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Docket Control
Arizona Corporation Commission
1200 West Washington
Phoenix, Arizona 85007

RE: NOTICE OF INQUIRY – CONCERNING THE ESTABLISHMENT OF A STATEWIDE FEED-IN TARIFF FOR ARIZONA'S ELECTRIC PUBLIC SERVICE CORPORATIONS DOCKET NO. E-00000J-09-0505

Arizona Public Service Company ("APS") submits the following comments in response to Commissioner Mayes' letter regarding a potential Arizona feed-in tariff for renewable energy production issued January 6, 2010 in the above-referenced matter.

If you have any questions regarding the information contained herein, please contact Erinn Andreasen at 602-250-3276.

Sincerely,

Leland R. Snook

LS/sl

Attachments

CC: Ernest Johnson
Steve Olea
Janice Alward
Rebecca Wilder
Lyn Farmer
Terri Ford
Barbara Keene

Arizona Public Service Company
Comments Regarding
Feed-In Tariffs for Renewable Energy Production
Docket No. E-00000J-09-0505

I. INTRODUCTION

On January 6, 2010, the Arizona Corporation Commission ("Commission") issued a Notice of Inquiry ("NOI") to solicit input from interested parties on specific issues related to developing a potential Feed-In Tariff ("FIT") program in Arizona. Arizona Public Service Company's ("APS" or "Company") comments, which address broad policy considerations related to FITs and the specific issues set forth in the NOI, are intended to respond to that request. In its comments, APS describes program components that the Company believes are essential when considering whether a FIT program may be a useful tool in the encouragement of renewable energy development and in ensuring the cost efficacy of such a program.

APS believes the following considerations and program elements should be taken into account in the development of a FIT:

- Current market tools have worked effectively to achieve compliance with the overall Renewable Energy Standard ("RES") requirements, and markets for distributed energy resources are growing at a dramatic pace. Additional procurement tools may not be needed to meet the RES requirements or overall renewable energy objectives.

- APS currently has two programs that have many of the characteristics of FIT programs: the Company's Small Generation Pilot Program ("Small-Gen Program") and the Production Based Incentive ("PBI") Program.

- Should the Commission determine that further targeting of specific market segments pursuant to a FIT will further the deployment of renewable energy, the FIT programs would become another mechanism for achieving compliance with the RES and funding through the RES adjustor would be appropriate.

- The Commission should provide flexibility to utilities to design FIT programs that target specific needs in their service territories, because every electric utility in Arizona has unique service territories, circumstances, and customer base.

- Any FIT program should have clearly defined energy, capacity and/or financial commitment targets. For any FIT program, costs and cost recovery should be clearly defined.

II. BACKGROUND

A FIT is a production-based incentive mechanism that is designed to encourage deployment of energy resources, specifically renewable energy resources. Under a FIT, an electric utility pays a renewable energy developer a predetermined rate for an extended number of years under a standardized commercial agreement. These rates are designed to provide certainty for the renewable energy provider, which in turn may stimulate the deployment of renewable technologies in the market. Rates may vary depending on the type of technology, the size of the project and its location. To promote innovation and drive participation, the FIT rate structure typically provides for high incentives in early years, then decreases over time as program capacity objectives are achieved. Through a FIT, utilities facilitate the development of the renewable energy project in much the same way as a Purchase Power Agreement ("PPA") for wholesale power supply between the developer and the utility. Developers are guaranteed a fixed payment for the project, which is typically recovered by the utility through an adjustor mechanism that allows the utility the full recovery of costs associated with contract and implementation.

In Europe, FITs have been the main mechanism to achieve renewable energy goals. The typical European FIT model has no limitation on the total amount of renewable energy that is eligible for the premium contract offering, in contrast to the United States where there are often project size limitations. As a result, FITs helped stimulate the growth of renewable generation in European countries, particularly Germany and Spain. However, the overall costs of these FIT programs have been high, with a significant impact to customers who bear the burden of the cost of the FIT program, including any subsidization, which may be significantly higher when compared to other renewable energy programs. The debate over the cost and structure of these programs has gained momentum, and some of the European countries have revised the operating rules and/or decided to lower the incentives of their FIT programs while others have suspended further program growth.

Due to the structural, industrial and policy differences between Europe and the United States, FIT programs that exist in the United States differ significantly from the European model. In the United States, state-mandated renewable energy standards and state and federal tax incentives are the primary means of promoting the deployment of renewable energy, rather than FIT programs. The implementation of FIT policies in the United States has been limited, and those implemented are in the early stages. Currently, FIT policies have been adopted in

ten states, and these programs have typically been limited to incentivizing small-scale distributed applications.[1]

III. DEVELOPING FIT POLICIES FOR ARIZONA

A. Renewable Energy in Arizona

The Commission was among the early leaders in recognizing the benefits of renewable energy. Arizona's RES Rules[2] mandate that jurisdictional electric utilities satisfy a significant annual renewable energy requirement, and include the most ambitious distributed energy requirement in the country. The success of the Arizona RES became clearly evident between 2008 and 2009. During this period, APS increased its portfolio of renewable resources by eighty percent and signed one of the most significant contracts for solar power in the world with Abengoa Solar to develop the Solana Generating Station. Also during this time, and most notably in late-2009, Arizona utilities experienced a surge in customer interest in the installation of new distributed renewable generation.

APS believes that the current approach to the deployment of renewable energy resources is proving to be effective. The Company has met the overall energy requirement of the RES in every year since the inception of the rules, and for the first time is strongly positioned to exceed the non-residential distributed energy requirements in 2010.[3] Residential participation in the distributed energy incentive programs rose dramatically in 2009, with 3,000 more installations (approximately 270%) than the previous year.

B. Targeting Specific Market Segments

APS believes that, using definitions broadly applied to FIT programs in the United States, it currently has two programs that have many of the characteristics of FIT programs. The Company's Small-Gen Program targets renewable energy projects that produce less than 35,000 megawatt hours ("MWh") per year; has specific eligibility criteria, including geographic diversity, community participation or educational partnerships, and leveraging of federal, state or local grants or funding sources; identifies specific technologies; and limits participation to a total of 45,000 MWh per year.[4] In addition, APS's PBI Program targets large, customer-

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[1] *See* Edison Electric Institute, Draft Report, *Feed-in Tariffs in Europe and the United States,* Dec. 2009. This report, which is subsequently referred to as "EEI FIT Report", is attached as Exhibit A. The report was reproduced with the permission of EEI.

[2] A.A.C. R14-2-1801 through 1816.

[3] *See* A.A.C. R14-2-1805.

[4] There have been significant responses to the Request for Proposal ("RFP") issued for the Small-Gen Program, and the projects from successful bidders are expected to be commercially operable

sited renewable energy projects and includes pre-approved life-time commitments, predetermined contract rates and terms, standard offer credit purchase agreements (contracts), and a transparent competition process for funding and selection. Importantly, the PBI Program only pays the customer/developer when the system is producing energy, as in a traditionally structured FIT.

In combination, these two APS programs demonstrate that, when carefully crafted, a FIT can work to drive project development with known, predetermined costs, and defined and approved cost recovery, which encourages economically favorable projects.

Arizona's RES provides an opportunity for all customers and market segments to participate in a utility's programs. If the Commission determines that further targeting of specific market segments pursuant to a FIT will further the deployment of renewable energy, the FIT programs would become another mechanism for achieving compliance with the RES. As such, funding through the RES adjustor would be an appropriate cost-recovery mechanism.

APS believes that in Arizona, any FIT program configuration, if deployed, should be utility-specific, rather than a uniform, statewide program. Each utility's current RES program is different, and there are varying degrees of which niche markets may be best served by a FIT program. For example, one utility may have some difficulty in expanding its RES program to reach customer-sited generation within a community, while another may struggle with engaging small generators of a particular technology. Under these circumstances, the type of program, the program cap and cost structure may vary among utilities. Failure to customize the programs would mean utility customers would be required to pay for unwanted or less attractive projects.

As demonstrated by APS's current programs, a FIT may work to serve specific market segments, such as the Small-Gen Program, or certain of those customers who install facilities eligible for PBIs. A FIT program that is targeted towards a specific market segment under the PBI program may be an effective mechanism to provide renewable energy to market segments that have potential barriers to installing systems under the current RES programs. Examples include targeted installations on multi-tenant/multi-customer rooftops, or individual businesses located in multi-tenant office buildings. A FIT program could be developed that would be similar to many aspects of APS's current PBI Program, and include a standard offer specific to a single technology. Likewise, small generation projects, which have been historically challenged by competitive solicitations with large-

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by the end of 2011. To further address the interest in this market segment, APS will be issuing another Small-Gen RFP this year.

scale projects, may benefit from a FIT program. A FIT under this model could be designed to offer small generators a standard contract with a long-term fixed price, much like an expanded application of APS's Small-Gen Program.

In addition, should the Commission determine that it is good policy to promote a particular technology, a FIT program targeting that technology may encourage increased development. An example is biogas, where there are currently very few developers for a reasonably-priced resource that has potential in Arizona.

IV. KEY FEATURES FOR SUCCESSFUL FIT PROGRAMS

FIT policy design in the United States differs from one state to the next, and from one utility to another. Nonetheless, there are basic features that are fundamental to successful domestic FIT programs. These include program size, how projects are prioritized, how environmental attributes are assigned, the tariff rate structure, project size limitation, performance guarantee requirements, and method for cost recovery. These policy design characteristics are key issues that should be addressed when designing a FIT program. These program features are discussed in greater detail below.

A. Limitations on Program Size

Most of the FIT programs within the United States are capped at a pre-defined size.[5] In a capped market, there is a limitation on the amount of renewable generation for which the FIT rate will be available. Program caps are most commonly defined by capacity, energy, or available FIT funding. The premium FIT rate that is paid to a renewable developer can be significantly higher than the rate paid under standard procurement models. Therefore, the purpose of placing a limitation on the program size is to limit the amount of customer-subsidized development incentives that are paid in any year. The type of cap – whether it is based on installed capacity or total program budget – can vary between utilities.

Typically, with a capped FIT program, a renewable energy developer will not build a plant until it receives assurances of acceptance into the FIT program.[6] This is notable because where FIT programs are aimed to accelerate project development, projects accepted into capped program queues are typically in a far less advanced stage of project development. As a result, there remains

[5] California, Florida, Central Vermont Public Service (Vermont), Xcel Energy (Wisconsin), WE Energies (Wisconsin) and Madison Gas and Electric (Wisconsin) have implemented a program size cap. Oregon and Green Mountain Power (Vermont) do not have program size caps.

[6] This is the reverse of the European uncapped approach, where developers were guaranteed financial certainty, so they procured the site for the generation, built the plant, and then turned to the utility for financing.

considerable debate around the ability of a FIT, as deployed domestically, to accelerate project development.

APS believes that to ensure a FIT is deployed in the most cost-effective manner, pilot programs should be limited by a pre-defined budget or a cap on capacity of the qualifying systems. Program limitations may vary among by utilities. It would also be appropriate to reassess program size limitations annually to confirm that the desired results are being achieved.

B. Project Size Limitations

If a FIT is introduced in Arizona, in conjunction with an overall program size limitation, there should be a limitation on individual projects under the program. APS believes, depending on the targeted market segment, that project size should be limited from 10 kilowatts ("kW") to 1 megawatt ("MW").

C. Prioritization by Economics

APS believes that its current renewable energy initiatives achieve the same goal that FITs are designed to meet – to encourage the rapid development of renewable generation – with a rate structure that is set by current market conditions. However, one goal of APS's RES programs is to develop renewable generation at a pace and rate set by the market to encourage technology and project development innovation, thus ultimately driving down the cost of new renewable generation in the future. By including a competitive selection process, APS's current approach to large distributed projects is designed to provide the maximum renewable energy for the least cost. While FITs do encourage a rapid increase in renewable generation, unless implemented under a competitive solicitation process, these programs are not likely to be the least cost option, which can ultimately cause the amounts to be collected from customers through the RES adjustor to increase. Through a FIT, customers could end up paying more than they otherwise would through a PBI mechanism for the same amount of renewable generation.

For these reasons, APS believes that FIT projects should be chosen through a process similar to a competitive solicitation process. Renewable developers should submit requests for a FIT pricing structure, as well as additional project data, which would then be analyzed and ranked against other projects. This would help to ensure that utilities choose projects that are shovel-ready, meet the needs of the targeted market segment, and are placed in optimal locations.

