

## APPENDIX D

### SF<sub>6</sub> EMISSION DETAIL, COST INFORMATION AND CALCULATION TABLES

## SF<sub>6</sub> Emission Detail, Cost Information and Calculation Tables

ARB staff's compliance cost analysis estimates that the proposed SF<sub>6</sub> emission reduction regulation would reduce a total of 253,000 metric tons of CO<sub>2</sub>-equivalent SF<sub>6</sub> emissions at a total cost of \$4.5 to \$7.0 million (2008 dollars). Emission reductions for rule compliance would occur over a period of ten years but the vast majority of projected reductions would not be required until 2019, due to the largest utilities voluntary emission reductions.

Because this compliance cost estimation method relies on unverified, self-reported emission and nameplate data, and because emission rates for some regulated entities are based on the U.S. EPA national data, the results should not be regarded as evidence of GHG emission reductions achieved by individual regulated entities. The results of this cost-estimation method are primarily intended for use in aggregated form.

The proposed regulation will expand on the recordkeeping and reporting requirements already required by the mandatory reporting regulations. The additional requirements are minimal and will have a limited impact on state and local agencies. Estimated recordkeeping and reporting costs are listed on Table D-1.

Tables D-2A and D-2B present the direct costs of reducing SF<sub>6</sub> emissions. These costs must be added to the recordkeeping and reporting costs of Table D-1 to obtain a total estimate of costs for an entity to comply. The costs were presented in different tables to better present the cost impact of the proposed regulation.

Two entities (San Diego Gas & Electric and Los Angeles Department of Water and Power) are expected to have no costs associated with reducing SF<sub>6</sub> emissions as these entities' SF<sub>6</sub> emission rates are already less than the proposed 2020 emission rate limits. These entities would be subject to the recordkeeping and reporting provisions of the proposed regulation and would incur a nominal average cost of approximately \$500 per year to comply with the proposed regulation.

SF<sub>6</sub> emission reduction activities will incur a cost savings during the initial years of the ten year regulatory period and will continue to be minimal until the final three years of this period. During these initial years, any additional costs may be offset by savings from reductions in SF<sub>6</sub> usage, absorbed within current operating costs or, if needed, passed on to electricity consumers. Measure costs passed to consumers are estimated to increase electricity rates by \$0.000016 to \$0.000025 per kilowatt-hour. This equates to an increase of between one and one and one-half cents per month for the average residential electricity bill. (See Table D-3, below.)

Costs of the proposed regulation would be apportioned among affected categories as follows: Investor-owned utilities represent 79 – 82%; publically-owned utilities (local government entities): 18 – 21%; electricity generators: < 1%; corporations with on-site electricity: < 1% ; state government: < 1% , federal government: < 1%. (See Table D-4, Total and Annual Measure Cost/Percentage of Measure Cost by Category, below.)

There are approximately 60 local publically-owned utilities and rural cooperatives affected by the proposed regulation. Of these 60, 13 responded to ARB's SF<sub>6</sub> mandatory reporting requirements which formed the basis for the fiscal analysis. Although each entity's emission reduction cost will differ based on the extent of their service territory and size of their GIS inventory, under the assumptions used for ARB's cost estimation method, local entities will incur an annual cost savings of \$730 during fiscal year 2011. Per entity costs for fiscal year 2012 are estimated to be \$35, and \$110 in fiscal year 2013. Average annual costs for the one affected state government agency (Department of Water Resources) are estimated to incur a cost savings of \$830 for fiscal year 2010, a cost of \$130 for fiscal year 2011, and \$410 for fiscal year 2012. (See Table D-5, below.) These costs are for emission reductions only and must be added to recording keeping and reporting costs to estimate total regulation costs.

<b>Table D-1: Recordkeeping and Reporting Costs and Cost Effectiveness</b>				
<b>Initial Year Costs</b>				
<b>Number of Entities</b>	<b>Hrs/yr</b>	<b>Labor Cost/hr</b>	<b>Total Cost</b>	<b>Avg Cost/Entity/Yr</b>
<b>Large Entities</b>				
4	40	\$48	\$7,680	\$1,920
<b>Medium Entities</b>				
25	20	\$48	\$24,000	\$960
<b>Small Entities</b>				
46	10	\$48	\$22,080	\$480
<b>Total First Year Costs</b>			<b>\$54,000</b>	
<b>Subsequent Year Costs</b>				
	<b>1/2 of 1st yr costs/entity</b>	<b>Number of Years</b>	<b>Total Cost</b>	<b>Total Avg. annual Cost/Entity</b>
<b>Large Entities</b>				
4	\$960	9	\$34,560	\$1,056
<b>Medium Entities</b>				
25	\$480	9	\$108,000	\$528
<b>Small Entities</b>				
46	\$240	9	\$99,360	\$264
<b>Total Subsequent Year Costs</b>			<b>\$242,000</b>	
<b>Total Recordkeeping and Reporting Costs</b>			<b>\$296,000</b>	
<b>Recordkeeping and Reporting Cost Effectiveness of Proposed Regulation</b>				
<b>Total Cost of Measure</b>	<b>Projected Reductions (MTCO2e)</b>	<b>Cost/ton CO2e Reduced</b>		
\$296,000	253,000	<b>\$1.17</b>		

