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MPSC Staff Discussion Paper on Michigan Feed-In Tariff Policies

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Introduction

This paper provides ideas for consideration of feed-in tariff policies under either of two scenarios.[1] One scenario is for a feed-in tariff designed to work within the context of the renewable energy standard (RES) that was already established for Michigan in 2008 Public Act 295 (MCL 460.1001 et seq.). The second scenario is for a feed-in tariff policy intended to produce growth in Michigan renewable energy production; above and beyond the goal for meeting the State's renewable energy standard.

In both scenarios, important goals for feed-in tariff (FIT) policies, in no particular order, include:

- Securing opportunities for a broad diversity of renewable energy supply types;
- Securing opportunities for small-scale, distributed, and self-service power renewable energy production and use;[2]
- Attracting and retaining manufacturers of renewable energy equipment;
- Developing Michigan's entire renewable energy systems value chain (including, for example, resource prospectors, system designers, and equipment distributors, dealers, and installers); and
- Increasing public awareness and acceptance of renewable energy systems.

Scenario One Synopsis – Working in Concert with RES: In the first scenario, the major objective is to reduce electric supplier compliance costs for meeting RES obligations, compared to what those costs otherwise would be using only requests for proposals (RFPs) to attract renewable energy production. In this scenario, either the aggregate FIT capacity or total cost allocated to a FIT program (or both) would have to be restricted, to ensure that aggregate rate impacts are

[1] This document was prepared by MPSC Staff from the Renewable Energy Section, Electric Reliability Division. The document is intended to provide a starting point for discussions amongst interested parties. The ideas presented here are those of the authors, and do not necessarily represent positions on issues that may be adopted in the future by MPSC Staff or the Commission.

[2] There is no universally accepted definition of what constitutes small-scale or distributed renewable energy systems, and the parameters are likely to vary based on renewable energy technology (e.g., different sizes for biomass, hydro, solar, and wind). In Michigan, electricity supplied to consumers on-site (sometimes termed "behind the meter") is called self-service power (MCL 460.10a(12); http://legislature.mi.gov/doc.aspx?mcl-460-10a).

constrained, within the rate caps and capacity caps provided by 2008 PA 295.[3] In this scenario, FIT prices primarily would reflect the value of energy and capacity provided to the utility system. Staff's preliminary proposal, for discussion purposes, is to consider a program that would grow at a reasonable pace, until it eventually equals approximately 10% of each electric supplier's RES compliance requirement.[4]

Scenario Two Synopsis – Speeding Growth of Michigan Renewable Energy Markets, Above and Beyond RES Requirements: The second scenario is for a feed-in tariff program with capacity limits determined only by the rate at which development will proceed, once developers are provided a low-risk opportunity to earn a reasonable return on investment by installing Michigan renewable energy facilities. This approach would be intended to develop vibrant renewable energy markets that would grow as fast as practical. In this scenario, feed-in tariff prices primarily would reflect the cost necessary to develop particular renewable energy resources, including a reasonable return on investment. A major additional goal to be addressed via this scenario is to accelerate proactively the growth of renewable energy production and use in Michigan, while reducing the negative environmental and public health effects associated with fossil-fuel production and use, and advancing Michigan's capabilities for responding most expeditiously and economically to future global climate change rules or regulations.

Staff Analysis of Major FIT Program Design Criteria

In either scenario, MPSC Staff recommends adjusting the program, approximately once every two years, to try to maintain FIT prices at the most appropriate levels.[5] Generally, FIT prices should be adjusted to reflect cost reductions that result from improvements in equipment technology performance and manufacturing, and in the product pipelines from manufacturer to dealer and installer and on to the end use customer.[6] This is called tariff degression.[7]

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[3] The price cap provisions are in Section 45 (MCL 460.1045).

[4] This would be approximately a five-year program that eventually would grow to provide about 90 MW for Consumers Energy and 120 MW for Detroit Edison.

[5] There is an inherent tension between setting prices frequently to most accurately track changes in project costs, and less frequently to give developers ample time to undertake all preliminary work associated with being ready to complete a project and begin to deliver electricity. Programmatic details will need to be determined, regarding the schedule for reviewing and adjusting FIT prices. Also, the point in time and stage of completion at which a project is able to lock-in its FIT price and assured eligibility to obtain the FIT contract must be determined, unambiguously.

[6] Historically, many manufacturing industries have achieved similar cost reductions. For example, each doubling in the quantity of electronics manufacturing has typically been associated with a 10% decrease in product costs. (NASA, *Learning Curve Calculator*; http://cost.jsc.nasa.gov/learn.html.) From 1998-2008 the installed cost of solar PV has decreased by an average of 3.6% per year. (Wiser, Ryan, Galen Barbose, Carla Peterman, Naim Darghouth, 2009, *Tracking the Sun II: the installed cost of photovoltaics in the U.S. from 1998-2008, p. 10*; http://eetd.lbl.gov/ea/emp/reports/lbnl-2674e.pdf.) From 1982-2008, for every doubling of installed wind turbine capacity, globally, a 10.8% reduction in cost was realized. (Wiser, Ryan, Mark Bolinger, et al., 2009, July, *2008 Wind Technologies Market Report*, http://www1.eere.energy.gov/windandhydro/pdfs/46026.pdf, p. 33.)

