

Feed-in Tariffs: A Mechanism, Not a Goal

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News Flash: City of Gainesville FL, Vermont and Ontario Canada Passed FITs in 2009

What are Feed-in Tariffs (FITs)?

- A FIT is a per kilowatt-hour (kWh) payment for electricity produced by a renewable resource.
- The **amount paid differs by technology**; for example, rooftop solar PV gets a much higher payment than larger-scale wind, which is already cost-competitive. Technologies we want to develop further, such as building-integrated thin-film solar, get a higher payment to encourage installation and innovation.
- The amount paid also varies by **geographic location** (to encourage the development of all locations, not just the prime locations); and by **size** (to encourage smaller-scale projects).

Various Names for Feed-in Tariffs

- “Feed-in tariff” is a literal translation from Germany’s 1991 *Stromeinspeisungsgesetz* (StrEG), the law on feeding electricity into the grid, and is the term used in Germany, France and Spain.
- North Americans have used the term “payments” rather than “tariffs” because many people associate the term “tariff” with “tax.”
- Other terms include Renewable Energy Payments and Renewable Energy Producer Payments.
- FIT advocates in Ontario, Canada are using the term **Advanced Renewable Tariffs (ARTs)**, which uses different payments that vary by technology, size, application, and resource intensity;¹ term “ART” is also used in U.S.

What are FITs in North America and the U.S. called?

- Like FITs, ARTs are differentiated by technology, project size, and application.
- Vermont and Ontario Canada just passed FIT laws in May 2009 (see below).
- California is currently considering a number of FIT bills.

How Do Feed-in Tariffs Enable Distributed Generation?

- FITs encourage development of renewable projects of all sizes, types and locations, from residential rooftop solar systems to farms of large wind turbines. When well designed, these differentiated tariffs result in the geographical distribution of various kinds of renewable energy. While FITs can be used to develop centralized renewable sources of generation, they are best known for increasing the role of distributed generation (DG).
- FITs also provide long-term investor security and replace imported fossil fuel with domestic jobs – even if more expensive in the short term.

What Renewable Energy Sources Are Included?

- FITs can be used only for solar, or only for wind. Germany, France, and Spain’s FITs are for many different technologies, including onshore and offshore wind, rooftop and ground-mounted solar, hydro, biomass and biogas, geothermal, and concentrating solar power.

How Are the Tariffs Calculated?

- By a transparent political process with input from industry, independent consultants, and users.

¹ Occasionally feed-in tariffs are incorrectly referred to as Standard Offer Contracts. In North America, Advanced Renewable Tariffs rely on “Standard Contracts” but specifically do not use “Standard Offers.” In systems of Advanced Renewable Tariffs, the “offers” differ by technology, size, application, and resource intensity, and are thus are not “standard.” Ontario has changed its terminology for FITs over the past few years, but the 2008 Minister of Energy prefers the term *feed-in tariff*.

- In Advanced Renewable Tariffs, prices based on the cost of generation (from a specific source such as offshore wind) plus a reasonable profit.
- Tariffs are designed to be high enough to spur development but not create excessive profits.

Do Feed-in Tariffs Eliminate Environmental Review?

- No. Projects using feed-in tariffs must comply with the same laws and environment requirements as any other projects. Feed-in tariffs typically only apply to the mechanism for getting access to the grid, for selling electricity to the grid, and for setting the price that is paid for the electricity.

What Are the Key Elements of Advanced Renewable Tariffs?

- Simple, comprehensible and transparent,
- Simplified interconnection,
- Sufficient price per kilowatt-hour to drive development,
- Long contract length to reward investment, and
- Tariffs differentiated by technology, size, and resource intensity.
- NO credits, NO monitoring, NO penalties and NO caps.

FITs and the Public Utilities Regulatory Act (PURPA)

- Under PURPA, the price for long-term power contracts = utilities avoided cost of fuels.
- German FITs decrease every year; so acts to spur *immediate* investment.
- PURPA does not prohibit FITs, only regulates qualified facilities, or QFs. States retain jurisdiction to regulate electricity rates and special programs for developing RE.

