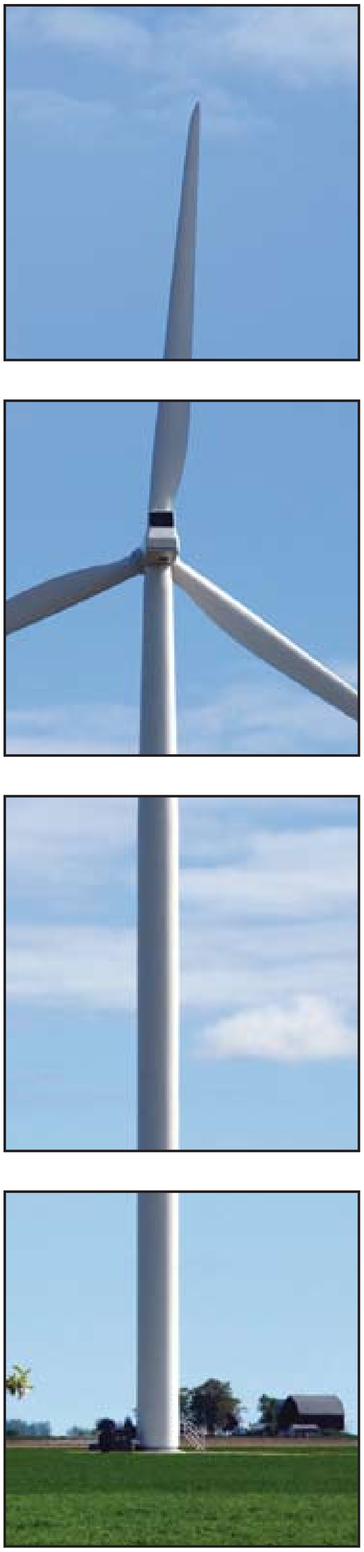
MICHIGAN ELECTRIC
COOPERATIVE ASSOCIATION



FEED-IN TARIFFS

ARE THEY RIGHT FOR MICHIGAN?

Richard A. Barclay Ph.D.

July 2009

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MICHIGAN'S ELECTRIC COOPERATIVES

In 1935, President Roosevelt created the Rural Electrification Administration (REA). Congress passed the Rural Electrification Act, which authorized REA to provide low-interest loans in order to speed electrification in rural areas. Widespread rural electrification began only when farmers and other rural residents formed electric cooperatives.

Electric cooperatives provide reliable power to half of Michigan

Today, nine distribution cooperatives provide power to more than 650,000 Michigan citizens in rural areas covering all or part of 59 counties—about half of the state's land area. As a group, Michigan electric cooperatives provide the best continuity of service in the state, based on a study by the Michigan Public Service Commission.

Electric cooperatives work together for their members

High quality service at reasonable prices is the goal of each co-op. Although each member-owned electric co-op is unique, they share important features:

- *Earnings are returned to the members.*
  Since co-ops are not-for-profit, any earnings in excess of operating expenses are returned to the members and/or invested in the co-op according to the co-op's bylaws.
- *Co-ops are controlled by their members.*
  Each member has one vote in cooperative elections. Board members are chosen from the co-op's membership and are responsible for hiring the manager and setting policy.

Four of the nine distribution co-ops and Wolverine Power Marketing Cooperative, an Alternative Energy Supplier, own Wolverine Power Supply Cooperative, which is a Generation and Transmission cooperative providing wholesale electricity to its members.

Michigan Electric Cooperative Association

All eleven co-ops are members of the Michigan Electric Cooperative Association (MECA), through which they:

- Communicate and advocate electric cooperative needs and concerns to national and state governments;
- Publish *Michigan Country Lines* magazine, which provides members with information about their co-op and other members;
- Conduct safety and job training programs for employees;
- Operate an Emergency Assistance Plan, enabling co-ops to share resources and personnel to get power restored quickly following major outages;
- Sponsor youth programs, such as Michigan Electric Cooperative Teen Days, and a Washington, D.C., Youth Tour.

MECA is located at:

Michigan Electric Cooperative Association
2859 W. Jolly Road
Okemos MI 48864

517-351-6322 (office)
517-351-6396 (fax)

DISCLAIMER

This White Paper was prepared by Richard A. Barclay, Director of Research and Policy Development at the Michigan Electric Cooperative Association. He alone is responsible for its content. It is not intended to represent nor imply the position of the Michigan Electric Cooperative Association or any of its members on the issue of feed-in tariffs. The author can be contacted at rbarclay@countrylines.com or 517-351-6322, extension 210.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Feed-in tariffs (FITs) are guaranteed minimum prices established by the government and paid by utilities to generators of electricity from renewable energy sources (RES) for a guaranteed minimum number of years. FITs are intended to dramatically increase the amount of electricity produced from RES and create green jobs. They are not to be confused with net metering or Community-Based Energy Development (C-BED) to which they are similar.

Feed-in tariffs have been adopted in almost all European countries. Germany enacted FITs in 1991. They are often described in terms like "stunning success." There is no question that FITs in Germany have achieved their objective. Germany is a world leader in both wind and solar production of electricity, as well as in the manufacture and export of their components. Why not adopt them in Michigan, too?

BACKGROUND

Feed-in tariffs typically have the following characteristics:

- Utilities are required to purchase all the electricity produced by the generators eligible for a FIT at a fixed price every year under a specified contract, usually 20 years.
- The FIT rates decline by some percentage following the first year in which they are established to reflect assumed improvements in RES technological efficiency and to reward early entrants. So, generators who contract in year one the policy is established get higher FIT rates than those who contract in year two, and so on.
- There are different rates for different types of RES reflecting underlining cost. That is, FITs for wind are generally lower than for solar photovoltaic (PV).
- Smaller capacity RES have higher rates than larger capacity RES, reflecting the diseconomies of scale of small facilities; they need larger incentives to be viable.
- The utility is required to connect the RES to the grid and absorb the connection costs.

FIT prices are usually established in law. FIT prices can be as low as four and as high as thirteen times regular prices. They are determined by politics, not by market economics. In a traditional rate case, rates are designed to create a price that is an approximation of a competitive market price determined by an experienced impartial commission after the costs of generation are known. Feed-in tariffs are determined by inexperienced politicians before the costs of generation are known.

They are intended to push development to diseconomies of size and push renewable energy development to locations where it is less economical. Proponents justify this as 'fairness;' calling it "leveling the playing field," reducing "cost inequities," and "market democratization."

The principal rationale for feed-in tariffs is to jump start as much RES electricity generation as possible. Generally there are no caps on the total amount generated. If the FIT payments are set too low, then little new RES development will result. And if set too high, the FIT may provide unwarranted profits to developers.

European electricity markets are very different than in North America so comparisons can be misleading.

- Electricity markets are competitive. In Germany rates are not regulated.
- The European Union has a cap-and-trade system of regulation on generators along with a carbon market. The price of a carbon credit certificate is the competitive market cost of the social/environmental externalities of traditional generation. In 2006, the cost of the German FIT for solar PV was 30 times the average price of a carbon credit certificate.
- Average electricity price/kilowatt hour in the U. S. is $0.106, $0.165 in Spain, and $0.222 in Germany.

German green job growth statistics quoted by FIT advocates sound enviable, but are often misleading or out of context. Advocates point to 134,000 green job growth between 2004 and 2007. But, German federal agencies report that only 57% of the growth was due to FITs. If one subtracts the jobs lost due to the FIT, it was roughly 32%, or 67-78,000 jobs in a labor force of 43,600,000. Green jobs in Germany account for less than 2% of the industrial labor force, after 18 years with feed-in tariffs. German government reports suggest that the net green job gains will be positive only insofar as the country remains a net technology exporter. Thus, the net effect on job creation can easily be negative.

Spain ranks second in solar- and third in wind-produced electricity in the world, with current plans for an additional 14,000,000 kilowatts of solar energy, the equivalent of nine nuclear plants. But, Spain is suffering from mismanaging its electricity markets, due in part to the subsidies represented by their FITs. Spanish electric utilities are not allowed to charge prices that cover all their costs, so consumers do not bear the full cost of the FITs. Nevertheless, 42% of a consumer's bill represents the FIT (roughly $127 per person). The rest of the FIT cost is rolled into the current "tariff deficit" of around $25 billion. In response, the government recently announced consumer electricity price increases of as much as 20% over the next three years. And, up to 40,000 green jobs could be lost in 2009 due to government changes in their FIT prices.

As one solar energy advocate in California put it:

> There is nothing particularly magical about a feed-in tariff as a policy model. The main driver in supercharging markets is the amount of money thrown at it, not the structure of the policy instrument. If you want to replicate Germany's growth, don't get caught up in replicating their model. Replicate their budget.

