

Western Regional Biomass Energy program

FINAL REPORT

**Green Power Marketing/Outreach Support for the Lake Tahoe
Biopower Program**



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McNeil Technologies Project # 1173-000

Project Name: Green Power Marketing/Outreach Support for the Lake Tahoe Biopower Program

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Project Summary

Green Power Marketing/Outreach Support for the Lake Tahoe Biopower Program

Research Funded by: U.S. Department of Energy (DOE), Office of Fuels Development and Office of Biopower and Hydropower Technologies

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Contract Funding:	WRBEP	\$39,950
	Cash Match	\$0
	In-Kind	\$68,642
	Total Match	\$68,642

Description: This project conducted technical assistance and outreach to support the marketing of green power produced from forest thinning residues from the Lake Tahoe Basin.

Primary Tasks:

1. Develop a marketing plan for the Tahoe Green Power Program
2. Conduct outreach to environmental groups and document their attitudes towards the project; enlist the support of the USFS to facilitate biomass supply
3. Develop cross-marketing promotions for selling the green power
4. Modify the existing Tahoe Green Power Program website
5. Assist with marketing Tahoe Green Power to customers
6. Final Report

Mid-way through the project, all work on tasks 1-3 and 5 was suspended and the following new tasks were added as a replacement:

- Research and Report on the potential for Tahoe Green Power to be sold through Green Tags
- Explore and document the potential to sell Tahoe Green Power into Nevada under the renewable portfolio standard
- As appropriate, facilitate the supply of biomass from the Basin. Contact at least one forest thinning contractor to document their experiences working in the Lake Tahoe Basin

Abstract

The goal of the work effort was to provide marketing and education/outreach support to the Tahoe Green Power Program (TGPP). The TGPP sought to sell green power that was generated using biomass from forest restoration efforts in the Lake Tahoe Basin. The power would be marketed as “Tahoe Green Power” at a premium to customers in California’s deregulated energy market. The original scope of the project was modified due to the energy crisis and the collapse of retail green power markets in California in 2000 and 2001. As a result, several new tasks were added to the project including an analysis of the potential to sell Green Tags from biomass power, an assessment of opportunities for biomass in Nevada due to the state’s Renewable Portfolio Standards and a discussion of the logistics and economics involved with collecting forest biomass from the Basin.

Keywords: Biomass, biomass energy, green power, renewable energy, forest health, Green Tags, Lake Tahoe, biopower,

Acknowledgments

The U.S. Department of Energy, Western Regional Biomass Energy Program funded this study. At WRBEP, Mr. Bruce Hauschild and Mr. Jeff Graef provided oversight and management of the project. The authors would like to thank them for their support and flexibility, especially for their understanding when the original objectives of the project needed to change in response to changing conditions in the California power markets.

Two initial partners were involved in this project and provided cost-sharing: Clean ‘n Green (which became Go Green.com) and Wheelabrator Martell. Mr. Richard Kohl from Go-Green was an enthusiastic partner who developed the initial marketing materials and marketing plan. Mr. William Carlson of Wheelabrator provided insights into the California biomass power industry as well as information on the logistics and challenges associated with using forest biomass as a fuel source for a green power program.

The authors wish to thank several people and organizations for their efforts in support of this project. At Wheelabrator, Mr. Jim Burke provided invaluable information on California biomass fuel markets, including detailed information on fuel costs, transportation, procurement logistics and contractual issues associated with obtaining biomass from U.S. Forest Service lands. Mr. Ken Keddington, formerly of Tenderland Power, stepped in and offered his support for the project after Go-Green had to file for bankruptcy in the late Fall of 2000 because of the collapse of the California green power markets.

Mr. Dave McNeil of the Nevada State Office of Energy has been a long-term supporter of biomass energy efforts in Nevada and the Lake Tahoe Basin. His support and vision are appreciated, and he has been at the forefront of innovative efforts to develop new energy markets for the forest biomass produced from fuels reduction efforts in the Tahoe Basin.

Finally, despite our best efforts at editing and revisions, mistakes may still remain within this document. Any mistakes or omissions are the sole responsibility of the authors. Any questions or comments should be addressed to McNeil Technologies Inc., 143 Union Blvd., Suite 900, Lakewood, CO 80228. McNeil staff who worked on this project included Scott Haase, Tim Rooney and Jill Tietjen.

