AMERICAN BAR ASSOCIATION
SECTION OF PUBLIC UTILITY, COMMUNICATIONS AND TRANSPORTATION LAW
SPRING 2010

REPORT OF THE RENEWABLE ENERGY COMMITTEE

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TABLE OF CONTENTS

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SPRING REPORT 2010

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INTRODUCTION

This report focuses on incentives available for the development of renewable energy generation facilities made possible by state governments. In this report we examine state incentives including: (1) feed-in tariffs, (2) renewable energy portfolio standards, (3) net metering programs, (4) tax incentives, (5) grants and (6) state-funded loans. Although this report is not comprehensive as to all state incentive programs or all of the types of incentives available, we have attempted to identify the primary types of incentives, the states that are taking a leading role in implementing those incentives and a list of other states that have followed that lead.

A. FEED-IN TARIFFS[1]

A feed-in tariff is a mechanism to ensure grid access to independent generators of electricity under long term contracts with standard terms and pre set prices. Often mandated by legislation, some U.S. utilities have developed their own feed-in tariff programs.[2] Generally, feed-in tariffs are a key instrument to advance the policy objective of increasing the share of renewable energy generation in the mix of energy sources.[3] Price levels are typically guaranteed for 10, 15 or 20 years under standard contract terms and conditions, established by each utility based on the characteristics of their service area and needs.[4] Guaranteeing access, simplifying transaction costs and providing price stability address several of the hurdles when financing renewable energy projects, but the key aspect of the incentive mechanism is the price itself.

[1] Contributor: Daniel Boyle, Heuristic Strategies, LLC.

[2] For a legislative example, *see, e.g.*, CA Pub. Util. Code §399.20, created by Assembly Bill (AB) 1969 (2006, Yee). For a voluntary example, *see, e.g. ¸infra* section 1(a) describing the program offered by the Sacramento Municipal Utility District.

[3] *See* Arne Klein, et al., Evaluation of Different Feed-in Tariff Design Options—Best Practice Paper for the International Feed-In Cooperation (2d ed. Oct. 2008), *available at* http://www.feed-in-cooperation.org/wDefault_7/content/research/research.php (last visited on January 24, 2010) (*hereinafter*, "Best Practices Paper"). Many readers will find a feed-in tariff analogous to the standard offers that utilities developed in response to the passage of the Public Utilities Regulatory Policy Act of 1978 (PURPA) Section 210, mandating grid access for small scale energy producers. Since these are state and utility level initiatives they tend to be more narrowly targeted than the previous standard offers.

[4] *See, e.g.*, CA Public Utilities Commission, Energy Division Resolution E-4298 (Dec. 17, 2009), *available at* http://docs.cpuc.ca.gov/PUBLISHED/FINAL_RESOLUTION/111386.htm. In particular, footnotes 26, 27, and 28 provide references to the standard offer contracts from Pacific Gas & Electric (http://www.pge.com/includes/docs/word_xls/b2b/wholesaleelectricsuppliersolicitation/FinalAttH2009RPSPPA(amendedforSTOffers)(00084346).DOC), Southern California Edison (http://www.sce.com/NR/rdonlyres/4F174486-40D2-470B-AB23-96A3A583C2E5/0/20090629_RFP_Appendix_B1_ProForma_Agreement.doc), and San Diego Gas & Electric (http://www.sdge.com/documents/rfo/renewable2009/ModelPPA.doc).

In establishing the price to be paid for the energy and capacity from the facilities, jurisdictions differ in philosophy and a variety of approaches are used to establish the rate per kWh.[5] A basic distinction is whether the price is based on the producer's cost of generation source or the local utility's avoided cost. Tariffs based on cost of production are thought to encourage renewable energy production as the producer's compensation is tied to the producer's costs. Tariffs based on avoided cost are thought to provide less encouragement to renewable energy producers.[6] Alternatively, a tariff based on avoided cost might also provide additional incentives to producers through a tariff premium with that premium representing an estimation of the reduced social costs (or negative externalities) applicable to the producer's method of renewable energy production (in contrast to the local utility's non-renewable means of production).[7]

Not all feed-in tariffs are equal. The U.S. regime to facilitate the expansion of renewable energy at the national level relies on tax credits and accelerated depreciation, with some talk of a national Renewable Portfolio Standard (RPS).[8] States like California enhance these national incentives with a hybrid approach to encourage renewable generation by combining Renewable Portfolio Standards (RPS), Net Metering, the California Solar Initiative (CSI), the Self Generation Incentive Program (SGIP) and feed-in tariffs.[9] In contrast, European nations have used feed-in tariffs as the principal

[5] Best Practices Paper, *supra*, n. 3 at 10 ("The differences range from the fact whether or not a purchase obligation exists to the method used for the determination and the adjustment of the tariff level.")

[6] *Id.* at 11.

[7] *Id.* at 12.

[8] *See, e.g.*, http://www.dsireusa.org/incentives/index.cfm?state=us&re=1&EE=1 (indexing the federal incentives) (*hereinafter*, "DSIRE Website") (last visited February 15, 2010).

[9] California Public Utilities Commission, *Summary of Feed-In Tariffs*, http://www.cpuc.ca.gov/PUC/energy/Renewables/feedintariffssum.htm (last viewed on Dec. 14, 2009); *see also* http://www.dsireusa.org (providing a state by state index to programs and incentives).

mechanism for increasing the share of renewables in generation. Most European nations developed technology-specific tariffs that vary both in duration and price per kWh for a host of renewable technologies such as small hydro, wind, solid biomass, biogas, solar photovoltaic (PV) and geothermal.[10] Spain and Germany achieved large increases in generation from renewable sources as a result of the inception of the program from 2004 through 2008.[11] The tariff level in 2008 for PV in Spain varied from 23.0 to 44.0 € Cents per kWh with a 25 year duration guarantee; in Germany the figures for 2008 were 31.94 to 43.01 € Cents per kWh with a 20 year duration guarantee.[12] California's scheme uses a "market price referent" where the price compares to a combined cycle natural gas fired base referent and then adds a time of day (TOD) premium or discount.[13] In 2008, California's referent figure for a 20 year plant was $0.11126 per kWh, adjusted by the TOD factor, but likely to be less than the rates in Spain or Germany.[14] The essence of the distinction between the California and European approaches is how and where subsidies are reflected in the pricing. It is important to note however, the distinction is not maintained routinely across the United States, and utilities in some states, as noted

[10] *Supra*, n. 3 at 13-15 (including a table showing tariff levels, both fixed and premiums, across twenty countries and for seven different technologies).

[11] *Id.* at 1. *See also* GTM Research, *Emerging Trends in the U.S. Solar Market*, eFlorida.com (Nov. 2009) ("As a result of its feed-in tariff, which offers projects installed in a given year fixed rates for 20 years of operation, Germany's PV market grew from 44MW in 2000 to 1260 MW in 2007, the largest in the world.").

[12] *Id.* at 14-15.

[13] California Public Utilities Commission, *Summary of Feed-In Tariffs*, http://www.cpuc.ca.gov/PUC/energy/Renewables/feed-n+Tariff+Price.htm (last viewed on Dec. 14, 2009). For a complete explanation and derivation of the Market Price Referent, *see* CPUC, Resolution E-4298 (December 17, 2009)

[14] *Id*.

below, follow the European philosophy of embedding subsidies in the feed-in tariff price levels.[15]

1. CALIFORNIA

As noted above, California's feed-in tariff program is one of a broader set of policy mechanisms to encourage the development of renewable generation sources which include the Renewable Portfolio Standards (RPS) Program for larger, utility scale projects, and the California Solar Initiative (CSI) and Self-Generation Incentive Program (SGIP). Those programs have stimulated growth in smaller solar projects of 1 MW or less.[16] The origin of California's feed-in tariff (FIT) was Assembly Bill 1969 (2006, Yee)[17] which was passed to allow water and wastewater agencies to develop smaller projects under 1 MW and to sell the energy to the state's electrical corporations at a market price referent for renewable projects to be determined by the Public Utilities Commission ("CPUC").[18] The purpose was to fill a gap between large projects that qualified for subsidies under the Renewable Portfolio Standards and smaller projects that were too big to meet the limitations on net metering.[19] As a result of decisions in 2007

[15] *Id*. at 2 (explaining the "[d]ifference between [California] feed-in tariffs and those offered in Spain and Germany: These feed-in tariffs differ from the similarly named "feed-in tariffs" in Germany and Spain which include an incentive in the feed-in tariff price. Under the feed-in tariffs in California, customers are paid for the cost of generation based on the "market price referent." The price is based on the value of electrical generation, but is not intended to embed a subsidy or rebate in the price offering.")

