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California Environmental Protection Agency
Air Resources Board

Comments submitted on draft AB 32 (“Global Warming Solutions Act”) Scoping Plan

The Center for Food Safety (CFS) and its Cool Foods Campaign submits the following comments in conjunction with the request for public comments on the draft scoping plan for AB 32, the “Global Warming Solutions Act” in California.

CFS is a non-profit public interest and environmental advocacy membership organization established in 1997, working to protect human health and the environment from potentially harmful food production technologies and promoting sustainable alternatives. CFS combines multiple tools and strategies in pursuing its goals, including litigation and legal petitions for rulemaking, policy and research, as well as public education.

The Cool Foods Campaign of the Center for Food Safety is a public advocacy education campaign to inform the public about the impact of greenhouse gas (GHG) emissions from agriculture and the food system on global warming. The Campaign has conducted extensive scientific data analyses of greenhouse gas emissions from all aspects of the U.S. food system. The aim of the Campaign is to educate people about the impact of their food choices across the entire food system and create lifestyle and legislative changes to reduce global warming. Our campaign seeks solutions to the problem of global warming, and focuses on agricultural practices and food choices that can reduce and reverse this trend.

While the Center for Food Safety and the Cool Foods Campaign focus mainly on sustainable agriculture, we are submitting our comments under “general comments” because there are a number of areas included in the scoping plan that directly affect farming and agriculture in various sectors. While the draft scoping plan specifically details agriculture as a sector, our

comments will focus more broadly on the entire food system of California, which is incorporated into various sectors including transportation, recycling and waste, water usage, industry and electricity. We will be focusing on the ways in which food and the food production and distribution system can limit its overall greenhouse gas emissions on a government, industry and household level. The Center for Food Safety (CFS) and the Cool Foods Campaign welcome the opportunity to submit comments on the AB 32 draft scoping plan and thank the California EPA for the inclusion of our comments.

Center for Food Safety Comments

Summary

As policymakers and individual people begin to grapple with ways to reduce carbon footprints, it is essential that agriculture and the entire food system be recognized as an area that needs to decrease its greenhouse gas emissions. Such reductions are essential, as they are in other sectors; however, agriculture also has a unique role to play in climate change discussions. It holds the potential to mitigate greenhouse gas emissions through carbon sequestration, as well as lessen and prevent the actual impacts of climate change on agricultural, land and water systems. Yet, our food system is embodied in numerous other sectors throughout the state of California and the rest of the country. A comprehensive approach to combating climate change will need to incorporate the emissions generated by our agricultural systems and the broader food system as a whole.

The Center for Food Safety and the Cool Foods Campaign have numerous comments and recommendations for the Air Resources Board, detailed in this document. Key amongst the comments is the need to fully integrate the emissions of the food system into the agricultural sector's general emissions and the recognition that our current industrial agricultural system is contributing heavily to climate change. Whether through excessive water use, synthetic fertilizers and pesticides, significant methane from confined livestock or biofuels, industrial agriculture can no longer continue on its same path of production without perpetuating climate change and global warming. Serious considerations of greenhouse gas emissions reduction must recognize the role of organic production systems, composting, grasslands and grazing animal production, nutrition and food education and the need for renewable energy systems and carbon offset programs for farmers. CFS submits these comments graciously and looks forward to seeing its suggestions incorporated into the final scoping plan.

Greenhouse Gas Emissions by Sector

As the evidence of climate change continues to mount, oversight paradigms like regional cap and trade programs have focused mostly on industrial and transportation sectors as targets of greenhouse gas mitigation. To date, the agricultural sector has been largely overlooked as both a source of greenhouse gas emissions and a potential tool for mitigation. Estimates of agricultural greenhouse gas emissions, as a percent of total emissions, range between 13.5% to nearly 1/3 of all global emissions.ⁱⁱⁱ Furthermore, the United Nations Food and Agriculture Organization estimates that animal production alone accounts for 18% of global greenhouse gas emissions.ⁱⁱⁱ In comparison, transportation emissions account for a little over

13% of total greenhouse gas emissions globally.^{iv} Clearly, there is a need for a shift in climate change policy to address this important sector.

