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Energy and commodity price benchmarking and market insights

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California Carbon and the Northwest

Portland, Oregon

Bill Peters

5 September 2013

Argus coverage

- Price assessment
- VWA of all trades (ICE, OTC, CME)
- Carbon-adjusted spark spreads
- Air Daily, US Electricity
- Argus California Carbon Summit Oct. 28-30 in San Francisco

California carbon allowances					\$/t
Vintage	Delivery	Bid	Ask	Price	±
2013	Dec 13	12.15	12.25	12.20	-0.20
2014	Dec 13	12.20	12.80	12.50	-0.20

California volume weighted averages					\$/t
Vintage	Delivery	Low	High	VWA	MTD
2013	Dec 13	12.15	12.25	12.19	13.14

Vintage	Delivery	Trades	MTD	Volume	MTD
2013	Dec 13	3	73	13,000	1,420,000

GAS-IMPLIED, CARBON-ADJUSTED SPARK SPREADS

Adjusted heat rates and carbon cost				
Marginal unit	NP15		SP15	
	Heat rate mnBtu/ MWh	Carbon cost \$/MWh	Heat rate mnBtu/ MWh	Carbon cost \$/MWh
Gas-implied	12.051	7.82	13.497	8.75
Carbon-adjusted	10.333	6.70	11.512	7.47
Western grid electric exports				5.22
Bonneville Power Administration exports				0.30
Powerex electric exports				0.36

Adjusted spark spreads				\$/MWh
Heat rate	7	8	10	12
NP15				
Gas-implied	19.70	15.80	8.00	0.20
Carbon-adjusted	15.16	10.61	1.51	-7.58
Carbon cost	4.54	5.19	6.49	7.78
SP15				
Gas-implied	24.43	20.67	13.15	5.63
Carbon-adjusted	19.89	15.48	6.66	-2.15
Carbon cost	4.54	5.19	6.49	7.78

The data display the spread of fuel and carbon costs of running a power plant compared with the power price at NP15 and SP15, along with the carbon cost per heat-rate and for unspecified power imports. Data for SP15 uses the day-ahead power price at SP15 and the day-ahead gas price at SoCal. Data for NP15 uses the day-ahead power price at NP15 and the day-ahead gas price at PG&E Citygates. Both use the assessed December 2013-Delivery CCA price for carbon costs. For more information about this data, please contact airdaily@argusmedia.com or +1 (202) 775-0240.

Why price carbon?

- Ideally results in the cheapest reductions of CO2
 - Provides a long-term price signal for investment
 - Rewards efficiency
- Has worked in the past with the Acid Rain Program, lead and Tier I, II gasoline programs

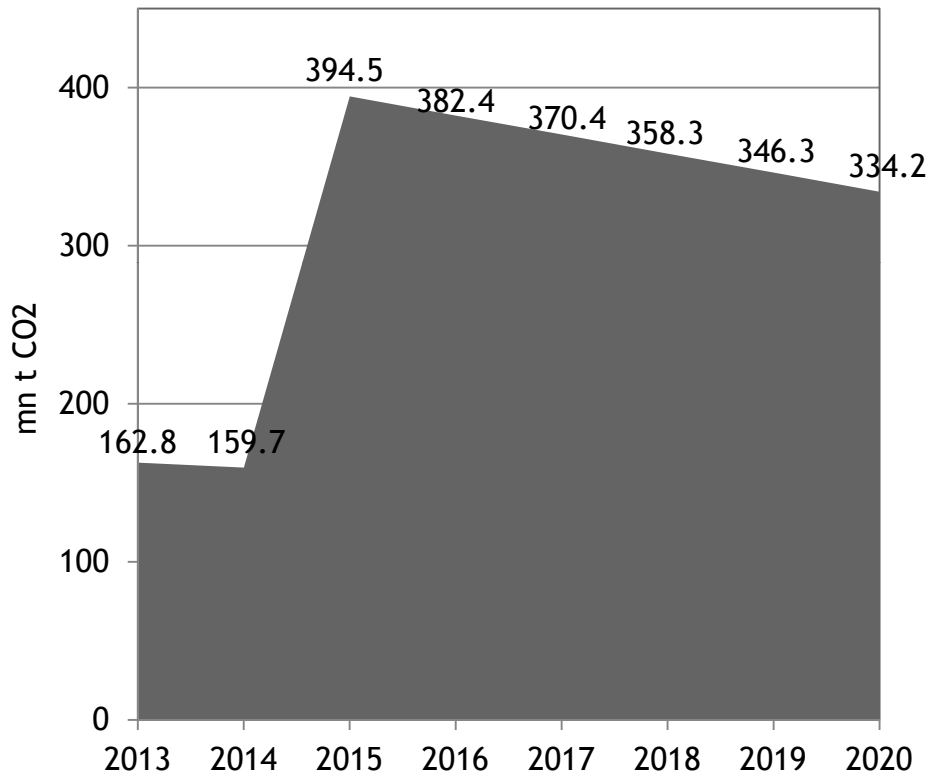
What is cap and trade?

- Government sets a cap on CO₂ and other greenhouse gases
- Then creates allowances (rights to emit a tonne of CO₂)
 - Can be given away for free or auctioned off
- Trade in allowances creates the carbon price and profit motive for reducing emissions

In Context

- California's cap-and-trade program is meant to be responsible for ~20% of its CO2 reductions
- The RPS, Low-Carbon Fuel Standard and over a dozen other programs doing the rest
- But the carbon price is the backstop and last line of defense for the 1990 levels of GHG emissions by 2020 target