[16] California Public Utilities Commission, Rulemaking 08-08-009, *System-Side Renewable Distributed Generation Pricing Proposal, Energy Division Staff Proposal – August 26, 2009, Attachment A* 2 (hereinafter "*CA Rulemaking 08-08-009*").

[17] Assembly Bill 1969 became law as Chapter 731, "An act to add Section 399.20 to the California Public Utilities Code." http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_1951-2000/ab_1969_bill_20060929_chaptered.pdf.

[18] California Assembly, Concurrence in Senate Amendments, AB 1969 Bill Analysis (2006). *Available at* http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_1951-2000/ab_1969_cfa_20060821_211836_asm_floor.html.

[19] *Id*.

and 2008, the CPUC implemented and expanded the program to include additional electrical corporations and to non-water and non-wastewater facility customers.[20] In March 2009, a proposal to expand the FIT program put forth by CPUC staff was advanced by an Administrative Law Rulemaking (R.) 08-08-009.[21]

CPUC proposed to expand the FIT program from 1.5 MW to 10 MW, and suggested an integrated resource planning model combined with a Renewable Auction Mechanism (RAM) as the method of determining the contract price.[22] Affected parties have since been responding to these proposals. In addition to questions over federal and state jurisdiction with respect to price setting for wholesale generators,[23] a large number of briefs and motions surrounding the proposal and pricing mechanisms are still outstanding as of January 2010.[24] Notwithstanding the uncertainty caused by this ongoing exchange, CPUC's compelling policy argument stands on the premise that the auction mechanism combined with integrated resource planning will ensure that long run costs remain competitive.[25] However, it is difficult to predict the extent of participation

[20] California Public Utilities Commission, Press Release Docket #: Res E-4137, *CPUC Approves Feed-In Tariffs to Support Development of Onsite Renewable Generation* (Feb. 14, 2008) (hereinafter, "*CA Release 4137*").

[21] *CA Rulemaking 08-08-009, supra*, note 16 at 1.

[22] *Id.* at 7 ("Key RAM program design elements will be decided prior to the auction, which include contract terms and conditions, project viability, location [sic] preferences, and revenue requirement. As a result, the utilities will be able to rank projects on price alone, creating a competitive process that should be easy for market participants to use and understand. The utilities will then sign all contracts that meet the pre-determined criteria up to a CPUC-authorized revenue requirement cap. Bidders that are not successful will have the opportunity to refine their projects and bid into future auctions.").

[23] *Id*. at 1.

[24] *See* http://docs.cpuc.ca.gov/published/proceedings/R0808009.htm.

[25] *CA Rulemaking 08-08-009, supra*, note 16, Appendix A, 14-17 (analyzing the impact of a 1% purchase of renewable energy per year from small scale systems by electrical corporations until a 33% RPS is reached, as advocated by "some FIT advocates" could lead to a cost premium for power from between 11 and 19 percent).

and pace of closure against RPS goals that the FIT program will contribute. Enterprise Florida and Greentech Media expect a ruling on the CPUC staff proposal in early 2010.[26]

By statute, the FIT program in California described above applies only to the electrical corporations, identified by the CPUC as Southern California Edison, Pacific Gas & Electric Company (PG&E), San Diego Gas & Electric Company, PacifiCorp, Sierra Pacific Power Company, Bear Valley Electric Service Division of Golden State Water Company, and Mountain Utilities.[27] On its own accord, the Sacramento Municipal Utility District (SMUD) created a feed-in tariff and agreement to contract up to 100 MW for projects up to 5 MW in size.[28] SMUD reported in January 2010 that it had received qualified bids in excess of the capacity sought, with all the projects based on solar PV technology.[29]

2. OTHER STATES AND UTILITIES

In addition to California, Hawaii and Vermont have statewide programs, and New York, Michigan and Washington are expected to consider cost-based FIT legislation.[30] Utilities in Florida, Oregon, Texas, Vermont, Washington, and Wisconsin have some form of FIT program. Many of these programs offer fixed price incentives, similar to the European model.[31] For instance, the program in Hawaii was the result of an agreement

[26] GTM Research, *Emerging Trends in the U.S. Solar Market* 5, eFlorida.com (Nov. 2009) (hereinafter "*Emerging Trends in U.S. Solar Market*").

[27] *CA Release 4137, supra* n. 20 at 2.

[28] *See* http://www.smud.org/en/community-environment/solar-renewables/pages/rfo-and-unsolicited-offers.aspx.

[29] SMUD News Release, *SMUD Gets Huge Response from Feed-In Tariff Opportunity*, January 19, 2010.

[30] *Emerging Trends in U.S. Solar Market, supra*, n. 26.

[31] *Id*.

between the state and its major utilities and bases the tariff on the cost of generation plus a reasonable profit.[32] A program implemented by the Gainesville Regional Utilities (GRU) in Florida is based on the cost of generation, with a price of $0.32/kWh for systems less than 25kW, and $0.26 for systems above 25 kW, and contracts with a twenty year duration.[33]

[32] *In re* Public Utilities Commission [State of Hawaii], Instituting a Proceeding to Investigate the Implementation of Feed-In Tariffs, Docket No. 2008-2073 (2009); *see also* Wind-Works.Org, *Hawaii PUC Decision on Feed-In Tariffs Summary*, October 7, 2009, *available at* http://www.wind-works.org/FeedLaws/USA/HawaiiPUCDecisiononFeed-inTariffsSummary.html (last viewed on January 28, 2010).

[33] *Emerging Trends in U.S. Solar Market, supra*, n. 26 at 5 (providing a table comparing programs across several states and utilities).

B. RENEWABLE PORTFOLIO STANDARDS[34]

1. RENEWABLE PORTFOLIO STANDARDS – AN OVERVIEW

A Renewable Portfolio Standard (RPS) is a requirement that a certain proportion or quantity of the electric power generated or delivered by each utility within a state be derived from renewable sources. An RPS can be a simple regulatory mandate from a state regulator that, by a specified date, each utility within its jurisdiction obtains a certain amount of its power from renewable sources. An RPS can also form the basis of a more sophisticated market-based system designed to incentivize the use of renewable energy sources.

As the ARRA extended federal tax incentives and grant opportunities for renewable and energy efficiency initiatives, and as the U.S. Senate continues to work on a comprehensive energy bill that may include cap-and-trade or carbon taxes, an increasing number of U.S. states and territories have already implemented their own RPS or renewable electricity standards ("RES"). In its 2009 Report, the Interstate Renewable Energy Council ("IREC") reported an overall "strengthening of state renewable portfolio standards (RPS) policies, continued support of state solar programs, new utility incentive programs, advancements in net metering and interconnection, an emphasis on *green jobs* growth, and an unprecedented federal commitment to renewable energy."[35]

As of June 2009, 33 states or territories had adopted renewable portfolio standards – 28 mandatory and 5 voluntary – that set targets with respect to a percentage of

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[34] Contributor: Brandon N. Robinson, Balch & Bingham LLP and Michael Barnas, GE Infrastructure.

[35] 2009 Updates and Trends, Annual Meeting, Interstate Renewable Energy Council, *available at* http://irecusa.org/fileadmin/user_upload/IRECGeneral/2009_annual_meeting/IREC_2009_Annual_Report Final.pdf. (2009 IREC Report), at 1 (October 26, 2009) (reporting observations of the Database on State Incentives in Renewables and Energy Efficiency ("DSIRE")).

electricity sales or an absolute capacity in megawatts.[36] Moreover, many existing RPS programs are being modified to take into account additional initiatives that would increase the programs' effectiveness in achieving the mandated targets, such as the incorporation of energy savings from efficiency measures.[37] Although each of the RPS policies shares common elements, each state's RPS is unique, and most are continually evolving through legislation, rule making or executive decision.[38] – for example, many differ how they define which renewable technologies are eligible while others differ on how they structure their targets and alternative compliance payment mechanisms.

2. GOALS AND TIMETABLES

At the heart of any RPS is the renewable energy target, which is generally expressed as a percentage of power sold or generated by each utility by the end of a stated period. The State/Federal RPS Collaborative ("Collaborative") recommends that state RPS targets "should be stable, ramp up steadily over time, and not be subject to sudden or uncertain shifts" so as to "create an investment climate for project development that is conducive to long-range planning and investment."[39] In setting timetables and goals, the Collaborative suggests that "[c]areful consideration should be given to

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[36] The states with voluntary standards include: Missouri, North Dakota, South Dakota, Vermont, and Virginia. The 33 states with mandatory standards include the District of Columbia. See "Overview of State Renewable Portfolio Standards," Council of State Governments, at 2 (Dec. 2008) ("CSG Overview"), available at http://www.csg.org/knowledgecenter/docs/TIA_RPS_screen.pdf; see also http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm?print.

