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SUMMIT BLUE
CONSULTING, LLC

Memorandum

To: **Fred Gordon and Peter West**

From: **Frank Stern and Jane Pater**

Cc: **Kevin Cooney**

Date: **November 6, 2008**

RE: **Framing Memo for Renewable Energy Roles and Risk Management Deliverables**

On January 1, 2008, the portion of Energy Trust of Oregon's mission related to renewable energy shifted. While prior years' programs focused on utility-scale generation, the program is now focused on renewable energy projects smaller than 20 MW of nameplate capacity. Energy Trust hired Summit Blue Consulting to assist it in identifying new roles for the organization as it operates in this new context and to examine the risks associated with the potential roles.

Summit Blue developed a series of memos that summarized the team's findings regarding potential roles and associated risks. These memos were in line with the set of deliverables outlined by Energy Trust at the outset of the project. Summit Blue relied on a variety of data sources: Energy Trust's existing program documentation, discussions with Energy Trust staff, related industry literature, interviews with relevant stakeholders, and Summit Blue's existing knowledge of the market for renewable energy. Each memo builds on the previous memos in the series, but focuses on a specific area.

This guide is intended to provide direction to board members or other stakeholders that are interested in a specific aspect of the deliverables. The memos themselves covered the issues in some depth, and we will not try to summarize those findings here. Instead, we highlight below the key components of each deliverable – the categories of issues covered, rather than a laundry list of what was said about them.

In short, Memos #1-5 examined the historic and current situation in the market for renewable energy projects smaller than 20 MW in Oregon. These initial memos provided the necessary context for exploring any new roles for Energy Trust in this marketplace, including internal and external circumstances. The last two memos provided a roadmap with which Energy Trust can move forward in the renewable energy market. Memos #6 and 7 provide a framework for decision making and Summit Blue's preliminary recommendations for potential roles moving forward.[1]

Memo #1 – Current Roles of Energy Trust in the Renewable Energy Markets

- Discussion of Energy Trust's existing goals related to renewable energy; and
- Summary of Energy Trust's approach to renewable energy and specific programmatic implementation of that approach.

Memo #2 – Energy Trust's Current Organizational Risks in the Renewable Energy Program

- Development and definition of common terminology for risk (Reputation, Operation, Financial, and Strategic) and risk response (Accept, Mitigate, Transfer, and Avoid) to be used for the remainder of the project; and
- Table describing the types of risk and risk responses associated with each of Energy Trust's existing roles in the renewable energy market as defined in Memo #1.

Memo #3 – Energy Trust's Renewable Energy Risks Compared to its Energy Efficiency Risks

- Comparison of the risks that Energy Trust accepts through its activities in the renewable energy market to those it takes on through its work in the energy efficiency market;
- Characterization of Energy Trust roles in the energy efficiency market; and
- Table describing the types of risk and risk responses that Energy Trust uses in the energy efficiency market.

Memo #4 – Literature Summary on Managing Small Renewable Energy Project Risks

- Review of the literature on risk management approaches taken by the financial and investment communities for renewable energy projects smaller than 20 MW; and
- Further description of the categories of risk described in Memo #1.

Memo #5 – Barriers to the Development of Small Renewable Energy Projects in Oregon

- Description of the financial and related barriers to development of small renewable energy projects in Oregon based on 14 stakeholder interviews and knowledge base at Energy Trust. Information organized by technology.

Memo #6 – Description of and Recommendations for Renewable Energy Roles for Energy Trust

- Discussion of potential roles for Energy Trust in the renewable energy market, organized according to technology and according to the role's fit with Energy Trust's current mandate;

[1] It should be noted that all of the analysis took place before the financial crisis that began in September 2008. Any decision-making process should consider how this crisis will affect the renewable energy market in Oregon and how Energy Trust may most effectively address those effects.

- Discussion of criteria used to prioritize the roles; and
- Extensive appendix includes description of each potential role, the role's relationship to Energy Trust's existing efforts, an assessment of the role's impact on the renewable energy market, the opportunities created by and barriers to implementing the role, and examples of previous implementation.

Memo #7 – Risk Assessment of Priority Roles and Decision Framework

- Outlines a set of risk decision making criteria for Energy Trust's renewable energy roles, including role-specific, organizational, and external considerations;
- Discusses the risks and benefits associated with each of the priority roles described in Memo #6, using the categories of risk and risk response developed in Memo #2; and
- Appendix provides a sample worksheet for decision makers to use when evaluating Energy Trust roles in the renewable energy market.

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Memorandum

To: **Fred Gordon, Energy Trust of Oregon**

From: **Frank Stern and Jane Pater**

Copy: **Kevin Cooney**

Date: **April 18, 2008**

RE: **Memo #1: Current Roles of Energy Trust in the Renewable Energy Markets**

On January 1, 2008, the portion of Energy Trust of Oregon's mission related to renewable energy shifted. While prior years' programs focused on utility-scale generation, the program is now focused on renewable energy projects smaller than 20 MW of nameplate capacity. As a first step in developing a strategy for making decisions about risk management under the new paradigm, this memo summarizes the current roles of Energy Trust in the renewable energy markets.

This memo first presents Energy Trust's goals with respect to renewable markets. The second section describes Energy Trust's two-pronged approach to achieving those goals. We then describe specific roles with each of the active program areas.

Goals

Under its 2007-2012 Strategic Plan, Energy Trust's board set a goal to help Oregonians meet 10 percent of their electric energy needs from renewable resources by 2012; this goal may be revised as part of the 2008 strategic planning process. Oregon's recently passed renewable portfolio standard (RPS) mandates that the state's investor-owned utilities (IOUs), Portland General Electric and Pacific Power, provide 25 percent of their Oregon retail customers' energy sales by renewable energy resources by 2025. By using these clean energy sources to generate electricity, Oregon's ratepayers will benefit through economic development, rate stability, reduced emissions, and staying in front of the impacts of climate change policy regulation. Senate Bill (SB) 838 can be found at: http://www.leg.state.or.us/07reg/measpdf/sb0800.dir/sb0838.en.pdf. A rule making proceeding on cost limitations is underway at this time.

Utility-scale generation resources will provide the bulk of the resources required under the RPS, and Energy Trust's role in the small scale renewable energy market will be complementary. In this role, Energy Trust will build the market from the bottom up. In doing so, Energy Trust will strive for two of its other goals under the 2007-2012 Strategic Plan:

- Expand participation by customers that have been hard to reach historically
- Encourage Oregonians to integrate energy efficiency and renewable energy in daily life.

The Oregon Public Utilities Commission (OPUC) measures Energy Trust's success by the amount of energy (megawatt-hours or MWh) generated from renewable energy resources in the state.

Energy Trust's Approach

Energy Trust has chosen to attempt to maximize renewable generation through a two-pronged approach:

1. Direct financial support to projects
2. Market development activities

Through this two-pronged approach, Energy Trust will balance short- and long-term opportunities to support the development of a sustainable market for renewable energy. The direct support of projects fostering financial viability provides the near-term push while market development activities seek to create sustainable long-term, diverse markets. This strategy prevents Energy Trust from focusing its energies on the market with the largest and lowest cost renewable resources (larger wind) and encourages it to provide support to less mature markets that are in need of more cultivation and smaller resources that may not catch the attention of volume-focused utility power purchasers. In its approach the set of programs is a portfolio of resource types (wind, biomass, hydro and solar) and short- and long- term market activities.

Direct Financial Support to Projects

Energy Trust's primary focus is getting renewable energy projects constructed in Oregon, and power from those projects sold to Oregon investor-owned utilities. Under the board-established green tag policy, Energy Trust also negotiates to purchase a portion of the green tags from renewable energy projects, primarily to assign them to utilities to retire on behalf of ratepayers.

The tags are acquired from renewable projects as part of the negotiation for Energy Trust funding. Energy Trust pays for renewable energy projects (and usually as part of the transaction receives green tags) either through a one-time payment on commencement of operations or over time as the energy is generated. The State Department of Energy shall establish a system of registering RECs; as further defined in SB 838 Sections 14 -17.

Energy Trust has developed a methodology for calculating the price it is willing to pay to contribute to the development of new renewable energy projects. Based on the above-market costs, this methodology takes into consideration the pre-existing economics of the project, the return on investment required to ensure that the project moves forward, and the existing market values of RECs. This process involves eight main steps:

1. Deciding how the project will help meet the relevant program's goals

2. Reviewing capital and operating costs, resource assumptions and management capabilities for the proposed project.

3. Defining an appropriate rate of return (IRR) for the project-based risk-adjusted costs of capital and equity for the same or similar technologies and circumstances.

4. Determining the market cost for buying energy with similar characteristics to the proposed renewable resource. As appropriate, this estimation is based on tariff retail rates, utility forecasts and qualifying facility rates.

5. Determining the above-market cost. Calculate, over the expected life of the project, the difference between the price the market would pay for energy and the cost to the deliverer, given Energy Trust's estimate of reasonable costs and appropriate IRRs.

6. Determining how much additional revenue the project needs to meet the market-based, appropriate rate of return and meet minimum debt and operating requirements.

7. Defining the share of the green tags Energy Trust will receive to compensate it for its contribution. Energy Trust's Green Tag Policy states, "Energy Trust's ownership of the green tags should be flexible over time, while reinforcing incentives for long-term project performance."[1] By allowing for flexibility in the negotiation, the policy recognizes the variability in project economics from one location or technology to the next and enables Energy Trust staff to use its professional judgment in determining how to administer Energy Trust funds.

8. Negotiating contract terms and conditions, including return of funds for underperformance.

In its Green Tag Policy, Energy Trust of Oregon states, "Green tags generated by renewable energy are one of the multiple values for Oregonians provided through investing in renewable resources."[2] While green tags capture the value of the environmental attributes associated with the generation of renewable energy, other benefits accrue to the ratepayers of the state of Oregon. For example, policy directives have still not made it clear whether or not the tags account for the greenhouse gas reduction benefits associated with clean energy. Further, in-state generation of electricity creates local economic benefits. While other state agencies are responsible for economic development, Energy Trust is cognizant of this factor in its investment decisions, and some projects help with assessment and development of additional types of renewable resources. The retention of green tags by a state entity that can sell the green tags on behalf of ratepayers also serves as a hedge against future increases in the price of electricity. Green tags simply cannot encompass all of these benefits.

Market Development Activities

Market development activities include resource characterization, being an information source, developing installation and equipment standards, speaking at conferences, providing technical assistance, funding feasibility studies, paying for interconnection studies, and other activities aimed at supporting projects at the very earliest and most uncertain stages. Some of this activity spills

[1] Energy Trust of Oregon. 4.14.000-P Green Tag Policy. March 28, 2007. As amended in R433.
[2] Energy Trust of Oregon. 4.14.000-P Green Tag Policy. March 28, 2007. As amended in R433.

into general market support where the less mature markets have yet to develop the full services needed to foster more rapid project development.

Energy Trust recognizes that renewable energy generation technologies that are expensive today require market development in order to make them more cost-effective in the future. At the same time, however, these investments do not maximize generation from renewable energy sources immediately. Despite this fact, Energy Trust invests in these longer-term markets alongside its investments in the nearer-term market in order to create a pipeline of energy resources for the state of Oregon going forward. Energy Trust uses this approach to portfolio management to integrate the organizational mission with its renewable energy goals.

Program Roles

Energy Trust strives to achieve its renewable energy goals through its four programs:

- Solar Photovoltaic (PV);
- Community- and Small-Scale Wind;
- Biomass; and
- Open Solicitation.

Each program has its own set of MWh production goals and supporting incentives. While they all serve Energy Trust's goal of generating electricity from renewable resources, each program also meets other goals laid out in the 2007-2012 Strategic Plan.

Within these programs, there are roles that Energy Trust fills as needed for the technologies eligible:

- Building awareness about the market and resources in Oregon (e.g., through conference presentations or case studies on successful projects)
- Undertaking resource assessment studies, which describe the potential and/or market for a class of projects (rather than a site-specific study)
- Funding feasibility studies for projects that look promising
- Funding on-site or plant-specific resource assessments
- Funding interconnection studies for projects that survive the feasibility screen
- Technical support for technology assessments and choice
- Development of equipment and installation standards and quality assurance activities and
- Serving as a buyer for all or a portion of the green tags associated with the project.

One of the roles that Energy Trust has avoided is assistance in the actual *development* of potential projects. Energy Trust has left the responsibility for arranging project finance, negotiating the permitting and siting processes, securing necessary equipment, and managing the construction to the developer of the project. In doing so, Energy Trust ensures that the developer has some "skin in the game," preventing free riders from accessing the benefits of the program and maintaining the organization's focus on *sustainable* markets for renewable energy in the state rather than those *operated* by the state. At times, Energy Trust has provided assistance and advice for development (e.g., funded and distributes a Community Wind Development Guidebook).

The remainder of this section discusses program-specific goals and roles for Energy Trust.

Solar Photovoltaic

The Solar PV program is Energy Trust's 'project volume' program. In 2007, Energy Trust provided incentives for the installation of PV units on 192 residences and 51 commercial buildings; together, these installations combined to produce 0.15 aMW in 2007.[3] The Solar PV program complements several state and federal incentives for PV, including the state income tax credit and the federal investment tax credit; together, these incentives in the best cases pay for nearly 80% of the project cost over a few years.

From the start, the program was designed to create more standardization in solar PV systems and transactions. While standard design and installation specifications and rebates have been utilized since the program's inception, this program's procedures have become more streamlined in recent years as Energy Trust and the market actors gained experience working together. By now, the performance of the technology permitted by Energy Trust policies is well understood.

Energy Trust instituted installation standards and trained installers on those standards in order to develop an identifiable and trusted product in the market – and a trained work force – in the process. All projects receive quality control commissioning, which adds value for the installer, project owner, and Energy Trust. These factors have helped develop a fairly standard process for participants in Energy Trust program.

While Energy Trust limits project size to increase the number of participants, the program welcomes a mix of residential and commercial/industrial scale projects. The smaller residential projects enable Energy Trust to encourage Oregonians to integrate renewable energy into their daily lives, while the larger systems move Energy Trust closer to its renewable energy production goals. This program is currently so popular that funds are being carefully managed to maintain activity within budgets in 2008.

Community- and Small-Scale Wind

Even before Senate Bill 838 mandated that Energy Trust curtail investment in utility-scale wind generation at the beginning of 2008, Energy Trust was actively working to secure community-scale wind generation. Community-scale wind can be as small as a couple of turbines or as large as the 20 MW limit on Energy Trust's investments.

In early 2008, Energy Trust also began a small-scale wind program. Small-scale wind projects are typically behind-the-meter projects. Projects must be smaller than 25 kW for residential systems and smaller than 50 kW for commercial systems.

[3] Energy Trust of Oregon. Quarterly Reports to the OPUC, Q1-Q4 2007.

The community-scale wind projects are typically driven by a developer that seeks a portion of project financing from a local government or a group of local residents. The small-scale projects, on the other hand, are typically driven by a single property owner. Staff developed a guidebook for potential developers of community wind to provide the market information on best practices and steer interested parties to the methods and procedures necessary to create successful projects.

In the community-scale wind arena, the major hurdle faced today is an inability to secure turbines due to global demand and limited supply. Energy Trust issued a request for proposals two years ago to identify projects, but due to the lack of turbines, all of the proposed projects have disappeared. Without the leverage of a large, creditworthy firm, the small developers driving these projects cannot secure the capital outlay needed to secure the necessary turbines.

Energy Trust has helped examine the potential for utilizing refurbished turbines to overcome this hurdle. Refurbished turbines have typically been retired by previous owners and restored to ensure improved performance. Testing to determine the effectiveness of these refurbished turbines is still underway. In the meantime, larger and larger turbines are becoming available through the refurbished market. If these prove to be viable, this would fill an important gap in the current supply. In the interim, Energy Trust is focused on building a pipeline of projects since it is unlikely that any new ones will be built until the production tax credit is renewed for more than a one-year period.

While the community-scale wind program offers negotiated incentives, the small-scale wind program is a standard offer program. Current rebates are proportional to blade diameter, which is highly correlated to generation. These incentives are paid directly to the contractor after the system has passed inspection. Like the PV program, the small-scale wind program relies on a list of approved technologies to serve as the basis for eligibility. An initial Community Wind RFP released in March 2006 identified 17 projects totaling 133 MW of capacity in 6 counties. Letters of Intent (LOI) were signed with two projects with construction scheduled for late 2007 or early 2008. The two LOIs have since been withdrawn, and no community wind projects have been constructed.

Biomass

Energy Trust's biomass program focuses on energy generated at mills, dairies, and wastewater treatment plants. Most of its projects to date have been anaerobic digester projects at municipal wastewater treatment plants, with capacity of 0.5 to 1.5 MW. However, the majority of the savings in the next several years is likely to come from forest product biomass plants, including projects currently under construction.

The types of mills with biomass resources in Oregon include pulp and paper mills, lumber and wood production facilities, and bark dust/waste processors. These projects are often combined heat and power. For these resources Energy Trust ran an RFP to determine the market price and publicize the program. A primary lesson from this process is that each plant needed a custom offer; a standard offer program would not succeed in this market. Six projects responded to that initial RFP, three of which are in operation today; the remaining three are still in talks with Energy Trust. In the future, forest thinning projects are likely to provide a substantial amount of resource, perhaps 150 to 500 MW of capacity in dispersed projects.

Energy Trust has begun outreach to the dairy segment, but it is still a work in progress. Energy Trust was able to develop a standard offer program based on data in Wisconsin and Europe, but industry structure makes it difficult to reach this dispersed population. Energy Trust is still working to determine the most effective set of services and incentives needed to convince these businessmen to invest in renewable energy technology.

Efforts to capture waste methane at wastewater treatment plants for electricity generation have been successful at two facilities. Several more are under study. This is a market that is characterized by government-owned and supervised facilities, some more independent than others. Project performance in this market is well known and successful at the larger facilities. The development and contracting process tends to be long and the market support for mid- to smaller sized facilities lacking. In a joint association with the Oregon Association of Clean Water Agencies, Energy Trust's Biomass and Production Efficiency Programs are developing a technical roadmap for waste water plants on how to reduce energy needs and, at the same time, generate renewable energy on site.

Open Solicitation

For projects that do not fit into one of the first three buckets of programs described in this memo, the Open Solicitation Program provides an alternative. The Open Solicitation Program is open to any commercially available technology, but it currently serves mainly hydropower and geothermal resources; the largest solar photovoltaic proposals also came in through this program. In order to maintain Energy Trust's focus on replicable technologies, the Open Solicitation staff members developed a definition of "commercial technology" to apply to any applicants. This definition requires that the technology

- have a successful operating history,
- be available to the public from entities with stable business histories,
- come with a standard performance warranty,
- have replacement parts and associated service personnel available from entities with stable business histories, and
- provide installation and operations manuals for key components.[4]

With respect to hydro, the availability of the resource is typically a certainty, but the entity with access to the resource needs to obtain a reasonable return in order to tap the resource. Any river-related project must be outside of federal or state protected areas and be environmentally benign. The Open Solicitation Program targets three main groups:

- irrigation/water districts,
- municipalities, and
- very small projects developed by or for residential customers.

Energy Trust has focused on the first group and recently began focusing on those in the second. The irrigation and water districts typically have some (though insufficient) access to capital. Access

[4] Energy Trust of Oregon. Undated. "Energy Trust Approach to Commercial Technology." Provided by Betsy Kauffman, April 2, 2008.

to capital varies among residential customers. The extent to which access to capital presents a barrier for municipal customers is still unknown because this market is still being developed. These projects have long lead times due to the level of capital, planning, and permitting required. Lead times are often on the order of three to four years. Two projects have already been started with irrigation districts. Energy Trust is investigating how it might provide more support to residential customers that would lead to more market activity.

On the geothermal side, finding funding for drilling is the main market barrier, but this is an area in which Energy Trust has not provided support. A recent technological development in the market may reduce this barrier, however. United Technologies Corporation recently proved a technology at Chena Hot Springs (in Alaska) that would function at lower temperatures if it works in different climates. Should it be proven in Oregon, the technology would open up resources that are not currently viable for producing electricity from geothermal sources.

The Open Solicitation program has received inquiries from tidal, larger solar, wave, and other emerging technologies. Energy Trust is investigating the current status of the wave power industry and is actively discussing some larger solar PV projects, but it is not currently pursuing other technologies. The economies of scale for solar thermal electric appear to be well over 20 aMW, and the Oregon coast may provide more opportunities for wave power than tidal power. Some of these proposals appear to be relevant only for one project and thus do not meet Energy Trust's criteria for repeatable projects.

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CONSULTING, LLC

Memorandum

To: **Fred Gordon, Energy Trust of Oregon**

From: **Frank Stern and Jane Pater**

Copy: **Kevin Cooney**

Date: **April 28, 2008**

RE: **Memo #2: Energy Trust's Current Organizational Risks in its Renewable Energy Programs**

The purpose of this memo is to characterize the organizational risks that the Energy Trust of Oregon currently assumes through its involvement in the renewable energy market and to characterize the activities that Energy Trust takes to mitigate those risks.

This memo builds on Summit Blue's previous memo regarding the roles that Energy Trust of Oregon currently plays in the renewable energy market in the state of Oregon. These roles can be condensed into six main areas:

1. Funding of feasibility studies,
2. Funding of interconnection studies,
3. Conducting requests for the proposal of projects that fall under the auspices of one of Energy Trust's programs,
4. Verifying the quality of installations funded by Energy Trust,
5. Providing financing for a portion of eligible renewable energy projects, and
6. Non-project specific market development activities, including resource characterization, serving as an information source, speaking at conferences, and other outreach activities.

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The remainder of this memo will provide a framework for thinking about the categories of risks associated with these roles, characterize the risks associated with each of these roles, and characterize the activities that Energy Trust is currently undertaking to mitigate those risks.

Categories of Risk

A set of common terms for different types of risk is helpful in creating a picture of the risks associated with Energy Trust's renewable energy efforts. Creating a framework under which to discuss risk enables us to systematically analyze the implications of Energy Trust's roles in renewable energy and to develop a starting point for considering the risks associated with other roles that Energy Trust might take on.

We will discuss four categories of risk that will serve as a framework for analyzing risk:

1. Reputation,
2. Operational,
3. Financial, and
4. Strategic.

A key point to remember when considering these risks is that the first three risks emanate from within the organization, while the last risk deals with threats from outside the organization. The reputation, operational, and financial risks are connected to the activities, decisions, policies, and investments made by the organization itself. Strategic risks are the result of actions by external players – customers, industry partners, regulators, or technology providers. The organization can take steps to address all four types of risk, but the approach is slightly different based on the factors over which the organization has control. This internal/external division is intended to help make that distinction.

Reputation risk. Reputation risk captures the range of risks associated with an organization's perception in the eyes of both internal and external stakeholders across a suite of issues.[1] Issues that may raise concerns for internal stakeholders include corporate governance, employee relations, effective management, and, in a mission-driven organization like Energy Trust, their sense of belief in the organizational mission.

In Energy Trust's role as a ratepayer-funded entity that is overseen by the Oregon Public Utilities Commission (OPUC), its reputation in the eyes of external stakeholders plays a significant role in its ability to carry out its policy mandate effectively. External stakeholders include policy makers, utility partners, project developers, end users, local government partners, the financial community, trade organizations, and other non-profit organizations. Issues included in this category of reputational risk in the eyes of external partners include

- Credibility in the marketplace,

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[1] Eccles, R.G. and S.C. Newquist and R. Schatz. February 2007. "Reputation and its Risks: Identify, Quantify, and Mange the Risks to Your Company's Reputation Long before a Problem or Crisis Strikes." *Harvard Business Review.* This source informed the bulk of the discussion on reputation risk.

- Perceived organizational strengths,
- Financial stability,
- Success in facilitating the development of markets for renewable energy in Oregon, and
- Market perception and perceptions of key stakeholders of Energy Trust's role in the market as effective and enabling.

Operational risk. Operational risk encompasses the set of risks resulting from the process used to accomplish an organization's goals and objectives. The Basel Committee on Banking Supervision, the authority on risk exposure, defines operational risk as, "The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events."[2] Operational risks include policies and procedures that inhibit participation in programs or fail to protect an organization from liability, processes used to manage programs, and the organization's ability to deliver on its promises using the processes it puts in place. Examples of such risks for Energy Trust include the risk of developing a lackluster project pipeline and an inadequate understanding of the barriers to market that it endeavors to help renewable energy and energy efficient technologies overcome. These risks are typically considered separately from the financial risks described next because they focus on processes that drive the organization.

Financial risk. Financial risk is perhaps the category of risk that is easiest to understand. It involves

1. Investment return risk: the cost of setting dollars aside for a project that may never come to fruition and losing the opportunity to invest in a successful project,
2. Delivery risk: the potential that a project funded may not deliver what it promised in exchange for the investment,
3. Repayment risk: the risk that a recipient of the incentive might go out of business before paying back the investment or might not pay back for other reasons.

Certain processes may be instituted to mitigate many risks, but where such activities are centered around *financial issues*, they are categorized as financial risk rather than operational risks.

Strategic risk. While the first three categories of risk focus on tangible types of risk *within* an organization, the last category of risk is more conceptual in nature and focuses on *external* threats. The development of an organization's strategy in response to these threats drives its reputational, operational, and financial characteristics. Examining only the individual components of an organization's strategy, however, fails to capture higher level issues that are elucidated by considering the context in which these components are developed. Thus, the category of strategic risk is examined separately in order to describe the context in which the organization operates.

[2] Basel Committee on Banking Supervision. June 26, 2004. *Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework.* Available: http://www.bis.org/publ/bcbs107.htm

Strategic risk covers the external threats and trends that affect an organization's role in the market place, its viability, or its productivity.[3] These threats and trends fall into seven groups:

1. Industry risk – risk associated with the industries that touch the organization. For Energy Trust, this might be deregulation in the utility industry or other regulatory risks, including environmental regulation. Supply chain issues that affect the availability of turbines for wind projects is another example.

2. Technology risk - Risks associated with the technology. For Energy Trust funds, this could be a game-changing advance in PV panels, the appearance of a revolutionary new technology that makes renewable energy sources obsolete, or the failure of a technology to live up to expectations.

3. Brand risk – This risk is related to the reputational risk category described above, but it can be more narrowly defined in the case of Energy Trust. Energy Trust uses its "brand recognition" as a stamp of approval for units installed under the standard offer PV program by contractors that have gone through its training programs. To the extent that this effort relies on confidence in the Energy Trust brand, it is a brand risk.

4. Competitor risk – To the extent that other market actors could fill an organization's role in the market and choose to do so, it is exposed to competitive risk. Although Energy Trust is designed to fill a role that is not already filled by other market actors, the market may evolve in such a way that other parties are willing to provide the same services. The result may be a shift in mission for Energy Trust.

5. Customer risk – Every organization's success depends on the satisfaction of its customers, a term used with a broad definition in this case. An organization can be exposed to customer risk when it relies too much on one customer or when its customers are in a position to drive the direction of the organization. In Energy Trust's case, customers can include its trade allies, end users of its programs, the OPUC, the utilities that fund it, and other parties. One example of a customer risk is when a customer's priorities shift away from those of the organization.

6. Project risk – Project risks include outright failure, inability to earn sufficient revenue (or produce as much energy as anticipated), and construction that is slower or more expensive than expected. This risk focuses on factors that contribute to project failure or sub-par production of energy that are separate from technology risk: poor project management, inability to secure financing, poor maintenance which reduces technology performance, legal issues, a decision to close down or move a facility (and the associated equipment), and other non-technology factors that can contribute to lackluster performance

7. Stagnation risk – An organization faces stagnation when it enters the last part of the product adoption curve. The market has reached maturity, and the price that the market is willing to pay for a product decreases while volume increases. The market perceives the organization's offerings as old and tired because the organization failed to innovate and stay

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[3] Slywotzky, A.J. and J. Drzik. April 2005. "Countering the Biggest Risk of All." *Harvard Business Review.* This source is used as the foundation for the discussion around strategic risk.

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8. ahead of the market. By failing to differentiate its products from competitors, an organization risks stagnating growth.

Responses to Risk

Once the risks facing an organization are identified, the organization must decide how to respond to them. To simplify things, we present four categories of risk response[4]:

1. **Avoidance.** Decline to take on the risk; implies that the anticipated rate of return is lower than the cost of incurring the risk.

2. **Transfer.** Share or the risk or shift to another party, e.g., through insurance, hedging, or partnering.[5]

3. **Mitigation.** Decrease the risk by instituting internal processes to regularly assess and manage it.

4. **Acceptance.** Assume the risk within the organization; implies that the rate of return is anticipated to be higher than the cost of incurring the risk.

These four categories will be used to categorize Energy Trust's response to the risks that it faces in its renewable energy program.

Energy Trust's Risks and Responses

Using the frameworks developed in this memo,

Roles	Specific Risk	Category of Risk	Specific Response	Category of Response
Funding resource assessments	Study may come to an incorrect conclusion regarding resource availability	Operational	Hire qualified contractors to conduct study	Mitigation
	Based on incorrect resource assessment, above-market costs are calculated to be greater than they actually are	Financial	Assume the risk	Acceptance

[4] Wideman, R.M. (1992). *Project and Program Risk Management: A Guide to Managing Project Risks*. Project Management Institute, Newton Square, PA.

[5] Froot, K. A. and D.S. Scharfstein and J.C. Stein. November 1994. "A Framework for Risk Management." *Harvard Business Review.* This article goes into depth on a variety of approaches that can be used to manage risk through hedging, one of the key strategies for transferring risk.

