

Feed-In Tariffs

Building a renewable energy industry in Kentucky

A white paper prepared by the
Kentucky Conservation Committee

DRAFT 1.2

September 24, 2009

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Executive Summary

What are Feed-In Tariffs?

- A feed-in tariff is a schedule of rates utilities must pay for electricity generated by renewable sources like solar and wind.
- The rates are set at cost plus reasonable return on investment, jump-starting those industries by minimizing investment risk.

Why establish a Feed-In Tariff program now?

- The Governor's 2009 energy plan envisions more diverse energy sources for Kentucky, which presently depends on fossil fuels (96% from coal and natural gas, 3% renewable).
- The energy plan recognizes that the main impediment to the development of a significant renewable energy sector is *financial*.

Why is a Feed-In Tariff program important to Kentucky's energy future?

- Makes available untapped and sustainable Kentucky energy resources.
- Prepares Kentucky for the emerging regional, national, and global energy market.
- Rapidly develops alternative energies without government subsidies or taxes.
- Creates new industries and new jobs in Kentucky.
- Decentralizes energy production for security and "smart grids."
- Mobilizes broad-based investment by homeowners, industries, and universities as well as utilities.

What will a Feed-In Tariff program cost?

- At first, consumers will pay negligibly more on their utility bills, and less than \$2 per month per household when current goals in the Governor's energy plan are reached.
- By contrast, rate increases from carbon taxes will average at least \$16 per month.

Are other states adopting Feed-In Tariffs?

- The Tennessee Valley Authority has a Feed-In Tariff program open to its customers.
- Vermont and Maine have passed comprehensive Feed-In Tariff legislation.
- Other states in our region considering legislation include Illinois, Indiana, and Michigan.
- A bill promoting Feed-In Tariffs is pending in the US Congress.

What would a Feed-In Tariff law ideally include?

- Require priority purchase and interconnection by utilities of renewable sources.
- Set tariff rates at levels that promote investment in appropriate technologies and consistent with energy plan goals.
- Guarantee the rates over a prolonged period, but decrease them over time to encourage economies and technological innovation.
- Establish regulatory standards for installers and target workforce development resources to train them.

What is a Feed-In Tariff?

A Feed-In Tariff is a schedule of payments for electricity from renewable sources such as solar and wind that encourage private investment in renewable energy production facilities. New renewable energy sources would “feed in” to the electrical grid as they come on line. Interconnection with the grid would be guaranteed within constraints determined for the Feed-In Tariff program by legislators and regulators based on the state’s energy goals.

Feed-In Tariffs recognize that electricity from renewable sources is presently more costly than from conventional sources and that the market must be structured differently to encourage the renewable sector’s development. Feed-In Tariff rates are typically based on an analysis of the cost of producing the electricity from the renewable source plus a reasonable return for investors, just like rates for electricity from conventional sources were set before deregulation in the 1980s.

Rates for renewable energies would differ based on source, size of the facility, technology used, and the size of the site. Producers would sign long-term contracts, typically twenty years, for their full output. The contracts would be similar to conventional power-purchase contracts, except that feed-in sources would be guaranteed the purchase of their product at the Feed-In Tariff rate.

Utilities would continue to purchase energy from conventional sources at the usual rates. The cost of electricity from the conventional and renewable sources would be combined by the utility into a single rate charged to its customers; typically, an equalization factor spreads uneven costs across all utilities and customers in the state. Through a planned decrease in the rates over time, rates for renewable energy would reduce as the renewable sector expands, economies of scale are realized, advances in technology are made, and the desired diversity of energy sources is reached. Eventually, Feed-In Tariffs would be phased out.

At first, Feed-In Tariffs would slightly increase customer electrical rates. As the renewable sector expands, consumer costs may rise more. However, consumer costs are expected to rise significantly in Kentucky’s coal-dependent electrical grid, regardless, as coal-powered electricity becomes more expensive from increasing competition for energy, the retirement of aging plants, and regulation to reduce carbon emissions to the atmosphere. The Governor’s 2008 energy plan states:

In the future, primarily relying on one source of power for electricity generation will not be prudent in the face of imminent climate change legislation at the federal level. While we anticipate retrofits of existing power plants for carbon dioxide capture, we must diversify our electricity generation to include renewable and other sources such as nuclear power.¹

Originating in Europe where they created hundreds of thousands of new jobs in Germany, France, and Spain, Feed-In Tariffs are used by the Tennessee Valley Authority and the city of Gainesville, FL, and are under development in fifteen states and three other American cities.² While Feed-In Tariffs are one of several strategies that may be implemented to achieve the goals or mandates of renewable energy portfolios, in Europe Feed-In Tariffs are proving more cost-effective than the competitive solicitation model used in renewable energy portfolio

¹ “Intelligent Energy Choices for Kentucky’s Future,” Governor Steven L. Beshear, 2009, 9.

² National Renewable Energy Laboratory, “Feed-In Tariff Policy” (2008), 1.

programs,³ and have proven more effective in raising private capital than tradable renewable energy credits.⁴ Feed-In Tariffs also promise to create the multiple source-nodes necessary for the gains in conservation, sustainability, and security promised by “distributed generation” and “smart grid” technologies.

Why establish Feed-In Tariffs now?

The future of Kentucky’s energy industry, like that of all other states (and nations), will depend on the generation of electricity from more diverse and sustainable sources. Coal currently provides 92.3 percent of Kentucky’s energy.⁵ Energy from non-coal sources, however, will continue to be more expensive for years, inhibiting private investment in its production. Energy from other large-scale alternatives like nuclear will not be available for decades, even after (and if) regulatory hurdles are jumped and the huge private investment necessary for construction is raised.

