THE PENNSYLVANIA

ELECTRIC POWER GENERATION ASSOCIATION

Introduction

- Thank you. This is the first public hearing held on the Alternative Energy Portfolio Standards Act – both before its enactment in 2004 and since it has been in place

- AEPS is a far reaching law that impacts electric prices, the development of other non "preferred" electric generation sources, and the reliable management of the electric grid

- Laws that impact consumers deserve the scrutiny of public policy makers

Electric Power Generation Association

- PA based statewide trade association representing generators
- Members own and operate every kind of generation, including many different forms of renewable energy
- Members participate in PJM wholesale market:
  - Developed based on <u>least-cost</u> dispatch system
  - Competitive markets produce the best result at most competitive price
- Members do not oppose alternative energy but have consistently opposed efforts that threaten the proper functioning of competitive wholesale markets:
  - New Jersey out-of-market subsidization of gas-fired generation
  - Maryland efforts to subsidize in state generation
  - Expansion of renewable standards that skew market risks and rewards and create "preferred" technologies without respect to cost or need

House Bill 1580

- House Bill 1580:
  - Designed to further subsidize existing developers, projects and owners, who have seen value of renewable energy credits decline:
    - Increases current demand in law to reflect current supply
    - Restricts marketplace where credits can be purchased to PA only
- EPGA opposes HB 1580 :
  - Markets must be left to work out supply and demand issues
  - Restricting marketplace is not in best interest of consumers
  - Jobs argument is overstated

House Bill 1580 (cont.)

- **Markets must be left to work out supply and demand issues**
  - Dramatic increase in solar supply is a direct result of the subsidization of solar through federal tax credits and grants, state grants as well as renewable energy credits:
    - PA Sunshine Program and Federal Stimulus Act
  - HB 1580 signals the willingness of state government to financially mitigate market risk for this specific technology over other competitive technologies:
    - After electric restructuring in 1996, the entire generation industry became overbuilt, wholesale prices significantly declined, and generators suffered - including EPGA members - two of which went bankrupt
    - In 2009, wholesale electric prices dropped 45%. EPGA members and their investors had to navigate those difficult market conditions without ratepayer or taxpayer assistance

House Bill 1580 (cont.)

- **Restricting marketplace not in best interest of consumers**
  - A "PA only" requirement will increase SREC prices and, in turn, consumers' electric bills
  - In state requirement was debated when AEPS was originally passed and when regulations at PUC were developed – was rejected because such a requirement inflates prices
  - State protectionism is detrimental to developers who need to participate in a broader regional market for long-term profitability and sustainability

House Bill 1580 (cont.)

- **Jobs argument is overstated**
  - Once a solar PV panel is in place, there's no need for a large number of workers to keep it operational
  - Most "green jobs" studies do not include loss of traditional electric generation jobs through "crowding out" factor
  - There has been no accounting for the impact of higher electricity prices to consumers, particularly commercial and industrial customers
  - Subsidized jobs are not created – *they are funded* – and as soon as the funding runs out, the jobs no longer exist

Conclusion

- **Markets must be left to work out supply and demand issues**
  - HB 1580 is an attempt to directly intervene in the laws of supply and demand in order to increase current value of SRECs
- **Restricting marketplace is not in best interest of consumers**
  - HB 1580 artificially inflates value of SRECs by restricting marketplace to "PA only," resulting in higher costs to consumers
- **Jobs argument is overstated**
  - HB 1580 fails to account for economic impact of higher electricity prices and displacement of other more cost-effective generation

Thank You

- EPGA appreciates the opportunity to express our views on HB 1580
- We believe PA can be a "powerhouse" of electric generation without unnecessary intrusion into the competitive markets – all generation is important to the growth the industry
- We encourage a continued and respectful dialogue on the impacts of AEPS

The Electric Power Generation Association

Working to Power Pennsylvania's Future

Douglas L. Biden, President Jacob G. Smeltz, Vice President

Dr. Jonathan Lesser *is President of Continental Economics, Inc., and has over 25 years of experience working for regulated utilities, government, and as an economic consultant. He has analyzed economic and regulatory issues affecting the energy industry, including cost-benefit analysis of transmission, generation, and distribution investments, gas and electric utility structure and operations, generating asset valuation under uncertainty, mergers and acquisitions, cost allocation and rate design, resource investment decision strategies, cost of capital, depreciation, risk management, incentive regulation, and economic impact studies of energy infrastructure development, including renewable generation. Dr. Lesser has prepared expert testimony and reports in cases before utility commissions in numerous states; before the Federal Energy Regulatory Commission (FERC), before legislative committees in Connecticut, Maryland, New Jersey, Ohio, Texas, Vermont, and Washington State, before energy regulators in Central and Latin America, and has served as an independent arbiter in disputes involving regulatory treatment of utilities and valuation of energy generation assets. He is most recently the coauthor of* Fundamentals of Energy Regulation, *published in 2007 by Public Utilities Reports, Inc.*

Renewable Energy and the Fallacy of 'Green' Jobs

As the United States economy continues to struggle, many politicians and energy regulators have adopted a "green jobs" mantra. They espouse the view that policies mandating renewable resources will provide both environmental and economic salvation. Quite simply, forcing consumers to buy high-cost electricity from subsidized renewable energy producers will not and cannot improve economic well-being.

Jonathan A. Lesser

I. Introduction

As the United States economy continues to struggle, many politicians and energy regulators have adopted a "green jobs" mantra. They espouse the view that policies mandating renewable resources will provide both environmental and economic salvation. Moreover, electric utilities that are being forced to purchase green energy at above-market prices have been hesitant to criticize the wobbly economics on which these policies rest, either because they can simply pass through the costs to ratepayers or, more likely, are afraid to challenge regulators who hold sway over the utilities' earnings.

Economists continue to point out that there is no such thing as a free lunch, green or otherwise. And, empirical evidence in other countries, such as Spain and Germany—both of which invested heavily in green energy—shows that the cost of these jobs is extraordinarily high. In Spain, for example, *each green job created led to the loss of two jobs in the rest of the Spanish economy.*[1]

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In Germany, the cost per green job created has been estimated to be 175,000 € ($225,000).[2] Moreover, as the authors of the German study note, "proponents of renewable energies often regard the requirement for more workers to produce a given amount of energy as a benefit, failing to recognize that this lowers the output potential of the economy and is hence counterproductive to net job creation."[3] Yet, politicians, perhaps because their own lunches are paid for by others, blithely ignore economists and continue promoting a mythical "green" economy that will soon emerge.

While ignoring economists—including this author—may be considered a civic virtue, doing so does not invalidate basic economic principles. Quite simply, forcing consumers to buy high-cost electricity from subsidized renewable energy producers will not and cannot improve economic well-being. Subsidizing renewable energy development may improve the environment (although there is no actual evidence of this),[4] create new jobs for renewable energy developers, and even "suppress" electricity and fossil fuel prices by reducing demand. But, when the *entire* economic ledger is tallied, the net impact of renewable energy subsidies will be lower economic growth and fewer jobs overall.

Several economic fallacies underlie green jobs policies.[5] For example, some renewable energy proponents and green jobs advocates fundamentally misrepresent wealth *transfers* as wealth *benefits*. And several recent "green jobs" studies have touted renewables development as a source of unbridled economic growth, but these studies contain errors: the economic models that drive their results fail to address all of the economic impacts. They are cost–benefit analyses, without the "cost" part. No wonder the results are so enthusiastic.

II. How Renewable Energy Subsidies Reduce Economic Well-Being

Ignoring, for the moment, the issue of green jobs creation, renewable energy studies often talk about "price suppression" as being a benefit of renewable resource development. The concept is straightforward: by increasing the supply of electricity, market prices decrease and consumers benefit. This is fundamentally true, but while consumers obviously benefit from lower market prices, artificial "price suppression" is a different matter.

"Price suppression" was first introduced as a policy goal as a reaction to market prices in installed capacity (ICAP) markets, especially in New England. In 2007, Connecticut passed legislation that changed the role of the Connecticut Energy Advisory Board (CEAB) to include issuing requests for proposals that would reduce capacity market prices in the state.[6] Similarly, in Massachusetts, Section 105(c) of the Green Communities Act of July 2, 2008, was designed to force renewable resource generation into the ISO-NE capacity market, with a goal of suppressing capacity market prices.[7]

Notwithstanding the fact that artificial price "suppression" is a form of market manipulation, the economic benefits of artificial price suppression are not the same as the benefits of increasing supplies in a competitive market. To understand this difference, consider Figure 1.

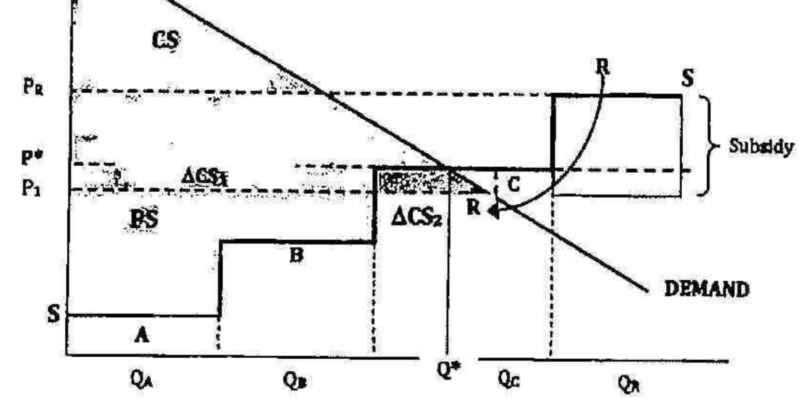

Figure 1: Market Value with Subsidized Renewable Generation

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In Figure 1, assume there are four generators: A, B, C, and a renewable generator, R, that can supply, Q_A, Q_B, Q_C, and Q_R MWh of generation, respectively. The electric supply curve is the stair-shaped thick line, **SS**. The initial market price is determined by the intersection of the demand and supply curves. The market price is **P***, and the quantity sold is **Q***. To supply that quantity of electricity, generators A and B sell all of their output, and generator C sells a fraction of its output. Because of its high selling price, none of the renewable generator's output is sold.

The economic value of this market equals the sum of *consumer's surplus* and *producer's surplus*. Consumer's surplus is the difference between what consumers would be willing to pay for each MWh of electricity and what they actually pay, the market price P_0. Similarly, producer's surplus is the difference between what producers are paid for their generation and the prices at which they would be willing to produce that generation. In Figure 1, therefore, consumer's surplus equals the diagonally shaded triangle labeled **CS**, and producer's surplus equals the lightly shaded L-shaped area labeled **PS**. The overall economic value of this market equals **CS + PS**.

Suppose policymakers subsidize the renewable energy generator in order to "suppress" market prices and create green jobs. To do this, they provide the renewable generator with a subsidy equal to $\$(P_R - P_1)$/MWh, where P_R is the cost of the renewable generator's output.[8] As a result of the subsidy, the renewable generator displaces generator C's output (shown as the arrow in Figure 1 from R to its new location), because the latter's output is now more costly. We assume the subsidy is set such that the renewable generator sells all of its output Q_R. The result is that the market price of electricity falls to P_1. The renewable subsidy has successfully "suppressed" the market price.

What is important to note is that the vast majority of the "benefits" of price suppression are not benefits in any economic sense.

Next, consider the economic welfare implications. Consumers are clearly better off, at least in terms of paying a lower price for electricity. They capture additional consumer's surplus that was formally producer's surplus (shown as the small rectangle labeled ΔCS_1). Consumers also gain additional consumer's surplus associated with purchasing additional electricity, equal to the dark grey shaded area labeled ΔCS_2. This gain is slightly less than the drop in price $(P^* - P_1)$ times Q_R. When renewables and green jobs advocates talk about price suppression, they are referring to these changes in consumer's surplus. What is important to note, however, is that the vast majority of the "benefits" of price suppression are not benefits in any economic sense. Rather, they represent an income *transfer*—and an economically inefficient one at that—from producers to consumers.[9] Green jobs studies often conflate such transfers with benefits.