Roles	Specific Risk	Category of Risk	Specific Response	Category of Response
	Study finds resource is sufficient but project is never built	Financial / Strategic	Require cost-share of resource assessment up front	Mitigation
	Developer may decide to sell power to a non-funding utility	Strategic / Reputation	Contractual terms that require return of funding	Transfer
	Study finds resource is sufficient but market for the RECs / power has dried up	Strategic	Market development role enables purchase of RECs	Acceptance
Fund feasibility studies	Study may come to an incorrect conclusion regarding feasibility	Operational	Hire qualified contractors to conduct study; perform quality control on studies	Mitigation
	Study may determine that project is not feasible	Financial	Assume the risk	Acceptance
	Study finds project is feasible but project is never built	Financial / Strategic	Cost share with the partner up to 50% of study cost or $30,000	Mitigation
	Developer may decide to sell power to a non-funding utility	Strategic / Reputation	Contractual terms that require return of funding	Transfer
	Study finds project may be feasible but market for the RECs / power has dried up	Strategic	Market development role enables purchase of RECs.	Acceptance
Fund inter-connection studies	Study may come to an incorrect conclusion regarding feasibility	Operational	Hire qualified contractors to conduct study	Mitigation
	Study may determine that interconnection is too expensive	Financial	Scope conditions before paying for study	Mitigation

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Roles	**Specific Risk**	**Category of Risk**	**Specific Response**	**Category of Response**
	Study finds project is feasible but project is never built	Financial / Strategic	Require that the project have passed through resource assessment and feasibility screens before agreeing to fund	Mitigation
	Developer may decide to sell power to a non-funding utility	Strategic / Reputation	Contractual terms that require return of funding	Transfer
	Study finds that interconnection may be feasible but market for the RECs / power has dried up	Strategic	Market development role enables purchase of RECs	Acceptance
Conduct RFPs	RFP may uncover that projects are too expensive for Energy Trust standards	Financial / Reputation	Assumes this risk	Acceptance
	Winning bids may never be built or are delayed, tying up Energy Trust funds	Financial / Strategic	Use Energy Trust escrow funds as leverage for project financing	Acceptance
Technical support	Technology assessment may determine that the technology is not viable	Financial	Screen out "mad scientist" types of technologies	Mitigation
	Technology assessment may determine that the project is not replicable	Reputational	Screen technologies for replicability	Mitigation

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Roles	Specific Risk	Category of Risk	Specific Response	Category of Response
	Technology is proven viable, but the application is more expensive than end user will absorb	Financial / Strategic	Assume this risk	Acceptance
	Technology is proven viable but is not available	Financial / Reputational	Require technologies to meet definition of "commercial technology"	Mitigation
	Technology is viable but is unacceptable from a societal perspective	Reputational / Financial / Strategic	Avoid involvement in such controversial technologies (e.g., off-shore wind, wave)	Avoidance
	Technology is proven viable but at larger scales than are eligible for Energy Trust funding	Financial / Reputational	Focus on technologies that are applicable in the small-scale setting	Mitigation
Verify quality of installations	Installers trained by Energy Trust perform poorly	Operational / Reputational	Develop installation standards, perform quality control verification	Mitigation
	Once verified, installed system does not meet performance expectations, reducing production of RECs or energy savings	Reputational / Financial	Prescreen equipment, place significant risk on developers so they do so. Plan for each system to achieve "average" performance	Transfer/ Mitigation
Providing financing	Energy Trust passes up other projects while funds are in escrow, and project is withdrawn	Financial / Strategic	Screens projects for viability	Mitigation

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Roles	Specific Risk	Category of Risk	Specific Response	Category of Response
	Funded project does not meet performance expectation, reducing production of RECs	Financial / Reputation	Structure some contracts on a pay-for-performance basis	Mitigation
	Pay too much for RECs relative to market value	Financial / Reputation	Green Tag Policy procedures for setting REC price	Mitigation
	Project developer sells RECs to Energy Trust and another party	Reputational / Strategic	Assumes this risk, if needed to pursue Contract rights, maybe litigation	Acceptance Mitigation
	Developers plan projects prior to informing Energy Trust of the projects, in effect committing more funds than Energy Trust has available	Strategic / Reputational	Develop open lines of communication with trade allies.	Mitigation
Non-project specific activities	Information dissemination is not the key market barrier in project development	Strategic	Use this non-project tool as part of a portfolio approach to market development	Mitigation
	Energy Trust's market power is limited by the size of its budget relative to those of venture capital, other private investors	Strategic / Financial	Identify market niches that leverage Energy Trust strengths Partner with these sources of capital	Mitigation Mitigation

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Roles	Specific Risk	Category of Risk	Specific Response	Category of Response
	The pipeline of new technologies to meet future demand for renewable energy is not sufficient to meet Energy Trust's goals	Strategic	Work in diverse early-stage markets to help develop markets for cost-effective technologies	Mitigation

characterizes the types of risk incurred by Energy Trust in its current roles and its responses to these risks. Note that this table does not represent the full universe of risks that Energy Trust *could* incur through its current roles but only those that it does incur, either partially or fully.

Energy Trust has thus far designed its programs and markets to provide the "least risky first approach" to renewables energy market barriers. The process of establishing of the Board and the

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PUC comfort with programs has, by its nature, guided programs to take smaller risks in the early stages of engagement. For example:

- Energy Trust currently takes no development risk other than investing in feasibility and interconnection studies.
- Energy Trust does not take an equity position in technologies that cannot otherwise get financing.
- Energy Trust does not currently buy generating equipment.
- Energy Trust pays only when equipment is installed and operational.

Each of these policies and other similar policies provides Energy Trust with financial protection. However, as Energy Trust gains experience, it may discover places where it can accelerate or cause progress in renewable energy markets only through its use of different financial strategies. These alternative strategies will be discussed in later memos.

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Roles	Specific Risk	Category of Risk	Specific Response	Category of Response
Funding resource assessments	Study may come to an incorrect conclusion regarding resource availability	Operational	Hire qualified contractors to conduct study	Mitigation
	Based on incorrect resource assessment, above-market costs are calculated to be greater than they actually are	Financial	Assume the risk	Acceptance
	Study finds resource is sufficient but project is never built	Financial / Strategic	Require cost-share of resource assessment up front	Mitigation
	Developer may decide to sell power to a non-funding utility	Strategic / Reputation	Contractual terms that require return of funding	Transfer
	Study finds resource is sufficient but market for the RECs / power has dried up	Strategic	Market development role enables purchase of RECs	Acceptance
Fund feasibility studies	Study may come to an incorrect conclusion regarding feasibility	Operational	Hire qualified contractors to conduct study; perform quality control on studies	Mitigation
	Study may determine that project is not feasible	Financial	Assume the risk	Acceptance
	Study finds project is feasible but project is never built	Financial / Strategic	Cost share with the partner up to 50% of study cost or $30,000	Mitigation
	Developer may decide to sell power to a non-funding utility	Strategic / Reputation	Contractual terms that require return of funding	Transfer
	Study finds project may be feasible but market for the RECs / power has dried up	Strategic	Market development role enables purchase of RECs.	Acceptance

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Roles	Specific Risk	Category of Risk	Specific Response	Category of Response
Fund inter-connection studies	Study may come to an incorrect conclusion regarding feasibility	Operational	Hire qualified contractors to conduct study	Mitigation
	Study may determine that interconnection is too expensive	Financial	Scope conditions before paying for study	Mitigation
	Study finds project is feasible but project is never built	Financial / Strategic	Require that the project have passed through resource assessment and feasibility screens before agreeing to fund	Mitigation
	Developer may decide to sell power to a non-funding utility	Strategic / Reputation	Contractual terms that require return of funding	Transfer
	Study finds that interconnection may be feasible but market for the RECs / power has dried up	Strategic	Market development role enables purchase of RECs	Acceptance
Conduct RFPs	RFP may uncover that projects are too expensive for Energy Trust standards	Financial / Reputation	Assumes this risk	Acceptance
	Winning bids may never be built or are delayed, tying up Energy Trust funds	Financial / Strategic	Use Energy Trust escrow funds as leverage for project financing	Acceptance

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Roles	Specific Risk	Category of Risk	Specific Response	Category of Response
Technical support	Technology assessment may determine that the technology is not viable	Financial	Screen out “mad scientist” types of technologies	Mitigation
	Technology assessment may determine that the project is not replicable	Reputational	Screen technologies for replicability	Mitigation
	Technology is proven viable, but the application is more expensive than end user will absorb	Financial / Strategic	Assume this risk	Acceptance
	Technology is proven viable but is not available	Financial / Reputational	Require technologies to meet definition of “commercial technology”	Mitigation
	Technology is viable but is unacceptable from a societal perspective	Reputational / Financial / Strategic	Avoid involvement in such controversial technologies (e.g., off-shore wind, wave)	Avoidance
	Technology is proven viable but at larger scales than are eligible for Energy Trust funding	Financial / Reputational	Focus on technologies that are applicable in the small-scale setting	Mitigation
Verify quality of installations	Installers trained by Energy Trust perform poorly	Operational / Reputational	Develop installation standards, perform quality control verification	Mitigation
	Once verified, installed system does not meet performance expectations, reducing production of RECs or energy savings	Reputational / Financial	Prescreen equipment, place significant risk on developers so they do so. Plan for each system to achieve “average” performance	Transfer/ Mitigation

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Roles	Specific Risk	Category of Risk	Specific Response	Category of Response
Providing financing	Energy Trust passes up other projects while funds are in escrow, and project is withdrawn	Financial / Strategic	Screens projects for viability	Mitigation
	Funded project does not meet performance expectation,[6] reducing production of RECs	Financial / Reputation	Structure some contracts on a pay-for-performance basis	Mitigation
	Pay too much for RECs relative to market value	Financial / Reputation	Green Tag Policy procedures for setting REC price	Mitigation
	Project developer sells RECs to Energy Trust and another party	Reputational / Strategic	Assumes this risk, if needed to pursue Contract rights, maybe litigation	Acceptance Mitigation
	Developers plan projects prior to informing Energy Trust of the projects, in effect committing more funds than Energy Trust has available	Strategic / Reputational	Develop open lines of communication with trade allies.	Mitigation

[6] A failure to perform may be the result of a variety of conditions, including a company that goes out of business, a family that moves its system to another service territory, or a technology that is discarded or sold because it fails to provide the same functions or benefits (amenities) as its less efficient counterpart. All of these circumstances contribute to the same financial and reputation risk.

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Roles	Specific Risk	Category of Risk	Specific Response	Category of Response
Non-project specific activities	Information dissemination is not the key market barrier in project development	Strategic	Use this non-project tool as part of a portfolio approach to market development	Mitigation
	Energy Trust's market power is limited by the size of its budget relative to those of venture capital, other private investors	Strategic / Financial	Identify market niches that leverage Energy Trust strengths Partner with these sources of capital	Mitigation Mitigation
	The pipeline of new technologies to meet future demand for renewable energy is not sufficient to meet Energy Trust's goals	Strategic	Work in diverse early-stage markets to help develop markets for cost-effective technologies	Mitigation

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SUMMIT BLUE
CONSULTING, LLC

Memorandum

To: Fred Gordon, Energy Trust of Oregon

From: Frank Stern and Jane Pater

Copy: Kevin Cooney

Date: May 9, 2008

RE: Memo #3: Energy Trust of Oregon's Renewable Energy Risks Compared to its Energy Efficiency Risks

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This memo is the third in the series of deliverables regarding Energy Trust's examination of its roles in the renewable energy marketplace. Building on the first two memos, this memo compares the risks that Energy Trust accepts through its activities in the renewable energy market to those it takes on through its work in the energy efficiency market. This memo uses the same framework for characterizing those risks as the previous memo, which focused only on Energy Trust's roles in the renewable energy market.

The next section discusses Energy Trust's roles in the energy efficiency market and compares it to its roles in the renewable energy market. This is followed by a section comparing the risks associated with energy efficiency to the risks associated with its roles in the renewable energy market.

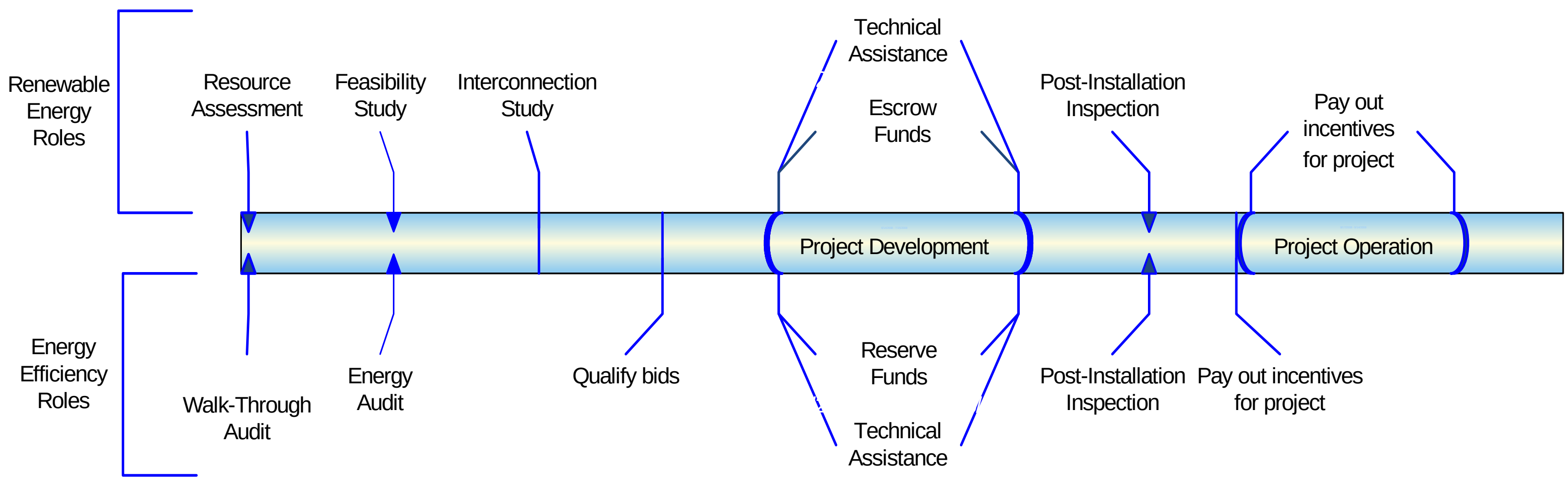
Energy Trust Roles in the Energy Efficiency Market

In many ways, Energy Trust's roles in individual energy efficiency projects are similar to its roles in the renewable energy market. Like its roles in the renewable energy market, Energy Trust's roles in the energy efficiency market fall into two buckets:

1. Project-related support

Market transformation activities.Figure 1 compares the roles that Energy Trust takes in its project-related support capacity for the renewable energy and energy efficiency markets.

Figure 1. Comparison of Energy Trust's Renewable Energy and Energy Efficiency Project-Related Support Roles



Within the similar roles, the specifics in the two markets may vary, but the essence is the same:

- ***Funding to determine resource availability:*** Early in the project scoping study, both sides of the organization will provide funding to determine the availability of the resource; these take the form of resource assessments for renewable energy projects and energy audits for energy efficiency projects.

- ***Project development technical assistance:*** During project development, Energy Trust limits its role for both types of projects. It provides technical assistance during this phase of the project for both renewables and efficiency.

- ***Commitment to fund early in the process:*** In both the efficiency and renewable energy markets, Energy Trust commits dollars to projects before they reach completion. This enables project developers to secure additional financing –from internal sources in efficiency or from external partners in renewable energy. Energy Trust does not disburse the funds until after the project is operating, but the pledge to fund a portion of the project enables Energy Trust to leverage additional resources available through other parties.

- ***Post-installation inspection:*** Energy Trust will perform quality control in the form of a post-installation inspection once the project has been completed. By doing so, it verifies that the contractor performed as it said it would and that the project will provide the benefits that Energy Trust (and the end user) anticipated. The level of quality control depends on the size and complexity of the project.

- ***Incentives:*** Energy Trust provides a financial incentive to the end user to encourage market adoption of the technology.

In other areas, Energy Trust assumes different project-level roles in the two markets:

- ***Feasibility and interconnection studies:*** Early in the scoping of renewable energy project, Energy Trust provides funding for feasibility and interconnection studies. These roles address areas with high levels of uncertainty in the renewable energy market. There is no equivalent for the energy efficiency market of that scale. In the efficiency market, Energy Trust provides walk-through reviews to existing single family homes and larger commercial and industrial facilities.

- ***Bid qualification:*** On the efficiency side, for certain types of projects Energy Trust will review contractors' proposals for the end user to assure that savings estimates are reasonable and that the appropriate types of work are planned. This serves as an assurance to the end user that they will get what they are paying for and that they are paying for the right things.

- ***Escrow of funds:*** Energy Trust will put funds in escrow for well-designed renewable energy projects at the end of the project development stage in order to help the developer secure additional financing. Energy efficiency project developers have not required this type of commitment from Energy Trust. The letter agreement that Energy Trust provides to energy efficiency project developers enables Energy Trust to utilize the funds during the efficiency project development; the escrow agreement does not allow for this flexibility.

In its broader marketing efforts in the efficiency market, Energy Trust's roles are similar to its roles in the renewable energy market. Primarily, these roles focus around the development of trade ally networks and serving as an information resource about these markets. Energy Efficiency does more of this more frequently than in renewables.

Energy Trust’s responsibility for developing training, support networks, promotional materials, and case studies featuring the trade allies is similar in both markets. These work areas build the tools necessary for creating renewable energy and energy efficiency markets where Energy Trust-funded projects can happen, and in some markets in energy efficiency eventually lead to market transformation. At a higher level, there is an early-stage effort to cross-train some of the existing efficiency trade allies on the renewable energy technologies and vice versa in order to encourage them to promote the full suite of clean energy opportunities to their customers. Such collaboration takes advantage of the synergies that exist in these two markets. Additionally, the programs are jointly funding studies for customers and linking the offerings for certain market segments; this is a specific focus in the dairy and wastewater treatment markets.

Comparing the Risks Associated with Efficiency to Renewable Energy Risks

At a high level, Energy Trust’s risk profile in the energy efficiency market is similar to its risk profile in the renewable energy market. Since Energy Trust takes on so many of the same roles in these two markets, it experiences the same risks in most cases. There are a few areas, noted earlier, in which Energy Trust provides different services in these two markets, and the risks assumed in those areas reflect the differences in the types of uncertainty incurred through those services.

On the efficiency side, most generalizations expressed in this memo hold true most of the time. There are typically exceptions to most Energy Trust approaches to securing energy savings. Sometimes, this is the result of different program structures within the Efficiency offerings (e.g., Existing Buildings and New Buildings). In other cases, it is the result of Energy Trust listening to its customers and identifying special solutions to specific project barriers. To the extent possible, this memo attempts to capture these exceptions. Since only a small sub-set of projects falls into this category, however, they have a relatively small effect on the overall character of the risks taken by Energy Trust. Where the effect is substantial, it is noted.

Beyond these exceptions, a couple of differences in the character of risk taken on by each part of the organization remain that cannot be explained by project scale:

1. The renewable energy program faces risks related to RECs and interconnect, which do not have efficiency analogues.

2. Renewable energy studies more often result in a finding of “project not recommended” and are higher-cost on average.

In these areas, Energy Trust approaches risk management differently in the renewable energy market.

In areas where Energy Trust’s roles are the same in these two markets, the risks associated with them are similar. The budget of the energy efficiency program is approximately four times the budget of the renewable energy program, however, creating a consistent disparity throughout the risk discussion. In most cases, the organization responds to most risks using a similar approach, but there are some instances of distinction. A few examples of these differences:

- ***Cost sharing policies for resource assessments:*** In the renewable energy market, Energy Trust requires its partners to fund at least half of the resource assessment. In the efficiency market, Energy Trust will fund 100% of the resource assessment up front; in return, the efficiency partner commits to install at least one recommended measure within the 12 months following the completion of the study. If an efficiency partner decides not to install any measures within the allotted time, Energy Trust will reduce its level of funding for future audits to 80% of the cost of the audit; the efficiency partner is responsible for the remaining 20% of the cost of the audit. The character of the response in these two cases is the same – mitigation – but the degree of the mitigation on small projects is different.

- ***Technology risk:*** The risk of a technology being viable but not widely available occurs in a greater proportion of renewable energy projects compared to the efficiency market. Energy Trust mitigates this risk in the renewable energy market with a formal definition of "commercial technology" while its approach in the efficiency market is quite similar but less formal. Energy Trust will very occasionally support testing high-priority pre-commercial efficiency technologies to assist the developers in further refinement. This is the exception rather than the rule, and in part reflects the greater funding available for energy efficiency.

- ***Securitization of funds:*** In both programs, Energy Trust will commit to providing funds upon project completion at an earlier time in its development. In the efficiency market, end users are typically satisfied with Energy Trust's letter of agreement that funds will be available. On the other hand, renewable energy project partners have required Energy Trust to hold the funds in escrow to secure other financing.

  In the renewable energy market, Energy Trust risks experiencing an opportunity cost for setting the funds aside because they cannot be spent in the meantime. These risks are mitigated by limiting the time funds are held, requiring milestones and controlling the amount any one entity can tie up. The structure in the efficiency market allows Energy Trust to schedule spending several quarters in advance but keeps cash available in the interim. If the project fails to materialize in the efficiency market, those funds can be allocated to another project.

- ***Timing of incentive payment:*** While Energy Trust pays incentives in both markets, the structure of its incentive varies. In the efficiency market, nearly all incentives are paid after the system is installed but before energy savings are realized.[1] For renewable energy projects, some incentives may be structured in this way, but Energy Trust also designs pay-for-performance structures in which the incentives are paid out over time as the system produces energy. In part, this is due to the fact that a longer history of evaluation with efficiency technologies provides a better understanding of how systems perform over time.

The net effect is that Energy Trust takes on risks with different magnitudes at different points in the process. Early in the process, Energy Trust is typically willing to invest more dollars in renewable energy projects if particular barriers are encountered, but requires a greater co-investment by project partners in those projects.[2] The mitigation strategy for this financial risk is to share the risk

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[1] Energy Trust pays an incentive based on performance in the New Buildings ENERGY STAR buildings track, to achieve operational savings. This is an experiment which may lead to more arrangements to pay for operational savings in other circumstances.

[2] Energy Trust caps its contribution to the cost of a renewable energy resource assessment at 50% and $30,000. It will pay the full cost for some energy efficiency studies up to $25,000. (http://www.energytrust.org/newbuildingefficiency/manuals/TechnicalAssistanceParticipantManual.pdf)

more evenly because the stakes are higher. In the efficiency market, Energy Trust will take on a larger portion of the risk but usually at a lower absolute cost per project. Because the efficiency market is more mature and because most efficiency measures will work with a limited amount of attention, Energy Trust can quantify the payoffs with a higher level of certainty. It takes the risks up front for efficiency and inserts provisions for its partners to accept risk if the partner fails to install measures.

As the project development cycle moves on, Energy Trust takes on more reputation and operational risk in the efficiency market and more financial risk for the renewable energy market. Energy Trust's roles larger projects in the efficiency market focus on qualifying contractor bids, providing technical support, and offering incentives. Incentives are the primary offer for many smaller projects. Since the estimated savings are typically based on prior evaluation results, these risks are considered modest. However, as a consequence, Energy Trust accepts some operational risk which can lead to reputation risk because Energy Trust is using its "brand name" as a sign of quality in the efficiency market place.[3]

In the renewable energy market, Energy Trust uses its capital to leverage investments through the use of escrow as a form of commitment that financiers understand. Escrowing eliminates Energy Trust's ability to put those funds to use while a project is under development. This reflects the different status of capital markets for efficiency and renewables. Efficiency funding is often from corporate internal funds or homeowner savings. Even when money is borrowed, the loan is rarely contingent on Energy Trust's incentive except occasionally for large projects where the customer is already heavily leveraged.

Since the technologies in the renewable energy market are may be broadly known, its investments in these projects may involve less knowledge about their lifetime performance. To counter these risks, Energy Trust solicits bids through an RFP process or through rigorous application screening, which enhances its ability to identify the most promising projects. It also structures some incentives on a pay-for-performance basis, which ensures that the technology is actually delivering the benefits it promised. These mitigation approaches are not taken in the efficiency market because the risks are not as project specific. The exceptions are efficiency technologies which are not quite proven in the field or are in the latter stages of refinement. Energy Trust mitigates these risks by often pooling with other funders to fund demonstrations and limiting the number of sites where incentives are paid to the number necessary to perform field tests. This approach reflects the nature of not-yet-commercial technologies and the practicalities of working with larger populations of smaller devices.

Table 1 breaks down the risks according to Energy Trust's roles in each market.

[3] While Energy Trust also uses its brand name in its work in the solar market, it is at a smaller scale due to a smaller number of projects and trade allies that are involved.

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Table 1. Risk Characterization and Risk Response

Roles	Specific Risk – Renewable Energy	Specific Risk – Energy Efficiency	Category of Risk	Specific Response – Renewable Energy	Specific Response – Energy Efficiency	Category of Response (Renewable Efficiency)
RE: Funding resource assessments **EE: Funding Walk-through audits**	Study may come to an incorrect conclusion regarding resource availability	Same	Operational	Hire qualified contractors to conduct study Use prior generating experience as basis for savings estimates where possible	Same Use the results of past evaluation efforts to inform energy audit tools	Mitigation Mitigation Mitigation Mitigation
	Based on incorrect assessment, above-market costs are calculated to be greater than they actually are	Based on incorrect assessment, resource available is less cost-effective than anticipated	Financial	Assume the risk Quality Control for studies	Assume the risk Quality control for studies	Acceptance Acceptance Mitigation Mitigation
	Study finds resource is sufficient but project is never built	Same	Financial / Strategic	Require cost-share of resource assessment up front	Limit Energy Trust share of payment for future studies to 80% of total cost if end user fails to install at least one eligible measure within 12 months of first study	Mitigation Mitigation
	Developer may decide to sell power to a non-funding utility	N/A	Strategic / Reputation	Contractual terms that require return of funding	N/A	Transfer N/A

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Roles	**Specific Risk – Renewable Energy**	**Specific Risk – Energy Efficiency**	**Category of Risk**	**Specific Response – Renewable Energy**	**Specific Response – Energy Efficiency**	**Category of Response (Renewable Efficiency)**
	Study finds resource is sufficient but market for the RECs / power has dried up	N/A	Strategic	Market development role enables purchase of RECs	N/A	Acceptance N/A
RE: Fund feasibility studies **EE: Energy Audits**	Study may come to an incorrect conclusion regarding feasibility		Operational	Hire qualified contractors to conduct study; perform quality control on studies	N/A	Mitigation N/A
	Study may determine that project is not feasible	Same	Financial	Assume the risk	N/A	Acceptance N/A
	Study finds project is feasible but project is never built	N/A	Financial / Strategic	Cost share with the partner up to 50% of study cost or $30,000	N/A	Mitigation N/A
	Developer may decide to sell power to a non-funding utility	N/A	Strategic / Reputation	Contractual terms that require return of funding	N/A	Transfer N/A
	Study finds project may be feasible but market for the RECs / power has dried up	N/A	Strategic	Market development role enables purchase of RECs.	N/A	Acceptance N/A

Roles	Specific Risk – Renewable Energy	Specific Risk – Energy Efficiency	Category of Risk	Specific Response – Renewable Energy	Specific Response – Energy Efficiency	Category of Response (Renewable Efficiency)
Fund inter-connection studies	Study may come to an incorrect conclusion regarding feasibility	N/A	Operational	Hire qualified contractors to conduct study	N/A	Mitigation N/A
	Study may determine that interconnection is too expensive	N/A	Financial	Scope conditions before paying for study	N/A	Mitigation N/A
	Study finds project is feasible but project is never built	N/A	Financial / Strategic	Require that the project have passed through resource assessment and feasibility screens before agreeing to fund	N/A	Mitigation N/A
	Developer may decide to sell power to a non-funding utility	N/A	Strategic / Reputation	Contractual terms that require return of funding	N/A	Transfer N/A
	Study finds that interconnection may be feasible but market for the RECs / power has dried up	N/A	Strategic	Market development role enables purchase of RECs	N/A	Acceptance N/A

Roles	Specific Risk – Renewable Energy	Specific Risk – Energy Efficiency	Category of Risk	Specific Response – Renewable Energy	Specific Response – Energy Efficiency	Category of Response (Renewable Efficiency)
RE: Conduct RFPs to identify candidate projects[4] **EE: N/A**	RFP may uncover that projects are too expensive for Energy Trust standards	N/A	Financial / Reputation	Assumes this risk	N/A	Acceptance N/A
	Winning bids may never be built or are delayed, tying up Energy Trust funds	N/A	Financial / Strategic	Use Energy Trust escrow funds as leverage for project financing	N/A	Acceptance N/A
RE: N/A **EE: Qualify Project-Specific Contractor Bids**	N/A	Personnel reviewing the proposal provides incorrect feedback, qualifying a bid that is unreasonable in terms of cost or energy savings	Operational Reputational	N/A	Hire qualified personnel to review bids	N/A Mitigation
	N/A	Contractor does not carry out the scope of work described in the proposal	Operational Reputational	N/A	Conduct post-installation inspection of project	N/A Mitigation

[4] Energy Trust uses the RFP process early in its involvement in renewable energy markets as a means to determine market prices and conditions. After this initial process, it uses the information gained through the RFP process to develop standard offers. Since the RFP is a key component of Energy Trust's strategy for addressing a renewable energy market, it is considered in the table of risk.

