Renewables Sector and Program Planning Summary

I. Sector Level Summary

A. Executive Summary

Since 2002 the Renewable Energy sector has had great success in advancing renewable energy markets forward and acquiring a total of 100 aMW. Solar has matured to the point where it looks and acts more like an efficiency measure with a manageable level of complexity for the typical homeowner or business. Large scale utility wind is now of similar cost to traditional generation resources and we're no longer needed to encourage its development, utilities are being developers themselves. In between large wind and solar are a whole host of distributed generation renewables with which we've built a strong pipeline through development assistance, handholding and leveraging of other funds.

Now and over the next 5 years there are many external influences at work, changing the market conditions around us including assumptions around which we built our program designs and goals. A competitive or eliminated BETC in particular will increase project above-market costs. With a limited budget, we will need to make some choices as we can't afford to make up for lack of funding from other resources and will have less generation to show for a similar budget. We can't continue to do it all but we need to remain a steady, stable, market development force for key technology areas within our influence. Our main strength is our niche ability to help develop early stage markets through development assistance/education and market delivery channel strengthening (trade ally networks, quality standards, co-product value development).

We plan to highlight our unique role in this industry by focusing less on the short term project acquisition goals and expanding our focus on "soft" long term goals of RE market development such as our ability to lessen regulatory barriers, additional funds we have leveraged, and expansion of available technology solutions we have influenced. We'll continue to set and meet annual generation acquisition goals as an outcome of the early stage work done in years prior. We'll look at new ways to deploy our funding of above market costs and continue to take advantage of other funding sources by building strategies to maximize use of BETC and other resources. Each technology has a market segment opportunity that seems to be "on the verge" of expansion and those areas where Energy Trust can have most impact will be pursued. Along the way, we will bring our stakeholders with us including utilities, OPUC, ODOE and many market specific organizations because without a collaborative effort, development of small scale renewables will continue to be a challenge for all.

B. Sector Vision, Mission and Leadership Statements

Renewable Energy Vision Statement – Oregonians invest in clean energy project development because they value the environmental and long term economic benefits derived from small scale renewable power production and energy savings.

Mission Statement – To catalyze development of small scale renewable energy systems that utilize Oregon's diverse and abundant resources.

Leadership Position - Energy Trust is a trusted and valued partner for Oregonians by providing assistance and funding that helps to build technology markets and install renewable energy projects.

II. Sector Level Generation

A. History

Since 2002, Energy Trust has supported 99.5 aMW of new renewable generation across renewable energy technologies of solar, wind, hydro, geothermal, and biopower. The most significant contribution to the total has been large utility scale wind, counting for 91.1 aMW. Biopower has the next largest contribution at 6.1 aMW followed by solar, hydro, and small wind.

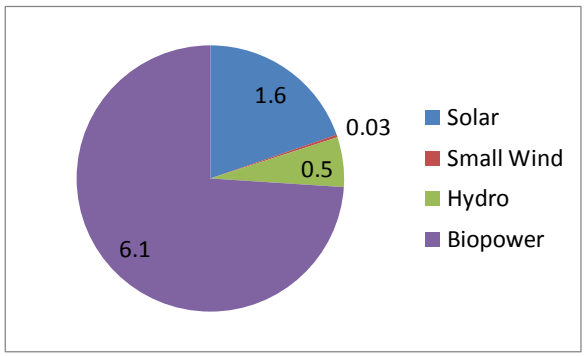

Figure 1: 2002-2009 aMW by technology, not including 91.1 aMW utility scale wind

As of January 1, 2008 with the passage of SB 838, Energy Trust no longer supports large scale projects but focuses only on those 20MW and under.

Installed projects within **biopower** have included target markets of waste water treatment plants, wood products facilities, food processing, dairies and landfills either through 3rd party developers or site owned projects. **Solar** applications are far reaching and have penetrated the residential markets and expanded into commercial with a noticeable bump in 3rd party structures prior to subsiding with the economic downturn and BETC uncertainty. **Small scale wind** has seen limited residential use but steadily increasing commercial interest. Community scale wind projects have shown interest and needed early development assistance but are yet to need an Energy Trust incentive. **Geothermal** just made the record books with the first low temperature installation in the state at OIT with a few more city projects under discussion and **Hydro** to date has installed projects with residents, ranches, irrigation districts, cities and has established a pipeline for more of the same.

