July 28, 2011

ELECTRONIC SERVICE
California Air Resources Board
Members of the Board of Directors
Mary Nichols, Chair
1001 I Street
Sacramento, California, 95814
http://www.arb.ca.gov/lispub/comm/bclist.php

Re: Communities for a Better Environment's Comments on ARB's Supplement to the AB 32 Scoping Plan FED

Dear Chair Nichols and Members of the Board of Directors,

CBE urges ARB to adopt an alternative to cap and trade and reject the Supplement to the Scoping Plan FED as proposed. The Scoping Plan itself is the blueprint that maps California's path to stop or significantly slow disastrous climate change. Since ARB certified the FED in 2009, new information has become available that should be considered in evaluating alternatives to Cap and Trade in the Scoping Plan. We have also reintroduced other significant information that CARB appears not have evaluated previously. This information demonstrates that Cap and Trade fails to meet pollution reductions and can cause significant environmental harm to communities (inside and outside California). Accordingly, if CARB is honest in its declaration to consider alternatives to cap and trade, it must take a serious look at alternatives, including direct regulations that can achieve big greenhouse gas and co-pollutant reductions and avoid significant negative impacts of Cap and Trade. We incorporate the comments submitted by Center on Race, Poverty & the Environment, to which CBE has signed-on.

SUMMARY:

I. The cap and trade program does not meet the project objectives

II. The latest evidence overwhelmingly demonstrates that all carbon trading programs have major flaws, resulting in unreliable predictability, and failure to meet reduction goals

A. European carbon trading is in its second phase and still not meeting reductions despite years of attempts, due to overallocation, banking, too many offsets, free allocations, fraud, failure to account for imports, etc., which are program designs present in California's Cap and Trade.

B. Columbia University found that all carbon trading programs evaluated in the U.S. and Europe suffered from overallocation either during earlier years, or in every year of the program.

C. The International Energy Agency found that unambitious goals, free allocations, overallocation, banking and other flaws caused trading programs to fail to achieve the needed reductions.

D. Forestry trades and other offsets have been notorious for false carbon reductions.

III. Cap and Trade health and environmental impacts can cause inequities that CARB and CDHS did not evaluate, and other severe environmental harms

A. Minding the Climate Gap (Pastor et. al.[1]) found that Cap and Trade could make air pollution hotspots worse, and cause existing inequities for people of color to worsen, and that cap and trade loses the opportunity to greatly reduce local pollution.

B. The Department of Health assessment of Cap and Trade health impacts only evaluated offsets occurring in California, but offsets are allowed outside California. Health impacts from increased toxic hotspots were outside the scope of the evaluation.

C. CARB cannot abandon AB 32's health protection requirements by relying only on other environmental laws.

D. Health impacts due to "co-pollutants" are already unacceptably high.

E. CARB needs to adequately screen for communities impacted by air pollution in order to assess impacts of various alternatives.

F. New evidence shows that carbon trading is causing harm to indigenous people through the offsets program/REDD program, and is not effective in achieving real greenhouse gas reductions

IV. Other alternatives are reliable & avoid Cap & Trade's significant impacts

CARB could entirely avoid the significant negative impacts from Cap and Trade through an alternative set of direct pollution controls, which achieve more than the 17 million tonnes[2] of the CO2 equivalent current cap and trade target, and achieve major co-pollutant reductions.

[1] April 16, 2010, *Minding the Climate Gap, What's at Stake if California's Climate Law isn't Done Right and Right Away*, http://dornsife.usc.edu/pere/documents/mindingthegap.pdf, Attached as CBE Exhibit A Minding the Gap

[2] Note that metric tonnes (1000 kilograms or 2200 lbs) and U.S. tons (2000 lbs) are similar, but are different units of measurement and frequently spelled differently to differentiate them

Direct control alternatives is locally enforceable & gains local reductions of health hazards	
Industrial	GHG Reductions (metric tonnes CO2e) + copollutant reductions
1. Industrial Energy Efficiency Improvements	~ 3 million or more - Including Boiler and Heater upgrades and others. Thorough audits need to be implemented and calculations made public to more specifically assess other reductions.
2. Industrial methane exemption removal & other methane reductions	3 million or more + (including over a hundred thousand tons/yr smog precursor reduction benefit, likely also H2S reduction)
3. Clean Electricity for Refineries	1.2 million + SOx, NOx, and other copollutant reductions
4. Clean Electricity for Cement sector	1 million + SOx, NOx, and other copollutant reductions
5. Other Cement sector controls	1.3 million + hazardous mercury reductions
6. Refinery Crude Quality Requirements (power plants have been required to phase in lower carbon feedstock for many years)	8 million compared to current baseline, and also avoids 20 million new tonnes that would occur by 2020 without stopping the higher carbon crude oil switch that is well documented to occur at CA refineries
7. 33% Refinery Renewable Portfolio Standard (RPS) (already required for power plants)	12 million (from replacing 33% of refinery production with renewable transportation) – Plus upwards of 40 million additional reductions from lower vehicle emissions + many thousands of tons per year of criteria pollutant reductions and toxic reductions
Expanded clean transportation goals (paired with 33% refinery RPS for reducing oil refinery production)	
1. Expanded pure ZEV, CAFÉ standards, plug in hybrids in conjunction with 33% RPS for oil refineries	
2. Public Transit funding through oil drilling tax (CA is only state not taxing drilling), carbon tax	
Additional large sources can bring GHG reductions and co-pollutant benefits:	
3. Other major sources can meet expanded reduction requirements including: • Power Plants • Large agricultural sources • Port, Rails, Trucks • LCFS improvements	
GRAND TOTAL Much greater than 17 MMTCO2e cap and trade target	

V. The alternatives analysis must consider new emissions information that demonstrates the need for bigger reductions and shows that cap and trade in the oil refinery sector will further significantly increase GHG emissions in California:

A. GHG emissions reductions needed are much higher than previously assessed because emissions transfers through imports are greatly increasing GHG emissions.

B. Peer reviewed GHG emissions evaluation shows refining lower quality crude greatly increases GHG emissions not assessed by CARB's proposed benchmarks.

I. Cap and Trade Does Not Meet the Project Objectives

As an initial matter, the purpose of an EIR or FED is to examine alternatives to the proposed project and describe ways to avoid or reduce the proposed Project's significant environmental effects. *See Citizens of Goleta Valley v. Bd. of Supervisors* (1990) 52 Cal.3d 553, 565. The alternatives and mitigation sections are "the core" of an EIR. *Id. at* 564. Agencies may not approve projects as proposed if there are feasible alternatives that would substantially lessen the significant environmental effects of such projects. *See* Pub Res. Code §§ 21002, 21081(a), CCR §60006; *see also County of San Diego v. Grossmont-Cuyamaca Community College Dist.* (2006) 141 Cal.App.4th 86, 98 (requirement of Section 21081 is a "substantive mandate" for public agencies). Moreover, agencies should adopt a superior alternative even if impedes to some degree the project objectives. Guidelines § 15126.6(b). Ironically, CARB's favored approach, cap and trade, would both impede the project objectives and cause significant impacts.

The Scoping Plan Supplement lists 20 project objectives. (Scoping Plan Supp. p. 4.) These objectives were not listed in the original Scoping plan. (*See* Scoping Plan J-74 (providing that the alternatives are required to feasibly obtain the objectives of the proposed project and noting that AB 32 requires CARB to prepare and approve a Scoping Plan for achieving the maximum technologically feasible and cost-effective greenhouse gas emission reductions.)) The objectives listed in the Supplement primarily mirror Health and Safety Code section 38562 – which describes the qualities that the regulations should possess. Cap and trade undermines many of these objectives. Among other things, an interstate or regional cap and trade program is not enforceable or capable of being monitored or verified; cap and trade does not ensure emissions reductions are real, permanent, quantifiable, verifiable and enforceable; does not achieve real reductions; and does not minimize the administrative burden of implementing and complying with the regulation. In brief:

1. **Cap and trade *fails* to achieve the maximum technologically feasible and cost-effective reductions in GHG emissions.** As CBE's comments will demonstrate, cap-and-trade programs consistently fail to meet reduction goals, in part because of overallocation, which delays or prevents emission reductions, while the alternatives CBE describes are proven much more reliable and cost-effective at achieving maximum reductions in emissions, and with greater economic benefits. Additionally, as to cost-effectiveness, the program is so complex that it is expected to cost $9 million dollars this budget year alone for staff and contract costs.[3]

2. **Cap and trade *fails* to ensure that activities undertaken to comply with the regulations do not disproportionately impact low-income communities.** As CBE's comments will

[3] Legislative Analyst's Office, Recommendations from our review of AB 32 zero-based budget submitted by Administration on May 4, May 20, 2011, available at: http://www.lao.ca.gov/laoapp/budgetlist/PublicSearch.aspx?PolicyAreaNum=22&Department_Number=-1&KeyCol=429&Yr=2011

demonstrate, cap-and-trade could worsen air pollution / toxic hotspots and exacerbate existing inequities for communities of color and low-income communities, where pollution sources are disproportionately located.

3. **Cap and trade does *not* complement existing air standards and does not ensure a lack of interference with efforts to achieve and maintain national and California Air Quality Attainment Standards. The program also fails to reduce toxic air contaminant (TAC) emissions.** Cap and trade is susceptible to a large number of fraudulent transactions which—if similar programs provide any predictions—are likely to lead to a program that significantly fails to meet emission reduction goals. Further, CBE's comments also illustrate that a huge resource drain would result from the implementation of the cap-and-trade program. This resource drain, at ARB and other implementing agencies, is likely to greatly undermine other efforts to meet state and national requirements. Trading will also incentivize major polluters to increase GHGs and its co-pollutants, as discussed in the final section below. Rather than complement, cap and trade could result in an increase in criteria pollutants and toxics in California's low-income communities of color.

4. **Cap and trade does *not* contribute to reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health.** As noted above, cap and trade could worsen pollution hot spots and exacerbate social, economic, and environmental inequalities. Furthermore, as described below, the California Department of Health Services' (CDHS) Health Impact Assessment of the cap-and-trade program emphasized that major parts of the program, and their associated environmental, health, and economic impacts were unassessed because there was either too little data, too little time, or else these assessments were outside the HIA scope. CDHS did not evaluate health impacts from increased toxic hot spots. At the same time, ARB acknowledges cap and trade's potential for increasing co-pollutants, worsening pollution and toxic hot spots, but does not make a significance finding—it simply does not quantify the extent of the effect. As discussed in the final section, cap and trade increases air pollutants and diminishes diversification of energy sources because it is through cap and trade that oil refineries, one of the state's major emitters of GHGs, can switch its operations to process heavier more contaminated oil. Further, aside from public health risks and increases in other air pollutants, ARB fails to take into account evidence that increases in co-pollutants and toxic emissions in urban areas shifts the economic burden to other areas of the economy, such as the health care sector, and also fails to consider evidence that cap and trade stifles innovation in emissions reduction technology and new energy sources, which also harms the economy.

5. **Cap and trade causes leakage.** While not leakage in the traditional sense, a trading scheme that is linked to other systems, such as the WCI, could result in "leakage" of California's jobs, capital, and air quality benefits to other jurisdictions as California's businesses choose to engage in reduction projects outside of California.

CBE described at length many of these concerns in its earlier comments on the Scoping Plan and on the proposed Cap and Trade regulation. However, the Legislative Analyst's Office (LAO) also recently identified many flaws in the cap-and-trade program that expose the program to potential gaming and fail to ensure adequate oversight or enforcement. Specifically, the LAO asserts that because ARB's program is extremely complex, and

includes policy objectives unrelated to reducing GHGs, like reducing the potential for economic activity to leave the state as a result of the program, it is susceptible to manipulation and fraudulent activity. Moreover, there is no current governmental authority established to routinely monitor and regulate carbon trading, so ARB intends to step in as the regulating authority. ARB, however, has no experience regulating such markets, and this inexperience increases the chances market manipulation could go undetected. Moreover, even if manipulation is found and violators of market rules can be banned from participating in the market, "any disciplinary action would take place after the fact, and ARB may not be able to invalidate transactions once completed."[4] Evidence and examples described in CBE's comments below confirm that the LAO's concerns regularly occur in other carbon trading programs.

CARB cites statutory authority to support most of its objectives. However, a few of the objectives either are not cited or are worded in a misleading way. Specifically, Objective 3 is to "to link, where feasible, with other Western Climate Initiative (WCI) partner programs to create a regional market system." This does not appear in the statute and could only be fulfilled by a market trading system. Objective 15 to "[a]chieve reductions over existing regulation using market-based strategies" gives the misimpression that Health & Safety Code § 38562 (d)(2) requires a market-based strategy but this is not the case. Instead, that section provides that if CARB adopts a market-based system pursuant to a different section, that market system's "reduction is in addition to any greenhouse gas emission reduction otherwise required by law or regulation, and any other greenhouse gas emission reduction that otherwise would occur." Similarly, while Objective 16 to "complement direct measures" suggests that AB 32's objective necessarily is to complement direct measures, this quality or requirement is not found in the section of AB 32 that CARB cites. Project objectives may not be written so narrowly that only the proposed project can meet those objectives. *See e.g., City of Santee v. County of San Diego* (1989) 214 Cal.App.3d 1438. Therefore, insofar as CARB has changed the plain language of the statute to create overly narrow objectives, or has added objectives that can only be met by the proposed project, those objectives are not valid.

There is substantial evidence that a cap and trade program would cause significant environmental impacts and that alternatives to cap and trade meet the objectives of the project, as laid out in AB 32. Moreover, cap and trade does not fulfill most of the project objectives. Despite this, CARB has proposed not to adopt any alternatives, in violation of CEQA.

II. The Latest Evidence Overwhelmingly Demonstrates That All Carbon Trading Programs Have Major Flaws, Resulting in Unreliable Predictability, and Failure to Meet Reduction Goals

The carbon trading program in Europe is in its second phase now and still is not working despite years of attempts. Very large numbers of fraudulent transactions are continuing up to the present, and overallocation continued in Phase II (2008-2012). Additionally, every version of studied pollution trading suffered from overallocation and other severe flaws, resulting either in failure to achieve emissions reductions goals during earlier years, or in absolute failures to

[4] Legislative Analyst's Office, *Cap-and-Trade Market Issues*, Presented to: Senate Select Committee on the Environment, Economy, and Climate Change, Hon. Fran Pavley, Chair (June 29, 2011).

achieve reduction goals. Studies found that fraud, overallocation, free allocation, banking, unambitious emissions reduction targets, and other design flaws resulted in failure to meet necessary reductions in carbon trading programs. Overallocation during early years combined with being allowed to bank those extra credits results in no need for reduction in later years. Offsets makes this problem worse. California, despite generalized statements about this, has not learned from the earlier and ongoing failures of pollution trading.

Columbia University study showed every pollution trading program suffered overallocation:

In a study by Columbia University, every pollution trading program either had years of delays in achieving reductions during the early years, or were fatally flawed so that reductions were never achieved.[5] These programs had the same characteristics (free allocations of pollution credits, offsets, banking, vulnerability to fraud, etc.) that were identified as causing the long delays that CARB's proposed Cap and Trade program has.

This Columbia study evaluated several U.S. trading programs (EPA's Acid Rain trading, Los Angeles's RECLAIM, the Chicago ERMs) as well as European carbon trading. Every program suffered from overallocation either in the early years or in all years, resulting in the failure to meet reduction goals for years because too many credits were available, so prices were too cheap to push investment in low carbon technologies. The European program, although in its second phase (each phase is multi-year), is still delayed in meeting its goals. It found:

- ERMS and Phase 1 EU trading had "absolute overallocation" -- allocations were greater than emissions such that the price of allowances collapsed. This allowance surplus is predicted to continue in Phase 2 2008-2012. Falling prices, such as those from 30 EU in July 2008 to below 15 EU in December, are also predicted by some analysts to continue. p. 443.
- RECLAIM and ARP had "early overallocation," with allowance allocations greater than emissions in early years. Overallocation and its accompanying effects compromised the environmental effectiveness of these cap-and trade programs.
- The recently developed Regional Greenhouse Gas Initiative (RGGI) has also been estimated to be overallocated by 17% in its first year of operation
- Common effects of early and absolute overallocation include low allowance prices, delayed emissions reductions, and development of a large allowance bank that allows for greater future emissions.
- Cap-and-trade systems have not generated high enough credit prices to economically trigger significant emissions reductions. p. 419.
- **"While requiring less of regulated sources is more politically appealing, it may well not be sufficiently protective of the environment.** A cap-and-trade program with high caps may make it look like something is being done when very little actual improvement can be attributed to the program. **In other words, part of the story of**

[5] 34 Colum. J. Envtl. L. 395 (July 17, 2009), Overallocation Problem in Cap-and-Trade: Moving toward Stringency, The; McAllister, Lesley K., http://www.columbiaenvironmentallaw.org/assets/pdfs/34.2/7._McAllister_34.2.pdf. (Attached as CBE Exhibit B Columbia Univeristy)

why cap-and-trade programs may appear to be so cost effective may simply be that to do less costs less. In the case of RECLAIM, a Los Angeles Times article may have hit the mark when it stated that "Companies saved an estimated 41% on compliance costs under RECLAIM compared to conventional regulation, although most of the savings occurred because pollution controls were delayed for too long." p. 444.

- The SCAQMD projected that allocations would be in excess of actual emissions for "the first few years."[36] Allocations in fact remained significantly in excess of emissions for five years. . . . **In the face of this significant noncompliance, SCAQMD partially dismantled RECLAIM in 2001 and began using conventional technology-based regulation to regulate large emitters.** p. 404-405.

The Columbia University study also found that cap and trade fails to promote innovation, which is crucial to the program:

It found:

- Commentators often posit that cap-and-trade regulation provides greater incentives for innovation in emissions reductions technology than conventional regulation because firms have more flexibility in making compliance decisions.
- In fact, a detailed study of the history of innovation in SO2 control technology found much more significant innovation under the conventional environmental regulations of the 1970s than under the ARP.
- It found that overallocation and volatility of prices may be the cause of undermining new emissions reductions technology. p. 423.

International Energy Agency Study found major flaws

At the end of 2010 the International Energy Agency also evaluated trading programs, and found that standard features such as free allocations (a major feature of California's Cap and Trade program) caused delays in achieving reductions.[6] The investigation found that free allocation slows the pace to low-carbon technologies, and that overallocation and banking caused delays (both allowed in California's Cap and Trade). It found that extensive offsets (generously allowed in California's Cap and trade at 8%) could result in locking in a high carbon infrastructure in the short term so that no progress would be made in the long term. In addition to the delays in achieving environmental improvements, this study also found that the standard approaches of cap and trade providing free allocation were not shown to be in the public's economic interest. It found these lead to windfall profits, do not prevent price increases to consumers, and that there are alternatives for offsetting consumer prices. It found that offsets and banking could reduce emissions reductions:

[6] *Reviewing Existing and Proposed Emissions Trading Systems*, Nov. 2010, International Energy Agency, http://www.iea.org/papers/2010/ets_paper2010.pdf. (Ellerman, 2010; European Commission, 2010c) (Attached as CBE Exhibit C Int Energy Agency CO2 trading.)

European Union Emissions Trading System (EU ETS):

Generous free allocation of allowances to emissions-intensive industries is standard, but economic analyses do not generally reveal why this should be in the wider economic interest. These companies face competition from rivals that do not face emissions pricing, but they also face competition from companies producing lower-emissions alternative products. Overly generous support to maintain current production patterns **slows the pace of transition to sustainable low-carbon technologies.** p.7.

In competitive markets, free allocation leads to windfall gains for electricity generators and does not prevent electricity price rises for end users. In regulated systems, **although free allocation could prevent price rises it can also remove the incentive to move to low-carbon generation.** In both cases, if the desire is to offset price rises for end consumers, it is better to compensate consumers directly (or via electricity distribution companies), rather than providing free allocation to generators. p.8.

There is a significant risk of insufficient targets and oversupply of allowances in the early stages of a trading scheme. **If over-allocated allowances can be banked for future use, they can make it more difficult to reach long-term emissions reduction targets.** p.8.

However as noted in Section 6.2, **extensive use of offsets in the short term could lock in investment in high-emissions infrastructure domestically, making the eventual transition to a low-carbon economy more difficult.**

Reports show pollution credits prices have fallen, undermining the market

A recent article (June 1, 2011), E&E Publishing Services reported that the value of carbon pollution credits had fallen, that the market was not sufficiently robust, and that the global carbon market had shrunk. It also reported that there had been a collapse in talks on worldwide emissions trading, and that there was global concern about the economic impacts related to trading of 2010 being the warmest year on record.[7]

Widespread fraud in pollution trading up to the present is another source of regulatory uncertainty

The largest and most developed cap and trade program – the European carbon trading program – is highly vulnerable to fraud. There is no reason to believe that a California cap and trade program would not be vulnerable to the same fraud. Fraudulent credits not only cause delays, they can close markets entirely[8]:

[7] Greenwire, E&E Publishing, LLC,Wash., D.C. 20001, www.eenews.net. (Attached as CBE Exhibit D Greenwire carbon markets shrink)

[8] This finding undermines CARB's statement that the need for regulatory certainty by regulated entities is a reason to complete its cap and trade regulation before Board consideration is carried out: "*This type of delay would result in a lack of regulatory certainty for regulated entities and would have several potentially irreversible and harmful consequences to the environment.*" (Number 12, Edith Chang declaration)

- **February 2011 -- European Union faces legal action over fraudulent carbon emissions trading**:[9] A Court case in Belgium was brought to recover 267,991 stolen carbon credits, closing carbon markets. A complete list of stolen serial numbers was not completed.

