BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF HAWAII

---------- In the Matter of ----------	)	
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PUBLIC UTILITIES COMMISSION	)	Docket No. 2008-0273
	)	
Instituting Proceedings to Investigate the	)	
Implementation of Feed-In Tariffs	)	
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Comments on Commission Scoping Paper

by Chris Mentzel, CEO, Clean Energy Maui LLC

and

Certificate of Service

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NRRI, the PUCs consultant published the document "Feed-in Tariffs: Best Design Focusing Hawaii's Investigation" in December 2008. It's stated purpose is to further discussion and does not necessarily represent the opinion of the Commission or NRRI.

This paper presents comments on the FIT, the scoping paper and answers to it's questions.

A few words about the author: As a native of Germany (the country that invented the Feed-In Tariff) Chris Mentzel been following that country's renewable energy development very closely and is very aware of the fundamental difference that the Feed-In Tariff has made. Through ongoing communication with parliamentary and scientific leaders in Germany, Chris Mentzel has a detailed view of its implementation.
Germany has the insolation of Alaska, yet half of the world's solar panels are installed there. It has far less wind than Hawaii, yet half of the world's wind generators are based there. In only seven years, 250,000 jobs were created in the renewable energy sector and half of the production is exported. The FIT is possibly Germany's most successful law and is embraced by all parties and the general population.
Bringing the FIT to Hawaii and adapting it to our particular needs has the potential to bring massive benefits to all of us on the islands, if all of us advising the Commission do our job right.

This paper first coherently presents issues regarding the proper design of a FIT and then comment on the particular points of the scoping paper.

Feed-in Tariff

This paper is provided as a starting point for the implementation of a truly effective feed-in tariff (FIT) that allows for the rapid development of as much renewable energy as possible. It is based on the hugely successes in Germany while taking into consideration the special circumstances here in Hawaii.

Background

In October 2008 the Governor of the State of Hawaii; the State Department of Business, Economic Development and Tourism; Hawaiian Electric Company, Hawaii Electric Light Company, Maui Electric Company ("Hawaiian Electric Companies"); and the Division of Consumer Advocacy of the Department of Commerce and Consumer Affairs signed the Energy Agreement that called amongst others for the introduction of a Feed-in Tariff.

Specifically the agreement stated:

- The parties are all committed to the rapid development of as much renewable energy as possible.

- The parties agree that feed-in tariffs should be designed to cover the renewable energy producer's costs of energy production plus some reasonable profit.

- [The parties agree] that the benefits to Hawaii from using a feed-in tariff to accelerate renewable energy development (from lowering oil imports, increasing energy security, and increasing both jobs and tax base for the state), exceed the potential incremental rents paid to the renewable providers in the short term.

- Successfully developing Hawaii's energy economy will make the State a global model for achieving a sustainable, clean, flexible, and economically vibrant energy future.

Clearly, 15 or 20% renewable energy is not a sufficient goal if we want to achieve a measurable independence from oil. A 70% or even 100% goal for renewable energy is achievable within a decade or two.

A properly designed FIT will lead to massive investments in clean energy, while a FIT designed with restrictions will bring about only small change towards the 20% RPS goal.

It is important to bear in mind the huge difference between the required investments of $15 billion to the existing electrical infrastructure value of $2 billion. The goal of a FIT is to enable the financing of these $15 billion by project financiers and developers. This is not the only solution to achieve energy independence. The utilities could find financing to undertake these projects themselves or the government could provide the financing. But under the current situation with the existing rules, a well designed FIT, project developers and low-cost financing offer the best chance for fast progress.

If the above numbers seem to make clean energy unaffordable, it is only because they don't include fuel costs. During the next 30 years Hawaii will need over $70 billion of oil imports to feed the current generators. A clean energy system will cost $15 billion and then operate at zero fuel cost.

Feed-in Tariff (FIT) definition

The single-minded purpose of a FIT is to create investment security for clean energy sources. Once this is done, enormous amounts of capital can be moved. For the successful design of a FIT, we need to focus on the need of investors to have a predictable stream of income for a long time.

FITs benefit the utilities by passing all the risks of building and operating clean energy facilities to the project developers. Because only the successful delivery of electricity is paid for, the utilities need to be much less concerned about the operational details of the projects.

Feed-in tariffs originated with PURPA in the U.S. and were introduced 1990 in Germany. They were not very successful until 2000, when the redesigned feed-in tariff (EEG) was passed in Germany. Internationally, the term feed-in tariff generally refers to this version because of its enormous success. Because Germany has less sun and wind than Hawaii, there is an incremental cost to this electricity borne by the customers. It is $1 per person per month and would not apply in Hawaii.

Misunderstandings

There are a number of misunderstandings that need to be cleaned up.

