2010

Feed-in Tariffs (FIT):

Frequently Asked Questions for State Utility Commissions

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Introduction

There is a growing push in the U.S. to increase renewable energy production in order to build a new green economy and lower carbon emissions. Because of high costs and financing challenges, States are looking for effective policies to drive funding to increase renewable energy, and the feed-in tariff has emerged as a potentially useful tool. Feed-in tariffs (FITs) have been credited with driving renewable energy growth in Europe, and a growing number of U.S. policy makers are examining the potential for achieving similar success if the policy can be made compatible with current energy and economic goals. While many finance tools and policies are already available in the U.S. to support the development of renewable energy, a feed-in tariff may offer an additional incentive particularly where gaps exist in current renewable energy policy.

The main attraction of the FIT is that it has shown high success in different economic and legal contexts in other countries for quickly driving the production of renewable energy by providing a guaranteed return for developers and reducing the red tape associated with connecting renewable energy systems to the grid. However, because the program is supported by ratepayers, electricity rates will likely increase as they have in Europe, though the impact of a FIT may vary significantly across the U.S. and other jurisdictions. In the U.S., the success of a FIT policy would depend on many variables including existing renewable energy generation, community acceptance of renewable energy and associated costs, and interconnection codes and standards. This document will explore common questions about feed-in tariffs and the issues faced in particular by State Public Utility Commissions.

What is a feed-in tariff?

A feed-in tariff (FIT) encourages new renewable energy development by creating a long-term financial incentive to customers who generate renewable electricity, and offering a standardized and streamlined process to do so, easing the entry for new systems. Under a feed-in tariff, a utility is contractually obligated to connect the renewable energy generator to the grid and pay that generator for electricity at a fixed rate for the life of the FIT contract, typically 10-20 years. The goal of a FIT is to create a robust market for renewable energy to lower technology costs and increase development of such resources for the duration of the program, and potentially pave the way for future growth. The design of FITs can vary considerably in how rates are calculated, eligibility of different technologies and resource sizes, and the contract terms.

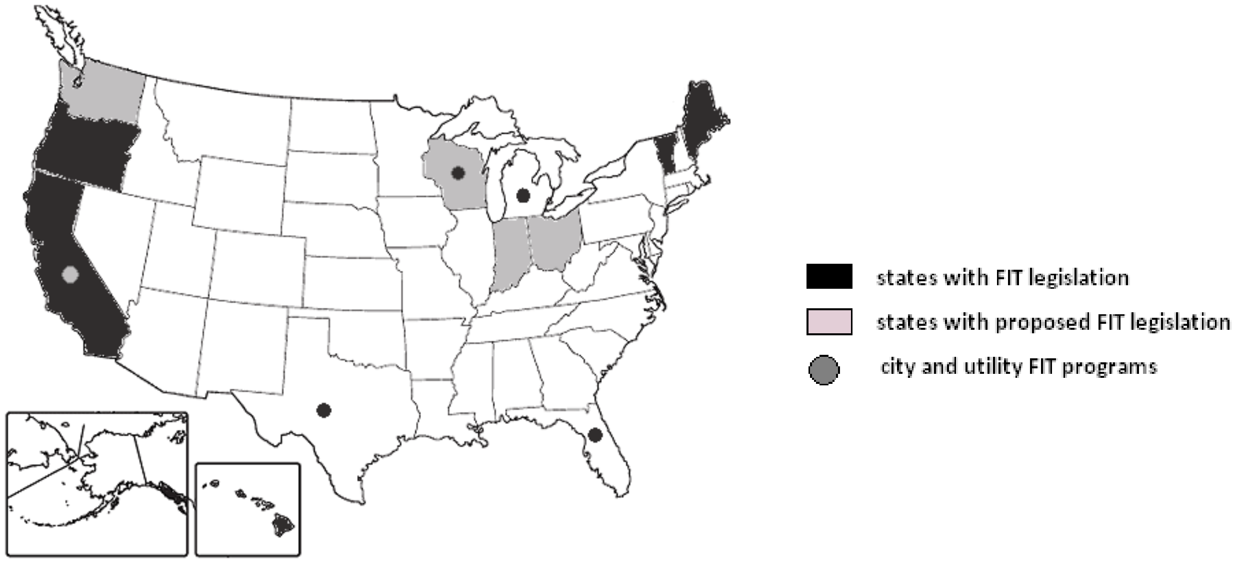
Who can use a feed-in tariff?

A FIT policy can be designed to encourage involvement from different customer classes, generation technologies (e.g., solar, biomass, etc.) and capacity sizes.

