Commentary for AB 32 Scoping Plan, Program Design Technical Stakeholder Work Group Meeting, March 17, 2008
[http://www.arb.ca.gov/cc/scopingplan/economics-sp/meetings/meetings.htm]

Submitted by Ken Johnson, unaffiliated (kjinnovation@earthlink.net)

My comments are organized into three topic areas: (1) Response to White Paper questions, (2) Comments relating to revenue-neutral auctions, (3) Comparison of alternative allocation policies.

Response to White Paper questions

Q. What method should we use to distribute the allowances?

A: Allowances or auction revenue should be distributed in a manner that most effectively creates market incentives and competition for low-carbon energy sources and sustainable, energy-efficient technologies. This distribution methodology serves the public interest and benefits consumer welfare by ensuring that there will be a sufficient supply of economical, low-carbon energy to meet consumer demand within the cap limit, minimizing the possibility of extreme price spikes and supply disruptions of the type that occurred with the RECLAIM program. In contrast to the alternative of distributing the allowance value directly to consumers, this approach has the advantage that it avoids possible leakage effects associated with revenue recycling (as consumers shift their disposable income to uncapped, GHG-intense commodities and services), and it does not make consumers economically dependent on GHG emissions.

Q. How should allowance value be used? And, if the allowance value should be used to ease the costs of regulation for entities, who should receive them and how many allowances should each entity receive?

A: The allowance value should be used not just to ease regulatory costs, but also to make greater emission reductions possible. This can be achieved, for example, by minimizing cross-subsidies out of the electricity sector, and by further minimizing cross-subsidies (e.g. from fossil fuels to Nuclear and Large Hydro) that serve no useful policy objective. By limiting cross-subsidies, regulatory costs are reduced, making it possible to achieve more ambitious emission reductions (e.g. via a more stringent cap or higher emission price). Furthermore, maintaining revenue neutrality within the electricity sector makes it possible to implement complementary policies in other sectors (such as appliance efficiency incentives) without double-counting emissions.

Q. How should allowances be distributed to new entities and how should entities that cease operating in California be treated?

A: Allowances should be distributed via a method such as an output-based, refunded auction, which delegates to the market detailed decisions about who gets allowances and auction revenue, and in what proportions. Regulations should function to ensure efficient

operation of the market, and should not impose on regulators the burden of micromanaging the distribution of allowances and auction revenue. Under a "market-based" regulatory model ARB would function as a kind of "Central Bank" for emission allowances, not as a "central planning agency".

Q. How should the methods of distributing allowances in a cap-and-trade program change in future years?

A: As fossil fuels are phased out and sustainable technologies become predominant, the system could gradually shift to being pure output-based, without discrimination based on fuel type. The focus of regulatory incentives and subsidies would progressively shift from low-carbon to zero-carbon and negative-net-emission technologies such as biosequestration.

Comments relating to revenue-neutral auctions

The White Paper discusses the option of a "revenue-neutral auction" (page 7, footnote 3). The term "revenue-neutral" is commonly applied to an auction or a tax when the revenue is earmarked for some designated purpose other than depositing it in the General Fund, but in this context the term is used in a stronger sense: The auction is revenue neutral *within the regulated sector*.

A revenue-neutral auction is essentially equivalent to free allocation if the same proportionate allocation formula (for revenue distribution or for allowance distribution) is used in either case. For example, if a regulated firm would receive 1% of the allowance distribution under free allocation, then it would receive 1% of revenue under an equivalent auction. If its allowance distribution amounts to 1000 MTCO2, then at an emission price of $50/MT the market value of its free allocation would be $50,000. Under the auction, the firm would need to pay $50,000 for the allowances; but it would receive a $50,000 refund distribution from auction revenue, so its 1% allocation would still effectively be free. This would remain true if the market price changes, e.g. at a $100/MT price the 1000-MT allowance would cost $100,000, but the refund would also be $100,000. If the firm needs to purchase allowances for more or less than 1000 MT to meet its needs, then its net gain or loss under the refunded auction would be the same as its trading gain or loss with free allocation.