- **March 2010 -** The Times, (London) March 18, 2010 article: Chaos on carbon market over 'recycled' permits:[10] Two carbon exchanges were forced to suspend trading as panic hit investors fearful they had bought invalid permits. Concern that used and worthless permits were circulating caused the price to collapse to less than €1.

- **February 2010 - Phishing attack nets 3 million euros of carbon permits** (BBC)**:**[11] The international carbon market was hit by a phishing attack which saw an estimated 250,000 permits worth over 3 million euros stolen. The scam involves six German companies and meant emissions trading registries in a number of EU countries shut down temporarily on 2 February. The criminals are believed to have created fake emissions registries. Registries in nine countries, were temporarily suspended. . . . **Phishing scams, which redirect people to a fake website via an e-mail, are common in the banking industry."**

Especially in California, where ARB envisions a regional program, and where ARB is the only regulator, there is little way to closely monitor and police the trading system, and little way for ARB to enforce rules violated out of state.

Economists now question the whole concept of pollution trading

The following very recent article by economist Hazel Henderson [12] (previous advisor to the U.S. Office of Technology Assessment and the National Science Foundation), co-developed with the Calvert Group (investors), found:

- **Emissions trading shown ineffective, economists' focus on carbon and its financial trading now seems a strategic mistake.**

- Widespread fraud in trading CO2 'offsets' led the UN police agency Interpol to warn that the next white collar global crime wave would likely be in trading these carbon derivatives.

- . . . large polluting industries in Europe's Emissions Trading Scheme (ETS) quickly gamed the Kyoto Protocol. They lobbied EU governments for so many free CO2 emission permits that they crashed the ETS markets for CO2.

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[9] Terry Macalister, guardian.co.uk, 20 February 2011, http://www.guardian.co.uk/business/2011/feb/20/carbon-emissions-trading-market-eu . (Attached as CBE Exhibit E Guardian carbon trading fraud)

[10] Carl Mortished: World Business Editor, The Times, (Attached as CBE Exhibit F Times carbon trading fraud) http://business.timesonline.co.uk/tol/business/industry_sectors/natural_resources/article7066315.ece

[11] BBC News, published 2010/02/03, http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8497129.stm (Attached as CBE Exhibit G BBC carbon trading fraud)

[12] *As Kyoto Expiration Nears, Emissions Trading Shown Ineffective*, by Hazel Henderson, Monday, May 23, 2011, Inter Press Service, Hazel Henderson, author, president of Ethical Markets Media (USA and Brazil), co-developed with the Calvert Group the Calvert-Henderson Quality of Life Indicators and co-authored "Qualitative Growth" (2009), Institute for Chartered Accountants of England and Wales, http://www.globalissues.org/news/2011/05/23/9757. (Attached as CBE Exhibit H Hazel Henderson carbon trading)

- Then, instead of shifting from fossil fuels to wind, solar, geothermal and energy efficiency, polluting industries purchased 'offsets' under the CDM to fund projects in developing countries.
- **Verification of these projects proved almost impossible,** since it was found that many of these projects would have happened anyway for sound business practice—e.g. energy efficiency and more productive, cleaner technologies.
- Now China has developed and captured these export markets; it has stopped selling 'offsets' to Europe's polluting industries, which must now "go green" and buy their new equipment from China.
- The CO2 permits were to be auctioned, but this quickly turned into what were essentially massive giveaways to polluters, which then sold them at a profit, as global levels continued to rise.
- **Thus 'cap and trade' turned out to be less efficient than direct tax and regulation.**

<u>The development and implementation of cap and trade requires enormous resources, whereas alternatives would allow money to be used for adaptation instead</u>

Implementing a cap and trade and offset program requires significant amounts of resources to staff and create the bureaucracy to manage its implementation. An analysis should be done of the efficiency and cost-savings of utilizing a cap and control strategy instead.

- From the Summary of LAO Findings and Recommendations on the 2011-12 Budget:[13]

  ZBB Shows Substantial Expenditures for Cap-and-Trade Development and Implementation in Budget Year. In the current year, ARB has a total of 32 positions which support the development and implementation of the **cap-and-trade program at a cost close to $5 million**. The ZBB shows an additional $4 million in contract costs related to cap-and-trade implementation in 2011-12, bringing the total cost of cap-and-trade development and implementation to about $9 million in the budget year.

  LAO Recommendation. The cap-and-trade program is a significant part of the AB 32 Scoping Plan. There are numerous policy considerations associated with its implementation, and, as such, proceeding with its implementation before completing the analysis discussed above is premature. **Therefore, we recommend that the Legislature direct the ARB to cease all work on the cap-and-trade program until it has completed the required analysis of potential alternatives and presented the results to the Legislature.** This would provide the Legislature with the opportunity to evaluate the analysis and to provide further policy direction to the ARB.

- Shefali Sharma writes:

[13] California Legislative Analyst's Office. http://www.lao.ca.gov/laoapp/budgetlist/PublicSearch.aspx?PolicyAreaNum=22&Department_Number=-1&KeyCol=429&Yr=2011 (Attached as CBE Exhibit I LAO on cap and trade)

> The FAO estimates that close to 17 billion euros (approximately 24.3 billion USD) could be required in transaction costs alone to set up soil carbon sequestration projects from 2010–2030, diverting scarce resources away from critical adaptation needs. According to the World Bank's own estimates adaptation costs to developing countries will range between 2.5 and 2.6 billion USD per year from 2010–2050. Experts monitoring Reduced Emissions from Deforestation and Degradation (REDD) schemes also find that important institutional and public resources are being diverted to create the technical capacity and infrastructure required to create offset credits to trade on potential forest carbon markets. Rather than diverting scarce resources, this money could be invested directly into institutions and communities to build resilience against climate change and directly address deforestation. [14]

III. Cap and Trade Health and Environmental Impacts Cause Inequities, Which CARB and CDHS Did Not Evaluate

A. Minding the Climate Gap[15] found that Cap and Trade could make air pollution hotspots worse, and cause existing inequities for people of color to worsen

This report ("Minding the Gap" Pastor, Morello-Frosch, Sadd, Scoggins, 2010) analyzed industrial facilities included under Cap and Trade (oil refineries, power plants, and cement plans), and confirmed that co-pollutants (such as particulate matter) from these facilities impact people of color more than non-hispanic whites due to the location of these facilities. The report then showed that Cap and Trade has the potential not only to fail to take this unprecedented opportunity to greatly improve existing inequities, **but could actually worsen them.** It also found that the economic benefits from directly reducing emissions at the most polluting facility would be enormous. The analysis found:

- Those who are most likely to suffer negative consequences of carbon trading system are communities of color and the low-income communities already facing the greatest impacts of climate change – widening instead of narrowing the climate gap.
- Economic opportunity that could be realized by reducing air pollution in dense neighborhoods is also enormous.
- **Geographic inequality in greenhouse gas (GHG) reduction is likely under any market-based scheme, and it matters for public health.**
- **The state is plagued by environmental inequity, and if new climate change regulations are not designed to address the growing climate gap, the suffering of those who bear the brunt of this burden may grow.**
- A cap and trade program could shift the economic burden to the healthcare system.

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[14] Shefali Sharma. April 21, 2011. The hype versus the reality of carbon markets and land-based offsets: Lessons for the new Africa carbon exchange. Institute for Agriculture and Trade Policy. (Attached as CBE Exhibit J Shefali Sharma offsets)
http://www.iatp.org/files/The%20hype%20versus%20the%20reality%20of%20carbon%20markets042011.pdf

[15] Id, Minding the Climate Gap

- Some dismissed concerns that because of other regulations, cap-and-trade will never produce "hot spots" where co-pollutants actually increase, but this did occur in the Southern California NOx RECLAIM program.
- The potential for such hotspots is by no means an extreme view: the potential for "hot spots" is acknowledged by some who are against imposing any sort of health- or EJ-based constraints on the cap-and-trade system. Schatzki and Stavins (2009), for example, concur that cap-and-trade could lead to an increase in local co-pollutant emissions.

The report found that refineries made up the greatest part of the emissions burden and risk of increased impacts. The report ranks the facilities below . **A few facilities accounted for most of the inequity, causing an increased pollution burden in communities of color:** p. 18.

Rank	Facility Name	City	Pollution Disparity Index*
1	BP Carson Refinery	Carson	1.442
2	Tesoro Wilmington Refinery	Wilmington (Los Angeles)	1.013
3	Paramount Refinery	Paramount	0.62
4	ConocoPhillips Wilmington Refinery	Wilmington (Los Angeles)	0.52
5	Exxon Mobil Torrance Refinery	Torrance	0.40
6	Chevron Richmond	Refinery Richmond	0.32
7	Malburg Generating Station (Vernon Power Plant)	Vernon	0.31
8	Conoco Phillips Carson Refinery	Carson	0.29
9	Valero Wilmington Refinery	Wilmington (Los Angeles)	0.24
10	California Portland Cement Company Colton Plant	Colton	0.16

* *Pollution disparity index* measures the relative co-pollutant burden on communities of color, as compared with non-Hispanic white communities[16]

It found that some trades or allowance allocations could widen the climate gap by deepening disparities in emissions burdens by race/ethnicity. It also found that targeting these facilities for cleanup would benefit everyone. p. 21. The report states: "**The research reviewed here suggests that the concerns of environmental justice advocates about the unequal**

[16] Minding the Gap, p. 27 – Pollution disparity index: *"Based on Bailey et al. (2008), we used the NO_x and PM_{10} emissions to calculate a health impacts index for each facility, which represents the relative potential health impact of the facilities included in the analysis (see Bailey et al. 2008 for assumptions and limitations). The only difference is that we used PM_{10} rather than total PM because it is considered more closely tied to health endpoints. The NOX and PM_{10} data come from the 2006 ARB Emissions Inventory for stationary sources and can be accessed at: http://www.arb.ca.gov/app/emsinv/emssumcat.php."*

impacts of cap-and-trade are not misplaced. The major facilities that will be regulated under any carbon reduction program are more frequently located near people of color and lower-income communities, with a handful of petroleum refineries making a significant contribution to the pattern of inequity. p.25.

Thus the most specific assessment of potential impact of Cap and Trade to communities of color in California has found that cap and trade could indeed not only fail to reduce large existing inequities, but make them worse. It found that cleaning up the facilities directly, particularly oil refineries, would address most of the risk of increase and help most people in California, including by providing great economic benefits.

B. California Health Services assessment scope didn't include many California impacts

The California Department of Health Services (CDHS) performed a Health Impact Assessment (HIA) for the proposed Cap and Trade program,[17] but this was very limited in scope, as described below. p. 89. Within this limited scope, the California Department of Health Services (CDHS) only evaluated those impacts occurring inside California. (The health department found small positive health effects related mainly to urban forestry projects inside California.) The department did not assess offset projects outside California, even though the Cap and Trade program allows all offsets to be implemented out of state. p. 57. Specifically, CDHS did not evaluate linking a California program to the Western States Climate Initiative (six Western states and four Canadian provinces),[18] in addition to Chiapas and Brazil.[19] However, CDHS did acknowledge that the positive impacts for California would only occur if these projects were inside California. p. 94.

Throughout the Health Department's HIA, the Department emphasized that major parts of the Cap and Trade Project and their associated environmental, health, and economic impacts were unassessed because there was either too little data, too little time, or else these assessments were outside the HIA scope:

> **In addition, the potential health impacts of linking broader national and international climate change mitigation efforts are not assessed.** p. 12.
>
> This document only addresses the portion of the HIA led by CDPH. p.19.
>
> **Local economic and health data were deemed too scarce to provide a reliable community-level analysis of these health determinants**, and assessing impacts on socioeconomic health determinants by region, county, or city were thus out of the scope of this assessment.

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[17] http://www.arb.ca.gov/cc/ab32publichealth/cdph_final_hia.pdf

[18] *"California is working closely with six other western states and four Canadian provinces through the Western Climate Initiative (WCI) to design a regional cap-and-trade program that can deliver GHG emission reductions within the region at costs lower than could be realized through a California-only program. To that end, the ARB rule development schedule is being coordinated with the WCI timeline for development of a regional cap-and-trade program."* CARB website, http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm

[19] http://californiareleaf.org/hompage-post/emission-trading-program-cleared ,
(Attached as CBE Exhibit K California Leaf cap and trade chiappas)

> This assessment is limited in its ability to geographically pinpoint local economic and air quality impacts and subsequent health effects. p. 22.
>
> Theoretically, **there are instances in which pollution could increase in some communities even though it would decrease overall statewide, but the distribution of such instances cannot be predicted with precision.** p. 90.

The Dept. of Health HIA specifically found that there was the potential for impacts in local communities, including increased impacts in communities of color:

> The cap is implemented at the State level, but as individual firms comply with the statewide cap in a manner that best fits their needs, **local community impacts will vary**. p. 21.
>
> **Low-income communities and communities of color in California are disproportionately impacted by environmental exposures** and have a greater susceptibility to the negative health impacts of environmental risks because of existing health and socioeconomic vulnerabilities. p. 60.

While the Health Department noted that increased emissions could occur due to Cap and Trade, it did not specifically assess the impacts that could occur from increased emissions in communities of color due to Cap and Trade. It did identify existing economic and health disparities in the Wilmington Harbor San Pedro Area, in Richmond, and in the San Joaquin valley. These communities are more vulnerable to further increases in pollution. Attached because of its length, is our summary from the Health Department's assessment describing the increased location of major air pollution sources, hazardous materials, and increased health impacts including asthma, cancer, lower birth weight, and higher death rates in these areas.[20]

In conclusion, CARB found that there are existing inequities in California in industrial pollution in communities of color that cause major health impacts, and CDHS states that increased impacts could occur due to Cap and Trade, but since CDHS does not determine the significance of these impacts, potentially significant impacts, are left unmitigated.

<u>CARB's Cap and Trade regulation does not address these major flaws</u>

In addition to the HIA performed by CDHS discussed above, ARB performed a "Co-Pollutant Emissions Assessment."[21] These two assessments were the sole evaluations performed to evaluate impacts caused by Cap and Trade in communities of color, where a very large percentage of the pollution sources are located—where they can be traded instead of directly controlled. As stated above, CDHS did not evaluate potential increases in toxic hotspots caused by Cap and Trade in communities of color. ARB's own analysis was not complete. Unfortunately, most of ARB's assessment stated conclusions without evidence that staff "believed" it unlikely that Cap and Trade would increase pollution, although it acknowledged that it was possible that emissions increases could occur due to Cap and Trade because of the inherent program flexibility of Cap and Trade. It concluded that since other laws would be in

[20] Attached as CBE Exhibit L Health Dept excerpts burden Wilm Richm San Joaq)

[21] CARB, Appendix P, Co-Pollutant emissions Assessment, 10/2010, http://www.arb.ca.gov/regact/2010/capandtrade10/capandtrade10.htm

effect (such as the Clean Air Act), and since ARB could do additional monitoring in the future, it need not complete its analysis.

C. CARB cannot abandon AB32's health protection requirements by relying solely on other environmental laws

Perfect combustion producing only carbon dioxide and water does not exist in the real world where we must breathe. Other combustion products that emit with CO2 commonly include methane, nitrous oxide, PM, benzene, metals, and sulfur compounds to name a few. As ARB well knows, these all cause hotspots to form. Hotspots are areas where pollutants concentrate locally rather than dispersing. These areas can cause dire health and other quality of life consequences. Since the carbon cannot be separated from the other pollutants, it is wholly artificial to address the carbon as if it came in its own package.

ARB's position has been that it need not worry about co-pollutants and hotspots because other laws, such as the Clean Air Act, will prevent polluters from increasing air pollution, even as the GHG emissions from a particular facility increase. But it is unreasonable for ARB to rely on such laws. First, AB 32 explicitly provides that ARB, in implementing the statute, must seek to *complement* and not interfere with pollution reduction efforts, ensure that compliance with the regulations does not disproportionately impact low-income communities, *consider* overall societal benefits including *reductions in other air pollutants,* consider direct indirect and cumulative impacts including localized impacts in communities already disproportionately burdened, design any market mechanism to *prevent any increase* in TACS or criteria air pollutants, and ensure that market-based programs maximize co-benefits. (See Health & Safety Code §§ 38562(b)(2),(4),(6); 38570(1),(2),(3).) Cap and trade undermines these objectives because it enables large polluting facilities to inexhaustibly increase GHG emissions and therefore to increase its co-pollutants emissions.

A view that the Clean Air Act prevents increased pollution is not based in reason. First, the air districts focus on regional pollution rather than localized impacts when issuing an air permit. In reality, even regionally, many areas, such as the South Coast Air Quality Management District, remain in non-attainment for many criteria pollutants yet continue to issue new pollution permits to new and existing facilities.

Other factors also must be considered, such as limited resources to enforce violations of state and federal air laws, the fact that many sources and chemicals remain unregulated, and that releases from fugitive and intermittent operations are difficult to monitor. More subtly, polluters seek permits in excess of its estimated emissions to avoid violations. This also gives them ample room to increase pollution to the maximum a permit will allow, which actually increases pollution on the ground. Nothing prevents a polluter from then installing bigger equipment. ARB should not build in a system that encourages increased pollution. Cap and trade allows and encourages facilities to increase emissions, and ARB cannot rely on existing permits to stop them.

The last section of this comment letter provides a glaring example, revealing extreme-high California refinery combustion emissions exceeding any other U.S. region that all these laws had failed to identify up until now. It then explains how cap and trade specifically

incentivizes increased emissions from the largest oil refining center in the western U.S. The comment documents here and throughout how emissions from refineries and other concentrated emissions increase concentrations of GHGs and co-pollutants in primarily low-income communities. Ultimately, co-pollutants are an issue that ARB must face directly. The Clean Air Act cannot serve as a justification to increase criteria pollutants and TACs and AB 32 does not endorse such an approach.

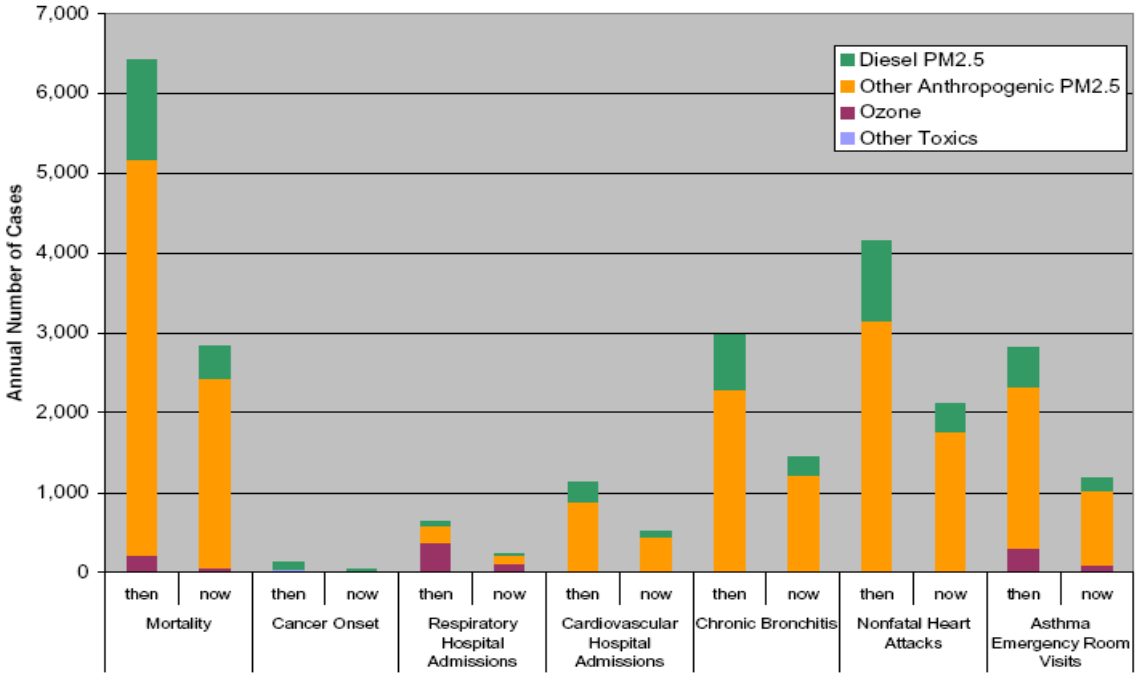
D. Health impacts of Co-pollutants are unacceptably high in California

Bay Area example of pollution impacts and Environmental Injustices

Californians are still being negatively impacted by poor air quality, especially low-income communities of color. The San Francisco Bay region is frequently talked about as having much better air quality than the severe problems in the Los Angeles region. It is important to note that the Bay Area is a major oil refining region with much other heavy industry, has a major international port, goods movement, severe impacts from diesel trucking, and heavy traffic. This section provides details on the Bay Area example of air pollution impacts, as an example of fossil fueled pollution that burdens communities of color most severely (with reduced lifespans), and also impacts all Californians. Cap and trade will not only fail to improve this severe burden but can make it worse, as discussed above. Also see attachment L (California Department of Health Services (CDHS)) discussed in the part B above, which summarizes severe disproportionate impacts in one area of Southern California (Wilmington), and the San Joaquin Valley.