[7] Depending on policy makers' objectives, FIT prices could also adjust automatically to prevent exceeding predetermined goals for capacity acquisition. One way to apply this technique is to reduce the rate paid for any new system's generation, if its addition would result in exceeding an annual or biennial goal while still remaining under a total FIT program cap. This would allow the market to reach intended goals, yet mitigates against over-saturation in any given time period.

In addition, Staff believes it is also best for FIT prices to adjust automatically and very rapidly (if not in real time) to any changes in the availability of financial incentives and subsidies. And, automatic FIT price adjustments designed to reflect actual system production should also be considered.[8] Both of these provisions will help prevent windfall profits for FIT system owners.

Staff also believes, based on historical experience with growth rates and market saturation for many other consumer goods, that it is appropriate for FIT prices to be adjusted to achieve approximately a doubling each year in the installed capacity in Michigan for each renewable energy production type and size category.[9]

Although one of the most important goals for Michigan is job attraction, creation, and retention, it should be understood that under either Scenario the Michigan market will be too small to make any considerable difference to manufacturers. This is especially true for Scenario One. Truly, manufacturers may be inclined to locate production facilities in states and countries where policies make markets most receptive to their products. But, the Michigan market, even unconstrained by implementation of a profitable, low-risk FIT program, is relatively so small that a Michigan FIT will be at most a modestly important lure for manufacturers.[10] Michigan's market is almost certainly too small, by itself, to significantly influence manufacturing quantities. On the other hand, a Michigan FIT could certainly advance the number of in-state installations sufficiently to produce significantly improved economies of scale and scope in the post-manufacturing value chain, which will help to translate into lower system costs in Michigan markets.[11] In addition, competition for manufacturing facilities is already high amongst Michigan, neighboring states, and Ontario, which already has established a comprehensive FIT

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[8] Couture, Toby, Cory, Karlynn. (2009). *State Clean Energy Policies Analysis (SCEPA) Project: An Analysis of Renewable Energy Feed-in Tariffs in the United States*, pg. 15; http://www.nrel.gov/docs/fy09osti/45551.pdf.

[9] MPSC and MEDC Staff are presently working on a report explaining the research that plausibly leads to the conclusion that an appropriate maximum desirable rate of growth is approximately annual doubling. Historically, many consumer appliances have achieved market growth rates in approximately this same range (*Fortune*, June 8, 1998, v137, n1, p. 64). Short-term growth rates much in excess of this range have led to serious concerns with renewable energy promotional policies, most notably for solar PV feed-in tariffs in Germany, France, and Spain (Dragomanovich, Vanya, March 2009, "Dark times for solar power," *Energy Risk* (London), p. S18 et seq.; EurActive Network, January 2010, *Germany, France cut support for solar power*, http://www.euractiv.com/en/energy/germany-france-cut-support-solar-power/article-189131; Rosenthal, Elisabeth, March 9, 2010, "Solar industry learns lessons in spanish sun," *New York Times*, p. A1). And, though a feed-in tariff policy was not used there, similar growing pains affected New Jersey in its efforts to provide subsidies for PV (Depalma, Anthony, "New Jersey dealing with solar policy's success," June 25, 2008, *New York Times, p. B1*). Staff's working hypothesis is that the entire value chain (from equipment manufacturing, to marketing and sales, to system installation and operation) can not be expected to grow faster than approximately annual doubling, without encountering significant problems.

[10] For example, *The Economist* (April 17-23, 2010, v395, n8678, p. 69) reports that a market study by Bloomberg New Energy Finance concludes the worldwide demand for photovoltaic installations in 2010 is approximately 17,000 MW (http://www.economist.com/business-finance/displaystory.cfm?story_id=15911021). And, similarly, the worldwide market for wind generation is expected to grow to 447 GW in the next five years according to a 2010 update; http://www.btm.dk/news/world+market+update+2009+forecast+2010-2014/?s=9&p=&n=31. According to the American Wind Energy Association, over 10,000 MW of new wind generation was installed in the U.S. in 2009. http://www.awea.org/newsroom/releases/04-08-10-U.S._Wind_Industry_Annual_Market_Report.html.

[11] There is already evidence of significantly decreased prices for solar PV equipment in states with larger markets. See, for example: Wiser, Ryan, et. al. (2009), *Tracking the Sun II: The Installed Cost of Photovoltaic in the U.S. from 1998-2006*; p. 18; http://eetd.lbl.gov/ea/emp/reports/lbnl-2674e.pdf.

program. In the face of such competition, a Michigan FIT (or some other policy framework capable of achieving similar levels of market development) could turn out to be a necessary but not sufficient element of a successful industrial recruitment policy.

Other important questions are whether larger-scale renewable energy projects should be eligible for FITs and whether utilities or their affiliates should be eligible to participate in a FIT program. Absent reliable information to support the opposite point of view, Staff does not think it makes sense to extend FIT offerings to utility-scale projects in Michigan, especially under the constraints of Scenario One. Staff does believe that it might be possible to structure a Michigan FIT program with ownership constraints along the lines of those already included in 2008 PA 295, which limits utility ownership to a maximum of 50%.

