

Allocation Scenarios: Preliminary Analysis

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Energy and Environmental Economics, Inc.

*Snuller Price, Partner
Energy and Environmental Economics, Inc.
101 Montgomery Street, Suite 1600
San Francisco, CA 94104
415-391-5100*



Allocation Scenario Analysis

- Starting point: CEC/CPUC Staff paper on Options for Allocation of GHG Allowances in the Electricity Sector
 - Applies four evaluation criteria to allocation methods
 - 1) Consumer cost, 2) transfers among customers of retail providers, 3) administrative simplicity, and 4) impact on new entrants
- Scenario analysis applied GHG calculator to evaluate transfers among customers of retail providers
 - Results are still preliminary, since model is not finalized
 - Results provide insight into direction of trends of the transfers between LSEs under different allocation methods
 - All scenarios assume \$30/t CO₂ price, 20% RPS, reference EE goals, any revenue return used to reduce rates

'Mock-up' of CO2 Market Control Panel

Market Clearing Price for Emissions Permits

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Market clearing price for permits (\$/MMTCO2e)	\$ 30.00	\$ 37.50	\$ 45.00	\$ 52.50	\$ 60.00	\$ 67.50	\$ 75.00	\$ 82.50	\$ 90.00

Administrative allocation

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Quantity of permits administratively allocated (MMT CO2e)	106.5	95.4	83.4	72.6	62.0	51.4	40.9	28.7	18.3
Percent of permits administratively allocated	100%	90%	80%	70%	60%	50%	40%	30%	20%
Percent of permits auctioned to energy deliverers	0%	10%	20%	30%	40%	50%	60%	70%	80%

Basis of allocation

Energy Output (updated yearly)	50%	60%	70%	80%	90%	100%	100%	100%	100%
Historic 2008 emissions	50%	40%	30%	20%	10%	0%	0%	0%	0%

Exclude non-fossil GWh from sales-based allocations ▼

CO2 Markets and Prices

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Offsets Price (\$/tonne CO2e)									
California offsets	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00
Regional offsets	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00
International offsets	\$ 25.00	\$ 25.00	\$ 25.00	\$ 25.00	\$ 25.00	\$ 25.00	\$ 25.00	\$ 25.00	\$ 25.00

Maximum % of emissions requirement that can be met with offsets

California offsets	10%	10%	10%	10%	10%	10%	10%	10%	10%
Regional offsets	5%	5%	5%	5%	5%	5%	5%	5%	5%
International offsets	5%	5%	5%	5%	5%	5%	5%	5%	5%

Auction Revenue Redistribution to LSEs

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Percent of auction revenue returned to LSEs	100%	100%	100%	100%	100%	100%	100%	100%	100%
Method for Returning Revenues									
Return based on LSE Sales (updated yearly)	50%	50%	50%	50%	50%	50%	50%	50%	50%
Return based on 2008 emissions	50%	50%	50%	50%	50%	50%	50%	50%	50%

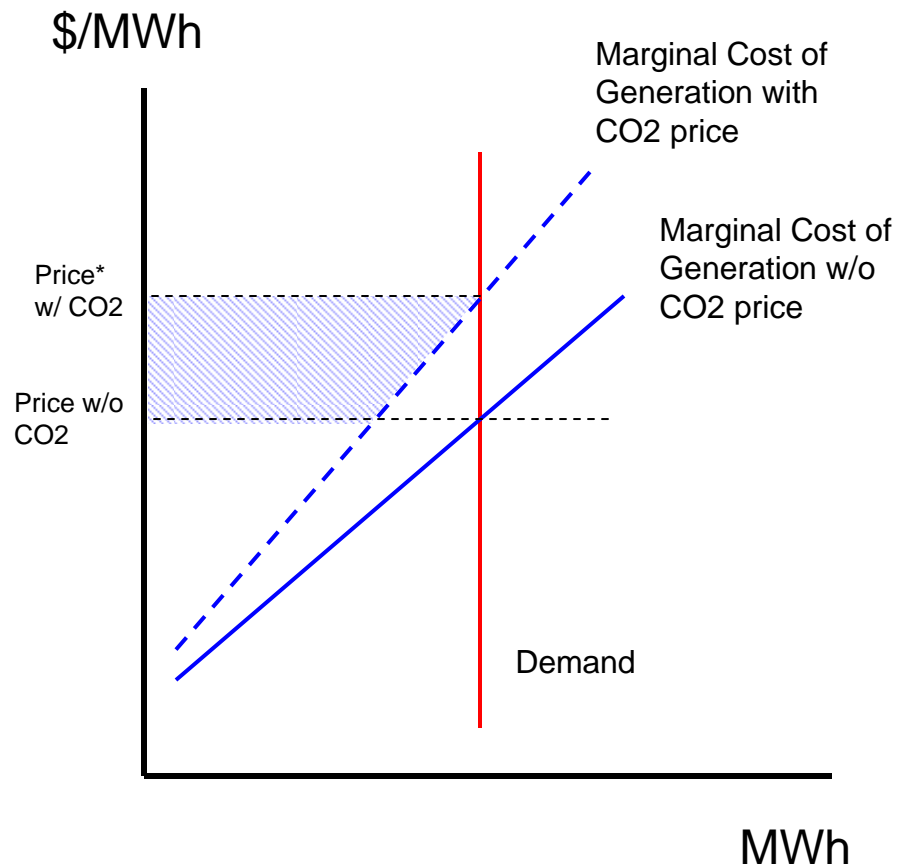


Modeling Differences to Staff Paper

- Output-based allocation provides allowances to all generators on the basis of MWh generated
 - Excluding zero-carbon deliverers is an option
- Setting the baseline allocations
 - Output-based allocations is based on current year output, updating for every year 2012 to 2020.
 - Emissions-based allocations are based on 2008 planning year. Since 2008 model has planning level hydro and thermal output, a multi-year baseline is not needed for the model.
- Sales based auction revenue return is based on actual sales, and not sales adjusted by EE achievements.

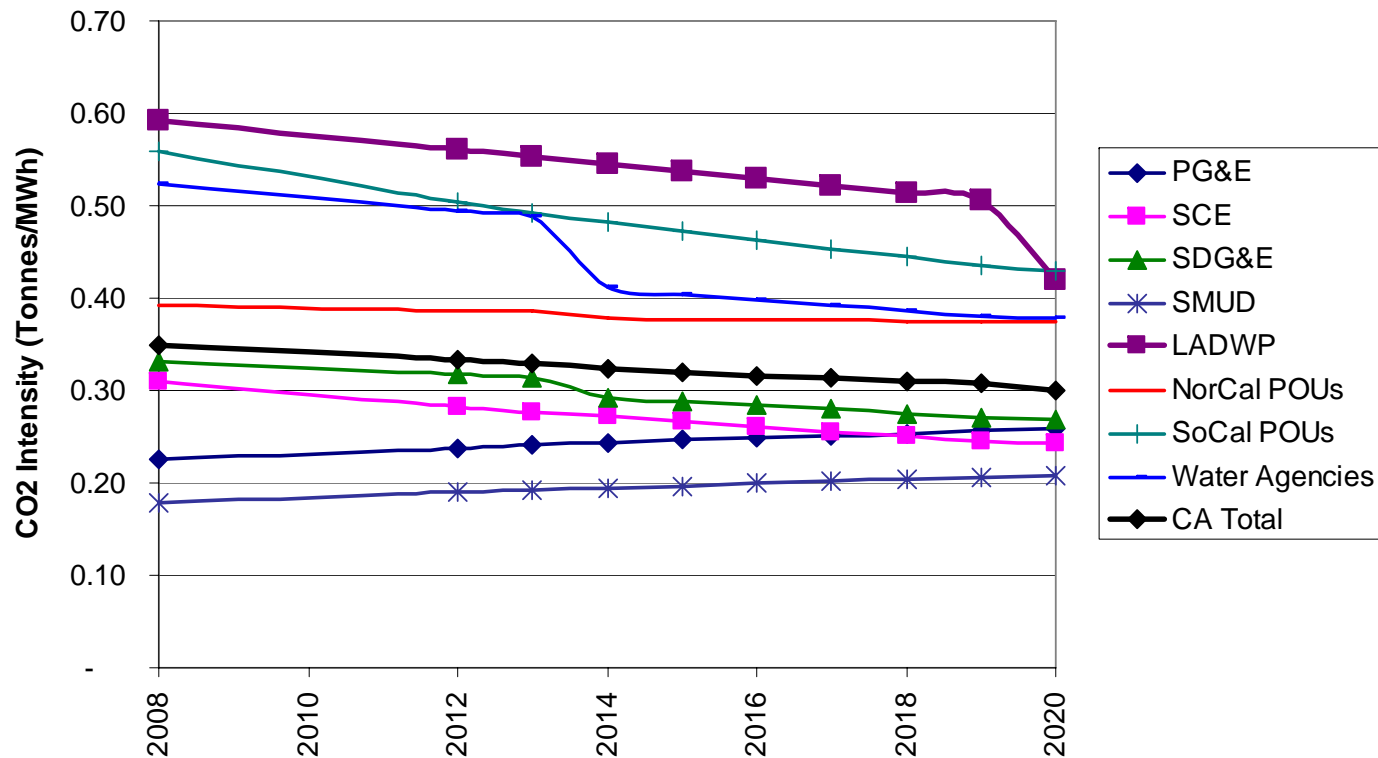
Market Clearing Price including Carbon

- Including CO₂ in the wholesale market increases the MCP
- Same market price results from all allocation models
 - Currently, there is no market price reduction assumed for output based allocations