Which states are using or considering feed-in tariffs?

States with legislation requiring FIT programs	States with current and recent proposed legislation	City and utility FIT programs
California	Indiana	Gainesville, Florida
Hawaii	Ohio	Consumer's Energy (Michigan utility)
Vermont	Washington	Madison, Wisconsin
Maine (pilot program)	Wisconsin	Sacramento, California
Oregon (solar pilot program)		San Antonio, Texas

Figure 1: U.S. States and cities using or considering feed-in tariffs
Source: www.wind-works.org; Map and table created by author



How much energy is being produced by FIT contracts in the U.S.? How much is anticipated to come online?

State	Signed Contracts (MW)	Projects online (MW)
California	34.67 MW	6 MW
Hawaii	n/a	n/a
Vermont	49 MW	0 MW
Maine	n/a	n/a
Oregon	n/a (available 7/1/2010)	n/a

**n/a designates a State with FIT programs still in design phase and therefore not open to contracts*

At least 6 MW of FIT projects have been installed and 84 MW more have signed contracts to produce power, not including city and utility-run programs. Other states have opened dockets on feed-in tariffs, including Arizona and Nevada to explore the potential for feed-in tariffs in their State. Still, other states interested in procuring renewable energy with a feed-in tariff are interested in further clarification that State feed-in tariffs are not preempted by the Federal Power Act, PURPA, or Federal Energy Regulatory Commission (FERC) regulations. A FERC ruling may provide clarity for States who desire to implement a feed-in tariff. This issue is discussed in further detail later in the FAQ.

How does FIT interact with other renewable energy policies?

FIT and the Renewable Portfolio Standard (RPS)

When considering a FIT in a state with an existing renewable portfolio standard, there are three areas worth exploring: the complementary nature of RPS and FIT, the differing procurement and finance mechanisms, and the divergent ways in which RPS and FIT interact with the market.

First, as both are supportive of renewable energy, FIT and RPS can complement each other in goals and performance. As a *complementary policy*, the RPS sets a goal for renewable generation and a feed-in tariff can help fulfill the goal by providing another revenue stream to deploy more renewable generation resources. Generation that is sold pursuant to a FIT can produce associated renewable energy certificates (RECs), which can be used to demonstrate compliance with an RPS.

Secondly, for both FIT and RPS, a generation capacity or energy goal is first established by legislation or regulation; however, procurement and finance methods are starkly different. A FIT project has a predetermined and guaranteed funding stream for project developers while resource prices and the resulting return on investment under an RPS rely on market mechanisms to the extent competitive bidding is used. So while FIT project developers can determine costs ahead of time, RPS project developers typically cannot, as they negotiate a price based on market prices with the utility or independent power producer (the exception being a power purchase agreement with prices tied to the spot market). When developers are relying solely on RPS compliance mechanisms, this price uncertainty can create difficulties in raising capital and obtaining financing.

Because FIT sets a specific price that is typically above market price while RPS allows market forces to set a price, FIT may be a more expensive program than RPS per unit cost of renewable energy, a clear disadvantage. One advantage of this fixed price, however, is that the price certainty of FIT may help secure funding for renewable energy investments, thereby increasing the likelihood that such resources will be developed. Ultimately, a FIT program may create a stronger price incentive than an RPS program to develop renewable energy resources but this development will likely come at a higher cost to ratepayers. Balancing the urgency of renewable energy development with limiting unnecessary costs to ensure development will be an important consideration for policymakers interested in renewable energy.

Does FIT achieve policy goals effectively?

One area for policymakers to consider is whether the balance of benefits from a FIT outweighs the ratepayer impact, and whether other existing or proposed programs can more effectively or affordably achieve the same policy goals. Merits of renewable energy must be considered, and may include greenhouse gas reduction, job growth, and in-state economic stimulation but should be carefully weighed against the potential rate increase and consumer dissatisfaction. For this reason, it is imperative to include all stakeholders in the planning process. The implementation of a FIT may also serve to supplement renewable energy procurement within an ineffective renewable energy policy or may be a state's first attempt at incentivizing renewable energy. See Figure 2 comparing FIT with other policies for further discussion of this topic.

Lastly, because FIT payments are often disassociated from the market price, they may distort the true market price of renewable energy. RPS projects, conversely, are financed on the basis of current market prices and will be priced based on relevant market conditions. If the FIT program is large enough, the fixed payments may disassociate renewable energy costs from the market, creating difficulty in predicting future competitiveness of renewable energy generation.