Other Reasons to Embrace FITs

- Money spent locally re-circulates 300-600% more than money sent out-of-state for fuel etc.
- Arizona sends about 60% of its electricity and heating dollars out of state.
- FITs encourage local renewable energy projects in diverse locations, so that generation can be truly distributed.

Solar in U.S Much Better than Germany: 20% Efficient in U.S. v. 11% in Germany

- RPS = goals; FITs = mechanism. Think long-term, building manufacturing and skillset and long-term value v. short-term cheap fossil fuels.

Why Should We Use Feed-in Tariffs?

- FITs have been successful at developing large amounts of geographically dispersed Renewable Energy (RE) quickly, at low cost and with minimal administration.
- Because FITs are not dependent upon the tax status of the owner – in other words, only valuable for the tax credit -- they are available to everyone.
- FITs promote Distributed Generation (DG).

Where are FITs being used right now?

- FITs helped Germany achieve 53% of the world's total installed solar PV; and are used in Spain, France and Switzerland as well; Germany also one of the top wind markets in the world.
- Many European countries are implementing FITs, where a vigorous debate is taking place.
- Ontario Canada and California have implemented FITs.
- Since 2007, FITs are being increasingly considered in various states: HA, IL, MI, MN, OR, RI, WA, WI.
- Gainesville FL implemented a FIT in February 2009; is similar to Germany's FIT

- - pays 32 cents/kWh for solar PV with a 20 year contract
- - program hit its 4 MW goal for 2009 before it even started; 4 MW for 2010 also sold out;
- - However, **state of FL failed to pass a RES** despite plea from Governor Charlie Crist;
- Washington state (WA) has a special net metering program that pays up to **54 cents/kWh for electricity from solar PV components that were assembled in-state.**
- **State of Texas has also killed a RES;** since legislature only meets every two years, can't reconsider until 2011.

What is the relationship between Net Metering, FITs and Renewable Portfolio Standards?

- Net-metering allows ratepayers to produce electricity on-site – for example, with rooftop solar – and run the kilowatt-hour meter backwards. Net metering allows a customer to offset their own electricity use or a slightly larger amount.
- In Arizona 125% of use can be net metered.
- FITs, unlike net metering, have no cap – in other words, a customer can put up as many solar panels or wind turbines as he/she wishes, and get paid for electricity produced.
- FITs pay for electricity *delivered to the grid*. To use FITs, you need a kilowatt-hour meter that measures the electricity delivered for sale to the grid.
- There are “hybrids” being introduced, such as a program in Florida that would allow a customer to offset his/her own use through net metering; but also pay that customer XX cents/kWh for solar electricity fed into the grid in excess of the customer's own use.
- FITs can be implemented alongside net metering.

What's the difference between a Renewable Portfolio Standard (RPS) and FITs?

- An RPS is a *target*, while FITs are a *mechanism*.
- For example, Arizona's RPS requires regulated utilities to get 15% of electricity from RE by 2025, with an eventual 30% of that electricity to come from Distributed Generation (DG). The FIT will make it easier to get to the DG goal, because it will spur smaller-scale, local DG.
- Currently, about 26 states have mandatory RPSs; and six states have voluntary RPSs.

Can Feed-in Tariffs Work in Parallel with Net Metering and RPSs?

- Yes, the feed-in tariff programs proposed in North America have all been designed to work alongside and in parallel with net metering and renewable energy standards.

Will Feed-in Tariffs Allow “Double Dipping” into State Rebate or Subsidy Programs?

- Feed-in tariffs are designed to provide sufficient financial incentives *without* capital grants, rebates, or other capital subsidies. Thus, in most states or provinces where they have been proposed, those who opt for feed-in tariffs cannot also use capital grants or rebates.
- However, in the United States the federal Investment Tax Credit (ITC) for solar systems and small wind turbines has been extended for eight years. Most U.S. feed-in tariff programs will allow the federal ITC alongside the feed-in tariff.

FITs in the U.S.