STRENGTHS OF FEED-IN TARIFFS

1. Guaranteed prices that cover all the investment costs plus a reasonable profit make renewable energy investments stable and predictable. In order to maintain the stability and predictability that creates the financial incentive to developers, one does not want to revise the FIT rates frequently.

2. Encourages development of renewable energy less expensively than a renewable portfolio standard since there is less investor risk and less associated transactions costs.
3. Stimulates 'green jobs' in the manufacturing of RES components.
4. More equitable than other policies allowing everyone to profit from RES.

WEAKNESSES OF FEED-IN TARIFFS

1. Not economically efficient since they push development to diseconomies of scale and location.
2. Complex political price fixing for different technologies, applications, size, regions, and resource intensities. Statutory prices cannot change to rapidly changing markets, federal laws, and technologies.
3. There are equity issues since feed-in tariffs favor wealthier people over poorer people. This occurs because lower-income households spend a larger fraction of their income than wealthier households do and energy accounts for a bigger share of their spending.
4. Encourages relocation or shut-down of electricity intensive industries. Consequently, in Germany energy-intensive manufacturing can apply to take less RES electricity and pay about half the FIT.
5. Do not include interconnection costs to the grid.
6. May not co-exist with renewable portfolio standards. Most European countries have chosen to use feed-in tariffs rather than renewable portfolio standards.

POTENTIAL IMPACTS ON MICHIGAN

Michigan is implementing a renewable portfolio standard (RPS) policy. A RPS policy focuses on setting quotas of production, while a FIT policy focuses on setting the price of production. It is not clear how there could be flexibility or market force corrections if both production and price are set by government mandate.

A FIT can make the RPS more expensive. House Bill 4137 of 2009, which would create feed-in tariff in Michigan, has an average FIT price for wind of $0.11. The current Midwest Independent Transmission System Operator (MISO) market price for wind is 6-8 cents, a price that has created a queue of 60,000,000 kilowatts of capacity waiting for a license to be connected to the grid.

Proponents argue that FITs allow all citizens to participate in renewable electricity generation. How many Michigan citizens can currently afford the high cost of installing residentially-based renewable energy sources?

In 2007 23-36% of residential cooperative members met the definition for low income used in Public Act 295 of 2008 which created the state's RPS. Half the Michigan population made $48,000 or less. How many households are likely to finance the investment of a $30,000 solar PV project which would provide only one third of their electricity?

Many advocate that by 2020 the state require that 20% of the electricity used come from renewable sources. If this were done using the feed-in tariffs in House Bill 4137 and Germany's goals for 2020, electric cooperative members' annual costs could increase by nearly 50%.

Indeed, using current German results and House Bill 4137 prices only two of the ten most electricity intensive electric cooperative members had additional annual costs of less than $100,000.

Interpolating from German statistics, Michigan FITs might create 4,500 green jobs at most, not accounting for jobs lost and assuming all the RES parts were manufactured in Michigan. In Michigan, the growth in all jobs in the renewable energy sector has been 30% since 2005. A recent report stated that over 109,000 green jobs had been created in Michigan, 2,500 since 2005 alone. Total green jobs already account for 3% of the labor force. That makes Michigan's record without a FIT about the same as Germany's.

Since Michigan cooperatives primarily serve rural areas with little commercial and industrial development, and unemployment typically is above the state's average, the negative impacts of FITs would be out of proportion to the positive impacts. Indeed, they could be crippling to current and future economic development.

INTRODUCTION

Michigan is suffering from the longest recession in its history and leads the United States in unemployment at nearly 13%. Since 2000, Michigan has lost almost half a million jobs.[1] Since 2002, Michigan has lost 19% of its manufacturing jobs, 17% of its construction jobs, 12% of its natural resources and mining jobs, and 11% of its information jobs.[2]

It is not surprising that state policy makers are desperate to find a mechanism to stimulate new job creation. An old policy idea has recently become a hot topic in Lansing; *feed-in tariffs*. Advocates argue that feed-in tariffs would not only create 'green jobs,' but also would encourage local development and ownership of small-scale renewable energy sources in all areas of the state.

Over the last few years, 38 states, including Michigan, have adopted renewable portfolio standards in large measure to stimulate the development of renewable energy sources (RES),[a] to reduce CO2 emissions, and to stimulate creation of green jobs. Why not add feed-in tariffs, too?

A feed-in tariff (FIT) is a term of art that means a guaranteed minimum price established by government policy paid by utilities to generators of electricity from RES for a guaranteed minimum number of years, under "standard offer contracts."

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The "stunning success" of the German experience with FITs is often highlighted as an example of their job simulative success; where there has been "a staggering increase in renewable energy production as well as jobs and industry" and where they have created nearly a quarter of a million jobs in the renewable energy industries.[3]

Despite the creative use by feed-in tariff advocates of economic euphemisms, FITs are not a market-oriented strategy. Advocates often claim that feed-in tariffs reflect "competitive rates"[4] since the increase in supply leads to overall lower rates over time. But in Denmark, they found that the subsidies far exceeded the savings in lower prices.[5] They are political price fixing to achieve political goals.

The underlining political goals typically are:[6]

- Simplicity, "no need negotiating with utilities, partnering with tax-credit hungry investors, or uncertainties about Congress."
- Stability, which means a guaranteed rate of return to investors with little market risk.
- Fairness, "it removes the barriers to participation," allowing people "with little or no tax liability or non-taxable entities" to pursue energy projects.

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[a] Renewable energy sources include biomass, geothermal, hydro, landfill gas, solar photovoltaic, and wind. In this paper only solar photovoltaic and wind are discussed since they are the renewable energy sources most frequently emphasized by advocates of feed-in tariffs.

What this really means is that it is bad to allow utilities and large scale renewable energy source developers to dominate renewable energy markets. It means it is good for prices to be set high enough by politicians to ensure that small non-economically viable projects will be built. It means it is good for everyone to own renewable energy sources if they want to, with no financial risk. Indeed, experiences in Europe suggest that where the FIT incentives do not meet these goals, the response is to raise the incentives until they do.

Where feed-in tariffs have been enacted, they are given credit primarily for stimulating biomass and wind energy production. They have had very little success stimulating significant solar energy production. Germany and Spain have had huge percentage increases in solar energy production, but solar accounts for less than 1% in both countries after 15 years of FIT subsidies.

In the United States, wind power generation has grown dramatically, while solar energy generation has struggled, just like in the rest of the world. In fact, it is hard to imagine that the growth rate in wind energy production could be increased from its current rate.

> This trend is illustrated by the numbers: as the U.S. economy hemorrhaged jobs in 2008, the wind industry enjoyed 70% job growth—growth that supported a 60% surge in new wind capacity installation over 2007. The wind industry installed 8,358 MW [megawatts] last year, which accounted for roughly 40% of all new electricity capacity. This incredible growth led to the addition of around 35,000 new jobs, creating a total of 85,000 people now employed in the wind industry.[7]

Indeed, wind energy production in Michigan "grew at the fastest clip" of any state in the country.[8,9] It also has more than 35 companies supplying components or services to the wind energy industry.[10] In May 2009, Global Wind Systems Inc. in Novi, Michigan, will be hiring 250 for wind turbine manufacturing.[11]

In Europe, the green job growth statistics quoted by FIT advocates are initially enviable, but often misleading or out of context.

And, recently, Michigan Gov. Jennifer Granholm spoke at the opening of a new wind turbine manufacturing plant that is expected to create 120 jobs, saying it was "truly power to the people, by the people, for the people."[12]

In Europe, the green job growth statistics quoted by FIT advocates are initially enviable, but often misleading or out of context.[13,14]

> Our review of the claims of green jobs proponents, however, leaves us skeptical because the green jobs literature is rife with internal contradictions, vague terminology, dubious science, and ignorance of basic economic principles. Indeed, the green jobs literature claims resemble the promises of long-term financial prosperity offered by Ponzi schemes.[15]

FIT advocates point to 249,000 green jobs in Germany, which is only part of the story: by the reckoning of several German federal agencies charged with assessing their feed-in tariff impacts, only 57% of the green job growth between 2004 and 2007 were due to the FIT, and if one subtracts the jobs lost due to the FIT, it is roughly 32%; that is, 67-78,000 jobs in a labor force of 43,600,000.[16] Total green jobs in Germany account for about 0.6% of the labor force and less than 2% of the industrial labor force, after 18 years with feed-in tariffs.[17]

In Michigan, the growth in all jobs in the renewable energy sector has been 30% since 2005.[18] Governor Granholm recently stated that over 109,000 green jobs had been created in Michigan, 2,500 since 2005 alone.[19,20] In Michigan, total green jobs already account for 3% of the labor force.[21] That makes Michigan's record without a FIT about the same as Germany's.