Preliminary MPSC Staff Recommendations for FIT Pricing

1. For a program intended to work in the context of the existing RES, use price setting based on the value renewable energy resources deliver to the utility system, with adjustments only as necessary to accommodate specific higher cost resources.

This approach would establish FIT prices based on the best available estimations of the value of the renewable energy generation to the utility company and conceivably to society as a whole. Examples of utility values include system (grid) benefits based on the specific time and location of electricity production.[12] Examples of societal values, among others, include the associated increases in in-state employment and the state and local economies, contributions towards reductions in air pollution and climate change mitigation, improved health impacts, and reduced energy security concerns.[13]

Calculating utility values can lead to discussions about what constitutes a utility's avoided costs. In U.S. jurisprudence, the avoided cost concept first appeared in the federal public utilities regulatory policy act (PURPA) of 1978. That law defined avoided cost as "the cost to the electric utility of the electric energy [and capacity] which, but for the purchase from [a] cogenerator or small power producer, such utility would generate or purchase from another source."[14] Under PURPA, state public utility commissions, such as the Michigan Public Service Commission (MPSC), were delegated authority for establishing utility avoided costs.[15] State commissions were given broad discretion regarding the establishment of avoided cost rates.

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[12] Lovins, A. B., Kyle Datta, Thomas Feiler, Karl R. Rábago, Joel N. Swisher PE, André Lehmann, and Ken Wicker, 2002, *Small is Profitable: the Hidden Economic Benefits of Making Electrical Resources the Right Size*; *Sections 2.2.9.6 (pp. 188-190); 2.3.2.9 (p. 242); and 2.4.1 through 2.4.10 (pp. 279-307);* (www.smallisprofitable.org). See also the discussion at the bottom of p .8 and top of p. 8, about the development of renewable energy systems at brownfield locations, .

[13] Ibid. The *Small is Profitable* appraisal identifies a total of 207 discrete benefits associated with distributed electric power generation. The gravitas of this assessment is that distributed electric power generation is frequently fully cost competitive today, but extant analytical and accounting practices – on the part of both utilities and their regulators – fail to value properly all of the associated cost-saving and risk-reducing benefits.

[14] Hempling, Scott, Carolyn Elefant, Karlynn Cory, and Kevin Porter, 2010, January, NREL/TP-6A2-47408, http://nrri.org/pubs/electricity/NRRI-NREL_renew_energy_prices_jan10.pdf, p. 7.

[15] The last time the MPSC explicitly established utility avoided costs was in its January 31, 1989 Order in Case No. U-8871, et al., http://www.dleg.state.mi.us/mpsc/orders/archive/pdfs/U-8871_01-29-1989.PDF, pp. 57, et seq.

Avoided costs may differentiate between various power sources, depending on their generating characteristics. In concept, this is very similar to the idea of pricing electric generating resources based on the value they provide to the utility system.

Staff proposes using the Commission-approved transfer price for each type of renewable energy as a preliminary indicator of avoided cost and value to the utility system.[16] Transfer prices are based on a combination of forecast market prices for electricity plus an estimated capacity value differentiated by technology type (e.g., biomass and hydro, solar, wind). Based on recent experience with renewable energy supplier bids in response to Michigan utility RFPs, it appears that transfer prices, without any additional subsidy, will be sufficient to attract some biomass (woody-biomass, agricultural waste, or wastewater treatment plant combustors, gasifiers, or digesters; landfill gas; and perhaps waste-to-energy systems),[17] hydroelectric and hydrokinetic, and wind energy projects.

Although solar electricity costs are continuing to decline, solar is presently more expensive compared to other renewable energy sources. Thus, attracting solar projects via value-based compensation could necessitate provision of some added subsidy. However, Michigan's renewable portfolio standard law already provides extra credit for solar production.[18]

Possible feed-in tariff policy strategies advocated by MPSC Staff include: (a) using minimal adjustments from the value-based price assessments, in order to attract solar and other worthy higher-priced investments; (b) establishing a FIT portfolio with capacity or spending limits on each major renewable energy project type, so that the entire FIT portfolio meets the goal of being value-based, even though a solar or other high-priced fraction might still require a subsidy; (c) using second-price auctions to attract investments at the lowest achievable price; and (d) using state-of-the-art utility green pricing programs to allow Michigan electric customers to voluntarily agree to pay higher long-term fixed-price rates in the near-term, in order to support the increased production and use of in-state renewable energy; in excess of the RES goal, which

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[16] Transfer prices arise from Michigan's Clean, Renewable and Efficient Energy Act of 2008, Section 47(2)(b)(iv) (MCL 460.1047).

Transfer prices for Consumers Energy and their calculation are referred to in the testimony of witness David F Ronk, Jr. (http://efile.mpsc.state.mi.us/efile/docs/15805/0024.pdf; Exhibit A-15 (DFR-8), pp. 48-156) and Jennifer S. Rose (http://efile.mpsc.state.mi.us/efile/docs/15805/0024.pdf; Exhibit A-23 (JSR-6) pp. 204).

