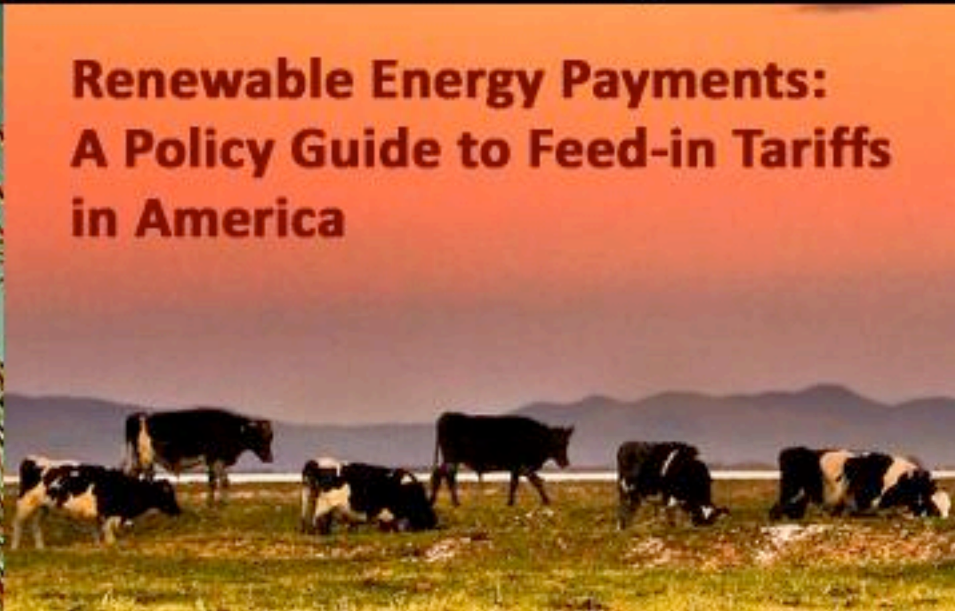
Renewable Energy Payments: A Policy Guide to Feed-in Tariffs in America



Prepared for:

EarthAction & the Alliance for Renewable Energy

EarthAction organizes campaigns focusing on the world's most pressing problems, with the mission to "inform and inspire people everywhere to turn their concern, passion, and outrage into meaningful action for a more just, peaceful, and sustainable world."[1] EarthAction was launched at the Earth Summit in Rio in 1992 and is now the world's largest network of organizations, policymakers, citizens, and journalists working toward a better world. Over the last 15 years, it has carried out 83 global campaigns on the environment, development, peace, human rights, and governance. Its current campaign is "Power to the People," promoting an innovative solution, Renewable Energy Payments (REPs), that gives everyone a chance to make a difference by producing, using, and selling renewable energy.

The Alliance for Renewable Energy is a coalition of energy experts, business leaders, non-profits, and concerned individuals who believe that REPs are the best tool to encourage a rapid shift from fossil fuels to cleaner renewable energy in the United States. ARE was created in Spring 2008, under the auspices of EarthAction, and has since been working on creating solid foundations for a full-scale, multi-track educational campaign in support of Renewable Energy Payment policies in North America.

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Foreword

The Alliance for Renewable Energy (ARE) was officially launched in October 2008. Despite our youth, our mission is ambitious, "to build awareness of and support for Renewable Energy Payment (REP) policies throughout North America." These policies, although well known and tremendously successful in Europe where they are called "feed-in tariffs," have been relatively unknown on this side of the Atlantic. Just as they have made Germany, Denmark, and Spain world leaders in renewable energy, we believe they can help us meet and exceed our renewable energy goals. Given the timeliness, importance, and enormity of our task, I was delighted and gave an enthusiastic "Yes" when I was contacted by faculty in the School of International and Public Affairs at Columbia University about having a dozen Master of Public Administration graduate students serve as consultants to ARE for the spring semester.

Working with this group has been both a pleasure and productive. This report is a result of their planning, research, and analysis. It will help us to educate policymakers, business and utility leaders, investors, environment and energy organizations, the media, and the general public about REPs. It covers the basics, analyzes critical concerns, compares REPs with other policies, and draws substantive and useful conclusions.

I am grateful for the time, energy, expertise, and enthusiasm that these Master students have brought to this project. I trust that this experience will be of benefit to each of them as they take the next steps in their lives in a world that will be increasingly powered by renewable energy.

Lois Barber
Executive Director, EarthAction
Co-chair, Alliance for Renewable Energy

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Executive Summary

Renewable Energy Payments (REPs) are a financial incentive to encourage production and use of renewable energy (RE). Utilities must guarantee contracted RE producers access to the electrical grid, and pay them a premium price over a guaranteed contract period, usually between 15 and 20 years. REPs are an innovative policy that has led Germany to become the world's largest producer of solar energy. It is now time for the US to scale up RE capacity. This policy has the ability to substantially increase the country's proportion of produced RE.

The Alliance for Renewable Energy (ARE) asked a group in Columbia University's Master of Public Administration Program in Environmental Science and Policy to research and analyze the current status of REPs in the US, in order to strengthen its campaign in support of this policy. To assist in this effort, the group undertook the following actions:

- Research and evaluate the benefits of REPs through comparative analysis of successful European models
- Provide ARE with strategic recommendations and tools to effectively promote REP policies in the US, concentrating on target states and stakeholders
- Create a "Green Standard" model for implementing REP policies in US states
- Create state report cards and adaptive materials to deploy in ARE's campaign

Through the analysis of European examples, we found that REPs:

- Attract extensive RE investment by reducing investment risks
- Substantially reduce the cost of RE over time, when properly designed
- Create jobs and stimulate economic growth
- Deliver benefits to a wide array of stakeholders

REPs are beginning to gain momentum in the US. Several states have designed and are implementing comprehensive REP policies. To assess these developments, we analyzed the energy profile and public comments to RE policies of five target states: California, Florida, New Jersey, Oregon, and Wisconsin, representing a broad sample of political landscapes and RE endowments. This allowed us to assess levels of stakeholder support of REP policies and informed the construction of a Green Standard model for implementation, including the following main Green Standard recommendations:

- Payment levels and systems should be clearly defined and properly calculated
- Programs should be limited in terms of contract duration and cap size
- REP implementation should consider the bounds of existing energy infrastructure
- REP policies must be compatible with existing policies
- Stakeholder involvement is essential to success of REP policies

No single policy design will suit every state, but this report outlines the key elements that policymakers should consider when designing REP policies within the unique context of an individual state. It thus serves as a guide to all those who are committed to the rapid expansion of RE in the US and especially to those seeking to implement effective REP policies in order to advance this goal.

Acronym Key

ARE: Alliance for Renewable Energy

CHP: Combined Heat and Power

DG: Distributed Generation

EEG: Erneuerbare Energien Gesetz (German Renewable Energy Sources Act)

EU: European Union

FERC: Federal Energy Regulatory Commission

FiT: Feed-in Tariff

GRU: Gainesville Regional Utilities

IEA: International Energy Agency

ITCs: Investment Tax Credits

kWh: Kilowatt Hours

LDC: Local Distribution Company

MW: Megawatts

MWh: Megawatt Hours

MWp: Megawatt Peak

NREL: National Renewable Energy Laboratory

OCE: Office of Clean Energy

OPA: Ontario Power Authority

PTC: Production Tax Credit

PV: Photovoltaics

PURPA: Public Utilities Regulatory Policies Act of 1978

RE: Renewable Energy

RECs: Renewable Energy Certificates

REPs: Renewable Energy Payments

RES: Renewable Energy Sources

RESOP: Renewable Energy Standard Offer Program

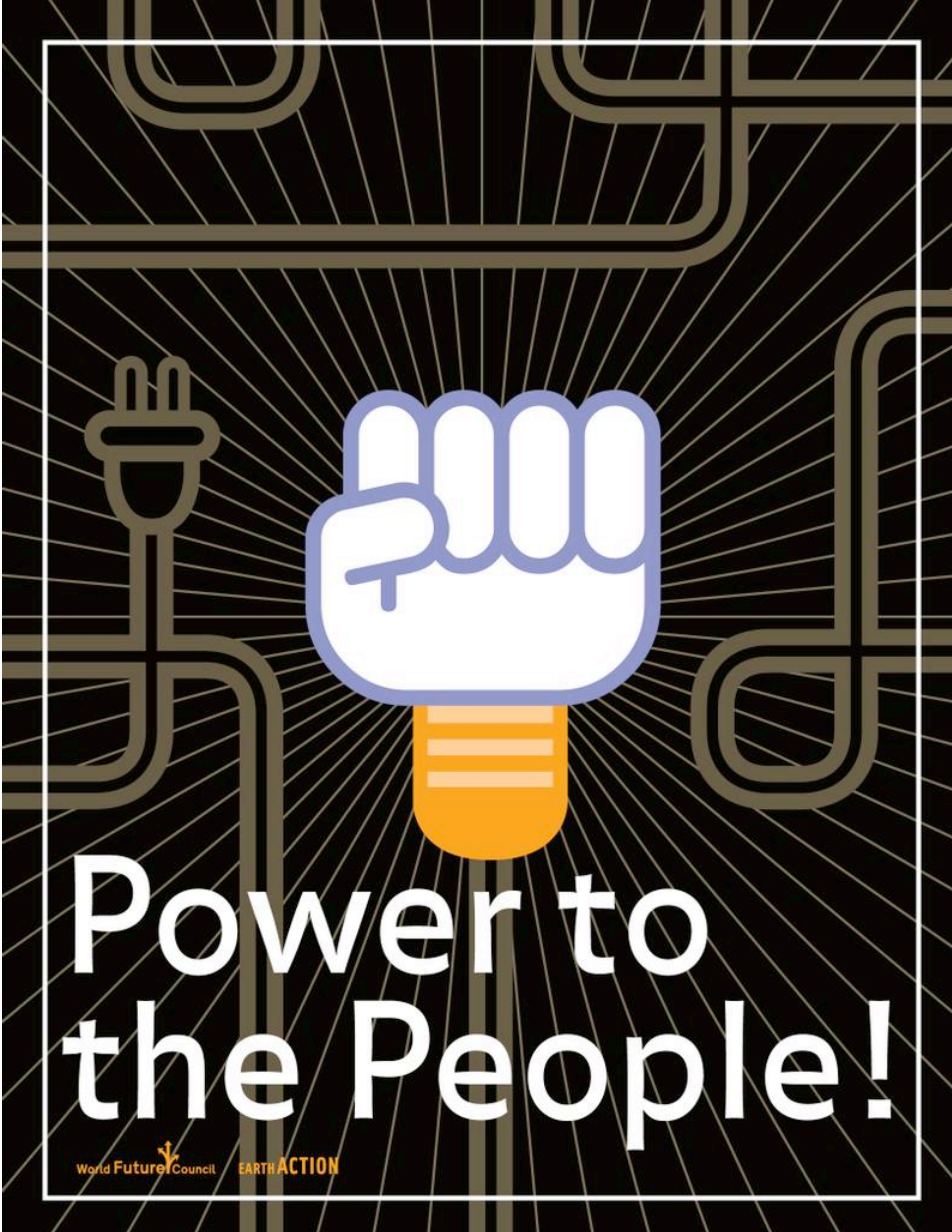
RPS: Renewable Portfolio Standard

SOC: Standard Offer Contract

TGCs: Tradable Green Certificates

TWh: Terawatt Hour

WTE: Waste to Energy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World Future Council
EARTH ACTION

Part I: Introduction

Historically, fossil fuels have been abundant and cheap, leading to their inefficient and rapid use. Their use, however, contributes significantly to greenhouse gas emissions implicated in global climate change. Furthermore, as worldwide demand rises, so do fuel prices, creating considerable international tensions as well as national concerns over future energy security.

According to the US Energy Information Administration, in 2008, coal combustion produced almost half of all electricity consumed in the US while natural gas produced just under a quarter of the supply. Nuclear energy, a zero-emissions source, supplied almost 20 percent of the country's electricity needs, but due to a host of political, safety, and cost issues, this source is not expected to grow significantly in the future. Renewable energy (RE) sources, such as wind, solar, and geothermal, comprise only 3 percent of total US electricity generation (see Figure 1) and must play an increasingly central role in any sustainable emissions reduction strategy.[2]

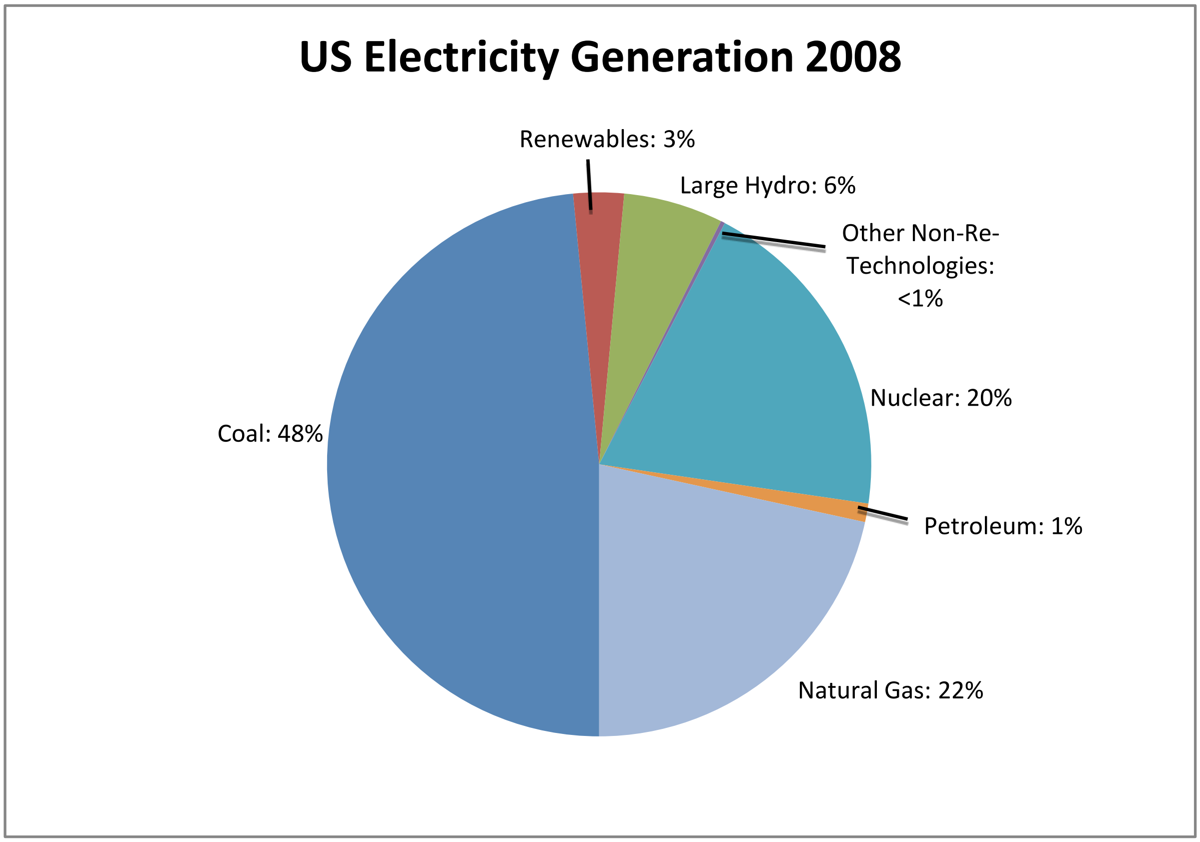


Figure 1: US Electricity Generation by Source 2008

Growing public awareness of the linkages between fossil fuel use and climate change has led to a resurgent interest in renewable energy sources that:

- Reduce greenhouse gas emissions and the risk of catastrophic climate change
- Improve energy supply security by lessening dependence on increasingly scarce fossil fuels
- Enhance economic competitiveness through new markets and jobs.[3]

The International Energy Agency (IEA) recently predicted that without new policies, the world's share of primary energy derived from renewable energy will stagnate at current levels between 2005 and 2030.[a] Effective policies promoting renewable energy development are therefore essential to accelerate its global production in the coming decades.[4]

The 2009 US stimulus package is one step towards fostering such policies. It provides for "over $30 billion to transform the nation's energy transmission, distribution, and production systems by allowing for a smarter and better grid and focusing investment in renewable technology."[5] The new federal administration has established "green" energy as one of its priorities, setting a national target of ten percent electricity produced from RE by 2012 and 25 percent by 2025.[6] Although these goals have not yet been written into law, production targets can create significant growth in the RE sector if accompanied by the right incentives (as discussed in this report). Proposed legislation that would establish a cap-and-trade system to limit CO_2 emissions has risen to the top of the current political agenda in Washington, but we find evidence that cap-and-trade will not in itself create sufficient growth in the RE sector. A case study in this report will detail the compatibility between cap-and-trade and Renewable Energy Payments.

What are Renewable Energy Payments?

Fossil fuel technologies have long dominated US electricity markets and maintain a financial advantage over RE, despite rapid technological advancement by the latter in recent years. Simply put, Renewable Energy Payments (REPs) are a financial incentive to encourage more people to produce and use RE. Under REPs, utilities must allow RE producers to sell electricity into the grid and receive a premium price. Regulators determine these rates, which are typically fixed for a period of 15 to 20 years in order to ensure a guaranteed return on investment. Rates can be differentiated depending on the technology, location, or project size, and can also be set to decline at a fixed pace over time as the renewable producers become more competitive in the market. REPs provide critical support to emerging RE technologies by shielding them from competition with more established technologies until their maturation is complete. The Alliance for Renewable Energy (ARE) calls Renewable Energy Payments (REPs) "the most successful renewable energy incentive in the world."[7]

REPs go by many names. In Europe, where REPs have been widely and successfully implemented, they are known as feed-in tariffs (FiTs). In North America, they have been called Standard Offer Contracts, Advanced Renewable Tariffs, Renewable Energy Rates, and Renewable Energy Dividends. **It is essential to note that these terms all refer to the same mechanism.** We will use "REPs" throughout this report because the policy was first introduced in the US House of Representatives as "Renewable Energy Payments."

In the US, REPs may be instituted at any level of government, whether federal, state, or municipal. Although a bill promoting REPs at the federal was introduced in May 2008 by Rep. Jay Inslee (D-Washington), the bill was not passed.[8] The initiative has not faltered, however, due to strong interest of constituents who have encouraged state legislatures and public utilities to take the lead. In fact, several states have designed and are implementing REPs that are more comprehensive and progressive than was originally proposed at the federal level. They may well serve as models for an integrated national energy policy that addresses both energy security and climate change.

Report Focus, Goals, and Methodology

This report focuses on the development of REPs at the state level because they have so far been most innovative and quick to adopt RE policies. We address the following three questions:

[a]Renewable Energy Policy Network for the 21st Century 2007 report considers that RE produces 18% of world energy, but this encompasses nuclear and large hydropower. This report considers RE "new renewables," that is, modern biomass, small hydro, wind, solar, geothermal and biofuels, but these constitute only 3% of global energy production (REN 21, 2008).

- What policies and political factors build momentum for RE deployment?
- What successes and failures should states bear in mind when implementing REPs?
- What policy considerations must federal legislation assess?

ARE requested us to strengthen its ability to engage in a three-year, full scale, multi-track, educational campaign in support of REPs in North America. As part of ARE's "campaign in motion," this project had four main goals:

- Research and evaluate the benefits of REPs, notably through the comparative analysis of successful European models
- Provide ARE with strategic recommendations and tools to effectively promote REP policies in the U.S, concentrating on target states and stakeholders
- Create a "Green Standard" model for implementing REP policies in US states
- Create state report cards and adaptive materials for action kits to deploy in ARE's campaign

Methodology

The ARE Steering Committee requested this report address eight key questions about REP implementation in the US (see following chapters), providing key information on advantages and disadvantages of REPs, the European experience with this policy, and considerations for potential US legislation.

As a second research focus, our team examined five states that have either implemented or are considering implementing REPs: California, Florida, New Jersey, Oregon and Wisconsin. These states, selected based on their RE endowments and diversity of their political landscape, have experienced recent legislative breakthroughs in RE policy and have considered a variety of REP policy features in legislative design. Collectively, they serve as a comprehensive overview of current REP policy progress in the US.

In order to assess implications for future implementation and monitoring, each focus state was evaluated using:

- Background research on energy supply and demand, as well as RE policies
- Assessments of stakeholder support and opposition
- Public comments on existing RE policies and specific REP programs when available

As REPs are a relatively new concept in the US, there is no blueprint for best implementation strategies. There are also challenges in thoroughly understanding synergistic effects of political and economic dynamics in each focus state and resulting receptiveness towards REP policies. Therefore, rather than prescribing detailed implementation solutions, our research team focused on highlighting concerns raised by stakeholder groups and key considerations necessary to advance REP policies. Case studies on regulatory proceedings for each focus state are included in Appendix B of this report.