B. Market Opportunity

Sector-wide, significant small scale renewable development potential remains. The technical potential for solar is nearly limitless, with one 2008 NREL study estimating 6,300 MW rooftop capacity. Each of the technologies has significant technical development potential; ~ 300MW for small wind and biopower, 50-1000MW geothermal

and 300+ MW hydropower. Oregon has a significant supply of renewable resources; the challenge is in finding economically viable projects and motivating and supporting project champions to develop them.

Over the next 5 years the expected range of developable opportunity is shown in Table 1 with key generation areas and uncertainties which may impact development of these resources described below.

Table 1. 5yr generation by technology

	Generation aMW				
	Low	High	$M/aW	$M, Avg aMW at avg $	Avg Gen
Wind	4.65	7.5	$1.45-$2M/aMW	10.45	6.08
Hydro	5	10	$0.5-$1.5M/aMW	5.63	7.50
Geothermal	2	8	$0.4-$0.8M/aMW	4.20	5.00
Biopower	7.5	10	$0.5-1.5M/aMW	8.75	8.75
Solar	2	4	$10.3M/aMW	30.84	3.00
RE TOTAL	21.15	39.5		59.86	30.33

Wind

The ideal resource for wind project development lies in the Columbia Gorge and Southeast Oregon with the coast resource restricted by permitting regulations. Customer segments for wind are **community scale** (developers and large land owners), **mid scale** (large on-site energy users such as processing facilities, cold storage and large farms), and **small scale** (rural small business and agricultural producers). The biggest opportunities for generation are community wind projects which have the most cost effective size range, and Energy Trust's incentive money for these projects is the lowest cost per aMW. For a community wind project to go forward, federal and state tax credits, turbine availability, and financing availability have to line up. Community wind is also the riskiest and the most difficult type of project to bring to completion, especially with uncertainty in tax credits. Therefore, the other target markets are important for the portfolio.

The mid scale market seems to be most on the verge of expanding development. Of most challenge to this segment is the limited choice in turbines, high cost and somewhat narrow applicability. Small scale remains high cost for small businesses and reduction of other resources will have an impact.

Hydro

In-conduit **irrigation district** projects are the top target priorities for the hydro program with opportunities for canal piping projects that can potentially save water and energy as well as generate electricity. The relative cost per kWh can result in highly viable projects. Irrigation districts are experienced with hydro applications and large capital project undertakings. They are motivated to develop projects by benefits beyond revenues of electricity sales such as water savings, making contributions toward sustainability goals, becoming energy independent and reducing pumping energy usage. Uncertainty of tax credits, permitting timelines and high capital costs (mostly driven by location factors

influencing piping and interconnection) will likely be the largest barriers to their development.

Municipalities have opportunities for projects at the sites of pressure reduction valves, but these are typically smaller projects. **Residential and/or ranch-scale** conduit projects or green-field projects on natural waterways are also smaller projects. Neither of these customers is significantly targeted due to project cost and complexity relative to generation, but the customers may participate in the program. Energy Trust plans to continue to be reactive to these segments while focusing on irrigation districts in the short term.

Geothermal

Low temperature units at existing wells in Southern, Central and Eastern Oregon show most promise for this sector. **Communities and property owners** with existing wells and planning small projects are our primary market. Removing the need to drill improves a project's economics considerably. In addition, projects that can make use of both heat and power have better economics than projects that produce electricity alone.

Uncertainties for these projects coming to fruition include availability of additional funds, market conditions in California becoming more favorable than supplying the Oregon grid, and wells not meeting temperature or flow requirements as expected.

Biopower

Opportunities in Biopower span across five market segments. **Wastewater treatment** plants continue to show potential for anaerobic digester system development (and co-digestion expansion) based on their interest in the co-products available from the project (i.e. energy independence, reduced energy costs and sustainability goals). There is also limited ARRA funding available for this sector, which is hoped to boost activity in the short term. Challenges include staffing and capital resource constraints in municipalities and lack of solid co-digestion supply markets to make the case for expansion. **Dairy** opportunities lie with a short term opportunity due to existing control and regulatory responsibility to manage feed stocks. The trend for dairies is in co-digestion with significant potential, beyond WWTP opportunity. Uncertainty surrounds the development model – while 3rd party structures have worked, landowner attempts have not been as successful.

