

# DRAFT

## State Agency Work Plans

DECEMBER 8, 2005



## Work Plans for Potential GHG Reduction Measures

### Air Resources Board

This package contains work plans prepared by ARB staff for the second-tier strategies listed in Table ES-2 of the Climate Action Team report. The potential strategies addressed are as follows:

<b>Greenhouse Gas Reduction Strategies</b>			
<b>Title</b>	<b>ARB Strategy Number</b>	<b>2010 Reduction (MMT)</b>	<b>2020 Reduction (MMT)</b>
Other New Light Duty Vehicle Technology Improvements	2-1	0	6
HFC Reduction Strategies	2-2	2.7	8.5
Transport Refrigeration Units (Electric Standby)	2-11		
Off-Road Electrification (Stationary Agricultural Engine Electrification)	2-13	0.1 (combined)	0.4 (combined)
Port Electrification	2-12		
Manure Management	2-8	0	1
Semiconductor Industry Targets (PFC Emissions)	2-7	2	2
Alternative Fuels: Biodiesel Blends	2-3	0.4	0.8
Alternative Fuels: Ethanol In Gasoline	2-9	0.7	2.7
Heavy Duty Vehicle Emission Reduction Measures	2-5	0	3
Reduced Venting And Leaks In Oil And Gas Systems	2-14	1	1

# Work Plan for Potential GHG Reduction Measure

## Air Resources Board

ARB 2-1

Strategy Name:

Other New Light Duty Vehicle Technology Improvements

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Other Involved Agencies:

None

Existing Measures:

In September 2004 the California Air Resources Board approved regulations to reduce greenhouse gas emissions from new motor vehicles. The regulations apply to new passenger vehicles and light duty trucks beginning with the 2009 model year. The standards adopted by the Board phase in during the 2009 through 2016 model years. When fully phased in, the near term (2009-2012) standards will result in about a 22 percent reduction as compared to the 2002 fleet, and the mid-term (2013-2016) standards will result in about a 30 percent reduction.

Possible New Measure(s):

Adopt new standards to phase in beginning in the 2017 model year (following up on the existing mid-term standards that reach maximum stringency in 2016). The technologies that might be employed include highly efficient hybrid vehicles, use of lightweight materials to reduce vehicle mass, and reductions in air conditioning related emissions through the use of cool paints, low-GWP refrigerants, or other approaches.

Potential GHG Reduction:

The currently adopted standards call for about a 30 percent reduction by 2016. Assuming that the new standards call for about a 50 percent reduction, phased in beginning in 2017, this measure would achieve about a 4 MMT reduction in 2020. The reduction achieved by this measure would significantly increase in subsequent years as clean new vehicles replace older vehicles in the fleet—staff estimates a 2030 reduction of about 27 MMT.

### Cost to Regulated Entities

Not yet determined.

### Implementation Steps:

In the near term, staff will continue to evaluate emerging technologies that have the potential to provide additional greenhouse gas reductions. This includes highly efficient hybrid vehicles, use of lightweight materials to reduce vehicle mass, and technologies to reduce air conditioning load, such as cool paints. The potential to mandate the use of low-GWP refrigerants will be evaluated as part of measure 2-2 (HFC reduction measures) but the results of that evaluation will be applied through this rulemaking.

Implementation of revised standards would require a new rulemaking similar to the AB 1493 rulemaking, which took three years. Because the standards are targeted at 2017 the new rulemaking would not need to begin until after 2010.

# Work Plan for Potential GHG Reduction Measure

## Air Resources Board

ARB 2-2

### Strategy Name

HFC Reduction Measures

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### Other Involved Agencies

Legislature, USEPA, BAR

### Existing Measures

In September 2004 the Board adopted limits on greenhouse gas emissions from new light-duty vehicles for model years 2009 and later. The limits apply to the combined CO<sub>2</sub>-equivalent emissions of four species (CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>, and HFCs) and thus include HFC-134a emissions resulting from leaks from vehicular air conditioners. To comply with the standards auto manufacturers have the option to use low-GWP refrigerants (refrigerants that have a lower Global Warming Potential than HFC 134a, meaning that they are less potent greenhouse gases) in new vehicles or improve the leak-tightness of new systems that continue to use HFC-134a. Research, development, and demonstration efforts are underway in the US and Europe for tighter air conditioning systems and systems that use low-GWP refrigerants. HFC-152 and CO<sub>2</sub> are the likely candidates to be low-GWP refrigerants.

For motor vehicle air conditioning systems, federal regulations pursuant to Section 609 of the Clean Air Act prohibit any person from breaching the air conditioning system on a motor vehicle without first recovering the refrigerant with equipment that meets U.S. EPA specifications, and either re-using the refrigerant or sending it to a qualified reclamation facility. The regulations require vehicle dismantlers and air conditioning service shops to have the required equipment and to employ trained operators. The U.S. EPA enforces the requirements on equipment ownership and training. However, according to our investigations, EPA has no direct means to assess compliance with the recovery requirement and does not enforce any requirement with respect to private vehicle servicing. ARB staff's investigation into HFC recovery by auto dismantlers could not document either substantial compliance or substantial disregard of the recovery requirement. However, in the instances of professional air conditioner servicing that we observed, recovery was complete.

For non-mobile air conditioning systems, federal regulations pursuant to Section 608 of the Clean Air Act prohibit the intentional venting of HFCs to the atmosphere during the maintenance, service, repair, and disposal of domestic and industrial air-conditioning and refrigeration equipment. In a recent report the U.S. EPA assumes that this prohibition is observed for large commercial/industrial refrigeration systems (for economic reasons) but not observed for small commercial/industrial systems and domestic systems.

### Possible New Measures

Staff has identified five possible measures to reduce HFC emissions from vehicular and commercial refrigeration systems. These measures could be captured under the common umbrella of an Australian-style cradle-to-grave system to be implemented in California. The Australian system involves recovery, reclamation and destruction of greenhouse gas chemicals used for refrigeration. California can expect similar success to Australia if the program is implemented in similar fashion, and can learn from the Australian experience to optimize program benefits.

Under this single program umbrella, the measures are not independent. For example, limiting the GWP of refrigerants in new vehicles (measure 2 below) would reduce the baseline emissions for two other measures (4 and 5). Thus, the measure-specific benefits depend on the order of adoption. The presumed order is shown below, based on the perceived ease of adoption as well as the ability to enforce.

1. *Ban the retail sale of HFCs in small (mostly 12-oz.) cans.* This would end the loss of can “heels” (small amounts of HFCs remaining in the can after service is complete) and prevent do-it-yourself re-filling of vehicular air conditioning systems. It would stop the cycle of leak, re-fill, leak, re-fill, and so on. Systems no longer repaired by do-it-yourself mechanics would either go empty or receive professional repair.
2. *Require that only low-GWP refrigerants be used in new vehicular systems.* For vehicles subject to the AB 1493 regulation, we assume that this would take effect in 2017 because the adopted regulations already specify standards and compliance options through 2016. For medium- and heavy-duty vehicles not subject to the AB 1493 regulation, the requirement would take effect in the 2010 timeframe. We have assumed a GWP of 120 as the cut-off for low-GWP refrigerants. Staff notes that refrigerant emissions from new vehicles alternatively could be reduced via a leakage standard similar to what the AB 1493 regulation recognizes for voluntary credit generation. However, the technical challenges of regulation-writing and enforcement would be much greater than for a GWP limit, and the benefits would be less. Therefore, we regard a leak standard as an inferior approach.
3. *Adopt specifications for new commercial refrigeration.* According to the U.S. EPA, most emissions from commercial systems are from refrigerators in retail food stores (which have a very wide range of sizes and technologies), restaurants, and

refrigerated transport vehicles (trucks and railcars). One possible specification is to limit the GWP for refrigerants used in such systems to 1300, which is the GWP of HFC-134a. (Currently, manufacturers are using HFCs with GWPs of around 3500. Systems with lower-GWP refrigerants are available--for example, ammonia or hydrocarbons--but there are safety and legal concerns about using these in public places. The workability of HFC-134a for retail food refrigeration is much less in doubt.) Another possible specification would be to require that centralized systems with large refrigerant charges and long distribution lines (to the evaporators) be avoided in favor of systems that use much less refrigerant and lack long distribution lines. These are said to have much lower leak rates. We assume that the measure would take effect in the 2010 timeframe.

- 4 *Add refrigerant leak-tightness to the “pass” criteria for vehicular Inspection and Maintenance programs (all vehicles) and adopt an “inspect and repair” measure for commercial systems.* We assume these measures would take effect in 2009. The vehicular measure could simply require that systems either be leak-free at Smog-Check, as determined with an HFC “sniffer”, or be empty and inoperable (e.g., compressor removed). Lacking data, we assume that leakage would be reduced by 50%.
5. *Enforce the federal ban on releasing HFCs.* This measure would focus on reducing emissions during the servicing and dismantling of vehicular air conditioners and commercial refrigeration systems.

Technologies that might be employed to achieve these reductions include low-GWP air conditioning systems. Many of the approaches however are based on better HFC management and do not involve the use of new technologies.

### Potential GHG Reductions

For measures 1 and 2 and the vehicular aspects of measures 4 and 5, we have estimated potential emission reductions based on the analyses in the technical support document of the AB1493 staff report.

For measure 3 and the commercial-refrigeration aspects of measures 4 and 5, our estimates are based on information developed by the U.S. EPA for the U.S. as a whole, but scaled to California. Although the U.S. EPA estimates are the products of a model whose inputs are strictly proprietary and some assumptions are not supported in their documentation, we have obtained public information from other sources that establishes plausibility for the U.S. EPA estimates. Therefore, we believe that they can be used with the understanding that they have great uncertainty and are not based on California-specific data. If control measures are to be developed, considerable effort must be made to review and firm up estimates of emission reductions.

The estimated reductions, in MMT CO<sub>2</sub>-equivalent per year, are shown below for the measures adopted *in the order shown*.

1. *Ban cans*

2010: 0 MMT      2020: 2.4 MMT

The initial impact of this measure would only be avoidance of the can “heels”. Later, excess leakage would end as the do-it-yourself systems either empty or receive professional repair. We assume that this would take a few years.

2. *GWP ≤ 120 in new vehicles (2017 for light duty vehicles, 2010 timeframe for others)*

2010: 0 MMT      2020: 0.1 to 0.9 MMT

The range in 2020 reflects the possible range of voluntary use of low-GWP refrigerants in new vehicles under the AB 1493 regulation (0 to 100% of light duty vehicles in 2017-2020; 0 to 50% assumed for other vehicles in 2009-2020).

3. *Specifications on new retail food refrigerators and refrigerated transport*

2010: 0 MMT      2020: 4 MMT

The reductions are based on a prohibition of central systems with large refrigerant charges and a GWP limit at 1300.

4. *Inspection and Repair in 2009*

	Vehicles* (all)	Commercial
2010	0.4	1.4
2020	0.3	0.9

\* If some systems will use CO<sub>2</sub>, the numbers will be lower in proportion. In 2010, GWP = 120, per measure 2.

5. *Enforce Recovery in 2009*

	Vehicles* (all)	Commercial
2010	0.1 to 0.6	0.7
2020	0.07 to 0.3	0.1

\* Range reflects ARB vs. EPA assumptions on contents at vehicle end of life. The ranges would be lower if some vehicles use CO<sub>2</sub>.

Total (approximate)

	Vehicles + Cans	Commercial*
2010	~0.7	~2
2020	~3.5	~5

\* based on unverified EPA estimates

### Cost to Regulated Entities

Not yet determined.

### Implementation Steps

1. *Ban cans* -- ARB and U.S. EPA already have work underway to better estimate the magnitude of excess HFC-134a emissions due to retail sale. The cost of lost business for manufacturers, packagers, and vendors of HFC as a retail refrigerant would have to be analyzed. The estimated time for completion is two years. ARB likely would need legislation establishing authority to regulate HFC cans.
2. *GWP<120* -- The emission effects, technical feasibility, and cost of this measure have already been addressed in general. For one complying fluid, HFC-152a, there are no significant technical issues except a fire-safety issue that is already receiving attention by U.S. EPA with positive resolution pending. . The estimated time to bring a measure to the Board for medium and heavy duty trucks is two years. For cars and light trucks already subject to GHG emission standards, this measure would be included in the development of measure 2-1 (Other new light duty vehicle technology improvements).
3. *Specifications for commercial refrigeration* -- The population of commercial systems by type of HFC, their emission rates, the technical feasibility and cost of using low-GWP refrigerants, and the rate of turnover of these systems would all need to be addressed. To acquire such information could require extramural research and extensive staff work. Tasks would include developing a baseline inventory through surveys and workshops, technical assessment of the many applications of refrigeration that vary in size and temperature, and assessing health and safety issues. The estimated time to complete an analysis and bring a measure to the Board is two to three years.

ARB (or districts) likely would need legislation for authority to regulate refrigerants in stationary-source applications.

4. *Inspection and Maintenance for vehicles* -- This measure would require the cooperation of the Bureau of Automotive Repair for method development. Legislation would likely be needed to expand the scope of the Inspection and Maintenance program.

*Inspection/repair of commercial systems* -- The population of commercial systems by type of HFC, their emission rates, the cost of maintenance programs, and the identification of an enforcement mechanism would all need to be addressed. There are no public data on these subjects known to staff. To acquire such information would require extramural research and in-house analyses on matters similar to those listed above for the low-GWP measure. The estimated time to complete an analysis and bring a measure to the Board is one to two years. New legislative authority would be needed.

5. *Enforcement of federal recovery regulations* -- This measure would require the cooperation of U.S. EPA, which would have to increase its regulatory enforcement effort. Cooperation with U.S. EPA in this regard would require a modest resource commitment by ARB. Alternatively, ARB could adopt and enforce its own regulations, which would require enabling legislation, new enforcement resources, and rulemaking.

# Work Plan for Potential GHG Reduction Measure

## Air Resources Board

ARB 2-11

Strategy Name:

Transport Refrigeration Units (Electric Standby)

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Other Involved Agencies:

None identified at this time

Existing Measures:

The Transport Refrigeration Unit (TRU) Air Toxics Control Measure was adopted in 2004. The compliance phase-in begins in 2008. This rule requires progressively cleaner diesel engines for transport refrigeration unit (TRU) applications or the use of alternative technologies including electric standby or cryogenic (CO<sub>2</sub>) units.

Possible New Measure(s):

- Require all new TRUs to be equipped with electric standby.
- Require cold storage facilities to install electric infrastructure to support electric standby TRUs.

The technologies to be employed in this measure thus include electric standby for TRUs and electric infrastructure at cold storage facilities.

Potential GHG Reduction:

Staff assumed 50 percent electrification by 2020, and TRU operation at a facility of about 30 percent. Using these assumptions staff estimates a reduction in 2020 of about 0.14 MMT.

### Cost to Regulated Entities

Incremental cost of electric standby of about \$20 million in 2010 and \$105 million in 2020. Additional facility infrastructure costs, not yet determined.

### Implementation Steps:

Normal rule development process

- Technical meeting and public workshops
- Proposed regulation and Initial Statement of Reasons
- Public Hearing
- Final Statement of Reasons

Could proceed as diesel emission control strategy under current authority.

# Work Plan for Potential GHG Reduction Measure

## Air Resources Board

ARB 2-13

Strategy Name:

Off Road Electrification (Stationary Agricultural Engine Electrification)

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Other Involved Agencies:

Public Utilities Commission  
Local air pollution control districts

Existing Measures:

A special rate structure was approved by the PUC in June 2005 for conversion of agricultural engines from diesel to electricity. This incentive rate allows PG & E and SCE to offer a reduced electricity rate to new agricultural customers who replace their diesel pump engines with an electric motor. The new rate is about 20 percent less than the current agricultural rate. This new rate is in effect for the next 10 years, although it increases annually at 1.5 percent.

There is also a "hook-up" allowance provided by the utility. Depending on the size of the electric motor (must be greater than 50 kW), the utility would provide between \$7,500 and about \$32,000 to cover the added line extension cost for power hook-up (referred to as an "adder"). This amount is on top of the current allowance for infrastructure from the utilities. Beyond the adder, the utilities would also allow farmers to make payments quarterly on any additional electrical infrastructure cost out of their pockets, with no penalty.

The combined effect of the Moyer incentive program, which would cover the capital cost of an electric motor, and the increased cost of diesel fuel give farmers a significant incentive to electrify. On average, the electric rate under the Ag ICE rate is about 7.5 cents per kWh. According to the Agricultural Energy Consumers Association, this is comparable to diesel fuel at approximately \$1.15 per gallon. Also, all ratcheted demand charges are significantly reduced, meaning that the cost during periods when farmers are not running their electric motor will be significantly reduced. Staff's understanding is that new 2006 Ag electric rates are, on average, 3.4 percent less and the ratcheted

demand charges will be eliminated. Also, PG&E is providing an electric motor rebate for customers purchasing the most efficient electric motors for their pumping operations. Use of Moyer funding could affect the amount of the rebate.

ARB is developing a Stationary (In-Use) Agricultural Engine Air Toxics Control Measure (ATCM) for Board consideration in 2006. This proposed measure is designed to ensure that diesel engines, if used in lieu of electrification, use the best available emission control technology.

***South Coast Air Quality Management District Rule 1110.2 (March 2005)***

This rule was updated to add a specific compliance schedule for agricultural engine emission limits. The limits for agricultural engines are the most stringent to date due to the District forcing agriculture into natural gas engines and electrification.

***San Joaquin Valley Air Pollution Control District IC Engine Rule 4702 (June 2005)***

This rule requires non-certified or Tier 0 agricultural diesel engines to meet Tier 3 or Tier 4 offroad standards, depending on hp, beginning January 1, 2010. Current Tier 1 and 2 diesel engines must meet Tier 4 offroad standards by January 1, 2015 or 12 years after their installation date, whichever is later. The rule also requires cleaner spark-ignited engines as well in 2008.

Possible New Measure(s):

This measure would likely use a combination of regulatory measures, cooperative agreements and incentive approaches. ARB could conduct outreach to encourage replacement of diesel engines with electric motors to take advantage of the incentive rate structure and Moyer funding, and to comply with District and pending ARB regulations. The technology employed thus would be electrification.

Potential GHG Reduction:

The in-use stationary diesel agricultural engine regulation currently under development at ARB will propose emission performance standards for engines rather than mandate electrification or any other specific compliance option. Staff believes that most engines will be replaced with new cleaner certified diesel engines or with electric motors. Retrofit and alternative fuels are other potential means of compliance. Staff is unable to predict what compliance option farmers will choose. In order to calculate the potential GHG reduction from agricultural engine electrification, staff assumes that 20 percent of existing in-use stationary diesel agricultural irrigation pump engines are replaced with electric motors by 2010 which would result in a 2010 reduction of .084 MMT.

Cost to Regulated Entities

Based on current assumptions staff estimates the cost of this measure as about \$15 million (5,000 pump engines x 0.20 x \$15,000 (average capital cost of electric motor). The cost estimate does not account for possible additional line extension and/or

electrical hook-up charges (highly variable for agricultural electric customers depending on location, crop, well-depth, and other variables) nor does it include any potential operating cost savings due to electrification. The estimate also does not account for any potential funds that may be provided to incentivize the switch from diesel- to electric-powered agricultural irrigation pumps.

Implementation Steps:

Working in association with agricultural industry organizations and electric utilities, staff will monitor the switch from diesel to electricity and calculate GHG benefits.

# Work Plan for Potential GHG Reduction Measure Air Resources Board

ARB 2-12

Strategy Name:

Port Electrification

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Other Involved Agencies:

Local air pollution control districts  
Port authorities  
Energy agencies

Existing Measures:

No measures are currently in place requiring the use of shore-side power. However, the ARB staff will propose a measure to the Board in December 2005 that requires emission reductions from the auxiliary engines used on ocean-going vessels (which supply electrical power for vessels). Most vessels are expected to comply with the proposed regulation through the use of cleaner marine distillate fuels. However, vessel operators can also comply with this proposed regulation through the use of shore-side power, and a limited number of vessels may pursue this compliance option.

In addition, ARB staff expects to develop a measure to go to the Board in 2006 to address emissions from ocean-going vessels that frequently visit California ports. One of the potential compliance strategies is the use of shore-side power.

Finally, the Port of Los Angeles was tasked with developing a strategy to cap emissions at current levels as the port expands in the future. To achieve this goal the port developed the "No Net Increase" Report (June 2005). This report details numerous emission control strategies to reduce emissions at the port, including an option to expand the use of shore-side power. The Port of Los Angeles already has implemented shore-side power in some China Shipping cargo vessels, and additional applications are under discussion.

### Possible New Measure(s):

- Require phase-in of vessel modifications and infrastructure to support expanded use of shore-side power.

Technologies to be employed in this measure include vessel modifications and shore-side infrastructure.