Michigan FITs might be able to create 1,500 green jobs at most; assuming that all the green jobs stimulated by a feed-in tariff were stimulated in Michigan.

Finally, Michigan has just embarked on the implementation of a renewable portfolio standard which the Governor said has "the potential to create more than 30,000 new jobs in wind turbine manufacturing alone."[22] Extrapolating from the data in German reports, Michigan FITs might be able to create 4,500 green jobs at most; assuming that all the green jobs stimulated by a feed-in tariff were stimulated in Michigan and not in the states where "of the top 10 global suppliers [of wind turbines] in 2007, seven—Vestas, GE, Gamesa, Suzlon, Siemens, Acciona, and Nordex—have [created] an American manufacturing presence" since 2005.[23]

Feed-in tariffs are most likely not compatible with renewable portfolio standards.

More importantly, feed-in tariffs are most likely not compatible with renewable portfolio standards. Renewable portfolio standards mandate the quantity of renewable energy utilities must supply to retail customers in aggregate. But, how that happens is still left to market mechanisms. Feed-in tariffs set the prices utilities must pay for all the renewable energy that is not produced by the utilities themselves. And, they must always purchase all this energy whenever it is produced, before using energy from any other source.[24] It is hard to imagine how any market would operate in an environment where the government requires utilities to use a minimum amount of renewable energy and at the same time requires them to purchase all the renewable energy produced at higher-than-market fixed prices.

Feed-in Tariffs can very easily be like cheap mortgages. Subprime mortgage rates were encouraged by Congress to encourage home ownership for everyone. 'Super-prime prices' for renewable energy development can lead to a similar result; it's too much of a good thing.[25]

To paraphrase the attorney for a 30-year old California "utility watchdog" organization, feed-in tariffs may be right for Germany, but they are wrong for Michigan.[26]

BACKGROUND

A feed-in tariff is a term of art that means a guaranteed minimum price established by government policy paid by utilities to generators of electricity from renewable energy sources for a guaranteed minimum number of years. Proponents sometimes refer to them as "PURPA[b] on steroids." It is common for government policy to call feed-in tariffs Advanced Renewable Tariffs, or ARTs.

WHAT IS A FEED-IN TARIFF?

Feed-in tariffs (FITs) are not new. Germany created its first FIT in 1991, and Spain in 1994. Both countries are often cited as FIT success stories and examples.

FIT rates are frequently four times higher than the price paid by a utility for other purchased power.

Utilities are required to purchase power at the feed-in tariff rate under government-designed contracts. FIT rates are frequently four times higher than the price paid by a utility for other purchased power. As such, they are designed to encourage the installation of non-utility-owned and non-commercial-scale renewable energy sources (RES) generation.[27]

They are distinguished from net metering inasmuch as net metering describes the practice where the generator uses the renewable energy source to provide its own electricity and only sells any surplus back to the grid. Under a FIT, the generator is required to sell all of the electricity produced back to the grid.

FITs are also different from Community-Based Energy Development (C-BED). A C-BED program encourages a consortium of locally based entities, such as famers, small businesses, local government, etc., to develop a small, commercially sized RES. Typically utilities are required to purchase the power under a special tariff design, rather than specific rates, that guarantee the viability of the project. Contracts are negotiated.

FIT rates are politically mandated prices as opposed to prices established by a market, or by a traditional state utility commission cost of service rate case.

COMMON CHARACTERISTICS OF FEED-IN TARIFFS[c]

FIT rates are politically mandated prices as opposed to prices established by a market, or by a traditional state utility commission cost of service rate case. Usually they are established in law. While they are very complicated, "successful" feed-in tariffs typically have the following characteristics:[28]

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[b] The Public Utility Regulatory Policies Act was passed by the U.S. Congress in 1978 as part of the National Energy Act, in order promote greater use of renewable energy. This law created a market for non-utility electric power producers forcing electric utilities to buy power from these producers at the "avoided cost" rate, which was the cost the electric utility would incur were it to generate or purchase from another source.

[c] For an in-depth discussion of Feed-in Tariff designs in Europe, see Arne Klein, Benjamin Pfluger, Anne Held, Mario Ragwitz (Fraunhofer ISI), Gustav Resch, Thomas Faber (EEG), *Evaluation of different feed-in tariff design options – Best practice paper for the International Feed-In Cooperation 2nd edition,* Fraunhofer Institut für Systemtechnik und Innovationsforschung, December 2006, http://www.feed-in-cooperation.org/images/files/best_practice_paper_2nd_edition_final.pdf

- Utilities are required to purchase the power and provide the FIT rate under a specified contract, called a "standard offer contract," which usually is for no less than 20 years, although some policies allow 10-15 year minimums. The FIT rate is fixed at the same price per kilowatt hour every year and guaranteed for the contract period.
- The FIT rate schedules decline by some percentage following the first year in which they are established, called "tariff digression." This is to reflect assumed increases in each RES' improvements in technological efficiency and to reward early entrants. So, generators who contract in the first year the policy is established get higher FIT rates than those who contract in year two, and so on.
- There are different rates for different types of RES reflecting underlining cost. That is, FITs for wind are generally lower than for solar photovoltaic (PV). (See Table 1, next pg.)
- There are different rates for RES located in different geographic locations, and/or on the ground versus located on a building. (See Table 1)
- Larger capacity RES have lower rates than smaller capacity RES, reflecting the diseconomies of scale of small facilities: the need for larger incentives for smaller facilities to be financially viable. (See Table 1)
- The utility is required to connect the RES to the grid and absorb the connection costs.

HOW DO YOU SET THE RIGHT PRICE?

Feed-in tariffs set prices rather than setting quotas of production, such as cap-and-trade or renewable portfolio standards policies do. It is "political control of the markets."[29]

Setting the right prices requires carefully and exactly determining the correct level of compensating the RES generators so that it is not too high.

> On the other hand, if not properly designed, FITs can be economically inefficient, as is widely regarded to have been the case under the Public Utility Regulatory Policies Act of 1978 (PURPA). Under PURPA, too high a guaranteed price led to the creation of so-called "PURPA machines"--poorly performing generating units that could survive financially only because of heavy subsidies that came at the expense of retail customers.[30]

In order to set all the prices correctly, a comprehensive analysis of all costs of all the variables associated with the different technologies, applications, sizes, regions, and resource intensities, must be accomplished.

Detailed analysis is required to properly set the payment level at the outset.

As with most policies, the FIT policy has some notable challenges. The first is the up-front administrative requirement: Detailed analysis is required to properly set the payment level at the outset. The payment level must ensure revenues will be adequate to cover project costs. If the FIT payments are set too low,

Table 1.
Current tariff structure of the German Renewable Energy Law from August 2004

Renewable energy source		Range of performance	Feed-in tariff in €/MWh				Degression[3]
Solar			installed on buildings	integrated in the façade of buildings	all other systems		5% 6.5% from 2006 in "all other systems"
		<30 kW	574	624	457		
		30 kW-100 kW	546	596			
		>100 kW	540	590			
Biomass			general	renewable resources	CHP	Used wood 1.7.2006	1.5%
		< 150 kW	115	175	135		
		150 -500 kW	99	159	119		
		500 kW - 5 MW	89	129 (114 for wood)	109	39	
		5 MW - 20 MW	84	84	104		
Hydro	large	< 500kW	77				1%
		500kW - 10MW	66				
		10MW - 20MW	61				
		20MW - 50MW	46				
		50MW – 150MW	37				
	small	500 kW	97				-
		5 MW	66				
Geothermal		5 MW	150				1% starting in 2010
		10 MW	140				
		20 MW	90				
		>20 MW	72				
Wind	off-shore		installed before 31.12.2010 for 12 years	installed after 31.12.2010 and after 12 years			2% after 2008
			91	619			
	on-shore		for at least 5 years after installation	after, time depending on yield of system			2%
			87	55			
Landfill gas, sewage gas, Mine gas				using specific innovative technologies			1.5%
		500 kW	77	96			
		500 kW - 5 MW	66	86			
		> 5 MW	Market price is paid for the capacity above 5 MW				

Source: *Dr. Mario Ragwitz, Dr. Claus Huber, Feed-In Systems in Germany and Spain and a comparison,* Fraunhofer Institut für Systemtechnik und Innovationsforschung then little new [renewable energy] development will result. And if set too high, the FIT may provide unwarranted profits to developers. To achieve the right balance across a wide range of technologies and project sizes, many levels of differentiation are used. However, if the FIT policy is too complex with too many bonuses, exemptions, and qualifications, it may hinder program implementation. And as costs change and markets shift due to technological innovation and increasing market maturity, the FIT policy needs periodic revision to reflect evolving costs and market conditions.[31]

SHOULD THE PRICE BE BASED UPON AVOIDED COST OR COST OF GENERATION?