On the other hand, broad development of renewable energy facilities is feasible today. Available technologies like photovoltaic solar are currently negligible contributors to Kentucky’s electrical system, but the Governor’s energy plan notes that Kentucky has greater solar resources than Germany, where a solar industry has exploded into a key sector of their energy picture and a creator of manufacturing jobs.

The barrier to exploiting solar and other renewable energies in Kentucky are not technological, but financial, according to the Governor’s energy plan:

The primary impediment toward the development of Kentucky’s renewable energy potential today is economic viability. The energy potential can be realized using commercially available technologies which can be deployed quickly and scaled over time. Consequently, there is not a significant rationale to delay implementation of Kentucky’s renewable resources if appropriate policies and incentives are created to ensure an adequate return on investment.⁶

Renewable energy technologies can be significant alternative energy sources in Kentucky’s portfolio under the appropriate rate-setting conditions and after regulatory barriers to distributed generation are overcome (something that Net Metering has helped do). Feed-In Tariffs would encourage private investment in small- and medium-scale generation facilities across Kentucky, linked by the state’s electric grid and producing increasing amounts of renewable energy for people’s consumption.

Feed-In Tariffs guarantee a reasonable return on investment to investors in renewable energy production facilities. In addition, rates designed to cover cost plus reasonable return minimize investor risks (and, therefore, costs passed on to consumers), and they encourage technological innovation to maximize investment return once the facilities are in place. Feed-In Tariffs also create new industries with thousands of new jobs. Moreover, Feed-In Tariffs would be powerful incentives to large institutions like universities and manufacturing plants to

³ NREL., 1.

⁴ At least in Europe, which has the only significant experience. Rickerson et al., 3.

⁵ In 2006, coal = 92.3%, hydro = 2.6%, and other renewable = 0.5%. Most of the “other renewable” is wood waste and landfill gas recovery; solar and wind round to 0% each. Governor’s energy plan, 31-32, quoting the federal Energy Information Administration.

⁶ Governor’s energy plan, 42.

incorporate renewable energy production in their facility plans to reduce their future energy costs. Finally, Feed-In Tariffs would permit everyone in Kentucky, from homeowners to small businesses to major industries to huge utilities, to invest in Kentucky's sustainable and affordable energy future.

While tax incentives, net-metering, and other policy initiatives in the Governor's energy plan will encourage some renewable energy development, Feed-In Tariffs have proven to be the most successful policy initiative in other nations for the *rapid* development of *significant* amounts of renewable energy. They are under wide consideration and development in many other states and should be part of Kentucky's energy strategy.

The time to lay the groundwork for the development of significant renewable sources that use proven technology is ***now***.

Why is a Feed-In Tariff program important to Kentucky's energy future?

1. Makes available untapped Kentucky energy resources

A 2008 report by the US Department of Energy cited in the Governor's energy plan assesses these renewable resources in Kentucky:⁷

- *Biomass*: "good" resources.
- *Hydropower*: "moderate" resources.
- *Solar*: "useful" resources for flat-plate collectors, but concentrating collectors will not be effective.
- *Wind*: small turbines may have applications in some areas, but insufficient resources for large-scale wind turbines.
- *Geothermal*: insufficient resources for concentrated geothermal technologies.

2. Prepares Kentucky for the emerging regional, national, and global energy market

Kentucky is currently dependent on electricity from cheap coal, but coal will not remain cheap because of environmental constraints, federal climate change legislation, and growing demand on limited and aging large facilities. The tripling of the capacity of the renewable sector in Kentucky envisioned by the Governor's energy plan⁸ is possible through the development of a network of small- and medium-sized generation facilities using available renewable technologies, if the facilities can be capitalized. Establishing a system of long-term contracts under a Feed-In Tariff program can assure investors in renewable facilities that they can amortize costs, minimize investment risks, and obtain a reasonable return.

3. Rapidly develops alternative energies without government subsidies or taxes

Feed-In Tariffs mobilize private capital to build a significant renewable energy sector. No taxes are necessary nor are tax incentives needed. Feed-In Tariff programs are usually coordinated with existing tax incentive programs to avoid excessive profits, and targeted according to goals for renewable energies set by policy-makers (e.g., renewable energy portfolios) so that overall consumer costs don't increase inappropriately.

⁷ USDOE, "Alternative Energy Resources in Kentucky," 2008. This internet application is no longer accessible, but a copy was obtained from the Kentucky Department of Energy and is available from KCC.

⁸ Governor's Energy Plan, vi-vii.

4. Creates new industries and new manufacturing jobs

Feed-In Tariffs have resulted in significant increases in the portion of electrical energy that comes from renewable sources in Germany, where they were first implemented at scale (in one recent year, from 2005 to 2006, their proportion of all electrical energy rose from 10.2% to 11.8%).⁹ There are 40 companies in Germany employing over 20,000 people who produce solar system components. The German renewable industry as a whole turned over €21.6 billion in 2006 (\$30.0 billion), up from €16.4 billion in 2005, and employed over 200,000 people. By 2020, Germany expects 500,000 people to be employed in the renewable energy sector.