For Detroit Edison, see testimony of witness Irene M. Dimitry (http://efile.mpsc.state.mi.us/efile/docs/15806/0026.pdf; pp. 57, 62) and James H Byron (http://efile.mpsc.state.mi.us/efile/docs/15806/0026.pdf; pp. 83-100, Exhibit A-8 (JHB-4) pp. 108). These transfer prices were adopted by the Commission, in its May 26, 2009 Order in Case No. U-15805 for Consumers Energy (http://efile.mpsc.state.mi.us/efile/docs/15805/0177.pdf, p. 32) and June 2, 2009 Order in Case No. U-15806 for Detroit Edison (http://efile.mpsc.state.mi.us/efile/docs/15806/0150.pdf p. 33).

To facilitate valuing different resources according to their time of production, transfer prices might be established on an hourly basis, or average monthly on-peak and off-peak basis.

For the currently approved 20-year schedule of average annual transfer prices, see Attachment B.

[17] It should be noted that many waste-to-energy systems may not qualify as renewable energy systems under Michigan law, but could possibly qualify for the production of Alternative Cleaner Energy. See http://www.michigan.gov/documents/mpsc/rps_eligibility_287865_7.pdf.

[18] Michigan law provides two bonus Michigan renewable energy credits (MIRECS; http://www.mirecs.org) for solar electricity, in addition to the base MIREC, for a total of 3 MIRECS for each MWh of solar generation. Other Michigan incentive credits also apply, for systems installed by a Michigan workforce, equipment manufactured in Michigan, and on-peak electricity. See MCL 460.1039(2); http://legislature.mi.gov/doc.aspx?mcl-460-1039.

is nominally 10% by 2015. These concepts are not mutually exclusive. On the contrary, important synergies could result from using them in combination. Each concept is discussed in more detail here:

(a) Use minimal adjustments from the value-based approach in order to attract solar and other worthy higher-cost investments.

A first step in making value-based feed-in tariffs work for solar and conceivably other worthy higher-cost renewable energy installations is to establish the expected value, taking into account the time and location of production.[19] If the expected utility system value is not sufficient to attract investment, then a second step is to calculate the amount necessary to attract investment. In this step, MPSC Staff recommends establishing solar FIT rates at the lowest end of the profitability index (e.g., a PI score of 0.1).[20] The difference between the value-based estimate and the price necessary to attract investment will have to be provided, one way or another, as a subsidy.

In this context, it should be noted that long-term feed-in tariff contracts greatly reduce the financial and regulatory risk associated with qualifying projects. Therefore, single-digit rates of return on investment could prove sufficient to attract investment. Staff recommends setting FIT rates at the lowest end of the profitability index, with the option of increasing FIT rates in the future, as necessary to maintain an annual doubling in the installed capacity.[21]

(b) Establish a FIT portfolio with capacity and spending limits on each major renewable energy project type, so that the entire FIT portfolio meets the goal of being value-based, even though any high-priced fraction might still require a subsidy.

Feed-in tariffs usually offer prices that differentiate between technology types and system sizes.[22] Staff's proposal is to develop a portfolio of FIT resources that will include some of the lowest cost renewable energy resources available. In Michigan, these are presently thought to

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[19] Due to the close correlation between the peak hours of PV production and Michigan electricity peak demand times, solar electricity production can help to serve peak loads. Because daily and monthly PV production matches peak demands fairly well, PV will tend to offset production or purchases with generally high market prices.

This relationship is being researched now for an MREP publication (Pung, Matthew L., and Pratt, Robert G., In Press, *Is Net-Metering Fair? Michigan Solar PV Electricity Value Based on Time of Production and Use*).

See also Lovins, A. B., Kyle Datta, Thomas Feiler, Karl R. Rábago, Joel N. Swisher PE, André Lehmann, and Ken Wicker, 2002 (op. cit., fn 5), Section 2.2.8 *Matching loadshapes*. In addition to solar's benefit of high correlation of energy production and peak demand, solar is extremely modular and can be built very quickly to match additional capacity requirements. Solar energy production is also fairly predictable from day to day, which at least partially helps to mitigate costly ISO day-ahead prediction error in the form of Resource Sufficiency Guarantee (RSG) charges. Transmission loss costs related to congestion are typically eliminated for solar PV installations at or very near the location where the electricity production is used.

[20] The profitability index is the quotient of present value of future cash flows divided by the present value of the initial investment; expressed as a ratio. See Mian, M.A., 2002, *Project Economics and Decision Analysis: Volume 1: Deterministic Models*, Tulsa, OK: PennWell, pp. 280-282.

[21] Op. cit., fn 6 and fn 9.

[22] It could also be advantageous to differentiate prices based on geographic location; to reflect additional values provided by generators installed at particular places on the grid. See Lovins, A. B., Kyle Datta, Thomas Feiler, Karl R. Rábago, Joel N. Swisher PE, André Lehmann, and Ken Wicker, 2002 (op. cit., fn 12), Section 2.3.2.2, *Grid losses: potential reductions*.

include specific types and sizes of biomass, hydro, and wind; not solar. Staff believes that a portfolio can be designed and managed to allow some higher-cost systems to be installed; as long as their higher cost is balanced by appropriate numbers of lower-cost systems. In this way, Staff expects a portfolio can be managed so that the total FIT program cost remains less than a similar capacity portfolio comprised only of resources procured using RFPs.