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EXECUTIVE SUMMARY

The purpose of the project was to support the creation and development of the Tahoe Green Power Program (TGPP). The idea behind the TGPP was to sell green power that was generated using biomass produced from fuels reduction and forest restoration efforts in the Lake Tahoe Basin. The power would be marketed and sold as “Tahoe Green Power” at a premium to customers in California. Wheelabrator Martell and Go-Green.com were the original partners on the project.

The overall goal of the effort was to assist Go-Green.com with the development and marketing of the Tahoe Green Power Program. The original tasks were to:

1. Develop a revised and expanded marketing plan for Tahoe Green Power to increase awareness of forest health issues and the benefits of biomass power.
2. Obtain the support of environmental groups and the public via outreach and education.
3. Devise and pursue cross-marketing promotions for businesses in the Lake Tahoe region.
4. Update the program website.
5. Assist with marketing the Tahoe Green Power to federal agencies, residential utility customers, non-profit groups and businesses.

The partners conducted a significant amount of work on the original tasks. In December of 2000, Go-Green was forced into bankruptcy due to the California energy crisis. In March of 2001, Tenderland Power Company (Tenderland) became the new marketing partner on the project. In September of 2001, the California PUC suspended retail access in California and all customers who had switched their utility providers were returned to their traditional utility. This meant that there was no longer an opportunity for independent energy service providers such as Tenderland to sell green power to retail customers.

All work was suspended on the project and WRBEP re-defined the tasks as noted above. Efforts on all tasks except the website were suspended. The website (Task 4) would become a general bioenergy website to support information exchange on biomass related activities in the Tahoe Basin and surrounding region. Three new Tasks were added:

1. Research and report on the potential for Tahoe Green Power to be sold through Green Tags.
2. Explore and document the potential to sell Tahoe Green Power to Nevada under the state’s Renewable Portfolio Standard.
3. As appropriate, facilitate the supply of biomass from the Basin, and contact at least one forest thinning contractor to document their experiences working in the Lake Tahoe Basin.

Results

This project documents the complex issues surrounding biomass power markets, thinning on public lands, the link between improved forest health and biomass power, biomass fuel supply logistics, economics of biomass power production and the potential for Green Tags.

The problem of excess vegetation on Basin lands has not gone away since this project started in August of 2000. The authors believe that the underlying rationale for developing the Tahoe Green Power Program still exists. The main barriers to using Basin biomass for energy now are:

- Retail access in California has been suspended;
- Wholesale electricity prices are lower than the costs of production of biopower;
- Biomass from the Lake Tahoe Basin is more expensive than biomass from other regions due to environmental regulations;
- Green Tags are a newly developing market mechanism, but forest thinnings are not included as an eligible resource from which tradable renewable certificates (TRCs) can be produced; and,
- The Wheelabrator Martell plant has been shut down so there are not any current biomass generators located within a reasonable haul distance of the Basin.

The barriers are mitigated somewhat by the Renewable Portfolio Standards that have been passed in both California and Nevada. The RPS legislation will provide some incentives for project development in each state, but the projects must still be economic.

There is potential in both states to develop new infrastructure that can use biomass as the fuel supply if the economics can be supported. Before investing in this infrastructure, investors and government need to be sure that raw material will be available for the period of time required to recover the capital. The USFS has recently obtained approval to develop and implement stewardship contracting mechanisms, which should help meet this requirement.

For biomass projects to succeed, investors must also be ensured that there is a set of project economics that will support the investment of this capital with a fair return and relatively low risk. If biomass energy is to serve as a potential outlet for forest biomass, it is clear that there is a need for some kind of market credit to help overcome the price disparity between the costs of production and the potential revenue from sales of electricity. The costs of biomass power are in the range of 1 to 4 cents/kWh over current wholesale market rates.

Potential credits include Green Tags, a production tax credit, or a biomass fuel credit. Biomass Green Tags could offer some incentives, but by themselves will not be sufficient to improve the economics. The market for green tags is just developing, and wholesale average prices are about 1 cent/kWh. If power could be produced using Basin biomass, selling the tags should be possible.

A production tax credit could be accomplished by expanding the Section 45 tax credit to include all biomass resources instead of only biomass grown exclusively for energy production (closed loop biomass). The credit would provide for an inflation-adjusted 1.5 cents/kWh for electricity generated from biomass. This is the same credit that the wind generators now receive. Congress is considering expanding this credit to biomass through the current energy bill.