The Takeaway: FIT can help fulfill an RPS with payments structured to encourage various targeted technologies and may create a stronger price incentive for investors resulting in higher project development. However, FIT rates are not always aligned with the market and program costs may be high in comparison to an RPS program, and therefore some argue that RPS may be a more sustainable policy in the long run.

What's the difference between FIT and Net Metering?

For most FITs, a utility is required to interconnect the renewable energy system to the grid and purchase any energy delivered to the grid, though some states are designing or proposing their FIT to guarantee generators will not receive compensation for any generation in excess of the consumer's annual energy consumption. In the case of net metering, instead of purchasing the energy, the utility may simply be required to provide a kilowatt-hour credit on the consumer's bill for energy produced by the net-metered system – in some states over an annual billing period without credit for "excess generation." However, the two programs are markedly different in the incentives that are provided to the generator. Net metering involves the generation, by a retail electric customer, of renewable energy typically located at the customer's premises. The generation may be used to offset the customer's load, with any excess generation sold back to the interconnecting utility, typically at retail rates. By contrast, a generator taking advantage of a FIT is selling all output of the renewable resource to the interconnecting utility, at predetermined rates that are not tied to retail rates.

	Feed-in Tariff	Renewable Portfolio Standards	Net Metering
How are rates determined?	Predetermined rate for all energy generated over a defined period.	Market dictates prices and ultimately determines investor returns.	The netting of generation has the effect of compensating electricity generation at retail rates.
Development requirements	Upfront capital to build RE system, engineering contract [may have same permitting requirements as any other generation unit]. Interconnection agreement and contract with utility.	Multiple contracts and permits required; financing, including upfront capital; interconnection agreement or transmission build out.	Varies by state. Interconnection agreement and contract with utility.
REC ownership	Depends on program design; may be generator or utility.	Generator is eligible to receive RECs and can sell RECs in combination with energy or can sell separately. Generally specified in legislation; typically transferred to utility for RPS compliance.	37% by generator; 6% by utility; 6% co-ownership, 43% not addressed.*

*the remaining 8% of states do not have a net metering policy

Figure 2: Comparison of feed-in tariffs, RPS, and net metering

Sources: DSIRE, NREL

How is the FIT different than PURPA?

The Public Utility Regulatory Policies Act (PURPA) of 1978 was enacted with many of the same goals as those now specified in feed-in tariffs. The PURPA statute enabled independent power producers (IPPs) to build and operate generation and sell electricity to a utility via a fixed-price standard offer contract at the utility's avoided cost of building generation. PURPA contracts encountered difficulty when the spot market price declined and utilities had to honor the agreed upon fixed-price contract with the IPP, and some argue that market power prices experienced artificial inflation.

A feed-in tariff also encourages the participation of IPPs and distributed generation development, however it can be designed with more flexibility than a PURPA contract to help achieve evolving goals and meet changing market conditions over time. For example, under FIT, the payments can be scheduled to be stepped down through the life of the contract or adjusted downward over time for new contracts, and differentiated by technology, size, and resource. Similar to PURPA contracts, which offer a streamlined approach to renewable energy development, the FIT aims to provide additional flexibility in program design framework. FIT policy designs have demonstrated some ability to achieve the delicate economic balance of minimizing ratepayer cost impacts and investor risk in renewable energy development, including elements such as biennial payment review to account for inflation/decline of electricity prices or aligning the payment to follow the fluctuations of the spot market (e.g., the spot market gap model used by The Netherlands). See *Designing a Feed-in Tariff: The Nuts and Bolts* below for further discussion on FIT program design elements. PURPA generators do have the choice of a market-based rate, as well, though there is no floor or ceiling for the payment as in the spot market gap model.

The Takeaway: Still a Standard Offer Contract, FIT programs have more design variables that enable the policy to be tailored for States and municipalities.

Designing a Feed-in Tariff: The Nuts and Bolts

For policy-makers considering how to design an effective FIT, two elements are worth considering first: the payment methodology (the guiding principles that determine how participants are to be paid), and the design rules for the overall program (i.e. who is eligible to participate, the term of the contract, and any other program requirements). *Payment methodology* and *FIT program design* are explored in this section.

Payment methodology: What should payments be based on?

Those designing a FIT would want the payments made to renewable generator participants to be high enough to attract investor interest without resulting in windfall profits and undue burden to the ratepayers. But in achieving this balance, what components should be included? What should participants be getting paid *for*? Two primary methodologies are used for determining payment structure: *cost-based payment* and *value-based payment*.