This equivalence notwithstanding, an auction could have advantages over free allocation: An auction would improve market liquidity; it could accommodate a price floor (per the MAC recommendation[1]); output-based allocation could be more easily based on actual output during each compliance period (not projected or historical output); an auction would be more transparent because it would assign a clear monetary value to the allocation; and it may be simpler to administer a full auction (with full or partial refunding) rather than supporting some auctioning and some free allocation.

[1] Market Advisory Committee, Final Report, June 29, 2007 (page 68) [http://www.climatechange.ca.gov/documents/2007-06-29_MAC_FINAL_REPORT.PDF]

Footnote 3 in the White Paper (page 7) makes mention of the Swedish NOx program as an example of a revenue-neutral auction. This program is actually a refunded emission tax, but the allocation method that it employs (distribution proportional to "useful energy output") would be equally applicable to an auction, or to free allocation. These three policy alternatives – a refunded emission tax, refunded auction, and free allocation – would have essentially equivalent regulatory costs if they use the same proportionate allocation formula; the only difference is that the refunded tax would exhibit no price volatility. (The emission price is set by mandate.) These are not mutually exclusive options – a refunded auction with a price floor would essentially switch to a refunded tax if prices drop to the floor level, ensuring that industries' investments in clean technology are not undermined by price erosion or collapse.

Under a pure output-based, refunded auction (or emission tax) in the electricity sector, the refund would be distributed to all electricity producers (including renewables) at a uniform dollar-per-MWh rate, which is determined to achieve revenue neutrality. Since the rate is uniformly applied, it would have no effect on the relative competitiveness of different energy sources or on the marginal incentives for renewable expansion or sequestration. Regulatory costs are reduced, but the tradeoff is that incentives for energy end-use efficiency are diminished by the refund. However, the revenue-neutrality makes it possible to implement complementary policies for end-use efficiency without double-counting emissions.[2] Furthermore, it should be recognized that even though average regulatory costs in the electricity sector would be zero, regulation-induced technology costs may be positive. These costs will be reflected in electricity prices and will, to some extent, motivate end-use efficiency improvement.

Output-based refunding can eliminate cross-subsidies out of the electric sector, and the refunding method can be further refined to manage cross-subsidies between electricity sub-sectors to further reduce costs or increase incentives for renewables and sequestration. Following is a quantitative illustration of this policy approach.

---

[2] For example, a carbon price applied to electric appliances, based on lifecycle emissions, would be premised on some industry-average carbon intensity of electricity. Under a revenue-neutral auction or tax in the electricity sector, a generator's regulatory cost would be zero if its carbon intensity matches the industry average, so there would be no double counting. If it does not match the average, then the electricity generator's regulatory cost, in combination with the appliance efficiency incentive, would be reflective of the emissions actually generated in connection with the appliance use. The appliance incentive could similarly be implemented to be revenue-neutral without affecting the marginal incentive for efficiency improvement. This method of combining complementary revenue-neutral policies is discussed from a more theoretical perspective (in the context of refunded taxes, aka "feebates") in Appendix B of Energy Policy 34 (18), 3965-3976 [http://dx.doi.org/10.1016/j.enpol.2005.10.005].

Comparison of alternative allocation policies

Following is a quantitative comparison of several auction allocation methodologies, based on the CA 2004 electricity market.[3] Three policy alternatives are compared: (1) an unrefunded auction, (2) a pure output-based, refunded auction, and (3) an output-based, refunded auction that is modified to selectively eliminate cross-subsidies between some industry sub-sectors defined by fuel type. An emission price of $10/MTCO2e is assumed for all three options. (This could be a market price under cap-and-trade, a floor price, or a carbon tax. In the cap-and-trade scenario, the cap could be electricity-specific or could be economy-wide.) Under option 2, cross-subsidies out of the electricity sector are eliminated. Under option 3, all cross-subsidies from Coal and NG to the combined Nuclear/Hydro sub-sector and cross-subsidies from Coal to NG are also eliminated. (With this option regulated entities would need to maintain an accounting of emissions and generation, disaggregated by fuel type.)