Emissions Intensity by LSE

CO2 Intensity by LSE



Scenario: 20% RPS, BAU reference case EE, no carbon market

Generator	Unit #	Location	Fuel Type	CA Owner	2008 LSE Share %	2020 Contract Status
Boardman	1	Boardman, OR	Coal	SDG&E	15.0%	2018
				Northern California Other	8.5%	2013
				Total CA	24%	
Four Corners	4 & 5	Fruitland, NM	Coal	SCE	48.0%	
				Total CA	48.0%	Same
Hoover		Boulder City, NV	Hydro	Southern California Other	34.1%	
				LADWP	15.4%	
				SCE	5.5%	
				Total CA	55.0%	Same
Intermountain Power Project	1 & 2	Delta, UT	Coal	LADWP	48.6%	
				Southern California Other	30.3%	
				Total CA	78.9%	Same
Navajo Generating Station	1,2 & 3	Page, AZ	Coal	LADWP	21.2%	2019
Palo Verde	1,2 & 3	Wintersburg, AZ	Nuclear	SCE	15.8%	
				Southern California Other	1.9%	
				LADWP	9.7%	
				Total CA	27.4%	Same
Reid Gardner	4	Moapa, NV	Coal	CA DWR	67.8%	2013
San Juan	3	San Juan, NM	Coal	Southern California Other	41.8%	Same
San Juan	4	San Juan, NM	Coal	Northern California Other	28.7%	
				Southern California Other	10.0%	
				Total CA	38.8%	Same
San Onofre	2,3	San Clemente, CA	Nuclear	SCE	75.0%	
				SDG&E	20.0%	
				Southern California Other	5.0%	
				Total CA	100.0%	Same
Diablo Canyon	1,2	San Louis Obispo, CA	Nuclear	PG&E	100.0%	Same
Bonaza	1	Utah	Coal	City of Riverside	6.0%	2009
Hunter	2	Utah	Coal	City of Riverside	6.0%	2009



Seven Allocation Scenarios

1. 'Pure Emission-Based Allocation'
2. 'Pure Output-Based Allocation'
 - a) Pure Output-Based Allocation excluding non-fossil generators
3. 'Pure Auction' with no Auction Revenue Recycling
4. 'Pure Auction' with Auction Revenue Recycling
5. Staff 'Preferred Emission-Based Allocation' proposal
6. Staff 'Preferred Output-Based Allocation' proposal
7. Staff 'Preferred Auction' proposal



Metrics

- Net Cost of CO2

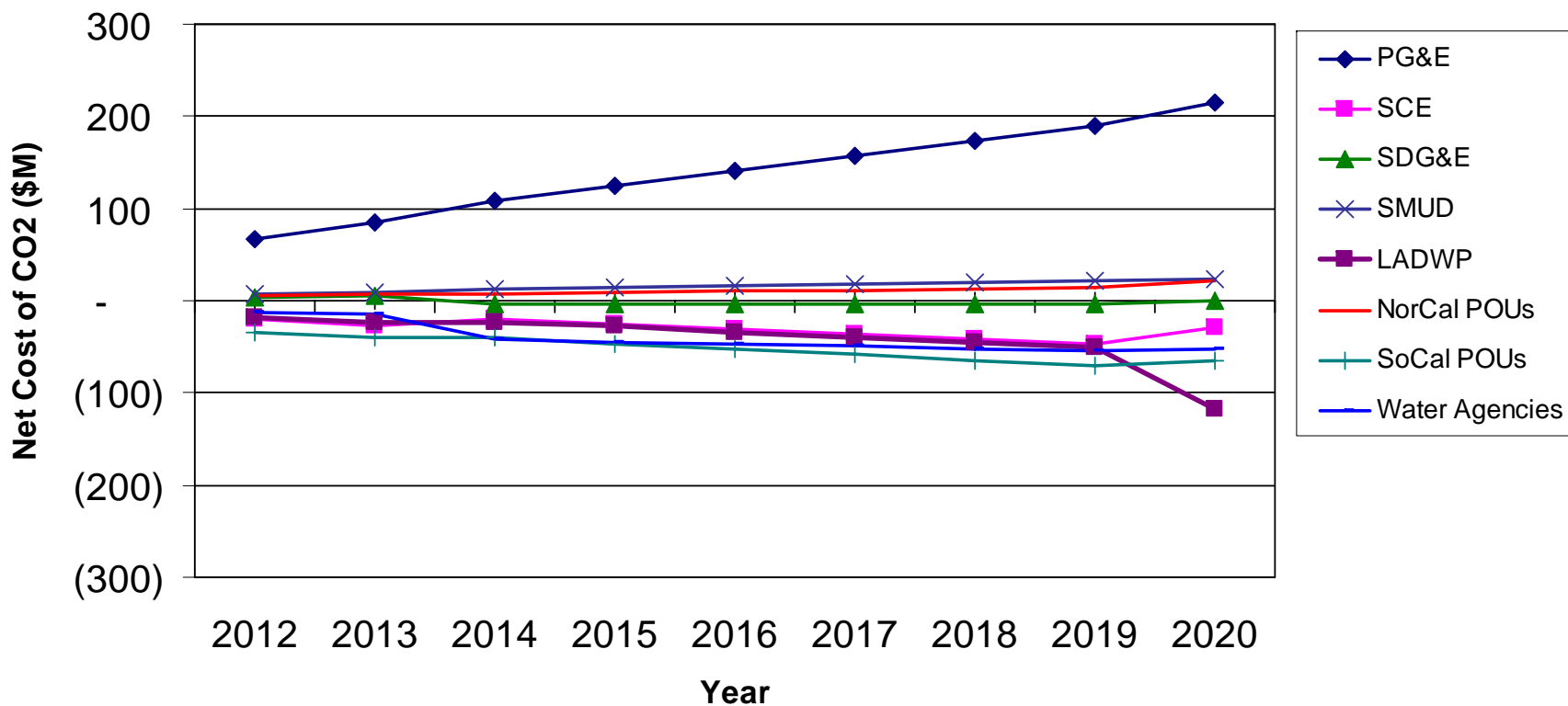
- Additional cost passed on to LSEs from energy deliverers from introduction of the CO2 market, net of any administrative allocation and auction revenue return

- Average Retail Rate Projection

- Average rate levels by LSE in 2020

Scenario 1: 'Pure Emission-Based'

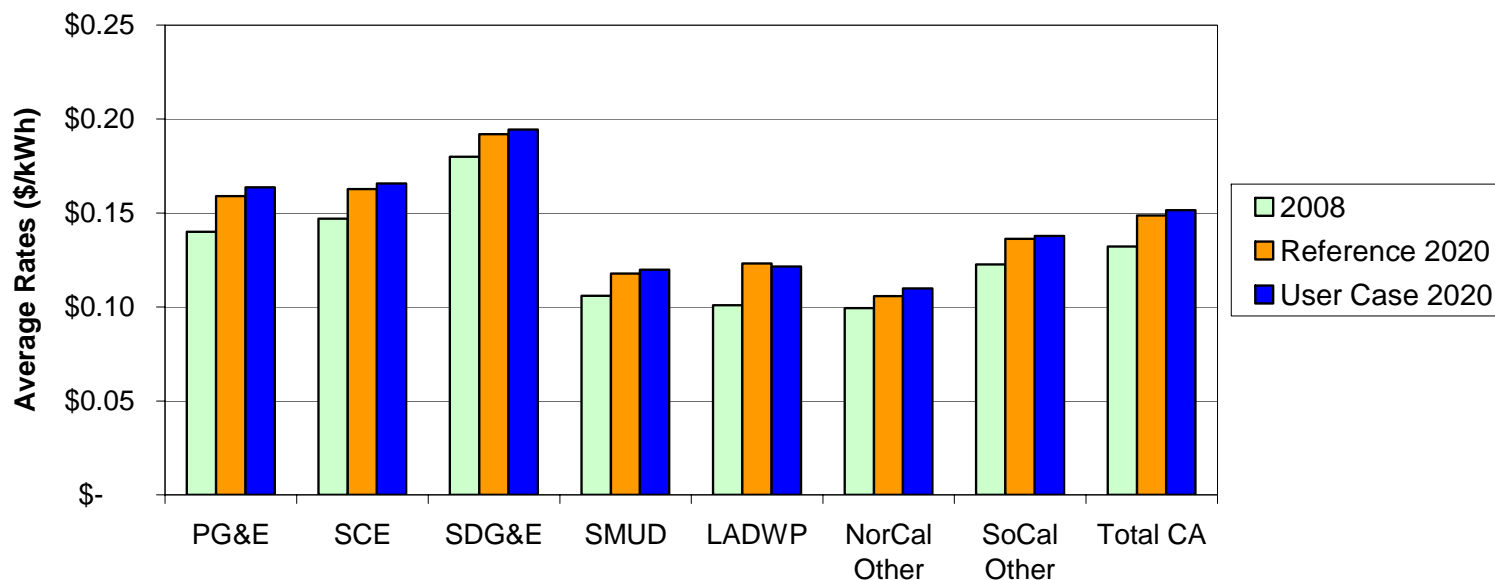
100% administrative allocation based on historical 2008 emissions