### Potential GHG Reduction:

Staff estimates that shore-side power could be used in 2-5% of ship visits in 2010 and 20-25% of ship visits in 2020. The reductions in CO<sub>2</sub> emissions shown below are the difference between the CO<sub>2</sub> emissions resulting from the generation of shore-side power supplied by utility companies and the CO<sub>2</sub> emissions resulting from power generated by shipboard diesel generators. For shore-side power emissions the estimate uses the average emissions from all grid sources (including combustion sources, hydropower and nuclear power plants). If one assumes that marginal shore-side power is provided by combustion sources alone the net reductions would be roughly 50% smaller.

2010

- Goal: 5 percent of ship visits use shore-side power
- Estimated CO<sub>2</sub> reduction: 0.016 MMT

2020

- Goal: 25 percent of ship visits use shore-side power
- Estimated CO<sub>2</sub> reductions: 0.18 MMT

### Cost to Regulated Entities

Staff estimates that the shore-side infrastructure will cost between \$3.5 and \$10 million per terminal, and vessel modification will cost between \$0.5 and \$1.5 million per ship. Based upon these costs, the overall capital cost to implement shore-side power is estimated to be \$15 to \$25 million in 2010, and \$180 to \$270 million in 2020.

### Implementation Steps:

The implementation of shore-side power is a challenge because it requires the construction of dock-side facilities as well as ship modifications (except for new builds) on primarily foreign-flagged vessels. In addition, cooperation is necessary to ensure that the connections between the vessel and terminal are compatible.

There are several different possible approaches to implementing shore-side power. One option would be a control measure requiring vessels that frequently visit California to further reduce their emissions. These additional reductions could be met through the

use of shore-side power or other options. Another option would be a cooperative agreement among the various affected parties. Under such an agreement, the regulatory agencies, Ports, affected ship operators, and other parties would sign on to an plan delineating an implementation schedule and contingencies if the required level of progress is not achieved. A third way to implement shore-side power is through provisions of Port terminal lease renewals or California Environmental Quality Act (CEQA) mitigation requirements.

Comments:

The implementation of shore-side power is technically feasible, and there are many port terminals where vessels currently plug in. Current applications include: (1) Princess cruise ships at Juneau, Alaska and Seattle, Washington; (2) China Shipping cargo vessels at the port of Los Angeles; (3) USS-POSCO steel carrier vessels at a Pittsburg, California terminal; (4) a training cargo vessel operated by the California Maritime Academy; and (5) U.S. Navy ships. In addition, staff at the port of Los Angeles are negotiating with cruise ship companies to cold-iron passenger ships that visit the port of Los Angeles.

While technically feasible, the implementation of shore-side power is not practical for all vessels. Shore-side power would be most practical for vessels that frequently visit the same port terminal because landside infrastructure costs, as well as vessel modifications, are very high. Other factors that need to be considered in the cost-effectiveness of shore-side power projects include the duration of the port visits, the power loads utilized while at dockside, and whether shore-side facilities can be used by other vessels. ARB is currently preparing a technical report on the cost-effectiveness of shore-side power at California ports. This report will discuss current applications of shore-side power, the results of the cost-effectiveness analysis on a ship category-basis (container ships, passenger ships, etc.), the California ports most likely to utilize shore-side power, and future shipping trends that may impact cost-effectiveness. The report is expected to be released in early 2006.

# Work Plan for Potential GHG Reduction Measure

## Air Resources Board

ARB 2-8

Strategy Name:

Manure Management

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Other Involved Agencies:

California Department of Food and Agriculture  
Office of Agriculture and Environmental Stewardship  
California Energy Commission

Existing Measures:

The following adopted district rules are intended to reduce gaseous pollutants (other than greenhouse gases) from manure management activities:

***South Coast Rule 1127—Emission Reductions from Livestock Waste***

This rule reduces ammonia (NH<sub>3</sub>), volatile organic compound (VOC) and particulate matter (PM<sub>10</sub>) emissions from livestock waste. It applies to dairy farms and related operations (such as heifer and calf farms) with at least 50 head, and to manure processing operations. For dairy farms, the rule requires best management practices for removing manure from corrals, minimizing excess water in corrals, paving feedlanes, and specifies the frequency of manure clearing and stockpile removal. By January 1, 2006, dairy farms must remove, or contract to remove, livestock waste to a manure processing operation, approved agricultural land within the district, or a combination of both. The rule requires manure processing operations to only process manure by an anaerobic digester, a composting operation in compliance with Rule 1133.2, or an alternative manure composting system.

***South Coast Rule 1133.2—Emission Reductions from Co-Composting Operations***

This rule reduces VOC and NH<sub>3</sub> emissions from new and existing co-composting operations that use biosolids and/or manure mixed with bulking agents to produce

compost. Existing operations are required to submit plans to reduce overall emissions by 70%. New operations must conduct the composting active phase within an enclosure and the curing phase using negative pressure aeration. Exhaust from the enclosure and aeration system must be vented to a control device with at least 80% emissions control efficiency.

Possible New Measure(s):

Develop cooperative agreements to employ technologies and/or management practices to reduce GHG emissions from confined animal facilities.

There are numerous potential technologies and practices that are likely to affect the types and levels of airborne emissions at livestock facilities. For example, covered lagoons or other types of manure digesters can capture gases that are generated by microbes that consume the nutrients in the manure. One use for these captured gases is as a fuel for electricity generation. Other technologies such as enclosed waste composting, more frequent manure scraping, the introduction of various microbial treatments, animal feed management, and other activities have the potential to alter and possibly reduce livestock greenhouse gas emissions.

However, the overall environmental benefits and impacts to the air, water, and soil must be carefully considered in adopting any specific control technologies. For example, covered lagoons may reduce greenhouse gas and other air emissions. But, because digesters can reduce ammonia volatilization, they may also substantially increase nitrogen loading in the lagoon water, which can lead to additional water and soil contamination. These combined effects must be considered in adopting any emission reduction strategies.

Potential GHG Reduction:

ARB staff estimates that a reduction of 1 MMT by 2020 if feasible. This is likely to be achieved through the use of biogas digesters along with the production of electricity and/or heating applications.

Cost to Regulated Entities:

Not yet determined.

Implementation Steps:

Chapter 479, Statutes of 2003 (SB 700, Florez) made agricultural sources subject to permitting and specified emission mitigation requirements for criteria pollutants. Requirements will be implemented at the local district level through adoption of rules and regulations. The districts are in the process of evaluating emission reduction options; however their evaluation does not specifically address GHGs. Legislation may

be required to direct districts to also reduce GHG emissions from this source. Cooperative agreements could also be pursued as an implementation alternative.

Due to the new status of confined animal facilities as a regulated stationary source, scientific knowledge available to help understand their impact on air quality, as well as the effectiveness of control technologies to reduce emissions, is not well established compared to other traditional stationary sources. However, new scientific findings characterizing and quantifying emissions and evaluating promising livestock emission mitigation practices are in the process of being developed and completed.

ARB staff workload would include:

- Formalizing the inventory and emission factors for GHG emissions from manure management activities;
- Reviewing district rules and other existing out-of-state control measures;
- Researching control technology options and cost; and
- Soliciting input from the districts (primarily San Joaquin Valley and South Coast, which have the highest concentration of dairies, with most dairies having over 500 milking cows), CAPCOA, and industry.

Comments:

This strategy relies on the use of anaerobic digesters as the primary means to reduce GHG emissions. However, as discussed above there are outstanding issues associated with widespread implementation of digesters for manure management. There are several working groups addressing feasibility, cost and other issues and the results of these efforts will be critical inputs to the implementation strategy.

The only digesters installed to date have been heavily subsidized by the CEC and the federal government and have been put in place for energy production, not as air pollution control technologies.

# Work Plan for Potential GHG Reduction Measure Air Resources Board

ARB 2-7

Strategy Name:

Semiconductor Industry Targets (Perfluorocarbon Emissions)

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Other Involved Agencies:

None

Existing Measures:

***South Coast AQMD Rule 1164, Antelope Valley APCD Rule 1164, Bay Area AQMD Rule 8-30, Placer County APCD Rule 244, Ventura County APCD Rule 74.21***

Each of these rules limit volatile organic compound (VOC) emissions from semiconductor manufacturing facilities through the application of improved emission control systems, use of low VOC content materials, solvent loss minimization requirements (covers, leak rates, freeboard ratio), and general good housekeeping requirements.

***National Emission Standards for Hazardous Air Pollutants from Semiconductor Manufacturing – Subpart BBBBB***

This regulation establishes national emissions standards for hazardous air pollutants (HAPs) for semiconductor manufacturing processes that are designated major sources of HAPs or that are located at, or are part of, a major source of HAP emissions.

***PFC Emission Reduction Partnership for the Semiconductor Industry***

This is a collaborative effort between the semiconductor industry and the U.S. Environmental Protection Agency to reduce emissions of high global warming potential gases. The major goal is to identify and install environmentally friendly technologies that can reduce emissions by at least 10 percent below the industry's 1995 baseline level by year-end 2010.

Possible New Measure(s):

Development of a model rule to be considered for adoption by the districts. The technologies to be employed in this measure may include improved emission control systems and the use of low VOC content materials.

Potential GHG Reduction:

The Tellus report estimates GHG reductions of 2 MMT for semiconductor operations in both 2010 and 2020, and ARB staff believes that these estimates are reasonable. This goal is based on the voluntary target outlined in the Memorandum of Understanding between the U.S. EPA and the Semiconductor Industry Association.

Cost to Regulated Entities

Not yet determined.

Implementation Steps:

Developing a model rule would take approximately one year. Staff would encourage local air pollution control districts with significant semiconductor manufacturing in their jurisdiction to adopt the measure as a local regulation.

Comments:

The use of a regulatory measure would guarantee the delivery of the emission reductions foreseen under the MOU, and could potentially achieve greater reductions.

# Work Plan for Potential GHG Reduction Measure

## Air Resources Board

ARB 2-3

Strategy Name:

Alternative Fuels: Biodiesel Blends

Lead Staff Contact:

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Other Involved Agencies:

Gary Yowell, California Energy Commission  
916-654-4698

Existing Measures:

None

Possible New Measure(s):

Develop measures to achieve the use of 2 to 4 percent biodiesel displacement of California diesel fuel. The technologies to be employed may include improved emission controls.

Potential GHG Reduction:

Staff estimates that a greenhouse gas reduction of about 0.4 MMT would be achieved in 2010 based on 2 percent displacement of diesel fuel. ARB and CEC staff estimate that biodiesel could likely provide up to a 4 percent displacement of diesel fuel by 2020. This would provide about 0.8 MMT of greenhouse gas reductions. It is important to note, however, that current supplies of biodiesel are limited in California. Thus this strategy presumes significant market expansion in addition to the regulatory steps outlined below.

Cost to Regulated Entities

Not yet determined.

### Implementation Steps:

Develop regulations or an incentive program to achieve the use of 2 to 4 percent biodiesel in all California diesel fuel.

- Develop biodiesel fuel specifications
- Address and mitigate NOx increase associated with biodiesel use
- Address biodiesel compatibility with diesel retrofit hardware controls

### Comments:

Recent national energy legislation establishes a minimum national requirement for use of biofuels in transportation. To achieve the additional GHG reductions described in this California measure, the biodiesel used will need to be in excess of the federal minimum.

The assumed 2 to 4 percent displacement of California diesel fuel based with biodiesel is based on projected feedstock availability and biodiesel production capacity in 2020, given appropriate economic signals from the state.

# Work Plan for Potential GHG Reduction Measure

## Air Resources Board

ARB 2-9

Strategy Name:

Alternative Fuels: Ethanol in Gasoline

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Other Involved Agencies:

California Energy Commission

Existing Measures:

California does not have a program to require ethanol as part of the State's gasoline supply. Current ethanol use, which has expanded rapidly since 2002 when the State's ban on MTBE in gasoline began to take effect, originally was the result of requirements in the national Clean Air Act. In August 2005 national energy legislation eliminated the Clean Air Act provisions that had led to widespread ethanol use in the State and concurrently established a minimum national requirement for the use of biofuels in transportation.

To achieve the biofuel use required under the new federal energy bill the State's fuel producers will be allocated a specified amount of renewable fuel use proportional to California's gasoline consumption. They will, however, have much greater flexibility on when and where to use renewable fuels. In 2010 the renewable fuel use obligation is expected to be 750 million gallons of either ethanol or biodiesel, which is almost 90% of the 2004 use of ethanol. By 2020 the obligation is expected to grow to 1 billion gallons annually, about 18 percent greater than the current use. If California were to do nothing more than meet its obligation under the new energy bill using ethanol produced from conventional methods (using grains as the base feed stock), there would be a slight increase in the State's GHG emissions over the next several years due to reduced ethanol use, but GHG emissions would decrease in the 2020 timeframe due to the projected 18 percent increase in ethanol use.

### Possible New Measure(s):

There are currently over 200,000 flexible fueled vehicles in California today that could use E-85 without any equipment modifications. This number will increase as manufacturers continue to produce additional new cars that are E-85 compatible. If E-85 became widely available at prices competitive with gasoline a significant portion of the fleet could be fueled primarily with ethanol by 2015.

Another possible measure is to increase the percentage of ethanol in gasoline to the maximum 10% (E-10) that is compatible with current vehicles. However, significant permeation emissions caused by the use of low percentage ethanol blends in the summertime suggest that such blends are best limited to wintertime use. In addition, other fuel properties would need to be adjusted to ensure that the use of E-10 does not increase emissions of smog forming compounds.

This measure would likely need to include improved methods for production of cellulosic ethanol in order for California use to produce real reductions in GWG emissions. This is because the 2005 energy bill establishes a national quota for use of biofuels in transportation, and allows any "extra" use in one region to be traded as credit in another area. To achieve additional GHG reductions, ethanol used in California will need to be in excess of the federal national quota or be produced by processes that provide greater GHG reductions than corn based ethanol. Use of cellulosic ethanol, instead of corn ethanol, would more than double the GHG reductions achieved by California ethanol use.

### Potential GHG Reduction:

If ethanol used in California continues to be derived from corn or other similar grains, the GHG benefits due to increased use of E-85 would be negligible in 2010 but could be as much as 2.7 MMT in 2020 (assumes that about 10% of the entire light duty vehicle fleet uses E-85 regularly.) If California were to produce 100% of the ethanol used in E-85 vehicles from biomass or waste materials, the GHG benefits would more than double.

Tellus estimates that using 10% ethanol content in gasoline year round would achieve greenhouse gas reductions of 1 MMT in 2010 and 2020. Restricting the use of 10 percent ethanol to a six month wintertime period would reduce ethanol use to roughly the level required under the federal energy bill, and thus would produce no new benefits

### Cost to Regulated Entities

Not yet determined.

### Implementation Steps:

Further study is needed to understand the supply and cost of ethanol in light of the new federal energy legislation, the demand created by these potential measures, and the economic impacts of a growth of in-state ethanol production. The CEC in cooperation with the ARB and other agencies is developing a plan to increase alternative fuel use and reduce California's petroleum dependency. This plan, due in 2006, will help guide the development of these measures.

### Comments:

The costs of this measure are difficult to predict. Since ethanol has less energy content than gasoline, increasing the amount of ethanol in gasoline could increase the cost to consumers as they would have to purchase more gasoline to travel the same distance. Thus E-10 and E-85 would be cost-effective to the consumer only if they are priced significantly less than gasoline.

# Work Plan for Potential GHG Reduction Measure

## Air Resources Board

ARB 2-5

Strategy Name:

Heavy Duty Vehicle GHG Reduction Measures

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Existing Measures:

Vehicle operating efficiency is an important facet of the heavy duty vehicle market. Since the late 1980's and early 1990's significant work has been done to improve the aerodynamics of heavy duty vehicles under the direct auspices of the engine manufacturers. Nonetheless, studies suggest that significant room for improvement remains, with some sources estimating that 65 percent of the power used to maintain a 70 mph speed on level terrain goes to counteract drag.

Possible New Measure(s):

In addition to on-going efforts to improve aerodynamics, Tellus also identified possible reductions through engine-based improved efficiency, vehicle weight reduction, and rolling and inertia resistance improvements. ARB has also identified other possible measures, such as a driver education program on how to optimize vehicle operation.

The feasibility of vehicle weight reduction may be uncertain, as heavy duty vehicles are subject to tip-over in moderate to high winds even at their present weights. The extent to which aerodynamic drag can be reduced also requires further study.

The technologies to be employed in this measure may include aerodynamic improvements, engine-based improved efficiency, vehicle weight reduction, and rolling and inertia resistance improvements

### Potential GHG Reduction:

The Tellus report estimates reductions of about 0.2 MMT for 2010 and about 3 MMT for 2020. ARB staff believes that it will be difficult to achieve reductions by 2010 due to leadtime considerations but that the 2020 estimate is reasonable. The Tellus report assumes that an efficiency improvement of 65 percent from 1990 levels is possible by 2030. These estimates were based on ARB/CEC estimates of fleet-wide diesel-use reductions achievable under a national approach based on DOE's 21<sup>st</sup> Century Truck Program.

### Cost to Regulated Entities

Not yet determined.

### Implementation Steps:

- Determine if state or federal legislative authority is necessary to establish greenhouse gas standards for the heavy duty vehicle sector. Interstate commerce issues would also need to be evaluated. A multi-pollutant rule may be easier to establish, although ARB has committed to attempt to harmonize with federal regulations where possible
- Research the potential for use of lightweight materials, and the minimum desirable weight for large surface-area vehicles. As more efficient vehicles become available, consider possible funding to accelerate fleet turnover. Conduct other research as appropriate.

### Comments:

Because of the interstate nature of most trucking, many of the largest operators can avoid California-specific regulations. The measure would be more effective if other states opted in to California's standards, or if a national requirement was established.



# Work Plan for Potential GHG Reduction Measure

## Air Resources Board

ARB 2-14

Strategy Name:

Reducing Methane Leaks and Venting in Oil and Gas Systems

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Other Involved Agencies:

U.S. EPA  
California Energy Commission  
California Air Pollution Control and Air Quality Management Districts

Existing Measures:

***San Joaquin Valley APCD Rule 4409, South Coast AQMD Rule 1173, Bay Area AQMD Rule 8-37, San Luis Obispo County APCD Rule 417, Santa Barbara County APCD Rule 331***

These rules limit VOC emissions from leaking components at refineries, oil and gas production fields, and natural gas processing facilities generally through the application of component leak standards; operator inspection, maintenance, and recordkeeping requirements; component replacement for recurrent repairs; and management plans.

***Natural Gas STAR Program***

This is a voluntary program established by U.S. EPA to reduce methane emissions in the natural gas industry. The program is a voluntary partnership between U.S. EPA and the natural gas and oil industries to reduce methane emissions from the production, transmission, and distribution of natural gas.

***Methane to Markets Partnership***

This is a collaborative effort involving multiple countries, with U.S. EPA in the lead role for the United States, aimed at reducing global methane emissions to enhance economic growth, promote energy security, improve the environment, and reduce greenhouse gas emissions. The initiative focuses on cost-effective, near-term methane recovery and use as a clean energy source, and initially targets three major methane sources for action: landfills, underground coal mines, and natural gas and oil systems.

Possible New Measure(s):

Staff would develop a model rule to be considered for adoption by the districts. This measure involves improved management practices and does not rely on the application of new technology.

Potential GHG Reduction:

The December 2004 draft report by the Tellus Institute estimates potential GHG reductions of 1 MMT CO<sub>2</sub> equivalent from leak and venting reduction in the production, processing, transport, and distribution of oil and natural gas in 2010 and 2020. This goal is based on U.S. EPA estimates that approximately 33 percent of emissions from oil and gas systems can be avoided cost-effectively [reference *Report on U.S. Methane Emissions 1990-2020: Inventories, Projections, and Opportunities for Reductions* (EPA 430-R-99-013)].

Cost to Regulated Entities

Not yet determined.

Implementation Steps:

Staff would develop a model rule. This would take approximately one year.

# Improving Transportation Energy Efficiency

## Title of Strategy

Improving Transportation Energy Efficiency

Light duty vehicles and on-road diesel vehicles accounts for over 35% of all anthropogenic greenhouse gases (GHG) produced in California. Annual net greenhouse gas emissions from surface transportation are roughly equal to the product of the number of vehicles, the average number of miles traveled by each vehicle (vehicle miles traveled, or VMT), and the average net emissions of GHG per vehicle mile traveled.

This work plan builds on current efforts to provide a framework for expanded and new initiatives, including incentives, tools and information, to advance cleaner, more efficient transportation and reduction of greenhouse gas emissions (GHG). The effort includes: Incorporating energy efficiency and GHG emissions reduction measures into the policy framework governing land use and transportation, including framework for developing energy element in state transportation and regional planning documents; increase incentives and accelerating technology applications to improve transportation system productivity and move toward cleaner and more efficient vehicles especially for public sector fleet; providing support for implementing Governor's Executive Order (EO) S-3-05 to reduce green house gas emissions, including coordination with the California Environmental Protection Agency and the Energy Commission; enhance outreach and public participation programs to bring a coordinated message of sustainable transportation and root causes of GHG emissions; diversifying transportation energy infrastructure, and advance measures to slow the rate of VMT growth, therefore excessive reliance on fossil fuel.

