



Carrot or Stick?

Tradability of Mobile Source Emissions in California

ARB Workshop

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California Refining - Mobile vs. Stationary Emissions



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2003 Estimates ton/year*	TOG	ROG	CO	NOX	SOX	PM	PM ₁₀	PM _{2.5}
Refining & Marketing Stationary Emissions	384.39	106.93	8.42	7.99	61.76	3.83	2.38	1.87
Gasoline based On-Road Mobile Source Emissions	914.20	843.15	8549.24	900.41	4.16	32.71	32.05	19.35

- With the exception of SOX, mobile source emissions from on-road gasoline use are far greater than the emissions from the facilities where the gasoline is produced, blended and stored
- In California, the majority of gasoline is consumed within relatively short distances from the producing centers (Bay Area, Los Angeles Basin)
- Historically, emission reductions from stationary sources have primarily been achieved through incentives: tradable emission reduction credits
- Emission reductions from mobile sources have primarily been achieved through mandated restrictions of fuel specifications and automotive technology improvements

* Source: California Air Resources Board, 2003 Emissions Inventory Almanac



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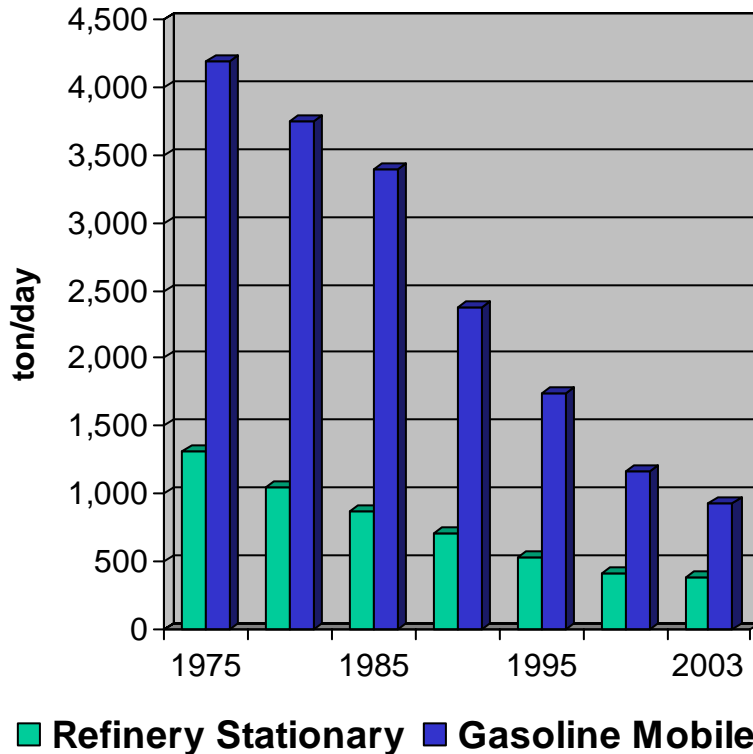
Stationary Emission Reductions: Diminishing Returns



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CA TOG Emissions 1975 - 2003



Source: California Air Resources Board, Emissions Inventory Almanac

- Further reductions in stationary emissions from refineries is difficult
- Example: SCAQMD Rule 1178
 - Requires LA Basin refiners and large petroleum terminal operators to reduce VOC emissions from storage tanks
 - Reductions achieved by doming of open roof floating storage tanks and engineering improvements of vents
 - Total expected reductions in the order of 1 to 1.5 ton/day
 - Five year implementation schedule in order to maintain operability of critical infrastructure
 - Total estimated cost after offsetting credits in the order of \$100 to \$150 million, or \$100 million per ton/day