Another potential credit, contained in the President's Healthy Forest Initiative, would provide a \$20/green ton credit to generators who convert forest biomass to electricity or fuel.

1 INTRODUCTION

1.1 Purpose

The purpose of the project was to provide marketing and education/outreach support to the Tahoe Green Power Program (TGPP). The TGPP sought to sell green power that was generated using biomass from forest restoration efforts in the Lake Tahoe Basin. The power would be marketed as “Tahoe Green Power” at a premium to customers in California.

1.2 Project Need

By the summer of 2000, considerable momentum was underway towards the development of the Tahoe Green Power Program. Both WRBEP and the Nevada State Office of Energy had supported earlier projects aimed at laying the groundwork for the program.¹ California power markets had been deregulated in 1998, and customers were permitted to choose from whom they wished to purchase their electricity. Customers could either continue to subscribe to traditional "bundled service" from their existing utility, or select direct retail access service from another electric service provider (ESP). ESPs could be either independent power marketers or other electric utilities. Customers who chose retail access could have their energy provided by an ESP while their transmission and distribution services would be provided by their traditional utility. The business model is similar to the long distance telephone market, where the local phone company maintains the wires but long distance service can be provided by any one of multiple companies. Several companies, Go-Green included, saw an opportunity to sell renewable power to environmentally-minded consumers and businesses. These green power marketers bought renewable power on the wholesale market, aggregated customers, and then re-sold the power to their direct access customers. Some traditional utilities also offered green power programs.

From the biomass supply perspective, the need for the TGPP was driven by several events, including concerns over wildfire and forest health in the Basin, the continued decline of Lake Tahoe's water clarity, and air quality problems associated with open burning of biomass generated from forestry operations.

Land managers embarked on fuels reduction and thinning programs in order to reduce the threat and impact of wildfires in the Basin. This thinning is expensive and results in large quantities of biomass that have few if any market outlets besides energy. Most of this biomass is piled and burned. The rationale behind the project was to market and sell Tahoe Green Power as a discrete renewable energy product to government, residential and commercial customers at a premium price. The premium would be used to help offset the high cost of biomass fuel resulting from forest thinning and fuels reduction operations.

In early 2000, Wheelabrator Martell (an existing 18 MW biomass power plant located in Jackson, California) had signed a Letter of Intent to act as the generating partner. Go-Green had agreed to buy the power and market it to retail customers in both the public and private sector. A preliminary website and brochure had been developed for the Program. Selling green power in

¹ Nevada Tahoe Conservation District. *Development of a Green Power Program Using Biomass from the Lake Tahoe Basin*, February 2000. Available on-line at <http://www.westbioenergy.org/tahoe/>

support of ecosystem restoration efforts was a novel concept, and biomass-based power is expensive relative to other retail green power offerings. Additional support for the TGPP was required to assist Go-Green and Wheelabrator with obtaining biomass from the Lake Tahoe Basin, developing publicity materials and the marketing message, marketing the product, educating the public about biomass energy and forest health, and locating customers for the product. WRBEP support was obtained to help with the start-up phases of the Program.

1.3 Project Team

McNeil Technologies, Inc. conducted the primary work on the project. At McNeil, Scott Haase was the project manager. He was responsible for interacting with the partners and developing information for several sections of the report, and was the primary author of the final report. Tim Rooney and Jill Tietjen provided technical support and analysis.

The partners on the project were Wheelabrator Martell, and Go-Green.com. Tenderland Power was added as a partner midway through the project after Go-Green was forced into bankruptcy when the energy crisis hit California in the summer and fall of 2000. At Wheelabrator, Bill Carlson provided support and insights into California's wholesale power markets, and contributed information on the economics of producing biomass power from forest thinnings. That information is included in this report in Section 6.5 and Section 7. He also was responsible for negotiating the relationship and power sales contract between Wheelabrator and Go-Green. Jim Burke, Wheelabrator's fuel supply manager, provided information on biomass fuel costs and procurement logistics from the Basin.

Rick Kohl from Go-Green was the overall manager for the effort to develop the program, market the power and obtain customers. After Go-Green dropped out of the project, Ken Keddington from Tenderland Power agreed to act as a new marketing partner. Tenderland was interested in developing small biomass plants using forest thinnings as the fuel source and then selling the power in the wholesale markets. After about a year, Tenderland dropped out of the project when they decided to focus on their core business of developing wind power.