Adjusting German rates of production and employment to Kentucky's population results in these numbers:

	Germany	Kentucky (projected)
Population	82.4 million	4.3 million
Solar industry employees (2006)	20,000	1,040
Renewable product (2006)	\$30.0 billion	\$1.56 billion
Estimated renewable industry employees (2020)	500,000	26,000

5. Decentralizes energy production

Almost by definition, renewable forms of energy production are scattered widely across the landscape and not concentrated in large facilities (Kentucky's solar and wind resources aren't sufficient for concentrated production of solar or wind energy.) Kentucky reduces risks of failure or sabotage of its grid by increasing the number of production facilities, which is what happens with renewable sources. In addition, increasing the number of production facilities increases the number of communities and individuals who participate directly in Kentucky's energy industry, providing a basis for wider citizen-based support for advancing Kentucky's energy interests and preparing its energy industry for future demands and global conditions.

6. Mobilizes broad-based investment

Because renewable energy facilities are generally small (and in many cases sited on buildings), more Kentucky citizens, companies, farmers, and institutions can invest in energy production. A Feed-In Tariff reduces investment risk to the point where small-scale investment becomes possible; furthermore, it will encourage companies and institutions to incorporate renewable energy production in their new or retrofitted buildings.

Frequently-Asked Questions About Feed-In Tariffs¹⁰

Are Feed-In Tariffs the same as tax credits or government subsidies?

No. Feed-In Tariffs are payments by the consumers of electricity for its generation and transmission. Feed-In Tariffs do not use tax funds (or avoided tax payments) to subsidize the cost of the equipment used to produce energy from renewable sources. Feed-In Tariffs simply establish a schedule of utility rates that are appropriate to encourage private investment in

⁹ e-Parliament: "Feed-In Tariffs support renewable energy in Germany," p 4. Online at:

www.e-parl.net/eparlimages/general/pdf/080603%20FIT%20toolkit.pdf

¹⁰ Adapted from Paul Gipe, "Frequently Asked Questions about Feed-In Tariffs, Advanced Renewable Tariffs, Renewable Tariffs, and Renewable Energy Producer Payments," Wind-works.org, 2008. Online at:

<http://www.wind-works.org/FeedLaws/PrimersonFeed-inTariffsandAdvancedRenewableTariffs.html>

facilities that generate renewable, as opposed to conventional, energy. The private investment market provides the money to build the facilities, because the rates assure that costs and reasonable profits will be covered over the long term.

Through the legislature and the Public Service Commission, Kentuckians decide the mix of conventional and renewable energies they believe are optimal, then they decide what the various sources should cost.

Are Feed-In Tariffs, taxes?

No. Feed-In Tariffs simply establish the prices utilities pay for electricity based on the cost of generating it. No money flows to or from the government as a result, except in the form of the usual taxes on energy.

Who pays for Feed-In Tariffs?

Consumers of electricity will pay for renewable energy generated at rates covered by Feed-In Tariffs through their electric bills, just as they do now for electricity coming from conventional power plants. Unlike tax-related incentives, where costs depend on the rules for paying taxes, people and industries who consume more electricity than others will pay more for renewable generation than those who use less.

How much will Feed-In Tariffs cost consumers?

Very little at first, because it takes several years for renewable sources of energy to become a significant part of electricity supply. Because the costs of Feed-In Tariffs are spread across all consumers of the energy, cost increases are modest; in Germany, which has the most extensive (and therefore costliest) Feed-In Tariff program, the additional cost per household is now €1.50 (about \$2.09) per month. Feed-In Tariff programs can be designed to moderate consumer cost impacts. Also, the additional cost must be considered in the context of rising energy costs: the additional cost per U.S. household for climate change legislation is \$13.30 per month, and likely higher in Kentucky, because of our dependence on fossil fuels.

Higher costs for energy to prevent further climate change do not necessarily create new jobs. In Germany, while electricity costs increased as a result of a Feed-In Tariff, Germany also experienced the creation of an estimated 20,000 new jobs in solar facility manufacturing alone, and the renewable energy sector now employs over 200,000 people, more than those employed by the nuclear and coal sectors combined.

How are Feed-In Tariffs different from net metering?

Net metering allows consumers to reduce the amount of energy they buy from the grid and to bank the value of electricity they don't use. Net metering does not permit a generator of electricity to sell electricity to the utility. While net metering provides incentives for small-scale, voluntary, consumer-based energy conservation, the potential of the program is limited by the amount consumed by individual customers; very little additional energy is created for the system. Feed-In Tariffs, on the other hand, allow individuals, institutions, cooperatives, and companies to generate and sell additional, renewable electricity to the grid, resulting in a gain in the amount of electricity that is available to *all* of the utility's customers.

How do we know that Feed-In Tariffs will help Kentucky achieve its energy goals?

Like any policy initiative, Feed-In Tariffs can be misapplied. The most common problem is setting the tariffs too low and failing to attract the desired amount of development. Another common problem is setting inappropriate maximums or minimums on project size, which can constrain investment and size-related efficiencies.

Will Feed-In Tariffs allow “double dipping” into state rebate or subsidy programs?

Feed-In Tariffs are designed to provide sufficient financial incentive to develop renewable energy without capital grants, rebates, or other capital subsidies. The federal Investment Tax Credit for solar systems and small wind turbines has been extended for eight years. As a consequence, most Feed-In Tariff programs proposed in the USA will include provisions for using the federal ITC alongside the Feed-In Tariff to avoid inappropriate profits.

Can Feed-In Tariffs work in parallel with existing programs?

Yes, the Feed-In Tariff programs proposed in North America have all been designed to work alongside and in parallel with existing policies, such as net metering and renewable energy standards. See the next section for a discussion of the relationship of Feed-In Tariffs to Renewable Energy Portfolios.