Roles	Specific Risk – Renewable Energy	Specific Risk – Energy Efficiency	Category of Risk	Specific Response – Renewable Energy	Specific Response – Energy Efficiency	Category of Response (Renewable Efficiency)
RE: Technical support **EE: Technical Support**	Technology assessment may determine that the technology is not viable	Analysis conducted mis-calculates the energy savings that a project can produce	Financial	Screen out "mad scientist" types of technologies	Same. Use standardized tools for calculating energy savings	Mitigation Mitigation N/A Mitigation
	Technology assessment may determine that the project is not replicable	Same	Reputational	Screen technologies for replicability	For projects that are not large enough to warrant individual attention (e.g., unique type of new home): same.	Mitigation Mitigation
	Technology is proven viable, but the application is more expensive than end user will absorb	Same	Financial / Strategic	Customer absorbs cost increase or decides not to proceed. (Assume this risk)	Customer absorbs cost increase or decides not to proceed. (Assume this risk)	Acceptance Acceptance
	Technology is proven viable but is not available	Same	Financial / Reputational	Require technologies to meet definition of "commercial technology"	Essentially the same.	Mitigation Mitigation
	Technology is viable but is unacceptable from a societal perspective	N/A	Reputational / Financial / Strategic	Avoid involvement in such controversial technologies (e.g., PV on coast)	N/A	Avoidance N/A

Roles	Specific Risk – Renewable Energy	Specific Risk – Energy Efficiency	Category of Risk	Specific Response – Renewable Energy	Specific Response – Energy Efficiency	Category of Response (Renewable Efficiency)
	Technology is proven viable but at larger scales than are eligible for Energy Trust funding	Technology is proven viable but individual project is so large that funding outstrips Energy Trust resources at that time.	Financial / Reputational	Focus on technologies that are applicable in the appropriate scale setting	N/A	Mitigation N/A
	Installers trained by Energy Trust perform poorly	Same	Operational / Reputational	Develop installation standards, perform quality control verification	Same	Mitigation Mitigation
RE: Verify quality of installations **EE: Verify quality of installations**	Once verified, installed system does not meet performance expectations, reducing production of RECs or energy savings	Same	Reputational / Financial	Prescreen equipment, place significant risk on developers so they do so. Plan for each system to achieve "average" performance For site-based smaller technologies, use the results of prior evaluations to update savings estimates	N/A Use the results of prior evaluations to update savings estimates	Transfer/ Mitigation N/A Mitigation Mitigation

Roles	Specific Risk – Renewable Energy	Specific Risk – Energy Efficiency	Category of Risk	Specific Response – Renewable Energy	Specific Response – Energy Efficiency	Category of Response (Renewable Efficiency)
RE: Paying out incentives **EE: Paying out incentives**	Energy Trust passes up other projects while funds are in escrow, and project is withdrawn	Projects to which funds are committed through the reservation process fail to materialize	Financial / Strategic	Screens projects for viability	Keep funds liquid until project is complete and commissioned	Mitigation Mitigation
	Funded project does not meet performance expectation,[5] reducing production of RECs	Funded project does not meet performance expectation, [6] reducing energy savings	Financial / Reputational	Structure some contracts on a pay-for-performance basis	Use results of prior evaluations and estimates that are scrutinized through national and regional processes (RTF, ENERGY STAR, CEEE) to improve estimates of energy savings	Mitigation Mitigation

[5] A failure to perform may be the result of a variety of conditions, including a company that goes out of business, a family that moves its system to another service territory, or a technology that is discarded or sold because it fails to provide the same functions or benefits (amenities) as its less efficient counterpart. All of these circumstances contribute to the same financial and reputation risk.

[6] A failure to perform may be the result of a variety of conditions, including a company that goes out of business, a family that moves its appliance to another service territory, or a technology that is discarded or sold because it fails to provide the same functions or benefits (amenities) as its less efficient counterpart. All of these circumstances contribute to the same financial and reputation risk.

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Roles	Specific Risk – Renewable Energy	Specific Risk – Energy Efficiency	Category of Risk	Specific Response – Renewable Energy	Specific Response – Energy Efficiency	Category of Response (Renewable Efficiency)
	Pay too much for RECs relative to market value	Pay too much for energy savings, relative to other resource costs	Financial / Reputational	Green Tag Policy procedures for setting REC price N/A	Use results of prior evaluations to improve estimates of energy savings Apply benefit-cost test	Mitigation Mitigation N/A Mitigation
	Project developer sells RECs to Energy Trust and another party	N/A	Strategic / Reputational	Assumes this risk, if needed to pursue Contract rights, maybe litigation	N/A N/A	Acceptance N/A Mitigation N/A
	Developers plan projects prior to informing Energy Trust of the projects, in effect committing more funds than Energy Trust has available	Same, although the risk also comes from vendors making unauthorized commitment on behalf of the Energy Trust.	Strategic / Reputational	Clear processes and documentation for commitment. Develop open lines of communication with trade allies and large consumers	Same Same	Mitigation Mitigation Mitigation Mitigation
	N/A	Less efficient technologies are installed because end users cannot wait for projects to be approved prior to purchase of equipment	Strategic	N/A	Implement an efficient process for reviewing potential projects and reducing turnaround time	N/A Mitigation

Roles	Specific Risk – Renewable Energy	Specific Risk – Energy Efficiency	Category of Risk	Specific Response – Renewable Energy	Specific Response – Energy Efficiency	Category of Response (Renewable Efficiency)
RE: Non-project specific activities **EE: Non-project specific activities**	The mix of marketing, information, technical assistance, and incentives offered proves not to successfully address key market barriers.	Same	Strategic	Adjust the mix of tools provided as part of a portfolio approach to market development	Same	Mitigation Mitigation
	Energy Trust's market power is limited by the size of its budget relative to those of venture capital, other private investors	Same	Strategic / Financial	Identify market niches that leverage Energy Trust strengths Partner with these sources of capital	Same N/A	Mitigation Mitigation Mitigation N/A
	The pipeline of new technologies to meet future demand for renewable energy is not sufficient to meet Energy Trust's goals	Same	Strategic	Work in diverse early-stage markets to help develop markets for cost-effective technologies N/A	Same, although commitments to activity in the early-stage technologies are limited to a small share of efficiency funding, and the primary focus is on innovation in delivery Leverage activities of the Northwest Energy Efficiency Alliance (NEEA) aimed at market transformation	Mitigation Acceptance N/A Mitigation

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SUMMIT BLUE CONSULTING, LLC

Memorandum

To: **Fred Gordon**

From: **Frank Stern and Jane Pater**

Cc: **Kevin Cooney**

Date: **June 10, 2008**

RE: **Memo #4: Literature Summary on Managing Small Renewable Energy Project Risks**

This memo is the fourth in a series developed as part of Summit Blue's work with Energy Trust of Oregon to assess the roles of its renewable energy programs and the associated risks. This memo summarizes the findings of Summit Blue's review of the literature on risk management approaches taken by the financial and investment communities for renewable energy projects smaller than 20 MW.

The next section describes our approach to the review. To provide a framework for this discussion, we then describe the types of risk that different entities take on through their involvement in the small renewables market. This is followed by discussion of risk management approaches.

Approach to Literature Review

The Summit Blue team drew on its experience in the renewable energy space as well as published literature on risk management approaches in small renewable energy projects. Summit Blue's recent engagements provided a foundation for identifying risk management approaches in this area. Interviews conducted as part of other projects and reviews of reports recently completed by team members also contributed to this literature review. Not all of the associated reports are available publicly, but the findings are adaptable to the Energy Trust context.

Beyond this initial review of existing Summit Blue knowledge, the team conducted a search for additional publications that focused on risk management for renewable energy projects smaller than 20 MW. This involved a broad internet search for case studies, risk management guides, and reports with relevant content; as well as a review of related conference proceedings to which

Summit Blue has access and publications from relevant national laboratories (specifically the National Renewable Energy Laboratory and Lawrence Berkeley National Laboratory). Combined, these searches added over 30 sources.

Types of Risk

Using the categories of risk outlined in the second memo in this series, Summit Blue organized the information gathered through the literature review for this memo. Where appropriate, the subcategories of risk utilize language that is used in the renewable energy community. These provide a common vocabulary, which can serve as a launching pad for discussions with members of the development and financial communities.

For the purposes of this memo, risk is considered from the perspective of the entities financing the renewable energy project. To Energy Trust, these can be barriers to meeting the goals of deploying new renewable generation. In some cases, the financing entity may be the same as the entity developing or operating the project, but in other cases it will not be. Additionally, many of these risks can be shouldered by several different stakeholders in a project; the financier is often the common link between many of these stakeholders, however, and is often responsible for allocating the risk. As such, the financier must understand all of these risks and the strategies for managing them, which will be discussed later.

Reputation Risk

Reputation risk was one of the categories of risk identified in the initial assessment of the risk profile of Energy Trust's activities in the renewable energy market. It was explained using the following definition: "Reputation risk captures the range of risks associated with an organization's perception in the eyes of both internal and external stakeholders across a suite of issues."[1] The sources in the literature review, however, did not discuss this risk.

Despite this oversight in the literature, Energy Trust must still assess threats to its reputation created by its involvement in both renewable energy and energy efficiency activities. A good reputation provides an organization with credibility in the market place, leverage at the bargaining table, and access to experts in its field. A good reputation can help an organization survive downturns in the market, overcome crises such as product recalls, and secure funding when it is scarce. An asset as valuable as reputation must be protected as such, despite the difficulties in quantifying a value of this intangible asset.

Operational Risk

Operational risks often lead to financial exposure but are considered separately from financial risks. Operational risks are project-related risks within the scope of project development, construction, and operation and maintenance. These risks are internal to the organizations involved in these project-related activities and relate to the processes used to move the organization toward its goals and objectives.

[1] Eccles, R.G., S.C. Newquist and R. Schatz. February 2007. "Reputation and its Risks: Identify, Quantify, and Mange the Risks to Your Company's Reputation Long before a Problem or Crisis Strikes." *Harvard Business Review.* This source informed the bulk of the discussion on reputation risk.

Some of the underlying issues that contribute to these operational risks are outside of the control of the company. By definition, these risks are *strategic* risks because they are external events and trends that shape the company. While they are mentioned under the Operational Risk category, they will be discussed in more detail under the Strategic Risk category below.

Development Risk

Uncertainties experienced as part of the project development phase are included under the heading of development risk. Development includes identifying a site with sufficient access to the resource, conducting the resource assessment, navigating the necessary permitting and approvals processes, securing funding and other necessary resources, and everything else necessary to getting a project underway. The most significant uncertainties in this stage include:

- **Resource identification risk** revolves around the process of locating a quality resource.[2] For geothermal resources, this involves the exploratory studies as well as drilling; for wind and solar, it typically includes monitoring studies; for biomass resources, it can vary by technology.[3,4] These processes can take significant resources, in terms of both time and dollars. The ability to locate a viable resource is one of the first steps in project development.

- **Siting risk** involves the developer's ability to secure the necessary permits, contractual agreements (e.g., land rights, access to transmission), and local support that enable construction to begin. This can be a time-consuming and frustrating process, and it can extend timelines by months and years, depending on the context. Construction cannot begin until all of these issues are addressed. Some aspects of this risk are strategic issues and are discussed further below.

- **Capital risk** is the developer's ability to secure financing for the project.[5,6] In vertically integrated companies, this is fairly straightforward because the capital budgeting process is already in place. For independent developers, however, this can be complex because it can involve pitching the project to a series of equity investors and debt providers and may require the assistance of an arranger. Without the capital to secure the land, equipment, and contractors' services, the project cannot move forward.

Completion Risk

Once the project has received all of the requisite approvals and secured financing, it is not necessarily guaranteed to become an operating project. The construction phase involves the

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[2] Walsh, Kevin (GE Energy Financial Services). March 2008. "Wind Finance." Washington International Renewable Energy Conference. Washington, D.C.

[3] Schreiber, H. K. Shimazaki and J. Combs. December 2006. "Financial Risk Management Instruments for Geothermal Energy Development Projects." Presented to UNEP's Second Consultation Meeting: Assessment of Financial Risk Management Instruments for Renewable Energy Projects.

[4] Marsh. 2004. Financial Risk Management Instruments for Renewable Energy Projects: Summary Document. Prepared for UNEP Division of Technology, Industry, and Economics.

[5] Harper, J. M. Karcher, and M. Bolinger. 2007. *Wind Project Financing Structures: A Review & Comparative Analysis*. Lawrence Berkeley National Laboratory. Report LBNL-63434.

[6] Summit Blue Consulting. February 2008. *U.S. Solar Market Assessment.*

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procurement of necessary equipment, negotiation and agreement with contracting teams, and actual construction of the facility. Two primary risks are associated with this stage of development:

- **Equipment availability** is a major issue today, especially for wind and PV projects.[7,8,9,10,11] In recent years, the uncertainty over the federal production tax credit (PTC) created instability in the market for wind turbines, leading to a shortage in supply. More recently, wind turbine and component manufacturers have ramped up production, but the rate at which supply has expanded falls short of the rate in increased demand; turbines are especially hard to come by for smaller developers. In the PV market, a shortage of silicon has created a bottleneck in the supply chain, which is amplified by a rapid growth in demand for PV systems in response to generous government incentives for the technology. In the geothermal market, developers are in competition with the booming oil and gas industry for drilling rigs. These shortages of supply create significant barriers to project completion.

- **Contractor performance** contributes directly to the on-time, on-budget completion of projects. Such projects require skilled workers, which are in short supply in the renewable energy field, especially for PV. Without the support of reliable contractor teams, renewable energy projects can fall behind schedule and risk missing the eligibility window for tax benefits or other incentives.[12,13,14,15] This is a major issue for wind and PV development, and it is recognized as a potential threat for geothermal and bioenergy resources.

- **Interconnection** can be a black box in terms of cost and timing. It can take up to 18 months from when equipment is identified to complete all the studies and have a good cost estimate. Often it is late in the process before a final cost can be known, creating an unknown in a potentially significant financial element. Further the utility may approach this in a linear, rather than parallel process, adding additional development time and associated costs.

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[7] Christy, Kevin (Helios Energy) March 2008. "Operational and Contractual Wind and Solar Equipment Lead Time Management." Infocast Renewable Power Project Finance Tutorial. Houston, Texas.

[8] Walsh, Kevin (GE Energy Financial Services). March 2008.

[9] Summit Blue. February 2008.

[10] Alam, Mohammed (Alyra Renewable Energy Project Finance) and Steve Krebs (Baker Botts LLP). March 2008. "Renewable Project Business Models: Deal Structures and Economics and Overview of Renewable Energy Project Financing." Infocast Renewable Power Project Finance Tutorial. Houston, Texas.

[11] McKinsey, J. (Stoel Rives) January 2008. "Insights on Renewable Energy Project Finance." Modeling New Renewables, ECAI Web Forum.

[12] Ferguson, Matt (Reznick Group). March 2008. "US Wind Power Economics." Washington International Renewable Energy Conference. Washington, D.C.

[13] Irvin, Mac (SunPower). March 2008. Solar Project Finance Presentation. Washington International Renewable Energy Conference. Washington, D.C.

[14] Holmes, William. March 2008. "Issues in Renewable Energy Project Contracts." Infocast Renewable Power Project Finance Tutorial. Houston, Texas.

[15] Previously cited sources: Summit Blue, February 2008. Walsh, Kevin, March 2008. Marsh, 2004. McKinsey 2008.

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Performance Risk

Once construction is complete, the project should begin operation; the risk is how effective that operation will relative to expectations. Although most renewable energy projects have expected useful operating lives of 20-30 years, the first few years are the most important to investors, for whom the time value of money necessitates highly effective early-stage performance. Several factors contribute to the risk of performance during this stage:

- **Equipment performance**, also known as **technology risk**, is one of the key factors determining the financial viability of a project.[16,17,18] Energy revenues are always tied to production for private financiers, and REC revenues are becoming tied to production in more markets. As such, the underlying technology performance is directly related to revenue streams. Technology may fail or underproduce due to manufacturer defect, fatigue, weathering, project design and installation, neglect of maintenance, inexperienced operators, and a host of other reasons. Project owners must attend to each of these issues in order to manage project profitability.

- **Resource risk** is related to the accuracy of the resource assessment and the annual variability inherent in most renewable resources. Due to current pressures on renewable energy project developers, many projects build pro formas using less than ideal data (e.g., non-site specific data or data from insufficient periods of time).[19] As a result, project owners take on higher levels of resource risk than in less hurried times. Additionally, there is a natural variation in the availability of wind, solar, and geothermal resources. To the extent that estimates used to build pro formas use imperfect data, this also contributes to the resource risk.[20]

- **Contractor performance** is closely tied to equipment performance, and it can affect the lifetime O&M costs for a given project. Since the parties responsible for project operation and maintenance do not have a stake in project performance, their performance can be less than ideal.[21] Over time, this can result in higher costs for O&M that were not anticipated in the initial project pro formas.[22] How far from the ideal they stray and how drastically that affects project output contribute to the magnitude of this risk.

- **Availability of spare parts** is becoming a more significant issue in the wind industry. Like the turbines themselves, the components needed to repair a damaged, worn, or broken system are in short supply due to the explosion of renewable energy development. The increase in downtime associated with this shortage can be damaging to project economics.

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[16] Sachs, Chad (MMA Renewable Ventures). March 2008. "Project Finance in the U.S. PV Sector." Washington International Renewable Energy Conference. Washington,

[17] UNEP Finance Initiative Climate Change Working Group. June 2004. *CEO Briefing: Renewable Energy.* UNEP.

[18] Previously cited: Summit Blue 2008. Ferguson 2008. Marsh 2004. Schreiber et al 2006. McKinsey 2008. Christy 2008. Alam and Krebs 2008.

[19] Previously cited: McKinsey 2008. Alam and Krebs 2008. Christy 2008. Ferguson 2008. Walsh 2008.

[20] Previously cited: Marsh 2008. Harper et al 2008.

[21] See footnotes 16-18.

[22] Previously cited: Walsh 2008. Ferguson 2008.

Financial Risk

Financial risks directly affect the financial condition of a project and the organization that owns it. Such an effect will manifest itself on the income statement, balance sheet, and statement of cash flows.

Energy Price

Energy price risk is present for all energy projects, including renewable energy projects.[23,24] In deregulated markets, project owners face a decision to lock in a fixed price for energy from one or more offtakers or to play the market and accept the price available when the project produces energy. In Oregon, a regulated market, qualified facilities (QFs) have three pricing options:

- a set price schedule for 15 years,
- a price schedule that floats with gas prices, or
- a hybrid pricing structure that combines features of the previous two arrangements.

If the price is set in either deregulated or regulated markets, there is a risk that the project could have earned more on the spot market or through the floating price schedule, respectively, if the market/floating price is higher than the fixed price. If project owners decide to play the market or utilize the floating price schedule, the risk is that the energy price decreases below where a fixed price could have been secured.

Renewable Energy Certificate Price

Renewable energy certificate (REC) prices are unique to the renewable energy market. RECs monetize the environmental attributes of renewable energy projects and can be sold together with the energy (bundled) or separately from the energy (unbundled). In either case, project owners can choose to sell the RECs on the spot market or through a fixed price contract. The risks are the same as with energy prices – higher market prices if a fixed price contract is arranged or lower market prices if the spot market approach is taken.[25,26]

Tax Benefit Monetization

In order to obtain the largest return on investment, project owners must be able to monetize the tax benefits for each type of renewable energy resource.[27,28,29,30,31] For solar, the investment tax credit

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[23] Fleten, S-E. and K. Maribu. 2005. Investment Timing and Capacity Choice for Small-Scale Wind Power Under Uncertainty. Lawrence Berkeley National Laboratory. Report LBNL-58072.

[24] Previously cited: Schreiber et al 2006.

[25] Wiser, R. and G. Barbose. 2008 "Renewable Portfolio Standards in the United States: A Status Report with Data through 2007." Lawrence Berkeley National Laboratory.

[26] Previously cited: Summit Blue 2008.

[27] Cory, K.J. Coughlin, T. Jenkin, J. Pater and B. Swezey. 2008. *Innovations in Wind and Solar PV Financing.* National Renewable Energy Laboratory. Report No. TP-670-42919.

[28] Eber, J. (JP Morgan) March 2008. "US Wind Power Finance." Washington International Renewable Energy Conference. Washington, D.C.

(ITC) and accelerated depreciation (also called Modified Accelerated Cost Recovery System or MACRS) can help recover over half of the cost of a PV system in the first year alone. For wind, small hydroelectric, and several types of bioenergy, the production tax credit (PTC) can add 20-25% on top of energy sales revenue; accelerated depreciation is also applied to these projects and enables a firm with a tax appetite to recover 20% of the capital cost in the first year. In Oregon, business tax credits allow project owners to take a state tax credit for 50% of the project costs, which can reduce up-front costs by about 3%.[32][33] Project owners must ensure that these benefits are monetized by a firm with sufficient tax appetite. Without this component of income, the project economics are much less attractive; this is a significant risk for developers that lack the tax liability.

Balance Sheet Exposure

Renewable energy projects can affect the balance sheets of two different types of entities in two different ways. First, for developers or equity investors that choose to leverage their investment, projects financed "on balance sheet" expose the assets of the entire company to the debt providers in the event of default.[34],[35] For investor-owned utilities (IOUs) that agree to long-term fixed price contracts, or power purchase agreements (PPAs), balance sheet risk is realized when rating agencies treat these agreements as debt. When many PPAs are combined with other debt, the IOUs' bonds can be de-rated by the agency, lowering the utility's credit rating.[36]

Fuel Supply

Fuel supply availability and price are inter-related risks that are unique to bioenergy projects (among renewable energy projects) and are especially acute for biomass projects.[37] The profitability of biomass facilities are typically dependent on the availability of a cost-effective fuel supply, which is usually limited by the proximity of the fuel source to the facility. Fuel supply may be constrained if competing energy users are increasing demand for it, or if it is used faster than it is reproduced. Accordingly, prices would increase, leading to financial exposure for the project owners.

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[29] Emmons, T. (HSH Nordbank) March 2008. "Wind Energy Finance: US, EU and Germany". Washington International Renewable Energy Conference. Washington, D.C.

[30] Bolgen, N. April 2007. "Fairhaven Wind Feasibility Study Results." Massachusetts Technology Collaborative.

[31] Previously cited: Harper et al. 2007. Alam and Krebs. 2008. Irvin 2008. Sachs 2008.

[32] Oregon Department of Energy – Conservation Division. May 15, 2008. "Business Energy Tax Credits." Available; http://www.oregon.gov/ENERGY/CONS/BUS/BETC.shtml

[33] 3% estimate is determined by multiplying the tax credit by the state income tax rate (6.6% in 2008) to determine the monetized benefits. Source of income tax rate: http://www.taxadmin.org/fta/rate/corp_inc.html)

[34] Knowlton, C. (Manulife Financial / John Hancock). March 2008. "An Institutional Lender's Perspective of Biofuels Finance." (From Biofuels/Bioenergy Finance Session). Washington International Renewable Energy Conference. Washington, D.C.

[35] Previously cited: Cory et al 2008. Schreiber et al 2006.

[36] Standard and Poor's. May 7, 2007. *Methodology for Imputing Debt for U.S. Utilities' Power Purchase Agreements.*

[37] Previously cited: McKinsey 2008. Knowlton 2008.

Strategic Risk

Strategic risks focus on external threats and capture the higher level issues that drive a firm's operational and financial decisions. These risks create the context in which the firm operates.

Policy Risk

The energy industry is inherently driven by a slew of policies at the federal, state, and local levels. Discontinuity or lack of confidence in any of these policies leads to uncertainty in the development of renewable energy projects.[38,39] Examples of significant policies include the following:

- **Federal ITC and PTC policies** are major issues in this category because they drive such significant portions of project finance; the approach of Congress has been temporary (one to two years) renewal and inconsistent.

- **Greenhouse gas regulation** has already started in the Northeast through the Regional Greenhouse Gas Initiative (RGGI) and is being explored in California. Federal policies are anticipated in the next couple of years, but it is not yet clear how they will affect renewable energy resources.

- **Renewable portfolio standards** (RPSs) are now in place in over half of the states. RECs are used in some states as a compliance mechanism but not in others, creating illiquid markets across state borders. Concern about potential evolution of these policies over time creates uncertainties in the marketplace.

- **State-level incentives,** such as tax breaks, are also constantly in question. There is uncertainty about their availability from one year to the next and the availability of funds through the end of the year. In Oregon, the availability of partners to pass through tax credits in exchange for cash can also be uncertain.

- **Permitting policies** at the state and local levels impact the siting of projects as described in the Operating Risks above. These vary from one jurisdiction to the next, creating hurdles to development, especially for projects (e.g., wind) that cross jurisdictional lines.

Equipment Risk

Equipment availability was described earlier as a component of Project Completion risk. Since the forces driving this availability are outside the bounds of a developer or financier, however, it is formally categorized as a strategic risk. The constraints on turbine and silicon supplies lead to higher prices, which can also jeopardize a project's viability.[40] The key drivers at this stage are government incentives, which encourage the development of these resources in the short-term (usually one to two years through the PTC or ITC) but fail to create certainty in the marketplace

[38] Cendagorta, J.L. March 2008. "Financing PV Plants in Spain". Washington International Renewable Energy Conference. Washington, D.C.

[39] Previously cited: Cory et al 2008. McKinsey 2008. Alam and Krebs 2008. Christy 2008. Sachs 2008. Ferguson 2008. Summit Blue 2008. Schreiber et al 2006.

[40] Previously cited: Harper et al 2007.

over the long-term. The result of this uncertainty is unwillingness on the part of manufacturers to invest capital in additional manufacturing facilities, leading to constrained supplies.

Stakeholder Risk

Stakeholder involvement in renewable energy projects is significant because of the visibility of many of the systems. The sheer size of wind turbines, for example, has created a variety of concerns for local stakeholders; the most damaging to wind developers has been the impact on viewsheds of these facilities. Conversely, residential- and commercial-scale PV systems are less conspicuous but can still cause concerns among neighbors whose view is impacted. Opposition to such projects can delay project timelines and increase the cost of project development.[41]

Risk Management Approaches

To mitigate their exposure to the risks described above, entities involved in project finance adopt a range of risk management approaches. Many of these approaches are similar among renewable energy technologies, and some risk management approaches are unique to specific technologies. We will outline the more general approaches first to provide structure and a common language. Then, we will provide technology-specific information regarding common risk management strategies.

General Approaches to Risk Management

The renewable energy financial community has a set of risk management tools that it can apply to any technology. Many of these were learned from more conventional energy technologies, and the same principles apply to the renewable energy investments. Generally speaking, these risk management approaches fall into four categories: strategic, financial, hedging, and operational approaches.

Note that this memo only discusses the risk management approaches revealed through the literature search. The approaches listed here are not comprehensive because the literature is not comprehensive. Other risk management approaches considered for other aspects of this project will be drawn from Summit Blue's experience in the field, and still other risk management approaches will be sought out during the interviews with the financial and developer communities.

Strategic Risk Management

Strategic risk management approaches are related to business models, partnerships, and other decisions that drive the business. These high level decisions provide the context for the rest of the financing and operational approaches. The strategic approaches that are prevalent across multiple technologies include the following:

- **Project bundling** enables financiers to aggregate risk and to create diverse portfolios of projects.[42] Projects can be aggregated for equity investors, debt providers, or insurers in order to provide a more attractive investment with a lower risk. Among others, project

[41] Previously cited: Marsh 2004. Ferguson 2008. Alam and Krebs 2008. McKinsey 2008.

[42] UNEP Finance Initiative Climate Change Working Group 2004. Summit Blue 2008. Sachs 2008. Harper et al 2007. Irvin 2008.

bundling helps to mitigate the risks associated with year-to-year resource variability, geographic resource variability, technology performance, and energy price volatility among different markets.

- **Cultivating partner relationships** enables project developers and financiers to identify creditworthy and credible partners to serve as contractors or counterparties for their portfolio of projects.[43] Devising mutually beneficial incentive structures can lead to fewer project delays, better project performance, and control of associated costs. Recognizing that these long-term commitments can create liabilities and benefits, decision makers can learn from contracting experience in other parts of their business to create sustainable partnerships.[44]

- **Industry consolidation** has created economies of scale, facilitated access to equipment and supplies, and diversified project pipelines within the resulting firms.[45] Vertical integration achieves the first two of these goals, while horizontal consolidation achieves the last. Larger developers are becoming more prevalent in wind and PV because of the cost savings that can be achieved through such partnerships.

- **Supply agreements** have provided developers with access to necessary equipment where vertical integration has not yet occurred.[46,47] These agreements address risks related to both scarcity and price. They can lock in a set number of turbines, for example, by a given date and at a fixed price.

- **Power Purchase Agreement (PPA) structures** reduce risk to both the party providing the financing and the party purchasing the energy. [48] PPAs provide certainty about energy prices and revenue for the developer. In the absence of the agreement in a deregulated market, the project owner would be subject to price volatility in the market. Without the PPA in a regulated market like Oregon's, third-party financiers could sell their project into the wholesale market – at wholesale rather than retail rates – under a standard offer if they were able to find a counterparty. Further, the third-party power purchase agreements allocate the performance risk to the party responsible for developing and maintaining the system, which is a reasonable alignment of risk, reward, and responsibility.

- **REC sales strategies** differ by technology, but this critical business decision can significantly affect project cash flows. Project owners may have the option of selling the RECs in a lump sum or trading them for financial participation in a project up front, of selling the RECs on the spot market over time, or some combination of these two

[43] Summit Blue 2008. Irvin 2008.

[44] Summit Blue 2008. Alam and Krebs 2008.

[45] Harper et al 2007. Cory et al 2008. Summit Blue 2008.

[46] See, for example, General Electric. January 2008. "Invenergy Agreement of More than $1 Billion Highlights Record Growth in 2007 for GE Energy's Wind Business." Available: http://www.gepower.com/about/press/en/2008_press/012208.htm
BP. July 2006. "Clipper Windpower PLC and BP Announce a Strategic Turbine Supply and Joint Development Agreement." Available: http://www.bp.com/genericarticle.do?categoryId=2012968&contentId=7019702

[47] Summit Blue 2008.

[48] Schreiber et al 2006. Summit Blue 2008. Cory et al 2008. Alam and Krebs 2008.

approaches.[49] All of these approaches have been used, and the determining factors are the requirements of project co-funders, owner's appetite for risk and the supply/demand balance for RECs in accessible compliance markets.

Financial Risk Management Approaches

The fundamental goal of finance is to allocate risks to the parties best equipped to tolerate them.[50] The approaches described in this category revolve around financial structures created to achieve that goal.

- **Partnership flip structures** permeate renewable energy project finance.[51] In the early years of such partnerships, investors with tax appetites available to take advantage of tax credits, such as the PTC, ITC and MACRS, own the majority of the project and monetize these tax benefits. After the tax benefit is exhausted, majority ownership transfers, or "flips," to another ownership group, often including the developer. This approach enables developers to mitigate tax benefit monetization and balance sheet exposure risks. In the absence of this arrangement, many projects would not happen because of the inability to monetize the tax benefits.