	Cost-Based (Project Cost + Profit)	Value-Based (Avoided External Cost)
Payment design	Includes the cost of renewable energy project, plus a return to investors as typically determined by program administrator.	Builds upon market-based products to include a premium based on the value of renewable generation to society.
Market interaction	The FIT payment is set and independent of fluctuating market conditions. Certain cost-based FIT payment structures are paid based on market price, with a premium administratively determined payment with floor and ceiling.	As the price of energy and electricity shifts, the total FIT payment shifts along with it.
Sale of FIT power	After entering into FIT contract, utility or program operator compensates FIT generator for electricity.	After entering into FIT contract, generators compete with each other to sell power.
States/utilities using structure	Vermont, Oregon	California, Sacramento Municipal Utility District
Benefits	1. Higher investment security may lead to lower capital costs and diverse investors. 2. Payment stability consistent with the cost characteristics of the technologies.	1. Ability to expressly incorporate external benefits, including avoided T&D and environmental compliance costs. 2. Lower payment levels lead to lower ratepayer impact.
Challenges	1. Determining the right payment levels to avoid overpayment or failure to attract willing investors.	1. Investor profit and ROI uncertainty. 2. Technology-neutral program may not encourage diverse renewable energy portfolio. 3. Administration of payment may be time-consuming and complicated.

Figure 3: Cost-based vs. Value-based payments

Sources: KEMA 2008, Cory et al. 2009, CPUC Feed-in Tariff Price

While the cost-based approach is the more commonly used FIT payment structure in Europe, it is still too early to identify a trend in the U.S. approach. Policymakers considering a FIT may want to weigh a number of factors in determining the true cost of a renewable energy project, such as an assessment of the capital investment for the plant, fuel (for biogas/biomass), licensing and permit costs, operation and maintenance (O&M) costs, inflation, interest rates, and investor profit margins (Klein et al. 2008). Because payments change from year to year (based on market price for value-based payments and administrative decisions for cost-based), the year a contract is signed will determine the fixed payment the FIT generator will receive for the lifetime of the contract.

Additional rate designs within these two approaches further distinguish how closely the FIT payment is aligned with the market, but is not covered in detail in this FAQ.

The Takeaway: Cost-based FIT rates encompass forecasted project costs plus a fair return for investors. Value-based FIT rates rely on market prices and add a premium payment. Because value-based payments are more uncertain, cost-based payments may provide a more effective incentive for development.

FIT Program Design: What program elements achieve policy goals?

In addition to determining the payment methodology, the structure of the FIT program design must be explored. **The key takeaway when considering a FIT is that the appropriate FIT design depends on the policy being pursued by the State, so policymakers should have a clear sense of what they would like to accomplish prior to the design phase.**

Six FIT design options have affected the success of various FIT programs:

I. Contract Length

II. Interconnection Rules

III. Program and Project Cap

IV. Tariff Revision

V. Payment Differentiation

VI. Bonus Payments

I. How long is a FIT contract?

Under a FIT program the renewable energy generator enters into a long-term contract that is typically 10-20 years. This contract's long term aims to **create a stable policy environment**, with the intent of providing investor security and encouraging development of FIT resources.

II. What are the interconnection rules and agreements?

FIT programs offer generators a streamlined process to connect to the grid. Regulators can adapt model interconnection technical standards, procedures and agreements to ensure interconnection to the grid ensures safety and reliability. Payment for interconnection varies; Vermont's program covers the interconnection costs, but Oregon and Gainesville, FL require FIT generators to pay for interconnection costs.

Under a FIT program, the utility or its agent typically enters into a "must take" agreement. Under this arrangement, whenever the participating resource is available, the utility will accept that energy and pay the FIT rate even if lower-cost resources are available, **ensuring that the renewable resources are able to contribute to the power mix**. This ensures the FIT project is connected to the grid and the developer can begin generating renewable energy and making a return on investment even if their energy resource is more expensive than electricity market prices. Additionally, bonus payments may be offered for close-to-load projects to contain program costs.

III. Should a FIT include a project and program cap?

In order to moderate the potential cost and system integration impacts of introducing a large number of FIT-funded renewable resources, many FIT programs have a cap on the total energy or capacity that can be built under the program. *Project Cap:* If the policy goal is solely to increase renewable energy, a cap on project size may not be necessary. However, the ratepayer impacts of such a program should be well understood. **If the policy goal also includes project diversity and local development and ownership, a project size limit by resource type may be set** to ensure the program is not flooded by a few large projects or a limited set of technologies.

