FINAL REPORT

EVALUATION OF THE ENERGY TRUST OF OREGON BIOPOWER PROJECT SOLICITATION

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October17, 2006

Executive Summary

This report presents the results of a process evaluation of the Energy Trust of Oregon's (Energy Trust's) solicitation of projects for its Biopower program. A two-stage solicitation was used: the RFP for the first round of proposals was issued in May 2005, and 25 proposals were received, representing a potential total generation capacity of approximately 91 nameplate MW. Of these, 16 projects were accepted into Round 2, with 10 projects submitting proposals by the October 14 deadline. After careful screening, 5 finalists representing 6 projects were selected for negotiations, with the following results.

- One contract has been signed to fund a more detailed technical study .
- Two projects -- a wastewater plant and a lumber mill -- have signed contracts to proceed with Energy Trust funding, representing 3 MW of capacity.
- Negotiations were terminated for two projects over ownership of Green Tags associated with power that would be sold by the project.
- Negotiations for a third project were suspended because the project could not be operational before the expiration of the Federal production tax credit (PTC).

In addition, six projects that participated in the RFP process – four in the dairy sector and two landfills -- appear to be going forward on their own – either because the review process found that they did not have above market costs or because the developers decided to proceed without Energy Trust involvement.

Overall, bidders commented favorably on the RFP process.

- The two-stage RFP process gave them an opportunity to submit a Round 1 proposal to evaluate the viability of their project without all the details required for the second round.
- RFP respondents approved of the clarity of the Energy Trust's goals, the types of projects considered, the description of the technical and financial requirements, and the general criteria for consideration. The level of effort and detail required to prepare the proposals was also seen as appropriate.
- Issues raised by finalists who had entered into final negotiations (both those who ultimately signed contracts and those who did not) included the treatment of Green Tags, the required time frame for the projects, and the perceived lack of transparency in the Energy Trust's calculation of above market costs.

Barriers to biopower projects identified by the evaluation included:

- Lack of knowledge regarding biopower and the low priority of power generation relative to other business and operational concerns
- The availability and adequacy of the fuel source
- Technical issues resulting from the low quality of the methane fuel generated by wastewater treatment plants and landfills
- Interconnection/access to the electric grid
- Uncertainty regarding the availability of the Production Tax Credit.

Opportunities for biopower identified across sectors included:

- The availability of developers and engineering firms to address technical and financial issues
- The use of an Energy Trust-funded consultant to make organizations aware of biopower potential and of the Energy Trust RFP
- More attractive power buyback terms enacted in the summer of 2005
- Tax credits and tax code provisions that help improve project economics.

In addition, a number of market-specific opportunities were identified:

- For dairies, waste disposal issues create an opportunity both to generate electricity and to package and sell the remaining detoxified nutrients as fertilizer.
- For landfills and wastewater treatment plants, there is growing industry experience with moderate sized biopower projects; population-driven capacity growth leading to increased methane production; and a need to address environmental/odor issues by capturing and using methane gas.
- In the forest products industry, facility personnel have extensive experience in boiler operation and power generation.

The main recommendations for Energy Trust going forward are:

- Place greater emphasis on the treatment of Green Tags early in the solicitation process to avoid confusion.
- Clarify the definition of above market costs and how they are calculated
- Continue to coordinate required project time frames with Energy Trust funding cycles, available tax credits, and the planning needs of potential bidders .

I. Introduction

This report summarizes the results of a process evaluation of the Energy Trust of Oregon's (Energy Trust's) Biopower program, which was launched as part of Energy Trust's renewables portfolio in 2005. The evaluation focused on the solicitation of projects to receive Energy Trust funding that was initiated in mid-2005 and culminated in the signing of two contracts representing 3 MW by July 2006.

Evaluation Goals

The goals of the evaluation were to document the program activities and process, as well as to gather program feedback and market intelligence in support of actionable recommendations that will improve:

- The RFP process
- Marketing, targeting, and recruitment of projects in part by identifying market barriers and opportunities
- Program delivery

Evaluation Tasks

The evaluation goals were addressed through the following tasks:

- Review of secondary literature and project documents, including the program website
- Interviews with other market actors and experts
- Interviews with owners of potential biopower sites, project developers and equipment vendors (project proposers, partners, and non-respondents)
- Interviews with program staff
- Analysis and reporting

Exhibit 1. Biopower Evaluation Completed Interviews

Interview Sample	Number of Completes	Population
Finalists	4	5
Non-finalists	3	5
Round 2 non-responders	6	6
Round 1 rejected with offer of help	5	6
Round 1 rejected	2	3
Non-responders	10	60+
Program staff	4	
Industry experts	2	
TOTAL	36	

II. Documentation Of Project History And The RFP Process

The timeline for the development of the Biopower project is summarized in Exhibit 2.

Exhibit 2. Biopower Project Timeline

CH2MHill Market Study	2004 to April 2005
Phone Interviews with potential bidders	March and April 2005
Request for Proposal Issued	May 17, 2005
Bidders Conference Call	June 1, 2005
Round 1 Proposals Due	June 24, 2006
Round 2 Candidates Notified	July 2005
Round 2 Proposal Due	October 14, 2005
Round 2 Finalists Announced	December 24, 2005
Contracts Signed with Finalists	February 2006 -- July 2006

A preliminary biopower market study was conducted by Itron in 2004, followed by a more focused Market Potential Study completed by CH2M Hill in April 2005. The CH2M Hill study identified the following sectors as having the greatest potential:

- Landfills (methane gas)
- Wastewater treatment (methane gas)
- Dairies (methane gas)
- Paper and wood products industries(wood waste)
- Logging/forestry (forest waste from logging and thinning)

In March and April 2005, many of the potential sites identified in the study were contacted by Energy Trust to inform them of the Trust's interest in biopower projects and its intention of issuing the RFP. The calls also gauged the interest in pursuing such projects among specific sites, including past experience, investigation and preliminary work done to date, and knowledge regarding available technologies.