- **Leveraging Clean Renewable Energy Bonds (CREBs)** enables electric cooperatives and government entities that own projects to monetize the tax benefits provided to renewable energy.[52] Without a tax appetite of their own, these entities cannot directly benefit from the PTC and ITC. Instead, CREBs enable these public owners of projects to transfer federal tax credits to the bond holders instead of paying out cash interest.[53] For Oregon business tax credits, the pass-through provides similar benefits. Like the Partnership Flip Structure, CREBs enable project owners to mitigate the tax benefit monetization risk; without these, the project economics for many projects would not justify development.

- **Separating the assets of the project from the owners' other assets** enables the owners to isolate the liabilities and risks of the renewable energy project.[54] Such separation can be achieved through the creation of a special purpose entity, such as a limited liability corporation, or through the use of non-recourse debt. This separation enables the financier to protect the rest of its assets in the event of project failure or underperformance. Such arrangements are only possible if the project's anticipated cash flows are sufficient to cover all expenses and provide a sufficient return on investment.

Hedging Approaches to Risk Management

In addition to designing financing structures that allocate risk, project owners can enter into hedging agreements that transfer more of the risk to other parties. While this approach adds cost to

[49] Cory et al 2008.

[50] McKinsey 2008. Knowlton 2008. Irvin 2008.

[51] Harper et al 2007. Cory et al 2008. Eber 2008. Ferguson 2008.

[52] Harper et al 2008.

[53] Database of State and Local Incentives for Renewable Energy (DSIRE). February 2008. "Clean Renewable Energy Bonds." Available: www.dsireusa.org

[54] Knowlton 2008.

a project, parties that are unwilling to accept certain types of risk are willing to reduce their return in order to put bounds around a project's financial flows. There are two main categories of hedging:

- **Enter into formal contractual agreements through over the counter or custom transactions.** Hedging instruments for "renewable energy" projects do not exists, so project owners enter into contracts with different but correlated underlying assets.[55] For example, in markets where natural gas is on the margin, natural gas hedges may serve as a proxy for the price of energy. In markets where the price of energy is traded on an over-the-counter exchange, these contracts may be used to hedge energy prices. In some cases, REC prices have been hedged through custom products.

  For merchant plants, these agreements can create "synthetic PPAs" by limiting downside risk for the energy price but enabling the project owners to take advantage of the upside. For example, the plant owners can buy "puts" on the price of energy, or the right to see their energy at a given price at a given point in time. The puts effectively create a price floor for the energy. Another strategy has renewable energy project owners purchasing a put and a call, which effectively creates a range of prices that the power can be sold for, creating more certainty for financial returns. Finally, the project can enter into custom agreements, called contracts for differences, which are directly tied to the price that the project receives for its output. Contracts for differences are only possible if the owners can find a counterparty that will accept the downside risk at an acceptable price; this is unique to contracts for differences because they are not traded over the counter like the other instruments discussed,

- **Insurance products** enable project owners to transfer specific risks to a more traditional insurer.[56] Many of the types of insurance available are analogous to products offered for conventional energy or other types of businesses. These products are available for some but not all technologies, and coverage may only be offered by a limited number of companies. Table 1 summarizes insurance products available for renewable energy projects.

Generally speaking, these insurance products are most widely available and affordable for the technologies (e.g., wind and biomass) whose risks are best understood. For this subset of technologies, the insurance products are more widely available and affordable for projects of a sizable scale; groups advocating for the broader availability of these products for smaller projects suggest that insurance providers bundle together several smaller projects, reducing the insurer's exposure to a single project.[57] As other technologies become more widely used and their risks better understood, the availability of insurance should become more widespread.

[55] Cory et al 2008. Harper et al 2007. Alam and Krebs 2008. Marsh 2004.

[56] Marsh 2004.

[57] Schreiber et al. 2006.

Table 1. Summary of Insurance Products Available for Renewable Energy Projects

Insurance Product	Description	Technologies Best Covered
Alternative Securitization Structures (asset-backed securities)	Securitized risk finance instruments including Insurance Linked Securities (CAT Bonds)/ Collateralized Debt Obligations issues with several tranches of credit /risk exposure. Based on credit differentials	
Business Interruption Insurance	Protects against sudden and unforeseen physical loss or physical damage to the plant/ assets during the operational phase of a project causing an interruption	Wind, PV
Captives or other pooling / mutualization structures	Self-insurance program whereby a firm sets up its own insurance company to manage its retained risks at a more efficient cost than transfer to a third party. Pooling through "mutual" or "protected cell" structures can further diversify risks among similar enterprises.	
Construction All Risks/Erection All Risks Insurance	Protects against all risks of physical loss or damage and third party liabilities, incl. all contractors' work	Wind, PV, Geothermal, Biogas
Contingent Capital	Insurance policy that can take the form of hybrid securities, debt or preference shares provided by (re-insurer to support and/or replace capital that the insured would otherwise be forced to obtain in the open market at punitive rates	
Delay in Start Up / Advance Loss of Profit Insurance	Protects against physical loss of and/or physical damage during the construction phase of a project causing a delay to project handover	Wind
Double-trigger products	Contracts or structures provided by re-insurers covering, for example, business interruption risks caused by a first trigger such as unforeseen operational problems that create a contingent event (e.g., spike in electricity prices)	
Finite Structure	Multi-year, limited liability contracts with premium calculated on likelihood of loss and impact. Smoothes out volatility of events that adversely impact earnings/cash flows. Potential to spread high cash-flow impact losses over time.	
General / Third-Party Liability Insurance	Protects against liability imposed by law, and/or Express Contractual Liability, for Bodily Injury or Property Damage	Wind, Geothermal, Biogas
Machinery Breakdown Insurance	Protects against sudden and accidental mechanical and electrical breakdown necessitating repair or replacement (excl. wear and tear)	Wind, Geothermal
Operating All Risks / Physical Damage Insurance	Protects against sudden and unforeseen physical loss or physical damage to the plant / assets during the operational phase of a project	Wind, Geothermal

Source: Marsh 2004 report.

<u>Operational Risk Management Approaches</u>

Companies can take a series of tactical approaches to risk management for renewable energy projects. These involve specific actions taken by project owners and management to mitigate certain risks, typically related to project performance risk.

- **Contracting with the mindset of risk management** creates legal liabilities for counterparties that fail to perform as promised, enabling project owners to transfer risk to the parties better able to control the outcomes. This approach can be applied to a variety of contracting vehicles – those with construction contractors and subcontractors, fuel suppliers, operations and maintenance contractors, equipment suppliers, and other entities whose performance is closely tied to project performance. Because they are legally binding, such agreements are powerful tools for assuring that key project partners perform as expected. They can be used to transfer appropriate risks to project partners, provided that they are both able and willing to accept those risks. These contracts are especially important when project partners do not have a stake in the outcome of projects and are only hired for specific tasks. If designed properly, these measures can contribute to higher certainty in cash flows.[58] Key contract clauses include the following:

- *Performance incentives and penalties:* When contractor interests are aligned with those of the project owners, performance is better from the viewpoint of project owners. Financial rewards and penalties create clear outcomes for a job well or poorly done. In some cases, these incentives take the form of fixed-price contracts to limit the project owner's downside risk.[59] In other cases, performance bonds or retainage for contractors ensure that the contractors provide a backstop for non-performance or damage.[60] For O&M contractors, the development of a long-term relationship with performance incentives can also improve project performance.[61]

- *Secure warranties or guarantees:* For systems with many moving parts, ensuring that the parts continue to perform over time is a critical issue.[62] These agreements shift the risk to the component provider and can include both part replacement as well as on-site assistance in addressing issues with the components. Agreements can be established with contractors, parts manufacturers, or developers.[63]

- *Pass-through clauses*: In many cases, offtakers will insert contract clauses that require the project owner to pay a penalty if the project is not completed on time or is out of service at specific times. To the extent that these risks can be passed through to the parties responsible for the delay or down time, this should be done.[64]

- **Setting aside contingency funds** enables project owners to cover unanticipated expenses.[65] These funds can address contractor cost over-runs during construction or operation or equipment-related expenses.

- **Using a proven technology with a proven design** reduces uncertainty in project performance.[66]

- **Conduct due diligence on resource assessments and incorporate those findings into financial modeling.** Many projects today rush through the resource assessment phase due

[58] McKinsey 2008.

[59] Alam and Krebs 2008. Schreiber et al 2006. Holmes 2008.

[60] Holmes 2008. Alam and Krebs 2008.

[61] Christy 2008. Ferguson 2008.

[62] Ferguson 2008. Alam and Krebs 2008.

[63] Ferguson 2008. Marsh 2004. Irvin 2008. Schreiber et al 2006.

[64] Holmes 2008.

[65] Knowlton 2008. Alam and Krebs 2008. Ferguson 2008.

[66] Alam and Krebs 2008.

to time constraints resulting from expiring incentives or competing development interests. Initial resource assessments should be reviewed by independent third parties to ensure viability.[67] Any uncertainties in the resource assessments can be built into financial models to create realistic pictures of project cash flows.

The following sections discuss risk management issues and approaches that are unique or more pronounced for certain types of renewables. The literature search uncovered sources related to PV community-scale wind, geothermal, and biomass projects. This review summarizes the findings on technology-specific risk management approaches for these resources.

Photovoltaic Power (PV)

Some characteristics of PV development are unique due to two factors: the up-front capital costs and set-aside clauses in renewable portfolio standards. The latter factor is not at play in Oregon because there are no such set-asides. However, there are requirements in SB838 for "community energy" becoming 8% of sales under the RPS, and funding is provided for the Energy Trust to acquire renewables under 20 MW per site. These provisions apply to a range of smaller renewable energy resources including PV.

Whereas bioenergy, geothermal, and community wind projects have been developed at scales that serve communities, PV systems are most prevalently developed to serve a single customer. These customers may be residential, commercial, or industrial entities, but the system is typically set up to deliver energy to only one entity. These single entities are typically uninterested in shouldering the unsubsidized up-front costs associated with PV. As a result, federal and state agencies and some utilities have provided incentives (e.g., ITC, business energy tax credits) to reduce this barrier for this class of owners.

As a result, financing of PV systems can be arranged through PPAs with the single energy buyer, also called an offtaker. This enables the project host/energy offtaker to avoid the up-front capital investment associated with PV. The cost of the system to the financier/developer is repaid through tax incentives and over time as the host/offtaker purchases the energy generated by the system. This arrangement reflects the lifetime benefits of the system in the cost-recovery approach for the owner.[68]

To manage risk under this approach, project owners tend to use standardized financing structures and documentation.[69] This reduces the transaction costs associated with each project as well as creating more certainty in the contracting process. The owner is able to anticipate the risks that it assumes and put in place appropriate mitigation strategies.

To account for the disparity between the cost of PV and other RPS-eligible resources, some states have developed RPS with carve-outs for solar. These set-asides create a separate market for solar RECs (SRECs), and the pricing for these attributes reflects the economics of PV development. That is, SRECs sell for considerably higher prices than RECs associated with wind, biomass, or small hydro.

[67] Marsh 2004. Ferguson 2008. Alam and Krebs 2008.

[68] UNEP Finance Initiative Climate Change Working Group 2004.

[69] Irvin 2008.

The separate market for SRECs and the higher up-front cost of solar has led to a different set of monetization strategies for the environmental attributes. In some cases, developer/owners today will sell all of the SRECs up front to a REC broker in order to accelerate their cost recovery.[70] This approach also transfers the risk that the SREC prices will collapse in response to unanticipated policy changes to the REC broker. Other owners will choose to play the market, but this is a risk that is more often transferred at this point in time.

Table 2 summarizes the risk management approaches taken by the financial community to mitigate risks associated with PV development.

[70] Cory et al 2008.

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Table 2. Summary of Risk Management Approaches for PV

PV Risks	PV Risk Management Approaches			
	Strategic	**Financial**	**Hedging**	**Operational**
Operational				
Development	- Use of PPA structure			
Completion	- Supply agreements - Vertical Integration - Contractor relationships		- Insurance: Contractors Overall Risks, Construction All Risks	- Contracts: guarantees, performance incentives, performance bonds, penalties
Performance	- Bundle projects	- Incorporate variability into financial model	- Insurance: Contractors Overall Risks, Business Interruption - Derivatives	- Due diligence on resource assessments - Contracts - Proven technology - Contingency fund - Pre-purchase spare parts
Financial				
Energy Price	- Use of PPA structure - Bundle projects		- Derivatives	
REC Price	- Sell RECs up front - Sell RECs into compliance markets with solar set aside		- Derivatives	
Tax Benefit Monetization	- Use of PPA structure - Bundle projects			
Balance Sheet Exposure	- Create special purpose entity	- Non-recourse debt		
Fuel Supply				
Strategic				
Policy	- Trade association lobbying - Vertical integration			- Contracts - Proven design
Equipment	- Supply agreements - Vertical Integration - Contractor relationships			

Wind

Energy Trust of Oregon is interested in both small and community-scale wind development. The literature search uncovered a strong body of literature related to community-scale development, but there are few resources available regarding the risk management approaches used for wind projects less than 1 MW. In part, this may be due to the fact that such small wind projects have not yet achieved the popularity or scale associated with small PV systems. Since there are no sources in the literature that deals with the small scale wind, this issue will need to be addressed in the interviews with developers.

Community-scale wind development is similar in many ways to the development of larger scale wind farms (i.e., those larger than 100 MW). The turbines are of the same scale; the siting and permitting issues are similar; the needs to monetize tax benefits and manage risk exposure are also the same. As a result, many of the risk management approaches used for these community-scale projects are parallel to those used for larger scale development. Many of these were discussed earlier in the General Risk Management Approaches section, but a few are specific to wind development and are addressed here:

- Performing scheduled maintenance.[71] This may sound straightforward, but early wind developments suffered sub-par performance because of lackluster maintenance efforts. The smaller scale of community wind eliminates the economies of scale for O&M created by the larger farms, which could lead to corner cutting. The cost to bring out a crane required for certain types of maintenance is hundreds of thousands of dollars. The scheduled maintenance is critical to long-term performance.

- Keep spare parts on hand.[72] Due to the rapid expansion of the wind industry, spare parts can be hard to come by on short notice. By keeping an inventory of critical components, community-scale wind farms can mitigate the risk of extended down time created by unavailable parts.

- Bundle projects to aggregate risk. Just as there is variability in resource availability and equipment performance for large-scale wind farms, community scale wind farms will have variations in their output. Project owners can bundle several projects in order to mitigate some of that risk. For several of its larger scale facilities, FPL Energy issued a 20-year bond to finance a portion of the projects.[73] This approach requires the backing of a stable entity, and most governments are considered stable enough to issue bonds for education and other local needs. Local governments that want to own community scale wind projects may consider bundling projects from several communities and issuing bonds backed by the assets of the project and the taxation privileges of the local governments.

It is not clear which parties will build community wind developments – local governments or private developers. The town of Fairhaven, Massachusetts, for example, considered both options and decided to allow a private developer to develop its 3.3 MW project in order to reduce the

[71] Ferguson 2008.

[72] Ferguson 2008.

[73] Cory et al.

community's exposure to risk and to monetize the associated tax benefits.[74] In contrast, a publicly owned utility in Washington State decided to issue revenue bonds to back its 48 MW wind facility to take advantage of its lower cost of capital.[75] In another case, a private entity owned the development, but the community took advantage of its lower cost of capital and pre-paid for the energy produced by the system; this approach eliminated its exposure to the risks of ownership but enabled it to reduce the long-term cost of purchasing power from the system.[76]

To the extent that public entities decide to own wind projects, two risk management approaches should be considered:

- PPA Each community will need to decide if it will sell its power through fixed price, floating price structures, or a hybrid approach will be taken. The higher level of risk associated with a merchant plant is significantly different from that associated with typical government investments. As such, it is expected that any community-owned wind will use a PPA structure. Risk management approaches should be harmonized with this structure.

- CREBs. As discussed earlier, CREBs are available to public entities that own renewable energy projects. These will be an important tool for monetizing the tax benefits of community-owned wind.

Table 3 summarizes the risk management approaches relevant for community-scale wind development.

[74] Bolgen, N. April 2007. "Fairhaven Wind Feasibility Study Results." Massachusetts Technology Collaborative.

[75] Wiser, R. December 2001. "Energy Northwest Bond Issuance for 48 MW Wind Project." Memorandum. Ernest Orlando Lawrence Berkeley National Laboratory.

[76] Emmons 2008.

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Table 3. Summary of Risk Management Approaches for Wind

Wind Risks	Wind Risk Management Approaches			
	Strategic	**Financial**	**Hedging**	**Operational**
Operational				
Development	- Use of PPA structure			
Completion	- Supply agreements - Vertical integration		- Insurance: Construction All Risks, Property Damage, Delay in Start Up/Advanced Loss of Profits, Contractors	- Contracts: guarantees, performance incentives, performance bonds, penalties
Performance	- Bundle projects	- Apply higher premiums to capital in order to account for underperformance risk	- Insurance: Contractors All Risk, Property Damage, Machinery Breakdown, Business Interruption - Derivatives	- Due diligence on resource assessments - Contracts - Proven technology - Contingency fund - Conduct regular O&M - Monitor project performance
Financial				
Energy Price	- Use of PPA structure - Bundle projects	- Combine PPA and merchant sales - Solicit pre-payment from public entities	- Derivatives for merchant plants: over-the-counter puts, collars; custom contracts for differences	
REC Price	- Leverage public dollars for RECs - Combine pre-payment of RECs with market sales		- Derivatives: custom contracts for differences	
Tax Benefit Monetization	- Use of partnership flip structure - All-equity deals	- Leverage Clean Renewable Energy Bonds for public projects		
Balance Sheet Exposure	- Create special purpose entity	- Non-recourse debt		
Fuel Supply				
Strategic				
Policy	- Trade association lobbying - Vertical integration			- Contracts - Proven design
Equipment	- Supply agreements - Vertical integration		- Machinery Breakdown	
Stakeholder	- Portfolio development			

Bioenergy

Bioenergy projects are different from all other resources discussed here for one key reason: they require the acquisition of fuel. The fuel may be in the form of methane from a landfill or wastewater treatment plant, wood scraps from construction and demolition, waste material from a paper mill, forest thinning, or offgassing from agricultural waste.

The diversity of fuel options requires bioenergy developers to assess the resource options carefully and select a combustion technology that is appropriate for that waste stream.[77] Many types of combustion technologies are available, and some can work with more than one feedstock. Some are more efficient with certain fuels than with others, and this requires the developer to assess the tradeoffs and determine which technology best addresses the feedstock risks of the specific situation. This is especially important for fuels that have multiple markets, which increases the competition for the fuel and adds value to technologies that can handle multiple fuel types.

In almost all cases, someone must be compensated for the feedstock and, in some cases, for the transportation of that resource to the site of generation. Accordingly, two central risk management tools are utilized by bioenergy project owners:

- Fuel supply agreement.[78] Such agreements specify costs and delivery quantities, which create bounds around the project owner's exposure to fuel cost and availability. These are key considerations for bioenergy resources, especially those that are not produced at the site of generation. Optimally, the agreement would specify a fixed price rather than just a range of prices.

- Pass through feedstock expenses.[79] To the extent that the energy offtaker can absorb this risk, bioenergy project owners can pass through feedstock expenses. This is similar to fuel surcharges allowed by many public utility commissions for natural gas.

Associated with the combustion of that fuel are air emissions, which none of the other renewable energy resources considered have to any significant degree. This type of regulatory risk is unique to biomass. Biomass project owners must stay abreast of regulatory changes and institute appropriate emissions control procedures and equipment.[80] Bioenergy producers can learn from the approaches developed by conventional energy producers as well.

Table 4 provides a summary of the risk management approaches appropriate for bioenergy projects.

[77] Marsh 2004.

[78] Marsh 2004.

[79] Knowlton 2008.

[80] Marsh 2004.

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Table 4. Summary of Risk Management Approaches for Bioenergy Projects

Bioenergy Risks	Bioenergy Risk Management Approaches			
	Strategic	**Financial**	**Hedging**	**Operational**
Operational				
Development	- Use of PPA structure			
Completion	Site on brownfields		- Insurance: Construction All Risks, Contractors Overall Risk	- Contracts: guarantees, performance incentives, performance bonds, penalties
Performance	- Bundle projects		- Insurance (spotty coverage)	- Contracts - Proven and appropriate technology - Contingency fund - Institute strict safety procedures and loss controls
Financial				
Energy Price	- Use of PPA structure		- Derivatives for merchant plants	
REC Price	- Monetize RECs			
Tax Benefit Monetization	- Use of partnership flip structure			
Balance Sheet Exposure	- Create special purpose entity	- Non-recourse debt		
Fuel Supply			- Secure long-term contracts for fuel supply	
Strategic				
Policy	- Trade association lobbying			- Contracts - Proven design
Stakeholder	- Site on brownfields			

Geothermal

As bioenergy resource developers can build on the experience of conventional electricity generators, geothermal resource developers can build on the experience of the oil and gas industry and the conventional electricity generators. The drilling risk faced by geothermal developers, for example, is akin to the exploration and development risk faced by investors in the oil and gas industry. Conducting comprehensive up-front analysis of the site and resource potential is a critical component to mitigating the exposure to drilling risk.[81],[82] The resource is subject to depletion, as are oil and gas resources. The geothermal power plants, which use steam turbines, are similar in many ways to fossil-fired plants in terms of operations and maintenance.

To manage contractor performance risk, geothermal developers use the engineering, procurement, and construction (EPC) contract structure almost exclusively.[83] EPC contracts create turnkey projects for project owners and decrease the level of uncertainty. EPC contracts pass through all design, procurement, construction, and completion risks to the contractor, creating incentives for efficient and comprehensive execution. These contracts include the following characteristics: fixed schedules, fixed prices, lump sum payment, turnkey basis, start-up testing, acceptance test, commissioning performance guarantees, and liquidated damages.

Geothermal project owners have access to a special type of insurance that helps to mitigate one of its unique risks. Operators Extra Expense insurance protects against sudden, accidental, uncontrolled and continuous flow from the well.[84] Though this coverage excludes exploration risk, it is an important risk mitigation measure for geothermal projects. Geothermal projects typically take on earthquake and catastrophe insurance coverages as well, due to their proximity to these types of geologic risk factors.[85]

Table 5 summarizes the risk management approaches relevant to geothermal projects.

Hydro

Small hydro projects in the United States have not garnered much attention in the literature. As a result, there is no discussion of small hydro-specific risk management approaches.

[81] Schreiber et al 2006.

[82] Note that the investment required to pay for drilling on a single project can exceed Energy Trust's entire average annual budget for renewable energy projects.

[83] Schreiber et al 2006.

[84] Marsh 2004.

[85] Schreiber et al 2006.

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Table 5. Summary of Risk Management Approaches for Geothermal Projects

Geothermal Risks	Geothermal Risk Management Approaches			
	Strategic	**Financial**	**Hedging**	**Operational**
Operational				
Development	- Use of PPA structure			
Completion	- Use of Engineering, Procurement, and Construction (EPC) contracts		- Insurance (type)	- Contracts: guarantees, performance incentives, performance bonds, penalties
Performance	- Bundle projects		- Insurance: Business Interruption, Earthquake, Catastrophic, General Liability, Operators Extra Expense	- Due diligence on resource assessments - Contracts - Proven and appropriate technology
Financial				
Energy Price	- Use of PPA structure		- Derivatives for merchant plants	
REC Price	- Monetize RECs			
Tax Benefit Monetization	- Use of partnership flip structure			
Balance Sheet Exposure	- Create special purpose entity	- Non-recourse debt		
Fuel Supply			- Secure long-term contracts for fuel supply	
Project Pipeline				
Strategic				
Policy				- Contracts

Conclusions

Many risks and risk management approaches are consistent across renewable energy technologies. Although technology-specific variations in the risks exist and technology-specific mitigation approaches have been developed, the fundamental principles are the same.

The literature is extensive but not comprehensive in its treatment of smaller scale renewable energy technologies. Since projects that approach 20 MW incur risks similar to those of larger scale developments, we can learn from these larger scale counterparts. In some areas, however, the economies of scale realized by the much larger projects cannot be realized at 20 MW, affecting the efficacy of the mitigation strategies. This can affect project economics, which means that parties that have a stake in the project financial viability must carefully consider the implications.

As renewable energy technologies become better known, the variety of risk management approaches will expand. Understanding the range of variability and the associated costs creates higher levels of certainty for counterparties in risk management agreements. At the same time, industry consolidation and market maturation are increasing the level of market knowledge consolidated within a given company. The transparency needed to reach higher levels of certainty is still evolving. As it improves, so should the risk management strategies utilized by renewable energy project owners and investors.

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CONSULTING, LLC

Memorandum

To: **Fred Gordon**

From: **Frank Stern and Jane Pater**

Cc: **Kevin Cooney**

Date: **July 25, 2008**

RE: **Memo #5: Barriers to developers of small renewable energy projects in Oregon**

This memo is the fifth in a series developed as part of Summit Blue's work with Energy Trust of Oregon. It will focus on the financial and related barriers faced by developers of small renewable energy projects in Oregon, including gaps in financial tools available to developers of renewable energy projects with nameplate capacities smaller than 20 MW. This work builds on earlier Summit Blue work products, which have focused on Energy Trust's current roles in the state's renewable energy market and the associated risks, and the risk management approaches taken by the broader financial community in the renewable energy space.

Approach

Summit Blue interviewed 14 individuals engaged in or contemplating engagement in the development of small renewable energy projects in Oregon. Summit Blue reached a representative from all of the companies that Energy Trust listed as priorities. These individuals represented a cross section of investors and developers of community wind, solar, and small hydro. The individuals interviewed represented the following organizations:

- AMERSCO
- Carlson Small Power Consultants
- Evergreen Energy
- MMA Renewable Ventures
- Central Oregon Irrigation District
- Sustainable Solutions Unlimited
- Gerding Edlen
- Northwest Independent Power Producers Coalition

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- Rough and Ready Lumber
- Columbia Energy Partners
- enXco
- TSS Consultants
- Oregon Department of Energy
- Midwest Wind Finance

During the interviews, Summit Blue asked three central questions and probed for more information as the conversation unfolded. The three central questions were as follows:

1. What are the barriers to the development of renewable energy projects smaller than 20 MW?

2. What are the gaps in the financial tools available to developers?

3. What roles could Energy Trust assume to mitigate these barriers and fill in the gaps?

During the course of conversations, many interviewees discussed barriers that were broader than financial issues. Some crossed into educational, policy, and political issues. In the end, many of these result in financial barriers to project development, and so we present them in this memo to provide context for some of the more immediate financial barriers.

In this memo, Summit Blue endeavors to communicate the concerns voiced by the individuals interviewed rather than assessing the validity of these concerns. Some of the statements made by members of the interview pool may not be accurate. Misperceptions are prevalent where incentives are available; this is not unique to Energy Trust or to Oregon. These statements are reproduced here to enable Energy Trust staff members to identify these gaps between perception and reality and develop strategies for mitigating them. The next memo, regarding potential roles for Energy Trust in the renewable energy market, will prioritize these barriers by describing roles that can address the highest priority issues.

Some barriers stretch across many technologies, while others are more technology-specific hurdles. This memo is organized to present the broader issues related to financial barriers affecting all technologies first and then to delve into the technology-specific issues.

Financial Barriers to Development of Renewable Energy Projects (< 20 MW) in Oregon

The revenues and expenses for renewable energy projects in Oregon consist of many individual parts that, when combined, can make projects financially viable. From the developer and investor standpoints, any combination of these revenues and expenses that result in a net present value (NPV) greater than zero at an acceptable discount rate is viable. Where there are gaps in existing revenue sources, Energy Trust is viewed as the last “adder” to the balance sheet that can make projects work. The remainder of this section summarizes the main issued discussed by the interviewees that affect several technologies.

Renewable energy certificates (RECs) purchased by Energy Trust are undervalued. Interviewees consistently mentioned Energy Trust’s acquisition of RECs in exchange for the incentive dollars as a barrier to development. The interview pool considers the RECs to be the upside for project owners, despite the fact that the market is not yet fully developed. Most of the interviewees mentioned that the price paid for these RECs by the Energy Trust is less than they are forecasting it to be in the next few years (presumably closer to the first true-up of the RPS). The developers’ forecasting methods may not be very complicated, but the perception that they are being underpaid is widespread. In some cases, this means that the project does not go through; in

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other cases, the developer is frustrated but the project is built. One individual did mention that this exchange of incentive dollars for a tangible good did not adversely affect the tax basis for the federal investment tax credit (ITC), which would have been reduced if the money was paid out as a grant; this was not a widely understood or necessarily agreed-upon qualification, however.

Benefit of the state tax credit is limited. One major component of project economics about which interviewees expressed concern across the board was Oregon's business energy tax credit (BETC). The state legislature enacted BETC in July 2007 as an incentive for investment in renewable energy. Over five years, it provides a state tax credit to businesses with sufficient in-state tax liability of 50% of project costs. For entities that wish to take advantage of the incentive but that lack sufficient tax appetite, BETC may be passed through to an eligible in-state business.

Fundamentally, several interviewees would prefer that this was a cash incentive instead of a tax credit. They discussed the added costs to the project developer that are inherent in this type of approach and the fact that it reduces the benefit that can be realized by the party with the most at stake in the project (i.e., the developer-owner). More specifically,

1. When BETC is passed through, it is sold at as much as a 33% discount, reducing its value to as low as 33.5% of up-front project costs from 50%.[1] This amount is also decreased by expenses related to lawyers and accountants and identifying partners.
2. BETC is taxable at the federal level. In cases where the BETC is passed through, this reduces the benefit to the project owner from 35% to roughly 23% of up-front costs. For project owners that can take advantage of the BETC directly, the benefit is reduced to 33%.
3. Pass-through recipients are in short supply. Without these financial partners, projects undertaken by entities without sufficient tax appetite will likely not move forward.
4. The long-term consistency of the BETC policy was questioned. It was unclear to the interviewees whether or not BETC would be honored in years in which the state runs a deficit. Some concern was also voiced that it may be retroactively applied under such circumstances. In either case, the associated risk requires project investors to deeply discount the value of BETC.