**Table D-2A: Total Projected Annual Costs (2008\$) of SF6 Emission Reduction Activities to Comply with Proposed Annual Emission Rates, Low End of Estimates**

<b>Entity Name</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
City of Lompoc	-\$7	\$1	\$3	\$6	\$8	\$10	\$18	\$26	\$34	\$41
Merced Irrigation District	-\$4	\$1	\$2	\$4	\$5	\$6	\$11	\$16	\$21	\$26
City of Alameda	-\$10	\$2	\$5	\$8	\$11	\$14	\$26	\$38	\$49	\$60
Pacificorp	-\$97	\$89	\$279	\$461	\$635	\$803	\$1,486	\$2,142	\$2,771	\$3,374
City of Redding	-\$159	\$25	\$79	\$130	\$180	\$227	\$420	\$605	\$783	\$953
City of Glendale	-\$229	\$36	\$114	\$188	\$259	\$327	\$606	\$873	\$1,129	\$1,375
City of Pasadena	-\$54	\$9	\$27	\$44	\$61	\$77	\$143	\$206	\$266	\$324
City of Roseville	-\$46	\$7	\$23	\$38	\$52	\$65	\$121	\$174	\$226	\$275
City of Burbank	-\$1,530	\$243	\$759	\$1,254	\$1,729	\$2,185	\$4,045	\$5,829	\$7,541	\$9,181
City of Riverside	-\$75	\$12	\$37	\$62	\$85	\$108	\$199	\$287	\$371	\$452
City of Anaheim	-\$741	\$118	\$367	\$607	\$837	\$1,057	\$1,957	\$2,821	\$3,649	\$4,443
Chevron	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Imperial Irrigation District	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Central Valley Project & Boulder City/Pkr Dvs	-\$625	\$99	\$310	\$513	\$707	\$893	\$1,653	\$2,383	\$3,082	\$3,753
Department of Water Resources	-\$831	\$132	\$412	\$681	\$939	\$1,186	\$2,196	\$3,166	\$4,095	\$4,986
Sacramento Municipal Utility District	\$0	\$0	\$0	\$0	\$0	\$0	\$8,502	\$12,254	\$15,851	\$19,300
San Diego Gas & Electric	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Los Angeles Department of Water and Power	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pacific Gas and Electric Company	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$706,514
Southern California Edison Company	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$221,177	\$1,174,171	\$1,429,654
Extrapolation For Unreported Entities	-\$26,229	\$4,165	\$13,008	\$21,495	\$29,638	\$37,447	\$69,323	\$99,909	\$129,244	\$157,366
<b>Total Cost</b>	<b>\$30,638</b>	<b>\$4,939</b>	<b>\$15,425</b>	<b>\$25,490</b>	<b>\$35,146</b>	<b>\$44,405</b>	<b>\$90,707</b>	<b>\$352,905</b>	<b>\$1,343,284</b>	<b>\$2,342,077</b>

Listed entity information derived from CARB Mandatory Reporting Regulations data.

**TOTAL PROJECTED COST  
(2008\$) \$4,200,000**

**Table D-2B: Total Projected Annual Costs (2008\$) of SF6 Emission Reduction Activities to Comply with Proposed Annual Emission Rates, High End of Estimates**