The Cap

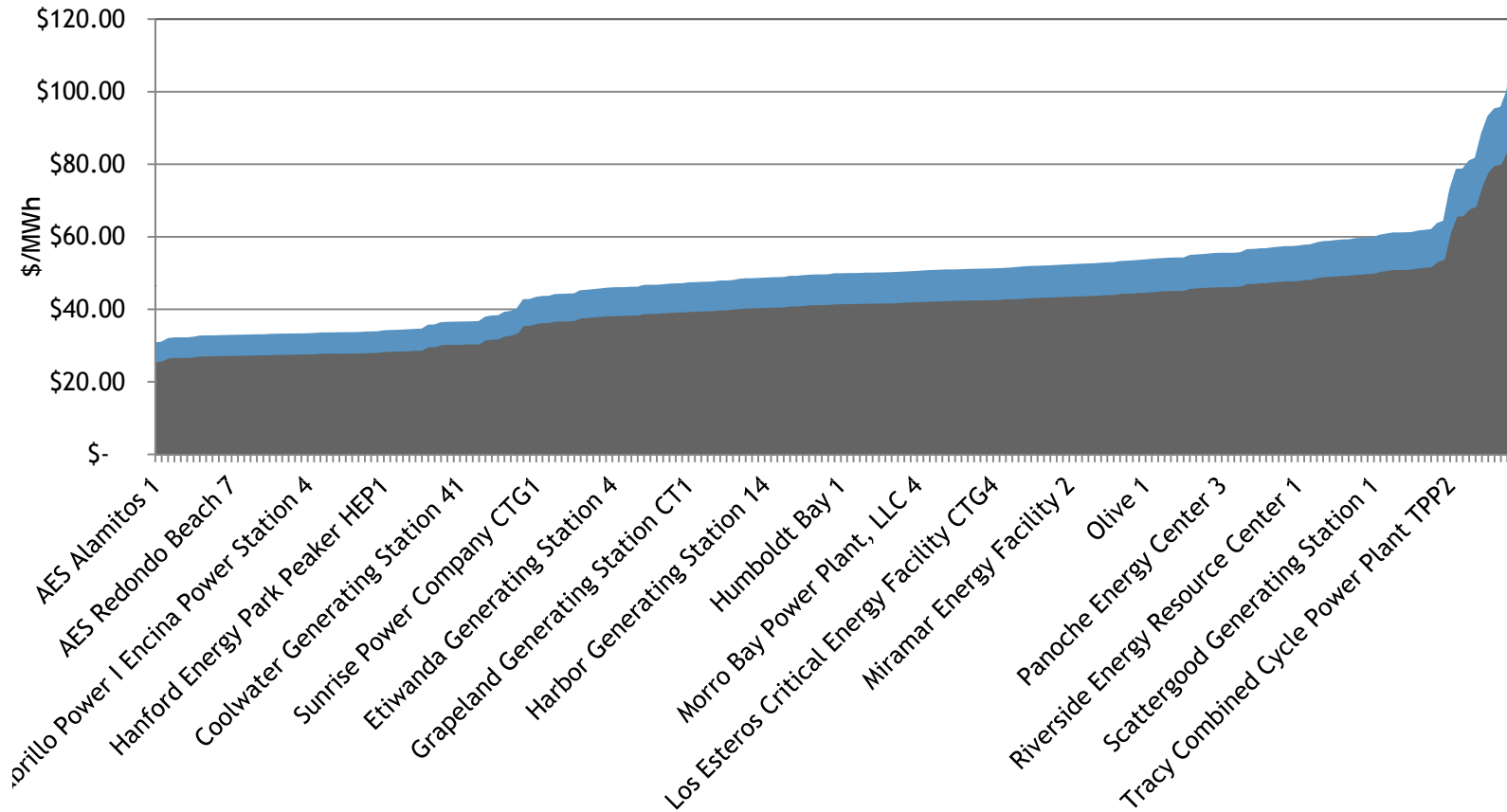


- Caps power sector and industrials in 2013-2014
- Then caps transport fuels and natural gas in 2015
- Allowances are both given away and auctioned by the state
- California now working on post-2020 caps for its program, finding other states to join up

Electric Sector

- Point of regulation: first electricity deliverers
- Electric imports are included
 - Plant-specific, Asset-Controlling Supplier or WECC default
 - System-tagged power may be added as a default
- Allowances
 - ~90pc of allowances allocated for free, based on historical emissions
 - 2013s allocated October 2012 for distribution utilities
 - 2014-2020s allocated on Nov 1 of each calendar year 2013-2019
 - IOUs must sell allowances at state-run auctions
 - Spending rules developed by CPUC
 - Auction are held every quarter, fifth one is in November

How carbon changes power running costs



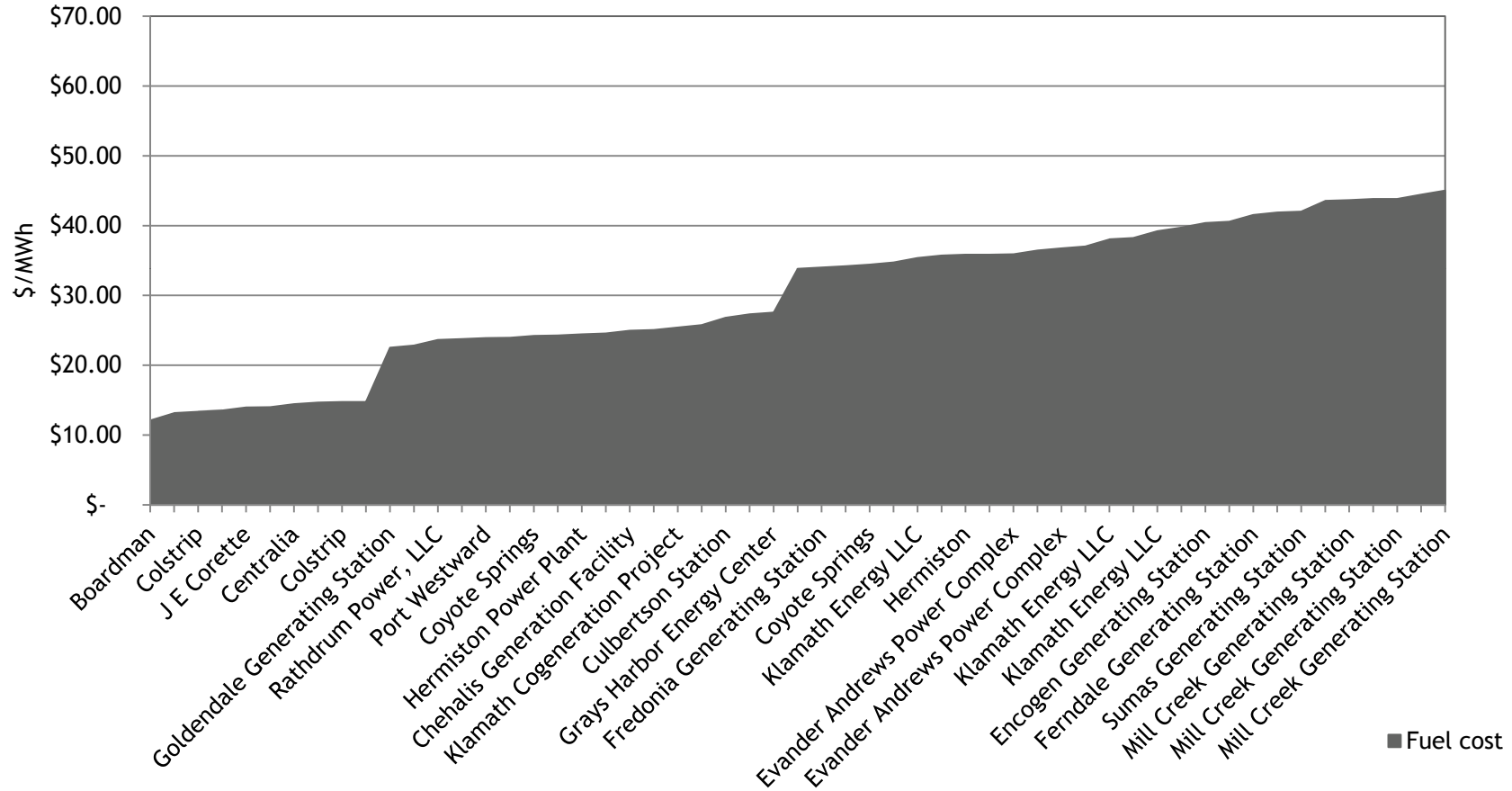
Source: Argus pricing, 2010-2012
Acid Rain Data for Heat rates

