

## ***Analysis of Tradable Credits as a Potential Cost Minimization Tool for California RPS Implementation***

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### **Introduction**

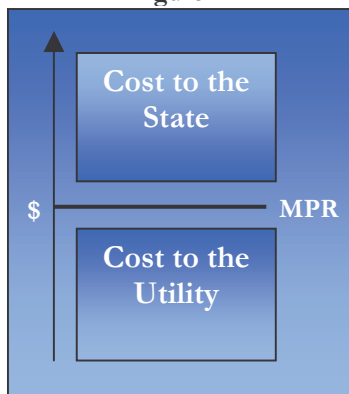
In 2002, the state of California chose to increase its reliance on renewable energy resources through the passage of its Renewables Portfolio Standard (RPS). The RPS requires the three major utilities (PG&E, SCE, and SDG&E) to increase their procurement of renewable energy to 20% of retail sales by the year 2017. It is designed to confer both economic and environmental benefits on ratepayers.

#### ***Purpose of California RPS Goals***

- Reduce national CO<sub>2</sub> emissions;
- Improve local air quality;
- Create local employment opportunities;
- Increase energy security.

The success of the California RPS program is contingent upon the sufficiency of public funding, which is derived from ratepayers. Compliance rules only require utilities to pay up to the established market price referent (MPR) for renewable energy procurement. The California Energy Commission (CEC) will pay up to the generator's remaining above-market costs in the form of supplemental energy payments (SEPs). Funding for SEP payments comes from the Public Goods Charge (PGC) fund and is currently allocated for the RPS program

**Figure 1**



at approximately \$70 million per year.

If the SEP fund is insufficient to cover the above-market costs of renewable generation during a particular compliance year, utilities are not obligated to meet their remaining RPS requirements for that year. The adequacy of SEP funding will depend upon the following:

1. quantity of PGC funds,
2. natural gas prices,
3. cost of eligible renewable technologies,
4. bidding level of generators, and
5. flexible compliance mechanisms.

The majority of these factors cannot be controlled by the CEC: the size of the fund has been set; the fluctuations of natural gas prices are a product of market forces; and the costs of eligible renewables are likely to drop as a function of technology and market developments. While some flexible mechanisms, such as procurement banking, have already been incorporated into the RPS, there may be opportunities to further reduce compliance costs by increasing the market-based mechanisms in the policy design. The use of tradable renewable energy credits (TREC) is one policy option that is credited with increasing market participation, enhancing market liquidity, and improving utility compliance.<sup>ii,iii</sup> Increased market liquidity may also lower the bids of renewable generators, which would allow the PGC fund to support additional projects.

### **Project Purpose**

The focus of this study is to determine how to advise the CEC on the inclusion of TREC) as a compliance mechanism in the California RPS. The recommendation will be primarily based on the ability of TREC) to facilitate the achievement of the RPS objective by reducing overall program costs.

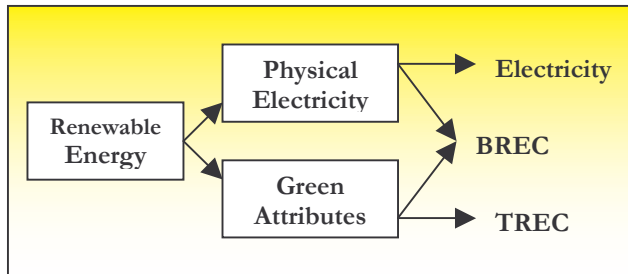
### **Tradable Renewable Energy Credits**

Renewable energy credits (RECs) serve to monetize the environmental benefits of renewable energy by representing the "green attributes" of one megawatt-hour of renewable electricity. For each unit of power, renewable generators generate physical electricity and a corresponding number of RECs, which can be

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“bundled” or “unbundled” from one another. In bundled transactions (bundled RECs or BRECs) the REC is sold with the underlying physical electricity. Unbundled transactions (tradable RECs or TRECs) allow the RECs to be sold and/or traded separately from the physical electricity.

