Comments of the Green Power Institute on the ARB's *Climate Change Draft Scoping Plan*

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Introduction

The Green Power Institute (GPI) respectfully submits these comments on the California Air Resources Board's (ARB) *Climate Change Draft Scoping Plan*. We believe that this comprehensive document does a very good job of setting forth a roadmap for the implementation of AB 32, and we are particularly pleased to see that the ARB has included a 33-percent-by-2020 RPS mandate for the state's electricity sector as one of the core components of the program. We offer comments in the areas of the developing WCI cap-and-trade system, the 33-percent RPS mandate, and the important potential links between biomass energy systems and sustainable forestry, agriculture, and waste disposal in California.

Allocation and Distribution of Greenhouse-Gas Emissions Allowances

Most discussions about the design of a cap-and-trade system for reducing greenhouse-gases in California fail to distinguish between the separate and distinct steps of allocating emissions allowances, and distributing the allowances to the allocation-rights holders. In the process, one of the most desirable alternatives that can be employed in the design of an effective cap-and-trade system is frequently overlooked. Of particular significance is the common misperception that administratively allocating emissions allowances

necessarily means that the allowances must be distributed to the allocation-rights holders free of charge. The corollary of this misperception is that the only way for the issuing body to sell emissions allowances to allocation-rights holders is via the mechanism of an auction process. In fact, the GPI believes that combing an administrative allocation of purchasing rights to emissions allowances, with distribution of the allowances to the allocation-rights holders for an administratively-determined fee, represents a useful additional approach that can be used in developing an effective cap-and-trade system for California and the entire WCI.

In the current California electricity marketplace, in which greenhouse gases are not yet regulated, it is generally acknowledged that the marginal energy source for most of the hours of the year is fossil fuel. As fossil-carbon emissions are squeezed out of the system as a result of the implementation of AB 32, lower and/or zero greenhouse-gas emitting sources, including efficiency, will have to increase their collective share of the overall supply mix. As this process proceeds, and regardless of the details of the allocation system for emissions allowances that is eventually adopted, the programmatically-created greenhouse-gas-emissions allowances will take on all of the characteristics of a commodity. We suggest that these allowances be treated as the commodities that they are from the start. In our opinion, giving emissions allowances away without charge is equivalent to giving away public assets or resources. This represents a very poor policy choice that is absolutely not in the public interest.

Greenhouse-gas allowances used in a California or WCI-wide cap-and-trade system will be valuable commodities. If they are distributed free of charge, either to generators or retailer sellers, the intrinsic value of the allowances will represent a windfall to the recipient entity, a windfall that would be provided by electricity consumers. We believe that the correct approach is to sell administratively-allocated emissions allowances to parties who hold the allocation rights at a preset, administratively-determined price. A properly-determined price for the allowances will prevent the allocation-rights holders from realizing a windfall, and will ensure that the value of the emissions allowances can be applied to the benefit of the energy consumers who ultimately pay for them. We

further believe that a secondary market for allowances should be allowed to develop that will serve to arbitrage their value based on constantly changing market conditions.

Regardless of the method of allocation, selling all greenhouse-gas emissions allowances rather than distributing them free-of-charge not only follows the well-established principle that public commodities should not be handed out for free, it also addresses the concern that there might be a need to provide for some amount of price stabilization for emissions allowances, at least in the early stages of the AB 32 program. Selling a significant block of allowances at an administratively-determined price would go a long way towards providing market-price stability for these commodities. Moreover, assuming that the mix of administrative allocation and auction is weighted towards the former in the beginning of the program, then gradually adjusted towards the auction option over time, the use of allowance sales in conjunction with the administrative allocations would be gradually phased out as the market matures, and price stabilization becomes less of a concern.