In order to determine how much variability should be offered in FIT prices, major questions need to be reviewed and discussed with interested parties. These include which system types will be eligible for FITs, for what sizes of systems, and for what specific system characteristics. For example, both Consumers Energy and Detroit Edison presently offer programs similar to FITs, but only for small scale solar photovoltaic (PV) installations and on a capacity-limited experimental or pilot program basis.[23] MPSC Staff recommends consideration of gradually, progressively expanding these programs to offer reasonable opportunities for the other major renewable energy system types (biomass, hydro, and wind). Staff further recommends establishing upper limits on system sizes eligible for FITs. Preliminarily, Staff recommends allowing systems up to 20 MW.[24] Depending on the review of federal and state legal issues and after receiving input from interested parties, Staff could be persuaded to support different maximum capacity sizes for various system types.

In addition to these basic program parameters, many details remain to be discussed and decided. For example: Should eligibility be restricted for biomass systems to those that meet minimum conversion-efficiencies (of the fuel energy content to useful energy production) to discourage waste and encourage high-efficiency combined heat and power installations? How can a FIT program best insure that all participating renewable energy systems will employ best practices for system design, high quality construction, and be well-maintained, so that they prove to be most productive and reliable? Should advanced energy storage technologies be offered FIT treatment, and if so what details need to be developed for standard-offer contracts? Is there an appropriate means to incorporate energy optimization (EO) practices in conjunction with a FIT program? For example, this might be accomplished through standard offer contracts for energy and capacity reductions associated with EO measures, or by requiring renewable energy system developers to match FIT capacity with some level of EO resource acquisition. Should the program allow or encourage participation for self-service power (provided to or produced by customers, behind the meter)? How about for off-grid systems?

[23] Consumers Energy presently offers its Experimental Advanced Renewable Program, which is a 2 MW pilot program offering producers a fixed-priced feed-in tariff for up to 12 years, with different prices for residential and non-residential participants. See http://www.consumersenergy.com/content.aspx?id=1801&sid=107. Detroit Edison presently offers its Solar Currents Program. This is a solar PV pilot program offering financial incentives for systems between 1 and 20 kW, which can be eligible only when enrolled in the Company's net metering program. Those financial incentives include $2.40 per Watt as an up-front payment designed to reduce installation costs, plus the purchase of MIRECS from 100% of the PV system output over the course of 20 years, at 11¢/kWh. See http://www.dteenergy.com/residentialCustomers/productsPrograms/solarCurrents/solarCurrents.html.

[24] Op. cit., fn 14, pp. 35-36. Until experience is gained with the application of feed-in tariffs in Michigan, Staff's recommendation is to use RFP processes for systems larger than 20 MW, while developing standard offer contracts as a means of attracting projects 20 MW and smaller. Most projects 20 MW and smaller will be interconnected to the distribution system, which remains under Michigan PSC jurisdiction for interconnection standards and costs.

There are still other ways to restrain and manage growth in FIT participation. For example, certain system types or sizes might be required to be installed on a qualified brownfield site, in order for the completed system to be eligible for a FIT. This approach could have the benefit of making the system eligible for brownfield redevelopment incentives, which would help to reduce the FIT price necessary to attract investors. And, many if not most Michigan brownfield sites could be associated with higher than average utility system locational values and ample existing and underutilized electric utility infrastructure to support small power generation facilities. Another requirement for FIT participation might be community-based energy development (C-BED).[25] A third might be to extend FIT treatment to systems financed in part using Michigan property assessed clean energy (PACE) bonds, and/or Michigan Saves financing.[26]

Subject to the results of dialogue with interested parties on these concepts, Staff is generally supportive of including one or more of these kinds of criteria as prerequisites for FIT participation, for at least some system types and sizes and until it can be demonstrated conclusively that the renewable resource portfolio supported through FIT policy is fully cost competitive compared to traditional means of expanding the utility resource portfolio. Logically, Staff prefers a FIT program with the broadest possible eligibility for system types and sizes. However, Staff does realize that various means may be required, at least for the time being, to keep in check the total program scope, participation, and cost. Such prerequisites can help to constrain the universe of eligible participants in a reasonable way while simultaneously advancing important added public policy objectives. Furthermore, depending on the criteria they can also reduce total system costs and thus required FIT payments. Therefore, Staff believes that prerequisites such as the ones discussed above are reasonable to consider when designing a FIT program.

MPSC Staff proposes to convene an open collaborative working group to address these and any additional questions regarding FIT program design and implementation.

(c) Use second-price auctions or Dutch auctions, to reduce FIT prices as much as practical.

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[25] There is no universally accepted definition for what defines a project as being community-based. Typically, C-BED refers to projects with at least a significant fraction of local ownership and local control. C-BED projects may be undertaken by: a municipality (village, township, city), or a county, or any associated group of local and/or county governments; or by any school, college, university or group of the same; or by any group of local non-governmental investors. C-BED services and systems may be provided for use in and to reduce energy costs for either government facilities or for facilities owned and operated by any group of constituents. For more information see: www.c-bed.org/, www.windustry.org, and www.newrules.org/energy/rules/communitybased-energy-development-cbed. Legislation related to C-BED is presently under consideration in Michigan. See House Bills 4023, 4243, 5640, and 5663, at http://www.michigan.gov/documents/mpsc/mi-renew-legislation_313395_7.pdf.

