March 19, 2007



California Energy Commission
Docket Office
1516 Ninth Street
Sacramento, CA 95814
(via email to docket@energy.state.ca.us)

**Re: Docket No. 03-RPS-1078 RPS Proceeding – Committee Workshop on Best Practices for Coordinating RPS with Carbon Market Design**

APX is pleased to submit comments on the recent Committee Workshop and questions related to the relationship between Renewable Portfolio Standards programs and Carbon Market Design. In addition to this introductory letter, the response consists of two parts:

- General comments on the relationship between renewable energy and carbon market design
- Specific responses to questions in Attachment A of the 3/13/07 Meeting Notice

APX is the nation's leading infrastructure provider for U.S. environmental markets in renewable energy and power generation information management, including emissions tracking. Our technology is the backbone for every major renewable energy market in North America, including the PJM (GATS), ISO New England (NEPOOL GIS), WECC (WREGIS), ERCOT (Texas REC) and most recently the Upper Midwest (M-RETS) markets. In total, more than 2 Billion digital certificates have been created and are under management using this infrastructure, each certificate representing 1 MWh of produced energy.

In addition to registering and tracking renewable energy, in some of these markets APX technology is used to track all power generation (above and beyond renewable energy) and all fuel types, including power imports and exports across states and regions. In some states and regions, such as the Mid-Atlantic (PJM GATS) and Northeast (NEPOOL GIS) the same infrastructure is also used to track greenhouse gases, including carbon dioxide, methane, volatile organics, particulates, and other emissions.

The ability to track the relationship between power generation, including renewables, and related emissions is a significant issue in California and equally important in other states, especially for states where a large portion of the electricity is imported from surrounding states. As California and other western states deploy the Western Renewable Energy Generation Information System (WREGIS) in 2007 to manage state Renewable Portfolio

Standards, the State will have at its disposal a rich toolkit for managing environmental market systems for not only renewable energy, but also greenhouse gas programs and energy efficiency.

Key lessons from our experience in implementing successful market based systems for environmental policy management include:

**Importance of a Transparent, Trusted Robust Infrastructure**

- Important to have a full audit trail and transaction history for all transactions.
- Full visibility for regulators and market participants.
- Must be scalable and capable of handling very large volumes of data with security and geographic redundancy.
- Must support 24/7 access to the market infrastructure, with phone support, as needed.
- Needs to be able to handle complex multi-tiered rules and regulations.

**Certainty of Market Rules, with Fairness and Access for all Market Participants**

- Web-based deployment gives everyone the same low cost access to the necessary market technology.
- Represents a full and clear implementation of the rules according the proscribed guidelines for access and use of the system.
- Implements a clear workflow process, so that all Market Participants know what they have to do.

**Lessons Can Be Learned from Other US Environmental Market Systems**

- Deployments of market based approaches to environmental management have been proven to be successful in the US.
- There is existing, proven technology available today. It is not new; rather it is well tested and mature.
- Such technology has been implemented on a large scale, with hundreds of millions of transactions and participants at a state and regional level.
- California has an existing environmental market technology infrastructure
- WREGIS is being deployed now and will be live in mid 2007. It handles California's renewable energy program
- Initial scope of WREGIS is renewable power generation, but should the State choose, it could be extended to handle all types of fixed emissions sources.
- WREGIS could be customized to support a regional greenhouse gas management scheme.
- The same technology used in WREGIS has additional modules that are being deployed in other parts of the country to track all types of emissions for certain states, to manage energy efficiency certificates, to manage all fuel types for generators, and to manage all sources of power generation within the state and from outside the state.

We offer our strong support and assistance to the Committee, and would welcome further discussion regarding how the existing WREGIS infrastructure might be extended to handle California's needs with respect to AB 32 program management. Over the last 7 years, APX has gained a substantial amount of experience in deploying and implementing market based environmental systems, and would welcome the opportunity to assist the Committee further. Please call me if you have any questions at 617-699-0929.

Thank you.

Sincerely,

Reiner Musier, Ph.D.
Vice President and CMO
APX, Inc.

## General Comments on Renewable Energy and Carbon Market Design

Regulators and Legislators across the US are today working to define the relationship between the nation's well established renewable energy certificate (REC) markets and the rapidly approaching US carbon markets. This response explains certain key decision points around the issue, and gives a perspective from the nation's largest infrastructure provider for power generation information systems and environmental markets.