All generators, except for the renewable energy generator, are unambiguously worse off. Some of the economic profits these generators previously earned have been lost. Producer C is especially worse off, because the subsidy has driven it out of the market entirely.

To support renewable portfolio standards (RPS), consumers are generally required to pay the renewable subsidy. This can be in the form of a specific charge on their electric bills or it may be embedded in above-market-cost power purchase contracts.[10] Thus, whereas consumers may benefit from lower market prices, they will also pay the subsidy, shown as the gray cross-hatched area on the right. Because the subsidy equals $(P_2 - P_1)$ times Q_R, it must be greater than ΔCS_2. Because ΔCS_1 is just a transfer from producer's to consumers, however, the total value of the market with the renewable subsidy decreases. In other words, the subsidy necessarily reduces the economic value of the electricity market and drives out some producers in favor of a subsidized one.

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One might argue that, if the other generators use fossil fuels, the subsidy paid to the renewable generator will be less than the external cost imposed on society by the fossil fuel generators. That is possible, but even if it's true, the subsidy is not the least-cost way of addressing that external cost. A properly set emissions tax will achieve the same result but at a lower cost.[11]

III. Modeling Economic Impacts: Details Matter

One of two broad methodological approaches is typically used to estimate economic impacts. The first is through the use of highly complex econometric models that attempt to estimate how an economy changes over time in response to different policy actions. These models are well-suited to long-term policy analysis because they can account for structural changes in an economy. Such "general equilibrium" models were first developed in 1874 by the economist Leon Walras, who assumed that output of an economy could be characterized by production functions.[12]

Over time, general equilibrium models increased in complexity. For example, in the early 1950s, Nobel Prize-winning economists Kenneth Arrow and Gerard Debreu developed a theoretical model of an economy that was based on fundamental economic axioms.[13] The problem with such models was that multiple equilibria could be reached, but not all of them were stable. In the 1960s, economists developed numerical methods to solve the general equilibrium framework developed by Arrow and Debreu.[14] Since that time, such models have grown in complexity. Moreover, they are better suited to studies of large-scale economic impacts (such as changes in tax policies) than they are to more narrowly focused studies (such as the economic impacts on an individual state from constructing a new highway, transmission line, or generating plant).

The second type of modeling approach is called *input–output* (I/O) modeling.[15] I/O modeling originated in the work of French economist François Quesnay, who in 1758 published his "Tableau Économique," which provided a diagrammatic representation of the French economy, tracing expenditures throughout. The modern "father" of I/O modeling and analysis, however, is Wassily Leontief, who developed the approach in the 1930s.[16]

I/O analysis traces the interdependencies of an economy, specifically the sales and purchases of goods among all of the sectors of an economy. For example, building a wind generating plant made up of several hundred individual wind turbines will require the purchase of concrete that will be used in foundations for the turbine towers. The concrete manufacturer, however, must first purchase inputs including sand, gravel, and electricity. The actual construction of the turbines will require many workers who will then spend their wages on a variety of goods and services. An I/O framework traces all of these economic relationships. For example, **Figure 2** provides a representation of the economic flows within and external to an individual state economy.

In Figure 2, an individual state economy is broken down into three broad sectors: manufacturing and mining, commercial services, and agriculture. There is also a household sector.[17] Purchases outside the local economy are considered "leakages." Leakages

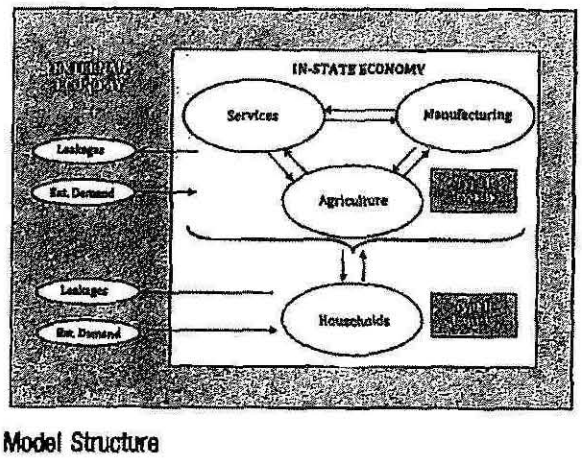

Figure 2: I/O Model Structure

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reduce in-state economic impacts; for example, if wind turbines are purchased from an overseas firm, no in-state economic impacts will be associated with manufacture of the turbines. Of course, sales by business and industry of goods and services to outside the local economy are treated as external demand. External demand increases the level of economic activity within the state.

There are also household impacts. Households in the state purchase goods and services from local industries and from the broader external economy. Moreover, external households purchase goods and services from firms within the local economy. If household impacts on the economies (e.g., the wages households earn that are spent on goods and services) are excluded from the economy, the resulting economic impacts are called *Type I* impacts. If households are included, the resulting induced economic impacts are called *Type II* impacts. Both are forms of *multiplier impacts* and reflect the degree to which an initial economic impact (e.g., construction of a wind or solar generating facility) ripples through an entire economy because of the various interdependencies.[18]

IV. Key Assumptions That Can Affect Economic Impact Studies

Whatever form of model is used to estimate economic impacts, numerous factors can influence the final results.

- Regional purchase coefficients (RPCs) dictate how quickly leakages outside a state economy dampen the overall in-state economic impacts. The greater an industry's regional purchase coefficient, the larger the "local" economic impacts are from increased purchases in that industry. This is one reason why, as I discuss in more detail below, some economic impact studies, as well as policies supporting renewable development, are predicated upon development of an in-state renewable manufacturing industry.[19] Without such in-state development, much of the equipment purchased is from out-of-state or foreign firms, reducing in-state economic impacts.

Because most policymakers are focused on job creation, the number of direct jobs created in the construction and operation phases is another key assumption.

- Because most policymakers are focused on job creation, the number of direct jobs created in the construction and operation phases is another key assumption.[20] This is especially true for wind and solar developments, which require few operation and maintenance personnel.[21] Again, however, the construction phase employment assumptions depend critically on where the raw materials are sourced. For example, if wind turbines are purchased from China, fewer jobs will be created than if the turbines are purchased from an in-state manufacturer.[22]
- The number of employees needed in both the construction and operation phases is critical, but so are those employees' assumed salaries. The reason stems from estimates of household impacts: the more employees are paid, the more money they will have to potentially spend on goods and services purchased from both in-state and external firms.

But perhaps the most important issue of all is determining which dollar flows to trace and which to ignore. Specifically, as I discussed in Section II, renewable portfolio standards that mandate purchases of above-market cost electricity *transfer* dollars from electricity consumers to renewable generation developers. If these transfers are ignored, as they are in the green-job "advocacy" studies I discuss below, the economic growth impacts of renewable energy policies will appear unlimited. This, of course, leads to a key fallacy: *if one ignores the economic impacts of the dollar transfers from consumers and taxpayers, the most costly—and least cost-effective—renewable resources will be seen to create the greatest economic "benefits."*

Such a conclusion, of course, defies reality. The reason is that, by reducing the net disposable income available to consumers after they pay their electric bills, those consumers' purchases of other goods and services necessarily decrease, and this has a cumulative job-reducing impact. Those job-reducing impacts will exceed the job-creating impacts of the renewable resource construction and operation.

V. Review of Recent Green Jobs Studies in the U.S.

Since fall 2009, several high-profile green jobs studies have been published. In November 2009, a report published by the College of Natural Resources at the University of California at Berkeley concluded:

> By aggressively promoting efficiency on the demand side of energy markets, alternative fuel and renewable technology development on the supply side can be combined with carbon pollution reduction to yield economic growth and net job creation. Indeed, a central finding of this research is that *the stronger the federal climate policy, the greater the economic reward.*[23]

The authors conclude that, by adopting a comprehensive energy policy, between 900,000 and 1.9 million new jobs can be created, and per-household income can increase between about $500 and $1,200 per year. However, their conclusion that "the stronger the federal climate policy, the greater the economic reward" is a stunning example of free-lunch economics. The study notes that from 1972 to 2006, energy efficiency programs in California "created 1.5 million additional jobs."[24] However, the authors fail to provide the most important component of their assertion: compared to what? And there is no evidence that the authors considered the impacts on businesses and households from higher electricity prices and

taxes to fund energy efficiency programs.

Another national study, by Navigant Consulting, was released in February 2010. It was prepared for the RES Alliance for Jobs, which is a group whose members primarily include renewable generation manufacturers.[25] The premise of this study was to examine the economic impacts of adopting a mandatory national RPS of 25 percent of total generation by the year 2025. The report concludes that such a standard "will lead to job growth in all states, especially those currently without state-level renewable electricity standards" and that it will create 274,000 new jobs in the renewables industry.[26]

Left unanalyzed is the number of jobs that this "25% by 2025" mandate will eliminate because of the higher prices for electricity that will result. While such a standard may indeed create 274,000 new jobs by the year 2025, the additional cost of the electricity provided will necessarily reduce available income for other goods and services and investment. Moreover, the report noted that nearer-term renewable standards are required to "mitigate a flattening or decline in industry-supported jobs that will otherwise occur across industries with the expiration of tax incentives and stimulus-related policies."[27] Thus, the report is actually arguing that without continued subsidies and mandates the renewable energy industry will shrink.[28]

The third and most recent study, prepared by Black & Veatch (B&V), is a state-level analysis of implementing a more stringent RPS in Pennsylvania.[29] Unlike the other two reports, which did not provide information regarding the underlying assumptions used to estimate job creation, the B&V study does provide a detailed discussion of modeling assumptions. Moreover, the B&V study estimates the additional cost of implementing the more stringent RPS and concludes that the latter has a higher net present value cost of $1.6 billion, or about $180 million per year on a levelized cost basis.[30]

The B&V study then estimates the cumulative (direct, indirect, and induced) economic impacts of the 15 percent RPS by using the

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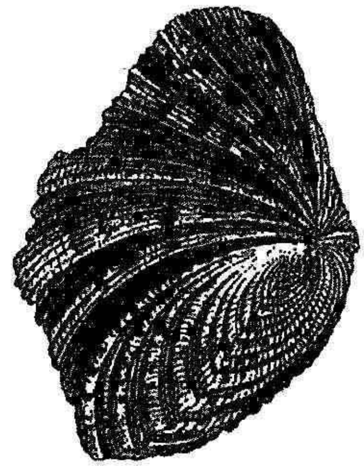
Bureau of Economic Analysis RIMS II model.[31] Although the report sets out some of the key assumptions—including regional purchase coefficients (RPCs)—other assumptions, such as the direct levels of employment in the construction and operation phases that drive the study's estimate of an additional 129,000 job-years between 2009 and 2026, are not identified.[32]

The B&V study also highlights three other "benefits" of the 15 percent renewables policy: (1) provision of a hedge against volatile natural gas prices; (2) reductions in fossil fuel prices; and (3) the suppression of electricity market prices.[33] Regarding the first benefit, the use of renewable resources to hedge natural gas prices is inefficient and expensive. Utilities and wholesale power producers concerned about volatile natural gas prices can hedge their risk exposure to the precise degree they prefer by using highly liquid options contracts, whereas with mandated renewable generation, that liquidity vanishes. Since renewable generation such as wind and solar are not firm resources, their output volatility (both in terms of quantity and timing) must itself be hedged, typically with natural-gas-fired generation. Thus, the hedging benefits of renewable resources are illusory at best. The second "benefit," reductions in fossil fuel prices, confuses income transfers with benefits, as discussed in Section II. Moreover, there is no empirical evidence that increased reliance on renewable generation reduces fossil fuel prices.[34] Finally, we have the price "suppression" benefit. Again, the benefit misconstrues income transfers for economic benefits. Moreover, the report ignores the additional costs imposed by having to cycle generators on and off to account for the unpredictable nature of renewable generation



availability. Such cycling increases operating costs of these units and reduces their fuel efficiency.