## Lead Staff Contact

Reza Navai. Chief, Office of Policy Analysis and Research, California Department of Transportation, [reza.navai@dot.ca.gov](mailto:reza.navai@dot.ca.gov).

## Steps to Implementing the Strategy

The Administration's strategic grow plan and implementation of the final joint agency climate team proposed climate change initiative – draft completed 2004. The proposed activities include:

1. Incorporate GHG emissions reductions and energy efficiency measures into the policy framework governing land use and transportation: This effort focuses on integrating energy and GHG emission concerns into transportation and land use plans, programs, projects, and investment decisions. Specific actions include: development of procedures and technical guidance for transportation planning and project development and how to conduct energy and GHG analysis in state and regional planning documents, including analysis of economic, security and environmental benefits. Establishing meaningful strategies and performance

measures to help achieve the Governor's energy and GHG emissions reduction targets for state and regional governments.

2. Improve transportation efficiency: The on-going turnover of California's fleet of vehicles offers the opportunity to move toward cleaner and more efficient vehicles for the private sector and especially the public sector. The state can accelerate this move by moving beyond the current, project-by-project approach to fleet greening to a comprehensive plan. Specific actions include enhancing the opportunities for state government travel to employ cleaner technologies; providing market incentives for consumers to purchase high fuel economy vehicles; Promoting the development and commercialization of more efficient vehicle technologies such as low rolling resistance tires, lightweight materials, and high-efficiency transmissions; Developing a program to accelerate improvement in California's freight sector through better freight transport management, efficiency gains reduced truck idling, technology improvements and alternative fueled heavy duty vehicles

3. Improve inventory and projection of GHG emissions from transportation: This program would focus on research and analysis necessary to develop effective strategies to improve transportation energy efficiency and reduce emissions. These improved capabilities complement the policy initiatives noted above. Specific actions include: developing more detailed information on transportation energy infrastructure and the sources and nature of GHG emissions from the transportation sector; improving modeling capabilities for projecting and evaluating impacts of energy efficient transportation and land use options; maintaining interagency research partnership, including with federal, universities and nonprofit research organizations to ensure enhanced and active research and evaluation of energy and global warming issues.

4. Educate the public regarding the link between transportation and climate change: The intent is to explain GHG emissions in a language that the public, the legislature and transportation policy makers can readily understand and explain immediate economic and strategic security benefits and costs. Specific action include: Enhancing outreach and public participation programs to bring a coordinated message of sustainable transportation and root causes of GHG emissions as was done with electricity conservation during the energy crisis. Producing reports, brochures, web sites, public service announcements and other products to increase awareness of clean transportation, energy efficiency, transportation-related GHG emissions, and benefits/costs of GHG reduction alternatives.

5. Enhance interagency collaboration and a coordinated effort on cross-agency energy policy, planning and implementation, particularly with environmental, energy, and resource agencies, including metropolitan planning organizations and federal agencies.

*Technical Analysis.*

Under way.

### *Cost-Effectiveness Analysis.*

In 2004, California drivers used an estimated 18.1 billion gallons of motor fuel at an estimated cost of \$35 billion and traveled 330 billion miles -- a 15 percent increase since 1990. If current growth trends continue, gasoline use and related CO2 emissions in the state will increase approximately 40 percent over the next 20 years. This increase has alarming economic and environmental costs, for instance, an additional \$14 billion in the cost of fueling the transportation system alone. Considering that over 50% of the petroleum consumed in California is imported, the near total reliance of transportation on petroleum exposes the State's economy to price spikes in the national or international markets and outflow of capital from the state and reducing Californian's purchasing power and living standard.

It is notable that a conservative target of one-percent reduction in transportation energy consumption (or rate of consumption growth) could amount to \$350,000,000 savings annually, removal of 1.8 million tons of pollutants from the air, and 2% reduction in Green House Gas (GHG) emissions. Considering other socioeconomic, environmental, health and strategic security benefits associated with proposed activities, the benefit to the State and local communities is extremely high.

### *PEER Review.*

The proposed strategic growth plan has been and will continue to be carefully scrutinized by a wide variety of land use planning and transportation specialists, economists, social scientists, politicians and the public as strategies are implemented at the local and state level and benefits are realized. The Cleaner, more efficient Transportation Initiative proposal has been reviewed by the technical staff of the 10 state agencies participating in the joint climate change working group. These plans will be further discussed with stakeholders as part of initiative development process

### *Public Meetings*

Eight regional workshops have so far been held around the state on the strategic plan. Further stakeholders and public sessions will be held as needed in developing its action plan. Stakeholder and public meeting will also be held for developing the final plan of the Cleaner, more efficient transportation initiative as needed.

### *Environmental Justice*

Social Equity and Environmental Justice issues will be addressed in response to the departmental director's policy, federal executive order and state law related to EJ.

### *Key Decision Points*

Key policy and initiative action recommendations will be decided after stakeholder outreach.

### Potential Legislative Needs

Implementing provision of the strategic growth plan will require passage of legislation allowing public-private partnerships to fund the development of transportation projects, including tolled facilities that can influence travel behavior through market based mechanisms. Other legislative proposals will be forthcoming. Also, the energy regulatory and policy agencies should examine potential application and adaptation of the air quality/transportation conformity procedures to establish “energy conformity procedures” for improving transportation energy efficiency and lowering GHG emissions from transportation.

# Smart Land Use and Intelligent Transportation Work Plan

## Title of Strategy

Smart Land use and Intelligent Transportation

Smart land use is an umbrella term for strategies that integrate transportation and land-use decisions. Such strategies generally encourage jobs/housing proximity, promote transit-oriented development, and encourage high-density residential/commercial development along transit corridors. These strategies develop more efficient land-use patterns while accommodating a sufficient housing supply within each jurisdiction to match population increases and workforce needs for the full spectrum of the population. Intelligent Transportation Systems (ITS) concerns with application of advanced technology systems to improve operational efficiency of the existing and new transportation systems and movement of people, goods and services. Smart land use development and ITS would minimize the need for major capital improvements and highway constructions, and can provide a host of benefits, including more livable communities, transportation energy efficiency, lower emissions from mobile sources and a lower-cost provision of public services (e.g., sewer, water).

## Lead Staff Contact

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## Steps to Implementing the Strategy

The Administration is finalizing a comprehensive 10-year investment strategy, Strategic Growth Plan, with the intent of developing ways to promote, through state investments, incentives and technical assistance, land use and technology strategies that provide for a prosperous economy, social equity and a quality environment. Smart land use, demand management, and value pricing are critical elements in this plan for improving mobility and transportation efficiency. The objective is to reduce, manage, and eliminate trips, that are primary cause of congestion and air pollutions, through wise and integrated land use decisions, innovative concepts designed to change travel behavior, and market based strategies. Specific strategies include: ensure jobs/housing proximity; promote transit oriented development; encourage high density residential/commercial development along transit/rail corridor; value and congestion pricing; Intelligent transportation systems, traveler information/traffic control, incident management; California ITS architecture and system plan; accelerated development of broadband infrastructure; comprehensive, integrated, multimodal planning.

## Emission Reduction Potential

It is estimated that the land use/ITS element of the strategic growth plan as stated could reduce congestion 20% or more on state highways when fully implemented. This could correspond to significant reduction in average vehicle miles traveled on the system and consequently several million tons of CO<sub>2</sub> emission reduction from mobile sources. The Tellus report and empirical studies suggest that suburban smart-growth measures can reduce household vehicle miles traveled by 10-30% percent, and that urban infill and related measures can reduce VMT by 30-50%.

Initial elements:

Transit Oriented Development Study-Compendium completed June 2005

The Regional Blueprint Planning Grant Program (Caltrans, HCD)-July 2005. The regional Blueprint Planning Grant Program is a compliment to the Governor's "GoCalifornia" initiative to significantly improve the effectiveness of the transportation system. This program will provide \$5 million in grants to help California's regions plan for future growth and quality of life through integration of transportation, housing, land use economic development and environmental protection.

Various ongoing Community Based Planning Grants and Environmental Justice Planning Grants administered by Caltrans. Goods movement action plan which is also a complement to the GoCa, includes air pollution reductions measures and community impacts mitigation – December 2005.

Development of Transportation System Performance Measures that include land use related indicators – December 2005. California ITS Architecture and Transportation Management System Master Plan – completed 2005.

On-going review and comment on local development proposals.

#### *Technical Analysis.*

On going

#### *Cost-Effectiveness Analysis.*

According to the Tellus report, focusing on VMT-reduction measures is not without its challenges. Judged by conventional cost-effectiveness metrics that typically ignore social and environmental benefits, and given the diffuse nature of their impacts, VMT-reduction measures may not show the same clear returns as fuel-reduction and fuel-substitution measures. They can also be more politically challenging to implement.

#### *PEER Review.*

GoCalifornia has been and will continue to be carefully scrutinized by a wide variety of land use planning and transportation specialists, economists, social scientists, politicians and the public as strategies are implemented at the local and state level and benefits are realized.

#### *Public Meetings*

Eight regional workshops have been held around the state with representatives from regional, county and city agencies, as well as local elected officials on the strategic growth plan. The Cabinet Working Group will continue to meet with stakeholders and conduct public listening sessions as needed in developing its action plan. Individual elements have already held, and will continue to hold public workshops as they are implemented.

#### *Environmental Justice*

Caltrans planning directly addresses Environmental Justice in response to the departmental director's policy, federal executive order and state law related to EJ.

#### *Key Decision Points*

TBD

### Potential Legislative Needs

The Legislature has already taken positive steps in this area with the passage of AB 857 (2002); AB2140 (2000); and prior legislation related to congestion management plans and regional housing needs analysis as part of the housing elements of general plans. The Legislature included funding for the Administration's Regional Blueprint Planning Grant Program in the FY2006 budget. As the Administration's Cabinet Working Group on smart land use continues its work, additional legislation action may be required.

# Work Plan for Potential GHG Reduction Measures

## Department of Food and Agriculture

CDFA 3-2

Title of Strategy  
Enteric Fermentation

Enteric fermentation is the process of feed digestion by ruminant animals (primarily dairy and beef cattle). This process results in methane emission from the animals. To reduce GHG emissions resulting from enteric fermentation, feed adjustments may be made that improve milk and meat productivity. Reducing market demand for these products was also presented in the Tellus report.

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Steps to Implementing the Strategy

### *Emission Reduction Potential*

According to the University of California, enteric emissions from animal husbandry in California are estimated at 7.3 MmtCO<sub>2</sub>e. According to the Tellus report, beef and dairy cattle represent over 95% of methane emissions from livestock in California. Cited in the report is a USEPA study that states that a combination of animal productivity improvements, production efficiency improvements and pricing strategies could reduce enteric emissions by 5% to 10% below baseline conditions over 15 years at costs of up to \$5.50 per tCO<sub>2</sub>e. However, this potential is based on national production efficiencies, which are well below those of California. If applicable to California, emission savings of 0.4 MMtCO<sub>2</sub>e by 2010 and 0.7 MMtCO<sub>2</sub>e by 2020 were presented. These potential savings need to be verified by directed research for California conditions. The emission reduction potential for 2010 and 2020 remains to be determined.

Other Involved Agencies  
UC Cooperative Extension

Existing Measures  
None.

Possible New Measures  
New measures would include establishing a research initiative to quantify emission changes from enteric fermentation resulting from changing feed regimens versus

productivity impacts. Different animal populations would have differing abilities to manage feed rations. For example, grass-fed beef would have little to no ability to reduce enteric emissions. Dairy operators vary feed rations based on numerous factors. Feed rations are a complex system that not only provide nutrition to the animal, but also provide cost-effective and efficient use of other agricultural byproducts including food processing residuals, fruit culls, almond hulls, cotton seed, and even rice straw. This system would have to be carefully analyzed to determine overall GHG emission effects if the use of these other residuals is altered. This analysis would include both a technical analysis and a cost effectiveness analysis that would be initiated in 2006.

Pricing of food commodities to reflect embodied GHG emissions is not recommended for any action at this time. There currently exists a “calcium crisis” in this country, where a significant portion of women and children are calcium deficient. Milk and dairy products are a major source of calcium that should be available to these at risk populations, especially those of low and moderate income, at affordable prices.

#### Cost to Regulated Entities

Not yet determined. It is envisioned that these practices would be implemented on a voluntary basis, based on economic attractiveness.

# Work Plan for Potential GHG Reduction Measures

## Department of Food and Agriculture

CDFA 3-1.

### Title of Strategy

Conservation Tillage and Cover Crops

Conservation tillage and cover crops practices are increasingly being used by California farmers for a variety of reasons, including improved soil tilth, improved water use efficiency, reduced tillage requirements, saving labor and fuel, and reduced fertilizer inputs. However, due to the wide diversity of California agriculture, these practices must be demonstrated in a wide variety of cropping systems, soil types, irrigation regimes, and climate conditions. This diversity also makes it especially difficult to quantify both carbon emissions and potential carbon sequestration benefits from implementing conservation tillage and cover crops in the myriad of California cropping systems. According to the Tellus report, there exists a potential GHG savings of 2 million tons of CO<sub>2</sub> equivalent per year by 2010 and 2020. This potential needs to be verified through extensive research directly applied to California conditions. Thus, the potential GHG savings for 2010 and 2020 remains to be determined.

### Lead Staff Contact

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### Other Involved Agencies

University of California

California Climate Action Registry

California Energy Commission

### Steps to Implementing the Strategy

Key research is needed to accurately estimate carbon sequestration potential and fossil fuel use reductions resulting from conservation tillage and cover cropping. Each soil type, of which there are more than 300 in California needs detailed analysis of sequestration potential. Various cropping systems, beyond those identified in the Tellus report (corn, cotton, beans, tomatoes, barley, wheat) including “permanent crops” such as almonds, walnuts, grapes need to be analyzed.

Conservation tillage techniques and cover crops need to be extensively demonstrated as suitable for cropping systems in terms of cost, yield, quality, pest management, etc. before they will be accepted by farmers. UC Cooperative Extension continues to perform these functions, but would require significant resources to extend its work to the multitude of cropping systems exhibited in California.

Accounting protocols as developed by the Climate Action Registry and carbons markets would have to be established that are transparent, simple, and economically attractive to induce significant changes in farming practices.

Documentation of cost savings and other benefits (e.g. ability to comply with other regulatory requirements such as for water quality and air quality) may provide sufficient motivation.

#### *Emission Reduction Potential*

Emission Reduction Potential for 2010 and 2020 as reported by Tellus are 2 MMtCO<sub>2</sub>e. This figure was derived by taking 50 percent of the total of estimates developed by Winrock for representative cropping systems in California. The diversity of soils and cropping systems, combined with the fact that reduced and minimum tillage systems are more applicable to California conditions than the no-till systems more prevalent in the Midwest, call into question the 2MmtCO<sub>2</sub>e figure. This potential needs to be verified through extensive research directly applied to California conditions. Thus, the GHG reduction potential remains to be determined.

#### Existing Measures

Some government supported research and development and demonstration work is being conducted by various research and education institutions. Some government support (through NRCS conservation programs such as EQIP) to farmers and ranchers provide technical and financial assistance on a voluntary basis. Some early adopters (farmers) are implementing these practices on an individual basis.

#### Possible New Measures

Expanded research, development, demonstration, technical and financial assistance programs. Develop Climate Action Registry protocols for conservation tillage and cover cropping practices.

Once quantifiable, develop and implement Climate Action Registry protocols.

#### Cost to Regulated Entities

Not yet determined. It is envisioned that these practices would be implemented on a voluntary basis, based on economic attractiveness.

#### Potential Legislative Needs

Funding appropriations at the state and federal level to continue and expand research development, demonstration, and technical and financial assistance to farmers and ranchers.

# Work Plan for Potential GHG Reduction Measure

## California Energy Commission

Strategy: Building and Appliance Energy Efficiency Standards

Public Resources Code 25402 authorizes the Energy Commission to adopt and periodically update its building energy efficiency standards (that apply to newly constructed buildings and additions to and alterations to existing buildings) and its appliance energy efficiency standards (that apply to energy using devices and equipment that are sold or offered for sale in California). The Energy Commission updates the standards at its discretion (i.e. three-year cycle for building standards). In addition to the long existing legislative mandates, recent policies have placed priority on and established specific goals for updating of the standards.

The Green Building Initiative directs that the stringency of the standards for nonresidential buildings be increased by 20% by 2015. The West Coast Governors' Global Warming Initiative established joint commitments for the States of Washington, Oregon, and California to increase the stringency of their building energy codes (both residential and nonresidential) by 15% by 2015. The Energy Action Plan and the Integrated Energy Policy Report both call for ongoing updating of the standards, including meeting energy efficiency goals, addressing demand response and promoting the combination of solar photovoltaics and high energy efficiency buildings.

The Energy Commission was in the process of considering standards for a number of appliances at the time that the Climate Action Initiative was being formulated. These standards represent a strategy that is beyond the CAT baseline. Standards for most of those appliances were adopted on December 15, 2004. The standards for a few of the appliances were delayed to further consider manufacturer comments. Those standards are being developed by the Energy Commission at the present time.

The Energy Commission has also initiated work for the building standards that will go into effect in 2008 (i.e. the first of three update cycles that will occur prior to 2015). Once adoption of the remainder of the appliance standards currently under consideration has occurred, the Energy Commission will identify and initiate work to adopt standards for additional appliances.

Lead Staff Contact

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Steps to Implementing the Strategy

Adoption of the standards for any measure (building standards) or appliance (appliance standards) requires technical research and analysis to quantify benefits and costs,

assess availability, reliability and practicality, determine cost effectiveness, determine statewide energy savings and environmental impacts, formulate regulatory language, and document and justify the standards. The Energy Commission conducts a very open, public process to review and take public comment on each of the above aspects of updated standards.

For major standards updates extensive workshops are held to review and take public comment on the research and analysis of potential measures and appliance efficiency levels and later on draft standards. Once the Energy Commission has considered that public comment in formulating its official proposed standards, it conducts a rulemaking with at least two and potentially more public hearings to take further comment, refine the proposed standards and adopt the standards.

### Technology Assessment

Building Standards: As part of the process of updating the Building Energy Efficiency Standards, the Energy Commission evaluates new and emerging technology for possible inclusion in the Standards. The Commission administers an ongoing "compliance option" process which evaluates to what extent compliance credit should be approved for new technologies and develops algorithms that can be used to properly evaluate their energy consequence within building simulation computer programs that are used for Standards compliance.

Upon Commission approval compliance options can be used to demonstrate compliance with the performance approach in the Standards. Once a compliance option has been in existence for a period of time, the Commission often considers whether or not the compliance option should be made a requirement of the Standards (as a prescriptive requirement and basis of the energy budget established for the performance standards).

The Commission Buildings and Appliances Office works on an ongoing basis with the Public Interest Energy Research (PIER) program and with the utility Codes and Standards programs to track promising new technologies and consider their appropriate inclusion in the Standards. Fundamentally, the Standards updating process is a thorough technology assessment of the potential to include new technologies in the Standards and through the compliance option approval process, this technology assessment is a continuous part of the Standards program.

Appliance Standards: As part of the process of updating the Appliance Energy Efficiency Standards, the Energy Commission evaluates new and emerging technology for increasing the energy efficiency of appliances and equipment for possible inclusion in the Standards. The Commission's Buildings and Appliances Office works on an ongoing basis with the Public Interest Energy Research (PIER) program and with the Utility Codes and Standards Programs, to track promising new technologies and consider their appropriate inclusion in the Standards. Fundamentally, the standards updating process is achieved through technology assessment of the potential to

include new technologies in the Standards, and the program is continuously evaluating new technologies.

2008 Building Energy Efficiency Standards

Technical Analysis and Public Workshops on Potential Measures –	December 2005
Draft Standards and Public Workshops on Potential Standards (determination of statewide impacts and savings)	July 2006
Public Rulemaking and Standards Adoption -	December 2006
Preparation of Compliance Manuals and Energy Commission - Approval	December 2007
Updating of Compliance Software and Energy Commission - Approval	July 2007
Standards Effective Date -	January 2008

2009 Appliance Energy Efficiency Standards

Identification of Additional Standards Opportunities	December 2005
Technical Research and Analysis (may include test procedures) -	December 2006
Draft Standards and Public Workshops on Potential Standards (determination of statewide impacts and savings)	July 2007
Public Rulemaking and Standards Adoption	December 2007
Standards Effective Date -	January 2009

# Work Plan for Potential GHG Reduction Measure

## California Energy Commission

Strategy: Cement Manufacturing

This strategy involves cost-effective reductions to reduce energy consumption and to lower carbon dioxide emissions in the cement industry. Based on our analysis, there is a large technical potential to improve energy efficiency in cement operations at a reasonable cost.