[26] PACE financing allows municipalities to use their bonding authority to raise funds that can be lent for energy related investments, which are then paid back through property tax bills. See http://www.pacenow.org. House Bill 5640 would authorize PACE financing in Michigan. See http://legislature.mi.gov/doc.aspx?2009-HB-5640.

Michigan Saves is the name for a program now being developed. The *Michigan Saves* approach is intended to allow consumers to make investments in energy efficiency and renewable energy, with no up front payments required. *Michigan Saves* financing may be established so that customer payments for procuring energy efficiency and renewable energy measures can be made through utility bills. See http://www.michigansaves.org/.

In general, these auction techniques are intended to result in markets that clear at the lowest available price. For FITs, MPSC Staff proposes establishing price ceilings (for each system type and size). This can be done through a combination of methods, including analysis of system costs using Profitability Index calculations, reviewing bids in recent utility RFPs, and reviewing the value basis for each system type. Preliminarily, Staff believes all three methods should be utilized in order to ascertain how much FIT prices would diverge, given the findings from the various methods. The effective price ceiling would be communicated to all potential bidders, who would then be asked to propose how much lower than the ceiling they are willing to accept. Bids would be accepted in the order of ascending prices, until the capacity cap is reached.

Because an auction of this type sounds so similar to the current RFP process, it is important to understand how it would differ. The essential difference would involve minimizing any deviations from a standard contract offer, with the sole exception of the price. Bidders would basically be assured that they would be able to complete their project and sell the output under the terms from a standard offer contract, as long as their price would be determined to be competitive. To the extent that standardization of contract terms can be achieved, the consequence would be substantially different from the current RFP process, which to date has resulted in bidders negotiating a variety of terms diverging from a standard power purchase agreement (PPA). MPSC Staff proposes using the collaborative working group to try to achieve consensus on the essential terms for standard offer contracts, which may be modified as necessary for the various renewable energy system types.

Staff recognizes the inherent tension between fixed-price offerings and an auction process. Staff recognizes an auction process could result in increased costs for participants and administrators. Staff recommends utilizing both techniques – fixed prices and auctions – on an experimental basis, until it can be determined that one approach or the other yields superior results.[27]

(d) Use voluntary green rate offerings.

In addition to volumes of renewable energy necessary for electric providers to meet their obligations under Michigan's RES, some Michigan electricity customers are ready and willing to sign long-term contracts to purchase renewable energy resources at a fixed price, even if that fixed price is presently higher than current rates. Staff believes such rates may be established for customers of Michigan electric suppliers. If so, any programmatic capacity cap for FITs could be allowed to expand as large as necessary to serve this voluntary market. This approach could allow expansion beyond the limits presently imposed by Michigan's RES. Staff also believes an internet-enabled double auction process can be used to aggregate both customer demand and the

[27] National Renewable Energy Laboratory staff report that sufficient evidence does not presently exist to conclude, either way, that administrative costs will be higher or lower for an auction versus a traditional fixed-price FIT (personal communications with Lori Bird and Claire Kreycik, April 23, 2010).

available renewable energy supplies to meet that demand.[28] The ultimate goal of a double auction is to maximize available supply and demand while simultaneously minimizing price. Staff believes both the voluntary green pricing and internet double auction should be further explored and developed, but it should also be recognized that a pre-existing FIT program could be augmented, at any time, by the addition of one or both approaches.

2. For a program with capacity limits determined only by the market-based rate of development for Michigan renewable energy resources, use price setting based on a hybrid of the value to the utility system, with cost-adders as necessary to incorporate all major technology choices.

This approach, identified at the beginning of this memo as Scenario Two, could benefit from application of any of the above-mentioned concepts. With this scenario, the primary emphasis would be on establishing FIT prices based on the best available data on Michigan renewable energy system development costs and productivity. FIT prices would be developed using the Profitability Index methodology, based on analysis of those costs and calculations of reasonable rates of return. FIT prices would be set so as to encourage rapid development of renewable energy resources, and would be adjusted every year or two, to try to maintain an annual doubling in the installed capacity of each major system type in Michigan.

It should be pointed out that this method for establishing feed-in tariff prices is very similar to the process historically used in Michigan to establish revenue requirements and utility rates. Traditionally, utilities built electric generating facilities and then applied to the Public Service Commission for rate recovery, which was based on the prudent and reasonable costs of construction and ongoing operation, with a reasonable rate of return on the invested capital. Feed-in tariffs differ only to the extent that: (a) the facility developers are not necessarily utilities; and (b) prices are pre-determined through a process based on the best available development cost estimates, rather than after the fact cost accounting.[29]

Finally, it should also be pointed out that traditional utility integrated resource planning (IRP) principles hold that cost-competitive renewable energy resources are a preferred option. Under traditional utility regulation, this means that to the extent renewable resources can be supported using value-based payments alone, without subsidy, they should be procured without limit.