To appropriately reflect the full cost of a renewable project and to encourage FIT projects located within load centers, APS believes that the costs associated with

acquiring adequate transmission service and interconnection to the utility's electric system should be borne by the renewable developer. (If a renewable project is close to a utility's load center or substation, the total cost of delivered energy, including costs to interconnect and transmit is lower.) Those costs would then be included in the overall FIT rate that the developer proposes for its project.

D. Environmental Attributes

In the United States, environmental attributes associated with FIT projects are granted to the utility. Most utilities or states have structured their FIT program to complement their RES, and have the ability to count the Renewable Energy Credits ("RECs") generated from these resources towards portfolio standard goals. A recent report by Edison Electric Institute ("EEI") states that FITs "...can help utilities comply with some aspects of their RES mandates, in particular the DG [Distributed Generation] and/or solar carve-outs that exist in many RES states."[7] Currently, most FITs in the United States are targeted to encourage small generation projects of a specific technology. Therefore, it is APS's opinion that a FIT program, if implemented, should be similar to other RES programs: funded by the RES with RECs applying toward the utility's annual renewable energy requirement.

E. Tariff Rate Structures

Another similarity among United States' FITs is a declining rate structure, where the premium FIT rates paid to developers are specifically designed to decrease either on specific dates or at each period when a specific amount of capacity has been installed. (In other words, a renewable energy developer that locked into a feed-in rate in 2011 would get a slightly lower rate than a developer that had locked into a rate in 2010.) While most US utilities with FIT programs have created a declining rate structure, other components of a utility's rate structure may differ. Pricing for FIT programs is primarily differentiated by the type of renewable technology, the size of the facility, and its location.

APS believes that a FIT program should incorporate a regular review process to assess and adjust the FIT components based on program growth. For example, an initial FIT program may have a program size cap of 10 MW increments. Once the first 10 MWs are committed, the utility should reassess the FIT program and adjust the rate, program size cap, and/or other aspects of the program to optimize the most effective and cost efficient outcome going forward.

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[7] EEI FIT Report at 25.

F. Standard Offer and Performance Guarantee

Under a FIT, the utilization of a standard contract eliminates counter-party negotiations and streamlines the process. For renewable energy developers, the benefit of a FIT program from a financing perspective is related to timing, in that the developer, once approved for a FIT payment, has the certainty of cash flow, and can negotiate with lenders more quickly than they would if they had to first negotiate a PPA. Regardless, once those contracted payments are locked down, whether through a FIT payment or PPA payment, the developer still has the challenge of arranging financing for the project.

Most United States' FIT programs offer long-term contracts to reduce uncertainty and investment costs, generally ranging between ten to twenty years. APS recognizes that a contract for an extended term of years provides greater certainty for the developers and financiers, and therefore supports a twenty-year contract term. In every case, APS believes that a FIT contract must include milestones and performance guarantees to assure that the energy promised is actually produced. This approach is similar to both APS's PBI Program and the contractual terms under the Small-Gen Program.

G. Cost Recovery

A FIT program should include utility cost recovery for multiple components, including, but not necessarily limited to, the following:

Transmission Cost. The transmission cost would include the cost the utility estimates from the point of delivery (where the generation is located), to the point of receipt (to the end-use customers). These costs may include transmission wheeling or transmission upgrade costs in the event sufficient transmission capacity is not available on the utility's system.

System Integration Costs. Depending upon the technology type of the generation resource, additional costs may be incurred to compensate for increased resources and regulating reserves, as required for energy output intermittency and forecast uncertainty.

Imputed Debt. If rating agencies impute debt on a FIT program (similar to what is imposed today on PPAs), the cost of portfolio rebalancing (*i.e.*, APS will be required to issue more equity to balance out debt imputed by the rating agencies) will add to the total cost of energy purchased through the program.

Credit Support and Warranty Costs. Because a utility will rely on the renewable resources provided under a FIT program, should the facility fail to deliver the

energy, customers would have to bear the cost of not only the renewable system, but also the cost to purchase replacement power. For that reason, a utility may require assurances that the promised energy will be delivered in the form of a credit support or a guarantee from the renewable generation provider, similar to standard provisions included in a PPA. These costs would be factored into the tariff rate.

Financing. A FIT program should take into consideration the fact that financing costs borne by small developers can be higher than the financing costs for a utility financed project, both of which will ultimately impact customers' rates.

Pricing. Depending on how the FIT program is structured, large well-established developers may have a better ability to benefit from this program than smaller developers. The larger developers will likely have large, well-defined supply contracts that allow them to capture better pricing through economies of scale. Under a FIT program, where all developers are guaranteed the same fixed payment, this dynamic may result in increased margins and returns for these more established developers in the market, rather than increased savings for the utility's customers. This underscores the importance of competitive procurement processes, whether through a FIT program, PBI program or utility-scale solicitation, to deliver the lowest cost renewable resources to our customers.

Accounting issues. Depending on the contract requirements, a FIT may require specialized accounting treatment related to the long-term commitment to purchase energy and/or RECs that include, but are not limited to, complex lease and derivative accounting. While these costs may not be known currently or well defined, it is reasonable to anticipate that these costs will become significant and, as such, should be well understood before ultimately defining a FIT.

V. RESPONSES TO NOTICE OF INQUIRY

The following are APS's responses to the specific questions set forth in the Commission's Notice of Inquiry.

Q1.1: *Should the Commission develop a new policy procurement of wholesale distributed generation resources?*

A1.1: APS believes that its current RES programs encourage the rapid development of renewable generation, while ensuring that customers benefit from competitively priced renewable energy by employing competitive market procurement, and that no new policy is required. However, APS supports the creation of a new policy for the procurement of distributed energy resources, if it is targeted towards a

specific market segment that currently has difficultly acquiring RES funding for projects. APS also recognizes that there are other targeted approaches besides a FIT that may be used to effectively reach under-served market segments.

Q1.2: *To what extent can Arizona look to other states/bodies/countries to apply lessons learned and best practices on developing a FIT program?*

A1.2: To implement a FIT in Arizona, APS believes it would be most appropriate to examine the FIT programs in the United States. Electric utilities in the United States are the most similarly situated entities from which to apply lessons learned when designing a FIT. While each state and/or utility program is different, all have similar characteristics: 1) each program has a program cap size; 2) each program defines specific technology types; and 3) each program includes a declining rate structure or competitive procurement.

Q1.3: *What states/countries have "model" FIT programs that can provide good insight. What are the various models of FITs and what are the main distinguishing features?*

A1.3: There are currently ten states that either have FIT programs or plan to implement one in the near future. These programs are described in detail in EEI's FIT Report, which is attached as Exhibit A.

Q2.1: *Should the Commission develop a new policy to support the development of customer-sited distributed generation through a FIT?*

A2.1: APS believes that the current renewable energy programs in Arizona have been successful in reaching customers interested in distributed energy, and that a FIT may not be necessary to encourage customer adoption of renewable technologies. However, the Company also recognizes that well-designed FIT policies could offer an additional method for fostering the development of renewable energy resources and facilitate compliance with the RES annual requirements. A FIT program would be particularly appropriate as a specific program that targets either market segments that may be lagging in the deployment of renewable energy, or technologies that have not yet been widely adopted. The appropriate market segment that should be targeted by a FIT program would likely differ from utility to utility.

Q2.2: *Would the adoption of an FIT for customer-sited distributed generation create customer confusion?*

A2.2: APS believes that a FIT for customer-sited distributed energy, if offered in tandem with current incentive programs, would result in customer confusion and increased challenges for creating clear customer messaging. One way to alleviate this would be to eliminate other RES programs that target the same market segment.

Q2.3: *If the Commission adopts a FIT designed to address customer-sited distributed generation, should it replace, in whole or in part, Up-Front Incentives ("UFI") and/or Performance-Based Incentives ("PBI")? Should the FIT be entirely additive to existing incentives?*

A2.3: Given the increased activity APS has seen in the last year through the PBI and UFI programs, APS believes that a FIT should not be used to broadly replace either the current PBI or UFI incentives. Further, APS does not believe that a FIT should be broadly additive to the current distributed energy incentive models. As described in Section III(B) of this filing, the FIT can target markets not currently served by these two incentive mechanisms. These markets could include certain classes of customers, such as non-taxpaying entities (such as schools and government agencies) that do not directly benefit from tax incentives, multi-family/multi-tenant housing installations, as well as classes of technologies that may be more valuable and/or under-represented in our overall generation portfolio (such as geothermal and biofuels).

It is important to note that whether or not a FIT is adopted within Arizona, APS's currently designed programs offer customers an efficient competitive solicitation mechanism in both the UFI program and the PBI Program. RECs that result from a FIT program should count towards RES compliance, along with the current UFI and PBI programs. If a FIT program is targeted towards a specific market segment, APS believes it should replace the current PBI program for that market segment only.

Q2.4: *What type of incentive (FIT, UFI, or PBI) is likely to result in the lowest overall lifetime cost of utilities meeting their annual renewable energy production responsibilities under the REST?*

A2.4: The lowest lifetime cost to customers to comply the renewable energy requirements under the RES Rules would most likely result from utility ownership of these assets. This results from three primary factors: 1) as of October 2008, utilities are now able to claim the Federal

Investment Tax Credit and share the benefits of this credit with its customers in accordance with federal income tax laws; 2) utilities have access to lower cost capital when the benefits of an investment grade balance sheet and immediate and certain recovery of the cost of ownership are provided through the RES are combined; and 3) under utility ownership, customers are able to benefit from the full useful life of a project.[8]

APS recognizes the benefit of having a robust market of developers focused on the distributed market as there are many customers to serve. As a result, the incentives paid through programs such as the PBI, UFI and potentially FIT are important to stimulate growth and activity in this marketplace. As the absolute dollar cost of these programs becomes larger, the Commission may want to consider a potential market structure whereby the utility will buy completed projects from developers, so that the utility's entire customer base can benefit from the advantages of long-term utility ownership, while still maintaining an active and robust market of developers that are out competing with each other and working to drive the cost of these systems down.

Q2.5: *What are the comparative advantages or disadvantages of a FIT versus a PBI?*

A2.5: A FIT program is similar to that of a PBI program. FIT payments can be structured as: 1) the actual levelized cost of renewable energy generation; 2) the utility's avoided cost; or 3) a fixed price. Importantly, the PBI model is designed currently toward customers who seek to offset their current utility consumption with on-site generation. As a result, an important contribution towards total project economics results to offset utility energy costs. This model allows for customers to manifest great economic benefit over time by both insulating from energy cost fluctuations and inflation. On the other hand, FITs are generally designed to provide energy directly to the electric utility and, as a result, the project developer and/or customer's benefit is separate from the current utility rates.

Q2.6: *What are the comparative advantages or disadvantages of a FIT versus a UFI?*

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[8] This can be contrasted with paying for the full development of a project under a PPA or PBI payment that lasts for 20 or so years, with the residual value benefiting the developer. (This is similar to the decision to buy or lease a vehicle. If one plans to own the car until it no longer runs, the consumer is better off economically buying the car and paying it off in five years, rather than making lease payments over the entire 10 years or more that the car is driven).

A2.6: UFIs are the primary mechanism for smaller renewable energy installations and residential customers to receive incentive benefits from the utility for renewable generation. Because the UFI is paid as a one-time payment after the system is installed, the UFI addresses the challenges posed by the high initial costs of renewable energy development. The downside is that utility customers must pay for the large up-front cost. FITs do not eliminate a customer's financial barrier of up-front financing and, therefore, would probably not provide the best benefit to this market segment. FITs do provide advantage to the utility customers because payments are made as the energy is produced, and payments are made only if the generator produces electricity.

Q2.7: *Would the adoption of a FIT affect the analysis of whether owners of distributed generation systems are public service corporations? If so, how? If owners of distributed generation systems are somehow public service corporations under an FIT, would the Commission have to determine the fair value of each system before approving the FIT?*

A2.7: To the extent that a FIT program involves wholesale power sales to the utility, it is unlikely that such a developer would be a public service corporation. As to other models, the issue of whether certain solar developers may be considered public service corporations subject to Commission jurisdiction is the fundamental issue in the SolarCity adjudication matter, which is currently pending. (Docket No. E-20690A-09-0346). Once issued, the Commission decision in that case should provide guidance in analyzing the issues as related to FIT providers.