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Fossil units in OR, WA, ID, MT



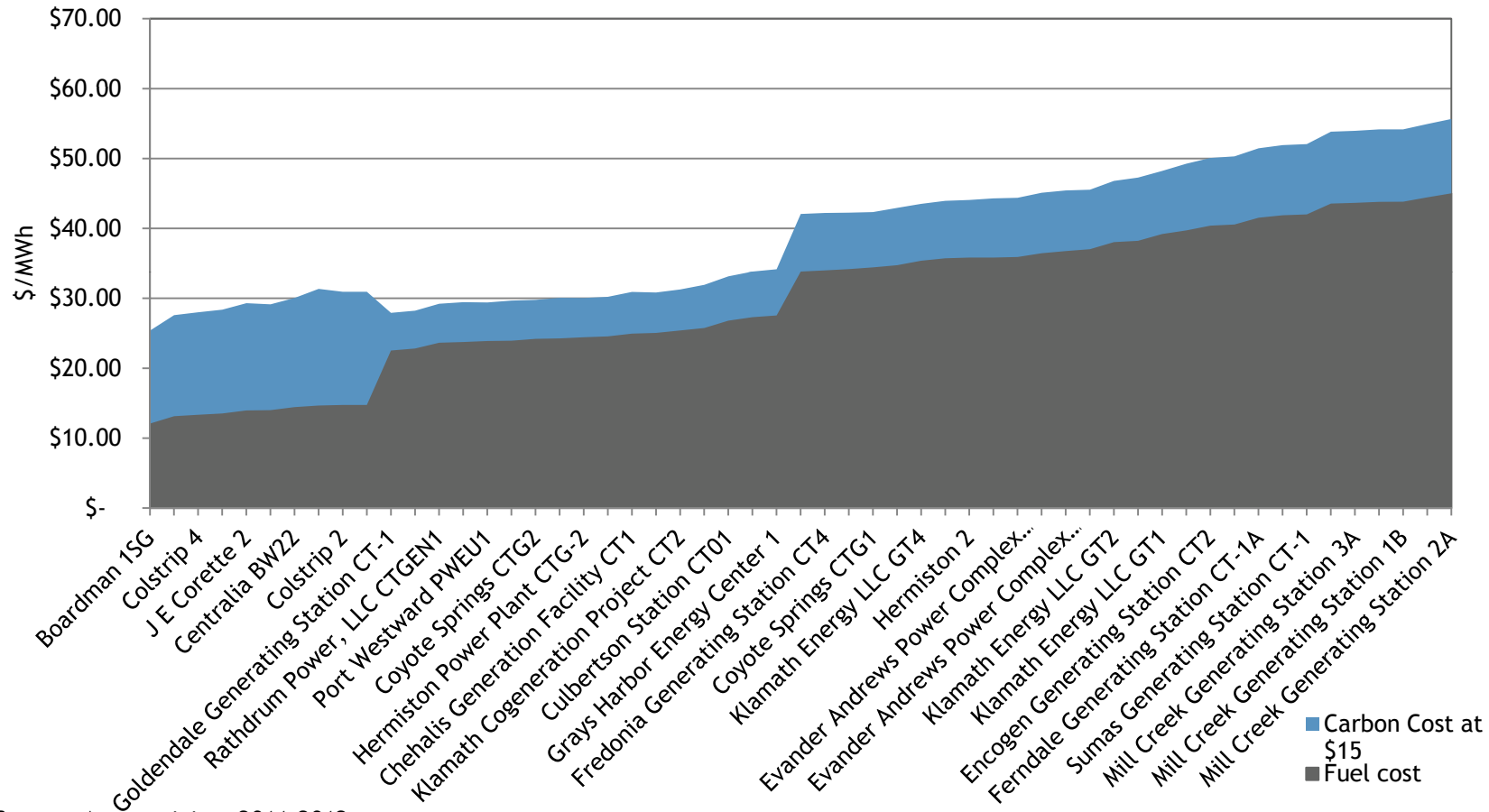
Source: Argus pricing, 2011-2012
Acid Rain Data for Heat, CO₂ rates

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And adding in a \$15/t carbon price