	$10/MTCO2e			$50/MTCO2e
Sub-sector	Option 1 $/MWh	Option 2 $/MWh	Option 3 $/MWh	Option 3 $/MWh
CA_Coal	11.550802	7.496018	1.1540071	5.77003543
Import_Coal	9.7626128	5.70782868	0.6129983	3.06499161
CA_NG	4.5559703	0.5011862	0.1088159	0.54407925
Import_NG	4.9117941	0.85700994	0.2764803	1.38240165
CA_Nuclear	0	-4.0547841	0	0
CA_Hydro	0	-4.0547841	0	0
Import_NonEmitting	0	-4.0547841	0	0
CA_WindSolar	0	-4.0547841	-4.054784	-20.273921
CA_Biomass	0.5477506	-3.5070335	-3.684295	-18.421473
CA_Geothermal	1.5826021	-2.4721821	-2.984338	-14.92169
CA_OtherGas	24.940924	20.8861396	12.814848	64.0742389
CA_Petroleum	10.393939	6.33915526	2.9755061	14.8775303
Import_Distillate	7.6190476	3.56426348	1.0986148	5.4930738
Aggregate:	4.0547841	0	0	0

Net emission charge (allowance cost minus refund) for (1) unrefunded auction, (2) pure output-based, refunded auction, and (3) modified output-based, refunded auction.

The values in the "Option 1" column equate to a straight carbon tax at the $10/MTCO2e rate. With uniform refunding (Option 2), regulatory costs of all fuel types are reduced by $4.05/MWh (becoming a subsidy for zero-emission sources), but the differences between fuel types are unaffected, so incentives for fuel substitution, e.g. from Coal to Wind/Solar, would be unaffected. With Option 3, the regulatory costs for Coal and NG are both greatly diminished by eliminating the Nuclear/Hydro subsidy. (Note that NG costs are reduced even though the Coal-to-NG cross-subsidy has also been

[3] This analysis is adapted from the following papers, which provide more detailed information on the analysis:
Response to the Western Climate Initiative solicitation for stakeholder input on Option Papers (Allocation and Electricity) [http://www.westernclimateinitiative.org/ewebeditpro/items/O104F15024.pdf]
COMMENTS OF KENNETH C. JOHNSON PERTAINING TO MODELING-RELATED ISSUES (submitted to CPUC/CEC) [http://docs.cpuc.ca.gov/efile/CM/75992.pdf]

eliminated.) The Wind/Solar subsidy ($4.05/MWh) is unchanged from Option 2, but the incentive for substituting Wind/Solar for Coal or NG is diminished because regulatory costs for Coal and NG are significantly lower. However, the regulation-induced competitive incentives within each sub-sector (e.g., the relative competitiveness of sequestered versus non-sequestered coal) is unaffected by the refund.

The above comparisons illustrate how regulatory costs can be greatly diminished by employing refunding and administrative management of cross-subsidies. The lower costs can make it feasible to apply a higher emission price (by imposing a more stringent cap, higher price floor, or higher emission price). This is illustrated in the last column of the above table, which represents Option 3 with a higher emission price ($50/MMTCO2e). Compared to Option 2 at $10/MMTCO2e, the regulatory costs for Coal are lower, and are only slightly higher for NG, even though the marginal regulatory incentive is increased five-fold. The Wind/Solar subsidy is increased by a factor of five. The (minor) tradeoff to this advantage is that the Nuclear/Hydro subsidy has been eliminated. (Unless it is a policy objective to expand Hydro and Nuclear to replace Coal and NG, this subsidy does not serve a useful purpose – it only diverts economic resources that might be more usefully spent on sequestration or renewable energy.) It should be noted, however, that the low regulatory cost under Option 3 is a consequence of the small market share of Wind/Solar and other renewables. As these alternatives gain market share, coal would become increasingly uneconomical, and unless large-scale sequestration technology is adopted, coal would eventually be phased out.