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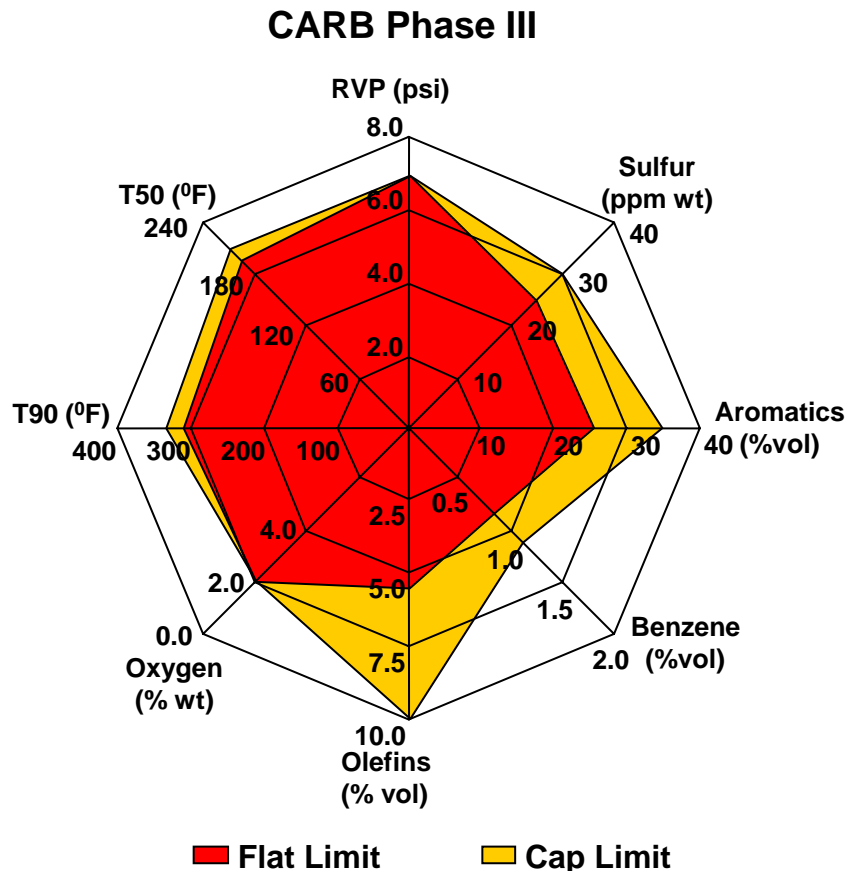
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Possibilities for Voluntary Mobile Source Reductions



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- Refiners currently have no incentive to blend beyond the acceptable limit of the Predictive Model
- Most refiners can frequently achieve better specifications but
 - Only at higher cost, for which there is no compensation
 - At odds with Unocal patent
- With fungible financial incentives
 - Refiners would optimize on-site capital investment versus operating cost
 - Offset operating cost versus emission credits
 - Alternative technologies such as clean fuel additives would have a market

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Potential for Mobile Source Reductions



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- The Predictive Model provides the tool to calculate the effect of voluntary improvements over State Average
- For instance, for SCAQMD alone the following reductions could be achieved*

	2003 t/d	5 ppm Lower S		5% less Aromatics		5 °F Lower T50	
		%	t/d	%	t/d	%	t/d
Total Exhaust HC	106	0.44%	0.46	0.75	0.79	1.78	1.89
NOX	173	0.80%	1.38	1.13	1.96	0.00	0.00
Potency Weighted Toxics	184	0.02%	0.04	2.78	5.10	1.14	2.10

* South Coast Air Basin SIP 2010 Summer THC; Version Emfac2002 V2.2 April 23 2003 WIS Enabled – Run Date 11/04/2004, SCEN year 2010, model years 1965 – 2010; season: summer; area South Coast Air Basin Grand Total, I and M program in effect.



Food for Thought



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- Voluntary improvements in fuel quality can result in emission reductions greater than those targeted by Rule 1178
- Refiners may well find such quality improvements more cost effective than mandatory improvements of fixed facilities
- By making stationary and mobile emission reductions fungible within the same air basin, an environment can be created that is conducive to novel solutions
- Technologies are emerging that can result in significant reductions in mobile source emissions but currently have no economic justification
- Alternative solutions that are potentially more effective in reducing harmful emissions currently face a long uphill battle



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