Inconsistency of federal tax credits limits development. This is not an issue that is unique to Oregon, but it is important to recognize how this uncertainty affects development in the state. Project development timeframes for biomass and community-driven wind development are long – on the order of three to five years – and the approach to renewal that has historically been taken by Congress is not sufficient for these entities to plan the projects. When the production tax credit (PTC) is nearing expiration, larger developers can simply delay projects or rush others to completion, building the pipeline of projects for when the PTC is renewed. For smaller developers, however, the project development process is halted during these times, creating an erratic project development cycle. In the end, many potential smaller developers decide not to enter the market.

For both large and small PV developers, the investment tax credit (ITC) is critical to project economics; in its absence, development stops. Larger developers can shift their development

[1] As set forth in Oregon Administrative Rules 330-090-0150. Effective June 20, 2008. Available: http://www.oregon.gov/ENERGY/CONS/BUS/docs/OAR_BETC_manuf_FINAL.pdf

overseas, where markets are large and more stable. Smaller, local developers are more vulnerable to the vagaries of Congress because they cannot shift development elsewhere, and waiting out the delay until renewal is perceived to be too risky. In light of this, many smaller companies that have contemplated starting PV-related businesses will wait to do so until a longer term policy is enacted. This reduces the competition in the marketplace, which keeps installation costs high.

Interconnection is expensive and risky for small developers. All of the developers interviewed for this project discussed the difficulty of interconnecting to the grid. The first issue was one of cost: the high cost of interconnecting these systems seemed to the developers as though it was designed to deter the developer from completing the project. The process of dealing with the utility was difficult, and the cost was high. The other major issue revolved around contract provisions: developers perceived that the interconnection agreement puts all of the risk on the developer and all of the control in the hands of the utility. For example, the utility delayed one project's online date by three months, which cost the project owner $60,000-$70,000 per month. The project owner had no recourse in this situation since the contract terms did not protect him. Developers suggested that the interconnection agreement should more appropriately assign risk according to each party's ability to control specific issues.

Inability to match development interest with financial and professional resources reduces the pool of potential projects. In addition to the difficulties in passing through BETC, market participants discussed a broader issue of matching development interests with appropriate financial partners and professional resources. For smaller renewable energy projects, the entities with access to the resource typically lack adequate knowledge about project development to move a project forward. While initial feasibility resources are available for most technologies, these less sophisticated investors also need assistance in navigating the project development process, including the identification of potential financial partners. Once the money is in place, professionals can be hired to facilitate the project development. Currently, there is no forum to organize this matching process.

Beyond these broad issues lie several technology-specific barriers to project development. The following sections will focus on the key issues for each technology.

Solar

Energy Trust's current incentive package effectively caps the size of solar photovoltaic (PV) projects that can be completed in Oregon at 100 kW. Above 100 kW, the incentive remains the same, regardless of the system size. As a result of the decreasing per-kW incentive, project economics for some projects do not warrant development. To differentiate between the projects smaller and larger than 100 kW, this section is divided into two subsections to reflect the different investment environments for these projects dependent on size.

PV projects smaller than 100 kW

For projects smaller than 100 kW, project developers' key concerns revolved around the particulars of Energy Trust's program. These were the central issues:

- **Energy Trust acquisition of RECs.** In some cases, project owners would like to take credit for the green attributes of their PV system. The main benefit of PV is perceived to be the marketing advantages of the system. When Energy Trust takes ownership of the RECs, this benefit is eliminated.

- **Exhaustion of Energy Trust incentives prior to year end.** Project developers perceived a risk that projects completed later in the year may not be able to obtain incentives from Energy Trust. Whether or not this is the case, the perception in the market place is a barrier to development.

- **Installers are required to be Energy Trust trade allies.** While this is beneficial for the trade allies and allows the Energy Trust to administer a quality assurance system affordably, there are some projects, especially in rural areas, that will not be completed because do-it-yourselfers would prefer to install the system on their own. These individuals do not like the idea of paying a contractor to do work that they could do themselves. As a result, they decide not to move forward once they learn about this aspect of Energy Trust's program.

- **Uncertainty over accounting issues.** Basic questions about the accounting rules behind the calculation of some of the incentives can delay the development process. For example, developers needed clarity about the taxability of the cash received in the BETC pass through and what counts toward the tax basis for the federal investment tax credit (ITC). These are not deal breakers, but they can introduce delays that reduce the profitability of the projects.

- **Low consumer awareness about the risks and benefits of PV.** The sales cycle for PV is extended because of this low level of awareness. PV developers must educate potential customers about PV technology itself and the associated risks and benefits before they can start talking about financing approaches or installation costs.

PV projects larger than 100 kW

Respondents noted that in other parts of the country, the average size of new PV projects under development by third-party financiers is 1 MW. In Oregon, the economics for projects of this size are not feasible because of the 100 kW cap on Energy Trust prescriptive incentives. Energy prices are considerably lower than in other parts of the country, the solar resource is lower, and Oregon's REC market is immature. Developers do not care about the origin of their revenue streams, but the total revenue must result in a return on investment that meets hurdle rates. In Oregon, Energy Trust incentives are viewed as the last line item in the calculation of project economics; in other words, Energy Trust's incentives can either make or break the deal.

Barriers to project development at this scale identified by respondents include the following:

- **The public misunderstands the stability of the region's low energy prices.** Developers discussed the fact that the region's hydro resources are being utilized to their full potential and that new energy sources coming online will all have costs in excess of the region's current prices. Yet, consumers want to see power purchase agreements (PPAs) with rates that are discounted from their current energy prices. While the developers did not expect to see incentives bringing down the price to 6 cents per kWh, the public's misunderstanding of the future of their energy prices is an issue.

- **Installation costs using local labor are higher in Oregon than in other parts of the country.** Installation costs in Oregon are at $7.50-8.00 per watt (W), which is high compared to prices in other parts of the country ($6.00-6.50/W). The state's current incentive system is not attracting enough competition to the labor market, nor is it creating

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economies of scale. Labor could easily be brought in to reduce installation costs, but this is not a viable option unless projects are larger.

- **Incentives in the state effectively cap the size of solar projects.** In addition to the 100 kW cap on Energy Trust incentives, the property tax and BETC incentives are also capped. The property tax exemption does not apply for projects larger than 2 MW (the net metering limit), and BETC's $20 million cap[2] on the eligible project cost effectively limits PV projects to 3.5-5 MW (depending on installation costs). Economies of scale that start to be realized at this size are lost.

- **Energy Trust's calculation of above-market costs is .not well understood.** The respondents' concerns here were fairly wide ranging:

  - Respondents perceive that the method applies the same rate of return to all projects. Developers discussed the varied risk profile of each project – caused by factors such as resource quality, creditworthiness of the energy offtaker, status of panel procurement – and the resulting difference in required rates of return. Developers understood that Energy Trust's model assumes one value, which is then used as the basis for calculating the incentive for the project.[3]

  - The calculation of the rate of return prior to the project's completion uses assumptions (e.g., about prices of panels) that may be inaccurate by the time the project is completed. This is a normal risk for any type of construction project but was nonetheless seen as a barrier. It may have been raised because component cost escalation has been pronounced recently for a wide array of energy and non-energy products.

  - Negotiating the incentive for every project separately is cumbersome.[4] These individuals would prefer to see a standard incentive that would allow them to determine whether or not a project is viable from the outset.

  - The above market cost model's assumptions are perceived to not hold for projects larger than 1 MW. At this scale, projects require significant O&M expenditures, asset management, insurance, and property tax. The model currently assumes all of these values to be zero, which results in project economics that fail to meet investor thresholds, even when Energy Trust incentives are considered.

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[2] As outlined in BETC Technical Requirements. Effective June 20, 2008. Available: http://www.lcd.state.or.us/ENERGY/CONS/BUS/docs/Tech_Req.pdf

[3] While this claim is not entirely accurate, the perception is reported to be complete. Energy Trust's policy dictates that variable rates are applied, depending on the capital markets' risk-adjusted view of similar projects.

[4] Energy Trust has used the project-by-project negotiation as a price discovery mechanism. Since this sector is relatively immature, the costs of the large projects are not completely known and circumstances vary from one large roof to the next. As a result, the standard offer is hard to set unless it is quite high. With limited funds, Energy Trust cannot make blanket offers for large projects and is supporting the most cost-effective projects first.

- **The limitations to net metering create uncertainties in the development of projects of scale.** A facility can only take advantage of net metering up to the amount of its annual energy consumption. For commercial and industrial facilities, this amount may change of over time. In many cases, the application of these types of spaces will change over 10 to 20 years, the typical term of a PPA. Such changes in use may result in lower energy needs than assumed in the PPA, which results in uncertainty in energy revenues. Further, this limit on the amount of energy sold to the utility through a net metering agreement can discourage energy efficiency upgrades over time; the resulting reduction in energy use may result in a loss of energy revenue for the system owner.

Community-Scale Wind

Utility-scale wind will likely meet a significant portion of Oregon's overall renewable portfolio standard (RPS) requirements, but community-scale wind will likely make up only a small portion of Energy Trust's portfolio under the current structure. There is one fundamental issue that makes it nearly impossible to develop community-scale wind projects in Oregon, and there are several other issues that make it difficult. In summary:

- **Fundamental issue: The optimal project size is impossible to achieve.** Projects must be smaller than 10 MW to take advantage of the standard offer PPA, but new turbines cannot be obtained in orders smaller than 15 MW. (Even at 15 MW, it is difficult, but not impossible, to obtain turbine supply agreements due to global demand.)

- **Refurbished turbines do not carry a warranty that meets certain grantors' requirements.** Projects developed in rural areas that meet certain requirements are eligible for grants from the United States Department of Agriculture. These grants can play a critical role in project economics. They require that turbine warranties meet certain requirements, however, which are not met by most refurbished turbine suppliers. Consequently, new turbines must be obtained. (See the earlier discussion about new turbines.)

- **Small projects require the same amount of effort to develop as larger ones but lack any economies of scale.** In other words, there is a certain level of fixed cost in wind development. "If you're going to do a small project, you might as well do a large project," was an oft-repeated refrain.

- **Project owners with only one project under ownership cannot hedge risk using a portfolio approach.** The portfolio approach has been critical in wind development to mitigate a variety of risks: permitting, resource, interconnection, policy, energy price, and others. If a community wanted to own a wind facility, it would only own one, which would leave it exposed to uncertainty in all of these areas that could not be hedged. Government entities are by their very definition risk averse. This does not help the equation.

- **Development is effectively restricted to areas with marginal resources within the Portland General Electric (PGE) and PacifiCorp service territories.** Wind in these areas is marginal compared to the resources in Eastern Oregon, which adds to already stressed project economics. While it is possible to develop in Eastern Oregon, the energy must be delivered to PGE or PacifiCorp, which would incur a wheeling charge and eliminate gains from the improved resource. While this charge does not stop *large* scale projects in Eastern Oregon, developers did mention it as one of the barriers to making *community scale* projects economically viable.

- **Permitting requirements are inconsistent across jurisdictions.** This is a common problem, even with utility-scale plants. The developers of utility-scale plants have the resources to deal with such complexity, however, while developers of smaller projects do not. This gets back to the issue of lacking economies of scale for the smaller projects.

Biomass

Biomass facilities have one unique issue among renewable energy technologies: fuel supply. Whether this fuel supply is from forest residue, mill waste, landfill gas, or agricultural waste, the availability of the fuel supply at predictable prices is a precondition to project development. One person said that the incentives for biomass in Oregon are the best in the country but that this issue counteracts most of those incentives.

Energy Trust's prioritization of interview candidates focused on projects that typically rely on forest residue and mill waste as inputs. As a result, the bulk of the barriers identified relate to these types of projects. Only one individual discussed dairy-related issues, and there was no discussion of municipal-related projects. This section will discuss the dairy-related issues briefly and focus the remainder of the discussion on projects powered by forest residue and mill waste.

Dairy Projects

The individual that discussed the barriers to biomass facility development at dairy farms had limited experience in Oregon as the company had just begun development work in the state. Generally speaking, however, the individual cited two key barriers:

- **Capital costs are nearly double those for comparable landfill gas facilities, which results in a lower return on investment.** The technologies used for landfill gas and agricultural waste facilities are similar since they both rely on methane as the fuel; accordingly, they operate at similar efficiencies and produce the same amount of electricity for similarly sized systems. As a result, companies that develop landfill projects are well suited to develop agricultural waste projects. The capital investment for dairies is so much higher than for landfills because the landfills already have the infrastructure in place to collect the methane; dairies must install it. Given these higher costs and the same amount of revenue is generated (relatively speaking), the developers prefer to implement projects at the landfills. This up-front cost does not stop all projects, but it makes the economics much more difficult to justify.

- **Dairy farm owners are reluctant to generate energy at their facilities.** More than a financial concern, this is more of a cultural issue. There is hesitancy on the part of most dairy farm owners to allow a new entity into their business. This is an issue that Energy Trust is already working to address, however, through its outreach activities to the dairy community.

Forest Residue and Mill Waste Projects

The remainder of the interviews focused on generating electricity from forest residue and mill waste. The key barriers cited for these projects include the following:

- **It is not possible to secure long-term fixed price supply contracts for fuel.** Fuel supplies vary from forest thinnings to mill waste. Throughout the United States, it is difficult to secure the long-term fixed-price supply agreements, but in Oregon, the market for forest thinnings is complicated by the volatility in the pulp and paper industry. Prices for forest waste today are the highest they have ever been – and are four times higher than they were in 2006 – in large part due to the boom in the pulp and paper industry. Financing cannot be secured with that type of uncertainty.

- **Rising transportation fuel costs change project economics.** Recently, the rule of thumb for biomass was that the fuel needed to be within 50 miles of the facility in order to be considered economic. Escalation in diesel fuel prices is decreasing that radius significantly. Additionally, diesel prices affect the cost of chipping the fuel stock, which is often done at the site of pick up using diesel-fueled generators.

- **REC prices in Oregon are perceived as too low.** Biomass facilities built in Oregon that use Oregon fuels are selling into the California market because they can get higher prices for energy as well as the REC. A recent transaction valued the RECs in California at $17-18/MWh compared to $5-7/MWh in Oregon. Until that fact changes, many biomass projects that are built in Oregon with the appropriate transmission access will forego the Energy Trust incentives and sell to California. It is important to note that Energy Trust is not aware of any projects that have been completed that are selling to California, although some have been discussed.

- **The term of the federal production tax credit (PTC) is too short for most development.** While this issue is not unique to Oregon, it provides context for the discussion about barriers to development. A two-year extension is not sufficient for a small developer to conceive of, initiate, plan, and construct a biomass facility. These types of project developers are risk averse, making this policy uncertainty a major hurdle.

Small Hydropower

Small hydropower development is often undertaken by governmental or quasi-governmental agencies, such as irrigation districts. It is important to realize that these organizations typically have core missions that are markedly different than renewable energy project development. As such, the barriers to development for the small hydro projects are significantly different than those for other renewable energy technologies:

- **In-house staff do not understand the project development process.** The staff in these types of organizations are typically focused on the day-to-day core operational aspects of the organization. While they may recognize a potential project, they are not typically familiar with the steps that are needed to turn those ideas into a productive project. They do not understand how to produce basic feasibility calculations or what they would do with them if they had them. An area that is particularly complicated is the state and federal permitting requirements for small hydro projects. Small hydro is an area in which the matching of development interest with financial and professional resources is of key importance.

- **Up-front capital commitment can be difficult.** Because these agencies use public or quasi-public funds, questions about prudent spending come up early in the process. They are unlikely to sign a contract with an engineering firm to conduct the feasibility studies (i.e., to provide pre-construction financing) before knowing if there is really something worth investigating. If a project is proven feasible, it may be difficult to secure the capital to invest in the project without some type of matching funds that leverages their spending power. In these instances, incentives like Energy Trust's lump-sum post-construction payment prove to be critical to project development.

Conclusions

Barriers to development of renewable energy in Oregon vary from federal-, to state-, to local-level issues. These barriers are summarized in Table 1. Many of these issues are not under the control of Energy Trust in its current role, but they are important to understanding the context in which development takes place in the state. A solid understanding of the financial models underlying renewable energy development forms a basis for understanding the barriers to development that are common to several technologies. When looking at technology-specific issues, however, policy and awareness issues are more prevalent. Evaluating the potential roles for Energy Trust in this space will need to consider all of these barriers. That is the next step in this process.

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Table 1. Major Components of Project Economics in Oregon before Energy Trust Incentives

Component of project economics	Related Concerns and Barriers
Energy revenue	▪ PPA rate is lower than other states because of prevailing energy prices ▪ Energy production is lower relative to other states because of lower insolation, construction of community-scale wind in marginal wind areas
REC revenue	▪ Currently a weak market in Oregon ($5-7/MWh), but expected to have upside for REC owners ▪ ETO policy to acquire RECs in exchange for incentives limits developer upside
Business Energy Tax Credit (BETC)	▪ Limited number of pass-through recipients ▪ If passed through, BETC is sold at a 30% discount ▪ BETC is taxable at federal level (reduced from 50% of project costs to 30% or 23% of project costs) ▪ For PV projects, BETC is effectively capped at 3.5-4 MW ▪ Concern about long-term consistency
Installation costs (PV)	▪ Insufficient competition in installer base results in higher costs in Oregon ($7.5-8/W) than in other states ($6.5/W)
Net metering (PV)	▪ Currently being challenged on legal grounds (uncertainty) ▪ Can only reduce energy costs, not demand charges ▪ Benefits of net metering are limited by the host facility's energy usage; the host facility does not receive payment for energy produced in excess of their annual usage
Federal tax credits (PTC/ITC)	▪ Inconsistent ▪ Renewal period is not sufficient for development of biomass or community-scale wind ▪ Biomass receives lower incentive than wind
Federal grants / loan guarantees	▪ For rural projects, some additional assistance is available, which can improve project economics
State property tax exemption (PV)	▪ Only viable for projects that use net metering (< 2 MW)
Fuel supply (Biomass)	▪ Inability to secure long-term fixed price contracts for fuel ▪ Escalating cost of transporting the fuel ▪ No hedging market available to mitigate risks
Interconnection	▪ Expensive ▪ Contract terms favor utility, fail to protect the producer

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Memorandum

To: **Fred Gordon and Peter West**

From: **Frank Stern and Jane Pater**

Cc: **Kevin Cooney**

Date: **August 25, 2008**

RE: **Memo #6: Description of and Recommendations for Renewable Energy Roles for Energy Trust**

This memo is the sixth in a series developed as part of Summit Blue's work with Energy Trust of Oregon. It focuses on future roles for Energy Trust that warrant further consideration. These roles address the financial and related barriers faced by developers of small renewable energy projects in Oregon, including gaps in financial tools available to developers of renewable energy projects with nameplate capacities smaller than 20 MW. Summit Blue identified these barriers in the fifth memo in this series. Previous Summit Blue work products have focused on Energy Trust's current roles in the state's renewable energy market and the associated risks, and the risk management approaches taken by the broader financial community in the renewable energy industry.

This memo is organized to provide context for the discussion of priority roles. First, the universe of potential roles are described and connected to the barriers outlined in the previous memo. From that group, the priority roles for future consideration – for Energy Trust and for other key market makers – are discussed, summarizing the findings of Summit Blue's analysis. Then, the rationale behind the decision not to address some market barriers through the priority roles is discussed. Finally, the memo sets the stage for the next issues to be discussed: the approach that Energy Trust will take to set its course in the renewable energy market for the next several years including an assessment of risks of new roles and risk decision criteria.

Overview of Potential Roles

This section outlines the roles that warrant further consideration by Energy Trust in its efforts to facilitate development of renewable energy projects across the spectrum of technologies in which it currently invests. These roles were identified by Energy Trust staff, by Energy Trust stakeholders and through Summit Blue's experience in the field. These roles can be segmented into four categories:

1. Providing information
2. Offering additional technical assistance
3. Re-considering the structure or form of incentives
4. Increasing the certainty around woody biomass fuel supply

This section presents only a subset of the roles that are within the realm of possibility for Energy Trust. Summit Blue selected these roles from the broader universe of potential roles using three basic criteria:

- They address the major barriers to development of renewable energy projects
- They leverage existing resources and expertise at Energy Trust
- They enable Energy Trust to create economies of scale that the private sector has yet to address.

The remainder of this section describes the most promising roles, according to these criteria, that fall under each of the four categories and how they address the barriers outlined in the previous memo in this series. The appendix provides additional information about each of these roles, including information about the arguments in favor of and against each role, examples of other organizations that have implemented a similar role, and the connection between the role and the barriers described in the previous memo. The appendix also provides the universe of roles considered before focusing on these most promising roles.

To preview the section, Table 1 provides a high level overview of Energy Trust's potential roles within each technology sector. The roles are segmented according to how they fit in with Energy Trust's current legislative mandate. The roles that *expand* on existing roles leverage Energy Trust's existing strengths and do not require changes to Energy Trust's formal mandate. The suggested *enhancements* require minimal policy, regulatory, or legal changes for the Energy Trust. The *new roles* require significant changes. The last column examines the roles that could be undertaken by other market actors to complement Energy Trust's role in each market.

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Table 1. Potential Energy Trust Roles within Existing Renewable Energy Programs

	Expand current practices	New roles within current mandate	New roles outside of current mandate	Key Roles for Other Market Actors
Community Wind	▪ Perform feasibility studies at the county level ▪ Create a long-term plan for Energy Trust's market involvement ▪ Facilitate matchmaking	▪ Aggregate turbine orders ▪ Allow buy-out clauses for RECs	▪ **Facilitate development** ▪ Become equity investor ▪ Create model programs for other utility territories	▪ Federal government: Extend PTC for a substantial length of time
Small wind	▪ Facilitate matchmaking ▪ **Targeted marketing effort** ▪ **Expand demonstration of close-to-market technologies**	▪ Reconsider REC policy		
Small PV (<100 kW)	▪ **Create a long-term plan for Energy Trust's market involvement** ▪ Facilitate matchmaking ▪ Targeted marketing effort			▪ Consider alternative financing structures: • On-bill financing • Property tax financing ▪ Federal government: Extend ITC for a substantial length of time ▪ OPUC: Consider alternative policies: • Feed-in tariff • Solar set-aside

*Note: Roles in **bold type** indicate that these roles would have the greatest impact in the technology-specific market.*

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	Expand current practices	New roles within current mandate	New roles outside of current mandate	Key Roles for Other Market Actors
Larger PV (>100 kW)	▪ **Create a long-term plan for Energy Trust's market involvement** ▪ Expand standard offers ▪ **Allow buy-out clauses for RECs** ▪ Expand demonstration of close-to-market technologies	▪ Offer bridge financing	▪ Create model programs for other utility territories	▪ Federal government: Extend ITC for a substantial length of time
Biomass	▪ **Create a long-term plan for Energy Trust's market involvement** ▪ Expand standard offers ▪ Allow buy-out clauses for RECs ▪ **Help developers examine their project from investor perspective**	▪ **Increase certainty around regional fuel supply and costs**		▪ Federal government: Extend PTC for a substantial length of time
Geothermal	▪ **Expand demonstration of close-to-market technologies**			▪ Identify insurance products or other tools to mitigate drilling risk
Small Hydro	▪ Develop a guide book for developers ▪ **Facilitate matchmaking**	▪ **Offer pre-construction financing**		▪ Negotiate a MOU with FERC to delegate smaller projects to state jurisdiction

*Note: Roles in **bold type** indicate that these roles would have the greatest impact in the technology-specific market.*

Providing information

- **Establish and communicate a long-term plan for Energy Trust's role in renewable energy.** Energy Trust can reduce one source of uncertainty in the market place by clarifying its role in Oregon's market for renewable energy, ideally for the next five to 10 years. Such a plan may be tied to goals such as nameplate capacity installation or share of households using some form of on-site renewable energy.

  A five- to10-year financial commitment may be more than the Energy Trust can practically do, given the dynamic nature of efficiency markets and Energy Trust funding. A more modest commitment, however, (e.g., a specified minimum share of the budget for three years) may also be useful. This activity would address or help to compensate for the following barriers:

Barrier Addressed	Link between Barrier and Potential Role
▪ Overall level of uncertainty is significant for developers	▪ By creating a plan for the future, Energy Trust would increase the market's certainty about the state's support of each technology-specific market.
▪ Higher labor cost	▪ Renewable energy companies can plan better – including for staff expansion and training – if they understand the types of support that will be in place in the future. (If the plan includes a provision for a ratcheted incentive for certain technologies, companies in those sectors will also be able to plan to reduce the cost of labor.)

- **Facilitate matchmaking among interested and relevant parties.** There is a spectrum of potential roles for Energy Trust within this area. Matchmaking may be as simple as expanding the list of trade allies to include accountants with relevant renewable energy tax credit experience, contractors that perform feasibility studies for various technologies, and potential financial partners. In the middle of the spectrum, Energy Trust leverages its own contacts to identify potential matches for developers or other parties that request assistance; this builds on its existing efforts to build bridges at conferences, workshops, and other Energy Trust-sponsored activities. At the far end of the spectrum, Energy Trust serves as an arranger for promising projects, connecting the entities with resource potential to those with professional and financial resources. This addresses or helps compensate for the following barriers:

Barrier Addressed	Link between Barrier and Potential Role
▪ Benefit of state tax credit is limited.	▪ The ability to monetize the Business Energy Tax Credit (BETC) is critical, and developers are challenged to find partners with sufficient tax appetite.
▪ Inability to match development interest with financial and professional resources	▪ Energy Trust can help overcome this barrier by identifying parties with similar goals and interests and connecting them.
▪ Uncertainty over accounting issues	▪ In most cases, most accounting issues could be addressed by consulting with a tax accountant that understands the relevant code, but it is difficult to know which ones have credible experience with renewable energy investments.
▪ Gap between Energy Trust support of feasibility and payment of incentives	▪ Energy Trust would not need to contribute capital to support projects in this arrangement, but it could help identify partners that are willing to invest.
▪ Municipal staff do not understand the project development process (esp. small hydro)	▪ Early in the project development process, many challenges caused by unfamiliarity with development can be addressed by meeting with a professional in that sector. The matchmaking service would help staff identify potential experts that can provide such assistance.

Offering additional technical assistance

- **Help biomass developers examine their project from the perspective of investors.** Energy Trust could use its staff's financial expertise to proactively analyze project *pro formas* and identify weaknesses in the project economics. Engaging in such analysis *before* a project developer brings in the financial community will enable developers to present viable, well-organized project economics to the funding community. Energy Trust could do this through seminars to reach a broad audience and then provide some project-specific support to developers that previously attended the seminar. This addresses or helps compensate for the following barriers:

Barrier Addressed	Link between Barrier and Potential Role
▪ Inability to match development interest with financial and professional resources	▪ Energy Trust could help developers present a more coherent business case for their projects to the investor from the outset, facilitating the partnerships between developers and investors.
▪ Energy Trust acquisition of RECs in exchange for incentive reduces project value to the developer	▪ Project financiers give more value to REC prices when the RECs are under a fixed-price contract with a buyer (which Energy Trust's incentives provide) than when they are left to a speculative market. Examining the project from an investor's perspective would enable developers to see the value of securing a contract with Energy Trust.

Re-considering the structure or form of incentives

- **Allow buy-out clauses for REC payments.** Buy-out clauses allow one party to pay to relieve itself of contractual duties. For Energy Trust partners, the contractual duties would be the delivery of RECs. When Energy Trust pays out incentives and negotiates its agreement with the seller, a clause would be included that allows for the seller to pay a specified amount to be excused from its obligation to deliver RECs under certain conditions. If Energy Trust thinks the market price will stay within smaller bounds than the developer thinks, this is a way of providing reassurances with a low probability of cost. This approach effectively allocates risk to the parties that are most willing to accept it, a fundamental principle of project negotiation. This addresses or helps compensate for the following barriers:

Barrier Addressed	Link between Barrier and Potential Role
▪ Perception that Energy Trust's method of valuing RECs undervalues RECs	▪ If developers have an "out," they can live with Energy Trust's initial valuation of RECs with the understanding that they can escape from it if it undervalued the RECs.
▪ Energy Trust acquisition of RECs in exchange for incentive reduces project value to the energy purchaser	▪ In some cases, the party purchasing the energy prefers to own the green attributes of a system (e.g., PV) in order to use it for marketing or to meet corporate commitments. The buy-out would enable them to do that.
▪ Concerns about the accuracy of Energy Trust's calculation of above-market costs	▪ If developers have an "out," they can live with Energy Trust's initial valuation of RECs with the understanding that they can escape from it if it undervalued the RECs.

- **Offer financing for development stages: bridge and construction financing.** Energy Trust can offer low-interest financing during pre-development and construction periods to help bridge the gap between its feasibility assistance and post-construction incentive payments. Once the borrower repays the loan, the money is returned to the pool available for additional loans. This addresses or helps compensate for the following barriers.

Barrier Addressed	Link between Barrier and Potential Role
▪ High fixed costs of wind development make small projects unreasonable	▪ Investors in wind industry have many options for investment. It is more difficult for small projects to secure enough capital to move forward because investors could commit the capital to larger projects with better returns.
▪ Gap between Energy Trust support of feasibility and payment of incentives	▪ Project developers must put up significant amounts of capital to prepare for construction (e.g., permitting, project design) and during the construction phase. Arranging this capital infusion, which is only needed until Energy Trust's incentives are paid, can kill projects.
▪ Up-front capital commitment can be difficult for small hydro projects	▪ Many small hydro projects are put forward by public agencies with multiple demands on capital. Although the money is only needed temporarily, the opportunity cost can discourage the investment since it is not needed to maintain a functioning system.

- **Facilitate project development for community wind and small hydro.** Energy Trust would facilitate the project development process: seeking out assisting potential project owners in identifying appropriate partners for each critical development role: obtaining necessary permits, procuring equipment, securing needed capital, and managing the construction process. In this role, Energy Trust would not need to put capital at risk but could work with partner organizations to accelerate the development of projects. This addresses or helps compensate for the following barriers:

Barrier Addressed	Link between Barrier and Potential Role
▪ Interconnection is expensive and risky for small developers.	▪ Energy Trust's experience with interconnection issues would enable it to assist project developers to navigate the process more efficiently.
▪ Inability to match development interest with financial and professional resources	▪ Energy Trust would facilitate the matchmaking for entities with development interest but without professional resources. This would streamline the development process.
▪ Municipal staff do not understand the project development process.	▪ Energy Trust would teach the municipal staff about key aspects of project development during the facilitation. By empowering the municipal staff with the knowledge of what it takes to make a project happen, Energy Trust would build a network of support for community-based renewable energy in the state.