Greenhouse gas emissions from burning fossil fuels in the manufacturing of cement produces 1.5 to 2.0 percent of U. S. carbon dioxide emissions. Roughly half is from fossil fuel combustion and roughly half is from the conversion of limestone (45 million metric tons per year). California's cement industry produced 5.6 million metric tons in 2001; total statewide greenhouse gases approached 500 million metric tons in 2001.

Annual emissions from the manufacturing of cement are growing at a rate of 2 percent per year, according to industry sources and using California-specific data. Direct emissions of carbon dioxide are estimated to rise from 10.4 million metric tons in 2005 to over 15 million metric tons in 2025. Use of limestone Portland cement and the use of blended cement account for 70 percent of the potential emission reductions and would cost less than \$10 per metric ton.

State policy options can take several forms, including technology mandates, financial incentives, negotiated agreements, voluntary commitments, emissions-intensity benchmarking, or mandatory measures. Policy changes would be needed to encourage the use of limestone and blended cement and to allow waste tires to be used as a fuel in cement manufacturing. Based on our analysis, these measures have been shown to provide cost-effective greenhouse gas reduction benefits.

To achieve the benefits of this strategy, implementation issues would need to be overcome:

- For limestone Portland cement, users of this cement product would need to accept the current national standard established by the American Society for Testing and Materials (ASTM).
- For blended cement, fly ash need for the manufacturing process would need to be imported from neighboring states.
- For waste tires, public resistance to the burning of waste tires would need to be overcome through a public education program to encourage their use as a fuel.
- Technological advances in cement manufacturing, specifically relating to clinker production, may also provide future benefits.

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## Steps to Implementing the Strategy

### *Technical Analysis*

The technical potential of these measures was determined, based on input from the cement industry and analysis by the Center for Clean Air Policy (CCAP). First, the baseline for future GHG emissions was established for 2005 to 2025, using California-specific data where possible and national data adjusted for California.

Date of Completion: June 2005

### *Economic Analysis*

CCAP collected information on the costs and benefits of energy efficiency measures and measures to reduce CO<sub>2</sub> emissions in clinker and cement production. Information was also used from publicly available reports, including a report by the Lawrence Berkeley National Lab for the Energy Commission's PIER program.

Date of Completion: June 2005

### *Technology Assessment*

Commercial available and cost-effective options exist today to improve the energy efficiency, and therefore the greenhouse gas reduction potential, in the manufacturing of cement. These include process improvements and improvements in fuel combustion. At the same time, some companies are exploring advanced technology solutions, which will require research, development and demonstration. The Energy Commission is soliciting input from individual cement companies and their industry associations on what's possible through new and advanced technologies.

### *PEER Review.*

This strategy was examined through the Energy Commission's Climate Change Advisory Committee, specifically through a working group which included representatives of the cement industry, and through informal one-on-one contacts with industry representations.

Date of completion: July 2005.

### *Public Meetings*

This strategy has been discussed in public meetings of the Energy Commission's Climate Change Advisory Committee and in off-line consultations with selected industry representatives, CEC Staff and our consultants. These conversations are likely to continue during the implementation phase for this strategy. Discussions with the

Business, Transportation, and Housing Agency and Cal Trans are needed to resolve the issue of the appropriate standard to be applied to blended cement.

Date of completion: November 2005

*Environmental Justice*

Not applicable at this stage of technical and economic feasibility analysis.

*Key Decision Points*

- For limestone Portland cement, Cal Trans could encourage its use in public works projects, including roads, bridges and highways.
- For blended concrete, Cal Trans would need to evaluate the effects of cement integrity and safety, and approve the use of ASTM standards used in other countries as a California standard.
- For waste tires, the Integrated Waste Management Board would need to permit the use of this fuel in cement plants. The Board would need to take a more active role in explaining the environmental benefits of burning waste tires at very high temperatures in cement kilns through a public education program.
- PIER funding should be considered for promising technologies that can potential reduce CO2 emissions in conjunction with clinker production.

*Potential Legislative Needs:* Not known at this time.

# Work Plan For Combined Heat and Power California Energy Commission

## **Title of Strategy: Combined Heat and Power Initiative**

This strategy constitutes cost-effective reductions from fossil fuel consumption in the commercial and industrial sector through application of onsite power production to meet both heat and electricity loads. To effectively implement this strategy, it is likely various policy instruments will be needed to attain the realistic market potential and subsequent CO<sub>2</sub> reductions. These policy mechanisms may include regulatory incentives to encourage utilities to promote customer and utility-owned CHP, utility rate structures that are transparent and connected to market forces where externalities such as environmental impacts and transmission and distribution constraints are internalized, rules and regulations enabling easier access to wholesale markets, production tax credits for CHP, and other measures or incentives directed at key commercial and industrial activities in California.

This strategy is not yet underway, will require further refinement, and could likely require administrative, legislative, regulatory and budget initiatives. Various policy approaches would need to be explored.

### **Lead Contact**

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California Energy Commission

### **Steps to Implementing the Strategy**

#### *Technical and Market Potential, and Cost Effectiveness Analysis Refinement*

The Energy Commission as part of the 2005 Integrated Energy Policy Report recently conducted an initial assessment of the technical and market potential of CHP in California<sup>1</sup>. As part of this assessment, the Energy Commission is looking at potential policy scenarios that could be implemented and what their respective effect would be on the installed capacity of CHP in California between today and 2020. This also took an initial look at the cost effectiveness of each policy scenario.

Given this initial analysis, the Energy Commission would refine this market, policy and cost effectiveness assessment to consider more refined cost effectiveness tests. The Public Utilities Commission (CPUC) is in the midst of developing a formal cost/benefit methodology for distributed generation (including CHP) in their current distributed

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<sup>1</sup> *Assessment of California CHP Market and Policy Options For Increased Penetration*, California Energy Commission, Publication #CEC-2005-060-D, April 2005, [<http://www.energy.ca.gov/2005publications/CEC-500-2005-060/CEC-500-2005-060-D.PDF>]

generation rulemaking (R.04-03-017). A decision is anticipated by the end of 2005. The Energy Commission would update the policy scenarios, market potential and cost effectiveness evaluation using the CPUC adopted cost/benefit methodology.

Date of Completion: March 2006

### *Implementation*

After refining the cost effectiveness of the different policy scenarios, and their respective capacity and energy impacts, and associated GHG benefits, the Energy Commission will develop a comprehensive implementation plan focused on improving end use efficiency in the commercial and industrial sectors via CHP. Through existing efficiency commercialization programs at the Energy Commission where relationships have been well established with the commercial and industrial sectors, a set of implementation activities will be developed that include, but are not limited to, the following:

- Utility tariffs to enable CHP owners to sell excess onsite electricity generation to the utility at prevailing wholesale prices. Existing analysis suggests this would be very effective in stimulating the near-term (next 5 years) market
- CO<sub>2</sub> reduction credits to reflect the net reduction of CO<sub>2</sub> emissions for the CHP systems compared to the avoided electricity and boiler fuel emissions
- Transmission and distribution benefit payments that reflect the local and temporal benefits CHP provides utilities
- Utility regulatory incentives to encourage utilities to promote installation of customer and utility owned CHP projects.

Date of Completion: September 2006

### *Peer Review and Public Meetings*

This strategy will be vetted and implemented through adoption of a revised Energy Commission *Distributed Generation Strategic Plan*.<sup>2</sup> This strategic plan was initially adopted in June 2002 and contains the basic vision, goals and objectives for the State to pursue to implement distributed generation and CHP. An update to this strategic plan will allow the Energy Commission to publicly incorporate current knowledge about distributed generation and CHP gleaned from current policy and technology development, including the *CHP Market and Policy Assessment*. Through this strategic plan update, the Energy Commission will engage key stakeholders from industry, end use sectors, utilities, government, environmental groups, and others to provide peer review of the implementation plan for this CHP Initiative.

Date of Completion: September 2006

### *Environmental Justice*

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<sup>2</sup> *Distributed Generation Strategic Plan*, California Energy Commission, Publication# P700-02-002, June 2002, [[http://www.energy.ca.gov/reports/2002-06-12\\_700-02-002.PDF](http://www.energy.ca.gov/reports/2002-06-12_700-02-002.PDF)]

It is uncertain whether there will be environmental justice issues at this time.

#### *Key Decision Points*

- Feasibility of attaining MW and MWh targets for CHP by 2020 and their associated CO<sub>2</sub> reductions.
- Cost effectiveness of particular policy scenarios.
- Adoption of an implementation plan via revision to the Energy Commission's Distributed Generation Strategic Plan.

#### **Potential Legislative Needs**

Specific legislative needs are not known at this time, however, it is anticipated that there may need to be legislative, administrative and regulatory actions necessary to establish utility incentives, CO<sub>2</sub> and transmission and distribution payments, and less complicated access for CHP to wholesale electricity markets.

# Work Plan for Potential GHG Reduction Measure California Energy Commission

Title of Strategy: Fuel Efficient Tire Program

State legislation (Chapter 912, Statutes of 2001) directed the Energy Commission to investigate and to recommend ways to improve fuel efficiency of vehicle tires. The bill established a statewide program to encourage the production and use of more fuel efficient tires, and required the Energy Commission to:

- Establish a test procedure for measuring tire fuel efficiency.
- Develop a data base on the fuel efficiency of existing tires in order to establish an accurate baseline of tire efficiency.
- Develop a rating system for tires that provides consumers with information on the fuel efficiency of individual tire models.
- Develop a consumer-friendly system to disseminate tire fuel-efficiency information as broadly as possible.
- Study the safety implications of different policies to promote fuel efficient replacement tires in the consumer market.
- Evaluating a mandatory fuel efficiency standard for all after market tires sold in California.
- Developing consumer incentive programs that would offer a rebate to purchasers of replacement tires that are more fuel-efficient than the average replacement tire.
- Study ways to improve the fuel-efficiency of vehicles in the State's fleet.

AB 844 later required tire manufacturers to report to the Energy Commission the rolling resistance and relative fuel economy of replacement tires sold in California.

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## Other Involved Agencies:

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## Existing Measures:

SB 1170; and AB 844 established the basis for two separate CEC rulemaking activities.

## Possible New Measure(s):

Implementation of fuel efficiency standards for tires if feasible (See AB 844 provisions) via California Energy Commission rulemaking activities—no new legislative authority is necessary.

#### Potential GHG Reduction:

Consumers are not aware that tires vary in fuel efficiency based on their rolling resistance characteristic and that the tires sold on new cars are more fuel efficient than replacement tires normally purchased. AB 844 requires tire manufacturers to report to the Energy Commission the rolling resistance and relative fuel economy of replacement tires sold in California. With this information composed in a reportable format, consumers will for the first time be able to select tires regarding fuel economy in addition to the existing parameters of use, cost and longevity. The Energy Commission will also be required to adopt (if feasible) minimum fuel efficiency standards for replacement tires resulting in a fuel economy equal to or better than for tires on new vehicles.

Rolling resistance information (which measures fuel economy) for replacement tires distributed and sold in California does not exist. Therefore, there is no public information what the relative fuel economy performance is for the consumer of these replacement tires. The California Energy Commission's Tire Rolling Resistance Study, which is currently underway, will produce rolling resistance information that can be used to accurately determine what, if any, fuel savings is possible through the promotion of usage of low rolling resistance tires.

The distribution of rolling resistance (which measures fuel economy) for the replacement tire market is unknown at this time. There is no public information what the relative fuel economy performance is for the consumer of these replacement tires. A complete database of all replacement tires marketed in CA will be publicly available in the 2007 timeframe after the CEC completes rulemaking for rolling resistance reporting requirements as prescribed by AB 844.

Looking at historical statements made by some in the tire industry, the potential range of rolling resistance could indicate a difference in fuel economy of greater than 5% from the worst performing tire to the best performing tire (not necessarily the same type and use as the worst). However, tire companies claim that rolling resistance is a characteristic that is traded for other characteristics such as longevity and traction.

#### Technology Assessment

The technology to improve the rolling resistance of tires exists today, since automobile companies typically install low-rolling resistance tires on new vehicles as one of the measures needed to achieve Corporate Average Fuel Economy Standards. However, after-market tires, or replacement tires, do not necessarily have the same technical

characteristics, and further study is needed on the potential rolling resistance of after-market tires, and their effect on safety, performance, longevity, and costs.

Estimated GHG reduction for 2010 and 2020

Preliminary estimates indicate potential savings of approximately 1.5 million metric tons of carbon dioxide emissions by 2010 and 2020, respectively. These estimates will need to be revised in spring 2006, when tire testing results become available. The California Energy Commission has its currently ongoing Fuel Efficient Tire Study, which will provide this information so an accurate assessment can be made.

Implementation Steps:

<b>Steps to Implement Fuel Efficient Tire Program</b>	<b>Estimated Date</b>
1. Selection of SAE test for RR reporting by tire manufacturers	July 30, 2005
2. Initial results from rolling resistance testing	January 15, 2006
3. Tire Wear and Safety Testing of Low RR tires	May 15, 2006
4. Final Report for CEC Tire Study	Sept 1, 2006
5. Begin first rulemaking activity to establish fuel efficiency reporting requirements per AB 844	January 1, 2007
6. Develop and publish database of relative fuel efficiency ratings for light duty vehicle replacement tires	June 1, 2007
7. Consumer information outreach program to encourage smart selection and use of fuel economy data by replacement tire consumers	May 1, 2007-ongoing
8. Review success of consumer outreach program, consider the adoption of second rulemaking activity – fuel efficiency minimum standards for replacement tires	June 1, 2008

# Work Plan for Potential GHG Reduction Measure California Energy Commission

Strategy: Additional Publicly Owned Utility Energy Efficiency Programs

The Energy Commission and the CPUC are collaborating on additional energy efficiency programs beyond those programs already adopted. In September 2004, the CPUC adopted aggressive energy savings goals for the investor-owned utilities for energy efficiency programs through 2013. These programs are funded through the public goods charge and through the IOU procurement budgets and approximate \$2 billion for the period 2006-2008.

In 1996, the California Legislature passed AB 1890 which required all publicly-owned utilities to invest in public benefit programs. The funding requirement, which continues through 2011, is calculated from the lowest expenditure level of the three largest electrical corporations in California on a percent of total 1994 revenue basis. Using this formula, the California Municipal Utilities Association recommended that publicly-owned utilities invest 2.85 percent of their total revenue in public benefits programs. This percentage includes funding for energy efficiency, research and development, renewables, and low-income programs. Data on public utility funding levels are incomplete making it difficult to ascertain whether the required level is being met.

A 2003 CEC staff report recommended a statewide goal of 30,000 cumulative gigawatt-hours by 2013; the CPUC subsequently adopted a goal for the IOUs of 23,183 gigawatt-hours by 2013. This leaves 6,817 gigawatt-hours of the CEC's proposed goal to be achieved by the publicly owned utilities.<sup>3</sup> The publicly owned utilities are not currently required to achieve the same energy savings goals as the IOUs.

**Estimated savings:** 1 million tons of carbon dioxide emissions in 2010; 5.9 million tons 2020.<sup>4</sup>

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<sup>3</sup> California Energy Commission; *Proposed Energy Savings Goals for Energy Efficiency Programs in California*, Publication 100-03-021F, October 27, 2003.

<sup>4</sup> These savings estimates were converted to CO2 reduction by the Tellus Institute, and may need to be further evaluated by the CEC Staff. These reductions are adjusted by 8.6% to account for transmission and distribution losses, and an avoided electricity emissions rate conversion.

## Steps to Implementing the Strategy

While the Energy Commission does not have regulatory authority over the publicly owned utilities, in the way that the CPUC regulates the IOUs, the publicly owned utilities are required to report their energy savings to the CEC. A process to ensure comparability

between public benefit program savings and funding data reported by public and investor-owned utilities will need to be established. Possible steps for implementing this strategy include:

- Pursuing a cooperative agreement with the publicly owned utilities to achieve the needed CO2 reductions;
- Establishing a formal Memorandum of Understanding (MOU) with the utilities to achieve these targets;
- Seeking state legislation requiring the publicly owned utilities to contribute proportionally to the State's energy efficiency goals.

### *Technical Analysis*

The Energy Commission completed an analysis in 2003, which documents the potential energy savings goals for the entire state, including the publicly owned utilities. New data will be available in late 2005 that will be used to revise the 2009-2013 goals. These data could be extrapolated to the publicly-owned utilities.

Publicly-owned utilities typically allocate approximately 40 percent of public goods funding to energy efficiency programs.<sup>5</sup> SMUD exceeds required spending, authorizing as much as 3.7 percent for its public goods programs. In 1999, energy efficiency was receiving 58 percent of the funding at SMUD or 2.1 percent. Comments from Natural Resources Defense Council during the 2005 IEPR indicated that LADWP, by contrast, invested less than 1 percent in energy efficiency in 2004.<sup>6</sup> In comparison, the IOUs spent approximately 1.4 percent of their total revenue on their energy efficiency programs in 2004.<sup>7</sup>

The Energy Commission has begun the goal setting process with SMUD.

### *Cost-Effectiveness Analysis*

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<sup>5</sup> California Energy Commission Survey of Public Benefit Programs of Publicly-Owned Utilities in California, Electricity Analysis Office, 1999; California Municipal Utilities Association Public Benefit Programs, <http://www.cmua.org>

<sup>6</sup> Comments of the Natural Resources Defense Council (NRDC) on the 2005 *Integrated Energy Policy Report IEPR* Staff Report "Implementing California's Loading Order for Electricity Resources," Docket Number 04-IEP-1E, August 1, 2005

<sup>7</sup> Funding and Energy Savings from Investor-Owned Utility Programs in California for Program Years 2000-2004, August 2005, CEC-400-2005-042-REV

State law requires each publicly owned utility to: “first acquire all available energy efficiency and demand reduction resources that are cost-effective, reliable and feasible” in procuring energy. Each POU is required to report its energy efficiency investments and savings to the CEC on an annual basis.

### *Technology Assessment*

Newly developed or emerging technologies that could be added into the efficiency program measures mix should be assessed. The Energy Efficiency Potential Summary Study completed in December 2005 (estimated publication date) could serve as a source document. The assessment should focus on identifying newer technologies with the greatest potential for reducing greenhouse gases. Additionally, any market or regulatory barriers that might impede the likelihood of achieving potential benefits should be documented and analyzed.

### *PEER Review.*

One-on-one interviews with stakeholders lead to the completion of the technical report noted above.

### *Public Meetings*

Public testimony was solicited as part of the *2005 Integrated Energy Policy Report* on these issues.

### *Environmental Justice*

Not applicable.

### *Key Decision Points*

The Energy Commission is well equipped to work cooperatively with the publicly owned utilities in achieving the potential GHG reductions resulting from the proposed strategy. However, if voluntary and cooperative activities fail, the CEC could decide to pursue a legislative solution.

### Potential Legislative Needs

Senate Bill 1037 (Kehoe, Statutes of 2005, Chapter 366) added language to Public Utilities Code Section 9615, providing new tools to the CEC to ensure that publicly owned utilities meet the State’s energy efficiency goals. State legislation could be proposed to require the publicly owned utilities to contribute proportionally to the energy savings needed to help meet the Governor’s greenhouse gas reduction targets.

# Work Plan for Potential GHG Reduction Measure California Energy Commission

## **Strategy: Accelerating Renewable Development by Municipal Utilities**

California's Renewable Portfolio Standard (RPS), established in 2002, requires that all load serving entities achieve a goal of 20 percent of retail electricity sales from renewable energy sources by 2017, within certain cost constraints. The *2003 Energy Action Plan* and the *2003 Integrated Energy Policy Report (2003 Energy Report)* accelerated the 20 percent goal from 2017 to 2010. The *2004 Energy Report Update* further recommended an increased goal of 33 percent renewable by 2020, which the California Public Utilities Commission (CPUC) and the California Energy Commission (Energy Commission) adopted in the *2005 Energy Action Plan II*.

The Energy Commission and the CPUC are responsible for implementing the RPS for the investor-owned utilities, electric service providers, and community choice aggregators. The publicly owned utilities are responsible for implementing their own RPS programs. There are proceedings underway at the Energy Commission and the CPUC to assure that the 20 percent target is achieved by the load serving entities under their jurisdiction. Furthermore, the *2003 Energy Report* recommended standardizing the RPS for all retail sellers of electricity, including publicly owned utilities, with exceptions provided for small utilities. A number of publicly owned and municipal utilities include large hydroelectric power in their RPS programs, even though large hydroelectric power is not eligible for the RPS administered by the CPUC and the Energy Commission.

