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FiT for America

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Best Practices in Feed-in Tariff Policies

Michael Chang, LEED GA
Energy and Carbon Consultant

Greener Dawn, Inc
444 S. Cedros Ave #195
Solana Beach, CA 92075
858.345.1686 | mchang@greenerdawn.com
www.greenerdawn.com

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BEST PRACTICES IN FEED-IN TARIFF POLICIES

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Executive Summary

Political leaders and the American public have broadly recognized the need to mitigate climate change risks and increase energy independence. The results of a [Washington Post – ABC News Poll](#) conducted in Aug 2009 show wide support for President Barack Obama's clean energy policies with 91% supporting the development of more solar and wind power compared to only 51% support for building new fossil fuel burning power plants. Because renewable energy (RE) projects generally have uncertain long-term returns and require considerable investments when compared with conventional power plants, public policy is required to engage the financial sector to attract investment and spur RE development.

In the US, the use of complicated tax incentives, rebates, and Renewable Energy Certificates (REC) has been the preferred incentive mechanisms. RECs are used to fulfill Renewable Portfolio Standard (RPS) contracts, currently adopted by 29 states and the District and Columbia and mandate a percentage of electricity procured by utilities come from renewable energy. (DSIRE, 2009) However, a RPS is simply a target and mostly effective only in supporting the lowest cost renewable energy technologies such as wind. California, for example, has merely seen a slight increase totaling 14 MW in deployed renewable energy resulting from current production incentives.

In efforts to drive Renewable Energy (RE) development and support RPS schemes, variations of the policy that has led Germany to become the world's largest producer of solar energy are gaining popularity in the United States. Called Feed-in Tariffs (FiT), this policy provides financial incentive to RE producers by offering guaranteed interconnection to the electricity grid and long-term contracts at premium fixed prices. A simpler and more comprehensive policy, FiTs encourage producers to invest in research and development, establishing critical conditions to support emerging technologies and meet RPS goals. (Rickerson, Wilson H., and et. al., 2007)

As of Sept 2009, several US states, utilities, and regions including California, Florida, Vermont, Wisconsin, Oregon, and Washington have implemented and are examining the expansion of current FiT policies. In efforts to inject market mechanisms into their FiTs, California is experimenting with different pricing strategies with Assembly Bill 1106, the Sacramento Municipal Utility District FiT, and the most recently proposed reverse auction mechanism in the California Public Utility Commission FiT policy. Other states, such as Arkansas, Hawaii, Illinois, Indiana, New York, and Rhode Island have introduced various forms of FiT proposals in their legislature. "The feed-in tariff has proven to be the best way to get quick movement in renewable energy development and create a lot of jobs" said state Rep. Matt Pierce (D), who has introduced a feed-in tariff proposal in Indiana.

This analysis begins with a discussion highlighting the advantages of FiTs when compared to RPS type policies. The next section identifies five best FiT design practices, which maximize the impact of FiT policies. Under the framework of five best practices, the paper examines the impact of current FiT policies in the United States including Gainesville, FL, the state of Vermont, and three separate initiatives in California. The paper concludes with a brief discourse on the future of US FiT policies, underscoring areas where greater research is needed.

The Case for FiT

Simplicity

Taking full advantage of RE policy in the United States requires sifting through a dizzying array of tax credits, rebates & incentives, and utility negotiations. Often times these individual policies are created without coordination between the federal and state level, increasing overlap and inefficiencies of policies that hinder the maximization of available incentives. This complex structure also increases overhead costs and raises hurdles to effective RE development.