VI. Estimating the Economic Impacts of Higher Electricity Prices

All of the studies mentioned in the previous section ignore the economic impacts of higher electricity prices that result from mandates to purchase above-market cost renewable generation. To examine those impacts, I prepared a simple analysis of the state of Pennsylvania using the IMPLAN model.

To estimate the overall economic impacts of the higher wholesale electric prices, I assume that consumers would not, initially, reduce their electricity consumption in response to the higher electric prices they faced. (In other words, price elasticity of demand is zero.) Because consumer income is assumed to be fixed in the short run, this implies consumers must reduce their expenditures on all other goods and services (including savings and investment) by an equivalent amount.

Similarly, I assume that Pennsylvania businesses would react to the increased price of electricity by reducing total output, such that their aggregate production expenses remained unchanged. This assumption is consistent with the assumption of fixed production coefficients in the Leontief model, which underlies I/O models. It also assumes that businesses would not be able to simply pass along their increased production costs to consumers.

Using the employment multipliers and RPCs from the IMPLAN model for Pennsylvania, I calculate weighted average output and employment multipliers over all sectors except electricity.[35] The IMPLAN data implies a weighted-average RPC of about 0.71 for all sectors of the Pennsylvania economy. Thus, using the $180 million annual levelized cost value from the B&V report, the direct reduction in purchases in all other sectors of the Pennsylvania economy would be $128 million, and the total

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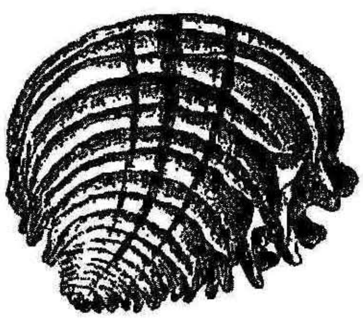
reduction in purchases would be about $236 million, which reflects an output multiplier of 1.84.

To determine the employment impacts of this reduction of in-state expenditures, I calculated the average employment level per million dollars of output. With an average of 6.4 employees per million dollars of output, a $180 million reduction in expenditures translates into over 800 jobs lost per year. Then, by applying the estimated weighted average jobs multiplier of 2.78, higher electricity costs translate into over 2,300 lost jobs each year. Thus, while the RPS standard would obviously create jobs in renewable energy sectors, it would destroy them throughout the rest of the Pennsylvania economy.

VII. Concluding Thoughts

Proponents of stringent mandates for renewable generation tend to emphasize different "benefits" of such policies: reductions in greenhouse gases, energy "independence," and most recently, with the U.S. economy in recession, green jobs (whatever those may be). Yet, empirical evidence in other countries, such as Spain and Germany, shows that the cost of these jobs is extraordinarily high. And, a straightforward analysis of adverse economic impacts, including the loss of several thousand jobs each year because of higher electric prices, shows that the promised economic benefits of renewable energy come with a stiff price—on everyone else.

The simple economic fact is that mandated subsidies for renewable generation (and states define what is and is not "renewable" in various ways) will necessarily reduce economic well-being, as all subsidies do. Renewable subsidies and



mandated purchases may benefit a chosen few, but the adverse economic impacts, including job losses, are borne by everyone else. Ultimately, if the goal is just jobs, whether green, red, or blue, then to paraphrase Keynes, "there are holes to be dug, and holes to be filled in."■

Endnotes:

1. G. Calzada *et al.*, Study of the Effects on Unemployment of Public Aid to Renewable Energy Sources, Universidad Rey Juan Carlos, Mar. 2009, at http://www.juandemariana.org/pdf/090327-employment-public-aid-renewable.pdf.

2. M. Frondel, N. Ritter and C. Vance, *Economic Impacts from the Promotion of Renewable Energies: The German Experience*, Final Report, Rheinisch-Westfälisches Institut für Wirtschaftsforschung, Oct. 2009, at www.instituteforenergyresearch.org/germany/Germany_Study_-_FINAL.pdf.

3. *Id.*, 23, citing R. Michaels and R. Murphy, *Green Jobs: Fact or Fiction?* Institute for Energy Research, Washington DC, Jan. 2009.

4. See, e.g., H. Sharman and H. Meyer, *Wind Energy: The Case of Denmark*, Center for Politiske Studier, Sept. 2009, for a discussion of the failure of wind power to reduce fossil fuel emissions in Denmark, which now obtains almost 20 percent of its electric generation from wind resources, at http://www.cepos.dk/fileadmin/user_upload/Arkiv/PDF/Wind_energy_-_the_case_of_Denmark.pdf.

5. In fact, there is no single definition of what a "green job" is. See, e.g., A. Morriss, W. Bogart, A Dorchak and R. Meiners, *7 Myths About Green Jobs*, PERC Policy Series No. 44, 2009, at www.perc.org.

6. Public Act 07-242, An Act Concerning Electricity and Energy Efficiency, at http://www.cga.ct.gov/2007/ACT/Pa/pdf/2007PA-00242-R00HB-07432-PA.pdf.

7. At http://www.mass.gov/legis/laws/seslaw08/sl080169.htm.

8. Although the variable operating cost of many renewable generators is close to zero, to simplify the example, I assume that, to stay in business, the renewable generator must ultimately recover a price of P_R per MWh. The effect of the subsidy on overall market value does not change with this simplification.

9. In other words, the transfer mechanism (forcing consumers to pay more for electricity to support renewable energy developers) is inefficient when compared to other types of transfer payment mechanisms, such as higher broad-based taxes, that could accomplish the same thing.

10. One such contract, between National Grid and Deepwater Wind LLC, was rejected by the Rhode Island Public Utilities Commission. The Commission concluded that the project was not "commercially reasonable" as defined under Rhode Island law and would not provide "direct economic benefits to Rhode

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Island such as job creation." See Rhode Island Public Utilities Commission, *In Re: Review of Proposed Town of New Shoreham Project Pursuant to R.I. Gen. Laws § 39-26.1-7*, Docket No. 4111, Report and Order, April 2, 2010, at 65.

11. See, e.g., W. Baumol and W. Oates, The Theory of Environmental Policy (New York: Cambridge Univ. Press, 1988). See also J. Lesser, D. Dodds and R. Zerbe, Environmental Economics and Policy (Reading, MA: Addison Wesley Longman, 1997), at 159–62.

12. L. Walras, Elements of Pure Economics, 1874, trans. W. Jaffe (Homewood, IL: Richard Irwin, 1954).

13. K. Arrow and G. Debreu, *The Existence of an Equilibrium for a Competitive Economy*, Econometrica 22 (1954): 265–90. See also G. Debreu, Theory of Value (New York: John Wiley, 1959).

14. H. Scarf, "Computation of General Equilibria," The New Palgrave Dictionary of Economics, 2nd Ed. (New York: Palgrave Macmillan, 2008).

15. Other models combine attributes of both econometric and input-output modeling techniques. A discussion of the relative merits of the different types of models is beyond the scope of this article. All of the approaches have advantages and disadvantages.

16. W. Leontief, Input–Output Economics, 2d ed. (New York: Oxford Univ. Press, 1986).

17. Typically, I/O models also include a government sector. For simplicity, Figure 2 excludes a separate government sector.

18. For a detailed discussion of how multipliers are calculated, see Leontief, *supra* note 16. See also R. Miller and P. Blair, Input–Output Analysis: Foundations and Extensions (Englewood Cliffs, NJ: Prentice-Hall, 1985), Ch. 2.

19. For example, one of the justifications for the Deepwater Wind project was development of an in-state wind turbine manufacturing capability. New Jersey, in an attempt to justify such requirements, is pursuing an offshore wind "carve-out" under its existing renewable portfolio standards requirements. Of course, only one state can possibly gain a "first-mover" or "infant industry" advantage. However, there is no evidence that using artificial subsidies to protect infant industries that cannot compete in the market provide net benefits. Moreover, as competition among numerous states for automobile manufacturing facilities in the 1980s and 1990s demonstrated, inducements to locate within a given state often include huge tax breaks, which are effectively transfers from other state taxpayers to the "favored" industry.

20. Economic impact studies do not, in fact, estimate job creation. Rather, they estimate job-years, i.e., employment impacts measured in full-time equivalents. A job-year, therefore, could represent one employee working full time for one year, or one employee working one-fourth time over four years, and so forth.

21. According to data collected by the New York Energy Research Development Agency, wind turbine facilities typically require about 1.5 full-time employees per 10 MW of installed capacity. As discussed in the next section, a report prepared by the firm Black & Veatch for the Community Foundation for the Alleghenies regarding the economic impacts of a more stringent renewable portfolio standard in the state of Pennsylvania used an employment value of 20 employees per 10 MW of installed capacity. Similarly, the study assumed 10 employees per 10 MW of installed capacity for solar photovoltaic. See Black & Veatch, Assessment of a Pennsylvania 15 Percent Alternative Energy Portfolio Standard, Project No. 165599, Jan. 2010, at 6–18, Table 6–5, at http://www.cfalleghenies.org/pdf/aepss.pdf.

22. Wind turbine generators require magnets that use a rare-earth element called neodymium. Almost all of the world's supply of this element is found in China, which is reducing its exports and concentrating on developing its own domestic manufacturing industry. See R. Bryce, Power Hungry (New York: Public Affairs Books, 2010), at 133–36.

23. D. Roland-Host, F. Kahrl, M. Khanna and J. Baka, An Economic Assessment of the American Clean Energy and Security Act and the Clean Energy Jobs and American Power Act: Executive Summary, Oct. 25, 2009, at 1 (emphasis in original), at http://calclimate.berkeley.edu/sites/default/files/host-Clean%20Energy%20and%20Climate.pdf. Although the report title indicates it is an executive summary, the full report does not appear to have been published. The report uses what it terms a "state-of-the-art" economic model called EAGLE. Again, however, there is no public documentation available for this model, although the report notes the model is calibrated using IMPLAN. *Id.* at 10.

24. *Id.* at 9.

25. Navigant Consulting, *Jobs Impact of a National Renewable Electricity Standard*, Feb. 2, 2010, at http://www.res-alliance.org/public/RESAllianceNavigantJobsStudy.pdf.

26. *Id.* at 3.

27. *Id.*

28. Some may argue that, because fossil fuel and nuclear generation are also subsidized, subsidizing renewable generation is needed to "level the playing field." Although a discussion of energy industry subsidies is far beyond the scope of this article, the simple economic fact is that all subsidies reduce economic well-being.

29. Black & Veatch, *supra* note 21.

30. *Id.* at 6–10.

31. RIMS II is an I/O model similar in structure to the IMPLAN model.

32. Black & Veatch, *supra* note 21, at 6–23. For example, in Table 6–4, RPC values for operating expenditures of in-state renewable generating facilities are all greater than 50 percent. In contrast, the RPCs for natural gas fired generators average 20 percent.

33. The report notes that none of these benefits was evaluated empirically.

34. R. Bryce, *supra* note 22, at 125–28, and references therein.

35. The weights are the output amounts in 2008 in each sector of the Pennsylvania economy.

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All RECs Are Local: How In-State Generation Requirements Adversely Affect Development of a Robust REC Market

While most U.S. states have now adopted renewable energy portfolio standards, most also require a certain percentage of such generation to be "home grown." These requirements lead to volatile and reduced-value markets for renewable energy credits and ultimately increase the cost of renewable energy. A review of the requirements suggests that either national or regional markets be fostered to reduce such adverse impacts of the requirements.