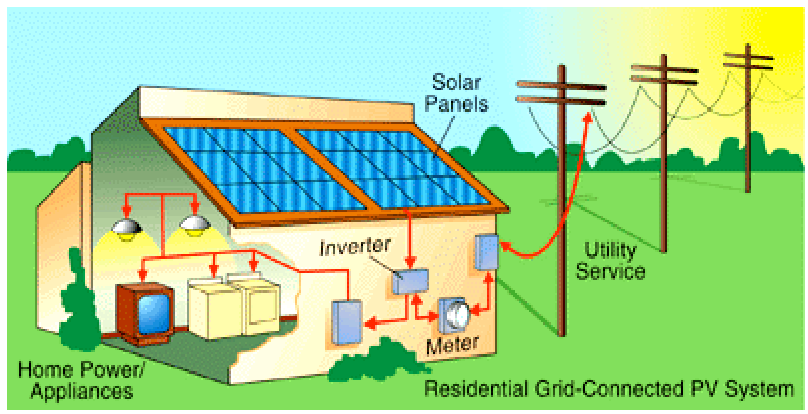
Overview of Renewable Energy Sources

Any discussion of a RE policy must begin with an understanding of the primary types of RE sources. What is considered RE is often a subject of contention. For this project, we chose five sources that we consider the main focus when discussing REPs.[b] These sources also correspond to the main RE sources being developed in the EU:

Wind: Kinetic energy is converted to electricity through the propulsion of wind turbines, and then fed into the electric grid. The turbines can work alone or in clusters called wind farms. Farmers, municipalities, and energy cooperatives have traditionally operated single turbines, while wind farms are more often industrial operations that require substantial additional investment. Wind power has recently undergone important technological improvements, resulting in a global 30 percent annual growth between 2000 and 2004 and installations in more than 70 countries.[9,10] Its primary disadvantage is that electricity is generated only when wind is blowing, resulting in intermittent energy supplied.[11] New technologies are being developed to deal with this issue, however, such as compressed air energy storage, which utilizes the excess energy generation to power compressors. These compressors can then be used to turn high-speed turbine generators when wind speeds are below optimum.

Solar: Two primary solar generation technologies are:

- **Photovoltaics (PV)** transform sunlight into electricity through the photoelectric effect. In very simple terms, PV cells are arranged in panels capturing solar radiation to generate electricity. Grid-connected solar PV is the fastest-growing power generation technology in the world. In 2006 and 2007, cumulative installed capacity increased annually by 50 percent.[12] Although PV generation is also intermittent, reliable insolation data makes it a predictable energy source.[13]

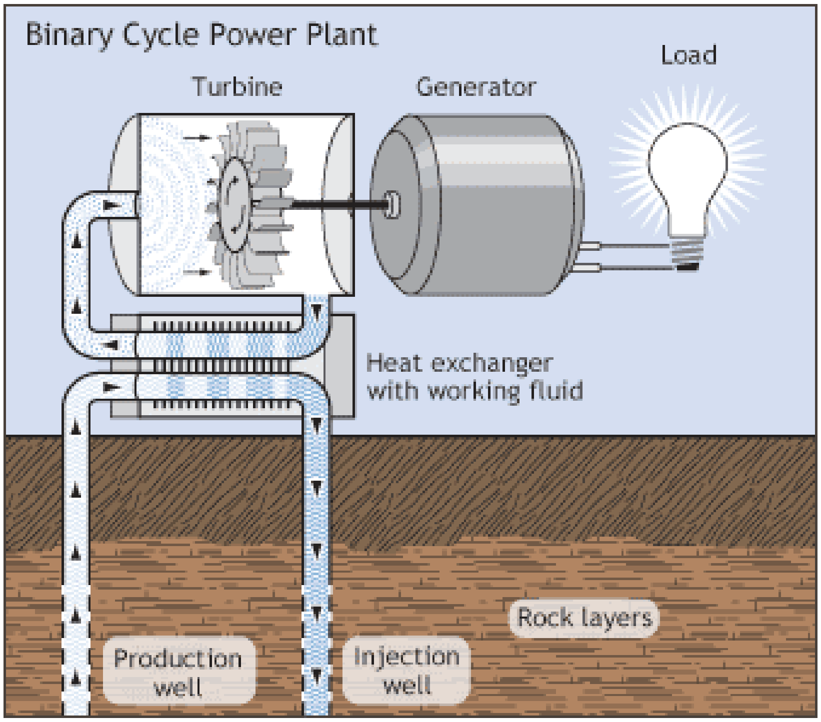


Grid-Connected Photovoltaic System

- **Solar Thermoelectric** converts the heat generated by the sun to electricity on a commercial scale. Its three main technologies are: power tower systems, parabolic trough systems, and parabolic dish systems.[14] In the same way as PV, solar thermoelectric is intermittent but dependent on sunlight that is relatively predictable.

Small Hydropower uses the gravity potential of water to drive turbines to produce electricity. Although there are fewer negative environmental effects than with large hydropower (large dams generally flood entire valleys), small hydropower installations can still detrimentally impact ecosystems.[15]

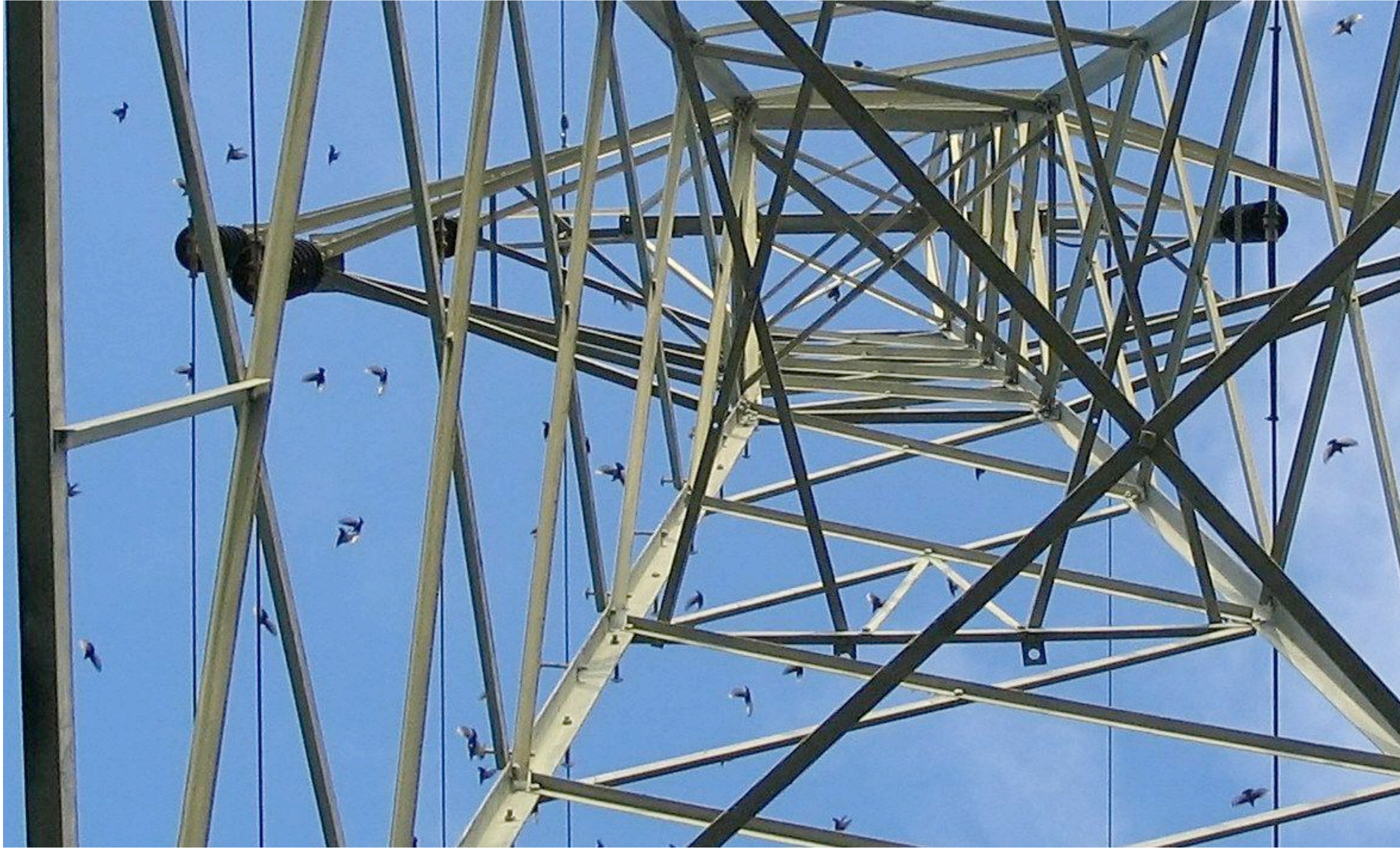
[b] This is not an exhaustive list and is not meant to be a comprehensive analysis. Although many analysts consider nuclear and large hydropower renewable sources, we consider their environmental drawbacks as too controversial to qualify.



Geothermal Energy Production

Geothermal energy originates in the Earth's interior where water from the surface is heated, and rises as steam which can be piped to a turbine to generate electricity.[16] The US has the largest installed geothermal capacity in the world and great potential for more.[17]

Biomass or Biofuels use organic matter such as plants, municipal waste, and animal waste to generate electricity. The most common process burns matter to generate steam, which then powers a turbine. Alternately, anaerobic digestion is a technology that traps methane released from organic waste and transforms it to electricity. Whether biomass power generation qualifies as an acceptable renewable energy depends on its energy return on investment.[18] The energy produced has to be greater than the energy put into producing the biomass in the first place. First generation biofuels, such as corn or palm oil grown explicitly as a fuel source, require considerable energy inputs and produce significant CO_2 emissions. Second generation biofuels, however, reclaim waste products such as manure or used oils. Many new technologies are being developed to harness biomass energy in a sustainable manner.



Part II: The Case for REPs

Political leaders in the US have broadly recognized the need to mitigate climate change and reduce energy dependence. We examine the reasons why REPs effectively address these challenges. We will make the case that REPs:

- Attract extensive RE investment by reducing the investment risks that have plagued the sector
- Substantially reduce the cost of RE over time, when properly designed
- Create jobs and stimulate economic growth
- Deliver benefits to a wide array of stakeholders, thus making them politically attractive

Part II draws upon Germany's Renewable Energy Sources Act, commonly known by its German acronym, EEG. The EEG, enacted in 2001 and subsequently revised, has been the most successful FiT to date and thus illustrates the great promise that REPs hold for the US. Under the EEG, Germany has attained an installed wind capacity of nearly 24,000 MW[19] and has met its 2010 target of 12.5 percent renewable electricity three years ahead of schedule.[20]

Part II also discusses a common alternative RE incentive mechanism known as Renewable Energy Certificates (RECs). A REC is a document certifying that a unit of electricity has been produced from a RE source. RECs are typically used in conjunction with Renewable Portfolio Standards (RPS), which mandate that a certain share of the electricity consumed in a specified jurisdiction (state or national, for example) is generated by RE sources. The use of RECs allows the benefits of green power to be traded separately from the unit of energy generated such that utilities can offset CO_2 emitting generation by supporting the development of RE sources.[21] RECs are used in many US states to meet RPS obligations, and we compare their effectiveness in developing RE capacity to that of REP policies.

REPs and Investment Security

In Brief

Proponents of RE see it as a critical tool in the fight to slow climate change. If renewable technologies are to play this role, the US will require massive investment to install enough clean electricity capacity to replace existing carbon-emitting power plants and compensate for growing demand. Unfortunately, RE projects typically offer highly uncertain long-term returns and require large initial expenditures, discouraging potential investors. Public policies must therefore counter this signal if they are to effectively engage the financial sector.

REPs are far more successful at attracting RE investment than alternative mechanisms such as RECs, because they eliminate the risk premiums in otherwise financially-attractive RE projects. Critics charge that REPs improperly distort capital markets by virtually eliminating this risk signal.[22] Yet when rapid RE deployment is a national priority, RE developers must have access to reasonably affordable capital so projects can move forward. Hence, REPs enable RE investment where the market does not, and they do so by providing the investment security of long-term fixed-rates to RE development financers.

Why Does Investment Security Matter?

Investors want to reduce their risk because lower risk leads to lower capital costs, making RE projects cheaper and easier to finance (see Figure 2).[23]

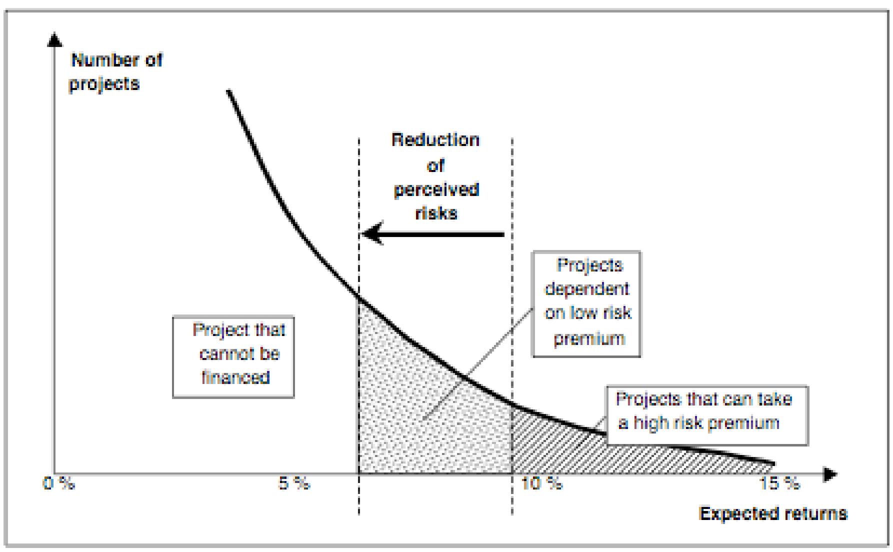


Figure 2: The number of economically feasible projects as a function of expected return.

As shown in Figure 2, the lower the risk premium, the greater the number of projects an investor can finance. Conversely, lowering the risk premium associated with a type of project reduces the rate of return that investors will expect if they are to finance a given number of projects. A policy that reduces investor risk, such as REPs, can both increase the capital available to RE developers and reduce the amount they must collect from ratepayers in order to compensate investors.[24]

The cost of a specific RE technology is highly dependent on the cost of capital, which is affected by three types of risk: *price, volume,* and *balancing.* These are notably affected in turn by *innovation* and *regulatory* risk. While no policy can negate all of these risks, those that present the largest risk reductions will lower the cost of capital, and thus operate most efficiently.

What detracts from investment security?

Price risk stems from the volatility of electricity markets. A REP that guarantees a fixed price, such as the German EEG, eliminates the price risk for the investor. Other policies (including RECs, tax credits, and premiums paid in addition to the market price) raise the expected rate of return on RE investment but do not negate price risk. Hedging or futures contracts are other ways to reduce price risk, but these contracts are usually associated with high fees and thus require higher levels of capital investment.[25]

Volume risk is the danger that RE facilities will not be able to sell their output.[26] Building a wind farm in a remote part of the Midwest, for example, currently holds a large amount of volume risk because there are significant uncertainties about transmission installations. Thus in many windy but remote areas of the Midwest, the volume risk is too high for serious growth to take place. Additionally, volume risk is high even in areas where transmission exists, as long as utilities have the option *not* to buy RE power. REPs are structured so that there is no volume risk because utilities are required to buy all of the power from the RE generating facilities.

Balancing risk is associated with the load profile that is produced by a RE generator. Some RE sources (e.g. wind and solar) produce intermittent power, and thus an unreliable load profile. Electricity grid regulators usually penalize a load profile that is unreliable, but REPs mandate a fixed price per kWh be paid regardless of when the electricity is delivered. This transfers balancing risk from the RE generator to the electricity grid regulator, who must then increase the supply from base load providers when the wind does not blow or the sun does not shine.[c]

Innovation risk is another form of risk that can have a significant impact on investors. The danger that future advances in RE technology will render current technologies obsolete adds considerably to the price and volume risks associated with investment in new capacity. While innovation that reduces consumer costs is desirable, its contribution to price uncertainty has been known to hinder RE deployment. Under the U.K.'s Renewables Obligation (RO) law, for example, utilities declined to offer RE generators medium- or long-term contracts for fear of being locked in when prices fell.[27] REPs, however, can be structured to promote innovation. The German feed-in law, for example, promotes innovation while still managing risk by reducing the kWh price by 1.5 percent in relation to the same technology installed in the previous year.[28]

Regulatory risk, or the threat that regulatory or statutory revision poses to the security of RE investment returns, considerably affects investor confidence as well.[29] Regulatory risk cannot be eliminated entirely, but different policies provide investors with varying levels of protection from the whims of politicians and administrators.[30] REC markets, which are artificially created by the state, are subject to dislocation if the state changes the rules or targets that govern them.[31] As noted above, REPs force utilities to sign long-term contracts for the purchase of RE, which are difficult to abrogate even if the state later changes its policy. Keeping the financing of the support scheme outside of the government budget, as the German EEG does, is another way to mitigate regulatory risk.[32]

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[c] As RE generation becomes a larger portion of a nation's electricity profile, however it will become essential for renewable generators to provide reliable loads. If a REP system does not take account for unreliable power, then there is no incentive for renewable generators to improve their technologies (Mitchell et al., 2006). This is a major point of contention around REP systems, and when designing an effective REP system policymakers must find ways to reduce balancing risk while also maintaining incentives to improve the load reliability of RE generators.

How has investment security affected RE policy outcomes?

REPs attract greater RE investment at a lower cost to consumers. Ecofys, a renewable energy consultancy, determined that RE incentive policies attentive to risk reduction can reduce the cost of RE by 10-30 percent. It credits REPs in various countries with achieving reductions of over 20 percent of the cost of wind and PV electricity generation.[33] Moreover, countries implementing REPs have experienced far stronger growth in RE investment than have countries implementing RECs, due to differing investment security merits rather than differences in incentive levels.

Germany and England

The United Kingdom (UK) was the first European Union (EU) member state to adopt a RPS that utilities meet through the purchase of tradable RECs.[34] As of 2003, the total per-kWh remuneration offered to RE generators in England[d] was comparable to the price mandated by the German EEG.[35] Yet the UK has failed to meet even its own modest RE targets,[e] let alone rival Germany's growth. As of 2004, the German share of total installed wind capacity in the EU was 49 percent, more than 20 times greater than that of the UK.[36]

The primary reason for these different policy outcomes is that high risk premiums have dissuaded RE investment in the UK. Only large, integrated companies have proved able to overcome the price and volume risks associated with REC markets.[37] Although wind conditions are more favorable in the UK, electricity from wind is on average two cents cheaper per kWh if produced in Germany where investment conditions are more favorable.[38] (This cost differential will be explored more thoroughly in the following section.) The UK Parliament has effectively acknowledged the REC market's deficiencies by modifying its policy in the Energy Law of 2008, which provides for the implementation of REPs for small facilities beginning in 2010.[39]

Can Germany's Success Translate to America?

As a result of the EEG, Germany has become the world leader in RE investment. Green capital investment totaled $14 billion in 2007, and the professional services firm Ernst & Young ranked Germany first on its recent index of the most attractive RE investment markets. Moreover, the EEG's investment security guarantee has shielded the German RE sector from the havoc that the global financial crisis has wreaked on the rest of its economy.[40]

American RE firms have not been so fortunate. Christopher Stolarski, Senior Vice President for Power, Renewables, and Infrastructure Project Finance at Mizuho Corporate Private Bank, explains that the tax incentives favored in the US only appeal to firms with large tax burdens to reduce, which is a somewhat select group even in boom times.[41] As pre-tax profits have shrunk since 2007, the number of primarily large financial institutions taking advantage of production tax credits for wind farm investors has been reduced from 18 to four.[42] Moreover, notes Stolarksi, "the constant specter of the expiry of the subsidy" has been a primary obstacle to RE firms whose attractiveness to investors depends on annual congressional action.

The recently-enacted US stimulus package has addressed some of these concerns. RE developers will be eligible for direct federal grants rather than tax write-offs through 2010, and the production tax credit will not expire for three years. Investors have responded positively to the risk reduction these measures provide, but with credit markets frozen they are no substitute for REPs.[43] Because they are "immensely financeable," Stolarski sees REPs as the most

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[d] This amount includes the market price of electricity plus the value of all RE incentive payments, including the value of RECs. Note that remuneration rates for solar PV were actually much higher in Germany than in the UK, but growth in this sector has been relatively insignificant compared to growth in deployment of other technologies, such as wind, for which remuneration rates in the two nations were comparable.

