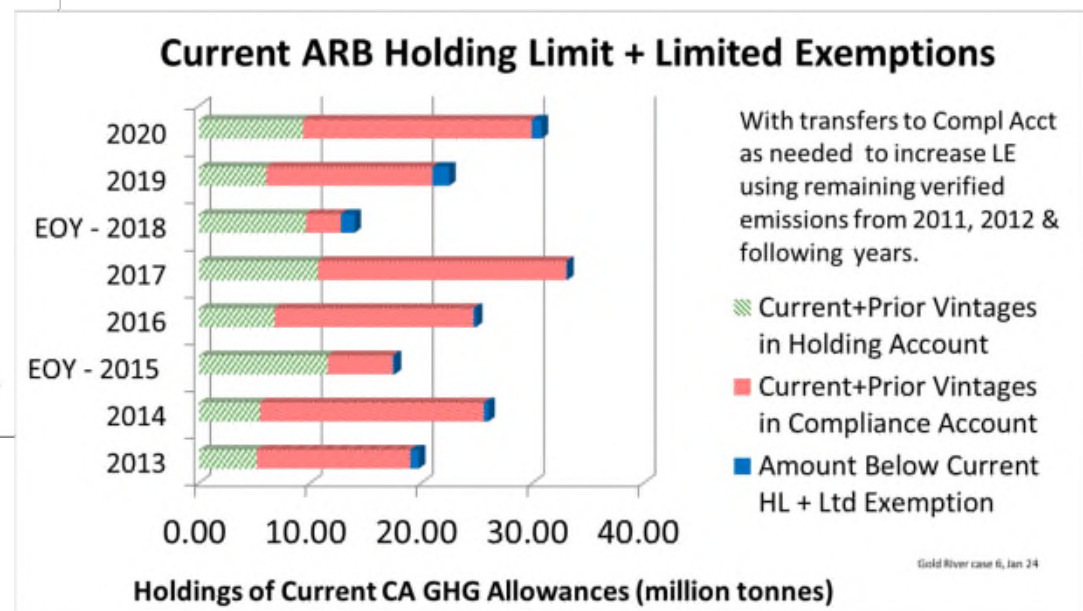
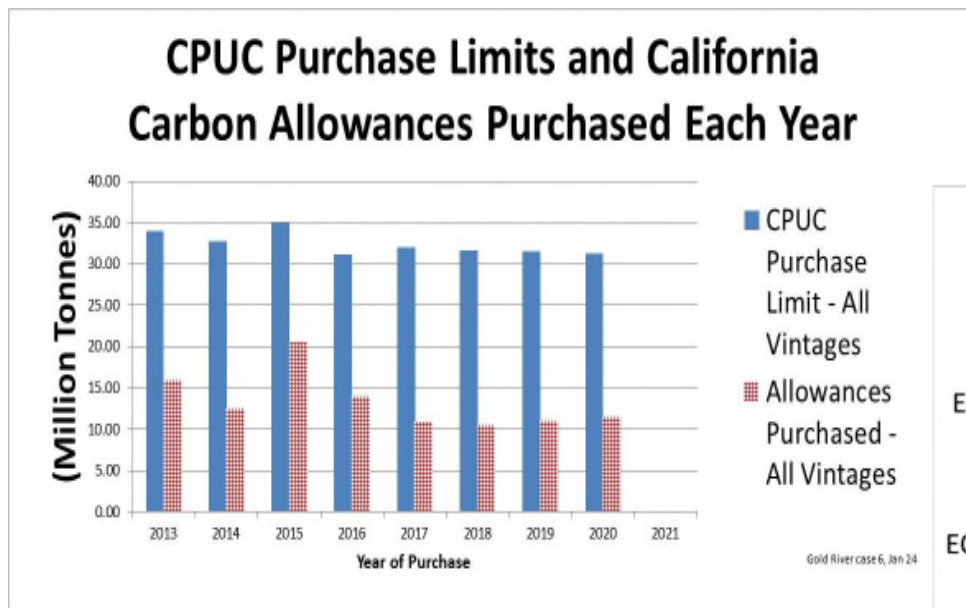
Allowance Purchase Limits

- Until January 1, 2015, ARB applies auction purchase limits in addition to its Holding Limits + Limited Exemptions.
- The California Public Utilities Commission (CPUC) applies its own annual purchase limits to Investor-Owned Utilities (IOUs).
 - The adopted CPUC purchase limit formula projects emissions using an implied market heat rate (IMHR) that is two-standard deviations above the expected IMHR.
 - Thus, forecasted GHG emissions used to derive the CPUC's annual purchase limits are 20% to 30% above base case forecasted emissions.
 - CPUC purchase limits recognize the need for IOU purchase strategies to accommodate uncertainties in future market conditions.



Allowance Purchase Limits^{cont'd}

- The CPUC's annual purchase limits for high-emitting Investor-Owned Utilities will be less restrictive than the ARB's Holding Limits + Limited Exemptions.



Hypothetical Gold River Electric Company - IOU





Findings & Recommendations



Findings: Compliance Account

- Allowances cannot be removed from the Compliance Account, except to surrender allowances to comply.
- The “one-way” restriction on the Compliance Account
 - Reduces allowance market liquidity by trapping surplus allowances that should be made available for trading.
 - Complicates effective management of allowance accounts by high-emitters.



Recommendation: Compliance Account

- Remove the “one-way” restriction on the Compliance Account to allow removal and trading of surplus allowances that are otherwise trapped in these accounts.
 - Perhaps, allow removal only for allowances being sold.
- This will enable more effective trading, especially when the supply of California carbon allowances tightens.



Findings: Holding Limits + Limited Exemptions

- Reduce allowance market liquidity and
- Increase prices and price volatility.
- The combination of Holding Limits and Limited Exemptions with “one-way” Compliance Accounts will restrict trading by high-emitters and could encourage, rather than prevent, market manipulation.
- Improving liquidity is the best defense against market manipulation. High liquidity makes market manipulation more risky, harder to achieve and less profitable.



Recommendations: Holding Limits + Limited Exemptions

- Modify the overly-complicated rules governing Holding Limits and Limited Exemptions, or
- Raise the annual Holding Limits
 - and, at the same time,
- Allow the removal of allowances from the Compliance Account
 - Perhaps, allow removal only of CCAs that are being sold.



Findings: Price Containment

- 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.
 - But, cannot cap prices, if the stock of APCR allowances is exhausted.

Shobe, Wm, Holt, C. & T. Huetteman. “Elements of Emission Market Design: An Experimental Analysis of California’s Market for Greenhouse Gas Allowances.” *Journal of Behavioral Economics*. JEBO-3346, 2014.



Recommendation: Price Containment

- Add a hard price cap to the Allowance Price Containment Reserve to prevent possible unlimited price increases, which could happen, if the APCR reserve of allowances is exhausted.
 - The inelastic, fixed total supply of CCAs could lead to rapid price increases and volatile prices.
 - If the APCR is exhausted, without a hard cap, there is no upper limit on CCA prices.



Why Change These Rules Now?

ARB should adopt this study's recommendations, in order to:

- Limit California Carbon Allowance prices, if the Allowance Price Containment Reserve is exhausted.
- Avoid rapid price increases and price volatility, particularly in the second & third compliance periods.
- Enhance market efficiency,
- Discourage market manipulation,
- Simplify overly-complex market rules that won't work as intended,
- Enable California's cap-and-trade market to be more easily adapted for a multi-state program that could satisfy EPA's proposed Clean Power Plan.





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 electricity and GHG allowance markets.



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 markets and compliance planning, 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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