Program caps **may enable States to contain the cost impact to ratepayers**. The appropriate program cap can be determined by the State Utility Commission or may be pre-determined in legislation, and may be capped by capacity, generation, or percentage of electricity sales. The State should assess the impact of renewable energy penetration on the electric grid prior to determining a program cap. The impact will vary, depending on current electricity load in the state. For example, California has a relatively high program cap of 500 MW, while Vermont settled on a 50 MW program cap. However, taking into account the amount of existing generating capacity Vermont's FIT program represents a 4.5% increase in generating capacity, while California's program will only garner .75% additional capacity at the current cap levels (EIA 2009). This increased FIT–supported renewable energy will impact these States differently.

IV. Can the FIT payment be adjusted during the 15-20 year contract?

FIT programs can be designed to have stepped-down rates, wherein FIT rates are lowered by a few cents every year over the contract lifetime. This step-down schedule can be determined during initial program design for the lifetime of a contract, and the payment may be reevaluated annually or biennially as new contracts are established. Ideally this would occur to remove the potential for large windfall profits for the participating renewable generators and resulting runaway program costs, while ensuring a high enough return for those participants to **ensure profitability and program sustainability**. By phasing down payments, unnecessary costs are reduced or removed and will ideally lead to a sustainable and non-subsidized renewable energy market. The payment will not change after a contract is signed, unless predetermined in the contract. Any rate adjustment for new contracts should be pursued with caution and should be clearly communicated with investors to maintain a stable policy environment.

V. Should different payment levels be used for differing technologies and other project variables?

Under a cost-based model, the price paid to a project will depend on the technology that is utilized, as the development and operation & maintenance costs can vary significantly depending on the method of generation. In addition, even within a given technology, it is possible that, with economies of scale, the cost of developing a project, and accordingly the price paid to the developer, may vary depending on the size of the project. The FIT payment design varies by state, and is often differentiated by technology, size of project, and resource quality, among other categories. **Using higher payment levels may incentivize a certain type or size of resource, helping to meet policy goals such as an RPS with 1 percent installed solar capacity or a goal to increase distributed resources**. Eligible technologies are defined within the jurisdiction implementing the FIT, and the available natural resources, as well as the political environment, of a given state can influence the decision as to which technologies are eligible for a FIT.

VI. Can bonus payments bolster policy priorities?

To accomplish specific policy goals, bonus payments may be offered on top of base feed-in tariff rates for certain categories. **Bonus payments can have an influence on power producer behavior and promote efficiencies and policy priorities** such as using locally sourced materials or close to load projects; however they may add additional complexities in program administration. Ontario has a bonus payment for indigenous people of Canada and Community projects (Ontario Power Authority). France pays a premium of up to 3 euro cents/kWh for high efficiency plants, such as geothermal (Klein et al. 2008). Bonus payments could also be paid to projects sited within distribution or transmission-constrained areas to lower grid congestion and increase grid security.

What is a microFIT?

MicroFIT is a new FIT initiative in Ontario, Canada, that has all properties of a normal FIT, but it applies only to systems less than 10 kW. The program was started in 2009 as a way to encourage homeowners, farmers, and small business owners to build more distributed resources, particularly wind and solar energy. Because the regular FIT program may encourage large-scale renewable energy projects with lengthy siting and permitting assessment periods, the microFIT has special incentives meant to provide additional support for small projects. MicroFIT projects offer fast-tracked applications, no connection test required, automatic contract eligibility, and also receive higher payments – e.g., 80.2 Canadian cents/kWh for solar PV. This policy illustrates Ontario's desire to increase domestic energy supply, particularly renewable and distributed generation sources and encourage consumers to become producers, which may create new jobs and help curb the growing energy demand in the province. The Ontario Power Authority estimates the first round of FIT projects through FIT and microFIT will generate $5 billion in investments and create thousands of new jobs (OPA Dec 16 2009).

Using a FIT in your state

What are the economic benefits and challenges from using a FIT?

FIT program costs vary from state to state but may include FIT generation payments, program administration, and system interconnection fees. Most above-market costs of a FIT program are shared among all ratepayers. The resulting impact to the average household electricity bill is undetermined in the U.S., as FIT programs are still in their infancy, though Germany shows a 5% increase in 2008 alone, averaging $2.66 to $8.00 per month (BMU 2008b). While electricity rates may increase, the resulting growth in the renewable energy market may also stimulate the State economy by creating jobs to site, develop, and build the RE systems. This is especially true during the construction phase of capital-intensive renewable projects. Offsetting these benefits are the higher costs of electricity during some or most of the FIT program years. If the FIT payments are structured to decrease overtime, eventually the fixed payment may fall below the market price offering protection to the ratepayer though this would likely happen towards the end of the contract lifetime.