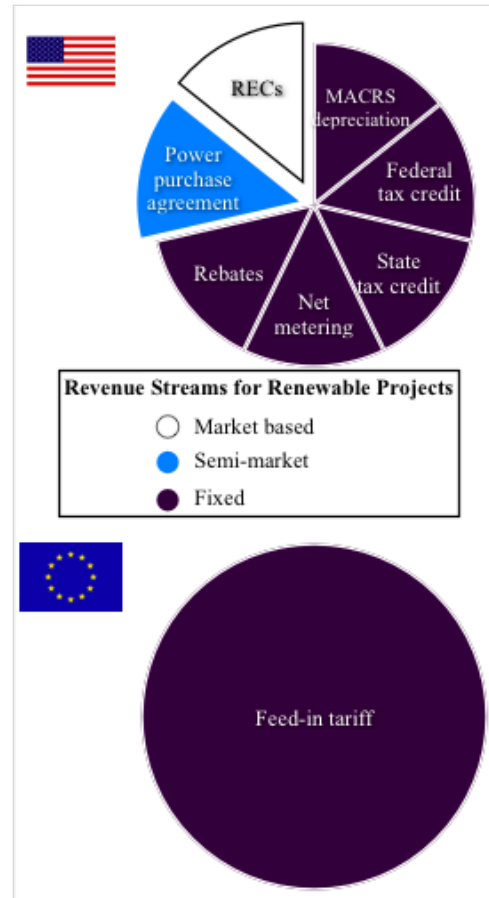
These inefficiencies are especially apparent when comparing solar development between Germany and California. As seen in Figure 2, Germany installed 10x more solar than California in 2008, even though Californians enjoy 50% more sunshine. (FIT Coalition, 2009) European FiT policies have proven much more effective at securing investment and spurring RE development.

A FiT simplifies generating renewable energy and is easily understood by the public and investors. By establishing a set price, FiT policies minimize the need for multiple incentives and complex financing through tax liabilities, which are currently employed to supplement RPS goals in the US. Anyone who builds a renewable energy generator is guaranteed grid interconnection and a long term contract with a set price for every kWh produced. These fixed price long-term contracts ensure a reasonable rate of return, promote development, and encourage technology adoption.

Investment Security

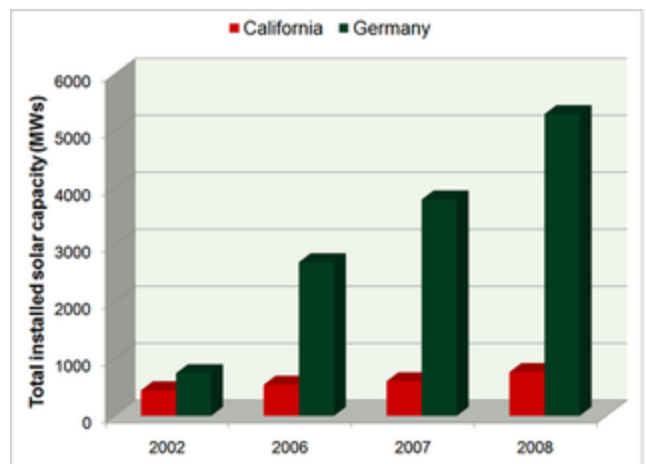
FiTs are also far more successful at attracting RE investment than alternative mechanisms such as RPS and RECs, because they eliminate the risk premiums in otherwise financially attractive RE projects. Critics argue that FiTs improperly

Figure 1: US vs. EU RE Policies



FARRELL 2009

Figure 2: Germany installs 10x more solar than California



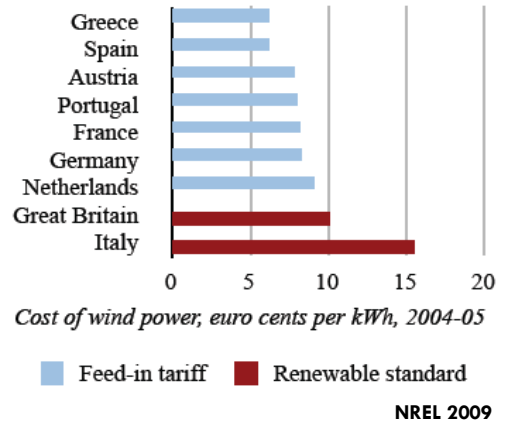
FIT COALITION 2009

distort capital markets by virtually eliminating this risk signal. (Columbia, 2009) Yet when rapid RE deployment and job creation is a national priority, RE developers must have access to reasonably affordable capital so projects can move forward. FiTs enable RE investment where the market does not, and they do so by providing the investment security of long-term fixed rates to RE development financiers. The lower the risk premium and cost of capital, the more projects can be financed with lower return on investment requirements.