In the draft scoping plan, ARB estimates the greenhouse gas emissions between 2002-2004 by sector. According to their estimates, transportation accounts for the largest percentage of total emissions, contributing 38%. This is followed by electricity (23%), Industry (20%), Commercial and residential (9%), agriculture (6%), high GWP (3%) and Recycling and Waste (1%). While these estimates were certainly calculated with sophistication, it appears that many of the estimates may incorporate various aspects of our food system outside of the definition merely of agriculture. Given that California produced half of all the vegetables grown in the United States in 2007^v, it is probable that agriculture contributes far greater than 6% of total emissions in California. It seems likely that the ARB incorporated emissions that could be considered agricultural into other sectors. Examples of this would include counting the production, packaging and transportation of fertilizers and pesticides under industry or transportation; counting on-farm energy use and requirements under electricity; or considering food and animal transport from farms under the transportation sector. It is important to recognize the overall impact of the food system and agriculture on greenhouse gas emissions, and food related emissions to the extent possible, should be included in the agricultural sector. CFS requests that the ARB re-examine their estimation techniques to better interpret emissions from food production into the agricultural sector.

Preliminary Recommendations by Sector

CFS recognizes that the draft scoping plan for AB-32 include 17 notable target areas for reduction and wishes to comment on several of the areas. The numbers listed do not necessarily correspond to the numbers listed in the draft scoping plan.

1) The Role of the State: Setting an Example

In the draft scoping plan, ARB recognizes the role of the state in setting an example for reducing greenhouse gas emissions. CFS is pleased to see the state of California government recognize their own ability to reduce greenhouse gas emissions and applaud their efforts. ARB notes,

As an employer of more than 350,000 California's, State government is uniquely situated to adopt and implement policies that give State workers the ability to decrease their individual carbon impact, including encouraging telecommuting, siting facilities to encourage jobs/housing balance, and use of alternative work schedules.^{vi}

These types of initiatives are certainly crucial for reducing transportation emissions and allowing employees to also potentially reduce their own fuel costs. Yet, as such a major employer and a large institution within the state, the government can certainly do far more. ARB recognizes that buildings are the second largest contributor to California's greenhouse gas emissions, contributing approximately 25% of total emissions in the state of California.^{vii} Requiring that new government buildings are LEED certified would be a key way to cut down not only on industry emissions, but also electricity emissions.

Another crucial way the government could cut back on its emissions would be in government cafeterias. Given that up to 1/3 of all emissions could be from the agricultural

sector^{viii} and nearly 1/5 of total global emissions come from animal production^{ix}, state-run cafeterias could significantly change their food purchasing habits to reduce greenhouse gas emissions from food. California is unique in that its warm climate allow for long and diverse growing seasons. Significant portions of state-run cafeteria food could be supplied exclusively from California, which would cut down on “food miles”. In addition, research has shown that organic and grass-fed food products contribute far fewer greenhouse gas emissions than their conventional counterparts.

Shifting to organic purchasing will allow state cafeterias to reduce greenhouse gas emissions as organic production systems produce overall fewer greenhouse gas emissions than conventional industrial farming systems. The United Nations FAO concluded that, “With lower energy inputs, organic systems contribute less to greenhouse gas emissions and have a greater potential to sequester carbon in biomass than conventional systems.”^x Since organic production systems are prohibited from using synthetic fertilizers and pesticides, they often rely on less intensive methods for fertilization including animal manure, cover crops and integrated pest management strategies.^{xi} Ongoing research at the Rodale Institute in conjunction with Cornell University demonstrated that a conventional corn production system required significantly more energy per hectare than organic systems. The reduced reliance on fossil fuel energy in the organic system reduced energy inputs about 30%, mostly because the organic systems relied on animal and legume nitrogen nutrients rather than synthetic fertilizers and pesticides.^{xii} In addition, nitrate leaching from fertilizers is significantly higher for intensive conventional systems compared to organic systems,^{xiii} and organic compost has the ability to reduce nitrogen and phosphorus leaching by 5 fold compared to synthetic fertilizers.^{xiv} Switching to organic purchasing will thus reduce not only initial greenhouse gas emissions from the production of fertilizers, but will also prevent their leaching into waterways and exacerbating emissions in hypoxic systems.

Many of the synthetic fertilizers and pesticides used in the United States are for feed crops for animal production. It is estimated that about half of the grain and oilseeds grown in the U.S. are fed to livestock^{xv} and conventional grain-fed beef requires twice as many energy inputs as grass-fed beef.^{xvi} Animals that are “grass-fed” or produced using organic methods produce significantly fewer GHG emissions than conventionally raised animals. These systems typically require fewer synthetic inputs and energy to operate than industrial facilities.^{xvii} Since pastured systems require fewer feed crops than confined systems, significant reductions in nitrous oxide would result from a shift to grass-fed animal production.^{xviii} Overall, the global warming potential of intensive animal farming compared to organic animal production is about 1/3 as much.^{xix} USDA-certified grass-fed animals cannot be fed grain or grain byproducts and must have continuous access to pasture during the growing season.^{xx} While some animals (like chickens or pigs) do not eat grass and may rely on feed crops, if raised organically the animals are fed 100% organic feed grown without synthetic pesticides and fertilizers. As a result, organic meat and dairy products result in significantly fewer GHG emissions than conventional meat and dairy.^{xxi} An increase in grass-fed and organic animal and dairy products in state cafeterias will significantly help to reduce the overall carbon “FoodPrint” of these facilities.