The first choice is between paying RES generators based upon the avoided cost to utilities of getting the electricity from traditional sources and external social and environmental costs, or paying the RES generator based upon their cost of generation.[32] Some of the early European models used the avoided-cost approach, but found it did not work well (was not a big enough incentive), so most FITs today are tied to the RES cost of generation, plus some profit margin for the owners of the RES.[33]

COST OF RENEWABLE ENERGY SOURCE GENERATION

In a traditional rate case, rates are determined by an experienced impartial commission after the costs of generation are known.

Determining a schedule of rates based upon estimated costs of RES production is political price-fixing[34] that differs significantly from traditional rate-making. In a traditional rate case, rates are determined by an experienced impartial commission after the costs of generation are known. With feed-in tariffs, rates are determined by inexperienced politicians before the costs of generation are known.

The following factors influence the RES power generation costs and therefore should be taken into account when the feed-in tariff rate levels are determined for each technology, for each size, and at each location:[35]

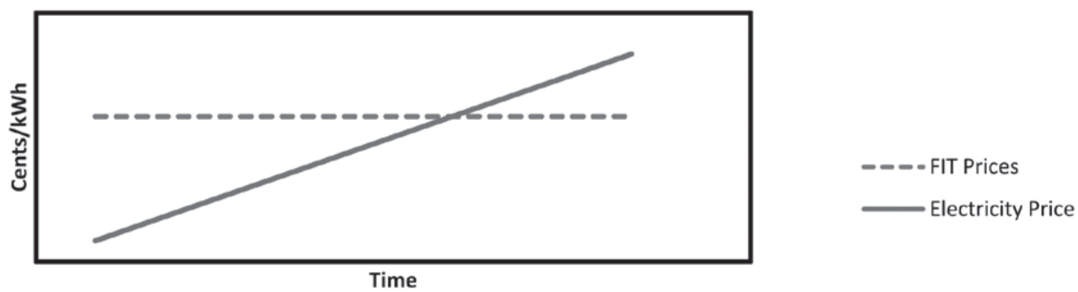
1. Investment for the plant
2. Other costs related to the project, such as expenses for licensing procedures
3. Operation and maintenance (O&M) costs
4. Fuel costs (in the case of biomass and biogas)
5. Inflation
6. Interest rates for the invested capital
7. Profit margins for investors.

SHOULD THE RATES BE A FIXED PRICE PREMIUM OR A VARIABLE PREMIUM ON PRICE?

Having determined a levelized cost of production for each of the RES generating technologies, one needs to decide if the rate will constitute a fixed rate, regardless of the average competitive market price, or will fluctuate in tandem with the competitive spot market rate. In either case, the FIT represents a premium above the market price to ensure the RES generator can recoup all of the seven items listed above. Most countries with FIT policies choose the fixed-price approach.[36]

The following two figures show the difference between fixed premium rate and a variable premium rate.[d]

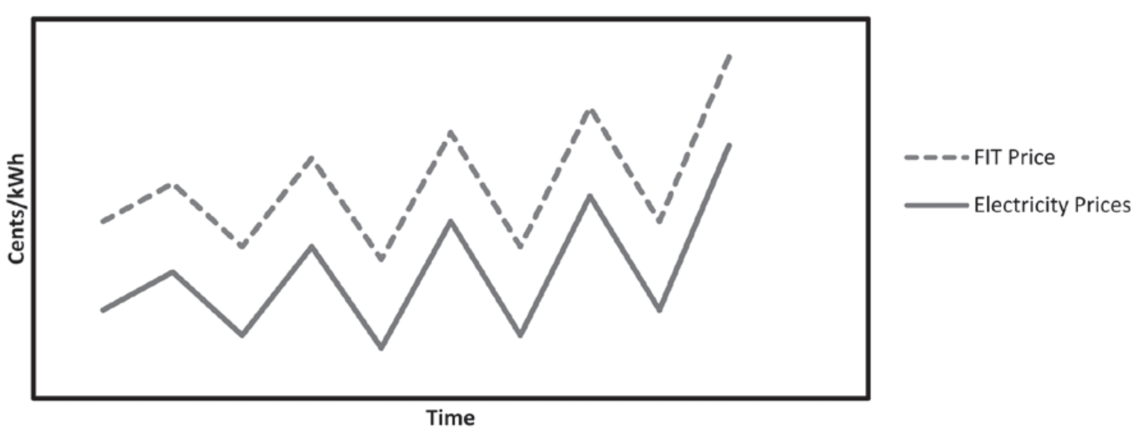
Figure 1. Fixed-price FIT Model



The fixed premium price model is based on average prices and assumes that, at some point in the future, the rising cost of traditional sources of electricity generation will drive the premium to zero, at which point the RES generation reaches price parity with, or even below, the market price of traditional sources of generation..

Under the variable premium price model, the RES generator is tied to the competitive spot market price where the RES generator is guaranteed a price that is some premium above the prevailing spot market. In Figure 2, the area between the FIT Prices and the Electricity Price is equal to the premium amount.

Figure 2. Variable Premium-price FIT Model



[d] The figures are reproduced from Karlynn Cory, Toby Couture, and Claire Kreycik, *Feed-in Tariff Policy: Design, Implementation, and RPS Policy Interactions*, http://www.nrel.gov/docs/fy09osti/45549.pdf

The presumed policy benefits of guaranteeing this premium are:

> This premium should reflect the social and ecological benefits of renewable energy sources, allow an adequate return on generating installations in special regimes and reduce the uncertainty regarding the economic viability of generation projects using renewable energy sources.[37]

SHOULD THERE BE A CAP ON ELECTRICITY PRODUCTION FROM FEED-IN TARIFFS?

The FIT policy makers must decide if they will cap the total amount of RES electricity that will be eligible for the FIT rates, or if they will require utilities to take all the RES generation that is created by the premium pricing.

Since the principal rationale for creating feed-in tariffs is to jump start as much RES electricity as possible, generally there is no cap. Clearly, this can lead to very high costs to consumers if the FIT price is too high and causes too much RES development.

Putting a cap on the total amount of megawatt hours of production that can be installed under the policy is a means of mitigating the total subsidy costs, and/or as a hedge in case the FIT rates are too high. Unfortunately, this can also have unintended consequences. Spain capped their FIT production to the first 400 megawatts of capacity annually. The solar FIT was so attractive companies rushed to get in on the deal and purchased 1,700,000 kilowatts of solar panels. When the Spanish policy makers saw the overwhelming response they reduced the FIT subsidies, only to leave developers with surplus panels they cannot hope to use.[38]

EXPERIENCE WITH FEED-IN TARIFFS

The electricity markets in Europe are so very different from electricity markets in North America that comparisons can be very misleading. In Germany, electricity markets are competitive inasmuch as consumers can pick from whom they purchase electricity and traditional-type rates are not regulated. Non-residential users negotiate their individual rates. Residential users cannot negotiate their rates, but they can switch suppliers.

Secondly, the European Union has a cap-and-trade system of regulation on generators along with a carbon market that effectively puts a competitive market price on the detrimental environmental aspects of coal-fired generation, the same environmental aspects that are supposed to be largely eliminated with RES generation. That is, the carbon market price reflects the economic value of the environmental mitigation.

Most European countries have chosen to use feed-in tariffs rather than renewable portfolio standards.

Third, most European countries have chosen to use feed-in tariffs rather than renewable portfolio standards, which are considered opposing policy options, to achieve the elimination of the negative environmental externalities of traditional generation.

Finally, the components of the final consumer price are very different. In Europe the cost of generation is usually less than half the final cost.[39] In Germany the FIT premium is one of eight separate charges and taxes represent over 20% of the bill.[40] In Michigan, generation costs are around 70% of the final cost and taxes are about 4-4.5%.

All of these differences lead to household electricity prices that are significantly higher in Europe. For example, electricity price per kilowatt hour in the United States on average is $0.106, compared to $0.165 in Spain, and $0.222 in Germany.[41]

Since the electricity markets in Europe are so different from those in North America, reliable 'apples-to-apples' comparisons due to FITs are difficult to make. For example a price change due to a FIT might result in a small percentage increase in the bill in Europe, but would result in a much larger percentage increase in the bill in North America.