[37] Recommended Principles and Best Practices for State Renewable Portfolio Standards, State/Federal RPS Collaborative (January 2009) ("Collaborative"), at 1, *available at* http://www.cleanenergystates.org/JointProjects/RPS/RPS_Principles_and_Best_Practices_Final_012609.pdf.

[38] The characteristics of various state incentives, including RPS, are summarized in the DSIRE Website, *supra* n. 8. DSIRE is a project of the North Carolina Solar Center and the Interstate Renewable Energy Council, and is funded by the U.S. Department of Energy.

[39] *Id.* at 4.

maintaining a supply and demand balance in setting timetables and goals" so as to "prevent recurring supply shortages that trigger enforcement actions as well as drive up the cost of compliance."[40]

Each of the 33 state RPS programs attempts to structure its targets to achieve this balance in its own way. The highest percentage is Maine's target of 40% by 2017, consisting of 10% new generation, and 30% pre-existing generation.[41] The lowest percentage target is 10% from states including Wisconsin (mandatory), and North and South Dakota (voluntary).[42] Some states, in lieu of a percentage, mandate an absolute capacity standard: Iowa's standard is 105 MW[43], whereas Texas mandates a 5880 MW by 2015. California has the earliest target date of 2010 (20%), whereas the record for the latest target date, 2025, is shared by Arizona (15%), Illinois (25%), New Hampshire (23.8%), Ohio (25%), Oregon (25%), and Utah (20%).[44] In any event, the state RPS programs typically "start low and then increase to a maximum" that usually increases by about 1% per year.[45] Some state RPS programs define different targets for different utilities within the state: Minnesota mandates a 30% by 2020 target for Xcel Energy but 25% by 2025 for other utilities,[46] whereas North Carolina includes a 12.5% target by 2021 for investor-owned utilities but a 10% by 2018 target for electric cooperatives and

[40] *Id.*

[41] DSIRE Website, *supra* n. 8.

[42] CSG Overview, *supra* n. 36, at 2.

[43] Additionally, in 2001, Iowa's governor instituted a secondary voluntary standard of 1,000 MW of wind generating capacity by 2010. DSIRE Website, *supra* n. 8.

[44] CSG Overview, *supra* note 36, at 2.

[45] *Id.* at 4.

[46] DSIRE Website, *supra* n. 8.

municipal utilities.[47] Further, some states may include minimum standards for generation sources that are prevalent in their region; North Carolina, home to several chicken and pig farms, includes in its RPS program a technology minimum of .2% solar by 2018, .2% swine waste by 2018, and 900,000 MWh poultry waste by 2014.[48]

Goals must also be evaluated in terms of their treatment of existing generation capacity. It is possible that Maine's 40% target includes 30% pre-existing generation because, unlike many state RPS programs that exclude existing hydro generation due to environmental concerns, Maine wanted its rich hydroelectric resources to count towards the 30% pre-existing goal to help Maine reach its ambitious 40% goal. Consider the cases of Washington and New York, which have historically met much of their demand through hydroelectric power. Washington has set a seemingly modest goal of 10% by 2020,[49] while New York recently stretched its goal from 24% to 30% by 2015.[50] However, while Washington's RPS can be fulfilled only by generating capacity brought on line after its RPS was implemented, about 19% of New York's goal will be met by hydroelectric capacity that was in place when the original target was established in 2004.

3. WHAT IS "RENEWABLE"?

Another significant difference in the various state RPS programs is the way each defines the renewable generation technologies eligible to meet its targets. As mentioned above, large or existing hydroelectric generation is often excluded (perhaps due to asserted environmental concerns), although small and incremental hydro is typically

[47] DSIRE Website, *supra* n. 8.

[48] *Id.*

[49] WASH. REV. CODE 19.285.

[50] NY PSC Order, Case 03-0188.

permitted.[51] Often states will include as eligible technologies those that utilize resources that are prevalent within that state, or, further, provide minimum targets for those resources, such as North Carolina's minimum standards for swine and chicken waste[52] or Illinois's requirement for investor-owned utilities that 75% of its 25% renewable energy target come from wind power.[53] Ohio's state RPS program is one of the few, if not the only, program that allows advanced nuclear technology as an eligible "advanced energy resource" to be eligible to comply with up to one half of its 25% by 2025 target.[54] Whatever resources a state RPS program elects to use, the Collaborative recommends "the use of clear, precise definitions of RPS resource eligibility [to] reduce[] administrative complexities and potential disputes with project developers."[55]

As one might expect, wind and solar power are eligible for RPS credit in all states. All RPS states also recognize hydro and biomass, but the treatment varies widely from state to state. Other technologies are recognized in states with particular resources:

[51] CSG Overview, *supra* n. 36, at 4. As mentioned above, however, Maine's RPS program allows for 30% pre-existing resources, including hydroelectric.

[52] *See* DSIRE Website, *supra* n. 8.

[53] *Id.* For alternatives retail electric suppliers (ARES), the requirement is 60% of the annual requirement. *See id.*

[54] *See* 49 O.R.C.§§ 4928.01(34)(d); 4928.64(B)(1). Such "advanced energy resources" also include clean coal technology, fuel cells, distributed cogeneration, demand-side management and energy efficiency; methane gas emissions from operating or abandoned coal mines, and any method or modification that increases electric generation output "to the extent such efficiency is achieved without additional carbon dioxide emissions by that facility." § 4928.01(34).

[55] Collaborative, *supra* n. 377, at 4.

a) *Wind*. Wind energy is recognized as renewable in all RPS states. Wind accounted for approximately 93% of the non-hydro renewable generating capacity installed in RPS states between 1998 through 2007.[56]

b) *Solar*. All RPS states consider PV solar energy renewable. Solar thermal technology is considered "renewable" in most, but not all, RPS states. Several states encourage the development of solar power by set asides, requiring a stated portion of their RPS to be fulfilled only from solar sources. Others have assigned solar power a "multiplier", permitting one kilowatt hour of solar power to count for as much as two kilowatt hours or more in RPS compliance. At least eleven states have set asides, three of which also provide credit multipliers. Multipliers alone are available in two other states.[57]

c) *Biofuels, Biomass and Landfill Gas*. All RPS states consider energy derived from biofuels and some forms of biomass to be renewable. Biofuels are fuels such as ethanol which are derived from renewable sources but designed for conventional engines. Biomass is a broad category of fuel that can include agricultural byproducts or wood chips. Biomass is renewable, but is disliked by some environmental proponents because of its gaseous emissions.

Landfill gas is methane-based fuel derived from organic material in the waste stream; like biofuel, it can be burned in conventional reciprocating engines or boilers.

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[56] Wiser, R and Barbose, G., *Renewables Portfolio Standards in the United States*, Lawrence Berkeley National Laboratory (April 2008) at 14, *available at* http://eetd.lbl.gov/ea/ems/re-pubs.html (hereinafter "Wiser and Barbose").

[57] Wiser and Barbose, s*upra* note 56 at 16-20. Texas offers a credit multiplier for all non-wind renewable capacity.

Most states consider some forms of landfill gas renewable; some exclude energy derived from municipal solid waste.

d) *Hydroelectric*. All state RPSs include some form of hydroelectric power, but details vary widely from state to state. In California, for example, any hydro facility with capacity in excess of 30 megawatts is ineligible; facilities coming on line after January 1, 2008 are also ineligible if they "cause an adverse impact on instream beneficial uses or cause a change in the volume or timing of streamflow".[58] Efficiency increases of up to 30MW are eligible regardless of the size of the original facility, but new efficiency increases must also meet the adverse impact test.[59]

e) *Other Renewable Sources*. Most RPS states give RPS credit for geothermal energy. Several states on or near the coast make provision for wave and tidal energy, which are small factors today but have significant potential for future development.

f) *Alternative Sources*. A few states have established a target for "alternative" energy, and treat renewable energy as a subset of the broader category. Ohio, for example, has set as its goal achieving 25% of its electric needs through alternative energy, a defining alternative energy as power generated by advanced nuclear and cleaner coal facilities, or gained from efficiency improvements.[60] The Pennsylvania alternative energy plan provides for two tiers of energy sources. Tier I includes conventional renewable resources, with a goal 8% by 2021. Tier II includes waste coal,

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[58] CAL. PUB. UTIL. CODE §399.12(C)(1)(A).

[59] California Energy Commission, *Renewables Portfolio Standard Eligibility Guidebook, Third Edition* (January, 2008) at 11-16, *available at* http://www.energy.ca.gov/renewables/documents/index.html#rps.