How do Feed-In Tariffs enable distributed generation?

While Feed-In Tariffs may be used to develop large, centralized renewable energy sources, they are best known for the creation of networks of smaller, more widely distributed renewable resources that are helpful in stabilizing electrical grids. Feed-In Tariffs can be designed to encourage development of renewable projects of all sizes, from residential rooftop solar systems to farms of large wind turbines, and in all locations, from sunny and windy sites to those sites that have fewer renewable resources. By creating an schedule of rates based on technology, size, and resource intensity, a wider geographical distribution of renewable development and a more diverse array of technologies become possible.

What renewable energy sources are included?

Feed-In Tariffs can be designed to include all renewable sources of generation or only those that Kentucky wants. Some jurisdictions limit Feed-In Tariffs to solar, or to wind. Others, such as Germany, France, and Spain, have tariffs for a host of different technologies including onshore and offshore wind, rooftop and ground-mounted solar, hydro, various forms of biomass and biogas, geothermal, and concentrated solar. Feed-In Tariff programs usually establish different rates for different technologies. See the Appendix for a listing of existing and proposed Feed-In Tariff program coverages for American programs.

How are Feed-In Tariff rates calculated?

Initial rates are typically set by the legislature and future rates by the public service commission. In both instances, it is important to use a transparent process based in input from industry, independent consultants, users, and other stakeholders. Rates should be based on the cost of generating electricity using a specific renewable technology under specific conditions, plus a reasonable profit. Successful programs typically establish rates based on cost plus profit, not by establishing a premium that is added to rates for conventional sources. In this way, the rates are high enough to spur development, but not so high to create excessive profits when wholesale rates increase. See the following section for more discussion on rate-setting.

Do Feed-In Tariffs eliminate environmental review?

No. Projects using Feed-In Tariffs must comply with the same laws and environment requirements as any project that may affect the environment.

What are the key elements of a Feed-In Tariff program?

Successful programs of Feed-In Tariffs:

- Are simple, comprehensible, and transparent,
- Provide simplified and guaranteed interconnection,
- Provide a sufficient price per kilowatt-hour to drive development,
- Provide contract length sufficient to reward investment, and
- Provide rates differentiated by technology, size, and resource intensity.

Does PURPA permit Feed-In Tariffs?

Yes. PURPA, the Federal Public Utility Regulatory Policies Act (1978), limits the basis of renewable energy rates to costs avoided from building new conventional facilities, but PURPA regulates only qualified facilities, not rate-setting. States retain jurisdiction to regulate electricity rates and to administer programs for developing renewable energy. For example, a renewable energy credit trading program that is part of a state's Renewable Portfolio Standard is permitted by the Federal Energy Regulatory Commission under PURPA. Permitted also would be any special program that paid rates above the wholesale price specified under PURPA. Independent power producers would have no need to register as "qualified facilities" under PURPA if a program of Feed-In Tariffs guaranteed access to the grid and paid higher prices than those under PURPA contracts.

Currently, several states have Feed-In Tariff programs that demonstrate compliance with PURPA. Washington and Wisconsin have rates for renewable energy that pay more than the PURPA-defined wholesale tariff. Washington has a special net-metering program that pays up to \$0.54 per kilowatt hour for five years for generation by solar photovoltaic components that have been 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 for small solar, wind, and biomass generators that are above the wholesale cost of generation.

How are Feed-In Tariffs adjusted for savings from new technology?

In some Feed-In Tariff programs, the rates offered for new projects decline annually from one year to the next at a "degression rate." Degression differs from the regular, scheduled review of rates by the Public Service Commission that would normally occur. Degression rates are set at the beginning of a contract and are based on the expectation that the cost of the generation of electricity from renewable sources will decrease as technology advances and economies of scale are realized. The degression rate will force the adoption of new technologies, cost-cutting, and other efficiencies. Unfortunately, the cost of generation from a particular technology doesn't always decline. In the case of wind energy during the period from 2006 to 2008, for example, the cost of generation actually increased.

Are Feed-In Tariffs adjusted for inflation?

They may be. In Europe, there is no inflation protection in the German program, but there is in the French and Spanish programs.

Some issues in Feed-In Tariff Programs¹¹

Rate-setting

The National Renewable Energy Laboratory, a federal agency, recently released a report on Feed-In Tariffs where it identified two rate-setting approaches that are most commonly used:¹²

- Levelized Cost Basis
- Value Basis

Levelized cost is computed from the sum of the cost of generation plus a stipulated return on investment. These rates can be specifically designed to ensure that project investors obtain a reasonable rate of return, while creating conditions more conducive to market growth. Most successful European programs use this approach.

Value-based cost is derived from estimates of the economic value of the renewable energy to producers and society; this approach is often used when legislation, not PSC analysis, sets the rates. These values may include costs a utility avoids from expanded conventional generation or the value to a society of climate mitigation, health and air quality, and energy security. Obviously, these are difficult to compute, and may result in excessive profits from rates that are too high or insufficient network development from rates that are too low. The NREL reports that many states have used the value basis for setting rates, but the approach has “so far been unsuccessful at driving rapid growth in renewable energy.”¹³

Payment structure

When rates are set using the levelized cost basis (the rate-setting alternative that has proven most effective), how rates might adjust to changing energy markets is an issue. The NREL identifies two payment designs that address market rate fluctuations:

- Fixed price
- Premium price

Under the *fixed-price* design, the rate paid for renewable energy is fixed in the long-term contract and is independent of the energy market. This design offers stable investment conditions and can result in lower financing costs.