1) The FIT is a political tool in order to introduce more renewable energy (our stated goal). Although the FIT will reduce the consumer's cost, that is not the main objective. It is a political decision to include technologies with higher costs (eg. solar), if societal or technological benefits are seen.

2) Avoided cost - FITs are based on technology costs, never on avoided cost. Avoided cost does not adequately consider the replacement costs of conventional power plants, which are higher than the typical costs of building clean energy systems. Operating and

fuel costs of clean power systems are close to zero and therefore preferable to the rising cost of oil. Externalities, such as Global Warming, Oil Wars, pollution, oil spills are never included in avoided cost calculations. Avoided costs also fluctuate wildly as in the last year and are different on every island.

3) A FIT is never a subset of other laws, such as RPS or PURPA or tax incentives. It stands alone and also vastly outperforms all of them.

4) No higher costs for FIT in Hawaii. A FIT in Hawaii will reduce our electricity costs, because we have excellent sources of renewable energy and high oil prices. In Germany all the societal benefits mentioned above come with a price tag of about $1 per month per consumer.

5) Because the utilities will purchase on a kWh as available basis, they need to be less concerned about the details of the implementations. The project developer carries all the risks. A properly designed FIT includes standard interconnection procedures, the guarantee of interconnection and a fair distribution of the cost of interconnection. This will remove much workload from the utilities, resulting in faster progress.

Specific issues in Hawaii

Small grids - Grid stability is an important issue, as the grids are relatively small and not interconnected. In the initial discussions about Germany's FIT this has also been a big concern, but has been later proven unfounded. From Heco's documentation it seems like there is a need for additional load-mitigating investments (battery storage, pumped storage, peaking power plants) that are not undertaken by either Heco or the clean energy providers. We therefore propose a FIT category for such projects. (The Energy Agreement stated: "Energy storage, such as pumped storage hydro and battery energy storage as well as transmission and distribution facilities are considered as utility integrating technologies for generation resources. Energy storage and other technologies which provide ancillary services may be utility-owned or may be acquired with PPAs with appropriate prices, terms and conditions designed specifically for grid integration and ancillary services.") A FIT, rather than a PPA, creates more investment security and therefore lowers project cost.

Existing laws - RPS, PURPA, the competitive bidding framework, tax incentives have formed a dense legal framework around clean energy projects that is reasonably effective for the beginning stage of clean energy introductions but becomes a hindrance for large-scale deployment.

High costs - Hawaii's high energy costs and abundant natural energy resources make this one of the prime spots for clean energy in the world.

Government interest - We are blessed by having all levels of government (federal, state, county) pulling together towards clean energy. There is little support left for continuing our payments to oil exporters for much longer.

Cost effectiveness - while other nations plan for the future, the U.S. has a strong obsession about keeping costs low at the present moment. That has resulted in the U.S. falling far behind in clean technologies and the general upkeep of infrastructure. Fortunately in Hawaii the goals of clean technology and cost effectiveness combine ideally, because on average the cost of clean energy is here lower than the cost of oil energy. Every day we continue to burn oil for electricity, the people of Hawaii lose money.

Basic construction of a FIT

It has taken me a year to understand why this simple law made such a big difference in Germany. Only repeated discussions with German politicians and engineers revealed the mechanics behind the basic principles. These are:

1) Create a good financial basis for investments in renewable energy with a return on investment of 5-10%. This will create a huge amount of available investment capital.

2) Provide priority interconnection of renewable energy systems to the grid. If the grid needs to be updated, the utility should do so at its own cost. Interconnection costs from the nearest grid access point to the system are paid by the project developer.

3) Define minimum payments per kWh that stay fixed for a period of 20 or 30 years. The payments should be differentiated by technology, system size and possibly other factors. The reason for this differentiation is to allow a large variety of systems to be built, while staying with a 5-10% return on investment. If the return is too low, the investment will not be made. If the return is too high, the ratepayer is taxed. That said, the effect on the ratepayer is rather moderate compared to the impact of oil price instabilities.

4) Because the stated goal is the "rapid development of as much renewable energy as possible", there should be no caps. Caps create insecurity for investors and utilities and necessitate additional procedures to mitigate them. The scarcity of land and permits will limit clean energy production before the necessary amounts of energy can be generated.

5) A yearly reduction in the FIT payments of 5-8% is necessary to encourage early investments rather than have investors wait for lower system prices next year. This is a very important part of any FIT.

6) No curtailments. They create insecurity for investors and drive up the interest rate, creating a much larger impact on ratepayer's cost. Storage and electric cars will take care of the curtailment issue.

7) Regular reviews of the rates every 2 years should be done to keep inside the target range of 5-10% return on investment.