Joel H. Mack, Natasha Gianvecchio, Marc T. Campopiano and Suzanne M. Logan

I. Introduction

The production of electrical energy from various renewable energy resources has long been promoted as an alternative to fossil fuel generation. Advocates over the years have highlighted, among other things, the environmental and national security (or energy independence) advantages of renewable energy. Since the enactment of the Public Utility Regulatory Policies Act of 1978, American regulators, policymakers, and other stakeholder groups have sought

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to incentivize the investment in, and development of, renewable energy generation, at the federal, state and local levels. Renewable energy production also enjoys broad popular support. A recent Pew Center poll found that 87 percent of the Americans polled would favor comprehensive energy legislation requiring utilities to produce more electricity from renewable sources.[1]

Since the late 1990s, states, in increasing numbers, have enacted renewable portfolio standard (RPS) regimes in order to support renewable energy investment, by requiring retail electricity suppliers to purchase a specified percentage of renewable energy to serve their customers over a specified period of time.

Renewable energy certificates (RECs) were created to facilitate compliance with RPS regimes by allowing the environmental attributes of renewable generation to be bought and sold independently of the underlying energy. RECs have also been developed in part to catalyze renewable energy generation development by monetizing the environmental benefits inherent in such generation. RECs can provide renewable energy developers with an additional revenue stream and increase the financeability of renewable energy projects. In order to maximize the incentives RECs present to renewable energy developers, and therefore, increase the likelihood that more renewable generation will be built, there is a general consensus that the market for RECs should be robust and liquid.

Although a majority of U.S. states and the District of Columbia have enacted statutes which are intended to foster the development of compliance-based REC trading regimes, the United States currently does not have a single, unified REC market. Instead, varying state-specific regulations have largely fragmented the trading in RECs, creating differential REC values across various states and regions. As long as REC trading is so fractured by state-specific regulations, volatility in the various REC markets will persist, which decreases their collective benefit to renewable energy developers and impedes the overall development of renewable energy generation in the United States.

Varying state-specific regulations have largely fragmented the trading in RECs, creating differential REC values across various states and regions.

In particular, regulations limiting the eligibility of renewable energy generation to produce RECs in a given state based on the geographic location of the underlying renewable energy (collectively referred to as "in-state generation requirements") contribute heavily to the fragmentation of REC markets in the United States. Despite increasing use by many states of regional transmission organizations to monitor and validate RECs, geographical barriers to REC trading remain in various forms. While these types of regulations generally seek to maximize the local benefits of renewable energy development and promote in-state development, their effect is to hinder the development of any national or regional REC market and, thus, hinder U.S. renewable energy development as a whole.

Two recent developments may compel states to reconsider in-state generation requirements. First, the constitutionality of such requirements has been called into question. TransCanada Power Marketing Ltd. ("TransCanada Power Marketing"), a U.S. affiliate of Canadian energy developer TransCanada Corporation, recently mounted the first official challenge to the validity, under the Interstate Commerce Clause, of the in-state generation requirements included in Massachusetts' solar REC trading scheme. Though TransCanada has since agreed to drop these claims in a partial settlement agreement with the state, this action could prompt challenges to similar limitations in other states. If any such challenge is successful, states may be required to eliminate (or limit) in-state generation requirements

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in their respective REC trading regimes.

Second, federal legislators continue to consider the enactment of a federal RPS or, alternatively, a clean energy standard (CES). Although Congress failed to pass an RPS in 2009 and 2010, certain lawmakers likely will continue to try to enact some form of federal renewable energy purchasing mandate. For instance, President Obama and several key lawmakers, in an effort to appeal to a broader range of interests, have recently focused on the passage of a federal CES in lieu of an RPS. A federal CES appears more probable than a federal RPS in the current political and economic climate, but it remains speculative whether a federal CES will be adopted, and even if it were to pass, what such a federal CES would entail.

This article begins with a general description of RPS regimes and RECs, before describing the in-state generation requirements of a representative selection of RPS regimes. Next, this article illustrates the collective disincentivizing effect on renewable energy development of individual states' in-state generation requirements. This article then concludes by examining how two developments may, or could, affect states' ability to enact or enforce in-state generation requirements in the future—constitutional challenges to such requirements and the enactment of a federal RPS or CES.

II. Renewable Portfolio Standards and the Promise of a Renewable Energy Certificate Market

A renewable portfolio standard[2] is a regulatory mechanism employed to promote the production of electricity from renewable energy resources. Massachusetts and Connecticut were among the first states to enact mandatory renewable portfolio standard requirements.[3] Since that time, about 30 U.S. states and the District of Columbia have enacted mandatory RPS requirements.[4] An RPS typically requires utilities that serve retail customers (also known as "load-serving entities") "to demonstrate that a certain percentage or volume of the power that they supply to retail customers stems from renewable energy."[5] Under many RPS regimes, a load-serving entity may satisfy its RPS obligations by purchasing renewable energy certificates from eligible renewable energy resources. A REC is a tradable instrument that represents the beneficial environmental attributes[6] of renewable energy generation.[7] When RECs are unbundled from the underlying energy being produced, RECs represent a separate product, which can be sold or traded separately from the energy.[8] RECs thus provide an additional stream of income for renewable energy developers and promote the efficient allocation of renewable energy investment.

RECs provide an additional stream of income for renewable energy developers and promote the efficient allocation of renewable energy investment.

This potential additional income stream helps to attract additional investment in renewable energy generation. Generally speaking, the development of renewable energy facilities, like conventional energy facilities, requires large up-front capital expenditures. Many renewable energy facilities obtain debt and/or equity financing for such expenditures on a nonrecourse, project finance basis. Under a project-based financing structure, facility assets and any revenue-producing project products or revenue-producing contracts serve as collateral for the debt, and debt obligations are repaid from the cash flow produced by such project contracts. Under this type of financing structure, potential debt or equity investors "base credit appraisals on the projected revenues from the operation of the facility, rather than the general assets or the credit of the promoter of the facility."[9] In theory, renewable energy developers should be able to obtain more favorable credit appraisals and credit terms if they

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are able to generate and sell both renewable energy and RECs separately, than they would if they were only able to sell RECs bundled with the renewable energy produced.[10]

III. The Reality of Renewable Energy Certificate Trading: Fractured, Volatile Markets

RECs have the potential to create additional value in the development and financing of renewable energy projects, but because of regulatory issues, this potential has not yet been fully realized. As Norbert Wohlgemuth and Reinhard Madlener point out, the importance of the effect of RECs on renewable energy development "depends on the market price of the certificates and as such on supply and demand characteristics."[11] The United States currently does not have a single, unified REC market and its regional markets are still developing; instead, varying state-specific regulations have created a large number of disparate REC trading regimes, with less supply and demand than would be available in a more harmonized national market or series of regional markets.

One component of current state-based RPS regulations which has had perhaps the most deleterious effect on the market's ability to realize the full potential of RECs is the in-state generation requirement. In-state generation requirements in part stem from states' self-interest in promoting renewable energy within their own borders, as certain Montana legislative findings illustrate well: "renewable energy production promotes sustainable rural economic development by creating new jobs and stimulating business and economic activity *in local communities across Montana,*" "increased use of renewable energy will enhance *Montana's* energy self-sufficiency and independence," and "all consumers and utilities should support expanded development of these resources to meet *the state's* electricity demand and stabilize electricity prices."[12] These rationales succinctly describe many of the primary justifications for the general promotion of renewable energy. Indeed, as the Montana legislature has found, "fuel diversity, economic, and environmental benefits from renewable energy production accrue *to the public at large.*"[13] Although the public benefits of renewable energy are not hindered by governmental boundaries, many states promote renewable energy generation and its attendant public benefits within their own borders.

In-state generation requirements in part stem from states' self-interest in promoting renewable energy within their own borders.

In-state generation requirements appear in a wide variety of forms across the states. A brief survey of the regulatory regimes governing renewable energy certificate markets in several states highlights this point.

A. Texas

In Texas, retail electric providers, municipally-owned utilities, and electric cooperatives may satisfy the minimum renewable energy requirements applicable to such entities by purchasing RECs from eligible renewable energy resources.[14] Texas regulations define a "renewable energy credit" in relevant part as one MWh of renewable energy "that is physically metered and verified in Texas."[15] The Electric Reliability Council of Texas (ERCOT), which administers the REC trading regime and tracks the production and transfer of RECs in Texas,[16] has further defined this requirement to allow out-of-state renewable energy resources to produce RECs eligible to be sold in the Texas market only if the underlying energy satisfies certain deliverability requirements within Texas. That is, an out-of-state REC is only eligible to be sold in the Texas market if (1) the

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first metering location for the underlying generation is located within Texas, (2) the renewable energy resource utilizes a dedicated transmission line into Texas (*i.e.*, all generation metered at the injection location must come from the same facility), and (3) the renewable energy resource obtains certification from the Public Utility Commission of Texas.[17] As of the end of 2009, there was no out-of-state participation in the Texas REC trading program.[18]

B. Ohio

In Ohio, all electric utilities and all electric service companies serving retail customers may satisfy the minimum renewable energy requirements applicable to such entities by purchasing RECs from eligible renewable energy resources.[19] Ohio statute dictates that at least half of the total renewable energy (including any unbundled RECs purchased in lieu of purchasing renewable energy bundled with its environmental benefits) utilized by a regulated entity to fulfill such requirements must be produced by renewable energy resources located in Ohio. Any remainder must come from renewable energy resources that "can be shown to be deliverable into" the state.[20] Ohio regulations further define the deliverability requirement to require that renewable energy originate from a renewable energy resource within a state that is "contiguous to Ohio" or other locations, so long as it can be demonstrated that "the electricity could be physically delivered to the state."[21]

Ohio law provides that regulated entities may request from the Ohio Public Utilities Commission (Ohio PUC) a "force majeure" determination excusing all or a portion of such entity's minimum renewable energy requirements for a given compliance year.[22] The Ohio PUC is required to consider the availability of renewable energy resources and RECs in the State of Ohio as well as in other jurisdictions within the Mid-Atlantic and Midwest regional transmission organizations (PJM Interconnection, LLC (PJM) and Midwest Independent Transmission System Operator, Inc. (MISO), respectively), which may not be contiguous to Ohio and/or may not be physically delivered or even deliverable to the state.[23] It is unclear, however, whether the regulations require (or even allow) the Ohio PUC to require regulated entities to purchase renewable energy or RECs from generation resources that cannot be physically delivered to the state.

As of the end of 2009, there was no out-of-state participation in the Texas REC trading program.