[e] In theory, RPS ensures that installed capacity targets will be met regardless of cost, but the UK instituted a "buy-out price" to cap total expenditures on the RO (Mitchell et al., 2006). This type of provision undermines the theoretical objective of RPS policies, but is often proposed for political reasons, as it was in the UK.

straightforward way to draw the necessary liquidity to RE development in the US. Ernst & Young's 2008 RE attractiveness study concurs, finding that investors prefer REPs, especially in uncertain times.[44]

Conclusion

Policymakers must reduce the risks associated with RE financing if they hope to stimulate sufficient levels of investment. REPs virtually eliminate most of the risks that currently limit RE development in the US. This is one of the primary reasons why REPs have been so successful at promoting RE growth in Germany and Denmark. REC-based incentive mechanisms, which leave investors vulnerable to price, volume, and balancing risks, have no similar record of success. Since extensive RE deployment is a national priority, it is inappropriate to subject renewable projects to the kinds of risk that private enterprises typically face. REPs are therefore an attractive option for policymakers looking to provide the security that RE investors seek.

Investment Security in New Jersey

Beginning in 2006, the New Jersey Board of Public Utilities' Office of Clean Energy (OCE) considered various incentive mechanisms aimed at achieving the state's RPS. OCE hired Summit Blue Consulting to evaluate mechanisms for achieving the RPS's solar energy targets. Summit Blue analyzed seven policies, including REPs, in terms of their economic impact to ratepayers. Its principal findings on REPs were:

- REPs manage regulatory risk, while REC markets are vulnerable to dislocation, caused by periodic revisions to RPS goals or REC market rules
- REPs have the lowest ratepayer impacts, due to the low risk premium assigned by developers to the stream of incentives from the set tariff, and applied across a range of assumed discount rates, risk premiums, annual installation targets, and project sizes
- Under baseline assumptions, Summit Blue concluded that the RPS would cost ratepayers 58 percent more if it were met through the use of RECs as opposed to REPs[1]

A wide variety of stakeholders weighed in on Summit Blue's report and the pending OCE decision through the comment process. Most of those who addressed the REP option were supportive. Pfister Energy, a renewable energy systems manufacturer, was one of several parties to recommend that OCE adopt REPs because of their investment security merits. "Replace the [REC] trading system with a tariff system," wrote Pfister's Tom Ryan. "Please reduce the overall cost to the rate base by removing the contingency that comes with risk."[2]

Despite opting for an REC mechanism, OCE acknowledged that the elimination of uncertainty made REPs very attractive to project investors.[3] Overall, the episode confirmed that renewable energy developers are enthusiastic about the investment security offered by REPs and that in many cases this security will reduce the ratepayer burden associated with meeting renewable energy targets.

[1] Kallock, Bill, Nicole Wobus, Kevin Cooney, and John V. Anderson. "An Analysis of Potential Ratepayer Impact of Alternatives for Transitioning the New Jersey Solar Market from Rebates to Market-Based Incentives." Summit Blue Consulting. Prepared for New Jersey Board of Public Utilities, Office of Clean Energy. 25 Apr. 2007. Retrieved 1 Mar. 2009 from: http://www.summitblue.com/dyn_downloads/nj-bpu_sacp_rpianalysisrep_042507.pdf

[2] New Jersey Renewable Energy Solar Market Transition. Discussion Paper. New Jersey Board of Public Utilities. Office of Clean Energy. 2 Aug. 2007. Retrieved 1 Mar. 2009 from: http://www.njcleanenergy.com/files/file/OCE%20Solar%20Discussion%20Mtg%208-9-07%20fnl.pdf

[3] New Jersey Office of Clean Energy (2007)

REP Cost Analysis

In Brief

Implementing renewables is a costly endeavor. Much of the nascent RE technology is still relatively expensive compared to traditional energy such as coal and natural gas.[45] REPs have the potential, however, to maximize a nation's or state's proportion of RE generated at the lowest cost. As detailed in the previous section, REPs lower RE developers' cost of capital, which lowers the overall cost of generating RE. Here we will show that when properly designed, REPs allow a fair return on investment, prevent windfall profits to generators, and equitably distribute costs to all ratepayers.

REPs are the most cost-effective policy for stimulating RE growth for two reasons. First, the REP can be designed to have a declining tariff over a 15 to 20-year period, reducing windfall profits to generators. Secondly, when the REP requires an equitable share of costs among all ratepayers, it reduces the impact of elevated RE systems costs to society.

Two energy policies are most frequently employed in the EU: the RPS, a quota system, and the FiT, a fixed payment system. In several instances, the FiT has been used for increasing the RE share in a jurisdiction's energy portfolio. Comparison of these systems reveals two contrasting methods of implementing RE systems:

- **Renewable Portfolio Standard (Quota)**:
  - Attempts to place downward pressure on RE costs, leading to lowest cost deployment of RE technology and lowered electricity rates.[46]
  - The primary weakness is that profit is linked to the number of megawatts (MW) of installed capacity rather than megawatt hours MWh generated. Due to this loophole, investors can profit without being connected to the grid and thus without actually providing energy to consumers.
- **Feed-in Tariff (Fixed Payment):**
  - Under this performance-based mechanism, the tariff offers incentive for improvements in efficiency. These efficiencies result in lower overall electricity rates.
  - Profit is linked to generation. Investors/generators only receive payment when systems are generating electricity on the grid.

Examining the FiT and the RPS

This section will contrast costs and ideology for the RPS/RECs and REPs, using the UK and Germany as showcases that use the RPS/REC model and a FiT, respectively.

The RPS in the UK is based on the concept that competitive markets and trading lead to the lowest-cost deployment of a technology. Under the RPS system, RECs are created for every MWh generated from a RE source. Ideally, these are traded between utilities to reach their RE generation obligation, which creates an incentive to generate RECs cheaply. The traditional economic view posits that this type of competition will place downward pressure on the price of generation; however, optimal economic designs tend to be hindered by the institutional complexities of the real world.[47]

The German FiT creates a set rate structure with the RE generator for a 15 to 20-year period of time. As opposed to forcing utilities to meet an obligation, the FiT creates an incentive for non-utility generators to join the electricity generation business. The FiT encourages the disaggregation of electricity production and in turn discourages the manipulation of prices by a few large firms.[f]

[f] In the UK few firms supply most of the market; therefore, these firms have a vested interest in the stability of RECs and will take actions to ensure that the prices do not "crash" (Toke, 2007). The result of this dynamic is that RE generators, which are also controlled by a small number of firms, will restrict overall supply (Mitchell et al., 2006). Because of the dynamics in the UK electricity markets, utilities exhibit behavior that seriously deviates from the perfectly competitive market model.

Utilities in many countries have resisted FiTs, however, claiming that the mechanism creates windfall profits for RE generators and dramatic increases in ratepayer burden.

Table 1 examines the differences between the UK under the RPS/REC and Germany under the FiT. For reference purposes, the UK refers to the RPS as Renewable Obligation (RO) and the REC as Renewable Obligation Certificates (ROC).

	UK RPS (2005/06)	German FiT (2006)
Term of Mechanism	RPS targets determined through 2027	Tariff rates valid for first 20 years of operation (through 2026 for a 2006 installation)
Level of Support	0.12 - 0.15 USD /kWh	0.05 - 0.16 USD /kWh
Total Power Sales	329 TWh	611 TWh
Total Annual Cost of Support Mechanism to Ratepayers	827m USD	2,750m USD
Unit Cost of Mechanism to Ratepayers per kWh Total Power Sales	0.0026 USD /kWh	0.0044 USD /kWh
Renewable Electricity Production	18.1 TWh	72.7 TWh
Unit Cost of Mechanism to Ratepayers per kWh of Renewable Electricity	0.046 USD /kWh	0.037 USD /kWh

Table 1: Cost to Consumer Comparison, FiT to RPS[48,49]

Table 1 shows German ratepayers in the FiT system pay a quarter less than their UK counterparts using the RPS—a significant decrease, particularly considering four times the RE production exists in Germany as compared to the UK.

Additionally, it is important to consider how these rates are determined to understand how costs would be affected in any given electricity jurisdiction. Again, using Germany and the UK as a model to compare a quota system and a fixed payment system, Table 2 compares the effects of both RE policies on ratepayer costs, spot market prices, transmission costs, and the associated price risk.

	UK RPS System	German Feed-in Tariff
Return on Investment for RE generator ($/kWh)	$171.61	$120.38
Effects on ratepayer costs	Generators sell electricity on market or make long-term contracts with electricity retail companies; rate increase is dependent on contracted price of RE and traditional energy prices, as determined by market conditions	System operator adds costs into rate pool for forward pricing, redistributed to all ratepayers
Effects on spot market prices	Not known (renewable penetration too low to determine figure)	Reduced by $8-$10.65/MWh
Effects on transmission costs	Interconnection paid by generator, system reinforcements paid by system operator, costs passed to consumers. Costs have increased due to large demand.	Interconnection paid by generator, system reinforcements paid by system operator, costs passed to consumers.
Price Risk	Quotas expose the RE generator to two risks: electricity price risk and certificate price risk. This risk premium trickles down to ratepayers.	The tariff transfers risk from RE generators to all ratepayers, who face fluctuating market prices while taking on the fixed price of the FiT. Ratepayer risk is minimal as the electricity generated by the tariff represents a small portion of all electricity generated.

Table 2, Quota System vs. Fixed Price System[50]

There is no straightforward answer to which policy is most effective in lowering costs for ratepayers, as both policies leave ratepayers exposed to market electricity prices. There are many variables to account for, such as rate design, state of liberalization, and other existing support policies. One study, however, determined that previous FiTs in Germany were quite small; they "represented [over] three percent of the costs for a kWh of household electricity."[51] This rate translates to an average ratepayer cost increase of $2.04 USD per month and $24.48 USD per year. This cost is relatively insignificant when accounting for the amount of RE installed in Germany under the FiT, which increased from 4.5 percent of electricity consumption in 1997 to 14 percent in 2007.[52] This comparative case study illustrates the cost-effectiveness of FiTs, as a small price increase per household accounts for a significant increase in overall RE generation.

Examining Ratepayer Costs in a Deregulated System

One complication of US electricity market design is that some electricity markets are deregulated, such as in California and New York. This introduces complexities when discussing the application of REPs, as it requires appropriate market design to ensure a fair cost distribution between utilities and ratepayers. Fair cost distribution is important for public acceptance of the policy, particularly because REPs ensure that all ratepayers share costs.

In a deregulated electricity sector, ratepayer costs could be uneven within one particular jurisdiction, producing a potential imbalance of costs for distribution companies. Ontario, Canada presents an interesting example of a deregulated market using REPs. Ontario deregulated in 1998, and now has one primary system operator, the Independent Electricity System Operator (IESO) and one primary generation company, the Ontario Power Authority (OPA), as well as several other generation companies and many distribution companies that service end-user customers.

Under the REP mechanism currently in place, RE generators participate through the following steps:[53]

1. Connect to the grid through the assistance of their local distribution company (LDC) or utility
2. The IESO settles with the generator for MWh supplied to the grid at market price
3. The OPA settles with the generator for MWh supplied to the grid at contract price less the IESO settlement

Under deregulation, customers are able to choose their supplier, or LDC, based on lowest cost. If there were not strict caps on allowances or an explicit equal share of contracts for all LDCs, the LDC would be required to contract with every eligible RE generator, thereby pushing electricity rates upward for that particular distributor. Rising rates in one jurisdiction would encourage ratepayers to switch to an LDC with a lower percentage of contracted generators. Because generators are locked into a long-term contract with their chosen LDC, the rates for that pool of ratepayers would increase as customers left for a lower-rate LDC.

The potential for uneven ratepayer increase is substantial in a deregulated jurisdiction, particularly if each LDC does not have a specific allotment for generation at the REP price. In the past, Ontario accounted for province-wide price increases through a global adjustment charge**,** which pooled all new costs together and distributed them to all ratepayers as a separate tax on their electricity bills. This issue must be accounted for when designing a REP policy in deregulated sectors and further study must be conducted on this topic to determine necessary market design in a deregulated market.

Designing Tariff Rates and Structure: A Case Study in Gainesville, Florida

A REP was enacted in Gainesville, Florida in February of 2009. This makes Gainesville the first jurisdiction to adopt a REP that is methodologically based on the cost of RE generation, i.e. considering the type, size, and location of the system that sets a tariff price including a RE profitability standard (a five percent rate of return). The policy covers only solar PV generation and is intended to encourage development of small-scale, distributed generation. It was implemented with the support of Gainesville Regional Utilities (GRU), the regulated municipal utility. This program reached its cap of four MW within the first day of implementation. Compared with the complex market design in Ontario, prices are easily distributed for Gainesville consumers, as all transmission, distribution wires, and other associated services and equipment are owned by GRU.

GRU held a workshop in November 2008 soliciting comments from important stakeholders, such as solar contractors, business leaders, and ratepayers.[54]

Comments included:[55]

- Increasing the tariff from $0.26/kWh to $0.32-$0.46/kWh to ensure investor participation, suggesting that the tariff be determined by first establishing a reasonable rate-of-return for the investor[g] and then working backwards to settle on the most cost-efficient tariff. (The tariff was adopted at $0.32/kWh.) Gainesville determined this would encourage a higher amount of investor participation, guaranteeing the policy's success
- Installation costs should be covered by the generator and not be included in the tariff rate. This ensures the generator will account for all system and installation costs, and an undue burden will not fall on ratepayers

Tariff Structure

After further deliberation of fair tariff rates, the law was passed February 9, 2009. (See Appendix B Part 2 for rate structure). The law included comments from the workshop including the initial tariff rate of $0.32/kWh and maintaining this rate for two years. Other provisions from the law include a declining structure over a 20-year period and that GRU will have ownership of RECs and Carbon Rights.[56] This encourages steady implementation of solar PV over a 20-year period for Gainesville.

Rate Design

The Gainesville tariff was structured by first collecting PV system cost information, then designing an analysis model to test scenarios with varying criteria, and finally selecting the feed-in tariff that performs best as a secure overall investment.[57] FiTs should be designed to still allow RE systems to respond to market signals by scheduling their operations in accordance with market prices, leading to societal benefit from decreasing costs.[58] This calls for a decreasing support structure annually or biannually, similar to the structure implemented in Germany.

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[g] Stakeholders suggested a five percent rate-of-return as a reasonable share.

Small Cost Increase

Quotas have already been filled for a four MW per year cap for 2009 and 2010, meaning customers can expect an eight MW increase of solar PV energy into their rate base. Ratepayer costs are expected to increase by an anticipated additional $0.75 per month to the customer electricity bill.[59] The rapid fulfillment of the '09 and '10 cap demonstrates a successful beginning to Gainesville's FiT program.

Benefits to Economy

According to GRU, the economy is already benefiting from investments made through the FiT. "I'm seeing it with my own eyes—[the FiT] is really having a good effect on our local economy, particularly in these hard times," said Ed Regan, the Assistant General Manager for Strategic Planning of GRU.[60]

Conclusion

It is clear from the cases above that REPs are flexible and can be structured to accommodate regional variation in electricity markets. Regulated or deregulated electricity markets can employ REPs to expand RE generation at a regional level. Rate design, cost increase, and tariff structure can be tailored to achieve maximum RE generation at minimum cost.

Job Creation and Economic Development

In Brief

In a time of economic crisis, US policymakers intent on addressing climate change must also be sensitive to the economic impacts of proposed green energy policies. As explained below, critics have charged that the high cost of RE constitutes a serious economic burden. REPs have spurred job creation and benefited economies by stimulating labor-intensive industries, lucrative export opportunities, and ultimately cost-competitive RE technologies that alleviate initial ratepayer burden.

How does RE affect the economy?

Reputable studies have reached wildly different conclusions regarding the economic impacts of RE development. Would a $100 billion public investment create two million green jobs, as a 2008 study by the Center for American Progress projected? Or would a switch from coal to RE cost the US 1.2 million jobs, as a 2006 study commissioned by the coal industry determined?[61] The contrast between these studies highlights the need for policymakers to understand the basis for competing claims about green jobs.

The most transparent studies are those that use analytical models to measure the direct employment impacts of using RE.[62] A satisfactory macroeconomic analysis, however, must consider negative effects in addition to the immediate gains in sectors like manufacturing and construction.[63] If RE replaces some fossil fuels, certain jobs, coal mining for example, will be lost. Yet because the energy sector currently employs no more than one percent of American and European workers,[64] the larger economic concern is the burden placed on public and private budgets by the higher cost of RE.[65] The EEG, for example, has cost German ratepayers a relatively small sum, but this sum constitutes money that would otherwise have been spent on other goods.

The Bremer Energie Institut surveyed eight studies on the employment impacts of RE deployment. All studies surveyed predicted considerable gross employment impacts, but those that accounted for so-called budget effects (as described above) yielded lower or even negative net results.[66] One argument against RE policies, therefore, is that the green jobs they create may be more than offset by the job losses that they trigger in other sectors.[67] The Institut argues that the accumulated impact of higher electricity prices will more than negate the initial job gains from investment in RE capacity, at least in a case where RE replaces a domestic fossil energy source.[68] The type of economic modeling on which its conclusions are based, however, is highly sensitive to selected assumptions that cannot necessarily be generalized.[69] An examination of the German EEG's actual economic impact shows how REPs increase overall employment and why they hold so much promise for the US.

How have REPs benefitted the German economy?

As discussed in the previous sections, Germany is a leader in using REPs to drive down the cost of RE and phase out increasingly expensive fossil fuel sources. Its environmental ministry projected in 2004 that Germans would pay less for electricity by 2020 than they would without their REP-driven approach to rapid RE development.[70] This finding, which relates to the notion that energy diversity protects an economy from fossil fuel price shocks, refutes the charge that REPs slow economic growth in the long run. The ministry also projected a *net* employment effect of 70,000 jobs, after taking into account critics' charges about impacts on other sectors of the economy.[71] Remarkably, RE job growth since then has suggested these positive forecasts are not optimistic enough. Germany added about 80,000 RE jobs between 2004 and 2006,[72] and, as of 2009, employs approximately 300,000 people in the RE sector. It is estimated that by 2020, green technologies will overtake the automobile and electrical engineering industries and employ more than 700,000 workers.[73]

About 60 percent of these jobs, mostly in wind energy, can be explicitly attributed to the EEG.[74] A German survey of more than 1,100 RE enterprises identified Germany as the most attractive location for RE businesses, in large part because of the EEG.[h] About half of the jobs these firms have created there are in the production and operation of RE systems, while the other half have appeared in upstream sectors such as steel and glass production.[75] Because of these widespread benefits, Germany's labor unions (except the Mining, Chemical, and Energy Industrial Union) now wholeheartedly embrace the EEG.[76]

Germany's RE policy has dramatically outperformed critics' expectations in part because REPs' ability to foster a stable investment climate and dependable domestic demand provide firms with a springboard to export-driven growth. Exports are largely responsible for the expansion and subsequent reinvestment in the German RE sector.[77] German RE firms are projected to export 69 percent of their production over the next decade,[78] as global investment in RE is expected to increase six-fold by 2020.[79] In a carbon-constrained world, countries that position themselves as RE leaders will significantly increase their export potential.[80] This is an important consideration for US states assessing the benefits of REPs. The Research and Policy Center of Environment California found, for example, that the effect of exports could increase the state's RE employment sixteen-fold.[81]

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[h] Other EU countries fared better than the US in the survey as well (Kratzat et al., 2007)

What will REPs do for the US?

The US economy would reap tremendous gains by switching from fossil fuels to RE, which we argue can be best achieved through REPs. A recent UC-Berkeley analysis surveyed 13 earlier studies on RE and US job creation and endorsed their unanimous conclusion that RE spurs growth and creates jobs.[82] Although we have questioned the reliability of such studies in general, we found sound evidence to support this particular finding. REPs create jobs in part because RE generation is more labor-intensive than traditional electricity generation.[83] Hence, all RE technologies generate more jobs than coal or natural gas per MWh or per dollar invested.[84] These jobs are primarily in manufacturing and construction, sectors hard-hit by high unemployment.[85] Moreover, states can ensure through REP implementation that jobs are created locally, due to REPs' propensity for promoting distributed generation (as described in the next chapter).

This does not mean the transition will be politically seamless. American labor unions are apprehensive about implementing carbon reduction policies like REPs outside the context of federal and global cap-and-trade systems.[86] Unions dependent on coal and other fossil fuels are especially concerned about RE deployment and are skeptical about the promise of so-called green jobs. "Mining jobs in these largely rural communities are by far the best paying jobs, with the best benefits, within hundreds of miles," states Phil Smith of the United Mine Workers of America.[87] Yet fossil fuel sector employment is in the midst of an inexorable decline and RE is not the culprit.[88] US coal mining employment fell 66 percent between 1980 and 1999 even as coal production increased 32 percent.[89] This trend, a result of general technical progress and mechanization, characterizes the energy sector as a whole.[90] How to replace these lost jobs will be a political issue regardless of whether REPs are widely adopted in the US.

Conclusion

Proponents of RE incentive polices and the benefits of a green economy must confront economic concerns about the cost of RE and the loss of fossil fuel sector employment. There is clear evidence that RE generation creates more jobs than prevailing alternatives and that REPs present the opportunity to create these new jobs in regions where old ones are being lost. The success of the German EEG also supports the notion that REPs have on balance a positive impact on overall short- and long-term local and economy-wide employment. This is because REPs provide a competitive advantage to domestic RE firms looking to exploit the burgeoning global market for RE technologies, and because REPs reduce the long-term economic risk associated with a nation or state's exposure to anticipated fossil fuel price rises.