Since the Scoping Plan was adopted, the Bay Area Air Quality Management District (BAAQMD) released its 2010 Clean Air Plan (CAP), in which it takes a multi-pollutant approach. The prioritized pollutants in the CAP are: ground-level ozone and ozone precursors: ROG and NOx; Particulate matter (PM): both directly-emitted PM and secondary PM; key air toxics, such as diesel PM, benzene, 1-3 butadiene, acetaldehyde, formaldehyde, and the "Kyoto 6" greenhouse gases (GHGs), including carbon dioxide, methane and nitrous oxide.

The figure below (BAAQMD CAP, 2010) shows the incidence of selected health effects among San Francisco Bay Area residents from air pollution in 2008 compared to when data was first available. The "then" in the figure above represents the earliest data available – 1970 for zone, and the late 1980s for toxics and PM. The "now" presents data from 2008.



Premature mortality related to air pollution is still an estimated 2,800 deaths per year in the Bay Area, largely attributed to other anthropogenic PM 2.5 and diesel PM 2.5, even though reductions have been made. According to BAAQMD, most premature deaths linked to PM 2.5 are associated with cardiovascular problems rather than cancer. Diesel PM 2.5 is still a large contributor to cancer onset.[22] Diesel exhaust contributes to 10-20% of PM-related mortality caused by cardiovascular problems. Other sources of PM, including secondary formation, is a primary contributor to PM-related deaths caused by cardiovascular problems. Cancer deaths related to diesel PM 2.5 exposures are 80-90 deaths per year.

The BAAQMD estimates annual health and societal costs from air pollution to be $2 billion and a societal cost of $28 per ton of greenhouse gases / CO2-equivalents emitted (See table below). Greenhouse gases have risen in the past 30 years.[23]

[22] Bay Area Air Quality Management District. Adopted September 15, 2010. Appendix A – Bay Area Air Pollution Burden: Past & Present. Final Bay Area 2010 Clean Air Plan. Available at: http://www.baaqmd.gov/Divisions/Planning-and-Research/Plans/Clean-Air-Plans.aspx (Attached as CBE Exhibit N BAAQMD air pollution burden)

[23] *Id.*

Health Effect	Unit Value (Cost per Incident, 2009 dollars)
Mortality (all ages)	$6,900,000
Chronic Bronchitis Onset	$409,189
Respiratory Hospital Admissions	Age 65 < : $35,228 Age 65 > : $33,375
Cardiovascular Hospital Admissions	Age 65 < : $43,889 Age 65 > : $38,759
Non-Fatal Heart Attacks	$84,076
Asthma Emergency Room Visits	$468
Acute Bronchitis Episodes	$534, for a 6 day illness period
Upper Respiratory Symptom Days	$35
Lower Respiratory Symptom Days	$22
Work Loss Days	Daily Median Wage by County ($168 to $243)
School Absence Days	$91
Minor Restricted Activity Days	$61
Cancer	$1,750,000
Greenhouse Gases	$28 per metric ton ($CO_2$ equivalent)

Although lifetime risks have dropped since the 1980's and 1990's from carcinogenic toxics in the Bay Area, risks are still high. Diesel lifetime cancer risks in 2008 were 318 per million Bay Area residents. Lifetime cancer risks (2008) were 405.3 per million Bay Area Residents (see table below). Currently the Bay Area mean PM 2.5 concentration is about 9.5 $\mu g/m^3$ with anthropogenic PM 2.5 contributing an average 6.5 $\mu g/m^3$. Health burdens are mostly from premature mortality at about 2,800 annually costing approximately $6.9 million per case (2008).

Compound	1st year	Most recent year	Estimated Annual Bay Area Mean ($\mu g/m^3$)		Lifetime Risk per million per ug/m3	Lifetime Risk per million Bay Area Residents		
			Earliest	2008		1990	2008	Reduction
Diesel	1987	2008	3.50	1.06	300.0	933.2	318.0	66%
Benzene	1987	2008	1.80	0.23	29.0	146.1	20.9	86%
1,3-butadiene	1989	2008	0.37	0.04	170.0	131.5	14.0	89%
Formaldehyde	1996	2008	2.11	1.37	6.0	18.2	10.1	44%
Acetaldehyde	1996	2008	0.84	0.69	2.7	4.5	3.4	25%
Carbon tetrachloride	1987	2006	0.10	0.10	42.0	27.0	26.2	3%
Methylene dichloride	1987	2006	0.83	0.31	1.0	2.6	1.1	59%
Perchloroethylene	1987	2008	0.39	0.02	5.9	13.1	0.7	95%
PAHs (risk-weighted)	1995	2004	0.15	0.09	1320.0	0.2	0.1	57%
Hexavalent chromium	1991	2006	0.28	0.07	150000.0	43.3	10.9	75%
Lifetime cancer risk	1990	2006				1318.7	405.3	69%

Because these estimates assume residents are exposed to the mean of each toxic, these are higher in impacted communities such as environmental justice communities, which bear the brunt of chemical exposures. In a community-based participatory research study on PM 2.5 air monitoring in East Oakland, CBE members found extremely high levels of PM 2.5 in East

Oakland, exceeding county levels, levels in the Oakland hills and state and federal standards up to four times (see figure below).[24]

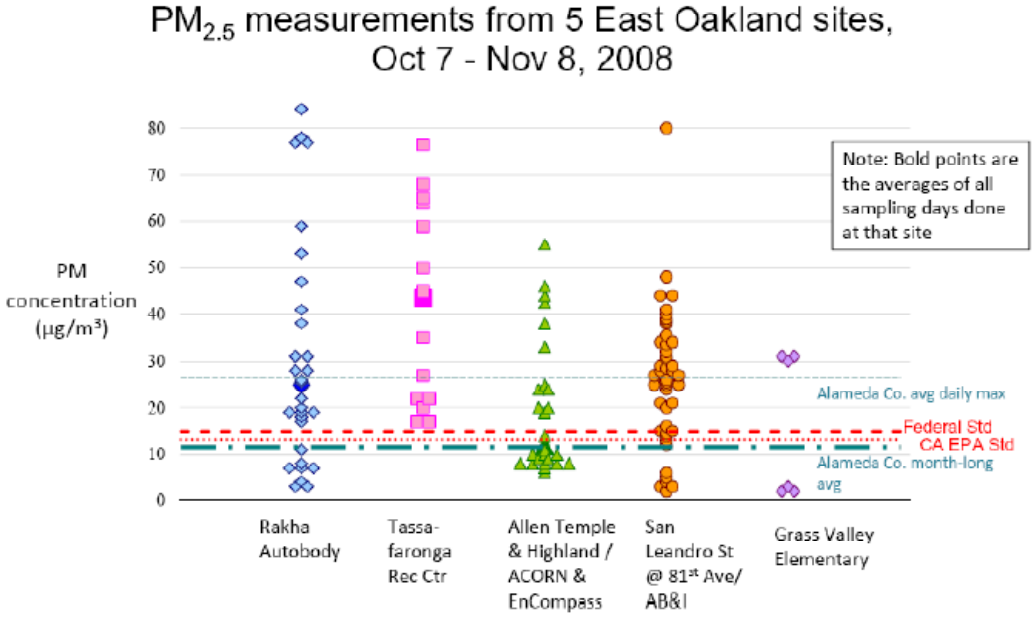


Figure 1. PM 2.5 measurements from 5 East Oakland sites, October 7-November 8, 2008. Each site is represented by a colored icon (left to right, x-axis): Rakha Autobody/ residential (blue diamond); Tassafaronga Recreation Center (pink squares); Allen Temple Baptist Church/ Highland Elementary/ ACORN Woodland Elementary/ Encompass Academy/ (green triangle); San Leandro street/ AB&I (orange circle); and Grass Valley Elementary (purple diamond). Each **bolded** icon indicates the average concentration measured on a day of measurement. The average concentration of particulate matter per day increases with placement on the graph vertically (y-axis). The horizontal lines represent the Alameda County average daily maximum (blue line, 27 µg/m3) and the month-long average (blue line, 11 µg/m3); the U. S. EPA (EPA, 15 µg/m3) and the California EPA annual standard (red line, 12 µg/m3).

Health disparities in the flatlands of Oakland – East and West Oakland – translate to a life expectancy about 10 years less than someone living the Oakland Hills, which is only one to two miles away, and less than the Alameda County and Bay Area averages.[25] Environmental regulations –including land use decisions – must reduce pollution and exposures, first and foremost, in vulnerable communities, including environmental justice communities who bear the brunt of unhealthy conditions.

[24] Lee, Anna Y, et al. September 2010. East Oakland Particulate Matter 2.5 Community-based Air Monitoring Research Report. Communities for a Better Environment. Available at: http://cbecal.org/campaigns/oakland.html , (Attached as CBE Exhibit O East Oakland PM report Lee)

[25] Alameda County Public Health Department. 2008. Life and Death from Unnatural Causes – Health and Social Inequity in Alameda County. Available at: http://www.acphd.org/user/data/DataRep_ListbyCat.asp?DataRepdivId=2&DataRepdivcatid=62 (Attached as CBE Exhibit P Alameda health disparities)

E. CARB needs to adequately screen for communities impacted by air pollution in order to assess impacts of various alternatives

To adequately assess impacts of the Scoping Plan and various alternatives on vulnerable Californians and specifically on low-income communities of color, the California Air Resources Board should consider recommendations from the AB 32 Environmental Justice Advisory Committee (EJAC). The EJAC recommended utilizing the Environmental Justice Screening Methodology developed by Dr.'s Manuel Pastor, Rachel Morello-Frosch and Jim Sadd.[26] This tool compared to another proposed by CARB staff, includes more evidence-based vulnerability indicators, regionally-appropriate indicators, prioritizes communities based on cumulative impacts, utilizes clear mapping results and includes proximity and land use analyses. This screening is important for ensuring that equitable and sufficient benefits are given and burdens are assessed and mitigated in a transparent way in the implementation of AB 32.

F. New evidence shows carbon trading is causing harm to indigenous people through the offsets program/ REDD and is not effective in achieving real greenhouse gas reductions

Around the world – environmental justice advocates, indigenous communities, forest-dependent communities and the Global South – are united that REDD — Reducing emissions from Deforestation and Degradation – has negative impacts on indigenous communities and is inadequate for addressing climate change. Despite protests, former California Governor Arnold Schwarzenegger signed an agreement with Chiapas, Mexico and Acre, Brazil.[27] REDD, REDD+ projects far too often exclude the needs of local and indigenous communities and their livelihoods, incentivize eviction of communities from their rightful land, and exacerbate poverty, while prioritizing profits for the industrial and agricultural sectors over forestry management and a number of other concerns.[28, 29, 30] The following are examples of the inadequacies of these programs:

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[26] AB 32 Environmental Justice Advisory Committee. August 25, 2010. AB32 Environmental Justice Advisory Committee Comments on the Proposed Screening Method for Low-Income Communities Highly Impacted by Air Pollution for AB 32 Assessments. California Air Resources Board. Available at: http://www.arb.ca.gov/cc/ejac/meetings/081610/ejac-letter-ej-screening-method.pdf (Attached as CBE Exhibit Q EJ Health Screening)

[27] Tropical Forest Group. November 21, 2010. Text of CA, Chiapas, Acre MOU on REDD (11/16/2010). http://tropicalforestgroup.blogspot.com/2010/11/text-of-ca-chiapas-acre-mou-on-redd.html (Attached as CBE Exhibit RChiappas)

[28] EurekAlert. January, 24 2010. Bioscience Technology. New study suggests global pacts like REDD ignore primary causes of destruction of forests. http://www.biosciencetechnology.com/News/Feeds/2011/01/industries-new-study-suggests-global-pacts-like-redd-ignore-p/ (Attached as CBE Exhibit S EurekAlert REDD)

[29] Climate Justice Research Project. December 2, 2010. Climate Justice Research Project Scholarly Note: Top Ten Disasters to Heed from REDD/REDD+ projects. Dartmouth College. http://www.box.net/shared/zsltxcet36 (Attached as CBE Exhibit T Climate Justice REDD)

[30] Indigenous Environmental Network. REDD Reader. http://www.ienearth.org/REDD/index.html (Attached as CBE Exhibit U IEN REDD)

- A 2010 Assessment shows that South America has lost 4 million hectares per year to deforestation and [a1] Africa lost 3.4 million hectares annually between 2000 and 2010 to deforestation.[31]

- Incidents of land grabs by governments and individuals who scheme to take advantage of REDD's forest-based carbon credits are growing and raising more concerns.[32,33]

- On the land grabs from communities in Chiapas as a result of the California-Chiapas REDD Agreement, one journalist, Jeff Conant (2010), writes:[34]

> REDD will restrict access to forests for livelihoods and cultural practices; it will reduce biodiversity; it will force subsistence farmers into the wage economy; it will violate human rights and indigenous rights; and it will not reduce global warming…The greatest threat to indigenous communities in Chiapas is the loss of their livelihoods and their natural resource base to the profit-driven industrial sector that has traditionally sought access to their oil, their timber, their water, their pastureland and their other resources, and which now seeks access to their productive lands for the purpose of producing jatropha curca and other biofuel-producing crops to generate carbon offsets.

- Two decades after the rise of the Zapatista Movement in Chiapas, the Lacondon Community is still suffering from the State government attempt to takeover of their land. The government is using a monthly REDD payment of 2000 pesos to landholders for forest protection, in exchange, they can access vast areas of forest, but end up with limited jobs and opportunities.[35] In one forest-community called Amador Hernández, vaccinations were being sanctioned to force them to move or negotiate and even after accepting moving and relinquishing all rights to return to their land, the State did not follow through on promises that their new homes and land would be good, with good schools and health services, modern sewage and drainage systems.[36] Instead, they developed health problems and insecurity from poor housing construction, failing water and sanitation, lack of medicine and medical attention and poor land to grow food.

- Shiney Varghese (2010) writes about the impacts of carbon pacts on vulnerable communities and the inadequacy of these programs:[37]

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[31] EurekAlert. January, 24 2010. Id.
[32] EurekAlert. January, 24 2010. Id.
[33] Jeff Conant. May 16, 2011. Apartheid Housing Posed as Solution to Climate Vulnerability in Chiapas. Global Justice Ecology Project. http://climate-connections.org/2011/05/16/apartheid-housing-posed-as-solution-to-climate-vulnerability-in-chiapas/ (Attached as CBE Exhibit V Apartheid Housing)
[34] Jeff Conant. December 17, 2010. California-Chiapas REDD Partnership Heating up Quickly: Hearings in Sacramento. California's Global Warming Law AB 32 Greenlights Dangerous Cap and Trade Propositions. Global Justice Ecology Project. http://climate-connections.org/2010/12/17/california-chiapas-redd-partnership-heating-up-quickly-hearings-in-sacramento/ (Attached as CBE Exhibit W Callifornia-Chiappas)
[35] Jeff Conant. April 7, 2011. A Broken Bridge to the Jungle: The *California-Chiapas* Climate Agreement Opens Old Wounds. Global Justice Ecology Project. http://climate-connections.org/2011/04/07/a-broken-bridge-to-the-jungle-the-california-chiapas-climate-agreement-opens-old-wounds/ (Attached as CBE Exhibit X Broken Bridge Chiappas)
[36] Jeff Conant. April 7, 2011. Id.
[37] Shiney Varghese. November 24, 2010. The cost of adding carbon credits to clean water. http://iatp.typepad.com/thinkforward/2010/11/cost-of-adding-carbon-credits-to-clean-water.html (Attached as CBE Exhibit Y carbon credits cost to clean water)

> Even if problems associated with carbon trading practices and carbon markets were to be fixed, some fundamental problems would persist. First of all, when carbon credits are allocated to GHG-reduction activities, often practiced by communities and countries in the South, it is a means for passing on the responsibility of GHG reduction to those countries whose climate footprint is limited but whose climate vulnerability is high. In the case of water poor, they need finances, and are willing to carry the burden in order to have access to funds to help climate-proof their nation. Second it allows polluting communities and companies to continue with their current GHG-emitting practices at almost no cost to themselves. Thirdly, carbon trading becomes a means for generating profit from doing almost nothing, or close to nothing.

- Panama's REDD plan possibly endangers the Kuna people of Panama, with a cultural and spiritual identity inextricably linked to their land and who are already suffering from rising sea levels and increasingly intense storms, and the indigenous Emberá peoples of Darién region who have already suffered from the fastest rate of deforestation in Panama (40% of the Emberá territory over the past 15 years).[38] The plan may not even thwart deforestation or cause any net greenhouse gas reduction.[39]
- Greenpeace warned that timber and oil palm companies were taking over the billion-dollar REDD deal between Norway and Indonesia for converting 40% of remaining natural forest, including 80% of peatland and 50% of orangutan habitat, to plantations; conversions that have made Indonesia the world's third biggest emitter of greenhouse gases, rife with corruption.[40]

Climate negotiations bring only vague promises of money for climate adaptation and mitigation for indigenous communities even though they are most vulnerable to climate change and are targeted for REDD and REDD+ projects.

> "…at least 19 of the plans explicitly contain provisions for tree plantations, which displace forest dwellers, degrade biodiversity, and cause high fire risk. Plantations are tolerated under the United Nations' definition of forests. They satisfy carbon investors who like precise measurement and predictability — not messy, biodiverse forest habitat…The Emberá of Panama, like the Ogiek of Kenya, have been the stewards of the land for millennia. But at best REDD would promise them compensation — and a dubious dependence on a cash economy, which tends to erode traditional culture. Especially in an age of climate chaos, the erosion of such stewardship is unacceptable. And in any case, nobody should mistake the initiative for a real solution to a changing climate. That remains what it was in Kyoto, and what it will be later this year in Durban: cut greenhouse gas emissions."[41]

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[38] Ruxandra Guidi. December 8, 2010. Will a UN Climate-Change Solution Help Kuna Yala? National Beographic Daily News. http://blogs.nationalgeographic.com/blogs/news/chiefeditor/2010/12/will-a-un-climate-change-solution-help-kuna-yala.html (Attached as CBE Exhibit Z Guidi UN Climate)

[39] *Id.*

[40] Arlina Arshad, Agence France-Presse. November 23,2010. Indonesia's Billion-Dollar Forest Deal in Danger: Greenpeace. Jakarta Globe. http://www.thejakartaglobe.com/home/indonesias-billion-dollar-forest-deal-in-danger-greenpeace/408073 (Attached as CBE Exhibit AA Indonesia forest danger)

[41] Dennis Martinez. January 10, 2011. Slow death by carbon credits: Indigenous peoples can suffer from pollution compensation plan. The Boston Globe. http://articles.boston.com/2011-01-10/bostonglobe/29338554_1_indigenous-peoples-carbon-credits-forests (Attached as CBE Exhibit BB slow death carbon credits)

Between 150,000 to 200,000 people in the Congo basin alone have been evicted off their land – often by military force.[42]

G. Offsets programs, including forestry trades have been notorious for false carbon reductions

Evidence shows that the REDD program — Reducing emissions from Deforestation and Degradation – and REDD+ are flawed with fraud, lack of accountability, weak legislative language. The following are examples of how offsets programs have terrible impacts on vulnerable communities and are ineffective:

- Widespread fraud in trading carbon in the Europe's Emissions Trading Scheme and large polluters have gamed the process that resulted in an overallocation of permits and crashed the markets.[43] Hendersen (2011) writes:

> There was a failure to disclose that setting up carbon caps and trading mechanisms actually entailed the creation of costly, complicated new bureaucracies. Monitoring, verifying the offsets, RECs (renewable energy certificates) while lowering the levels (caps) on CO2 emissions was opposed by the polluters. The CO2 permits were to be auctioned, but this quickly turned into massive giveaways to polluters, which then sold them at a profit, as global levels continued to rise. Thus 'cap and trade' turned out to be less efficient then direct taxing and regulation. Meanwhile our Ethical Markets Green Transition Scoreboard researching all private investments in green technologies since 2007 reported $ 2 trillion by Q1 2011. While politicians argued, Ethical Markets urged global pension funds and institutional investors to shift at least 10 per cent of their portfolios to green companies.
>
> At the same time, the re-think on climate policy produced two ground-breaking reports from IPCC and UNFCCC itself with the World Meteorological Organisation. They advised broader approaches to global emissions beyond CO2 to focus on soot, methane, VOCs and ozone — pointing out that this could decelerate global warming more rapidly.