In making our proposal for combining administrative allocations of greenhouse-gas emissions allowances with distribution of the allowances to the allocation-rights holders via sales at a preset, administratively-determined price, the GPI is not suggesting that we consider this option to be preferable to allocation and distribution by auction. We see a role for the use of both methods of allocation as the newly-created market for emissions allowances is established. What we are suggesting is that in all cases where administrative allocation is determined to be the method of choice, for some or all of the emissions allowances, the administrative allocation should be an allocation of purchasing rights for the allowances, and the revenues raised through the allowance sales, like the revenues raised via auctions, should be used to invest in new, zero-emitting generating options and efficiency, in order to benefit consumers by providing the infrastructure needed for living in a carbon-constrained world. A number of parties have been arguing for the exclusive use of auctions, rather than administrative allocations, in order to ensure that all emissions allowances are sold, rather than distributed without charge. Our proposal allows emissions allowances to be administratively allocated without having to giveaway the allowances. In the opinion of the GPI, the proper approach for distributing

greenhouse-gas emissions allowances, when administrative allocation is the method of choice, is to administratively allocate rights to **purchase** emissions allowances at a pre-determined, administratively-set price.

The difference between using an administrative-allocation system with free distribution, vs. administrative-allocation with distribution of the allowances by sales to the purchase-rights holders, is not so much in how it affects the operating behavior of fossil generators. The major difference is on a more macro-economic level. In the free-distribution option individual fossil generators, by trimming operations when their operating margin is thin, will see little effect on their bottom lines, even if overall market prices were to remain unaffected by the AB 32 compliance system. On the other hand, if the allowances are sold rather than distributed free of charge, then the fossil generators will see their costs rise during all of their permitted operating hours, which would indeed represent a significant effect on their bottom lines.

With the free-distribution system, there will be minimal pressure for fossil generators to act to push up the overall wholesale market price of electricity, since their own bottom lines are minimally affected. The only market-wide impact on energy prices, therefore, will be the result of the increased price that will have to be paid to make up for the diminished amount of fossil power in the marketplace. With the distribution-by-sales option, regardless of the method of allocation, there will be real pressure on fossil generators to be the catalyst for pushing up the overall price of electricity, because their bottom lines are directly affected by their need to purchase allowances for every hour that they generate. In this case the market will also have to make up the power that is eliminated by the limited supply of allowances, but the price increase demanded by fossil generators for their power will be enough to cover some or all of the cost of the makeup power.

Under perfect market conditions the overall market price increase that results from a given level of reduction in permitted greenhouse-gas emissions should be same regardless of the allowance-distribution options (free or sales). In the case of the free-distribution alternative the fossil generators, who do not see a significant change in their

operating margin, pocket nearly all of the value of the ultimate increase in market price. If the allowances are sold to the emitters, the value of the increase in the overall market price will be collected in the form of allowance-sales revenues. In this case the funds can be applied to the benefit of the consumers who provide them, while fossil generators' bottom lines are approximately the same as they were before the imposition of the regulation (increased market price offsets the cost of allowances).

In looking beyond theoretical, idealized economics, we believe that distribution of allowances by sales rather than without charge provides some important market protections and benefits. By having to pay an amount approximating the overall market value for allowances, market participants who receive allocations of allowance-purchase rights will be far less likely to exhibit manipulative or hording behavior than if the allowances are distributed without charge. In addition, by imposing greater operating costs directly on the fossil generators who are the source of the emissions we are trying to reduce, the AB 32 compliance program will ensure that the inevitable pressure on the market price of electricity comes from the fossil-fuel segment of the supply market. In the free-distribution approach, this large and influential segment of the market will have little impetus to be the catalyst for higher market prices. The result will be that it will fall to the carbon-free alternatives to do the leg-work for increased market prices, and they have far less market power than fossil generators. In this case, there is a much greater probability that the program will stall, and AB 32 targets will fail to be met.

As consumer and environmental advocates, the GPI does not wish to leave the impression that we believe that higher overall market prices for electricity are in some sense a virtue, or even desirable. We simply accept the inevitability that achieving the emissions-reduction goals of AB 32 will come at a cost, and that cost ultimately will be expressed as an increase in the overall market price of electricity. If, in fact, the alternatives to fossil power were cheaper than fossil power, then those alternatives would be utilized in preference to fossil fuels, and there would be no need for an AB 32. One of the primary goals of the design of the AB 32 compliance program should be to develop an efficient program that minimizes the overall cost increase, while achieving the goals of the legislation.

The corollary to the postulate that achieving AB 32 goals inevitably will lead to an increase in the overall cost of electricity, is that artificially holding the line on the retail price of electricity may be incompatible with achieving the goals of AB 32. This is the basis for our concern that if there is insufficient pressure on electricity prices coming from the fossil sector, and all of the pressure is perceived to be coming from the renewables and efficiency sectors, then the likelihood of safety valves being invoked and the goals of AB 32 not being achieved are greatly increased.