- **Expand program for demonstrating close-to-market technology.** New technologies are available that may facilitate the deployment of renewable energy projects. Technologies include small-scale geothermal projects with lower temperature conditions than conventional technology, building-integrated PV systems, and small wind systems that haven't gotten much traction in the marketplace. Energy Trust could expand its existing demonstration program that showcases close-to-market or emerging technologies to include these technologies. The goal of this activity would be to provide additional information to the market about technologies' viability with the intention that the information would promote adoption of the technology. This addresses or helps compensate for the following barriers:

Barrier Addressed	Link between Barrier and Potential Role
▪ Drilling of geothermal wells incurs too much risk for potential return	▪ New geothermal technologies can produce electricity at lower temperatures than conventional technologies. Thus, the likelihood that a viable resource is found for these technologies is higher.
▪ Low consumer awareness about the risks and benefits of renewable energy technologies	▪ Deploying these unfamiliar technologies in high profile settings will enable the public to become better acquainted with them and to consider the possibility of installing the technologies on their own property.

Increasing the certainty around woody biomass fuel supply

- **Increase certainty around the market for biomass fuels.** Uncertainty of supply is a common problem for biomass projects. There is a spectrum of potential roles for enhancing certainty around forest waste/mill residue fuel supplies. At a basic level, Energy Trust can conduct regional fuel assessments to identify potential fuel sources and current demand for them. Taking another step, Energy Trust can identify areas in which to concentrate urban wood waste or forest waste and secure aggregated supplies of those resources for biomass facilities.

  The important concept in this role is risk sharing, rather than full risk bearing. Energy Trust can take on a quantifiable share of this risk while requiring the developer to maintain a stake in the risk as well. This is appropriate since the developer maintains the benefit of the upside potential and should, accordingly, take on an appropriate amount of the downside risk related to fuel price. While Energy Trust can help to put some parameters on the extent of that downside risk, it cannot be expected to fully bear this risk. This addresses or helps compensate for the following barriers:

Barrier Addressed	Link between Barrier and Potential Role
▪ Inability to secure long-term fixed price supply contracts for fuel	▪ The aggregator of the fuel (Energy Trust or another party) may decide to offer long-term fixed-price contracts , alleviating this barrier.
▪ Rising transportation fuel costs change project economics.	▪ Identifying and aggregating fuel sources near potential development sites can help to create economies of scale in the logistics for these fuels.

Key Roles for Other Market Actors

The most significant external driver of success of Energy Trust's programs is the federal government's willingness to establish a long-term energy policy. A policy that extends the PTC and ITC by five to 10 years or introduces other policies designed to incentivize renewable energy (e.g., a greenhouse gas regulatory scheme) would reduce the uncertainty around project economics and facilitate a more continuous development cycle.

A secondary important driver of successful implementation of Energy Trust programs is the establishment of certain rules around Oregon's RPS. In the current situation, it is not clear how the state's REC market will evolve over the next five to 15 years. Specifically, the market needs to understand the penalties for non-compliance. By July 1, 2009, the OPUC is legally required to establish the alternative compliance payment (ACP),[1] which will, in practice, serve as the cap on the price of RECs sold into the Oregon utility system. Until that level is known, there is uncertainty about the value of RECs, and developers will view existing forward price curves as conjecture. Once that level is set, project economics can incorporate the forward price curves, and developers will become more accepting of the REC prices that Energy Trust assumes in its calculation of incentives. As REC prices for sale to out-of-state utilities are established, uncertainty about prices will further diminish for those projects with access to out-of-state transmission. However, with regional and federal carbon legislation expected in the next two years, and an ongoing discussion of feed-in tariff legislation in Oregon, turbulence and uncertainty will still be significant for the next two to three years at a minimum.

Resource Commitments Required by Priority Roles

In addition to examining the priority roles on a technology-by-technology basis, it is also important to consider the level of resource commitments associated with each of them. It will not be possible to pursue all of the roles outlined in this memo within the constraints of Energy Trust's existing budget. Some roles can be done well with limited additional capital commitment, while others will require significant resources in terms of personnel or dollars or both.

Table 2 provides a framework for considering the resource commitments associated with each of the priority roles described in this memo. It employs a qualitative distinction between modest and significant levels of commitment. Generally speaking, however, the modest commitments involve minor additions to staff or financial resources relative to what is available currently. The significant commitments involve additions of staff or financial resources beyond those that are currently

[2] Further, Energy Trust already has the authority to locate demonstration projects outside of the PGE and PacifiCorp service territories if it is required to establish the viability and reliability of a technology.

available. As these roles are more carefully defined, these resource commitments can be more clearly delineated as well.

Table 2. Relative Resource Commitments for Priority Roles

	Modest Personnel Commitment	Significant Personnel Commitment
Model Financial Commitment	▪ Long-term plan ▪ Facilitate matchmaking ▪ Allow buy-out clauses for RECs	▪ Facilitate project development ▪ Expand demonstration of close-to-market technology ▪ Examine biomass projects from a financial perspective
Significant Financial Commitment	▪ Increase certainty around the market for biomass fuels	▪ Offer bridge and construction financing

Barriers Not Addressed by Priority Roles

Some of the barriers outlined in the fifth memo are not addressed by the roles for Energy Trust that are described in this memo. Generally speaking, efforts to address these barriers would have a less significant impact on the Energy Trust's ability to influence development of smaller renewable energy projects than efforts to address the barriers addressed by the roles proposed in this memo. Energy Trust may consider incorporating strategies to address these barriers as components of other roles that it may adopt in the future, rather than prioritizing these issues. The barriers that fall into this category include the following:

- **PV installation must be performed by Energy Trust trade allies.** One-off installations of PV systems (such as those completed by do-it-yourselfers) are not the most efficient way to expand the market for renewable energy in Oregon. Self-installations involve a limited number of sites and make quality assurance either difficult or uncertain. Instead, Energy Trust can focus on bringing down the cost of hiring a professional installation team to perform PV system installations; as part of the long-term plan, Energy Trust could incorporate ratcheted incentives to accomplish this end. Over time, this will have a more widespread impact on the adoption of PV systems.

- **Limitations of net metering.** Oregonian developers are concerned that changes in facility use patterns may reduce energy use over time, which would then reduce the amount of energy that is eligible to be sold into the grid through net metering. Implementing PPAs for shorter periods of time can address the issue of the effect of changing building uses on the amount of energy eligible for net metering. In other markets, PPAs are being negotiated for time periods that are closer to the planning horizon for commercial real estate investors. That is, PPAs with terms of 10 years are more closely aligned with commercial and industrial facility owners' and occupants' expectations about the facility's use and its level of energy consumption. The private sector can adjust its practices in this way to overcome this barrier without assistance from Energy Trust.

- **Inconsistent permitting requirements.** Permitting requirements for wind projects vary across local community lines as well as across county lines. Getting down to the details of local governance would require a high up-front cost considering the scale of projects being considered. Further, if the development process includes local governments (as it does when Energy Trust assumes the role of the developer), the permitting process should be facilitated. As a result, this barrier is indirectly addressed by the earlier recommendation that Energy Trust serve as project developer.

- **Development restricted to Portland General Electric (PGE) and PacifiCorp service territories.** One of the key benefits of developing projects that are smaller than 20 MW is that their output can be utilized by local customers. Locating projects outside of the PGE and PacifiCorp service territories will result in wheeling the power back to the population centers. Since transmission constraints are already becoming more significant for larger wind projects that are located far from the load centers, Energy Trust should focus on subsidizing the development of projects that avoid this issue.[2]

- **Refurbished turbines fail to carry sufficient warranties.** Minimal data exist on the performance of refurbished turbines, and Energy Trust's ability to provide insurance sufficient to meet grantors' requirements would require that it assume this unknown risk. Instead of assuming such a risk, Energy Trust can look for new studies on performance of refurbished turbines to provide more certainty around this issue and provide information about appropriate warranty terms to potential buyers of refurbished equipment.

In one case, fully addressing one of the barriers identified by stakeholders may not be in the best interest of Energy Trust or the ratepayers. Several participants in the interviews discussed their dissatisfaction with Energy Trust's acquisition of RECs, typically because of the price offered for them. Enabling the project developers to retain ownership of the RECs, however, may result in Energy Trust funding projects that sell RECs into California and count toward California' RPS requirements rather than Oregon's. Oregon IOU ratepayers would then need to pay for other additional renewable resources to meet RPS requirements.

Several of the roles highlighted for further consideration address aspects of this issue. Contracts for differences and buy-out clauses for RECs would provide developers with needed certainty around the price of RECs but allow them to sell the RECs on the open market if the terms are more agreeable. The targeted marketing role would enable Energy Trust to communicate the rationale behind the acquisition of RECs to key parties, including developers and the financial community.

An important concept surrounding these potential roles would be the terms laid out in the contracts that allow for these modifications to Energy Trust's approach to acquiring RECs. For example, it would be important to include a provision that any market sale of RECs would need to occur within the state of Oregon and perhaps only if sold to PacifiCorp or PGE. This enables Energy Trust to ensure that the benefits of its programs are delivered to the parties paying for its services. Otherwise, there might be a scenario in which developers build projects in Oregon using Energy Trust incentives and Oregon natural resources (e.g., biomass) and sell the renewable attributes into California's market. This would be an unintended consequence of Energy Trust's agreement to comply with the requests of developers in the state.

Conclusions

The roles identified in this memo warrant further consideration by Energy Trust in light of its current strategic planning process. The primary guide to determining Energy Trust's roles in the renewable energy market going forward should be a reconsideration and quantification of the goals

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of the program. Within such a framework, Energy Trust can determine which roles fit best with the organization's direction, reputation, and resources.

Depending on which goals receive priority, one strategy may be more appropriate for a given technology than another. For example, the main barrier for geothermal relates to the inadequacy of the risk-reward ratio for drilling. Testing a new technology does not directly address that issue. It does provide some promise that lower temperature settings would yield projects, however, which could improve the reward side of the ratio if the technology is viable. The alternative is to identify insurance products that mitigate the drilling risk. If Energy Trust's priority goal is to meet specific capacity goals, the immediate development of projects is necessary, and the insurance strategy is more appropriate. If Energy Trust's priority goal is to prove new technologies, then the demonstration project approach moves it further in that direction.

The next memo will characterize the risks associated with the priority roles and the decision criteria that Energy Trust's staff and board can use to assess the risks associated with the roles it considers in the future. This set of decision criteria can be used by Energy Trust for its strategic planning process and beyond. The convergence of Energy Trust's preferred risk profile and the types of risks associated with each of the roles it assumes will shape the

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APPENDIX A:

HIGH-LEVEL ANALYSIS OF POTENTIAL ROLES: PROVIDING INFORMATION

Potential Role

Establish and communicate a long-term plan for Energy Trust's role in renewable energy.

Description

Energy Trust can reduce one source of uncertainty in the market place by clarifying its role in Oregon's market for renewable energy for the next three to five years. Such a plan may be tied to goals related to nameplate capacity installation or share of households using some form of on-site renewable energy. In it, Energy Trust may commit to a specific set of technologies for a certain number of years and estimate annual budgets for each of them. It may clarify how Energy Trust will implement its REC policy and how Energy Trust envisions contributing to each market's development. A long-term plan will remove one critical source of uncertainty: how Energy Trust will deploy its resources to provide above-market funding for renewable energy projects. Currently, Energy Trust's 2007-2012 strategic plans outlines several goals toward which the renewable energy programs are working. These include contributing toward the RPS, encouraging Oregonians to integrate renewable energy into their daily lives, and to reach hard-to-reach markets. Translating these goals into measurable objectives or targets will provide more clarity for market participants.

It is important to note that such a plan can be completed at several levels of detail. Energy Trust's 2007-2012 strategic plan provides a framework for Energy Trust's activity. A long-term plan could go one level deeper by assigning measurable targets and objectives to each of the goals discussed in the strategic plan. One step further would outline specific strategies that would be utilized to achieve those targets. Another level of detail would include specific incentive levels. It is not necessary to go that far in depth, however. Quantified targets – and a commitment to meet them – would go a long way toward increasing certainty. Such targets would outline a "minimum" standard toward which Energy Trust would work in the future.

These targets may take several forms. They could quantify capacity (MW) installation goals for each technology – either as subsidized by Energy Trust or as developed in the marketplace without incentives. They may include a certain number of renewable energy companies with offices in Oregon or that offer services in Oregon. The goals may also take the form of the amount of capacity that will be funded through Energy Trust each year to provide developers with an expectation about how those incentives will decrease over time. Whatever the goals are, they will help to provide more certainty in the marketplace if they are transparent and measurable.

Once Energy Trust completes the plan, it should be packaged to address the concerns of technology-specific segments. Simply having the plan will not sufficiently address the issue of uncertainty. The plan's contents must be communicated to specific market segments in a way that meets their needs. Energy Trust's work in recruiting and maintaining its Trade Ally network provides needed experience in reaching such markets.

An important consideration in developing this type of a plan is the type of flexibility to adjust funding allocations or areas of focus that is built into it. The renewable energy industry is rapidly evolving, and goals and targets that seem appropriate today may seem laughable in two years. Thus, the plan that Energy Trust develops will need to take into consideration the evolution of the marketplace *and* the needs of the market actors. Some markets need clearer signals than others; for these, Energy Trust can provide more details while still allowing for flexibility. For others, Energy Trust can build in more flexibility to adjust its role as needed. This concept ties back to the fundamental issue of risk sharing: to affect real change in the renewable energy market, Energy Trust can take on the burden of portions of the risk but need not accept all of the risk. It need only be clear about which risks it is leaving to other market actors.

Relationship to current practices: Expand current practices

Key barriers addressed:

Barrier Addressed	Link between Barrier and Potential Role
▪ Overall level of uncertainty is significant for developers	▪ By creating a plan for the future, Energy Trust would increase the market's certainty about the state's support of each technology-specific market.
▪ Higher labor cost	▪ Renewable energy companies can plan better – including for staff expansion and training – if they understand the types of support that will be in place in the future. (If the plan includes a provision for a ratcheted incentive for certain technologies, companies in those sectors will also be able to plan to reduce the cost of labor.)

Magnitude of impact: Varies by technology, depending on the allocation of funds and flexibility in the plan

Opportunities and Barriers

Opportunities	Barriers
▪ Eliminates one source of uncertainty that adds to the cost of projects.	▪ Strategic – Legislative mandate limits time horizon for planning.
▪ Creates a more stable environment for businesses wishing to locate and do business in Oregon.	▪ Strategic/Financial –Oregon's legislative framework market for renewables are changing rapidly; a firm plan may lead to misallocation of funds over the long run. ▪
▪ Establishes tangible goals against which Energy Trust can measure progress.	▪ Strategic – Internalizes some market risk by shaping the market rather than responding to gaps.
▪ Provides a framework within which all Energy Trust renewable energy activities can take place.	▪ Strategic – Budget allocation is determined by public purposes charge, which may fluctuate over time, affecting Energy Trust's ability to meet its objectives.
	▪ Strategic – Developers of different resources need information on different timelines; some plan on a two-year horizon, some on a 20-year horizon.
	▪ Operational – Limits Energy Trust's ability to reallocate funds on an as-needed basis among the technology markets, which is its current practice.

Examples of existing (or previous) implementation

California established a decade-long plan for its solar incentives through the California Solar Initiative (CSI). Over that period, the state committed over $2.2 billion to its solar program in addition to another $400 million through other programs.[3] Several developers cited such programs as the reason that California is leading the nation in solar installations.

[3] "About the California Solar Initiative." Undated. Available: http://www.gosolarcalifornia.ca.gov/csi/index.html

Potential Role: Facilitate matchmaking among interested and relevant parties.

Description

There is a spectrum of potential roles for Energy Trust within this area. Matchmaking may be as simple as expanding the list of trade allies to include accountants with relevant renewable energy tax credit experience, contractors that perform feasibility studies for various technologies, and potential financial partners. In the middle of the spectrum, Energy Trust leverages its own contacts to identify potential matches for developers or other parties that request assistance; this builds on its existing efforts to build bridges at conferences, workshops, and other Energy Trust-sponsored activities. At the far end of the spectrum, Energy Trust serves as an arranger for promising projects, connecting the entities with energy potential to those with professional and financial resources.

One of the most useful steps within this spectrum would be to provide some guidance on navigating the intricacies of the tax code as they relate to renewable energy projects. For projects in the small wind and small PV realms, these issues can be confusing and cause projects to stop. Such guidance may take the form of a list of accountants that have experience with renewable energy projects or an advice letter from a tax attorney addressing a subset of issues for a target audience (e.g., residential customers).

Relationship to current practices: Expand current practices

Barrier Addressed	Link between Barrier and Potential Role
▪ Benefit of state tax credit is limited.	▪ The ability to monetize the Business Energy Tax Credit (BETC) is critical, and developers are challenged to find partners with sufficient tax appetite.
▪ Inability to match development interest with financial and professional resources	▪ Energy Trust can help overcome this barrier by identifying parties with similar goals and interests and connecting them.
▪ Uncertainty over accounting issues	▪ In most cases, most accounting issues could be addressed by consulting with a tax accountant that understands the relevant code, but it is difficult to know which ones have credible experience with renewable energy investments
▪ Gap between Energy Trust support of feasibility and payment of incentives	▪ Energy Trust would not need to contribute capital to support projects in this arrangement, but it could help identify partners that are willing to invest.
▪ Municipal staff do not understand the project development process (esp. small hydro)	▪ Early in the project development process, many challenges caused by unfamiliarity with development can be addressed by meeting with a professional in that sector. The matchmaking service would help staff identify potential experts that can provide such assistance.

Magnitude of impact: Moderate impact

Barriers and Opportunities

Opportunities	Barriers
▪ Leverages existing interest in development.	▪ Strategic – Some parties may resist making their interest public
▪ Minimal capital commitment, though it does require staff commitment.	▪ Operation/Financial – Energy Trust cannot be construed as a tax advisor
▪ Ability to choose the scale of involvement and to change it as resources change.	▪ Reputation – Care must be taken that Energy Trust not be in a position to pick favorites in competition among highly qualified firms without competitive processes. Even if Energy Trust process is patently fair, it may not be perceived or construed as such.
▪ Builds on existing Energy Trust activity in this area.	▪ Reputation- Energy Trust may lose credibility if referred partners don't pan out.

Examples of existing (or previous) implementation:

Energy Trust is already active in some parts of this spectrum. The Trade Ally Networks is one example of its involvement, as are the conferences that Energy Trust holds periodically. However, Energy Trust rarely recommends individual Trade Allies among competing firms. Energy Trust either provides choices or rotates referrals

Potential Role: Further expand targeted marketing efforts to clarify Energy Trust's role in the marketplace and the importance of renewable energy technologies.

Description

In coordination with other efficiency and renewable energy organizations, Energy Trust could expand its efforts to achieve two objectives, one for each of two target audiences:

Objective	Primary Target Audience
To clarify Energy Trust's role in the market landscape relative to other state, non-profit and private entities	Key industry players (e.g., PV installers)
To communicate the importance of renewable energy technology in the state's energy future	Segments of the public with the ability to influence the adoption of renewables (e.g., financial community)

Under the first objective, Energy Trust would communicate its goals as an organization (as outlined in the long-term strategic plan) and the means used to achieve them (e.g., the above-market cost methodology). This would inform key industry players about the resources that Energy Trust has available. Under the second objective, Energy Trust would help to overcome some of the basic educational needs of project developers, building end user demand for the technologies (especially for PV and dairy-sited biomass).

Relationship to current practices: Expand current practices

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Energy Trust acquisition of RECs	▪ Developers need to understand Energy Trust's rationale behind and approach to calculating is share of the RECs.
▪ Low consumer awareness about PV benefits and risks	▪ Another component of the communication effort could focus on outreach to key markets.
▪ Concerns about the accuracy of Energy Trust's calculation of above-market costs	▪ Communicating Energy Trust's approach to the public would alleviate concerns about its accuracy – and facilitate a dialogue about actual costs.

Magnitude of impact: Significant increase in awareness of Energy Trust's resources

Barriers and Opportunities

Opportunities	Barriers
▪ Create a common language for discussing renewable energy resources	▪ Reputation – If done ineffectively, marketing could hurt rather than help
▪ Leverage economies of scale, accessing hard-to-reach communities with the potential to impact installed capacity	▪ Operation –Requires addition of staff with broader marketing focus rather than technology-specific focus
▪ Opportunity to draw on social networks, other organizations' existing messaging	▪ Operation – Many of these issues are difficult to understand unless the audience is working through a project with Energy Trust.

Examples of existing (or previous) implementation:

Social marketing has been integrated into demand-side management programs across the country, including the San Francisco Peak Energy Partnership and the Energy Center of Wisconsin.[4]

[4] Summit Blue Consulting. January 2007. *Appendix A: Program and Literature Summaries in Support of Social Marketing: Market Review.* Available: http://www.summitblue.com/dyn_downloads/1209484217.pdf

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APPENDIX B:

HIGH-LEVEL ANALYSIS OF POTENTIAL ROLES: RESTRUCTURING INCENTIVES

Potential Role: Expand standard offers.

Description

Energy Trust could extend standard offers to commercial solar photovoltaic (PV) projects that are 30 kW up to at least 1 MW in size and to biomass projects. The inclusion of larger PV projects is a critical step in developing economies of scale in the PV market. When larger projects are successfully incentivized, the labor pool needed to install the projects grows more competitive, driving down the costs of future projects. Over time, this reduction in project cost will enable Energy Trust to reduce its per-project incentive levels. Energy Trust may make a one- or two-year commitment to funding a certain number of these large projects using a standard offer to constrain the impact of such a program on the program's budget.

This is an extension of Energy Trust's current practice of providing standard offer contracts for residential and small commercial solar photovoltaic (PV) systems and to small wind projects. It is Energy Trust's practice to establish standard offers when classes of projects are known well enough to establish standard costs, those costs and above-market cost are fairly consistent and when funds are available for a volume of projects. As such, Energy Trust would still use its above-market cost methodology but would use industry averages when the class of projects is well enough understood. Ensuring that sufficient funds are available to provide incentives for an adequate number of projects will be a challenge, but this could be addressed by establishing rigorous requirements for eligibility for the incentives.

Relationship to current practices: Expand current practice

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Overall level of uncertainty is significant for developers	▪ Many parts of a project's economics are in flux throughout the development cycle. If Energy Trust would extend a standard offer to more projects, it could eliminate its contribution to the uncertainty in project economics.
▪ Cap on project size due to state and Energy Trust incentives	▪ Larger projects start to develop economies of scale, but the project economics typically require additional incentives to make the ends meet. Energy Trust could offer a lower per-kW incentive for larger projects because of the economies of scale and secure more kW development at a lower cost.
▪ High transaction costs associated with project-by-project negotiation	▪ Standard offers eliminate this transaction cost, which can be high if negotiations are extended.
▪ Installation costs using local labor are higher in Oregon than in other parts of the country.	▪ Until the project economics make sense for these large projects, developers of scale will not develop a presence in Oregon, and installation costs for all PV projects – small and large – will remain higher than in other states.

Magnitude of impact: Significant increase in installed MW

Opportunities and Barriers

Opportunities	Barriers
▪ Ability to secure additional installed capacity	▪ Financial – Increasing size of eligible PV projects requires larger budget than is currently available.
▪ Create economies of scale and competition in the labor pool	▪ Operation – May lose some marginal projects by using industry norms rather than project-specific data
▪ Reduce transaction costs for Energy Trust and for developers	▪ Financial – May overpay for some projects when using industry norms
▪ Eliminate one source of uncertainty in the developers' pro forma	• Operational – If level is inappropriately set, there may be no uptake.

Examples of existing (or previous) implementation:

Massachusetts' Commonwealth Solar program offers incentives for PV projects up to 500 kW.[5]

[5] Database of State Incentives for Renewable Energy. "Massachusetts: Commonwealth Solar Rebates." Available: www.dsireusa.org

Potential Role: Allow buy-out clauses for REC payments

Description

Buy-out clauses allow one party to pay to relieve itself of contractual duties. For Energy Trust partners, the contractual duties would be the delivery of RECs. When Energy Trust pays out incentives and negotiates its agreement with the seller, a clause would be included that allows for the seller to pay a specified amount to be excused from its obligation to deliver RECs under certain conditions.

In effect, this would create a price floor for RECs. If the price of RECs were below the price agreed upon with Energy Trust in the contract, the project owner would not pay to terminate the contract. If, in fact, the market price for RECs exceeded the price negotiated with Energy Trust by a sufficient amount to cover the buy-out payment, then the owner would under the terms of the contract pay to acquire the RECs from ET and sell on the open market. This is another strategy for reducing the uncertainty in the pro forma.

Relationship to current practices: Expand current practices.

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Perception that Energy Trust's method of valuing RECs undervalues RECs	▪ If developers have an "out," they can live with Energy Trust's initial valuation of RECs with the understanding that they can escape from it if it undervalued the RECs.
▪ Energy Trust acquisition of RECs in exchange for incentive reduces project value to the energy purchaser	▪ In some cases, the party purchasing the energy prefers to own the green attributes of a system (e.g., PV) in order to use it for marketing or to meet corporate commitments. The buy-out would enable them to do that.
▪ Concerns about the accuracy of Energy Trust's calculation of above-market costs	▪ If developers have an "out," they can live with Energy Trust's initial valuation of RECs with the understanding that they can escape from it if it undervalued the RECs.

Magnitude of impact: Moderate to significant

Barriers and Opportunities

Opportunities	Barriers
▪ RECs could be released into the market when REC prices are high to increase supply (and reduce prices)	▪ Strategic – RECs could be sold in California or another market with higher REC prices
▪ Provide a minimum incentive for developing a project in Oregon, allowing the developer to take advantage of the upside	▪ Strategic – Owners could sell RECs into the Oregon market at higher prices, eliminating the price mitigation benefits to ratepayers
▪ Energy Trust funding is replenished after project is up and running, reducing opportunity cost	▪ Financial [for ratepayers] – Unless the resale of RECs is restricted to Oregon IOUs, utilities may need more RECs at a time when prices are high, thereby increasing costs to ratepayers.
▪ Benefits of Energy Trust's early purchase of RECs could be secured by restricting buy-outs to times when utilities are in balance for the RPS. This would allow the projects to take advantage of higher prices in other states.	▪ Financial [for ratepayers] – Financial benefits of early Energy Trust purchase of RECs are lost.

Examples of existing (or previous) implementation:

The Massachusetts Technology Collaborative (MTC) used price floors as one option in its Massachusetts Green Power Program (MGPP).[6] MTC guaranteed a minimum price for the projects' RECs by establishing an escrow account in the name of the project. In the event the project used MTC funds, MTC sold the RECs into the market and received the proceeds.

[6] Cory, K. and N. Bolgen and B. Sheingold. "Long-term Revenue Support to Help Developers Secure Project Financing." Presented at the American Wind Energy Association's 2004 WINDPOWER conference.

Potential Role: Offer financing for development stages: bridge and construction financing

Description

Energy Trust can offer low-interest financing during pre-development and construction periods to help bridge the gap between its feasibility assistance and post-construction incentive payments. Energy Trust should plan to limit its share of the project costs to a certain dollar amount and a certain percentage of overall project first costs. It should also assure that the borrower provides collateral in case the project is not finished or the loan is not repaid. This will ensure that the partners have a stake in the project and provide some assurance that the project developer will complete the project.

Once the borrower pays back the loan, the money is put back into the pool available for additional loans. This will enable Energy Trust to continue providing assistance to new projects, adding installed capacity of renewable energy technologies.

Relationship to current practices: New roles within current mandate

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ High fixed costs of wind development make small projects unreasonable	▪ The competition for capital investment in the wind development community is fierce. It is more difficult for small projects to secure enough capital to move forward because investors could commit the capital to larger projects with better returns.
▪ Gap between Energy Trust support of feasibility and payment of incentives	▪ Project developers must put up significant amounts of capital to prepare for construction (e.g., permitting, project design) and during the construction phase. Arranging this capital infusion, which is only needed until Energy Trust's incentives are paid, can kill projects.
▪ Up-front capital commitment can be difficult for small hydro projects	▪ Many small hydro projects are put forward by public agencies with multiple demands on capital. Although the money is only needed temporarily, the opportunity cost can discourage the investment since it is not needed to maintain a functioning system.

Magnitude of impact: Significant increase in installed capacity

Barriers and Opportunities

Opportunities	Barriers
▪ Bridge gap between Energy Trust technical assistance/feasibility funding and incentive payment	▪ Strategic – Eliminates existing Energy Trust screen for developers to prove their ability to manage the project. (Energy Trust would need to develop other methods to prove developer readiness.)
▪ For small hydro, overcome capital constraints of government agencies	▪ Operation – Transfers risk of project failure or delay from developer to Energy Trust if no collateral is held for the loans
▪ Leverage funds available from developer (e.g., through matching)	▪ Strategic – Potential overlap with Oregon Department of Energy's energy loan programs (SELP), which also provides financing for construction

Examples of existing (or previous) implementation:

The Renewable Energy Trust of Massachusetts will provide funding for up to 75% of pre-development costs for certain renewable energy technologies.[7] This amount is capped at $250,000 for wind and biomass projects and $150,000 for other eligible renewable energy technologies. These funds are disbursed as a loan, subject to an interest rate of prime plus 2%, at the time costs are incurred (either invoiced or paid) rather than at the time of approval.

[7] Massachusetts Technology Collaborative. July 8, 2008. "Pre-Development Financing Solicitation." Solicitation Number 2009-PDI-01. Available: http://www.masstech.org/grants_and_awards/CE/predev_overview.htm Additional information, including terms and conditions, are available at this website.

Potential Role: Act as project developer for community wind and small hydro.

Description

Energy Trust would take on the role of a developer, identifying potential projects, working with relevant parties to ensure that all necessary permits are obtained, procuring equipment, putting up capital, and managing the construction process. If Energy Trust took on the role of solely a developer, it could try to find another party (e.g., a municipality) to pay Energy Trust a developers' fee and to front the pre-development, development, and construction costs. In other words, the third party would act as the equity investor. The development role would work best, however, if coupled with the next role in which Energy Trust also serves as an equity investor.

