



Port of
LONG BEACH
The Green Port

DRAFT 2010 UPDATE

Appendix C: Analysis of Original CAAP Progress Metrics

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In the original CAAP, published in November of 2006, the expected emissions reductions to be achieved by the plan were forecasted from the 2005 CAAP baseline year through 2011. Emission reduction estimates were developed using the emissions reductions expected to be achieved by the various control measures compared to “uncontrolled” emissions, grown based upon anticipated cargo activity increases.

The original CAAP 2005 baseline emission estimates were based on the 2001 POLA and 2002 POLB ocean-going vessel (OGV) and heavy-duty truck (HDV) emissions grown to 2005 activity levels, and draft 2005 CHE emissions from both ports. It is important to note that the CAAP was released prior to finalization of the 2005 inventories and only the draft 2005 CHE emission estimates were available at that time. Rail and harbor craft emissions were not included in the original CAAP emission reduction estimates because of uncertainties in both fleet characteristics and control strategy implementation.

In Section 6.1 of the original CAAP document, Effects of Growth on Emissions Reduction Measures, there were three tables (6.1 through 6.3) that estimated the effectiveness of the CAAP measures based on CARB’s Goods Movement Plan (GMP) growth forecast. These tables, which presented percent reductions of controlled versus uncontrolled emissions estimates for OGV, CHE, and HDV each year from 2007 through 2011, are provided below for reference.

Table 6.1: Effect of Growth & Clean Air Action Plan on DPM Emissions

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
DPM Emissions with Growth, no Control Measures											
OGVs	1,231	1,436	1,641	1,847	2,052	2,175	2,298	2,421	2,544	2,667	2,780
CHE	181	174	166	159	152	152	152	152	152	152	152
HDVs	1,236	1,168	1,101	1,033	966	966	966	966	966	966	966
Total	2,648	2,778	2,909	3,039	3,170	3,293	3,416	3,539	3,662	3,785	3,898
DPM Emissions with Growth and CAAP Control Measures											
OGVs	1,231	1,436	1,641	1,847	2,052	2,175	2,196	2,116	1,921	1,864	1,836
CHE	181	174	166	159	152	152	138	100	67	58	48
HDVs	1,236	1,168	1,101	1,033	966	966	944	730	524	354	184
Total	2,648	2,778	2,909	3,039	3,170	3,293	3,278	2,946	2,512	2,276	2,068
Percent Reduction							4%	17%	31%	40%	47%

Table 6.2: Effect of Growth & Clean Air Action Plan on NOx Emissions

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NOx Emissions with Growth, no Control Measures											
OGVs	13,574	15,452	17,329	19,207	21,085	22,207	23,329	24,451	25,573	26,696	27,800
CHE	4,352	4,243	4,134	4,025	3,916	3,916	3,916	3,916	3,916	3,916	3,916
HDVs	9,569	9,744	9,919	10,094	10,269	10,269	10,269	10,269	10,269	10,269	10,269
Total	27,495	29,439	31,383	33,326	35,270	36,392	37,514	38,636	39,758	40,881	41,985
NOx Emissions with Growth and CAAP Control Measures											
OGVs	13,574	15,452	17,329	19,207	21,085	22,207	20,174	19,255	17,653	17,304	16,828
CHE	4,352	4,243	4,134	4,025	3,916	3,916	3,665	2,949	2,330	2,279	2,163
HDVs	9,569	9,744	9,919	10,094	10,269	10,269	10,102	8,498	6,940	5,491	4,041
Total	27,495	29,439	31,383	33,326	35,270	36,392	33,940	30,703	26,924	25,074	23,032
Percent Reduction							10%	21%	32%	39%	45%

Table 6.3: Effect of Growth & Clean Air Action Plan on SO_x Emissions

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
SO_x Emissions with Growth, no Control Measures											
OGVs	7,749	8,902	10,054	11,207	12,360	13,119	13,878	14,638	15,397	16,157	16,916
CHE	8	8	8	8	8	8	8	8	8	8	8
HDVs	9	9	9	9	9	9	9	9	9	9	9
Total	7,766	8,919	10,071	11,224	12,377	13,136	13,895	14,655	15,414	16,174	16,933
SO_x Emissions with Growth and CAAP Control Measures											
OGVs	7,749	8,902	10,054	11,207	12,360	13,119	11,939	10,174	8,895	8,474	8,046
CHE	8	8	8	8	8	8	8	8	8	8	8
HDVs	9	9	9	9	9	9	9	8	8	7	7
Total	7,766	8,919	10,071	11,224	12,377	13,136	11,956	10,191	8,910	8,490	8,061
Percent Reduction							14%	30%	42%	48%	52%

The 2011 goals of the CAAP's effectiveness as represented in these tables were:

- Reduce DPM by 47% compared to uncontrolled emissions growth
- Reduce NO_x by 45% compared to uncontrolled emissions growth
- Reduce SO_x by 52% compared to uncontrolled emissions growth

It's important again to note that in the original CAAP the forecasted 2011 controlled and uncontrolled emission estimates were based on CARB's GMP growth forecast and regulations that were in effect in May of 2005.