[60] OHIO REV. CODE. ANN. 4928.64 et seq.; OAC 4901:1-40 et seq.

large hydro, and integrated coal gasification facilities, with a goal for Tier II sources of 10% by 2021.[61]

4. CHALLENGES AND APPROACHES

Notwithstanding the public policy rationales for RPS, state RPS programs (and a proposed federal RPS program), face several challenges and obstacles, and have garnered a significant amount of discussion. Although states may set ambitious targets that draw attention, the evaluation of whether any state RPS program is truly "successful" must also consider, among other factors, the compliance rates of the obligated parties and the ability of the RPS program to meet its stated goals.[62] Setting specific goals for an RPS program requires ordering priorities and balancing competing interests because resources are finite.[63] RPS programs should therefore establish (and many of them have) adjustment mechanisms that can be triggered with little regulatory risk if the overall objectives are not being met.[64]

One chief concern about state RPS programs is that they will lead to increased prices to retail consumers.[65] A 2008 study from the Lawrence Berkeley National Laboratory asserts, however, that "[t]he electricity rate increases associated with existing state RPS policies, for those states in which such impacts are readily calculable, generally

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[61] 73 PA. CONSL. STAT §1648.1 et seq.; 66 PA. CONSL. STAT. §2814.

[62] *Collaborative*, *supra* n. 37 at 2 (listing several possible examples of RPS goals, such as ""improving air and water quality, reducing global warming emissions, creating jobs and increasing tax revenues, increasing technology diversity, moving toward energy independence, stabilizing electricity prices, [or] fostering inter-state resource development.").

[63] *Id.* ("[I]f promoting technology diversity is a priority goal, then an RPS design may want to include set-asides for solar and distributed generation. If addressing global warming is a priority over local job creation, geographic eligibility constraints may be less critical.")

[64] *Id.*

[65] *See* CSG Overview, *supra* note 36 at 1.

equal 1% or less so far; in several states, the renewable electricity required by these policies appears to be priced competitively with fossil generation."[66] Supporters also argue that RPS standards may stabilize prices in areas of heavy natural gas use because the increased fuel source diversity will help mitigate prices in times of volatile price spikes.[67] Some RPS programs address potential costs by capping cost increases or by exempting certain classes of customers: for example, Michigan imposes separate rate impact cost ceilings for residential, secondary commercial and primary commercial and industrial customers,[68] whereas Delaware exempts sales to industrial customers with peak demands of 1,500 kilowatts or more.[69]

Another potential challenge to the success of RPS programs is the cost-effectiveness of constructing and siting large transmission lines for remote renewable resources such as solar and wind. Such large and expensive transmission efforts often run into obstacles because of environmental and scenic concerns or because of NIMBY ("Not In My Back Yard") resistance.[70] A major issue with siting such lines is cost allocation, with those who would directly benefit from such lines often arguing for broad cost socialization, a view that is vigorously opposed by many. Because much of the

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[66] Wiser and Barbose, *supra* n. 56.

[67] *See* CSG Overview, *supra* note 36 at 1. This argument, however, may not fully consider or account for (a) the costs already sunk into the gas plants, (b) the relative stability of other non-renewable generation resources within a given utility or municipality's portfolio, or (c) the potential market volatility of new renewable technologies that would be eligible under a given state RPS but for which there has not yet been enough commercial viability or volume to establish the market stability for that resource. It also (d) assumes that renewable energy will be available when needed, and (e) does not recognize that RPS will eventually require subsidies for natural gas units that will be needed to meet new, higher capacity reserve requirements necessary for reliably integrating variable resources, even though the resources won't be used all the time, etc.

[68] *See* DSIRE Website, supra n. 8.

[69] *Id.*

[70] *Id.*

transmission infrastructure may cross state lines or serve neighboring states, states may need to consider partnering together in facilitating regional transmission through agreement such as interstate compacts.[71] In an effort to address NIMBY and environmental concerns associated with building new transmission lines, FERC was given backstop siting authority in the Energy Policy Act of 2005,[72] and expansion of that authority is being considered to accomplish RPS and other policy objectives; even this attempted solution, however, raises significant federalism concerns over the interests of state regulators.[73] In this respect, renewables located closer to load centers and existing transmission lines (such as off-shore wind in the MidAtlantic and Northeast, biomass, and nuclear) have an advantage over remotely located solar and wind because their integration does not require such a significant transmission build-out. However, locally available renewables also often face challenges of their own, such as higher installation and operating and maintenance costs for off-shore wind and potential fuel pricing volatility risks for biomass.

5. TRADABLE CREDITS

Most current RPSs include provisions for trading Renewable Energy Certificates (RECs). In a REC-based scheme, a retail utility must hold currently-valid RECs equal in value to the mandated percentage of its total energy sales. In states with vertically-integrated utilities, it might earn RECs by generating power from renewable sources.

[71] *Id.*

[72] Section 1221 of the Energy Policy Act of 2005, amending the Federal Power Act by inserting section 216 (codified as 16 U.S.C. § 824p et seq).

[73] *See, e.g.*, Remarks of FERC Commission Spitzer, Conference Transcript, Technical Conference on "In re: Integrating Renewable Resources into the Wholesale Electric Grid, under Docket No. AD 09-4, at 10:18-11:23 (March 3, 2009).

There and elsewhere it might buy RECs "bundled" with renewable energy from an independent power producer, or "unbundled" from generators who have an excess. Typically, RECs can be used to meet RPS requirements for a fixed period, which varies between states. Once used, they are "retired". Longer validity periods make it easier for utilities to manage risk over time, but can clog the market and bring down prices.

Several regional electronic tracking systems have grown up to facilitate trading in unbundled RECs; generally, each of these systems is coterminous with one of the regional interconnection control systems. The growth of these trading schemes has encouraged several states to unbundle their RECs and to accept out-of-state RECs in satisfaction of RPS goals.[74]

6. SANCTIONS AND PENALTIES

In states where generation and distribution are bifurcated, compliance with a RPS is most often enforced though an Alternative Compliance Payment (ACP), generally paid into a renewable energy fund and used to encourage future development. Cost recovery from retail buyers may be permitted, in some cases only if the ACP is the lowest-cost compliance method.

In states with vertically-integrated utilities, straightforward financial penalties are applied. These may automatic, or may be discretionary on the part of the regulatory authority. In some states, rate base recovery may be permitted.

[74] Wiser and Barbose, *supra* n. 56.

7. A CASE STUDY: TEXAS

The RPS is a relatively new regulatory structure, and it is probably too soon to declare the current profusion of RPSs schemes a complete success. There are some individual state plans that have clearly succeeded, most notably Texas.

Texas was not the first to adopt an RPS; that honor goes to Iowa. But in 1999, under then-Governor George W. Bush, Texas became the first large state to adopt an RPS with aggressive goals and a REC trading mechanism. The rules promulgated in 2001 provided for targets of 400 megawatts of renewable capacity by 2003, 850 megawatts by 2005, 1,400 megawatts by 2005 and 2,000 megawatts by 2009.[75] The effect was immediate: over 900 megawatts were installed during 2001, and the 2,000 megawatt mark was reached in 2005, four years early.[76] Today, Texas leads the nation in wind capacity, with 9,410 megawatts installed by the end of 2009.[77]

The Texas plan was helped by a trading system administered by the Electric Reliability Council of Texas, Inc. (ERCOT), the independent system operator which serves approximately 75% of the area of the State.

8. THE FEDERAL RES

A Federal RPS, known as the Renewable Electricity Standard (RES) is under consideration by both the House of Representatives and the Senate. Both the House and Senate versions of the RES cover a wide range of generation technologies, and both include a system of tradable RECs.

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[75] Wiser, R., *The Renewables Portfolio Standard in Texas: An Early Assessment* (2001).

[76] Güllen et al., *RPS in Texas – Lessons Learned & Way Forward* (2009), *available at* http://www.usaee.org

[77] American Wind *Energy* Association, *Year End 2009 Market Report* (January, 2010) *available at* http://www.awea.org/publications/reports/4Q09.pdf.

The American Clean Energy Leadership Act of 2009[78] was reported by the Senate Energy and Natural Resources Committee on June 17, 2009. It includes a 15% RES to be achieved in 2020, of which 4% can be achieved through energy efficiency. The American Clean Energy and Security Act of 2009 was passed by the House of Representatives on June 26, 2009. It sets a 20% goal for 2020, of which 8% can be achieved through energy efficiency.[79] Both bills are awaiting further action by the Congress. Other bills, including Waxman-Markey, also would impose an RES if adopted into law. The future of a federal RES is largely a function of political will and priorities.

[78] S. 1462.

[79] H.R. 2454.