Economics and Cost

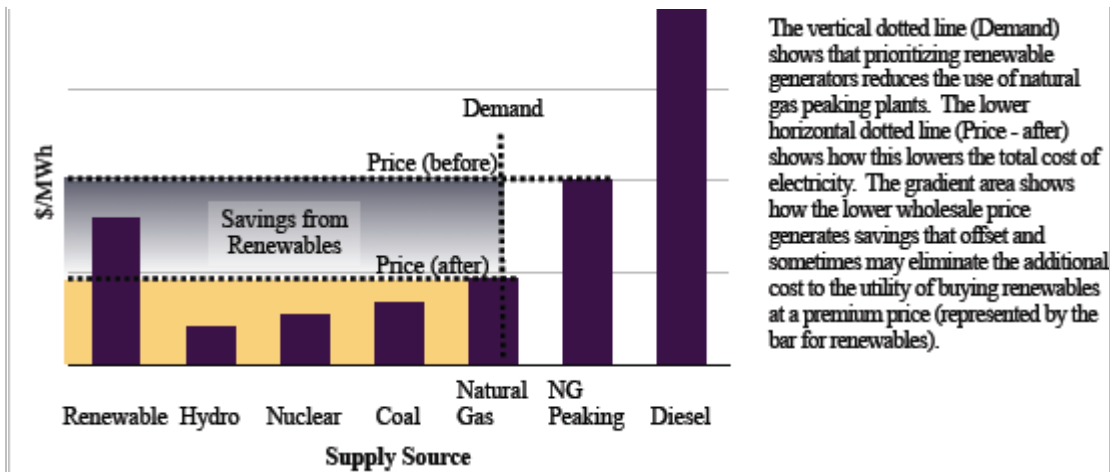
Evidence from Europe has proven that FiT policies may be a less expensive route to renewable energy development compared to other policies. The uncertainty of REC prices in RE policies increases financing costs, resulting in higher costs for ratepayers and preventing access to small project developers. For example, electricity from wind turbines in Europe is considerably cheaper in countries with FiT policies than those who implemented a quota system. In 2008, Ernst & Young concluded that Germany's system of feed-in tariffs delivers more renewable energy at lower cost to consumers than Britain's Renewable Obligation and its certificate trading system.

Figure 3: Wind Power Cheaper with FiT



If RE is prioritized similar to that of Germany, where utilities procure RE power to the grid first, then RE displaces the use of expensive peak power plants. Not only does FiT policy promote cheaper renewable energy, but it also brings down the wholesale price of electricity supply.

Figure 4: Price of Electricity with Renewables



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Policy Design is Key

The structure of FiT policies can vary greatly to effectively support all renewable technologies including wind, solar, geothermal, biomass, biofuels, ocean power, etc. These policies can effectively increase development of RE projects of different technologies and sizes over a wide geographic area when payment levels are differentiated appropriately. As with any policy, there are essential best practices that can help ensure success and effective implementation.

The five best FiT practices in the following section draws largely from analysis by leading European and US research institutions of the European RE policies, as they have the longest and most successful experience with FiT policy design and implementation.