Q3.1: *If you believe the Commission should develop a policy to support procurement of wholesale distributed generation resources, what policy goals should guide the development of such a program? For example, is the goal to guarantee a reasonable profit to developers, provide for procurement at lowest cost to ratepayers, promote local economic activity, etc.? The Commission has developed a draft list of policy goals that might guide the development of a feed-in tariff program for Arizona (Attachment A, below). Please comment on the proposed policy goals.*

A3.1: APS provides the following comments on the Commission's proposed policy goals.

1. *Greatly accelerate the amount of wholesale renewable energy installed in the state.* APS has already committed to exceeding the

renewable energy required under the RES Rules, and believes that current methods and programs are sufficient to achieve those goals without the introduction of a FIT program.

2. *Provide sufficient payment to stimulate untapped market segments at the distribution level and build new projects while minimizing ratepayer costs and preserving competition.* There will need to be further policy discussion to determine what constitutes an "untapped market segment", and the Company looks forward to participating in those discussions. APS agrees that it is important to minimize customer costs and preserve competition.

3. *Focus on projects of a certain size that can effectively mitigate the market and regulatory constraints (such as site control and permitting) that slow down development of larger renewable projects.* APS agrees that smaller projects often may have less regulatory constraints; however, these projects have other obstacles. For example, it is often more challenging to finance smaller projects because there are few lenders that are interested in small-scale projects. Additionally, the smaller projects will likely be more expensive, because they lack economies of scale.

4. *Minimize the transaction costs for the seller, buyer and the regulator.* APS agrees that the minimization of costs is an appropriate policy consideration.

5. *Adopt program design elements and a contract that adequately address project viability.* APS believes that proposed FIT projects should be evaluated to assure that projects selected have demonstrated indicia of viability, including developer experience and financial strength, as well as commercially proven technologies. Additionally, the utility should develop standard contract terms that include specific performance milestones, as well as remedies for lack of performance. APS and other utilities have knowledge and expertise on effective commercial terms that should be utilized in adopting any standard contract terms. To assure completion of a project, APS would regularly assess performance criteria related to development and contractual requirements.

6. *Facilitate interconnection of projects that efficiently utilize the existing distribution system.* The safety of the customer, utility worker and the overall general public must be considered when interconnecting FIT projects with the utility's distribution system.

With solar distributed generation, APS must be integrated into the connection and design process to assure that its delivery system is not compromised, or that undesirable conditions, such as unintentional islanding, do not occur. APS currently implements extensive interconnection and inspection processes to assure safety of all distributed energy that is interconnected to the Company's electric system and follows the Commission's Interconnection Rules approved in Decision No. 69674.

7. *Complement, but not impede or duplicate, existing renewable energy programs.* APS agrees that FIT programs should not impede or duplicate existing programs. APS believes that the programs that the Company currently has in place are successfully driving development of renewable energy. APS also notes that its current PBI Program and Small-Gen Program already have many of the features of a FIT program.

8. *Provide sufficient regulatory certainty to create a sustainable marketplace for small distributed generation renewable developers.* With the RES Rules that have been established and the Implementation Plans that have been approved by the Commission, renewable energy resources in Arizona are taking hold. APS, as well as other utilities, are continuing to move forward, with customers taking advantage of incentive programs and new contracts for renewable energy being executed on a regular basis. Markets require monitoring and potential adjustments, both of which are already brought to light through the annual RES compliance filings. APS believes that the Commission has created a sustainable marketplace for small distributed renewable energy projects, and that it is important to stay the course to ensure continued success.

9. *Provide just and reasonable rates for the buyer, seller, and ratepayer.* The Company has a responsibility to provide its customers with reliable electricity at reasonable rates. The best way to achieve this goal is to acquire renewable energy, including that produced from any FIT program, through a competitive process that results in the most cost-efficient resources, and regular program and incentive review.

10. *Help Arizona's developing renewable energy industries mature by bringing down costs and enhancing expertise.* APS agrees that with the further development of renewable energy resources, the

industry will mature, which should decrease costs and increase the expertise in Arizona.

Q4.1: *What is the appropriate size range of projects to target? What is the size of the potential market for projects in the size range you suggest?*

A4.1: APS's current programs attempt to include each customer/market segment, from residential to utility-scale central station generation facilities. In part, the size of projects will be determined by the Commission's policy decisions, such as the amount of RES funding that should be allocated for FIT programs. APS believes that in its service territory there are certain market segments that would be appropriate for a targeted FIT program, as described in Section III(B).

Q4.2: *Would a FIT provide a benefit to rural areas, urban areas, or both? Why or why not?*

A4.2: A FIT program is a procurement strategy, not a resource strategy. In other words, resource development specifically aimed at benefiting either rural or urban areas can be accomplished with targeted solicitations and/or utility specified development efforts. Because FITs are a procurement effort, these projects may serve to complement these objectives.

Q4.3: *What benefits would procurement from projects in this size range provide to Arizona ratepayers? Would a feed-in tariff assist utilities in more quickly meeting their overall RES requirements, particularly in light of the apparent difficulty facing large-scale projects in achieving financing?*

A4.3: A FIT program that included only small projects would likely be a more expensive approach to achieve RES requirements, as compared to large, utility-scale projects. In addition, the utility generally exercises less discretion over project location and timing in a FIT program, creating potential bottlenecks in various aspects of project development. The actual benefits to Arizona customers of a FIT would depend on how the program is implemented. If a FIT is designed based on a competitive bid solicitation and includes a program cap, the financial benefit to customers would be greater than if the program included large premiums and no program cap. If the FIT program is targeted towards a specific market segment that currently has difficulty in building new renewable generation, this should assist utilities in more quickly meeting their overall RES requirements. However, APS also recognizes

that other targeted approaches, other than a FIT program, may be used to effectively reach under-served market segments.

APS also believes that with its current strategies, the Company will continue to meet the RES compliance requirements, and further, that those strategies support its goals of exceeding the RES requirements.

Q4.4: *Should it be used as an incentive for higher value locations, such as recognized congestion zones or areas with anticipated higher capital costs?*

A4.4: APS reiterates that a FIT is not a resource planning tool, but rather a procurement tool. Like many procurement tools, a FIT can be designed to include a process similar to that of a competitive solicitation, which could specify that locations in congested zones or near load centers would provide a higher probability of being awarded FIT incentives.

Q4.5: *Should it be used as a tool to attract customers who would otherwise be unable to make use of current programs such as Non-Profits, Non-taxable entities, Home Owner Associations and multi-family dwellings?*

A4.5: A FIT could benefit market segments that currently have a more difficult time accessing the incentive funding though the current RES programs. These markets would differ among the utilities. For further discussion on targeting specific market segments, see Section III(B).

Q5.1: *Should the Commission adopt a statewide FIT, or should FITs vary by utility?*

A5.1: Every utility has unique circumstances, customer base and service territories. In developing policy related to FITs, the Commission should provide utilities the flexibility to design FIT programs that target specific needs in their service territories.

Q6.1: *In light of the proposed policy goals, what would be the most appropriate procurement method to use in procuring power from projects in the size range you recommend, and what cost or capacity limits should be applied to the program?*

A6.1: To assure that projects that receive the FIT premium incentives provide just and reasonable rates for the buyer, seller and customers, a FIT should incorporate a competitive selection process, that is at a minimum, similar to that used in APS's PBI Program. In that process,

applications are evaluated based on system production and project costs, and RES incentives are paid only to the most cost-effective projects.

Cost or capacity limits would necessarily vary by utility, by target market segment, by the utility's current RES compliance status, and, likely, by a number of segment specific variables. In any case, because a FIT program – regardless of what market segment might be targeted – would be a new endeavor, at this time, one cannot predict whether the program will be successful in its first design and deployment. Therefore, APS believes that any initial FIT pilot program should be limited to a small percentage of the overall RES funding requirement to minimize the risk of non-compliance.

Q7.1: *Assuming a capped program, on what basis should winning contracts be selected?*

A7.1: APS believes the most cost efficient and effective method for selecting contracts under a proposed FIT program is by a competitive solicitation. Specific details of the process would depend on how the FIT program is designed. While not all-inclusive, key selection process components that should be considered include the location of the renewable generation system (*e.g.*, whether it is close to a load center or whether new transmission or transmission upgrades are required), the size of the system, and the technology.

Q8.1: *Would projects located in certain areas (e.g. congested areas), provide greater benefits to Arizona ratepayers, and if so, how might the Commission focus policy design to promote project development in these areas?*

A8.1: Each utility may have certain locations, whether congested urban areas or rural areas, where a small distributed renewable energy system would provide benefits to its customers. Because each utility has unique circumstances in their service territories, the Commission policy related to FIT projects should allow the utilities flexibility in designing a FIT program. To promote project development in specific areas, a FIT program that included a competitive process for awarding incentives could specify the targeted locations and incorporate those factors into the rating process.

Q9.1: *Please discuss what price-setting method would be most likely to: (a) capture changes in generator costs, (b) produce the lowest cost to ratepayers, (c) be easiest for Commission staff and utilities to administer,*

(d) encourage competition, (e) be mostly likely to result in viable projects (f) exert a downward pressure on prices and (g) best support the Commission's goals?

A9.1: APS believes the most effective price-setting method would be similar to the approach currently used in its PBI Program. With this approach, the utility would submit a FIT program proposal to the Commission for approval as part of its annual RES Implementation Plan. Once approved, APS would implement a similar approach as the Company's competitive selection process for awarding PBIs. FIT project proposals would be evaluated based on proposed cost and energy production, and awarded to those projects that meet the objectives and economics of the approved program.

Q9.2: *Should a FIT be created so as to be based on avoided costs or cost of technology plus a small return on investment?*

A9.2 Because Arizona's net metering rules and the federal PURPA rules base rates on avoided costs, this may prove to be an efficient and cost effective methodology in the determination of a FIT. However, there may be other avenues of pricing, such as technology cost, plus a return on investment adder, that may also be appropriate. APS anticipates that these issues will be more fully explored through the Commission's FIT workshops, and plans to fully participate in that process.

Q9.3: *Should the rates be a fixed price premium or a variable premium on price?*

A9.3: Most FIT programs within the United States offer long-term contracts that have incentives that are a fixed rate plus a fixed premium to reduce uncertainty and investment costs. APS believes that this is the appropriate approach.

Q9.4: *Which technologies should be eligible to participate in this program?*

A9.4: While APS believes that choice of technologies is primarily a policy determination that is the Commission's purview, FITs have proven particularly effective at stimulating markets for technologies that have historically struggled to gain the interest of developers and financiers. As such, APS believes that one appropriate technology to target in a FIT program would be biogas resources. Biogas has reasonable potential in Arizona, and currently, there does not appear to be interested developers in such projects. Biogas is a high-value

renewable energy resource for utilities because it can serve electric load day and night, much like a conventional baseload resource. Additionally, FITs would also be appropriate for proven renewable technologies.

Q9.5: *Should the FIT rate be the same for all qualified technologies, irrespective of technology type or generator size? If not, why not?*

A9.5: No, the FIT rate should not be the same for all qualified technologies because: 1) the value of the energy and the time of delivery; 2) the capacity value provided by the installed technology; and 3) the capital cost of each technology differs significantly and the value to utility customers is different. On the other hand, within the same technology, there should be no difference in the FIT rate based on the size of the project within broadly-defined project size segments.

Q9.6: *Should it vary depending on the time of day and reward generators more for on-peak production than for off-peak production? If not, why not?*

A9.6: APS currently offers time of use pricing structures to wholesale generators to encourage production during peak hours and believes that this would be an appropriate approach for renewable energy as well. There is value for the utility in encouraging generation that helps to meet peak load.

Q9.7 *What should be the applicable payment term of a FIT? 5, 10, 15 or 20 years?*

A9.7: APS believes that the longer-term contracts, such as 20 years, are the most appropriate for FITs, because the longer term brings more benefits to customers. Under these contracts, developers are guaranteed premium incentives, and they should be required to deliver those resources for the duration of the contract term. In addition, longer-term tariffs facilitate project financing.

Q10.1: *In light of the policy goals and procurement mechanism you recommend, what additional elements must the Commission consider, e.g. standard contract development, rate recovery for regulated utilities, contract approval requirements, etc?*

A10.1: APS has discussed the key features for successful FIT programs in detail at Section IV of this filing.