A first round of interviews was conducted to gather information about the target market, communicate initial information about the RFP, and use the information to adjust the RFP process. Utilizing lists from the Oregon Department of Energy (ODOE), the Oregon Department of Environmental Quality (DEQ), CH2M Hill, and Itron, Energy Trust contacted people at 3 landfills, 5 wastewater treatment plants, and 2 wood mills to gather information on perceptions and opinions respondents had about the technical/economic

feasibility of a project, decision-making processes, readiness to respond to an RFP, and best channels for reaching contact person.

A second round of interviews was designed to help develop a high-quality distribution list for the RFP by talking with the people on the list to assess their capacity to respond and provide information about the RFP. Energy Trust contacted every landfill, wastewater treatment plant, and wood/paper mill in the service territory that was listed in the CH2M Hill market assessment with the exception of very small facilities. Energy Trust also contacted some large Oregon facilities located outside of the service territory that appeared by virtue of their size and energy potential to have the ability to deliver power to PGE or the Oregon portion of PacifiCorp's grid. These shorter interviews were designed to provide information about the RFP and gather information on 1) what kind of research a respondent had already done into the energy recovery idea and 2) what individual at a potential project site should receive the RFP.

Other names were also added to the contact list, including those of consultants, vendors of biomass equipment, and trade associations. An Energy Trust representative also spoke to a conference of the Solid Waste Association of North America (Northwest Chapter) and sent information on the RFP to the Association of Clean Water Agencies and American Forest and Paper Association.

The RFP for the first Round of proposals was issued on May 17, 2005 and a bidders conference, attended by 15 potential bidders, was held June 1, 2005 to assist firms in developing proposals for their projects. Notes from the bidders' teleconference were posted on the program website.

Energy Trust sent the RFP to facilities that had been contacted and had expressed an interest, as well as to several dozen organizations that had contacted Energy Trust about the solicitation. In addition, the RFP was made available on the Energy Trust website and announced through several other channels, including the EPA Landfill Methane Outreach Program (LMOP) and the associations mentioned above.

Exhibit 3 presents the number of requests for information, the number of times the RFP was downloaded, and other measures of participation, showing the reduction in the number of projects under consideration from 25 initial proposals received to 5 projects selected as finalists, including one undergoing a detailed feasibility study and two under contract to proceed with projects totaling 3 MW of nameplate capacity.

Exhibit 3. Biopower Solicitation –Number of Contacts

Number of:	
Initial Telephone Inquiries	42
RFP Downloads from Website	233
Conference Call Participants	15
Round 1 Proposals Received	25
Round 1 Proposals Invited for Round 2	16
Complete Round 2 Proposals Received	10
Round 2 Proposals Selected as Finalists	5*
Contracts Negotiated as of 8/1/06	2
Feasiblity Study Funded	1
Projects Being Pursued Without Energy Trust	6

* A sixth project was not selected as a finalist, but was offered funding for a detailed feasibility study

As shown in Exhibit 4, the 25 proposals received for Round 1 represented a potential total generation capacity of approximately 91 nameplate MW (that is, the maximum capacity available from the proposed plants, as opposed to what would actually be available 24/7.) This was a small percentage of the ultimate market potential estimated by the CH2M Hill study, as shown in the table below, although it was a much larger fraction of the potential given today's market realities.

Exhibit 4. Oregon Biopower Market and Proposed Projects

	Market	Potential	Proposals Received	Proposals MW	Proposals 2nd Round	MW 2nd Round
Landfills	13 with gas collection systems	40-45 MW	5	6.3	1	2
Wastewater Treatment	28 WWTP with digesters installed	5-7 MW	6	2.1	2	1.8
Dairy	32 with over 1,000 cows	20-30 MW	4	8.8	2	8.5
	52 with 500-1000 cows					
Paper and Wood Products	12 mills with boilers	50 MW	10	74.1	5	30.1
Logging/ Forestry	Only one current site	500 MW[1]	0	0	0	0

[1] It should be noted that 500 MW is the top end of the forest biomass estimate, and that the CH2M Hill study said that none of this capacity is currently achievable, given lack of legal and market infrastructure.

Both the quality of the Round 1 proposals and the degree to which projects had been planned and initiated to date varied widely. Energy Trust was looking for projects with

2006 start dates, but received everything from projects that were well under way and ready to start in 2005 to those that could not possibly be operational for several years.

Energy Trust staff and consultants developed a detailed protocol to evaluate both the Round 1 and Round 2 proposals. Although the details of the protocols are confidential, the criteria used to evaluate proposals were made known to the proposers, and included:

- The presence of fatal flaws, defined as project characteristics or information gaps that individually or as a group would make the proposal non-responsive to the requirements laid out in the RFP and other program materials. Examples of fatal flaws include geographically ineligible projects, projects already underway, and significantly incomplete applications.
- Project maturity, defined as ability to operate in 2006 or (for larger projects) in 2007, based on status of the proposer's technology plan, permit plan, interconnection plan, and other project elements.