Food processors are another opportunity with existing experience in digesters but cost drivers are still falling short for aggressive development. Largely driven towards renewable development by sustainability requirements and marketing claims, this segment is currently heavily focused on efficiency improvements through NWFPA, and are just at the beginning of the learning curve for renewable power generation. **Municipal solid waste** regulatory goals to divert organics from landfills and the benefits of integrating biogas plants into composting processes are driving this segment. If feed stocks can be controlled and managed, there is real opportunity the main uncertainty if lack of business models, experience, and regulatory support for developing this segment. Finally, **forest products**, as the most well established and largest biopower sector with mature CHP applications has large technical potential but the large capital costs and lack of feedstock stability continue to hurt its development. This sector could

develop one or two 10MW+ facilities in the next 5 years or not develop at all, it's the most difficult to forecast.

Solar

Nearly every building in PGE and Pacific Power territory is a candidate for solar. **Homeowners** are especially strong candidates for solar. They generally can all benefit from tax credits, they all use electricity, and their home will continue to exist for decades to come. To reach homeowners the offer must be simple and affordable. The community bulk purchase initiatives are effecting rapid change now, but also represent the opportunity for dramatically increased awareness and future high density installations in a local area. How homeowners respond to the feed-in –tariff will become much clearer over the next few months but remains uncertain now.

Contractors have been successful at selling to **businesses and commercial property owners** emphasizing reduction in ongoing operating cost, a reasonable ROI and the ability to demonstrate green values to customers. If the third party ownership model does not remain viable with the BETC, up front financing for businesses will become a more significant barrier for the program to address. Engaging employees of businesses to participate in Energy Trust programs presents additional savings/generation opportunities.

The **public sector** represents approximately 25% of Oregon's commercial building floor space, and has responded strongly to the third party financing model. Without third party support, this sector is unlikely to afford solar since the majority of incentives are in the form of tax credits they cannot receive or employ the feed in tariff. However, federal stimulus funding may present future opportunities for public sector investment in solar.

The **agricultural** sector has opportunity for growth, with many success stories to point to. Select contractors are targeting this market through direct sales and via influencers such as accountants. Changes to net metering rules may be required to allow farms to serve all their electrical loads with one solar installation.

RE Sector

Combined, the technology specific opportunities translate into forecasted continued growth of 19.5 – 37.3aMW assuming a 2.5% increase to annual revenues and no major to change to external assumptions such as the BETC. The majority of the generation will be attributed to biopower and hydro development.