Q11.1: *How should this new program fit into existing renewable energy requirements? Should it be additive to the RES requirement? Should generation procured under this policy qualify toward the Distributed Renewable Energy Requirement in the RES? Toward the non-distributed requirement in the RES?*

A11.1: All energy generated by FIT projects should count toward compliance with the annual renewable energy requirement under the RES Rules. The market segment targeted through the FIT would determine how the energy is counted. If the targeted market segment is within the current distributed energy program, the energy would count toward compliance with the distributed energy portion of the RES requirement. If the targeted market segment is within the current small generation program, the energy would count towards the RES renewable generation goal.

Q11.2: *Should all FIT expenses be recouped via the REST surcharge? If not, how should they be recouped?*

A11.2: The initial distribution of any dollars associated with the FIT should be recovered within the RES mechanism. The long-term or lifetime costs of the agreement may be categorized as a PPA, and in those circumstances, it may be appropriate to use another recovery mechanism for recovery of the up-to-market or fuel related costs. In any event, it is essential that the utility recover the full cost of a FIT program as described in Section IV(G).

Q12.1: *Should there be any additional restrictions or prioritization of siting opportunities (e.g. should the program be restricted to rooftops, etc)?*

A12.1: Generally, it is preferable to allow for flexibility when developing new programs, APS does not believe that a FIT program should be limited to a specific site, because to do so may restrict worthwhile opportunities. For example, one FIT program may be designed similar to APS's PBI Program, where renewable facilities are customer-sited, while another FIT program may be similar to APS's Small-Gen Program, where the renewable systems would be small utility-scale facilities. As a result, in developing FIT policies, APS would caution against unnecessary restrictions. On the other hand, if the Commission determines that there are specific market segments or technologies that FIT programs should target, this would provide a basis for prioritizing projects. In any case, the utilities should be allowed to

develop FIT programs in their service territories to meet the standard objectives of the RES.

Q13.1: *Are there legal or jurisdictional issues that should be considered in the development of a feed-in tariff program? If so, how might the Commission address those concerns in the design of the program?*

A13.1: APS believes the best way to develop a FIT would be as part of the Implementation Plan under the RES Rules. This process, which includes utility submission of program proposals, Staff review, intervenor participation and Commission approval, provides an appropriate regulatory framework. For discussion on jurisdictional issues, see response to Q2.7.

Q14.1: *Please discuss any additional elements that the Commission should consider.*

A14.1: For additional discussion on relevant policy issues and key features of successful FIT programs, please see Sections III and IV of this filing.

Exhibit A

EDISON ELECTRIC INSTITUTE

Feed-in Tariffs

In Europe and the United States

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December 2009

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EXECUTIVE SUMMARY

Europe is often cited as the primary example of success of feed-in tariffs (FITs) as a support mechanism for renewable energy in the electric power sector. The perceived effectiveness of FITs in Europe is often used to justify the introduction of this type of mechanism in the United States. This position is further validated, according to its proponents, by the adoption of FIT programs in some U.S. states. The recent enthusiasm toward, and validity of, this type of policy in the U.S. needs to be tempered with a few comments.

Feed-in laws in Europe were chosen instead of quota obligations with tradable credits, not in addition to them. In the U.S., the existence of numerous state renewable electricity standard (RES) mandates and federal tax incentives renders the introduction of European-style feed-in tariffs unnecessary. As more experience and data are gathered, FIT programs increasingly appear to be expensive policies to promote renewable generation. Moreover, structural and industrial differences between Europe and the U.S. make it unlikely that the success of FITs overseas would be replicated in the U.S. Existing FIT programs in the U.S. provide a poor justification for the introduction of far-reaching feed-in laws at the national or state levels. The programs currently in place are narrowly defined policies that target customer-owned, small-scale distributed sources, and their reach falls far short of the broad subsidy policies in place in Europe.

Section 1, *Feed-In Tariffs and Their Context*, describes FITs as production incentives for renewable electricity that entail long-term utility purchase commitments at above-market rates, with guaranteed access to the grid. They typically are differentiated by technology, and FIT rates decline over time to encourage increased economic efficiency among suppliers. FITs have proven effective in stimulating the rapid market penetration of renewable technologies. However, FITs increase retail electricity rates, are fundamentally incompatible with competitive markets, entail significant administrative cost, and may constrain utilities' ability to reduce carbon emissions at least cost. Alternative policy approaches to stimulating renewable energy include the use of RES programs and competitive auctions to procure predetermined amounts of renewable resources. In general, a technology-neutral approach that allows the market to find least-cost solutions to environmental goals will produce better results.

Section 2, *The European Feed-In Tariff Model*, reviews the experience in Europe, where FIT programs have been the policy of choice for promoting renewable energy. Both Germany and Spain have seen their share of renewable energy rapidly climb in the past few years. The cost, however, has been significant. Germany, for instance, offered rates ranging from $0.678 per kWh equivalent for photovoltaic sources to $0.116 per kWh for wind sources in 2008. In addition to cost, the case of Spain

and the burst of the world's market of solar panels has also shown the difficulty of designing a long-term, well-functioning program.

Section 3, *The American Interpretation of Feed-In Tariffs*, reviews the status of FIT schemes in the United States that have been implemented on a voluntary or mandatory basis by investor-owned and municipal utilities. Among the common features of U.S. FITs is their almost exclusive focus on small-scale (i.e., distributed) applications. Most are based on some estimate of production cost plus a rate of return; include project and program caps; are differentiated by technology, size, and/or location; require that all associated renewable energy credits pass to the purchasing utility; are in states that have implemented RES; and entail a long-term purchase commitment by the utility.

Section 4, *Europe vs. United States*, considers the transferability of the European experience with FITs to the U.S. and concludes that there are many geographic, structural, and policy differences between Europe and the U.S. that limit such transferability. These include: (1) a larger, more diverse renewable resource base in the U.S., which means the cost of sub-optimization/resource misallocation is higher in the U.S. ; (2) a more dispersed population in the U.S., which means the impacts of FITs on the need for new transmission is a far more important consideration than in Europe; (3) lower retail rates in the U.S., which means FIT-related rate impacts will be greater in the U.S.; (4) too much concentration in the generation segment of the Single European Market compared to the U.S., which means that European FITs offer policy benefits not applicable or needed in the U.S.; (5) the fact that European policymakers have relied on FITs as the primary policy tool to encourage renewable generation, whereas U.S. policymakers have relied on RES; and (6) the legacy of the Public Utility Regulatory Policies Act in the U.S., which teaches that policy interventions to promote preferred generating resources and technologies can lead to abuses and unintended consequences. Fundamentally, FITs preempt, and thereby undermine the outcomes of, competitive markets and competitive procurement processes.

Section 5, *Conclusion*, reiterates that FITs have proven effective in promoting the development of renewable energy sources, but at significant cost. On the basis of their cost, as well as the differences of the U.S. system compared to that in Europe, FITs are ill-suited to be the main mechanism to increase the market penetration of renewable energy. FITs can help utilities comply with some aspects of their RES mandates, particularly distributed generation and/or solar carve-outs. For these reasons, the decision to introduce a FIT program, as well as its specific configuration, should be left to the discretion of the utility offering it.

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FEED-IN TARIFFS AND THEIR CONTEXT

The term "feed-in tariff" is a literal translation of Germany's law on feeding electricity into the grid (*Stromeinspeisungsgesetz*). Feed-in tariffs (FITs) are also called renewable tariffs or renewable energy payments. They are incentive mechanisms for the development of renewable generation and entail the paying of above-market rates to providers of renewable generation by electricity companies, usually distributors, which must guarantee access to the grid. The electricity companies, in turn, are generally allowed to recover the costs of this generation from their customers.

The success of FITs in some European countries in increasing the market penetration of renewable energy technologies, notably wind and solar, as well as rapid adoption by many nations around the world, has prompted some policymakers, analysts and advocates of renewable energy to make the case for the suitability of FITs in the United States. Although many of these claims and the rationale behind them are not always unsubstantiated, FITs' usefulness, mechanisms and interactions with other policies are widely misunderstood and mischaracterized. Under some measures of success, FITs in Germany, Spain and certain other countries have been undeniably helpful in promoting the growth of renewable energy. These programs, however, have not been without problems or economic side effects that should mitigate current enthusiasm for similar programs. In addition, fundamental differences between American and European policy and industrial structures should further temper enthusiasm over the appropriateness of FITs in the U.S. electricity market.

History

The first U.S. FIT program was introduced in California in 1969. It required some utilities to buy renewable energy produced by water and wastewater treatment companies. In 1978, in the aftermath of the oil shocks of the 1970s, President Jimmy Carter signed the Public Utility Regulatory Policies Act (PURPA), which was intended to encourage energy independence and the development of renewable resources for electricity generation. PURPA created a market for small non-utility generators by granting them access to the grid and guaranteeing the purchase of their generation by utilities at a fixed rate based on the utility's avoided cost.

Other similar programs followed. In the early 1980s, for instance, the California Public Utilities Commission (PUC) introduced Standard Offer Contracts for small renewable energy developers that mandated that investor-owned utilities offer standardized contracts at fixed prices to small developers.

It is Germany, however, that raised the worldwide visibility of programs mandating long-term purchases of renewable energy at fixed prices. The first German law was introduced in 1990, but it was the Feed-In-Tariff law of 2000 (*Erneuerbare-Energien-Gesetz*) that became a model for many other countries. As of 2009, around 40 countries had adopted FITs worldwide, and many others are considering adopting this policy or some variation of its main mechanisms.

Principle, advantages and disadvantages

FITs are production-based incentives for the development of renewable generation. They entail the payment of above-market rates to providers of renewable generation, guaranteed access to the grid, and long-term contracts by electricity companies, usually distributors, which in turn are generally allowed to recover the costs of this generation from their customers via a higher energy charge, a supplemental tracker, or through compensation from a third-party entity. FIT payments are usually differentiated by technology for an extended number of years (5 to 20). The actual rates paid to renewable energy providers are administratively set and specified in the tariffs, and generally vary with the particular technologies (e.g., solar, wind, biomass), the size of the project and its location. The rates in feed-in-tariffs are also usually designed to decline over time in order to encourage innovation and increase efficiency in the production of renewable energy.

By guaranteeing a fixed price for an extended period of time, FITs are intended to reduce uncertainty and hence investment costs. The above-market premium is meant to ensure that generators recover their fixed costs so that renewable technologies, more expensive than other forms of generation, are able to enter the market. Through these mechanisms, FITs allow for the forced, gradual introduction of renewable generation, creating a market for these technologies. The feed-in premiums usually are phased out once the technologies become mature or the desired level of renewable penetration has been achieved. FITs also tend to be more transparent than other types of incentives aimed at promoting renewables such as net metering, because it is easier to show the actual cost of the subsidy on electric bills.

Like all policies centered on subsidies, however, FITs also present risks. The main risk is over-subsidization (subsidization in excess of the level that would be needed to make renewable generation competitive with other forms of generation), which can lead to a misallocation of resources and economic inefficiencies (investments in inferior technologies). These inefficiencies increase the cost of the program and may reduce its environmental effectiveness.

Other risks with FITs require consideration of the following:

- From an economic and environmental perspective, technology-neutral policies should be preferred as they allow the market to pick the most cost-effective technology to achieve the environmental goals set by the government.
- If the cost is not socialized, a subsidy benefiting certain types of resources could result in cost-shifting among electricity customers depending on the size of their utility, location, electricity market structure, etc.
- FITs increase electricity prices for consumers, but do not create incentives to reduce fossil fuel generation or increase system efficiency.
- Although in the short term, FITs may be an effective instrument to increase the market penetration of some technologies, in the longer term a system of fixed premium prices tends to be costly, inefficient and distortive of competitive pricing.
- FITs, with their implied system of fixed premium prices, conflicts with rules and practices of competitive markets whether in the U.S. or Europe and its Single European Electricity Market.
- The administration of FITs can be burdensome and costly, especially in a large country with disparate electricity markets like the U.S.
- Because FITs may create an incentive to develop renewable generation independently of resource and/or infrastructure availability, they may create a suboptimal allocation of transmission resources and render local and regional long-term planning of transmission more difficult.
- Because of their fixed price and national scope, FITs create the possibility of "over" construction in certain areas, which could crowd out traditional generation, increase strains on the grid and harm local environments.

Concerns also arise regarding the administrative complexity and regulatory permanence of FITs. Major revisions to the operating rules of the German, Spanish and Danish FIT programs have been required since 2000 due to electricity price decreases associated with market liberalization, the overall cost of the program or a need to adjust the tariffs to better reflect market and industrial developments. These revisions raise awareness of the difficulty of designing a stable and efficient FIT policy.