The project team set aside for consideration proposals describing potentially sound projects that were unlikely to operate in 2006 and proposals describing projects that could operate in 2006, but that lacked analytic sophistication. The purpose of setting these projects aside was to identify immature projects that, with the assistance of cost-shared analytic support, might be able to develop a competitive response to Round Two of the RFP or that might evolve into competitive applicants for Energy Trust funding in future years.

Of the 25 proposals received, 2 were rejected as being incomplete, while one had their thermal load destroyed by a fire. Another 6 were deemed to offer potential, but were not yet sufficiently mature. For these projects Energy Trust offered to share the cost of more detailed feasibility analysis to help bidders better understand the potential of their projects. In other words, rather than simply telling bidders they had not been accepted, Energy Trust took pains to encourage those projects that appeared to have potential outside the time frame of the current solicitation or with additional technical assistance. The purpose of this was to develop a pipeline of projects that would allow Energy Trust to achieve its business goals in future years.

The 16 projects accepted into Round 2 were notified by Energy Trust in July, and respondents were given a submission deadline of October 14. Ultimately, 10 projects submitted proposals for Round 2. Among those that did not submit, two told Energy Trust they would not be submitting, while several others simply did not respond.

The next step for Energy Trust was to establish a short list of applicants for more detailed analysis, consisting of all projects for which Energy Trust received complete, on-time Round Two applications that conformed to all requirements of the RFP and supporting program documents. An evaluation team of Energy Trust staff and contractors was assembled to conduct detailed analyses of the projects submitted in response to Round 2 and a systematic process was developed to rank the proposals.

While the evaluation criteria were clearly described to bidders, the specific weights assigned to each criterion were confidential. Energy Trust staff said, however, that they were explicit in conversations and in the bidders conference call that required subsidy per MWh would be at least 50% of the selection criteria. For instance, this is reflected in published notes from the bidders' teleconference.

Using a standardized pro forma based on submitted financial information, amended where appropriate, proposed costs were reviewed on an item-by-item basis and capped at "usual and reasonable" levels, increased where appropriate (i.e., where they had been understated or omitted), and used to establish a project-specific, risk-adjusted rate of return. The purpose of this estimate of above-market costs was to provide grounds for an even comparison among projects of above-market cost, on both a per-MWh and a total project basis. Because the Energy Trust's mandate only allows it to fund above market costs, the standardized pro forma generated an apples-to-apples estimate for each project, with clear and comparable assumptions.

One result of this analysis was that some projects were found not to have above market costs, which meant that there was no justification for Energy Trust to fund them. At the same time, the fact that Energy Trust was potentially offering to cover the above-market cost allowed a number of projects to proceed that otherwise would have not been pursued.

Other aspects of each project were reviewed and rated by each member of the evaluation team, although there were no specific weights assigned to these other issues, which included:

- Is the project well conceived technically?
- Is the project well conceived economically?
- Is the financing plan clear and reasonable?
- What are the likely market impacts of successful completion and operation of the project?

Among the issues that arose during the evaluation of the Round 2 submissions, fuel supply was relevant for several projects, since both adequate, predictable fuel availability (in reasonable proximity to the generation site) and the opportunity cost of fuel used to generate power had to be considered. In addition, several applications had not accounted for property tax in their calculations (while Oregon law exempts wind and solar facilities, it does not exempt power generation facilities using wood waste) while others appeared to rely too heavily on debt rather than equity financing, and still others faced uncertainty regarding their ability to connect to the grid to sell power.

Five finalists representing six projects selected from the Round 2 proposals were announced on the Energy Trust website in a memo dated December 25, 2005. Negotiations commenced with those five finalists, with the following results.

- One contract has been signed to fund a more detailed technical study
- Two projects -- a wastewater plant and a lumber mill -- have signed contracts to proceed with Energy Trust funding

- Negotiations were terminated for two projects because the Energy Trust and the finalists were unable to reach agreement on the ownership of Green Tags associated with power that would be sold by the project.
- Negotiations for a third project were suspended because it became clear that the project could not be operational before the end of 2007, thereby losing the benefit of the production tax credit, which had been crucial to the project's viability. Planning for the project continues to move forward in anticipation of the PTC being reinstated in the future. The developer hopes to resume negotiations with Energy Trust once Congress acts to restore the PTC.

In all, six projects that participated in the RFP process appear to be going forward on their own – either because the review process found that they did not have above market costs or because the developers decided to proceed without Energy Trust involvement. (It is possible that one or two finalists who terminated negotiations over the treatment of Green Tags may also proceed independently.)

- Four of the six projects are in the dairy sector. Two of these are already under construction and plan to be operational in 2006, one had plans to begin construction in May 2006, and the fourth is in the design stage, but is still seeking out funding sources.

- Two projects are planning to utilize landfill gas. One of these is, according to the developer, lining up financing and shooting for May 2007 operation. The other is in the planning stages at corporate headquarters for the national corporation that operates the landfill, with no time frame specified. The local site manager for the latter landfill noted that Round 1 helped to validate the project and encouraged the corporate group that develops these projects to move forward.