Scenario: market clearing price of \$30/t CO2, 20% RPS, BAU reference case EE

Scenario 1: 'Pure Emission-Based'

100% administrative allocation based on historical 2008 emissions

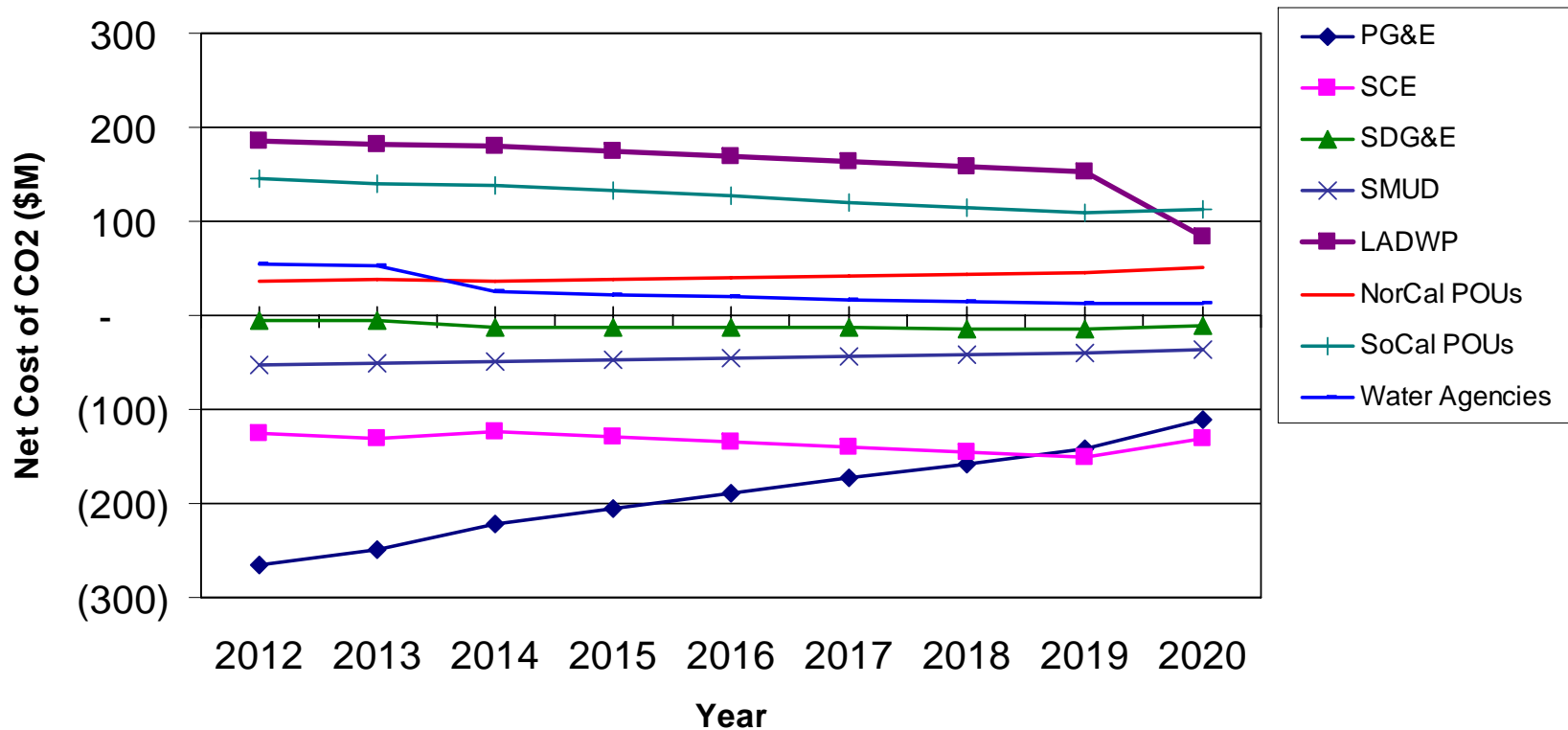


Rate Change between 2020 Reference and 2020 User Case

Utility	Rate Change (%)
PG&E	3%
SCE	2%
SDG&E	1%
SMUD	2%
LADWP	-1%
NorCal Other	4%
SoCal Other	1%
Total CA	2%

Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

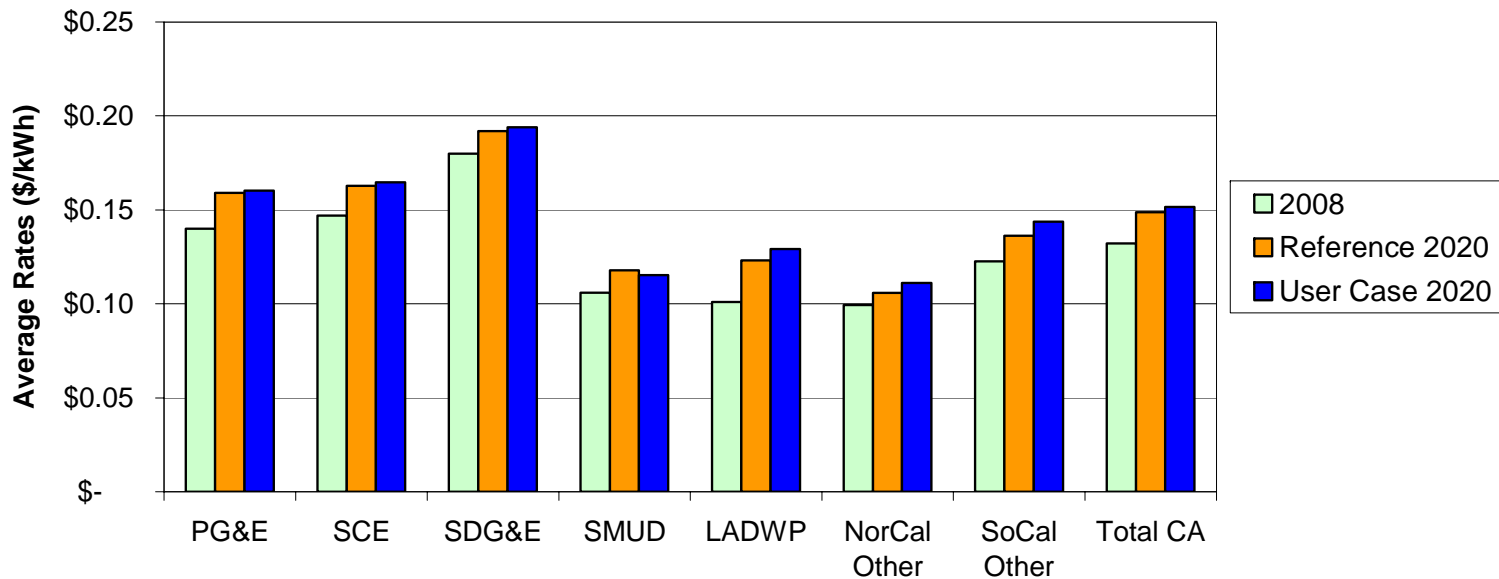
Scenario 2: 'Pure Output-Based'



Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

Scenario 2: 'Pure Output-Based'

100% administrative allocation based on updating yearly output (GWh)