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[28] In a double auction, both buyers and sellers participate simultaneously. Buyers indicate their interest in purchasing, and sellers indicate their interest in producing, the same commodity. Both buyers and sellers provide bids for both price and quantity. See, for example: Kambil, Ajit and Eric van Heck, 2000, *Online Auctions: A Primer*, Accenture Institute for Strategic Change, http://www.accenture.com/NR/rdonlyres/39835575-9A32-4110-8CC5-6BF39B4D9CA5/0/ggOn_Line_AuctionsA_Primer.pdf, p. 5; and Tesfatsion, Leigh, 2002 Winter, "Agent-Based Computational Economics: Growing Economies from the Bottom Up," *Artificial Life*, v8, n1, pp. 55-82, http://www.mitpressjournals.org/doi/abs/10.1162/106454602753694765.

[29] For more information see: Mendonca, Miguel (for World Future Council), 2007, *Feed-In Tariffs: Accelerating the Deployment of Renewable Energy*. London: Earthscan; www.earthscan.co.uk/?tabid=298; Hempling, Scott, et al., 2010, *Renewable Energy Prices in State-Level Feed-in Tariffs: Federal Law Constraints and Possible Solutions.* National Renewable Energy Laboratory; TP-6A2-47408; www.nrel.gov/analysis/publications.html; and Cory, Karlynn, Couture, Toby, and Kreycik, Claire, 2009, *Feed-in Tariff Policy: Design, Implementation, and RPS Policy Interactions*. National Renewable Energy Laboratory; http://www.nrel.gov/analysis/publications.html.

Although this statement is an oversimplification of the details associated with this IRP principle, the main point is that renewable resources might be supported by value-based FITs, even much in excess of the currently applicable 10% Michigan RES.

Attachment A, on the following pages, summarizes these MPSC Staff preliminary recommendations.

Attachment A:
Summary Table: Concepts for FIT Implementation

Payment Options for FIT			**MPSC RE Section Staff Notes**
Price setting based on:	Cost of generation	Actual development cost, plus profit	Single-digit percent profit should be ample reward for motivated investors. Since FIT contracts result in low risk, lower returns are appropriate.
	Value to the utility system	Based on time of delivery, avoided costs, grid values, and/or etc.	Start by using transfer prices, and include additions based on known, measurable utility system values that are not already accounted for when calculating transfer prices. This approach may require offering FIT payments in the form of levelized or even front-loaded, rather than nominal, transfer prices.
	Hybrid		Use the "value to the system" methodology where sufficient, but use a price-adder for systems not quite fully economical. Establish a combined FIT portfolio that meets the value-based criteria as a whole, even though some fraction of eligible resources will receive subsidies.
Differentiated based on:	Technology and fuel type	Reflects grid value and/or project costs for each technology	Solar only? Ag-Waste or Community Digesters? C-BED projects? Staff recommends including multiple system types.
	Size	Helps mitigate windfall profits due to economies of scale.	Use approved sizes, per MPSC interconnection standards rules: 0 to 20kW / 20+to150kW / 150+ to 1MW / 1+MW and larger? Allow a maximum of 20 MW, and perhaps limit only to systems interconnected at distribution system voltages, to cover only MPSC-jurisdictional systems.
	Resource quality	Helps mitigate windfall profits from above-par resources.	Not so relevant with solar. Mostly a concern for wind.
	Location	Siting in particular locations can produce specific added value to the utility grid and perhaps lower development and production cost.	Offer variable locational pricing, based on provision of specific grid values. Encourage: brownfield redevelopment, siting close to loads, and self-service power systems, serving behind-the-meter loads. For systems making electricity using any thermal process, encourage only high-efficiency combined heat and power (CHP) applications.

Payment Options for FIT (continued)			**MPSC RE Section Staff Notes**
Further differentiated to encourage:	Energy production coincident with peak demand		Ties into "value to the system" and “hybrid” pricing approaches.
	Specific preferred ownership structures (e.g. community ownership, schools)		Possible limits or prerequisites to restrict eligible participants? Staff may support a program that limits eligibility for some sizes or types of installations to, for example: brownfield redevelopment projects; community-based projects (see fn 25, p. 8); PACE or Michigan Saves financed projects; etc.
	Combined requirements for energy efficiency plus renewable energy?		Could act as a further limit to eligibility. Provides additional system value, which may be an additional reason for supporting this policy.
Adjusted based on changes over time:	Tariff degression	Projects receive long-term contracts based on prices in effect when they enter commercial operation. Projects completed in subsequent years will receive lower prices, based on cost improvements throughout the value chain.	Differs for each technology based on learning curve cost reductions.
	Periodic adjustment	Payment adjustments can be used to most accurately track actual electricity production.	Could integrate with front-loaded and/or performance differentiated FIT prices.

Implementation		**MPSC RE Section Staff Notes**
Eligibility	Vintage: Target all installations or only those installed after a certain date.	Staff may support eligibility for qualifying pre-existing projects, such as for net-metering customers and C-BED, with contracts prorated to reflect pre-program installation.
Contract length	Current Michigan range is generally from 12 to 20 years.	Staff may support whatever contract lengths are desired on the part of interested system developers, as long as prices meet value-based criteria and will not lead to windfall profits or dysfunctional markets.

Implementation (continued)		**MPSC RE Section Staff Notes**
Purchase obligation	Electric provider required to purchase generation and give priority over other power projects.	Staff generally supports mandatory REC transfer to electric suppliers whose ratepayers provide FIT payments. But, depending on the outcome of further cost analysis and the level of FIT program caps vis a vis Michigan's RES, Staff might support allowing non-subsidized producers to retain REC ownership.
Interconnection	Cost sharing of grid upgrades and interconnection costs.	Follow the current MPSC interconnection and net metering standards rules, and supplement with grant funding if needed to cover interconnection costs. Encourage systems only where the location produces sufficient grid benefits compared to interconnection costs?