- The program fails to differentiate between forests and plantations and so companies deforest to create plantations and claim them as carbon offsets. One example is the Japanese company Oji Paper that wants to take forest-land in central Laos and plant 50,000 hectares of eucalyptus plantations and get REDD funding for it.[44]
- REDD-Monitor reported that Australian David John Nilsson, representing Hong Kong company (SCRL, Sustainable Carbon Resources Limited) falsely promised the remote Matsés indigenous people of Peru that they would make billions of dollars if they handed

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[42] *Id.*

[43] Hazel Henderson. May 24, 2011. Id. http://www.deccanherald.com/content/163665/emissions-trading-shown-ineffective.html

[44] Chris Lang. November 29, 2010. Forest destroyer Oji Paper to carry out REDD feasibility study in Laos. REDD-Monitor. http://www.redd-monitor.org/2010/11/29/forest-destroyer-oji-paper-to-carry-out-redd-feasibility-study-in-laos/#more-6560 (Attached as CBE Exhibit CC Oji Paper REDD)

over the carbon rights to their forests, and promised to share 50% of the profits with the communities.[45]

- Another example in the South Indian community of Mettur in Tamil Nadu is Chemplast Sanmar, which has been emitting "unsafe" levels of mercury, chloroform and vinyl chloride, yet makes $10 million a year from selling carbon credits to offset pollution emitted from American and European companies because it stopped emitting HFC-23, a potent greenhouse gas pollutant, costing the company $2.2 million.[46]
- Guyana has failed to adequately implement the 2009 agreement with Norway because of project delays; violating limits on deforestation; lack of safeguarding the Guyana REDD+ Investment Fund; lack of transparency, public access to information and safeguards for land allocation to the indigenous Amerindians' misuse of funds and inaccurate independent verification.[47]
- The Africa Carbon Exchange (ACX), launched in Nairobi on March 24, 2011 which, "because the bulk of forest and agriculture land is used by local communities, significant risks are associated with land tenure issues and social conflicts, with research showing an increase in land grabs of large areas of customary land in Africa by agribusiness and government agencies and…has serious implications for food production and food security in Africa."[48] Shefali Sharma also points out that resources are needed for African countries to adapt to climate change.[49]
- Another example of false GHG-reductions is the case of the Vestergaard Frandsen company, which can accrue carbon credits worth billions for themselves for false GHG-reduction practices in order to provide clean water to poor sub-Saharan Africa.[50]
- In Costa Rica, Friends of the Earth Costa Rica / Coecoceiba stated its absolute opposition to the inclusion of the REDD program in carbon market mechanisms, and proposed analyzing alternative approaches.[51]
- Nigeria is aligning itself to include one million hectares of tropical forest with endemic primates and endangered tree species in REDD+ and Friends of the Earth Nigeria / Environmental Rights Action have already expressed concerns about including

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[45] Chris Lang. May 3, 2011. AIDESEP and COICA condemn and reject "carbon cowboy" David Nilsson and demand his expulsion from Peru. REDD-Monitor. http://www.redd-monitor.org/2011/05/03/aidesep-and-coica-condemn-and-reject-carbon-cowboy-david-nilsson-and-demand-his-expulsion-from-peru/#more-8275 (Attached as CBE Exhibit DD Carbon Cowboy rejected)

[46] Will Evans. May 21, 2011. Global carbon market's dirty secret. GlobalPost. (Attached as CBE Exhibit EE carbon market dirty secret) http://www.globalpost.com/dispatch/news/regions/asia-pacific/india/110224/carbon-credits-india-environment

[47] Chris Lang. March 25, 2011. Eight problems with Norway's REDD support to Guyana: Open letter to Erik Solheim. http://www.redd-monitor.org/2011/03/25/eight-problems-with-norways-redd-support-to-guyana-open-letter-to-erik-solheim/ (Attached as CBE Exhibit FF 8 problems Norway REDD)

[48] Shefali Sharma. April 21, 2011. Id. http://www.iatp.org/files/The%20hype%20versus%20the%20reality%20of%20carbon%20markets042011.pdf

[49] *Id.*

[50] Shiney Varghese. November 24, 2010. Id. http://iatp.typepad.com/thinkforward/2010/11/cost-of-adding-carbon-credits-to-clean-water.html

[51] Ronnie Hall. 2010. REDD: The Realities in Black and White. Friends of the Earth International.http://www.foei.org/en/resources/publications/pdfs/2010/redd-the-realities-in-black-and-white/view?searchterm=cameroon%20redd (Attached as CBE Exhibit GG FOE REDD)

indigenous communities, land evictions and carrying on culture and livelihoods for forest-dependent communities.[52]

IV. Other Alternatives Are Reliable & Avoid Cap & Trade's Significant Environmental Impacts

CARB could entirely avoid the major negative impacts from Cap and Trade, through an alternative set of direct pollution controls (additional details provided in the text after the table below). These are much more reliable than Cap and Trade to achieve well over the current 17 million metric tonnes CO2 equivalent (MMTCO2e) cap and trade target. The measures use existing, cost-effective technologies. Most use commonplace methods that could be adopted quickly and achieve major emissions reductions of both greenhouse gases and toxic co-pollutants within five years or much less. One is more ambitious in scope (the 33% Renewable Portfolio Standard for oil refineries), but entirely feasible, using only existing technologies and practices. That measure requires overcoming big political obstacles for California regulators to challenge the oil industry. This industry has up to now been subject to far less stringent requirements under greenhouse gas and clean energy requirements compared to the electricity sector. (Oil refineries currently have requirements for zero tonnes of greenhouse gas reductions, either through the Low Carbon Fuel Standard, or through Cap and Trade.)

There are likely additional ways that CARB could directly reduce emissions from the sources listed below, but serious development within the Scoping Plan of such direct measures for Industrial sources is completely missing, so we have identified some feasible options.

Direct controls alternatives cut smog, toxics, & can replace > 17 MMTCO2e Cap & Trade target

	GHG Reduction Estimations (metric tonnes[53] CO2e per year)	**Estimated Co-pollutant Reduction Benefits** (US tons per day or year)
Industrial		
1. Industrial Energy Efficiency Improvements (saves money)	**~ 3 million or more** - Including Boiler and Heater upgrades and others. Thorough audits need to be implemented and calculations made public to more specifically assess other reductions	Thousands of tons per year of TOG, CO, NOx, SOx, PM, PM10 (If 10% refinery reduction met, from statewide inventory)
2. Industrial methane exemption removal & other methane	**3 million or more –** through control of fugitive methane emissions in oil drilling and other industrial operations, potentially also CO2 emissions from the same sources	~136,000 tpy smog-forming methane
3. Clean Electricity for Refineries (they use signif. grid	**1.2 million –** through requirements for replacement of average grid electricity with clean renewable contracts	+ criteria and toxic emissions reductions

[52] Ronnie Hall. 2010. REDD: Id.

[53] Note that metric tonnes (1000 kilograms or 2200 lbs) and U.S. tons (2000 lbs) are similar, but are different units of measurement and frequently spelled differently to differentiate them

electricity)		
4. Clean Electricity for Cement Plants,	**1 million** – through requirements for replacement of average grid electricity with clean renewable contracts	+ criteria and toxic emissions reductions
5. Other Cement Plant reductions	**1.3 million** – through requirements for replacement of average grid electricity with clean renewable contracts	Mercury
6. Crude Quality Requirements	**8 million** compared to current baseline, **also avoids 20 million** increase that would occur by 2020 without stopping the higher carbon crude oil switch well documented to be occurring in CA refineries	Crude Quality Requirements
7. 33% Renewable Portfolio Standard (RPS) for Oil Refineries (already required for power plants, can be phased in))	**12 million** (from refineries) + Plus much more from vehicles replaced with Zero Emission Vehicles (ZEV), clean electricity, fuel efficiency, expanded public transit Methods: reinstating original 10% pure Zero Emission Vehicles (ZEV) for auto mfgr. would have reduced 13 million from vehicles + another couple million from reduced refinery production	Refineries - Tens of thousands of tons per year of TOG, CO, NOx, SOx, PM, PM10 (33% of statewide refinery emissions) Vehicles - Even higher criteria and toxic pollutant reductions from major replacement of 1/3 of state's fossil-fueled vehicles with clean alternatives
Expanded clean transportation goals (paired with 33% RPS for oil refineries)		
8. Reinstate 10% pure ZEV (Zero Emission Vehicle) mandate for auto makers, beginning with 10% by 2020 (originally was to be met in 2003)		
9. **Public Transit funding** through these models: • **Oil drilling fee**: A 6% fee on oil drilling (at 240 million barrels extracted from California in 2008) would generate more than $1 billion a year.[54] (CA is only state not requiring this.) • **Canada's carbon fee**: generated $740 million in 2010-11, another $950 million expected 2011-12.[55] • **Washington State carbon fee**: University of Washington[56] found at $30/tonne CO_2, this would reduce Washington emissions by 8.4%,with $2.1 billion in revenues in 2035		
Additional large sources can bring GHG reductions, copollutant benefits, and funding:		
10. Other major sources should be similarly assessed for reductions, including: • Added Power Plant requirements – stop building unnecessary new fossil fueled plants, don't provide credits to offset their emissions, speed up alternatives deployment		

[54] The CEC found about 240 million barrels of crude extracted in 2008 from CA lands and waters, with price at $70/bbl, a 6% tax contemplated by Proposition 87 would have generated more than $1 billion a year.[54] http://articles.latimes.com/2009/jun/15/business/fi-hiltzik15 (Attached as CBE Exhibit HH CEC carbon fee gives $1billion)

[55] *B.C. may put carbon tax toward transit*, by Kelly Sinoski, Vancouver Sun, May 18, 2011, http://www.vancouversun.com/technology/carbon+toward+transit/4799888/story.html (Attached as CBE Exhibit II BC Carbon fee toward transit)

[56] University of Washington, Evans School of Public Affairs study http://evans.washington.edu/students/forms-advising/degree-projects/archive/washington-state-carbon-tax-fiscal-and-environmental-impacts (Attached as CBE Exhibit JJ -UnivWashington carbon fee $2billion revenues)

• Large Agricultural sources – Require solar pumping, return biomass to soil, biofilter methane. • Port & Rail expanded electrification replacing diesel, use clean electricity, require energy efficiency measures, prevention refrigerant coolant leaks. • Low Carbon Fuel Standard - Ban importing any Canadian Tar Sands-derived oils; stop allowing worsening of crude oil inputs; remove corn ethanol as acceptable fuel; remove pollution trading
TOTAL Much greater than 17 MMTCO2e cap and trade target

The direct industrial reductions measures above are realistic from a technical and cost-effectiveness view, for example:

- Industrial Energy Efficiency Improvements: There are already-identified measures that CARB has documented for replacing and improving grandfathered Industrial Boilers & Heaters, which saves money, but these are currently inside the Cap and Trade program. As a result, feasible direct cleanup becomes a mere option. It is also very likely that if energy efficiency audits are thorough and made public, best practices will be identified for separate refinery operations which can be implemented at all facilities. When required, such efficiency pays off over time because of major fuel cost savings, and are also jobs-producing. However, audits and calculations are currently allowed by CARB to be kept secret by industrial facilities, with only a summary of results reported.
- Industrial methane exemption removal & other methane reductions: During continued regional ground-level ozone rulemaking, rules are constantly updated. The State should require that each regional air quality agency immediately begin removing these exemptions, to be completed within 5 years. Other reductions were identified by CARB as achievable. (See section below.)
- Clean Electricity for Refineries and Cement Plants, and additional Cement reductions: Refiners and Cement producers can purchase grid power from zero-emission renewable suppliers such as wind and/or thermal solar generation suppliers; the suppliers can provide it and in fact would further expand production with the financial support those purchases would bring. ARB also identified additional reductions achievable from direct controls on cement facilities. ARB can and should require that they do so.

Additional measures in the table are feasible using available technologies, and are discussed in the detailed sections below. Currently, the Scoping Plan has no requirements for direct emission reductions from oil refineries, cement plants, and other large industrial sources.

Industrial Energy Efficiency, including Boiler & Heater replacement & optimization

CBE proposed doing industrial energy efficiency audits, and implementing their results during the original Scoping Plan development. Energy efficiency is known to get the biggest bang for the buck in reducing emissions, since less polluting fuel burned means the associated pollution is entirely prevented (not just reduced). Energy efficiency is also quite cost-effective, saving the cost of fuel. CARB did add an energy efficiency audit regulation to the Scoping

Plan, but it allows the unscientific practice of audits kept secret by the large industrial sources such as the oil companies with only generalized summaries submitted to CARB, and implementation of results are not required.[57]

CARB has recently announced that it intends to require implementation of results of the industrial audits so that facilities will have to reduce their energy use. If this occurs, it would make the measure the only requirement for direct greenhouse controls for industrial facilities in California,[58] but reliable reductions would still depend on audits being publicly verifiable. CARB has not yet provided details or a public process related to this intention. Also, the audit implementation will be inside the Cap and Trade program, so it is unclear how such a requirement would result in any direct reductions of local emissions, or would still be tradeable. The tons of reduction are unknown. Still, if data begins to be collected and publicly verified, and energy audit results are required to be implemented, this tool can achieve substantial reductions in energy use, greenhouse gases, and criteria and toxic co-pollutants near these large facilities.

One example of achievable measures for industrial sources is replacement of old and inefficient boilers and heaters, upgrading existing ones, and maintenance. These sources burn large amounts of fossil fuels at oil refineries and other industries and largely drive these industrial processes. Oil refineries make up the bulk of the emissions and reduction opportunities from this category, and perhaps should be separately treated compared to less hazardous facilities, such as Food industries.

CARB's staff identified large reductions in fuel use that would be achievable and very cost-effective, using different methods listed below, but these were evaluated under the Cap and Trade program as: compliance pathways," which are currently tradeable and not required to be carried out. CARB evaluated Department of Energy Data on industrial boilers and heaters and provided two datasheets [59]as part of the Cap and Trade program, under the compliance pathways appendix.[60] Instead of evaluating these as part of a Cap and Trade program, CARB require these improvements directly, using the identified equipment improvement methods. CARB identified many options for greatly and cost-effectively reducing fuel use from industrial boilers and heaters, including the following:

1. Replace low and medium efficiency Boilers
2. Optimize Boilers by reducing excess air
3. Retrofitting Feedwater Economizers

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[57] Only very generalized summaries of the audits are required to be submitted to CARB. This over-protectiveness of large industrial facilities by CARB in keeping information out of even CARB's possession means the public has no basis for judging the results. This is unnecessary overkill since CARB already removes Confidential Business Information when the public makes records act requests, and is also unscientific since secret calculations cannot be the basis of proven results. Without being required to submit and substantiate the results, industry energy audits have a poor chance of even identifying worst and best individual equipment units and practices. This is especially unfortunate in the oil industry, where each refinery is highly complex and customized.

[58] A small possible exception is that requirements for oil drilling operations are slated for 1.1 MMTCO2e reductions in the Scoping Plan, but in the recent CARB document on status of the plan, CARB announced that this measure is under review and may not be met. (See our comments in this letter on methane source reductions.) Oil refineries and all other industrial sources are required to get zero tons of direct reductions in the Scoping Plan.

[59] Compliance Pathways Analysis – Boilers, available at http://www.arb.ca.gov/cc/capandtrade/capandtrade/compathboiler.xls and Compliance Pathways Analysis – and Process Heaters, available at http://www.arb.ca.gov/cc/capandtrade/capandtrade/compathprocessheat.xls

[60] Page http://www.arb.ca.gov/regact/2010/capandtrade10/capv3appf.pdf

4. Retrofit with Air Preheaters
5. Blowdown Reduction With Controls and with Feedwater Cleanup
6. Blowdown Heat Recovery
7. Optimize Steam Quality
8. Optimize Condensate Recovery
9. Minimize Vented Steam
10. Insulation Maintenance
11. Steam Trap Maintenance
12. Steam Leak Maintenance
13. Replace Low and Medium Efficiency Heaters
14. Optimize Heaters
15. Recover Flue Gas Heat
16. Replace Refractory Brick
17. Insulation Maintenance

These reduction measures in total achieve about 4 million TCO2E/year, and save about $46 million dollars, as shown in the following charts excerpted from the data CARB provided.

In our proposed set of environmentally superior alternatives that should replace Cap and Trade, we only included 3 MMTCO2E/year, since these are not necessarily all additive (some of these methods may be overlapping, such as replacing or improving boilers). However, this is one source of energy efficiency measures identified, and industrial audits are likely to identify many others. The following tables show the specific data we compiled from the datasheets CARB provided:

Industrial Boilers: Annual Greenhouse Gas Reductions

	1. Replace Boilers		**2. Optimize Boilers**		**3. Feedwater Economizer**		
Sub Sector	Low Efficiency Boilers (Category 1)	Medium Efficiency Boilers (Category 2)	Reduce Excess Air of Boilers (Category 1)	Reduce Excess Air of Boilers (Category 2)	Retrofit with Feedwater Economizer (Category 1)	Retrofit with Feedwater Economizer (Category 2)	TOTAL 1-3
Petroleum	177,002	172,685	79,533	47,720	35,400	21,240	533,579
Food	11,416	12,532	7,010	4,206	5,461	3,276	43,902
Wood Products	13,277	12,953	5,966	3,579	4,647	2,788	43,210
Chemicals	26,155	25,517	11,752	7,051	5,231	3,139	78,846
Oil and Gas	160,875	109,866	50,600	30,360	39,414	23,649	414,764
Total	388,724	333,552	154,862	92,917	90,153	54,092	1,114,300
	4. Air Preheater		**5. Blowdown Practices**		**6. Blowdown Heat Recovery**		
	Retrofit with Air Preheaters (Category 1)	Retrofit with Air Preheaters (Category 2)	Reduction With Controls (Category 1)	Reduction with Feedwater Cleanup (Category 2)	Heat Recovery (Category 1)	Heat Recovery (Category 2)	TOTAL 4-6
Petroleum	8,850	5,310	10,030	30,090	17,700	10,620	82,601
Food	936	562	1,279	3,838	1,560	936	9,112
Wood Products	797	478	1,089	3,266	1,328	797	7,754
Chemicals	1,657	994	1,482	4,446	2,616	1,569	12,764
Oil and Gas	6,757	4,054	9,234	27,703	11,261	6,757	65,766
Total	18,996	11,398	23,114	69,343	34,465	20,679	177,995

	7. Optimize Steam Quality		8. Optimize Condensate		9. Minimize Vented Steam		
Sub Sector	Optimize Steam Quality (Category 1)	Optimize Steam Quality (Category 2)	Optimize Condensate Recovery (Category 1)	Optimize Condensate Recovery (Category 2)	Minimize Vented Steam (Category 1)	Minimize Vented Steam (Category 2)	TOTAL 7-9
Petroleum	6,844	4,106	9,440	5,664	12,095	7,257	45,407
Food	1,175	705	832	499	1,664	999	5,875
Wood Products	1,000	600	708	425	1,416	850	4,999
Chemicals	1,011	607	1,395	837	1,787	1,072	6,710
Oil and Gas	8,483	5,090	6,006	3,604	11,449	6,869	41,501
Total	18,514	11,109	18,381	11,029	28,412	17,047	104,492
	10. Insulation Maint.		**11 Steam Trap Maint.**		**12 Steam Leak Maint.**		
Sub Sector	Insulation Maintenance (Category 1)	Insulation Maintenance (Category 2)	Steam Trap Maintenance (Category 1)	Steam Trap Maintenance (Category 2)	Steam Leak Maintenance (Category 1)	Steam Leak Maintenance (Category 2)	TOTAL 10-12
Petroleum	165,202	44,250	177,002	177,002	59,001	35,400	657,856
Food	14,562	3,900	15,602	15,602	5,201	3,120	57,987
Wood Products	12,392	3,319	13,277	13,277	4,426	2,655	49,345
Chemicals	24,412	6,539	26,155	26,155	8,718	5,231	97,210
Oil and Gas	105,105	28,153	112,612	112,612	37,537	22,522	418,542
Total	321,671	86,162	344,648	344,648	114,883	68,930	1,280,941
						GRAND TOTAL	**2,677,728**
Total from Petroleum, Chemicals, Oil & Gas (Excluding Food & Wood Products)						MMTCO2e	**2,455,546**

Industrial Boilers: Annual Costs and Savings from GHG reduction measures $36 million/year