Relationship to current practices: New role outside of current mandate

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Interconnection is expensive and risky for small developers.	▪ Energy Trust's experience with interconnection issues would enable it to navigate the process more efficiently.
▪ Inability to match development interest with financial and professional resources	▪ Energy Trust would serve as the match for entities with development interest but without professional resources. This would streamline the development process.
▪ Municipal staff do not understand the project development process.	▪ Energy Trust would develop the projects, teaching the municipal staff about key aspects along the way. It would not require municipal staff to replace their regular duties with development activity, however.

Magnitude of impact: Significant increase in installed capacity

Barriers and Opportunities

Opportunities	Barriers
▪ Fills a significant gap in the market	▪ Strategic – Must find another party that is willing to put up capital and pay Energy Trust a developers' fee.
▪ Leverages existing Energy Trust capacities	▪ Strategic – Energy Trust builds capacity internally rather than in private sector.
▪	▪ Strategic – Complicates relationships with utilities.

Examples of existing (or previous) implementation:

This role has not been taken on by other public or ratepayer-funded agencies.

Potential Role: Act as project equity investor for community wind and small hydro.

Description

This role could serve as an alternative to the financing role described earlier. For projects developed by outside entities, Energy Trust could serve as one of several[8] equity investors in exchange for a reasonable return on its investment. If Energy Trust serves in the developer's role, Energy Trust could negotiate with the local municipality for project purchase at the time of project completion, reducing risk for the municipality and creating a guaranteed exit (with a sufficient rate of return) for Energy Trust. In either case, the returns could be used to fund additional projects going forward. Energy Trust could build a portfolio of these smaller projects to mitigate the risk that any single project does not reach completion.

Relationship to current practices: New role outside of current mandate

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Project owners with only one project cannot hedge risk using a portfolio approach.	▪ If it maintained a stake in several projects, Energy Trust could build a portfolio of projects, hedging the risk associated with any single project
▪ Up-front capital commitment can be difficult.	▪ Many small hydro projects are put forward by public agencies with multiple demands on capital. Although the money is only needed temporarily, the opportunity cost can discourage the investment since it is not needed to maintain a functioning system.
▪ Inability to achieve ideal project size	▪ If Energy Trust served as an equity investor in several community wind projects, it could aggregate the turbine orders. This would overcome the hurdle of securing turbines.
▪ High fixed costs of wind develop make small projects unreasonable	▪ The competition for capital investment in the wind development community is fierce. It is more difficult for small projects to secure enough capital to move forward because investors could commit the capital to larger projects with better returns.

Magnitude of impact: Significant increase in installed capacity

[8] One of the other investors should be able to directly take advantage of the tax benefits offered for renewables.

Barriers and Opportunities

Opportunities	Barriers
▪ Fills a significant gap in the market	▪ Operational – Requires more funding than is currently available for Energy Trust
▪ Addresses difficulty in securing capital in municipal/community settings	▪ Strategic – Energy Trust builds capacity internally rather than in private sector.
	▪ Strategic – Eliminates existing Energy Trust screen for developers to prove their ability to manage the project. (Energy Trust would need to develop other methods to prove developer readiness.)
	▪ Financial – Energy Trust's funds are at risk without collateral

Examples of existing (or previous) implementation:

This role has not been taken on by other public or ratepayer-funded agencies. One of the clean energy funds in Pennsylvania has invested equity in clean energy companies, though not at the project level. In its investment in the companies, the fund partnered with a private equity fund as a limited partner, reserving veto rights over investments that failed to meet its risk profile. This partnership leveraged the funds of both the state fund and the private equity partner and enabled the public investment to benefit from the expertise of the private equity investor, which examines hundreds of deals every year.

Potential Role: Aggregate turbine orders

Description

Energy Trust can aggregate the turbine purchases of several community-scale projects in order to develop turbine orders that get attention from turbine manufacturers. Energy Trust can identify several community-scale projects in need of turbines and combine their orders into a single order. Such agreements would need to be driven by contracts that specify the terms and conditions under which the order is placed.

Key decision points include which party puts up the collateral for the order, how far into the development cycle projects would need to be in order to qualify, how large the aggregate order would need to be, and which turbine manufacturer would agree to deliver the turbines to different locations. One option would be to finance the turbine acquisition through a program such at that offered by Midwest Wind Finance.

Relationship to current practices: New role within current mandate

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Inability to achieve ideal project size	▪ By aggregating turbine orders, Energy Trust could overcome a single developer's inability to place a turbine order with a reputable manufacturer.

Magnitude of impact: Modest effect on installed capacity of community wind projects

Barriers and Opportunities

Opportunities	Barriers
▪ Addresses the primary barrier to development of community-scale wind in Oregon.	▪ Operation /Performance risk: Some turbines work better in certain conditions than others. One turbine may not fit all needs.
▪ Creates economies of scale.	▪ Financial – Risk must be allocated appropriately between Energy Trust and developers. Risk that if projects fail, ET has capital locked up in hardware. ▪
▪ Facilitates development of several projects at once.	▪ Operation – Aggregate number of turbines needed at any given time may not reach critical mass needed for order.
▪	▪ Since one turbine is a large percentage of current ET renewable budget, there are large binary risks. Delays could tie up a large share of ET funds.

Examples of existing (or previous) implementation:

Massachusetts purchased two 1.65 MW turbines and placed them up for sale, first to in-state developers wishing to develop on publicly-owned land.[9] If they fail to sell by the deadline, they will be offered to any developer. This is a slight variation on the theme proposed here for Energy Trust.

[9] Massachusetts Technology Collaborative. November 2007. "Turbine Supply Agreement Term Sheet." Available: http://www.masstech.org/Grants_and_Awards/turbine/turbine63008.html

Potential Role: Expand program for demonstrating close-to-market technologies.

Description

New technology is available that may facilitate the deployment of renewable energy projects. Technologies include small-scale geothermal projects with lower temperature conditions than conventional technology, building-integrated PV systems, and small wind systems that haven't gotten much traction in the marketplace. Energy Trust could expand its existing demonstration program that showcases close-to-market technologies to include this technology. Providing funding for a small number of installations at sites with characteristics similar to other potential installation sites in Oregon would enable the technology to be tested at minimal risk to the host site. If the technology is proven in these installations, it may be eligible for installation in other parts of the state.

Relationship to current practices: Expand current practices

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Drilling of geothermal wells incurs too much risk for potential return	▪ New geothermal technologies can produce electricity at lower temperatures than conventional technologies. Thus, the likelihood that a viable resource is found for these technologies is higher.
▪ Low consumer awareness about the risks and benefits of renewable energy technologies	▪ Deploying these unfamiliar technologies in high profile settings will enable the public to become better acquainted with them and to consider the possibility of installing the technologies on their own property.

Magnitude of impact: Unknown

Barriers and Opportunities

Opportunities	Barriers
▪ Prove technology at minimal risk to end user	▪ Strategic – Some technologies may not have been proven to work in conditions similar to Oregon's
▪ Potential to replicate projects if technology is proven and price is right	▪ Strategic – If technology works, its ultimate success would depend on factors in addition to technical viability (e.g., price point)
▪ Increases local familiarity with technology	▪ Strategic – Up-front labor costs for some technologies will be high due to the lack of trained labor
▪ Provides opportunity for outreach to public on renewable energy and to engage high profile players (e.g., major corporations or municipalities) as project partners.	▪ Financial – Energy Trust would likely need to bear the bulk of financial risk for early projects

Examples of existing (or previous) implementation:

A UTC technology that produces electricity using lower changes in temperatures than traditional geothermal technologies was demonstrated at the Chena Hot Springs Resort in Alaska.[10] Co-funding was provided by UTC and the resort. Further, most renewable energy technologies (including wind and PV) have received demonstration funding by public entities at some point in their development. Examples include U.S. Department of Energy funding of wind and PV demonstrations and Cleveland's Great Lakes Science Center funding of a highly visible wind turbine and a solar array along Cleveland's lakefront.

[10] Karl, B. March 2006. "Renewable Energy and Sustainable Development Projects at Chena Hot Springs, Alaska." Available: http://www.smu.edu/geothermal/Oil&Gas/Karl_Chena,%20AK.pdf

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APPENDIX C:
HIGH-LEVEL ANALYSIS OF POTENTIAL ROLES:
PROVIDE ADDITIONAL TECHNICAL ASSISTANCE

Potential Role: Conduct high level wind feasibility studies at the county level

Description

Feasibility studies could include a *high level* assessment of environmental impacts (including avian and bat impacts), interconnection situation, stringency of permitting process and requirements, and assessment of the wind resource in the area. Energy Trust currently co-funds feasibility studies on a project-by-project level, and this role would expand that activity beyond project-specific studies. Through the more general feasibility studies, Energy Trust would consider an entire county to help a community-scale wind developer identify the economies of scale that could be leveraged by building several smaller projects in the same area. By providing this service, Energy Trust would enable developers to focus their efforts on areas with higher likelihood of project success, thereby increasing the likelihood that a project would be completed.

Relationship to current practices: Expand current practices

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Overall level of uncertainty is significant for developers	▪ Community-scale wind developers would benefit from a framework in which to evaluate project development opportunities. Energy Trust's up-front feasibility studies that are not tied to a specific project will provide such a framework. This will enable developers to assess project economics earlier in the process and reduce transaction costs.
▪ Small projects require the same amount of effort to develop as larger ones but lack economies of scale.	▪ Energy Trust's funding of early stage feasibility studies can help developers identify the projects that will never be successful early on. By reducing some of the up-front costs, this effort will improve project economics.

Magnitude of impact: Dependent on effectiveness of role in turbine acquisition

Barriers and Opportunities

Opportunities	Barriers
▪ Create economies of scale	▪ Operation – Provides only a high-level overview rather than high resolution information
▪ Reduce transaction costs for developers	▪ Strategic – Fails to address the issue that the rights to many of the best sites for wind have already been bought up by large developers.
▪ Assist developers identify wind-friendly permitting and interconnection schemes	▪ Financial – Since this is not tied to a specific project, risk that the funds will be spent and no projects developed
▪ May reduce number of "dry holes" for full studies.	▪

Examples of existing (or previous) implementation:

Several feasibility studies have been conducted at the county level since large-scale wind facilities often span entire counties; these studies are typically funded by the developer. Cuyahoga County, located in Northern Ohio on the banks of Lake Erie, recently sponsored a feasibility study for an off-shore wind demonstration project.[11] It is examining the wind resource, environmental considerations, issues related to grid connection, and other related issues.

[11] Cuyahoga County Board of County Commissioners. 2007. "Wind Turbine Feasibility Study." Available: http://development.cuyahogacounty.us/en-US/Wind-Turbine-Feasibility-Study.aspx

Potential Role: Help biomass developers examine their project from the perspective of investors

Description

Energy Trust could use its staff's financial expertise to analyze project *pro formas* and identify weaknesses in the project economics. Engaging in such analysis *before* a project developer brings in the financial community will enable developers to present viable, well-organized project economics to the funding community. This should reduce the time it takes to identify investors and the amount of time that developers spend chasing after uneconomic or marginal projects. Energy Trust can also leverage this opportunity to communicate with the biomass developer about the range of financial resources available to improve project economics, including Energy Trust funds, and federal and state grants.

Relationship to current practices: Expand current practice

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Inability to match development interest with financial and professional resources	▪ Energy Trust could help developers present a more coherent business case for their projects to the investor from the outset, facilitating the partnerships between developers and investors.
▪ Energy Trust acquisition of RECs in exchange for incentive reduces project value to the developer	▪ Project financiers give more value to REC prices when the RECs are under a fixed-price contract with a buyer (which Energy Trust's incentives provide) than when they are left to a speculative market. Examining the project from an investor's perspective would enable developers to see the value of securing a contract with Energy Trust.

Magnitude of impact: Marginal impact but would increase interaction with interested developers, which may have secondary benefits

Barriers and Opportunities

Opportunities	Barriers
▪ Enables Energy Trust to identify quality projects early in the process	▪ Operation Risk – New service requires marketing to reach target audience
▪ Leverages existing Energy Trust expertise	▪ Operation Risk – Developers may be wary of divulging details of project finances so early in the process
▪ Minimal capital commitment required	▪ Operation Risk – Developers (or interested parties) may bring in an abundance of marginal or poor projects, overloading Energy Trust staff
▪ Increases touch points with potential developers, facilitating development of viable projects	▪ Operation – Energy Trust's existing financial capabilities are a starting point but will need to be enhanced with financial sector experience.
▪ Identifies other sources of financial support early on, leveraging Energy Trust resources	▪ Financial/Reputation – Providing investment advice can lead to lawsuits. Need to define role carefully.
▪ Minimal exposure to financial risk for Energy Trust	
▪ Helps less experienced developers find financial partners	

Examples of existing (or previous) implementation:

This is an extension of services that Energy Trust is already providing for biomass. Currently, Energy Trust will co-fund feasibility studies for developers and can provide targeted guidance in building the financial case for a project. This role would have Energy Trust expanding its participation in the latter area significantly, including providing information to a broad audience of potential developers. The proposed role would also incorporate more detailed analysis and guidance on the financial aspects of a project.

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APPENDIX D: HIGH-LEVEL ANALYSIS OF POTENTIAL ROLES: INCREASE CERTAINTY AROUND THE MARKET FOR BIOMASS FUELS

Potential Role: Increase certainty around the market for biomass fuels

Description

Similar to the spectrum of matchmaking services that Energy Trust can provide, there is a spectrum of potential roles for enhancing certainty around forest waste/mill residue fuel supplies. At a basic level, Energy Trust can conduct regional fuel assessments to identify potential fuel sources and current demand for them. Taking another step, Energy Trust can identify areas in which to concentrate urban wood waste or forest waste and secure aggregated supplies of those resources for biomass facilities. These roles would reduce some uncertainty about the sources of fuel but not about the price of the resources.

Relationship to current practices: New roles within current mandate

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Inability to secure long-term fixed price supply contracts for fuel	▪ The aggregator of the fuel (Energy Trust or another party) may decide to offer long-term fixed-price contracts , alleviating this barrier.
▪ Rising transportation fuel costs change project economics.	▪ Identifying and aggregating fuel sources near potential development sites can help to create economies of scale in the logistics for these fuels.

Magnitude of impact: Moderate to significant increase in installed biomass capacity

Barriers and Opportunities: Resource assessment and resource aggregation

Opportunities	Barriers
▪ Assessment takes steps toward overcoming market failure of imperfect information	▪ Operation – Assessment and aggregation of fuel supply does not guarantee a fixed price ▪
▪ Resource aggregation encourage concentration of plants near load centers	▪ Operation/Reputation – Resource assessment would require regular updates as new biomass facilities are built and demand for the resources increases
▪ Resource aggregation creates economy of scale, reduces transaction costs	▪ Operation/Reputation – Federal access policy to forests may change with new administration and is not predictable- may influence scale of potential market.

Examples of existing (or previous) implementation:

Massachusetts[12] commissioned a statewide resource assessment of woody biomass, as did Wyoming.[13]

Potential Role: Deploy Contracts for Differences

Description

Contracts for differences (CFD) are used to manage price risk; in the financial markets, they are also known as swaps. CFDs allow parties to trade fixed and floating cash flows: one party with access to a floating cash flow (e.g., merchant REC sales) trades it to a counterparty for a fixed cash flow (e.g., a set payment for RECs). The counterparty that is accepting the floating cash flow charges a premium for providing the service. CFDs enable the parties to match their risk appetites to their risk profiles.

To address the issue of fuel price volatility, Energy Trust can utilize the contracts for differences (CFD) or establish plant-specific contingency funds for years in which biomass prices exceed a specific price. Developers cite the scarcity of fixed price fuel supply agreements for forest biomass and mill residue as the primary barrier to development. At a minimum, CFDs would need to last five to seven years. CFDs with Energy Trust would enable developers to remove that uncertainty from their financial statements, reducing the risk and the associated cost of capital.

Either of these instruments would serve as insurance to the biomass facility owner and would put Energy Trust in the position of underwriter. Such a position would require significant research to establish appropriate price points, risks, and mitigation efforts. Energy Trust could assemble a portfolio of CFDs to mitigate risk, which is difficult for small-scale developers.

Relationship to current practices: New role- may require changes in PUC grant agreement or exceptions from PUC for term beyond 3 years.

Key barriers addressed

Barrier Addressed	Link between Barrier and Potential Role
▪ Overall level of uncertainty is significant for developers	▪ Developers face uncertainties in many aspects of project development and operation. CFDs would address the major uncertainty for woody biomass projects.
▪ Uncertainty in fuel supply availability and price	▪ Certainty in the price and availability of fuel is the primary barrier to developing woody biomass projects. CFDs can alleviate part or all of that uncertainty

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[12] Massachusetts Biomass Energy Working Group Supply Subcommittee. May 2002. *The Woody biomass Supply in Massachusetts: A Literature-Based Estimate.* Available: http://www.mass.gov/doer/programs/renew/rps-docs/woody.pdf

[13] Wyoming State Forestry Division, Office of State Lands and Investments. 2007. *Wyoming Biomass Inventory: Animal Waste, Crop Residue, Wood Residue, and Municipal Solid Waste.* Available: http://slf-web.state.wy.us/forestry/adobe/biomass.pdf

Magnitude of impact: Moderate to significant for biomass

Barriers and Opportunities

Opportunities	Barriers
▪ Could generate income for Energy Trust	▪ Financial – Energy Trust adopts market risk, making it difficult to predict the cost of this approach for Energy Trust
▪ Reduce uncertainty about biomass fuel supply availability and price	▪ Financial – Involves setting aside funds (e.g., in escrow) to secure the contract. Amount of escrow required is difficult to estimate, and may be larger per project until there is a diversified portfolio.
▪ Provide a more straightforward approach to valuing RECs	▪ Financial/Operation – Requires data analysis to forecast fuel/REC prices going forward
▪ Assembly of portfolio of CFDs would enable Energy Trust to hedge risk	▪ Strategic –Flow of large projects at Energy Trust scale is sporadic, and market conditions are volatile; demand for the product may be erratic and is difficult to predict.
▪ CFD, contingency funds take steps toward overcoming the primary barrier to biomass development	▪ Financial – CFD, contingency funds transfer significant financial risks to Energy Trust. Level of capital reserves required may be difficult to estimate. This may be a significant investment relative to Energy Trust's renewable energy budget.
	▪ Strategic – Market for CFDs for biomass fuel supply is not liquid; alternative hedging instruments must be used
	▪ Strategic – CFDs, contingency funds could suppress price signals, resulting in overdevelopment of biomass plants relative to available supply of fuel.
	▪ Strategic – RPS rules and carbon regulation may completely change the market by the time Energy Trust establishes its products in the market.
	▪ Strategic – The biomass market is tied to both wood products and pulp and paper markets. Each of these markets is susceptible to global influences that are difficult to predict. Committing funds to this area would result in unknown levels of risk exposure.

Examples of existing (or previous) implementation:

Enel North America and Fortis Merchant and Private Banking entered into a CFD for the energy from a wind plant in Texas.[14] The introduction of CFDs in REC and fuel markets is not documented.

[14] Cory, K. and T. Coughlin and T. Jenkin and J. Pater and B. Swezey. February 2008. *Innovations in Wind and Solar Financing."* National Renewable Energy Laboratory: NREL/TP-670-42919.

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SUMMIT BLUE
CONSULTING, LLC

Memorandum

To: **Fred Gordon and Peter West**

From: **Frank Stern and Jane Pater**

Cc: **Kevin Cooney**

Date: **October 2, 2008**

RE: **Memo #7: Risk Assessment of Priority Roles and Decision Framework**

This memo is the seventh and final in a series of memos to Energy Trust regarding its roles in the renewable energy market in Oregon. The earliest memos examined current renewable energy roles and the associated risks and compared these to the risks that Energy Trust takes on through its work in the energy efficiency arena. More recent memos examined the risk management approaches used by organizations in other parts of the United States, specific market barriers to the adoption of renewable energy projects smaller than 20 MW in Oregon, and recommendations regarding potential roles for Energy Trust to consider moving forward.

This memo will focus on two additional forward-looking issues. To provide a framework for discussions about risk, the memo will develop a set of risk decision criteria for Energy Trust to use as it considers potential roles for the organization moving forward. Components of the decision-making framework will then be demonstrated in the second half of the memo. The second half of the memo will then present a risk assessment for the roles that Summit Blue recommended that Energy Trust adopt moving forward; the risk assessment includes a discussion of both the risks and the benefits of each role. This discussion of risks and benefits can serve as part of the input to the decision-making framework for these roles.

We anticipate that these considerations are for staff to weigh and use as the basis for the presentation of key considerations to the board. As with any decision framework, it is important to keep in mind that this should be viewed as assistance to the decision making process, with limitations. Ultimately, some human intelligence needs to be a part of the process to address real-life situations as they arise.

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A Decision-Making Framework for Energy Trust's Role in the Renewable Energy Market

The framework risk decision criteria laid out in this memo are intended to lay the foundation for Energy Trust's future decisions regarding roles in the renewable energy market place. The goal is to allow for decision makers to establish their priorities for the organization and to reflect those priorities in this framework. As such, it does not assign weightings to different criteria. Such weightings can be developed and assigned by decision makers to integrate the goals established during this and subsequent strategic planning processes into the selection of roles for Energy Trust in the renewable energy market.

The goals established by the board during the strategic planning process are a critical input for putting this framework to work. The questions posed in the framework can be answered without having an established set of goals, but the goals will create outputs that line up the activities of the organization with its vision for the future. Understanding which goals take precedence will ensure that the roles selected help move Energy Trust toward those ends. Until those goals are established, however, it will be difficult to evaluate the potential roles effectively.

The next section provides the structure of the framework. This is followed by role-specific, organizational, and external considerations. A section on applying the framework closes this part of the memo.

STRUCTURE OF THE FRAMEWORK

The basic framework provides the basis to address considerations in three realms.

1. The characteristics of the specific proposed role.

2. How the proposed role fits with the broader context of Energy Trust as an organization.

3. How the proposed role will mesh with external considerations, including market forces and policy drivers.

Figure 1 represents the relationship among these three spheres.

The remainder of this section will describe the criteria that fall into each of these categories in more detail and how the framework can be integrated into Energy Trust's decision-making process.

Figure 1. Structure of the Decision-Making Framework

ROLE-SPECIFIC CONSIDERATIONS

The first category of considerations examines the proposed role as a stand-alone entity. The issues raised in this realm focus on the characteristics of the proposed role. By addressing the issues in this section, decision-makers will develop a clearer picture of how the role is designed to affect the marketplace.

In this realm, the framework addresses the following issues:

1. **Expected payoff.** This metric takes into account the magnitude of the amount of energy generated and the likelihood that the effort will succeed. This impact should be for a program/effort as a whole, rather than the impact of any single project that would be developed under it. The likelihood would be a ball-park figure, measured as a percent likelihood of success. Then, the magnitude and likelihood would be multiplied together (e.g., 30 aMW*50% = 15 aMW) to arrive at the estimated payoff.

2. **Estimated time to payoff (short-term, mid-term, long-term).** This metric estimates the time to the payoffs that were described under #1 above. For example, an investment in tidal power may not generate a significant amount of energy (hundreds of aMW per year) for 10-15 years, providing a long-term payoff. On the other hand, a small amount of PV (single-digit aMW) may be installed each year, providing a short-term payoff.

3. **Estimated resource commitment required.** This metric will enable Energy Trust to understand the resources required to execute the role effectively. It can be considered in three parts:

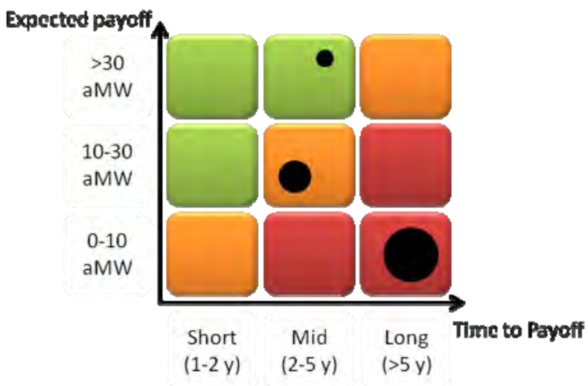
   - Absolute resource requirements: financial ($), staff (number, expertise)

   - Resource commitment relative to overall renewable energy program budget (%): financial, staff

- Staff competencies required beyond those already maintained at Energy Trust: existing, need to hire, need to contract, cannot obtain at this time

The responses to #1, #2, and #3 would be combined in a matrix format as seen in 2. The size of the dot placed would signify the magnitude of the resource commitment; each dot represents a different program/effort.

Figure 2. Simple Risk Matrix for Expected Payoff and Time to Payoff



4. **Risks to Energy Trust and risk management strategies.** Energy Trust will analyze the risks associated with each proposed role and present a proposed risk management strategy to the board. This will build on the concepts developed in Memo 2, which described a framework for characterizing risk and risk management strategies. A description of this issue could be structured in a tabular format, similar to the one in Table 1.

Table 1. Template for Presentation of Risks and Risk Management Strategies

Type of Risk	Risks Associated with Role	Risk Management Approach
Financial Risks	XXX	Accept/Mitigate/Transfer/Avoid
Operational Risks	YYY	Accept/Mitigate/Transfer/Avoid
Reputation Risks	ZZZ	Accept/Mitigate/Transfer/Avoid

Together, the issues addressed in the Role-Specific Considerations section will enable Energy Trust to develop a thorough profile of the role in terms that are relevant to decision makers.

ORGANIZATIONAL CONSIDERATIONS

In addition to considering the merits of the role itself, Energy Trust should consider how the role fits within the organization as a whole. This will take into account the results of the strategic planning process as well as the characteristics of the other roles taken on by Energy Trust, with a special focus on the risks/reward balance.

In the Organizational realm, the framework addresses the following issues:

1. **Fit with organizational goals and objectives.** Any new roles pursued by Energy Trust must be in line with the goals and objectives approved by the board. This metric can be as simple as a

checklist of connection between a proposed role and the goals existing in the strategic plan; or it can be more detailed, with a more concrete explanation of how the role connects with the goals. One possible structure is outlined in Table 2.

Table 2. Potential Presentation of a Role's Fit with Organizational Goals

	Strategic Plan Goal 3	Strategic Plan Goal 4	Strategic Plan Goal 5	Strategic Plan Goal 6
Program 1	X		X	
Program 2		X	X	
Proposed Role A	X			X

2. **Relationship of proposed role to existing roles and mandates.** Describing how a proposed role fits with existing roles and mandates can provide context about how much extra effort a given role will require at startup. Memo #6 presented a matrix that categorized the proposed roles according to their relationship with existing roles and mandates: expansion of current role, new role that fits within current mandate, new role that requires new or expanded mandate. These same categories could be used in the framework.

3. **Fit with entire portfolio of programs.** The addition of any new roles to Energy Trust's existing portfolio of activities will affect the overall profile of the organization. The new role may intensify, counteract, or offset existing characteristics of Energy Trust's profile. It is important to understand how the proposed role will affect Energy Trust's existing portfolio along several dimensions, including the following:

- Resource commitment – plot multiple points on matrix in Figure 2
- Time to payoff – plot multiple points on matrix in Figure 2
- Expected payoff – plot multiple points on matrix in Figure 2
- Risk exposure – comparison of Table 1 for multiple options

Making decisions about whether the interaction is "good" or "bad" will depend on the goals and objectives that Energy Trust's board approves. If, for example, Energy Trust decides that it is willing to accept a significant level of technology risk in exchange for the potential scale of energy generation that could be realized, an investment in tidal or another emerging technology may be worthwhile. On the other hand, if the goal is to achieve energy savings immediately, such a risk would not be appropriate. Once Energy Trust establishes these goals, it will be possible to evaluate the benefits and tradeoffs of each proposed role. One of the constraints that will need to be considered in that evaluation will be the budget allocated to Energy Trust; all decisions made must acknowledge that there are limits to what Energy Trust's budget will allow.

Examining each potential role in the context of Energy Trust as an organization will provide additional context for the decision regarding each role. It will be up to the decision makers to determine if it is appropriate to limit the portfolio considered to the renewable energy program alone or if it is appropriate to include the energy efficiency program as well. This decision may vary from one dimension to the next, depending on how the goals are developed.

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EXTERNAL CONSIDERATIONS

Finally, Energy Trust must consider the relationship between the proposed role and the external contexts in which it operates, including market forces and policy drivers. This part of the framework is intended to enable Energy Trust to assess the real-world implications of each specific role. When assessing the role in the context of external forces, Energy Trust should consider four issues:

1. **Strategic risks that can interfere with success.** This is the fourth and final category of risk defined in Memo #2. Strategic risks are defined by their presence in the world outside of the organization considering them; examples include policy risk, market risk, and industry risk. Because the source of these risks is external to the organization, they are considered separately from the other three categories of risk. A sample presentation of these risks and the associated risk management approaches is presented in Table 3.

Table 3. Sample Presentation of Strategic Risks and Related Risk Management Approaches

Type of Risk	Risks Associated with Role	Risk Management Approach
Strategic Risks		Accept/Mitigate/Transfer/Avoid

2. **Value created by having Energy Trust execute the proposed role (instead of another market actor).** Energy Trust can consider where it can add the most value in the marketplace when considering which new roles to undertake. Imperfect information is a common market failure in the renewable energy market, for example, because it is inefficient for several entities to provide education and information to move the market in a given direction when there are several beneficiaries. Energy Trust is able to help overcome this market failure by providing the information and achieving economies of scale. Energy Trust should consider alternatives to the proposed new role and explain why it is most appropriate.

3. **Fit with intentions of policy makers.** While policy makers can clearly state *what* they want done, it is not always clear *why* they want it done. It is important for policy implementers, like Energy Trust, to understand the competing intentions and how the organization can balance those intentions through its roles in the marketplace. This may require clarification from policy makers or their agents.

4. **Importance of the market barriers addressed relative to other options.** The renewable energy market is complex, and the challenges to widespread use of any one technology involve multiple market barriers. Energy Trust should be clear about its understanding of *all* of the market barriers involved and the rationale behind its decision to take on the set of market barriers addressed by its proposed activity.