2) Renewables Portfolio Standard

According to the draft plan, nearly 12% of the retail electric load is from renewable sources, and the draft scoping plan aims to increase this percentage to 33% of total electricity to be

provided by renewable fuels by 2020. This is an ambitious goal, but certainly achievable for California who has access to significant areas of solar and wind energy.

Increasing the renewable portfolio standard will have many benefits for a variety of people through the state of California. As the draft scoping plan notes, investing in green technologies has the ability to increase jobs more than other sector growth. The America Wind Energy Association estimates that just in the early 1990s more than 1,200 direct and 4,000 indirect jobs were created in the state of California.^{xxiii} Renewable energies will also help reduce the cost to the public for electricity. As the state begins to examine the ways to increase renewable energy generation throughout the state, CFS encourages the ARB to especially consider farms and agricultural and rangeland into their planning.

Wind turbines are a promising sector for farmlands and can often provide a significant increase in income for small to medium-scale farmers. Royalties are typically around \$2,000-\$5,000 per year for each turbine. Farmers can also scale up to produce their own power to sell to others as a developer. Regardless, “these payments can provide a stable supplement to a farmer’s income, helping to counteract swings in commodity prices.”^{xxiv} The ability of farmers to put wind turbines on their farm will of course depend on the upfront cost. With smaller turbines, farmers will likely use most of the energy they generate which will certainly reduce their on farm emissions and costs.^{xxv} With increased turbine systems, farmers can help their communities and others offset greenhouse gas emissions and reduce overall emissions within the state of California.

Additional opportunities for renewable fuels in California include solar and geothermal. Significant prospects also lay in this area for farmers, who can use marginal croplands or other areas for electricity generation. As part of the Million Solar Roofs Program that the draft scoping plan aims to incorporate, ARB should consider farms as potential places of implementation. Utilizing solar energy on farms may not necessarily involve installing solar panels. Redesigning barns and other farm buildings to be more energy efficient and capture sunlight better to warm buildings and utilizing solar drying equipment to dry crops like hay are also unique ways in which farmers can be encouraged to decrease electricity use. Buildings on farms can also make use of photovoltaic (PV) panels to increase electricity generation on farms, and PV panels may also be beneficial to many farmers in the field for areas far away from electric lines. Solar greenhouses are another option that can reduce fuel usage and continue to grow crops and seedlings year round.^{xxvi} As the ARB continues to investigate the best ways to utilize renewable energy, CFS strongly encourages them to consider the use of farms and agricultural land for the generation of electricity and for potential initiatives that will reduce on farm electricity use.

3) Water

The draft scoping plan notes, “Water use requires significant amounts of energy. Approximately one-fifth of the electricity and a third of the non-power plan natural gas consumed in the state are associated with water use.”^{xxvii} Measures to decrease greenhouse gas emissions from water usage and withdrawal within AB 32 aim to increase water use efficiency, water recycling and water reuse. One of the key areas that ARB should focus its efforts is within the agricultural sector, specifically in terms of irrigation. In the United States, about 80% of water used is solely for irrigation to increase crop production.^{xxviii} Plants typically can utilize about two-thirds of this water and one-third is non-recoverable,^{xxix}

making increased efficiency of irrigation systems vitally important to reducing water usage. Irrigation is energetically and financially expensive, typically costing about \$1,200 per acre. On average, a hectare of corn requires about 14 million liters of water, and uses three times as much energy as rain-fed corn to produce similar yields.^{xxx}

According to the U.S. Geological Society, California has more irrigated land than any other state in the country. 10,100,000 acres of land were irrigated in the year 2000, with more than half that amount being the inefficient use of surface irrigation. Each day California withdraws 30,500,000,000 gallons of water a day for the use of irrigation.^{xxxi} Such significant amounts are clearly a large portion of water usage and electricity needs for water within the state.