THE FEED-IN TARIFF EXPERIENCE IN GERMANY

The German experience is the most often cited example of the success of feed-in tariffs.

In 1991, Germany created the Electric Feed Law, which was "hardly effective" in promoting any RES other than wind, leading to major changes enacted in the Renewables Energy Law (EEG) in 2000.[42] Significant changes were again made in 2004, primarily to deal with grid integration issues, and revised FITs due to the changing costs of RES technologies.[43]

One of the principal motivations in Germany for creating FITs was to increase the number of generators.[44] The 'competitive market' only applies to the ability of consumers to pick their supplier. Since there are only four traditional suppliers, the unregulated market prices are not seen as 'competitive prices.' To achieve 'real competition' requires more suppliers.

There is no question that the FIT in Germany has achieved its policy objective of stimulating RES generation, making Germany a world leader in both wind and solar production of electricity, as well as in the manufacture and export of wind and solar components.

There is no question that the FIT in Germany has achieved its policy objective of stimulating RES generation, making Germany a world leader in both wind and solar production of electricity, as well as in the manufacture and export of wind and solar components. However, since wind has been installed in almost all available sites, there is not much prospect for installing new capacity.[45]

But this has come at a significant increase in the cost of electricity to consumers. From 2000 to 2007, the cost of generation, transmission, and marketing increased 42%. The cost of the FIT premium increased 407%.[46] In 2006, the cost of the FITs for solar was "30 times the average price of a carbon credit certificate…."[47] Since the price of a carbon credit certificate is the competitive market cost of the negative environmental externalities of traditional generation, this means that paying the solar FIT to get electricity generated without those externalities is 30 times higher than the social cost of those externalities.

As one solar energy advocate in California put it:

> There is nothing particularly magical about a feed-in tariff as a policy model. The main driver in supercharging markets is the amount of money thrown at it, not the structure of the policy instrument. If you want to replicate Germany's growth, don't get caught up in replicating their model. Replicate their budget. [48]

Indeed, one of the reasons the German experience is considered especially successful is not due to the new RES generation itself, but rather due to the stimulation of the related RES jobs created.[49] What is ignored is what might otherwise have been done with the same resources devoted to RES, and what has been lost with the misdirection of resources.[50,51]

> Moreover, most of these 'green jobs' were transitory, anyhow, mostly connected with construction, not operation. A study funded by the German Environment Ministry shows the net effect on job creation—the number of green jobs created minus the number of jobs lost because of higher energy prices—can be positive only insofar as the country remains a net technology exporter. Thus, the net effect on net European job creation can easily be negative.[52,53]

Finally, despite the unquestionable success of feed-in tariffs to stimulate electricity generation from RES, it has not obviated the need for more coal-fired generation.

Finally, despite the unquestionable success of feed-in tariffs to stimulate electricity generation from RES, it has not obviated the need for more coal-fired generation. In 2007 "solar still generates just 0.6 percent of Germany's total electricity, compared with 6.4 percent for wind."[54] In early 2007, "up to 26 coal-fired power plants … are either being built right now or are in the planning stages in Germany."[55] One year later, "about 60 new coal-fired power stations [were being] planned."[56] At least 14 new coal plants with a capacity of 14,000,000 kilowatts are scheduled to go online in 2012.[57]

THE FEED-IN TARIFF EXPERIENCE IN SPAIN [e]

Spain offers a good example of not only the upside of FITs, but also their downside.

Spain offers a good example of not only the upside of FITs, but also their downside. Spain ranks second in solar- and third in wind-produced electricity in the world. Spain is "the world's biggest builder of solar-energy plants" with current plans for an additional 14,000,000 kilowatts of solar energy, the equivalent of nine nuclear plants.[58]

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[e] For in depth discussion of the Spanish experience see Gabriel Calzada Álvarez, Raquel Merino Jara, Juan Ramón Rallo Julián, *Study of the effects on employment of public aid to renewable energy sources*, Universidad Rey Juan Carlos, March 2009, http://www.juandemariana.org/pdf/090327-employment-public-aid-renewable.pdf

The current FIT in Spain can be as high as 10 times the cost of coal production.[59] The problem with finding the right FIT rate, leading to the solar panel glut, has already been mentioned above. In addition:

> These schemes create serious "bubble" potential, as Spain is now discovering. The most paradigmatic bubble case can be found in the photovoltaic industry. Even with subsidy schemes leaving the mean sale price of electricity generated from solar photovoltaic power 7 times higher than the mean price of the pool, solar failed even to reach 1% of Spain's total electricity production in 2008.[60]

One of the principal arguments made in favor of instituting FITs is their impact on creating new 'green jobs,' both jobs associated with the construction and operation of the RES themselves, and the jobs created in the RES component-related industries. Impressive statistics are often quoted.[61] However, these sources often only tell one side of the story. Recently, BP closed a solar-cell factory in Madrid and laid-off 480 workers.[62]

> Spain, meanwhile, faces the prospect of government-induced 'green' unemployment. Spain's renewable energy sector expanded very quickly due to large government incentives - which the government has since realized are unsustainable, so the industry is now cutting back. While Spanish taxpayers and consumers will pay higher bills for years, the stock value of green energy firms has crashed more than the stock market index, even in these troubled times. Up to 40,000 jobs could be lost in 2009 as the number of 'green jobs' contracts.[63]

Spain is suffering from mis-managing its electricity markets, due in part to the subsidies represented by their FITs.

Spain is suffering from mismanaging its electricity markets, due in part to the subsidies represented by their FITs.[64,65]

> "Spain is currently trying to figure out how they're going to pay their annual feed-in-tariff bill," Chase [manager of the Solar Insight Service at New Energy Finance] said. "Spain is a bit of a disaster area and the government is probably trying to exclude as many projects as possible from the 2008 feed-in tariff."[65a]

Spanish electric utilities are not allowed to charge prices that cover all their costs, so consumers do not bear the full cost of the FITs. Nevertheless, 42% of a consumer's annual bill represents the FIT (roughly $127 per person).[66] The rest of the FIT cost is rolled into the current "tariff deficit" of around $25 billion. To pay this in full over five years would require price increases of around 35%. In response, the government recently announced consumer electricity price increases of as much as 20% over the next three years. Some families will see their rates increase 16%. Low-income families were supposed to see increases of 5.6%. But recently, the government froze the rates for an estimated 14.5 million people where all family members are unemployed or claiming a minimum state pension.[67]

THE FEED-IN TARIFF EXPERIENCE IN THE UNITED STATES AND ONTARIO

Between 2006 and 2008, six states, including Michigan, introduced FIT legislation and eight other states were looking at the policy. One bill was introduced on the national level. Currently, only one city, Gainesville, Florida, has a FIT for its municipally-owned utility. Vermont recently enacted a "pilot" program capped at 50 megawatts,[68a] and California has a very limited "experiment."[68]

The Province of Ontario enacted its first of two feed-in tariffs in late 2006. By some measures, it has been a success, by others, not so much.

> Since last November, [the Ontario Power Authority] has received applications under the new FIT for 65 wind, solar, biomass and hydropower projects totaling roughly 330 megawatts (MW) of capacity. According to OPA, those numbers are better than what was originally projected. However, there have been few applications for residential and small-scale commercial projects. This has come as a surprise to program administrators.[69]

Most of the new RES generation was wind. Since one of the goals for creating the FIT was to stimulate small scale RES generation and to stimulate solar in particular, there was a move to increase the rate.

> Gipe notes that the tariff must be raised in order to encourage more "community-based renewable energy development" from farmers, co-ops and groups of homeowners like what is happening in Germany, where the solar tariff is $0.80. At $0.42 the tariff price set by OPA for solar is four times the price of retail electricity rates. Because utility customers pay a bit extra on their electricity bill to support the FIT, administrators say they don't want to raise the price too high.[70]

By late 2008, the plan was 'being fixed.'

> Under the proposed plan, the first of its kind on the continent, homeowners who put solar power systems on their rooftops will be able to fetch more than 80 cents for every kilowatt-hour sold into the grid, roughly 13 times the going rate for electricity. [71]

Despite very high FIT rates, the prospects for significant RES generation aside from wind continue to remain unlikely in Ontario.

> Developers of multi-megawatt solar projects, meanwhile, said a tariff of 44.3 cents for power from large solar farms still wouldn't make such initiatives economical enough to proceed.[72]

STRENGTHS AND WEAKNESSES OF FEED-IN TARIFFS

STRENGTHS OF FEED-IN TARIFFS

1. Creates a stable and predictable economic environment for investments in renewable energy sources. [73]

By guaranteeing a set price that covers all the investment costs plus a reasonable profit, developers can find the necessary capital to finance RES development of all technologies, all sizes, and in all locations. This makes investments very attractive since they are stable and predictable.

