# Feed-in Tariffs vs. Auctions: What’s all the fuss about?

A debate between renewable energy advocates (primarily solar industry players) about the comparative merits of feed-in tariffs and auctions has played out in several US states and cities in recent months. While everyone seems to agree on the objective, namely to increase renewable energy deployment, the renewable energy community in the U.S. is increasingly divided about how best to deliver on that objective. To paraphrase George Bernard Shaw, renewable energy advocates have effectively become two groups divided by a common goal.

The most prominent of these policy debates have occurred during the Reverse Auction Mechanism (RAM) proceedings in California and the Pilot Solar Volumetric Incentive Rates and Payments Program proceedings in Oregon. Similar conversations have also taken place, however, in (among others) Arizona, Florida, New Jersey, Nevada, Vermont, and the City of Fort Collins, CO. This short memo provides a high-level overview of the debate and discusses key issues.

# So what is being debated, exactly?

It is often unclear exactly what is being debated because the broad policy labels “feed-in tariff” and “auctions” each obscure a broad range of potential possible meanings. This confusion is further compounded by how the two concepts are publicly discussed. In the

RAM proceedings, for example, the solar developer Recurrent Energy argued in favor of auctions over feed-in tariffs,1 whereas in regulatory proceedings in Arizona and Nevada Vote Solar classified auctions as a type of feed-in tariff.2 The National Renewable Energy Laboratory, meanwhile, has stated that auctions can be used to establish feed-in tariffs.3 In order to determine what exactly is being debated, terms must first be defined more precisely.

# What is a feed-in tariff?

Part of the confusion is that the term “feed-in tariff” is tricky to define. Although there have been multiple attempts to define feed-in tariffs, there is no universally accepted definition. This is because the policy has spread to 50+ countries and no two designs are the same. For almost every “rule” used to define FITs, an exception can always be found. Another difficulty is that feed-in tariffs are not a single policy, but rather a package of regulatory measures that can (but does not always!) include:

* ***Interconnection***: guaranteed interconnection, priority interconnection, and/or streamlined interconnection

1 Nimmons, J. (2009). *Comments of Recurrent Energy on Administrative Law Judge's Ruling Regarding Pricing Approaches & Structures for a Feed-in Tariff (Rulemaking 08-08-009)*. San Francisco, CA: California Public Utilities Commission.

2 Carmichael, A. (2010). *Comments of Vote Solar in response to the Notice of Request for Comments*

(Investigation regarding feed-in tariffs, Docket No. 09-11004). Carson City, NV: Public Utilities Commission of Nevada.

3 Couture, T., Cory, K., Kreycik, C., & Williams, E. (2010). *A policymaker's guide to feed-in tariff policy design* (NREL/TP-6A2-44849). Golden, CO: National Renewable Energy Laboratory.

* ***Transmission system protocols***: priority dispatch
* ***Electricity transactions:*** Electricity purchase is guaranteed
* ***Contractual and administrative details***: standard contracts, long-term contracts, streamlined/minimal paperwork
* ***Pricing***: fixed, administratively determined rates based on generation cost of target technologies; can also be structured to include a premium on top of market prices, bonus payments, etc.

When stakeholders argue for or against “feed-in tariffs,” they frequently do not specify what part of the policy they are supporting, or criticizing. This makes it difficult to have a meaningful discussion about the strengths and weaknesses of different policy options.

# What is an auction?

Just as there are many different ways to define feed-in tariffs, there is also a remarkable spectrum of different auction designs grounded in a vast academic literature.4 This memo will not attempt an exhaustive overview of auctions. Instead, a representative list of auction design choices reflecting different participant behavior, outcomes, and

performance is included below:

* How many winners are there? Is there only one?
* How many rounds of bidding are there? Is there only one chance to win?
* How is the winner picked? The best price? The second best price? Are non-price attributes included in selecting winning bids?
* Are bidders able to see other bidders’ bids?
* Is the auction live or “offline” (e.g. sealed bids)
* What does the winner actually win? e.g. a commodity or the right to negotiate a contract?