1.4 Goals and Objectives

The overall goal of the project was to assist Wheelabrator and Go-Green with the development and marketing of the Tahoe Green Power Program. The original tasks/objectives of the project were to:

1. Develop a revised and expanded marketing plan to increase awareness of forest health issues and the benefits of biomass power.
2. Obtain the support of environmental groups and the public via outreach and education.
3. Devise and pursue cross-marketing promotions for businesses in the Lake Tahoe region that would allow businesses to offer product or service discounts in exchange for purchasing Biopower.
4. Update the preliminary program website.

6. Assist with marketing the biopower to federal agencies, residential utility customers, non-profit groups and businesses.
7. Document the results through a final report.

As explained in Section 1.5, the original scope of work for the project was modified due to the impacts of the California energy crisis. In the fall of 2001, work on several tasks was suspended and three additional tasks were added.

1.5 Summary of Activities Performed

The team started off following the original scope of work, seeking to accomplish the original goals and objectives of the project as described in Section 1.4. Go-Green developed the final marketing plan, had corporate sponsors lined up, and was in the process of developing brochures and other marketing materials to expand their retail green power product to include Tahoe Green Power. They had conducted a targeted mailing to 100 high-profile companies (e.g. Wells Fargo, REI, Raley's Grocery Stores) in an attempt to sign them up as customers. Wheelabrator had obtained several loads of biomass from the Basin as a test to measure the costs and logistics of procuring fuel from the Basin. McNeil was assisting Go-Green with developing marketing materials and identifying potential program sponsors. For example, Heavenly Valley Ski Resort was going to be a sponsor and offer a free lift ticket for Tahoe Green Power customers. McNeil was also locating potential customers, meeting with environmental groups, and updating the website.

In December of 2000, Go-Green was forced into bankruptcy due to the California energy crisis. This was caused by the rising market prices of wholesale power in the California market, coupled with the rate freeze on residential energy rates that was imposed by California regulators when the power markets deregulated. Go-Green had been successful in obtaining thousands of paying green power customers in California prior to the power markets collapsing. These customers had signed up to buy renewable green power, at a fixed rate, over a period of time. To obtain the power for these customers, Go-Green was buying power through a combination of long-term fixed price contracts as well as spot market purchases of renewable energy on the wholesale power markets. When California's wholesale power prices surged in the summer and fall of 2000, Go-Green was forced to pay exorbitant prices on the spot market to meet their customer's needs. Since their customers were on fixed rates, Go-Green was not able to pass the higher costs of power purchase on to its customers. Go-Green quickly exhausted its line of credit, and by late 2000, the company went out of business.

In March of 2001, the project partners approached Tenderland Power Company (Tenderland) as a potential new marketing partner on the project. Tenderland is located in Truckee, California, just north of the Basin. Tenderland owns and operates over 100 MW of wind power plants in southern California, and in early 2001, it was looking to add biomass to its power mix in order to have access to steady, base-load power. Tenderland's strategy was to own and operate the renewable generation, and then sell the power directly to the end-use customer in California. Tenderland was a vertically integrated energy service provider (ESP), controlling renewable generation, buying green power on the wholesale market and then selling the power to end-users at the retail level. At the time, Tenderland was the only ESP capable of producing and retailing renewable electric energy in the state of California. For this reason, Tenderland kept its retail

customers longer than Go-Green. Since Tenderland owned most of the generation that supplied its customers, it was not as impacted by the wholesale power price increases as was Go-Green.

In addition to being interested in purchasing Biopower from Wheelabrator, Tenderland wanted to explore the longer-term feasibility (2-3 years out) of building a small biomass power plant (5-10 MW) in a location much closer to the Basin (Truckee for example). This would significantly reduce the biomass transportation costs, provide a local outlet for the material, create local jobs, and hopefully create local support for biomass energy. Because Tenderland is located near the Tahoe Basin, it wanted to work with the local utility (Truckee- Donner Public Utility District (TDPUD)) to integrate Biopower into the utility's portfolio, and work with TDPUD to sell green power to the local customers.

For the next six months, McNeil worked with Tenderland and Wheelabrator to revive the program and restructure it for the changing conditions in California. However, on September 20, 2001, the California Public Utilities Commission (PUC) voted to suspend retail access for California electricity customers. This effectively killed the market for third party green power marketing in the state. The state suspended most provisions of deregulation and sought to stabilize wholesale power markets by capping prices and requiring all customers who had opted for retail access to return to their utility.