III. Evaluation Findings

Effectiveness of the RFP process

Overall, respondents commented favorably on the RFP process, noting that it was clear, had generally reasonable deadlines and requirements, and appeared to have been fairly evaluated. The reaction among both successful bidders (i.e. those who moved into Round 2) and unsuccessful bidders was that both the RFP process overall and the specific requirements of the RFP were reasonable. Similarly, potential bidders who recalled receiving the RFP but did not submit a proposal typically stated that they did not respond because of their own circumstances (e.g., their planning/expansion cycle; limited capacity; other concerns) rather than any perceived difficulty in responding to the RFP.

The two-stage RFP process in particular was described by one respondent as "relatively user-friendly."

- A number of respondents said they appreciated the opportunity to submit a Round 1 proposal evaluate the viability of their project without having to provide all the

details required for the second Round. Several bidders said specifically that they wanted to "throw their hat into the ring" (two used that phrase) even though they did not expect to proceed immediately.

- One of these respondents also said that one reason for submitting a Round 1 proposal was that they were not sure if there would be another opportunity to do so in the future; as a result they submitted a proposal even though they were not really prepared to move forward with their project.

Round 1

The level of effort for Round 1 was also seen as reasonable. Respondents who were able to estimate how much time they spent on their Round 1 proposals offered a range from 20 hours to "about 2 weeks," although the latter respondent may have been referring to calendar time rather than the number of hours spent. Several noted that they had help in preparing their Round 1 proposal; in some cases from a vendor, in others from an on-call consultant with whom they already had an established relationship, and in the forest products industry, from the consultant retained by Energy Trust to help build awareness of the Biopower solicitation and provide proposal support.

Similarly, Round 1 respondents approved of the clarity of the RFP in terms of the Energy Trust's goals, the types of projects considered, the description of the technical and financial requirements, and the general criteria for consideration. When pressed, however, a few respondents said they were not completely clear about what constituted "above market" costs relative to an acceptable rate of return, with one saying they did not think their project would be viable because it "would have had a payback of 15-20 years" and another noting that they weren't sure if their project "would pencil out." In other words, some of these respondents appear not to have understood that projects of this kind were precisely what Energy Trust was hoping to fund in order to jump start the biopower market.

Those who were rejected in Round 1 generally understood the reason for rejection, in some cases commenting that they either had not had enough time to pull all the necessary information together, that they knew their project was not sufficiently developed, or that they were not surprised that there were no above-market costs. The one exception – a wood waste proposal developed with the help of an Energy Trust funded consultant – is discussed under RFP Targeting below.

Round 2

Among projects that were cleared to move into Round 2 but that did not respond, virtually all either decided not to proceed with the project or determined that the project was attractive enough even with Energy Trust's involvement. In other words, it was not a question of the proposal process being too daunting or time-consuming. While several said they did not currently have the required level of detail, they recognized that a feasibility study (which they would have expected to complete before moving forward) would have provided the required Round 2 information.

Four of the projects that moved into Round 2 were directed to the RFP in part by the efforts of a vendor representing the Stirling engine manufacturers; the vendor acted as the

program developer and RFP respondents for one project and provided the technology for three others. Although our initial impression was that most of these non-responders had withdrawn because of technical problems with Stirling engine technology, most told us that they decided not to respond for other reasons, and several decision-makers were unaware that there were issues with the Stirling technology.

- Only one landfill – the project for which the Stirling representative was also the developer/proposer -- dropped out primarily because of the technology. The primary problem appears to have been the presence of contaminants in the methane generated by the landfill or wastewater plant, although there were also problems with piston rings, according to one respondent. While the piston ring problem was expected to be addressed, contaminants are a more fundamental concern, because if the landfill/wastewater gas has to be treated before it can be used to fuel the Stirling engine, this creates a significant added cost.
- One wastewater treatment plant said they had been informed about the problems with the Stirling engine, but said that the fact that the current size of their facility made their project technically marginal had already made them decide not to pursue it in light of more pressing plant expansion projects.
- Another wastewater plant said it would have been premature to move ahead with a generation project; they are currently investigating whether it makes more sense for them to use the gas for generation or to use it directly.
- A third wastewater plant said their Round 2 response "just fell through the cracks" and believe they will be able to move forward with the project even without Energy Trust assistance in another year or two. They were not aware of problems with Stirling.
- Finally, a dairy manure project is pursuing alternate sources of funding, with the developer noting that the dairy itself will have to invest some money rather than relying exclusively on external funding.

With regard to the amount of information required for Round 2, most of those who responded with a Round 2 proposal said they thought the amount of information was reasonable because "you would need this for your project anyway." Only one vendor, a developer who did not respond to Round 2 because of technical issues, said that more detail was required than they considered necessary, noting that: "For Round 2 my big issue was that for wastewater the Trust was asking for way too much information that might not be necessary for the analysis. …. It's time consuming and costly to get. At best it's a nuisance."

Representatives of Round 2 projects that did not become finalists generally perceived the judging of proposals as fair, with the following caveats:

- One developer for a project that was found to be without above-market costs felt that Energy Trust was "rewarding the less effective projects"
- Two respondents felt that the emphasis on cost per MWh made it very difficult for smaller projects to compete. One suggested that he would like to see either "a standard offer, with separate terms for smaller and larger projects" or separate allocation of funds for small and large projects.

Final Negotiations

Issues raised by finalists who had entered into final negotiations (both those who ultimately signed contracts and those who did not) included the treatment of Green Tags, the required time frame for the projects, and the perceived lack of transparency in the Energy Trust's calculation of above market costs.