Depending on the answers to these questions, auction theorists can apply a series of different labels and terms of art, such as Vickrey auctions, English Auctions, Dutch auctions, clock auctions, combinatorial auctions, auctions with “shoot outs,” etc. In order to truly argue for or against auctions it is important to specify what kind of auction is actually being discussed.

In translating auction theory into the world of renewable energy policy, there has often been a lack of specificity as to what auction design is being considered. This is compounded by the fact that renewable energy advocates and analysts have at times relied on (or invented) their own taxonomies for different types of auctions which do not match established auction terminology. For example, requests for proposals (RFPs), which are frequently used to procure electricity, are actually a type of auction. RFPs have been used to procure renewable energy in the US for decades, but auction advocates do not seem to have RFPs in mind when they refer to auctions (or do they?).

4 *See,* for example, the annotated bibliography in: Holt, C., Shobe, W., Burtraw, D., Palmer, K., & Goeree,

J. (2007). *Auction design for selling CO2 emission allowances under the Regional Greenhouse Gas Initiative*: Regional Greenhouse Gas Initiative.

# Again… what is being debated exactly?

The auction vs. FIT debate is limited primarily to the pricing component of the feed-in tariff policy “package.5” Under FITs, incentive levels are set administratively whereas with an auction, incentive levels are set through a competitive bidding process. Auction advocates commonly argue that open competition in the market should be used to

“discover” prices, rather than setting the payment levels administratively through market research.

FIT advocates on the other hand argue that renewable energy generation costs are sufficiently well known to allow prices to be accurately determined in most technology classes. This is because RE generation costs are determined primarily by capital costs (turbines, solar panels, etc), and renewable resource quality, both of which are more-or- less readily obtainable in the marketplace.

It is important to note, however, that stakeholder on both sides of the debate typically do not distinguish the pricing element from other elements of feed-in tariffs. Auctions are typically discussed as a mutually exclusive replacement for “feed-in tariffs.” This obscures the fact that both supporters of auctions and of FITs are likely to agree on the importance of clear interconnection, transmission, purchasing and contracting protocols, for instance, even though they may disagree on how the final price should be discovered, and how contracts should be awarded. This distinction has not been discussed in depth to date in regulatory proceedings (or other venues).

# A bird’s eye view of pros and cons

In the pricing debate, the same sets of arguments tend to be aired during each contest. This section summarizes some of these arguments.

Auction advocates often utilize the following arguments:

* Auctions are “market-based.” The competition they inspire delivers accurate pricing – not too high and not too low - because market participants have more information than the government (or the government’s consultants / research institutes).
* Auctions are “easier” and “cheaper” to administer than feed-in tariffs
* The requirements to effectively compete in an auction create justifiable barriers to entry, as they limit the ability of unqualified developers to participate – in this way, only “real” developers can obtain contracts.
* Auctions circumvent concerns about federal preemption of state rate setting activities

Auction opponents, meanwhile, often invoke the following arguments:

* Competition under auctions does not necessarily deliver the “lowest price;” collusion, or other factors such as a low number of auction participants, can result in high prices whereas strategic or speculative bidding can result in unrealistically low prices.

5 Although there are secondary distinctions between the two, such as that feed-in tariffs are typically available on a rolling basis, whereas auction-based procurements are only periodically available.

* Auction competition has historically resulted in high rates of contract failure (i.e. projects that win auctions are not built), which in turn leads to “regulatory failure.” In some cases, this has hindered the ability to reach climate and energy goals.
* Auctions are extremely difficult to design effectively, and the risk of policy failure is high.
* The periodic nature of auctions (i.e. they occur once or twice a year rather than being open on a rolling basis) prevents steady market development and contributes to boom and bust cycles.
* The transaction costs associated with auctions prevent broad participation in renewable energy markets (e.g. residential or community-based project owners).

# Who is right?

The answer to this question is (of course), it depends. The answer is complicated by the fact that some of these arguments depend on the perspective, or ideology of the individual making them, and are difficult to address with empirical evidence or arguments.