Despite these disadvantages, FITs in some cases have been able to actively promote renewable resources. This benefit, however, is not necessarily unique to FITs. Other policies also can be designed and implemented to increase the market penetration of renewable technologies.

Policy Alternatives to Feed-in-Tariffs

The main goal of a FIT program is to encourage the market penetration of one or more renewable energy sources. Three main policy approaches exist to achieve that policy objective:

i. Quota obligations (called Renewable Electricity Standards (RES) in the U.S.) set a quantitative target and let the market decide the appropriate technologies to fulfill that requirement at the least cost. Tradable certificates or credits ensure that all entities are able to comply with the desired policy objective at the lowest possible cost. Without the possibility of trading certificates, a quota obligation would be a mere target, not a mechanism to promote renewable resources.

ii. Fixed Payments (i.e., feed-in tariffs) set the price for the technologies without worrying about the level of renewable energy that will actually get built.

iii. Tendering systems procure, usually in a centralized manner, a predetermined amount of renewable resources through bids which are then supplied on a contract basis to the complying entities or the electric system.

If properly designed, all these policies have the potential of achieving the same environmental results (i.e., the same level of renewable energy penetration), but their mechanism, chances of success and socio-economic consequences can be largely disparate. In a system based on market mechanisms like the RES, markets can ensure that the environmental goal is met with a more efficient allocation of resources, hence more cost-effective solutions, than in a system with administratively set prices like a FIT program. Whereas a quota obligation artificially creates a "regulatory demand" for renewable energy while allowing the market to pick the most cost-effective technologies and set supply costs and prices, a FIT program artificially creates both the demand for renewable energy, through an obligation to purchase, and also its supply, through a fixed incentive. In general terms, a technology-neutral policy will always result in better economic and environmental benefits.

To accompany these policies and facilitate their implementation, other policies and support mechanisms can be introduced to help achieve renewable goals, mainly tax and other financial incentives. These types of incentives have been widely used both in Europe and the U.S.

Although all of these policies, in many different combinations, have been implemented in the world over the past 20 years, two main mechanisms have emerged. In the United States, state-driven RES mandates (most with tradable certificates) have been supported with federal tax credits for different renewable technologies, while in most countries in the European Union, feed-in tariffs have been the main support mechanism to achieve the renewable energy goals stated by the European Commission.

It is worth noting, however, that both FITs and RES programs were first introduced in Europe and the U.S. as instruments of industrial and economic policy as much as for the promotion of renewable energy. The lack of clarity surrounding the main goal given to these policies renders their assessment and evaluation all the more difficult.

THE EUROPEAN FEED-IN TARIFF MODEL: AN ALTERNATIVE TO RENEWABLE ELECTRICITY STANDARDS

The first European Directive on renewable energy (2001) established national goals for renewable generation, but left it up to each national state to decide how to achieve those goals. Again, the main two mechanisms chosen were quota obligations imposed on the electric companies (essentially a RES) and FITs for renewable energy producers. FITs very quickly became the policy of choice. Seventeen out of the 27 member states have adopted FITs, alone or in combination with some other support mechanism. Some of those that initially adopted a quota mechanism moved to a FIT system later on. In general, the FIT programs apply to all renewable technologies, including all forms of hydropower, and all project sizes, from small distributed generation to large central station plants.

Table 1. Main policies, targets and progress for renewable electricity in EU-27[1]

	Main policy	2006 share (%)	2010 target (%)	Progress made toward target
Austria	Feed-in tariff Regional investment incentives	61.6	78.1	0-33%
Belgium	Quota obligation Minimum prices for electricity from RES	3.9	6	34-66%
Bulgaria	Feed-in tariff Purchase obligation Tax incentive	6.8	11	0-33%
Cyprus	Feed-in tariff Investment grant scheme	0	6	0-33%
Czech Republic	Feed-in tariff Investment grants	4.1	8	0-33%
Denmark	Premium feed-in tariffs Tender for offshore wind	25.9	29	67-100%
Estonia	Feed-in tariff	1.5	5.1	0-33%

[1] The Support of Electricity from Renewable Energy Sources, Commission Staff Working Document, 2008 (SEC (2008) 57).
The Renewable Energy Progress Report, Communication from the Commission to the Council and the European Parliament, April 2009 (COM (2009) 192 final).

	Main policy	2006 share (%)	2010 target (%)	Progress made toward target
Finland	Energy tax exemption Investment incentives	26.5	31.5	0-33%
France	Feed-in tariff Tendering for large projects	14.3	21	0-33%
Germany	Feed-in tariff	12.6	12.5	67-100%
Greece	Feed-in tariff Investment incentives	8.8	20.1	0-33%
Hungary	Feed-in tariff Purchase obligations Grants	3.7	3.6	67-100%
Ireland	Feed-in tariff	8.6	13.2	34-66%
Italy	Quota obligation Feed-in tariff for photovoltaic	18.3	22.5	34-66%
Latvia	Quota obligation Feed-in tariffs	40.4	49.3	0-33%
Lithuania	Feed-in tariff Purchase obligation	3.9	7	0-33%
Luxembourg	Feed-in tariff	3.7	5.7	34-66%
Malta	Very low value added tax	0	5	0-33%
Netherlands	Premium payments	7.9	9	67-100%
Poland	Quota obligation	3.1	7.5	0-33%
Portugal	Feed-in tariff Investment incentives	31.2	39	0-33%
Romania	Quota obligation	28.1	33	0-33%
Slovak Republic	Feed-in tariff Tax incentives	16	31	0-33%
Slovenia	Feed-in tariffs and premium	28.3	33.6	0-33%
Spain	Feed-in tariffs and premium	19.1	29.4	0-33%
Sweden	Quota obligation	52.3	60	34-66%
United Kingdom	Quota obligation	4.6	10	0-33%

In 2008, the European Commission released a report with an updated analysis of the performance of the different support mechanisms for renewable energy. The conclusion of this report was unequivocally in favor of FITs, which it characterized as "generally the most efficient and effective support schemes for promoting renewable electricity."[2] This conclusion was partly driven by the rapid

[2] The Support of Electricity from Renewable Energy Sources, Commission Staff Working Document, 2008 (SEC (2008) 57), p. 3.

penetration of renewable energy technologies in Germany and Spain. The 2009 Commission's Progress Report,[3] however, suggested that the 2010 21% target will not be reached without significant additional effort. Out of all the European countries, most of which have feed-in tariffs in place, only four seem to be on track for achieving the renewable energy targets established.

Germany

Germany first introduced a feed-in law in 1991 (the Electricity Feed-in Act), but revised it several times as design problems and market developments revealed that the law had asymmetric impacts on the different electricity companies. Moreover, the movement of electricity prices in a liberalized market had begun to undermine the economic basis for FIT incentives.

The current legal framework was set by a 2009 revision of the 2000 version of the FIT law (*Erneuerbare-Energien-Gesetz*, or EEG) and calls for 12.5% of electricity generation to come from renewable sources, including large hydropower, by 2010 and 20% by 2020.

The EEG was intended to accelerate the development of renewable energy in response to the government's decision to phase out nuclear power by 2021. It was also designed as an economic development policy aimed at benefitting some rural areas and fostering domestic manufacturing. It is now clear, however, that renewables will not be able to replace nuclear generation. In addition to energy security concerns, this raises the issue of a possible reversal or postponement of Germany's nuclear phase-out. Such a development could render FITs obsolete as one of their main *raisons d'être* disappears. In fact, Germany's new government has announced plans to change the FIT scheme for solar in 2010 and aims to undertake a major revision of its renewable energy policy in 2012, which could well produce significant changes to the existing financial incentives.

Current Mechanism

The German law guarantees renewable developers interconnection to the grid and a technology-differentiated declining rate for 20 years that ensures price certainty while encouraging technology innovation and cost-efficiency. The system operator is legally obliged to provide access to the grid for all renewable generators, and to pay the renewable tariff to those suppliers that qualify under the terms of the EEG.

In 2008, the average FIT rate in Germany was $0.18/kilowatt hour (kWh), while the average market electricity cost (avoided cost) was around $0.10/kWh. The incremental cost of the FIT program is socialized and equally paid for by all ratepayers in order to avoid regional distortions and increase the

[3] The Renewable Energy Progress Report, Communication from the Commission to the Council and the European Parliament, April 2009 (COM (2009) 192 final)

fairness of the program. Also, since 2000, feed-in prices are fixed and no longer linked to electricity prices, and there is no cap on the share of renewable generation.

Feed-in Tariffs in US-Cents/kWh in 2008:[4]

Wind onshore	11.64
Wind offshore	12.93
Photovoltaics	67.79
Biomass	19.00

Results and assessment

Between 2000 and 2008, renewable generation doubled. In 2005, generation from renewable sources, including large hydropower, accounted for 10% of the German electricity output (3.5% hydro, 4.5% wind, 1.4% biomass and 0.6% solar). This share increased to around 15% in 2008, 70% of which was supported through FIT subsidies. In 2008, Germany had the second largest installed wind capacity in the world (23,900 megawatts (MW)), behind the U.S., and the largest installed photovoltaic (PV) capacity (5,311 MW). The development of renewable energy in Germany and abroad has fostered growth in the German manufacturing industry. According to the German Environmental Ministry, between 2004 and 2007, green jobs increased by 55%.[5]

The German policy undoubtedly met one of the objectives set by the EEG—the promotion of renewable generation. It did not, however, meet the other goals that the policy was meant to achieve (i.e., climate change mitigation, energy supply cost reduction, and fossil fuel conservation). Also, as experience with the program accumulates and more data is gathered, it is more apparent that the perception of German success should be moderated. The German model is increasingly becoming the example of a very expensive policy that helped promote renewable energy sources unevenly, and which clearly conflicts with the overarching cap-and-trade regime in that country.

One of the stated goals of the 2000 feed-in law was to reduce the cost of energy supply. This target has not been achieved and in fact, costs have increased due to the subsidy. Renewable energy currently accounts for about 5% of household electricity bills and the additional cost of the program has been estimated at around $0.02/kWh which, compared to a retail rate of about $0.17/kWh for industrial and

[4] BMU (2004) Renewable Energy Sources Act, EEG.
BDEW (2009) EEG Jahresabrechnung 2008, Bundesverband der Energie- und Wasserwirtschaft e.V., July 27th 2009, Berlin, Germany.
[5] BMU (2008) Bruttobeschaeftigung durch erneuerbare Energien in Deutschland im Jahr 2008, Federal Ministry of the Environment, Nature Conservation and Nuclear Safety, Berlin, Germany.
RWI (2009) Economic impacts from the promotion of renewable energies: The German experience, Essen, Germany.

$0.29/kWh for residential customers, represents a 13% increase in rates for industrial customers and a 7.6% increase for residential ratepayers.

The debate over the cost of the FIT program has been gaining momentum in Germany as the economic crisis brings cost and industrial competitiveness back to the forefront of policy concerns. More than 100 electricity service providers announced significant price increases (as high as 16% for households) for 2010, claiming increased costs associated with purchasing and delivering renewable energy. Increasing numbers of policymakers, economists and energy executives are advocating a gradual phase-out of renewable energy incentives as a way to lower electricity prices and encourage domestic manufacturers of renewable technologies to become more cost efficient. This trend is occurring as China and other foreign manufacturers are rapidly increasing their market share in solar and other renewables systems.

Moreover, as debate occurs over the suitability of FITs in Germany as a tool to abate greenhouse gas (GHG) emissions, feed-in-tariffs are proving to be extremely expensive instruments. Whereas European emission allowances trade at around $20/metric ton CO_2e (all-time high below $45), a 2009 report[6] estimated photovoltaics' abatement cost at $1,050 per metric ton CO_2e, and wind's abatement cost at around $80 per metric ton CO_2e.

Spain

The FIT program in Spain set a target of 12% of total energy consumption and 29% of electricity from renewable sources by 2010. As in Germany, the Spanish feed-in law has been revised several times. The current law is the result of a 2008 revision that created a separate law for PV (Royal decree 1578/2008), but kept all other renewable sources under the previous 2007 law (Royal decree 661/2007).