**Estimated savings:** 4.5 million tons of carbon dioxide (CO<sub>2</sub>) emissions in 2020.<sup>8</sup>

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### Steps to Implementing the Strategy

The CPUC has undertaken a study to identify the steps necessary to achieve the 33 percent goal for the state's IOUs. The CPUC study will lay out a regulatory framework for future regulatory and administrative actions needed to implement a successful program. The Energy Commission is undertaking a similar, related study on RPS

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<sup>8</sup> Assumptions: includes electricity used by DWR to pump water; subtracts the amount of electricity needed by POUs and DWR to reach 20 percent by 2010 and maintain 20 percent through 2020; has not been reduced by other strategies (e.g., efficiency) that would reduce retail sales.

programs adopted by publicly owned utilities, including barriers and policy options to accelerate those programs to reach the 20 percent goal by 2010 and 33 percent goal by 2020. Possible steps for implementing this strategy include:

- Pursuing a cooperative agreement with the publicly owned utilities to achieve the needed CO2 reductions.
- Establishing a formal Memorandum of Understanding (MOU) with the publicly owned utilities to achieve these targets.
- Seeking state legislation requiring the publicly owned utilities to contribute proportionally to the state's RPS goals.

### *Technical Analysis*

The Energy Commission is sponsoring consultant work during 2005 and 2006 to explore the options for accelerating RPS programs adopted by publicly owned utilities to reach the 20 percent by 2010 and 33 percent by 2020. The first phase of this work, *Publicly Owned Electric Utilities and the California RPS: A Summary of Data Collection Activities, Draft Consultant Report*, will be available in November 2005.<sup>9</sup> The draft report provides the basis for a preliminary work plan to address three primary elements or task areas:

- Collect baseline information of RPS plans, procurements, and policies by publicly owned utilities.
- Develop recommendations for a more consistent tracking system for renewable energy projects participating in RPS programs adopted by publicly owned utilities.
- Identify barriers and opportunities for more aggressive renewable purchases by publicly owned utilities to reach 20 percent by 2010 and 33 percent by 2020.

**Date of Completion:** June 2006.

### *Cost-Effectiveness Analysis*

According to Senate Bill 1078 (SB 1078, Statutes of 2002, Chapter 516, Sher), each publicly owned utility must consider the effect of its RPS program on rates and financial resources, among other considerations.<sup>10</sup>

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<sup>9</sup> California Energy Commission, (forthcoming November 2005), *Publicly Owned Electric Utilities and the California RPS: A Summary of Data Collection Activities, Draft Consultant Report*, [www.energy.ca.gov/portfolio/documents/](http://www.energy.ca.gov/portfolio/documents/).

<sup>10</sup> This statute further requires that :

- (a) Each governing body of a local publicly owned electric utility, as defined in Section 9604, shall be responsible for implementing and enforcing a renewables portfolio standard that recognizes the intent of the Legislature to encourage renewable resources, while taking into consideration the effect of the standard on rates, reliability, and financial resources and the goal of environmental improvement.
- (b) Each local publicly owned electric utility shall report, on an annual basis, to its customers, the following:

## *Technology Assessment*

While there are renewable technologies that are mature today, regulatory and market incentives are needed to accomplish the potential greenhouse gas reductions from this strategy. Over the last several years, publicly owned utilities have contracted with about 1,000 MW of eligible renewable energy, which excludes large hydropower. These contracts include wind, geothermal, landfill gas, and solid-fuel biomass.<sup>11</sup>

Natural gas prices are expected to increase during the coming decade, making renewable resources that displace gas-fired electricity generation more competitive. However, renewable resources that are most economic with currently available technology and infrastructure are likely to be developed first. To keep costs low statewide, infrastructure development and cost-reducing technological advances need to progress in step with the pace of renewable energy development anticipated in this strategy.

Clear market signals regarding long-term commitment to develop eligible renewable resources will encourage the private sector to make the sizeable investments necessary to further reduce the cost of renewable energy. Cost-competitive renewable energy is essential for publicly owned utilities to achieve 33 percent renewable target by 2020 and associated greenhouse gas reductions.

## *PEER Review.*

One-on-one interviews with stakeholders are planned to explore policy options for achieving greater uniformity in RPS achievement by publicly owned utilities. Interviews will include environmental stakeholders, investor-owned utilities, renewable energy developers, and CA ISO.

## *Public Meetings*

Staff plans to conduct a public workshop in late June 2006 to solicit input regarding the findings of the follow-on draft consultant report to be released in early June 2006.

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(1) Expenditures of public goods funds collected pursuant to Section 385 for renewable energy resource development. Reports shall contain a description of programs, expenditures, and expected or actual results.

(2) The resource mix used to serve its customers by fuel type. Reports shall contain the contribution of each type of renewable energy resource with separate categories for those fuels considered eligible renewable energy resources as defined by Section 399.12.

<sup>11</sup> California Energy Commission, November 2005, Publicly Owned Electric utilities and the California RPS: A Summary of Data Collection Activities, Consultant Report, prepared by KEMA, Inc., <http://www.energy.ca.gov/2005publications/CEC-300-2005-023/CEC-300-2005-023.PDF>, p. 18.

### *Environmental Justice*

Not applicable.

### *Key Decision Points*

The Energy Commission will consider input from the stakeholder interviews and public workshop in making recommendations for legislative or administrative actions needed to implement this strategy.

### *Potential Legislative Needs*

If voluntary commitments are not possible, state legislation will be needed to implement this strategy, since neither the Energy Commission nor the CPUC have authority to require municipal utilities to increase their use of renewable energy development.

# Work Plan for Potential GHG Reduction Measure

## California Energy Commission

Strategy: Municipal Utility Electricity Carbon Policy

The Energy Commission and the CPUC are collaborating on additional programs to address ways to transition away from carbon-intensive electricity sources. Some publicly owned utilities have historically relied on coal-based generation, and many of these facilities will reach the end of their design life by 2020. The Energy Commission will explore options to encourage municipal utilities to transition away from carbon-intensive generation to low-carbon alternatives, and to reduce purchases of carbon-intensive power. Options include establishing emissions targets or caps, providing incentives for preferred generation options, and setting a greenhouse gas performance standard for new utility resource procurement, including both coal and non-coal resource additions.

In its recently adopted *2005 Integrated Energy Policy Report*, the Energy Commission recommends:

- A greenhouse gas performance (GHG) standard for utility procurement should be set no higher than emission levels from new combined-cycle natural gas turbines.
- The state should specify a GHG performance standard and apply it to all utility procurement, including in-state generation and out-of-state purchases, coal and non-coal resources.
- Additional consideration is needed before determining what role greenhouse gas offsets could play in complying with such a standard.
- The Energy Commission should work with the CPUC to develop a framework that accounts for the financial risk of reliance on carbon-based generation.

California should have a consistent electricity carbon policy for all electric utilities within the state that applies to both in-state generation and out-of-state power purchases.

**Estimated savings:** 3 million metric tons of carbon dioxide emissions in 2010; 9 million metric tons 2020.<sup>12</sup>

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<sup>12</sup> These values are based on the assumed replacement of coal-based power generation with natural gas during the 2010 and 2020 time frames. These estimates are a result of preliminary CEC staff analysis based on percent ownership of out-of-state power plants by public utilities in California, derived as a result of modeling the energy outputs, expressed in gigawatt-hours, for specific power plants which deliver electricity to California. Staff assumed heat rate of 10,000 British thermal units per kilowatt-hour of output for both coal and natural gas generation. These estimates assumes that one third of the coal-based generation is phased out by 2010 and 100 percent by 2020. Publicly owned utilities establish bilateral power contracts, rather than purchasing power on the energy market.

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### Steps to Implementing the Strategy

The Energy Commission does not have regulatory authority over the publicly owned utilities, in the way that the CPUC regulates the investor-owned utilities. Rather, electricity resource decisions by publicly owned utilities are subject to the approval of their respective elected or appointed boards. Possible steps for implementing this strategy include:

- Pursuing a cooperative agreement with the publicly owned and municipal utilities to achieve the needed CO2 reductions;
- Establishing a formal Memorandum of Understanding (MOU) with the utilities to achieve these targets;
- Seeking state legislation requiring the publicly owned utilities to contribute proportionally to the State's resource diversity and climate change goals.

This strategy also involves the following steps:

- Determine a consistent and transparent methodology to track greenhouse gas reductions from both in-state and out-of-state generation sources.
- Work with the CPUC to ensure that both municipal utilities and investor-owned utilities use consistent methodologies to report their GHG emissions.
- Begin work to establish emission baselines for the publicly owned utilities.

### *Technical Analysis*

Most utilities in California quarterly report their electricity use by fuel type and their energy consumption by sector to the Energy Commission as part of the Quarterly Fuel and Energy Report. The Energy Commission has not yet completed an analysis of the feasibility and costs of carrying out this strategy.

### *Cost-Effectiveness Analysis*

While the CPUC has adopted a carbon adder for the investor-owned utilities, to account for the risk of reliance on carbon-based generation, a similar policy does not exist for publicly owned utilities.

### *Technology Assessment*

Newly developed or emerging technologies to reduce greenhouse gas emissions from electricity generation should be assessed. The assessment should focus on identifying newer technologies with the greatest potential for reducing greenhouse gases.

*PEER Review.*

One-on-one interviews with stakeholders lead to the completion of the technical report noted above.

*Public Meetings*

Public testimony will be solicited as part of the *2007 Integrated Energy Policy Report* on these issues.

*Environmental Justice*

Not applicable at this time.

*Key Decision Points*

This is a new strategy, which will require further investigation, before a fixed timeframe for a decision to move forward.

Potential Legislative Needs

None at this time, although the Energy Commission acknowledges that a longer-term carbon policy for the electricity sector should include the public power sector. As a result, if cooperative efforts fail, this strategy may require legislation in the future.

# Work Plan for Potential GHG Reduction Measure California Energy Commission

## **Strategy: Municipal Utility Combined Heat and Power Initiative**

This strategy facilitates cost-effective reductions from fossil fuel consumption in the commercial and industrial sector through application of onsite power production to meet both heat and electricity loads. Various policy instruments will be needed to attain the realistic market potential and subsequent CO<sub>2</sub> reductions.

These policy mechanisms may include incentives to encourage or legislation to require publicly owned utilities (POU) to promote customer and utility-owned combined heat and power (CHP). Methods to promote CHP include changes to utility rate designs, market rules and regulations enabling easier access to wholesale markets, production tax credits for CHP, and other measures or incentives directed at key commercial and industrial activities in California.

The CHP Initiative proposed in the *2005 Integrated Energy Policy Report (IEPR)* would seek to develop additional programs to further encourage the development of CHP. These additional programs are not yet underway. They will require further consideration, and could likely require administrative, legislative, regulatory and budget initiatives. It will be necessary to explore various policy approaches.

**Estimated savings:** 0.04 million metric tons of carbon dioxide equivalent emissions in 2010; 0.3 million metric tons of carbon dioxide equivalent emissions in 2020.<sup>13</sup>

### **Lead Contact**

B.B. Blevins  
Executive Director  
California Energy Commission

### **Steps to Develop and Implement the Strategy**

*Pre-Implementation Study of Technical and Market Potential, and Cost Effectiveness Analysis*

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<sup>13</sup> CEC staff prepared these estimates based on the following assumptions: 1) municipal utility contribution to CHP is 25 percent of state total, based on energy delivery ratio between municipal and investor-owned utilities; 2) CHP units average 50 percent capacity factor; 3) system avoided heat rate is 10,000 Btu/kWh; 4) system efficiency for gas turbine-based CHP systems is 7,000 Btu/kWh and fuel cell CHP systems is 9,000 Btu/kWh, based on "Assessment of California CHP Market and Policy Options" listed below; and 5) the bulk of new systems in the 10-year estimate is based on gas turbines, with a larger percentage of systems based on fuel cells in the 20-year estimate.

The Energy Commission as part of the 2005 Integrated Energy Policy Report recently conducted an initial assessment of the technical and market potential of CHP in California, based on process steam, hot water and absorption cooling potential<sup>14</sup>. This assessment looked at potential policy scenarios that could be implemented, and what their respective effect would be on the installed capacity of CHP in California between today and 2020. The IEPR process also took an initial look at the cost effectiveness of each policy scenario.

Given this initial analysis, the Energy Commission would refine this market, policy and cost effectiveness assessment to reflect the ongoing regulatory consideration of DG cost effectiveness tests as well as additional process-heat-based CHP potential. The CPUC and the Energy Commission formed a collaborative partnership to develop a formal cost/benefit methodology for distributed generation (including CHP) in the CPUC current distributed generation rulemaking (R.04-03-017). The Energy Commission will update the IEPR policy scenarios, market potential and cost effectiveness evaluation using the CPUC adopted cost/benefit methodology.

Through existing efficiency commercialization programs at the Energy Commission where relationships have been well established with the commercial and industrial sectors, a set of implementation activities will be developed that include, but are not limited to, the following:

- Encouraging utility tariffs to enable CHP owners to sell excess onsite electricity generation to the utility at prevailing wholesale prices. Existing analysis suggests this would be very effective in stimulating the near-term (during the next 5 years) market;
- Estimating CO<sub>2</sub> reduction credits to reflect the net reduction of CO<sub>2</sub> emissions for the CHP systems compared to the avoided electricity and boiler fuel emissions;
- Calculating potential transmission and distribution benefit payments that reflect the value of local and temporal benefits CHP provides utilities;
- Proposing incentives to encourage utilities to promote installation of customer and utility owned CHP projects.

Date of Completion: September 2006

### *Implementation*

The Energy Commission will develop additional programs to encourage additional CHP for publicly owned utility customers. The CEC will assess the cost-effectiveness and emission-reducing characteristics of CHP projects. We will use these assessments and

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<sup>14</sup> *Assessment of California CHP Market and Policy Options For Increased Penetration*, California Energy Commission, Publication #CEC-2005-060-D, April 2005, [<http://www.energy.ca.gov/2005publications/CEC-500-2005-060/CEC-500-2005-060-D.PDF>]

the CHP recommendations contained in the 2005 IEPR for deciding on the value and design of CHP commercialization programs. The Energy Commission will also consider additional deployment strategies, and identify opportunities to further integrate CHP with utility procurement planning, particularly for projects over 5 MW.

### *Technology Assessment*

The technology for combined heat and power is not new; use of cogeneration, producing electricity and process heat from a single fuel sources, has been employed in California since the 1960s. Technology to improve grid interconnection and electricity metering to allow two-way communication between industrial and commercial facilities and utilities will facilitate the development of CHP.

### *Peer Review and Public Meetings*

This strategy will be publicly vetted and implemented through adoption of a revised Energy Commission *Distributed Generation Strategic Plan*.<sup>15</sup> This strategic plan was initially adopted in June 2002 and contains the basic vision, goals and objectives for the State to support distributed generation and CHP.

Through this strategic plan update, the Energy Commission will solicit input from key stakeholders from industry, end use sectors, utilities, government, environmental groups, and others to provide peer review of the implementation plan for this CHP Initiative. The Energy Commission will receive public input and consider cost-effective DG and CHP deployment strategies through its administrative processes.

Date of Completion: September 2007

### *Environmental Justice*

It is uncertain whether there will be environmental justice issues at this time.

### *Key Decision Points*

- Feasibility of attaining MW and MWh targets for CHP by 2020 and their associated CO<sub>2</sub> reductions.
- Cost effectiveness of particular policy scenarios.
- Adoption of an implementation plan via revision to the Energy Commission's Distributed Generation Strategic Plan.

### **Potential Legislative Needs**

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<sup>15</sup> *Distributed Generation Strategic Plan*, California Energy Commission, Publication# P700-02-002, June 2002, [[http://www.energy.ca.gov/reports/2002-06-12\\_700-02-002.PDF](http://www.energy.ca.gov/reports/2002-06-12_700-02-002.PDF)]

Legislation is required in order to apply a state strategy for CHP programs implemented by publicly-owned utilities. Specific legislative needs to implement this strategy publicly owned and municipal utilities are not known at this time.

Similar to the strategy for investor-owned utilities, it is anticipated that administrative and regulatory actions are necessary to establish utility incentives, CO<sub>2</sub> and transmission and distribution payments, and less complicated access for CHP to wholesale electricity markets.

# Work Plan for Potential GHG Reduction Measure California Energy Commission

## **Title of Strategy: Alternative Fuels: Non-Petroleum**

This strategy involves increasing the use of non-petroleum fuels in California's transportation sector, as recommended in the Energy Commission's *2003 and 2005 Integrated Energy Policy Reports*. The Governor has also directed the Energy Commission to develop a workable, long-term transportation fuels plan that will result in significant gasoline and diesel use and that will establish realistic and achievable objectives. The Bio-Energy Interagency Working Group, which the Energy Commission is leading, has been asked to recommend options for optimizing the market potential for bio-fuels through a coordinated, state level effort.

Assembly Bill 1007 (AB 1007, Pavley, Chapter 371, Statutes of 2005) requires that the Energy Commission, in partnership with the Air Resources Board and in consultation with relevant state agencies, develop and adopt a state plan by June 30, 2007, to increase the use of alternative fuels for transportation. AB 1007 mandates that the plan (1) evaluate alternative fuels on a full fuel-cycle assessment; (2) set goals for 2012, 2017, and 2022 for increased alternative fuel use; and (3) recommend policies to ensure goals are attained.

State policy options can take several forms, including technology performance standards, financial incentives, negotiated agreements, voluntary commitments, emissions-intensity benchmarking for fuel producers or automobile manufacturers, or other mandatory measures, such as fuels or motor vehicle standards or a cap-and-trade program. Based on our analysis, some alternative fuels, have been shown to provide cost-effective greenhouse gas reduction benefits, but face economic, market or regulatory barriers that are impeding their use.

To achieve the benefits of this strategy, implementation issues would need to be overcome:

- The high first cost of alternative fueled vehicles, when compared to conventional vehicles using internal combustion engines;
- The absence of a convenient retail fueling network to dispense alternative fuels to customers;
- Policies are needed to ensure that alternative fuels are available for dual-fuel or flexible fueled vehicles.
- The lack of credible public information on consumer choices of fuels and vehicles.
- Depending on which alternative fuel, there are certain regulatory and market barriers which would need to be overcome.
- Vehicles and fuels recommended as part of this strategy will require certification by the Air Resources Board under the highest possible emission standards.

## **Lead Staff Contact**

B. B. Blevins  
Executive Director  
California Energy Commission

## **Steps to Implementing the Strategy**

Work is ongoing to expand and update the analyses done for the *2005 Integrated Energy Policy Report*, which will form the basis for the alternative fuels plan requested by both the Governor and the Legislature.

### *Technical Analysis*

The technical potential of these measures was first determined, based on a Joint Report by the Energy Commission and the Air Resources Board, which was adopted in June 2003, *Reducing California's Petroleum Dependence*. Building upon this work, the Energy Commission proposes to further evaluate alternative fuels based on a full fuel-cycle assessment as required by AB 1007. Results of our analysis will be reported in a draft report in January 2007 and a final report in June 2007.

Date of Completion: June 2007

### *Economic Analysis*

The Energy Commission plans to hire consultant expertise to perform the needed analysis of the costs and benefits of various fuel options, vehicles and fuel and vehicle combinations. A contractor will be hired in July 2006, and work will be completed by June 2007.

Date of Completion: June 2007

### *Technology Assessment*

The status of vehicle technology for alternative fueled vehicles varies from commercially available, in the case of compressed natural gas and flexible fueled vehicles using methanol or ethanol, to advanced and emerging, in the case of hydrogen fuel cell vehicles. Certain alternative fuels, such as compressed and liquefied natural gas and ethanol blends, are being commercially produced today, and their economics will improve with higher volume production.

### *PEER Review.*

The work performed under this strategy will be reviewed by the Air Resources Board staff, other relevant state agencies, and key representatives of the alternative fuels industry.

Date of completion: December 2006

### *Public Meetings*

This strategy will be examined through a stakeholder process coordinated by the Energy Commission staff, beginning in September 2006. At least one public workshop and one-on-one meetings with key stakeholders are planned.

Date of completion: December 2006

*Environmental Justice*

Not applicable at this stage of technical and economic feasibility analysis.

*Key Decision Points*

- Results of the full fuel-cycle analysis will need to be evaluated to determine next steps in implementing this strategy.
- The Air Resources Board (ARB) will determine the emissions performance of the recommended fuels and vehicles in meeting air quality requirements.
- Both the Energy Commission and the ARB will need to agree on performance indicators for reducing greenhouse gas emissions and for reducing energy consumption in the transportation sector.
- The Energy Commission Staff will develop policy recommendations, based on the analysis, input from other state agencies, public outreach and stakeholder comments.

*Potential Legislative Needs:* State legislation may be required to fund the recommended policy and program options, including financial incentives needed for alternative fueled vehicles and fueling infrastructure. A transportation “public goods” surcharge on gasoline and diesel sales is one option for funding the recommended alternative fuel programs.

Additional state legislation may be needed to establish the recommended goals for 2012, 2017, and 2022 which will be one outcome of the Energy Commission’s work in support of the AB 1007 requirements.

# **GHG Reduction Strategy Recently Underway CIWMB Draft Work Plan 1—3MMTCO<sub>2</sub>e by 2010**

## **Title of Strategy: 50% Statewide Recycling Goal**

Achieving the State's 50% waste diversion mandate as established by the Integrated Waste Management Act of 1989, will reduce GHG emissions associated with energy intensive material extraction and production as well as methane emission from landfills. Currently a diversion rate of 48% has been achieved on a statewide basis. This strategy would result in achieving an additional 2% waste diversion of recyclables from landfills using existing authorities and mandates, collection infrastructures, and recycling processes.