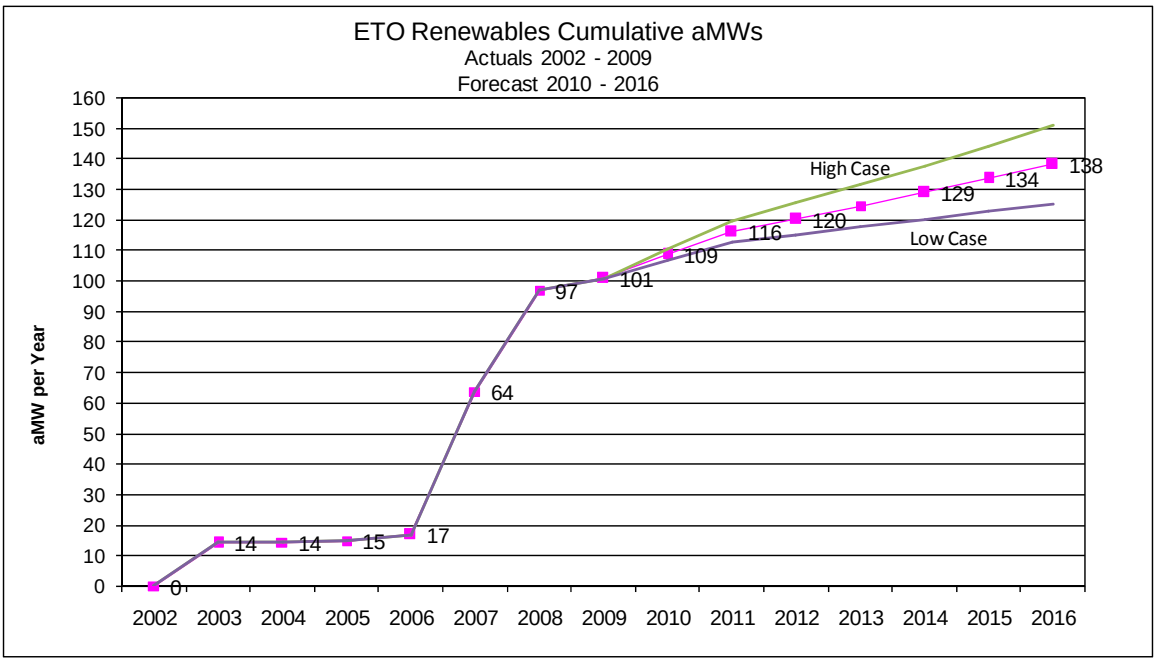

Figure 2: RE Sector forecasted generation

Each technology seems to have at least one target segment for opportunity that is just "on the verge" of rapid expansion once the early stage for the market is past the proofing stage. Seeing our role as the catalyst by which these early ideas can get moving sooner than they would have without our assistance, there is great opportunity for Energy Trust to create change.

III. Sector Level Strategies

A. Areas of Focus and Targeted Market Segments

Sector wide, four strategic themes describe our focus areas for the next 5 years which will guide our actions towards meeting goals.

1. **In the short term (1-1.5yr), continue to support a portfolio of programs for a variety of resources and technologies, focusing on distributed generation of 20 MW and less.** Energy Trust will continue to fund the full range of commercially available renewable technologies (solar, wind, biopower, hydropower, and geothermal) primarily through project incentives and cost-share funding for a range of development assistance. As we work through pipeline development with a competitive and uncertain BETC along with other market challenges that impact all technologies, we will revisit this plan, knowing at some point we may not be able to do it all with a steady budget and may need to make choices in the technologies and markets we support.

2. **Go further upstream in the project cycle to support project development.** Much of the non utility scale resource potential lies with customers whose core missions are not energy-related. These customers are initially unfamiliar with financing, developing and operating energy projects. Energy Trust has provided services to such customers in the past. We expect demand for these services to increase in the next five years, requiring us to shift our role even more towards

market development. Our access to expertise and our status as a neutral party gives us a unique ability to to serve this niche need. To better define and communicate our progress in the role as market developers, we'll add new "softer" goals with less of an emphasis on short term generation acquisition.

- Continue to build a network of project development technical assistance services for as interconnection, power purchase agreements, permitting, financing, resource assessment, and other project needs.
- Address technical and capital barriers to successful project completion by providing educational, technical and financial resources.
- Use Energy Trust's earned reputation as a neutral party to help market players such as lenders understand renewable power projects and application of tax credits and other available incentives to the project proforma through workshops and similar outreach to tax and finance professionals.
- Lend our energy policy and technical expertise in support of lessening regulatory barriers to development.

3. **Expand market opportunities.**
   Developing renewable energy markets is a long term goal – expanding our reach into new areas begins this long term process producing benefits that may materialize past the 5 year span. Although seemingly counter to a possible short term need to make choices in what we support, finding new opportunities within existing technologies and markets we have yet to uncover may be more fruitful than existing targets and provide more results with limited budget.

4. **Design for funding plateau**
   We have been successful in building a larger pipeline of projects during the past few years and winnowing down budget carryover from earlier years. Our funding is not expected to increase beyond utility load and rate increase projections. As we reach a point where we will need to address the newer problem of not being able to fund every project we would like, we need to remain relevant to the renewable energy markets with less annual funding and greater above market costs to cover. Shifting greater focus to these areas will allow us to continue to have impact, even as funding decreases;

   - Leveraging the efforts of organizations that work with our clients
   - Continuing to partner with organizations on educational events, aggregation of projects, and other innovative program delivery methods
   - Assisting project developers in securing additional sources of funding by becoming a clearinghouse of knowledge for applicable financing options and state, local and federal support for public and private projects.
   - Exploring new ways of deploying our above market cost incentives such as loans or guarantees

Each program has identified key activities which tie to the four RE themes just described and are designed to advance market segment opportunities. Table 2 summarizes these key activities.