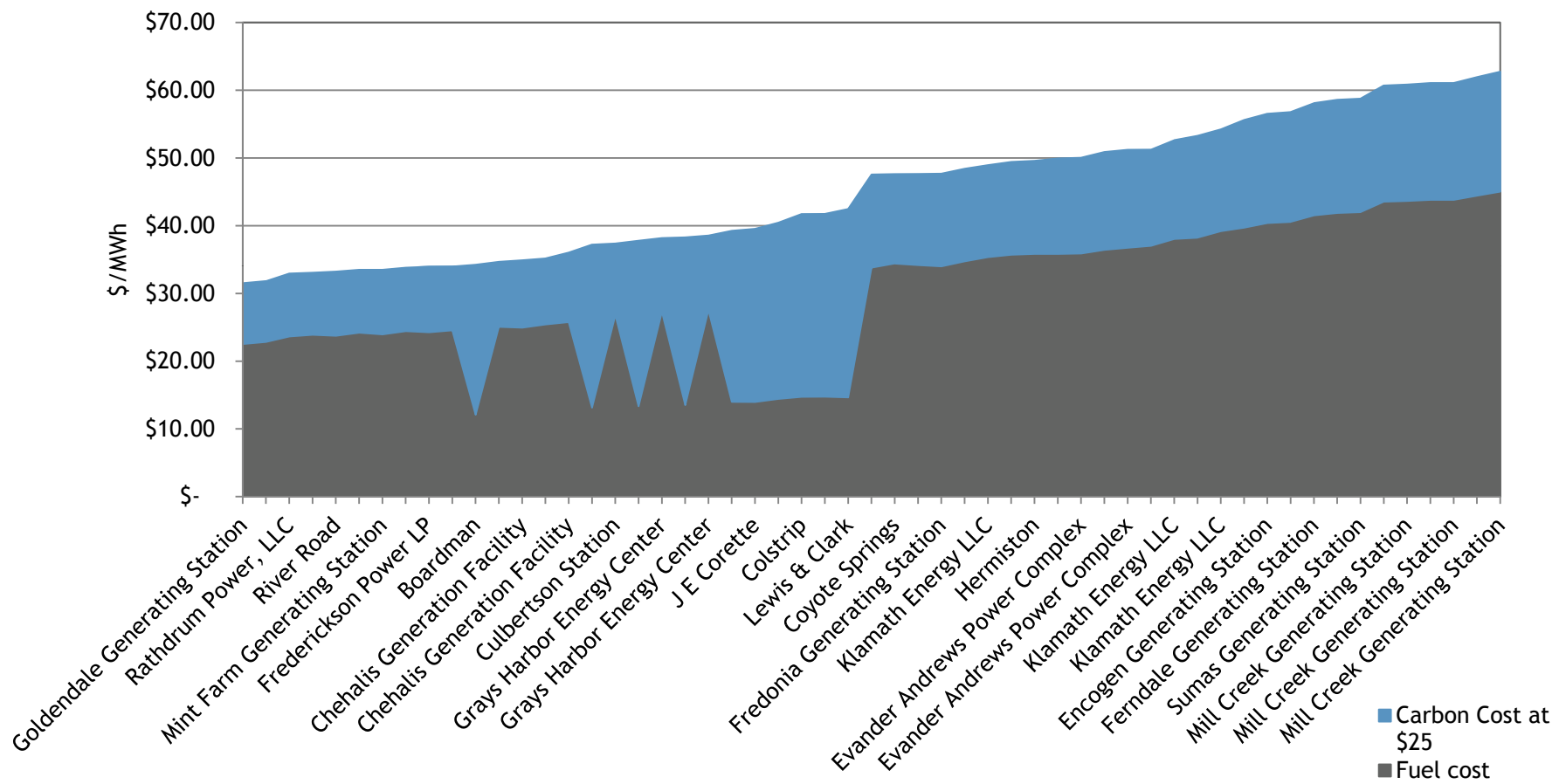
Source: Argus pricing, 2011-2012
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And with a \$25/t carbon price



Source: Argus pricing, 2011-2012
Acid Rain Data for Heat, CO₂ rates

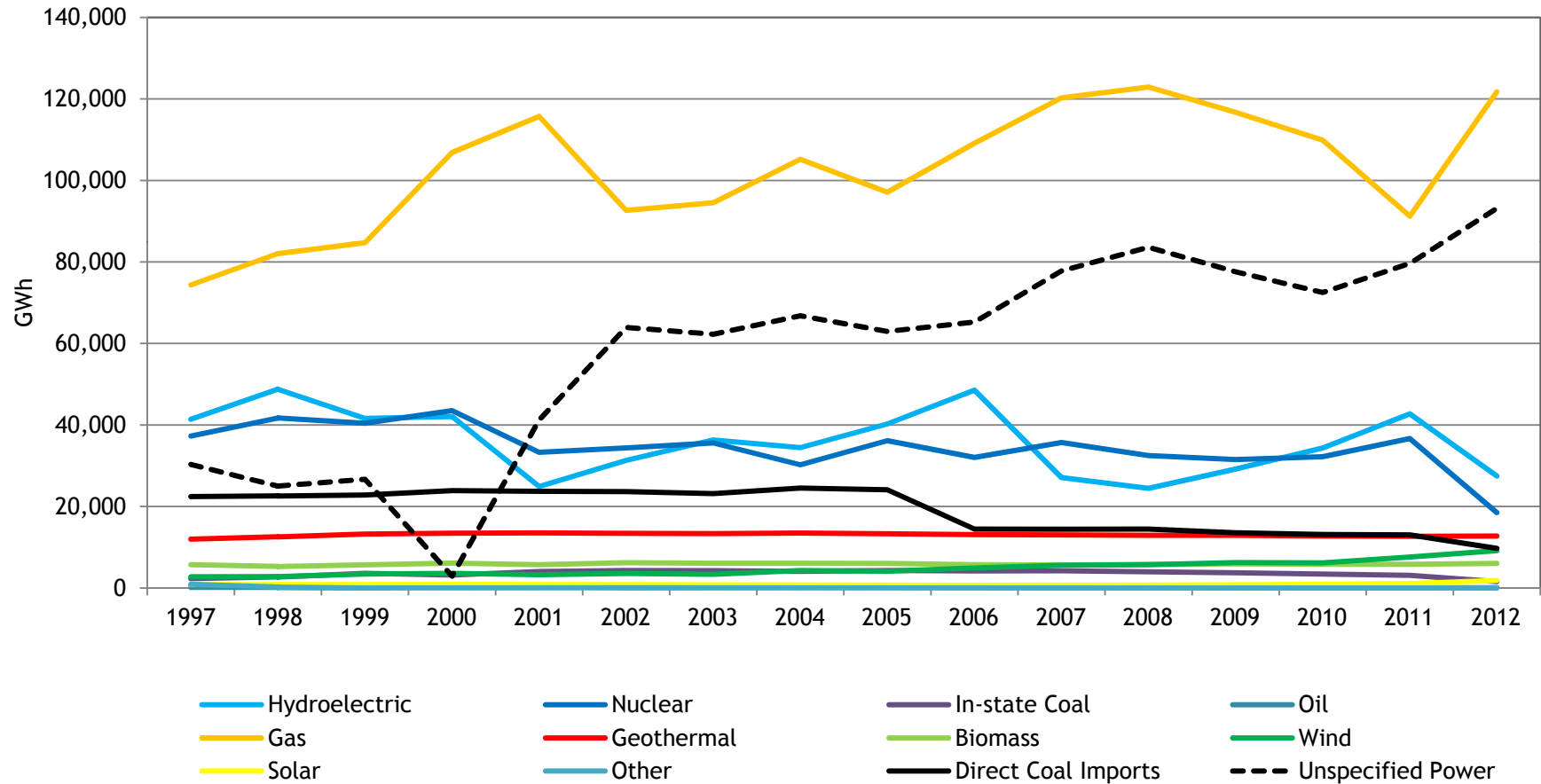
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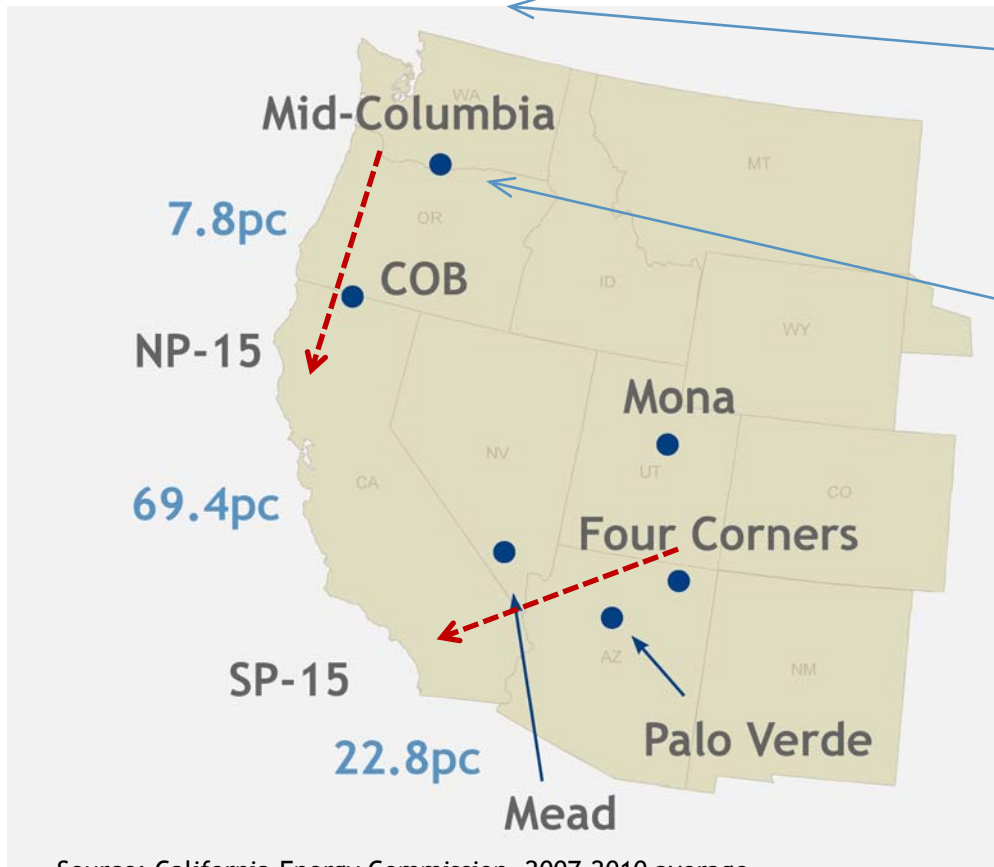
Over to Lenny