2. Encourages the development of renewable energy sources less expensively than a renewable portfolio standard. [74]

Most studies that have compared the two policies reach this conclusion, primarily due to the fact that there is less risk in RES investments (see 1. above) and less associated transactions costs, such as establishing and administering a renewable energy credit certificate trading market.

3. Creates green jobs in the manufacturing of renewable energy sources components.[75]

Many of the articles and studies that promote feed-in tariffs quote enviable statistics of job creation in places where they have been instituted, primarily Germany.[76] One of the stated goals of the Michigan feed-in tariff legislation is, "Stimulate the development of new jobs, technologies, and industry in Michigan."

Based on the numbers of jobs attributable to the FIT in Germany,[f] the number of new green jobs that might be created from a Michigan FIT, net of the jobs lost, would be around 4,500 total.[77] Implicit in this calculation is that the RES components would come from Michigan-based manufacturing; that the jobs created by the FIT would be in Michigan and not in neighboring states.

4. Feed-in tariffs work because "they are more equitable than other policies. They enable everyone—including homeowners, farmers, cooperatives, and businesses large and small—to profit from renewable energy." [78]

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[f] *Renewable Energy Sources Act (EEG) Progress Report 2007*, prepared by several German agencies for the German Parliament as required by the energy act.

One of the stated goals of the Michigan feed-in tariff legislation is to, “Allow all citizens to participate in renewable electricity generation.”

In Germany, 45 percent of wind projects are locally owned.[79] However, in Spain, where small scale solar generation was encouraged, big businesses ‘gamed the system.’

> Nonetheless, as is common with such schemes this only emboldens craftiness. Indeed, in order to take advantage of the 575% over TMR,[g] “solar farms” of various MW started to proliferate, motivated by businesses which ran these installations under several clients’ names, usually assigning to each one less than the 100kW limit. Thus, these firms could manage a big solar farm (for example, 10MW) connected by a series of transformers up to 100kW each.[80]

WEAKNESSES OF FEED-IN TARIFFS

1. Feed-in tariffs are not economically efficient.

They do not use market-based principles to determine where resources are directed.[81] Nor do they use traditional utility rate-making proceedings, which are designed to create a price that is an approximation of a competitive market price.[82]

It is acknowledged that FITs do not lead to “minimization of generation costs.”[83]

Instead, they artificially manipulate traditional economic incentives in order to push development to diseconomies of scale and push RES development to locations where they are least economical. Proponents effectively acknowledge this, but justify it under a pretense of ‘fairness.’ Proponents call this “leveling the playing field,”[84] reducing “cost inequities,”[85] and “market democratization.”[86] The last term underscores that FITs are determined by politics rather that by economics.

In Germany, “moving wind-powered development away from the windiest locations”[87] was justified on the grounds that a wide distribution of RES development was needed to minimize over burdening the grid in one location (the windiest). Also, promoting smaller RES that are not economically viable was justified on the grounds that future price competition would result from increasing the number of energy generators, and that price parity would be achieved in time. Additionally, since utilities are required to buy all the RES electricity first, spot market prices can go down. But in Denmark, they found that the subsidies far exceeded the savings in lower prices they encouraged. [88]

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[g] TMR is The Mean Reference tariff, or the average tariff for the cost of electricity to an average Spanish consumer.

2. Setting the right prices means accurately evaluating a very complex set of variables and their interactions. Feed-in tariffs are not just one rate. They are a whole schedule of rates for different technologies, applications, size, regions, and resource intensities.[89,90]

Typically, rates for all the combinations of the factors mentioned above are set in statute by a politically driven process, rather than a market- or expert-driven process. House Bill 4137 of 2009 has 23 different rates that could only be changed by law. This makes House Bill 4137 either very simple, or not comprehensive. The German tariff system has 45 price categories,[91] and a flow diagram offered by one advocate has 66 decisions to be made (see Figure 3, next page).[92] If the decisions are not made correctly, they are not easy to fix.

> If the FIT payments are set too low, then little new [renewable energy] development will result. And if set too high, the FIT may provide unwarranted profits to developers.[93]

Statutory prices cannot adapt to rapidly changing markets, federal laws, and technologies. In order to maintain the stability and predictability that creates the financial incentive to developers, one does not want to revise the FIT rates frequently. This is a point on which advocates equivocate since they argue that stability encourages development, and they also argue that if the FITs do not work, they can be easily adjusted.[94]

All of this has led to a lot of trial and error in Europe and Ontario when the results have not matched expectations.

3. There are equity issues since feed-in tariffs favor wealthier people over poorer people.[95]

A report done by the Congressional Budget Office found that a 15% reduction in carbon dioxide emissions under a cap-and-trade program had almost twice the negative impact on the lowest income quintile versus the highest income quintile. This should hardly be a surprise.

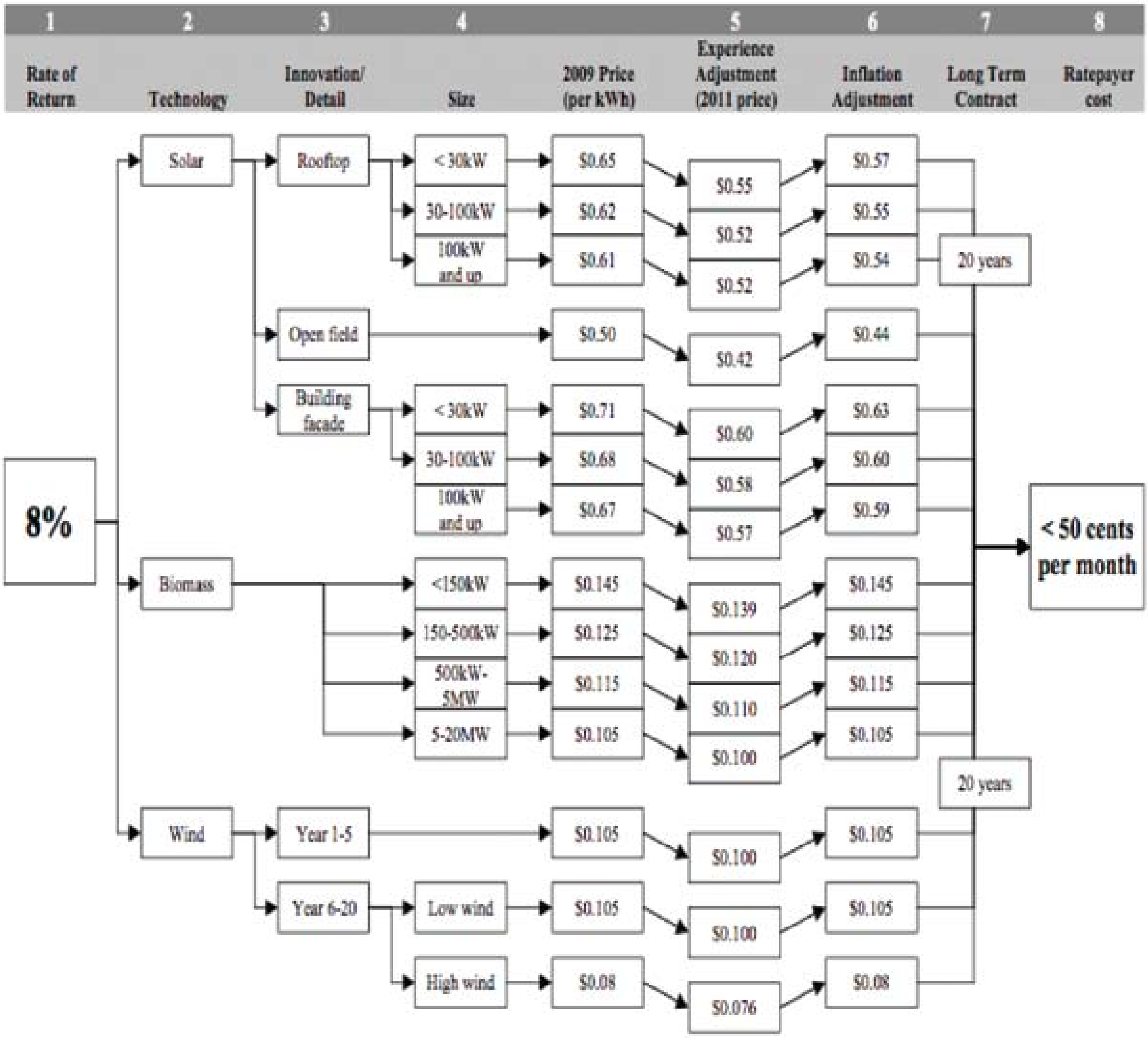
> That regressivity occurs because lower-income households tend to spend a larger fraction of their income than wealthier households do and because energy products account for a bigger share of their spending.[96]

The economic principles would remain the same for a FIT.