Programmatic Elements		**MPSC RE Section Staff Notes**
Program Revision	Review every year for the first 5 years. Every 4 years thereafter.	Staff generally supports either annual or biennial review and ratesetting.
Caps	Program-wide or utility/provider cap.	Grow over approximately 4-5 years, to fill approximately 1% of total sales for each Michigan energy provider (estimated at 90 MW for Consumers Energy and 120 MW for Detroit Edison). Cap based on total FIT program cost as a fraction of RES compliance cost? Explore the option of a program where the state procures resources and then allocates costs to all electric providers based on a pro-rata share of statewide sales (similar to Illinois and New York).
	Individual project size.	Limited to 20 MW or smaller? Limited only to distribution system interconnections?
	Technology type or other caps	Limits for specific technology types or sizes? Limits for types of facilities developed (e.g., school or local government buildings only?; brownfields only?)
Financing options	Ratepayer funded.	Through PA 295 surcharge.

Attachment B:
Table of MPSC Approved Transfer Prices for Electricity from Renewable Resources

		Consumers Energy Transfer Price Schedule (Rose, Exhibit A-23)					Detroit Edison Transfer Price Schedule (Byron, Exhibit A-8)			
Year		Anaerobic Digester	Landfill Gas	Solar	Wind		Landfill Gas	Anaerobic Digester	Solar	Wind
2009		$52.28	$51.84	$69.94	$49.78		$51.66	$52.05	$70.21	$49.66
2010		$58.96	$58.42	$78.97	$55.92		$58.20	$58.67	$80.73	$55.77
2011		$62.41	$61.69	$83.59	$58.36		$61.40	$62.03	$91.45	$58.16
2012		$80.86	$79.79	$99.94	$74.79		$79.32	$80.27	$124.27	$74.49
2013		$86.02	$84.41	$107.63	$76.91		$83.74	$85.17	$151.35	$76.47
2014		$92.07	$89.83	$117.50	$79.42		$88.90	$90.88	$182.81	$78.80
2015		$99.78	$96.98	$129.38	$83.97		$95.82	$98.29	$213.13	$83.20
2016		$102.84	$99.92	$133.43	$86.35		$98.65	$101.23	$220.65	$85.53
2017		$104.90	$101.87	$135.34	$87.75		$100.60	$103.29	$227.87	$86.92
2018		$107.99	$104.84	$139.60	$90.17		$103.53	$106.32	$235.79	$89.30
2019		$112.58	$109.31	$145.68	$94.07		$107.95	$110.85	$245.31	$93.17
2020		$116.95	$113.55	$151.64	$97.72		$112.07	$115.07	$254.39	$96.76
2021		$122.39	$118.86	$159.02	$102.40		$117.38	$120.51	$265.70	$101.43
2022		$127.58	$123.91	$165.71	$106.81		$122.38	$125.63	$276.51	$105.80
2023		$133.70	$129.88	$173.67	$112.11		$128.29	$131.67	$288.47	$111.06
2024		$140.49	$136.53	$182.73	$118.07		$134.80	$138.30	$300.73	$116.95
2025		$142.73	$138.60	$184.99	$119.41		$136.89	$140.54	$309.88	$118.28
2026		$148.16	$143.88	$192.19	$123.94		$142.09	$145.89	$321.88	$122.76
2027		$154.20	$149.74	$200.03	$129.01		$147.89	$151.83	$334.75	$127.79
2028		$164.04	$159.41	$215.67	$137.86		$157.39	$161.48	$351.16	$136.55
2029		$170.78	$165.98	$224.55	$143.62		$163.98	$168.23	$365.58	$142.29
Simple Average:		**$113.41**	**$110.44**	**$147.20**	**$96.59**		**$109.19**	**$111.82**	**$233.93**	**$95.72**

Source: Transfer prices for Consumers Energy: testimony of witness David F Ronk, Jr. (http://efile.mpsc.state.mi.us/efile/docs/15805/0024.pdf; Exhibit A-15 (DFR-8) pp. 48-156) and Jennifer S. Rose (http://efile.mpsc.state.mi.us/efile/docs/15805/0024.pdf; Exhibit A-23 (JSR-6) pp. 204). For Detroit Edison: testimony of witness Irene M. Dimitry (http://efile.mpsc.state.mi.us/efile/docs/15806/0026.pdf; pp. 57, 62) and James H Byron (http://efile.mpsc.state.mi.us/efile/docs/15806/0026.pdf; pp. 83-100 and Exhibit A-8 (JHB-4) pp. 108). These transfer prices were adopted by the Commission pursuant to approving the Companies' renewable energy plans in its May 26, 2009 Order in Case No. U-15805 for Consumers Energy (http://efile.mpsc.state.mi.us/efile/docs/15805/0177.pdf, p. 32) and June 2, 2009 Order in Case No. U-15806 for Detroit Edison (http://efile.mpsc.state.mi.us/efile/docs/15806/0150.pdf p. 33).