The most significant issue that arose during negotiations was the treatment of Green Tags – the premium paid in the marketplace to producers of renewable power. This issue ultimately caused two finalists in the wood products industry to abandon negotiations, and even one participant that agreed to proceed expressed some concerns about the issue.

The positions of the Energy Trust and of the proposers can be summarized as follows:

- Energy Trust feels that its funding of above market costs for the project entitles it – as the custodian of the public purpose funds levied on electricity ratepayers – to receive the revenue accruing to the "green" power generated by the biopower projects. This position is currently an organizational policy set by the Energy Trust Board, and staff have no flexibility to modify it.
- The project developers, on the other hand, believe that Energy Trust should be funding projects on their ability to deliver renewable power (just as they fund energy efficiency improvements). They see the Green Tags as a potential source of upside benefits if the value of Green Tags increases dramatically in the future. Since they are bearing the brunt of the risk, the project developers say, they should also reap the rewards if the value of Green Tags increases. Comments offered by the finalists about Green Tags included:
  - "We had done some research on Green Tags, but it's still kind of a new thing. As a producer we felt we should retain ownership; why would the Trust take ownership of them?"
  - "Energy Trust, in my opinion, collects money from ratepayers in the public purpose charge, and their job is to support renewable energy sources. In the end what they offered us was funding in return for our Green Tags, and in my opinion they were not incenting our project but getting involved in a commercial transaction, and to me that's just plain wrong. For other projects, they give you an incentive, so I was very frustrated by the whole approach."

While one of the finalists said that the value assigned to the Green Tags by Energy Trust was lower than their own estimates, Energy Trust and project developers agree that the current value of Green Tags is not the primary concern; the big issue is the potential for increased revenue as Green Tags become more widely traded and (perhaps) more valuable in future years. One of the project developers offered a compromise solution, where the project and Energy Trust would share any "windfall" resulting from sharply higher Green Tag values in future years. This proposal was rejected by the Energy Trust Board, however.

While it appears that the terms surrounding the Green Tags were set out early in the solicitation process, it may be necessary to call more attention to the issue up front to emphasize that this is a non-negotiable issue due to the policies established by the Energy

Trust Board of Directors. In part because most project developers were not very knowledgeable about Green Tags, the issue did not come to the forefront until projects had passed the Round 2 process. One finalist said that: "After they evaluated the second stage they came back with an offer, but in return I had to give them the Green Tags. They should have made that much clearer up front." Another finalist also noted that the treatment of Green Tags had not been obvious to him from the RFP, but he added that when the issue came up in discussions and the Trust explained that they would be taking ownership of the Green Tags, he went back to the original RFP documents and confirmed that Energy Trust's position was set out there.

A second, related problem is that several finalists did not really understand the criteria by which Energy Trust evaluated proposals and decided on the amount of above market cost they would contribute toward the project.

- One finalist noted that: "Our above market costs without Green Tags were significantly higher than what the Trust calculated, so we had two different processes; they had theirs and we had our own, and we look at the world differently. If there is a suggestion, it would be that in the different approaches to the above market costs there would be an exchange of ideas: how we calculate vs. how they do. We never saw their approach."

- The representative of another project that is being funded by the Trust echoes that observation. "What I would have liked to see different is for them just to be more transparent on where things stand; we want to see same the transparency from them that they expect from us. This partnership is not as transparent as others."

The timeline for the proposed projects was a concern for several finalists for two reasons:

- One source of time pressure was the expiration of the Federal Production Tax Credit (PTC), which forced one finalist to terminate negotiations. Although they had been making progress with both PGE and Pacific Power in negotiating a power purchase agreement, the project developers had been unable to close an agreement with either utility, and were unwilling to order equipment without an executed agreement In late July 2006, their equipment vendor informed them that he could no longer guarantee operation by the end of 2007, when the production tax credit (PTC) is scheduled to expire. As a result, the project was put on hold, although negotiations on the power contract, permits, and other aspects of the project are continuing in anticipation of the PTC being restored in the future. When (and if) the PTC is re-instated, we recommend that Energy Trust move as quickly as possible to help bring this project to completion.

- A separate time-related constraint was the need for Energy Trust to be able to allocate funds to projects that would be completed in time to meet its own funding deadlines. One of the projects being funded by the Trust is being pushed faster than the developing organization (a government agency) would like in order to be online by the end of 2007. The representative for that project explains that "The one (difficulty in negotiations) that sticks in my mind is the need to have the work

done by the end of 2007, which is hard for us. I think we'll make it but I worry about the engineer who's managing this and other projects because it puts a lot on his shoulders. I believe we should not let the grant drive the work; the grant is 5% of the cost of this project, so its feels a little unbalanced."

RFP Targeting, Marketing and Recruitment

Most of those who submitted Round 1 proposals said they had learned of the RFP through Energy Trust's preliminary phone calls, which they said gave them a good sense of the overall goals of the RFP and the kinds of projects Energy Trust was looking for. Others mentioned trade associations (specifically the Solid Waste Association conference where an Energy Trust representative described the program.)

The Energy Trust's biopower website played a key role in providing both an overview of the process and detailed information needed to respond, which provided proposers with a one-stop source of the needed data. Almost all of the organizations that responded to the RFP said they used the website extensively, and found it easy to use and informative. Sample comments included: "Very useful for more details," "It worked great," We used it and our consultant used it," and "we downloaded the RFP and got other information. It worked fine."