Project developers, for example, have an incentive to limit the field of competition (which could be an argument in favor for auctions with high barriers to entry) whereas technology manufacturers have an incentive to create multiple channels for market participation (i.e. to boost sales), which could argue in favor of feed-in tariffs.

Similarly, some policy makers may value the appearance of market competition over the “optics” of administrative rate setting, independent of the results the processes may deliver.

Some of these arguments depend heavily on the designs of the policies being compared. The concern that auctions block broad participation may be alleviated, for example, by an auction whose results are used to set a standard offer contract open to all.

The argument that auctions deliver the lowest price would also depend heavily on auction design and whether it is vulnerable to gaming or strategic behavior. The California Public Utilities Commission, for example, barred the use of reverse auctions by utilities in 2004 for capital construction projects saying that “*the potential for a utility accepting an artificially high bid in a reverse auction would be especially pronounced where a*

*market… is not highly competitive*.”6

Some of these arguments are purely theoretical and have not been empirically analyzed. For instance:

6 Taylor, M., Morse, F., Jaehne, C. H., McGree, M., Beebe, B., O'Donnell, A., et al. (2008). *Utility procurement study: Solar electricity in the utility market*. Washington, DC: Solar Electric Power Association.

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* In the RAM proceedings in California, Recurrent Energy argued that feed-in tariffs were administratively more costly and complicated than auctions.7
* In the New Jersey Board of Public Utilities proceedings on solar market transition, the Board consultants projected that a standard offer for solar RECs would be cheaper to administer than an auction for solar RECs.8

Also, there have been arguments raised on the basis of FERC’s rulings, although the answers to such questions are not entirely yet clear:

Feed-in tariffs have been challenged in some states on the grounds that states are preempted from setting wholesale power rates above “avoided” costs by the Federal Power Act and the Public Utilities Regulatory Policy Act. Recent guidance from FERC, however, appears to open the door to state feed-in tariff development via avoided cost rates differentiated by technology when certain conditions are met (e.g. the state has a renewable energy requirement that specifies certain amounts of electricity be procured from different renewable technologies).

Oregon opted to pursue auctions over FITs in order to avoid federal preemption arguments. However, in most cases, state administered auction prices must still be approved by FERC since these prices are for wholesale electricity. California’s Reverse Auction Mechanism was recently challenged by utilities as running afoul of federal law. However, the same recent guidance from FERC relevant to FITs (mentioned above) could allow for differentiated rates via an auction process as well.

# No seriously, who is right?

The reality is that for all of the reasons highlighted above (and more), there is no clear, universally applicable answer - as with most policy debates, it often depends on policy *objectives*. If the goal is to foster broad-based investment in renewable energy, investment that includes homeowners, farms, businesses, and independent investors, experience around the world suggests that FITs are more likely to meet that objective. However, if the goal is to bring larger renewable energy projects on-line, financed by larger utility-scale players, then auctions may be more suitable.

To date, experience with auctions specifically to procure long-term contracts for renewable electricity (and/or RECs and other attributes) has been mixed. Policymakers are typically concerned with delivering renewable energy at the lowest cost to ratepayers, and with meeting renewable energy targets on time. Before concluding, it is useful to look at the available data from programs across the U.S. on these two metrics.

7 Nimmons, J. (2009). *Comments of Recurrent Energy on Administrative Law Judge's Ruling Regarding Pricing Approaches & Structures for a Feed-in Tariff (Rulemaking 08-08-009)*. San Francisco, CA: California Public Utilities Commission.

8 Summit Blue Consulting, & Rocky Mountain Institute. (2007). *An analysis of potential ratepayer impact of alternatives for transitioning the New Jersey solar market from rebates to market-based incentives* (Final Report). Boulder, CO: Summit Blue Consulting. Prepared for the New Jersey Board of Public Utilities, Office of Clean Energy.