Hawaii-specific elements of a FIT

1) A FIT category for energy storage, such as pumped storage hydro and battery energy storage as well as other technologies which provide ancillary services. This will provide for investments in technologies that make the grid able to accept more as-available energy.

2) A non-capped FIT category for firm renewable power. This will encourage investments in new technologies that cannot be foreseen or calculated by the Commission. While such technologies' output could also be sold by PPAs or on the basis of PURPA, a FIT makes investment decisions much easier and therefore capital cheaper. To protect the ratepayer, this category should be close to estimated avoided cost.

3) A FIT category for firm power that is connected to the grid at multiple locations. This would allow for the combination of as-available energy with firming resources at another location.

Long range benefit of a FIT

In the following table we detail the development over the next 30 years of a steadily rising avoided cost relative to a fixed FIT. This table should make clear that it is in the interest of the consumer to have a guaranteed rate for as long as possible. Incidentally, the same is true for the investor, because she prefers long time steady payment flows.

Year	avoided cost	FIT
2009	$0.26	$0.26
2010	$0.28	$0.26
2011	$0.30	$0.26
2012	$0.32	$0.26
2013	$0.35	$0.26
2014	$0.37	$0.26
2015	$0.40	$0.26
2016	$0.43	$0.26
2017	$0.46	$0.26
2018	$0.50	$0.26
2019	$0.54	$0.26
2020	$0.58	$0.26
2021	$0.62	$0.26
2022	$0.67	$0.26
2023	$0.72	$0.26

2024	$0.77	$0.26
2025	$0.83	$0.26
2026	$0.89	$0.26
2027	$0.96	$0.26
2028	$1.03	$0.26
2029	$1.10	$0.26
2030	$1.19	$0.26
2031	$1.28	$0.26
2032	$1.37	$0.26
2033	$1.47	$0.26
2034	$1.59	$0.26
2035	$1.70	$0.26
2036	$1.83	$0.26
2037	$1.97	$0.26
2038	$2.12	$0.26

Scoping Paper Questions

1. I will leave the legal answers to this question to the lawyers, but here are my thoughts
    a) Avoided cost fluctuated wildly this year and will rise probably faster and higher than the table above. The FIT for wind will be lower than current avoided cost and solar will be higher. The benefits of solar (long life, easy integration in buildings, maintenance free) will outweigh the small extra cost for the first few years.
    b) The signatories to the Energy Agreement did agree "that the benefits to Hawaii from using a feed-in tariff to accelerate renewable energy development (from lowering oil imports, increasing energy security, and increasing both jobs and tax base for the state), exceed the potential incremental rents paid to the renewable providers in the short term."
    c) <left to professional opinion by the lawyers>

2. For FIT rates a determination would be made on the basis of existing FITs, responses to the 100 MW RFP by Hawaiian Electric and responses to the questions in Appendix A of this paper. Consider that the ratepayer will benefit by the rapid introduction of FITs below avoided cost. Consider that the benefits to Hawaii will outweigh FIT rates slightly avoided cost.
    a) <left to professional opinion by the lawyers>
    b) Gather cost responses to Appendix A until Jan 14 with a possible 14-day extension.

3. PURPA
    a) <left to professional opinion by the lawyers>
    b) <left to professional opinion by the lawyers>

c) A fixed price makes it easier to get investors than a fluctuating price
d) <left to professional opinion by the lawyers>

4. The RPS goal of 20% can and should be exceeded. The State tax credit is non-refundable and therefore only used by a part of the projects. It is therefore questionable if it should be included in any FIT calculations.
Net metering is well established and could continue for small projects.

5. Hawaii will benefit from the introduction of the FIT. We need the additional jobs, investments and reduction of fossil fuel expenses urgently.

6. The key issue for the spreading of renewable energy is the availability of investment capital. As explained above, a FIT is the best method to create massive investment in renewable energy installations.

7. Because wind energy is cheaper than oil-based energy, the shift to a mix of renewables dominated by wind will reduce the cost to the ratepayer. As explained above, the RPS goal should be vastly exceeded for the benefit of the islands.

8. Here are some numbers for 30 years, the lifetime of typical clean energy installations, based on a 100% conversion to renewable energy.
Oil is artificially cheap because externalities are not included in its price and paid by the taxpayer. A recent study estimates the real cost of a gallon of gasoline to be $19, once military, environmental and health costs are factored in. That would make $2 billion annual fuel expenditures carry $10 billion in externalities. Over 30 years that will be $300 billion in externalities saved. Germany created 250,000 jobs in renewables. Proportional to population, Hawaii would gain 4,000 jobs - and more. Investments and building expenditures of $15 billion are needed to build sufficient renewable energy systems. The state of Hawaii will save, over the next 30 years, $70 billion in oil imports for electricity generation plus $100 billion in oil imports if the transportation system is electrified. Ratepayers will pay on average (over the next 30 years) two thirds less per kWh generated.
This gives a total of around $500 billion in benefits for an investment of $15 billion. Clearly, a properly designed FIT can be very valuable.