The Western region representative of the EPA Landfill Methane Outreach Program (LMOP) said that his organization had posted the RFP, although he was not aware of specific landfills that had followed up. (It should be noted that several of the larger candidate landfills in LMOP's Oregon database are among those that submitted proposals for the Biopower solicitation.)

Among potential respondents who did not submit a Round 1 proposal, many said they had not been aware of the RFP – even when records show they had been contacted and interviewed by Energy Trust not long before the RFP was issued. Several non-responding organizations pointed out that huge volumes of both regular mail and email come across their desk, and they may simply have missed the notification of the RFP because they were too busy.

Thus, while it is clear that enough of the targeted participants received the RFP to generate the desired volume of responses, other potential respondents would benefit from a more active outreach effort. In the forest products industry, the use of a dedicated consultant to promote the RFP appears to have been very effective, as evidenced by the high proportion of finalists from this sector. It should be noted, however, that the investment threshold for planning a biopower project is generally lower for this sector, since they have engineers on staff that are familiar with large boilers. In addition, they often have looked into such a project before, and frequently have experience negotiating with electric utilities in the context of cogeneration projects.

The consultant hired for the outreach effort to the forest products industry had the contacts and industry knowledge to allow them to prescreen candidates and then to help

them with the proposal preparation process. The consultant emphasized that the companies need this kind of assistance because they are absolutely not used to being on the "selling side" of a transaction; they are typically actively pursued by vendors who offer them turnkey solutions that only require them to sign on the dotted line.

A similar approach might be very effective for several other sectors. In particular it appears that there would be an opportunity in the dairy sector, where many of the barriers associated with these projects could be overcome with the help of a knowledgeable industry-specific consultant.

It is important, however, for the role of any consultant to be clearly defined in terms of their outreach role as opposed to serving as an advocate for individual projects. To the extent that the same consultant who helped identify opportunities also helped prepare proposals for some of the projects, the two roles appear to have been blurred during the solicitation process, with some applicants clearly having the impression that the consultant was working on their behalf (an understandable perception, since the applicant was in some cases paying for at least some of the consultant's time).

One applicant in the forest products industry who had received assistance from the Energy Trust-funded consultant thought that their project had a good chance for approval based on their conversations with the consultant and the consultant's interpretation of what it would take for a project to qualify (there was no indication that there was any direct communication between the consultant and Energy Trust regarding the chances for a specific project). For this specific forest products industry applicant, the consultant's role complicated their interaction with Energy Trust, since the consultant was actively involved in proposal preparation but explicitly took a hands-off approach after the proposal was submitted.

In addition to using consultants to promote the marketing efforts, it may be possible to more effectively disseminate RFP information using other organizations seeking to promote biopower; specifically LMOP for landfills, the US EPA Combined Heat and Power (CHP) Partnership for wastewater plants and forest products; and USDA for dairy waste methane. While involving these organizations as full partners in the RFP process is not warranted and would likely be counterproductive, keeping them informed could enhance the visibility of Energy Trust's efforts.

Among interview respondents who were aware of the solicitation, several said they put in Round 1 proposals even though they were not really prepared to move forward with a project simply because they believed this would be their only chance to qualify for Energy Trust funding. One respondent said he understood why the unstructured open solicitation process made it difficult to compare projects, but wondered if it would be possible for Energy Trust to announce in advance that they would have, for example, two solicitations per year – one in the spring and one in the fall -- so that potential applicants could work their biopower project plans into their facility expansion/renovation plans.

Market Barriers and Opportunities

Barriers

Barriers discussed here are primarily those noted by interview respondents rather than all those identified in the literature – although there is significant overlap between them.

Lack of Knowledge and Experience

Clearly, the development of a biopower project requires different expertise than the successful operation of a wastewater plant, landfill, dairy, or forest products plant. However, the lack of expertise is less pronounces for mills and wastewater plants, which often already also produce heat from biomass for internal needs. Moreover, there is a significant base of industry expertise with energy in these sectors (a number of mills already operate boilers and/or cogeneration facilities and have experience working with utilities on power purchase agreements and other interconnection details,) which is not the case for landfills or dairies.

Plant managers typically said they had only limited knowledge of the technical and financial aspects of project development. Lack of knowledge also extends to such details as Green Tags (more than half of respondents said they knew virtually nothing about them), the BETC, production tax credits, and other financial details that can mean the difference between success and failure for a project.

Overall, however, one of the key barriers that came up in the interviews is less the lack of expertise regarding biopower (since this can be overcome through the use of consultants or project developers), but rather the low priority of power generation relative to other concerns for many potential proposers.

- Facilities such as wastewater plants and landfills are public-sector organizations that are much more concerned with attaining regulatory requirements and serving their political constituencies than with pursuing biopower projects. Moreover, these facilities are very risk-averse and have a relatively drawn-out planning process that involves both budget cycles and the need to work with the community.
    - One respondent explained that he was in the middle of winning community support for a landfill expansion, and there was no way he could initiate the process of gaining approval for a biopower generation project until his current battle had been won.
    - He noted that “We have close neighbors who look at everything with a lot of skepticism. We're constructing some other support facilities, so before I add anything else I have to get this done. Biopower would be a concern, even if there's no noise, etc. and it's all good, they'll still oppose it.”

- Similarly, dairy farms have a focus on milk production rather than on power generation, and basically appear to consider biopower as an option that will help them deal with environmental regulations that would otherwise hamper their

ability to produce milk. In other words, biopower projects are sometimes recognized as a waste management solution that happens to produce electricity and heat as co-products able to partially defray the cost of waste management.