	1. Replace Boilers		2. Optimize Boilers		3. Feedwater Economizer		
Sub Sector	Low Efficiency Boilers (Category 1)	Medium Efficiency Boilers (Category 2)	Reduce Excess Air of Boilers (Category 1)	Reduce Excess Air of Boilers (Category 2)	Retrofit with Feedwater Economizer (Category 1)	Retrofit with Feedwater Economizer (Category 2)	**TOTAL 1-3**
Petroleum	$12,643,626	$ 26,045,204	$ (8,059,514)	$ (1,703,494)	$ 1,254,479	$ 3,307,725	$33,488,026
Food	$2,144,114	$ 3,249,083	$ (710,413)	$(150,156)	$ (158,390)	$ 158,334	$ 4,532,572
Wood Products	$ 1,307,731	$ 2,432,751	$ (604,536)	$ (127,777)	$ (134,784)	$134,737	$3,008,121
Chemicals	$2,201,467	$ 4,292,845	$ (1,190,943)	$ (251,723)	$240,895	$ 544,301	$5,836,841
Oil and Gas	$2,475,871	$ 18,482,945	$ (5,127,634)	$ (1,083,799)	$ (1,412,167)	$873,891	$14,209,107
Total	$ 20,772,809	$ 54,502,827	$ (15,693,040)	$ (3,316,950)	$ (209,967)	$ 5,018,987	$ 61,074,667
	4. Air Preheater		**5. Blowdown Practices**		**6. Blowdown Heat Recovery**		
Sub Sector	Retrofit with Air Preheaters (Category 1)	Retrofit with Air Preheaters (Category 2)	Reduction With Controls (Category 1)	Reduction with Feedwater Cleanup (Category 2)	Retrofit with Air Preheaters (Category 1)	Retrofit with Air Preheaters (Category 2)	Reduction With Controls (Category 1)
Petroleum	$ (509,239)	$158,881	$ (138,514)	$900,325	$ (1,018,477)	$ 8,146	$ (598,879)
Food	$ (37,490)	$ 36,455	$ (17,668)	$ 114,839	$ (89,775)	$718	$7,080
Wood Products	$ (31,903)	$ 31,022	$ (15,035)	$ 97,723	$ (76,395)	$ 611	$ 6,024
Chemicals	$ (51,852)	$ 81,895	$ (20,468)	$133,040	$ (150,499)	$ 1,204	$ (6,681)
Oil and Gas	$ (270,596)	$263,129	$ (127,523)	$828,884	$ (647,977)	$5,182	$51,099
Total	$ (901,079)	$ 571,382	$ (319,208)	$2,074,810	$ (1,983,123)	$15,861	$ (541,357)
	7. Optimize Steam Quality		**8. Optimize Condensate**		**9. Minimize Vented Steam**		
Sub Sector	Optimize Steam Quality (Category 1)	Optimize Steam Quality (Category 2)	Optimize Condensate Recovery (Category 1)	Optimize Condensate Recovery (Category 2)	Minimize Vented Steam (Category 1)	Minimize Vented Steam (Category 2)	
Petroleum	$ (543,459)	$ (146,498)	$ (336,777)	$ 210,755	$ (1,489,351)	$ (787,825)	$ (3,093,155)
Food	$ (93,330)	$ (25,158)	$ (29,686)	$18,577	$ (204,925)	$ (108,400)	$ (442,921)
Wood Products	$ (79,420)	$ (21,409)	$ (25,261)	$15,809	$ (174,384)	$ (92,244)	$ (376,910)
Chemicals	$ (80,306)	$ (21,648)	$ (49,765)	$31,143	$ (220,079)	$ (116,416)	$ (457,071)
Oil and Gas	$ (673,636)	$ (181,589)	$ (214,265)	$ 134,087	$ (1,409,779)	$ (745,734)	$ (3,090,916)
Total	$ (1,470,151)	$ (396,303)	$ (655,754)	$ 410,371	$ (3,498,518)	$ (1,850,618)	$ (7,460,974)
	10. Insulation Maint.		**11 Steam Trap Maint.**		**12 Steam Leak Maint.**		
Sub Sector	Insulation Maintenance (Category 1)	Insulation Maintenance (Category 2)	Steam Trap Maintenance (Category 1)	Steam Trap Maintenance (Category 2)	Steam Leak Maintenance (Category 1)	Steam Leak Maintenance (Category 2)	
Petroleum	$ (9,505,789)	$ (641,639)	$ (17,925,175)	$(14,116,067)	$ (4,684,991)	$ 672,186	$ (46,201,475)
Food	$ (837,896)	$ (56,558)	$ (1,580,031)	$ (1,244,274)	$ (412,963)	$59,250	$ (4,072,471)
Wood Products	$ (713,020)	$ (48,129)	$ (1,344,549)	$ (1,058,832)	$ (351,416)	$ 50,420	$ (3,465,526)
Chemicals	$ (1,404,657)	$ (94,814)	$ (2,648,778)	$ (2,085,911)	$ (692,295)	$99,328	$ (6,827,127)
Oil and Gas	$ (6,047,784)	$ (408,225)	$ (11,404,376)	$ (8,980,941)	$ (2,980,691)	$427,659	$ (29,394,357)
Total	$(18,509,146)	$ (1,249,365)	$ (34,902,909)	$(27,486,024)	$ (9,122,356)	$1,308,843	$ (89,960,957)
						GRAND TOTAL	**$ (36,888,620)**
Total from Petroleum, Chemicals, Oil & Gas (Excluding Food & Wood Products)							**$ (36,084,589)**

Industrial Heaters: Annual GHG Reductions

	1. Replace Heaters		2. Optimize Heaters		3. Recover Flue Gas Heat		
Sub Sector	Replace Low Efficiency Heaters	Replace Med. Effic. Heaters	Optimize Heater (Category 1)	Optimize Heater (Category 2)	Recover Flue Gas Heat (Category 1)	Recover Flue Gas Heat (Category 2)	**Total 1-3**
Petroleum	426,777	267,169	147,659	88,595	65,724	39,434	1,035,358
Food	8,168	5,113	2,826	1,696	2,201	1,321	21,324
Iron and Steel	3,917	2,452	1,355	813	1,056	633	10,227
Chemical	10,058	6,297	3,480	2,088	1,549	929	24,402
Total	**448,920**	**281,031**	**155,320**	**93,192**	**70,530**	**42,318**	**1,091,311**
	4. Replace Refract. Brick		**5. Insulation Maint.**				
Sub Sector	Replace Refractory Brick (Category 1)	Replace Refractory Brick (Category 2)	Insulation Maintenance (Category 1)	Insulation Maintenance (Category 2)			**Total 4-5**
Petroleum	8,763	5,258	306,710	82,155			402,886
Food	168	101	5,870	1,572			7,711
Iron and Steel	80	48	2,815	754			3,698
Chemical	207	124	7,229	1,936			9,495
Total	9,218	5,531	322,624	86,417			**423,790**
						GRAND TOTAL	**1,515,101**
						MMTCO2e	**1,472,141**

Total Petroleum & Chemical (excluding Iron & Steel, & Food)

Annual Costs and Savings due to implementing GHG reduction measures (from saved fuel costs)

→ Saves $9.8 million/year - DOUBLE CHECK

	1. Replace Heaters		2. Optimize Heaters		3. Recover Flue Gas Heat		
Sub Sector	Replace Low Effic. Heaters	Replace Med. Effic. Heaters	Optimize Heater (Category 1)	**Total 1-3**	Recover Flue Gas Heat (Category 1)	Recover Flue Gas Heat (Category 2)	**Total 1-3**
Petroleum	$9,271,118	$32,414,511	$(14,953,610)	$(3,160,661)	$529,433	$4,341,452	$28,442,242
Food	$347,654	$790,578	$ (286,186)	$ (60,489)	$17,732	$145,403	$954,692
Iron and Steel	$166,735	$379,162	$ (137,255)	$ (29,011)	$8,504	$69,736	$457,871
Chemical	$317,153	$862,606	$ (352,433)	$ (74,492)	$12,478	$102,321	$867,633
Total	10,102,660	$34,446,857	$ (15,729,484)	$(3,324,653)	$568,147	$4,658,912	$30,722,439
	4. Replace Refract. Bricl		**5. Insulation Maint.**				
Sub Sector	Replace Refractory Brick (Category 1)	Replace Refractory Brick (Category 2)	Insulation Maintenance (Category 1)	Insulation Maintenance (Category 2)			**Total 4-5**
Petroleum	$(810,811)	$(302,542)	$(17,648,272)	$(1,134,544)			$(19,896,169)
Food	$ (15,517)	$ (5,790)	$ (337,757)	$ (21,713)			$ (380,777)
Iron and Steel	$ (7,442)	$ (2,777)	$ (161,988)	$ (10,414)			$ (182,621)
Chemical	$ (19,110)	$ (7,130)	$ (415,942)	$ (26,739)			$ (468,922)
Total	$ (852,880)	$ (318,239)	$(18,563,959)	$(1,193,411)			$(20,928,489)
						GRAND TOTAL	**$9,793,950**
						Total Petroleum & Chemical (excluding Iron & Steel, & Food)	**$8,944,785**

Removal of methane exemptions and other reductions from methane sources

During the development of the 2008 Scoping Plan, CBE commented that it is no longer justifiable to exempt methane from smog regulations, as methane is now known to be both a smog precursor and potent greenhouse gas.[61] Although ARB did not adopt a requirement in the Scoping Plan for removing methane exemptions from all smog regulations in the state, ARB did include two control measures for methane sources (and CO2 from these same sources). These were Oil and Gas Extraction and Transmission (drilling) with 1.1 MMTCO2e reduction planned, and Recycling and Waste (Landfill Methane), with 1.0 MMTCO2e. These appear to be the two largest methane sources in the State (excluding agriculture sources).

ARB has not yet carried out regulation of these sources, but has prepared additional studies and surveys of emissions. In these surveys, ARB found emissions higher than the Scoping Plan inventory. This is not surprising since methane is exempt in most smog regulations, and since there were no greenhouse gas regulations, methane was not rigorously monitored. In the category of oil and gas extraction and transmission, a 2009 ARB staff presentation[62] evaluating both methane and CO2 emissions from this source, found that vented and fugitive emissions, (estimated in the Scoping Plan at 0.8 MMTCO2E) was actually 2.9 to 3.4 MMTCO2E, and combustion emissions (estimated at 17.9) was 19 to 19.5 MMTCO2E (page 12). Together these add up to 3.1 to 4.1 additional MMTCO2E compared to the Scoping Plan for this source.

Despite the higher emissions for this source, the Scoping Plan update[63] (page 5) found, without identifying a reason, that it may not get reductions from these oil drilling operations,

> **Industrial Measures (for sources covered under cap-and-trade program)**
>
> Industrial measures implemented by sources not covered under cap-and-trade program address emissions from oil and gas extraction and transmission operations. The Scoping Plan identifies a potential reduction of 1.1 MMTCO2e for these measures. These measures are under review; potential reductions are uncertain at this time.
>
> http://www.arb.ca.gov/cc/oil-gas/oil-gas.htm
>
> http://www.arb.ca.gov/cc/gas-trans/gas-trans.htm

Regarding the fugitive sources, CARB's update does not identify why these emission reductions were uncertain. Control of industrial fugitive emissions sources are well-known, through requirements for leak standards for valves, flanges, pumps, and compressors and LDAR

[61] CBE May 2008 Comments on AB32 Scoping Plan, (Attached as CBE Exhibit KK CBE comments May 2008 Scoping Plan)
[62] CARB staff presentation, Oil & Natural Gas Production, Processing, and Storage Public Workshop, http://www.arb.ca.gov/cc/oil-gas/meetings/Workshop_Presentation_12-8-09.pdf
[63] http://www.arb.ca.gov/cc/scopingplan/status_of_scoping_plan_measures.pdf, p 5.

programs (Leak Detection and Repair). Most of these fugitive emissions of 2.9 to 3.4 MMTCO2E could be eliminated through such programs. The source also includes another approximate 19 MMTCO2E from combustion, which also likely has options for reducing emissions through improved efficiency, reduced flaring, etc.

It is important to achieve the fugitive and combustion source reductions from industrial operations not only to reduce GHG emissions, but also to reduce toxic and odorous copollutants such as hydrogen sulfide. People who live near oil drilling operations have great difficulty getting relief from these odors despite existing odor abatement programs at local air districts.

It is likely that other industrial methane sources have higher emissions than the state inventories indicate especially for fugitive sources that are harder to monitor. For compounds exempt in smog regulations, it is even less likely that inventories capture the full emissions. The staff presentation on oil drilling operations confirms this problem: "Districts typically do not inventory GHGs" (page 5). We urge CARB to add to the Scoping Plan a requirement that all methane exemptions be removed within five years, and that methane emissions be more accurately inventoried.

We included a reduction only of 3 MMTCO2E from this entire source category, which should be achievable from the oil drilling fugitives and venting category alone, but reductions may also come from oil drilling combustion sources and from oil refinery and other industrial source methane emissions.

Clean electricity use by Oil Refineries: renewable grid purchase GHG reduction is available

California refineries consumed a total of 15.85 TWh of electricity purchased from the grid during the period 2006–2010.[64] Based on emission factors developed, documented and used for U.S. reporting of GHG emissions under international agreements, and conservatively assuming the California grid factor,[65] [66] statewide refineries emit 0.3713 tonnes/MWhr purchased electricity, or 1.18 million tonnes/year as CO_2e.

Refiners can purchase grid power from zero-emission renewable suppliers such as wind and/or thermal solar generation suppliers; the suppliers can provide it and in fact would further expand production with the financial support those purchases would bring; and ARB can and should require refiners to do so. This readily available action would eliminate 1.18 million tonnes/year as CO_2e with the additional benefit of directly supporting the expansion of renewable energy.

[64] *M13 Refinery Data;* California Energy Commission: Sacramento, CA; Aggregated California annual data, 2006–2010 from PIIRA Form M13 Monthly Refinery Fuels reports provided in response to request for information; Per. Comm., Greg Karras, CBE with Susanne Garfield, 26 May 2011 and with Andre Freeman, 27 May 2011 and 14 June 2011. Original data report inserted into text above as received: see *M13 Refinery Data*.

[65] *Voluntary reporting of greenhouse gases program;* U.S. Energy Information Administration: Washington, D.C., 2010. Emission factors and global warming potentials, EIA Web site (Attached as CBE Exhibit LL EIA data) www.ia.doe.gov/oiaf/1605/emission_factors.html# emissions; accessed 27 May 2010.

[66] Conti et al., 2007. *Documentation for emissions of greenhouse gases in the United States;* DOE/EIA-0638 (2005); U.S. Energy Information Administration: Washington, D.C., EIA Web site www.eia.doe.gov/oiaf/1605/ggrpt/index.html. (Attached as CBE Exhibit MM Conti EIA GHG data)

Refiner	M13 Fuel Used							
Year	Sum of Natural Gas, Used As Refinery Fuel (In 000s of Cubic Feet)	Sum of Purchased Electricity (In 000s of kWh)	Sum of Purchased Steam (In 000s of LBS.)	Sum of Catalyst Petroleum Coke, Used As Refinery Fuel (In Barrels)	Sum of Marketable Petroleum Coke, Used As Refinery Fuel	Sum of Still Gas, Used As Refinery Fuel (In Barrels)	Sum of Liquefied Petroleum Gases, Used As Refinery Fuel (In Barrels)	Sum of Distillate Fuel Oil, Used As Refinery Fuel (In Barrels)
2006	131,406,502	3,257,114	12,711,886	11,703,973	4,103,846	39,823,767	1,014,660	78,238
2007	137,790,854	3,113,372	12,627,689	10,853,047	4,309,031	39,159,175	969,964	62,947
2008	142,678,331	3,303,884	12,255,475	9,764,562	4,562,146	37,843,341	1,005,211	121,967
2009	146,279,344	3,059,266	12,888,132	9,229,478	4,012,484	35,002,150	929,717	157,879
2010	153,761,736	3,113,923	12,179,804	8,882,309	4,976,373	34,785,751	392,422	177,741

Require cement sector to use clean electricity and other measures identified by CARB

Cement Industry Clean Electricity requirement: The Cement Sector, another industry that uses large amounts of grid electricity, like the refining industry, can be required to contract with clean renewable energy producers, which would be only too happy to get the business. The United Nations Environment Program (UNEP) Global Environmental Alert Service publicized the cement industry as one of the most polluting in *Environmental Science Alert, Greening Cement Production has a Big Role to Play in Reducing Greenhouse Gas Emissions*: [67]

> The industry has a large ecological footprint: it uses significant amounts of natural resources such as limestone and sand, and depending on the variety and process, requires 60-130 kg of fuel oil and 110 kWh of electricity to produce each tonne of cement. In addition, the cement industry is second only to power generation in the production of CO2. Producing one tonne of portland cement releases roughly one tone of CO2 to the atmosphere, and sometimes much more, and the cement industry accounts for 7-8 per cent of the planet's human-produced CO2 emissions. Half of it comes from producing clinker (the incombustible remains of coal combustion), 40 per cent from burning fuel and 10 per cent from electricity use and transportation (Mahasenan and others 2003, WBCSD 2005).

And the Lawrence Berkeley Labs found California's cement industry is the largest in the U.S., and quantified its electricity use:

> **California is the largest cement producing state in the U.S., accounting for between 10% and 15% of U.S. cement production and cement industry employment.** The cement industry in California consists of 31 sites that consume large amounts of energy, annually: **1,600 GWh of electricity,** 22 million therms of natural gas, 2.3 million tons of coal, 0.25 tons of coke, and smaller amounts of waste materials, including tires.

[67] http://na.unep.net/geas/science/pdfs/GEAS%20November.pdf (Attached as CBE Exhibit NN UNEP Greening Cement Alert)

PG&E published its own CO2 emissions rates, and the national average CO2 emissions in pounds CO2 per megawatt-hour of electricity produced:[68]

Emissions Rates	PG&E Corporation*[1]	National Average*[2]
CO_2 Fossil-Fuel Units Only	1,454	1,950
CO_2 All Generation Sources	850	1,392

*Pounds per megawatt-hour of electricity produced

1. Emissions rates for 2002

2. National average is from U.S. EPA's eGRID Database (Version 2.01 Released 2008, provides data for 2000, latest year available for complete comparison)

With California's cement industry using 1,600 GWh (billion watt-hours) of grid electricity annually, and calculating the range of emissions using the lowest emission rate above (850 lbs/megawatt-hr), and the highest above (1,950 lbs/megawatt-hr), this results in a range of emissions reductions that would be achieved by avoiding these emissions, through a requirement for contracting with clean renewable energy producers. The reduction ranges from 0.6-1.4 MMTCO2E per year, depending on the supply of electricity used.[69] We will use the average of these two, at 1 MMTCO2E/year.

Other Cement reductions : CARB identified specific measures within the Cap and Trade Appendix F Compliance Pathways for reducing GHGs from the Cement industry, but did not consider them as part of a direct regulation strategy.

Table F-3: Cement Cost and Reduction Summary

Abatement Strategy	Total Annual Capital Cost (30% discount rate) ($)	Total Fuel Reduction	Total GHG Reduction ($MMTCO_2e$)	Cost of Strategy ($/$MTCO_2e$)
Replace Long Dry Kiln with PH/PC Kiln	5,294,499	803,280	0.08	38
Install Better Insulating Refractory Brick	45,642	361,476	0.04	-28
Improve Clinker Cooler Efficiency	60,248	45,902	0.01	-34
Improve Kiln Combustion	182,569	286,886	0.03	-23
Use Alternative Fuels	32,000,000	0	0.55	36
Increase Supplementary Cementitious Material Blending	0	0	0.60	-17

[68] PG& E 2002 Environmental Report, Page 21, (Attached as CBE Exhibit OO PGE CO2 other emissions) http://www.pgecorp.com/corp_responsibility/environmental/report/2002/images/PGE_2002ER.pdf

[69] 1600 x 10^9 watt-hrs x 850 lbs /(10^6 watt-hrs) / (2200 lbs/metric tonne) / 1 million) = 0.6MMTCO2e. Using the national average of 1,950 lbs/megawatt-hour, emissions are 2.3 times higher, resulting in emissions of 1.4MMTCO2e

This chart developed by CARB shows a total of 1.31MMTCO2e/year of feasible reductions. Directly controlling these emissions would not only much more reliably achieve more quantifiable reductions, but would be much more enforceable. **There is no question that local inspection options in California are inherently and vastly more enforceable than verifying pollution trades on an international basis.** Direct, local control also reduces criteria pollutants and the highly toxic mercury emissions in California, with the largest cement industry in the country. The cost per ton of reduction is also very reasonable, ranging from savings of $34, to a cost of $38/MTCO2e.

The Natural Resources Defense Council (NRDC) commented on the cement sector regarding other reduction methods for CO2 emissions, but also for reducing the co-pollutant mercury (Hg), which is highly hazardous at extremely low emissions:[70]

> Researchers have identified an extensive list of practical energy efficiency measures for cement plants.[4] These include relatively inexpensive energy savings measures with short pay back times, such as automated process control and management systems (potential annual CO_2 and Hg emission reductions of .07-.14 million metric tons (MMT) and 12-24 lbs respectively) and improved preheating kiln technology (potential annual CO_2 and Hg emission reductions of .2 MMT and 30.5 lbs respectively).

Require a 33% RPS for Oil Refineries, as now required for Electrical Power Plants

To make real progress solving climate change and smog, we have no choice but to consciously decide that we will need to begin to replace fossil fuel production (not just reduce emissions). Available alternatives need to be phased in, step by step, while we deliberately reduce fossil fuel production, including oil refinery production. Pretending that we will be able to solve climate change, smog, and toxic emissions without phasing out production of these sources in-state, merely puts off our obvious and inevitable responsibility. California's greenhouse gases are equivalent to the 9th largest country in the world, and we have the worst smog nationwide.