There are many opportunities for decreasing the amount of water needed for irrigation within the state of California and thus reducing greenhouse gas emissions. While improvements in recent years have begun to incorporate more efficient water usage in irrigation including drip irrigation, gray water recycling and tailwater return systems there remains much to be done. In 2001, only 32.9% of total crops were utilizing micro or drip irrigation.^{xxxii} Increasing the use of drip irrigation and other water saving techniques in irrigation and on farms will help to decrease overall state water usage, reduce run-off of synthetic fertilizers and pesticides, and significantly cut back on the more than 30 billion gallons of water used for irrigation each day in California.

Water use is also excessive in livestock production. The U.S. Geological Society notes that water use in the production of animals is,

Associated with livestock watering, feedlots, dairy operations, and other on-farm needs. Livestock includes dairy cows and heifers, beef cattle and calves, sheep and lambs, goats, hogs and pigs, horses, and poultry. Other livestock water uses include cooling of facilities for the animals and products, dairy sanitation and wash down of facilities, animal waste-disposal systems, and incidental water losses.

California withdraws 409,000,000 gallons of water per day for livestock and animal production. This is more than 1/5 of the water withdrawal in the entire country for the production of animals.^{xxxiii} CFS recommends that the ARB strongly consider ways to reduce and limit water consumption in the production of animal and livestock facilities. CFS especially encourages the ARB to consider implementing programs to transition farmers to grass-fed livestock, which does not require the amount of inputs, in particular of water, that conventional livestock rearing does. “The production of meat from animals fed on irrigated crops has a direct impact on water resources, much more so than if the meat is derived from grazing animals and animals fed on residues.”^{xxxiv} Animals that are “grass-fed” or produced using organic methods produce significantly fewer GHG emissions than conventionally raised animals. These systems typically require fewer synthetic inputs and energy to operate than industrial facilities.^{xxxv} Since pastured systems require fewer feed crops than confined systems, significant reductions in nitrous oxide emissions and water usage would result from a shift to grass-fed animal production.

4) Heavy/Medium-Duty Vehicles

ARB proposes to decrease emissions from heavy and medium duty vehicles by 2.5 MMTCO₂E by 2020. ARB acknowledges that these types of vehicles account for about

20% of total transportation emissions within the state of California. Yet, a significant amount of greenhouse gas emissions are generated annually from non-road vehicles including those involved in construction, agriculture, industry and recreation. The US EPA estimates that non-road equipment generated more than 220,000,000 tons of CO₂ in 2007. Agricultural equipment accounted for about 1/5 of these emissions.^{xxxvi} CFS recommends that the ARB consider implementing emissions reductions for non-road vehicles, especially heavy and medium-duty agricultural vehicles, which are making notable contributions to emissions in California.

5) Community Waste and Recycling

As part of the local government actions section in the draft proposal, ARB notes the importance of community waste and recycling programs. According to the EPA, Americans threw away 251 million tons of waste in 2006. Of this, the second and third most thrown away items were yard trimmings (12.9% of the total) and food waste (12.4% of the total). Both yard trimmings and food waste are for the most part compostable and could help reduce greenhouse gas emissions in several ways.

First, with less waste being picked up, trucks will increase fuel efficiency and decrease fuel use by carrying lighter loads. Second, compost can be an excellent alternative to conventional synthetic fertilizers and pesticides, which contribute significant amount of greenhouse gas emissions each year to the atmosphere. Each year, the U.S. food system uses nearly 40 billion pounds of synthetic fertilizers and more than one billion pounds of synthetic pesticides.^{xxxviii xxxviiii xxxix} The greenhouse gas emissions associated with the production, packaging, transport and application of these chemicals are contributing to climate change and air pollution globally. The production of synthetic fertilizers and pesticides contributes more than 1 trillion pounds of greenhouse gas to the atmosphere each year.^{xl} Once on our soils, the U.S. Environmental Protection Agency (EPA) estimates that synthetic fertilizers generate over 138 billion pounds of greenhouse gases.^{xli} The often common practice of over applying synthetic fertilizers results in “run-off” when fertilizers are carried off of fields during weather events and irrigation.^{xlii} It is estimated that nearly 75% of fertilizer applied to land is never absorbed into the soil^{xliii} In addition, nitrate leaching from fertilizers is significantly higher for intensive conventional systems compared to organic systems,^{xliv} and organic compost has the ability to reduce nitrogen and phosphorus leaching by 5 fold compared to synthetic fertilizers.^{xlv} CFS recommends that the ARB consider implementing localized composting programs to distribute compost bins and collection sites, which can help to reduce not only California’s landfill waste stream but also greenhouse gas emissions associated with synthetic fertilizers and pesticides.