> Under a feed-in tariff, wealthy businesses and individuals can double-dip - building their systems with generous subsidies, enjoying free electricity and higher home values, and then selling the excess power back to the consumers for hugely inflated prices. [97]

FITs lead to very high prices for purchased electricity, as high as 1300% higher,[98] which are economically regressive since they have a disproportionate impact on low-income consumers.

Figure 3. A nuanced price system helps create a vibrant renewable energy market at low cost



Source: John Farrell, Feed-in Tariffs in America Driving the Economy with Renewable Energy Policy that Works, *New Rules Project, April 2009*

> In contrast, a high feed-in tariff, like other programs funded through utility bills, burdens small consumers with higher bills that have limited returns.[99]

4. Encourages relocation or shut-down of electricity intensive industries.

A critical measure of success is the number of manufacturing jobs FITs create within the same geographic locale within which they are imposed. Proponents often quote 'green job' statistics to bolster their arguments. The European experience discussed above puts these statistics into a larger context.

What proponents do not mention is that higher prices encourages the relocation or shut-down of electricity intensive industries. Recognizing this, in Germany “energy-intensive enterprises in the production sector and for railways… can apply to take a much reduced quantity of [RES produced] electricity; based on an [FIT] surcharge of only [5] cents per kilowatt-hour” versus 11.4 cents for others.[100] These same energy-intensive users can also get a reduced surcharge under the German Heat and Power Cogeneration Act:

> For final consumers with an annual electricity consumption of more than 100,000 kilowatt-hours (kWh) per delivery point it is a maximum of [5] cents per kilowatt-hour for the portion that exceeds the 100,000 kWh threshold. If electricity costs accounted for more than 4% of sales revenue in the preceding calendar year, the surcharge for the quantity exceeding 100,000 kWh is reduced to as little as [2.5] cents per kilowatt-hour. [101]

5. Does not include interconnection costs to the grid[102] and need for more base-load due to fluctuations cause by RES generation.[103]

Interconnection costs of the RES to the grid are simply a hidden cost of FITs.

Renewable energy sources are intermittent and the amount of electricity being produced can change very quickly and without warning. Consequently, as the percentage of RES capacity is put on the grid, there is a corresponding amount of additional backup generation required that can be dispatched quickly to compensate for drops in generation from RESs.

The intermittent nature of RES energy can lead to too much electricity, as it did in Spain.

> Therefore 37% (2,792 megawatts) of wind power installations had to be disconnected—the equivalent to three nuclear power stations - until 9 am the next morning when demand for electricity went up again. [104]

Or it can mean too little, as it did in Texas when “wind production fell from more than 1,700 megawatts… to 300 megawatts” so that the system operator had to “[curtail] power to interruptible customers to shave 1,100 megawatts of demand…” within ten minutes.[105]

6. Feed-in tariffs are not likely to co-exist well in places where renewable portfolio standards have already been established. (See “Can Michigan’s Renewable Portfolio Standards Co-exist with Feed-in Tariffs?,” below.)

CAN MICHIGAN'S RENEWABLE PORTFOLIO STANDARDS CO-EXIST WITH FEED-IN TARIFFS?

Under Public Act 295 of 2008, Michigan is implementing a renewable portfolio standard (RPS) policy. Renewable portfolio standards and feed-in tariffs are intended to achieve almost identical policy goals: to dramatically increase the amount of electricity produced from renewable energy sources and create green jobs.[106,107]

It is not clear how there could be any flexibility or market force corrections if both production and price are set by government mandate.

A RPS policy focuses exclusively on setting the amount of production, while a FIT policy focuses exclusively on setting the price of production.[108,109] It is not clear how there could be any flexibility or market force corrections if both production and price are set by government mandate.

In Europe, RPS policy is seen as an alternative, not a complement, to a feed-in tariff policy. Indeed, some in the U.S. have stated that a FIT is "contrary to the rationale for establishing a renewable portfolio standard."[110]

In this country some argue, "Where RPS is already in place, [a FIT] can make the RPS more expensive."[111] Here in the Midwest, they note that a minimum feed-in tariff price for wind is around 8-25 cents per kilowatt hour. The current Midwest Independent Transmission System Operator (MISO) market price of wind is 6-8 cents, a price that has already created a queue of 60,000 megawatts of capacity waiting for a license to be connected to the grid. [112]

According to the United States Environmental Protection Agency,

> A Renewable Portfolio Standard (RPS) provides states with a mechanism to increase renewable energy generation using a cost-effective, market-based approach that is administratively efficient.[113]

However, a 2005 Commission of the European Communities' report found that countries with RPS had higher incentive payments than those with FITs, "feed-in tariffs are more efficient and less costly than Renewable Energy Credit trading."[114] However, a Commission of the European Communities' report found that RPS stimulated more innovation.[115]

In Denmark, the government switched from a FIT-type policy to a RPS-type policy, and "Additions to wind power capacity declined precipitously."[116]

It is not clear how a feed-in tariff policy would work in Michigan in conjunction with its RPS policy. For example, who would get the renewable attribute represented by the renewable energy credit associated with RES production? To whom will they sell the electricity at the end of the 20-year contracts? Not even Germany has an answer to this.[117]

Along with adding C-BED policy to the Michigan mix, the staff at the Michigan Public Service Commission have been "thinking on this."[118]

POTENTIAL IMPACTS OF FEED-IN TARIFFS ON MEMBERS OF MICHIGAN ELECTRIC COOPERATIVES

Tables 2 and 3 below summarize the potential impact on Michigan's nine distribution electric cooperative members.

Tables 2 and 3 represent the cost impacts on Michigan electric cooperative members if House Bill 4137 were enacted and is as successful in achieving the same percentages of wind and solar electricity production achieved in Germany by 2007, Spain by 2008, and projected for Germany for 2020.

All of the numbers in the tables are based upon the simple average feed-in tariff rate for wind, $0.11; and for solar, $0.63 in House Bill 4137. These prices happened to be close to the average rates in Ontario.

Table 2.
Potential Impact on Michigan Electric Cooperative Members Using Average Wind and Solar Feed-in Tariffs from Michigan House Bill 4137 of 2009 and the Percentages of Wind and Solar Electricity Produced Due to Feed-in Tariffs (FIT) in Germany and Spain

	GERMANY 2007		SPAIN 2008		GERMANY 2020	
	Added Cost Per Year	Change Due to FIT	Added Cost Per Year	Change Due to FIT	Added Cost Per Year	Change Due to FIT
HIGH						
Residential	$ 74.40	16%	$ 121.10	26%	$ 221.75	48%
Commercial & Industrial	393.25	16%	640.55	26%	1,172.65	48%
LOW						
Residential	44.05	8%	43.10	8%	82.55	16%
Commercial & Industrial	214.10	8%	115.30	8%	221.15	16%
AVERAGE						
Residential	57.00	10%	93.70	16%	174.70	29%
Commercial & Industrial	290.75	10%	470.75	16%	868.10	30%

Source: Michigan Electric Cooperative Association

The comparison of costs with a feed-in tariff was made in all scenarios to the cost of electricity at the 2007 power purchase price for the cooperatives. That is, all the other charges and taxes paid by members were not included. In addition, the costs were rounded to the nearest nickel and the percentages to the nearest whole percent. Therefore, these results represent magnitudes of change and not exact changes.

The data used for numbers of members, kilowatt hours used, and the cooperatives purchased power price without a feed-in tariff were summarized from the P-521 annual reports found at the Michigan Public Service Commission website.

Residential members in Table 2 are only the non-seasonal, year-around, members. The Added Cost Per Year figures for the Commercial & Industrial members is an average for all of that cooperative's commercial and industrial members; not the highest per individual member.

GERMANY 2007, SPAIN 2008, and GERMANY 2020 are scenarios based upon the percentages of wind and solar electricity in those two countries in those years. For GERMANY 2020, it is the target percentages.

For the HIGH and LOW scenarios, the cooperatives were analyzed separately. The high and lows were the biggest and smallest changes respectively from all of the nine cooperatives. The AVERAGE scenario is the weighted average of all nine cooperatives collectively.

Table 3.