There are many successful precedents for eliminating production (or greatly reducing it) in an inherently polluting industry. Examples include California's 33% Renewable Portfolio Standard (RPS) for phasing in renewable electricity (already being implemented), the Montreal Protocol (which phased out production of chlorofluorocarbons (CFCs)), earlier bans on DDT, and others. The Montreal Protocol for example, was not only cost-effective, it resulted in windfall profits for chemical companies at the same time that economical replacement products became available. This major environmental achievement would not have been possible without a decision to stop making these harmful products.

In contrast, oil refineries are now allowed to continue to switch to dirtier, higher carbon feedstock, requiring even more energy to refine. This must be stopped, and reversed. Oil

[70] Center for Energy Efficiency and Renewable Technologies, Environment California, Natural Resources Defense Council, Planning and Conservation League, Sierra Club, California, January 22, 2007, http://www.arb.ca.gov/cc/ccea/comments/jan/CFEEART_012207.pdf (CBE Exhibit PP Cement comments)

refineries currently are responsible for about half California's greenhouse gas emissions, with oil refineries directly emitting about 10% of statewide emissions (and growing), and responsible for another ~40% emitted due to burning refinery products (gasoline, diesel, jet fuel, etc.). We cannot prevent climate change disaster without gradually phasing out large percentages of oil refinery production. This is no longer a revolutionary idea; it is imminently necessary to begin the process, rather than allowing a permanent higher carbon oil refinery infrastructure to be built.

In addition to the model 33% RPS for power plants, other electrical sector regulation provides models for oil refinery production replacement, over a reasonable timeframe. **The Loading Order Priority for power plants of the Public Utilities Commission (PUC) requires environmentally superior options be used first** as numbered below, with cleaner fossil fueled sources dispatched last:

1. Energy Efficiency (using less energy always gets the biggest bang for the buck)
2. Demand Response[71] (voluntary reduced consumer use during peak periods based on higher prices during peaks)
3. Renewable Sources (such as required by the 33% RPS)
4. Distributed Generation (local power advantage, including needing less transmission)
5. Clean and Efficient Fossil-Fuel Generation (listed so as to be chosen last)

Of course there are big differences in the regulation of power plants and refineries. Electricity is pooled on the grid through common transmission lines, with three major utilities providing most of the electricity (Southern California Edison, Pacific Gas and Electric, and San Diego Gas and Electric), and with the Independent System Operator (ISO) dispatching the power. This is compared to a larger number of oil refining companies (BP, ConcoPhillips, Valero, Tesoro, Chevron, Exxon Mobil, Shell, and a few smaller) selling their products directly to the public at myriad gas stations. However, many of the methods used to meet the PUC's loading order requirements for energy efficiency and renewable are very similar to measures available for oil refineries. These include measures that are already being implemented in California, but which can and need to be greatly expanded. California has taken very important new steps in recent years such as the Pavley Bill[72] which will reduce vehicle greenhouse gases.

However, we can greatly increase the requirements for automakers to provide inherently lower pollution vehicles. We had such regulations in the past through significant percentages of pure ZEVs, stronger CAFÉ standards (Corporate Average Fuel Economy) without SUV loopholes, and now have the added option for increasing plug in hybrids. In the past our public transit was much more robust, and needs to be re-invigorated and funded (see section below on Carbon Fee for funding public transit). These programs would transition our fossil fuel based economy over a reasonable time period to a green economy, achieve major emissions reductions, and create jobs.

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[71] "Demand response is a resource that allows end-use electric customers to reduce their electricity usage in a given time period, or shift that usage to another time period, in response to a price signal, a financial incentive, an environmental condition or a reliability signal. Demand response saves ratepayers money by lowering peak time energy usage, which are high-priced. This lowers the price of wholesale energy, and in turn, retail rates. Demand response may also prevent rolling blackouts by offsetting the need for more electricity generation and can mitigate generator market power" http://www.cpuc.ca.gov/PUC/energy/Demand+Response/

[72] http://www.arb.ca.gov/cc/ccms/ccms.htm

- **The ZEV (Zero Emission Vehicle) program can be reinstated to its original higher numbers:** CARB's original ZEV program required 10% Zero Emission Vehicles in each manufacturer's fleet sold in California by 2003.[73] California had about 18 million automobiles in 2003;[74] removing 10% would have meant about 1.8 million ZEVs replacing fossil fueled vehicles. The California Energy Commission's (CEC's) December 2006 Inventory of California Greenhouse Gas Emissions and Sinks: 1990 TO 2004[75] states gives total California 2004 emissions from burning motor gasoline at 131 MMTCO2e in 2004. With 10% of that replaced by Zero Emission Vehicles, over 13 MMTCO2e would have been removed, in addition to a reduction in oil refinery emissions from decreased production. This program was gutted due to automobile and oil industry pressure.[76] There is new hope for an expanded ZEV rule and for expanding mandates for clean vehicles in California. For example, the ZEV rule is up for review at CARB this year.
- **CAFE Standards:** If the U.S. increased fuel economy to 45% higher miles per gallon using cost-efficient techniques, we'd save over 50 billion gallons of gasoline/year. (National Academy of Sciences[77]) This is equivalent to saving about 3 1/3 California's worth of gas use each year (California used about 15 billion gallons per year in 2003).[78] Increasing fuel efficiency of cars & trucks by only 3 miles per gallon can save > 1million barrels of oil / day or five times the amount of Arctic Refuge might produce."[79] The Pavley Bill and CARB clean cars efforts increase fuel efficiency, and should be utilized to the maximum achievable levels.
- **PLUG IN HYBRIDS:** For each mile driven on electricity instead of gasoline, CO2 emissions would be reduced 42% on average in the US (although this advantage could be hurt by coal-generated electric power plants)[80] Plug-ins encourage development of renewable electricity because they provide distributed battery storage. Running a plug-in would reduce average fuel cost by about half, (based on a price of $2.77/gallon for gasoline (Sept 2005) and 8 cents per kWh for electricity, (Jan 2006)).

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[73] Regulations were adopted as described in *CARB Staff Report: Initial Statement of Rulemaking, Proposed Amendments to Low-Emission Vehicle Regulations*, August 1995 "Beginning in 1998 all large volume manufacturers with sales in California exceeding 35,000 vehicles per year (General Motors, Ford, Chrysler, Toyota, Nissan, Mazda and Honda), are required to introduce the following percentages of their passenger cars and very light-duty trucks as ZEVs," http://www.arb.ca.gov/msprog/levprog/stfrpt.pdf (Attached as CBE Exhibit QQ ZEV rule)

[74] http://www.fhwa.dot.gov/policy/ohim/hs03/htm/mv1.htm (Attached as CBE Exhibit RR 18 million vehicles 2003)

[75] CEC, Inventory of California Greenhouse Gases and Sinks: "Motor gasoline is the single largest subcategory of transportation emissions at 131 MMTCO2E in 2004." p. 39, CEC, December 2006, http://www.energy.ca.gov/2006publications/CEC-600-2006-013/CEC-600-2006-013-SF.PDF (Attached as CBE Exhibit SS CEC Inventory)

[76] See *Who Killed the Electric Car*, for a very illuminating documentation of the attack on this regulation by the auto and oil industry, at http://www.whokilledtheelectriccar.com/

[77] *Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards*, National Academy of Sciences, 2002, http://www.nap.edu/openbook.php?isbn=0309076013

[78] *Market Power in California's Gasoline Market*, University of California Energy Institute, Center for the Study of Energy Markets, 2004, page 4, http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1035&context=ucei/csem

[79] According to the Arctic Refuge Defense Campaign, http://www.arcticrefuge.org/

[80] *Tackling Climate Change in the U.S.: Potential Carbon Emissions Reductions from Energy Efficiency and Renewable Energy by 2030*, American Solar Energy Society, Charles F. Kutscher, Editor, January 2007, http://www.ases.org/climatechange/toc/exec-summary.pdf

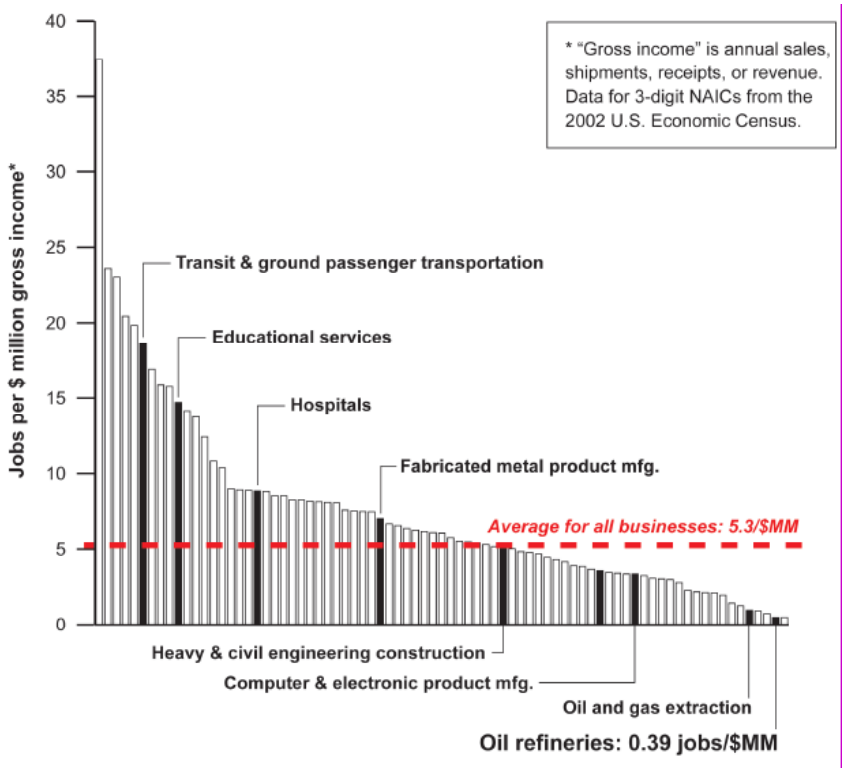
A 33% RPS for oil refineries would replace a third of the state's refinery capacity with clean transportation sources. The following table shows CARB's statewide inventory for emissions from oil refineries. (This appears to underestimate at least two pollutants compared to regional air quality agency data.)

	TOG (total organic gases)	ROG (reactive organic gases, a subset of TOG)	CO (carbon monoxide)	NOx (nitrogen oxides)	SOx (sulfur oxides)	PM (particulate matter)	PM10 (particulate matter <10 microns)
Statewide emissions from CARB statewide criteria pollutant inventory, most recent available, 2008[1]							
tons per year	10,139	6,787	7,219	10,767	13,494	3,150	2,439
33% of statewide refineries	3,376	2,260	2,404	3,586	4,494	1,049	812
10% of statewide refineries	1,014	679	722	1,077	1,349	315	244

Replacing 33% of the state's refining capacity with clean, non-fossil fueled energy and energy efficiency would not only remove CO2e emissions of about 12 MMTCO2e, it would also remove over 3300 tons per year (tpy) of TOG, over 2200 tpy or more of CO, over 3500 tpy NOx, almost almost 4500 tpy SOx, and over 1000 tpy PM. An interim requirement for a 10% refinery RPS would achieve almost 4 MMTCO2e, and more with dirtier crude phasing in, plus all the criteria pollutants listed above in the last row of the chart.

As discussed in the section below regarding carbon taxes, clean transportation sources are generating thousands of new jobs in California, including electric vehicle manufacture. Phasing out oil industry production would reduce jobs, and California needs to fund the transition for workers from high pollution industries to other fields. Our proposals for increasing oil refinery efficiency would add thousands of construction jobs. But as a general matter, the oil industry is last in producing jobs compared to almost every other economic sector in the state, as shown in the following chart excerpted from CBE's fact sheet – Big Oil Little Jobs.[81] The oil industry makes record profits, but is 2nd to last for number of jobs produced per income, especially compared to public transit and other sectors:

[81] Available at: http://www.cbecal.org/pdf/Big%20Oil%20little%20jobs%20051910.pdf (Attached as CBE Exhibit UU Big Oil Little Jobs)



This bar chart shows employment and "gross income" (annual sales, shipments, receipts, or revenue) for 79 business types in California's economy, which are grouped by their North American Industrial Classification. Businesses with more jobs per million dollars of income are shown as taller bars. The dashed horizontal line shows the weighted average jobs per million dollars for all of them. Oil refining ranks next-to-last among all these businesses for jobs per million dollars. California businesses on average are about ten times more jobs-intensive than oil refining. **Public transit creates about twenty times as many jobs as oil refining. Heavy construction creates about ten times as many jobs as oil refining.** The table below shows that these differences persist over decades.

A Carbon fees could fund public transit, and avoid environmental impacts of carbon trading

Carbon taxes can provide significant revenue that could fund clean public transit. Public transit cuts greenhouse gases, smog, and toxic emissions, replaces the need for driving, and a portion of oil production. Carbon taxes are the environmentally superior option compared to Cap and Trade, but as a supplement to direct control of local pollution.

> **Oil drilling fee example**: 2009 article -- According to the state Energy Commission, about 240 million barrels of crude were extracted last year from California lands and waters, including federal waters offshore. At the current world benchmark price of about $70, the 6% fee contemplated by Proposition 87 would have generated more than $1 billion a year.[82] California is the only state that does not tax oil extracted in the state.

[82] http://articles.latimes.com/2009/jun/15/business/fi-hiltzik15 , Id.

Canadian Carbon carbon fee example: Canadian report – "Brought in $740 million in 2010-11 and another $950 million expected in 2011-12."[83]

Washington State carbon fee example: A study by the University of Washington Evans School of Public Affairs,[84] requested by the Washington State Department of Commerce, found at $30/metric ton of CO2, would reduce greenhouse gases by 8.4% in the state from projected 2035 emissions, with revenues of *$2*.1 billion that year, and recommended upping to $70 per ton and using with complementary policies.

Clean transportation also creates jobs, so funding public transit through a carbon fee is not a simple cost, it is a transfer of money from the high carbon oil industry to cleaner transportation sources that sustain the economy while reducing pollution directly. A report by the Green Economy Post listed many examples of jobs creation in California from transit projects and other clean transportation sources (such as electric vehicle manufacture), but in summary it stated:

> California's clean transportation sector is growing and is creating thousands of new green jobs in the state; from the thousands of new jobs that are being created in the high speed passenger rail network now being built to the jobs that are opening up in the electric car manufacturing and related industries and manufacturing that has clustered in California; to the continued growth in job opportunities in mass transit.[85]

Not only could a carbon fee fund public transit, it avoids negative impacts caused by a cap and trade program. Flaws identified in carbon trading and present in California's cap and trade program, and why carbon fees avoid them: [86]

- Carbon fees lend predictability to energy prices; **cap-and-trade aggravates price volatility** that historically has discouraged investments in lower carbon electricity, energy efficiency and carbon-replacing renewable energy.

Price volatility, especially low prices, undermines emissions reduction and encourages high carbon infrastructure.

- Carbon fees are transparent and easily understandable, making them more likely to elicit the necessary public support than **an opaque and difficult to understand cap-and-trade system.**

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[83] *B.C. may put carbon tax toward transit*, by Kelly Sinoski, Vancouver Sun, May 18, 2011, Id. http://www.vancouversun.com/technology/carbon+toward+transit/4799888/story.html

[84] http://evans.washington.edu/students/forms-advising/degree-projects/archive/washington-state-carbon-tax-fiscal-and-environmental-impacts , Id.

[85] *The Clean Transportation Jobs in California*, http://greeneconomypost.com/green-resource-center/green-jobs-careers/find-green-jobs-state/find-green-jobs-california/clean-transportation-jobs-california (Attached as CBE Exhibit XX Clean Transportation provides new jobs)

[86] Carbon Tax Center, Vs Cap & Trade, ***April 2009 updates****:*http://www.carbontax.org/issues/carbon-taxes-vs-cap-and-trade/ (Attached as CBE Exhibit YY compare fees and carbon trading)

- Carbon fees can be implemented with far less opportunity for manipulation by special interests, while **a cap-and-trade system's complexity opens it to exploitation by special interests and perverse incentives that can undermine public confidence and undercut its effectiveness.**
- Carbon fee revenues would most likely be returned to the public through dividends or progressive tax-shifting, while the **costs of cap-and-trade systems are likely to become a hidden tax as dollars flow to market participants, lawyers and consultants.**

In addition, money from cap-and-trade doesn't go back to the people who are paying it, but to the lawyers, consultants, and economists who are trying to make the market work, whereas carbon fee dollars can be easily directed back to the consumers, either through dividends, or through public services like funding mass transit.

Regarding the issue of whether such a tax could be put in place after the passage of Prop 26, a legal analysis of the proposition is not the subject of this document. It is clear however that there was a broad misunderstanding of the language of that proposition. The public was largely unaware that industrial polluters backers of the proposition were looking for tax breaks for themselves, rather than protecting the public from taxes. Should the proposition be brought back for a re-vote, there is now broad support for repealing tax breaks for the oil industry. Even a U.S. Republican Congressman from Virginia publicly supported eliminating tax breaks for the oil industry:[87]

> 3. ENERGY POLICY: Cantor would support oil subsidy rollback in 'broader' tax reform
>
> House Majority Leader Eric Cantor (R-Va.) today said that he could support eliminating subsidies for major oil companies "in a broader, broader sense" as part of a tax reform effort that would close loopholes while lowering overall rates.

Ports & Rail

Ports and rail are sources of large greenhouse gas, smog, and toxic emissions. The Ports of Los Angeles, Long Beach, and Oakland, and associated goods movement (rail and trucks) highly impact communities of color in Southern and Northern California. While the adopted Scoping Plan does include 3.5 MMTCO2e, the update (Status of Scoping Plan Measures[88]) states that:

> Goods Movement includes measures to reduce emissions from shipping and port operations including such actions as reducing vessel speed and electrifying port equipment. The Scoping Plan attributed 3.5 MMTCO2e to these system-wide measures. **System-wide efficiency improvements are in progress but are not likely to provide significant GHG reductions by 2020.**
> http://www.arb.ca.gov/planning/gmerp/gmerp.htm

[87] *E&ENews PM, 04/27/2011* Elana Schor, E&E reporter, http://www.eenews.net/public/eenewspm/2011/04/27/3?page_type=print

[88] page 4, http://www.arb.ca.gov/cc/scopingplan/status_of_scoping_plan_measures.pdf

It appears from the above statement that CARB is retreating from even the 3.5 MMTCO2e commitment for ports. This needs to be clarified. Port and rail pollution prevention instead needs to be expanded, especially with major plans for port expansion. Available expanded port and rail pollution prevention methods include electrification, clean electricity requirements, energy efficiency, and stopping refrigerant leaks.

Other major reductions options are available that should be similarly assessed outside the cap and trade program as direct control measures:

This should include at least:

- Added Power Plant requirements – stop building unnecessary new fossil fueled plants, don't provide credits to offset their emissions, speed up alternatives deployment
- Large Agricultural sources – Require solar pumping, return biomass to soil, biofilter methane.
- Low Carbon Fuel Standard - Ban importing any Canadian Tar Sands-derived oils; stop allowing worsening of crude oil inputs; remove corn ethanol as acceptable fuel; remove pollution trading

V. The Alternatives Analysis Must Take into Account New Information That Demonstrates the Need for Bigger Reductions and That Shows That Cap and Trade in the Oil Refinery Sector Will Significantly Increase GHG Emissions in California

A. GHG emissions reductions needed are much higher than previously assessed because emissions transfers through imports are greatly increasing GHG emissions

GHG emissions reductions needed are higher than previously assessed because emissions transfers through imports are greatly increasing GHG emissions, according to a study published in the proceedings of the National Academy of Sciences.[89] This study found: "Most developed

[89] *Growth in emission transfers via international trade from 1990 to 2008*, Glen P. Peters et al, Center for International Climate and Environmental Research–Oslo, Edited by William C. Clark, Harvard University, Cambridge, Ma, and approved March 29, 2011 (received for review May 12, 2010)

ABSTRACT: Despite the emergence of regional climate policies, growth in global CO2 emissions has remained strong. From 1990 to 2008 CO2 emissions in developed countries (defined as countries with emission reduction commitments in the Kyoto Protocol, Annex B) have stabilized, but emissions in developing countries (non-Annex B) have doubled. Some studies suggest that the stabilization of emissions in developed countries was partially because of growing imports from developing countries. To quantify the growth in emission transfers via international trade, we developed a trade-linked global database for CO2 emissions covering 113 countries and 57 economic sectors from 1990 to 2008. We find that the emissions from the production of traded goods and services have increased from 4.3 Gt CO2 in 1990 (20% of global emissions) to 7.8 Gt CO2 in 2008 (26%). Most developed countries have increased their consumption-based emissions faster than their territorial emissions, and non–energy-intensive manufacturing had a key role in the emission transfers. The net emission transfers via international trade

countries have increased their consumption-based emissions faster than their territorial emissions, and non–energy-intensive manufacturing had a key role in the emission transfers." CARB needs to re-evaluate the emission reduction targets and bring more reductions into the alternatives assessment to consider this impact over the long term.