In addition, for jurisdictions that seek to reduce the emission of greenhouse gases, a FIT provides significant incentive for development of renewable resources. Additionally, including FIT policy options such as a bonus payment for purchasing in-state RE systems may serve to stimulate further in-State economic growth.

The Takeaway: FIT programs are likely to cause an increase in monthly electricity bills, but may also in turn spur short term local and economic job growth during the construction phase of projects.

Which policies need to be reexamined when implementing the feed-in tariff in your state?

Several policy areas often identified as complicating the development of renewable energy resources may simultaneously affect the potential effectiveness of a FIT. For example, regulations and state statutes authorizing a FIT may need to incorporate consideration of interconnection standards and practices, metering requirements (ensuring these requirements reflect those of the system operator) and the siting process for renewable energy systems. A thorough exploration of existing renewable energy policies and their merits should occur when considering a FIT.

What is the authority of the PUC for a feed-in tariff?

If a feed-in tariff is passed as law by the state or area legislative body, the PUC may have the responsibility to design, implement, and monitor the feed-in tariff program. For example, the State of Vermont enacted the Vermont EnergyAct of 2009, which directed the Vermont Public Service Board to design a feed-in tariff policy (Public Act 45 Vermont 2009). It is important to recognize that the Federal Power Act and Regional Transmission Organization (RTO) requirements, including potential federal approval of power contracts, settlement requirements, and registration and metering requirements of generation units, respectively, should be considered in designing a FIT (Hempling et al. 2010).

It is important to note that the U.S. and Europe have different laws governing the development of renewable energy, and as such U.S. feed-in tariffs must be implemented in a different way than in Europe. Because a sale of feed-in tariff electricity is considered a wholesale sale, and the U.S. wholesale market is regulated by federal authority (FERC) some argue that a State-based feed-in tariff may be preempted by federal law. Two different federal statutes regulate the U.S. wholesale market: The Federal Power Act and PURPA. Under the Federal Power Act, generators cannot be paid above the federally established wholesale rate. Under PURPA, generators cannot be compensated above the utility's avoided cost. Both statutes limit the ability of States to require a utility to pay for electricity at a cost above the wholesale market price or the avoided cost of the utility, creating challenges in designing a State-based feed-in tariff which would likely desire a higher payment than wholesale or avoided cost to attract investors.

However, specified paths have been identified to ensure that FIT generators are in compliance with PURPA and the Federal Power Act (FPA) and prudent design is necessary to remain compliant with federal statutes (Hempling et al. 2010). Outside of these paths, Congress or the FERC could amend current federal statutes or clarify existing rules. One such example is the recent May 2010 petition filed by the California Public Utilities Commission. The California PUC filed a petition for declaratory order with the FERC to find that its decision to promote Combined Heat and Power (CHP) systems under 20 MW is not preempted by the FPA or PURPA, in order to further clarify the legal basis for its CHP feed-in tariff (CPUC Docket No. EL10-64, May 4 2010). The decision has potential to set a precedent for other States facing similar issues in renewable energy policy and may encourage States to file similar declaratory orders encompassing additional resource types that would ease constraints for State feed-in tariffs.

What happened in Spain?

In 2007, Spain introduced a new FIT program, with a 400 MW cap and payments of up to 44 euro cents for solar photovoltaic (PV). The program was meant to encourage new projects - particularly PV - over a three year span until 2010 but investors interested in the high payment levels quickly flooded the program within six months. To accommodate the investors, the Spanish government increased the cap to 1,200 MW, but reduced the FIT payment by thirty percent to contain the cost impact from the new projects. Many solar developers were unable to continue with their projects, resulting in a global market distortion with unfulfilled projects and a backlog of unsold PV panels that would be a large factor in lowering the global price for PV panels by 40 percent in 2009. Pro's and con's of this program are numerous: 3 GW of solar capacity was installed in less than eighteen months and Spain gained valuable knowledge of systems integration, however, the program resulted in high debt, poorly designed solar installations, and a global PV market disruption.

The takeaway: When designing a FIT program setting the initial payment level correctly is vital to provide economic certainty for developers and industry; if the payment level is set too high and program cap too large, the program will likely be unsustainable and costly to ratepayers.