6) Agriculture

At present, the ARB draft scoping plan only incorporates reductions in agriculture through the use of one method- methane digesters to be installed at large scale dairy farms. CFS has several strong reservations about the use of this technology. Recent interest in methane digesters on farms may offer some mitigation opportunities, but also poses many challenges. There are many factors with methane digesters that may in fact not result in overall reductions in greenhouse gas emissions. Research has estimated that methane digesters could potentially only provide about .0002% of the energy currently consumed in the U.S.^{xlvi} As well, the compression of methane gas requires significant amounts of energy, which may offset any potential greenhouse reductions.^{xlvii} Transportation of methane gas may also

present difficulties, as most large scale farms will be able to produce more gas than they can use on farm; yet, given the economic investment of digesters, only large farms are usually able to invest in this technology. Research has also shown that the use of antibiotics, and their presence in manure, impedes the bacterial breakdown in methane digesters. It is estimated that 70% of all antimicrobials used in the United States are administered to animals.^{xlviii} Given the prevalence of antibiotic use in livestock throughout the country, the ARB should examine the impact that antibiotic use will have on methane digestion and biogas production. If antibiotic use decreases the effectiveness of methane digesters, the ARB should not offer financial assistance to farms wishing to build methane digesters, if they are using antibiotics.

ARB also mentions several other factors for consideration in reducing greenhouse gas emissions from agriculture. They note that nitrogen emissions from the use of nitrogen-based fertilizers are a significant source of emissions.^{xlix} Nitrous oxide, which is 296 times more potent than carbon dioxide,¹ is a greenhouse gas that needs to be strongly considered in mitigation techniques. ARB has estimated that nitrogen emissions are 2.8% of total California GHG emissions- nearly as much as high GWP gases.^{li} ARB further notes, "Agricultural soil was the largest source of N₂O, accounting for approximately 8.1 MMTCO₂E or 50 percent of the State's total N₂O emissions. It is estimated that approximately 4.9 MMTCO₂E of N₂O emissions from agricultural soil results from the application of organic and synthetic fertilizers."^{lii} Research, from the Air Resources Board itself, has clearly shown that 85% of total emissions from nitrogen applications were the result of synthetic fertilizers.^{liii}

With regards to nitrogen emissions, CFS strongly recommends that the ARB recognize the importance of organic production methods in agriculture. Since organic production systems are prohibited from using synthetic fertilizers and pesticides, they often rely on less intensive methods for fertilization including animal manure, cover crops and integrated pest management strategies.^{liv} Ongoing research at the Rodale Institute in conjunction with Cornell University demonstrated that a conventional corn production system required significantly more energy per hectare than organic systems. The reduced reliance on fossil fuel energy in the organic system reduced energy inputs about 30%, mostly because the organic systems relied on animal and legume nitrogen nutrients rather than synthetic fertilizers and pesticides.^{lv} In addition, nitrate leaching from fertilizers is significantly higher for intensive conventional systems compared to organic systems.^{lvi} Switching to organic production will thus reduce not only initial greenhouse gas emissions from the production of fertilizers, but will also prevent their leaching into waterways and exacerbating emissions in hypoxic systems.

ARB additionally notes that they are examining the ability of agriculture to increase carbon sequestration in soils. CFS also recommends that the ARB recognize the exceptional documented ability of organic soils to sequester carbon at rates far more significant than conventional systems. Microbes and other soil organisms play a vital role in maintaining the health of agricultural soils as they decompose organic matter, cycle nutrients, and convert atmospheric nitrogen into organic forms.^{lvii lviii lix} The EPA estimates that composting one ton of organic materials results in a net storage of about 405 pounds of GHG.^{lx} While all types of agriculture have the ability to sequester carbon, organic agriculture has the ability to sequester significantly more carbon than conventional and even conventional no-till systems.

That is because organic agriculture abstains from synthetic fertilizer and pesticide use, incorporates leguminous cover crops and prioritizes increasing soil organic matter. A number of studies have shown that organic soils are able to sequester more carbon than conventional soils.^{lxi lxii lxiii lxiv}

In comparisons of field trials of organic and conventional farming plots, researchers found that while the soil carbon levels were initially the same, after more than two decades the organic systems had significantly higher soil carbon levels. The organic systems—one using legume cover crops and the other using manure—retained more carbon in the soil, “resulting in an annual soil carbon increase of 981 and 574 kg per ha in the organic animal and organic legume systems, compared with only 293 kg per ha in the conventional system.”^{lxv} Similar long term research at the United States Department of Agriculture demonstrated that organic agriculture increased overall soil health better than conventional no-till methods and also had increased yields over conventional production.^{lxvi}