> **Cuts in carbon emissions by developed countries since 1990 have been cancelled out three times over by increases in imported goods from developing countries such as China, according to the most comprehensive global figures ever compiled.** . . . .
>
> Campaigners say this allows rich countries unfairly to claim they are reducing or stabilising their emissions when they may be simply sending them offshore – relying increasingly on goods imported from emerging economies that do not have binding emissions targets under Kyoto.
>
> According to standard data, developed countries can claim to have reduced their collective emissions by almost 2% between 1990 and 2008. **But once the carbon cost of imports have been added to each country, and exports subtracted – the true change has been an increase of 7%.** If Russia and Ukraine – which cut their CO2 emissions rapidly in the 1990s due to economic collapse – are excluded, the rise is 12%.
>
> Rajendra Pachauri, chair of the UN Intergovernmental Panel on Climate Change, said: **'The 7% increase in emissions of developed countries since 1990 is a deviation from what the IPCC fourth assessment report had assessed as the most cost-effective trajectory for limiting emissions …** if [that rate] is to continue then not only would we encounter more serious impacts of climate change over time, but mitigation actions undertaken later to reduce emissions would prove far more costly.'
>
> Glen Peters, of the Centre for International Climate and Environmental Research in Oslo, who was lead researcher on the paper published in Proceedings of the National Academy of Sciences, said: **'Our study shows for the first time that emissions from increased production of internationally traded products have more than offset the emissions reductions achieved under the Kyoto Protocol …** this suggests that the current focus on territorial emissions in a subset of countries may be ineffective at reducing global emissions without some mechanisms to monitor and report emissions from the production of imported goods and services.

This is also very relevant to California, which has very high levels of imported products brought in through the Ports of Los Angeles, Long Beach, Oakland, etc. Without taking into account and addressing our imports of high-carbon goods, we are offsetting any reductions we achieve, by buying goods with high carbon manufacturing processes from outside the U.S.

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from developing to developed countries increased from 0.4 Gt CO2 in 1990 to 1.6 Gt CO2 in 2008, which exceeds the Kyoto Protocol emission reductions. Our results indicate that international trade is a significant factor in explaining the change in emissions in many countries, from both a production and consumption perspective. We suggest that countries monitor emission transfers via international trade, in addition to territorial emissions, to ensure progress toward stabilization of global greenhouse gas emissions.
http://www.pnas.org/content/early/2011/04/19/1006388108.full.pdf+html, and attached.

B. **Oil refinery impacts will increase GHG emissions 20 million tonnes/year by 2020 due to worsening refinery Crude Feed Quality if not addressed, but could be decreased from current levels by 8 million tonnes/year if Crude Limits were required**

California refineries emit much more GHG per barrel crude refined than other U.S. refineries. They *could* emit less: others do. They emit more because they run the worst quality, highest density crude of any major U.S. refining region. Putting a bigger share of the denser crude barrel through aggressive processing to make vehicle fuels from it takes more energy and burns more fuel for that energy, increasing emissions from refineries. The steps in this causal chain are proven and measured based on national data—and now new statewide refinery data. California refineries' claim that they cannot change their crude is dead wrong: their crude supply is changing drastically right now.

Setting crude density and sulfur limits for the California industry to meet the average East Coast refinery crude input quality would cut statewide GHG emissions by 7.8 million tonnes annually—and prevent a switch to even worse heavy oil that could increase statewide refinery emissions by 19.6 million tonnes/yr. ARB's alternatives analysis ignores this evidence; problem, huge emissions reduction opportunity, and enormous emissions threat. Worse, ARB's cap–and–trade scheme would sell refiners exemptions for the "dirtier" crude emissions increase for less than they make from price discounts on dirtier crude, *encouraging* them to go the wrong way, and virtually ensuring the worst-case emissions increase. An estimated 27.4 million tonnes/year of emissions is at stake because of this fatal flaw in cap–and–trade alone.

The technical support for this is conclusive. The documentation is as follows:

With respect to petroleum refinery emissions intensity, crude feed quality, crude switching, and crude discounting, the Air Resources Board (ARB) alternatives analysis commits a series of individually serious and cumulatively fatal errors. Correcting these errors will show that ARB's pollution trading scheme will pollute while alternatives will clean up.

1. <u>ARB ignores the highest refinery emissions intensity in the U.S here in California</u>.

Average California refinery emissions intensity is at the extreme-high end of the range among U.S. refining regions, exceeding that of any other region by a wide margin. See Figure Crude–1. This is demonstrated by publicly reported data that were available to ARB, but had to be gathered and analyzed by non-profit organizations after it became clear that ARB would not perform and report this analysis at this time.[90] Further, ARB's data cannot rebut this conclusion, as shown by the refinery emissions for individual facilities in this chart. These are based on ARB-reported emissions and 100% utilization of refinery capacity, which is necessary because

[90] Research presented in this section was conducted in part for the Union of Concerned Scientists to develop a GHG performance benchmark for refineries. All conclusions presented herein are those of CBE alone. The data referenced are presented and documented in Attachment Crude–1, which is attached hereto, and incorporated into this comment. References cited in this section (e.g., *(22)*) are given in Attachment Crude–1. (Attached as CBE Exhibit ZZ Attachment Crude–1)

facility capacity utilization is not reported, but underestimates emission intensity. Also, ARB's emissions reports are not publicly verifiable because ARB allows refiners to keep the underlying data secret. Nevertheless, and despite this underestimation, ARB-reported emissions from all major California refineries exceed average Midwest and East Coast emissions and seven major California refineries exceed average Gulf Coast refinery emissions.

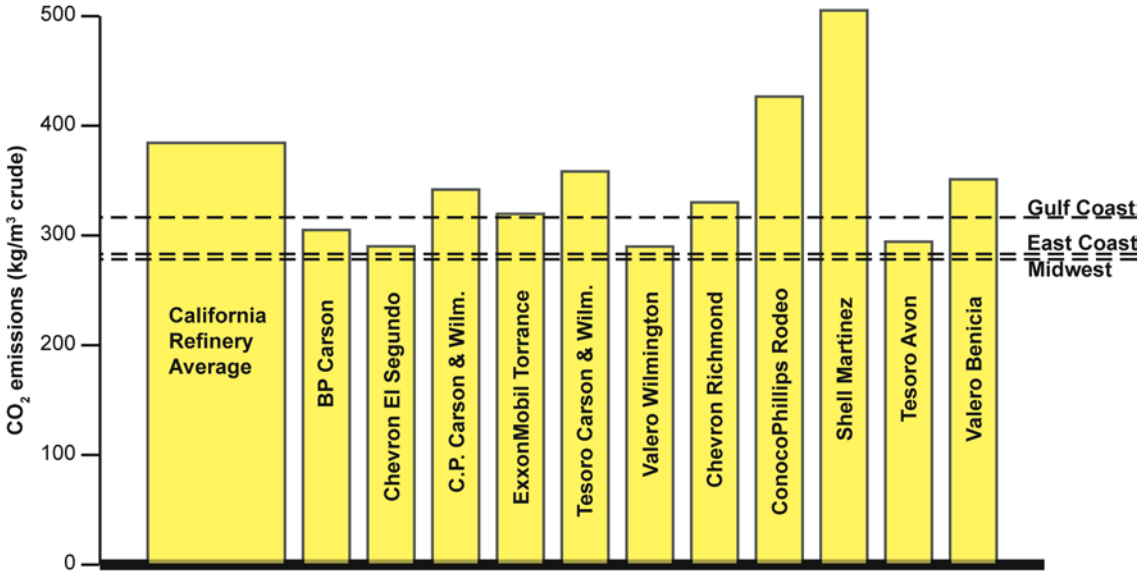

Figure Crude–1. Refinery CO_2 emission intensity, California vs other U.S. regions

U.S. East Coast, Midwest, and Gulf Coast (PADDs 1–3): five year average of 2003–2008 data from reference 1. California refinery average: five year average of 2004–2009 data from Table 2-1 attached. Facility emissions: two year average of 2008–2009 facility-reported emissions per vol. atmospheric crude distillation capacity; data from tables 2-5, 2-6 attached. Facility emissions may be underestimated by the assumption of 100% capacity utilization and/or errors in facility-reported emissions.

Refinery emissions performance across the rest of the U.S. demonstrates what refineries can achieve under the right conditions. Average statewide refinery emissions in California (384 kg/m^3 crude refined, 2004–2009) could be reduced by roughly 18 % if California refineries matched Gulf Coast refinery average performance (316 kg/m^3) and by roughly 28 % if California matched Midwest refinery average performance (278 kg/m^3). ARB's analysis commits a serious error by ignoring this evidence that a large refinery emission reduction is available. ARB does not, propose this measure.

2. ARB fails to analyze what California refineries are refining

The increasing energy-and emissions-intensities of processes[91] to make gasoline, distillate and jet fuel from denser and more contaminated crude oil has been demonstrated and measured across U.S. refineries. (See references in Attachment Crude-1, 1, 3, 4, 9, 28–33,

[91] Carbon rejection, hydrogen injection, and supporting processes

referred to from here on only by reference number.) In 2007, a seminal paper by researchers that ARB separately used as key technical advisors warned: ***"A transition to low-quality and synthetic petroleum resources such as tar sands or coal-to-liquids synfuels could raise upstream GHG emissions by several gigatonnes of carbon (GtC) per year by mid-century unless mitigation steps are taken."*** *(30)* In 2008 and 2009 CBE provided ARB detailed data, analysis, and advice on this issue. In 2010 CBE's work showing how crude feed quality not only drives, but also predicts, refinery CO_2 emissions intensity was published in the peer reviewed American Chemical Society journal *Environmental Science & Technology* with the following abstract:

> The greenhouse gas emission intensity of refining lower quality petroleum was estimated from fuel combustion for energy used by operating plants to process crude oils of varying quality. Refinery crude feed, processing, yield, and fuel data from four regions accounting for 97% of U.S. refining capacity from 1999–2008 were compared among regions and years for effects on processing and energy consumption predicted by the processing characteristics of heavier, higher sulfur oils. Crude feed density and sulfur content could predict 94% of processing intensity, 90% of energy intensity, and 85% of carbon dioxide emission intensity differences among regions and years and drove a 39% increase in emissions across regions and years. Fuel combustion energy for processing increased by approximately 61 MJ/m^3 crude feed for each 1 kg/m^3 sulfur and 44 MJ/m^3 for each 1 kg/m^3 density of crude refined. Differences in products, capacity utilized, and fuels burned were not confounding factors. Fuel combustion increments observed predict that a switch to heavy oil and tar sands could double or triple refinery emissions and add 1.6–3.7 gigatons of carbon dioxide to the atmosphere annually from fuel combustion to process the oil. *(1)*[92]

Importantly, this peer reviewed work showed that **the high emission intensity reported by San Francisco Bay Area refineries as a group can be explained by the relatively low quality of the S.F. Bay area refinery crude feed.**

More recently, CBE gathered extensive additional data specific to California refineries. Review of these data *(Attachment Crude–1)*[93] reveals that California refineries are not different except that they are extreme: their performance falls along a continuum observed among U.S. refining regions. **California refinery performance is extreme for the factors linked to emissions from processing lower quality crude. These are energy intensity, processing intensity, by-production of coke and fuel gas associated with processing intensity, hydrogen production, and crude feed density.** California performance is similar to other regions for factors that are not linked to crude quality and emissions nationally: secondary products processing; motor fuels yield; the mix of fuels burned in refineries.

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[92] This paper: Karras, 2010. Combustion emissions from refining lower quality oil: What is the global warming potential? *Env. Sci. Technol.* 44(24): 9584–9589. DOI 10.1021/es1019965; including Supporting Information available from the American Chemical Society free of charge at: http://pubs.acs.org/doi/abs/10.1021/es1019965 is hereby attached electronically. This paper has been given to ARB previously. Its supporting documentation is lengthy and more efficiently addressed and accessible to all parties electronically. It is referenced formally herein as attached for the record

[93] Research presented in Attachment Crude–1 was conducted in part for the Union of Concerned Scientists to develop a GHG performance benchmark for refineries. All conclusions presented herein are those of CBE alone.

Applying the same analysis method used in our peer reviewed work *(1)* to the California data confirms that the driving impact of crude feed quality on emissions explains California refiners' extreme-high emission intensity. Figure Crude-2 below shows observations for California refineries 2004–2009 with those published from the national work for each of the four largest U.S. Petroleum Administration Defense districts (PADDs) 1999–2008. *(1)* Each of the 46 observations shown represent the annual average for one of these five regions in one year. The ten observations appearing closest to the California observations are from PADD 5, which includes California. Note the trend among these observations with respect to the positions of observed (vertical scale) and predicted (horizontal scale) energy intensity. Refining lower quality crude increases energy intensity left to right in this chart. Refining higher quality (lower density, lower sulfur, or both) crude reduces refinery energy intensity right to left in the chart.

Energy intensity—the amount of fuel energy refiners burn to process each cubic meter of crude—relates to refinery emissions intensity. Energy intensity *(EI)* relates directly to emissions intensity for California refineries, as shown in the detailed results illustrated in this chart, which are presented in Table Crude-1 below. This makes sense because burning more of the same fuels emits more combustion products; it emits more CO_2.

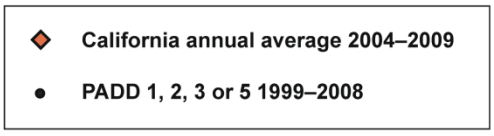
Figure Crude–2. Refinery energy intensity predicted by crude feed density and sulfur content
Prediction for California refineries on 1999–2008 data from U.S. refineries

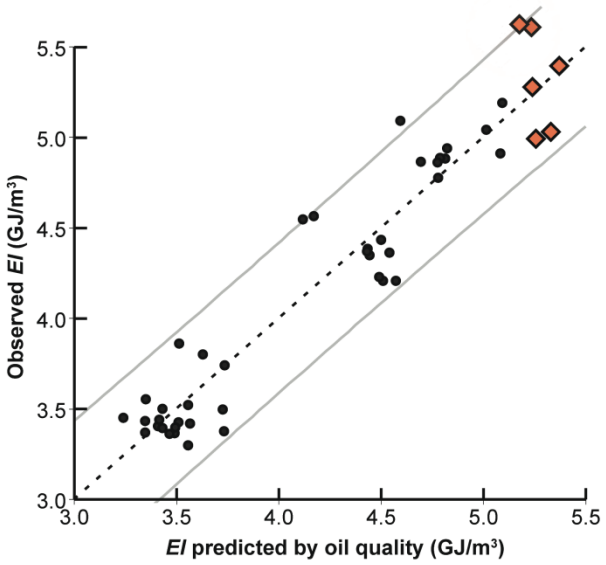
R^2 0.90

Diagonal lines bound the 95% confidence of prediction for observations

Figure adapted from Figure 1 in *Env. Sci. Technol.* 44(24) 9584–9589; DOI 10.1021/es1019965; American Chemical Society

Data from Table Crude–1





Observed California emissions fall within the prediction in four of six cases and fall within 2% of the confidence of prediction in all cases. Overall, emissions predicted by crude feed quality are within 1% of the average 2004-2009 California refinery emissions observed. Thus, the driving causal factor boosting California refinery emissions intensity to its extreme high, and also driving the less extreme performance in other U.S. refining regions that California refineries could achieve, is known. This supports the availability of refinery emissions reductions that ARB's analysis ignores.

ARB staff says it believes "[h]eavier sour crude oil inherently takes more energy to process." *(40).* But despite this assertion, and contrary to its confusing LCFS document titles, which imply that it analyzed crude quality impacts of the "average crude refined in California" *(34, 35),* ARB has reported no quantitative analysis of California crude feed quality impacts on

refinery emissions. None. Moreover, ARB could not have done any such analysis by its own admission. On 23 June 2011, months after CBE requested the data informally and weeks after CBE filed a formal request pursuant to the California Public Records Act, ARB staff finally admitted that they could find no records relating to the density and/or sulfur content of crude oil refined in California. *(15)*[94] Since ARB did not collect the data to find out what was being refined—with respect to the key refinery emission intensity drivers crude feed density and sulfur—ARB did not analyze the effects of crude feed quality on refinery emissions.

Having failed to identify California refiners' extreme-high emissions intensity, ARB then fails to analyze its major cause. Ignoring both the less polluting refinery performance everywhere else, and the causal evidence showing how California refineries can achieve this less polluting performance, ARB's analysis ignores available emission reductions.

[94] See Attachment Crude–1 for ARB's response to this CBE Public Records Act request.

Table Crude-1. Refinery energy intensity and CO_2 emission intensity predicted by crude feed quality

		EI	density	sulfur	cap.	prod.	*EI* pred. 95% confidence			Fuel mix	Emit pred. 95% conf.			Obs. CO
PADD	Year	(GJ/m^3)	(kg/m^3)	(kg/m^3)	ut. (%)	ratio	Lower	Central	Upper	(kg/GJ)	Lower	Central	Upper	(kg/m^3)
1	1999	3.451	858.20	8.24	90.9	3.668	2.877	3.241	3.604	81.53	235	264	294	281
1	2000	3.430	860.18	8.00	91.7	3.489	2.987	3.349	3.711	80.34	240	269	298	276
1	2001	3.518	866.34	7.71	87.2	3.479	3.198	3.559	3.919	81.85	262	291	321	288
1	2002	3.426	865.71	7.45	88.9	3.605	3.152	3.511	3.870	81.08	256	285	314	278
1	2003	3.364	863.44	7.43	92.7	3.321	3.133	3.493	3.853	81.51	255	285	314	274
1	2004	3.416	865.44	7.79	90.4	3.397	3.209	3.568	3.927	81.46	261	291	320	278
1	2005	3.404	863.38	7.17	93.1	3.756	3.048	3.410	3.772	81.23	248	277	306	277
1	2006	3.440	864.12	7.17	86.7	3.522	3.054	3.417	3.780	80.40	246	275	304	277
1	2007	3.499	864.33	7.26	85.6	3.443	3.067	3.433	3.800	82.28	252	282	313	288
1	2008	3.551	863.65	7.08	80.8	3.400	2.972	3.352	3.733	83.26	247	279	311	296
2	1999	3.368	858.25	10.64	93.3	4.077	2.984	3.347	3.711	78.11	233	261	290	263
2	2000	3.361	860.03	11.35	94.2	4.132	3.104	3.468	3.832	77.56	241	269	297	261
2	2001	3.396	861.33	11.37	93.9	4.313	3.126	3.495	3.863	77.46	242	271	299	263
2	2002	3.393	861.02	11.28	90.0	4.345	3.068	3.432	3.796	77.90	239	267	296	264
2	2003	3.298	862.80	11.65	91.6	4.281	3.195	3.558	3.922	78.00	249	278	306	257
2	2004	3.376	865.65	11.86	93.6	4.167	3.369	3.733	4.098	77.25	260	288	317	261
2	2005	3.496	865.65	11.95	92.9	4.207	3.362	3.725	4.089	77.27	260	288	316	270
2	2006	3.738	865.44	11.60	92.4	3.907	3.380	3.738	4.095	75.84	256	283	311	284
2	2007	3.800	864.07	11.84	90.1	4.161	3.270	3.629	3.989	75.55	247	274	301	287
2	2008	3.858	862.59	11.73	88.4	4.333	3.154	3.515	3.875	74.97	236	263	291	289
3	1999	4.546	869.00	12.86	94.7	3.120	3.759	4.117	4.476	71.61	269	295	321	326
3	2000	4.563	870.29	12.97	93.9	3.120	3.813	4.172	4.531	71.87	274	300	326	328
3	2001	4.348	874.43	14.34	94.8	3.128	4.086	4.444	4.803	72.43	296	322	348	315
3	2002	4.434	876.70	14.47	91.5	3.251	4.140	4.499	4.859	72.71	301	327	353	322
3	2003	4.381	874.48	14.43	93.6	3.160	4.076	4.435	4.794	72.81	297	323	349	319
3	2004	4.204	877.79	14.40	94.1	3.228	4.213	4.572	4.930	73.43	309	336	362	309
3	2005	4.205	878.01	14.40	88.3	3.316	4.149	4.511	4.873	73.24	304	330	357	308
3	2006	4.367	875.67	14.36	88.7	3.176	4.067	4.433	4.798	74.15	302	329	356	324
3	2007	4.226	876.98	14.47	88.7	3.205	4.127	4.491	4.856	74.93	309	337	364	317
3	2008	4.361	878.66	14.94	83.6	3.229	4.165	4.540	4.915	74.48	310	338	366	325
5	1999	4.908	894.61	11.09	87.1	2.952	4.713	5.082	5.451	70.27	331	357	383	345
5	2000	5.189	895.85	10.84	87.5	3.160	4.725	5.092	5.460	69.09	326	352	377	358
5	2001	5.039	893.76	10.99	89.1	3.231	4.648	5.014	5.380	69.38	322	348	373	350
5	2002	4.881	889.99	10.86	90.0	3.460	4.450	4.814	5.178	69.15	308	333	358	338
5	2003	4.885	889.10	10.94	91.3	3.487	4.422	4.788	5.153	69.40	307	332	358	339
5	2004	4.861	888.87	11.20	90.4	3.551	4.410	4.775	5.140	69.89	308	334	359	340
5	2005	4.774	888.99	11.38	91.7	3.700	4.409	4.780	5.151	69.88	308	334	360	334
5	2006	4.862	887.65	10.92	90.5	3.615	4.331	4.695	5.060	69.32	300	325	351	337
5	2007	5.091	885.54	11.07	87.6	3.551	4.235	4.594	4.953	69.12	293	318	342	352
5	2008	4.939	890.16	12.11	88.1	3.803	4.456	4.824	5.191	68.39	305	330	355	338
Predictions for California refineries														
Calif. average, 2004			899.23	11.46	93.0	3.633	4.881	5.256	5.632	70.82	346	372	399	354
Calif. average, 2005			900.56	11.82	95.0	3.801	4.937	5.329	5.721	71.06	351	379	407	358
Calif. average, 2006			899.56	11.73	91.5	3.845	4.861	5.239	5.616	72.65	353	381	408	384
Calif. average, 2007			899.84	11.89	88.3	3.814	4.866	5.234	5.603	71.43	348	374	400	401
Calif. average, 2008			902.00	12.85	91.0	4.087	4.980	5.370	5.759	71.02	354	381	409	383
Calif. average, 2009			901.38	11.70	82.9	4.045	4.837	5.200	5.564	70.54	341	367	392	397

EI: refinery energy intensity as measured by fuel energy consumed/vo. crude refined.