Regardless of whether allocation is by administrative fiat or by auction, the revenues that are raised through the distribution-by-sales of greenhouse-gas emissions allowances should be used to invest in new, zero-emitting generating resources and energy efficiency. In this way, the cost of reducing greenhouse-gas emissions will benefit consumers by providing the infrastructure needed for meeting increasingly stringent emissions targets. Using the allowance-sales revenues to try to maintain affordable rates for consumers not only fails to provide an enduring value to the consumer from the funds that the consumers themselves will provide via increased energy prices; it also serves to dampen the price signals that are necessary to elicit desirable market responses. The best way to benefit consumers is to invest the funds raised by sales of greenhouse-gas allowances in the infrastructure that ultimately is needed in the state in order to comply with AB 32, and the even stricter standards that are sure to follow.

The 33 Percent Renewables Target

The Green Power Institute congratulates the California Air Resources Board for adopting a 33-percent renewables by 2020 standard as one of the core components of the *Climate Change Draft Scoping Plan*. We know that there will be strong pressure from some parties to drop the 33 percent renewables mandate from the final *Scoping Plan*, pressure that is often accompanied by a plea to let the market determine the mix of solutions needed to comply with AB 32. These pressures should be resisted. There is simply no question that renewable energy must be a major part of any set of strategies that can be used to reduce the state's greenhouse-gas emissions, and the institution of a clear 2020

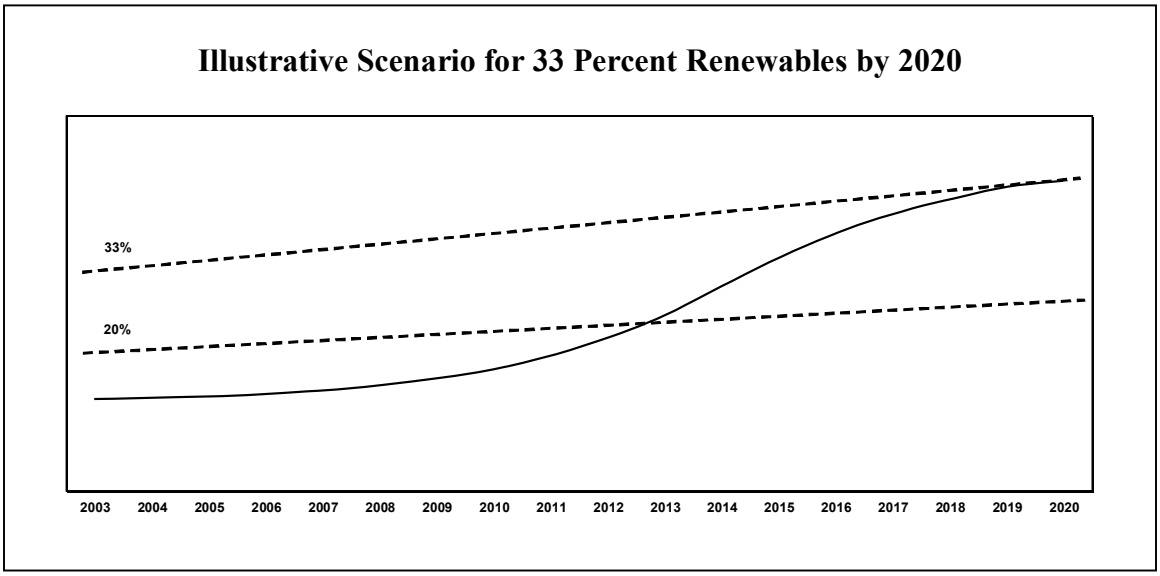
RPS mandate in the final *Scoping Plan* will provide the continuing market confidence that is needed to allow renewable energy generating capacity to expand in California. The ARB should not yield to requests to remove or soften the 33-percent renewables-by-2020 mandate from the final *Scoping Plan*. To do so would materially reduce the probability that AB 32 goals ultimately will be achieved.