These external influences will affect how effectively a proposed role will help Energy Trust achieve a stated goal. Understanding how the forces in the outside world, from policy to market to personalities, are related to the success of a proposed role will provide additional information to decision makers about resource allocation.

APPLYING THE FRAMEWORK TO REAL-WORLD DECISIONS

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The first step to implementing the framework is for Energy Trust's board to clarify the order of priority for the organization's goals in the renewable energy space. To provide context for discussing the issues in this memo, Energy Trust needs to answer the following questions (at a minimum):

- What is the relative order of importance of Energy Trust's goals in the renewable energy marketplace?
- How will the organization's progress towards those goals be measured? When will it be measured?
- How much risk is the organization willing to take on? Which types of risks are acceptable?
- How should the organization's portfolio of programs work toward that target risk profile? Is it the *balance* of risks that is important? Are the *specific* risks adopted through each role important?

Ideally, the board will be clear enough in its description of goals, objectives, and success criteria that decision criteria related to new roles will be directly derived from them. These decision criteria should be made as transparent as possible so that the decision-making process used to select Energy Trust's roles going forward has some level of predictability. The integration of transparency and predictability will enable the team proposing roles to weed out ineffective roles before they get to the board, facilitating an efficient use of resources during this process.

Appendix A includes a sample worksheet for addressing each of the issues raised earlier in this memo. This worksheet, or something similar to it, can be used to prepare a profile of the role for consideration by internal stakeholders and by the board. It will engage the team proposing the role in an exercise to explain why a given role will have the desired impact in the marketplace and will be a good fit with the organization as a whole. Additionally, it should require the proposing team to make the case for the role as concisely as possible.

Considering the Risks and Benefits of Roles Recommended for Energy Trust

One of the main issues that will affect the selection of roles for Energy Trust is the types of risk associated with each role. To provide some up-front context for this discussion, the remainder of this memo will focus on the types of risk associated with the roles that Summit Blue highlighted as priority roles for Energy Trust in Memo #6.

The priority roles discussed below are:

- Establish and communicate a long-term plan for Energy Trust's role in renewable energy;
- Facilitate matchmaking among interested and relevant parties;
- Allow buy-out clauses for REC payments;
- Offer financing for development stages: bridge and construction financing;
- Facilitate project development for community wind and small hydro;
- Expand program for demonstrating close-to-market technology;
- Help biomass developers examine their project from the perspective of investors; and

- Increase certainty in the market for biomass fuels.

ESTABLISH AND COMMUNICATE A LONG-TERM PLAN FOR ENERGY TRUST'S ROLE IN RENEWABLE ENERGY

The idea of establishing a long-term plan for Energy Trust's role in the renewable energy market is a step beyond its existing strategic planning process. ***The key benefit of this type of approach is the certainty that it adds for key market actors.*** The plan can be targeted to impact those market actors that are in most need of this certainty, and the specifics of the plan (duration, level of specificity, commitments) can be tailored to the needs of each technology-specific market sector. This reduction in uncertainty can help reduce the cost of these projects and accelerate the technologies' adoption into the marketplace.

On the other hand, however, there are risks associated with this role.

Table 4 summarizes the key risks and categorizes the types of risk management approaches that Energy Trust can employ to address each type of risk. For now, these suggested risk management approaches are left at a high level to allow Energy Trust to develop its own approaches to addressing them based on the guiding principles established by the board.

Table 4. Risks Associated with Long-Term Planning

Type of Risk	Risks Associated with Role	Suggested Risk Management Approach	New Risk?
Financial Risks	A firm plan may lead to misallocation of funds over the long run as the market evolves.	Mitigate	Y
Operational Risks	Limits Energy Trust's ability to reallocate funds on an as-needed basis among the technology markets, which is its current practice.	Mitigate	Y
Reputation Risks	Energy Trust runs risk of losing market confidence if changes to plan are needed as market or Energy Trust's role, funding, and regulatory and legislative guidance evolves.	Mitigate	Y
	Can leave unspent balances from one year to the next; if not redeployed, can be raided.	Mitigate	Y
	Limits ability to back-fill if demand is growing beyond the yearly allocation and places greater emphasis on changing incentive levels within a year to moderate demand.	Mitigate	Y
	Energy Trust's limited budget may limit its ability to have a real impact on some markets as they grow in size; potential to be locked into spending funds that have minimal impact.	Mitigate	N
Strategic Risks	Legislative mandate limits time horizon for planning.	Mitigate	N
	Oregon's legislative framework market for renewables	Mitigate	N

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	are changing rapidly.		
	Internalizes some market risk by shaping the market rather than responding to gaps.	Accept	N
	Budget allocation is determined by public purposes charge, which may fluctuate over time, affecting Energy Trust's ability to meet its objectives.	Mitigate	N
	Developers of different resources need information on different timelines; some plan on a two-year horizon, some on a 20-year horizon.	Accept	N

Many of the risks associated with this role can be mitigated by imbuing the plan with some flexibility. The renewable energy industry is rapidly evolving, and goals and targets that seem appropriate today may seem laughable in two years. Thus, the plan that Energy Trust develops will need to strike a balance between the needs of market actors today and the long-term needs of the market, considering Energy Trust's limited ability to make long-term commitments. Some markets need clearer signals than others; for these, Energy Trust can provide more details while still allowing for flexibility. For others, Energy Trust can build in more flexibility to adjust its role as needed. This concept ties back to the fundamental issue of risk sharing: to affect real change in the renewable energy market, Energy Trust can take on the burden of portions of the risk, but need not accept all of the risk. It need only be clear about which risks it is leaving to other market actors. Energy Trust may also choose to pursue this option for those markets in which it is clearly needed, in which the scale of ET's resources is commensurate with the commitment needed to move a market ahead, and in which the market is a priority for Energy Trust.

FACILITATE MATCHMAKING AMONG INTERESTED AND RELEVANT PARTIES.

There is a spectrum of potential roles for Energy Trust to play to facilitate matchmaking among interested and relevant parties. Matchmaking may be as simple as expanding the list of trade allies to include accountants with relevant renewable energy tax credit experience, contractors that perform feasibility studies for various technologies, and potential financial partners. Because of this spectrum, the key benefits and risks of such a strategy vary according to the specific role assumed. At one end of the spectrum is a world in which Energy Trust holds conferences or starts work groups that create a forum in which interested parties can interact. At the other end of the spectrum, Energy Trust would serve as a broker, matching up parties that are best suited for one another.

The key benefits to the matchmaking role relate to the ability to have a significant impact on the marketplace while committing to a low level of financial resources. This approach leverages Energy Trust's existing interest in the development arena and builds on its Trade Ally Network approach to building business networks that focus on renewable energy development. As a result, the up-front capital investment associated with this effort is negligible compared to some of the other recommendations made in this memo. Further, Energy Trust can quickly scale its role up or down based on evolving market needs or on internal resource allocation.

Along with the benefits of a matchmaking effort come risks. The risks outlined in Table 5 are related to a middle-of-the-road role in which Energy Trust leverages its own contacts to identify potential matches for developers or other parties that request assistance.

Table 5. Risks Associated with Matchmaking Facilitation

Type of Risk	Risks Associated with Role	Suggested Risk Management Approach	New Risk?
Financial Risks	Energy Trust could commit funds through this effort to projects that do not actually need the assistance and miss the opportunity to assist projects that cannot get done without it.	Mitigate	N
Operational Risks	Energy Trust cannot be construed as a tax advisor.	Avoid	N
Reputation Risks	Care must be taken that Energy Trust not be in a position to pick favorites in competition among highly qualified firms without competitive processes. Even if Energy Trust process is patently fair, it may not be perceived or construed as such.	Mitigate	N
	Energy Trust may lose credibility if referred partners fail to perform.	Mitigate	N
Strategic Risks	Some parties may resist making their interest in development public, compromising the benefits of transparency created by this effort.	Accept	N
	If markets are not responsive or if Energy Trust's help simply reveals additional market barriers, Energy Trust may commit a significant amount of limited staff resources to this effort at the expense of other roles.	Mitigate	Y

In this case, Energy Trust can employ a wider variety of risk management approaches in order to achieve a risk profile that conforms to organizational expectations. Energy Trust is already familiar with these risks through its Trade Ally Network efforts, however, and risk management approaches leveraged in those programs can be transferred to this more expansive effort.

ALLOW BUY-OUT CLAUSES FOR REC PAYMENTS

When Energy Trust negotiates its agreement with the seller, a contract clause would be included to allow the seller to pay a specified amount to be excused from its obligation to deliver renewable energy certificates (RECs, sometimes referred to as Green Tags) under certain conditions. In effect, this would create a price floor for RECs. If the price of RECs were below the price agreed upon with Energy Trust in the contract, the project owner would not pay to terminate the contract.

The key benefits of this type of program focus on the dual function of helping a developer to secure financing while also providing them with the opportunity to earn additional return in the market if it is available. Financial institutions will heavily discount revenue from the sale of RECs in a pro forma unless it is locked in through a fixed price contract, such as those that Energy Trust provides to its partners. As such, Energy Trust's commitment to fund RECs at a minimum price is a critical component to securing financing for these projects, which often cannot show a high enough return without it. At the same time, however, project developers dislike the idea of giving up market upside to lock in those prices; the buy-

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out clause allows a developer to take advantage of that upside in exchange for a payment to Energy Trust that compensates Energy Trust for the opportunity cost of committing its funds to the project.

Table 6 summarizes the risks associated with the REC buy-out clauses and suggests risk management approaches for each of them.

Table 6. Risks Associated with Buy-Out Clauses for RECs

Type of Risk	Risks Associated with Role	Suggested Risk Management Approach	New Risk?
Financial Risks	Energy Trust could commit funds to projects that do not actually need the funding and miss the opportunity to fund projects that cannot get done without it.	Mitigate	N
Operational Risks	Requires a contract specialist that understands the marketplace.	Accept	N
Reputation Risks	Unless the resale of RECs is restricted to Oregon IOUs, utilities may need more RECs at a time when prices are high, thereby increasing costs to ratepayers.	Avoid	Y
	Financial benefits of early Energy Trust purchase of RECs are lost.	Avoid	Y
Strategic Risks	RECs could be sold in California or another market with higher REC prices.	Mitigate	N
	Owners could sell RECs into the Oregon market at higher prices, eliminating the price mitigation benefits to ratepayers.	Mitigate	Y

The reputational and strategic risks inherent to this strategy depend largely on whether there is a price for RECs about which developers are concerned, but which Energy Trust does not expect to occur. If the buyout clause is triggered at a very high price that Energy Trust does not expect to occur, then assurance is only provided for extreme conditions and risks are mitigated. However, if only a low threshold price will move additional transactions, the risk is significantly higher.

Some of the risks associated with this role are new to Energy Trust, because they introduce the risk that the RECs may be re-sold into the Oregon compliance market at higher prices than Energy Trust originally secured. It is likely that these RECs will have a small impact on the overall price paid for RECs to meet the compliance schedule associated with Oregon's renewable portfolio standard (RPS). The projects funded by Energy Trust comprise such a small share of the total RECs needed to meet those targets; the ratepayer risk will be small. However, the risk to Energy Trust's reputation as an effective partner in Oregon's climate strategy may be more significant. Energy Trust can adopt contract clauses that help to mitigate this risk according to the board's risk tolerance and understanding of the legislative mandate.

OFFER FINANCING FOR DEVELOPMENT STAGES: BRIDGE AND CONSTRUCTION FINANCING

Energy Trust can offer low-interest financing during pre-development and construction periods to help bridge the gap between its feasibility assistance and post-construction incentive payments. ***The main benefit is that this approach would address two of the most significant gaps in the marketplace for small hydro and community wind projects.*** These markets are subject to long capital allocation cycles associated with public agencies, which delay project timelines. In the case of biomass project, the bridge financing would leverage capital supplied by the developer, multiplying the effects of the funds immediately. The loans would help to overcome those delays and move projects forward more quickly.

The key risks associated with this type of role are outlined in Table 7.

Table 7. Risks Associated with Bridge and Construction Financing

Type of Risk	Risks Associated with Role	Suggested Risk Management Approach	New Risk?
Financial Risks	Uncollateralized loans leave Energy Trust exposed to major losses.	Mitigate	N
	Significant financial commitment means that Energy Trust cannot fund other efforts to the same extent.	Mitigate	N
Operational Risks	Transfers risk of project failure or delay from developer to Energy Trust if no collateral is held for the loans.	Mitigate	Y
Reputation Risks	If projects fail to materialize, Energy Trust appears to have used ratepayer funds inefficiently.	Mitigate	N
Strategic Risks	Eliminates existing Energy Trust screen for developers to prove their ability to manage the project. (Energy Trust would need to develop other methods to prove developer readiness.)	Mitigate	Y
	Potential overlap with Oregon Department of Energy's energy loan programs (SELP), which also provides financing for construction.	Avoid	N

The key to risk management in this context is to appropriately allocate risks among the interested parties, including establishing appropriate collateral requirements. Energy Trust could plan to limit its share of the project costs to a certain dollar amount and a certain percentage of overall project first costs. It could also assure that the borrower provide collateral in case the project is not finished or the loan is not repaid. This will ensure that the partners have a stake in the project and provide some assurance that the project developer will complete the project.

Another key consideration is the level of funding that this type of effort would require. Construction costs for biomass and small hydro projects can run into millions of dollars. If Energy Trust were to commit to even one project at that level, it would severely undercut the organization's ability to support other technologies. Thus, this option can be made available only for smaller projects (or for a smaller fraction of the cost of larger projects) without eliminating other programs given Energy Trust's current budget.

FACILITATE PROJECT DEVELOPMENT FOR COMMUNITY WIND AND SMALL HYDRO

Through this role, Energy Trust would leverage its networks and familiarity with the project development process to facilitate development of projects that have buy-in from key parties who lack the practical skills needed to bring it to fruition. At a basic level, Energy Trust might organize a series of workshops that outline the steps in the development for parties interested in developing projects. If it were to choose to become more deeply involved in this capacity, Energy Trust might help an interested party self-develop a project, providing resources for permitting, equipment procurement, and construction management. At an extreme level, Energy Trust could develop projects.

The main benefits of this role are its gap-filling capability and its capability to enable those parties that have tangible interest in development. This role complements the matchmaking role described earlier by providing tangible opportunities for collaboration to those interested in owning a project. Further, the project development facilitation role enables the development of good projects that may not otherwise be developed due to the resource owner's lack of expertise or available time. In many cases these parties have access to the capital necessary to build, but are unfamiliar with the process; Energy Trust's knowledge of the industry can serve as a complement.

The primary risks associated with the middle-of-the road role (assisting a party interested in self-developing a project) are laid out in Table 8.

Table 8. Risks Associated with Project Development Facilitation

Type of Risk	Risks Associated with Role	Suggested Risk Management Approach	New Risk?
Financial Risks	Energy Trust could commit funds through this effort to projects that do not actually need the assistance and miss the opportunity to assist projects that cannot get done without it.	Accept	N
Operational Risks	Requires staff with experience in development and extensive network of contacts in relevant industries.	Accept	N
	Requires significant investment of time, which will limit the number of projects able to participate.	Mitigate	N
Reputation Risks	If projects fail to materialize, Energy Trust appears to have used ratepayer funds inefficiently.	Mitigate	N
	May appear to be "picking favorites" by developers whom the Energy Trust believes are less ready.	Mitigate	Y
Strategic Risks	Must find another party that is willing to put up capital.	Accept	N
	Energy Trust builds capacity internally rather than in private sector.	Mitigate	N

The risks associated with this role are familiar, since this role is so closely related to the matchmaking role, which is also related to Energy Trust's Trade Ally Networks. In the basic and intermediate manifestations, it has low capital requirements, but significant time commitments, which compete with other uses of staff members' time. This tradeoff is one with which Energy Trust

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is intimately familiar. If Energy Trust were to go all the way and develop projects, this would be a significant financial and staff commitment.

EXPAND PROGRAM FOR DEMONSTRATING CLOSE-TO-MARKET TECHNOLOGY

New technology is available that may facilitate the deployment of renewable energy projects. Technologies include small-scale geothermal projects with lower temperature conditions than conventional technology, building-integrated PV systems, and small wind systems that have not gotten much traction in the marketplace. Energy Trust could expand its existing demonstration program that showcases close-to-market technologies to include these options.

The main benefit of this early-stage commitment to these technologies is that it is the equivalent of buying an option to invest more significant funds in them in the future. The demonstration provides an opportunity to prove the technologies' ability to function in Oregon-specific conditions. If the technologies function appropriately and meet other tests, Energy Trust would be familiar with the technologies and in a good position to move them into the mainstream. In some cases, it will also foster familiarity with the technologies by the labor force that will be responsible for installing them once they have been proven. This is a critical component of a successful go-to-market strategy.

To date, Energy Trust has invested in two classes of demonstration projects:

- Demonstrations of pre-commercial technology – technologies operated by stable operators and targeted at clear market niches with the potential to generate energy for at least five years that have not yet achieved widespread commercial use; and

- Demonstrations of commercial technology not in common use in Oregon – technologies that meet Energy Trust's definition of "commercial technologies" that are not widely available in Oregon or are not commonly used by a given market segment.

The risks associated with each approach differ significantly due to the stage of development of the technology. Table 9 summarizes the key risks associated with the expansion of the pre-commercial technology demonstration program. Table 10 summarizes the risks associated with an expansion of the demonstration program for technologies not in common use in Oregon.

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Table 9. Risks Associated with Expanding the Demonstration Program for Pre-Commercial Technologies

Type of Risk	Risks Associated with Role	Suggested Risk Management Approach	New Risk?
Financial Risks	Energy Trust would likely need to bear the bulk of financial risk for early projects.	Mitigate	N
	With limited funds, Energy Trust may not be able to invest in a sufficiently diverse portfolio of projects to assure some success, increasing uncertainty of success.	Mitigate	N
	Pre-commercial technologies have a higher failure rate than products that have already reached the market.	Accept	N
Operational Risks	Requires staff with enough technical knowledge and R&D experience to organize a structured process to select appropriate technologies and to manage the projects.	Accept	N
Reputation Risks	Results may not be as expected, leading to questions about the level of due diligence performed.	Mitigate	N
Strategic Risks	For technologies that are still far from market, the market may change dramatically between the demonstration and commercial viability that the development is discontinued.	Mitigate	N
	If technology works, its ultimate success would depend on factors in addition to technical viability (e.g., price point).	Mitigate	N
	Up-front labor costs for some technologies will be high due to the lack of trained labor.	Mitigate	N
	Energy Trust’s funding for such early stage technologies is drowned out by venture capital and private equity funding.	Accept	N

Table 10. Risks Associated with Expanding the Demonstration Program for Commercially Available Technologies Not in Common Use in Oregon

Type of Risk	Risks Associated with Role	Suggested Risk Management Approach	New Risk?
Financial Risks	Energy Trust would likely need to bear the bulk of financial risk for early projects.	Mitigate	N
	With limited funds, Energy Trust may not be able to invest in a sufficiently diverse portfolio of projects to assure some success, increasing uncertainty of success.	Mitigate	N
Operational Risks	Requires staff with enough technical knowledge to select appropriate technologies and to manage the projects.	Accept	N
Reputation Risks	Results may not be as expected, leading to questions about the level of due diligence performed.	Mitigate	N
Strategic Risks	Unclear if technologies would work under Oregonian conditions.	Mitigate	N
	Up-front labor costs for some technologies will be high due to the lack of trained labor.	Mitigate	N

Energy Trust is familiar with most of these risks due to its current experience with demonstrations. Those related to the market-readiness of and the market's response to the technologies are the most prominent and can be addressed in similar ways across technologies. For example, a structured screening process informed by those used in the venture capital and private equity world would provide Energy Trust with a proven framework for technology selection. Additionally, market response can be anticipated by requiring that applicants perform a market assessment prior to applying for Energy Trust funds. As with existing demonstration projects, these demonstrations could be used to reach the well-defined target audience and to engage them on those topics that go beyond the technical issues.

HELP BIOMASS DEVELOPERS EXAMINE THEIR PROJECT FROM THE PERSPECTIVE OF INVESTORS

Energy Trust could build on its staff's financial expertise to analyze project *pro formas* and identify weaknesses in the project economics. The benefits of engaging in such analysis *before* a project developer brings in the financial community include enhancing developers' ability to present viable, well-organized project economics to the funding community. This should reduce the time it takes to identify investors and the amount of time that developers spend chasing after uneconomic or marginal projects. Energy Trust can also leverage this opportunity to communicate with the biomass developer about the range of financial resources available to improve project economics, including Energy Trust funds, and federal and state grants.

The main benefit of this low-capital outreach effort is that it would enable Energy Trust to increase its touch points with both the biomass development and financing communities. These touch points could be used as a feeder to Energy Trust's incentive programs and to the matchmaking efforts. With a better sense of the potential projects, Energy Trust would be able to better serve the investment community in identifying worthwhile projects; this expertise could increase Energy Trust's ability to leverage its own financial commitments to these projects. Together, these efforts would enable Energy Trust to leverage its funds by drawing in funding from other sources to develop promising projects. Energy Trust incurs minimal financial exposure while making a tangible impact on project development.

Table 11 summarizes the risks associated with this approach and the suggested approaches to managing these risks.

Table 11. Risks Associated with Examining Biomass Projects from a Financial Perspective

Type of Risk	Risks Associated with Role	Suggested Risk Management Approach	New Risk?
Financial Risks	Providing investment advice can lead to lawsuits.	Mitigate	N
Operational Risks	Developers may be wary of divulging details of project finances so early in the process.	Accept	N
	New service requires marketing to reach target audience.	Accept	N
	Developers (or interested parties) may bring in an abundance of marginal or poor projects, overloading Energy Trust staff.	Mitigate	N
	Energy Trust's existing financial capabilities are a starting point, but will need to be enhanced with financial sector experience.	Accept	Y
Reputation Risks	If a project fails to secure funding after consultation with Energy Trust, Energy Trust may be blamed even if other market forces are at work.	Transfer	Y
Strategic Risks	Market for investment in biomass can change rapidly.	Accept	N
	Each type of biomass resource (e.g., landfill gas, agricultural waste, woody biomass) involves a different type of financial expertise.	Accept	N

By and large, Energy Trust is familiar with the risks incurred in this type of an effort, but there is one new uncertainty that it must address. Developers will become more dependent on Energy Trust's expertise the earlier that Energy Trust becomes involved in the project. Energy Trust will contribute a significant amount of work on the financial case for these projects. As a result, Energy Trust may be blamed if a project does not qualify for financing. Energy Trust can manage this exposure by building capacity in the developer to make his own choices about viable packages and decision drivers. This will create more up-front work for Energy Trust, but should result in a self-supporting marketplace in time.

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INCREASE CERTAINTY IN THE MARKET FOR BIOMASS FUELS

Similar to the spectrum of matchmaking services that Energy Trust can provide, there is a spectrum of potential roles for enhancing certainty around forest waste/mill residue fuel supplies. At a basic level, Energy Trust can conduct regional fuel assessments to identify potential fuel sources and current demand for them. A more aggressive role would be for Energy Trust to identify areas in which to concentrate urban wood waste or forest waste and secure aggregated supplies of those resources for biomass facilities. These roles would reduce some uncertainty about the sources of fuel, but not about the price of the resources.

The main benefits of this type of role center on Energy Trust's ability to overcome market failures that the private sector cannot. A simple resource assessment is not efficient for a single, private market actor to undertake, because the return of a single project cannot justify the cost of the assessment. Since these are not undertaken, the market has imperfect information about the available resources. Energy Trust can help overcome this imperfect information by supplying a public good that can be used by many developers. If Energy Trust were to go further and invest in concentrating urban wood supplies, it could take advantage of an economy of scale that a single project owner could not. The concentrated wood supply would reduce transportation costs and may create a pocket of plants located close to load, which would help to alleviate long-term transmission issues.

At the same time, there are risks associated with this type of a role. Table 12 presents the risks associated with aggregating biomass supply; Energy Trust is already familiar with the risks associated with resource assessments through its existing activities.

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Table 12. Risks Associated with Aggregating Woody Biomass Fuels

Type of Risk	Risks Associated with Role	Suggested Risk Management Approach	New Risk?
Financial Risks	The deeper Energy Trust is involved in the market for fuel supply, the more it will be exposed to financial loss.	Mitigate	Y
	The price of woody biomass fuel is tightly connected to the price of diesel, which has been highly volatile.	Mitigate	Y
	If the demand for woody biomass fuels declined, Energy Trust may be exposed to financial loss through any contracts that it put in place.	Mitigate	Y
`	Energy Trust's current budget would require strict limits on the amount of fuel that it would be able to supply.	Accept	N
Operational Risks	Assessment and aggregation of fuel supply does not guarantee a fixed price.	Transfer	N
	Energy Trust would need to maintain an updated resource assessment to track changing supply and demand.	Accept	Y
Reputation Risks	If Energy Trust's activities disrupt market functioning for some players, it may be viewed unfavorably.	Mitigate	N
Strategic Risks	Federal access policy to forests may change with new administration and is not predictable – may influence scale of potential market.	Avoid	Y
	The market for woody biomass is subject to many unpredictable market forces; needs of the market can change rapidly.	Mitigate	N

The most significant risks associated with this role are new to Energy Trust. The fuel supply price and federal policy are the greatest uncertainties in this market, and the deeper that Energy Trust becomes involved in that market, the more risk it will assume. Energy Trust will need to establish a boundary for the amount of risk it is willing to accept, which may be tied to the potential return on the investment that Energy Trust makes. That boundary – and Energy Trust's budget – will likely dictate how far along the spectrum of roles Energy Trust is willing to place its bets.

In addition to risk, Energy Trust will need to consider the threshold level of resources that will be required to make a tangible market impact. The relationship between the investment and the amount of impact on the market is not a direct one; it is a stepwise function. A significant upfront investment will need to be made to have any tangible effect on the ability of biomass developers to convince a lender of a reliable fuel supply. Energy Trust will need to characterize the market to quantify how significant that first step is; only then can the organization decide if the investment is realistic given its budget constraints.

Conclusions

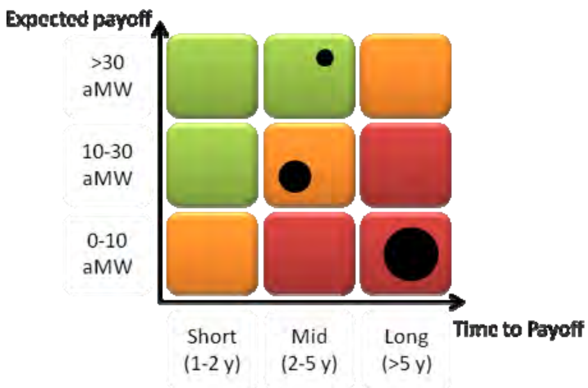
Energy Trust is in the midst of a decision-making process that considers a redefinition of its role in the market for renewable energy in Oregon; this study is only one step along that path. Using a standard framework for assessing each potential role will provide a measure of continuity in the process that will be defined by the change it brings. The framework suggested in this document can be applied under a variety of circumstances, including different visions of Energy Trust's effect on the market during the next strategic planning cycle. The framework must be set in the context of those circumstances, specifically the goals established by Energy Trust's board. This adaptation is not drastic, but it is a precursor to the effective use of the framework.

Risk will be one of the decision factors driving the application of the framework in Energy Trust's decision making process. A fundamental principle that should be applied when examining the risks associated with the roles and the options for managing those risks is this: risk should be allocated to the parties best equipped to handle it. This means that Energy Trust should focus on risk sharing with the right partners, rather than trying to remove all risk from the marketplace. To the extent that risk can be quantified, it will simplify the negotiations over which party will adopt which risks. Using a combination of historic market data, projections about the market's future, and some common sense, Energy Trust and its partners can work together to establish a reasonable approach to strengthening the market for renewable energy projects smaller than 20 MW in Oregon.

APPENDIX A: SAMPLE ROLE PROPOSAL WORKSHEET

ROLE-SPECIFIC CONSIDERATIONS

1. Expected payoff (y-axis in diagram below)
2. Estimated time to payoff (short, mid, long term) (x-axis in diagram below)
3. Estimated resource commitment required (dot in diagram below)
   - Absolute resource requirements: financial ($), staff (number, expertise)
   - Resource commitment relative to overall renewable energy program budget (%): financial, staff
   - Staff competencies required beyond those already maintained at Energy Trust: existing, need to hire, need to contract, cannot obtain at this time



4. Risks to Energy Trust and Risk Management Strategies:

Type of Risk	Risks Associated with Role	Risk Management Approach
Financial Risks		Accept/Mitigate/Transfer/Avoid
Operational Risks		Accept/Mitigate/Transfer/Avoid
Reputation Risks		Accept/Mitigate/Transfer/Avoid

ORGANIZATIONAL CONSIDERATIONS

1. Fit with organizational goals and objectives (as stated in strategic plan or other planning docs)

	Strategic Plan Goal 3	Strategic Plan Goal 4	Strategic Plan Goal 5	Strategic Plan Goal 6
Program 1				
Program 2				
Proposed Role A				

2. Relationship of the proposed role to existing roles:

___Expansion of current role
___New role that fits within current mandate
___New role that requires expanded or new mandate

3. Fit with remaining portfolio of programs:
   - Risks – compare/line up tables from Q2 above
   - Resource commitment – plot data from all activities in matrix above
   - Time to payoff – plot data from all activities in matrix above
   - Potential reward – plot data from all activities in matrix above

EXTERNAL CONSIDERATIONS

1. Strategic risks that can interfere with success

Type of Risk	Risks Associated with Role	Risk Management Approach
Strategic Risks		Accept/Mitigate/Transfer/Avoid

2. Value created by having Energy Trust execute the proposed role (instead of another market actor).

Alternative Actor	Alternative Role	Energy Trust Competitive Advantage

3. Fit with intentions of policy makers

4. Importance of the market barriers addressed relative to other options

	Market Barrier #1	Market Barrier #2	Market Barrier #3
Significance in obstructing market adoption (low/med/hi)			
Energy Trust's ability to address this issue			
Rationale for not addressing			