## **Lead Staff Contact:**

Rosario Marin, CIWMB Chair  
Mark Leary, CIWMB Executive Director  
Judith Friedman, CIWMB Branch Manager

## **Steps to Implementing the Strategy:**

- **Task 1-Market Assessment**  
Implement the CIWMB Market Assessment Action Plan to determine the flow and quantity of priority recyclable materials in the state. [Completion of phase 1-- Spring 2007]
- **Task 2-Stimulate RCP Markets**  
Implement the CIWMB Green Procurement Action Plan to stimulate the markets for recycled content products thereby increasing the incentive to divert recyclables from the landfill. Included in this is a major PR campaign with Olgilvy Public Relations Worldwide to increase procurement of priority materials at local and state government levels. [Completion of phase 1—Spring 2007]
- **Task 3-Increase Business Waste Diversion**  
Continue to implement/enhance business waste diversion programs, since businesses generate over 60% of the waste stream. [Ongoing]
- **Task 4-Enforce Diversion Mandate**  
Continued enforcement of AB 939 diversion mandate via biennial review, and compliance order processes to bring all jurisdictions to 50%. Included in this is technical assistance to those jurisdictions that are having trouble reaching the mandate. [Target completion date—2008]
- **Task 5-Promotion and Outreach**  
Continued promotion and outreach to local governments and businesses to increase diversion program implementation on a statewide basis. [Ongoing]

- **Task 6-Cost Benefit Analysis**  
Conduct cost benefit analysis to evaluate the effectiveness of increased recycling. [Pending approval of BCP, and completion of analysis—estimated date of completion is 2007]
- **Task 7-Measure Outcomes**  
Measure the GHG reduction as an outcome of this strategy. [Pending approval of BCP, and completion of analysis—estimated date of completion 2010]

***Public Meetings/Environmental Justice:***

All elements of the 50% strategy will be subject to public scrutiny and EJ evaluations at the open publicly noticed CIWMB board meetings. This includes regular updates to the Board on general progress, as well as specific decision-points for individual projects.

***Key Decision Points:***

- 1) CIWMB Board approval of contract concepts that support implementation of Green Procurement Action Plan.
- 2) CIWMB Board support of existing business assistance programs and proposed enhancements.
- 3) CIWMB holds jurisdictions accountable to the 50% mandate by continuing to implement enforcement actions for those who fail to meet it.
- 4) Agency/DOF/Governor and Legislature via Budget Act process approval of BCP for CIWMB staffing and research in support of the work of this strategy.

**Potential Legislative Needs**

BCP approval is needed via Budget Act for FY06-07.

**Technology Assessment**

This strategy would be implemented using existing authorities and mandates, collection infrastructures, and recycling processes. These include everything from collection vehicles, to sorting line technologies at Materials Recovery Facilities, to balers, chippers, grinders, flaking and washing equipment and the equipment used to manufacture goods from recycled content materials.

**Cost to Implement**

Two studies were conducted in 2001 to determine the economic impact of implementing AB 939, the law that mandates a 50% reduction in waste to be maintained in perpetuity by the year 2000. These studies show that recycling has twice the economic benefit of burying waste in the ground. These studies showed that recycling generates \$4 billion in salaries and wages, produces \$10 billion worth of goods and services annually, and

generates \$200 million annually in sales tax revenue at the local level. (Sources: “The Economic Impact of Waste Disposal and Diversion in California”, April 2001; and “California Recycling Economic Information Study” July, 2001.)

In order to implement this GHG reduction strategy, we will need to assure the diversion of an estimated additional 1.8 million tons of waste. This estimate is based on the most recent calculation of statewide diversion rates done in 2004. The cost to implement this strategy needs to be more fully evaluated for accuracy. However, it is estimated that the cost to recycle ranges from \$35 to \$200 per ton. This would equal a total cost of \$63 to \$360 million. This would also result in economic benefits such as described above. For this strategy, it is estimated that recycling the target amount versus disposing it in the landfill would generate an additional \$182 million in salaries and wages, produce nearly \$500 million more in goods and services and generated \$243 million more in sales. Depending on the direction of cap and trade options, there may be additional economic benefits associated with GHG offsets from the recycling industry.

# **GHG Reduction Strategy Recently Underway CIWMB/CEC Draft Work Plan 3—2MMTCO<sub>2</sub>e by 2010, 3MMTCO<sub>2</sub>e by 2020**

## **Title of Strategy: Landfill Methane Capture**

Methane emissions from landfills contribute about 4 percent of the total net greenhouse gas (GHG) emissions in California (PIER 2001 inventory). Methane production varies greatly from landfill to landfill depending on site-specific characteristics such as the quantity of waste in place, waste composition, moisture content, landfill design and operating practices, and climate. Unless captured first by a gas recovery system, methane generated by the landfill is emitted when it migrates through the landfill cover to the atmosphere and becomes a potent GHG.

Landfills can install direct gas use projects or electricity projects with backup flare systems to capture and use methane. The technical applicability of any mitigation option is dependent on the amount of landfill gas generated by landfills in a given size category. Project costs are driven by two main factors – landfill size and landfill age. In general, larger landfills tend to have more cost-effective projects because they produce greater amounts of methane and can sell greater amounts of direct gas or electricity. Age impacts methane generation since it dictates the stage of decomposition of the waste in place and the rate of landfill gas generation.

## **Lead Staff Contacts:**

Rosario Marin, CIWMB Chair  
Mark Leary, CIWMB Executive Director  
Judy Friedman, CIWMB Branch Manager  
John Bell, CIWMB Permitting and Enforcement Division

## **Steps to Implementing the Strategy:**

- **Task 1 – Review Existing Data**  
Review existing data and studies of California's in-place waste at landfills and of existing methane recovery rates (e.g., at County of Los Angeles Sanitation District sites, other sites surveyed by SCS, U.S. EPA's Landfill Methane Outreach Program (LMOP), etc.) [Target Completion Date: February 2006]
- **Task 2 – Update Landfill Gas to Energy Inventory**  
Compile and update current CIWMB and CEC data inventory on landfill gas collection and recovery systems. [Target Completion Date: February 2006]
- **Task 3 – Refine Models on Emissions Generation and Reduction**  
Support additional research by CEC to reduce uncertainty and improve baseline and emissions reduction estimates for landfills, including refining methodologies/models, and conducting testing/measurement to verify estimates. Assess assumptions in

current models regarding methane collection efficiency; whether all baseline residual emissions can be mitigated; how much waste in place is already under control systems; what % of landfills have direct gas use or an electric project; whether acreage is related to waste in place or landfill size; and variability in emissions over seasons and time. Provide for field testing of assumptions where feasible. Incorporate results from Task 4 as appropriate. Use refined model to estimate potential reductions and evaluate reduction strategies. [CEC contract to be initiated Winter 2006; final results 2008]

- **Task 4 – Assess Gas Monitoring System Viability**  
Develop methods and procedures and conduct field tests to determine the viability of existing perimeter gas monitoring wells. Assess lateral gas emissions and use information as appropriate in Task 3. [Contract award May 2006; initial results Summer 2007]
- **Task 5 – Participate in CEC Landfill Gas to Energy Task Force**  
Participate in Landfill Gas to Energy Task Force, if reconvened, in consultation with CEC, ARB/Air Districts, Cal/EPA, USEPA Landfill Methane Outreach Program, Interagency Bioenergy Working Group, California Biomass Collaborative and other stakeholders. [Beginning 2006 depending on whether reconvened by CEC or as subset of Bioenergy Working Group]
- **Task 6 – Update Technology Evaluation**
  - a) Assist CEC in updating evaluation of research and development of landfill gas control and recovery technologies. Potential topics include microturbine efficiencies (including siloxane and NO<sub>x</sub> issues); new technologies for air emission reductions from LFGTE systems; recovery system optimization by computer control; mulch and compost covers to increase methane oxidation; enhanced collection efficiencies through final closure completions in accordance with 27 CCR standards. [CEC contract discussions to be initiated 2006; initial results 2008]
  - b) CIWMB/SWRCB will complete Subtitle D RD&D regulations and track collection efficiencies and emissions reductions at bioreactor landfill projects. [Regulations completed; tracking ongoing]
  - c) In addition, provide assistance on installation of gas recovery systems at older pre-regulation landfills based on ongoing investigations and remediation projects. [As appropriate]
- **Task 7 –Coordinate Steering Group**  
Convene and coordinate a panel of experts to serve as a steering group to provide comments on Tasks 1, 3, and 6 (e.g., regarding methodologies, modeling assumptions, field testing, and methane capture options). [Ongoing commencing with initiation of CEC contract work related to Task 3]
- **Task 8 – Regulatory Oversight**  
Provide continued regulatory oversight and track landfill operating performance and closures, CIA site investigations, solid waste cleanup funding with respect to landfill gas control and/or recovery and collection efficiencies. [Ongoing]
- **Task 9 – Policy and Legislative Analyses**  
Evaluate policy options such as tax incentives, grants, and offsets for new recovery systems. Explore funding and potential regulatory and/or legislative concepts for

promoting landfill gas emissions reduction practices and technologies. [As appropriate]

- **Task 10 – Action Plan Updates**

Revise and update Action Plan and goals as necessary. [As needed]

### **Public Meetings/Environmental Justice:**

All elements of the landfill methane capture strategy will be subject to public scrutiny and EJ evaluations at the open publicly noticed CIWMB board meetings. This includes regular updates to the Board on general progress, as well as specific decision-points for individual projects.

### **Key Decision Points:**

- 1) CIWMB Board approval of contract concepts that support implementation of Technology Assessment Action Plan.
- 2) CIWMB Board support of existing landfill gas-related programs and proposed enhancements.
- 3) Agency/DOF/Governor and Legislature via Budget Act process approval of BCP for CIWMB staffing and research in support of this strategy.

### **Potential Legislative Needs**

Potential legislative changes may be needed to enhance promotion of emission reduction practices and performance reporting system of LFG to energy technologies.

### **Technology Assessment**

This strategy would be implemented using typical systems such as reciprocating engines, combustion turbines, and steam cycle power plants and would account for gas control systems required under air quality regulatory requirements. Additional benefits would be realized from further expansion of landfill-gas-to-energy production, e.g., completed closure at landfills, improvements in capture efficiencies, etc. The strategy would evaluate microturbines and fuel cells, direct use (medium-BTU) projects and pipeline quality (High-BTU) gas production projects, and landfill-gas-to-energy systems that produce CNG or LNG vehicle fuels. Landfill-gas-to-energy projects that produce LNG and CNG vehicle fuels are especially of interest since the emissions reduction (NO<sub>x</sub>, CO and PM) potentials are tremendous as compared with best available control technology (i.e., flares) and other systems that use reciprocating engines and combustion turbines.

### **Cost To Implement**

Landfill gas to energy (LFGTE) systems are already in place at about 60 landfills in California, including most of those most suitable for large-scale, economical electricity

generation. Cost estimates for new and expanded LFGTE systems vary widely based on type of technology, size of project, and age of landfill. Cost estimates range from \$1,100/kW to \$4,000/kW for total installed costs. For example, cost estimates for typical systems such as reciprocating engines, combustion turbines, and steam cycle power plants range from \$1,100 to \$1,300 per kW total installed cost, with 1.4¢ to 2.0¢ per kWh for operation/maintenance (SCS Draft report 8/2001 incorporated in Draft California Landfill Gas Primer, 10/2001). For microturbines and fuel cells, CEC cost estimates range from \$1,800 to \$4,000 per kW total installed cost, with 2.0¢ to 2.5¢ per kWh for operation/maintenance. For direct use (medium-BTU) projects and pipeline quality (High-BTU) gas production, estimates range from \$0.6 to \$1.5 million per mmscfd for capital costs (not including pipeline), with \$400 to \$1,000 per mmscfd for operation/maintenance. The Biomass Collaborative estimated an average capital cost of \$3,500 per kWh, which may be slightly high depending on the mix of technologies employed.

To reach the targeted GHG reductions identified in this work plan we estimate the overall cost would range from \$30-\$270 million. This range is dependent on a wide variety of assumptions related to capture efficiencies, expanded energy recovery, completed closure at landfills, avoided emissions and economies of scale. These cost estimates do not reflect annual O/M costs or revenues from the sale of electricity or gas, nor do they reflect potential tax rate credits or differing discount rates. Depending on the direction of cap and trade options, there may be additional economic benefits associated with GHG offsets from the industry. There also are significant fuel diversity and air quality benefits that would accrue from LFGTE systems that produce CNG or LNG vehicle fuels.

As part of this work plan, we anticipate further refining these assumptions and the total cost to implement LFGTE technologies.

# GHG Reduction Strategy Under Consideration CIWMB Draft Work Plan 2—3MMTCO<sub>2</sub>e by 2020

## **Title of Strategy: Zero Waste/High Recycling Strategies**

Additional recovery of recyclable materials from landfills will reduce the GHG emissions associated with energy intensive material extraction and production as well as methane emission from landfills. Transforming organics/biomass and plastic waste into marketable products will also reduce the amount of material going to landfill, and therefore will further reduce GHG emissions. Currently, the State is mandated to divert 50% of waste going to landfills as established by the IWMA of 1989. Efforts to exceed the 50% goal would allow for additional reductions in GHGs.

### **Lead Staff Contact:**

Rosario Marin, CIWMB Chair  
Mark Leary, CIWMB Executive Director  
Judith Friedman, CIWMB Branch Manager

### **Steps to Implementing the Strategy:**

- **Task 1-Maintain existing programs**  
Continue to stimulate existing programs to maintain the foundation of base level diversion (50%) [Ongoing]
- **Task 2-Evaluate New Technologies**  
Implement CIWMB Technical Assessment Action Plan to evaluate new diversion technologies for MSW still not diverted. [Completion of phase 1--Spring 2007, additional assessments to continue in future phases to 2020]
- **Task 3-Focus diversion targets**  
Implement results of the CIWMB Market Assessment Action Plan to pinpoint focused diversion targets. [Estimated completion date 2020]
- **Task 4-Stimulate RCP Markets**  
Continue to implement market development strategies identified by future phases of the CIWMB Green Procurement Action Plan, thereby increasing the incentive to divert recyclables from the landfill. [Estimated completion date 2020]
- **Task 5-Provide Incentives for Zero Waste Programs**  
Provide incentives for zero waste programs and alternative waste management strategy development including source reduction programs such as waste prevention and reuse. [Estimated completion date 2020]
- **Task 6-Increase Business Waste Diversion**  
Continue to implement/enhance business waste diversion programs, since businesses generate over 60% of the waste stream. Focus on energy and resource intensive business sectors such as electronic products and chip manufacturing. [Ongoing]
- **Task 7- Promotion and Outreach**

Conduct education campaign(s) on zero waste behaviors and practices such as the benefits of reuse and environmentally preferable purchasing choices including reduced packaging, bulk purchasing, energy efficient products, and environmentally friendly household items. [Estimated completion date 2020].

- **Task 8-Conduct LCA and Cost Analysis**

Conduct research, lifecycle analysis and cost benefit analysis to evaluate the effectiveness of high recycling/zero waste programs including GHG reductions and other cross media benefits. [Estimated completion date 2020]

- **Task 9-Measure Outcomes**

Measure the GHG reduction as an outcome of this strategy. [Pending approval of BCP, and completion of analysis—estimated date of completion 2020]

### ***Public Meetings/Environmental Justice:***

All elements of this high recycling/zero waste strategy will be subject to public scrutiny and EJ evaluations at the open publicly noticed CIWMB board meetings. This includes regular updates to the Board on general progress, as well as specific decision-points for individual projects.

### ***Key Decision Points***

- 5) CIWMB Board support of existing programs and proposed enhancements. CIWMB holds jurisdictions accountable to the diversion mandate by continuing to implement enforcement actions for those who fail to meet it.
- 6) CIWMB Board approval of contract concepts that support future phases of the CIWMB Green Procurement, Market Assessment and Technical Assessment Action Plans.
- 7) CIWMB Board approval of resources for zero waste programs, business diversion programs and public awareness campaigns.
- 8) Agency/DOF/Governor and Legislature via Budget Act process approval of BCP for CIWMB staffing and research in support of the work of this strategy.

### **Potential Legislative Needs**

As the CIWMB strives for achieving Zero Waste and implements alternative zero waste strategies, there may be a need for legislative changes.

### **Technology Assessment**

This strategy would be implemented using both existing collection infrastructures and recycling processes and emerging technologies that include energy extraction from the materials. Existing infrastructure and recycling processes include everything from collection vehicles, to sorting line technologies at Materials Recovery Facilities, to balers, chippers, grinders, flaking and washing equipment and the equipment used to manufacture goods from recycled content materials. Emerging technologies include

Biochemical processes such as anaerobic digestion and fermentation and Thermochemical processes such as gasification, pyrolysis and hydrolysis.

### **Cost to Implement**

To fully evaluate the cost to implement this GHG reduction strategy, a detailed cost benefit analysis must be performed. This strategy includes pursuing multiple zero waste options that go well beyond recycling including waste prevention, reuse, utilizing new technologies, public behavior changes, consumer choices, and business and manufacturing processes. The cost/benefit of all of these options is not well defined at this point.

Regarding the increased recycling portion of this strategy, it is estimated that the cost to recycle ranges from \$35 to \$200 per ton. This is based on two studies that were conducted in 2001 to determine the economic impact of implementing AB 939, the law that mandates a 50% reduction in waste to be maintained in perpetuity by the year 2000. These studies showed that recycling has twice the economic benefit of burying waste in the ground. These studies showed that recycling generates \$4 billion in salaries and wages, produces \$10 billion worth of goods and services annually, and generates \$200 million annually in sales tax revenue at the local level. (Sources: "The Economic Impact of Waste Disposal and Diversion in California", April 2001; and "California Recycling Economic Information Study" July, 2001.)

# CALIFORNIA PUBLIC UTILITIES COMMISSION CLIMATE ACTION TEAM WORKPLAN

## SUMMARY

This Work Plan sets forth the PUC's plans for implementing the following strategies:

- Accelerated Renewable Portfolio Standard
- California Solar Initiative
- Energy Efficiency Programs
- Additional Energy Efficiency Programs
- Electricity Sector Carbon Policy
- Combined Heat and Power Initiative

We note that descriptions of some strategies in this Work Plan are brief because these strategies, such as Additional Energy Efficiency Programs and Electricity Sector Carbon Policy, are expected to develop over a period of years. The PUC views this Work Plan as an evolving document and will revise and update it as necessary and appropriate as new information is developed.

## STRATEGIES

**Title of Strategy:** Accelerated Renewable Portfolio Standard (Table 1)

**Lead Staff Contact:** Theresa Cho

**Steps to Implementing the Strategy:**

*The Renewable Portfolio Standard (RPS) program mandates that all load serving entities (LSEs), including Investor Owned Utilities (IOUs), Energy Service Providers (ESPs) and Community Choice Aggregators, achieve a goal of 20% renewables in their procurement mix by 2017. (Pub.Util.Code §§ 399.11 et seq.) The 2003 Energy Action Plan accelerated the 20% RPS goal from 2017 to 2010. The PUC and California Energy Commission (Energy Commission) are charged with implementing the RPS and have a number of proceedings underway to assure that the 20% by 2010 target is achieved. In November, the PUC will act on a decision setting forth the framework for ESP, CCA, and small and multi-jurisdictional utilities' participation in the RPS program for the 20% goal.*

*The Governor has set a goal of achieving 33% renewables in the State's resource mix by 2020. The joint PUC/Energy Commission September 2005 Energy Action Plan II (EAP II) adopts the 33% goal. The PUC and Energy Commission have already commenced review of the legal, regulatory and infrastructure changes necessary to achieve the Governor's goal.*

*The Center for Resource Solutions has prepared a preliminary assessment for the PUC to identify necessary implementation steps and barriers that must be overcome in order to achieve the 33% goal for the state's IOUs (Study). The Study will be finalized by the end of 2005 and will provide a starting point for developing a regulatory framework and future action by the PUC. The Energy Commission has undertaken a related study on expanding the renewable portfolio standards to publicly-owned utilities (Energy Commission Work Plan).*

*Implementation of a successful program will be complex and time consuming and the PUC must move as quickly as possible to lay the legal, regulatory and administrative foundation for the 33% goal. In addition to the development of the Study, the PUC has already taken steps to address some of the RPS-related critical and time sensitive issues:*

- *The PUC initiated an investigation (I0509005) to facilitate proactive development of transmission infrastructure to access renewable energy resources for California.*
- *Approval and implementation of Budget Change Proposals for additional staff will be necessary to accommodate the expansion of the renewables program.*

Additional implementation steps are:

- Complete PUC Study - December 2005
- Complete PUC investigation into renewable resource transmission needs and commence implementation – 2006
- Develop legislation needed to achieve the 33% goal
- Commence an investigation of the other structural, process and regulatory changes necessary to achieve the 33% goal – 2006-2007

**Technical Analysis/Technology Assessment.** The Study will be the starting point for the analysis necessary to develop a detailed 33% renewables program. The PUC will continue to work closely with the Energy Commission and the Independent System Operator to conduct additional analysis on availability of additional renewable resources, transmission, and other infrastructure constraints, and ISO protocols that may limit the use of renewable resources.