The GPI has long argued that the only compelling rationale for accelerating the state's 20-percent RPS target deadline from 2017 to 2010 is so that the accelerated goal can be backed up by a higher, longer-term stretch goal for renewables. Otherwise, the policy would result in a quick burst of development activity in the state's renewable energy sector, followed by an abrupt and precipitous halt. Those are not the kind of conditions that are conducive to the development of a stable, sustainable renewable-energy industry in the state. Renewable energy generation is a highly capital-intensive enterprise, and in order to sustain a flow of investment capital into the renewable-energy sector in California a long-term stretch goal for renewables is highly desirable. The state's statutory greenhouse-gas-reduction mandate (AB 32) only reinforces the need for the establishment of the 33-percent-by-2020 renewables mandate.

Uncertainty regarding long-term renewables policy in California has long been a major impediment to attracting investment capital. The stretch target of 33-percent renewables by 2020 is exactly the kind of goal that can lead to the steady long-term development of the renewable energy industry that Californians overwhelmingly desire. Adopting the 33-percent stretch goal for renewables as one of the core elements of the final *Scoping Plan* will greatly enhance the chances for the state to meet its AB 32 targets.

It is now widely recognized that the utilities are not going to meet their statutory obligation to procure 20 percent of their energy supply from qualifying renewables by 2010. Several parties, including some of the utilities who are lagging in meeting their current annual RPS obligations, have argued that their impending failure to make the 2010 mandate indicates that the stretch target of 33 percent by 2020 is equally unobtainable. This is simply incorrect. Due to the long lead time that is still available for reaching the 2020 stretch goal, combined with the head-start that has been provided by

the acceleration of the original twenty-percent renewables goal to 2010, it will actually be easier for the LSEs to reach the 33-percent-by-2020 standard than it ever was for them to reach 20-percent renewables by 2010. The Figure below illustrates graphically how this is the case:



The renewables-procurement curve in the figure is based on actual procurement data for 2003 – 2007 provided by the three IOUs in their periodic *RPS Compliance Reports* to the CPUC, and a growth rate for composite IOU retail sales of 1.5-percent per year. The near-term part of the projection shown in the figure, 2008 – 2010, is based on maintaining the entire existing renewable infrastructure that is currently serving the three IOUs, augmented by the scheduled startup of new renewable capacity that is currently under development for the three IOUs, with a 70-percent success rate applied to all new and restart contracts. The long-term part of the projection, 2011 – 2020, is based on constructing a market-reasonable scenario for connecting the 2003 – 2010 data to a 33 percent renewables contribution by 2020.

The RPS penetration curve for the three IOUs shown in the figure illustrates a scenario that, we believe, the state's retail electricity providers could realistically achieve, although not without focused, diligent, and sustained procurement efforts over the next decade and longer. In 2007 the state's three large IOUs had a composite renewable

content of approximately 12.7 percent in their energy mix, down from 13.2 percent in 2006. Statewide, the qualifying renewables content is lower. In order for California's electricity sector to get onto the renewables-growth curve illustrated in the figure, all of the state's retail providers will have to be far more effective in their future renewables procurement efforts than they have been so far. Even if all retail providers are able to follow the scenario shown in the figure, the twenty-percent benchmark will not be achieved until 2013 at the earliest.

California's two largest utilities, PG&E and SCE, have both argued that, in effect, the state is already running out of renewable resource development opportunities. If true, this would put the 33-percent-by-2020 stretch goal seriously in doubt. We strongly disagree with the assertion that California is experiencing renewable resource shortages at this early stage of the RPS program. Considering the minimal amount of new renewables development that has actually occurred in California since the 2002 enactment of the RPS program, asserting that the pool of renewables is already being depleted is equivalent to saying that the pool was nearly empty from the start. A variety of sources have documented California's bountiful endowment of renewable resources. This includes specific reports on biomass[1], geothermal[2], hydropower[3], solar[4] and wind[5]. According to the seminal CEC *Renewable Resources Development Report*:[6]

> The gross technical potential for wind, geothermal, biomass, biogas, small hydroelectricity, and solar power is estimated to be more than 262,000 gigawatthours per year (GWh/year). By way of comparison, total electricity generated in California in 2002 was 272,509 GWh. [CEC *Renewable Resource Development Report*, p.52]

We believe that there is a clear record showing that California has a more than adequate resource base to support the achievement of the stretch goal of 33-percent renewables in California's energy mix by 2020, and that this resource base has the capacity to support

