



Growing Crops in a Changing Climate

FACT SHEET

How New State Global Warming Policies May Affect California Farms

California Climate Choices

If left unchecked, global warming will pose serious challenges for agriculture. Rising temperatures, decreased snowpack, and potential changes in rainfall patterns are expected to influence the selection of California crops and how these crops are grown. To help avert the detrimental effects of global warming on California's largest industries, including agriculture, the state legislature passed and Governor Schwarzenegger signed into law the Global Warming Solutions Act (AB 32) in 2006. The law requires the state to reduce its global warming pollution to 1990 levels by 2020—a reduction of approximately 29 percent (see box).

BENEFITS FOR FARMERS

By the end of 2008, the California Air Resources Board (CARB) will identify a package of policies and regulations to meet the 2020 emissions reduction requirement. California farmers have many opportunities to benefit while helping the state reach the 2020 requirement:

Incentives—Farmers may receive financial incentives to help implement climate-friendly agricultural practices such as more efficient use of water and fertilizer, and improved (i.e., lower impact) pest management. A potential source of incentive funding is a state-run auction of global warming emis-

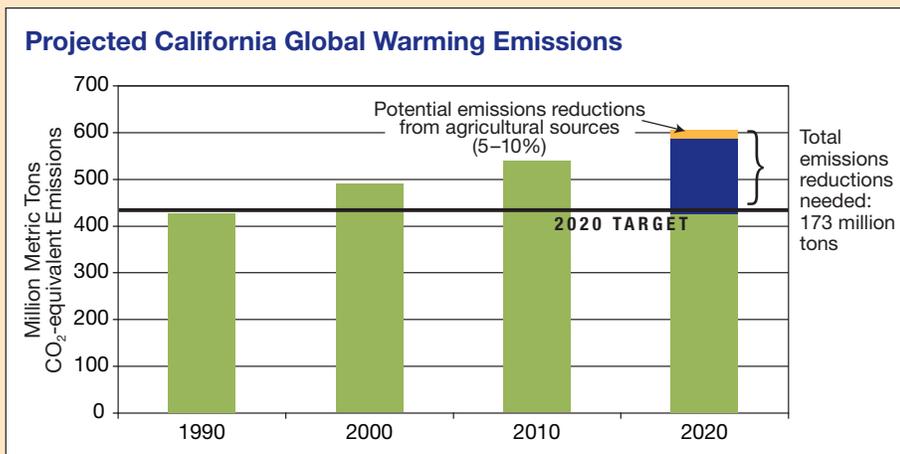
sion allowances in a cap-and-trade system.

Offsets—The global warming emissions reduced through certain agricultural projects, such as methane digesters for livestock waste,¹ may be able to be sold as “offsets” to other entities that emit global warming pollution, and count toward emissions reduction targets. For offset projects to qualify, the emissions reduced through the project must be permanent, verifiable, and quantifiable with a high level of confidence.

Bioenergy—Some farmers may be able to use crop waste, or grow new crops, to produce low-carbon fuels for the electricity or transportation sector. These “biofuels” can help the state

Implementing AB 32

AB 32 requires global warming emissions to be reduced to 1990 levels by 2020, as the first step on the path of reducing emissions 80 percent below 1990 levels by 2050. The 2020 requirement will be met by setting an enforceable statewide cap on global warming emissions that will be phased in starting in 2012. CARB will adopt a scoping plan by the end of 2008 for reaching the 2020 goal in a way that is cost-effective and maximizes environmental and economic co-benefits to California. The scoping plan will be a package of recommended regulations, market-based mechanisms, alternative compliance mechanisms, incentives, and voluntary measures.



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meet regulatory requirements for cleaner electricity and fuels.

HOW AB 32 COULD AFFECT AGRICULTURAL PROJECTS

Regulations

Many agricultural activities are not easily subject to regulation and will likely be exempt from initial mandatory reductions, but the sector could benefit indirectly from regulations developed for the industrial, electricity, and transportation sectors. For example, regulations that create financial incentives for bioenergy use will likely increase the value of crop and forest residues used

for low-carbon bioenergy, providing California farmers with the opportunity to capitalize on these increased prices.

Two existing regulations already offer potential benefits for farmers. Under the state's existing renewable electricity standard, methane captured from manure is considered a renewable energy resource and can be used directly by farmers to power onsite operations or sold to electric utilities. Capturing methane provides dual benefits of generating electricity while cutting agricultural global warming emissions. In addition, CARB is in the process of developing a Low Carbon Fuel Standard that requires

at least a 10 percent reduction in the average global warming pollution from transportation fuels by 2020. The sustainable development and use of bio-fuels, such as ethanol and biodiesel, will likely be a key compliance strategy.

INCENTIVES AND OFFSETS

Many anticipate that CARB will adopt a "cap-and-trade" program as part of AB 32. In this program, regulators establish a "cap" that limits the emissions from major California polluters to a level lower than their current emissions. The emissions required under the new cap are divided into individual permits

Potential Global Warming Emissions Reductions from Agriculture

Both the California Climate Action Team² (a collaborative group of state agencies) and CARB's Economic and Technology Advancement Advisory Committee (ETAAC)³ have developed estimates on the amount of global warming pollution that can be reduced through various policies that affect the agricultural sector (see table below).