**(1) The most fundamental question is whether the further development of renewable energy in the US is an emissions reduction tool.** As of 2007, twenty three states plus the District of Columbia have adopted Renewable Portfolio Standards (RPS) which mandate that a certain percentage of a state's electricity demand be covered by renewable energy. This number has grown steadily, up from only 6 states in 2000. There are clear differences in these programs across states, and some critics have argued that not all state RPS programs are zero emissions. It's true that the burning of biomass or landfill methane for power generation creates greenhouse gas (GHG) emissions. But it's a small percentage. The overwhelming majority of renewable energy supported by RPS programs is fueled by wind and sun, and is indeed zero emitting.

Whether these programs were initially conceived primarily as GHG reduction mechanisms or for some other purpose, the outcome of RPS programs has been to deliver GHG emissions reductions through the funding of additional solar and wind power generation facilities. The outcome rather than the initial intent of these programs is what's relevant to the GHG discussion.

To achieve meaningful reductions in US GHG emissions toward 20 year, and certainly 50 year targets requires continued growth in renewable energy, as well as energy efficiency programs. What many do not understand is that carbon emissions are fundamentally different than the acid rain gases $SO_2$ and $NO_X$ that were so successfully regulated two decades ago. Their reduction could be achieved by chemical and mechanical technology at the plant level. Plants could be "scrubbed" of their $SO_2$ and $NO_X$ emissions. In contrast, as of today, fossil generation plants cannot be scrubbed of their carbon emissions. The fundamental difference with GHG emissions is that $CO_2$ and water are the end products of the complete combustion of a fossil fuel. These products are the natural end state of combustion. The only way to avoid them is to avoid combustion altogether. If nuclear energy remains a politically untenable option and further large scale hydroelectric projects remain unlikely for environmental impact reasons, then zero emitting renewable energy and energy efficiency remain two of the best tools to achieve greenhouse gas emissions reductions. This remains our premise.

**(2) Quantifying the relationship between renewable energy and emissions reduction.** If we accept a clear link between renewable energy and emissions reductions, the next logical step is to define that relationship more exactly. The surge in US investment in wind power development and solar projects over the last 5 years has allowed the US to

avoid bringing on more conventional fossil fuel generation capacity. But exactly how much carbon emission has been avoided?

The main point of this section is that quantifying the relationship between renewable energy and avoided GHG emissions is solvable and is not particularly difficult. The necessary approach is to determine a reasonable value for the avoided GHG emissions for a renewable power generation facility in a specific location. To be sure, there are a number of ways to do that, and the discussion can result in debate -- there is no one correct answer. However, there are a number of options for the formula which are simple, generally fair, easy to understand and explain, and easy to implement.

The general approach is to calculate the amount of emissions that would have been generated by the type of power generation that has been avoided by the next renewable energy generation unit. The decision regarding the formula is a policy-level decision that needs to balance simplicity with the level of rigor of the calculation.

The formula for avoided emissions takes into account several factors. One part of the formula relates to geography, since the renewables facility (say a wind or solar generating plant) is in a particular state or electricity region. The second part of the formula relates to the emissions footprint for the state or region, whose avoidance attributes will be related to the renewable energy. For example, regulators may choose to count all the Kyoto gases when calculating the avoided emissions, or only $CO_2$ and methane. This is a policy decision.

For the state of California, for example, the simplest approach would be to calculate the "system power" emissions mix based on total power generation in the state per MWh, and assign that as the value of avoided GHG emissions per MWh of renewable energy from wind or solar power generation in the state. So in this hypothetical example, if state-wide system power causes emissions of 800 lbs $CO_2$/MWh for 2006, then 800 lbs $CO_2$/MWh would be the value of avoided emissions for a REC in California.

Certainly more sophisticated approaches can be contemplated. Electricity regions could be used rather than state boundaries to define the geographic scope of the calculation. When calculating the system mix, certain forms of generation could be excluded, such as nuclear and hydro facilities. An assumption could be made that any new fossil generation would be gas turbines, so only the emissions footprint of gas turbines should be used in calculating the avoided emissions.