The feed-in tariff was established in 1997 (Electric Power Act) and reformed in 2004 and 2007. The initial Spanish feed-in law defined differentiated tariffs by technology and system capacity and gave renewable energy generators the choice between a fixed price and a "premium" added to electricity market prices. When electricity prices rose dramatically, the costs for consumers under the market option and producers' windfall profits increased more than expected. The 2007 revision sought to address those problems.

Before its last revision in 2008, the law guaranteed fixed electricity rates of up to €0.44/kWh to all new solar panel projects connected to the grid by September 2008. Also, the law allowed bundles of small, ground-based projects to receive up to 575% of the average electricity price. The generosity of the

[6] RWI (2009) Economic impacts from the promotion of renewable energies: The German experience, Essen, Germany.

solar premiums and the loopholes of the 2007 law created a boom cycle in the solar industry. They were fixed by the 2008 revision, bursting the solar market worldwide.

Current Mechanism

The Spanish legislation imposes deployment caps for some technologies, but guarantees renewable developers interconnection to the grid and a technology-differentiated fixed rate for 20-25 years. The system operator is legally obliged to provide access to the grid for all renewable generators and to pay the renewable tariff to those suppliers that qualify under the terms of the law.

As mentioned, Spain now treats photovoltaics separately under a 2008 law, which differentiates installations between building integrated systems (€0.31-0.34/kWh) and non-integrated systems (€0.32/kWh). All other technologies still follow the 2007 law with rates ranging from €0.07/kWh for geothermal to €0.27/kWh for solar thermal.

Results and assessment

The growth of renewable generation in Spain has been notable in the past few years. In 2008, renewable generation provided almost 20% of the country's electricity. Wind accounted for around 10% of electricity supply, with approximately 1,500 MW of new capacity added every year, while biomass and solar PV provided almost 1% each. Despite its relatively low generation share, solar power has grown rapidly. At the end of 2007, Spain had 470 solar plants. A year later, it had over 1,500.

As in Germany, over-subsidization and the overall cost of the FIT program have become major sources of concern in Spain. Unlike Germany, however, the Spanish 2007 feed-in law has become the example of poor design and the cause of the boom and collapse of a renewable resource market. The PV market had been cutting costs rapidly during the past few years, and the Spanish tariff, with its high rates, attracted unanticipated levels of investment. Unlike in Germany, Spain's feed-in law had no built-in mechanism to reduce tariff rates if capacity targets were exceeded; there were no rate reductions, or degressions.

Since it first introduced its generous feed-in law, Spain has been a key market for the solar industry worldwide. In 2008 alone, it was estimated that more than 3 gigawatts (GW) of new solar power were added to the system, more than 40% of the world's solar installations last year and more than all new installations in the world in 2007. This very rapid growth forced the government to revise its FIT law in 2008 as it quickly realized that it could not sustain the program during the economic recession. In 2007 alone, Spain's FIT program committed to payments estimated at €26.4 billion. Although the law provides for the cost of the FIT program to be share equally by all ratepayers, some particularities of

the Spanish electricity system prevented the extra cost from being passed on to consumers. At the beginning of each year, the government sets retail rates and, if electricity costs rise more than expected, the government then reimburses power providers and grid operators the difference. As a result, utilities were forced to sell electricity at below cost and brought the government's so-called "tariff deficit" to an estimated €4.85 billion in 2008 (€14 billion since 2000).

The 2007 law set a national solar cap of 400 MW in expectation that it would be sufficient for the 2007-2010 timeframe. By September 2007, new solar capacity reached 344 MW prompting the government to set a new cap of 500 MW for 2009 and lower the tariffs for both rooftop and ground installations by as much as 29%. In response, solar developers rushed to complete as many projects as possible before the new rules were enacted and purchased about 1.7 GW of solar panels. They were only able to install less than half. As a result, PV prices went down as developers tried to cut their losses and sold their excess panels at cost, adding downward pressure to PV prices worldwide. In summer 2009, prices for solar panels ($2.40/Watt) stood at about half of what they were merely a year before.

The Spanish FIT solar fiasco will have lasting consequences both in Spain and in other areas. The new cap and the reduced solar rates are expected to result in a slimmed down Spanish solar market over the next two years while Spain's solar industry has already lost an estimated 20,000 jobs. The downturn will necessarily also affect manufacturers in Europe and other parts of the world.

THE AMERICAN INTERPRETATION OF FEED-IN TARIFFS: SUPPORTING SMALL-SCALE DISTRIBUTED GENERATION

Contrary to Europe, the U.S. has chosen to promote the growth of renewable resources through tax incentives and state-driven RES mandates that do not set prices. FIT programs in the U.S. have been limited to the very concrete purpose of encouraging small-scale distributed applications.

Policymakers have cited the economic and environmental benefits of distributed generation (DG), e.g., such projects impose less strain on existing transmission infrastructure than do utility-scale projects. Policymakers also commonly point to the potential for DG to increase the availability of renewable resources for RES compliance.

It remains to be seen how RES mandates and FIT mechanisms would mesh. Implementation of state-mandated FITs is in an early stage in the applicable states, and many program implementation details have yet to be decided.

One area of interaction requiring resolution is the treatment of environmental attributes. State RES laws generally require renewable attributes—mostly in the form of renewable energy certificates or credits (RECs)—to be granted to a utility purchaser for the purpose of RES compliance. Similarly, FIT authorities require transfer of environmental attributes, but they vary in their definitions of attributes, with some including certain emission allowances, for example. A dual system of renewable attributes would require careful management and likely add complexity to what already is a complex process for achieving RES compliance in the states.

Another example of potential incompatibility lies in the context for procurement of renewable energy to meet RES targets. If a utility seeks to satisfy an RES in a traditional regulatory setting, it will generally do so at the least cost, e.g., through the purchase and banking of RECs obtained through a competitive procurement process. FITs, on the other hand, may help minimize transaction costs but they do not help minimize costs for ratepayers who foot the bill. Under FITs, prices are available to all qualified comers regardless of underlying costs, in opposition to a least-cost compliance strategy.

Following are highlights of FIT policies and their underlying purposes, as adopted by state and/or local entities in the states. For information on specific FIT program features, see the Annex.

Voluntary state programs

Voluntary, utility-driven FITs have been adopted in Michigan and Wisconsin for reasons that are specific to the utility's needs and circumstances. A voluntary policy has been adopted in Washington tailored to the state's needs and circumstances.

Wisconsin: The Wisconsin Public Service Commission (PSC) under existing regulatory authority has approved five utility-proposed feed-in tariffs, called advanced renewable tariffs (ARTs), on a case-by-case basis over the past four years.

The proposals were made for a variety of reasons, including as part of a strategy to acquire supply to meet demand under a voluntary "green pricing" program, and to help encourage customer-driven DG. Under typical green pricing programs, customers voluntarily purchase renewable energy for a premium added to their existing rates.

The PSC also is considering expansion of ART availability on a more uniform basis in the state. The investigation is proceeding in response to the Governor's Task Force on Global Warming, which issued a final report in July 2008 recommending that the state establish an ART policy to stimulate the deployment of renewable generation projects smaller than 15 MW. The task force was charged with developing recommendations to:

- address climate change challenges
- reduce dependence on fossil fuels
- advance the state's energy independence objectives

The task force also urged strengthening of the state's existing RES, but the state has not acted on this recommendation. The task force included ART development in a set of "enabling policies" that would help facilitate compliance with an enhanced RES. The report stated that FITs would not directly lead to GHG emissions, but rather would contribute to the achievement of overall reductions of GHG emissions via the RES.

Even if the state RES weren't enhanced, a stand-alone ART policy would promote DG, which carries economic and environmental advantages, according to the task force.

Wisconsin Utility Examples:

- An **Xcel Energy** ART approved in early 2008 grew out of the utility's work with a state distributed resources collaborative in response to a PSC request. Although the collaborative did

not reach a consensus on the ART model, Xcel proposed the experimental tariff for the primary purpose of moving the renewable-based DG market forward. The utility will revisit the tariff after four years. All energy purchases under the program will count toward RES compliance.

- A **Madison Gas & Electric** (MG&E) ART approved in late 2007 was proposed by the utility as one of several ways to help meet strong customer demand under a green pricing program, which was undergoing significant expansion at the time. MG&E said demand was growing in response to a state clean energy initiative, and as customers sought to obtain Leadership in Energy and Environmental Design (LEED) certification for new and existing buildings. The MG&E ART is targeted at solar PV. Only those customers that value additional renewable energy, i.e., participate in the green pricing program, pay the incremental cost under the ART.

Michigan: The Michigan PSC in May 2009 approved an experimental ART as part of Consumers Energy's proposed renewable energy plan. The plan was filed in compliance with a PSC directive under the state's new RES, which was enacted in October 2008, to encourage solar PV development. The RES does not specifically mandate FITs.

Likewise, the PSC approved Wisconsin Electric Power's proposed ART, which was modeled after the utility's approved FIT in Wisconsin, but which targeted solar PV instead of biomass and digester gas as in Wisconsin.

The Michigan legislature favored an RES over proposed FIT legislation (HB 5218), which died in 2007 despite support from Gov. Jennifer Granholm, who promoted FIT policy to help restore the state's economy and create jobs.

Washington: Washington enacted a law in 2005 providing for a voluntary FIT program under which residential, commercial, and local government projects may receive a fixed-price incentive for solar PV and thermal electric installations, and gas digester systems. The state amended the program in May 2009 to make community solar project eligible.

Utilities are not obligated to offer FITs under the law. The policy is financed by taxpayers rather than ratepayers, in that a utility can earn a tax credit equal to the cost of its incentive payment to a producer, subject to a cap.

The intent of the law is to reduce load on the grid by providing clean sources of electricity generation, and to create jobs. The legislature found the state's economy could be enhanced through creation of incentives to develop additional renewable energy industries in the state.

Voluntary local programs

Several localities in the U.S. also have voluntarily adopted FIT mechanisms, including the Sacramento Municipal Utility District (SMUD) in California and the city of Gainesville, Florida.

California—SMUD: The SMUD board in June 2009 approved a FIT that will take effect in Jan 2010 to promote DG development. SMUD more recently indicated the tariff will enable compliance with the state's new FIT law (SB 32, described below), which was enacted subsequent to the board action. In addition to renewables, the tariff will be available to fossil fuel-fired combined heat and power systems.

The rates will vary based on time of day and season and include adders reflecting avoided GHG compliance costs and gas price hedge value. They will not be differentiated by technology, size or other factors. Critics say the rates will be numerous and complex, and may fall short of the level needed to spur small DG development.

Florida—Gainesville: The Florida city of Gainesville in early 2009 passed a FIT ordinance as it and the nation experienced an economic downturn. The key driver was to strengthen the local economy and create jobs.

Under the ordinance, the city-owned utility, Gainesville Regional Utilities (GRU), purchases solar PV energy under long-term standard offer contracts. GRU has received enough applications to meet the program caps through 2016 and is no longer accepting applications.

The city is not subject to an RES, nor does the state of Florida have in place an RES mandate.

Mandated state programs

Policymakers typically view mandated FITs as mechanisms that are complementary to state RES policies. The interaction of FIT and RES mechanisms has yet to be designed and tested, and market response to implemented FIT programs has generally been under- or overwhelming, indicating erroneous market signals from mandated administrative pricing.

California: The state in fall 2009 enacted SB 32, a law strengthening the state's existing mandated FIT policy and for the first time expanding coverage to include publicly owned as well as investor-owned utilities. The law thus brings FIT policy closer to a true statewide mandate. The previous policy was perceived by policymakers as ineffective based on low market response due to underpricing.

Under the new law, the FIT is now available for renewable energy facilities up to 3 MW, up from the previous threshold of 1.5 MW. SB 32 will not take effect until the California PUC adopts implementing regulations.

The legislature cited various intentions behind the measure, including:

- Encourage the location of clean generation close to load centers to meet increases in electricity demand
- Remove barriers to participation by small projects (less than 3 MW) in competitive solicitations under the state RES
- Assist in achieving RES compliance and meeting the state goal for reducing GHG emissions under the California Global Warming Solutions Act of 2006

At the same time the PUC must develop implementing regulations for SB 32, the regulators are considering a staff proposal to create a reverse auction system to promote customer-sited renewable DG, especially solar PV, through provision of a long-term investment pricing signal. The proposal came as part of a proceeding (Case R.08-08-009) that is considering FITs as an RES compliance tool.