State Agency Implementing Strategy	Area in Which Reduction Will Be Made	Estimated Annual Emissions Reductions in the Agricultural Sector by 2020 (Million Metric Tons CO ₂ -Equivalent)	
		ETAAC	California Climate Action Team
CalEPA/Air Resources Board	Manure-to-energy facilities/ Manure management	3.1	1
	Biodiesel blends		.8
	Ethanol		2.38
	Dedicated biofuels crops	1	
Department of Forestry	Afforestation and reforestation		1.98
Department of Water Resources	Water use efficiency		.51
Department of Food and Agriculture	Carbon sequestration in soil/ farmscapes	6	
	Enteric fermentation	.8	1
	Fertilizer use efficiency	1.8	
Public Utilities Commission	Using agricultural or forest biomass to produce energy	4.1	1.2
	Total	16.8	8.9



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(also called “allowances”) that represent the right to emit that amount.

Some or possibly all of the emissions allowances will likely be distributed on the basis of a state auction. Auction revenues could be used to provide incentives for a number of different agriculture-related emissions reduction initiatives that benefit both the farmer and the environment, such as improved pest management, carbon sequestration in soil, crop switching, water use efficiency, and energy efficiency.

A CARB-regulated cap-and-trade program may also include a provision for allowing capped entities to achieve a portion of their emissions reductions through the purchase of “offsets” instead of making direct emission reductions. Some agricultural mitigation options such as the use of methane digesters registered with the Climate Action Registry, or nitrogen management (no protocol yet established), may be good offset candidates and could be a source of additional revenue in the agricultural sector, as the emissions reduced through these projects take on financial value. However, if unlimited

amounts of offsets from around the world are allowed to flood the California market, this could depress the price of offsets and inhibit the development and value of offset projects in California.

California farmers have many opportunities to benefit while helping the state reach the 2020 requirement.

RESEARCH NEEDS

The ways in which agriculture contributes to global warming, in terms of the emissions it produces, are still not precisely understood. For example, the expansion of bioenergy could help significantly reduce emissions from the transportation and electricity sectors, but this expansion has implications for agricultural emissions if large amounts of fossil fuels are used to produce those fuels. Effects on biodiversity, water and soil quality, and food production must be carefully evaluated. Further research

on the complexities of the nitrogen cycle, particularly regarding fertilizer use and soil management practices, is also needed.

The chart on the next page highlights several practices that may benefit farmland and farmers while reducing harmful global warming emissions such as carbon dioxide, methane, and nitrous oxide. More scientific research is needed in order to accurately quantify emissions reductions associated with these practices and prioritize their implementation.

ENDNOTES

- 1 California Climate Action Registry. 2007. Livestock project reporting protocol: Capturing and combusting methane from manure management systems. June. Available online at www.climateregistry.org/PROTOCOLS/PIP.
- 2 California Climate Action Team Economics Subgroup. 2007. Updated macroeconomic analysis of climate strategies presented in the March 2006 Climate Action Team report. Final report. October 15. Available online at www.climatechange.ca.gov/events/2007-09-14_workshop/final_report/2007-10-15_MACROECONOMIC_ANALYSIS.PDF.
- 3 Economic and Technology Advancement Advisory Committee. 2008. Recommendations of the Economic and Technology Advancement Advisory Committee (ETACC) final report: Technologies and policies to consider for reducing greenhouse gas emissions in California. February 11. Available online at www.arb.ca.gov/etaac/ETAACFinalReport2-11-08.pdf.
- 4 Intergovernmental Panel on Climate Change. 2001. *Climate Change 2001: The Scientific Basis*, Summary for Policymakers. Cambridge, UK: Cambridge University Press.

Co-Benefits to Farmers from Reducing Global Warming Emissions

California farmers have many opportunities to mitigate not only carbon dioxide but two other powerful global warming gases: methane and nitrous oxide. Methane has 23 times the power of carbon dioxide to trap heat in Earth's atmosphere, while nitrous oxide is nearly 300 times as powerful as carbon dioxide at trapping heat.⁴

Reducing global warming pollution from agricultural operations can provide significant benefits to California farmers, including reduced operation costs and new economic opportunities (see table below).

Pollutant	Emission Reduction Strategy	Co-benefit
Carbon Dioxide	Energy efficiency in farm operations to reduce fossil fuel use	Lower farmer operation costs
	Water use efficiency/improved irrigation	Lower farmer operation costs
	Efficient pest management (organic practices, or integrated practices that reduce tractor passes for spraying)	Lower input costs, improved air quality, less machinery wear and tear
	Conservation tillage (to reduce tractor passes)	Reduced labor, time, fertilizer and fuel use, machinery wear and tear; improved soil tilth and water quality; less soil erosion; increased soil organic matter
	Growing crops for use as bioenergy or biofuels*	Increased income from selling biofuels; decreased dependence on fossil fuels
	Using crop residues for bioenergy production	Increased income from selling biofuels; decreased dependence on fossil fuels
Nitrous Oxide	Reducing use of nitrogen fertilizers	Lower input costs, improved water quality
	Utilizing nitrification inhibitors to increase the effectiveness of nitrogen fertilizers and decrease nitrogen oxide production	Increased water quality, reduced fertilizer costs, higher crop yields
	Better timing of nitrogen inputs and irrigation management	Fewer tractor passes, less money spent on tractor fuel
	Converting grazing land to perennial plants and trees, and re-establishing woody vegetation on field edges, marginal agricultural lands, and cleared riparian areas**	Improved erosion control, water quality, and wildlife habitat
Methane	Capturing and destruction of methane from manure	Improved air quality; potential for use in electricity generation
	Capturing and destruction of enteric methane (methane generated from cows' biological processes)	Improved air quality; potential for use in electricity generation
	Dietary supplements to reduce enteric methane from livestock	Improved air quality

* Reduces emissions indirectly ** Also reduces carbon dioxide emissions

An electronic version of this fact sheet is available on the UCS website at www.climatechoices.org.



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