- In the forest products industry, plant managers are more likely to have experience with boiler operation and the generation of power. On the other hand, a consultant who works with this industry says many forest industry facilities are often part of a much larger organization, which makes it more difficult to initiate and gain approval for biopower or other projects. The number of finalist projects in this industry suggests, however, that this is a less important barrier.

Fuel Source

The availability and adequacy of the fuel source was also mentioned by a number of respondents.

- Several dairies, landfills, and wastewater plants said they were either too small or at best marginal, to generate enough gas to support power production, although several landfills and treatment plants said they expect available methane gas to grow as population in their area increases. One wastewater operator stated that "We're doing a whole plant upgrade, and may be on the border for having enough gas to run a generator, with another 500 people moving into town." Ironically the expansion of capacity for wastewater treatment plants and landfills as population grows may add to the potential availability of fuel, but also creates a greater possibility of opposition to projects from neighborhoods located close to the facility. On the other hand, for dairies, anaerobic digestion of waste and associated electricity production represent an effective odor-control measure, and therefore a solution to the good neighbor problem.

- For forest product waste, supply issues identified by interview respondents appear to center on 1) ensuring long term access to forest resources – both in terms of availability (i.e., enough waste being generated) and access (the facility having the right to use the waste wood), 2) transportation costs of bringing wood waste to the boiler where it is being used as fuel, and 3) the value of waste-wood-generated heat as a direct heat source (e.g., whether there is a use for the heat being generated in cogeneration and whether the hog fuel might be more profitably sold than used to generate power.)

- Unlike wood waste that can be burned in a boiler, the collection of gas is a necessary (and costly) prerequisite to the generation of power for landfill, wastewater, and dairy waste facilities. One landfill manager who did not respond to the RFP cited the LMOP guidelines that a landfill should have about 1 million tons of waste in place to generate the minimum required 300 cubic feet per minute (CFM) of gas, and noted that "We have 160 CFM already capped. If we spent $3 million and capped the rest we would be in the 400 CFM range pretty quickly, which would probably be (enough to support a power generation project with) a 15 year payback, but we don't have that kind of capital." It should be noted that

Energy Trust funding might have been able to make the needed capital available, and that this project may be a candidate for future solicitations.

Technology

Some of the most pressing technology-related barriers also center on fuel supply - specifically problems with the quality of the methane fuel generated by wastewater treatment plants and landfills. Several respondents mentioned that they were aware that contaminants can affect both the reliability and life of generators for biopower projects. The Stirling engine, which was expected to offer a technology suitable for relatively small scale generation from wastewater plants and landfills, developed problems as a result of contaminants. This was responsible for at least one project withdrawing from the process, although, as noted previously, not for as many Round 2 projects as originally thought were motivated to withdraw due to this technology concern.

Interconnect/Grid Access

Most of those interviewed said that the sale of power is one of the issues that would have to be resolved before they could go ahead with their project. Only one developer said he was not particularly worried about tying into the grid because of his past experience working at utilities; others all said that their initial efforts to negotiate power purchase contracts with their utility led to long drawn out negotiations that involved everything from engineers to lawyers. One developer noted that “The law requires it so in theory it shouldn’t be a problem. In practice, will the open access be delivered in an open, fairly rapid process? There are lots of projects where I've been treated unfairly.”

Decision makers for several of the wastewater projects (and one waste wood facility) said they were not at all concerned about selling power, because any electricity they could generate would be used to offset their own significant power purchases. It should be noted, however, that many developers ultimately find it more advantageous to sell the entire output at the PURPA rate, while continuing to supply their own needs at the standard retail tariff.

One respondent involved in a methane from dairy waste project explained that because they are at the end of the grid, utilities say it is technically more difficult to reverse the flow of power back into the grid rather than only to the end user. This problem was also mentioned in the literature as having been a concern for a number of dairy waste methane projects in California.

Opportunities

Despite the formidable barriers, interview respondents also alluded to both direct and indirect opportunities created by a convergence of market forces, regulatory changes, environmental concerns, and other programs.

Cross-Cutting Opportunities

Opportunities that appear to affect all market segments typically address broad-based market barriers and include the following:

- Developers and engineering firms can address technical and financial issues. Many of those interviewed noted that they had assistance in developing their proposal from either a project developer or from an engineering firm that they already work with. This tends to overcome the lack of detailed knowledge and experience that facility managers have with regard to biopower
- Energy Trust-funded consultants can also attack the knowledge barrier. As noted elsewhere, the use of an Energy Trust-funded consultant was effective in making organizations aware of the potential for a biopower project at their facility and of the Energy Trust RFP.
- New power buyback terms enacted by the Oregon PUC in the summer of 2005 significantly improved the economics of biopower projects. The ruling not only effectively increased the price received by qualifying facilities from about $.03-.035/kWh to $.06/kWh or more, it also assured biopower projects of contracts of 15-20 years. As one respondent noted "With the new avoided cost structure, all of a sudden we have a cash flow positive project."
- Similarly, the Oregon Business Energy Tax Credit (BETC), Accelerated Cost Recovery (ACR), and other tax credits and tax code provisions can also help improve project economics if a deal can be properly structured

Market-Specific Opportunities

There are also a number of market-specific opportunities; again, most of those were identified in the CH2M Hill report, and only those mentioned by interviewed bidders are discussed here.