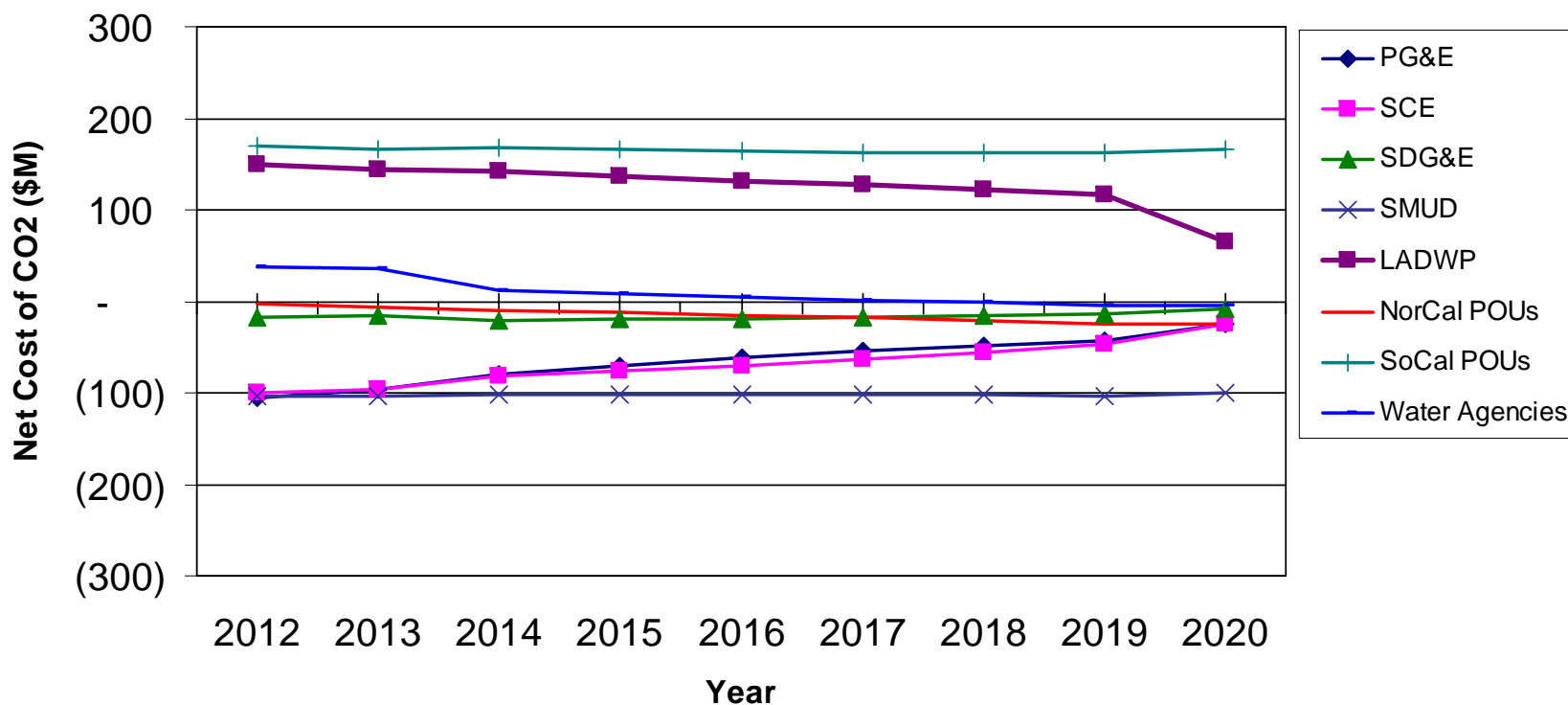
Rate Change between 2020 Reference and 2020 User Case

Region	Rate Change (%)
PG&E	1%
SCE	1%
SDG&E	1%
SMUD	-2%
LADWP	5%
NorCal Other	5%
SoCal Other	5%
Total CA	2%

Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

Scenario 2a: Pure Output-Based Allocation excluding non-fossil generators

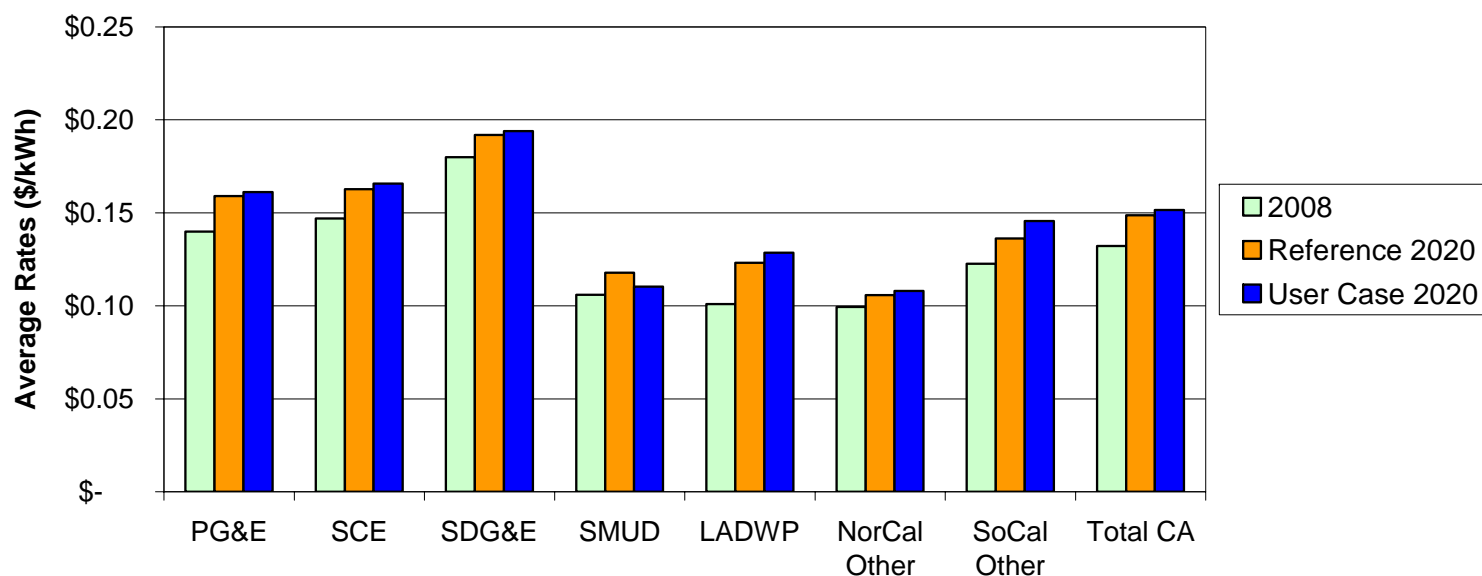
100% administrative allocation based on updating yearly output (GWh)



Scenario: market clearing price of \$30/t CO2, 20% RPS, BAU reference case EE

Scenario 2a: Pure Output-Based Allocation excluding non-fossil generators

100% administrative allocation based on updating yearly output (GWh)