Under the *premium price* design, feed-in rates are a premium on top of spot-market electricity prices computed hourly. The premium may be fixed or variable. A fixed premium can result in windfall profits for the producer if spot-market prices increase substantially, but if prices fall, the investor’s return is at risk, a risk that will increase project-financing costs. As a result, the premium price method requires higher rates to obtain the same renewable energy development, unless refined.¹⁴ Spain established guard rails that moderate the variability of the cost-plus-premium when based on the spot market, which stabilizes the investment environment while protecting ratepayers.

The Netherlands recently introduced a “spot-market gap” model that guarantees developers a pre-determined minimum payment; the premium offsets a gap below the minimum, but isn’t paid when the spot market exceeds the minimum. The NREL concludes that

¹¹ Adapted from National Renewable Energy Laboratory, “Feed-In Tariff Policy” (2008).

¹² NREL, 2.

¹³ NREL, 3.

¹⁴ NREL, 5.

this method “may be suitable to the U.S. political and regulatory context, because the cost can be transparently derived and feed-in rates decrease to zero when spot-market prices exceed the minimum.”¹⁵

Payment differentiation

A common issue identified by the NREL report is whether Feed-In Tariff rates will differ based on project-specific factors,¹⁶ including:

- Technology type (solar, wind, geothermal, etc.) or fuel type (in the case of biomass or biogas)
- Size of the project (to account for economies of scale, in the case of solar or wind farms; note, however, that wind farms are not considered practical in Kentucky)
- Quality of the resource (which can vary by site in the case of wind or solar) to encourage certain sectors or to avoid windfalls for resource-rich sites
- Specific location

Rate-setting for these factors is tied to overall renewable energy goals. European models encouraged wide-spread development by utilities as well as utility customers; the ability of everyone to feed in renewable energy “was a powerful vehicle for leveraging both local and global capital toward renewable energy development.”¹⁷

Coordination with Renewable Portfolio Standards

Renewable Portfolio standards (RPS) are used by more than 28 states to mandate that utilities provide a certain percentage of renewable electricity to their customers, and they “appear to have successfully motivated new renewable development in certain regions of the United States.”¹⁸ More than half of renewable energy development occurred in states with an RPS, although it can’t be demonstrated that the RPS was the only factor. The Governor’s energy plan for Kentucky includes an RPS, but the percentage of renewable energy it recommends is a “goal,” not a mandate.

Whether RPS can create a significant segment for renewable energy in a state’s portfolio without Feed-In Tariffs or other financing mechanisms is questionable, based on the states’ experiences with the portfolios. (The Governor’s energy plan currently relies on “tradable renewable energy credits,” which have not stimulated significant renewable energy development elsewhere, according to the NREL).

The NREL report identifies these problems that states have experienced in using the RPS approach, even on a mandatory basis, as their primary means of developing renewable energy development:¹⁹

- Uncertainties with project financing
- High contract failure rates
- High level of market concentration due to a limited number of investors
- Little local and community-scale development in renewable energy development

¹⁵ NREL, 6.

¹⁶ NREL, 7.

¹⁷ NREL, 7.

¹⁸ NREL, 8.

¹⁹ NREL, 8.

However, the NREL report observes that using coordinating a Feed-In Tariff program with a state's RPS may be more effective in meeting RPS goals, whether in tandem, delegated to utilities, or "carved out":²⁰

- Feed-In Tariffs provide an investment environment that will invite more proposals for production toward an RPS goal or mandate, and assures that more contracts will be likely to succeed.
- Feed-In Tariffs are a more economical procurement strategy than the request-for-proposals process used in a RPS.
- Feed-In Tariffs have a built-in hedge against project delays and cancellations.
- Under Feed-in Tariffs, the state or the utility is not required to assess each project's viability, and the onus for success or failure shifts to the investor community and the discipline of the market.
- A Feed-In Tariff focuses on "reasonable cost" as opposed to least cost. The focus in a RPS on least-cost proposals may result in inadequate return on investment, reducing incentives for investors. A well-designed Feed-In Tariff will establish a cost-plus-return rate that assures the right amount and mix of renewable energy development.
- Feed-In Tariffs can include a premium that recognizes the cost of emerging technologies, covering the additional investment risk associated with developing them.
- Feed-In Tariffs can offset the risks utilities take from regulatory prudence reviews under usual public service commission rules.

Policy Challenges

The NREL report identifies these challenges to policy-makers who are considering a Feed-In Tariff program:²¹

Up-front administrative costs: Public Service or Legislative Research Commission analysts are required to make detailed studies to set appropriate payment levels at the outset to assure the level of desired development of renewable energy. Too complex a structure may inhibit implementation, but a structure needing frequent later adjustment may deter investment.

Costs of emerging technologies: Rates established to account for the higher risk of developing an emerging technology may result in an unacceptable short-term cost burden for consumers. That burden needs to be weighed against the benefits of job creation as well as the future costs avoided by developing the technology. Capacity caps can limit this exposure.

Policy development over time: Uncertainty over what changes may be necessary in the Feed-In Tariff program as it adjusts to rising energy costs and emerging technologies will increase investor risk, which will be reflected in rates or, in a worst case, alienation of investors from the renewable energy market.

²⁰ NREL, 10.

²¹ NREL, 11-12.