- In 2006, several states were looking at FIT-like policies; by 2008, about a half dozen states had introduced FIT bills, another eight states are considering; while WA, OR and WI enacted **utility-based FITs that are different than Germany's or Vermont's FIT law.**

Vermont's New FIT Law

- Passed May 2009, is the first true FIT passed in the U.S., mirrors Germany's FIT;²
- Would implement a pilot FIT policy:
 - - costs are borne by ratepayers, not taxpayers
 - - program cap is 50 MW; project size cap is 2.2 MW
 - - Wind tariff: less than 15 kW is 20 cents/kWh; over 15 kW is 14 cents/kWh
 - - Landfill and biogas tariff: 12 cents/kWh
 - - **solar tariff is 30 cents/kWh**
 - - tariffs are differentiated by size, technology
 - - tariffs are based on cost of RE technology, plus profit
 - - Profit based on Rate of Return for VT utilities
 - - regular review of tariffs by Public Service Commission

Washington, Wisconsin and Oregon Have FITs

- WA state and WI have tariffs that **pay more than the PURPA-defined "wholesale" rate.**
- **WA has a special net-metering program that pays up to \$0.54/kWh for five years for generation with solar photovoltaics (PV) components that were assembled in the state.** This tariff is well above the wholesale cost in the Pacific Northwest.
- Several utilities in Wisconsin also pay special incentive rates above wholesale for small solar, wind, and biomass generators.

Six States with FIT Legislation Introduced: CA, MI, MN, IL, HI, RI

- Relevant features include: capacity limits (for example, capped at 1.5 MW); contract terms of 10-20 years; similar to net metering in that generators can either sell 100% or just sell excess electricity; pricing based on time-of-use rather than individual technology; see table below for general information from the six states. Highlights from each state below:³
- **California:** initial cap of 1.5 MW increased to 20 MW; 250 MW total statewide cap increased to 478 MW. California's peak summer rate is 31 cents/kWh so payment by time-of-use makes sense. California Energy Commission holding workshops, and concluded that state RPS (Renewable Portfolio Standard) needs more transparency, less complexity, and full valuation of RE.
- **Michigan:** Introduced by State Rep. Kathleen Law in 2007 (HB5218), similar to Ontario FIT; 20 year, technology-specific payments that start at 10.5 cents/kWh for larger wind up to 25 cents/kWh for small wind.
- **Illinois:** initial FIT bill met with significant opposition, then amended to replace FITs with net metering that would compensate generators for excess solar PV generation at 200% of the retail rate (14 cents/kWh).
- **Minnesota:** Rep. David Bly introduced HF3537; similar to Michigan proposal. MN addition: **generators must be majority-owned by Minnesotans.** MN has history of cooperative ownership; bill is built on existing law: Community-Based Energy Development (C-BED); C-BED task force looking at how to improve and whether it can be structured like FITs. Any actions taken by MN will affect Nebraska, South Dakota, Iowa and Ohio since these states are also considering C-BED legislation.

² See article at: <http://www.grist.org/article/2009-05-29-vermont-feed-in-tariffs/>

³ Each state needs further research to make sure information is up-to-date. Current data about state FITs: May 2008, *Feed-in Tariffs and Renewable Energy Policy in the USA – A Policy Update*, by Wilson Rickerson, Florian Bennhold, and James Bradbury, May 2008. www.worldfuturecouncil.org

- **Rhode Island:** Rep. Ray Sullivan introduced H7616 in 2008; based on Michigan model but with key differences; PV payments are significantly lower than other bills; resources without specific rates are guaranteed a payment that's 1.15 times greater than avoided cost.
- **Hawaii:** several FIT bills introduced in 2006-2007 (HB 1748-Kaiki; SB1223-Menor; SB1609-Hannabusa). All bills included 20 year, 0.70 cents/kWh FIT for solar PV up to 20 MW. FIT rates apply only to excess electricity from net metered systems. FIT capped at 5% of peak demand; rate for solar PV is 0.45 cents/kWh. Bills did not pass in 2007 but will be re-introduced.