With the PUC's suspension of the retail access provisions, customers could no longer purchase green power from ESPs. The retail green power market collapsed, and green power customers were returned to bundled service with their previous local utility company. The market mechanism under which the TGPP could be implemented collapsed. Based on the results of the PUC decision, Tenderland Power decided that it could no longer be the retail partner of the TGPP and dropped its support for the effort.

Based on these events, WRBEP modified the project's scope of work. Efforts on Tasks 1-3 and 5 were suspended. The website (Task 4) would be modified to be a general bioenergy website to support information exchange on biomass related activities in the Tahoe Basin and surrounding region. Three new Tasks were added:

1. Research and report on the potential for Tahoe Green Power to be sold through Green Tags.
2. Explore and document the potential to sell Tahoe Green Power to Nevada under the state's Renewable Portfolio Standard.
3. As appropriate, facilitate the supply of biomass from the Basin, and contact at least one forest thinning contractor to document their experiences working in the Lake Tahoe Basin.

The results of these tasks are documented in Section 6 of this report.

2 MARKETING PLAN FOR THE TAHOE GREEN POWER PROGRAM

2.1 Task Objective

The objective of this task was to finalize a plan to market Tahoe Biopower and increase awareness of forest health issues. The primary market sectors to be targeted included government agencies, residential utility customers, non-profit groups and businesses. The team sought to develop specific target markets and customers, create a work plan for implementing the program, delineate team members' work responsibilities, finalize timeframes, clarify the types of promotional materials and messages to be developed, and define approaches for implementation.

2.1.1 Changes to the Task

Work on this task was suspended as documented in Section 1.5.

2.2 Activities/Methodology

McNeil and Go-Green developed a marketing plan for the Tahoe Green Power Program. The plan represents the approach that Go-Green was going to use to market the product in California. The marketing plan is reproduced in its entirety in Appendix A.

The plan may be useful as a template for other entities interested in developing a forest biomass green power program.

3 OUTREACH TO ENVIRONMENTAL GROUPS, US FOREST SERVICE AND STATE LAND MANAGEMENT AGENCIES

3.1 Task Objective

The objective of this task was to meet with key environmental groups and land management agencies in the Basin, discuss the program with them, and obtain their endorsement and support for the program. The meetings sought to educate these groups about the benefits and role of biomass green power within the larger context of forest health restoration efforts in the Lake Tahoe region.

3.1.1 Changes to the Task

Work on this task was suspended as documented in Section 1.5.

3.2 Activities/Methodology

McNeil contacted a variety of environmental groups and government forestry agencies that operate in the Lake Tahoe Basin to gauge their support for and concerns about the development of biomass power markets in the Basin. The League to Save Lake Tahoe was the primary focus for environmental groups, since it is the single most influential environmental organization in the Basin. The results of the outreach effort are summarized below.

3.2.1 Environmental groups

3.2.1.1 League to Save Lake Tahoe

In 2001, McNeil staff met with John Paul Harries and Dan Sussman at the League to Save Lake Tahoe (The League) – South Shore Office (Address: 955 Emerald Bay Road S. Lake Tahoe, CA 96150 Phone: 530-541-5388 E-mail: Jon Paul Harries – jonpaul@keoptahoebblue.org Dan Sussman – dan@keoptahoebblue.org). Outreach efforts included distributing information and making a presentation to the League’s staff members.

One observation that Jon Paul Harries made was that the U.S. Forest Service in the Basin sometimes runs into budgetary constraints that prevent it from being able to promptly conduct site clean up and slash pile burning at forest management sites. In general, the League’s staff expressed support for the development of green power and a local biomass industry. It supports efforts that can provide markets for small diameter materials insofar as it might reduce slash piles and smoke from prescribed burning associated with existing fuels reduction activities. Regarding the potential issues that might affect the siting of such a facility, air quality was the most likely to be a factor. In particular, Washoe County has stricter air regulations than other counties due to air quality issues in Reno, Nevada.

The League staff, however, made it clear that they do not want the fuel needs of a biomass power plant to drive forest management policy and thinning efforts in the Basin. The League does not have a problem with thinning and mechanical treatment so long as commercial logging does not become the over-riding objective of such forest health restoration programs. The League is opposed to cutting any trees that are over 30 inches in diameter.