**Cost-Effectiveness Analysis.** The PUC will examine the costs and benefits of the 33% goal from a ratepayer perspective and identify necessary steps to provide ratepayer value.

**PEER Review.** The PUC will obtain peer review through its regular processes and procedures.

**Public Meetings:** All actions taken by the PUC to create a 33% renewables program will be pursuant to the PUC's regular processes and procedures for public input.

**Environmental Justice:** No issues identified at this time.

**Key Decision Points:** The PUC will initiate administrative proceedings on implementing the 33 percent goal. The proceedings will result in the issuance of a decision with an implementation plan.

**Potential Legislative Needs:** Legislation is necessary to (1) amend a provision in SB 1078 that prohibits the PUC from establishing renewable requirements for LSEs that exceed 20% and to codify the 20% by 2010 and 33% goals, and (2) reauthorize the second phase of the Public Goods Charge (PGC). As the program is developed, the PUC anticipates that further legislation could be necessary – in particular in the area of tradable renewable energy credits - to achieve the 33% goal.

**Title of Strategy:** California Solar Initiative (Table I)

**Lead Staff Contact:** Theresa Cho

**Steps to Implementing the Strategy:** Governor Schwarzenegger's solar initiative includes installation of one million solar roofs or an equivalent 3,000 MW by 2017 on homes and businesses; increased use of solar thermal systems to offset the increasing demand for natural gas; use of advanced metering in solar applications; and creation of a funding source which can provide rebates over ten years through a declining incentive schedule.

Legislation to codify the Governor's initiative (SB 1) failed to pass the California Assembly this Fall. However, the PUC in cooperation with the Energy Commission and the Governor's Office, will develop a plan to implement the California Solar Initiative (CSI) under its existing statutory authority. The program will be submitted to the Governor's Office on December 8, 2005. The PUC will update this Work Plan in December to reflect the new program.

- Prepare plan for implementation of the CSI - December 8, 2005.
- Implementation of Plan – 2006 through 2017.

**Technical Analysis/Technology Assessment.** In cooperation with the Energy Commission, additional technical analyses will be conducted as necessary through the PUC's regular processes and procedures.

**Cost-Effectiveness Analysis.** In cooperation with the Energy Commission, ongoing program evaluation, including cost/benefit analyses, will be conducted through the PUC's regular processes and procedures.

**PEER Review.** The PUC will continue to work with the Energy Commission and will obtain peer review through its regular processes and procedures.

**Public Meetings:** Public meetings will be conducted as a part of the PUC's regular administrative processes and procedures.

**Environmental Justice:** No issues identified at this time.

**Key Decision Points:** The program for implementation of the CSI will be submitted to the Governor's Office by December 8, 2005.

**Potential Legislative Needs:** Legislation is needed to expand the current net-metering cap. The cap is one half of 1% and must be raised to at least 2.5% to accommodate the new solar installations coming online under the new program.

**Title of Strategy:** Investor Owned Utility Energy Efficiency Programs (Table I)

**Lead Staff Contact:** Theresa Cho

**Steps to Implementing the Strategy:** In September 2004, the PUC adopted aggressive savings targets for the IOUs' energy efficiency programs through 2013. The savings targets through 2013 are stretch goals and the PUC will reassess these targets and adopt the actual goals during each three-year program cycle. The PUC funds energy efficiency programs through the Public Goods Charge and the IOUs' resource procurement budgets. For the 2006-2008 program cycle, the total energy efficiency budget for all of the IOUs is approximately \$2 billion, for a total projected annual net savings of 7,371 gigawatt hours and 121,989 million therms. These projections exceed the savings targets by 108% and 109% respectively. By 2008 these programs will reduce annual carbon dioxide emissions by more than 3 million tons per year.

Over the next year, the PUC will develop a risk/reward incentive mechanism for the IOUs and refine energy measurement and verification protocols. In 2008, the PUC will evaluate and adopt the IOUs' 2009-2011 energy efficiency savings goals and programs.

- Refine baseline and calculate emissions reductions from energy efficiency programs in the PUC's resource procurement proceeding. It appears that the estimated reductions from this strategy include IOU procurement funded energy efficiency savings from 2004-2013 and that PGC funded energy efficiency savings are included in the baseline.
- Complete Phase II on energy efficiency incentive program for the IOUs and energy measurement and verification protocols – 2006

**Technical Analysis/Technology Assessment:** The Energy Commission is a partner in implementing the energy efficiency programs for the IOUs. The Energy Commission and PUC will continue to collaborate on additional technical analyses as needed.

**Cost-Effectiveness Analysis:** Additional cost/benefit analyses will be conducted as necessary through the PUC's regular processes and procedures.

**PEER Review:** PEER Review will be conducted through the PUC's regular processes and procedures.

**Public Meetings:** All PUC actions will be pursuant to the PUC's regular processes and procedures for public input.

**Environmental Justice:** No issues identified at this time.

**Key Decision Points:** In 2008, the PUC will initiate a proceeding to approve IOU budgets and programs for the 2009 to 2012 program years. The PUC will issue a decision by the end of 2008.

**Potential Legislative Needs:** Legislation to reauthorize the Public Goods Charge is necessary.

**Title of Strategy:** Additional Energy Efficiency Programs/Demand Response (Table II)

**Lead Staff Contact:** Theresa Cho

**Steps to Implementing the Strategy:** It is the PUC's understanding that the Additional Energy Efficiency Programs strategy in Table II refers to savings goals and measures from all ratepayer funding sources (PGC and procurement) for program years 2014-2020. While the PUC has not yet adopted savings goals for this period, we have an on-going proceeding on energy efficiency in which new measures and savings goals for electricity and natural gas are continually evaluated and implemented as appropriate. It is expected that as technology evolves and become more cost effective, the PUC will include new efficiency measures into the IOU programs. In this proceeding, the PUC will also continue to consider accelerated natural gas efficiency goals.

- Evaluate new energy efficiency measures and savings targets on an on-going basis.
- Implement new cost-effective measures.

**Technical Analysis/Technology Assessment:** The PUC expects to continue to work in close collaboration with the Energy Commission on the energy efficiency programs. In cooperation with the Energy Commission, additional technical analyses and

assessments will be conducted as necessary through the PUC's regular processes and procedures.

**Cost-Effectiveness Analysis:** Additional cost/benefit analyses will be conducted as necessary through the PUC's regular processes and procedures.

**PEER Review:** The PUC will continue to work with the Energy Commission and will obtain stakeholder review through its processes and procedures.

**Public Meetings:** All PUC actions will be pursuant to the PUC's regular processes and procedures for public input.

**Environmental Justice:** No issues identified at this time.

**Key Decision Points:** Not identified at this time.

**Potential Legislative Needs:** None at this time.

**Title of Strategy:** Combined Heat and Power Initiative (Table II)

**Lead Contact:** Theresa Cho

**Steps to Implement the Strategy:** This strategy encourages the installation of onsite power production to meet both heat and electricity loads, known as combined heat and power projects (CHP). The CPUC's existing Self-Generation Incentive Program allocates \$0.80 per watt to eligible CHP projects in the territories of the IOUs, up to a capacity size of 5 MW. Currently, all SGIP funds are reserved through 2007, although funding may become available if proposed projects do not materialize.

This strategy would seek to develop additional programs to further encourage the development of CHP. These additional programs are not yet underway, will require further consideration, and could likely require administrative, legislative, regulatory and budget initiatives. To effectively implement this strategy, it is likely various policy instruments will be needed to attain the realistic market potential and subsequent CO<sub>2</sub> reductions. These policy mechanisms may include regulatory incentives to encourage IOUs to promote customer and utility-owned CHP, changes to IOU rate design, market rules and regulations enabling easier access to wholesale markets, production tax credits for CHP, and other measures or incentives directed at key commercial and industrial activities in California. Legislation is required in order to apply a similar strategy for CHP programs implemented by publicly-owned utilities.

After assessing the cost effectiveness of the different policy scenarios, their respective capacity and energy impacts, and associated GHG benefits, the Energy Commission

will develop recommended implementation activities focused on improving end use efficiency in the commercial and industrial sectors via CHP.

The CPUC will determine whether it is appropriate to develop additional programs to encourage additional CHP for IOU customers. The CPUC will use the CEC's assessment of the cost-effectiveness and emission-reducing characteristics of CHP projects for commercialization programs and the CHP recommendations contained in the 2005 IPER in its analysis. The CPUC will also consider additional deployment strategies, including the Energy Commission's recommendations for implementation, and opportunities to further integrate CHP with utility procurement planning, particularly for projects over 5 MW.

**Technical Analysis/Technology Assessment:** The Energy Commission recently conducted an initial assessment of the technical and market potential of CHP in California as part of the 2005 Integrated Energy Policy Report. This assessment looked at potential policy scenarios that could be implemented, and what their respective effect would be on the installed capacity of CHP in California between today and 2020. The IEPR process also took an initial look at the cost effectiveness of each policy scenario.

**Cost-Effectiveness Analysis:** The PUC and the Energy Commission formed a collaborative partnership to develop a formal cost/benefit methodology for distributed generation (including CHP) in the CPUC's current distributed generation rulemaking (R.04-03-017). The Energy Commission would update the IEPR policy scenarios, market potential and cost effectiveness evaluation using the CPUC adopted cost/benefit methodology.

**PEER Review:** The PUC will receive public input and consider cost-effective DG and CHP deployment strategies through its administrative processes.

The Energy Commission will engage key stakeholders from industry, end use sectors, utilities, government, environmental groups, and others in its proceeding to adopt a revised *Distributed Generation Strategic Plan*.<sup>16</sup> The revised Plan will allow the Energy Commission to incorporate current knowledge about distributed generation and CHP gleaned from current policy and technology development.

**Public Meetings:** The PUC and the Energy Commission will conduct public meetings in accordance with their regular processes and proceedings.

**Environmental Justice:** No issues at this time.

**Key Decision Points:**

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<sup>16</sup> *Distributed Generation Strategic Plan*, California Energy Commission, Publication# P700-02-002, June 2002, [[http://www.energy.ca.gov/reports/2002-06-12\\_700-02-002.PDF](http://www.energy.ca.gov/reports/2002-06-12_700-02-002.PDF)]

- Feasibility of attaining MW and MWh targets for CHP by 2020 and their associated CO<sub>2</sub> reductions.
- Cost effectiveness of particular policy scenarios.
- Adoption of an implementation plan.

**Potential Legislative Needs:** Specific legislative needs to implement this strategy for the IOUs are not known at this time; however, it is anticipated that administrative and regulatory action is necessary to establish utility incentives, CO<sub>2</sub> and transmission and distribution payments, and less complicated access for CHP to wholesale electricity markets. Legislation is necessary to apply this strategy to publicly-owned utilities.

**Title of Strategy:** Electricity Sector Carbon Policy<sup>17</sup> (Table II)

**Lead Staff Contact:** Theresa Cho

**Steps to Implementing the Strategy:** The PUC is currently investigating various strategies and incentives to encourage the IOUs to make cost-effective procurement decisions that are based in part on reducing climate change emissions. These strategies include emissions targets or caps, incentives for preferred procurement options, and incentives for portfolio optimization and total cost minimization. The PUC conducted workshops in March 2005 on the procurement incentive framework and issued a staff report in March 2005. The post-workshop comments were filed in April and May 2005. A final decision on whether to include a carbon cap in the procurement incentive framework will likely be adopted by the beginning of 2006. This strategy includes the following steps:

- Determine a methodology the IOUs will use to report their GHG emissions.
- Continue to work with the CEC to ensure that the IOUs and the munis use consistent methodologies to report their emissions.
- Begin work to establish emission baselines for IOUs.

**Technical Analysis/Technology Assessment:** Additional technical analyses and assessments will be conducted as necessary through the PUC's regular processes and procedures.

**Cost-Effectiveness Analysis:** Additional cost/benefit analyses will be conducted as necessary through the PUC's regular processes and procedures.

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<sup>17</sup> This strategy is not a cap and trade policy. The PUC is a member of the Climate Action Team's Carbon Cap and Trade Working Group and anticipates that any workplan related to a cap and trade policy will be coordinated with the work of that Group.

**PEER Review:** The PUC will continue to work with the CEC on implementation and will conduct peer review through its regular processes and procedures.

**Public Meetings:** Public review of the staff report has been completed and a final Decision on procurement incentives will be adopted by the end of 2005.

**Environmental Justice:** No issues identified at this time.

**Key Decision Points:**

➤ Adoption of decision on IOU Procurement policies in early 2006.

**Potential Legislative Needs:** None at this time, although the PUC acknowledges that a longer-term climate change strategy for the energy sector should include the public power sector, which is something that can only be directed statutorily.

**Title of Strategy:** Load Serving Entities Strategies (RPS and Energy Efficiency) (Table II)

**Lead Contact:** Theresa Cho

**Steps to Implement the Strategy:** *Energy Service Providers (ESPs) and Community Choice Aggregators (CCA), are required to achieve a goal of 20% renewables in their procurement mix by 2010. ESP customers are eligible to participate in the IOUs' energy efficiency programs. The PUC will evaluate a 33% renewables goal for ESPs and CCAs and additional opportunities for energy efficiency programs for ESP and CCA customers.*

*In November 2005, the PUC will act on a decision setting forth the framework for ESP, CCA, and small and multi-jurisdictional utilities' participation in the RPS program for the 20% goal. A 33 % by 2020 goal for ESPs and CCAs will be evaluated after the framework is adopted. Energy efficiency programs will be evaluated as part of the PUC's energy efficiency proceedings.*

**Technical Analysis/Technology Assessment:** Additional technical analyses and assessments will be conducted as necessary through the PUC's regular processes and procedures.

**Cost-Effectiveness Analysis:** Additional cost/benefit analyses will be conducted as necessary through the PUC's regular processes and procedures.

**PEER Review:** The PUC will obtain stakeholder review through its processes and procedures.

**Public Meetings:** All PUC actions will be pursuant to the PUC's regular processes and procedures for public input.

**Environmental Justice:** No issues identified at this time.

**Key Decision Points:** The PUC will adopt a framework for RPS compliance in November 2005.

**Potential Legislative Needs:** None at this time.

# Green Buildings Initiative

## Title of Strategy

### Green Buildings Initiative

Governor Schwarzenegger's Green Building Executive Order, S-20-04, sets an ambitious goal of reducing energy use in public and private buildings by 20% by the year 2015, as compared with 2003 levels. The Executive Order and related Action Plan spell out specific actions state agencies are to take with state owned and leased buildings. The order and plan also discuss various strategies and incentives to encourage private building owners and operators to achieve the 20% target.

## Lead Staff Contacts

Cal/EPA: Michael Papanian 916-324-2568 [papanian@calepa.ca.gov](mailto:papanian@calepa.ca.gov) (coordinating between green building initiative leadership and Cal/EPA & Climate Change effort)

DGS/State & Consumer Services (Lead on Green Building Initiative overall): Roy McBrayer, 916- 376-5035, [Roy.McBrayer@dgs.ca.gov](mailto:Roy.McBrayer@dgs.ca.gov)

Energy Commission: Bill Pennington, 916-654-4064, [bpenning@energy.state.ca.us](mailto:bpenning@energy.state.ca.us)

## Steps to Implementing the Strategy

### *Technical Analysis.*

This is being refined at the California Energy Commission. Preliminary rough estimates indicate that annually by the year 2015 6.5 million tons of CO2 will be reduced overall through building efficiency efforts in commercial and institutional buildings. This number is based on the average displaced power generation being an efficient natural gas combined cycle turbine. Further analysis of the basis for the number must be undertaken. Further, there is much double counting within the projected GHG strategies. For example, this number includes much of what is being counted elsewhere, including additional efficiency programs being undertaken by the PUC, the solar pv buildings initiative additional building/appliance standards.

Further information/timeline/etc. on when this information can be developed will be forthcoming from the Energy Commission.

In addition, the GBI goal is to be fully implemented by 2015, with milestones in between. Information will need to be developed regarding how much of the GBI can realistically be expected to be implemented in the 2010 timeframe of the Climate Change effort.

*Cost-Effectiveness Analysis.*

The Sustainable Building Task Force has recommended the FEMP model for a life cycle cost assessment methodology that will be used to evaluate the cost effectiveness of building design and construction decisions and their impact on over a facility's life cycle. The Department of Finance is reviewing this recommendation and is also tasked with developing financing and delivery mechanisms. Timeline: TBD

*PEER Review.*

TBD

*Public Meetings*

Much of the work related to the Green Building Initiative is vetted through the cabinet-level Green Action Team. These meetings are public. The next one is scheduled for August 18 at 11 a.m. at the Cal/EPA building.

*Environmental Justice*

n/a

*Key Decision Points*

TBD

Attachments: Green Building Executive Order  
Green Building Action Plan

*Potential Legislative Needs*

None at this time.

# **Work Plan for Potential GHG Reduction Measures Resources Agency California Department of Forestry and Fire Protection**

**Strategy Name: Afforestation/Reforestation:** Forest projects that restore native tree cover on lands that were previously forested and are now covered with other vegetative types.

Recent studies have estimated that approximately 9 million acres of land in California could be reforested to increase carbon stocks and provide other benefits. Each of these acres has the potential to store between 150 to 230 tons of carbon.

## **Lead Staff Contact:**

Russ Henly, 916 653-9447

## **Other Involved Agencies:**

Department of Fish and Game, State Water Resources Control Board, Air Resources Board, U. S. Fish and Wildlife Service, U.S. Forest Service; Bureau of Land Management; Bureau of Indian Affairs

## **Existing Measures:**

*California Forest Improvement Program.* The California Forest Improvement Program encourages private and public investment in, and improved management of, California forest lands and resources. The program provides technical assistance to private forest landowners, forest operators, wood processors, and public agencies. Historically this program has been funded through receipts of timber sold from State Forests. The funding has always been erratic, with the higher annual funding for grants reaching \$2million.

*Federal Forest Stewardship Program:* The Forest Stewardship Program is a federally-mandated program designed to encourage the long-term stewardship of private forestland, to assist landowners in improving their management of the land, and to establish a positive land ethic among forestland owners. Approximately \$ 4 million were allocated to California in FY 05-06.

## **Possible New Measures:**

- 1. Establish a new state-wide goal of reforesting 500,000 acres of forestlands by 2020, including 250,000 acres on private lands and 250,000 acres on federal lands.**
- 2. Seek \$30 million annually, or \$300 million in bond funds to meet these targets.**
- 3. Establish a long-term loan program to fund private land reforestation.** The state would fully fund the cost of afforestation/reforestation in the form of a loan,

secured by real property that would come due upon the landowner's decision to harvest the crop of trees.

4. **Establish a multisector cap and trade program:** Reforestation projects can be included as offsets in a broader, multi-sector greenhouse gas cap and trade program.
5. **Establish a State-owned carbon bank, modeled after Oregon's Climate Trust, as part of a cap and trade program.** The state would fund the afforestation of lands capable of supporting conifer or hardwood forests in return for carbon rights to the new crop of trees. These carbon rights could then be sold (or otherwise traded) as offsets to industries not meeting their emission reduction goals. These sales would recapture the cost of the afforestation projects to the state.

### **Potential GHG Reduction**

Recent studies, including Winrock (2005), have concluded that afforestation provides the largest opportunities for carbon sequestration at relatively low costs. Reforestation of 500,000 acres annually would increase forest carbon stocks by 12.5 million tons of CO<sub>2</sub> at less than \$20 per ton. It should be noted, however, that the benefits of afforestation do not accrue until years after projects are funded.

### **Workload Implications:**

CDF would need \$2.5 million annually to staff an expanded afforestation program, together with 6 PY for technical assistance and inspections, and 2 PY for administration and data base management. This level of funding would also provide for the production of seedlings to match species and location needs for high survival plantation success.

### **Comments:**

# **DRAFT POTENTIAL GHG REDUCTION MEASURES FROM THE FORESTY SECTOR**

## **Resources Agency California Department of Forestry**

Forest Management Projects: Forest projects based on the commercial or non-commercial harvest and regeneration of native trees and that employ natural forest management practices.

1. Mandate older harvest ages and/or increased riparian buffers
2. Provide financial incentives by reducing the harvest yield tax paid by landowners if older trees are harvested
3. Credit ghg reductions by allowing offsets through a cap and trade program

Reforestation Projects: Forest projects that are based on the restoration of native tree cover on lands that were previously forested.

1. Increase investments in existing reforestation incentive programs, including the CA Forest Improvement Program and the federal Forest Stewardship Program
2. Credit ghg reductions by allowing offsets through a cap and trade program

Conservation Projects: Forest projects that are based on specific actions to prevent the conversion of native forests to a non-forest use, such as agriculture or other commercial development.