States that are considering FITs:

- **Florida:** a number of FL organizations have endorsed FITs; Florida's clean energy plan supposed to be good, according to Hunter Lovins.
- **Maine:** MidCoast Green Collaborative calling for FITs;
- **Massachusetts:** considering; Governor Deval Patrick announced target of 250 MW of solar electricity by 2017.
- **New Jersey:** one of the **first states to have a solar set-aside target**; Board of Public Utilities analysis determined that FITs would increase investor security and comparatively low ratepayer impacts.
- **New York:** considering.
- **Vermont:** SB209 (Lyons) introduced, includes 15 year contract and directed Vermont Public Service Board to set cost at levels "adequate to promote" renewable energy; ***Vermont allows environmental externalities to be taken into account.***
- **Oregon:** Oregon Department of Energy's Wind Working Group recommended looking into FITs.
- **Wisconsin:** Governor set up Global Warming Task Force, which is considering a FIT.

General Terms and Prices for FITs in Various States

- Contract term: 20 years
- Caps: 20 MW common; 1.5 MW per system in IL; 51% ownership by MN residents in MN;
- Costs: wind has a lot of variation, depending on location and size, from 10.5 to 25 cents/kWh; solar PV: from 48 to 71 cents/kWh, depending on type (ground-mounted gets lowest tariff, while building-integrated PV gets the highest); biomass 10.5 to 14 cents/kWh; landfill gas 8.5 to 10 cents/kWh.
- IL innovation: all excess kWh generated through net metering pay 200% of retail rate.

Federal FIT: proposed by Congressman Jay Inslee from Seattle (WA-1st CD); includes:

- (1) guaranteed interconnection and uniform minimum standards;
- (2) mandatory purchase through 20-year fixed rate contracts; and
- (3) rate recovery through regional national systems benefits charge.

Concerns with Federal FIT:

- States are protective of ratemaking authority; precedent goes back to 1935 Federal Power Act; in 1978 Congress passed PURPA, and Section 210 requires all utilities to connect non-utility power producers and to purchase electricity at the "avoided cost" rate; but implementation of "avoided cost" rate left to individual states.
- Expansion of FERC's power over states a problem;
- National benefits charge would be a line item on customer bills;
- Conventional industry doesn't like bill, but solar industry isn't necessarily united behind Inslee.

Canada and FITs: Ontario Passed Law May 2009

- Province of Ontario Canada passed FIT law May 2009; the Green Energy and Economy Act⁴
- Bill was introduced in November 2008; 87% of people polled support
- Estimate it will create 90,000 jobs per year in conservation, RE and grid upgrades
- Specifics:
 - - provides clear, transparent path for approval of RE projects
 - - domestic content requirements for RE projects to jump-start manufacturing
 - - allow local communities and tribes to build, own and operate RE projects
 - - specific rates for different technologies
 - - right to connect to the grid
 - - make EE (energy efficiency) a key purpose of Ontario's building code
 - - require home energy audits before sales
 - - set conservation targets for local utilities
 - - **paying 42 cents/kWh for solar PV guaranteed for 20 years**
- Ontario already has about 1,000 MW of RE online since October 2003; will bring 1,200 more RE MW online in 2009; RE investments total \$4 billion so far.
- The Ontario Power Authority (OPA) did a survey to determine interest in building RE, and received bids from 150 developers for 15,000 MW of RE (13,000 wind and 1,200 solar PV).⁵
- Builds on Ontario's initiative to eliminate coal from power supply.

Who can benefit from FITs?

- Anyone, not just utilities. They are more equitable than Renewable Portfolio Standards (RPSs) because homeowners, farmers, small and large businesses and cooperatives can all participate.
- Anyone who installs Renewable Energy (RE) can profit, spreading out the value among citizens and not just owners of large-scale power stations.
- The cost of Renewable Energy (RE) has come down 80% over the past twenty years. Just twenty years ago wind was expensive – now it's usually cheaper than natural gas and sometimes as cheap as coal.

Feed-in Tariffs and Tax Credits

- No. Feed-in tariffs are simply payments for generation – not taxes or subsidies. Thus, FITs are more egalitarian because they allow everyone to be paid for generating electricity, even those who do not pay a lot in taxes.
- FITs: no credits, no monitoring, no penalties and no caps; so easier to administer.