Recommended Legislation

The Kentucky Conservation Committee considers these elements essential when drafting Feed-In Tariff legislation for Kentucky:²²

Impose priority purchase and interconnection obligations on utilities

Grid operators must be required to connect qualified renewable energy producers to the grid, whether the producers are utilities, businesses, or private households, and they must be required to transmit the energy they produce. Connection and transmission must have a priority over conventional sources to minimize investment risk (and cost) for renewable facilities.

Laws should also specify who pays for connections to the grid and establish standards for inter-connection. Typically, the utility pays for connections when facilities are located near suitable grid lines unless a stipulated large quantity of energy will be produced.

Set tariff rates to incentivize investments in appropriate technologies

The law must clearly identify the technologies and plants that are covered. These technologies are appropriate for using Kentucky's renewable resources:

- Hydroelectric
- Landfill or sewer treatment gas
- Biomass or biogas
- Small-scale wind
- Flat-plate solar

The rate for electricity generated from renewable sources must be set at a level that reflects costs of using that technology and provides a reasonable rate of return on for investment. The rates should be based on economic and technological analysis but still be transparent to stakeholders and the public; the public service commission is an ideal rate-setting venue.

Laws should also specify minimum and maximum capacities for participating renewable sources, including an overall capacity for program participants, which is typically increased year by year to support sustained and measured growth in the industry toward energy plan goals..

Guarantee the tariff rate over a specific and prolonged period of time

Price-per-unit rates should be guaranteed for a specified period of time after qualifying producers have connected to the grid. This minimizes investment risk and encourages innovation. Time frames are typically different depending on the technology. Typically, rates are guaranteed for twenty years. When public service commissions change rates in a typical biennial review process, the review does not affect existing contractual rates but does affect contracts entered into after the review.

Regress tariff rates each year

Reducing the rates for participating producers acknowledges economies of scale that are being achieved and encourages innovation and cost-cutting. German rates of regression are about 6.5 percent.

²²Adapted from a "toolkit" prepared for legislators in EU countries by e-Parliament: "Feed-In Tariffs support renewable energy in Germany," online at:

www.e-parl.net/eparlimages/general/pdf/080603%20FIT%20toolkit.pdf

Determine an equitable way of distributing costs to consumers

Most countries that have implemented Feed-In Tariffs have established a cost-sharing mechanism so that the cost of renewable energy production is distributed across all consumers, based on their overall usage, by equalizing impacts on utilities.

Establish regulatory standards for installers and target workforce development resources to train them

The rapid expansion of small-scale renewable energy production facilities that results from a Feed-In Tariff will require a small army of qualified installers and inspectors. A certification program with an associated workforce development strategy will be necessary.

Links and Resources

Kentucky Governor's Energy Plan:

Kentucky Department for Energy Development and Independence, "Intelligent Energy Choices for Kentucky's Future," 2009. Online at:

eec.ky.gov/NR/rdonlyres/3BB23D1C-F42C-4E3D-808D-CF7588926BD3/0/FinalEnergyStrategy.pdf

National Renewable Energy Laboratory

US National Renewable Energy Laboratory, "Feed-In Tariff Policy," 2008. Online at:

www.nrel.gov/docs/fy09osti/45549.pdf

Wind-Works.org

This site compiles a myriad of links to internet resources on renewable energy, and compiles them state by state.

Referenced in this KCC white paper is this monograph found on the Wind-Works website:

Wilson Rickerson et al., "Feed-In Tariffs and Renewable Energy in the USA—A Policy Update," 2008. Online at:

www.wind-works.org/FeedLaws/USA/Feed-in_Tariffs_and_Renewable_Energy_in_the_USA_-_a_Policy_Update.pdf

Database of State Incentives for Renewables and Efficiency:

<http://www.dsireusa.org/>

Energy Information Administration, Kentucky State Energy Profile:

http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=KY

Appendix 1—Comparison of U.S. Feed-In Tariff programs

rickerson paper has a similar grid

State	Statute/ Effective Date	Links	Coverage	Rates	Limits
Vermont	HB 444, "Vermont Energy Act;" 2009	Legislative information: http://www.leg.state.vt.us/docs/2010/bills/Passed/H-446.pdf	Photovoltaics Landfill Gas Wind Biomass, Hydroelectric Municipal Solid Waste Anaerobic Digestion Small Hydroelectric	Established by the legislation: \$ 0.12/ kWh methane/ landfill//ag \$ 0.20/kWh wind < 15kW \$ 0.30/kWh solar Avg retail for hydro or wind > 15 kW or biomass (all rates pending public service commission review)	10-25-year contracts, depending on technology. Plant capacity < 2.2 mW. Overall capacity 50 mW.
TVA	"Green Power Switch" program; Current	pays a premium above standard tariffs for producers of renewable energy. Limited to producers of 0.5-1.0 megawatts. Program information: www.tva.gov/greenpower/switch/partners/index.htm	Photovoltaics Landfill Gas Wind Biomass Municipal Solid Waste Small Hydroelectric	\$1000 plus \$ 0.12/kWh premium above wholesale for solar and \$ 0.03/kWh premium for all others	10-year contracts.
Maine	LD 1450 (pending)	Legislative information: http://www.mainelegislature.org/legis/bills/display_ps.asp?id=1450&PID=1456&snum=124			
Indiana	HB 1622, "Advanced Renewable Energy Tariff" (pending)	Legislative information: www.in.gov/apps/lisa/session/billwatch/billinfo?year=2009&session=1&request=getBill&doctype=HB&docno=1622	Hydropower Landfill or sewer treatment gas Biogas Geothermal Wind Solar	Legislation sets rates, with review by the Indiana Utility Regulatory Commission every two years.	