Carbon sequestration is not exclusive to crop systems and can also provide substantial opportunities for farmers in animal production. The IPCC has reported that marginal cropland re-seeded to grassland would sequester 1,103 pounds of carbon per hectare per year, and after 50 years sequestration would increase to 1,764 pounds of carbon per hectare per year.^{lxvii} Increased ground cover can stabilize soil and reduce emissions associated with erosion, and may also offer an opportunity to integrate grazing livestock with cropland.^{lxviii} Pastured animals in rotational grazing could increase soil carbon to offset greenhouse gas emissions by 15 to 30%.^{lxix} Incorporating sustainable and organic grassland management into livestock production systems can not only reduce emissions from manure but can also help offset additional emissions from animal production.

As well, with regards to animal production, ARB notes they are interested in conducting additional research on understanding and quantifying the benefits of practices to reduce direct methane emissions from livestock enteric fermentation.^{lxx} Research from the EPA has suggested that methane emissions are reduced significantly when cattle are raised in pasture, rather than fed grain products. They note, “Feedlot cattle fed a high energy grain diet generate manure with a high methane-producing capacity. Range cattle feeding on a low energy diet of forage material produce manure with only half the methane-producing capacity of feedlot cattle manure.”^{lxxi} CFS encourages the ARB to consider this research in their ongoing efforts to better understand ruminant emissions.

CFS also encourages the ARB to consider the impact of ethanol production on the dietary habits of livestock and ruminant animals. There has been a rapid increase in ethanol production in recent years. Production doubled from 3 billion barrels in 2003 to 6 billion barrels in 2007, and is expected to double again to 12 billion barrels by 2010.^{lxxii} Estimates for 2008-2009 field crop use of corn by the USDA concludes that ethanol and its coproducts (including distillers grains) make up almost 30% of total corn supply.^{lxxiii} The production of ethanol as a means to address climate change still remains controversial and inconclusive, since studies demonstrate that ethanol production is in fact not reducing greenhouse gas emissions^{lxxiv}. As production continues to increase, the impacts of ethanol production are being felt far and wide throughout the United States. Already one of the by-products of ethanol is having significant impacts on animal production. Recent increases in the

production of ethanol have led to a substantial increase in distillers grains- a byproduct of ethanol production. In 2004 alone, ethanol plants produced approximately 7.3 million tons of distillers grains^{lxxv}, which has increased as ethanol production has rapidly scaled up to meet political mandates. Ethanol production continues unabated and distillers grains are becoming common animal feed.

ARB should examine the dietary and health impacts of feeding distillers grains to cattle and other animals, especially since there is an increase in the by-product as a result of biofuel production. Preliminary research has indicated that feeding distillers grains to cattle increases the ability of *E.Coli* O157:H7 to survive and flourish in cattle stomachs.^{lxxvixxvii} Such persistence can and will have drastic effects on the American meat supply and could potentially sicken vast numbers of people. *E.Coli* O157:H7 is a deadly strain of bacteria that can contaminate a large portion of the food chain as food animals are slaughtered and redistributed throughout foods. In addition, research also shows that feeding cattle diets high in distillers grains increases the emission rates of nitrous oxide, hydrogen sulfide and methane^{lxxviii}—all potent greenhouse gases themselves. As the ARB is trying to examine ways in which to decrease climate change impacts and greenhouse gas emissions, it is imperative that they fully understand the impact of ruminant diets.

7) Offsets

ARB discusses the role of carbon offsets in the Global Warming Solutions Act. In particular, they mention that offsets must be verifiable. CFS recommends that the ARB consider the potential of creating carbon offsets for farmers who transition to organic agriculture. Given the increasing consensus of evidence that shows organic agriculture is better suited to sequester carbon, offset programs established within cap and trade programs and public-based carbon offset initiatives should consider adding offset components for agriculture. As well, since there is already a national verifiable certification process for organic farms, the ARB would be guaranteed to know that the offset programs are legitimate. CFS also recommends that the ARB consider using revenue generated through the AB32 program to help farmers transition to organic production.

8) Other Sustainability Issues

ARB makes note of other sustainability issues to consider in implementing the Global Warming Solutions Act, among them genetically-modified organisms and the impact of biofuels. CFS encourages the ARB to strongly examine the mounting evidence that demonstrates the unsustainable nature of biofuels and genetically-engineered organisms as well as their potential negative impacts on climate change and the environment. ARB seems especially concerned with the impact of biofuels on food supplies and food prices.