C. North Carolina

In North Carolina, electric public utilities, electric membership corporations and municipalities may satisfy the minimum renewable energy requirements applicable to such entities by purchasing RECs, up to 25 percent of which may be derived from out-of-state renewable energy facilities.[24] While out-of-state renewable *electric power* purchased by electric public utilities[25] in order to meet such requirements must be delivered to a "public utility that provides electric power to retail electric customers in the state," there is no such deliverability requirement with respect to RECs.[26]

D. Pennsylvania

In Pennsylvania, electric distribution companies and electric generation suppliers may satisfy the minimum renewable energy requirements applicable to such entities by purchasing alternative energy credits[27] from alternative energy sources within the Commonwealth of Pennsylvania or within the transmission systems operated by the regional transmission organizations MISO (with respect to all electric distribution companies and electric generation suppliers located within such

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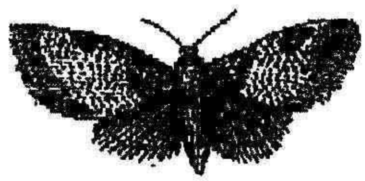
transmission system) or PJM (with respect to all electric distribution companies and electric generation suppliers in the state).[28] The Pennsylvania Public Utilities Commission has clarified that "there is no requirement that the energy associated with an [alternative energy credit] be consumed within or delivered to the distribution system of an [electric distribution company] in this Commonwealth or the control area of [a regional transmission organization] that manages a portion of this Commonwealth's transmission system."[29] Significantly, it asserted that requiring consumption or delivery into Pennsylvania would "in effect tie the [alternative energy credit] directly to the electric commodity, preventing the ability to trade the [alternative energy credit] separately from the commodity."[30] As of February 2010, 567 renewable energy facilities had been certified to produce RECs within Pennsylvania representing approximately 5,000 MW of installed capacity, and 545 renewable energy facilities had been certified to produce RECs outside Pennsylvania representing nearly 9,000 MW of installed capacity.[31]

E. Connecticut

In Connecticut, electric suppliers and electric distribution companies may satisfy the minimum renewable energy requirements applicable to such entities by purchasing renewable energy certificates issued by the New England Power Pool Generation Information System (NEPOOL GIS), so long as (1) such certificates are for energy produced by using a renewable energy technology that is eligible under Connecticut law and (2) the underlying energy was (i) produced by a generating unit



located within the jurisdiction of the transmission system operated by the regional transmission organization ISO New England Inc. (ISO-NE) or (ii) was imported into the balancing authority area of ISO-NE pursuant to and in accordance with NEPOOL GIS's import rules.[32] The Connecticut Department of Public Utility Control has clarified that the RECs eligible to satisfy renewable energy obligations in Connecticut potentially could come from Connecticut, Rhode Island, Massachusetts, New Hampshire, Vermont, and parts of Maine, as well as New York, Pennsylvania, New Jersey, Maryland, or Delaware, "if these states' Renewable Portfolio Standards meet certain comparability standards."[33]

F. New Jersey

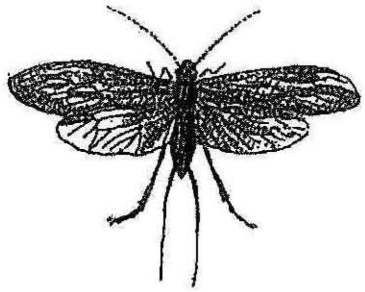
In New Jersey, which has one of the most aggressive RPS regimes in the U.S., supplier/providers generally may satisfy the minimum renewable energy requirements applicable to such entities by purchasing RECs issued by the PJM Generation Attribute Tracking System (GATS). "Class I" and "Class II" RECs[34] must be generated within the PJM region or delivered into the PJM region through "dynamic scheduling."[35] Thus, Class I and Class II RECs may be generated in a relatively large number of states. On the other hand, New Jersey has a distinct solar energy requirement, and the generation underlying solar RECs used to comply with this requirement may only occur within the state.[36] On Feb. 10, 2011, the New Jersey Board of Public Utilities also revised the state's RPS to include an obligation to purchase a minimum percentage of offshore wind energy (or "ORECs"), which will be a component of the Class I renewable energy requirement. To qualify to produce ORECs, an offshore wind facility must be interconnected to New Jersey's electrical transmission system.[37]

G. Massachusetts

In Massachusetts, retail electricity suppliers, generally speaking, may satisfy the minimum renewable energy requirements applicable to such entities by purchasing RECs issued by the NEPOOL GIS.[38] Thus, as in Connecticut, the RECs eligible to satisfy most renewable energy obligations in Massachusetts could potentially come from a large number of states, and RECs eligible in Massachusetts may even come from Canada. In fact, the Massachusetts Department of Energy Resources (DOER) recently stated that the supply of RECs produced in jurisdictions outside the ISO-NE balancing authority area increased by nearly 60 percent from 2007 to 2008, "after more than doubling between 2006 and 2007."[39] For the year 2008, fully 80 percent of the renewable energy used to comply with the Massachusetts renewable energy obligations (whether as energy or RECs) was generated outside the Commonwealth of Massachusetts.[40] New York renewable energy resources (including wind farms and landfill methane plants) "were the single largest source...at 27 percent of the total, closed followed by 26 percent from Maine (mostly biomass), 14 percent from New Hampshire (mostly biomass), [and] 13 percent from wind farms in adjacent Canadian provinces."[41] Just 10 percent originated in Massachusetts itself (primarily landfill methane).[42]

The Green Communities Act of 2008, however, amended the Massachusetts renewable energy obligations, adding a provision which states:

> In satisfying its annual [renewable energy] obligations...each retail supplier shall provide a portion of the required minimum percentage of kilowatt-hour sales from new on-site renewable energy generating sources *located in the commonwealth* and have a power production capacity of not more than 2 megawatts which began commercial operation after December 31, 2007, including, but not limited to, behind the meter generation and other similar categories of generation determined by the department.[43]



As is the case with other RECs in Massachusetts (which are not tied to in-state generation), solar RECs will be issued and tracked using NEPOOL-GIS.[44] Despite a challenge (described below) to the Solar Carve Out Program on the grounds that, *inter alia*, its in-state generation requirements violated the Interstate Commerce Clause of the U.S. Constitution, final Solar Carve Out Program regulations, which retain the in-state generation requirements, were promulgated in December 2010.[45]

H. California

Perhaps nowhere else in the country are in-state generation requirements the subject of as much uncertainty and debate as in California. The following sections summarize the rapidly evolving California RPS program.

1. California Renewables Portfolio Standard. The California RPS, enacted in 2002, requires retail sellers of electricity to procure at least 20 percent of their electricity from renewable energy sources by Dec. 31, 2010.[46] The California Public Utilities Commission (CPUC) and the California Energy Commission (CEC) jointly implement the RPS program. The CEC is responsible for certifying renewable facilities[47] and the CPUC is responsible for ensuring compliance with the RPS requirements.[48] To facilitate compliance, the CPUC and CEC established a REC-based accounting system.[49]
Electricity generated from a facility cannot count towards meeting RPS compliance obligations until the CEC certifies the facility as RPS-eligible.[50] The CEC has certain additional requirements for out-of-state

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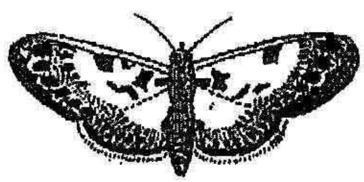
facilities beyond those required for in-state facilities[51]:

- Must be connected to the Western Electricity Coordinating Council (WECC) transmission system;
- Generally must have begun operating after Jan. 1, 2005;
- Cannot cause or contribute to any violation of a California environmental quality standard or other applicable requirements within California; and,
- If located outside the United States, must be developed and operated in a manner that is as protective of the environment as would a similar facility be if it were located in California.

Out-of-state facilities must also satisfy electricity delivery requirements under the RPS.[52] Electricity is considered delivered when it is either generated at a California facility or is "scheduled for consumption by California end-use retail customers" pursuant to Cal. Pub. Res. Code § 25741(a).[53] Electricity that is scheduled for consumption by a California end-use retail customer may be "generated at a different time from consumption by a California end-use customer" by allowing "firming" and "shaping" of electricity. Firming and shaping "refers to the process by which resources with variable delivery schedules may be backed up or supplemented with delivery from another source to meet customer load."[54] A facility located outside of California but with a first point of interconnection to the WECC inside of California need not comply with further delivery requirements.[55]

The CEC guidelines provide that "to count generation from out-of-state facilities for RPS compliance," the RPS-certified facility must enter into a power purchase agreement (PPA) with a retail seller, procurement entity, or third party.[56] Under the terms



of the PPA, the retail seller or procurement entity will then secure transmission into California, either by facilitating transmission directly to California, or by entering into another agreement with a facility in the WECC transmission system to deliver the electricity to California.[57] The CEC then compares the amount of RPS-eligible electricity generated by the facility with the amount actually delivered into California, and the amount actually delivered to California earns RECs.[58]

The CPUC has imposed an additional layer of restrictions on California utilities' ability to rely on out-of-state facilities for RPS compliance. Either bundled RECs or unbundled RECs (generally called tradable RECs (TRECs)) can be used towards RPS compliance obligations after the CPUC issued a decision on Jan. 14, 2011, creating a TREC trading regime.[59] The CPUC decision, however, imposes significant limitations on the use of TRECs. In particular, the CPUC has defined most out-of-state procurement of RECs as unbundled TRECs, and only allows the three largest investor-owned utilities (IOUs) to obtain 25 percent of their RECs through TRECs.[60] The remaining 75 percent must be obtained through bundled REC transactions, which include transactions where the generator's first point of interconnection is with a California balancing authority (such as the CAISO), or the RPS-eligible energy is dynamically transferred to a California balancing authority area. Unlike states such as Texas, the CPUC has not yet determined whether out-of-state renewable transactions that are delivered into California through dedicated transmission arrangements should be classified as bundled RECs, and therefore not subject to the 25 percent cap. The CPUC decision extends the period of time in which these limitations will remain in effect to December 2013.[61] Requests for rehearing of Jan. 14, 2011, decision have been filed, and subsequent judicial challenges may also occur. As a result, policies concerning TRECs

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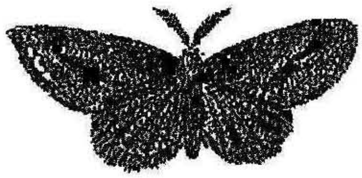
are likely to continue to shift and evolve.

2. *California Renewable Electricity Standard.* On Sept. 15, 2009, California Gov. Arnold Schwarzenegger issued an executive order requiring the California Air Resources Board (CARB) to adopt regulations, pursuant to the California Global Warming Solutions Act of 2006 (AB 32), that would require California utilities to meet a 33 percent renewable energy target by 2020.[62] The executive order was issued after Gov. Schwarzenegger vetoed two bills that would have increased the RPS to 33 percent, as Gov. Schwarzenegger expressed concern that the legislation too greatly restricted the use of out-of-state renewable resources to meet that requirement.[63] The CARB regulations are intended to increase the use of renewable energy while facilitating the use of out-of-state energy to meet this goal.[64]

On Sept. 23, 2010, CARB unanimously adopted the Renewable Energy Standard (RES) to require a 33 percent by 2020 renewable energy procurement mandate for most retail sellers of electricity in California, including but not limited to publicly-owned utilities (POUs) and the state's three largest IOUs, Pacific Gas & Electric Company (PG&E), Southern California Edison Company (SCE) and San Diego Gas & Electric Company (SDG&E).[65] Similar to the RPS, the RES uses an REC-based accounting system to ensure that regulated entities are in compliance with the required percentage of renewable energy.[66] However, the RES differs from the RPS because it likely will increase the availability of out-of-state renewable resources for RES compliance. In particular, the RES would:



- Eliminate the delivery requirement, which would permit more out-of-state facilities to provide electricity to California under the RES than the RPS[67];
- Allow for an unlimited use of unbundled or TRECs;
- Create a more flexible certification process[68]; and
- Allow the banking and trading of RECs.[69]

While the RES is more flexible than the RPS, there remain obstacles to compliance for out-of-state facilities. Under the RES, out-of-state facilities must continue to meet certification requirements that are not required of other facilities, including that a facility must not contribute to a violation of California environmental quality standards. Facilities located outside the United States must also be developed and operated in a manner that is protective of the environment similar to if it were located in California.[70]

3. *RPS legislation.* On April 12, 2011, Gov. Jerry Brown signed into law Senate Bill SBX1 2 to increase California's existing RPS [71] to require utilities to obtain 33 percent of their total energy supplies from renewable sources by Dec. 31, 2020. Senate Bill 2 becomes effective on Jan. 1, 2012.