3.2.1.2 Nature Conservancy – Northern Sierra Project

Contact: Director Jim Gaither, Truckee, California Phone: 415-777-0487.

In a telephone conversation in November 2001, Mr. Gaither explained that his specific expertise is in the conservation and protection of meadow habitat on private land in the Northern Meadows that is at risk of loss through development and subdivision. His efforts focus on land acquisition. He does not work directly on forest conservation and management issues, and there is no Nature Conservancy representative focusing on forest management issues in the Tahoe area. In general, the position of the California chapter of the Nature Conservancy is to take a non-confrontational approach to political issues, and so he was not able to provide specific support for biomass power market development in the Tahoe area. However, he mentioned that nationally the Nature Conservancy supports forest management tools that can improve old-growth characteristics and other forest ecosystem benefits, including the appropriate application of mechanical thinning and prescribed burn treatments.

3.2.1.3 The Sierra Club - Tahoe Area

Contacts: Michael Donahoe (e-mail: donahoe5@home.com) or Stephanie Heller (e-mail: mountain_grrrl@hotmail.com) Web: <http://www.tahoicons.ca.gov>.

McNeil attempted to contact representatives from this organization several times. They did not respond messages so their attitudes were not documented.

3.2.1.4 The Sierra Nevada Alliance

Contact: Phil Chang Address: PO Box 7989 South Lake Tahoe, CA 96158 Phone: 530 542 4546
E-mail: sna@sierranevadaalliance.org Web: www.sierranevadaalliance.org.

This group is primarily an umbrella/advocacy group and does not focus on forest management or forest restoration issues in the Basin. Representatives did not offer an opinion on the TGPP.

3.2.2 U.S. Forest Service

The TGPP team met with representatives from the U.S. Forest Service, Nevada Division of Forestry, California Division of Forestry, the Lake Tahoe regional fire chiefs association, Truckee-Tahoe Disposal Company, Nevada Tahoe Conservation District, and others. Participants from the TGPP team were Scott Haase, McNeil Technologies and Ken Keddington, Tenderland Power Company.

The purpose of the meeting was to discuss the TGPP and the National Fire Plan (being administered by the U.S. Forest Service). Representatives from the land management agencies were familiar with the TGPP and stated their support for the concept. They did however state that their main objective is to implement wildfire threat reduction projects on their land, and they are supportive of any efforts to reduce the costs by developing new market outlets for the biomass. They stated that the agencies would not be able to sign any document that formally endorses the TGPP, as they are not allowed to officially endorse any project that may be seen to

benefit a private company such as Tenderland. The agencies did state that they are willing to work with the partners to document their planned projects, estimate biomass supply that will be available in the Basin, and to identify opportunities to reduce the cost of biomass collection.

3.2.3 Truckee-Donner Public Utility District

The TGPP team conducted a meeting with TDPUD in March 2001. Participants in the meeting were: Scott Haase, McNeil Technologies; Ken Keddington, Tenderland Power Company; Scott Terrell, TDPUD.

TDPUD serves the area immediately north of the Basin, and it also serves some customers in North Lake Tahoe. The purpose of the meeting was to discuss the TGPP and determine whether TDPUD would be interested in offering a green pricing program to its local customers. Although TDPUD is interested in the concept, it could not offer a green program to their customers. At the time, TDPUD had an “all requirements” power purchase agreement with the Western Area Power Administration (WAPA) and Idaho Power, and thus the utility was not contractually allowed to purchase power from other providers. Portions of this agreement expired in 2003. TDPUD was interested in exploring the development of a medium-sized biomass plant in its territory. McNeil, Tenderland and TDPUD agreed to further explore this concept.

4 DEVELOP CROSS MARKETING PROMOTIONS FOR BIOPOWER

4.1 Task Objective

The objective of this task was to investigate and set up cross marketing promotions for biopower through resorts and environmentally conscious businesses in the Lake Tahoe Basin. When this project was conceptualized, businesses in the Basin could not participate in the TGPP by purchasing biopower because Sierra Pacific Power Company (the local utility) was not subject to the deregulation of California's power markets. The cross-marketing promotions offered businesses in the Basin a way to support the program by offering TGPP participant discounts on goods and services. Examples of promotional bonuses include discounts on ski tickets and hotel stays.

4.1.1 Changes to Task

Work on this task was suspended as documented in Section 1.5.