Renewable Energy Payments and Ownership Models

In Brief

Ownership of a RE project determines who has a financial stake in the project and how economic benefits from REPs will accrue to various stakeholders. An "ownership model" addresses details such as the number of owners of a specific project and allocation of equity among these owners. Variables that determine ownership of a RE generating site include access to and cost of capital, risk allocation, ability to use tax incentives, amount of local investment, complexity of the project, and existing incentive structures.[91]

The following section will examine the impact that REPs would have on various ownership models of RE development projects. Models examined will include Local Ownership, Multiple-Investor Ownership, Utility Ownership, and Public Ownership Models.

REPs and Local Ownership

REPs have most notably been associated with increased local ownership of RE projects. Local ownership consists of communal or individual ownership of distributed on-site generators. Individual ownership includes homeowners or small business owners who install RE capacity on their property, selling all generated power to the grid at the set rate, and purchasing electricity fed in from the grid at the consumer rate to meet their own needs. Community ownership would consist of cooperatives and development trusts.[92]Benefits of the local ownership model include a guaranteed return on investment, as well as local control of power generation, job creation, scale and siting of development, and load management. REPs remove the challenge to local development by providing incentive to install distributed generation, given that the RE owner will be connected to the electricity grid and receive a guaranteed payment for generated electricity. Without REPs, there are significant challenges to local development. One such challenge is that utilities are not required to connect small generators to the electric grid, which prevents interested community-based small-scale generators from entering the market. With the REP in place however, a utility is mandated to connect the small generator to the grid. Germany presents an example of the effectiveness of the REP in overcoming this specific barrier, as described below.

Use of REPs to promote local ownership of distributed RE generators in Europe

Germany achieved rapid expansion of RE primarily through the increase of small RE systems built and owned by individuals and community members. Germany's first FiT, adopted in 1990, mandated that utilities connect RE generators to the grid leading to an astonishing growth from 60 to 6,000 MW of installed wind capacity in the first ten years, with 75 percent of all wind turbines locally owned. Under the EEG, which encouraged relatively large-scale RE, the rate of local ownership declined to 45 percent by 2004. However, this is still a considerable portion of the country's electricity profile.

In contrast, a combination of state and local incentives fostered an expansion of Minnesota's wind industry from 290 MW in 1999 to 900 MW in 2006, but only a quarter of these projects were locally-owned. Hence, while American policies (as described in the Investment Security chapter) have strongly favored large investors, the rapid growth of local ownership in the first stages of the German FiT illustrates how REPs enable broad local participation in RE generation. This is because REPs can adjust for project size and local resource quality, allowing producers of any size and geographic region to participate in generating RE.[93]

RE and the Multiple Investor Ownership Model

REPs provide an adequate finance structure for small scale RE producers. However, large RE projects, i.e. wind farms or geothermal plants, often require multiple investors for financial feasibility. In recent years, a primary source of RE financing has come from lending institutions that benefit through tax credits.[94] These tax credit policies have been instrumental in large-scale development of RE generation because they allow for the high initial start-up costs of RE projects to be recovered by investors.[95] In Multiple-Investor models, local owners can pair up with investors who can either provide the necessary capital to cover high installation costs of RE generation or provide the necessary tax liability to receive a Federal Production Tax Credit (PTC). RE producers often do not have the tax liability to be eligible for a tax credit, and therefore must establish a relationship with other investors, which often requires costly legal fees. These tax credit policies increase the complexity of ownership under the Multiple-Investor model.

The REP, conversely, creates a simple ownership model for multiple investors involved in large-scale RE construction. Gains accrue first to the power generation company, often a limited liability corporation, and are then disbursed to equity-holders, as pre-determined by the equity holders.

REPs and Utility Ownership Models

Electric utilities engage in the generation, transmission, and distribution of electricity in a regulated market. Utilities can be investor owned, publicly owned, or managed by a cooperative or municipality. How would REPs impact ownership models of RE generation sites owned by utilities?

Investor-Owned Utility

An investor owned utility (IOU) is a business organization providing a product or service regarded as a utility, and managed as a private enterprise rather than a function of the government. Traditionally, IOUs purchase energy from large, centralized power plants. Under the REP, however, IOUs would be mandated to connect RE producers using distributed generation. IOUs then serve as the enabler of RE production, by entering into REP contracts with RE producers. In this model, RE producers maintain ownership of RE systems, while utilities are the mandated purchasers of this energy. Additionally, REPs shift RE from larger centralized power plants to smaller scale RE systems, often distributed generation.

An example of this situation can be found in California. IOUs are the exclusive purchasers of energy from RE producers

Comparing Net Metering and REPs

Net metering is currently used as a mechanism to encourage local ownership of PV systems. It is a special metering and billing agreement between utilities and their customers which allows customers to sell excess electricity back to the grid at market price. Unlike REPs, net metering agreements do not offer a premium price for RE and, in practice, provide far less compensation for RE generation than would be available under REPs. Furthermore, it can be difficult for individuals to negotiate with large institutions to recover their net metering credits and/or rebates for using RE such that excess energy is not always accepted back into the grid. Additionally, customers frequently do not require enough energy on-site to use the retail credits they receive with net metering before it expires at the end of the year. This is especially applicable to PV sites with large surface areas, such as giant warehouses, farm buildings and parking facilities, which generate far more energy than is required on-site.

For these reasons, solar insiders believe that PV systems currently targeted by net metering incentives would be ideal candidates for REPs.[1] REPs provide PV owners with a guaranteed rate for all electricity generated and can therefore be expected to expand PV ownership. US experience with SOCs is instructive in this regard. Most jurisdictions with SOCs also establish an overall program size cap at the outset, in order to maintain control over the deployment of new energy resources, and to allow impacts on the reliability of the grid to be assessed progressively.[2] This limit on maximum voltage means that electricity produced by local projects will have a higher probability of being locally consumed.

[1]Harris, Glenn. "Net-metering or Feed-in Tariff: Can they Co-exist?" Renewable Energy World. 25 Sep. 2008. Retrieved 29 Mar. 2009 from: http://www.renewableenergyworld.com/rea/news/article/2008/09/net-metering-or-feed-in-tariff-can-they-co-exist-53618

[2]Couture, Toby, Yves Gagnon and K.C. Irving. "Community Wind Energy Policy Models." New Brunswick Community Wind Energy Initiative Information Document. 2008.

under the existing REP system in California. This program enables small RE producers to sell electricity to large IOUs such as Pacific Gas and Electric, Southern California Edison and San Diego Gas and Electric, which will now also be required to purchase RE from larger sources. As a result of expanding a REP system, IOUs will add and distribute another 1000 MW of RE to the California system. The example of California shows that this ownership model is highly compatible with REPs. IOUs and large or small-scale RE generators can continue to work in tandem to achieve a state's RE goals.

Public Ownership of RE Projects

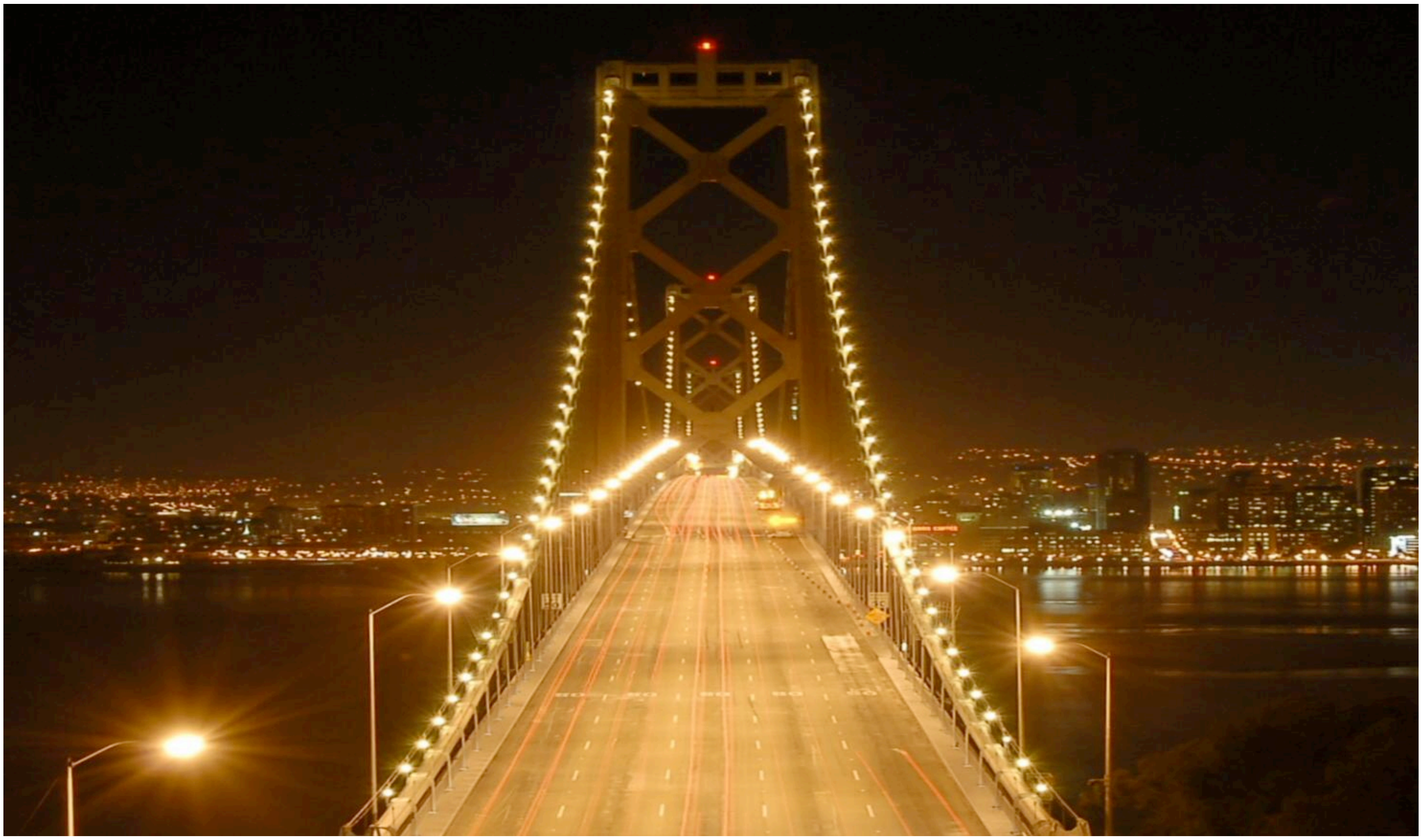
A publicly-owned utility is a not-for-profit entity that maintains the infrastructure for a public service, and thus is subject to public control and regulation. For example, a solid waste processing facility that generates waste to power for a municipality could be considered a publicly-owned RE producer.

Public utilities, including municipal and electric cooperative utilities, can benefit from distributed generation, such as solar panels, because it shaves costs for expensive peak load electricity.[96] Additionally, the implementation of distributed generation can assist a public utility in lowering transmission and distribution costs.[97] For these two reasons, public utilities should be in favor of REPs, and particularly so under the REP. RE producers hold ownership of their RE systems, while the public utility is required to connect them to the grid, and all costs are passed through to the ratepayers. The REP will cause a slight increase in costs for all ratepayers, however the avoided costs of transmission and distribution upgrades makes this policy an attractive option for public utilities.

One example of a public utility success story is the city of Gainesville and their associated municipal utility, Gainesville Regional Utilities. After implementing the REP, many businesses and individual homeowners will now maintain ownership of RE distributed generation, while GRU maintains ownership of all RECs earned by the facility.

Conclusion

REPs incentivize non-utility generators to become electricity producers. Under REP policies, utilities must offer grid access and a premium rate to any individual or entity that wants to sell electricity generated from RE sources. Thus, REPs disrupt traditional power-ownership models, prompting a redistribution of ownership of RE- generating sources from centralized power generators to smaller, distributed, and frequently, locally-sited producers. REPs, as opposed to tax incentives, simplify ownership models, and can also work in tandem with IOUs and public utilities to achieve RPS requirements.



Part III: How Can REPs Work in the US?

The evidence presented in Part II provides a compelling argument that REPs are superior to other RE support policies previously implemented in the US. As with any policy tool, however, REPs will not be effective if they are not designed and implemented properly. Part III examines why some REP policies have been more successful than others and why US implementation poses new challenges that policymakers must confront.

Successes and Challenges of REPs around the World: Best Practices for the United States

Background

REPs are a direct result of the 1973 global oil crisis that prompted governments to explore measures to encourage societal investment in RE. This policy tool has continuously evolved over the last 35 years. Before the Public Utility Regulatory Policies Act (PURPA) of 1978, multiple REPs existed as simple community agreements in the US. PURPA, however, included a clause requiring electric utilities to purchase RE from designated qualified facilities at the avoided cost, which is the difference between a utility's power generation costs and the power costs for the qualified facility. The policy assumed that the cost to the latter would be less.[98] However, this requirement only created an incentive for RE when the cost of oil was high. After the immediacy of the oil crisis had passed, REPs were neglected as policy instruments worldwide until Portugal instituted the first European feed-in law in 1988 and an energy generation price premium was introduced.[99]

Around the same time as Portugal's law was instituted, Denmark's community agreements inspired stakeholders in nearby Northern Germany to begin lobbying their state representatives for a simple FiT law to improve hydropower returns. The lobbying was successful and the first FiT in Germany was established. As the law gained momentum in Germany, the wind industry grew significantly. FiT laws in Denmark, Germany, and Spain were ultimately responsible for a 53 percent increase in global installed wind energy from 1990 to 2005.[100] During this time, many FiTs were adjusted, with some being replaced by alternative policies, as in Denmark, and others being renegotiated many times over, as in Germany. The US should look to best practices established by Denmark, Germany, and Spain, as well as its neighbor, Canada, for models of success and challenges to consider when instituting REP policies.

Case in Point: Denmark

For over 30 years, Denmark has maintained a commitment to using RE to meet energy demands by increasing self-sufficiency, and therefore increasing energy security.[101] As Danish citizens took a strong stand against nuclear energy, the country turned to wind power to increase capacity, developing wind power test stations to prove its value as an electricity generation source.[102] The success of these stations bolstered public support for wind power and resulted in an effective feed-in law that was used in tandem with a carbon tax refund and a production subsidy.[103] These combined financial incentives propelled Denmark to the forefront of RE technology and manufacturing. However, in 2001 the newly-elected government phased out the FiT in favor of RECs.[104] Consequently, development of new RE capacity has stalled, although the country remains a leader in renewable technology. Studies show that 80 percent of Danes favor the increased use of RE, indicating that the public continues to support FiT legislation even when the ruling party might not.[105]

Implications for REPs in the US

The Denmark experience provides several important lessons:

- The creation of a robust FiT and complementary subsidies created an economically-secure environment for technological innovation, which resulted in wind turbine technology improving more rapidly than during any other time.
- Large investor profits and a projected continued increase in wind capacity led critics to question whether society was financially burdened by this policy. In 2001, Denmark replaced the FiT in favor of RECs in the hopes that it would prove less costly.[106] As RE growth has stagnated, however, it has become apparent that Denmark may have fared better by adjusting down FiT rates, restructuring other financial incentives to prevent dual-subsidies, and allowing for periodic review and adjustment.
- Despite Denmark's changed policies, it remains a leading exporter of wind turbines due to its jumpstart in technological innovation spurred by FiT investment.
- Bi-partisan approval of any energy policy is critical in ensuring the long-term stability for investment that will withstand changes in political structure or interests.

Case in Point: Germany

Northern Germany drew from the early successes of Denmark's FiT to construct a similar strategy for hydropower generation. Several northern states lobbied for a national feed-in law for wind and hydropower, which parliament passed without much opposition. Under the law, wind generation grew rapidly in the north. The southern states lacked the hydropower and wind endowments covered by the law, and suffered economically as a result. Amendments rectified the disproportionate burden on southern states by incorporating tariffs for all RE sources, and the German FiT has since gone through several iterations to keep up with the exponential growth of the RE industry. In working through some of the unforeseen consequences of FiTs, the policy is now widely supported by a broad coalition within the country.[107] In regards to policy implications for the US, Germany has used FiTs to replace traditional fossil fuel capacity with RE capacity.

Germany's FiT has been successful in many ways and is looked to as a leader in the arena of energy policy development by the rest of the world. Interestingly, Germany promoted the policy as a "cost internalization" rather than a subsidy. Job creation is one of the most significant indicators of success, as discussed in Part II. Additionally, Germany has set an aggressive RE goal of 30 percent by 2020, with FiTs as the driving instrument behind that goal.[108] Today, tariffs have been adjusted such that ratepayers' monthly energy bills have only increased by the equivalent of a loaf of bread.[109]

Implications for REPs in the US

The German case has implications for the United States in several ways:

- Rate structure is important because pricing RE technologies too low will provide little incentive for innovation. Many different components, such as degression and step-down (as defined in the "Green Standard" chapter), must be considered to create a policy that can adapt to a rapidly-changing political environment.
- Germany is made up of many smaller states and it was important to distribute the burden fairly among all ratepayers. Their solution has implications not only for US national policy, but also at the state level. For example, in California different parts of the state have different renewable resource endowments, and this could result in areas with high RE resource endowments paying less than areas that are RE-poor.
- The US is also faced with issues of RE-poor states relative to other states (see Federal/State REP section). The German model can provide direction for US policies.

- Improving manufacturing capacity for RE equipment will promote job creation
- Finally, Germany learned that excluding utilities from reaping the benefits of FiTs bred animosity and distrust. Therefore, well-designed REP policies must provide compensation for utility-owned RE facilities, especially in the US where utilities are a primary stakeholder.

Case in Point: Spain

Spain is an interesting case study because it sought to increase capacity rather than replace existing generation. Spain pursued solar as its main RE technology due to solar energy endowments. Through the introduction of two FiTs, one for photovoltaic and one for other RE endowments, the country has become a leader in both solar and wind technology and RE generators are a significant lobby.[110] When Spain's government debated RE support mechanisms, RE generators pushed for a FiT from the start.[111] The government, however, also wanted to create a mechanism that induced some of the RE generation to go to the electricity market. The result was a "double option" that was proposed and passed in 1998 which allowed RE generators to choose between a feed-in price "fixed tariff" and the "market price plus a premium."[112] The feed-in tariff created a favorable economic environment for the solar sector, while the "market price plus" option provided the correct incentive for wind producers to enter the electricity market. Regardless of the choice made, the FiT stimulated significant growth, increasing the country's wind generation market share from one percent of total installed onshore wind capacity in Western Europe in 1990 to 21 percent in 2000[113], making it an important exporter of RE technology.

Implications for REPs in the US

- Spain introduced the concept of a hybridized FiT and market system. While those in the US who favor market solutions might embrace this idea, it is important to note that the downside is the loss of a stable investment environment.
- Spain found that their rapid market growth outpaced their ability to pay the FiTs and thus the policy became unsustainable. The country subsequently introduced program and project caps to remedy this situation. Because there is room for rapid adoption of RE in the US, program and project caps should be considered to prevent policy collapse and an undue burden on utilities and ratepayers.
- Flexibility to redesign the policy as issues arise will also be crucial to prevent the perverse incentives that contributed to Spain's unstable market growth experience.

PURPA: The First Feed-in Tariff

The Public Utilities Regulatory Policy Act (PURPA) was introduced as part of the National Energy Act of 1978. The 1970s were a time of great uncertainty for energy supply. The intent of PURPA was to supplement existing electricity production, extend supply beyond standard generating facilities, and encourage more efficient energy production.[1] The law contained clauses that allowed for distributed generation technologies to compete with larger generation facilities. It instituted Standard Offer Contracts (SOCs), which required utilities to enter into long-term contracts to buy electricity from small generation facilities (known as qualified facilities). Prior to PURPA, electricity generation had been a capital-intensive business that was bundled with transmission and retail. However, SOCs broke with this model, giving smaller generation facilities the necessary incentives and parameters to enter the electricity generation business.[2]

When PURPA was introduced, energy rates were expected to continue rising exponentially. SOCs were expected to keep power prices low, all the while encouraging RE development.[3] However, when energy prices dropped in the 1980s, electricity rates stayed high. The now-costly contracts received much of the blame for the high prices. Utilities and consumers lobbied against SOCs, and eventually PURPA's power was diluted.

Although PURPA is disparaged for its effect on energy prices, it is rarely recognized for the positive changes it brought about in the US electricity sector. By providing small generators investment incentives, SOCs stimulated remarkable growth and innovation in RE technologies. Furthermore, prior to the law's institution, the electricity business was considered a natural monopoly. PURPA challenged that model by unbundling generation from transmission and retail. These changes allowed for greater competition, and initiated discussion that led to the deregulation of the electricity sector.[4]

SOCs offer a fixed rate for specified small energy generators. In the late 1980s and 1990s, Germany and Denmark would use PURPA's SOC concept to craft their RE feed-in tariff laws.