Are Feed-in Tariffs Just Another Subsidy?

- Feed-in tariffs are not subsidies. They do not subsidize the cost of the equipment used to produce renewably-generated electricity, like solar panels or wind turbines, nor do the payments come from taxpayers.
- Instead, feed-in tariffs are simply payment for the generation of electricity.

⁴ Green Energy Ontario website (group that pushed for the bill); http://www.greenenergyact.ca/Page.asp?PageID=1224&SiteNodeID=202&BL_ExpandID=44 ; Ontario Ministry of Energy and Infrastructure: <http://www.mei.gov.on.ca/english/energy/gea/> ; Paul Gipe collection of articles on Ontario's FIT: <http://www.wind-works.org/FeedLaws/Canada/OntarioandtheCampaignforAdvancedRenewableTariffs.html>

⁵ <http://www.wind-works.org/FeedLaws/Canada/HugeInterestinOntarioProposedRenewableEnergyFeed-inTariffProgram.html>

- The idea behind FITs is that there's a benefit to all citizens to invest in and build renewable energy. The payment for Renewable Energy (RE) – small or large wind, or solar PV, biogas, landfill gas, geothermal etc. – is determined by the cost of production, plus a small profit.
- If FITs had the same payment for all types of RE, then the U.S. would only build wind, because wind is always cheaper than solar. Solar payment is higher to spur innovation and reduce costs.

Are Tariffs Taxes?

- No. Tariffs are the rate paid for commodities like electricity. An electricity tariff is the price paid per kilowatt-hour of electricity generated.

Who Pays for Feed-in Tariffs?

- Ratepayers pay for FITs through charges on their electric bills.
- There are also programs in most states and provinces that protect low-income consumers from paying high prices for their electricity, especially during the winter months.

How Much Do Feed-in Tariffs Cost Consumers?

- In Germany in 2007, the average household paid less than \$50 per year for the world's largest concentration of wind turbines, solar panels, and biomass plants, and the **250,000 new jobs these industries have created; 40,000 people were employed in PV manufacturing.**
- FITs added 0.6 cents/kWh to retail rates.
- In Germany and Spain, the additional cost of renewable energy is modest because the costs are spread fairly across all consumers.
- The German government estimates that the actual cost is near zero, because the **benefits of reducing carbon emissions and other air pollutants**, as well as reducing the cost of expensive fossil-fired generation offsets the cost of the renewable energy.

Do Feed-in Tariffs Allow You to Sell "Back" to the Grid?

- No. Feed-in tariffs allow you to "sell" to the grid, not "sell back" to the grid. Selling "back" to the grid implies that you are already buying from the grid; that is, that you are a customer and already have a kilowatt-hour meter. Feed-in tariffs allow you to generate electricity and sell it to the grid *even if you are not presently a customer.*
- Feed-in tariffs allow the development of green-field sites, such as the installation of wind turbines that are owned by groups of neighborhood investors, cooperatives, or traditional business.

How Do We Know That Feed-in Tariffs Will Work?

- Like any policy mechanism, feed-in tariffs can be misapplied. The most common problem is setting the prices, or tariffs, *too low* and not attracting the desired amount of development.
- Another common problem is setting a limit on project size. However, where there was serious political commitment for the programs to succeed, they have done so. This is seen especially in Germany, France, and Spain.
- **Germany reduced CO2 emissions 18.5% by 2006;**
- **Germany on target to get 25% of electricity from RE by 2025;**
- 400,000 German households have installed solar PV.

Germany – Renewable Energy and FITs

- Largest wind project in Germany is about 100 MW and owned by dozens of entities;
- Farmers in Germany are working with "middlemen" like John Deere to put up community wind;
- Original Germany goal of 12% RE by 2010 was at 14.2% in late 2007;

- Increase in RE in Germany: was ~6% in 2000; 14.2% by 2008;
- In Germany, PV market is: 10% ground-mounted field systems; 40% residential; 50% commercial.
- TWO percent of all of Bavaria's electricity comes from solar but on sunny days up to 20% from solar PV; and no problems from this short-term high penetration.
- German wind is so-so but has over 20,000 MW of wind (compared to total wind in U.S: 28,000 MW; Germany as sunny as southern Alaska.
- **German RE industry: \$40 billion in revenue 2007; up 10% from 2006 and four times 2000.**⁶

Utilities in Germany v. U.S.