The PUC staff said in its August 26, 2009, proposal that a market-based pricing mechanism may induce system-wide renewable DG developers to bid the lowest prices at which they would be willing to develop projects. Such developers are defined as distribution grid-connected projects between 1-20 MW that export 100% of electric output to the utility. The staff said this mechanism would allow the state to pay developers a price sufficient to bring projects online while not providing "surplus profits at ratepayer expense."

Whether the PUC can reconcile the FIT requirements of SB 32 and the staff-proposed market-based mechanism remains to be seen.

The FIT has a relatively long history in California that is rooted in PURPA. The 1978 federal law led to the establishment of standard offer contracts in the early 1980s, including Standard Offer No. 4 for renewable energy. California has since considered FITs in the context of RES compliance. However, utilities have relied primarily on competitive procurements to meet their RES obligations.

The PUC shares RES implementation responsibilities with the California Energy Commission (CEC), which explores FITs in its biennial Integrated Energy Policy Report process. Since 2007, the CEC has recommended moving toward a project cost-based FIT policy that would replace the current approach, which is based on avoided cost. The CEC also has recommended that the PUC consider FIT policies for projects up to 20 MW, and to begin a collaborative process to develop FITs for projects above 20 MW.

Hawaii: The Hawaii PUC in September 2009 approved a FIT mechanism under which the state's affiliated investor-owned utilities may procure renewable energy by paying an incentive to small-scale DG developers under long-term contracts.

The action arose from an October 2008 state agreement to implement a FIT policy. The agreement was signed by the governor, the Department of Business Economic Development and Tourism, the Division of Consumer Advocacy of the Department of Commerce and Consumer Affairs, and the Hawaiian Electric Companies. Its purpose is to lessen the state's dependence on imported oil for electricity and ground transportation, increase reliance on abundant indigenous renewable resources, and move toward an energy efficiency ethic.

Maine: Legislation (LD 1450) that would have required the Maine PUC to develop a standard contract with incentive rates for renewable energy failed to pass in 2009. The aim was to encourage development of environmentally healthy generation and reduce dependence on fossil fuels. The state instead enacted LD 1075 requiring a limited pilot with more modest rates for locally owned, in-state renewable resources. The PUC will develop rules and administer the program.

Oregon: A law (HB 3039) enacted in July 2009 establishes a pilot FIT to promote solar PV for non-consumer-owned electric utilities under the existing state RES. The Oregon PUC is charged with adopting rules and incentive rates, which has yet to be accomplished. Of the 25 MW program cap, 75% must come from DG, subject to definition by the PUC.

The FIT is based not on the production cost as most other state FIT programs provide, but rather on the resource cost, defined as the avoided capacity and energy cost. The law is not expected to have great impact on the solar PV market because of its extremely limited scope.

Vermont: Act 45 was enacted in May 2009 to require retail electricity providers to procure renewable energy via a pilot FIT program under which technology-specific, long-term standard offers are made. The law is aimed at promoting renewables development to help meet the state's voluntary goals in the existing Sustainably Priced Energy Enterprise Development (SPEED) program, which potentially is a precursor to a state RES mandate.

The program is capped at 50 MW, which is perceived as a major commitment for a small state. Applications for 50 MW have been accepted under the program, which is now fully subscribed. A lottery is being implemented to select final solar and biomass projects.

Act 45 was enacted after Gov. James Douglas decided not to sign the bill rather than risk a likely veto override. He said the bill "will needlessly increase costs to Vermont consumers so as to subsidize this

one favored business sector." Proponents said the law will help Vermont become a leader in the green energy economy.

Similarities of state FIT policies in the U.S.

Implementation of FIT policies in the U.S. is in an early stage and varies by jurisdiction in design and purpose, yet a number of similarities can be observed:

- FIT programs provide support for small-scale renewable DG.
- FIT projects generally are not eligible for net metering.
- Most pricing is based on production cost plus a modest rate of return, with exceptions, notably the California and Oregon FIT mechanisms, which are based on avoided cost.
- FIT programs generally provide for guaranteed payments for the entire output of a project over the contract term.
- Most FIT programs are limited in scope, with project and program caps applying.
- No broad open-ended policy has been implemented.
- Administratively priced FIT programs typically have resulted in under- or over-subscription, indicating pricing that is too low or too high.
- Specific technologies are usually targeted, especially solar PV.
- Pricing is differentiated by factors such as technology, size, and/or location of projects.
- Environmental attributes associated with FIT projects are granted to the purchasing utility (but have varying definitions).
- Most FIT states have RES frameworks in place, except for Vermont, which has a voluntary goal, and Florida, in which a locality has mandated a FIT but not a state entity.
- Almost all FIT programs provide for long-term contracts (10+ years).

EUROPE VS. UNITED STATES: WHY SOME POLICIES SHOULD NOT BE IMPORTED

Based on the overall cost of European subsidization programs compared to other alternative policies, and the adverse effects of a poorly designed FIT program, the success of feed-in tariffs in Europe needs to be nuanced. It is also important to note a number of structural and policy differences between Europe and the United States that not only render the introduction of FITs unnecessary in this country, but could very well turn programs of this kind into pernicious policies from both the economic and environmental points of view.

Structural differences

Renewable resource potential: As a whole, the U.S. enjoys a much richer endowment of renewable resources than European countries, so their development can be achieved at a lower cost than in Europe. Large direct subsidies FIT-style are not necessary, but, most importantly, they could prove detrimental to the development of least-cost resources, which also happen to be in the most remote areas of the country with little or no access to transmission grids.

A FIT creates an incentive for developers to build new renewable generation capacity and an obligation to electric companies to purchase the ensuing renewable power, but it creates no incentive to build the necessary transmission infrastructure that would allow the development of the richest and least-cost resources. As a consequence, an ambitious FIT policy aimed at increasing the penetration of large-scale renewable projects could result in the development of projects located near transmission lines and load centers, but that are lower quality and more expensive, thereby reducing the cost-effectiveness of the FIT program and bypassing its main purpose. A FIT policy, with its attractive rates, also could well reduce business opportunities for transmission companies as generators might be willing to pay for and own their own interconnections.

System size: European countries are much smaller than the United States. This size discrepancy has a number of important implications. First, the smaller the area, the less disparity in resource endowment there is, hence the potential for misallocating resources geographically is also smaller. In the U.S., the risk and adverse effects noted above would add to a geographical disparity in resource development and cost. The smaller size of European countries also means a denser population and tighter electricity grids which render the transmission prerequisite for developing renewables a much less important issue. Contrary to European policies, a U.S. policy aimed at increasing the market penetration of

renewable energy must include a solution to facilitate new transmission infrastructure. FITs provide no incentive for tackling this problem.

Higher electricity prices: The high cost of the renewable subsidy in Europe represents a lower percentage than in the U.S. because electricity prices are higher there. Hence, for a given tariff, American customers would see a higher increase in their electricity bills than their European counterparts. For example, an additional 2.2 cents/kWh, as experienced in Germany, would represent an 18% increase over the 10 cents/kWh U.S. average. In general, policies aimed at promoting renewable resources do not follow a strictly economic logic, which conflicts with the mission of public utility commissions and consumer advocates to ensure rates are just and reasonable.

Competitive markets: The introduction of FITs in some European countries also may have been driven by a separate, yet very important, policy consideration—the creation of a Single European Market. The process of creating a Single European Market for Electricity forced European electric companies to unbundle their generation in order to create competitive wholesale markets. However, competition is still being challenged by the absence of numerous generators in some member states. By guaranteeing access to the grid, FITs create an incentive for generators to enter the market, hence they indirectly help increase the chances that competition will develop once the FITs disappear.

More importantly, with their fixed price and purchase obligation, FITs go against the principles of competitive markets and competitive procurement rules. They can also burden one set of customers over another. Under a European-style FIT, utilities would be required to purchase any renewable generation in their area and/or market, which would result in generation costs that could differ widely across utilities, thereby forcing consumers to switch to lower-cost providers.

To be competitively neutral, feed-in laws should have a cost recovery and sharing mechanism that allows for the cost of the policy to be evenly redistributed among all ratepayers. European electricity systems are different in that they were liberalized (deregulated) and have only one system operator, which makes the redistribution and "socialization" of costs an easier task than in a system like the U.S. with many different system operators and regulatory structures. As a result, equity concerns may be more pronounced in the U.S. than in Europe.

Policy differences

Choice of policy to promote renewable resources: In Europe, FITs have been chosen over quota obligations with tradable credits to promote renewable generation. In the U.S. the multiplication of state RES mandates is a strong reason to preclude the introduction of another competing policy. Proponents of FITs often stress that renewable payments can help achieve the targets set by RES

policies, but they ignore the fact that RES states have already coupled their renewable goals with supporting mechanisms. Usually, this mechanism is a system of tradable permits, which will achieve the same compliance result at a lower cost. Other options also exist. New York, for instance, chose a system of centralized procurement.

Federal system of government: The differences in government institutional frameworks between the U.S. and Europe also have important implications for FITs in U.S. markets. In Europe, the European Commission issues Directives and member states have full discretion on how to comply with them. In the United States, the balance and division of authority between the federal government and the state governments is a more delicate one grounded by the general principles of the U.S. Constitution and federal and state energy laws.

As a general matter, the U.S. Constitution provides the federal government with almost plenary authority over matters impacting interstate commerce. Regulation of matters that are wholly intrastate in nature is reserved to the authority of state governments. Application of these principles over time has resulted in a division of regulatory authority over the electricity industry and utility services between the federal and state governments. The Federal Power Act (FPA), passed by Congress in 1935, grants the Federal Energy Regulatory Commission (FERC) authority to regulate the transmission of electric energy in interstate commerce, and sales of electric energy at wholesale (sales for resale) in interstate commerce. All remaining aspects of regulation remain with the state governments, through state public utility commissions that typically regulate electric distribution facilities and retail sales of electricity to end users as well as utilities' cost recovery. The FPA, in fact, explicitly reserves many aspects of electric utility regulation to the states, including regulation of generating facilities (apart from the rates they charge for wholesale power sales) and local distribution facilities.

This division of authority between federal regulation of wholesale transactions and state regulation of retail transactions can limit the ability of either level of government to implement broad policy directives. Federal price-setting initiatives can run into roadblocks if they impinge on state authority to regulate retail rates, or conflict with individual state resource development goals. Similarly, state regulatory programs at the retail level can be limited in their reach or negatively impacted by regulatory decisions made at the wholesale level. Unlike the discretion afforded individual member states in the European Commission, neither federal nor state regulators have unfettered discretion to take actions that might impinge on the jurisdiction of the other.

Policy preferences and the PURPA experience: Contrary to Europe, the U.S. has traditionally been somewhat reluctant to introduce direct subsidies and command-and-control interventions in the

market to stimulate particular industries. Nevertheless, Congress did pass PURPA in 1978,[7] with effects that still resonate within the industry.

PURPA required electric utilities to interconnect with, and purchase the output of, Qualifying Facilities ("QFs"), defined as cogenerators and small power producers of up to 80 MW capacity that use waste heat or renewable energy as their primary fuel. QFs were to be paid at the utility's avoided cost, which was defined as the incremental energy and capacity cost the utility would have incurred but for the purchase of QF output.

The result was that over 20,000 MW of QF capacity was brought on line in the 1980s.[8] In many instances this was more supply than needed, and was purchased under long-term contracts at prices that exceeded the incumbent utility's eventual true avoided cost.[9] Another result was that there were abuses in which suppliers designed so-called "PURPA machines" that qualified for utility payments without providing the benefits PURPA was intended to deliver.

Congress recognized these abuses and fundamentally reformed the cogeneration provisions of PURPA in the Energy Policy Act of 2005 (EPAct '05). Congress also recognized that PURPA's mandatory purchase obligation, which was intended to guarantee access to markets for third party cogenerators and small power producers, was likely no longer necessary in light of the changes in the industry since PURPA was passed that opened the transmission system and wholesale electricity markets to third-party, non-utility generators. As a result, Section 1253 of EPAct '05 allowed electric utilities to apply to FERC to be relieved of the purchase obligation if the utility demonstrated that QFs in its region have non-discriminatory access to a competitive wholesale market for energy and capacity.

As importantly, and with direct consequences for the design and implementation of FIT schemes in the U.S., PURPA prevented states from setting rates above avoided cost.

[7] US CODE: Title 16, Chapter 46.

[8] 1988 Capacity and Generation of Non-Utility Sources of Energy, EEI, April 1990, Table 29.