[1] "Public Utility Regulatory Policy Act (PURPA)." Union of Concerned Scientists. Citizens and Scientists for Environmental Solutions. 2009. Retrieved 22 Feb. 2009 from: http://www.ucsusa.org/clean_energy/solutions/big_picture_solutions/public-utility-regulatory.html

[2] Hirsh, Richard F. "PURPA: The Spur to Competition and Utility Restructuring." The Electricity Journal. 12.7 (1999). 60-72.

[3] PURPA, Union of Concerned Scientists (2009)

[4] Hirsh (1999)

REPs in Asia—a solution to fossil fuel dependency?

South Korea's and China's economies are among the fastest-growing in East Asia, and both are highly dependent on fossil fuels. South Korea is the largest foreign oil importer in the world and China relies heavily on coal as a primary energy source. However, these countries are beginning to realize the environmental impacts their energy consumption creates and have set aggressive plans to use REP programs to encourage RE. Actions taken by these influential countries have the potential to inspire similar action in other emerging economies.

South Korea

In 2002, South Korea adopted a solar FiT policy to achieve its goal to supply five percent of its domestic energy needs with renewable energy sources by 2010, and produce 1.3 GW from photovoltaic (PV) sources by 2012. The tariff policy increased solar installations in Korea from 51 in 2006 to 134 in 2007 (a 163 percent increase). Today, South Korea has 160 MW of solar power capacity. In August 2008, Conergy Korea (a subsidiary of the world leader in solar business) announced its plan to extend Asia's largest solar power plant in SinAn, South Korea from 19.6 to 24 MWp, projected to produce over 33,000 MWh per year.[114]

China

China passed its national renewable energy law in February 2005, which set an RPS to boost RE use to ten percent by 2020. In 2007, the State Electricity Regulatory Commission introduced a REP program that requires utilities to buy all of the RE produced at registered facilities in their local areas at either a government-fixed or government-directed price. Borrowing the German FiT cost share model, the Chinese government has been adding a generation cost of 0.001 yuan (US $0.013) for every unit of electricity to all household utility bills each month.[115] The original Chinese REP program, however, did not set a program cap and had a weak monitoring system, which spurred RE companies and energy efficiency projects to take advantage of the economic incentive, resulting in windfalls to generators and an economic burden to society. Learning from previous mistakes, the Chinese government announced an alternative solar subsidy plan in March 2009 which provides 20 yuan (around US $2.94) per watt of solar PV installations greater than 50 kilowatts with a program cap (exact amount unknown), cutting the current cost of installation by half.[116] Similar to Florida's situation, municipalities in China are implementing more ambitious RE goals than national programs. Recently, Jiangsu Province announced its own three-year plan to increase provincial solar capacity to 260 MW with different production incentives including a FiT that will be separate from the national solar subsidies.[117,118]

Conclusion

Asia's recent REPs experience offers a lesson to the US—REPs are generally effective in achieving RPS goals and a program cap would ensure steady renewable energy growth.

Case in Point: Ontario, Canada

Ontario is an important case study due to its proximity to the US and similarity of RE endowment to a number of Midwestern states. In 2006, Ontario introduced a Renewable Energy Standard Offer Program (RESOP),[119] which has many of the same components as FiTs and REPs but uses avoided cost pricing[120] similar to PURPA. Drawing on the lessons of Europe, Germany in particular, Ontario has made some innovative changes to the REP concept. Because electricity must be produced at the time it is demanded, Ontario offers a premium to RE generators capable of providing energy at peak times. Ontario has also set project caps based on geographic proximity to transmission facilities. This has helped avoid overloading any one facility and diversify the types and location of new projects. Through these mechanisms Ontario used the RESOP to both encourage renewable energy generation and control the timing and location of production.

Ontario temporarily shelved RESOP in order to resolve some of the problems that arose[121]. Although they achieved their ten-year goal within the first year of the policy, a number of the contracts were never implemented. In the future, the province will require demonstrated progress on RE development in order to retain the contract for the RESOP premium.

In March 2009, Ontario unveiled its Green Energy and Green Economy Act of 2009, which modified the RESOP into a FiT program for various RE sources. [122] The draft program rules maintain a higher premium for peak-hour RE producers. They have also streamlined the application process, granted a higher tariff to, home or community-based systems over medium-sized systems, and modified the project cap of ten MW to only apply to solar systems. Moreover, the Ontario Power Authority (OPA) will review the program after the first year of implementation and every two years thereafter to make any necessary amendments.[123] The OPA is also actively engaging stakeholders' opinions by conducting weekly consultation sessions to solicit comments on the draft program rules and pricing schedule.[124]

Implications for REPs in the US

- A FiT differentiated by project size and technology could be useful in developing program focus
- A project cap helps stabilize RE production in popular sectors such as solar.
- Regular periodic review is needed to enforce long-term delivery of RE and allow for adaptive program management.

Conclusion

Five themes recur in the case studies above: pricing strategy, program and project caps, RE technology exportation, flexibility in policy design, and the consideration of stakeholders. It is clear that REPs are both sophisticated and complicated, with many components to consider before finalizing a policy strategy for an individual state. Through analysis of a number of best practices, we have identified 13 key policy components and descriptions that can be found in the "Green Standard" chapter of this report. In addition to these policy building blocks, it is also important to consider the level of public support, current land planning and zoning practices, and the possibility of economic development when crafting a REP policy for maximum effectiveness. Through stakeholder engagement, careful consideration of the necessary components for a successful policy, and study of the lessons learned from other policies, the US can use REPs to realize sustainable and long-term energy independence.

The "Green Standard": Key REP Policy Components

Our analysis of European, Canadian, and US experiences has demonstrated that policymakers must consider a number of key factors essential to creating an effective REP policy. These factors include the socioeconomic, demographic, and political conditions of the state or municipality, including the specific political motivations for developing RE sources. In an effort to promote widespread adoption of REPs across the US, we have identified 13 key components for REP implementation, monitoring, and revision:

1. Setting Initial Payment Level

REPs provide an incentive to increase production of RE by making the investment economically attractive to producers and buyers. The key to getting REPs "right" is to understand the level of incentive required to stimulate the policy targets' interest: if the payment were set too low, there would be little motivation to produce; if it were set too high, a RE boom with accompanying windfall profits might result, placing a disproportionate burden on ratepayers. The three most common methods used to calculate payments are:

a) **Renewable energy generation cost**: The recently passed Gainesville solar feed-in tariff (FiT) and some European FiT models use this straightforward method. The payment level is set so that RE generators recover project costs plus a reasonable level of return on investment over a specified period of time.

b) **Avoided (external) costs:** Policymakers would set the REP according to an electric utility's avoided (external) costs including those of climate change effects, and the impacts of pollution on public health and agriculture.[125]

c) **Fixed monetary reward (premium):** The state would offer a premium to RE producers similar to a rebate program, to be paid on top of the market price per unit of electricity generated. This was one of the options given to producers in Spain as noted in the preceding chapter.

2. Payment Degression

Policymakers should build in a schedule to revise payment levels in new contracts as technological innovation, participation rate, and RE generation costs change over time. Some existing REP policies set a degression schedule which institutes a regular percentage decrease of the payment level (calculated based on depreciation of equipment and future generation cost predictions). The German FiT policy amendment (EEG Amendment of 2004), for instance, sets an annual degression rate of one to 6.5 percent depending on the RE technology.[126] This means renewable energy producers who entered German FiT program later would receive a lower tariff payment than the early participants due to annual degression schedule. As we will see, this policy feature is effective in encouraging more early participation and adjusting tariff based on updated generation costs and market conditions.

3. Payment Differentiation

Differentiating the REP by size and RE type allows the policy to fairly reward producers of systems of various sizes, from large-scale generators to home energy producers. A state with diverse RE potential such as a mix of wind, solar, geothermal, hydro, and biomass should consider differentiating payment rates by technology type and system size to better reflect productivity and generation capacity. For example, if a state's developed solar energy sector is composed of both rooftop photovoltaic panels and concentrated solar power systems that generate significantly different amounts of energy at different costs, a fixed rate for all types of production systems would neither be fair nor economically efficient. Some countries and states also choose to identify a single focus RE source with the highest natural endowment (e.g. Gainesville, Florida's solar FiT). Thus they only need to worry about differentiating REP pricing on the basis of generation size, rather than having to also set different incentive levels for different RE sources.

4. Program Duration

An effective REP policy design includes a contract duration that guarantees a premium payment for a specific term, in order to create a stable investment environment for RE (usually between 15 and 20 years). Ideally, this period would last until the market can support sufficient amounts of RE without subsidies or incentives, but most importantly, it must be long enough to provide investors with enough security to overcome investment risks as we discussed in Part II.

5. Program Review and Corresponding Payment Adjustment

A sound monitoring and evaluation mechanism will allow a REP policy to be adjusted and improved over the long term through the use of adaptive management. Regular program reviews should determine participation rates and ensure higher participation in the future as well as revisit the rate-setting method and digression schedule for new contracts. REP levels for new contracts may be adjusted over time to reflect changes in program costs, inflation, and other relevant expenses.

6. Existing Energy Infrastructure

The current energy infrastructure of a state will help shape the public's receptiveness towards REPs. For example, some states have made more progress in establishing a net metering mechanism to incentivize small-scale local RE generation, and thus offer less support for REPs. (See "Comparing Net Metering and REPs" on page 25 for more on this subject.) Other states may have outdated and inefficient transmission and distribution systems that will lower the effectiveness of a REP policy. Thus, policymakers should also consider possible infrastructure upgrades that may be necessary when implementing REPs.

7. Production Capacity

Many existing REP policies specify a program cap and/or project cap in the contract. This cap is set in place to avoid a potential boom that will burden taxpayers in the event of an energy surplus. A cap also serves as a program goal. Depending on the state's interest in RE production and the level of economic incentive in the REP plan, some programs may meet their caps soon after implementation. At that point, the policymaker can decide whether to adjust the cap or close the procurement phase.

8. Purchase Obligation

A key component of any REP policy is the requirement that the wholesale purchaser of electricity, typically state or local utilities in the US, purchases power from the contracted producers and feeds it into the grid, independent of short-term demand.[127] In many countries where FiTs have been established, this agreement is also a priority obligation, meaning that the contracted RE must be purchased before electricity from other sources, in order to foster investment security in the market.

9. Innovation Premium

An innovation premium spurs technological advancement by providing a higher payment for RE that is novel in some way. It may be a newly discovered process, a project with particularly high efficiency, an unusual location where existing renewable technologies are not feasible, or some other type of advance.[128] For example, a coastal area wanting to cultivate the use of wave technology might pay an innovation premium to encourage further development. The innovation premium can also be used to encourage universities and RE producers to work together in researching and developing new technology. For example, the Gainesville, FL solar FiT offered a $40 million innovation premium to University of Florida for the establishment of a renewable energy institute.[129]

10. Other Energy Policy Incentives

A number of other policy incentives have been created in the effort to incentivize development and encourage the growth of the RE sector. Many of these incentives can work in tandem with REP policy to achieve RE goals and wean states from the use of fossil fuels. The three most commonly adopted incentives are as follows:

a) **Renewable Portfolio Standard (RPS)**. Probably the most well-known of this category, RPSs identify a percentage goal and a timeframe for adoption to convert a certain amount of a state's energy production to RE. For instance, California set one of the most aggressive goals with a target of 33 percent of state energy consumption from renewable sources by 2020. In most cases, having an RPS encourages the adoption of REP policies, as they are effective implementation tools to help meet RPS goals as proven in many US and European examples.

b) **Renewable Energy Certificates (RECs, also known as Tradable Green Certificates).** These market commodities are traded to help achieve state RPS at the lowest cost. We earlier contrasted RECs with REPs, but in fact, both policies can be used at different stages in a RE development program. While RECs are good for capturing "low-hanging fruit" by incentivizing already cost-efficient RE production, REPs can encourage development of higher-cost, less proven technologies in their infancy.[130] Once these technologies mature, they can move into the free market to compete with comparably-priced energies. Also, California and Minnesota employ the use of REPs for small-scale projects, while using other incentives for projects over a certain megawatt threshold.

c) **Tax credits** are another common instrument used to encourage RE by directly reducing taxes owed. There are two common categories: Production Tax Credits (PTCs) or Investment Tax Credits (ITCs). As the name implies, ITCs are available to individual investors and also small businesses that install some sort of RE system—often times a solar panel or small solar array.[131] Similarly, PTCs are offered to large-scale RE producers.[132] As recipients of tax credits must have some mandatory tax liabilities in order to qualify, there are opportunities for REPs to work in tandem with tax credits by providing incentives for energy development to those that are ineligible for PTCs or ITCs. Also, recent federal legislation has created a new structure for tax credits whereby a new construction incentive is provided through cash grants for projects beginning in the 2009–2010 timeframe. As the grants are specifically for construction, a REP policy could ensure that the marginal RE price is set at a competitive level.

Note that if no other energy policies are currently in place in the state, REPs can stand alone as an excellent policy incentive for RE production, as shown in many countries in Europe and Germany in particular.[133]

An efficient and effective REP policy design must be compatible with likely forthcoming legislation introducing a carbon tax or cap and trade program. Our research and analysis demonstrates that a REP policy would work effectively with these programs. A case study on the compatibility between cap-and-trade and REPs on page 45 will provide more details.

11. Policy Marketing

A sufficient level of interest and investment must be generated for a REP policy to be successful. Effective marketing tools, such as program advertisements placed on utility bills or in newspapers, can serve to attract stakeholders and potential investors. Other methods may be more effective among specific demographic and interest groups, and states should evaluate how best to market the program to their intended audiences.

12. Stakeholder Engagement

The European examples demonstrate the need to revise FiT policy provisions over time based on trial and error. The risk of policy glitches could be reduced if a state solicited feedback from stakeholders and third-party consultants. California and Ontario succeeded in engaging stakeholders at the pre-implementation, implementation, and revision stages, in an effort to continuously improve the REPs policy.

13. Energy Policy Example

States endowed with similar RE potential and/or in similar geographic locations will often borrow legislation from one another, both to simplify the legislative process and to standardize rates regionally. For example, Minnesota, Michigan, and Indiana often craft legislation based on each other's policies. Germany's EEG also serves as a useful frame of reference. The country's trial and error process has been an invaluable example for Denmark, Spain, Ontario, and even some US states.

Stakeholder Engagement

Any new energy policy, especially a format that fixes electricity rates, will elicit strong opinion during its comment phase (see Appendix II). Stakeholder engagement during policy construction is critical in creating an inclusive policy. This may include workshops, such as the ones that California has held prior to bill introduction. [134] However, this can be a difficult process, depending on the level of input and lobbying power of these groups. The department or agency charged with holding such workshops must be knowledgeable about REP policies and establish a structure to guide productive participation.

If workshops or similar venues are not possible, policy analysts should review stakeholder comments from recently-proposed RE legislation to anticipate likely support or opposition in the community. Some important stakeholders include business and industry organizations, investor and banking groups, environment and energy advocacy groups, existing generators, manufacturers, and citizen coalitions.

The following discussion introduces some recurring stakeholder issues. However, each state should consider their unique characteristics, such as demographics and local industry, when anticipating stakeholder response.

Recurring Issues

Least-cost generation appears as a frequent concern for many stakeholder groups, such as business and industry organizations. In considering a system benefits charge for New York State's RPS, Multiple Intervenors, an association of large energy consumers, commented that adding a per kWh charge would interfere with market behavior and increase electricity costs, disproportionately impacting large consumers.[135] Other groups may be naturally more sympathetic to REP polices, but will still view cost as a factor. For example, The Energy Council of Rhode Island, a similar organization that frequently comments on energy legislation in that state, maintains an objective "to lower the cost of energy for RI businesses while preserving environmental quality and adequate supply."[136] Thus, proponents of REPs must understand how they impact end-user costs and why, as we explained earlier, they are typically more cost-effective than alternatives.

Potential generators are concerned with equitable application of tariffs. Differentiated tariffs must be set with the state's needs and endowments in mind. However, stakeholders may be concerned that technologies that are granted higher rates are given unfair preferential treatment. For example, as peak generation is traditionally very expensive, encouraging investment in peak-producing RE generation by offering higher guaranteed rates can help bring down peak rates in the long-run. However, Wisconsin farmers expressed dissatisfaction for peak differentiation. Anaerobic digesters work best when they run continuously and thus farmers are afraid that they are being shortchanged by providing a baseload rather than peak source.[137] Such equity concerns should be considered during policy formation in order to obtain creative solutions that can be agreed upon by all generation sources.

The definition of qualified renewable sources also comes up frequently in RE legislation. For example, states have debated whether certain sources are "clean," "renewable," or both. During the Florida RPS discussion phase, waste to energy (WTE) facilities argued that generation from this source is renewable and thus should be counted as a qualified facility. Combined heat and power (CHP) sources also claimed that these energy-efficient sources should be considered a preferred provider. The state must anticipate these comments and define ahead of time what is counted as a renewable source, and whether generation that uses exhaustible resources, such as natural gas utilized in CHP, or that can have potentially detrimental environmental impacts, such as WTE, should be counted.

Conclusion

Public support for RE is emerging in the US with vigor. Yet Americans demand the ability to participate in the development of policies that will affect their livelihoods. As mentioned above, these interests are likewise represented through utilities, advocacy groups, businesses, and generators. Stakeholder engagement can be a daunting task, but the input will be invaluable for the development of an effective policy that will be accepted by the consumer. In developing a critical analysis of any policy, it is imperative to include all perspectives and not allow any one voice to dominate the criticisms or accolades of a given proposal. We believe that creative and inclusive engagement of stakeholders will make REPs stronger and more viable policy solutions for increasing RE in this country.

National Security

The local ownership and distributed aspect of REPs has led Former CIA Director, R. James Woolsey, to support them and affirm that they enhance national security in two ways:

- Oil dependence is reduced. Even though oil only fuels a minor share of US electricity production, REPs can help provide the power to electrify transportation. States like Florida that have a large part of oil-powered electricity production will doubly benefit, as REPs help reduce oil use.
- Decentralizing energy production. Creating thousands of individual sources of power makes the system more resilient against cyber hackers and terrorist attacks. REPs reduce the potential of utilities and energy generators to become easy targets for terrorism.[1]

[1] "Woolsey Visit: Former CIA Director Stresses Energy Security to Florida Lawmakers." Florida Alliance for Renewable Energy. 20 Apr. 2009. Retrieved from: http://www.floridaallianceforrenewableenergy.org/Woolsey_Visit.html

REPs and RPS

The most important policy options available for the development of RE in the US are REPs and RPS. Currently, 33 states and Washington, DC have either mandatory or voluntary RPS goals, and a national RPS is being considered. As such, the introduction of state-wide REP policies must consider how these two mechanisms will work together. Although there are a host of other complementary or conflicting incentive and regulatory issues, some of which have been discussed elsewhere in this report, the current discussion centers primarily on these two policies and how to make them compatible and effective.

What are the key differences between REPs and RPS?

Based on the experience of the EU, the effectiveness of policies is linked with whether they are aimed to assist producers/developers of RE (through price-based incentives such as REPs) or to focus on promoting installed capacity (through RPS).[138] Most commonly in the US, RPS policies employ renewable energy certificates (RECs) to fund RE development. In addition, competitive solicitations are used in the US, in which project developers bid for contracts to be approved RE generators.

With competitive solicitations, RE projects are awarded to the lowest-price bidder by the corresponding state-level authority. By definition, this reduces profit margins for developers, who in turn invest in lowest-cost established technologies. Less incentive is provided for investment in longer-term research and development of emergent technologies.[139] In the case of REPs, where a secure return on investment is guaranteed for developers over a longer period, there is greater incentive for producers to invest in research and development, as they are the ones receiving the largest portion of the direct benefit of the policy.[140] The long-term difference between the two policies is that one inherently promotes low-cost, short-term return on investment, while the other establishes favorable conditions for the development of the emerging technologies to diversify energy sources.

Are REP and RPS policies compatible?

It is possible for RPS and REP policies to coexist, the more appropriate question would be how they can do so. Given that 33 states have RPS policies in place, the most viable option is to create state-specific policy frameworks whereby different opportunities and potential developers can benefit from different policies. In cases such as New York or Wisconsin, where the potential for different technologies exists because of natural endowment or economic organization (agricultural and dairy sectors along with large urban centers), combined policies can be implemented to target different technologies (for example biogas for farms and rooftop PV for cities) and different types of investors.

REPs can be implemented in states with RPS policies as a distinct procurement method for underdeveloped technologies. Separate mechanisms through which to promote RE projects of differing sizes and qualities will assist utilities and states in meeting RPS mandates more efficiently. This may be particularly relevant for states that may have very different potential owners of systems. In these states, REP policies can be designed to target smaller projects, while larger-scale projects remain under the guise of the RPS procurement process. However, policy differences must be clearly communicated to key stakeholders to ensure that resistance is not based on partial or limited information.