Do feed-in tariff payments impact the wholesale electricity price? The retail price?

Generally, the reason a FIT is implemented is that the preferred resource eligible for a FIT payment is otherwise unable to compete on a market price-basis with other resources. For example, solar PV is more expensive than baseload coal on a per unit basis in many areas, and a FIT closes that economic gap to introduce the policy-preferred resource (in this case, the solar resource). It seems intuitive that introducing a FIT will increase wholesale electricity prices, and this would likely be the case.

However, feed-in tariff electricity is purchased directly by the utility, and therefore does not enter the wholesale market, though it is considered a wholesale sale. In fact, if the FIT program is large enough, it may provide a sufficient amount of energy on the retail side to reduce the amount needed from wholesale markets, thus potentially reducing the need for additional marginal power plants to be dispatched. Without these marginal price units, the wholesale price will be lowered to the price offered by the next-highest power plant being dispatched. In this instance, feed-in tariff prices do not necessarily increase, and may in fact reduce, wholesale market prices (Joskow 2005).

The retail bill is another matter. All FIT payments are typically lump-summed and shared among all ratepayers through a systems benefit charge on electricity bills, or the costs are simply rolled into rates without explicitly being called out on the bill. Even if the wholesale price of electricity is reduced from less marginal units being used, customers may still experience an increase in their electricity bill from the inclusion of FIT program costs. For FIT participants, any increase in bills resulting from the total amount of FIT projects may be more than offset by their receiving a dedicated FIT payment – this depends on the amount of renewable energy built through the FIT program and the established payments. Although non-participants may have higher bills, these are likely to be smaller costs spread across a large ratepayer base, and may or may not be discernable when commingled with other factors. Policymakers considering the rate impacts of a FIT will need to weigh whether the potential increases in non-participant bills are outweighed by the multiple benefits to the system that come from the inclusion of renewable resources.

The Takeaway: The impact to wholesale prices is dependent on the size and total cost of the FIT program. The more significant impact is likely to be seen in the retail ratepayer electricity bill if FIT prices are significantly above the wholesale market prices.

Will a FIT mean grid system instability?

If a FIT is successful, it can lead to the introduction of a significant amount of renewable energy, potentially distributed over the retail distribution system instead of simply connected to the bulk transmission system. Managing power flows and the intermittency of these resources can be a challenge - and the solution will vary in each State due to the varying design of each distribution system - but technological understanding of integrating these resources has vastly improved in the past decade. If States desire to implement a feed-in tariff, they should first assess the ability of the distribution system to accommodate new distributed resources as well as the capacity of existing interconnection codes and standards. It is important to ensure that utilities, while being required to interconnect FIT resources, are allowed to require adequate interconnection equipment and acquire firming resources to protect system reliability and stability.

The Takeaway: States should evaluate the impacts of new renewable resources on transmission and distribution grids and ensure the interconnection codes and standards are updated to optimally integrate new resources on the grid.

If not FIT, then what?

There are a plethora of other renewable energy policies that have helped drive renewable energy growth in the United States. RPS and Net Metering were discussed in this FAQ (see Figure 2), but States are successfully using other renewable energy policies to achieve their policy goals. These policies include incentives that are tied to system performance, rebates that cover capital costs of renewable systems, and grant and tax incentive programs that can identify projects with high value. Another renewable energy policy receiving attention with policy makers is the Property Assessed Clean Energy policy (PACE). PACE enables local governments to issue bonds to make loans to property and home owners to finance clean energy investments. These PACE bonds eliminate upfront costs for property owners, and the loan is paid back over a 20 year period as an annual special tax on their property tax bill. Currently, solar energy and energy efficiency projects are available for PACE financing, and nearly 20 states have passed PACE legislation since early 2009.

Additionally, RPS set-asides are receiving attention from policymakers as another tool to drive renewable energy. Set-aside programs set aside a specific amount of the RPS for a dedicated resource and may create a separate funding stream, such as the Solar Renewable Energy Credit (SREC) program in New Jersey which enables solar generators to receive a REC for every MWh generated. These SRECs are then traded on the REC market, allowing the developer to make a profit based on market prices. As it is tied to the market, one highlight of this program is that it remains unaffected by a policy decision that may halt rebate programs or lower FIT payments. New Jersey's SREC program initiated in 2007 is successfully expanding the States solar energy capacity, as 14 MW of solar PV has been installed as of March 2010 (NJ Office of Clean Energy 2010).