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[1] California Biomass Collaborative, *Biomass Resource Assessment in California*, Report no. CEC-500-2005-066-D, April 2005.
[2] Sison-Lebrill and Tiangco, *California Geothermal Resources*, Report no. CEC-500-2005-070, April 2005.
[3] Kane, California Small Hydropower and Ocean Wave Energy Resources, Report no. CEC-500-2005-074, April 2005.
[4] Simons and McCabe, *California Solar Resources*, Report no. CEC-500-2005-072-D, April 2005.
[5] Yen-Nakafuji, *California Wind Resources*, Report no. CEC-500-2005-071-D, April 2005.
[6] California Energy Commission, *Renewable resources Development Report*, report no. 500-03-080F, November 2003.

much more new project development than is currently occurring in the state. To the extent that there are impediments to the development of new renewable generating facilities in California, it is not in the area of inadequate physical resources, nor are there inadequate technologies to harness the available resources.

The GPI has little doubt that if the right commercial terms were offered to developers, there would be a plentiful supply of new renewable project proposals with a strong likelihood of achieving commercial operations. During the early 1980s, when the interim standard offer no. 4 PPAs were available, there was a flood of proposals for new renewable energy projects being made to the utilities. Those contracts apparently offered commercial terms that were conducive to attracting project proposals. Most of the state's current renewable energy supply is generated by facilities that were developed during this period. Since the suspension of standard offer no. 4 there has been a dearth of new renewable energy projects developed in the state. Thus, our conclusion is that if the right commercial terms were available today, without knowing exactly what those terms might be, there would be a flock of responsive proposals with a strong likelihood of achieving commercial operations.

One of the serious impediments to the development of new renewable generating capacity in California today is the lack of adequate transmission infrastructure. We readily acknowledge that the state's existing transmission infrastructure is inadequate for today's needs, never mind tomorrow's, and that new transmission will need to be developed in the state in order to achieve the 33-percent renewables-by-2020 goal. While the inadequacy of the existing transmission system poses a serious challenge to the procurement of sufficient renewables to meet the state's renewable goals, we believe that it is not an issue that will ultimately prevent its achievement. With the compliance date set in 2020 there is sufficient lead time to update and expand transmission capabilities to areas of the state that can support high renewable energy production, and efforts to make this happen are well underway in the state on a number of fronts, including the statewide Renewable Energy Transmission Initiative (RETI), on whose Stakeholder Steering Committee the GPI sits. Moreover, we are aware on an anecdotal basis of a number of viable renewable energy projects that would not require major transmission upgrades,

which are being overlooked in the current process of RPS solicitations. Transmission access is indeed an impediment to increased renewables development in California, but in the opinion of the GPI, it is also being used as an excuse for failure to meet current annual procurement targets, and as a rationale for arguing against setting aggressive future procurement targets. In both instances the problem of inadequate transmission, while significant, is being oversold.

The GPI believes that the 33-percent renewables-by-2020 mandate for the electricity sector must be an integral component of the ARB's final *Scoping Plan*. GPI notes that the adoption of the long-term stretch goal in the final *Scoping Plan* will help to stabilize and drive renewable market growth. The physical resources necessary for the development of adequate renewable generating capacity to supply 33-percent of all statewide energy procurement are available within the state of California, and can be augmented by some amount of imported renewables. The 33-percent renewables-by-2020 goal is undeniably technically feasible. As such, the GPI believes that it is only a matter of establishing the right commercial terms in order to achieve the goal of 33-percent renewables by 2020. We note, however, that if retail providers continue to gear their procurement activities to acquiring just barely enough power-purchase contracts to provide their mandated procurement requirements, they will surely fail to meet the 33-percent mandate. This is so because not all signed contracts will result in operating generating facilities. The 33-percent-by-2020 target should be maintained as one of the core components of the final *Scoping Plan*, and retail providers should be expected to secure a sufficiently robust portfolio of contracts to ensure that they will indeed achieve their procurement obligations.