Table 2. Key Activities by Technology

Technology	Key activities	Link to sector strategy
Wind	• Evaluate support for community wind • Identify and target agricultural sectors for net metered mid scale systems • Expand support for small wind- grant writing, site assessments, reliability standards, wind map validation, etc	May need to make choices and evaluating support needs is part of this, which technologies and sectors can benefit most from our assistance? Going further upstream
Hydropower	• Pipeline building of irrigation district projects with relationship development, feasibility studies and tech assistance • Streamline small project support	Expanding market – identifying new resource potential Support all technologies and segments as able
Geothermal	• Identify and target existing well owners for low temperature market • Provide feasibility funding, grant writing and technical assistance	Expanding market – identifying new resource potential Go further upstream in development
Biopower	• Wastewater treatment plant market development – support and disseminate study information and coordinate feedstock supplies and other common needs • Document benefits of biogas plants at food processing facilities – work with regulatory agencies to address challenges of waste stream movement of co-digestion • Support expanded organics diversion for municipal solid waste • Continue outreach to forest products and find ways to help reduce volatility of feedstock market	Go further upstream in development “ “ Expanding market – identifying new resource potential Support all technologies and segments as able

Solar	• Grow demand by addressing barriers of value, complexity, reliability, financing, etc • Ensure quality installations with QA and training • Support policy development • Adjust program design to declining budget – reduce incentives, leverage other funding, innovate delivery structures • Promote EE program participation with direct communications and trade ally training • Help utilities gain solar experience- shift capacity requirements earlier than otherwise	Go further upstream " " " " Design for funding plateau " " Go further upstream in development

Today, we have enough funding to be able to support the market development activities for each technology and to provide significant project incentives ranging typically from 10-30% of installed project cost. As market opportunities arise in one technology we can shift incentive funds to move projects without sacrificing the development strategies building for all technologies. In the future, if BETC or other resources projects receive today are not available we'll have to make choices.

Dedicating no more than 50% of the budget to one technology has been a policy to date. As funding conditions change, several questions will come up that will need to be addressed. Here are some examples:

- Should we continue to dedicate no more than 50% of our budget to one technology?
- Some resources show more short term potential for project installations (biopower and hydro) than others (geothermal and some wind markets). Do these projects also need less incentive from us to move their project forward?

As we learn more about how BETC changes are impacting the market this year, we'll be better positioned to answer these questions and make choices.

B. Challenges and Barriers

Major issues can be sorted into three categories: BETC uncertainty, opportunity vs. funding imbalance, and adaptation of policies to evolving markets.

1. Business Energy Tax Credit (BETC) modifications

Energy Trust's renewable energy programs are structured on the assumption that projects' above-market costs will be reduced by a variety of incentives including federal tax credits and Oregon's BETC. Recent changes in BETC have called this assumption into question: funding for BETC is now capped and under new temporary rules, the number of projects to be funded is limited and also competitive. In addition, BETC itself is set to sunset in 2012 and may or may not be extended after that date. A capped and competitive BETC has potentially significant implications for Energy Trust's renewable

energy program. If projects are not able to secure BETCs, Energy Trust would expect above-market costs to increase more than three-fold.

These changes will likely impact on our ability to meet 2010 goals. We estimate that in 2010 about 1 aMW of the conservative goal of 4.1 aMW is at risk. Effects in 2011 are likely to be more dramatic because few of our Tier 2 and 3 pipeline projects are pre-certified for BETC. We estimate that 4.5 aMW of our efforts are at risk. Among the effects we may see:

- Projects that delay their development schedules to take advantage of BETC review processes;
- Larger incentives required to make up for the lack of BETC, reducing the number of projects Energy Trust can fund; In some cases, we may be unable to make up for the lack of BETC;
- Projects that had no above-market costs with BETC will have above-market costs without BETC, resulting in new project opportunities for Energy Trust.

Energy Trust sees two viable responses. These include proactively negotiating incentives assuming BETC for projects with a good chance of success; if budget allows, we would adjust incentives for projects that do not land a BETC; and continue to provide technical assistance to move markets. The second response would be to align our project choices with those of the state's competitive process, by first funding projects that get a BETC. We recognize that this may be at the expense of our strategy to support a mix of technologies and markets, but this approach would maximize the generation we can achieve within the limits of BETC and Energy Trust funds.

We plan to pursue a combination of the first and second options, with an emphasis on proactively supporting projects that will advance our strategic market development goals. This approach is likely to do the best job of producing renewable energy, growing renewable energy markets, and maintaining a steady presence in the marketplace. It also would allow us to actively help projects satisfy BETC criteria, and we can reassess our approach as BETC developments unfold.

Although we considered holding some funds back and reacting to BETC changes as they unfold in 2011, we do not see this strategy as a viable option because we need to stay open for business. If we put funding decisions on hold while changes settle out, all of our programs will be affected. We need to continue evaluating projects, building a pipeline and committing dollars to projects.