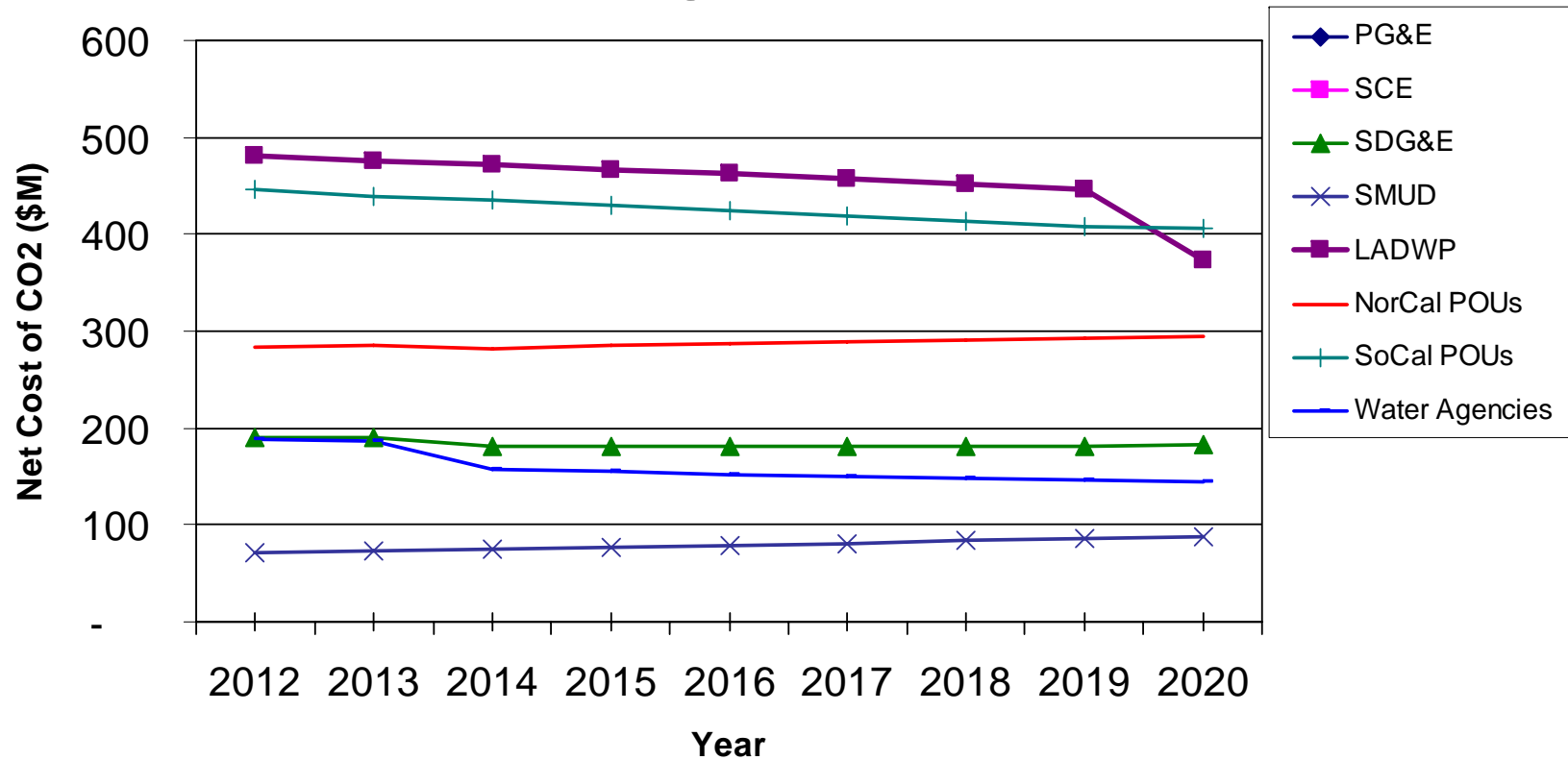


Rate Change between 2020 Reference and 2020 User Case

Region	Rate Change (%)
PG&E	1%
SCE	2%
SDG&E	1%
SMUD	-6%
LADWP	4%
NorCal Other	2%
SoCal Other	7%
Total CA	2%

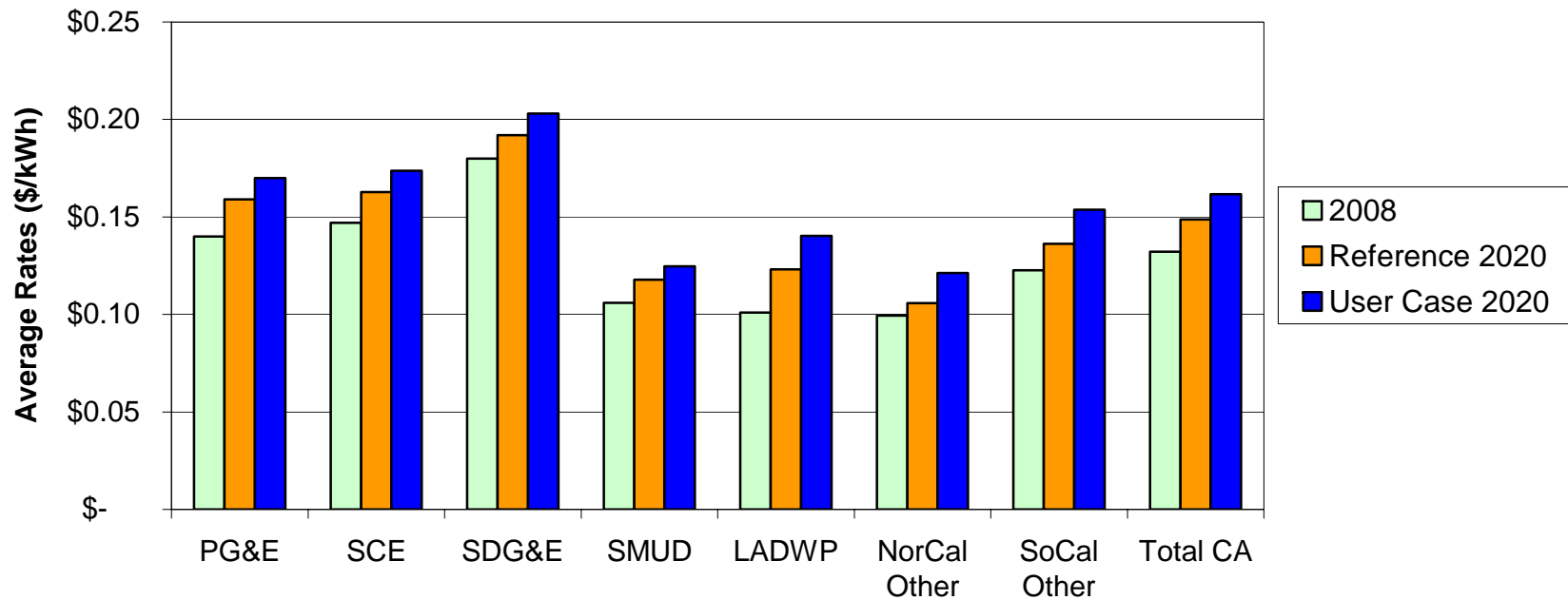
Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

Scenario 3: 'Pure Auction' – no revenue recycling



Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

Scenario 3: 'Pure Auction' – no revenue recycling



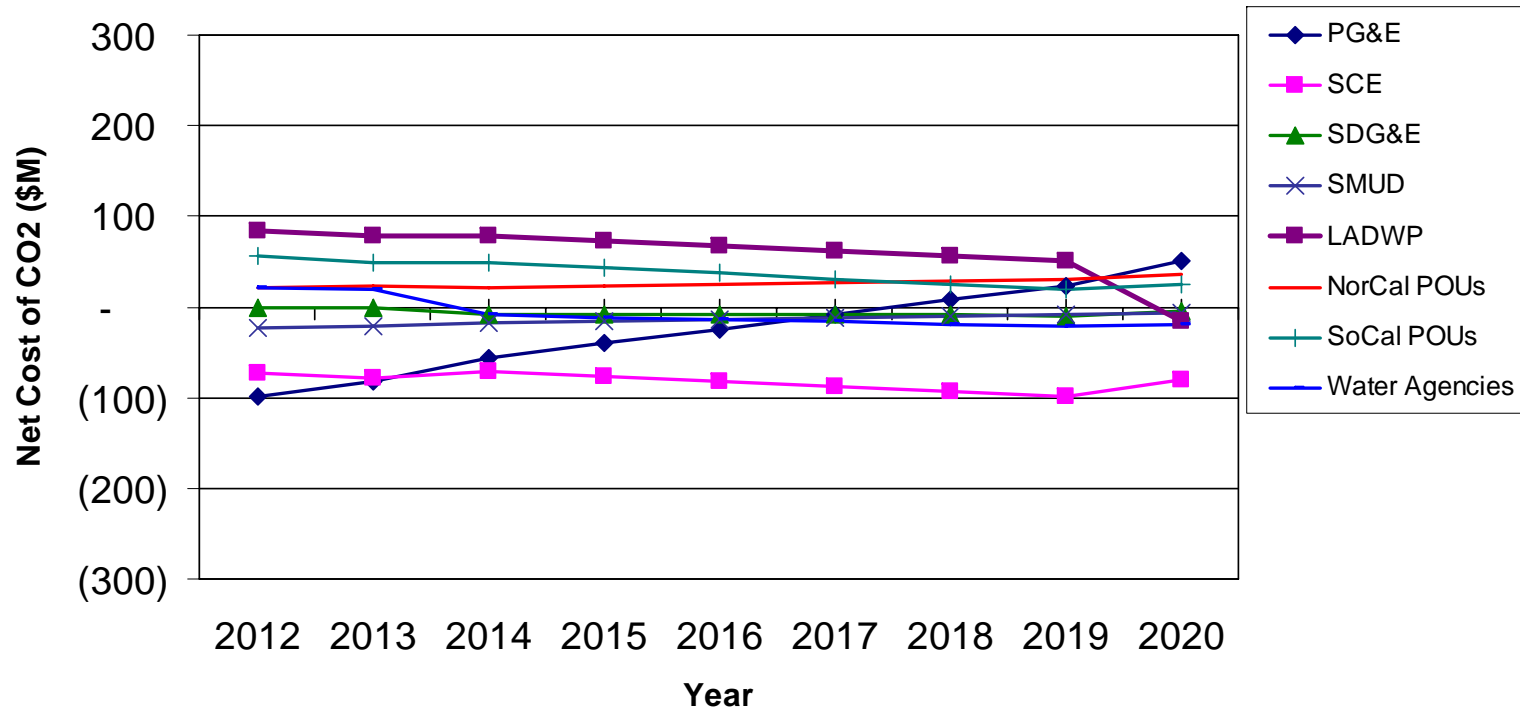
Rate Change between 2020 Reference and 2020 User Case