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In terms of meeting renewable energy targets, contract failure has been a risk under auctions:9

* In the early 1990s, France, the UK, and Ireland used competitive procurement to meet their national renewable energy goals, but only 22-33% of contracted capacity was built. All three countries subsequently enacted feed-in tariffs (although the UK switched first to a tradable credit system during the 2000s before finally implementing FITs for small systems).
* By contrast, a 1994 survey of North American renewable energy procurements (both auctions and standard offers) found a success rate of 83% on a project basis and 60% on a capacity basis.10
* Contract failure can also be an issue under standard offer contracts, although this is less of an issue when the feed-in tariff is uncapped (as in Germany) or when there is a waiting list for other projects that can step in at the same rate (if there is a policy cap).

Whether or not an auction actually results in meeting targets depends heavily on design.

Turning to the question of ratepayer impact, there has been little formal research with regard to whether administratively set rates or competitively-set rates deliver lower rates for comparable technologies. While a full investigation is beyond the scope of this memo, we conduct a basic net present value comparison of the auction results in jurisdictions where feed-in tariffs and auctions have been debated (New Jersey and Oregon) with US jurisdictions where FIT rates were administratively determined (Vermont and Gainesville). We select solar PV for comparison since it is the common technology

across jurisdictions.11

* Vermont: Vermont Public Service Board set an initial 25-year feed-in tariff rate of

$300/MWh in 2009. In January, 2010, the rate was lowered to $240/MWh.

* Gainesville Regional Utilities (GRU) set 20-year FIT rates of $320/MWh and

$260/MWh in 2009 and released amended rates of $290.00 and $260.00 in 2010.

* Three New Jersey utilities procure solar renewable energy credits using auctions in order to meet the state solar RPS requirements. The New Jersey Board of Public Utilities12 reports that the lowest price from the auction for 10-year S-REC contracts in December 2010 was $419.69/MWh. The S-REC is paid on top of the net metering rate. In our analysis, the value of a net metered MWh of electricity is assumed to be equal to the average commercial retail rate as reported by the US EIA in November

2010.13 It is further assumed that this retail rate is available for 25 years to match Vermont’s FIT term, although no escalation factor is assumed.14 Finally, although

9 Wiser, R., O'Connell, R., Bolinger, M., Grace, R., & Pletka, R. (2006). *Building a "margin of safety" into renewable energy procurements: A review of experience with contract failure* (CEC-300-2006-004).

Sacramento, CA: California Energy Commission.

10 Morris, G. (1994). *Utility experiences with private, renewable energy generating sources*. Montréal, QC: Hydro-Quebec.

11 Gainesville, New Jersey and Oregon are solar PV only

12 <http://www.njedcsolar.com/assets/files/NJEDCSolar_Board_Order_Approving_Results_12-16-10-> 2A.pdf

13 <http://www.eia.gov/cneaf/electricity/epm/epmxlfile5_6_a.xls>

14 Typically, retail electricity rates, and therefore net metering rates, rise over time

solar systems in New Jersey generate S-RECs for 15 years, no additional REC sale value is assumed after the 10-year contract expires.

* Oregon held utility-specific auctions for 15-year contracts recently and reported

$350/MWh average bids for systems in PacifiCorp territory and $390/MWh in PGE territory.

The net present values of the sale of one MWh per year under each of these policies is calculated in the table below using the average discount rate applied to S-REC contracts in New Jersey (i.e. 7.07%15). As can be seen in the table, the New Jersey auction results deliver a far higher net present value to generators than do any of the other administratively set feed-in tariff rates. Even if the net metering assumption is removed entirely, the NPV of the 10-year SREC stream falls to $2,938, which in the range of, or higher than, the Gainesville and Vermont rates.

The Oregon results are also within the range, or higher, than those of the other jurisdictions.