Cap. ut.: operable refinery capacity utilization as defined by U.S. EIA.

Prod. ratio: the ratio by volume of gasolines, distillate, kerosenes and naphtha to other refinery products.

Fuel mix emission intensity measured from reported data as detailed in Table 2-1.

Data from Table 2-1.

CBE asks ARB to note that this evidence also supports ARB's "clean fuels" standard by further debunking industry claims that making California gasoline and diesel pollutes.

Specifically, refiners wrongly blame the extra product treating and hydrogen needed to meet ARB fuel sulfur and aromatics standards alone for higher refinery emissions. But California refiners' average product hydrotreating and reforming capacities are similar to those of other regions and even a bit lower than the Midwest averages, on an equivalent capacity basis. *(Data from Table 2-1.)* This alone makes their claim nearly impossible.

Further, the aggressive hydrogen addition and removal of process catalyst poisons needed to make gasoline and diesel blendstocks from denser, more contaminated oils—whether for California fuels or those sold elsewhere—uses much more hydrogen/m^3 oil feed than does product stream hydrotreating of gasoline and diesel. *(1, 38)* This is why refinery hydrogen production increases with crude feed density *(1, 3)*, and capacity for aggressive hydroprocessing rather than product hydrotreating *(1)*, nationwide.

Refinery capacity for this aggressive hydrocracking and hydrotreating of gas oil and residua is higher in California than other regions, while product hydrotreating capacity is not. *(Table 2-1)* Thus, the vast majority of the hydrogen energy and emissions commitments for California refining are for making product from the extra gas oil and residua in lower quality crude. See Figure Crude–3.

Figure Crude–3. Hydrogen use for hydroprocessing various feeds, California refineries, 1995 and 2007 (MMscf/d)

Based on 100% capacity

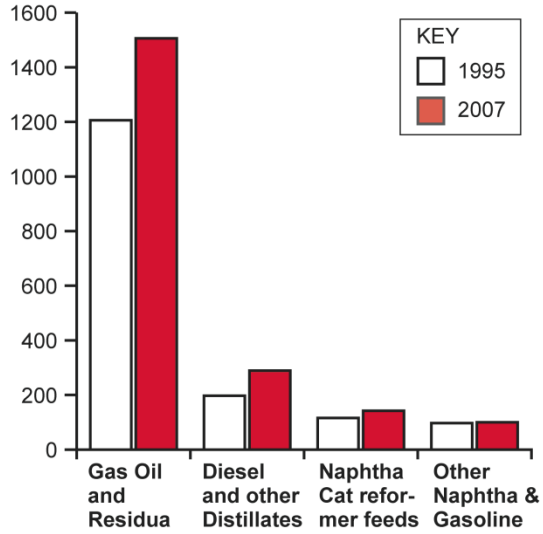
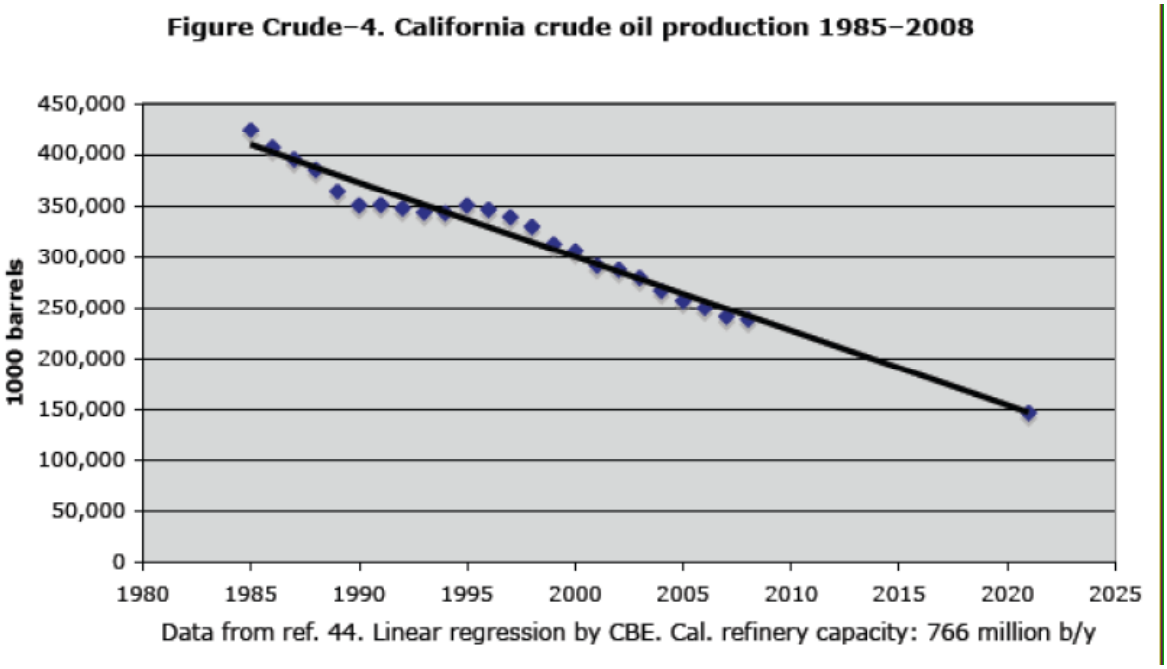


Figure adapted from CBE (2008) analysis citing references 6 and 38 herein.

In sum, "dirty" crude, not "clean" fuels, is the main causal factor driving California refineries' extreme-high CO_2 emission intensity.



3. <u>ARB fails to analyze emissions from changes in what refineries are refining</u>.

Refiners often claim it is impossible or too difficult to switch from an existing high-pollution crude supply. This claim is not correct in this case, and ARB knows of at least one reason to suspect it is wrong: California refiners have spent the last two years asking ARB to change its LCFS so that they can refine new sources of crude. Nevertheless, ARB's refinery emissions reduction analysis essentially ducks analysis of this question altogether. That is a serious error.

The long, terminal decline of California's existing crude production sources that has continued since the mid-1980s (Figure Crude–3); government analysis *(18);* and industry analysis *(19)* all project with confidence that some 70–76% of crude processed by California refineries in 2020 will <u>not</u> be from existing California production. Further, the ongoing decline of Alaska's current production *(18, 19)* and the ease of decadal switching among foreign supplies demonstrated historically *(14)* show that, for all practical purposes, up to three-quarters of the 2020 California crude feed will be from "new" sources. California refineries <u>must</u> select and adjust to new and different crude oils.

Since California refineries must change the driving factor causing their extreme-high emission intensity, they can choose blends of "new" crude oils of better quality, like every other major U.S. refining region does, and that would curb their emissions. Replacing the 70% of refinery crude input that will be lost from current California production by 2020 with crude the quality of the total average East Coast refinery input could curb average California refinery emission intensity to approximately 308 kg/m^3, a reduction of –20% or –7.8 million tonnes/year, as CO_2. This is based on the same data and methods that predicted currently observed California refinery emissions within 1% on average *(1),* and is detailed in Table Crude–2 below.

Table Crude-2. 2020 California refinery CO_2 emission predictions for two scenarios

PADD	Year	*EI* (GJ/m^3)	density (kg/m^3)	sulfur (kg/m^3)	cap. ut. (%)	prod. ratio	*EI* pred. 95% confidence Lower	Central	Upper	Fuel mix (kg/GJ)	Emit pred. 95% conf. Lower	Central	Upper	Obs. CO_2 (kg/m^3)
1	1999	3.451	858.20	8.24	90.9	3.668	2.877	3.241	3.604	81.53	235	264	294	281
1	2000	3.430	860.18	8.00	91.7	3.489	2.987	3.349	3.711	80.34	240	269	298	276
1	2001	3.518	866.34	7.71	87.2	3.479	3.198	3.559	3.919	81.85	262	291	321	288
1	2002	3.426	865.71	7.45	88.9	3.605	3.152	3.511	3.870	81.08	256	285	314	278
1	2003	3.364	863.44	7.43	92.7	3.321	3.133	3.493	3.853	81.51	255	285	314	274
1	2004	3.416	865.44	7.79	90.4	3.397	3.209	3.568	3.927	81.46	261	291	320	278
1	2005	3.404	863.38	7.17	93.1	3.756	3.048	3.410	3.772	81.23	248	277	306	277
1	2006	3.440	864.12	7.17	86.7	3.522	3.054	3.417	3.780	80.40	246	275	304	277
1	2007	3.499	864.33	7.26	85.6	3.443	3.067	3.433	3.800	82.28	252	282	313	288
1	2008	3.551	863.65	7.08	80.8	3.400	2.972	3.352	3.733	83.26	247	279	311	296
2	1999	3.368	858.25	10.64	93.3	4.077	2.984	3.347	3.711	78.11	233	261	290	263
2	2000	3.361	860.03	11.35	94.2	4.132	3.104	3.468	3.832	77.56	241	269	297	261
2	2001	3.396	861.33	11.37	93.9	4.313	3.126	3.495	3.863	77.46	242	271	299	263
2	2002	3.393	861.02	11.28	90.0	4.345	3.068	3.432	3.796	77.90	239	267	296	264
2	2003	3.298	862.80	11.65	91.6	4.281	3.195	3.558	3.922	78.00	249	278	306	257
2	2004	3.376	865.65	11.86	93.6	4.167	3.369	3.733	4.098	77.25	260	288	317	261
2	2005	3.496	865.65	11.95	92.9	4.207	3.362	3.725	4.089	77.27	260	288	316	270
2	2006	3.738	865.44	11.60	92.4	3.907	3.380	3.738	4.095	75.84	256	283	311	284
2	2007	3.800	864.07	11.84	90.1	4.161	3.270	3.629	3.989	75.55	247	274	301	287
2	2008	3.858	862.59	11.73	88.4	4.333	3.154	3.515	3.875	74.97	236	263	291	289
3	1999	4.546	869.00	12.86	94.7	3.120	3.759	4.117	4.476	71.61	269	295	321	326
3	2000	4.563	870.29	12.97	93.9	3.120	3.813	4.172	4.531	71.87	274	300	326	328
3	2001	4.348	874.43	14.34	94.8	3.128	4.086	4.444	4.803	72.43	296	322	348	315
3	2002	4.434	876.70	14.47	91.5	3.251	4.140	4.499	4.859	72.71	301	327	353	322
3	2003	4.381	874.48	14.43	93.6	3.160	4.076	4.435	4.794	72.81	297	323	349	319
3	2004	4.204	877.79	14.40	94.1	3.228	4.213	4.572	4.930	73.43	309	336	362	309
3	2005	4.205	878.01	14.40	88.3	3.316	4.149	4.511	4.873	73.24	304	330	357	308
3	2006	4.367	875.67	14.36	88.7	3.176	4.067	4.433	4.798	74.15	302	329	356	324
3	2007	4.226	876.98	14.47	88.7	3.205	4.127	4.491	4.856	74.93	309	337	364	317
3	2008	4.361	878.66	14.94	83.6	3.229	4.165	4.540	4.915	74.48	310	338	366	325
5	1999	4.908	894.61	11.09	87.1	2.952	4.713	5.082	5.451	70.27	331	357	383	345
5	2000	5.189	895.85	10.84	87.5	3.160	4.725	5.092	5.460	69.09	326	352	377	358
5	2001	5.039	893.76	10.99	89.1	3.231	4.648	5.014	5.380	69.38	322	348	373	350
5	2002	4.881	889.99	10.86	90.0	3.460	4.450	4.814	5.178	69.15	308	333	358	338
5	2003	4.885	889.10	10.94	91.3	3.487	4.422	4.788	5.153	69.40	307	332	358	339
5	2004	4.861	888.87	11.20	90.4	3.551	4.410	4.775	5.140	69.89	308	334	359	340
5	2005	4.774	888.99	11.38	91.7	3.700	4.409	4.780	5.151	69.88	308	334	360	334
5	2006	4.862	887.65	10.92	90.5	3.615	4.331	4.695	5.060	69.32	300	325	351	337
5	2007	5.091	885.54	11.07	87.6	3.551	4.235	4.594	4.953	69.12	293	318	342	352
5	2008	4.939	890.16	12.11	88.1	3.803	4.456	4.824	5.191	68.39	305	330	355	338
Predictions for California refineries in 2020														
Emit reduction case			883.14	8.24	91.8	3.836	3.953	4.313	4.674	71.40	282	308	334	--
Emit increase case			948.39	22.59	91.8	3.836	7.511	8.037	8.563	71.40	536	574	611	--

Key to S.F. Bay Area prediction cases. Case inputs:
Emit reduction case: 2020 crude feed is 70/30 blend of PADD 1 quality/California-produced crude.
Emit increase case: 2020 crude feed is 70/30 blend of heavy oil/California-produced crude.
California-produced crude quality is 2004–2008 average density and sulfur content from Table 2-3.
PADD 1 quality is 2004–2008 avg. from Table 2-1; USGS avg. heavy oil (957.4 kg/m^3 *d*; 27.8 kg/m^3 *S*) *(1, 28)*
2020 California capacity utilization, products ratio & fuel mix are 2004–2008 averages from Table 2-1.

EI: refinery energy intensity as measured by fuel energy consumed/vo. crude refined.
Cap. ut.: operable refinery capacity utilization as defined by U.S. EIA.
Prod. ratio: the ratio by volume of gasolines, distillate, kerosenes and naphtha to other refinery products.
Fuel mix emission intensity measured from reported data as detailed in Table 2-1.
U.S. Refinery data from Table 2-1.

Avoiding continuation of that 7.8 million tonnes/year of CO_2 emissions directly at the refineries would also curb GHG co-pollutants impacting communities near refineries, and it would support ARB's LCFS as California's massive refining industry would no longer be creating market pressure to expand heavy oil and tar sands production. Compared to total crude barrel price swings approaching $100/barrel—which we do notice at the gas pump—the dirty-oil price discount refiners would be giving up for the environment by this measure (~$5/$m^3$ or ~2 cents per gallon, see Table Crude–3) might not even be noticeable at the pump. Two cents/gallon is less than 1% of $100/barrel crude.

Table Crude–3. Light–heavy crude price spreads, U.S. imports[a]

	Discount from PADD 1–range crude 1983–2009			
Density range	**25th Percentile**	**Mean**	**75th Percentile**	
30.1–35.0 ºAPI	—	—	—	U.S. PADD 1 falls in this range[b]
25.1–30.0 ºAPI	$1.95/m³	$5.08/m³	$7.39/m³	California refining falls in this range[b]
< 20 ºAPI	$21.42/m³	$32.67/m³	$36.67/m³	Heavy oil falls in this range[c]

[a] Landed costs of imported crude from Table 24 in Petroleum Marketing Annual; DOE/EIA-0487 (2009);
[b] Based on average PADD 1, California refinery crude feeds 2004–2008, data from Table 2-1.
[c] Heavy oil as defined by U.S. Geological Survey, and worldwide average density, from reference 28.

However, that two cents on the gallon cost adds up to an attractive profit-boosting opportunity when refiners account for the great volume of crude they process. They can be expected to switch to cheaper crude if otherwise allowed, which could greatly increase their already extreme emissions intensity. In fact, industry trade journals advertise this strategy even as the best of them acknowledge that it will increase emissions. *(20, 33)* This means a worsening of the driving factor causing California's extreme-high refinery emission intensity is more than likely to further increase emissions unless curbed.

Replacing the 70% of refinery input that will no longer be from existing California production by 2020 with the average heavy oil, as defined by the USGS (957.4 kg/m^3 *d*; 27.8 kg/m^3 *S*) *(28, 1)* would boost average California refinery emissions to approximately 574 kg/m^3, an increase of 49% or 19.6 million tonnes/year. See Table Crude–2.

Thus, instead of some imagined barrier to switching crude sources that ARB might cite to excuse allowing 7.8 million tonnes of avoidable refinery emissions annually, crude sources are changing and that will further increase emissions unless policy limits refinery emissions, crude feed quality, or both.

Failing to analyze changes in what refiners are refining—the driving factor for their high emissions which it also ignored—ARB ignores both a readily achievable emission reduction and an enormous pollution threat.

4. <u>ARB's cap-and-trade scheme will increase refinery emissions dramatically</u>.

ARB asserts generally that it intends to allow emissions to continue or even increase from some sources so long as total emissions meet a declining cap, and even if it did not make this crucial admission, that is undeniably the central logic and actual effect of its cap-and-trade pollution trading scheme. It <u>replaces</u> direct emissions control requirements on specific sources because it <u>must</u> create the "flexibility" that allows some sources to pay for actions intended to occur elsewhere. This is at the core of its concept.

Here, ARB has grossly mistaken the emissions performance, emission reduction opportunity, and emission increase potential of the largest refining center in the U.S. West, and this industry is uniquely entrenched.[96] Setting aside its numerous other severe flaws and injustices for a moment to focus on this one clearly, applying ARB's cap-and-trade scheme to refineries will incent a crude switch that almost certainly would increase emissions drastically; it will do so because this is the way it is designed; and ARB's analysis inappropriately ignores this fundamental error in ARB's program design.

California's refining industry must switch crude supplies 2011–2020 as documented above. Oil companies will net profits by actions that increase their pollution under ARB's scheme. This is simple math. From the emissions increment caused by switching to 70% heavy oil instead of PADD 1-quality oil (0.266 tonnes/m^3 crude, Table Crude–2), and the 25-year average price discount on heavy vs. PADD 1-quality oil ($32.67/$m^3$, Table Crude–3), switching to heavy crude would save refiners about $121 per tonne of incremental GHG emitted by this "dirty crude" switch. This exceeds any "carbon price" ARB has talked about seriously by several times. By telling refiners they can emit the extra CO_2 for, say $25/tonne, ARB is telling them the dirtier oil is more profitable.

That means ARB's cap-and-trade scheme will <u>incent</u> refiners to profit from making an historic crude switch in exactly the wrong direction and <u>sell them exemptions from</u> the emission control requirements we need to prevent the drastic emission increase that is sure to follow and might add +20 million tonnes/y. Total refinery emissions would then preclude meeting IPCC climate targets in California alone, even if every other emission source went to zero. Toxic GHG copollutants—which always emit along with CO_2 from burning refinery fuels—would increase, perhaps by a similar percentage, worsening already-severe and disparate environmental health threats in communities near refineries.

Further, ARB's own U.C. advisors warned in writing that including the oil industry in a multi-sector cap-and-trade scheme will not work—that oil companies would buy emission credits instead of curbing pollution—because oil is so firmly and uniquely entrenched.[95] The new evidence on crude switching and crude price discounts provides additional evidence that independently proves the point. Together, the two bodies of evidence appear irrefutable. Tragically, ARB continues to ignore this crucial problem.

[95] Farrell and Sperling, 2007. *A low carbon fuel standard for California, part 1: Technical Analysis;* UCD-ITS-RR-07-07; Institute of Transportation Studies, U.C. Davis: Davis, California. 1 August 2007; see pages 22–24.

CONCLUSION

CBE urges you to take seriously the failures of cap and trade and its potential to cause significant environmental and health harm, and to adopt feasible superior alternatives that avoid these impacts and have a greater measure of effectiveness.

Thank you for your consideration,

Sincerely,

/s/	/s/	/s/	/s/	/s/
Julia May	Anna Yun Lee	Greg Karras	Adrienne Bloch	Maya Golden-Krasner