Potential Impact on Michigan Electric Cooperative (Co-op) Top Ten Agricultural, Commercial, and Industrial Members Using Average Wind and Solar Feed-in Tariffs from Michigan House Bill 4137 of 2009 and the Percentages of Wind and Solar Electricity Produced Due to Feed-in Tariffs (FIT) in Germany and Spain

CO-OPS	GERMANY 2007		SPAIN 2008		GERMANY 2020	
Current Annual Cost	Added Cost Per Year	Change Due to FIT	Added Cost Per Year	Change Due to FIT	Added Cost Per Year	Change Due to FIT
$ 3,860,187	$ 342,978	9%	$ 561,029	15%	$ 1,044,820	27%
2,749,271	244,273	9%	399,571	15%	744,133	27%
1,937,867	172,179	9%	281,644	15%	524,514	27%
1,919,112	161,560	8%	264,414	14%	493,473	26%
1,485,664	132,001	9%	215,922	15%	402,118	27%
1,452,746	129,076	9%	211,138	15%	393,208	27%
1,432,718	127,297	9%	208,227	15%	387,787	27%
776,822	68,094	9%	111,400	14%	207,572	27%
561,978	47,310	8%	77,429	14%	144,505	26%
418,461	36,681	9%	60,009	14%	111,815	27%
TOTAL **$16,594,826**	**$1,461,454**	**9%**	**$2,930,788**	**14%**	**$4,453,949**	**27%**

Source: Michigan Electric Cooperative Association

The TOP 10 in Table 3 (above) represents the ten largest users of electricity from all nine cooperatives, and represents a cross section of commercial, industrial, and agricultural users.

POTENTIAL IMPACT ON COOPERATIVES' MEMBERS' COSTS IN GENERAL

As one can infer from the tables the potential impact from enacting House Bill 4137 is not trivial.

In the GERMANY 2007 scenario, where solar power represents only 0.6% and wind represents 6.4% of total electricity, members' annual costs could increase by over 15%.

If this were done using the feed-in tariffs in House Bill 4137 and the GERMANY 2020 scenarios, where solar power represents 2% and wind represents 17% of total electricity, cooperative members' annual costs could increase by nearly 50%.

In Michigan, the idea that the state might require that 20% of the electricity used be from renewable sources by 2020 has been strongly advocated. If this were done using the feed-in tariffs in House Bill 4137 and the GERMANY 2020 scenarios, where solar power represents 2% and wind represents 17% of total electricity, cooperative members' annual costs could increase by nearly 50%.

POTENTIAL IMPACT ON COOPERATIVES' LOW INCOME POPULATION

In recognition of the potential impact on Michigan's low income population in general, Tom Stanton of the Michigan Public Service Commission has spoken of a "lack of political will to create [FITs] without a ratepayer cap." [119]

While proponents argue that FITs allow all citizens to participate in renewable electricity generation, how many Michigan citizens can realistically afford the high cost of installing residential-based RES?

> For example, a homeowner in Ontario would be looking at a residential scale Solar PV project of about 3 kilowatts, which costs around $30,000. This would provide enough electricity to meet one third of their consumption and would generate about $7 per day. This payment would result in approximately $2,500 in revenue per year for the homeowner, resulting in about a 12-year payback. [120]

In 2007 23-36% of residential cooperative members met the definition for low income used in Public Act 295 of 2008.[h,121] In 2007 half the Michigan population made $48,000 or less.[122] Consequently, how many households are likely to finance an investment of $30,000?

[h] A family of four with an annual income of $42,000 meets the definition for low income used in Public Act 295 of 2008, as calculated by the Michigan Electric Cooperative Association using County-Level Unemployment and Median Household Income for Michigan, 2007, http://www.ers.usda.gov/data/unemployment/RDList2.asp?S=MI

POTENTIAL IMPACT ON COOPERATIVES' BUSINESS POPULATION

Not surprisingly, the impacts are biggest on large commercial and industrial users of electricity; literally amounting to millions of dollars in new costs not found in any other state.

Not surprisingly, the impacts are biggest on large commercial and industrial users of electricity; literally amounting to millions of dollars in new costs not found in any other state.

Indeed in all the scenarios, only 3 of the top 10 companies had additional total costs of less than $100,000 each. It is not surprising that in Germany, special provisions are made for large users dramatically dampening the negative impacts of the feed-in tariffs. Consequently, the costs are shifted to the other consumers.

Since Michigan cooperatives primarily serve rural areas with little commercial and industrial activity, and unemployment typically is above the state's average, the negative impacts would be out of proportion to the specific impacts. Indeed, they could be crippling to current and future economic development.

CURRENT ACTIVITY IN MICHIGAN

LEGISLATION

HOUSE BILL 4137 of 2009 (Gonzales- D) is a reintroduction of House Bill 5218 of 2007 (Law). It was introduced on February 04, 2009. The House Energy and Technology Committee has not yet considered it, but there are significant discussions going on in Lansing.

It would:

- Cap projects to 20 MW
- 100% power goes to distribution grid
- Interconnection costs paid by utility
- Developer profit of 10%-30%
- Contract duration minimum 20 years

Fixed price Feed-in Tariffs as follows:

- Wind
    - $0.105 (< 700 kWh/m2/year)
    - linear in between 700 to 1,100 (kWh/m2/year)
    - $0.08(>1,100 kWh/m2/year)
    - $0.25 (1,000 sq. ft. swept area)

- Hydropower
  - $0.10 (< 500 kW)
  - $0.085 (500 kW to 10 MW)
  - $0.065 (10 MW < 20 MW)
- Biomass or Biogas
  - $0.145 (< 150 kW)
  - $0.125 (150 kW to 500 kW)
  - $0.115 (500 MW to 5 MW)
  - $0.105 (5 MW to 20 MW)
- Landfill Gas (or sewage treatment gas)
  - $0.10 (< 500 kW)
  - $0.085 (> 500 kW)
- Photovoltaic
  - $0.71 (façade cladding < 30 kW)
  - $0.68 (façade cladding 30 kW to 100 kW)
  - $0.67 (façade cladding > 100 kW)
  - $0.65 (rooftop < 30 kW)
  - $0.62 (rooftop 30 kW to 100 kW)
  - $0.61 (rooftop > 100 kW)
  - $0.50 (ground mounted)
- Geothermal
  - $0.19 (< 5 MW)
  - $0.18 (5 MW to 10 MW)
  - $0.115 (10 MW 20 MW)
  - $0.09 (> 20 MW)

Reduces rates to reflect any other incentives

RECENT DISCUSSIONS INVOLVING LANSING POLICY MAKERS

Over the last two years, there has been an ever increasing push to increase the support for the adoption of a feed-in tariff policy in Michigan, including among others:

- Web Seminar of "Perspectives on Advanced Renewable Tariffs," October 28, 2008
- Presentations, one by then Representative Law and one by Tom Stanton, MPSC, at: http://www.midwestagenergy.net/webseminar-tariffs.html
- Program on Feed-In Tariffs conducted at the offices of the Michigan Public Service Commission, December 18, 2008, hosted by MPSC staff.
- "The Most Effective Policy Option for Achieving Job Creation, Energy Security and the Rapid Deployment of Renewable Energy;" April 1, 2009, State Capitol Building (with web feed), hosted by Representatives Gonzales and Valentine.
- Following the Legislative Luncheon meeting (above) there was a "working session" about feed-in tariffs "for professionals …willing to dedicate time in the coming weeks to providing input about possible Michigan feed-in tariff designs."
- "This event is a starting point for discussions on FITs in Michigan and to help facilitate that discussion [Land Policy Institute at Michigan State University] has posted a discussion in the *Ask the Expert Forums* where leaders on the issue can continue a dialogue with decision makers and stakeholders.
- *Michigan Now's* Chris McCarus was also on hand to cover the event. Listen in to his radio report at International Feed-in Tariff Experts at Capitol"

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117 *Seeing solar success*, Solar Fact Finding Mission to Germany by Utility Decision Makers, June 2008, http://www.onlinepact.org/937.html, "One question frequently asked by members of the delegation remains unanswered: What happens at the end of the 20-year term of the feed-in tariff? Will customers continue to sell all of the power back into the grid or will they want to go to a net metering model? Most likely net metering will offer greater economic value to building sited systems, while ground-mounted more remote systems will need to analyze the wholesale market structure and their O&M costs to determine the viability of continued operations versus deconstruction and reselling the parts."

118 Tom Stanton, Manager Renewable Energy Section Electric Reliability Division, Michigan Public Service Commission, at the Feed-in Tariff Meeting at the offices of the Michigan Public Service Commission , December 18, 2008

119 Tom Stanton, Manager Renewable Energy Section Electric Reliability Division, Michigan Public Service Commission, while giving his presentation during the Web Seminar of "Perspectives on Advanced Renewable Tariffs," October 28, 2008 http://www.midwestagenergy.net/

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