As we adjust to the changes to the BETC, we expect to see several changes in our daily work program execution and planning:

- We need to recognize the evolving BETC criteria and make contingency plans:
- Staff will develop two budgets this fall to allow for different BETC scenarios.
- In the case of projects where we can compensate for a lack of a BETC, staff will develop a contingency offer that will include a higher incentive amount.
- For projects with larger above-market costs where we cannot compensate for a BETC, we will be unable to fund the project. Government-sponsored projects with poorer economics may fall into this category.
- If projects cease to be viable without a BETC, we may need to rethink our strategy of supporting a mix of technologies.
- Similarly, we may need to lower our generation goals.

Finally, we plan this summer and fall to hold broader conversations with stakeholders to reassess how to support small-medium renewable development.

2. Opportunity vs. funding imbalance

The issue of imbalance between utility funding availability and resource opportunity has been evident since Energy Trust's inception. PGE territory provides more than half the funding for renewable programs but has limited natural resource ability. Solar is abundant but geothermal, hydro and some biopower and wind applications are mostly found in rural areas of Pacific Power territory. Keeping incentives higher in PGE territory helps provide more encouragement for development, and limiting outreach and marketing in Pacific territory has helped manage demand. The program budgets also follow where the resources are. For example, solar is funded more than 60% PGE allowing the other programs to use more of the Pacific budget than direct funding share. These measures help somewhat but we currently have a large carryover of PGE funds from canceled/delayed projects and will need to consider short term ideas for moving funding out sooner. An RFP for large scale solar, special deals with deadlines and working with PGE on their acquisition goals for their voluntary customers are under consideration.

In addition to the utility funding imbalance with opportunity, the most popular program, solar, will see budget reductions across both utilities over the next few years. As the sector budget begins to more closely match the amount of annual revenue as carryover is spent down over the years, and we adhere to budgeting no more than 50% of the total budget to any one technology, the solar program plans to redesign services and incentives. How many projects opt for the feed in tariff compared to Energy Trust programs will be revealed this summer, possibly taking some of the demand off of our budget.

3. Adaption of policies and regulations to evolving markets

As renewables become a more accepted, regular segment of our energy equation, the policies used to encourage their development also need to transform. This is most relevant with Renewable Energy Credits (RECs) The REC market is divided into two segments; compliance and voluntary. Utilities plan to meet their RPS goals in the short term with projects that do not have an above market cost, large scale wind is now on par with traditional resource costs. Currently there is really no compliance market since both utilities can meet the requirements with existing or planned low cost resources. The voluntary market is for new projects not contributing towards the RPS and is a lightly traded market currently. Energy Trust holds RECs for rate payer value, attributing RECs towards the utility RPS compliance where stakeholders feel Energy Trust directly provides value. Project owners see REC value in two ways, either as a new revenue stream or as their access to be able to make environmental claims and meet sustainability goals. Since a large portion of the markets we find we are best suited to assist fit more directly into the voluntary market wishing to meet sustainability goals, we often run in to conflict.

As both REC markets continue to develop, we'll stay engaged in understanding the customer perspective and ratepayer value to guide whether we need to recommend policy changes.

Feed in tariff development assistance, avoided cost methodology and interconnection regulations also fall into this issue category. Removing or lessening market and regulatory barriers as possible will continue to be a main focus over the next five years.

IV. Sector Level Summary

The renewable energy sector is in the process of redefining itself with the changing small-medium scale renewable energy markets. To date we've provided early technical assistance and project incentives across technologies. The focus of our goals has been on short term project acquisition and incentives. We've been successful but see the market dynamics changing and the need for our role to adapt.

Over the next five years, we plan to continue to catalyze the development of small scale renewables by more clearly defining our role as market developers. No other organization is providing the combination of early development education, outreach, market delivery network creation, QA and policy support we are able to provide. These services are critical to moving a market forward where many players are inexperienced but willing early adopters. A check at the end is not enough to drive change. Quantifying the value of these services to long term renewable energy development for ratepayers is a large part of our strategy as is being willing to re-evaluate which markets we support because with limited funding, we can't do it all.

For some of the major unknowns in our strategic plan we can shed light by testing new product ideas (construction financing, bulk purchase delivery, etc.) and performing additional market analysis. For others, such as BETC uncertainty, it will take time working with the modified program to learn how best to adapt and ultimately the 2011 session outcome will answer many questions.