REP and RPS policies: Beyond the confrontational debate

In considering the effectiveness of REP and RPS policies, experiences in Europe, both at the country level and across the EU, are illustrative. Germany, Spain and Denmark are often cited as the pioneers and success stories of REP policies.[141] With almost 20 years of experience since the initial policies were implemented, supporters of REP policies cite hundreds of thousands of jobs created, reduced CO_2 emissions, and increased energy security for the countries.[142]

Recently, in January 2009, the European Parliament approved the target of 20 percent RE in the total EU consumption profile by 2020.[143] This is an important milestone. For the past few years, Member States and the EU governance bodies had been involved in a public debate between policy options supporting FiTs or a harmonized EU-wide scheme for RECs. Through the EU Parliament's decision, Member States accepted differentiated targets ranging from 8.5 to 20 percent of their RE portfolio, based on country-specific 2005 baselines. At least five elements from the European experience have important policy implications for RPS/REP policy considerations in the US:

(i) ***Positions and support at the national level will shift over time***: In 1999, the EU commission wholeheartedly supported an RPS policy framework, citing the drawbacks and ineffectiveness of FiT policies.[144] Ten years later, the EU parliament implicitly accepts that national FiT policies have been effective and that there is no need for a "harmonized" EU-wide legislation context for RECs.

(ii) ***Individual jurisdictions can take the lead successfully:*** The experiences of Germany and Spain in particular are important in that they clearly show that an EU-wide framework is not necessary for effective and successful local or national policies,.

(iii) ***Periodic, public, informed, and transparent debate over policy options is important***: If there is one thing that the European experience for RE development has shown is the importance of well-informed, transparent, and public discussions over policy options and periodic revisions. The European experience clearly shows a learning curve and the necessity to revise, amend, and shift policies when deemed necessary.

(iv) ***Acknowledgement of local contexts and the need for flexibility in national legislation is necessary:*** Given the considerable differences among the 27 Member States, EU-wide legislation needed to be flexible enough to account for local differences and the need for Member States to establish/maintain national and local policies.

(v) ***A national RPS policy and local REP policies need not be mutually exclusive:*** After a heated and protracted debate in the EU Parliament, the outcome was an acknowledgement that the two policy options need not be mutually exclusive and that indeed, they can be complementary. All EU Member States have RPS targets, including those with REP policies.

Conclusion

Current RPS polices have not generated enough investment in RE to meet national needs. The present economic downturn coupled with a renewed push for energy independence through RE has created a unique opportunity for RE development. REPs have the dual benefit of providing environmental benefits while promoting distributed generation and rapid growth of a diversified energy profile. Policymakers must formulate an optimal approach for these two policy options to work together.

Can cap-and-trade and REPs coexist?

A recent issue of the *Economist* voiced a common complaint about REPs: that RE support mechanisms are incompatible with cap-and-trade.[145] Cap-and-trade, goes the argument, is a mechanism for reducing greenhouse gas emissions at the lowest cost. Thus REPs or any other RE incentive policy will only add to this cost and will not reduce emissions any further than the level mandated by the cap.[146] Various studies show that the marginal cost of switching to renewables is about five times greater than the anticipated price of carbon under a cap.[147] While some see this is as reason to put off RE deployment until carbon markets demand it, it is in fact further evidence that REPs, proven to reduce RE costs over time, are needed now.

The US EPA's widely-cited sulfur dioxide cap-and-trade program has demonstrated that cap-and-trade encourages firms to undertake least-cost presently-available abatement measures. The SO_2 cap enticed utilities to switch from high- to low-sulfur coal, but did not induce any long-term technological advancement.[148] Similarly, a carbon cap would promote energy efficiency and, in some cases, substitution of natural gas for coal. Thus if one believes that RE deployment must be part of the solution to climate change, cap-and-trade alone is not a viable option.

Moreover, cap-and-trade is only economically efficient in a very specific sense. At best, it indirectly ensures that a politically-determined level of short-term emissions reductions is achieved at least cost. (Even if credit markets were functioning perfectly, political and regulatory risks preclude investment in long term reductions of the sort that would be realized through RE deployment.) As this report has shown, REPs directly promote job creation, a safe and healthy environment, and energy security along with climate stability. In fact, it is these other benefits of RE that may provide the U.S. with the political will to press on in the fight against climate change.

Since President Obama favors cap-and-trade legislation, it is essential to consider the challenge of implementing the two types of policies in concert. As we have noted, governments must set REP levels high enough that investors earn a reasonable return but not so high that they make windfall profits. If the government freely gives energy corporations CO_2 permits that they can then sell upon installing RE, as in Europe, this balancing act becomes nearly impossible.[149] This is because the sale of permits then provides generators with a variable revenue stream on top of the administratively-determined fixed payments, thus eliminating the revenue-certainty characteristic of REPs. Fortunately, the President has proposed that the government auction 100 percent of the permits issued under cap-and-trade, which would not interfere with the functioning of REPs in this way. Under this approach, the two policies are complementary. A carbon price prompts firms to take advantage of immediate, low-cost opportunities to reduce emissions while REPs ensure that such opportunities will be abundant in the long run.

Federal and State REPs

In May 2008, Congressman Jay Inslee from the State of Washington introduced the first national REP bill on Capitol Hill.[150] Inslee, known as a "champion of clean energy," holds two influential positions within the US Congress, one on the Energy and Commerce Committee and a second on the Select Committee on Energy Independence and Global Warming.[151] Since the latter committee was created in 2007, RE has received increased attention as a method to lessen US dependence on fossil fuels. Inslee proposed the national bill to test Congress's interest for this innovative RE financing mechanism at the federal level. Although the bill did not gain sufficient support, Inslee's staff expects to revise the proposal in 2009 and reattempt to garner interest for a national REP.[152]

Federal Policy Structure

The 2008 national REP bill included three main elements drawn from successful European models:

1. Guaranteed grid connections
2. 20-year mandatory purchase contracts
3. Regional cost sharing[153]

The maximum project size under this policy was 20 MW, with the Federal Energy Regulatory Commission (FERC) given considerable, controversial power to set standards for interconnection, transmission, and rates.[154] The bill required FERC to differentiate rates for different technologies based on cost, while providing all RE generators a ten percent internal rate of return on their investment.[155]

In theory, the costs of a national REP would ideally be shared by every electricity consumer in the US to equally distribute the financial burden of the transition to green energy. However, for reasons of feasibility and political support, cost burdens under the Inslee bill would be administered and applied through regional cost sharing programs based loosely around existing grid boundaries (Figure 3). Regional cost sharing promotes investment in the most cost-effective technologies in each region, while also quieting concerns over transfers of wealth.[156] Concerning wealth transfers, some opponents of REP policies argue that less-endowed states would ultimately fund investments in the Midwest and Southwest, where huge potential exists for wind and solar, respectively. Regional cost sharing programs keep RE investments somewhat localized, thereby creating economic growth from RE in each region.[157]

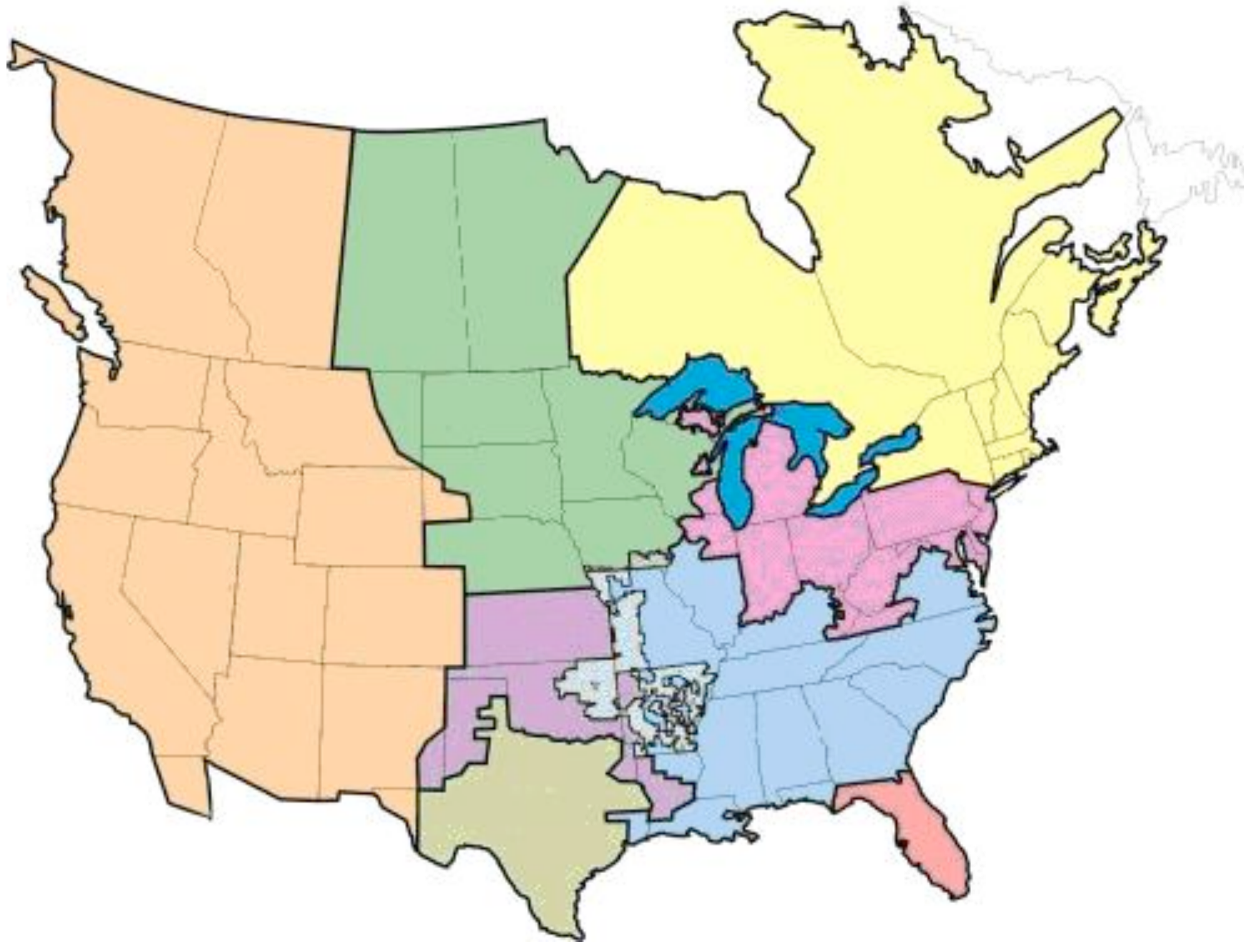


Figure 3: North American Electric Reliability Corporation Regions That Cost Sharing Regions Could Emerge From[158]

High-hanging Fruit

The passage of any federal policy requires broad support from both houses of Congress. A federal REP bill faces three significant obstacles to being voted into law:

- States opposed to transfer of power to the federal government
- Misunderstanding of a REP's complex financial mechanism
- Resistance from coal interests and states with lesser RE resources[159]

States possessing relatively modest RE endowments will likely show strong resistance to federal legislation that they perceive as a federal mandate requiring subsidization of RE investments in neighboring states. Furthermore, with the potential intersection of a national REP and a national RPS, these states envision being forced to buy energy from other states at unacceptable premiums, while being told how much RE they must buy.[160] Understandably, these states want to protect state rights before allowing the federal government to pass sweeping legislative mandates that seize control of program cash flows away from them.[161]

But support for climate change legislation continues to grow, and the political will to pass a federal REP policy may still materialize. The recently-released draft of the American Clean Energy and Security Act of 2009 includes a proposal for a cap-and-trade system and also a national RPS. A REP policy might be seen as a necessary alternative should either cap-and-trade or a national RPS prove too politically unpopular. While a national RPS is less than ideal because it favors current technologies applied on a larger scale rather than incentivizing emerging technologies, RPS and REP policies are not mutually exclusive, as discussed previously.[162]

Making National, State and Local REP Policies Compatible

Each state represents diverse political interests and equally diverse natural resource endowments. A national policy must treat all states fairly regardless of their renewable generation potential by permitting state and local REP policies to function synergistically with federal policy. Two specific policy elements needed to allow state and local REP policies to operate in concert with a national one are:

- An amendment to PURPA allowing states to set rates above federal requirements
- A similar amendment to the Federal Power Act[163]

These proposed amendments do not appear to be politically contentious because they both return some rate-setting authority to states.[164] With FERC orchestrating the logistics of program administration, transmission, and rate-setting, REP policies would not inherently conflict with one another. On the contrary, states sharing regional costs of RE generation would want to secure as much of the regional production capacity investment as possible. With this in mind, states would encourage participation in the federal program and design their own programs to further incentivize in-state investment. Again, this raises the issue of RE potential inequality between states. Without additional policy elements, states with abundant RE endowments will be able to provide lower-cost electricity than their neighbors, and dominate the region.

Decentralization, Diversification, and Self-Sufficiency

In contrast with state-based cost sharing, regional cost sharing as proposed in the federal REP bill provides states that can produce the lowest-cost RE with an advantage over other states in their region. States with high generation costs would feel pressure to buy cheap RE from neighboring states rather than exploit their own, more expensive resources. Comparative advantage forms the basis for interstate trade, but a certain level of self-sufficiency in RE production for each state remains a goal of REP policy. To counteract these forces, states with smaller endowments can be granted in-state carve outs.

FOR EXAMPLE

Suppose the federal bill enacts a national REP providing for solar projects up to 20 MW at a rate of $0.27/kWh based on a cost of production that assumes certain economies of scale such as buying solar panels in large quantities. But Florida, in this hypothetical example, wishes to promote small-scale, decentralized solar installations that are not as attractive financially under the federal program because smaller-scale projects are more expensive per kWh installed. Florida could enact a state REP for projects up to 1.5 MW at a rate of $.32/kWh. A small project in Florida would then draw incentives from the combination of federal and state programs with $.27/kWh of the cost shouldered by regional cost sharing and the additional $.09/kwh cost recovered through in-state cost sharing, meaning from Floridians only.

An in-state carve out mandates that a certain percentage of RE be produced exclusively within state borders. This mechanism makes the most sense when considering a hypothetical future where the federal government has passed a national RPS along with a national REP. The RPS would require every state to source a percentage of their electricity from renewables. An in-state carve out would further mandate that the targeted state must generate a minimum percentage of the national standard strictly from in-state sources.[165] A carve out drives in-state investment in the same manner as a state RPS, but it carries the added benefit of spreading associated costs across the region instead of merely statewide. In this way, potential low-cost, wind energy generators in South Dakota or solar energy generators in New Mexico would benefit from exporting surplus electricity, but they would also have to shoulder some of the costs required to generate developing RE technologies elsewhere in their regions for the sake of diverse, decentralized generation and state-based self-sufficiency.

Conclusion

The implementation of REP policies at the federal level faces several obstacles, notably coal industry opposition and strong resistance from states with lower current RE endowments. Policy designs must encourage state self-sufficiency, development of nascent technologies, and a smooth transition to RE production. With REPs at the national, state, and local levels sharing reasonable compatibility, public service organizations such as the Alliance for Renewable Energy can educate Congressional representatives on the merits of a national REP policy in the years ahead.

Part IV Conclusion

The previous sections have examined a complex policy mechanism in intricate detail, but have perhaps left the reader with some unanswered questions about the broader context of Renewable Energy Payments. If REPs do not look like other policies, and if they do not fit neatly within traditional political arguments, it is because climate change is unlike other political problems we have faced. No Manhattan Project-like effort will develop the technological solution to climate change, because no single one exists and the market might not buy it anyway. Nor can textbook economic solutions that rely on the power of markets account for the full political, social, and scientific complexity of climate change.

Hence REPs represent a vision as well as a policy tool. Through REPs, we will individually and collectively choose the renewable energy future that we believe is the best hope for maintaining a liveable planet. We will commit to slightly higher utility bills in the short run, so that anyone who is willing and able can help build the new energy future we envision. We will not leave the responsibility for achieving this future to either government alone, nor to the few business interests that have shaped our energy profile in the past, nor to the financial markets that have so recently failed to promote the collective good. We will adapt our policies as new technical knowledge emerges, but we will not hesitate to support RE technologies that as best we now know hold significant promise for the future.

It is within this context that this report is best understood. The recommendations we have provided are intended to translate vision into policy. While some may view climate change as the transcendent political issue of our time, it is certainly not the only problem that Americans face. Thus REPs must be tailored to the realities of each political jurisdiction and to the day-to-day issues that matter most to specific constituencies. They must contribute to national security, job creation, and economic growth, and they must complement other policies that governments have passed or will pass in order to address climate change. REPs on their own will not ensure a sustainable future, but it is our hope that the arguments and implementation recommendations presented in this report will be a valuable resource to policymakers looking to contribute to it.

Appendix A: Glossary

Baseload: the minimum amount of power that a utility or distribution company must make available to customers.

Carbon Tax: a carbon tax is an instrument of environmental cost internalization. It is an excise tax on the producers of raw fossil fuels based on the relative carbon content of those fuels.

Day-Ahead Trading: the market for energy for the following day, or more specifically, the market for energy 24 hours in advance of a given time in any day. A day in this context may be more or less than 24 hours. For example, a utility may purchase the next morning's energy in the afternoon (less than 24 hours ahead) or purchase the next afternoon's energy the previous morning (more than 24 hours ahead). Energy producers offer energy on this market based on their ability to produce energy for a specific period on the following day.

Degression: a gradual decrease in the rate of taxation on sums below a specified amount.

Deregulation: the act of removing government regulations and control over an industry, increasing competition.

Distributed Generation: small, modular, decentralized, grid-connected or off-grid energy systems located in or near the place where energy is used (EPA).

Installed Capacity: the annual production capacity that the installed equipment of a plant can theoretically produce.

Intermittent: an energy source is considered intermittent when its output is not predictable: wind blows inconsistently and the sun doesn't always shine.

Investor Security: secure investments offer predictable returns over a given period. Investors require higher rates of return to compensate for uncertainty in an investment's revenue stream, and unacceptable levels of uncertainty will prevent investment altogether.

Local Investment Multiplier: local investment has a multiplicative effect by creating its own demand. For example, development of many small anaerobic digesters creates the demand for technicians to service equipment. These new jobs spur further demand for goods and services in their communities.

Megawatt: one million Watts.

Megawatt hours: one thousand kilowatt-hours or one million watt-hours.

Megawatt peak: MWp, peak hour generation. This measure represents the capacity for solar cell production. One MWp is equivalent to one MWh.

Methane: a greenhouse gas that is 20 times more effective at capturing heat in the atmosphere than CO_2. It is emitted from sources such as landfills, natural gas, petroleum systems and manure.

Net Metering: an energy policy that allows consumers who own RE facilities to generate credits when they are producing more electricity than they consume. The meter runs forward when they are consuming more and runs backwards when they are producing more, allowing them to be paid for the excess electricity they contribute.

Primary Energy: Energy that has not undergone any anthropogenic conversions.

Regional Cost Sharing: spreading the cost of an REP over all electricity consumers in a region.

Renewable Energy Certificate (REC): a tradable environmental commodity which represent proof that a specified amount of electricity was generated from renewable sources.

Renewable Portfolio Standard (RPS): a regulatory policy that requires that a specified share of energy be generated from renewable sources.

Risk premium: the difference between the prices investors will pay for guaranteed and uncertain payment streams with equivalent expected value.

Spot Market: a market in which goods are sold for cash and delivered immediately.

State-Based Cost Sharing: spreading the cost of an REP over all electricity consumers in a state.

System Operator: the organization that monitors and controls the operation of the electric system in real time.

Transfer of Wealth: an often unintended effect of policy that benefits one group of people at the expense of another.

Terawatt hour: one trillion watt-hours.

Appendix B: State Case Studies
1 California

Background

In 2006, Senator Leland Yee (D-San Francisco/San Mateo) pursued Assembly Bill (AB) 1969, which proposed a REP policy for California. The California Public Utilities Commission (CPUC) adopted this policy in July 2007, requiring utilities (generators) to buy electricity from RE generation facilities owned and powered by public wastewater agencies. In order to help utilities meet the state RPS goals (20 percent CO2 emissions reduction by 2020), this REP policy only offered a premium to systems with a capacity of 1.5 MW or lower and capped the program at 250 MW. The original REP program cap shows California's intention of promoting small-scale production. Generators have the option of entering into ten-, 15 or 20-year non-negotiable contracts, each with a fixed tariff rate set based on the time of delivery incentivize generation during times of peak demand. RE producers could also choose to sell 100 percent or just surplus generated power. Two of the state's major utilities, Southern California Edison (SCE) and Pacific Gas and Electric Company (PG&E), could purchase RE from any customers. Other utilities, e.g. San Diego Gas and Electric Company, PacifiCorp, Sierra Pacific Power Company, Bear Valley Electric Service Division of Golden State Water Company, and Mountain Utilities, could only buy RE from public wastewater agencies. This initiative attempted to feed power generated by wastewater agencies' facilities back into the grid. In February 2008, the CPUC held a workshop to decide if it should raise its REP program cap to 480 MW (system cap remains at 1.5 MW or lower) to include more small facilities across the state.[166]Most stakeholder groups, except for large-scale utilities, supported a more inclusive REP program. The opponents argued that current energy infrastructure in CA, e.g. inefficient transmission and distribution systems, would decrease the effectiveness of an expanded REP program. The CPUC and California Energy Commission finally proposed an expansion proposal in April 2009.