California power mix



Source: California Energy Commission

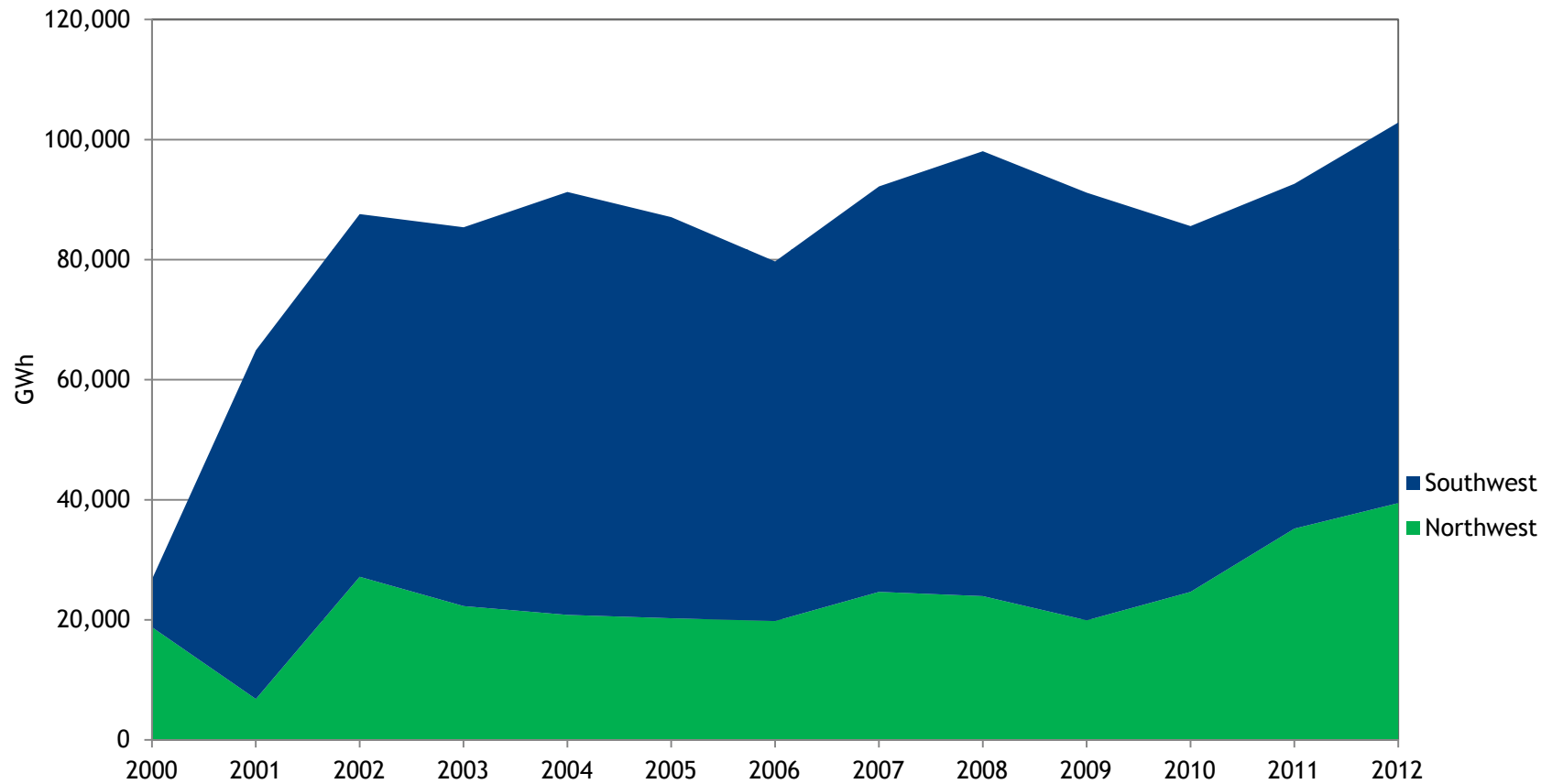
Electricity imports



- Powerex (BC Hydro): 0.0293mt/MWh
- BPA: 0.0249mt/MWh
- WECC-wide default: 0.428mt/MWh