C. NET METERING[80]

Net metering is a policy that requires utilities to measure the net amount of electricity consumed (or produced by customers), giving customers credit for electricity produced that it sent back into the grid. Net metering programs facilitate the bi-directional flow of electricity by encouraging utility customers to generate their own power on site and connect their excess power to the grid. Every time a customer's electricity generation exceeds the customer's electricity use, electricity supplied by the customer to the utility causes the meter to spin backwards, offsetting the electricity the customer must purchase from the utility in the future. The utility grid acts in the same capacity as an energy storage device which stores electricity in the same manner as a battery backup system, without the expense of a battery.

The Energy Policy Act of 2005[81] ("EPAct 2005") required state regulatory authorities and non regulated utilities to review and consider a net metering standard by August 2008.[82] Although EPAct 2005 provided little guidance as to the specific aspects of net metering that states should consider, EPAct 2005 was useful in requiring states to reevaluate existing standards. As a result, many states considered net metering policies and adopted some kind of net metering policy.[83] Today while 42[84] states have authorized net metering programs that permit the flow of electricity back to the grid, which eight states (Alabama, Alaska, Idaho, Mississippi, South Carolina, South Dakota, Tennessee

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[80] Contributor: Hal Emalfarb, Emalfarb, Swan & Bain.

[81] Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (hereinafter "EPAct 2005").

[82] *Id*. at Sec. 1251, amending 16 U.S.C. §2621(d).

[83] Michael Sheehan, Connecting to the Grid A Guide to Distributed Generation Interconnection Issues (6th ed. 2009) at 12 (*hereinafter* "Distributed Generation Guide").

[84] http://www.newenergychoices.org/index.php?page=nm07_WhatIsNM&sd=nm

and Texas) have not yet adopted a net-metering program. Net metering programs vary from state to state.[85] Each of the 42 states with net metering programs, through legislation or PUC action, has adopted a set of rules and regulations outlining similar but distinctive differences that either encourage or restrict net metering programs within a utility's jurisdiction. The contents of a net metering policy can have a significant impact on the development of new renewable energy generation.

The experience in Illinois is instructive. Illinois' Net Metering Statute took effect on August 24, 2007.[86] Section 107.5(h) required the Illinois PUC to have standards in place regarding net metering within 120 days after the statute's effective date.[87] The Net Metering Statute also requires electricity providers to offer net metering to the public no later than April 1, 2008.[88] Utilities were required to allow unlimited net metering during an open enrollment period from April 1, 2008 to March 31, 2009. After the enrollment period, new enrollment is permitted on a first-come, first-served basis, with utilities obligated to accept new enrollments up to the point that installed customer capacity equaled or exceed 1% of peak demand.

The Illinois rules made net metering available to customers with production capacity of 40 kW or less, allowing those customers to receive a one-to-one retail rate credit (with each kW of customer produced-power having a value equal to one kW of utility-generated power). Eligible customers will therefore be compensated for their power generation at the same rate they pay for their consumption. Net metering credits

[85] Distributed Generation Guide, *supra* n. 83.

[86] P.A. 95-420 (eff. Aug. 24, 2008) *available* at *http://illinoisattorneygeneral.gov/environment/The_Illinois_Net_Metering_Statute.*pdf (last visited March 20, 2009) (hereinafter, "Illinois Net Metering Act".

[87] Illinois Net Metering Act, *supra* n. 86 at (h).

[88] *Id.* at (j).

were to carry over from month to month, allowing customers to generate more than their monthly needs and to carry over their credits to seasons when their private generation capacity is less than their consumption.

Under the Illinois statute, Customers with eligible renewable generation capacity of more than 40 kW but less than 2 MW were to receive credits equal to the utility's avoided cost for their excess generation. These credits will be carried over month May to April, or November to October, at the customer's discretion.[89] However, customers who are "time of use" customers are compensated at time-of-use rates according to Illinois's Net Metering Rules:[90]

On December 19, 2007, the Illinois PUC issued an Order authorizing the submission of an emergency rule regarding net metering to the Illinois Secretary of State. That Order also authorized the submission to the Secretary of State of the First Notice of the proposed Rule, Part 465, thus beginning a notice period for state Administrative Procedure Act purposes. Each electric utility subject to Section 16-107.5 of the Act was required to file a tariff with the Illinois Commerce Commission in compliance with the net metering rule.

[89] *Id.*

[90] *Id.*

D. TAX INCENTIVES[91]

1. STATE PROPERTY TAX INCENTIVES

A relatively new financing platform for renewable energy projects are property assessed clean energy financing programs ("PACE"). Homes and buildings across the country represent nearly forty percent of our domestic energy use and one-third of our greenhouse gas emissions. They present great possibilities for increased use of renewable energy technologies but property owners are frequently limited by the economics of investing in renewable or efficiency technologies. This is largely explained by the high rate of property turnover; owners are less inclined to purchase technologies if they cannot recuperate their investment in the time they foresee holding the property. Under PACE programs, local government use their bonding authority to raise funds, which the local governments then lend to public entities, private organizations or individuals in the local community to finance renewable energy projects. The borrowers of these funds repay these loans through additional assessments on their individual property taxes. The benefits to the borrower include: a long-term, fixed-cost financing option; a loan secured by property and not based on the property-owner's credit; a loan for a fixed-investment that transfers to the new owner upon sale of the property; and the potential to include the interest in a borrower's local property tax deduction from federal income tax. These programs can help satisfy community renewable energy goals without significant impact on local budgets because the programs leverage the private investment of the participating individuals and have no shared impact on non-participating taxpayers.

[91] Contributors: Kathy Konieczny, Clerk - D.C. Court of Appeals and Lisa Novins, State of Vermont Judiciary.

In order to implement a PACE program, local governments must have statutory authority to both issue the bonds and use the proceeds to finance renewable energy projects: typically, local governments create statutorily-authorized special assessment districts, similar to those used for other public goods projects. As these programs have gained rapid popularity, several states, including California, Colorado, Florida, Hawaii, Illinois, Louisiana, Maryland, Nevada, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Vermont, Virginia and Wisconsin, have passed laws authorizing local governments to establish PACE programs, which have the potential to dramatically improve the economics of energy retrofits by essentially creating a financing market.[92]

PACE bonds are used to finance retrofits ranging from implementing energy efficiency technologies to installing small-scale renewable systems such as solar panels. In 2008, Berkeley established the Financing Initiative for Renewable and Solar Technology.[93] The "Berkeley FIRST" program was reportedly the first PACE bond program in the country. Berkeley FIRST is a voluntary solar financing program that provides a mechanism for property owners to obtain funds to install solar photovoltaic electric systems by allowing homeowners to finance the installation with a loan from the city's Sustainable Energy Financing District. The loan is repaid over a period of twenty years through an annual special property tax.[94]

The Berkeley FIRST program has a number of benefits that, together, help

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[92] *See* Property Assessed Clean Energy "PACE" Bonds: Innovative Funding to Accelerate the Retrofitting of America's Buildings for Energy Independence, http://www.pacenow.org/ (last visited February 15, 2010).

[93] *See* http://www.berkeleyfirst.renewfund.com/.

[94] *See* Berkeley Office of Energy and Sustainable Development, Berkeley FIRST Financing Initiative for Renewable and Solar Technology, http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=26580 (last visited February 15, 2010).

address the typical return on investment concerns noted above. First, the property owner pays relatively little in up-front costs. Second, the cost of the system is repaid over a period of twenty years. Third, the financing costs are comparable to or below a traditional equity line or mortgage. Finally, since the system stays with the property, so does the tax obligation. In other words, if the property is transferred or sold, the new owners both get the benefit of the property's renewable energy system and obligation of paying the remaining annual tax assessment.[95] The theory is that the monthly energy savings approximates the tax payments so the property owner gets both the short- and long-term benefits of expanding their own renewable energy use with no net impact on their pocketbook.

To achieve this, the program essentially creates a type of land-secured financing district that is a standard element of municipal bond finance.[96] The city covers the up-front costs and each participating homeowner repays the city through a tax assessment levied only on their participating property. The bonds are secured through a tax lien on the property. The assessment stays with the property, so subsequent homeowner pays the remaining balance and gets solar power in return. The monthly cost of bond repayment adjusted for rebates and tax credits works out to be approximately the same as powering the same home from the grid.