Significantly, California has a number of robust RE initiatives and production incentives that may complement or conflict with such a REP policy. In 2008, the California Energy Commission charged the consultancy company KEMA, Inc. with the task of developing two reports on REP policy options and issues and followed up with a 57-question survey to solicit feedback from stakeholder groups.[167]

Objective: This case study seeks to analyze KEMA's findings and stakeholder responses to identify controversies over further development of the California REP legislation.

KEMA's Findings

KEMA projected six policy paths for further discussion of a REP policy and potential program expansion in a September 2008 report titled "California Feed-In Tariff Design and Policy Options." These paths vary in renewable resource type, system size, market scope, price-setting methodology, tariff differentiation, and implementation schedule. KEMA identified the following RE objectives as high-priority:[168]

- Promote projects that can feasibly help reach the RPS goal of 33 percent by 2020
- Provide the market certainty and financial support that developers and investors need to bring new projects on line
- Support smaller RE process or businesses

The KEMA consultants found issues of electricity transmission and siting of new generators as roadblocks to further state RE goals. This report demonstrates that a REP policy in California is an effective supplemental strategy to the current RPS program in meeting RPS goals if the state first addresses such obstacles

Stakeholder Comments

A majority of those who responded to KEMA's reports and the Energy Commission survey supported the REP policy and its subsequent expansion. The most commonly cited benefits of an expanded REP program were:

- REP is a viable and quick mechanism to prevent further delay in achieving state RPS goal
- REP provides increased investment security
- More large projects will produce economies of scale sooner, thus decreasing future costs

California is still experimenting with different design and implementation options for REPs because of real challenges in understanding the applicability of various policy components in specific political and socioeconomic contexts. For instance, stakeholders identified the following weaknesses:

- Cost allocation is unclear—should the extra costs be shared among all ratepayers?
- Price should be set based on generation costs plus reasonable profits instead of market price referent, in order to decouple RE from fossil fuel based sources
- Insufficient evaluation before implementation
- RPS program constraints, i.e. transmission management, tedious processes of permission and siting, and uncertainty about production tax credits (PTCs) and investment tax credits (ITC) were not addressed
- Missing performance requirements and monitoring mechanisms to ensure that producers follow through with contracts

Solar businesses, solar energy producers associations, and environmental interest groups preferred policy path 6 described in the KEMA report, which would offer cost-based, long-term REPs to all types of renewable sources up to 20 MW in size across the market. In order to diversify the state's RE portfolio, there would be no program cap or limit to technology. The tariff would be differentiated by size and technology to account for different productivity, generation costs, and product values.[169]

The Los Angeles Department of Water & Power (LADWP), a municipal utility agency, opted for policy path 4 in the report, which suggests a utility-specific solar pilot REP program to identify challenges in developing an improved long-term implementation plan.[170]

The large-scale utilities, SCE and PG&E, argued that the REP policy should only apply to systems smaller than 1.5 MW to avoid higher transmission costs and interconnection complications. They also suggested that if the objective of the REP program were to strive towards the RPS goals, then it would have to address the weaknesses in transmission efficiency and simplify the administrative processes of obtaining permission and siting of renewable production.

No comments from project investors and non-solar RE producers were available on the Energy Commission website.

A summary table of highlight REP comments can be found at the end of this case study.

Policy Outcome and Explanation

Stakeholders recognized a number of advantages to REPs including:

- An effective way to achieve state RPS

- Previous successful examples as implementation references
- Effective in managing risk and cost in RE investment
- Job creation
- Compatible with the net-metering system

But stakeholders also found drawbacks to REPs, including:

- Standard contracts decrease utilities' profits and lead to higher-priced power
- Transmission and distribution issues
- Compatibility with other RE production incentives remains uncertain

The California Energy Commission, although receptive towards stakeholder responses, did not choose any specific path projected by KEMA but instead selected specific elements from these paths. In March 2009, CPUC proposed to offer REPs to systems larger than 1.5 MW to "simplify the power-purchase process between utilities and power generation."[171] Despite most stakeholders' recommendations of a cost-based tariff calculation method as opposed to a market price referent that fails to reflect true generation costs, the expansion proposal called for more time to research price calculation strategies and their implications. The proposal also removed the option of excess sales; requiring future REP participants to sell the full amount of RE back into the electricity grid. Interestingly, to solve the cap issue, the proposal suggested an increase of REP project cap from 1.5 to 10 MW. Projects between ten and 20 MW would be eligible for utility-specific standard offer contracts. The expanded REP pursues the state RPS goals more aggressively by offering reasonable incentives to production systems of different sizes.[172]

Analysis and Implications

California's public comments exhibited a dynamic and transparent public policy process. CA stakeholders are generally quite educated on various designs of a REP policy. Stakeholder input has consequently been constructive in improving effectiveness of the state REP policy. Incorporating these suggestions, the CA government has practiced adaptive management to improve its existing REP program. Interestingly, the state still struggles with setting the price "right" after several revisions, implying the complexity of tariff pricing. Even though most stakeholders were supportive of a state REP policy, large utilities, fearing economic losses, were against the proposal to offer REP to larger projects. Lastly, these public comments point out important managerial issues in transmission and project approval duration. Outdated transmission systems will directly affect the robustness of a REP policy as a productive incentive. Tedious, lengthy project permission and siting processes will increase transaction costs and lower participation rates. It is therefore necessary to tackle these problems in future implementation of a state-level REP policy.

Stakeholder Comments on Proposed REPs (Highlights from July 8, 2008 to January 8, 2009)

Name	Description	Stance on REPs	Reasons/Remarks
Solar Santa Monica	City-level initiative to install 100 MW of solar photovoltaic panels on rooftops by 2020	Supportive, but demands for inclusion of smaller solar production systems	Plans to build a “net zero” community power systems that are infeasible under a net metering system
Central California Power	Diesel Electric Generators	Supportive	REP policies have successful examples; CA is not on track to meet its RPS by 2010 therefore needs a new policy framework
Pacific Gas & Electric Company (PG&E)	Large-scale utility	Supportive—REP policy; opposed—program expansion	REP should only apply to systems producing less than 1.5 MW because larger projects need to overcome interconnection issues; fear of locking in a tariff that will increase future supply cost
Southern California Edison (SCE)	Large-scale utility	Opposed	AB 1969 is not clearly defined; CPUC should work with individual utilities to develop RE goals; REP should apply to systems smaller than 1.5 MW to avoid transmission costs
Independent Energy Producers Association	Small-scale energy producers group	Supportive (of REP policy expansion)	REP as a valuable tool to achieve RPS goals
Joint Solar Parties (The Solar Alliance, Greenvolts, and the California Solar Energy Industries Association)	Solar energy producers group	Supportive— of REP policy and program expansion	REP may overcome delay or project failure of RPS contracts and diversify the state’s energy portfolio through increased distributed generation
Sierra Club California	Environmental interest group	Supportive—REP policy	REP policies have successful examples and could help achieve RPS goals. Larger projects will reach economies of scale, decrease RE costs, and create jobs.
Union of Concerned Scientists	Scientists group	Supportive	REP policies could help achieve RPS goals; could be improved in terms of setting payment
Los Angeles Department of Water & Power (LADWP)	Municipal utility agency	Opposed	CA has a robust existing RE policy framework which should be pushed before introducing a statewide REP; LADWP invested in other compliance projects to achieve its RPS goals

Breathe California	Environmental interest group	Supportive	REP should work in concert with RPS programs, not as a solution to noncompliance with RPS
Community Environmental Council	Environmental interest group	Supportive	Support a cost-based tariff calculation method instead of market price referent and a “must-take” provision that require utilities to purchase RE generated by qualified facilities.

2 Florida

Background

In 2007, Florida Governor Charlie Crist (R) issued several executive orders to push for a progressive state RPS goal of 20 percent by 2020. The Florida Public Service Commission (PSC) consequently conducted rule development workshops to solicit RPS program design ideas. Many stakeholder comments suggest REPs are an effective means to achieve the state RPS goal. The discussion of a RPS program framework is politically charged, however, with ongoing debates about whether nuclear energy and efficient energy (e.g. waste to power) is considered “renewable” and counts towards the state RPS. This ambiguity has created severe challenges in implementing a statewide REP legislation. In addition, Florida is also considering expanding its utility-specific tradable RECs to the state-level as an alternative to state REPs.[173]

Since 2006, investor-owned utilities (IOUs) such as Progress Energy Florida and Florida Power & Light Company have petitioned to obtain approval for establishing a standard offer contract (SOC) program at the PSC. A SOC is a utility-specific REP policy (see the Green Standard chapter for more information). In July 2008, the PSC granted Progress Energy Florida and Florida Power & Light permission to launch the SOC program, which requires utilities to purchase RE from facilities with a capacity of 1 kW or below for at least ten years.[174] Implementation of this SOC program has been problematic because the current SOC program has insufficiently defined terms and conditions, such as what is considered a “qualified facility.” Many waste to power facilities attempt to enter into contracts but the PSC argues that clean energy is not necessarily renewable; an issue that remains unresolved.

While the future of state-level REP legislation is uncertain, Gainesville, FL became the first US city to implement a solar FiT program on March 1, 2009. The Gainesville Regional Utilities Commission (GRUC) requires utilities to offer a tariff of $0.32 per kilowatt-hour to producers with photovoltaic solar systems for the next 20 years, capping the annual capacity at four MW. GRUC has received such a large number of applications that it has already approached its annual program cap.

Objective: This case study reviews stakeholder stances on RPS definitions and the current SOC program as well as public endorsement of feed-in tariffs to assess implications for future development of state-level REP legislation in Florida.

Stakeholder Comments

A majority of respondents include investor-owned utilities, energy industry groups, and public solid-waste authorities that produce cogenerated power (e.g. combined heat and power, CHP) or biofuels from waste. The PSC left it up to state legislators to decide what is considered “clean” versus “renewable energy” for the RPS. As a result, clean energy producers such as waste to power and cogeneration facilities, like the Florida Industrial Cogeneration Association and the Solid Waste Authority of Palm Beach Co., are petitioning for “qualified facility” status. This ambiguity extends to the SOC program, as it is intended to help achieve the RPS.

The Florida Solar Energy Industry Association, a leading solar group, and Environmental Defense Fund both commented on the state’s energy policies and endorsed REPs as a valuable tool to increase RE generation.[175,176] These organizations also compared REP to a REC market and concluded that REP would be more effective in Florida’s situation.

The most commonly cited benefits of the existing SOC program and a potential REP policy include:

- Effectively in pushes Florida towards its RPS goal
- Simple implementation lowers administrative and transaction costs
- Successfully brings economies of scale to RE production

- Negligible cost shared among all ratepayers
- Job creation

The SOC program falls short in terms of:

- Lack of program cap
- Ambiguous terms and conditions

The contention that arises in the Florida state SOC program stems primarily from unclear definitions. A successful future state REP legislation must refine the following concepts:

- Define a "qualified facility"

  Florida must ensure that only qualified facilities can subscribe to the SOC or REP program and gain tariff benefits. Since the Florida SOC proposal has no program cap, successful statewide REP legislation must clearly define criteria for a "qualified facility" as well as implement a periodic review mechanism to ensure that qualified systems supply a stable amount of RE for the long-term. For instance, should waste to power generators, e.g. municipal solid waste facilities, be allowed to participate in a SOC/REP program and contribute to the state RPS goals? This uncertainty in definition caused waste to power generators, including Solid Waste Authority of Palm Beach and Florida Industrial Cogeneration Association, to dispute SOC design features proposed by four investor-owned utilities (IOUs)—Gulf Power Co, Florida Power & Light Co, Progress Energy Florida.

- "Clean" vs. "Renewable" energy

  The PSC left it up to legislators to determine the distinction between clean and renewable energy sources, leading to a political push-and-pull about fuel tax increase and nuclear power generation under RPS. The categorization of recycled energy such as combined heat and power is also unclear. A successful REP program, as shown in the German case, must include an unambiguous contract with specific guidelines on tariff differentiation for clearly defined technologies.

- Compatibility with Renewable Energy Credits

  Florida grants exclusive ownership of TRECs to the RE generator. This provision demonstrates that the Florida Legislature does not allow utilities to profit from both RECs and REP ("double-dipping") programs without the approval of a renewable generating facility. The state has not further clarified how RECs and REPs would work together.

A summary table of public comments can be found at the end of this case study.

Policy Outcome, Analysis and Explanation

The program is growing despite unclear SOC definitions. In April 2008, Progress Energy Florida and Florida Power and Light issued a request for proposals to solicit more standard offer contracts.[177]

Simultaneously, the state RPS portfolio composition is unclear. Senator Jim King (R-Jacksonville) introduced a clean energy proposal (SB 1154) in March 2009 that proposed achieving one quarter of the 20 percent by 2020 RPS goal using nuclear power. Progress Energy Florida and Florida Power and Light supported this initiative because they have nuclear power plant construction underway. The public, however, on the whole opposed this bill based on the cost argument: wind and solar energy sources are cheaper and safer to maintain.[178] These ongoing debates reflect that the RPS legislation still requires further investigation and debate.

Although Florida has not yet introduced a statewide REP policy, enthusiasm to participate in the SOC program among stakeholders and public REP endorsement demonstrate an increased momentum in legislative development. The prerequisite to success of REPs in Florida is a well-designed RPS framework.

To proceed with state-level implementation of SOC/REP legislation, Florida must resolve its political conflict over definition of clean and renewable energy and revisit the proposal for further elaboration.

The success of Gainesville's city-level REP program may suggest that smaller-scale implementation may be more suitable for Florida's current political climate. Whether action comes at the state or municipal level, the state must directly address RE development in the most pragmatic way possible to increase Florida's current RE production rate of six percent in order to meet the 20 percent portfolio standard by 2020.

Name	Description	Stance on FiT	Reasons
Progress Energy Florida	Investor-owned utility (IOU)	Support	Help to meet Florida's RPS
Gulf Power Co.	IOU	Support	Want purchase of RE
Florida Power & Light	IOU	Support	Want purchase of RE
Tampa Electric	IOU	Support	Want to purchase RE
Florida Industrial Cogeneration Association (FICA)	Trade association of FL industrial co-generators	Contentious support	Petitioned PSC to consider recovered waste heat a RE resource
Solid Waste Authority of Palm Beach Co.	Public waste utility	Contentious support	Wants waste to energy considered eligible for the SOC
Florida Solar Energy Industry Association (FLASEIA)	Solar Industry Group	Support	Commented on the state RPS goal and pushed for REPs
Environmental Defense Fund	Nonprofit Organization	Support	Commented on the state RPS goal and pushed for REPs

3 New Jersey

Background

In 2006, the New Jersey Board of Public Utilities' Office of Clean Energy (OCE) began to consider seven incentive mechanisms to achieve the state's RPS, which includes a distinct target for solar energy. Two of the options considered were modeled on European FiTs:

- A 15-year full tariff model
- A Hybridized tariff model combining tariffs with solar renewable energy credits (SREC)

In January 2007, the OCE commissioned an analysis of the seven policies from the energy consulting firm Summit Blue Consulting, LLC. Summit Blue's report highlighted ratepayer savings as a benefit of the FiT model, finding that the full FiT model had the lowest rates of all the options. They found that FiTs could manage regulatory risk better than alternatives and had lower administrative costs. Summit Blue was concerned, however, that FiTs were "very unlikely to leave behind a thriving market for renewable energy systems" that would be self-sustaining. A number of public review sessions on Summit Blue's findings held in 2006 and 2007 provided the opportunity to comment and weigh in on preferred methods to achieve New Jersey's RPS goal.

Summit Blue's Findings

Summit Blue Consulting analyzed seven policies for their economic impact on ratepayers. They found FiTs:

- Manage regulatory risk, while SREC markets are vulnerable to dislocation resulting from periodic revisions to RPS goals or SREC rules
- Have lower administrative costs than SRECs or rebates
- Have the lowest ratepayer impacts, due to the low risk premium assigned by developers to the stream of incentives from the firm tariff. This finding held true across a range of assumed discount rates, risk premiums, and annual installation targets, and applied to small private projects as well as large private and public projects.

Stakeholder Comments

A wide variety of stakeholders weighed in through the comment process on the Summit Blue report and the pending decision of which mechanism could best support New Jersey's RPS goal of 22.5 percent by 2021. Most of those who addressed the FiT option were supportive of it, with the solar industry responsible for the bulk of these comments. Cited benefits of FiTs included:

- Investment security and long-term guaranteed incentives
- Least cost model for ratepayers
- Flexibility as compared to "one-size-fits-all" SREC approach

New Jersey's largest utility, PSE&G, weighed in to express support for a mechanism providing greater investment security than SRECs, but did not explicitly support a FiT. No financial-sector firms commented on the FiT, despite the debate's focus on investment security. The strongest argument against FiTs came from the NJ Department of the Public Advocate's Division of Rate Counsel. Arguments against FiTs included:

- Incompatible with competitive electricity markets

- Consumer costs would not decrease because prices are set by regulators rather than markets
- FiTs encourage small private installations, which are least efficient.

A summary table of FiT comments can be found at the end of this case study

Policy Outcome and Explanation

The Office of Clean Energy recognized FiTs provided a number of advantages including:

- Lower cost to ratepayers than other models considered
- Attractive to project investors because it eliminates uncertainty in returns
- Consistent with other policy goals such as:
  - Job growth
  - Fairness and equity to all ratepayer classes
  - Improved reliability/security.

OCE found, however, that FiTs were unattractive for of the following reasons:

- Heavy reliance on regulatory foresight in setting tariff level
- High probability of either over- or under-subsidizing projects
- Belief that FiTs are less effective at driving down costs over time than rebate/SREC approach
- Inconsistent with regional efforts (neighboring states favor REC schemes)
- Concern that OCE lacks authority to implement FiT
- Concern that electric utilities may not be supportive.

The OCE ultimately chose a SREC approach, citing the following advantages:

- More "market based" because it did not require regulatory intervention, and instead was based on supply and demand required to meet RPS
- Competitiveness of SREC markets will drive down project costs
- State is already invested in the SREC system so there would be a political cost in the financial community in abandoning it.

Although the FiT policy was not ultimately chosen, this does not preclude its adoption during future reexaminations of electricity policy. A campaign to reintroduce FiTs should seek to address some of the reasons the model was not adopted by utilizing the green standard guidelines proposed in this report.

Policy Analysis and Implications for State FiT Promotion

The NJ case study highlights many of the primary arguments for and against FiTs with which the ARE campaign must engage. In New Jersey, if the OCE had a clear understanding of their regulatory ability to administer a FiT, they may have made a different policy choice. Although Advanced Solar Products' comments on the Summit Blue report included a legal brief on the statutory ability to approve a FiT, a commissioned analysis by an uninvolved third party may have held more sway.

In order to reintroduce FiTs into the policy picture for NJ, three major issues must be addressed: 1) pricing strategy, 2) regulatory burden, and 3) stakeholder participation.

A transparent, adjustable pricing strategy, which could be applied on a state-by-state basis in an easily adaptable way, would go a long way in alleviating fears associated with defining FiT payments. In the same vein, the regulatory burden brought on by setting prices as opposed to letting the market decide is a noticeable concern. Proponents of FiTs must clearly enumerate the savings to ratepayers, the lower up-front costs to administer a FiT and economic growth potential, in comparison to other RE policy incentives.

The New Jersey case also highlights the importance of stakeholder engagement in the policymaking process. Solar energy firms have been active but not necessarily influential supporters of FiTs. Utilities are powerful players in most state energy sectors and it is essential to define a compatible role for them in FiT adoption. In this case, the OCE was clearly concerned with opposition from utilities. Interestingly the state's largest utility expressed hesitancy over the SREC approach that OCE ultimately chose.

FiTs are steadily gaining ground in the traditionally market-based environment of the US. FiT policy has clearly made headway on questions of investment security and developer confidence, and it is worth noting that none of the comments against FiTs suggested that it would not achieve the end goal to grow renewable capacity. Finally, continued promotion of FiTs among states will keep the option salient, and viability in one state can be used to leverage other states to consider or reconsider it as an option. Just as New Jersey was influenced by neighboring states to consider RECs, Minnesota, Wisconsin, and Oregon borrowed the idea for FiT legislation from nearby Michigan and California, respectively.