4.2 Activities/Methodology

Go-Green had initiated contact with several companies. Heavenly Valley Ski Resort was committed as a partner, and they were going to offer discount lift tickets to purchasers of Tahoe Green Power. Raley's Grocery Stores (a large chain in northern California) was going to display information on the program at kiosks in their stores. The National Arbor Day Foundation had agreed to provide each TGPP customer with a one-year membership and to plant a tree in his or her name. Go-Green was pursuing additional arrangements with casinos and other businesses in the Basin.

5 WEBSITE IMPROVEMENTS

5.1 Task Objective

The objective of this task was to modify, as necessary, the draft TGPP website that was developed with Nevada State Office of Energy (NSOE) funding in 1999. The original TGPP website included an information request form and links to local conservation and government sites. The website was to be integrated with Go-Green's Internet site and include information on cross-marketing promotions implemented to help recruit biopower customers. Links to out-of-Basin partners were also to be included.

5.1.1 Changes

The original intent of this task was no longer valid once retail access was suspended in California. After Go-Green went out of business, the NSOE deactivated their TGPP website. Midway through the project, the objective for the website was changed. The new objective was to get the NSOE Internet link up and running again, and to improve Tenderland Power Company's Web site as it pertained to the TGPP. When Tenderland withdrew from the project, that portion of the work was suspended. The message of the websites was refocused to concentrate on public education and outreach. All references to the model of selling green power through a third party retail marketer at a premium were removed.

5.2 Activities/Methodology

McNeil staff, in consultation with staff from the NSOE updated the content of the website. The html coding for the website was provided to the NSOE. The website can be accessed through the home page of the NSOE at the following address: <http://energy.state.nv.us/>. As of the date of this report, the site is not yet active. NSOE expects to activate the site in September 2003.

The site provides general information on forest health, biomass energy, and wildfire mitigation. Printouts of the pages from the new website are shown in Appendix B.

6 BIOPOWER DEVELOPMENT AND MARKETING

6.1 Task Objective

The task objective was to assist Go-Green with the actual marketing of the Tahoe Green Power product. The following subtasks were planned:

1. Develop revised promotional and product materials for the Lake Tahoe biopower product, such as bumper stickers, brochures and public service announcements.
2. Incorporate the TGPP product into Go-Green's on-going marketing efforts using the profile and customer subset developed in Task 1.
3. Develop materials in electronic formats for businesses to adapt and use in Biopower cross marketing promotions.
4. Contact target markets that have a vested interest in protecting Lake Tahoe (e.g., federal agencies, California land agencies (CDF), outdoor companies, etc.).
5. Assist Wheelabrator Martell in negotiating agreements with suppliers of forest thinning residues from the Lake Tahoe Basin, in negotiating power sales agreements with energy service companies to serve retail customers, and related activities to develop biomass power supply and delivery.

6.1.1 Changes to the Task

This task included five subtasks in the original Contract. The work activities on the first four subtasks were suspended in August 2001. The fifth subtask was to work on and assist Wheelabrator Martell, Inc. in negotiating agreements with suppliers of forest thinning residues from the Lake Tahoe Basin and related activities to develop biomass supply and power delivery mechanisms. The market environments in the Lake Tahoe area became much more complex making this task more difficult. Work was to continue on the fifth subtask to the extent that potential partners are willing to cooperate.

The following three subtasks were added to the contract:

Subtask 6 - Research and report on the potential for Tahoe Green Power to be sold through "Green Tags" transactions. Document the concept of Green Tags, develop background information on the transaction process, and evaluate and report on the potential of selling tags for Lake Tahoe green power.

Subtask 7 - Explore and document the opportunities to sell Tahoe Green Power into Nevada under the requirements of the Renewable Portfolio Standard (RPS) that was recently enacted in Nevada. Examine, evaluate, summarize, and report on the terms of the Nevada RPS and conduct preliminary discussions with Sierra Pacific Power Company (a Nevada utility company) to determine how they plan to meet the RPS and whether there are any opportunities to cooperate with the utility on biomass power projects.

Subtask 8 - Continue efforts to develop a reliable, cost-effective source of biomass from the Basin and to connect such a fuel source with a potential power generator. Wheelabrator Martell, Inc. will be approached to implement a pilot power project using Lake Tahoe Basin biomass fuel. Contact at least one biomass chipping operator who has done work in the Lake Tahoe Basin and determine the firm's perspective on the process of working with Lake Tahoe Basin land management agencies.