Forestry, Agriculture and Waste Disposal, and the Nexus with Bioenergy

The Draft Scoping Plan looks to sustainable forestry to provide a reduction of 5 million tons of CO_2 equivalents in 2020, with an additional 2 million tons of CO_2 equivalents in 2020 to come from methane capture at landfills and large dairies, equally divided between the two. In each of these sectors, sustainable forests, agriculture, and waste disposal, the greenhouse-gas reductions desired have important potential connections

with the production and use of energy from biomass and biogas resources. Biofuels, including various forms of solid biomass and biogas, are low-grade, carbon-based fuels, but the carbon in biofuels is already part of the active global carbon cycle, in which carbon exchanges rapidly between the atmosphere and the biosphere. Carbon that is already part of the active cycle is referred to as biogenic carbon, while carbon that is in geological storage, where it is unavailable to the atmosphere (e.g. fossil fuels), is referred to as fossil carbon. Bioenergy production does not add new carbon to the active carbon cycle,[7] but it can affect global greenhouse-gas levels by enhancing the long-term sequestration of carbon in the forest, and by reducing the emissions of reduced carbon gases associated with the decomposition and open-burning of biomass. A recent White Paper by the Pacific Institute, *Bioenergy and Greenhouse Gases*,[8] analyzes the complex nexus between bioenergy production, and sustainable forestry, agriculture, and waste disposal. We are submitting this report to the record this proceeding along with these comments.

The recommendation in the *Draft Scoping Memo* for a 5-million-ton reduction for sustainable forests is based on an estimate that that is the current net rate of sequestration in California's forests:

> The 2020 target for California's forests is to achieve a 5 $MMTCO_2E$ reduction through sustainable management practices, including reducing the risk of catastrophic wildfire … The 5 $MMTCO_2E$ emission reduction target is set equal to the current estimate of the net emission reduction from California forests. [*Draft Scoping Plan*, page 27]

There is a potential inconsistency between these two statements, which needs to be explored as policies for sustainable forests are developed. The accumulation of biomass in California forests that are already overgrown is a prime factor in contributing to California's increasing risks of catastrophic wildfires, and susceptibility to insect and

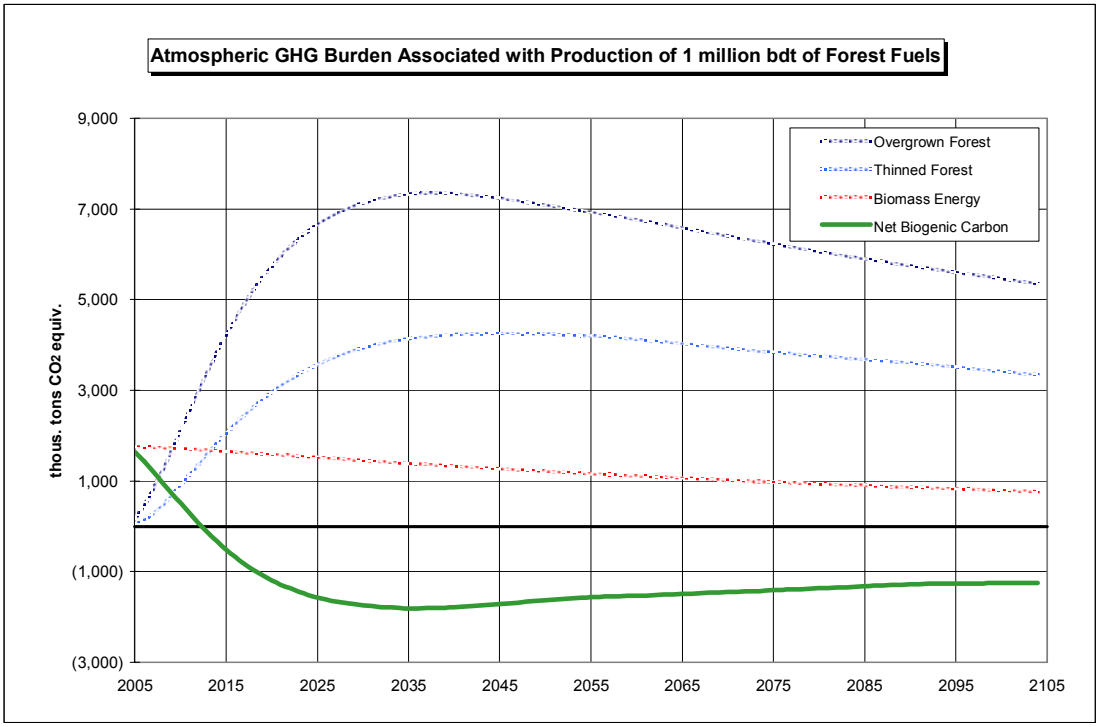
[7] Some fossil fuel (diesel) is used in the production and transportation of biomass fuels, and in the power-production process. The amount of the fossil greenhouse-gas emissions associated with biomass-power generation is typically less than 2 percent of the biogenic emissions. Because biogenic emissions are different than fossil emissions, we net the fossil emissions of biomass power generation against the avoided emissions of fossil power generation, rather than adding them to the biogenic power-plant emissions for reporting purposes.