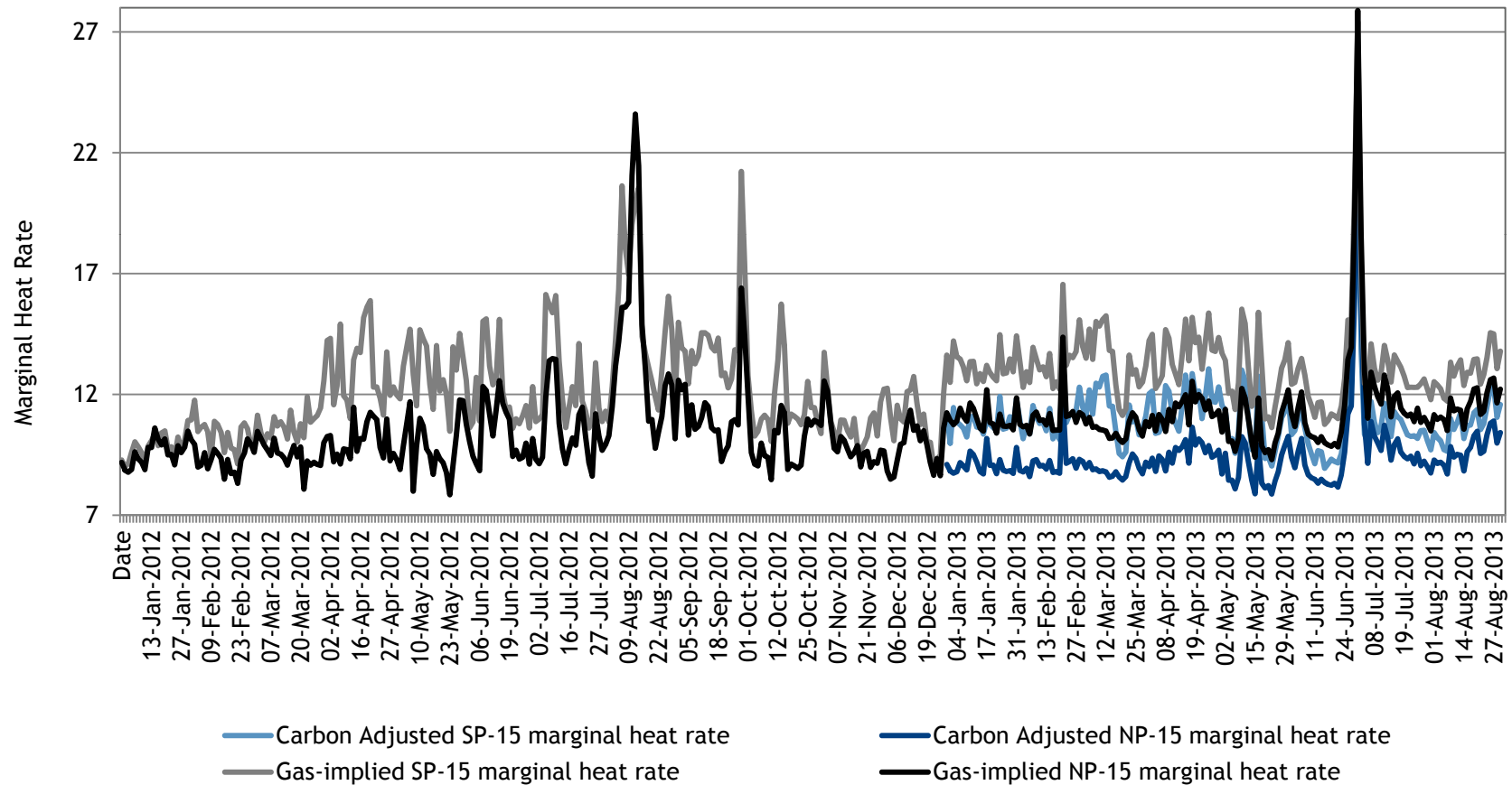
Source: California Energy Commission, 2007-2010 average generation/imports