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| --- | --- | --- | --- |
| **State policy** | **NPV of 1-****MWh/yr of solar PV** | **Rate ($/MWh)** | **Term (Years)** |
| Vermont interim FIT (2009) | $3,474.14 | $300.00 | 25 |
| Vermont final FIT (2010) | $2,779.31 | $240.00 | 25 |
| Gainesville roof/pavement mount FIT (2009) | $3,371.72 | $320.00 | 20 |
| Gainesville free-standing > 25 kW FIT (2009) | $2,739.52 | $260.00 | 20 |
| Gainesville roof/pavement mount 10 kW> x > 300 kW FIT (2010) | $3,055.62 | $290.00 | 20 |
| Gainesville free-standing 25 kW > x > 1 MW FIT (2010) | $2,528.79 | $240.00 | 20 |
| New Jersey S-REC auctions | $3,857.43 | • $419.69• $131.10 | • 10• 25 |
| Oregon PGE solar auction | $3,536.43 | $390.00 | 15 |
| Oregon PacifiCorp solar auction | $3,173.72 | $350.00 | 15 |

This basic empirical analysis is intended to be illustrative and does not take into account factors that may drive project economics such as different levels of irradiance across different states, interconnection costs for projects that are behind the meter instead of in front of the meter, and differences in project sizes.16 Nor does it represent a broad sample

of auction results or reflect a broad spectrum of auction structures.

15 <http://www.njedcsolar.com/assets/files/NJEDCSolar_RFP_Rules_1-6-2011.pdf>

16 Vermont allows systems up to 2.2 MW, for example, whereas New Jersey limited its auctions to 500 kW and below. As reported in recent LBNL analyses, however, there have not been significant differences in installed costs between 500 kW systems and systems over 1 MW. *See* Barbose, G., Darghouth, N., &

What it does illustrate, however, is that administratively determined prices may be able to deliver market growth (both the Vermont and Gainesville policies have been successful in meeting policy objectives) at lower societal cost than prices determined through auctions. Thus, the (albeit limited) evidence gained to date in the U.S. suggests that auctions do not always result in lower or more “efficient” prices. In many cases, the prices have been higher than under administratively determined FITs, leading to a greater ratepayer impact. While this result is counter-intuitive, more research is required to determine why this might be the case.

# Wrapping up

The feed-in tariff vs. auction debate is unlikely to fade any time soon, but so far, it has remained largely polarized and there are opportunities to focus the discussion in the months ahead.

In theory, auctions could provide an effective way to elicit price discovery from the marketplace, and could provide a vehicle to award contracts to the most efficient developers. In practice, the picture has often been murkier, with bids coming in higher than anticipated, and with auction processes still resulting in stubbornly high contract failure rates. These issues will have to be resolved if auctions are to secure a lasting place in policymakers’ toolkit.

In contrast, feed-in tariffs have already proven that they can be effective, both from a price standpoint, and in terms of actual MW installed. However, concerns remain over how prices are set. Also, it is important that they include proper controls to avoid the kind of boom-and-bust seen recently in countries like Spain. Ultimately, one thread that unites both policies is that policy design is critical.

Several questions that may be worth exploring further include:

* Could common ground be found about the non-price elements of feed-in tariff policies, such as grid access, and standard interconnection procedures?
* Would it be useful to shift the debate from “feed-in tariffs vs. auctions” to a specific discussion around rate setting?
* Are there opportunities to combine feed-in tariffs and auctions in advantageous ways?
* Can peace be made by differentiating instances in which the different approaches could be applied to achieve different goals? For example, could auctions be used to set prices for projects 10 MW and above and could administrative rate setting be used for projects below 10 MW?
* What are the research priorities regarding auctions? The RAM has not yet been launched and the Oregon and New Jersey auctions are still in their early stages. What lessons can be learned about “good” and “bad” design from experience thus far, and from the experience of other industries where auctions have been utilized?

Wiser, R. (2010). *Tracking the sun III: The installed cost of photovoltaics in the U.S. from 1998-2009*

(LBNL-4121E). Berkeley, CA: Lawrence Berkeley National Laboratory.

Answering some of these questions could help in redirecting the discussion between renewable energy advocates and help ensure that they are united (rather than divided) by a common goal.