[8] Morris, G., *Bioenergy and Greenhouse Gases*, Report of the Pacific Institute, May 15, 2008.

disease attacks.[9] Reducing the risk of catastrophic wildfires on overgrown forest lands requires thinning of the forest, which means the removal of typically some 25 percent of the treated forest's carbon. Merchantable biomass in the removals can be converted into wood products, in which the fixed carbon has a substantial residence time before being returned to the atmosphere, but the remainder of the removals will be combusted, either in piles in the forest, or at biomass power plants, with the carbon emitted promptly to the atmosphere. In other words, in order to maximize the amount of carbon that is sequestered in California's forests on a long term, sustainable basis, it is necessary to reduce the stocking of biomass on the state's most overgrown forest lands, in the process converting most of the carbon in the removals immediately into greenhouse gases.

The chart below, which is reproduced from the Pacific Institute White Paper referenced above (Figure 14, page 32), shows that net biogenic greenhouse gases (green curve in the figure) are elevated for up to about ten years after thinning operations are performed, which is 2005 in the figure, following which the net biogenic greenhouse-gas levels associated with the thinned forests are reduced in comparison with overgrown forests, as a result of the enhanced biomass growth rates in the thinned forests, and the reduced fire losses. The net biogenic greenhouse-gas level associated with the treatment of overgrown forests is defined as the difference between the emissions associated with the treated forest, which include combustion of the treatment removals (biomass energy production, red curve), and net losses (net of growth) of forest biomass over the thinned acreage due to fires (blue curve), less the greater amount of net losses of forest biomass that would have occurred if the acreage was not thinned in 2005 (dark blue curve).

[9] Fire is used as a proxy in these comments for a variety of stress-related biomass-loss vectors, including insect attackes and disease outbreaks.



California's forests are highly diverse. Overgrown forests that are candidates for thinning operations exist in all of the state's major forest regions, although the types and extent of treatments that are needed vary greatly with geography. The figure shows the greenhouse-gas profiles over a 100-year timeframe for the use of one million bdt of forest treatment fuels in 2005, versus the case of not performing the treatments. The production of one million bdt of forest fuel is associated with the treatment of approximately 60,000 acres of overgrown forest, assumed to located around the state. Treatment of these 60,000 acres of California forest in 2005, presumably scattered around the state, would lead to an immediate increase in net biogenic greenhouse gases of almost 1.65 million tons of CO_2 equivalents (green curve at vertical axis). Over time the net biogenic greenhouse-gas burden associated with the thinned acreage declines due to the enhanced biomass growth rate on the thinned acreage, and the reduced fire losses. Twenty-five years after the treatments are performed (2030), the net biogenic greenhouse-gas level is nearly two million tons of CO_2 equivalents lower than what it would have been if the 2005 treatments had not been performed. This reduction is in addition to the avoidance of approximately 0.9 million tons of fossil CO_2 emissions in 2005 due to electricity production from the treatment residues (avoided fossil emissions not shown in the

figure), which would leave a residual level of approximately 0.75 million tons of CO_2 equiv. in the atmosphere 25 years later (2030).

The table below, which is reproduced from the previously referenced Pacific Institute White Paper (Table 6, page 41), presents greenhouse-gas emissions reduction factors for a variety of bioenergy options. Energy production from forest-treatment residues (labeled Forest Accumulation in the table) reduces net biogenic greenhouse gases by 1.87 ton/MWh of CO_2 equiv., plus it avoids 0.80 ton/MWh of fossil CO_2 emissions. Biomass and biogas fuels that are diverted from other alternative disposal fates provide different levels of biogenic greenhouse-gas reductions, as shown in the table.