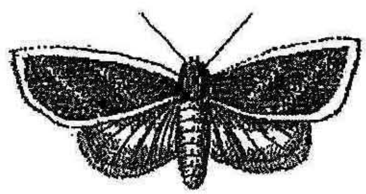
Senate Bill SBX1 2 expands the RPS to cover publicly owned utilities. Senate Bill 2X1 2 sets new limits on the use of out-of-state renewable resources. After an initial phase in period, Senate Bill 2X1 2 limits the use of out-of-state renewable resources to 25 percent of a utility's RPS obligations, subject to limited exceptions for out-of-state facilities located near California.[72] Senate Bill 2X1 2 establishes maximum limits for using TRECs: up to 25 percent of RPS requirements until Dec. 31, 2013; up to 15 percent during the Dec. 31, 2014, to Dec. 31, 2016, compliance period; and up to 10 percent thereafter.[73] Therefore, after Dec. 31, 2016, only 10 percent of a utility's RPS obligations can be satisfied with TRECs. Firmed and shaped electricity can be used to satisfy the portion of a utility's compliance obligation that is not required to be satisfied by minimum in-state resources but cannot be satisfied with TRECs.[74]

The CPUC may waive or delay certain compliance obligations if a utility can demonstrate that it has taken all reasonable steps to comply and certain enumerated constraints exist that prevent its timely compliance.[75]

IV. Effects of REC Market Fragmentation

In-state generation requirements, in addition to other variations among state RPS requirements,[76] contribute to significant volatility in REC prices in individual markets and significant variability in REC prices among the different REC markets. For example, prices for Texas RECs, which experienced a critical price drop from 2005 to 2006 (from $10–15 per REC in January 2005 to approximately $5 per REC by July 2006),[77] now seem to be relatively stable but have become among the lowest-priced RECs available in any U.S. market. Texas prices throughout 2010 held steady at approximately $1 per REC.[78]

Compare these prices to average Class I REC prices in Connecticut, which have been among the highest across state REC trading programs. Class I REC prices in Connecticut have varied from a low of less than $5 per REC around the end of 2005 to a high of around $50 per REC throughout the latter half of 2007.[79] Throughout 2010, Class I REC prices in Connecticut ranged from a high of approximately $30.50 per REC to a low of approximately $11 per REC.[80] In Pennsylvania, "there were more Tier II credits created in each of the years from 2005 through 2008 than will be needed in 2021. As a result, there will likely be many more Tier II credits created in any given year than are needed to meet annual requirements during the 2010–2021 period."[81] Such excess credits may be eligible for use in another

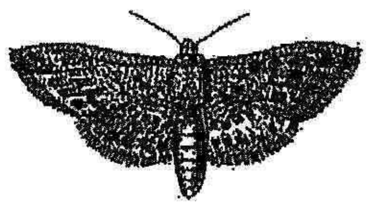


state, depending on applicable eligibility requirements, and Pennsylvania RECs are valid for two compliance years after the compliance year in which they were created. However, excess Tier II credits may also cause price fluctuations or depress prices for such credits.

In REC markets with relatively restrictive in-state generation requirements, REC prices can become very sensitive to the timing and size of even individual projects, which renders rational economic planning infeasible with respect to RECs. Ohio's recent REC experience illustrates this point. As discussed above, Ohio requires that at least half of the renewable energy or RECs used to comply with Ohio's renewable energy requirements be generated within the state and allows the remainder to be generated in contiguous states (absent a force majeure determination as described above). Ohio-generated REC prices increased steadily within 2009, from approximately $9 per REC to approximately $35 per REC.[82] Ohio REC prices as of mid-2010 remained within the high end of this range. Jack Velasquez, vice president for environmental products at Spectron Energy, has stated, "It's safe to say the Ohio REC prices are the highest in the country."[83] Velasquez attributes these high prices to lack of supply. Indeed, according to a recent Platts article, "Ohio lacks the wind energy capacity, with only about 4 MW of installed capacity as of June 2010."[84] In August 2010, however, the Ohio Public Utilities Commission approved a plan to retrofit an Ohio coal energy facility to enable it to burn wood pellets and allowed the facility to generate extra RECs, pursuant to a biomass-focused incentive included in the Ohio RPS.[85] Platt's has predicted that in-state Ohio REC prices could fall to as low as $1 per REC once this facility commences commercial operation.[86] If Ohio's RPS did not include restrictive in-state generation requirements, in-state REC prices may not have increased to the levels they did in 2009, but they also would not be likely to fall from $35 per REC to $1 per REC and be nearly as volatile. While higher REC prices are attractive to developers in the short term, volatility in the market is likely to undermine the value of those prices to investors and lenders in the long term.

Bloomberg New Energy Finance recently conducted a REC markets survey, in which respondents were asked to anticipate REC prices in various REC markets for the 2013–2020 time period, which highlights REC price uncertainty in U.S. markets. With respect to the PJM REC market, for example, respondents generally expected future REC prices to be high, but specific expectations regarding REC prices varied considerably. Twenty-three percent of respondents felt REC prices for this time period would be in the $0–5 per REC range, while 39 percent of respondents believed REC prices for the same time period would be over $40 per REC.[87] As Christopher Berendt has noted, "It is difficult for renewable energy investors to ascertain what they will get from the sale of the RECs their projects generate next year, let alone in five or 10 years."[88]

Many U.S. renewable energy facilities are developed and constructed using a limited-recourse project finance structure. Under such a structure, the borrower typically is a special-purpose entity created by the project sponsor and the collateral typically consists of, *inter alia*, a pledge of the membership or other ownership interests of the borrower and the facility's current and future assets and assignments of the facility's various contractual rights. Facility revenue is the most typical method of repayment in such project financings. The borrower's ability to repay a project finance loan, as described above, then depends largely on the amount of, and certainty with respect to, the facility's projected revenues. Financing parties thus consider



these factors when making initial credit approvals, sizing project finance loans and negotiating terms and conditions of credit agreements. When financing parties perform due diligence reviews of a potential borrower's project, then, the facilities' offtake agreements play a central role.

Because REC prices historically have been so varied (across states and regions) and volatile (within states and regions), financing parties tend to prefer that renewable energy developers enter into long-term REC offtake agreements. However, given the volatility of such markets, as well as the uncertainty with respect to federal action, long-term REC purchase and sale agreements at sustainable prices are not always available in every market.

As an initial matter, if a borrower is unwilling or unable to fully contract its projected REC supply over the term of the loan, financing parties may elect to discount, or even eliminate, projected REC revenues from the financial models such financing parties use to size loans (thus making less debt financing available to the borrower), or they may attach additional conditions a borrower must satisfy prior to accessing debt that is based on projected REC revenues. REC offtake agreements preferred by financing parties can have terms of as long as 20 years or more. In order to enter into such long-term agreements, renewable energy developers often must enter into bundled agreements to sell RECs and other products, such as capacity, energy, or ancillary services, to offtakers. The potential pool of offtakers interested in entering into such long-term agreements tends to be limited to public utilities, to the exclusion of energy and/or REC marketers, which sell these products in the spot market. Renewable energy developers often must shoulder much of the pricing risk with respect to RECs in such long-term contracts. Change of law risk is also heavily negotiated between developers and offtakers and REC agreements may include "regulatory out" clauses that provide for contract abrogation or

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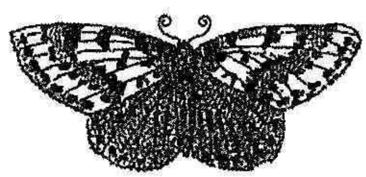
termination due to regulatory changes that negatively affect the applicable REC market(s).

Because they are not able to capture the full potential value of RECs in long-term contracts, renewable energy developers may not be able to realize the full potential benefits of RECs when project financing their facilities. The amount of debt financing available to such developers may still be lower than the amount that theoretically could be obtained if a thriving, stable REC market allowed for consistent long-term REC price projections. Interest rates and other terms and conditions also may be less favorable than otherwise would be obtainable, and financing institutions may require additional sponsor support or other assurances. The effects of REC market fragmentation indeed touch all aspects of the development and construction of renewable energy facilities in the United States.

V. Recent Developments Potentially Threaten In-State Generation Requirements

Two recent developments may force significant changes with respect to in-state generation requirements in state RPS programs. First, the constitutionality of in-state generation requirements in REC trading regimes recently was called formally into question.[89] On April 16, 2010, TransCanada Power Marketing Ltd. ("TransCanada"), a U.S. affiliate of Canadian energy developer TransCanada Corporation, challenged the validity, under the Interstate Commerce Clause, of the in-state generation requirements included in Massachusetts' Solar Carve Out Program (described above).



Article I of the U.S. Constitution vests in Congress the authority to "regulate Commerce. . .among the several States."[90] "This grant of exclusive federal power carries an implicit consequence for states' powers. When states regulate commerce within their own borders, they cannot enact laws that discriminate against out-of-state economic interests in favor of in-state competitors absent congressional authorization or some other source of constitutional authority."[91] In its recent complaint, TransCanada argued that the in-state generation requirements under the Solar Carve Out Program are facially invalid under the Interstate Commerce Clause, arguing that such requirements represent "differential treatment of in-state and out-of-state economic interests that benefits the former and burdens the latter."[92] It sought (1) a judgment from the United States District Court for the District of Massachusetts, Central Division, declaring that the Solar Carve Out Program was "unconstitutional, invalid and unenforceable" to the extent that it requires retail electricity suppliers to purchase Solar RECs "from generation units located in Massachusetts (to the exclusion of generation units located outside Massachusetts)[93] and (2) temporary and permanent injunctions against enforcement of the Solar Carve Out Program."[94]

On May 28, 2010, the parties entered into a partial settlement agreement which required the State of Massachusetts to amend certain regulations governing the Solar Carve Out Program but allowed the State to retain the in-state generation requirements.

While the partial settlement agreement resolved the immediate uncertainty that plagued Massachusetts' Solar Carve Out Program during pendency of the challenge, the constitutionality of in-state generation requirements remains unresolved. This action could prompt challenges to such requirements in other states. If any such challenge is successful, states may be required to eliminate or significantly modify

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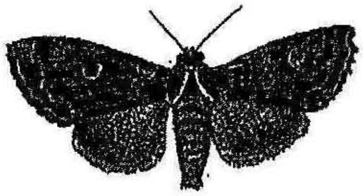
in-state generation requirements in their respective REC trading regimes.

Second, federal legislators continue to consider the enactment of a federal RPS or CES. Congress failed to pass an RPS in 2009 or 2010 despite a concerted effort by the Democratic leadership.[95] The results of the November 2010 elections make it unlikely that a political consensus will form around RPS legislation in the near term. President Obama and several key lawmakers, in an effort to appeal to a broader range of interests, have recently focused on the passage of a federal CES.[96] Although not strictly defined, a CES would likely require utilities to procure a certain percentage of energy from renewable sources similar to an RPS but would also allow other energy sources with cleaner greenhouse gas profiles than traditional coal-based generation, such as nuclear, clean-coal, and possibly natural gas, to count towards compliance obligations. A CES appears more probable than an RES with the current Congress but it remains speculative whether a CES will be adopted, and if it were to pass, what such a CES would entail. In particular, it is difficult to predict whether and to what extent a federal CES may preempt more aggressive state RPS programs or how the two types of programs may coexist.