9. Clearly, this is an "all hands on deck" situation to work together and gain these benefits for the entire state as soon as possible.

10. Between 2 years and 4 years (Germany). An automatic yearly reduction of the FIT by 5-8% needs to be planned in, as explained above.

11. There are good numbers for wind and solar. As explained above, firm renewable generation should have it's basic FIT to allow for many of the other technologies. As-available technologies that are still in the development stage (e.g. wave energy) are difficult to calculate. They should at least earn at least as much as wind power or provide their own firming and be sold at the firm renewable energy rate.

12. As we learn more about new technologies and their costs, appropriate FITs can be established that are based on a 5-10% return on investment. If these tariffs are more expensive than expected avoided cost, a political decision has to be made if their societal benefits outweigh the extra costs to ratepayers.

13. No, there should be no caps on FITs. The only valid reason for caps would be the provision of too much as-available energy, which would endanger grid stability. A good FIT for storage and ancillary power will take care of that problem. A good FIT for firm renewable energy will also encourage wind project developers to provide their own firming.

14. Certainly Heco needs to strengthen it's grids to accommodate renewable power from locations that have abundant energy, such as Oahu's north shore. These costs should be reimbursed.

15. Generally, as explained above, the longer a FIT defines a flat payment rate, the better. Germany has set 20 years, which is a good term both regarding life expectancy and financing horizon. Hawaii could choose 30 years. Interestingly, Germany has no policy for the remainder of the project's lifetime.

16. FITs generally treat a renewable energy producer separately from the consumer. The entire output gets sold to the utility and the consumer purchases from the utility. That said, a consumer could choose to use his own electricity first and purchase the remainder from the utility.

17. N/A (no cap, longtime FIT)

18. Since variable costs are small compared to fixed costs, most FITs operate with flat rates. They make it easier for the investors to calculate their income. And they are better for ratepayers, since the real cost for electricity is reduced by inflation.

19. The FIT rate is determined by the year in which the installation is put into service. Any renewable energy installation is eligible, disregard the RPS. Utility affiliates should be able to receive FIT payments, but only if there are no caps and there is a mandatory interconnection. Otherwise every producer shut out by caps or refusal to connect could (and would) sue the utility.

20. Stepped tariffs allow a larger bandwidth of projects to be reasonably profitable. As our goal is the rapid development of as much renewable energy as possible, this is a good thing. For each project parameter (size, location etc.) the return on investment is calculated to be 5-10%.

21. Natural energy (wind, sun, waves, hydro, OTEC, geothermal) is free, once the investment is paid for. Obviously, it is optimal to harvest as much of it as the installation

allows. Stored energy will generally be needed to control grid stability. Only biofuels can be stored and used at will and may benefit from a time-of-use rate.

22. The low risk of a FIT-based investment allows for leverages up to 90%, sometimes even higher. The calculation of the FIT should be based on the overall return on investment, independent of leverage.

23. Yes, lowering capital cost and increasing capital availability are the core reasons to have a FIT.

24. A properly designed FIT needs to have an annual decrease of 5-8% to encourage early development rather than create a wait-and-see response from the investor. A project put into service in 2009 would be paid 20 cents/kWh for 20 years. If it is put into service in 2010, it would be paid 19 cents/kWh for 20 years.

25. The companies I have interviewed are cautiously optimistic. They point out that a renewable energy system is a highly stable annuity investment. A lot of money pulled out of the stock market is searching for such secure places. For example, the Hawaii State retirement funds would fare much better if they were placed in wind and solar farms than the stock market.

26. Heco is a public company, striving to achieve higher returns. If there is a monetary benefit from pursuing renewable energy, it will likely happen. If there is no benefit and a reduction in the generating business and a corresponding loss of control, management would not fulfill its obligations to the shareholders. This has been the situation in the past years. The inclusion in the rate base is designed to pay Heco for actively pursuing renewable energy and is therefore a good thing. I leave the quantitative and legal analysis to the experts.

27. No comment.

28. Yes. Simply define Heco's allowed return on capital by the percentage of renewable energy delivered to it's customers.

29. This is one of the most difficult problems to solve. If a developer does not utilize the state tax credit, should he receive a higher FIT? If he gets a future carbon tax benefit, should his FIT rate be reduced? These problems result from the existing mix of incentives and merit further discussion.

CERTIFICATE OF SERVICE

The foregoing document was served on the date of filing by mail, postage prepaid, and properly addressed or electronically transmitted to each such Party.

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