The first step to implementing a PACE program at the local level is most states must pass legislation allowing municipalities the ability to form a special tax district or

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[95] *Id.*

[96] *See* Matt Jenkins, *Francisco DeVries invents a financing mechanism that makes rooftop solar affordable in Berkeley and other cities across California*, MILLER-MCCUNE, June 23, 2009, *available at* http://www.miller-mccune.com/science-environment/solar-system-3625/.

assessment district to finance energy improvements.[97] California law, AB 811, authorizes municipalities "to determine that it would be in the public interest to designate an area within which authorized city officials and free and willing property owners may enter into contractual assessments to finance the installation of distributed generation renewable energy sources or energy efficiency improvements that are permanently fixed to real property." Since Berkeley is a "charter city," it has supreme authority over municipal affairs pursuant to the Mello-Roos Act of 1982 and did not have to wait for the passage of AB 811. Pursuant to the Mello-Roos Act, the Berkeley City Council went through four steps to create Berkeley FIRST. First, it adopted a special tax code authorizing the Energy Financing District. Second, it held a public hearing, after which the Council created a special tax district and authorized the levy of special taxes on participating properties. Third, property owners voted on the special taxes and issuance of bonds. Finally, the city authorized the issuance of bonds with each round of funding.[98] Although there are differences between the technical aspects of the process authorized by AB 811 and financing permitted to charter cities by the Mello-Roos Act, AB 811 effectively allowed Berkeley FIRST to become a model for other municipalities in the state.[99] Thus far in California, Palm Desert and Sonoma County have also begun PACE programs. Similarly, Boulder County, Colorado, authorized the issuance of $40 million

[97] *See* Renewable Funding, State Legislation, http://www.renewfund.com/node/175 (last visited February 15, 2010).

[98] *See* MERRIAN FULLER ET AL., RENEWABLE AND APPROPRIATE ENERGY LAB, GUIDE TO ENERGY EFFICIENCY & RENEWABLE ENERGY FINANCING DISTRICTS FOR LOCAL GOVERNMENTS 24-25 (2009), *available at* http://rael.berkeley.edu/sites/default/files/old-site-files/2009/FullerKunkelKammen-MunicipalEnergyFinancing2009.pdf.

[99] *See id*. at 24.

in bonds to support a program that provides tax assessment "loans" from $15,000 to $50,000, which are repaid over 15 years at interest rates ranging from 6.75-8.75%.[100]

2. STATE SALES TAX INCENTIVES

More than half of the states offer a sales tax incentive to producers of renewable energy development. The sales and use tax exemption typically applies to the retail sale of renewable energy devices and the installation of such devices by contractors. It may apply to residential users, commercial users, or both.

Because this tax incentive is most effective at supporting technologies for which a state has excellent resources, the incentive is often limited to a particular type of renewable energy resource. Some states, however, take a more expansive approach. Washington encourages the development of a wide range of renewable energy sources. There are retail sales tax exemptions for purchases and installation of machinery and equipment used directly in generating electricity using fuel cells, sun, wind, biomass energy, tidal and wave energy, geothermal resources, anaerobic digestion, technology that converts otherwise lost energy from exhaust, or landfill gas. The state, in recognition of its large timber industry, specifically provides sales and use tax exemptions on purchases of wood waste and forest-derived biomass (not including firewood or wood pellets) to produce electricity, steam, heat, or biofuel. Seemingly every source of renewable energy is encouraged: even waste vegetable oil from commercial food processors is exempt from sale, use, and special fuel taxes to encourage its use in the production of biodiesel fuel for personal use.[101]

A sales tax incentive encourages purchases in the near future either by having a

[100] *See* http://www.bouldercounty.org/bocc/cslp/.
[101] *See* WASH. STATE DEP'T OF REVENUE, RENEWABLE ENERGY TAX INCENTIVES (2010), *available at* http://dor.wa.gov/Docs/Pubs/Incentives/RenewableEnergy.pdf.

clear expiration date or by tapering off after a year or so. In Washington, the sales tax incentives for generation of electricity from renewable resources begins as a sales tax exemption, but in mid-2011 it becomes a partial exemption in the form of a refund from the Department of Revenue for 75 percent of the sales or use tax paid. The exemption expires in 2013.

The sales tax incentive is also restricted in some states to the quantity of electricity generated. In Washington, renewable energy facilities need only produce one kilowatt or more, and solar energy facilities may benefit with even less output.[102] In comparison, Utah limits its renewable energy sales and use tax exemption to facilities with a generation capacity of 20 kW or greater or those that increase their generation capacity by one or more MW as a result of the machinery or equipment.[103]

The Maryland Clean Energy Production Tax Credit differs from other states in that it is available for either individuals or corporations producing clean energy. The statutory definition of "clean energy" is also quite broad, including not only solar and wind but also geothermal, municipal solid waste, anaerobic digestion, and certain co-firing technologies.[104]

3. STATE CORPORATE TAX INCENTIVES

After property and sales tax incentives, corporate tax incentives are also available to promote renewable energy. Incentives range from those limited to particular types of renewable energy projects to those allocated to businesses that focus exclusively on a

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[102] *See* Wash. STATE DEP'T OF REVENUE, SPECIAL NOTICE: TAX INCENTIVES FOR GENERATION OF ELECTRICITY FROM RENEWABLE ENERGY RESOURCES (2009), *available at* http://dor.wa.gov/Docs/Pubs/SpecialNotices/2009/sn_09_Electricity.pdf.

[103] UTAH Code ANN. § 59-12-104(56), (57) (West 2009); *see also* Utah Geological Survey, Renewable Energy Incentives, http://geology.utah.gov/sep/incentives/rincentives.htm (last visited February 15, 2010).

[104] See DSIRE Website, *supra* n. 8.

targeted renewable energy.

In Texas, a corporation or limited liability company engaged solely in the business of manufacturing, selling, or installing solar or wind energy devices is fully exempted from the franchise (business) tax.[105] If a business merely installs a qualifying solar or wind energy device, it has access to a franchise tax reduction. The business may deduct the cost of a solar or wind energy device from the tax in one of two ways: (1) the total cost of the system may be deducted from the company's taxable capital, or (2) 10% of the system's cost may be deducted from the company's income.[106]

Other states provide tax benefits that focus on research and development. Massachusetts, for example, in addition to allowing businesses to deduct the installation cost of qualifying solar or wind-powered units may permit up to a five-year corporate excise tax deduction for any income received from a patent for an alternative energy or energy conservation system or device.[107] This is also extended to the state personal income tax.[108]

4. STATE PERSONAL TAX INCENTIVES

Maryland offers the Clean Energy Production Tax Credit, which is an income tax credit based upon the production of electricity generated at a facility that primarily uses qualified resources. In order to qualify, the facility must be located in Maryland and be placed in service or co-firing with coal must commence on or after January 1, 2006 but before January 1, 2011. The list of qualified resources includes wind, geothermal energy,

[105] TEX. TAX CODE ANN. § 171.056 (Vernon 2009).

[106] TEX. TAX CODE ANN. § 171.107.

[107] MASS. GEN. LAWS ANN. ch. 63, § 30(3) (West 2009).

[108] MASS. GEN. LAWS ANN. ch. 62, § 2(a)(2)(G).

solar energy, hydropower, small irrigation power, municipal solid waste and a long list of biomass resources.[109]

The tax credit is two-tiered. For energy generated by qualified resources, the credit is 0.85 cents per kilowatt hour. For energy generated from co-firing with coal, the credit is 0.50 cents per kilowatt hour.[110]

Before a person may claim the credit, the process begins with an initial credit application and certification process by the Maryland Energy Administration. The initial credit certificates were issued on a first-come, first served basis. No initial certification was permitted to exceed $2.5 million and the entire program was not to exceed $25 million. Once a person receives the certification, the credit may be claimed over a five year period with no year exceeding one-fifth of the total. In order to claim the credit, the electricity generated must be sold to an unrelated person during the tax year. Either net metering or an interconnection agreement is sufficient documentation to fulfill its requirements.

The Administration may cancel a portion of the initial credit for the remaining years, per a particular formula, if over a three year period, the credit claimed is less than an average of 10% of the total projected credit. Alternatively, if a single taxable year's credit exceeds the one-fifth of total cap, the remainder of the credit may be carried forward and applied to succeeding taxable years until the credit is used or until the expiration of the 10th taxable year after the taxable year in which the credit began.[111]

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[109] *See* DSIRE Website, *supra* n. 8.

[110] *See* Md. Energy Admin., Clean Energy Production Tax Credit, http://energy.maryland.gov/incentives/allprograms/cep_taxcredit.asp (last visited February 15, 2010).

[111] See MD. CODE. ANN., TAX-GEN. §10-710 (West 2009); MD. CODE REGS. 14.26.06.00-.11 (2009).

5. STATE INDUSTRY RECRUITMENT TAX INCENTIVES

As the renewable energy industry grows and hires more workers, state leaders have been competing to bring those jobs to their residents. While this may be accomplished through more indirect means, some states have taken a highly targeted approach.