5 FiT Best Practices (Rickerson, et. al. 2008, Raglitz 2007, Couture 2009, Columbia 2009):

1. Setting an Effective Payment Rate

FiTs provide an incentive to increase production of RE by making the investment economically attractive to producers and buyers. The key FiT policy success is to understand the level of incentive required to stimulate RE development. If the payment was set too low, there would be little motivation to produce; if it was set too high, a RE boom with accompanying windfall profits might result, placing a disproportionate burden on ratepayers. The most common methods used to set tariff pricing are:

- a) **Renewable energy generation cost:** The recently passed Gainesville solar FiT and some European FiT models use this method. The payment level is set so that RE generators recover project costs plus a reasonable level of return on investment over a specified period of time. This method has also proven to be the most effective in promoting RE development.
- b) **Avoided costs:** Policymakers would set the FiT according to an electric utility's avoided (external) costs including those of climate change effects, and the impacts of pollution on public health and agriculture. This has been the preferred pricing mechanism used in the US, but since the tariff is most often calculated on the avoided cost of natural gas, the policies have been largely ineffective in spurring RE growth.
- c) **Fixed monetary premium:** The state would offer a premium to RE producers similar to a rebate program, to be paid on top of the market price per unit of electricity generated. This was one of the options given to producers in California and Spain.
- d) **Payment digression:** Policymakers would build in a schedule to revise payment levels in new contracts as technological innovation, participation rate, and RE generation costs change over time.

2. Payment Differentiation by Technology, Size, and Location

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

3. Program Duration

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

4. Program Capacity

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

5. Guaranteed Standard Access to Grid

A key component of any FiT policy is the requirement that the wholesale purchaser of electricity, typically state or local utilities in the U.S., purchases the generated RE from the producers and feeds it into the grid, independent of short-term demand. In many countries where FiTs have been established, this agreement is also a priority obligation, meaning that RE is purchased before other types of energy to foster investment security in the market. (Providing a price support for RE production is of no use if you do not also ensure that the electricity generated is purchased at that price.)

FiT for the US

US FIT ELEMENTS AND PROJECTED IMPACT

State	Entity	Price Mechanism	Tech Diff.	Price (c/kWh)	Program Duration	Project Size Caps	Program Size Caps	FiT Policy Impact
FL	Municipal: Gainesville Regional Utilities (GRU)	Cost of Generation (Solar)	Solar	32	20 years	None	4 MW per year	High (small scale)
VT	State: Legislature	Cost of Generation	Most	12 to 30	5 years	2.2 MW	50 MW	High
CA	State: Revised AB 1106	<5 MW: Cost of Generation; 5-10 MW: Avoided-cost Based	Most	6 to 19	10, 15, or 20 yrs	1.5 MW	478 MW	Medium
	Municipal: Sacramento MUD	Avoided-cost Based, Value Based	Solar & CHP	8 to 29	10, 15, or 20 yrs	5 MW	100 MW	Medium - Low
	State: CPUC Proposal	Renewable (Reverse) Auction Mechanism	Solar	Auction Price	10, 15, 20, or 25 yrs	20 MW	500 MW	Medium

Gainesville

In February, Gainesville, Florida jumpstarted the momentum to implement German style FiT policies in the US to stimulate renewable energy development and job creation. Gainesville is offering 20 year contracts at \$0.32/kWh capped at 4 MW in 2009 and 2010. The program reached its first year capacity in the first day, and has received sufficient applications to fulfill quotas to 2016. (DSIRE, 2009)

Vermont

Vermont quickly followed suit and passed FiT policies through state legislature, and other states and utilities are not far behind. Although the program is relatively small, capped at 50MW, it has all the essential elements of a

successful FiT. The effort is a serious commitment for a state the size of Vermont. Vermont tariffs are based on the cost of generation plus a profit, as defined by a reasonable rate of return, and are differentiated by type and size of the resource. Contract terms are for 20 years.

Initial program rates in Vermont are \$0.12/kWh for landfill and biogas projects and \$0.30/kWh for solar. The Vermont Public Service Board will start regulatory examination of the rates in September and set new rates based on costs plus profit no later than January 2010.

California

California created a state-wide feed-in tariff in 2006, targeted at water and wastewater plants. The program was expanded to a wider range of renewable sources in 2007. Under the policy, sellers of renewable power receive fixed rate contracts ranging from 10 to 25 years based on the utilities avoided costs as defined by the current Market Price Referent (MPR). The MPR price is based on the average cost of producing electricity for a combined-cycle natural gas fired generation facility.