State	Statute/ Effective Date	Links	Coverage	Rates	Limits
Florida	Gainesville "Feed-In Tariff" Program, 2008	<p>Program information: http://www.gru.com/AboutGRU/NewsReleases/Archives/Articles/news-2009-02-06.jsp Meanwhile, the state legislature is considering statewide coverage. Legislative information: www.heraldtribune.com/article/20090226/ARTICLE/902260382/2055/NEWS?Title=When-the-sun-shines-and-the-dollars-add-up</p>	Photovoltaics	<p>\$ 0.32/kWh for building-mounted facilities < 25 Kw \$ 0.26/kWh for free-standing facilities > 25 Kw 20-year contracts</p>	20-year contracts. Overall capacity may increase 4.0 mW per year.
Illinois	HB 5655, "Illinois Renewable Energy Sources Act" (failed sine die)	<p>Legislative information: http://www.ilga.gov/legislation/billstatus.asp?DocNum=5855&GAID=9&GA=95&DocTypeID=HB&LegID=37530&SessionID=51</p>	<p>Hydroelectric Landfill or sewer treatment gas Biomass or biogas Geothermal Wind Solar</p>	<p>Surcharges to be set by the Illinois Commerce Commission and reviewed every two years.</p>	
Michigan	HB 5218 (failed sine die 2007)	<p>Legislative information: http://legislature.mi.gov/doc.aspx?2007-HB-5218</p>			
US Congress	HR 6401, "The Renewable Energy Jobs and Security Act" (pending)	<p>Amends PURPA and directs the Federal Energy Regulatory Commission to write rules to expedite the interconnection of renewable energy sources with utilities. Legislative information: http://www.govtrack.us/congress/bill.xpd?bill=h110-6401</p>			

Appendix 2—Maine’s draft legislation

SUMMARY

This bill requires the Public Utilities Commission to establish by rule a renewable energy resources program to encourage the rapid and sustainable development of renewable energy resources and technology for environmentally healthy generation of electricity. It requires that utilities purchase renewably produced electricity from all qualified suppliers. It sets the rate that electric utilities must pay for such power. It sets the rate that electric utilities must pay for such powers. It requires that utilities enter into a standard contract with all renewable energy suppliers for a set term. It establishes for the Public Utilities Commission management and oversight responsibilities. It reserves to the Legislature the power to periodically review and revise the rates and the terms of the standard contract in the public interest.

An Act To Establish the Renewable Energy Resources Program

Be it enacted by the People of the State of Maine as follows:

Sec. 1. 35-A MRSA c. 36 is enacted to read:

CHAPTER 36

RENEWABLE ENERGY RESOURCES

§ 3601. Renewable energy resources

1. Program established. The commission shall by rule establish a renewable energy resources program in order to encourage the rapid and sustainable development of renewable energy resources and technology for environmentally healthy generation of electricity and to decrease the demand for fossil fuel. In establishing the program, the commission shall concentrate on electricity generation that contributes no net carbon additions to the atmosphere.

2. Standards of program. The commission shall establish standards for the interconnection of eligible electric generators with the distribution systems of grid operators; adopt standard contracts for use; establish rates, charges, surcharges and incentives; and establish a program review process for this program as described in this chapter.

§ 3602. Definitions

As used in this chapter, unless the context indicates otherwise, the following terms have the following meanings.

1. Eligible electric generator. "Eligible electric generator" means a system for the generation of electricity that contributes no net carbon additions to the atmosphere, is no greater than 20 megawatts in size, is majority owned by a person or entity that owns less than 20 megawatts of electricity generating capacity in the State and uses the following renewable energy resources in this State:

- A. Solar photovoltaic panels or solar thermal or concentrating solar systems;
- B. Wind power;
- C. Hydroelectric power;
- D. Generators fueled by methane from sewage treatment facilities, landfills or agricultural waste;
- E. Generators fueled by combustion of biomass; and
- F. Tidal power projects.

2. Grid operator. "Grid operator" means an entity that oversees the delivery of electricity by means of an interconnected system.

3. Net carbon addition. "Net carbon addition" means an addition of carbon to the atmospheric carbon cycle that was previously sequestered in a form of fossil fuel or any waste, product or byproduct of a fossil fuel.

4. Renewable energy opportunity county. "Renewable energy opportunity county" means a county where the average weekly wages are at or below the mean average weekly wages for the State as defined by the average of the 10 most recent years of Department of Labor statistics.

5. Utilized public property. "Utilized public property" means:

- A. A building or parking lot owned by the State or a county or municipal government;
- B. A school or school property that obtains the majority of its funding through taxpayer dollars; or
- C. Other property owned by a governmental unit that is not managed as a historic site, public reserved land or state park.

6. Value added. "Value added" means a monetary total of all labor and materials added to a product at each stage prior to sale to a wholesaler or consumer.

§ 3603. Connection to grid operators' distribution system

A grid operator shall connect an eligible electric generator to the existing electricity distribution system within 90 days of a request by an eligible electric generator.

1. Interconnection standards. The commission by rule shall establish reasonable standards for the interconnection of eligible electric generators with the transmission and distribution systems of grid operators. The standards must be consistent with generally accepted industry practices and guidelines and must be established to ensure the reliability of electric service and the safety of customers, grid operators' employees and the general public.

2. Costs. The costs associated with the interconnection must be included in the rates

under section 3605 as long as electric transmission lines already exist at the location of or within 100 feet of the eligible electric generator. If the eligible electric generator is more than 100 feet from existing electric transmission lines, the eligible electric generator bears the cost of interconnection.