Figure 2



TRECs serve to monetize environmental benefits and allow the highest bidder to purchase credits. They are also credited with:

- lowering compliance costs,
- increasing market participation,
- enhancing renewable resource diversity, and
- improving administrative and utility compliance flexibility.

**Project Approach**

The purpose of this project was to analyze whether potential cost savings from TRECs would provide the CEC with an appropriate policy tool for better ensuring that RPS goals are met. In order to assess the value of TRECs within the RPS program, this analysis consisted of the following:

1. Developing a model of the California electricity market in order to calculate the above-market costs of renewable energy production.
2. Characterizing existing TREC markets to determine whether TRECs offer cost-savings by enhancing market liquidity.

The analysis concludes with a recommendation to the CEC regarding the most appropriate use of TRECs within the California RPS framework.

**Model Results**

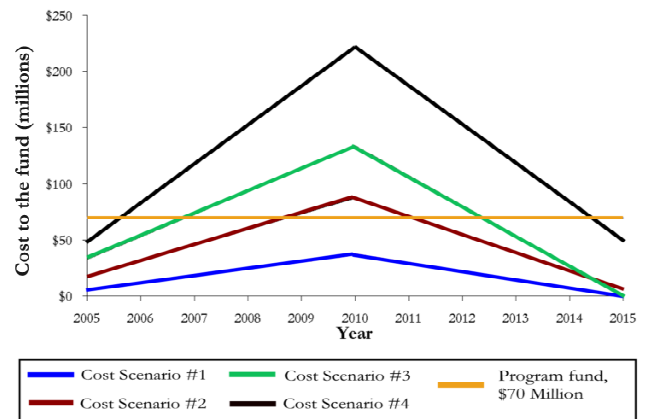
The results from the model indicate that the cost to the state of meeting the RPS requirement will likely exceed allocated PGC funding. In three of

**Model Scenarios**

- #1: PTC and High Natural Gas Prices
- #2: PTC and Low Natural Gas Prices
- #3: No PTC and High Natural Gas Prices
- #4: No PTC and Low Natural Gas Prices

the four model scenarios, in which natural gas prices varied from high or low projections and the Federal Production Tax Credit<sup>2</sup> (PTC) was either included or excluded, the expected cost to the state exceeded the total funding available (see Figure 3). The model found that funding will be sufficient only if the Federal PTC is reinstated and if natural gas prices continue to rise.

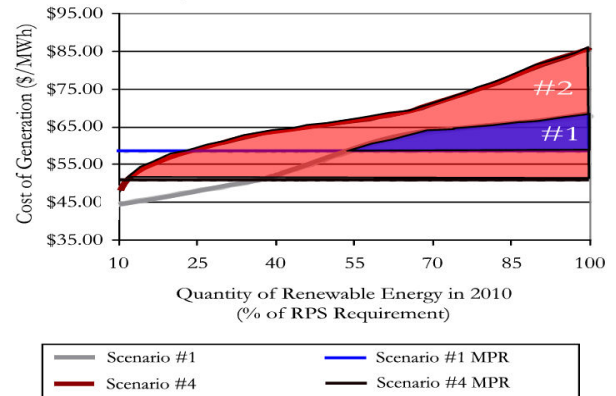
Figure 3  
Anticipated Cost of RPS Program vs. Available Funding



*Expected Cost to the State*

The results of the model represent the *minimum* expected cost of the RPS to the state since the model output is based on the costs of production. In reality, the costs to the state will likely be greater, since the actual bids will likely fall between the respective resource’s cost of production and the marginal cost of renewable production. Therefore, the cost of the program is anticipated to exceed the costs predicted by the model. These findings support the need to introduce cost-saving policy mechanisms into the RPS program.