For example, in Michigan a company or community may apply to have a geographic area designated a Renewable Energy Renaissance Zone (RERZ). The RERZ may be located anywhere within Michigan, but the proposed facility must create energy directly or fuel from a long list of sources. Alternatively, the facility may focus on research, development, or manufacturing of systems or components of systems used to create energy or fuel from various renewable sources. First approved by a local taxing body and then at the state level, a RERZ results in extraordinary tax benefits: facilities within a renaissance zone do not pay the Michigan Business Tax, state education tax, personal and real property taxes, or local income taxes (where applicable) for up to 15 years, with the abatements being phased out in 25% increments over the last three years of the zone designation. The State of Michigan will reimburse intermediate and local school districts, community college districts, and public libraries for tax revenue lost to a RERZ.[112] There may be up to fifteen RERZs; currently there are four.[113] While other states have more modest tax recruitment schemes, the Michigan model is thought to be the most far-reaching and comprehensive of its types.

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[112] See MICH. COMP. LAWS ANN. § 125.2681-2696 (West 2009).

[113] Press Release, Mich. Econ. Dev. Corp., Governor Announces State Approval of Renewable Energy Renaissance Zone in St. Clair (Aug. 26, 2009), http://www.themedc.org/News-Media/Press-Releases/Detail.aspx?ContentId=14805583-e8ea-4dbe-a9c4-18fffc805ee8.

E. GRANTS

1. STATE GRANT PROGRAMS[114]

Grants for renewable energy projects have received increased focus since the passage of the American Recovery and Reinvestment Act of 2009 (Stimulus Act), which provides, *inter alia*, for $3.1 billion in federal funding to state energy programs that support investments in energy efficiency and renewable energy technologies.[115] However, many states offered grant programs intended to encourage the development of renewable energy well before the Stimulus Act was passed.

State grant programs vary based on the industry sectors (such as commercial, industrial, utility, education or government sectors) and the renewable energy technologies that may apply for the grant. In addition, the maximum amount of funding available varies within and between programs. The following chart provides a list of state grants divided by state and technology.

State	Grant Program(s)	Eligible Renewal Energy Technologies
Alabama	Biomass Energy Program	Landfill Gas, Biomass, Municipal Solid Waste
Alaska	Alaska Energy Authority - Renewable Energy Grant Program	Solar Water Heat, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Geothermal Heat Pumps, CHP/Cogeneration, Hydrothermal, Waste Heat, Transmission or Distribution Infrastructure, Anaerobic Digestion, Tidal Energy, Wave Energy, Direct-Use Geothermal Energy
California	School Facility Program-Modernization Grants	Photovoltaics, Other Distributed Generation Technologies
Colorado	New Energy Economic Development Grant Program	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Fuel Cells, Small Hydroelectric, Renewable Fuels, Other Distributed Generation Technologies
Connecticut	On-Site Renewable DG Program	Photovoltaics, Landfill Gas, Wind, Biomass, Fuel Cells, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal

[114] Contributors: Joey Lee Miranda and Lauren Vinokur, Robinson & Cole LLP.

[115] American Recovery and Reinvestment Act, Pub. L. No. 111-5 (Feb. 17, 2009).

State	Grant Program(s)	Eligible Renewal Energy Technologies
Delaware	Research and Development Grants	Passive Solar Space Heat, Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Renewable Fuel Vehicles, Geothermal Electric, Fuel Cells, Municipal Solid Waste, Hydrogen, Anaerobic Digestion, Renewable Fuels, Ethanol, Methanol, Biodiesel
	Technology and Demonstration Grants	Passive Solar Space Heat, Solar Thermal Electric, Photovoltaics, Wind, Hydroelectric, Fuel Cells, Biodiesel Manufacturing Facilities, Storage, Conversion and Conditioning Equipment
Illinois	Biogas and Biomass to Energy Grant Program	Landfill Gas, Biomass, CHP/Cogeneration, Biogas (methane produced by livestock manure and waste, municipal waste water sludge, segregated organic wastes), Anaerobic Digestion, Other Distributed Generation Technologies
Indiana	Alternative Power & Energy Grant Program	Solar Water Heat, Solar Space Heat, Photovoltaics, Wind, Biomass, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric
Iowa	Iowa Energy Center - Grants for Energy Efficiency and Renewable Energy Research	Passive Solar Space Heat, Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Renewable Transportation Fuels, Municipal Solid Waste
Maine	Voluntary Renewable Resources Grants	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, Tidal Energy
Massachusetts	Commonwealth Hydropower Initiative	Hydroelectric, Small Hydroelectric
	Commonwealth Wind Incentive Program - Commercial Wind Initiative	Wind
	Commonwealth Wind Incentive Program - Community-Scale Wind Initiative	Wind
	Matching Grants for Communities	Photovoltaics, Wind, Solar Lighting, Data Acquisition Equipment
Michigan	Biomass Energy Program Grants	Biomass, Renewable Transportation Fuels
	Energy Efficiency Grants	Solar Water Heat, Photovoltaics, Wind, Fuel Cells, Anaerobic Digestion
Minnesota	Renewable Energy Equipment Grant	Solar Space Heat, Biodiesel
	Solar Energy Legacy Grants	Solar Water Heat, Solar Space Heat, Photovoltaics
New Jersey	Edison Innovation Clean Energy Fund	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Geothermal Electric, Hydrogen, Other Low-Emission Advanced Renewables, Tidal Energy, Wave Energy, Ocean Thermal, Fuel Cells using Renewable Fuels
New York	Assisted Home Performance Grants	Solar Water Heat, Photovoltaics, Wind, Biomass, Geothermal Heat Pumps
	Grants for Public and Non-Profit Energy Conservation Projects	Solar Water Heat, Solar Space Heat, Photovoltaics, Wind, Biomass, Fuel Cells, Geothermal Heat Pumps, Other Alternative Fuel Vehicles, Refueling Stations

State	Grant Program(s)	Eligible Renewal Energy Technologies
North Carolina	North Carolina Green Business Fund	Passive Solar Space Heat, Solar Water Heat, Solar Space Heat, Solar Thermal Process Heat, Photovoltaics, Wind, Biomass, Hydroelectric, Renewable Transportation Fuels, Geothermal Heat Pumps, CHP/Cogeneration, Hydrogen, Renewable Energy Technologies, Tidal Energy, Wave Energy, Refueling Stations, Renewable Fuels, Other Distributed Generation Technologies
Ohio	Advanced Energy Program Grants - Energy Efficiency for Manufacturers	Geothermal Heat Pumps, CHP/Cogeneration
	Advanced Energy Program Grants - Multi-Family Residential Solar Thermal Incentive	Solar Water Heat, Solar Space Heat
	Advanced Energy Program Grants - Non-Residential Distributed Energy Incentive	Landfill Gas, Biomass, Fuel Cells, CHP/Cogeneration, Reciprocating Engines, Anaerobic Digestion, Microturbines, Other Distributed Generation Technologies
	Advanced Energy Program Grants - Non-Residential Renewable Energy Incentive	Solar Water Heat, Photovoltaics, Wind
	Advanced Energy Program Grants - Residential Solar Photovoltaic Energy Incentive	Photovoltaics
	Advanced Energy Program Grants - Residential Wind Energy Incentive	Wind
Oregon	Energy Trust - Large-Scale Renewable Energy Program	Biomass, Hydroelectric, Geothermal Electric, Wave Energy, Fuel Cells using Renewable Fuels
	Community Renewable Energy Feasibility Fund Program	Passive Solar Space Heat, Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Renewable Transportation Fuels, Geothermal Electric, Geothermal Heat Pumps, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ethanol, Methanol, Biodiesel, Direct-Use Geothermal Energy
Pennsylvania	High Performance Building Incentives Program	Passive Solar Space Heat, Solar Water Heat, Solar Space Heat, Photovoltaics, Wind, Biomass, Geothermal Heat Pumps, Biogas, Small Hydroelectric
	Alternative and Clean Energy Program	Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Geothermal Heat Pumps, Municipal Solid Waste (Must be Waste-to-Energy), Anaerobic Digestion, Small Hydroelectric, Renewable Fuels, Direct-Use Geothermal Energy