Name	**Description**	**Stance on FiT**	**Reasons**
Progress Energy Florida	**Investor-owned utility (IOU)**	**Support**	**Help to meet Florida's RPS**
Name	Description	Stance on FiT	Reasons
Sun Farm Solar	Solar company	Opposed?	Attributes German success to a) correct incentive levels; b) long-term revenue assurance; c) easily available capital. Says this can be achieved without FiT.
Gabel Associates	Energy consultants	Opposed	Prefers performance-based rebates. Concerned about "host of regulatory/legal issues" associated with utilities.
PowerLight	Large-scale solar	Mixed	Likes RECs, but in combination with "tariff-based mechanism" to boost investors' confidence.
Advanced Solar Products	Large solar	Supportive	58% cheaper than SRECs. Disputes OCE's claim that they lack authority to implement.
EVCO Mechanical	Large solar	Supportive	Least expensive. Incentives can be tailored to market segments (including residential, C&I, and public sector). Secure revenue stream eases financing.
NJ Housing & Mortgage Finance Agency	Public agency	Supportive	Price predictability and low risk that affordable housing developers need.
Pfister Energy	Large-scale solar	Supportive	Reduces "overall cost to the rate base by removing contingency that comes with risk."
NJ Sustainable Energy Industry Association	Industry organization	Supportive	Stable, long-term revenue stream. No regulatory/market risk→more private sector financing. Low cost (if there are annual capacity limits). Incentives can be tailored to different sectors. Utilities will recover additional cost → no reason to object. Incentive to install best systems (unlike rebates). Tariff can be changed prospectively to adjust to changes in RE cost. Can incentivize all technologies (not just solar).

PSE&G	Utility	Supportive?	RECs put all risk on project owners. Solar market not ready for this, needs long-term (15-20 years) "backstop."
Clean Energy Advocates	Unknown, now defunct	Supportive	Easily understood by customers. Highest degree of investor confidence. Lower investment cost→lower electricity cost. REC market infrastructure costly to set up.
Department of the Public Advocate, Division of Rate Counsel	Public agency	Opposed, but prefers FiT to RECs (Favors Competitive Bidding for Contracts in Auction)	Prices set by regulation are inefficient. Competitive bidding needed in order to pass unit cost decreases on to consumers. FiT encourages small private installations, which cost most on a per kWh basis. Fatal flaw: not compatible with competitive (liberalized) electricity markets. Prices set by "regulation not competition" will send inappropriate & inefficient signals to capital.

4 Oregon

Background

Oregon has a strong history of providing RE incentives. Existing incentives provided through the Oregon Department of Energy (ODOE) include the Residential Energy Tax Credit (RETC) which provides a maximum credit of $1,500 per year for residential projects and the Business Energy Tax Credit (BETC) which deducts up to 35 percent of eligible energy project costs from Oregon income tax liability. Energy Trust of Oregon, charged by the Oregon Public Utility Commission (PUC) to invest in cost-effective energy conservation and funded by a three percent Public Purpose Charge also offers RE project rebates. There are limits to these incentives, however; Energy Trust has only a small pool of money and thus must turn away many applications and focus only on small projects. The business credit is only available to entities with tax liabilities, so non-profits, churches and the like are not eligible.

In June 2008, Oregon signed an RPS of 25 percent by 2025 (SB838) into law. This is an aggressive goal as only four percent of Oregon's energy is currently from renewable sources, not considering existing hydropower (42 percent) which is excluded from the goal. The remaining 54 percent of Oregon's electricity comes from fossil fuels that are imported from out of state. The Oregon Renewable Energy Working Group solicited ideas to achieve the goal of the standard and the concept of REPs emerged. In January 2009, the Alliance for Democracy and Tax Fairness Oregon drafted a REP Act for consideration by Oregon legislature. This act became HB2121, a pilot program to test a small application of REPs, up to 17 MW, in the solar sector.

On February 10 2009, the House Committee on Sustainability and Economic Development session showed considerable support for HB2121 (detailed below). Subsequently, two bills featuring REPs were introduced in March 2009: HB3038 and HB3039. Both bills contain REP components but are framed slightly differently. HB3038 requires the PUC to study Oregon's electricity needs, with the goal to plan for those needs. HB3039 requires the PUC to study qualifying RE projects, but does not mandate action on the findings. The Alliance for Democracy favors HB3038 because it finds HB3039 is not comprehensive enough, only devoting section 10 of the bill to addressing a partial REP for solar PV. On the other hand utilities favor HB3039 because it is primarily designed for utility-scale generation and is more flexible in its purchase agreement requirements. Both bills are currently open for public hearing and work sessions are scheduled.

Stakeholder Comments

At the time of writing, only HB2121 had been heard in Committee. Public comments on the pilot program were overwhelmingly supportive, with many advocating taking the program statewide and expanding it to all renewable sources sooner rather than later. Stakeholders included the ODOE, Public Utilities Commission, Oregon Municipal Electric Utilities' Association, citizens' groups, industry consultants and renewable technology manufacturers. A number of groups had specific recommendations for improving the bill, from rate structure to program caps, and offered to participate in a working group. Only one respondent, the think tank Cascade Policy Institute, opposed the legislation outright. It emphasized that any kind of subsidy, including Oregon's RPS legislation, disturbs the equilibrium of the market and thus creates unsustainable business models. Several speakers referred to other states that had introduced REP legislation as proof that REPs are gaining momentum and implied that Oregon should be on the forefront of energy policy. Finally, Tax Fairness Oregon observed that only four banks are currently willing to fund wind installations given the poor economic climate and promoted the investment security provided by REPs.

A complete summary table of REP comments can be found on the following page.

Policy Outcome and Explanation

It is likely only a matter of time before Oregon sees a full-fledged REP policy given its rich natural renewable resources, aggressive RPS, broad support for a REP policy and goal of eight percent of renewable generation to come from community-based RE projects. Regardless of whether HB3038 or HB3039 gains the greatest support, stakeholders must reach an agreement on program and project caps, pricing structure and audience. If these obstacles can be overcome, then Oregon may well be the next state to pass REP legislation.

Name	Description	Stance on FiT	Reasons
HB2121 - House Chamber Session, Sustainability and Economic Development Committee, February 10, 2009			
Lee Byer, Chair, Oregon PUC	Public Utilities Commission	Support	Wants specifics of rate structure, cap, time limit and pilot start and end dates; Envisioned PUC governed utilities, not private utilities participating in pilot
Mike Graney, Director, Dept. of Energy	Oregon Department of Energy	Support	Good way to meet energy needs w/out creating additional GHG; savings on line charges, transportation, 15-18 cent savings, might offset costs; subsidy on renewables from ratepayers rather than taxpayers
Glen Harris, CEO, SunCentric, Inc.	OR based solar electric consultancy firm	Support	Wants to expand statewide to all utilities servicing more than 1% of the load for the state, must employ REP, 4-5MW/month; create demand, manufacturing will respond – creates economic growth
North Cheetham, Citizen lobbyist, Hood River, OR	Farmer w/ own wind generator installed 2003	Support	REPs in public interest – would support vision of solar rooftop build-out; made reference to states with pending legislation
Kris Alman, Tax Fairness Oregon	Volunteer citizens group advocating for fair taxation	Support	Current economic crises – only four banks willing to fund wind installations - stable market for investment in RE; pay-through increases in electricity rates will decrease consumption – motivate conservation efforts
John Charles, President, Cascade Policy Institute	Market-oriented research institute	Oppose	Perpetual subsidies not sustainable business model; distraction from serious work in energy - should be focused on coming baseload shortage; base funding decisions on positive cash-flow from emerging technologies (don't subsidize *any* fuel sources – fossil included, favors carbon tax)
Suzanne Lita-Lu, Senior Policy Advocate, Renewable Northwest Project	Public-interest organization actively promoting RE	Support	FiT should supplement limits of existing subsidies (BETC/RETC/ETO); focus on distributive generation; do not set rates in statute preventing adjustment later; expand pilot bill to consumer and end utilities
Judy Barnes, Renewable Payments Action Project	Citizens group in support of REPs	Support	Goal: market diversity, open to all Oregonians, all geographic regions, all source-types; house in Oregon Dept. of Energy instead of PUC; include all stakeholders in rate setting process rather than PUC setting; Main St. renewables, not Wall St. renewables; interested in small-scale, distributive energy production

Ramona Baker, Energy Policy Associate, Environment Oregon	Citizen-based environmental advocacy organization	Support	Top priority: reduce global warming pollution, RE critical to that; pay by actual production, not just capacity
Tom O'Connor, Oregon Municipal Electric Utilites' Association		Support	No objections to original concept; concerned if initiative expanded to include consumer owned utilities at 5MW per year per utility - some utilities total load-growth is only 1MW/year; want focus on carbon reduction programs – conservation, demand response, customer side metering - more cost-effective way to get at carbon reduction
Jennifer Gleason, ELAW	Network of lawyers for the environment	Support	OR should continue to be a leader in RE policy – reference to WA, MN, MI, RI, expand policy; identified elements for REP success; HB2121 – implementation by set date, price=cost of generation + reasonable profit, interconnection to grid, long-term contract
Comments on FiT before introduction of HB2121			
Don Bain, Aeropower Services, Inc.	Wind development consulting	Support	Mar. 2006, OR Renewable Energy Working Group: Spoke to clarify that RPS and REP are not an either/or – as they are complimentary policies, no need to choose between
Robert Migliori, VoltAir Wind Electric	Wind turbine manufacturer	Support	May 2008, OR Renewable Energy Working Group: achieve Community-Based Renewable Energy Projects of SB838 through REP; nod to MI HB5218, CA AB1807, MN HF32537 and Inslee's federal work
Boris Klebensberger, COO, SolarWorld	Solar cell manufacturer	Support	Nov. 2008, response to Governor's pilot program announcement: REPs will "accelerate Oregon's use of solar energy"; wants consumers to be able to buy solar panels and sell electricity back to utilities

5 Wisconsin

Background

Wisconsin currently produces 63 percent of its electricity from coal, all of which is imported from other states. As fuels generally account for the single highest cost of non-renewable electricity production,[179] the state is particularly well positioned to benefit economically from harnessing its own natural renewable resources. In January 2005, Wisconsin began a limited experimental program to buy electricity at fixed rates from distributed RE generators, putting REPs on the agenda in a small, yet meaningful way.[180] In July 2008, the Governor's Task Force on Global Warming recommended that the state, through the authority of the Public Service Commission of Wisconsin (PSC), extend the fixed rate buyback program into a statewide policy.[181] Although the state calls their REP mechanism an Advanced Renewable Tariff (ART), the policy is identical to a REP.

The PSC opened up the issue to citizens and other stakeholders for public comments and mailed notices to 228 key stakeholders informing them of the public comment session.[182] Respondents posted all comments to their website, http://psc.wi.gov/apps/erf_search/default.aspx, for general viewing under Docket No. 05-EI-148.[183] PSC provided 16 detailed, yet optional questions for interested stakeholders to answer, and they strongly urged electric utilities to comment.[184] Analysis of the public record, detailed below, exhibited considerable enthusiasm for ARTs despite a large number of respondents showing a lack of knowledge about key elements. The most informed and presumably influential organizations from both sides of the issue debated the details of ART implementation. The Wisconsin Utilities Association, the Wisconsin Cast Metals Association and the Wisconsin Industrial Energy Group pitted themselves against the state's triumvirate of green public interest groups; the Citizens Utility Board of Wisconsin; Clean Wisconsin; and RENEW.

Stakeholder Comments

A detailed review of over 40 public comments revealed the following five major points of contention among stakeholders concerning an Advanced Renewable Tariff policy in Wisconsin:

- Should Wisconsin fulfill its mandatory RPS obligation at the lowest cost or through more expensive distributed generation enabled by an ART policy?
- Does the PSC have legal authority to require participation in an ART program by all utilities?
- Should ART costs apply to all ratepayers or only those voluntarily requesting electricity from renewable resources?
- Should differentiated on-peak/off-peak pricing be employed?
- Should tariff rates adjust to account for inflation?

These points are detailed in order below.

Fulfilling RPS Obligations

Wisconsin continues to prove its dedication to environmental stewardship through its mandatory RPS. In 2007, all 118 electricity providers in the state met their RPS obligations, and the respectable statewide goal of ten percent of electricity from renewable sources by 2015 appears within reach given that the state currently generates over four percent from renewables.[185] Yet a debate rages as to whether utilities should continue to meet RPS requirements through low cost, industrial scale projects, or whether the people of Wisconsin would prefer to meet their RPS standard with small scale, distributed generation projects at a higher cost. The benefits of distributed generation, including the local investment multiplier that supports small businesses and local agrarian communities,[186] provide strong arguments for implementing an ART policy. However, powerful associations representing large industrial electricity consumers, such as the Wisconsin Industrial Energy Group, contend that ARTs are economically unjustifiable.[187] These groups argue that distributed generation suits states with higher population densities, such as New Jersey, but in Wisconsin, sparsely populated areas lend themselves to large wind farm developments where economies of scale provide significant economic savings.

The PSC must decide, perhaps after another public debate within the Wisconsin state legislature, whether to continue along the current path of competitively bid, centralized RE production under the direct control of utilities or to pursue ARTs more aggressively. The loudest voices for ARTs belong to the designers and developers of anaerobic digesters who would like to see accelerated investment in distributed generation projects on Wisconsin's many dairy farms. The dairy industry favors such a policy; a predictable yet meaningful action given the state's 1.25 million dairy cows,[188] each of which produces between two and three tons of energy-rich manure every year.[189]

Legal Authority of the PSC

The PSC of Wisconsin has the mission directive of "overseeing and facilitating the efficient and fair provision of quality utility services."[190] Certain stakeholders raised the question of PSC's legal authority to impose higher rates on utilities in order to foster RE development. Specifically, the Wisconsin Utilities Association (WUA) argues that a generation facility with a capacity of five MW or more can "probably" access the electricity market for independent energy producers without facing discrimination.[191] If this statement is true, then utilities may not have to buy energy from generators of five MW or more under an ART policy. The Federal Energy Policy Act of 2005 amended PURPA so that a utility does not have to purchase RE from a qualified generation facility if that utility is in compliance with its RPS requirements[192] and the generation facility has nondiscriminatory access to a wholesale power market.[193]

WUA's arguments appear sound, but RENEW and Clean Wisconsin hold that the PSC has the legal authority over utilities to "compel certain RE purchases" because "requiring utilities to offer an ART is distinct from a RPS requirement".[194] In effect, RENEW and Clean Wisconsin argue that RPS and ART policies operate on completely different levels—an RPS mandates that utilities increase their RE percentage, while an ART merely offers customers specific rates for energy they voluntarily choose to produce.[195] The legal language used appears to leave this question open to interpretation. Fortunately for supporters of ART policy, legal precedents carry considerable weight, and the scenario described by RENEW and Clean Wisconsin closely resembles the buyback system that the PSC has regulated in Wisconsin since 1983.[196]

Voluntary or Forced Cost Sharing?

As previously stated in this report's REP gold standard, any fixed-rate payment legislation should include mandatory cost sharing across all ratepayers in the municipality, state, region or country to which it applies. But within the public comments made to Wisconsin's PSC, a great number of responses stressed the importance of making the ART voluntary. A voluntary ART functions in the same manner as a green pricing program where consumers voluntarily take on higher electricity rates to fund the development of RE projects.[197] Such a financing mechanism fails to distribute the cost of RE generation to all those who benefit from cleaner air, sustainable resource use, distributed generation, and so on. Enacting a voluntary ART means having no tariff policy at all, and the PSC should not consider demands for a voluntary ART.

Provision for Peak Demand

Setting of tariff rates is a tricky business, but can be done successfully, as seen in Germany. Setting rates too low stifles investment, while setting overly generous rates overburdens the public and overcompensates generators. Policymakers must address such concerns so the question of on-peak and off-peak pricing holds particular importance in the minds of the Wisconsin public. This preoccupation with peak-related pricing undoubtedly finds its roots within the state's immense dairy industry.

Utilities seek to incentivize on-peak generation when demand for electricity reaches a maximum along with the cost of production. Conversely, utilities lack the motivation to reward off-peak generation in a similar fashion because electricity is cheap when demand drops. Vital to this discussion is the fact that anaerobic digesters, the systems that biodegrade cow manure into biogas for electricity production, operate most efficiently when run continuously. Many digesters rely on bacteria that perform a continuous biological process so farmers find it nearly impossible to operate these systems in a manner that takes advantage of peak pricing.[198] As a result, farmers operating digesters look upon utilities' peak-related prices with disapproval.

Peak-related pricing irritates farmers, but makes good economic sense for supply and demand, and it incentivizes the most versatile renewable technologies. On-peak and off-peak pricing should be employed wherever possible to take advantage of these investment incentives and to resist favoring the current prevailing RE technology. The state might establish a relatively small gap between on-peak and off-peak tariff rates so the associated incentives take effect without raising the ire of the state's dairy farmers.

Accounting for Inflation

Most generation projects require significant maintenance and operating costs throughout the life of the project; therefore, inflation must be taken into account. Solar energy avoids such problems because, once installed, the system generally operates on its own and only known fixed costs apply. For complex mechanical systems like anaerobic digesters, ongoing maintenance and operations costs represent a greater percentage of the systems' overall costs. This poses a problem for policymakers if the tariff rate cannot be adjusted for inflation. For example, if a farmer has only a few years remaining on a long-term ART contract, yet faces inflated maintenance costs, he or she may find it cost prohibitive to maintain a digester for the duration of the contract. Public comments showed broad support for inflation-adjusted tariff rates, but PSC should research this subject carefully to prevent overcompensating certain types of RE generation.

A Midwest Model

The final noteworthy issue to emerge from these public comments concerned ART as a tool to reduce CO_2 emissions. Wisconsin, as directed by executive order #191 from the office of the governor, must act to become "a leader in implementation of global warming solutions" and ART is one such tool.[199] However, a number of utilities made the effort to point out that ARTs do not directly reduce emissions, but rather only enable emissions reductions. Such unhelpful resistance to climate change policy could prevent Wisconsin from taking the leadership role directed by its governor. Three neighboring states, Michigan, Illinois and Minnesota, have all positioned themselves to adopt full-scale ART policies. The first state to pass such legislation will be given credit for establishing the Midwest model for ART policy, as well as providing leadership on climate change policy.

Analysis and Implications

Wisconsin's public comments docket provided an intriguing perspective into this unique state's fixed-rate tariff debate. This state is a national leader in anaerobic digestion installations due to the many dairy operations. Policymakers face pressure to reward dairy farmers for lowered greenhouse gas emissions achieved through the installation of digesters, yet politicians must also withstand demands for favoritism from these powerful interest groups. Many arguments were made in the public comments about one-off benefits of certain technologies, for example odor control by anaerobic digesters, and how PSC should set rates higher or lower depending on who receives these benefits. An ART shares the costs of renewable resource development across all ratepayers and, in return, all ratepayers should have an equal opportunity to generate RE regardless of the resource they intend to harness. The PSC should only to adhere to its own mission of providing quality service in a fair, efficient manner. The overriding concern is that any fixed-rate tariff policy must above all else achieve its objective through simplicity.

This analysis stresses the need to keep policy elements simple so that:

- Citizens understand the benefits of investment
- Lending institutions feel safe providing financing
- Favoritism is avoided in policy design
- Regulators can preclude attempts to manipulate the market

Wisconsin is particularly well-disposed to benefit from a fixed-rate tariff program. An expanded ART policy would:

- Accelerate the installation of distributed generation projects
- Drive widespread in-state investment
- Promote energy self-sufficiency locally and at the state level
- Fulfill the governor's mandate of providing leadership on climate change solutions in the Midwest and globally

Wisconsin's future competitiveness may rest on the state's ability to lead the new industrial revolution based on cheap, clean, sustainable electricity. Adopting a fixed-rate tariff policy ahead of other states could propel Wisconsin into this leadership position, but in such a sparsely populated state, large wind farms and their economies of scale remain a viable alternative.

Name	Description	Stance on FiT	Reasons
Citizens Utility Board of Wisconsin	Public advocacy organization	Supports	Wants distributed generation
Clean Wisconsin	Public advocacy organization	Supports	Wants distributed generation
Governor's Task Force on Global Warming	Diverse group of key WI business, industry, government, energy and environmental leaders	Supports	Wants distributed generation for WI leadership on emissions reductions
RENEW	Public advocacy organization	Supports	Wants distributed generation
Various biogas project developers	Private sector designers and developers of anaerobic digestion systems	Supports	Seeking accelerated investment in distributed generation on dairy farms in Wisconsin
Wisconsin Cast Metals Association	Trade association of WI industrial electricity consumers	Opposes	Views fixed-rate tariffs as economically unfeasible
Wisconsin Dairy Business Association	Trade association of WI dairy farmers	Supports	Seeking fixed-rate tariffs for investment in anaerobic digesters
Wisconsin Industrial Energy Group	Trade association of WI industrial electricity consumers	Opposes	Views fixed-rate tariffs as economically unfeasible
Wisconsin Public Service Commission	Public utility provider and administrator	Neutral	Not permitted to as an organization to take a stance on public policy
Wisconsin Utilities Association	Trade association of WI utility companies	Opposes	Wishes to maintain control over RE generation

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