Utility	Rate Change (%)
PG&E	7%
SCE	7%
SDG&E	6%
SMUD	6%
LADWP	14%
NorCal Other	15%
SoCal Other	13%
Total CA	9%

Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

Scenario 4: 'Pure Auction' with revenue recycling

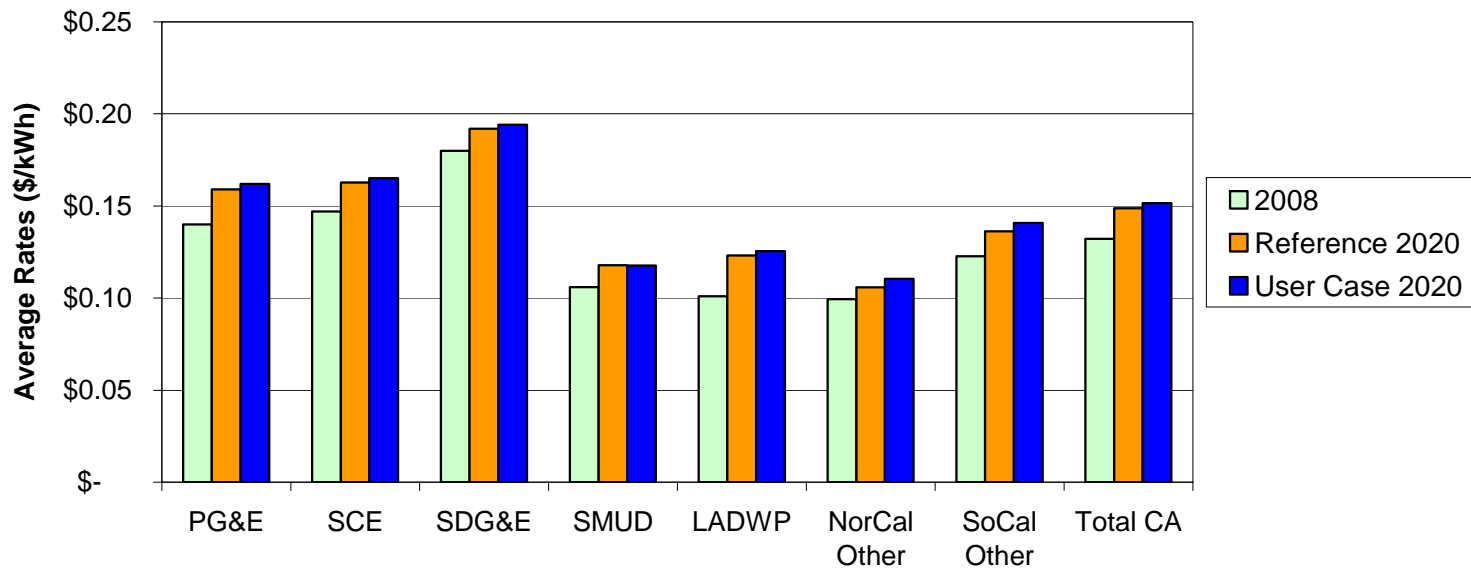
50% revenue recycling based on LSE sales, 50% based on 2008 emissions



Scenario: market clearing price of \$30/t CO2, 20% RPS, BAU reference case EE

Scenario 4: 'Pure Auction' with revenue recycling

50% revenue recycling based on LSE sales, 50% based on 2008 emissions



Rate Change between 2020 Reference and 2020 User Case

LSE	PG&E	SCE	SDG&E	SMUD	LADWP	NorCal Other	SoCal Other	Total CA
Rate Change	2%	1%	1%	0%	2%	4%	3%	2%

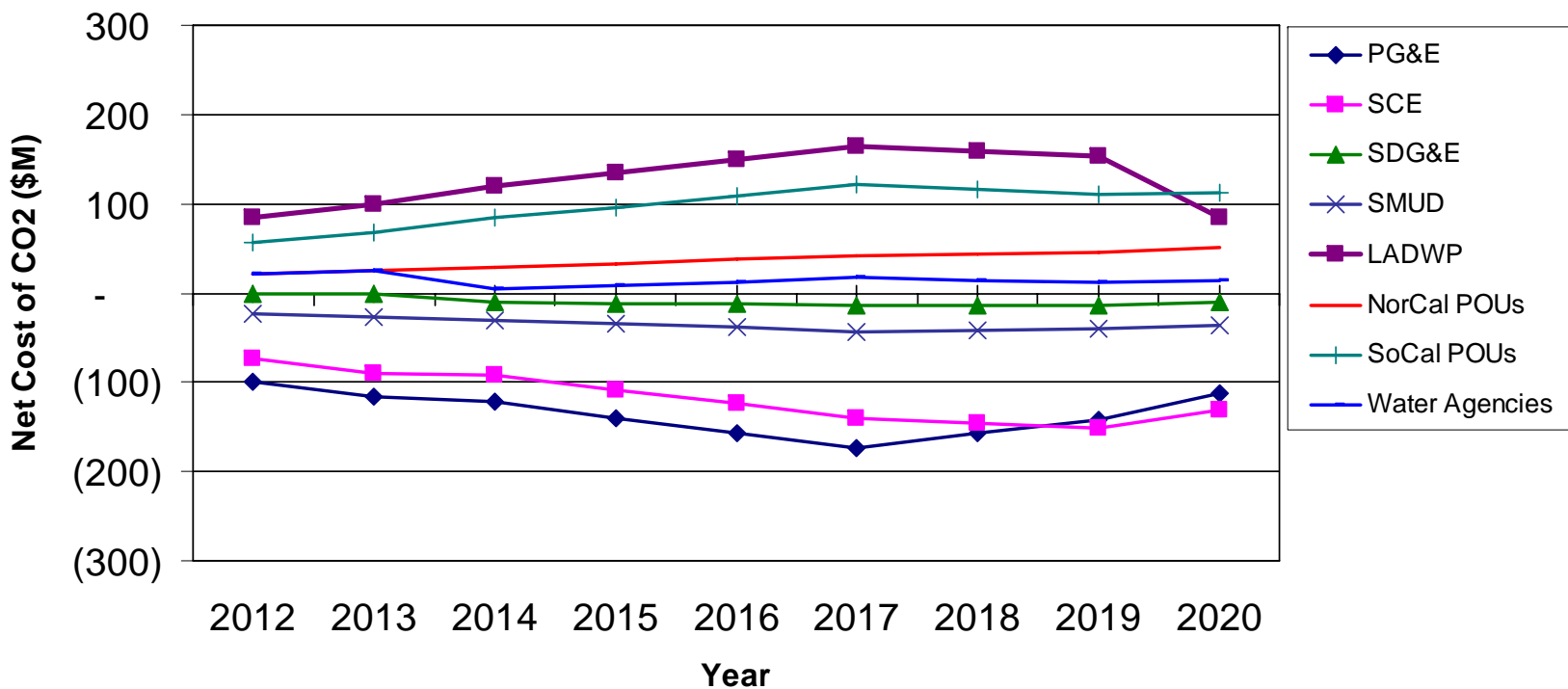
Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

Scenario 5: 'Preferred Emission-Based' Staff Straw Proposal

- If emission-based allocation is adopted, staff recommend:
- 100% admin. allocation starting with split between emissions and output based allocation, with transition to 100% output-based
- Allowances allocated only to fossil-fuel based generators