Even to the extent a federal RPS or CES program passes Congress, it remains unclear whether the program would fully eliminate in-state generation requirements, though doing so would be critical to the success of any federal, or even regional, REC trading regime. For example, Sen. Jeff Bingaman introduced the American Clean Energy Leadership Act of 2009 to the Senate, which was considered front-runner RPS legislation.[97] Although the Bingaman



legislation did not pass, it is informative of proposed RPS legislation and a CES would likely contain some similar attributes. The Bingaman legislation would amend Title VI of the Public Utility Regulatory Policies Act of 1978 and would require electric utilities to obtain 15 percent of their "base quantity" of electricity from renewable resources by 2021.[98] Utilities would comply with this requirement through the use of RECs, federal energy efficiency credits, or alternative compliance payments at the rate of 2.1 cents per kilowatt hour, adjusted for inflation.[99] The legislation would direct the Secretary to create a tradable REC program, but does not detail specifics of how a REC market would function.

The Bingaman legislation did not, however, solve the problem of geographic discrimination that exists under the state RPS programs. In particular, the Bingaman legislation specifically stated that "nothing in this section diminishes any authority of a State or a political subdivision of a State to adopt or enforce any law or regulation respecting renewable energy or energy efficiency, or the regulation of electric utilities," and provided further that there would be "coordination between the Federal program and state programs."[100] Indeed, a utility would be in compliance if it was subject to a state RPS program and complied "with the state standard by generating or purchasing renewable electric energy or renewable energy certificates or credits representing renewable electric energy."[101] Thus, Bingaman's legislation would not preempt state legislation, and it would be possible to comply with the federal standard simply by complying with state programs.

VI. Conclusion

RECs have been created by states, in part, to allow developers of renewable energy facilities to realize monetarily the environmental benefits inherent in renewable energy generation. Many states have understandably chosen to impose in-state

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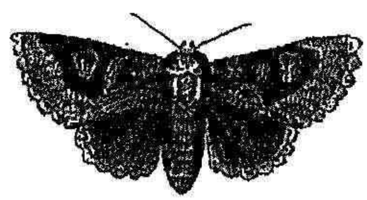
generation requirements on RECs used to qualify with such states' RPS regimes, in an effort to promote the myriad benefits of renewable energy development within state lines. By geographically limiting qualifying RECs in this way, however, states that have adopted in-state generation requirements have (perhaps unintentionally) created small, disparate markets in RECs and have also impacted the ability of renewable energy projects to obtain price transparency in regional markets, all of which ultimately increases the net cost to produce (and ultimately the cost to utility ratepayers) of renewable energy. Such price volatility and variability will ultimately reduce the amount and efficiency of renewable energy projects and transactions in any given state market. Renewable energy developers typically are forced to shoulder these price volatility risks, which diminishing the catalyzing effect RECs were intended to create. At the margin, REC price variability and lack of liquidity may negatively impact renewable energy developers' appetites for renewable energy development in certain states or regions, regardless of renewable resource availability in such areas.

Federal legislators continue to consider the enactment of a federal renewable portfolio standard or, alternatively, a clean energy standard.

Some in-state generation requirements may also be judicially vulnerable, as the *TransCanada* litigation attempted to accomplish, under the Interstate Commerce Clause of the U.S. Constitution. But even a judicial ruling that limits or prevents imposing in-state generation requirements would not necessarily solve the problem, without any regional or national market for RECs. As part of its ongoing evaluation of national energy and environmental policy, we suggest that Congress legislatively eliminate or limit in-state generation requirements at the federal level, by adopting either a federal RPS, that preempts state RPS in-state generation requirements, either in whole or, at a minimum, with respect to the minimum renewable energy purchase obligation set forth in the federal RPS, or a federal CES that does not discriminate or allow discrimination against out-of-state renewable resources. At a minimum, Congress should consider incentives to foster regional REC markets that are coincident with regional transmission organizations, if not a fully national market. Even in the absence of federal action, states can – and some states currently are – developing unified regional REC markets, with standardized rules for trading within, and in limited cases among, such markets. However, unless in-state requirements are eliminated or limited, such regional markets will still suffer from price volatility and lack of liquidity. Federal action should help to consolidate the market for RECs in the United States, stabilize REC prices and encourage the growth of long-term, unbundled REC purchase and sale agreements.[99] ■



Endnotes:

1. The Pew Research Center for the People & the Press, Public Remains of Two Minds on Energy Policy, Jun. 14, 2010, at http://people-press.org/report/622/.

2. Other names for an RPS include renewable energy standard, renewable electricity standard, and environmental portfolio standard.

3. *See* Mass. Gen. Laws, Ch. 25A, §11F; Conn. Gen. Stat. §16–245a *et seq.*; *see also* K.S. Cory and B.G. Swezey, *Renewable Portfolio Standards in the States: Balancing Goals and Implementation Strategies*, NREL/TP-670-41409 (Dec. 2007), at 9, *at* http://www.nrel.gov/docs/fy08osti/41409.pdf.

4. *See generally* DSIRE, Database of State Incentives for Renewables and Efficiency, at http://www.dsireusa.org.

5. Christopher Berendt, *A State-Based Approach to Building a Liquid National Market for Renewable Energy Certificates: The REC-EX Model*, 19 Elec. J. 54, 56 (2006).

6. A single REC typically represents the environmental attributes of 1 MWh of renewable energy.

7. *See, e.g.*, Berendt, *supra* note 5 at 55; U.S. Environmental Protection Agency, *EPA's Green Power Partnership, Renewable Energy Certificates*, July 2008, at http://www.epa.gov/greenpower/documents/gpp_basics-recs.pdf.

8. *See* Ed Holt and Lori Bird, *Emerging Markets for Renewable Energy Certificates: Opportunities and Challenges*, NREL/TP-620-37388 (Jan. 2005), at 1.

9. Scott L. Hoffman, The Law and Business of International Project Finance: A Resource for Governments, Sponsors, Lenders, Lawyers and Project Participants (2 Ed.) (2001), at 683.

10. *See, e.g.*, Norbert Wohlgemuth and Reinhard Madlener, *Financial Support of Renewable Energy Systems: Investment vs. Operating Cost Subsidies*, Proceedings of Norwegian Association for Energy Economics Conference, "Towards an Integrated European Energy Market," Bergen, Norway, Aug. 31–Sept. 2, 2000 ("With such a system, renewable electricity is fed into the electricity grid and sold at market prices, but the renewable electricity producer also receives a certificate that is sold on the market for certificates and improves the competitiveness of the renewable production, because it has the effect of a subsidy.")

11. *Id.*

12. Mont. Code Ann. § 69-3-2002 (*year*) (emphasis added).

13. *Id.* at § 69-3-2002(4) (emphasis added).

14. Tex. Utilities Code Ann. § 39.904 (*year*).

15. 25 Tex. Admin. Code § 25.173(c)(13) (*year*).

16. *See* Tex. Admin. Code § 25.173(g); *see also* Electricity Reliability Council of Texas, Inc., State of Texas

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Renewable Energy Credit Trading Program, Aug. 1, 2009, *at* http://www.ercot.com/mktrules/protocols/current.

17. Electric Reliability Council of Texas, *ERCOT Protocols, Section 14: State of Texas Renewable Energy Credit Trading Program*, Aug. 1, 2009, at 9, *at* http://www.ercot.com/mktrules/protocols/current. Note that the requirement to obtain certification from the Public Utility Commission of Texas is applicable to all renewable energy resources, whether located within or outside of the state. *See* Tex. Admin. Code § 25.173(o).

18. Electric Reliability Council of Texas, *ERCOT's 2009 Annual Report on the Texas Renewable Energy Credit Trading Program*, Project No. 27706, May 14, 2010, *at* http://www.ercot.com/news/press_releases/2010/nr-05-14-10. Note that Texas currently has only limited interstate interconnections in the ERCOT region and the Federal Energy Regulatory Commission has only limited jurisdiction over the ERCOT region. For these reasons, interstate REC trading may pose unique challenges in Texas. *See generally* Jared M. Fleisher, *ERCOT's Jurisdictional Status: A Legal History and Contemporary Appraisal*, 1 Tex. J. Oil Gas & Energy L. 5 (2008).

19. Ohio Rev. Code Ann. §§ 4928.64(B)(2), 4928.65 (*year*). Renewable energy credits traded in Ohio are tracked using the PJM-GATS and M-RETS tracking systems. Ohio Admin. Code § 4901:1-40-04(D)(2).

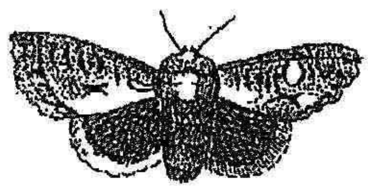
20. Ohio Rev. Code Ann. §§ 4928.64(B)(3).

21. Ohio Admin. Code § 4901:1-40-01(I) (year). Note that the regulations are ambiguous as to whether the underlying energy *must* be delivered into the state in order for such energy to produce renewable energy credits eligible to be traded in Ohio.

22. Ohio Rev. Code Ann. § 4928.64(C)(4).

23. *Id.*

24. N.C. Gen. Stat. §§ 62-133.8(b)(2)(e); 62-133.8(c)(2)(d) (year). Note that the 25 percent limitation does not apply to electric public utilities with fewer than 150,000 retail jurisdictional customers in North Carolina as of Dec. 31, 2006. *Id.* As of July 1, 2010, North Carolina Renewable Energy Tracking System (NC-RETS), which was developed and will be implemented by Automated Power Exchange, Inc. (APX), has been responsible for issuing and tracking RECs sold in the North Carolina market. *See* North Carolina Renewable Energy Tracking System (NC-RETS), at http://www.ncrets.org/; *see also*, APX, Inc., Solutions & Services for the Energy & Environmental Markets, http://www.apx.com/. Note that APX, Inc. also developed and currently administers the Michigan Renewable Energy Certification System (MIRECS), M-RETS, NEPOOL GIS, PJM GATS, and WREGIS, and developed and initiated the Texas REC program.



25. *Id.* at § 62-133.8(b)(2). Note that electric membership corporations and municipalities may not purchase out-of-state renewable energy to meet the minimum renewable energy requirements. *See id.* at § 62-133.8(c)(2).

26. *Id.* at § 62-133.8(b)(2);

27. Though precise definitions vary among jurisdictions, an "alternative energy credit" is defined substantially similarly to a "renewable energy credit" or "renewable energy certificate."

28. Pa. Stat. Ann. §§ 1648.3(e); 1648.4 (year); Pennsylvania Public Utility Commission, *Final Rulemaking Order*, Docket No. L-00060180 (May 28, 2009), at 11.

29. Pennsylvania Public Utility Commission, *Final Rulemaking Order*, Docket No. L-00060180 (May 28, 2009), at 14.

30. *Id.*

31. Pennsylvania Public Utility Commission, *2008 and 2009 Annual Reports: Alternative Energy Portfolio Standards Act of 2004* (Jun. 2010), at 11, *at* http://www.puc.state.pa.us/electric/pdf/AEPS/AEPS_Ann_Rpt_2008-09.pdf.

32. Conn. Gen. Stat. § 16-245a(b).

33. Connecticut Department of Public Utility Control, *DPUC Review of RPS Standards and Trading Programs in New York, Pennsylvania, New Jersey, Maryland, and Delaware*, Docket No. 04-01-13 (Nov. 9, 2005), at 1.

34. New Jersey has enacted distinct RPS requirements with respect to Class I renewable energy and Class II renewable energy, each of which is defined to include different renewable energy resources. For example, Class I renewable energy includes, among other resources, wind, solar, geothermal and wave or tidal energy. Class II renewable energy includes certain hydropower and resource recovery facilities. Class I RECs may be used to satisfy Class II renewable energy requirements, but the reverse is not permissible. *See* 8 N.J.A.C. § 14.8-2.3(f).

35. 8 N.J.A.C. § 14.8-2.7.

36. 8 N.J.A.C. § 14.8-2.9(d).