To date, less than 14 MW of generation capacity has been added to the grid, with the majority of contracts for hydropower and landfill gas.

AB 1106 – California’s Renewable Energy & Stimulus Act of 2009 (REESA FiT)

California's State Senate amended AB 1106 on June 25, 2009 and again on July 15, 2009. AB 1106 is one of several feed-in tariff bills in the California legislature, which has already passed the Assembly and is now waiting for a Senate vote. The program is capped at 500 MW, which may seem large when compared to Vermont's 50 MW program, but California consumes 43x more electricity. A CA program comparable to that of Vermont's would be capped at 2150 MW.

AB1106 creates two classes of renewable energy projects based on size. The PUC is directed to set Tier 1 tariffs for projects less than 5 MW and Tier 2 tariffs for projects 5-10 MW. Only Tier 1 tariffs would be comparable to feed-in tariffs in Europe, Ontario, and Vermont, whereas Tier 2 mirrors the current ineffective FiT based on MPR. The PUC would be required to approve feed-in tariffs and standard contracts by June 1, 2011, and utilities would be required to offer contracts by June 30, 2011, two years from the time the bill was amended.

Sacramento MUD FiT

In July 2009, the Sacramento Municipal Utility District (SMUD) established a FiT effective July 2010. Renewable energy generators below 5 MW qualify with system generating capacity capped at 100MW. The FiT applies to both renewable and fossil-fuel generating opportunities, and sets a higher rate for RE. However, the pricing structure largely depends on the time of day and peak rates, consisting of 216 different payment rates. It has yet

to be seen whether the pricing schedule will give a clear enough signal to encourage RE developers and investors. (Gipe, 2009)

CPUC FiT Proposal

In August 2009, the California Public Utilities Commission (CPUC) proposed a FiT policy that would feature a reverse Renewable Auction Mechanism (RAM) to set the payment level for RE projects between 1 MW and 20 MW. The proposal attempts to integrate market pricing to avoid overpayment for renewable energy while requiring utilities to hold two auctions annually to purchase larger amounts of clean electricity. (CPUC, 2009)

On first read, there's much to like about the RAM proposal. California's aggressive RPS has resulted in high demand for large-scale RE projects across the state. But the lack of adequate transmission is preventing many of these projects from moving forward. The RAM mechanism is designed to promote distributed generation and smaller installations, allowing state utilities to meet RPS demands without encountering transmission siting issues. The reverse auction also circumvents legal hurdles. Earlier this year, Southern California Edison contested CPUC's authority in setting price premiums above "avoided cost" rates. With the RAM mechanism, the CPUC avoids this issue altogether by allowing the market to set the price. (Browning, 2009)

Other parties such as the California Solar Energy Industries Association (CALSEIA), state that fixed prices should be the approach for small projects below 3 MW. CALSEIA argues that the implementation of RAM will result in: high transaction costs that will lead to market concentration, causing inability of smaller and new enterprises to compete in a reverse auction; lowball bidding that results in projects that cannot be constructed, causing further delays in the RE pipeline; and higher ratepayer costs.

Without adequate protection for small producers and policy provisions, disproportionate opportunities exist for large players such as First Solar (NasdaqGS: FSLR), SunPower (NasdaqGS: SPWRA and SPWRB) and MEMC (NYSE: WFR). Blogger and photovoltaic enthusiast Edgar Gunther writes:

"...GAMING BIDDERS IN THE FIRST FEW AUCTIONS COULD LOWBALL BIDS TO WIN PROJECTS AND LOCKOUT COMPETITION DRIVING THEM OUT OF FUTURE AUCTIONS. SUBSEQUENT AUCTIONS COULD SEE FLAT OR EVEN INCREASED BIDS FROM OLIGARCHS ONCE COMPETITION WAS ELIMINATED. MY CONCERNS ON LOWBALL BIDS ARE ELEVATED BY SUNTECH'S (NYSE: STP) RECENT SOLAR MODULE DUMPING FLIP FLOP PER "SUNTECH EXEC NOW SAYS NOT ACTUALLY SELLING BELOW COST" BY ERIC SAVITZ FOR BARRON'S TECH TRADER DAILY."