Figure 4: Minimum Cost to the State of the RPS



<sup>2</sup> The PTC is a federal tax credit enacted in 1992 that supports electricity generated by wind, closed-loop biomass, and poultry waste at the rate of 1.5¢ per kWh. The PTC expired on December 31, 2003 and at the time of the analysis it was unclear whether it would be renewed

In Figure 4, the shaded areas represent the minimum predicted cost to the state of RPS compliance, as predicted by the four model scenarios. The blue shaded area (#1) represents the lowest estimate of minimum costs; the red area (#2) represents the highest estimate of minimum costs. Figure 4 illustrates a market in which generators bid for contracts at their exact cost of production.

range of potential costs to the state. In order to push California’s RPS cost to fall closer to the minimum cost, TRECs were examined as a potential cost-reducing market mechanism.

**Results from TREC Market Analysis**

The analysis of existing TREC policy and pricing data found that TRECs, with a well-designed policy, present an opportunity to (1) decrease compliance costs, (2) increase market participation, (3) increase the selection of renewable resource options, and (4) would not exacerbate administrative costs of existing policy options.

*1. Decreased Compliance Costs*

TRECs reduce compliance costs through the removal of the temporal and spatial components of producing electricity. First, TRECs remove the electricity delivery requirements from the energy transaction; thus, time-of-delivery costs are not necessarily reflected in the price of the TREC. Spatially, TRECs minimize transmission costs by allowing utilities to support remotely produced renewable electricity without requiring the energy to be wheeled to the utilities’ service area.<sup>iii</sup>

*2. Increased Market Participation*

A TREC market may facilitate greater market entry by allowing small renewable generators who are not otherwise considered for power purchase agreements to sell their TRECs to credit marketers.

*3. Increased Selection of Renewable Resource Options*

The use of TRECs would allow utilities to meet their procurement targets through the development of the least expensive renewable technologies, regardless of their type or location within the state.<sup>iv</sup>

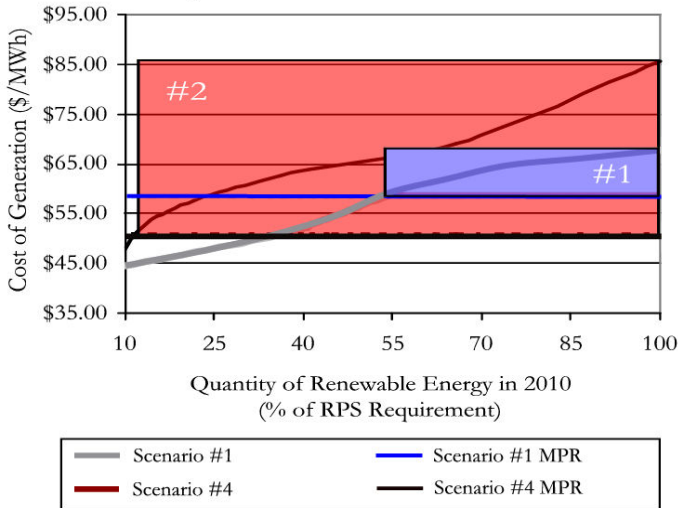
*4. Similar Administrative Costs*

The CEC is currently developing an electronic tracking system that will be part of a region-wide system and capable of tracking TRECs, thereby not exacerbating current administrative costs.

**Refuted Disadvantages of TRECs**

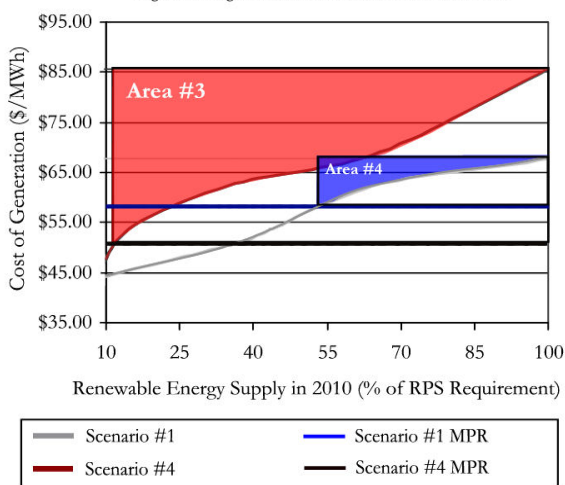
Many market participants are divided by their opinions regarding the advantages and disadvantages of TRECs. Despite their many benefits, TRECs are also charged with displacing ratepayer benefits, decreasing resource diversity, failing to capture the full value of the renewable attribute, creating a premium for a resource that could otherwise be sold at (or below) the MPR,

Figure 5: Maximum Cost to the State of the RPS



In Figure 5, the shaded areas (#1 and #2) represent the maximum predicted cost to the state of RPS compliance. Figure 5 illustrates a hypothetical scenario in which generators bid at the marginal cost of producing renewable electricity.