Imports into California

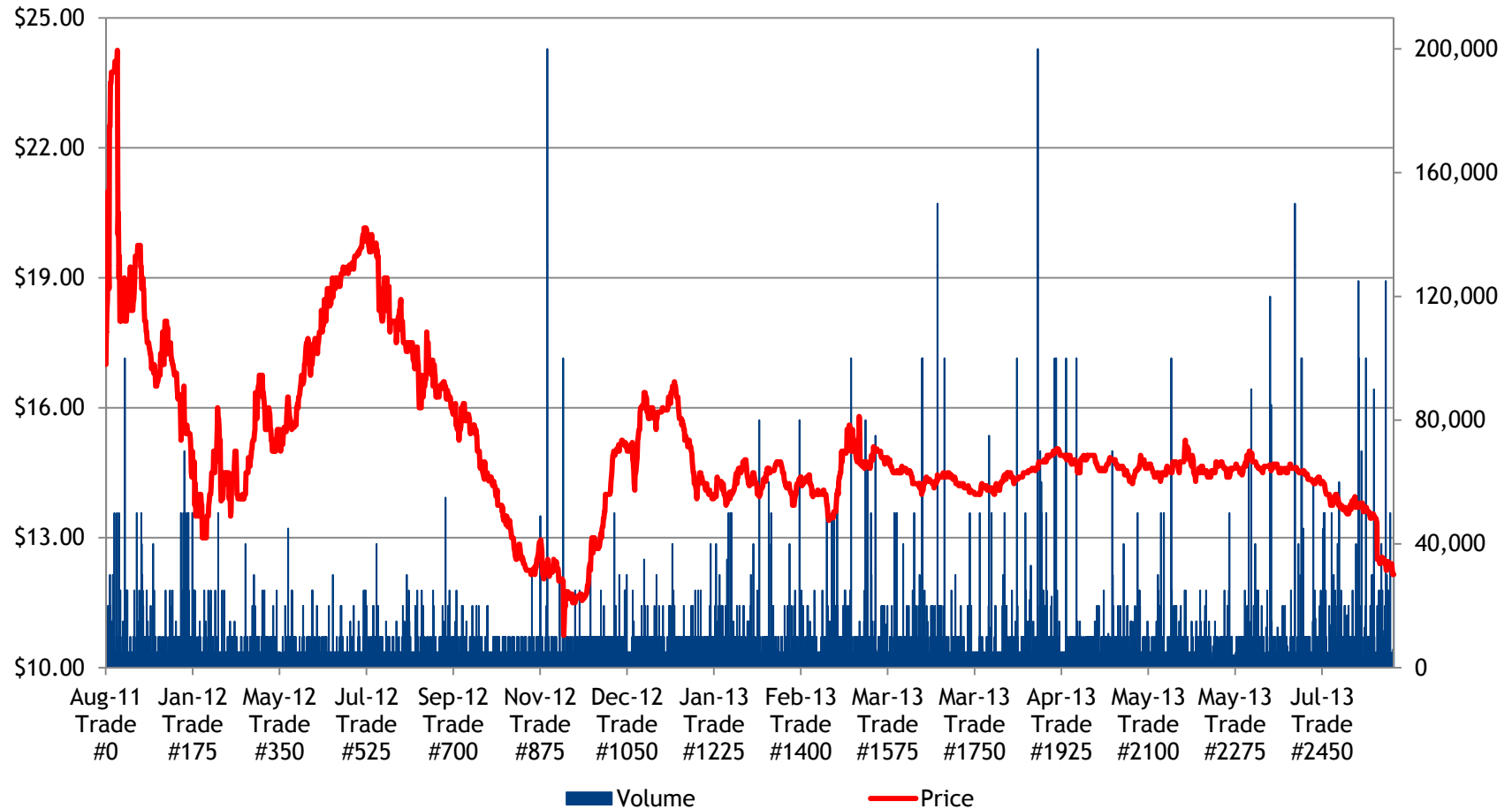


Source: California Energy Commission

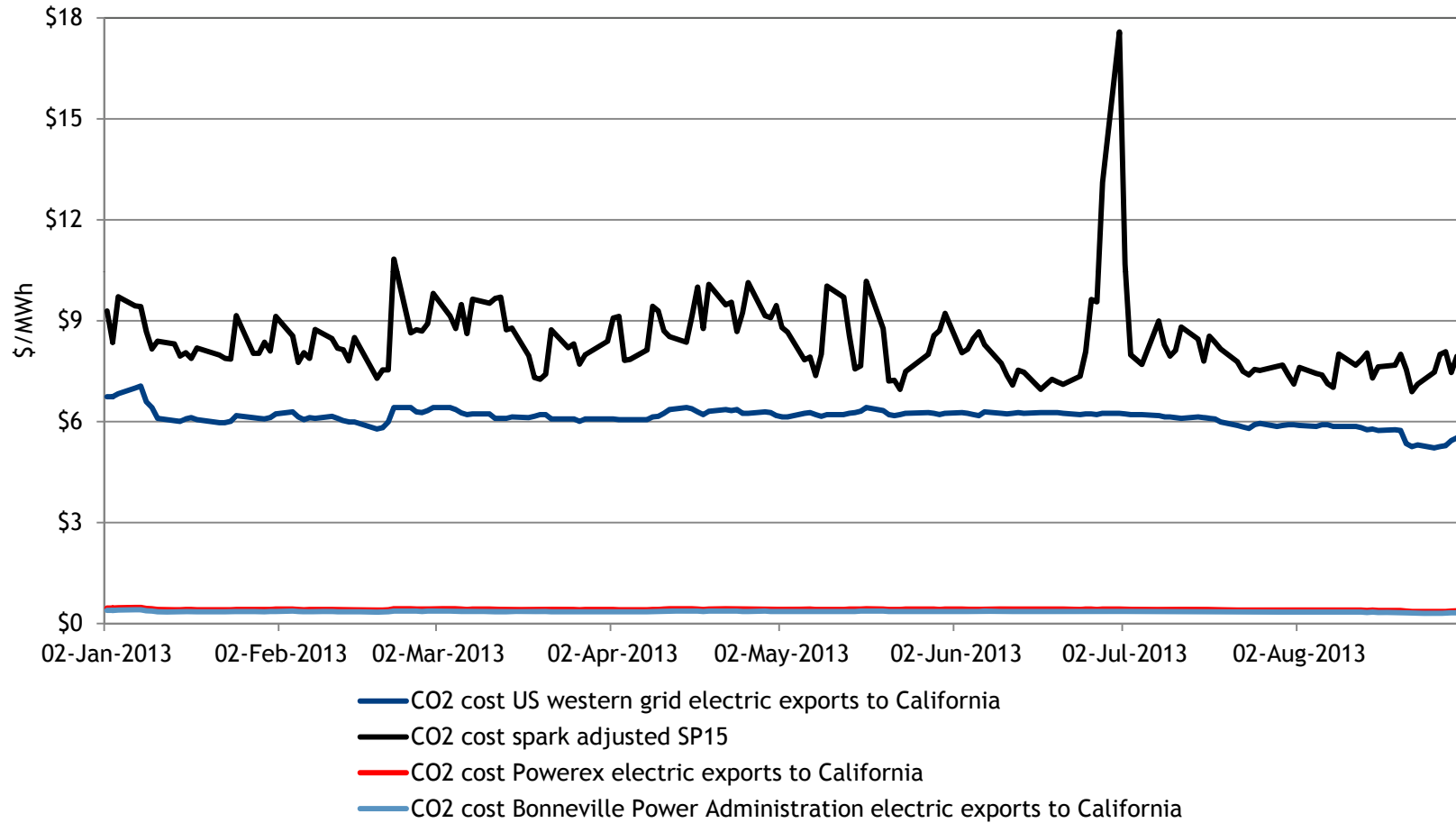
Carbon price integrated well



December 2013, Vintage 2013 CCAs



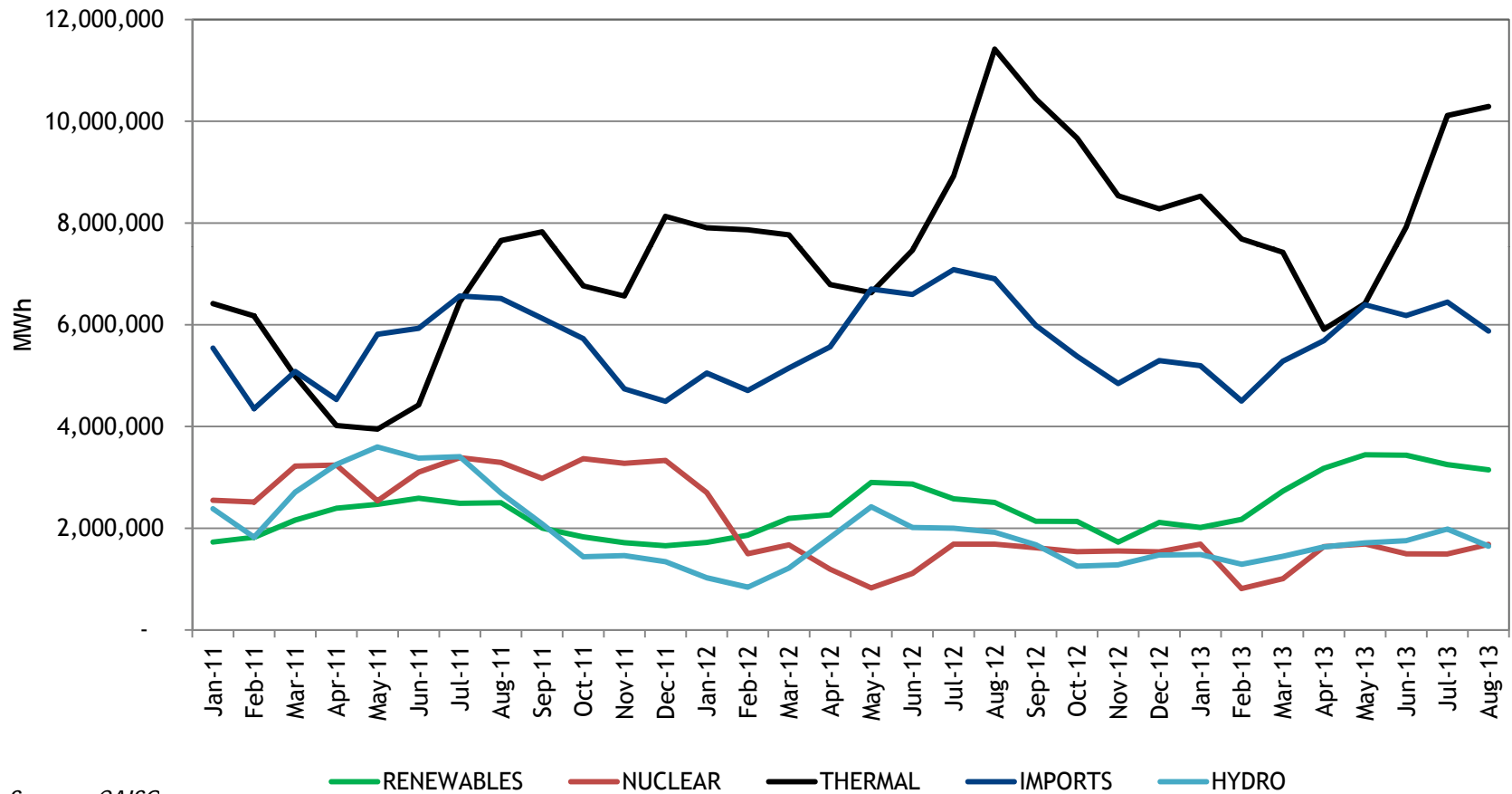
California CO₂ costs for power



Electricity Imports

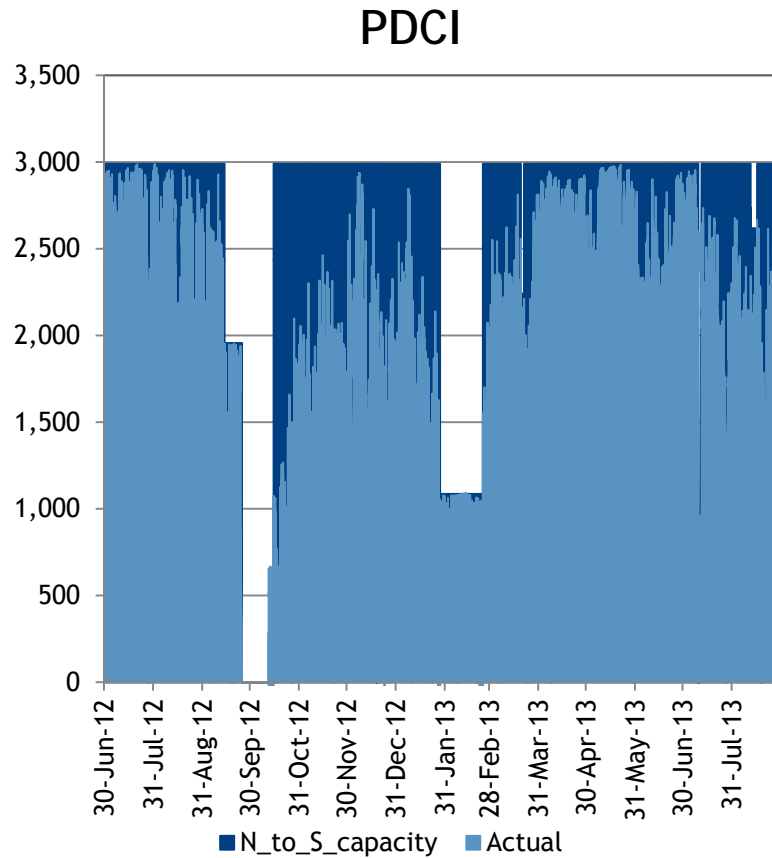
- Carbon price adds \$4.50-6/MWh on unspecified WECC imports to CA