[9] After many utilities finalized long-term purchase agreements with PURPA QFs (at then-determined avoided costs), the costs of traditional generation capacity moved lower. As a result, the avoided cost determinations made for these utilities turned out to be much higher than what their avoided costs would actually have been. In some limited circumstances, utilities were not permitted by regulators to recover all of the costs of these PURPA QF purchases in rates, resulting in financial difficulty.

CONCLUSION: VOLUNTARY FITS IF THEY FIT

FITs have been helpful mechanisms in some European countries in promoting the development of renewable generation. They have also been expensive programs.

The cost shortcomings of FITs as well as the particularities of the U.S. system compared to those in Europe make FITs an ill-suited policy in the U.S. as the main mechanism to increase the market penetration of renewable energy. FITs, however, can help utilities comply with some aspects of their RES mandates, in particular the DG and/or solar carve-outs that exist in many RES states. The carve-outs also tend to provide multiple credits, thereby encouraging utilities to meet them. FITs can be one of the many policies and programs that a utility can implement to incentivize otherwise inert electricity consumers to develop DG so the RES targets can be met. However, the decision to introduce a FIT as well as the design of its tariff, rules and other characteristics should lie with the utility alone.

All technologies should be part of a balanced power generation portfolio, and renewable energy needs to be part of a long-term carbon mitigation strategy. The multiplication and strengthening of state RES programs, as well as the legislative developments regarding a federal carbon abatement policy, will require that utilities and regulators consider all the available policy options to achieve those goals with a clear view of the benefits and challenges as well as cost-effectiveness of each option.

Given that the responsibility for meeting environmental mandates often resides with investor-owned electric utilities, and that such utilities have statutory obligations to provide reliable service at rates that are just and reasonable, FIT programs should not be mandated by law, but should be part of a panoply of tools and programs that utilities can implement on a *voluntary* basis. Whereas FITs or similar programs can be a useful instrument to achieve a particular utility objective (implement carbon strategy, meet renewable energy supply requirements, etc.), they can also, as the PURPA experience shows, unnecessarily raise the cost of electricity to consumers.

Utilities are in the best position to decide whether a FIT is the best tool to achieve relevant policy goals, and if so, how to configure it. A mandated FIT program, equal for all utilities, would preclude companies from using their individual discretion in the choice of policies needed to achieve their responsibilities within the context of their existing resources, regulatory framework and carbon and renewable energy goals.

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ANNEX—U.S. FIT PROGRAMS

EDISON ELECTRIC INSTITUTE

Feed-in Tariff Policies: Adopted in 10 States

By State and/or Local Entities

December 2009 — *Acronym Glossary located at end of table*

State	Policy Reference	Covered Entities	Eligible Technologies	Features
California	• SB 32, enacted 10/11/09 (amended law enacted 9/28/08 (SB 380))	• Electrical corporations • Publicly owned utilities	• Wind • Solar thermal/PV • Biomass • Geothermal • Ocean • Small hydro • Fuel cells using renewables • MSW • Landfill gas • Gas from digesters • Biofuel *Note: Expected to primarily benefit solar PV*	• Rate: Based on avoided cost using PUC market price referent, adjusted for distributed factors such as time of delivery and value of offsetting peak demand on a distribution circuit, and including cost of current/anticipated environmental compliance • Terms: 10, 15, or 20 yrs • Program cap (statewide): Increased from 500 MW to 750 MW • Project size cap: Increased from 1.5 MW to 3 MW
	• SB 380, enacted 9/28/08, amended AB 1969 (enacted 9/29/06)	• Electrical corporations	• Wind • Solar thermal/PV • Biomass • Geothermal • Ocean • Small hydro • Fuel cells using renewables • MSW • Landfill gas • Gas from digesters • Biofuel	• Rate: Based on avoided cost using PUC market price referent, adjusted by TOU factors. Higher rate provided for solar between 8 am-6 pm • Terms: 10, 15, or 20 yrs • Program cap (statewide): 500 MW • Project size caps: 1.5 MW for deliveries to PG&E, SDG&E & SCE; 1 MW for deliveries to other IOUs.
	• PUC Resolution E-4137, decided 2/14/08	• PG&E, Pacific Power, SDG&E, SCE, Sierra Pacific, Mountain Utilities, Bear Valley Electric Service	• For PG&E and SCE: Any eligible customer-owned RE facility • For all 7 utilities: RE systems located at public water/wastewater	

State	Policy Reference	Covered Entities	Eligible Technologies	Features
			facilities	
	• Sacramento Municipal Utility District announcement 7/17/09, effective 1/1/2010	• SMUD	• Renewables • CHP	• Rates: Varying, based on avoided cost w/premium adders for avoided greenhouse gas compliance costs and gas price hedge value, and differentiated by time of day and season • Terms: 10, 15, 20 yrs • Program cap: 100 MW • Project size cap: 5 MW
Florida	• Gainesville Ordinance 0-08-88, enacted 2/5/09	• Gainesville Regional Utilities	• Solar PV	• Rates: $0.32/kWh for any size building- or pavement-mounted systems, or ground-mounted systems < 25 kW; $0.26/kWh for free-standing systems > 25 kW • Term: 20 yrs
Hawaii	• PUC Case 2008-0273, decided 9/25/09	• Hawaiian Electric, Hawaii Electric Light, Maui Electric	• Solar PV • Concentrated solar power (CSP) • Onshore wind • In-line hydro	• Rates: Based on project cost + reasonable profit of typical project; vary by technology or resource, size, and interconnection costs; levelized; baseline rate to be set = lowest specified FIT rate for any given project size • Term: 20 yrs • Program cap: 5% of 2008 peak demand for each co. • Project sizes/caps: **Tier 1** = 0-20 kW (all islands); **Tier 2** = 21-500 kW (PV on Oahu), 21-500 kW (CSP on Oahu), 21-100 kW (hydro, wind- all islands), and lesser caps for PV/CSP on other islands; **Tier 3** = greater than Tier 2 caps up to and including lesser of 5 MW (Oahu) and 2.72 MW (Maui, Hawaii) or 1% of system peak load from previous year, except wind precluded on Maui, Hawaii
Maine	• LD 1075, enacted 6/9/09	• Investor-owned utilities • Co-op participation is voluntary	Community-based: • Solar • Wind • Hydro • Qualified biomass • Fuel cells • Tidal	• Rate: For projects ≥ 1 MW, price capped @ $0.10/kWh and may not exceed project cost plus reasonable ROR; for projects < 1 MW, prices TBD by PUC based on cost analysis, and may be differentiated by technology and time of generation • Term: ≤ 20 yrs • Program cap: 50 MW, including 10

State	Policy Reference	Covered Entities	Eligible Technologies	Features
				MW set aside for DG < 100 kW • Project size: 10 MW
Michigan	• PSC Case U-15805, et al., decided 5/26/09	• Consumers Energy	• Solar PV	• Rate: For service no later than 12/31/09, $0.65 for residential, $0.45 for C&I; for service after 12/31/09, $0.525 for residential, $0.376 for C&I • Term: 12 yrs • Program cap: 2 MW • Project size: Residential, 1 kW-150 kW; C&I, 20 kW-150 kW
	• PSC Case U-15500, decided 11/13/08	• Wisconsin Electric Power	• Solar PV	• Rate: $0.225/kWh • Term: 10 yrs • Program cap: 75 kW • Project size range: 1.5 kW-15 kW
Oregon	• HB 3039, enacted 7/22/09	• Non-consumer-owned electric utilities	• Solar PV	• Rate: Volumetric incentive rates, TBD by PUC • Term: 15 yrs • Program cap (statewide): 25 MW • Project size: Small scale, TBD by PUC
	• Eugene Water & Electric Board Solar Electric Program, eff. 1/25/08	• EWEB	• Solar PV	• Rate: $0.12/kWh • Term: 10 yrs • Project size: 10 kW floor, no ceiling
Texas	• CPS Energy, municipal utility serving San Antonio	• CPS Energy	• Solar PV	• Rate: $0.27/kWh • Term: 20 yrs • Program cap: 10 MW • Project size: 25-500 kW
Vermont	• H 446, enacted 5/27/09 • PSB Case 7533, interim implementation order, decided 9/15/09	• Retail electricity providers	• Wind • Solar thermal/PV • Biomass • Small hydro • Landfill gas • Gas from digesters • MSW	• Rates: Based on cost of generation + return, reviewed by PSB every 2 yrs. Initially set by statute, and affirmed by interim PSB order, as follows: For **landfill gas**, $0.12/kWh; for **wind** ≤ 15 kW, $0.20/kWh; for **solar**, $0.30/kWh; for **hydro, wind > 15 kW, qualified biomass**, $0.125/kWh. Interim order raised price for digester gas (farm methane) from initial $0.12/kWh to $0.16/kWh. • Terms: 10-20 yrs, except solar is 10-25 yrs • Program cap: 50 MW • Project size cap: 2.2 MW
Washington	• SB 5101, enacted 5/6/05; SB 6170, enacted 5/12/09	• Light and power businesses (almost all utilities)	• Wind • Solar PV/thermal • Gas from digesters	• Rates: $0.12/kWh - $1.08/kWh; varies by project/technology type, manufacturing source of equipment

State	Policy Reference	Covered Entities	Eligible Technologies	Features
				• Term: Until 6/30/20
Wisconsin	• PSC Case 6680-UR-116, decided 12/30/08	• Wisconsin Power & Light	• Wind • Solar thermal/PV • Biomass • Geothermal • Ocean-wave, tidal • Small hydro • Fuel cells using renewables • Landfill gas • Gas from digesters	• Rates: Solar, $0.25/kWh; non-solar, $0.12/kWh (on-peak), $0.0735 (off-peak) • Term: 10 yrs • Program caps: Solar, 683 kW; non-solar, 0.5% prior year retail electricity sales • Project size: Not specified
	• PSC Case 6690-UR-119, decided 12/30/08	• Wisconsin Public Service	• Solar PV	• Rate: $0.25/kWh • Term: 10 yrs • Program cap: 300 kW
	• PSC Case 4220-UR-115, decided 1/8/08	• Xcel Energy	• Wind • Biomass • Geothermal • Ocean-wave, tidal • Small hydro • Fuel cells using renewables • Gas from digesters	• Rates: Wind, $0.066/kWh; biogas, $0.073/kWh; other, negotiated case by case • Term: 10 yrs • Program cap: 0.25% of prior year retail electricity sales • Project size range: Biomass/biogas, 20 kW- 800 kW; other, 1 MW cap
	• PSC Case 3270-UR-115, decided 12/14/07	• Madison Gas and Electric	• Solar PV	• Rate: $0.25/kWh • Term: 10 yrs • Project size: 1 kW to 10 kW
	• PSC Case 5-UR-102, decided 1/25/06	• Wisconsin Electric Power	• Biomass • Gas from digesters	• Rates: $0.155 kWh on-peak, $0.040 kWh off-peak • Term: 10 yrs • Program cap: 10 MW • Project size cap: 1 MW

ACRONYM GLOSSARY

C&I – commercial and industrial
CHP – combined heat and power
CSP – concentrated solar power
DG – distributed generation
EWEB – Eugene Water & Electric Board
IOU – investor-owned utility
kW – kilowatt
kWh – kilowatt hour
MSW – municipal solid waste
MW – megawatt
PG&E – Pacific Gas and Electric
PSB – Public Service Board
PSC – Public Service Commission
PUC – Public Utilities Commission or Public Utility Commission
PV – photovoltaic
RE – renewable energy
REP – retail electricity provider
ROR – rate of return
SCE – Southern California Edison
SDG&E – San Diego Gas & Electric
SMUD – Sacramental Municipal Utility District
TBD – to be determined
TOU – time of use

Note: Table entries were selected according to the following criteria for characteristics of a feed-in tariff: 1) policy action by state or local entity, 2) utility makes guaranteed above-market payment to generator, 3) contracts are long term (10+ years), 4) all electric output is sold to utility purchaser, and 5) projects are not also eligible for net metering. Similar production incentive mechanisms not meeting these criteria are not included.

For more information on production incentives, including feed-in tariffs and other mechanisms, please visit the Database of State Incentives for Renewables & Efficiency (DSIRE) website at http://www.dsireusa.org/

Sources: Edison Electric Institute; DSIRE; SNL Financial; National Renewable Energy Laboratory report: *State Clean Energy Policies Analysis (SCEPA) Project: An Analysis of Renewable Energy Feed-in Tariffs in the United States*, May 2009
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