As the production of ethanol has increased steadily, land-use has changed significantly. Subsidies for ethanol production have caused land previously held in reserve under the Conservation Reserve Program, to be taken out of conservation for corn production. In 2006, a chief economist for the USDA, Keith Collins, testified before the Senate about ethanol production. He noted, “The Conservation Reserve Program (CRP), which has 36 million acres set aside from crop production for environmental reasons, may provide a source of additional crop acreage...4.3 to 7.2 million acres currently enrolled in the CRP could be used to grow corn or soybeans.”^{lxxix} Although biofuels are conceived of as environmentally friendly alternatives to fossil fuels, current biofuel technology results in a

net increase of GHG emissions. Consider that all of the ethanol produced in the U.S. is made from corn,^{lxxx} yet the production of one liter of corn ethanol consumes 29% more energy than it produces.^{lxxxii} One study found a 93% increase in emissions when corn ethanol is used instead of gasoline.^{lxxxii}

Pimentel and Patzek (2005) found that, using even the most optimistic data, substituting only one-third of the gasoline used per year with corn ethanol would require more cropland than is currently used for food.^{lxxxiii} Researchers note that when only a small proportion of food crops are diverted to ethanol production higher prices are expected to ensue, followed by the clearing of virgin land for food crops.^{lxxxiv lxxxv} In the Brazilian Amazon, for instance, deforestation of tropical forests has been directly correlated with the price of soybeans.^{lxxxvi} This has had the effect of releasing to the atmosphere a great deal of carbon previously stored in plants and soils.^{lxxxvii lxxxviii} It has been estimated that an average of 774,000 pounds of GHG are emitted for every hectare of virgin land converted to cropland.^{lxxxix} ARB should consider the impact of biofuels on conservation and land use changes. As ethanol especially, moves land out of food production and onto fuel production, food prices may be negatively impacted.

ARB also mentions they are considering further evaluation on the environmental impacts of genetically-modified organisms. CFS strongly urges the ARB to consider the impact of glyphosate tolerant crops in particular, which represent the vast majority of GMO crops within the United States. While it may seem that glyphosate tolerant crops have reduced pesticide use within the United States, in fact, the opposite is true. According to the USDA, glyphosate is now applied at a greater rate than ever before. In 2006 almost 97 million pounds of glyphosate were applied to soybeans. This is up by 28% from only a year earlier, and up by 213% from 1998. Corn and cotton have experienced a similar increase in application: almost 26 million pounds were applied to corn in 2005, a 780% increase from 1998. In the same time period glyphosate use on cotton has increased by 320%.^{xc} According to USDA's most recent Chemical Usage reports, nearly 140 million pounds of glyphosate are applied annually to soybeans, corn, cotton, sugar beets, and alfalfa.^{xcii}¹ Producing, transporting and applying this much glyphosate emits significant portions of greenhouse gas emissions throughout various sectors.

CFS also urges ARB to evaluate the claims that GMO crops are reducing global warming through the use of reduced tillage. The increasing popularity of no-till agriculture pre-dated the introduction of glyphosate tolerant crops.^{xciii} Further, there is evidence that shows that glyphosate tolerant crops *decrease* no-till agriculture; as the number of herbicide tolerant weeds increases; farmers are forced to turn back to the plow as a means of pest control.^{xciv xcv}^{xcvi xcvii} Regardless, long term research at the United States Department of Agriculture demonstrated that organic agriculture increased overall soil health better than conventional no-till methods and also had increased yields over conventional production.^{xcviii} CFS asks that ARB strongly consider the evidence that GMO crops are driving an increase in pesticide use and thus greenhouse gas emissions, and incorporate these issues into their final scoping plan.

9) Personal Action

¹ These five crops, plus canola, are the only glyphosate tolerant crops currently on the market.

As part of the draft scoping plan, ARB includes a substantial section of the implementation section on incorporating personal action in mitigation techniques. CFS commends the ARB for including such a section and appreciates the ARB's recognition of the role that individual action can play in reducing greenhouse gas emissions. ARB states,

Thinking about climate change in ways that will reduce our individual and household carbon footprint will become an integral part of our everyday decisions about travel, work, and recreation. Some may decide to make locally grown food a larger part of their diet as a way to reduce related emissions from transportation.

CFS applauds the ARB for noting the impact that eating locally can have on reducing greenhouse gas emissions, but encourages the ARB to advocate for other individual actions to reduce the impact of food on global warming. Recent research has shown that eating locally does not reduce greenhouse gas emissions as much as reducing conventional meat and dairy consumption. According to a recent study, almost 58% of greenhouse gas emissions from food are from meat, poultry, eggs, fish and dairy.^{xcix} One study demonstrated that the fossil fuel requirements of an omnivorous diet were more than twice that of a vegetarian and seven times greater than a vegan.^c Choosing less processed and packaged foods and eating organically can also help to reduce greenhouse gas emissions. The ARB should educate the public about these additional ways that people can eat in a more environmentally friendly way.