An alternative to a FIT is to tailor an RPS program by implementing technology "carve-outs", e.g., the solar REC program in New Jersey that reserves a certain number of RECs for solar resources. Without RPS carve-outs, RPS programs typically require only a least-cost compliance approach that may lead to less resource diversity.

International Experience

What is the international experience with the FIT?

U.S. Feed-in tariffs are still in their infancy; however Europe and other parts of the world have been using the FIT for years with Germany implementing the first feed-in tariff in 1991. Currently 18 out of 25 EU countries are using the FIT, along with Australia, Canada, China, and some Middle Eastern and Asian countries. The feed-in tariff has helped drive renewable energy to higher levels, but at a cost to ratepayers.

Germany

Germany's long-term experience with FIT is partly credited with spurring its tremendous renewable energy growth, increasing from 100 MW in 2000 to 5,311 MW in 2008. See Figure 4 for Germany's growth in renewable energy as a percentage of total capacity.

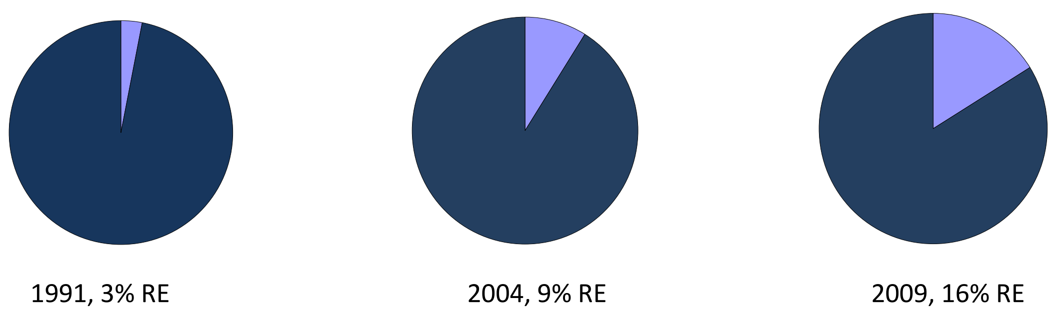


Figure 4: Renewable Energy Growth in Germany with a feed-in tariff, 1991-2009

source: http://www.volker-quaschning.de/datserv/ren-Strom-D/index_e.php

Germany points to the success of its feed-in tariff in its higher level of installed renewable energy capacity than its European counterparts, but this growth came at a cost of a 3% rate increase for consumers in the lifetime of the program (Frondel 2009). Still, advocates insist that renewable energy growth in Germany has many positive externalities. FIT-supporters assert that it has resulted in robust job creation in the renewable energy industry, pointing to Germany's leadership in renewable energy components and supply production. In addition to job creation, the FIT has achieved support because it enables communities to build their own systems and make a profit, accruing more visible benefits locally. The German renewable energy market may be headed for a change, however.

A large decline in PV system costs in 2009 led the German parliament to propose a 16 percent payment reduction for solar PV in March 2010, meant to reduce unnecessary costs to the ratepayer. The regional government assembly- the governments from the 16 German states – called for relaxed payment cuts of no more than 10 percent, likely to protect German PV producers and manufacturers that would be affected by the payment reductions (German FEM 2009). The payment reduction may be stalled as the federal-state debate persists, and consequently speculation and uncertainty about its effects on the economy, jobs, and the global PV market will continue. Regardless, it would seem that German ratepayers will bear FIT costs for many years to come, as current solar FIT payments are nearly eight times higher than the market electricity price at 39 eurocents per kW, and FIT generators remain utterly dependant on these subsidies to survive.

The takeaway: The FIT drove unprecedented renewable energy growth for Germany, but its future efficacy is muddled in political uncertainty. While policy goals are important, e.g., job growth, continued economic success, and renewable energy development, policy makers should also consider the implications of inflated payments and disassociation of renewable energy costs from the market and its potential effects on ratepayers, program sustainability and health of the renewable energy market.

Where can I find out more?

This FAQ, an introduction to the feed-in tariff, was authored by Julie Taylor of NARUC's Grants & Research staff with funding from the U.S. Department of Energy. It was written through extensive research, interviews, and contribution from several organizations, including staff from the Vermont Department of Public Utilities, the Nevada Public Utilities Commission, the California Public Utilities Commission, the Maine Public Utilities Commission, the Regulatory Assistance Project, the U.S. Department of Energy, and the Edison Electric Institute. Oversight was provided by Commissioner Rebecca Wagner of the Nevada Public Utilities Commission. Refer to the Resources Cited section for additional resources on feed-in tariffs.

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