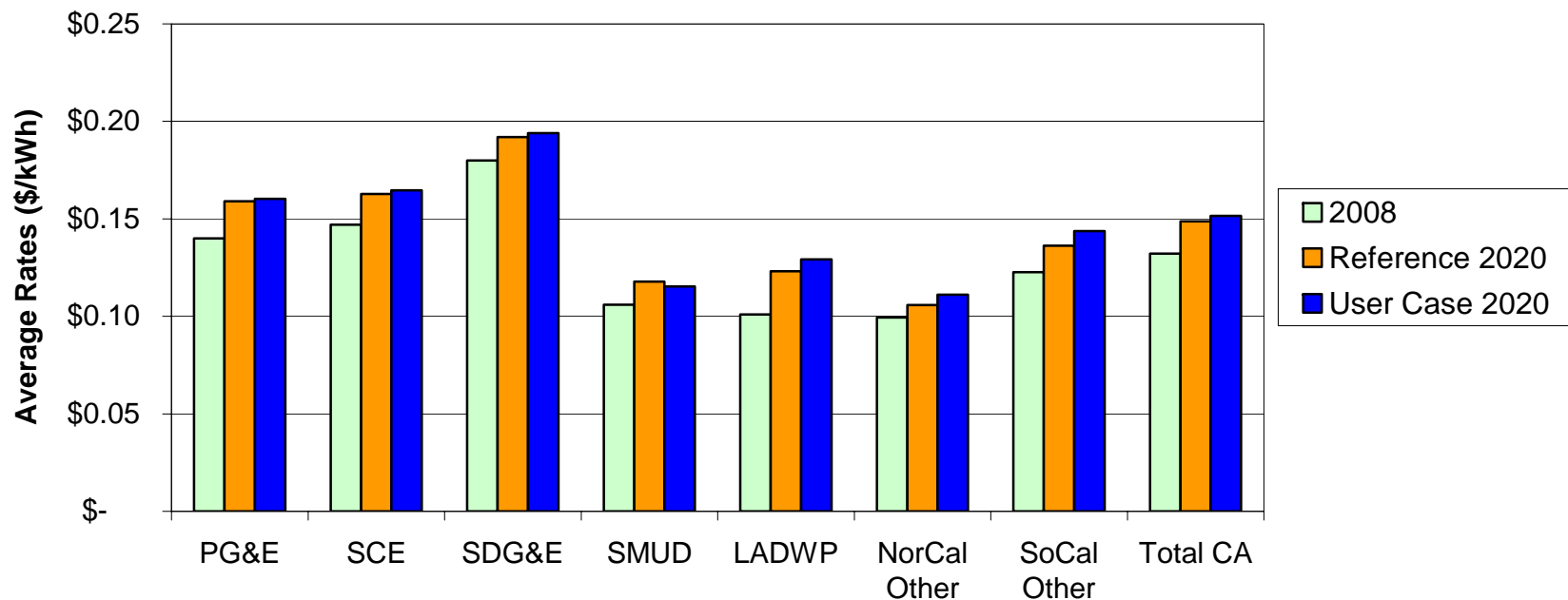
Year	% allocated on emissions basis	% allocated on output basis
2012	50%	50%
2013	40%	60%
2014	30%	70%
2015	20%	80%
2016	10%	90%
2017+	0%	100%

Scenario 5: 'Preferred Emission-Based' Staff Straw Proposal



Scenario: market clearing price of \$30/t CO2, 20% RPS, BAU reference case EE

Scenario 5: 'Preferred Emission-Based' Staff Straw Proposal



Rate Change between 2020 Reference and 2020 User Case

Utility	PG&E	SCE	SDG&E	SMUD	LADWP	NorCal Other	SoCal Other	Total CA
Rate Change	1%	1%	1%	-2%	5%	5%	5%	2%

Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

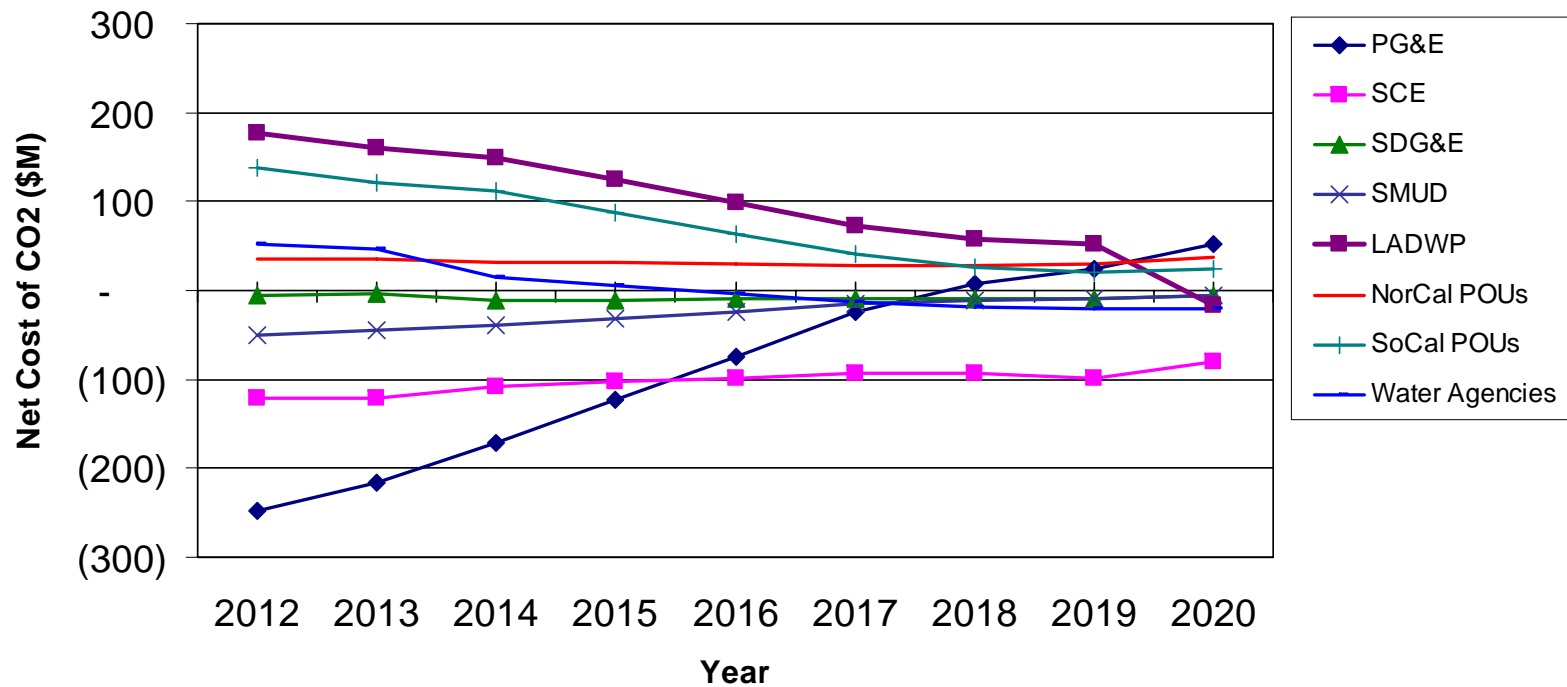
Scenario 6: 'Preferred Output-Based Allocation to Auction' Staff Straw Proposal

- If output-based allocation is adopted, staff recommend:
- Transition to 100% auction
- This scenario: 100% revenue recycling based on 50/50 split btwn. 2008 emissions and LSE sales
- Allowances allocated to all generators

Year	% allocated on output basis	% auctioned
2012	90%	10%
2013	80%	20%
2014	70%	30%
2015	50%	50%
2016	30%	70%
2017	10%	90%
2018+	0%	100%

Scenario 6: Administrative allocation transitioning to auction

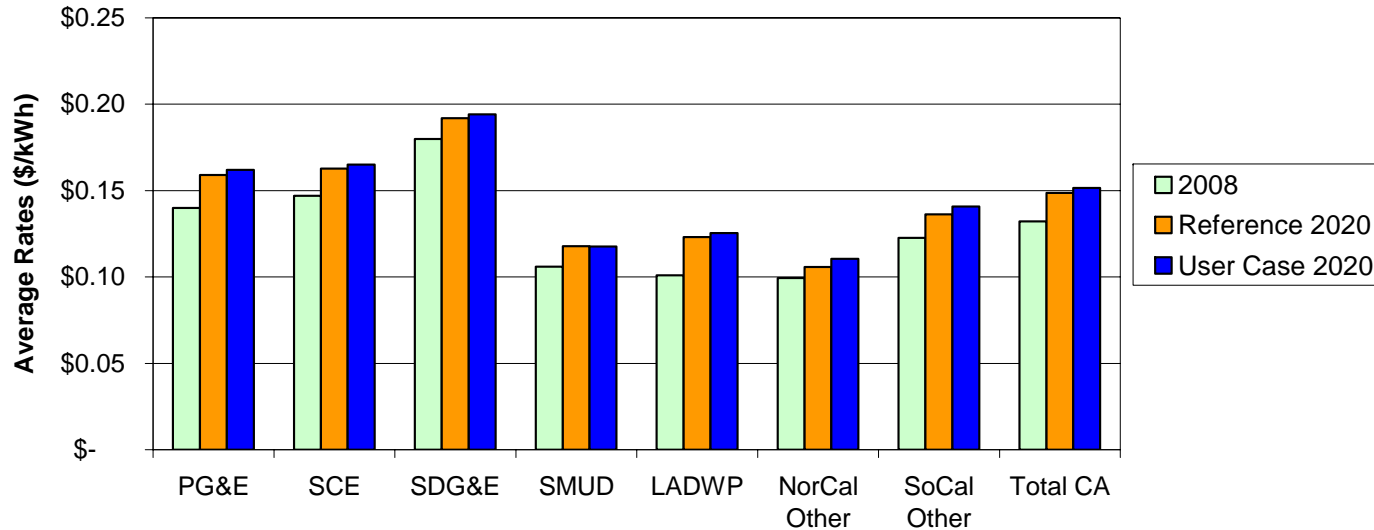
50% revenue recycling based on LSE sales, 50% based on 2008 emissions