ARB is also proposing to incorporate climate-related education into schools as a part of the scoping plan. CFS believes this is an excellent idea and strongly applauds the ARB's decision to educate future generations about the importance of considering the environment and climate change in all types of decisions. CFS also encourages the ARB to ensure that the curriculum educating about climate change is based on sound science that is overwhelmingly supported by climatologists throughout the world. Education on climate change should include not only the impacts of climate change and potential mitigation and adaptation techniques, but also the ways in which to reduce climate change and the sound evidence for why climate change is occurring. CFS further recommends that as part of the climate change curriculum in schools, that the ARB consider implementing farm-to-school programs or school gardening initiatives. Such programs are already in place throughout the United States and aim to reduce greenhouse gas emissions from "food miles" but also reconnect students with their food sources. School garden initiatives will educate students about agricultural techniques and also may be an excellent source of fresh produce for school lunch programs.

Conclusion

CFS thanks the ARB for the opportunity to submit their comments and for the review and inclusion of their comments within the final scoping plan. CFS has made recommendations and comments on several sectors of the draft scoping plan including:

- Re-evaluate the calculation of agricultural emissions, currently only at 6% of total state emissions, in the Draft Scoping Plan to better incorporate food system emissions that may be externalized in another sector.

- Encourage state and local governments to construct new buildings to LEED certification standards and to encourage state-run cafeteria systems to purchase more organic, local and less processed foods
- Examine the possibilities of wind, solar and other types of renewable energy initiatives on farms, agricultural and grazing lands as part of the Renewable Portfolio Standard. Develop programs and incentives for farmers to incorporate renewable energies onto their farms for their own power and to sell to a grid system.
- Consider the large amount of water used in the state of California for irrigation and implement methods to convert surface irrigation into micro and drip irrigation systems. Examine ways to shift livestock production to grass-fed systems which require far fewer water requirements than feedlot production.
- Incorporate non-road vehicles, including agricultural equipment, into heavy and medium duty truck greenhouse gas emission reductions.
- Recognize the impact of food waste and yard scraps on the waste stream in California. Develop and implement composting initiatives in local communities, including free and accessible compost bins. Utilize compost within communities as an alternative to synthetic fertilizers and pesticides to reduce greenhouse gas emissions from the production of these chemicals.
- Thoroughly evaluate the economic and environmental viability of methane digesters as a means to reduce methane emissions on farms. Specifically, ARB should consider the impact of antibiotics on methane digestion and not reward farmers with subsidies to pay for methane digesters if they are using antibiotics in their livestock.
- Implement research and policy to shift away from nitrogen based fertilizers, which are the main culprit of nitrogen emissions within the state of California. Advocating for compost use and organic production methods will reduce the need for synthetic nitrogen fertilizers.
- Consider the mounting evidence that demonstrates organic agriculture sequesters more carbon than conventional agriculture and work to shift farmers toward organic production as means to reduce greenhouse gas emissions and increase sequestration. CFS encourages ARB to also recognize the role of grassland animal production in sequestering carbon and asks them to consider transition programs for farmers to produce grass-fed livestock.
- Re-evaluate the impact of ethanol byproducts—distillers grains—on animal feeding habits. With recent research demonstrating distillers grains are increasing greenhouse gas emissions from enteric fermentation and simultaneously increasing E. coli O157:H7 rates, CFS believes that ARB should not implement any policies that advocate for this type of feeding.
- Implement a carbon offset program for new certified organic farmers, since the process is both verifiable and “new”.
- Evaluate scientific evidence that suggests biofuels, especially ethanol, are not reducing greenhouse gas emissions. Especially consider the impact of land-use change on food security.
- Recognize that GMO crops have not reduced pesticide use or increased the use of no-till agriculture. Claims that GMO crops are reducing climate change

impacts and global warming are not valid. GMO crops should not be considered a viable or real solution to climate change.

- CFS applauds ARB on their inclusion of climate change education programs in schools and asks that they include science-based evidence of climate change, and education about the ways in which society can reduce, mitigate and adapt to climate change. As part of the curriculum ARB should establish farm-to-school programs and school gardens to reduce greenhouse gas emissions from food and encourage agricultural education.

Respectfully Submitted,

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