Once policy makers decide on the formula, implementation of the formula at the state or regional level can be rapid. Power generation and related emissions data are generally available and well understood, so the calculation itself is not difficult. In California, it could be implemented in the state's Western Renewable Energy Generation Information System (WREGIS) in a matter of weeks to track the avoided emissions related to renewable power generation in the state (with the approval of WREGIS stakeholders as a prerequisite).

**(3) On the tracking of RECs and the tracking of Avoided Emissions Related to RECs.** A renewable energy certificate (REC) is 1 MWh of power generation from a renewable resource, such as a wind or solar generation unit. So using the approach of the previous section, we will know the quantity of avoided carbon emissions for every REC in the state of California. Are the Avoided Emissions an attribute of the REC, or are they best tracked as separate certificates?

Existing tracking systems, like WREGIS, can track RECs and the Avoided Emissions of the REC as one certificate, independent certificates or as linked certificates. Any of these approaches are "doable" from a technology and systems standpoint. This means that:

- If avoided emissions are an attribute of a REC, then an advantage is that they are bound to the REC, travel with the REC, and are tracked under one serial number.
- If the avoided emissions are certificated separately, then they could be assigned their own serial numbers, and could probably be more easily transferred separately from the REC. Tracking systems, like WREGIS, could maintain the data relationship between the REC serial number and the Avoided Emissions serial number, if these were certificated separately. That is possible under the APX infrastructure, and is not difficult.

The main point here is that either mechanism can be made to work equally well in generation information systems like WREGIS, and the decision should be made around which approach best supports the implementation of the environmental policy. Ultimately, the decision to handle RECs and their Avoided Emissions as bundled or separate certificates is a significant policy question, but there are no technology or implementation barriers in either case.

**(4) Renewable Energy in the Cap of a "Cap and Trade" Approach.** Some policy observers have argued that if renewable energy is indeed an emissions reduction mechanism, then policy approaches should be aligned with this policy objective. Renewable energy can be included inside the cap, or can be outside the cap:

- In an **"outside the cap"** approach, the emissions reductions of RPS programs are assumed, and the cap is set assuming that these will occur. Renewable energy is considered separately from other GHG emission reduction efforts. In this case, the benefits of renewable energy have been taken into account when setting the cap. This is the approach proposed by the Regional Greenhouse Gas Initiative (RGGI).
- In an **"inside the cap"** approach, the emissions reduction benefits of renewable energy are combined with other sources of emissions reductions in a unified program Cap. The tracking and incentives for renewable energy are considered together with tracking and incentives for other emissions reductions.

Advantages have been claimed for both options:

**(a) For Renewables "Outside the Cap"**

So far in the US, the Regional Greenhouse Gas Initiative (RGGI), consisting of a number of mid Atlantic and Northeast states, is the first group of states so far to have selected a preliminary approach, and theirs has been to consider renewable energy outside the Cap. This has also commonly been referred to as an "Off the Top" approach with respect to renewable energy, because emissions reductions of RPS programs are assumed before further emissions reductions are targeted. The RGGI group states that it has assumed full RPS compliance in its participant states when setting the GHG emissions caps for the region. So the Cap nominally has been set assuming that all states meet their RPS goals, and the emissions reduction targets have been reduced by an amount equal to the benefits of the RPS programs. Some observers have questioned the analytical rigor of the RGGI approach, pointing out the lack of a direct correlation between modeling of emissions and the Cap, and have questioned whether the Cap setting was more a political rather than analytical exercise. Nevertheless, the RGGI approach forms the most advanced template in the US, and has been a service in bringing the discussion to a national level.

The RGGI "Model Rule" also proposes an approach for voluntary renewable energy markets. In this approach, the emissions reductions for voluntary sales of renewable energy certificates are subtracted from the Emissions Allowances that are allocated to the states, and automatically retired before the allocation occurs. So this is also an "Off the Top" approach with respect to the handling of Allowances.

The advocates of this approach believe that if state RPS programs are supporting renewable energy development, then additional incentives should be targeted at new areas to create additional GHG reduction benefits. Why provide additional incentives to an area like renewable energy development that is already receiving incentives, they ask. However, renewable energy advocates counter that enough is still not being done to support renewable energy.

Implications of this approach are that there would generally be no additional revenue stream from the sale of certificates or credits for renewable energy development from the Cap and Trade mechanism. The renewable energy and power industry would still benefit, however, because renewable energy would reduce the cost of Cap and Trade mechanism compliance (it would reduce a generator's overall emissions, and hence lower their obligations to buy allowance or offsets). However, this would be an indirect benefit, rather than a direct benefit from the sale of certificates or credits for emissions reductions.