State	Grant Program(s)	Eligible Renewal Energy Technologies
	Solar Energy Incentives Program	Solar Water Heat, Solar Thermal Process Heat, Photovoltaics
	Wind and Geothermal Incentives Program	Wind, Geothermal Electric, Geothermal Heat Pumps
	High Performance Green Schools Planning Grants	Passive Solar Space Heat, Solar Water Heat, Solar Space Heat, Photovoltaics, Wind, Biomass, Geothermal Heat Pumps, Small Hydroelectric
	Small Business Energy Efficiency Grant Program	Geothermal Heat Pumps
	Pennsylvania Energy Development Authority (PEDA) - Grants	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Renewable Transportation Fuels, Fuel Cells, Geothermal Heat Pumps, Coal-Mine Methane, Waste Coal, Anaerobic Digestion, Small Hydroelectric, Other Distributed Generation Technologies
	Pennsylvania Energy Harvest Grant Program	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Renewable Transportation Fuels, Fuel Cells, Geothermal Heat Pumps, Anaerobic Digestion, Small Hydroelectric, Other Distributed Generation Technologies
Rhode Island	Renewable Energy Fund Grants	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Fuel Cells using Renewable Fuels
Tennessee	Energy Efficient Schools Initiative	Geothermal Heat Pumps
	Tennessee Clean Energy Technology Grant	Solar Water Heat, Photovoltaics, Wind, Solar Hybrid Lighting, Fuel Cells using Renewable Fuels
Texas	Department of Rural Affairs - Wind Energy for Desalination Program	Wind, Other Renewables in Conjunction With Wind (Must Be Associated With Providing Electricity for Desalination of Brackish Groundwater)
	Department of Rural Affairs - Renewable Energy Demonstration Pilot Program	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Tidal Energy, Wave Energy, Direct-Use Geothermal Energy
US Virgin Islands	Discretionary Grant Program	Solar Outdoor Lighting
Vermont	Clean Energy Development Fund (CEDF) Grant Program	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Wind, Biomass, Geothermal Electric, Fuel Cells, Geothermal Heat Pumps, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Microturbines
	Clean Energy Development Fund (CEDF) - Municipal Technical Assistance Grants	Photovoltaics, Landfill Gas, Wind, Biomass, CHP/Cogeneration, Wastewater Methane Recovery, Anaerobic Digestion, Small Hydroelectric, Other Distributed Generation Technologies
Wisconsin	Focus on Energy - Renewable Energy Grant Programs	Solar Water Heat, Solar Thermal Process Heat, Wind, Biomass, Solar Pool Heating, Anaerobic Digestion

Additional information on these grant programs can be obtained by logging on to a particular state's website or from the Database of State Incentives for Renewable Energy (DSIRE), [116] an online source that compiles information on state, local, utility, and federal energy incentives.

[116] *See* DSIRE Website, *supra* n. 8.

F. STATE AND LOCAL LOAN PROGRAMS[117]

Despite broad and growing interest in clean energy in the U.S., funding -- especially borrowing to finance clean energy investment -- remains difficult, if not impossible, to secure. While federal loan guarantees have attracted a great deal of attention and can be a valuable tool for securing or subsidizing large loan commitments, most installers, consumers and even smaller developers cannot make use of these programs which are competitive, expensive and targeted at projects with capital needs of more than $25 to $30 million.

For projects between $1 million and $25 million, it is often possible to structure debt financing based on the project's fundamentals. However, smaller projects such as smaller roof-top solar arrays or geothermal heat pumps can be extremely difficult to get financed on a standalone basis – the condition of the real estate market, combined with restrictive lending practices in the wake of the financial crisis, makes leveraging existing equity in a home or building limited to only a few eligible borrowers. As a result, many state and local governments have created or encouraged targeted lending and hybrid lending structures to help meet the demand for available, inexpensive capital to finance renewable energy projects. There are countless programs available and such programs range from having a very limited impact, to popular programs like the property assessed clean energy programs.

1. STATE LOAN PROGRAMS

Some state loan programs target commercial and industrial renewable energy producers. These programs typically have much higher loan limits, often coupled with

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very low interest rates. New Jersey's Clean Energy Solutions Capital Investment Loan/Grant Fund offered loans of up to $5 million at zero-interest borrowing for commercial, industrial and institutional entities with new state-of-the-art electric generation facilities.[118] While inadequate for funding utility-scale energy facilities, this type of program provides significant benefits to industries like solar photovoltaics that are used in medium to large roof-top settings.

Idaho's Low Interest Energy Loan program is typical of the more widely available small loan programs. The program offers loans with 4% interest rates and 5-year terms of repayment. Residential loans range from $1,000 to $15,000 and commercial loans range from $1,000 to $100,000.[119] While widely available, relatively modest caps like these, especially combined with short repayment terms, makes a program like this effective for only a limited pool of potential borrowers.

Other state loan programs concentrate on government, educational, hospital or other non-profit borrowers. Alabama's Local Government Energy Loan Program offers zero-interest, ten-year loans of up to $500,000 for local government and schools systems to support energy investment.[120] A program like this may exist only as an alternate incentive for development because the program requires the local government, which is ineligible for many federal incentives, to act as the borrower and owner of the facility, limiting the use of alternative ownership structures to access federal funding.

Finally, some state loan programs are exclusively aimed at residential properties. Connecticut's Energy Conservation Loan Program offers loans of up to $60,000, with

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[118] N.J. Admin. Code § 7:27D-1.1 *et seq.*

[119] *See http://www.energy.idaho.gov/financialassistance/lowinterestenergyloans.shtml.*

[120] *See http://adeca.alabama.gov/C3/Local%20Government%20Energy%20Loan%20P/default.aspx.*

below-market interest rates, for solar systems associated with single- and multi-family residences.[121] The terms of the loan, including the interest rate, varies depending upon the financial eligibility of the borrowers.

2. LOCAL AND UTILITY LOAN PROGRAMS

Loan programs have been established by local governments as well. These local governments often partner with area nonprofit organizations in establishing and maintaining the programs. New Generation Energy has worked with local governments in Maine, Massachusetts, New Hampshire, Rhode Island and Vermont to establish community loan programs, which offer loans of up to $100,000 and interest rates as low as 2% to finance solar energy projects.[122]

Public utilities have also established loan programs. The Sacramento Municipal Utilities District's Residential Loan program offers 20-year loans for photovoltaic installations at generally attractive rates.[123] Similar loan funds are offered by utilities in Arizona, Florida, New Jersey, South Carolina, Washington and Wyoming. The Pennsylvania Public Utility Commission worked with regulated utilities to establish the Sustainable Development Fund, which provides renewable energy loans ranging from $25,000 to $250,000, with interest rates from 5-6.5%, and terms of repayment as long as 25 years.[124]

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[121] Conn. Gen Stat. §§ 32-315 *et seq.*

[122] *See* http://www.*newgenerationenergy*.org/.

[123] *See http://www.smud.org/en/rebates/Documents/financing-form-2-09.pdf.*

[124] *See http://www.puc.state.pa.us/utilitychoice/electricity/green_clean.aspx# Sustainable%20Energy%20Funds.*

3. PROPERTY ASSESSED CLEAN ENERGY PROGRAMS

A relatively new financing platform for renewable energy projects are property assessed clean energy financing programs ("PACE"). Under PACE programs, local government use their bonding authority to raise funds, which the local governments then lend to public entities, private organizations or individuals in the local community to finance renewable energy projects. The borrowers of these funds repay these loans through additional assessments on their individual property taxes. The benefits to the borrower include: a long-term, fixed-cost financing option; a loan secured by property and not based on the property-owner's credit; a loan for a fixed-investment that transfers to the new owner upon sale of the property; and the potential to include the interest in a borrower's local property tax deduction from federal income tax. These programs can help satisfy community renewable energy goals without significant impact on local budgets because the programs leverage the private investment of the participating individuals and have no shared impact on non-participating taxpayers.

In order to implement a PACE program, local governments must have statutory authority to both issue the bonds and use the proceeds to finance renewable energy projects: typically, local governments create statutorily-authorized special assessment districts, similar to those used for other public goods projects. As these programs have gained rapid popularity, several states, including California, Colorado, Florida, Hawaii, Illinois, Louisiana, Maryland, Nevada, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Vermont, Virginia and Wisconsin, have passed laws authorizing local governments to establish PACE programs.

Berkeley, California, and Boulder, Colorado, have both used this authority to initiate high-profile PACE programs. In 2008, Berkeley established the Financing Initiative for Renewable and Solar Technology, which lends to property owners installing solar photovoltaic electric systems and allow the cost to be repaid over 20 years.[125] Boulder County, Colorado, authorized the issuance of $40 million in bonds to support a program that provides tax assessment "loans" from $15,000 to $50,000, which are repaid over 15 years at interest rates ranging from 6.75-8.75%.[126]

Opportunities for development support through state level lending programs can be an important consideration for clean energy developers and consumers. While the current programs are diverse and often limited in application, it is likely that these will be an increasingly favored tool going forward, especially given the manageable costs of operating these programs.

[125] *See http://www.berkeleyfirst.renewfund.com/.*

[126] *See http://www.bouldercounty.org/bocc/cslp/.*