37. *See* Board of Public Utilities, Offshore Wind Renewable Energy (New Rules), *at* http://www.state.nj.us/bpu/pdf/announcements/oswregs.pdf.

38. Mass. Gen. Laws Ann. 25A §11F (2009); 225 Mass. Code Regs. §§ 14.05(1)(c)-(d); 14.05(5).

39. Commonwealth of Massachusetts, Department of Energy Resources, *Massachusetts Renewable Energy Portfolio Standard: Annual RPS Compliance Report for 2008*, Jul. 29,

2010, at 9, *at* http://www.mass.gov/Eoeea/docs/doer/rps/rps-2008annual-rpt.pdf.

40. *Id.* at 3.

41. *Id.*

42. *Id.*

43. 2008 MASS. ACTS Ch. 169, Sec. 11F(g) (emphasis added). The production capacity limit in this requirement was subsequently increased to 6 MW. *See* 225 MASS. CODE REGS. § 14.05(4)(a).

44. Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, *About the RPS Solar Carve-Out Program*, http://www.mass.gov/?pageID=eoeeaterminal&L=5&L0=Home&L1=Energy%2c+Utilities+%26+Clean+Technologies&L2=Renewable+Energy&L3=Solar&L4=RPS+Solar+Carve-Out&sid=Eoeea&b=terminalcontent&f=doer_renewables_solar_about-the-rps&csid=Eoeea.

45. *See* Dept. of Energy Resources, Executive Office of Energy and Environmental Affairs, Ongoing Public Rulemaking Process, at http://www.mass.gov/?pageID=eoeeaterminal&L=5&L0=Home&L1=Energy%2C+Utilities+%26+Clean+Technologies&L2=Renewable+Energy&L3=Solar&L4=RPS+Solar+Carve-Out&sid=Eoeea&b=terminalcontent&f=doer_renewables_solar_ongoing-public-rulemaking&csid=Eoeea.

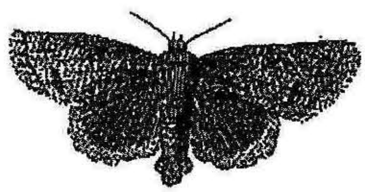
46. *See* S.B. 1078, Gen. Assem. 2002, Reg. Sess. (Cal. 2002); Cal. Pub. Util. Code § 399.15(b)(1); *see also* Cal. Pub. Util. Code § 399.12(g) ("'Retail seller' means an entity engaged in the retail sale of electricity to end-use customers located within the state, including any of the following: (1) an electrical corporation ...; (2) a community choice aggregator ...; or (3) An electric service provider ....").

47. *See* Cal. Pub. Util. Code § 399.13(a).

48. *See* California Public Utilities Commission, RPS Program Overview, *at* http://www.cpuc.ca.gov/PUC/energy/Renewables/overview (last visited March 7, 2011); *see also* Cal. Pub. Util. Code § 399.16.

49. Order Initiating Implementation of the Senate Bill 1078 Renewable Portfolio Standard Program, Cal.P.U.C., Ruling 01-10-024 (Oct. 25, 2001); Cal. Pub. Util. Code §§ 399.12(f)(1), 399.13(b).

50. California Energy Commission, Renewables Portfolio Standard Eligibility Guidebook, 42, (Jan. 2011), *at* http://www.energy.ca.gov/2010publications/CEC-300-2010-008/CEC-300-2010-008-CMF.PDF (last visited March 8, 2011) ("RPS Eligibility Guidebook").



51. *Id.* at 35.

52. *See* Cal. Pub. Res. Code § 25741(a).

53. RPS Eligibility Guidebook, at 36–37.

54. *Id.* at 37.

55. *See* Cal. Pub. Res. Code § 25741(b)(2)(A) (also requiring delivery of electricity to a location in California); *see* RPS Eligibility Guidebook, at 37.

56. RPS Eligibility Guidebook, at 38.

57. *Id.* Note that under both scenarios, the electricity must eventually be delivered to California within the calendar year. *See id.* These transactions are "marked" with what is called a "NERC E-Tag" that tracks the electricity. *Id.*

58. *Id.*

59. Decision Resolving Petitions for Modification of Decision 10-03-021 Authorizing Use of Renewable Energy Credits for Compliance with the California Renewables Portfolio Standard and Lifting Stay and Moratorium Imposed by Decision 10-05-018, Cal.P.U.C., Ruling 06-02-012 (January 13, 2011), *at* http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/129517.htm.

60. *Id.* In a separate Decision 11-01-026, on Jan. 13, 2011, the CPUC also imposed a 25 percent cap on TRECs for Energy Service Providers in California, but declined to impose the $50 per TREC price cap.

61. *Id.*

62. Gov. Schwarzenegger, Executive Order S-21-09 (Sept. 15, 2009), *at* http://gov38.ca.gov/index.php?/executive-order/13269/.

63. Latham & Watkins *Client Alert* Number 938 (citing *Los Angeles Times*, "Schwarzenegger may order a change in green energy rules," Marc Lifsher, Sept. 14, 2009, *at* http://articles.latimes.com/2009/sep/14/business/fi-power14).

64. *See id.* (discussing that Gov. Schwarzenegger vetoed legislation that increased the RPS percentage to 33 percent due to concerns that the RPS restricts utilities' ability to purchase out-of-state RECs).

65. *See* CARB News Release: California Commits to More Clean, Green Energy (Sept. 23, 2010), *at* http://www.arb.ca.gov/newsrel/newsrelease.php?id=155; *see also* proposed 17 Cal. Code Regs. § 97004(a).

66. *See* Staff Report at VI-3.

67. *See* proposed 17 Cal. Code Regs. §§ 97002(a)(8), 97005(a)(2).

68. *See* proposed 17 Cal. Code Regs., § 97007(a). The RES would allow for certification in one of three ways: (1) by the CEC based on the current RPS program guidelines; (2) by the CEC under an interagency agreement with CARB based on the RPS program guidelines *except for* any delivery requirement; or (3) by a CARB Executive Officer, his designee, or a third party contractor.

69. *See* proposed 17 Cal. Code Regs., § 97005(d); *See* Staff Report at p. VIII-4.

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70. *See* proposed 17 Cal. Code Regs., § 97007; *see also* Staff Report at p. VIII-4.

71. Sen. Bill 2 (2011-2012 1st Ex. Sess.) § 4, *available at http://leginfo.ca.gov/pub/11-12/bill/sen/sb_0001-0050/sbx1_2_bill_20110201_introduced.pdf.*

72. Cal. Pub. Util. Code § 399.16.

73. Cal. Pub. Util. Code § 399.16(c)(2).

74. Cal. Pub. Util. Code § 399.16(c)(3).

75. Cal. Pub. Util. Code § 399.15(b)(5), (7), § 399.16(e).

76. Other State RPS requirements, variations in which contribute to lack of harmonization in the REC markets include, but are not limited to, the eligibility of different renewable energy technologies, alternative compliance amounts, aggressiveness of RPS goals, availability of "banking" RECs for use in compliance periods after the compliance period in which the REC was created. The relative availability of other state-based renewable energy subsidies also plays a role.

77. U.S. Dept. of Energy, Energy Efficiency & Renewable Energy, *2009 Wind Technologies Market Report* (Aug. 2010), at 40, *at* http://eetd.lbl.gov/ea/emp/reports/lbnl-3716e.pdf.

78. Michel Di Capua, US REC Markets: NARUC Annual Conference, Nov. 16, 2010, at 5, *at* http://www.narucmeetings.org/Presentations/mdicapua%20-%20bloomberg%20new%20energy%20finance.pdf.

79. U.S. Dept. of Energy, Energy Efficiency & Renewable Energy, *2009 Wind Technologies Market Report* (Aug. 2010), at 40, *at* http://eetd.lbl.gov/ea/emp/reports/lbnl-3716e.pdf.

80. Michel Di Capua, US REC Markets: NARUC Annual Conference, Nov. 16, 2010, at 5, *at* http://www.narucmeetings.org/Presentations/mdicapua%20-%20bloomberg%20new%20energy%20finance.pdf.

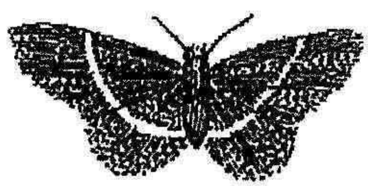
81. Pennsylvania Public Utility Commission, *2008 and 2009 Annual Reports: Alternative Energy Portfolio Standards Act of 2004* (Jun. 2010), at 11, *available at* http://www.puc.state.pa.us/electric/pdf/AEPS/AEPS_Ann_Rpt_2008-09.pdf.

82. *Ohio Biomass Decision to Impact REC Market*, Platts, Megawatt Daily, Aug. 16, 2010, at http://clearenergybrokerage.com/files/Ohio-REC-1pg.pdf.

83. *Id.*

84. *Id.*

85. *Id; see also* John Funk, *FirstEnergy Seeks OK to Burn Biomass at Burger Plant in Southern Ohio*, Aug. 10, 2010, at http://www.cleveland.com/business/index.ssf/2010/08/firstenergy_seeks_ok_to_burn_b.html.



86. *Ohio Biomass Decision to Impact REC Market*, Platts, Megawatt Daily, Aug. 16, 2010, at http://clearenergybrokerage.com/files/Ohio-REC-1pg.pdf.

87. Michel Di Capua, US REC Markets: Background for Panel on REC Transparency, REC Energy Markets Conference, Oct. 20, 2010, at http://www.renewableenergymarkets.com/docs/presentations/2010/Wed_REC%20Price%20Transparency_Michel%20Dicapua.pdf.

88. Christopher B. Berendt, *A State-Based Approach to Building a Liquid National Market for Renewable Energy Certificates: The REC-EX Model*, 19 Elec. J. 5, 54–68, at 55 (2006).

89. *See* Complaint, TransCanada Power Marketing Ltd. v. Bowles, No. 4:10-cv-40070-FDS (C.D. Mass. Apr. 16, 2010). Note that the constitutionality of in-state generation requirements has long been questioned. *See, e.g.*, Benjamin K. Sovacool and Christopher Cooper, *Big Is Beautiful: The Case for Federal Leadership in a National Renewable Portfolio Standard*, 20 Elec. J. 48 (May 2007).

90. U.S. Const. art. 1, § 8, cl. 3.

91. *Family Winemakers of California v. Jenkins*, 592 F.3d 1, 4, n. 1 (1st Cir. 2010) (citing *Or. Waste Sys., Inc. v. Dep't of Envtl. Quality*, 511 U.S. 93, 98 (1994).

92. Complaint, at 3–4, quoting *Family Winemakers of California v. Jenkins*, 592 F.3d 1, 9 (1st Cir. 2010).

93. Complaint, at 22.

94. Complaint, at 22–23.

95. *See, e.g.*, http://www.nytimes.com/gwire/2009/02/25/25greenwire-reid-outlines-3-steps-to-meeting-obamas-energy--9864.html.

96. *See, e.g.*, http://abcnews.go.com/Business/wireStory?id=12771095, and http://thehill.com/blogs/e2-wire/677-e2-wire/133023-overnight-energy-sen-lindsey-graham-plots-return-to-energy-talks.

97. *See* S. 1462, 111th Congress, Subtitle C (2009).

98. *Id.* § 610(b)(1).

99. *Id.* § 610(b)(2).

100. *Id.* §§ 610(h)(1), 610(h)(3).

101. *Id.* § 610(h)(4).

102. The authors wish to emphasize that in-state generation requirements, though an important impediment to the growth of a unified REC market, are not the only impediment to such growth. Other state-specific regulations which can impair the tradability of RECs across different RPS regimes include the types of renewable energy resources eligible to produce RECs and restrictions on the capacity and vintage of facilities qualified to produce RECs, among others.