The CPUC pricing proposal provides a high-level outline of how the program could be implemented, and is currently open for public questions and comments. While it's too early to determine the effectiveness of the different proposed FiTs, it is interesting to see how each of the three different approaches in California strives to inject certain market mechanisms and flexibility into proven FiT policy mechanisms used by the Europeans.

Conclusion

FiTs are the most effective policy to stimulate cost efficient RE development and drive new technologies to market. FiT policies have also been known to help with other policy initiatives. The Europeans have experienced added economic, environmental, and social benefits from well-designed FiTs. (Farrell, 2009) Especially important during this financial crisis, FiT policies help promote numerous state and federal goals including increased economic development, job creation, fossil fuel price hedge, energy resource diversification, and GHG emissions reductions. (NREL, 2009)

RE development and these additional benefits are several of the major drivers of FiT type policies in the US. This creates an urgency to benefit from an effective FiT implementation, but US entities have been acutely focused on testing innovative price setting mechanisms to ensure the right tariff rate. The focus should be instead redirected to developing a standard, well thought-out FiT policy with the integration of best practices identified from European experiences such as the five best practices highlighted in previous sections. As more is learned about the impacts and nuances of FiTs, greater research is required to develop more effective market pricing mechanisms similar to the CPUC-proposed RAM.

The integration of unproven pricing mechanisms infuses unnecessary risk into proven FiT policies, and may set initial US FiT attempts for failure. One of the main roadblocks for US FiT policies today lie in the comparison between FiT and the failed PURPA policy of the 1980s. Even though the two policies are intrinsically different, FiTs cannot shake the negative connotation of PURPA in the US. While further trials and research are needed for the development of a truly equitable and effective RE policy, we can all benefit from the immediate implementation of proven fixed price FiT policies. "The feed-in tariff is a mechanism that, typically, Americans don't like," said Santiago Seage, the CEO of Abengoa Solar SA. "They believe it doesn't optimize costs for the taxpayers. ... Nevertheless, I feel it has a huge advantage. It's a simple mechanism to get the market started."

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About Greener Dawn

Greener Dawn Climate works with businesses as trusted advisors to help identify Carbon and Efficiency strategies, evaluate regulatory and financial environmental risks, and provide climate change solutions appropriate to your organization to combat global warming or generate tradable credits. Our clients include innovators in clean technology and investment groups.

Greener Dawn Investment Group (GDIG) is a privately held company providing equity research and investment banking services, with a focus on companies in the renewable energy and clean technology sectors.

Greener Dawn Inc. focuses on energy and water efficiency, LEED consulting, energy audits, and carbon strategies for Residential and Commercial real estate. Taking a holistic approach to making an asset more sustainable maximizes lower operating expenses, green collar jobs creation, and carbon footprint reduction. Homeowners, municipalities, asset managers, and building owners are their clients.

Michael Chang, LEED GA, Energy and Carbon Specialist

Michael Chang is a Carbon Credit and Energy Interconnectivity specialist in the Commercial Advisory group at Greener Dawn. He is passionate about finding innovative solutions to accelerate the adoption of clean and efficient energy towards a sustainable energy future. Prior to joining GD, Michael worked in China for three years in the high-tech manufacturing and clean energy sectors. He ran the Shanghai Marathon twice, and was a founding member of a company triathlon team.

Michael received a BA in Economics from New York University and a Masters in International Energy Management and Policy from Columbia University. During his graduate program, he researched carbon finance opportunities for the New York City government in support of PlaNYC initiatives.

Greener Dawn Climate Group Contacts

Michael Chang- 858-345-1686, mchang@greenerdawn.com

Courtland Weisleder- 858-345-1679, cweisleder@greenerdawn.com