Figure 6: Range of Potential Costs of the RPS to the State



This analysis assumed that generators bid as low as their cost of production and as high as the marginal cost of renewable generation. Figure 6 is the difference between Figures 4 and 5 and represents the



and contributing to market uncertainty. However, this analysis has refuted a number of these disadvantages.

*1. Lack of Benefits to Ratepayers:* Displacing ratepayers' benefits would be minimized if only in-state generators are eligible for funding. While it is true that the distribution of benefits throughout the state may be less equitable with TRECs, the law does not have any requirements in this regard.

*2. Decreased Resource Diversity:* Although it is true that TRECs may decrease resource diversity by facilitating the development of least-cost renewable technologies, market disciplines would ensure that only the best renewable resources are developed.

*3. Insufficiently Capturing the Full Value of the Renewable Attribute:* Some renewable generators believe that disaggregating the renewable attributes would better reflect the full value of the electricity, and that new markets will emerge to allow these individual attributes to be traded. However, until these markets are created, generators would benefit from a TREC market in order to recover their costs of production.<sup>iv</sup>

*4. Uncertainty of a Market with Little Precedent in California:* The great uncertainty regarding the future impacts of a California TREC market is perhaps the best argument against its implementation. However, similar TREC markets in states such as Texas have been successful and may provide a good model for California.<sup>v</sup>

**California Stakeholder Opinions**

**TREC Proponents**

- SDG&E
- REC Marketers
- AWEA
- TURN
- Environmental Defense

**TREC Opponents**

- SCE
- Vulcan Power

**No Comment**

- PG&E
- Independent Energy Producers
- Green Power Institute

**Recommendation to the CEC**

Integrating TRECs into the California RPS is recommended with the following stipulations:

- *Only* tradable credits that originate from generators identified by current RPS rules should be eligible for SEP funding. Placing in-state delivery requirements on all funded generation projects ensures that California ratepayers receive the benefits of displacing conventional energy sources by greening the energy supply.
- TRECs that originate outside of California should be eligible for RPS compliance, provided three rules are met. First, the source of the credits must be compatible with the resource eligibility rules as prescribed by California's RPS. Secondly, no ratepayer funding may be used for credits generated outside of California. And third, the electricity must be delivered to the western grid.
- Banking of TRECs should be allowed to stabilize market price volatility that is borne by inter-year fluctuations of energy supply from intermittent resources, natural gas prices, and other uncertainties that can affect prices.

<sup>i</sup> California Energy Commission. (2002) 2002-2012 Electricity Outlook Report. February.

<sup>ii</sup> Berry, D. (2002). "The market for tradable renewable energy credits." *Ecological Economics* 42(3): 369-379.

<sup>iii</sup> Mozumder, P., Marathe, A. Gains from an Integrated Market for Tradable Renewable Energy Credits, Los Alamos National Laboratory.

<sup>iv</sup> Hanson, C., Van Son, V. (2003) "Renewable energy certificates: an attractive means for corporate customers to purchase renewable energy." World Resources Institute: Corporate Guide to Green Power Markets. September.

<sup>v</sup> Wisner, R., Langniss, O. (2001). "The Renewables Portfolio Standard in Texas: An Early Assessment." Lawrence Berkeley National Laboratory. November.

**Conclusions**

Based on the model's calculation of potential costs imposed by the RPS, this analysis has determined that SEP funds will be insufficient to meet the ultimate RPS goals. Thus, the analysis recommends the use of TRECs as a cost-reducing compliance mechanism, from which cost savings will be a function of increased market liquidity and compliance flexibility.