<b>Entity Name</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
City of Lompoc	-\$7	\$1	\$3	\$6	\$8	\$10	\$25	\$40	\$54	\$67
Merced Irrigation District	-\$4	\$1	\$2	\$4	\$5	\$6	\$16	\$25	\$34	\$42
City of Alameda	-\$10	\$2	\$5	\$8	\$11	\$14	\$36	\$58	\$78	\$98
Pacificorp	-\$97	\$89	\$279	\$461	\$635	\$803	\$2,059	\$3,264	\$4,421	\$5,530
City of Redding	-\$159	\$25	\$79	\$130	\$180	\$227	\$582	\$922	\$1,249	\$1,562
City of Glendale	-\$229	\$36	\$114	\$188	\$259	\$327	\$839	\$1,330	\$1,801	\$2,253
City of Pasadena	-\$54	\$9	\$27	\$44	\$61	\$77	\$198	\$314	\$425	\$531
City of Roseville	-\$46	\$7	\$23	\$38	\$52	\$65	\$168	\$266	\$360	\$450
City of Burbank	-\$1,530	\$243	\$759	\$1,254	\$1,729	\$2,185	\$5,603	\$8,883	\$12,030	\$15,048
City of Riverside	-\$75	\$12	\$37	\$62	\$85	\$108	\$276	\$438	\$593	\$741
City of Anaheim	-\$741	\$118	\$367	\$607	\$837	\$1,057	\$2,711	\$4,299	\$5,822	\$7,282
Chevron	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Imperial Irrigation District	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Central Valley Project & Boulder City/Pkr Dvs	-\$625	\$99	\$310	\$513	\$707	\$893	\$2,290	\$3,631	\$4,917	\$6,150
Department of Water Resources	-\$831	\$132	\$412	\$681	\$939	\$1,186	\$3,043	\$4,824	\$6,533	\$8,172
Sacramento Municipal Utility District	\$0	\$0	\$0	\$0	\$0	\$0	\$11,778	\$18,674	\$25,289	\$31,632
San Diego Gas & Electric	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Los Angeles Department of Water and Power	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pacific Gas and Electric Company	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,157,921
Southern California Edison Company	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$338,581	\$1,873,229	\$2,343,089
Extrapolation For Unreported Entities	-\$26,229	\$4,165	\$13,008	\$21,495	\$29,638	\$37,447	\$96,030	\$152,254	\$206,191	\$257,910
<b>Total Cost</b>	<b>\$30,638</b>	<b>\$4,939</b>	<b>\$15,425</b>	<b>\$25,490</b>	<b>\$35,146</b>	<b>\$44,405</b>	<b>\$125,652</b>	<b>\$537,801</b>	<b>\$2,143,025</b>	<b>\$3,838,478</b>

**TOTAL PROJECTED COST (2008\$)**  
**\$6,700,000**

Listed entity information derived from CARB Mandatory Reporting Regulations data

<b>Table D-3 Average, Annual Increase In Electricity Rates Passed To Consumer</b>	
Total cost of proposed regulation	\$4,500,000 to \$7,000,000
Annual cost	\$450,000 to \$700,000
2007 CA electricity consumption in kilowatt-hours (kWh) <sup>1</sup>	283,000,000,000
Increased cost per kWh	\$0.000016 to \$0.000025
<sup>1</sup> California Energy Commission, Energy Consumption Data Management System, Electricity Consumption by Utility (2007), <a href="http://ecdms.energy.ca.gov/elecbyutil.aspx">http://ecdms.energy.ca.gov/elecbyutil.aspx</a>	

<b>TABLE D-4: Total &amp; Annual Measure Cost/Percentage of Measure Cost by Category</b>		
<b>Category</b>	<b>Total Category Cost</b>	<b>Percentage of Total Measure Cost</b>
Investor Owned Utilities	\$4,300,000 – 6,900,000	79 – 82%
Publically Owned Utilities (Local Government)	\$940,000 – 1,300,000	18 – 21%
State Government	\$17,000 – 26,000	<1%
Federal Government	\$14,000 – \$20,000	<1%
Industrial Self-Generators	\$1,000	<1%
<b>TOTAL</b>	<b>\$4,500,000 – \$7,000,000</b>	<b>100%</b>

**TABLE D-5: Fiscal Impact: Local and State Government  
Projected Annual Cost (2008\$) of SF<sub>6</sub> Reductions Activities for  
Reporting Entities  
FY 2011, 2012, and 2013**

<b>Reporting Utility Name</b>	<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013</b>
City of Lompoc	-\$7	\$1	\$3
Merced Irrigation District	-\$4	\$1	\$2
City of Alameda	-\$10	\$2	\$5
City of Redding	-\$159	\$25	\$79
City of Glendale	-\$229	\$36	\$114
City of Pasadena	-\$54	\$9	\$27
City of Roseville	-\$46	\$7	\$23
City of Burbank	-\$1,530	\$243	\$759
City of Riverside	-\$75	\$12	\$37
City of Anaheim	-\$7,401	\$118	\$367
Imperial Irrigation District	\$0	\$0	\$0
Sacramento Municipal Utility District	\$0	\$0	\$0
Los Angeles Department of Water and Power	\$0	\$0	\$0
<b>Total local government/FY</b>	<b>\$-9,515</b>	<b>\$454</b>	<b>\$1,416</b>
<b>Avg per local government</b>	<b>\$-732</b>	<b>\$35</b>	<b>\$109</b>
<b>State Government Costs</b>			
CA Dept. of Water Resources	\$-831	\$132	\$412