Two dairies explained that the need to address waste disposal issues creates an opportunity both to generate electricity and to package and sell the remaining detoxified nutrients; in fact the sale of fertilizer often represents a greater profit opportunity and helps make the biopower project possible. In addition, dairy sector respondents said, USDA has been promoting power generation from methane and there are several sites in the region that appear to be operating successfully.

For both landfills and wastewater treatment plants, there is growing industry experience with moderate sized biopower projects across the country and in the Northwest. Several wastewater plants cited the Energy Trust funded project in Corvallis, although one respondent noted that "The one at Corvallis has been OK, but they weren't jumping up and down." (It should be noted that Energy Trust has withdrawn its funding for the Corvallis project because it has failed to meet required project milestones due to technical problems with the Stirling engine.)

For both types of facilities, population growth creates a need for greater capacity, which brings with it an opportunity for increased methane production and potential power generation. In addition, both types of facilities are faced with environmental/odor issues

related to the uncontrolled release of methane gas. Collecting the methane address both odor and greenhouse emission concerns.

Finally, both national and regional associations and government programs such as LMOP take an active role in promoting biopower projects in these industries; several respondents said they had learned about the Energy Trust RFP from their regional association, and one landfill operator cited LMOP as a source of good information on issue related to biopower. The LMOP Western Region Program Manager said he was familiar with the Energy Trust solicitation and had announced it in on their website but was not aware of specific landfills moving forward.

In the forest products industry, facility personnel do have extensive experience in boiler operation and power generation, which makes biopower projects a better fit than for other markets. Moreover, the strong housing market has created demand for lumber and helped to create more wood waste. If those fuel sources can be secured in long term contracts, there should be additional opportunities in this segment.

IV. Summary of Key Findings

- The overall solicitation process worked well, was systematic, and was generally perceived as being fair.

- Although a few respondents proposed projects that were already under way, the solicitation process succeeded in calling attention to biopower opportunities and spurring a number of organizations to pursue projects that otherwise would not have happened.

- Quite apart from the availability of Energy Trust funding, the overall process provided a platform to make potential project owners aware of changes in PURPA rates, the availability of the Business Energy Tax Credit, the role of Green Tags, and other factors that directly affect the viability of a biopower project. As one respondent noted: “They (Energy Trust) drive projects out of the woodwork that are kind of getting ready, but there are so many other factors. You don't do it only for the money.”

- Use of an independent consultant to develop interest and assist in proposal preparation was very effective in securing a high degree of participation from the forest industry, and we recommend that similar use of a knowledgeable industry-specific consultant be considered for other sectors, notably dairy. However, the consultant’s roles (acting on Energy Trust’s behalf to identify projects; acting on the facility’s behalf to develop a winning proposal) should be carefully designed and explained to the facilities they work with.

- The amount of time allotted and amount of detail required for the Round 1 proposals were perceived as reasonable, and the RFP was seen as clearly stating Energy Trust’s objectives, requirements, and criteria for success.

- Most of the first round proposals that were rejected received offers of Energy Trust assistance in conducting more detailed feasibility analyses – a very useful way of keeping projects in play and on the radar of facility decision makers.

- Several rejected Round 1 and Round 2 projects are moving forward (and in some cases were already moving forward when the proposal was submitted.) A total of 6 projects appear to be moving ahead without Energy Trust assistance.

- Among the projects invited into Round 2 that did not submit proposals, most opted not to do so because their internal planning/business needs made a biopower project impractical at the current time, although one was withdrawn because of technical problems and another said the project "fell through the cracks" suggesting that more active follow-up might have been useful.

- Round 2 was perceived as more time-consuming than Round 1, but most proposers said the required information was readily available from feasibility research and due diligence that had to be conducted for any project of this size. One potential Round 2 respondent, however, thought the data requirements for Round 2 excessive, noting that "the Trust was asking for way too much information that might not be necessary for the analysis."

- Although the LMOP Western Regional Director was aware of the Energy Trust solicitation and said he had announced it on the program's website, closer coordination with LMOP for assistance in helping disseminate information about the RFP may be beneficial. Similar ties with the CHP Program should also be investigated for possible synergy between Energy Trust and Federal efforts.

- For finalists, the treatment of Green Tags was the most controversial aspects of the solicitation process.

  – Negotiations with two finalists ultimately broke down over this issue.

  – Several finalists felt that Energy Trust should have allowed projects to retain ownership of Green Tags so that they could benefit from potential increases in the value of Green Tags, since they were bearing most of the risk of initiating and implementing the project.

  – Other finalists recognized that while Green Tags might ultimately be a more valuable resource than the money being provided by Energy Trust, the latter was far more certain and predictable in the crucial first years of project operation.

  – Most of the finalists said the treatment of Green Tags should have been more explicitly addressed in the description of the project parameters for Round 1 of the solicitation.

- A few finalists also commented on the “black box” nature of the Energy Trust’s process for calculating above market costs and the amount the Trust would be willing and able to fund. Project developers said that more guidance up front on the amount of assistance available and the criteria for receiving that assistance would have been helpful.

- Expiration of the Federal Production Tax Credit (PTC) forced one finalist to terminate negotiations. When (and if) the PTC is re-instated, we recommend that Energy Trust move as quickly as possible to help bring this project to completion.

- To the extent possible in the context of the Energy Trust’s funding cycle and the need to ensure that earmarked funds are actually used, future solicitations should attempt to accommodate longer project timelines.