- Or \$0.35-45/MWh for specified BPA or BC Hydro power
- Premium for BPA-specified should be around \$5 ideally, but congestion costs and policy/verification risk pull premium down
- Was around \$2-3/MWh, but no recent data

Imports into CAISO are about the same

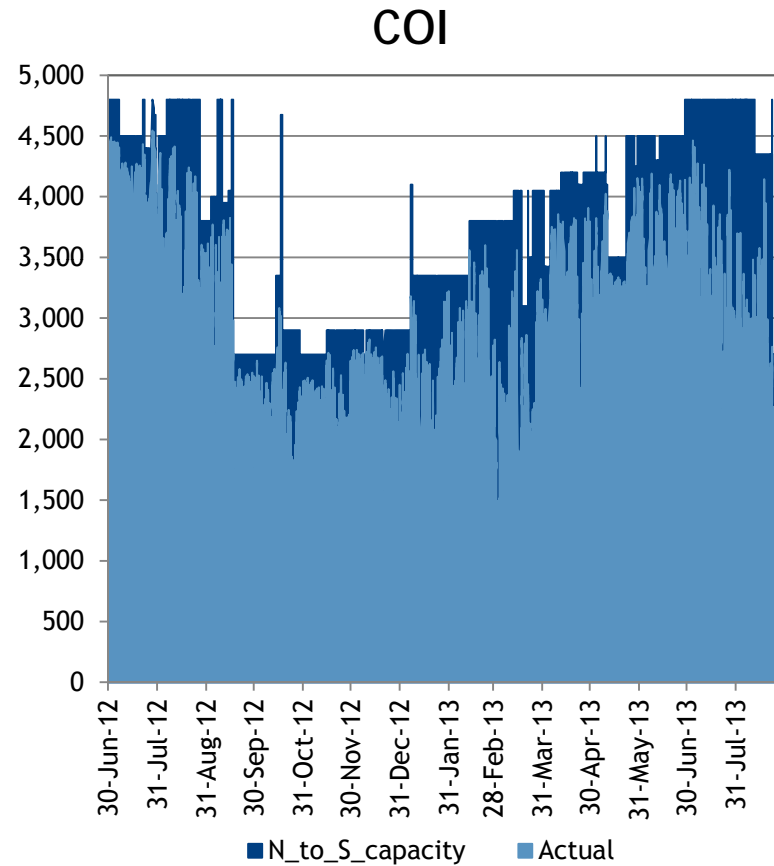


Source: CAISO

North to South seem about same



Source: BPA



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