1. Increase investments in conservation easements (Forest Legacy Program)
2. Credit ghg reductions by allowing offsets through a cap and trade program

## **WATER**

Water Management: Work with urban and agricultural water suppliers to implement measures that reduce energy demand while meeting water supply and water use efficiency goals.

# **Work Plan for Potential GHG Reduction Measures**

## **Resources Agency**

### **California Department of Forestry and Fire Protection**

#### **Strategy:**

**Forest Conservation:** Minimize/prevent the greenhouse gases that are associated with the conversion of forestland to non-forest uses by adding incentives to maintain an undeveloped forest landscape.

California is losing forestland at increasing rates: 35,000 – 40,000 acres of private forestland annually to non-forest uses (Bill Stewart, 2005) , which could contribute as much as 12 million tons of CO<sub>2</sub> emissions annually. Policies designed to minimize or prevent forestland conversion to non-forest uses could provide significant climate benefits by; 1) preventing or minimizing greenhouse emissions that are associated with increasing forestland conversion in California and 2) maintaining the opportunity to increase forest carbon stocks on these lands through additional sequestration over time. Forest conservation can also enhance and protect biodiversity, water quality and habitat - resources that the state will increasingly seek to protect from the negative effects of climate change. Finally, in contrast to the other forest sector strategies such as reforestation, the climate benefits of forest conservation are immediate.

#### **Lead Staff Contact**

Bill Snyder, 653-4298, [bill.snyder@fire.ca.gov](mailto:bill.snyder@fire.ca.gov)

#### **Other involved Agencies**

State: Department of Fish and Game, State Conservancies, Environmental Protection Agency

#### **Existing Measures**

**CEQA:** At the statewide level, California has some control over forestland conversion through the California Environmental Quality Act (CEQA), the Forest Practice Act, and the Timberland Production Zone Act. However, the majority of the land use decisions/policies remain at the county level, where there is often few resources to guide or limit development in a way that minimizes forestland conversion and greenhouse gas emissions.

**Forest Legacy Program:** The Forest Legacy program is a coordinated program between the federal and state government designed to protect private forestlands from conversion to non-forest uses through land acquisitions and conservation easements..

While the Forest Legacy program has the potential to be very effective, two major factors are limiting its potential: 1) funds are limited compared to the value of the forest lands in need of protection; and 2) California's Forest Legacy program has historically tied itself to the Federal Forest Legacy funding/selection process, which is too time-consuming (thus putting time sensitive real estate transactions at risk), has limited funds and allows only governmental entities (vs. qualified non-profit entities) to hold easements.

California Climate Action Registry Forest Protocols - *The California Climate Action Registry* has standardized forest protocols that are specifically designed to quantify the climate benefits/greenhouse gas emission reductions achieved through forest conservation at the landowner level.

### **Potential new measures**

- 1. Establish Independent State Program.** The Board of Forestry should adopt new guidelines to clarify that the CA program can operate independently from the federal Forest Legacy program.
- 2. Increase Forest Legacy Program Funding:** An \$11 million annual investment could prevent the conversion of 14,000 acres of forestland.
- 3. Direct the Wildlife Conservation Board,** the State Conservancies, and other state land acquisition and easement programs to consider climate benefits in evaluating and ranking projects to be funded.
- 4. Cap and Trade/Climate Trust Program:** Forestland conservation can be included as an emission reduction project in a broader multi-sector greenhouse gas cap and trade or climate trust system. California's forest sector provides potential offsets to capped entities; the California Climate Action Registry's existing forest protocols can provide the standardized accounting mechanism to quantify and certify the greenhouse gas reductions of forest conservation projects.

### **Potential GHG Reductions:**

If 14,000 acres of conifer forestlands were conserved rather than converted to other non-forest uses, up to 4.2 million tons of associated CO<sub>2</sub> emissions could be prevented at a cost of \$12 to \$18 per ton of avoided carbon dioxide emissions.

### **Workload Implications:**

To support these other strategies, CDF would need approximately 4PY to implement and assure the quality of information in the protocols to support a new Cap and Trade or Climate Trust Program. This would require approximately \$500k one time and \$800k ongoing for staffing support.

# Work Plan for Potential GHG Reduction Measure

## Resources Agency

### California Department of Forestry and Fire Protection

**Strategy Name: Forest Management:** Increasing forest carbon stocks across the landscape through changes in forest management.

Strategies for storing more carbon through forest management activities can involve a range of management activities such as increasing either the growth of individual trees, the overall age of trees prior to harvest, or dedicating land to older aged trees. With roughly 4 million acres of private managed forestland in California, changes in forest management can produce significant amounts of greenhouse gas benefits for the state.

Inclusion of the forest sector in climate mitigation policy can also lead to additional local environmental benefits that may help the state's resources adapt to potential negative effects of climate change. Overall changes in forest management can enhance and protect biodiversity, water quality and habitat - resources that the state will increasingly seek to protect in the advent of climate change.

#### **Lead Staff Contact**

Bill Snyder, 916-653-4298, [bill.snyder@fire.ca.gov](mailto:bill.snyder@fire.ca.gov)

#### **Other Involved Agencies**

*State:* Department of Fish and Game, State Water Resources Control Board, Air Resources Board, Board of Equalization.

*Federal:* U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Forest Service.

#### **Existing Measures**

*California Forest Practice Rules.* The Board of Forestry's Forest Practice Rules include requirements for minimum harvest ages, tree species size and diversity, and for ownerships larger than 50,000 acres, a demonstration of long-term sustained yield. The rules also require buffer zones to protect watercourses.

*State and Federal Endangered Species Acts* – Federal ESA protections for the Marbled Murrelet, Spotted Owl, and other species have required the retention or development of larger older trees and buffer zones near watercourses.

*California Climate Action Registry Forest Protocols* - The California Climate Action Registry has standardized forest protocols that are specifically designed to quantify the

climate benefits/greenhouse gas emission reductions achieved through changes in forest management at the landowner level.

### **Possible New Measures:**

#### **5. Establish Cap and Trade/Climate Trust Program with Forest-sector Offsets:**

Forest management projects could be included in a broader multi-sector greenhouse gas cap and trade or climate trust system. In a cap and trade program, forest management projects could provide offsets that would be purchased by capped entities; in a climate trust program, the state would fund forest management projects and recapture the costs by selling carbon credits to industries needing to reduce their greenhouse gas emissions.

**6. Permit Streamlining:** The regulatory framework for timber harvesting requires landowners to secure permits from a large number of agencies to meet Forest Practice Act, Endangered Species Act, and Clean Water Act requirements. Together the time and cost of obtaining these permits have led to conversions of timberlands to other uses and made it more difficult and time consuming to implement forest management activities that would increase carbon storage. Simplification of the permitting processes for forest management and timber harvesting would result in additional carbon being stored over a larger number of acres.

**7. California Climate Action Registry:** The Registry should review current forestry protocols and update the wood products section. This will enable land owners and industrial firms to certify carbon stocks associated with wood products.

### **Potential GHG Reduction**

According to recent studies, including Winrock (2005), changes in management practices on forest lands can sequester additional carbon, but the amounts are small and relatively expensive. As part of a cap and trade or climate trust program, forest management projects could reduce up to 1-4 million tons of CO<sub>2</sub> emissions annually at a cost of \$23 to \$50 per ton. A carbon stock accounting method to measure these emission reductions is provided in the California Climate Action Registry forest protocols.

### **Workload and Budget Implications**

CDF would need approximately 4PY to implement and assure the quality of information in the protocols to support a new Cap and Trade or Climate Trust Program. This would require approximately \$500k one time and \$800k ongoing for staffing support.

### **Comments:**

# Work Plan for Potential GHG Reduction Measure

## Resources Agency

### California Department of Forestry and Fire Protection

#### Strategy Name:

**Fuel Reduction and Biomass:** Large, episodic, unnaturally hot fires are an increasing trend on California's wildlands because of decades of fire suppression activities, sustained drought, and increasing insect, disease, and invasive plant infestations. Actions taken to reduce wildfire severity through fuel reduction and biomass development would reduce GHG emissions from wildfire, increase carbon sequestration, replace fossil fuels, and provide significant local economic development opportunities.

Fuel reduction and biomass development projects would 1) reduce the intensity of wildfires and their associated greenhouse gas emissions; 2) increase the carbon stock of the remaining trees, 3) remove pests that create mortality of live stored carbon and reduce large damaging wildfires, 4) reduce state and local fire suppression costs; 5) provide a source of renewable alternative fuel; and 6) provide significant rural economic development opportunities.

#### Lead Staff Contact:

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#### Other Involved Agencies:

*State:* Department of Fish and Game, State Water Resources Control Board, Air Resources Board, California Conservation Corps, California Department of Corrections.

*Federal:* U.S. Forest Service, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, U.S. Department of Energy, National Marine Fisheries Service.

#### Existing Measures:

**Fuel Reduction:** CDF received \$35 million in Proposition 40 funds for fuel hazard reduction over a five year period. Other state fuel reduction programs include CDF's Vegetation Management Program and California Forest Improvement Program, but these programs do not have stable sources of funds. Through these programs, the state currently treats roughly 25,000 acres annually.

At the federal level, the National Fire Plan (NFP) and the Healthy Forests Restoration Act of 2003 (HFRA) (P.L. 108-148) contain a variety of provisions to speed up hazardous-fuel reduction and forest-restoration projects on specific types of Federal

land that are at risk of wildland fire and/or of insect and disease. The US Forest Service estimates that 5.5 million acres of California’s public forestland are in need of fuels reduction, but only 100,000 acres of federal forest land are treated annually.

**Biomass:** State programs include the CEC and PUC’s Renewable Portfolio Standards (RPS) Program, which require private utilities to obtain 20% of their electricity from renewable sources by 2010, and 33% by 2017. In addition, Governor Schwarzenegger, in his response to the 2003 and 2004 Energy Reports, expressed his support for the California Biomass Collaborative and charged the Interagency Working Group on Bioenergy with developing an integrated and consistent state policy on biomass.

At the federal level, the U.S. Department of Energy’s (DOE) Biomass Program develops technology for conversion of biomass (plant-derived material) to valuable fuels, chemicals, materials and power to reduce dependence on foreign oil and foster growth of bio-refineries. The Federal Energy Policy Act of 2005 (H.R. 6) authorizes \$50 million annually to DOE for a biomass grant program. It also increases the amount of biofuel (usually ethanol) that must be mixed with gasoline sold in the United States to triple the current requirement (7.5 billion gallons by 2012).

The CA Biomass Collaborative estimates that 10 million bone dry tons (BDT) of forest biomass could be available each year for harvest. Current levels are well below this figure, however, because the costs of harvesting and transporting forest biomass are high, and there are few manufacturing facilities in the state capable of using forest biomass. The state currently uses about 5 million bone-dry tons of forest, agricultural, and urban biomass, producing about 2% of the state’s electricity.

**Possible New Measures:**

- 1. Establish Target for Fuels Reduction and Biomass Development:** Establish a new state goal of thinning, removing, and treating 212,000 acres of public and privately owned forestland annually by 2010, and 275,000 acres by 2020, as follows:

	<u>Current Level</u>	<u>2010 Target</u>	<u>2020 Target</u>
Federal	100,000	160,000	200,000
State	25,000	50,000	75,000

**Potential GHG Reduction/Costs:**

	<b><u>2010</u></b>	<b><u>2020</u></b>
<b>Fuel Reduction/Thinning:</b>	1 million metric tons  CO2 annually in avoided wildfire emissions  wildfire emissions	2 million metric tons
<b>Biomass:</b>	2.4 million metric tons CO2 annually from replacement of the use of fossil fuels and additional storage.	5 million

The cost of CO<sub>2</sub> emissions avoided with these actions would average less than \$20 per ton.

**Implementation Steps:**

1. **Executive Order:** Issue an Governor's Executive Order establishing the new state targets and directing the Board of Forestry to develop plans to achieve them.
2. **State Funding:** Seek \$20 million in state funds to increase state treatment levels from 25,000 acres to 75,000 acres annually.
3. **Federal Funding:** Work with the California congressional delegation to maintain current annual federal appropriations (\$21 million) for fuel reduction programs in California through the Healthy Forest Restoration Act (HFRA). This funding level would be adequate to maintain federal treatment of 100,000 acres annually, and would be directed toward communities most at risk from damage by severe wildfire.
4. **New Protocol:** Direct the California Climate Action Registry to develop and adopt a protocol for fire management
5. **Biomass Action Plan:** Through the Interagency Bioenergy Workgroup and other forums, develop an action plan by March 2006 to meet the 175,000 acre forest sector biomass development target. The plan should identify and address the principal barriers to development of forest sector biomass projects, including securing reliable supplies from the Forest Service, and provide incentives to encourage new markets for low value and small diameter trees.

**Workload and Budget Implications:**

*CDF would need 5 PY to administer these expanded programs. As the fuel reduction strategies are implemented, the overall cost would be partially offset by reduced fuel suppression costs.*

**Comments:**

# **Work Plan for Potential GHG Reduction Measure Resources Agency California Department of Forestry and Fire Protection (CDF)**

**Strategy Name: Urban Forestry:** Increase tree planting in urban areas to sequester carbon, save energy, and reduce pollution.

**Lead Staff Contact:**

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**Other Involved Agencies:**

*State:* California Energy Commission State Water Resources Control Board, Air Resources Board, Public Utilities Commission, Cal EPA.

*Federal:* Federal Department of Energy, USDA Forest Service.

**Existing Measures:**

*State Urban Forestry Program* - Approximately \$1 million dollars per year is available for the next two years for tree planting grants and up to three years of maintenance for those trees.

*Federal Grants* - California receives approximately \$1 million in matching grants to use for urban forestry efforts. This amount will be reduced by at least 19% next year. This money supports California Department of Forestry staff and non-profit foundations, including California Releaf, which provide community outreach and urban forestry grants.

**Possible New Measures/ Implementation steps:**

1. **Expand State Urban Forestry Program:** Establish a new state-wide goal of planting 5 million trees in urban areas by 2020 through the expansion of local urban forestry programs. At a cost of \$100 per tree, \$500 million would have to be invested by local urban forestry programs to meet this target.
  - a. Issue an Executive Order establishing the new state-wide goal and directing the Board of Forestry and CDF to launch an aggressive public assistance and outreach campaign to expand local urban forestry programs

- b. Request that the California Climate Action Registry develop and adopt a protocol for the certification of GHG emission reductions from local urban forestry programs.
2. **Develop new urban biomass programs:** Direct CDF to develop an urban biomass utilization program to provide technical advice, planning, education, and seed money for local government marketing centers for biomass waste.

### **GHG Potential Reduction**

**Urban Forestry Program:** The strategic planting of 5 million new urban trees by 2020 will store an additional 3.5 million tons of CO<sub>2</sub> annually and produce an annual energy savings of 10,000 Gwh, enough to eliminate the need for 100 MW of power, save \$70 million annually in power costs, and reduce peak load demand by 3% during hot summer periods.

**Urban Biomass Program:** Approximately 38 Million bone dry tons of municipal green waste is created annually [California Biomass Collaborative White Paper, 2004], which could provide fuel to add over 500MW of additional power annually and displace approximately 80 tons of fossil fuel emissions. Current estimates of cost for that power are between 6-8 cents per Kwh using new gasification technology.

### **Workload and Budget Implications:**

CDF would need an additional 5 PY for technical assistance and outreach to expand the current urban forestry program and launch a new urban biomass program.

### **Comment:**

# Reduction of Greenhouse Gas Emissions Through Water Use Efficiency Measures

## Resources Agency Department of Water Resources

Approximately 19% of all electricity and 30% of all natural gas is used to convey, treat, distribute and use water and wastewater. Based on data from the draft *Statewide Assessment of Energy Used to Manage Water*, the California Energy Commission (CEC) estimates 44 million tons of CO<sub>2</sub> emissions are expelled annually on average to provide the 44 million acre feet (MAF) of water used statewide.

The key to the reduction of GHG through water use efficiency is strategic investment in measures tied to water energy intensity. When a unit of water is saved, so too is the energy required to convey, treat, affect local delivery, perform wastewater treatment and safely dispose of that unit of water. Region, elevation, water use sector, and energy source, among other factors, all influence water energy intensity. The statewide average for GHG emissions per acre foot is skewed by the wide local variation in the water energy intensity. Everything else being equal, a cooling tower condition meter installed in a industrial plant in Northern California will save 2,920 kWh compared to 9,270 kWh saved in a comparable plant South of the Tehachapi's, annually.

The California Water Plan Update (Bulletin 160-05) estimates water use efficiency can reduce urban water use by 1.1 to 2.3 MAF per year and agricultural water by 0.5 to 2.0 MAF per year by 2030. Accelerating the investment to attain that water use savings by 2015 would result in an estimated additional GHG reduction of approximately 30 million tons by 2030.

The California Bay-Delta Authority's larger estimated potential for 3.0 MAF per year urban water use reduction requires a greater rate of local and state/federal investment in conservation. Incentive driven advances in water-saving technology over the next 25 years potentially could further push savings beyond the levels indicated.

### **Strategy to reduce the energy intensity of water and greenhouse gas emissions:**

- Accelerate investment in water use efficiency: Accelerate implementation of Best Management Practices and Efficient Water Management Practices (EWMP) and incentives.
- Shift resources to water use efficiency measures that require less energy.
- Shift water use off the peak energy demand period.

### **Steps to Implementing the Strategy**

- Identify and prioritize agricultural and urban water use efficiency measures with negligible or low energy demand and shift resources accordingly.

- Identify water energy intensity use by region, water use sector, and other factors using current data compiled by water agencies.
- Based on current information, establish Statewide GHG Reduced Emission Targets (RETs) from WUE measures.
  - Initial reasonable targets of 2.0 million acre feet of water savings and resulting 2.0 million tons of GHG emissions reduction can be achieved by 2030 through current investment and assuming all locally cost effective projects are implemented by all ag and urban agencies. Alternatively, if locally cost effective projects are not implemented, additional state investment of \$30 million per year will provide the same level of GHG reduction. Therefore, GHG emissions reduction targets of 0.4 million tons for 2010 and 1.2 million tons for 2020 through WUE are achievable.
  - Refine the initial targets after gathering data over the next year. As input to this effort, survey a statewide inventory of agriculture and urban water suppliers and wastewater treatment agencies to inventory GHG emissions related to water use.
- Estimate funding needs and develop financing strategies for achieving the GHG RETs.
- If directed by the Governor, DWR take the lead in developing and enacting a specific set of strategies within 2 years in time for the next update of the Climate Action Plan to meet the specified refined targets..

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Possible measures which might be implemented after the first two years:

- Apply legal, financial, and regulatory initiatives to accelerate greater BMP and EWMP implementation by urban and agricultural water suppliers:
- Establish a program for cost effective demand side water management similar to the Public Benefit Program in Public Utilities Code 385.
- Establish a Pay As You Save (PAYS) system to enable building owners or tenants to obtain and install efficiency products with no upfront payment and no debt obligation.
- Implement legislative changes to facilitate reporting of greenhouse gas emissions related to water use.
- Revise standards for water using appliances and fixtures.
- Establish statewide pump efficiency testing program and replacement program.
- Research and implement new water use efficiency measures and technologies.

*Technical Analysis.* Analysis of water energy intensity for various water uses and sectors are needed. Research is needed to estimate electricity use for groundwater pumping in general, and irrigation use specifically in order to update the potential GHG emission reductions. The current estimates are based on information with large data gaps; and unknown trends for future use. Although significant, cost-effective opportunities exist to reduce water sector electricity use through water conservation and efficiency programs, further research and analysis is warranted.

*Cost-Effectiveness Analysis.* Appendix D of the CEC's May, 2005 "Water-Energy Relationship Report" includes an avoided-cost based analysis of present water conservation and efficiency programs. This analysis shows that effective water conservation and efficiency programs can provide an entire string of benefits, including energy savings, reduced air emissions, and lowered natural gas prices.

*Peer Review.* Peer review of the Strategy could be conducted by California Energy Commission and California Air Resources Board, California Environmental Protection Agency, and US Environmental Protection Agency

*Public Meeting.* DWR could conduct Water/Wastewater Agency Equipment and Operation Workshops by summer, 2006. DWR assisted by other entities and government organizations can also conduct workshops for the recommended legal, financial and regulatory changes.

*Environmental Justice.* Establish access to water use efficiency rebates, incentives and services and PAYS program for low income water customers.

#### *Key Decision Points*

- Shall funding be established and technical and financial assistance provided for water use efficiency measures and implementation accelerated?
- Shall a process be established to permit those who benefit from water use efficiency savings to pay for those measures through a charge on their utility bill?
- Shall the Model Landscape Ordinance, Urban Water Management Planning and Agricultural Water Suppliers Efficient Water Management Practices acts be amended?
- Shall water efficiency standards for appliances and plumbing fixtures be revised and Title 24 amended?