3. Fines. A grid operator that fails to connect an eligible electric generator to the grid operator's distribution system is subject to fines of not more than \$100 per day that the grid operator is in violation of this subsection.

§ 3604. Standard contract

The commission shall draft and make available a standard contract, with a duration of not less than 20 years, for electricity purchases by a grid operator from an eligible electric generator.

1. Classes. The contract must set the prices to be paid for each kilowatt-hour generated by each class, as described in section 3605, subsection 1, of eligible electric generator.

2. Deadline. The commission shall adopt rules establishing the terms and conditions for the standard contract no later than January 1, 2010.

3. Contract. On request of an eligible electric generator, a grid operator must enter into a power purchase agreement by the standard contract and at the proper classification to purchase all electricity from that eligible electric generator for a period of not less than 20 years.

4. Transferable. Executed contracts must be site specific and transferable.

§ 3605. Rates and terms

The commission shall set just and reasonable rates, as modified under sections 3603 and 3607, sufficient to provide revenues to operate and to attract necessary capital and investment for eligible electric generators to be paid by electric utilities to eligible electric generators under the standard contract under section 3604.

1. Classes. The rates must establish specific classes of eligible electric generators, both by type of renewable resource used and by amount of annual electrical output, and for specific time periods of the contract's duration.

2. Rates. The commission shall establish rates to provide revenue for the following purposes:

A. To be consistent with the requirements of chapter 3;

B. To pay for current expenses for operating and maintaining the generating system;

C. To provide funding for the usual and regular renewals, replacement and repair of the generating system;

D. To pay the annual principal and interest due of loans for the construction of the generating system;

E. To provide for an annual contribution to a contingency reserve fund up to an amount equal to 25% of the operational budget for the generating system;

F. To pay for the use of existing or new transmission and distribution lines;

G. To make up for the avoided cost, if any, of building or purchasing additional nonrenewable generated electricity;

H. To pay for any and all other reasonable costs and expenses related to generating electricity by the eligible electric generator;

I. To pay a minimum annual return of at least 8% to the eligible electric generator for the first 2 years after January 1, 2010 for all renewable resources except solar power. Thereafter, every 2 years, the commission may reduce the minimum annual return by 1%;

J. To pay a minimum annual return of at least 8% to solar powered generators for the first 2 years after January 1, 2010 for all installations made over existing parking lots in existence for at least 5 years and mounted onto roofs and buildings. Thereafter, every 2 years, the commission may reduce the minimum annual return by 1%; and

K. To pay a reasonable annual return of not more than 4% for the first 2 years after January 1, 2010 to all other eligible solar powered generators. Thereafter, every 2 years, the commission may reduce the minimum annual return by 1%.

3. Incentives. The commission shall include the following incentives in each class.

A. An eligible electric generator certified with at least 70% of the value added in the State, exclusive of installation costs, must receive a 5% premium in addition to the rates under section 3605. This incentive must be paid in addition to all other incentives included in this section.

B. Any eligible electric generator, with at least 50% value added in a renewable energy opportunity county, must receive a 5% premium in addition to the rates under section 3605. This incentive must be paid in addition to all other incentives included in this section.

C. An eligible electric generator that is installed on utilized public property must receive a 5% premium in addition to the rates under section 3605 if the net income generated from such production is used for governmental purposes and can be demonstrated to have reduced taxes. This incentive must be paid in addition to all other incentives included in this section.

D. An eligible electric generator that uses naturally produced methane from manure, decaying biomass or from landfills must receive a 5% premium in addition to the rates under section 3605. This incentive must be paid in addition to all other incentives included in this section.

4. Proceeding. The commission shall adopt rules by July 1, 2010 for the design of the rates under this section.

§ 3606. Surcharge

The commission shall, after notice and hearing, biannually establish a renewable energy factor that must be a nonbypassable surcharge payable by every customer of a grid operator. The surcharge must be payable by all customer classes. The commission shall set the surcharge at a level sufficient to pay the costs of electricity purchased under section 3605 and any interconnection costs under section 3603. For the purpose of this section, "nonbypassable surcharge" means charges applied to all customer billings in a given region whether they receive service from a local utility or from a competitive supplier. These charges include transition charges, access charges, regional levies and taxes.

§ 3607. Review

The commission shall review the rates established in section 3605 by January 1st and once every 2 years thereafter and adjust those rates for new contracts as necessary to account for inflation, assist in the profitable development of eligible electric generators, prevent excessive profits for eligible electric generators and prevent unnecessary costs to ratepayers. The commission shall reduce the rates in section 3605 to reflect any federal or state subsidies, tax credits or other incentives that an eligible electric generator may receive.

§ 3608. Report

By January 1, 2010, January 1, 2011 and once every 4 years thereafter, the commission shall file a report with the Governor and Legislature that must include the following:

1. Kilowatt hours. The kilowatt-hours of electricity purchased from eligible electric generators;

2. Number. The number of new eligible electric generators in the State and the environmental effects of the addition of those generators;

3. Recommendations. Recommendations from the public or the commission for legislation and changes to the rates and the terms of the standard contract in the public interest; and

4. Actions. Actions taken by the commission to implement this chapter.

Eligible electric generators shall, upon request, provide the commission any information that may be relevant to the commission performing its duties under this chapter.

§ 3609. Rules

The commission shall adopt rules to implement this chapter. Rules adopted under this section are routine technical rules as defined in Title 5, chapter 375, subchapter 2-A.