If renewable energy is managed outside the Cap and Trade mechanism and if the Cap is set without taking renewable energy emissions reductions into account, then it would significantly weaken any emission reduction claims of REC purchases, whether for state RPS compliance or for voluntary green power programs. This would be seen as a significant downside by many in the renewable power industry. As mentioned above,

RGGI claims to have take RPS programs into account when setting their Cap, somewhat mitigating this concern in their region.

**(b) For Renewables "Inside the Cap"**
An "inside the cap" approach for renewables would create a single framework for all GHG emissions reductions from all sources, and would appear to better enable unified policy management with respect to emissions reduction.

One advantage is that it could give regulators more precise control and knowledge of actual total greenhouse gas emissions reductions. A limitation of the RGGI approach has been a structural issue related to the separate and various state RPS standards. Under RGGI, avoided emissions related to renewable energy are not specifically tracked or calculated. In fact, not all renewable energy within RGGI is zero emissions, and there is some question regarding whether these emissions were considered in setting the Cap. By specifically calculating the avoided emissions related to renewable energy and managing it under one unified Cap, this issue can be avoided. Industry as a whole, and the power generation industry in particular, can better be held accountable for GHG emissions reductions through a unified Cap, since all emissions, avoided emissions, and emissions reductions are specifically tracked.

By considering renewable energy directly under the Cap, the potential exists for additional incentives to drive renewable energy development above and beyond the levels of state RPS guidelines. Today's RPS programs typically drive load serving entities (utilities) to meet, but not necessarily to exceed the state renewable portfolio or renewable energy standard.

Another advantage of including renewable energy within the Cap is that it would provide industry with additional flexibility in achieving compliance, and doing so at lower cost. If the Avoided Emissions of a REC were treated as a certificate which industry could trade to achieve emissions reduction, the industry would have another tool with which to achieve compliance. Lower cost would likely be achieved through greater market liquidity for the certificates that would be bought and sold to achieve compliance.

Even if the "Avoided Emissions of a REC" certificates were merely calculated, created, recorded and then acquired or retired (rather than bought and sold to achieve compliance), then at a minimum Regulators would have a more precise understanding of the contribution of renewable energy toward greenhouse gas goals. This has a societal value, as well as value for policy makers.

For Regulators, a unified emissions Cap that encompassed renewable energy along with other emissions reduction mechanisms would offer flexibility for the future. State and federal programs are likely to continue to evolve over the next several years. Putting in place a unified emissions Cap and a unified emissions management approach can set the stage for future programs that are not yet imagined. Consider that states and regions are currently contemplating a variety of environmental certificates around which to build compliance and voluntary programs:

- Renewable Energy Certificates (RECs), representing 1 MWh of renewable energy
- Avoided Emissions related to a REC, generally in lbs of $CO_2$ equivalents
- Carbon Emissions Allowance, initially created by a regulator grant or auction
- Carbon Offset or Verified Emissions Reduction, representing the avoided or reduced greenhouse gas emissions from an emissions reduction project
- Energy Efficiency Certificate, representing 1 MWh of energy efficiency savings or avoided power generation from an energy efficiency or conservation program
- Avoided Emissions of an Energy Efficiency Certificate

A unified emission Cap could manage these and other type of certificates in a consistent policy framework.

**An Example**

Let's look at an example involving a renewable generator and two utility companies in a state with an RPS program and renewable energy "inside the Cap".

From the perspective of the state RPS program, things would look very much the same as today. RECs would still be used by utilities to report compliance with state RPS programs. However, the greenhouse gas side is a new dimension. Consider this scenario:

- Assume that 1 MWh of "system power" for the state generates emissions equal to 800 lbs $CO_2$/MWh. In this example, these are the average emissions statewide for conventional power generation. Also assume that 1MWh of renewable energy avoids these emissions, to the tune of 800 lbs $CO_2$/MWh.
- Utility A buys 1 REC from a wind farm, including all its environmental benefits. (Whether the additional environmental benefits are treated as an attribute of the REC or as a separate certificate is unimportant to this example.)
- Utility B buys 1 MWh of electricity from the wind farm. This is sometimes referred to as "null power", meaning that Utility B is buying the electricity only. Utility B has not bought the REC or the environmental benefit associated with the zero emissions of the wind power generation.
- Utility A retires the REC for state RPS compliance purposes.
- Utility A's emissions <u>decrease</u> by 800 lbs, since they bought the REC and its environmental benefits, namely the avoided emissions in the amount of 800 lbs $CO_2$.
- Utility B's emissions would <u>increase</u> by 800 lbs, since they bought the electricity only and no rights to the environmental benefit. They achieve the benefit of the electricity in meeting their power obligations only, with an emissions profile equal to the system mix. Their alternative would have been to purchase power generated by conventional means, so from an emissions perspective, they are no worse off.

If Utility B had bought the REC as well as the power, then they could have used the REC and the Avoided Emissions to meet their RPS and GHG obligations. If the REC and its Avoided Emissions attributes had been purchased and retired via the voluntary REC market, the effect would have been to lower the Cap.

Regardless of the approach ultimately chosen by California regulators, the current environmental market infrastructure has the flexibility necessary to support California's environmental policy management.

## Specific responses to questions in Attachment A of the 3/13/07 Notice

**Question 6a: On the how a REC could be used in a regulatory carbon market.**

On pages 4 and 5 above, we describe in some detail how the avoided emissions related to renewable energy could be calculated and tracked, either as an attribute of a REC, or as a separate certificate, which may or may not be bought and sold.

**Question 6b: On whether the allowable cap for GHG emissions should be reduced to account for the amount of renewable energy required by RPS targets, and how this could be done.**

On pages 6 through 8, we describe pros and cons related to how and whether the cap on GHG emissions should include the avoided emissions related to state RPS programs. APX is policy neutral, and prefers not to recommend a specific approach.

**Question 7: On the treatment of null energy with respect to GHG emission reductions.**

We discuss a specific example on the treatment of null energy on page 9.

**Question 8: On the use of renewable energy for RPS compliance and the future carbon market**

On pages 5 to 8 we describe how to the GHG benefit of renewable energy could be calculated, and how it might be treated in the carbon markets.

**Question 9a: On the RGGI plans to allocate a percentage of CO2 allowances to a public goods fund to provide incentives for energy efficiency and renewable energy.**

As a policy neutral infrastructure provider for environmental and power markets, APX prefers not to take a position on whether California should or should not adopt such an approach related to the public goods charge fund.

However, we can say that if California allocates or auctions CO2 allowances to power companies and other industries, the current environmental market infrastructure (which will be deployed in California for WREGIS) will be ready and able to track CO2 allowances and offsets, manage them, record ownership and transactions, and provide reporting capabilities for compliance reporting, should the policymakers so decide.

**Question 9b: On the allocation of allowances for voluntary markets for renewable energy.**

While APX is not in a position to comment on the policy question, the APX infrastructure (which is the basis for California's WREGIS system) is being extended to handle CO2 allowances, carbon offsets, as well as the tracking of the Avoided Emissions associated with a Renewable Energy Certificate (REC), since we anticipate that this will be needed across US environmental markets in the not-too-distant future.

Regarding smaller account holders, in some US environmental markets supported by APX, individuals and small businesses are already account holders in the tracking systems, and the current technology is scalable to handle large numbers of such account holders.

**Question 10: On the advantages and disadvantages of allowing IOUs to meet RPS requirements with unbundled RECs**

The current environmental market infrastructure can enable unbundled RECs, RECs associated with energy, and RECs associated with avoided emissions (as described on pages 4 and 5 above.)

**Question 11: Regarding the treatment of behind the meter renewable energy when issuing REC's eligible for California's RPS.**

The most relevant situation in another state that we are aware of is in the case of Rhode Island, which in January of 2007 began to operate its Renewable Energy Standard (RES) program in the NEPOOL Generation Information System (GIS), administered by APX.

A novel aspect of the Rhode Island RES relates to customer-sited and off-grid generation facilities (often called "behind-the-meter" generation) which may be certified as an eligible resource. This is generation that is not monitored by the ISO New England settlement system, displaces all or part of the metered consumption of the end use customer, and is not connected to a utility transmission or distribution system. The RES requires that such generation be monitored and verified by a party independent of the generation unit and any other party that might create a conflict of interest. This requirement sets an important precedent for third party verification to ensure data integrity in such circumstances.