Scenario: market clearing price of \$30/t CO2, 20% RPS, BAU reference case EE

Scenario 6: Administrative allocation transitioning to auction

50% revenue recycling based on LSE sales, 50% based on 2008 emissions



Rate Change between 2020 Reference and 2020 User Case

Utility	Rate Change (%)
PG&E	2%
SCE	1%
SDG&E	1%
SMUD	0%
LADWP	2%
NorCal Other	4%
SoCal Other	3%
Total CA	2%

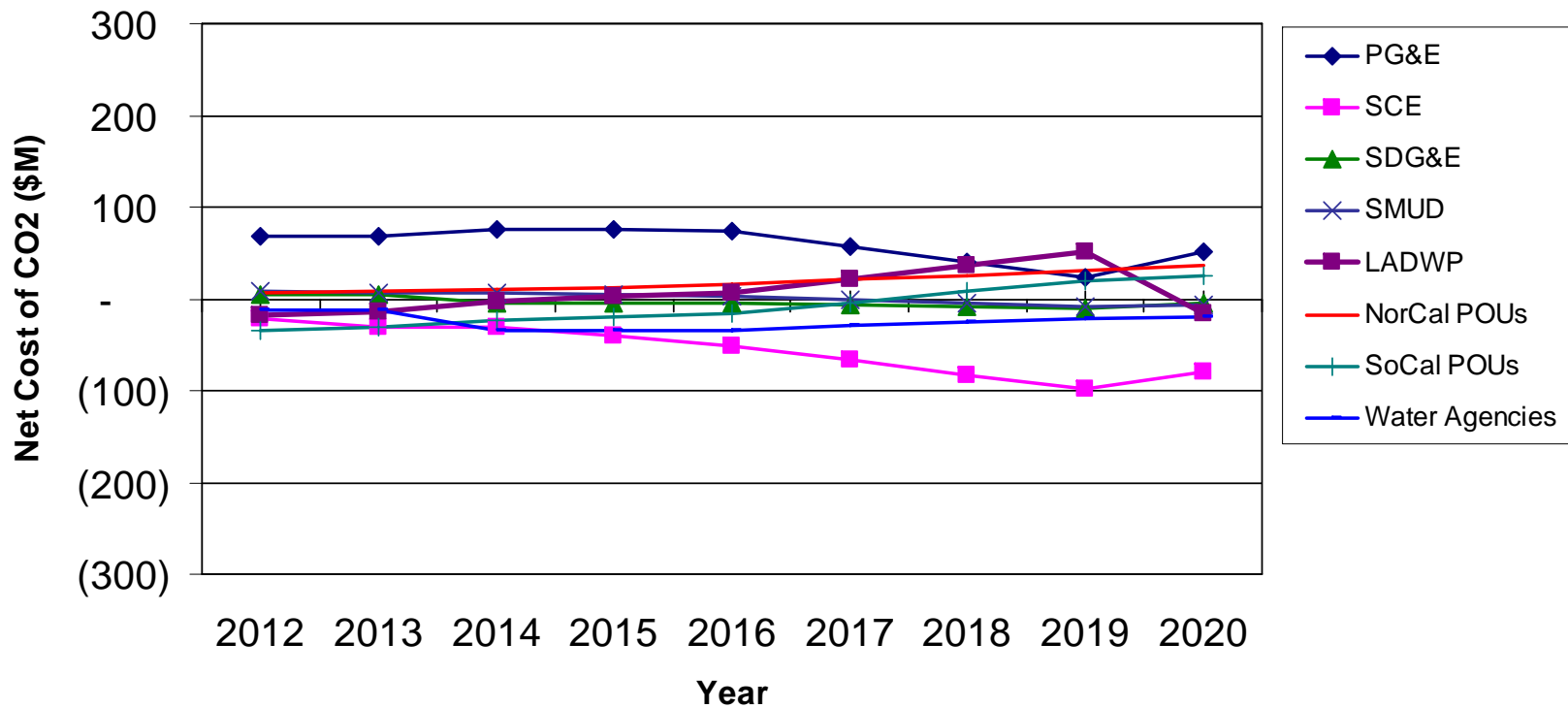
Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

Scenario 7: 'Preferred Auction' Staff Straw Proposal

- If auction is adopted, staff recommend:
- 100% auction revenue recycling on historic emissions basis transitioning to sales-basis

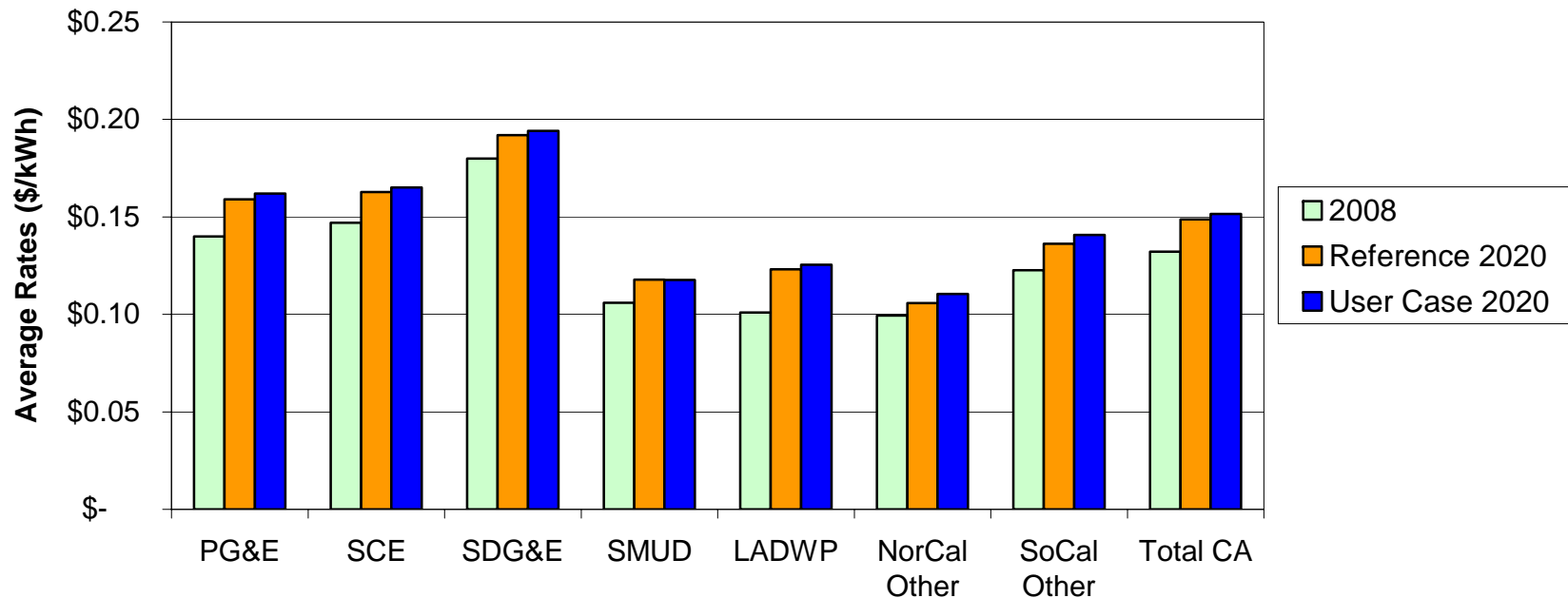
Year	Revenue recycling on emissions basis	Revenue recycling on sales basis
2012	100%	0%
2013	95%	5%
2014	90%	10%
2015	85%	15%
2016	80%	20%
2017	70%	30%
2018	60%	40%
2019+	50%	50%

Scenario 7: 'Preferred Auction' Staff Straw Proposal



Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

Scenario 7: 'Preferred Auction' Staff Straw Proposal



Rate Change between 2020 Reference and 2020 User Case

Region	PG&E	SCE	SDG&E	SMUD	LADWP	NorCal Other	SoCal Other	Total CA
Rate Change	2%	1%	1%	0%	2%	4%	3%	2%

Scenario: market clearing price of \$30/t CO₂, 20% RPS, BAU reference case EE

Thank You



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