Greenhouse Gas Emissions Factors for Biomass and Biogas
(all factors expressed as equivalent year-1 emissions of CO_2 equivalents)

	ton/bdt	ton/bil.btu	ton/MWh
Biomass			
Net Reduction in Biogenic C			
Open Burning	0.62	36	0.62
Forest Accumulation	1.87	110	1.87
Uncontrolled Landfill	2.28	134	2.28
Controlled Landfill	0.27	16	0.27
Spreading	0.69	41	0.69
Composting	1.00	59	1.00
Kiln Boiler / Fireplaces	0.22	13	0.22
California Biomass Mix 2005	0.81	48	0.81
Avoided Fossil Fuel Use	0.80	47	0.80
Landfill Gas (LFG)			
Net Reduction in Biogenic C			
Uncontrolled Landfill		241	2.89
Controlled Landfill		22	0.26
Avoided Fossil Fuel Use		65	0.78
Dairy Manure			
Net Reduction in Biogenic C	2.88	180	8.64
Avoided Fossil Fuel Use	0.26	16	0.78

On average (California Biomass Mix 2005 in the table), biomass power generation in California provides comparable greenhouse-gas benefits in terms of the avoidance of

fossil emissions (0.80 ton/MWh of CO_2 equiv.), and the reduction in biogenic emissions compared to the alternative fates for the resources (0.81 ton/MWh of CO_2 equiv.). Avoided fossil emissions are based on an assumed 50 / 50 mix of avoided coal and combined-cycle gas generators, which is reflective of the baseload nature of the energy produced by biomass and biogas generators, and the conventional baseload energy supply mix currently serving California. The avoided fossil emissions are reported net of the emissions associated with the fossil fuels used in producing and transporting biomass fuels.

Power generation from biomass and biogas in California provides roughly the double the greenhouse-gas benefits of other renewables, due to the reduction in biogenic emissions that is provided in addition to the avoidance of fossil fuel use. In designing a program to implement AB 32, we recommend that the ARB provide a mechanism to reward bioenergy generation for the reductions in biogenic emissions that are unique to biomass- and biogas-powered generating sources. Failure to do so will mean that the potential for achieving these reductions will not be realized. Options for incenting bioenergy production include providing offsets for the biogenic emissions reductions, or issuing emissions allowances based on the biogenic emissions reductions. If the offset option is adopted, the GPI recommends that the biopower offsets be characterized as special offsets, and not be subject to the proposed ten-percent limitation on regular offsets that is incorporated in the *Draft Scoping Plan*.

Electricity generation from biomass and biogas in California today is based entirely on the use of resources that are wastes or residues. That is a circumstance that is unlikely to change in the future, as rules and regulations for the implementation of AB 32 go into effect. Biodiesel and ethanol fuels made from waste and residue forms of biomass resources have greenhouse-gas footprints that are similar to the greenhouse-gas footprint described above for bioenergy. However, virtually all of the ethanol fuel consumed in California today is derived from corn grown in the U.S. Midwest, not from wastes or residues. The greenhouse-gas implications of producing ethanol from corn have recently become an issue of considerable debate, which we will not attempt to recreate here. Ethanol fuels in the future might also be produced from cellulosic crops, such as Switch

Grasses. While some of the food vs. fuel issues attached to the use of corn for ethanol production are avoided with the conversion of Switch Grass grown on marginal land, there are still serious land-use issues and other greenhouse-gas implications that are not yet well-enough understood to be able to offer a reliable opinion as to their ultimate implications. In making greenhouse-gas policy, it is important to distinguish between biomass-energy applications based on wastes and residues, and biomass-energy applications based on purposely-grown energy crops.

Conclusion

In designing a cap-and-trade system for greenhouse-gas-emissions allowances, the ARB and the WCI should ensure that, regardless of the allocation system that is adopted (administrative or auction), all allowances are sold to allocation-rights holders at a market-based price. The proceeds from the sale of the allowances should be dedicated to investments in efficiency and carbon-free energy that will promote the achievement of the state's greenhouse-gas reduction goals, both in the near term, and in the long term. The stretch RPS goal of 33-percent renewables statewide by 2020 should remain one of the cornerstones of the final *Scoping Plan*. The final document should be augmented with a greater consideration of the nexus between biomass energy production, and sustainable forestry, agriculture, and waste disposal, and the resulting implications and opportunities for reducing greenhouse gases.