Comparing Actual Progress to the Original CAAP Estimates

To complete a comparison of the original CAAP's estimated effectiveness and actual progress, the following steps must be performed:

- Step 1. For 2007 through 2008, controlled emission estimates are based on actual activity data modeled with the 2005 methods and assumptions.
- Step 2. Forecast 2009 through 2011 controlled and uncontrolled emission estimates using the 2005 methods and assumptions and the updated 2007 cargo forecast.

These steps are further detailed and the findings presented below.

Step 1 - Actual 2007 and 2008 activity for both ports was reloaded in the 2005 emissions inventory databases and modeled with the 2005 methods and assumptions. Regulations that were not promulgated prior to May 2005 were not included. The results are presented below in Tables A-1 through A-3.

**Table A-1 2007 & 2008 DPM Uncontrolled & Controlled Emission Estimates
Using 2005 Methodology**

Sources	DPM, tpy	
	2007	2008
<i>Uncontrolled</i>		
OGV, HDV, CHE	2,093	2,095
<i>Controlled</i>		
OGV, HDV, CHE	1,527	1,465
Percent Reduced	27%	30%

**Table A-2 2007 & 2008 NO_x Uncontrolled & Controlled Emission Estimates
Using 2005 Methodology**

Sources	NO_x, tpy	
	2007	2008
<i>Uncontrolled</i>		
OGV, HDV, CHE	32,254	33,808
<i>Controlled</i>		
OGV, HDV, CHE	28,711	25,294
Percent Reduced	11%	25%

**Table A-3 2007 & 2008 SO_x Uncontrolled & Controlled Emission Estimates
Using 2005 Methodology**

Sources	SO_x, tpy	
	2007	2008
<i>Uncontrolled</i>		
OGV, HDV, CHE	15,187	16,245
<i>Controlled</i>		
OGV, HDV, CHE	9,176	9,817
Percent Reduced	40%	40%

Step 2 – Forecasting future-year emissions (2009 through 2011) for both controlled and uncontrolled emissions is based on growing uncontrolled emissions by the growth estimates in the 2007 cargo growth forecast and then applying the emissions controls of the CAAP measures and applicable regulations to those emissions, similar to what was done in developing tables 6.1 through 6.3 in the original CAAP. The results are presented below in Tables A-4 through A-6.

**Table A-4 2007-2011 DPM Uncontrolled & Controlled Emission Estimates
Using 2005 Methodology**

Sources	DPM, tpy				
	2007	2008	2009	2010	2011
<i>Uncontrolled</i>					
OGV, HDV, CHE	2,093	2,095	2,165	2,266	2,359
<i>Controlled</i>					
OGV, HDV, CHE	1,527	1,465	1,363	648	644
Percent Reduced	27%	30%	37%	71%	73%

**Table A-5 2007-2011 NO_x Uncontrolled & Controlled Emission Estimates
Using 2005 Methodology**

Sources	NO _x , tpy				
	2007	2008	2009	2010	2011
<i>Uncontrolled</i>					
OGV, HDV, CHE	32,254	33,808	35,361	36,005	36,592
<i>Controlled</i>					
OGV, HDV, CHE	28,711	25,294	32,231	27,644	27,865
Percent Reduced	11%	25%	9%	23%	24%

**Table A-6 2007-2011 SO_x Uncontrolled & Controlled Emission Estimates
Using 2005 Methodology**

Sources	SO _x , tpy				
	2007	2008	2009	2010	2011
<i>Uncontrolled</i>					
OGV, HDV, CHE	15,187	16,245	17,269	18,365	19,327
<i>Controlled</i>					
OGV, HDV, CHE	9,176	9,817	9,226	4,487	4,510
Percent Reduced	40%	40%	47%	76%	77%

As shown above, in 2008, the ports had nearly reached the original CAAP goals established for 2011 for DPM and SO_x (based on the original CAAP methods and assumptions, and utilizing actual activity data and an updated forecast) and are forecasted (even with the higher 2007 cargo forecast) to far exceed the original goals. The 2011 NO_x estimates, using the 2007 cargo forecast, indicates that the ports will fall short of the original 45% NO_x reduction goal. This estimated shortfall is due to changes from the assumptions that were made for the original CAAP analysis, including changes to the implementation timeline and changes in the fleet mix. For example opportunities to implement requirements through new or renewed leases have not come about on the schedule originally anticipated. Finally, the decrease in NO_x emissions in 2009 is less than 2007 and 2008 because uncontrolled emissions are based on estimated higher growth from the 2007 cargo forecast, whereas controlled emissions in 2007 and 2008 reflect the actual decline in growth that occurred during those years.



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Despite the modeled estimates, the ports anticipate they will actually meet or exceed the original NO_x goal before 2011. This is expected to a result from the recent economic downturn, where actual cargo volumes are lower than predicted by the 2007 cargo forecast. Actual emissions from the ports will continue to be calculated and made available through each port's annual Emission Inventory.