- All German utilities are regulated; with full retail competition and applies to both publicly owned and privately owned utilities; both types own generation and buy wholesale markets;
- German wholesale and retail prices higher: 15-20 cents/kWh wholesale; 25-40 cents/kWh retail.
- Vast majority of distribution (and some transmission) lines are buried in Germany;
- German residential meters read only once/year, but bills are sent monthly (with year-end true-up).

Why were Germans so supportive of the FIT?

- Citizens were supportive because they could participate in, and profit from, FITs.
- With RPSs, only **large-scale utilities can participate**;
- Net metering focuses on “avoided generation” cost which does not reflect the true value of distributed solar feeding into the grid at peak times;
- Germany placed a premium on **building its RE manufacturing base and accompanying jobs and skillsets**. Germany sees traditional industries such as steel, chemicals and automobiles moving to lower cost regions, growing slowly or not growing at all.

Cost of FITs in Germany

- FITs add 0.06 cents Euro to a retail rate around 0.19 cents Euro per Craig Morris, author and journalist (*Energy Switch: Proven Solutions for a Renewable Future*).
- Per municipal utility Badenova located in Frieberg Germany, in **2007 the FIT cost US\$52.00 for a three person family for a year** – less than 5% of total electricity costs.

External Benefits of RE Estimated at \$4.3 billion Euros Annually

- Most “external” costs due to pollution from coal and lignite (cheapest and dirtiest form of coal).

Germany and FITs: Key Data on Electricity from RE and Employees in RE

Key Data on German Renewable Energies 2006 – 2007 www.petiteplanete.org and the German Environmental Ministry			
	2006	2007	% change
Share of RE in total gross electricity consumption	11.7%	14.2%	+21.4%
Share of RE in total final energy consumption for heating	5.8%	6.6%	+13.8%
Employees in RE sector	236,000	249,000	+5.5%

⁶ *Feed-in Frenzy*, by Chris Turner from www.walrusmagazine.com, Jan-Feb. 2009 issue.

- Germany Exported More Goods from 2003 to 2007 than the U.S., China, France and Japan:
www.countryreports.org

What about integrating RE into the grid? Aren't there problems?

- Research shows that even with high grid integration of 20-30% solar into the grid, there aren't integration problems.
- Utilities are finding solar provides grid stability.

What are Degression Rates?

Degression rates = declining tariff due to expected lower future cost of RE; however, sometimes the cost doesn't always decline – cost of wind energy from 2006 to 2008 increased.

Is Legislation Required to Implement Feed-in Tariffs?

In some states FITs can be implemented administratively; most municipal utilities can implement directly.

Where Can I Find More Information on Feed-in Tariffs?

There are several web sites that feature news and articles about feed-in tariffs. The most comprehensive site can be found at http://www.wind-works.org/articles/feed_laws.html. On this page there are links to more detailed information on the following subjects.

Books on Feed-in Tariffs

There several books with detailed information on feed-in tariffs and renewable tariff policy. You can find information about these books at the links below.

- [Feed-in Tariffs by Miguel Mendonca--a Review](#)
- [Energy Switch: Proven Solutions for a Renewable Future](#)
- [Switching to Renewable Power by Volkmar Lauber](#)

Research Sources:

Solar Fact Finding Mission to Germany for Utility Decision Makers; Summary Report, June 9-13, 2008, Solar Electric Power Association: <http://www.allianceforrenewableenergy.org/2008/07/solar-fact-find.html>;

Feed-in Tariffs and Renewable Energy in the USA – a Policy Update, by Wilson Rickerson, Florian Bennhold and James Bradbury, May 2008: http://www.wind-works.org/FeedLaws/USA/Feed-in_Tariffs_and_Renewable_Energy_in_the_USA_-_a_Policy_Update.pdf

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