6.2 Activities/Methodology

Go-Green and Wheelabrator Martell were in the process of negotiating a power purchase contract when Go-Green was forced to shutdown. Go-Green wanted to keep the price for power in the 5-7 cents/kWh range. Development of promotional materials such as brochures and bumper stickers was not implemented. A draft brochure was created in 2000 under funding provided by the Nevada State Energy Office.

McNeil staff initiated the process of working with the Wheelabrator fuel supply manager and the land management agencies to identify materials that could have been brought to the plant under the TGPP. McNeil was working with Wheelabrator and the US Forest Service to determine the logistics and costs of biomass processing, staging and transportation.

The results of subtasks 6 through 8 are provided in the following sections.

6.3 Green Tags

Renewable energy can be sold to retail customers through two primary mechanisms. These are:

- Utility green pricing programs; and
- Green Tags, also called renewable energy certificates or tradable renewable certificates.

Utility green pricing programs are offered by some utilities and enable consumers to purchase electricity from renewable resources directly through their local utility. Green pricing is an option that allows utility customers to voluntarily support a greater level of investment in renewable energy technologies. Through green pricing, participating customers pay a premium on their electric bill to cover the extra cost of the renewable energy. More than 80 utilities have either implemented or announced plans to offer a green pricing option.

A consumer buying green power through a utility green pricing program is buying both the electricity and the environmental attributes. The electricity provides the functionality to power lights and appliances, and the "green-ness" allows the consumer to support the generation of electricity from renewable, sustainable sources. Green pricing programs ask a subset of utility customers to fund a public good through voluntary contributions, rather than through public policy measures.

With green pricing transactions, the green power is delivered into the transmission system, where it is intermingled with all other power being transmitted and distributed. Utilities transport the power and deliver it to the customers. The environmental attributes associated with the green power source are, in effect, hitching a ride with the electricity as it is transmitted and distributed to the customer. The utility charges its green pricing customers more, e.g., 10 ¢/kWh instead of 8

¢/kWh, to support the actual costs of purchasing power generated using renewable resources. In practice, the electricity flowing into the green power customer's home is no different from that flowing into any other home. The premium that the green power customer is paying doesn't make the power green, but makes part of the mix of power that goes into the entire system green.²

“**Green Tags**” are created when a grid connected renewable energy facility generates power. Green Tags are certificates that represent the environmental attributes or benefits associated with electricity generation from new renewable technologies. When a renewable energy site produces electricity that enters the grid, or offsets grid power, the electricity can be unbundled from the "green" attributes of that electricity. Those green attributes are quantified as Green Tags. Thus there are two distinct quantities formed--the electricity which enters the grid, and the Green Tags from that electricity.

Green Tags are used to assign a value to the environmental benefits of renewable energy. This value arises from offsetting electricity generated from fossil fuels, such as coal or natural gas. The renewable electricity takes the place of non-green power that would otherwise have been generated and delivered to the power grid. The green tag also represents the fact that the renewable energy was generated with better emissions, or pollution characteristics, than normal electricity.

The idea behind Green Tags is that the renewable attributes are associated with, but can be sold separately from, the electricity generated from renewable resources. The electricity is consumed on-site or sold in the conventional power market (via net metering or through a utility power purchase agreement) without accounting for its environmental attributes. The generating facility can no longer make environmental claims for this power because the green tag now represents the entire package of environmental benefits associated with these specific megawatt hours. For example, a biomass power facility at a lumber mill that has sold its Green Tags may not claim to be “renewable powered.” However, it could use language describing itself as “hosting a renewable energy facility.”³

The Green Tags are sold separately to electricity service providers (wholesale) or consumers (retail) who wish to “green” their energy supplies. Purchasing Green Tags does not affect the consumer's traditional electric bill. Consumers continue to receive their electricity bill from their existing provider. That bill includes the cost of conventional electricity only. The consumer who buys Green Tags is billed separately for the renewable attributes. With Green Tags, the consumer is buying both electricity and ‘green-ness’ – but is buying them separately. The tag is purchased from a renewable generator or a third party marketer. Green Tags can be sold anywhere and are not restricted by geography or tied to the utility that is serving a particular territory. In other words, a generator in California could sell Green Tags to a buyer located in Illinois, or any other state.

² Bonneville Environmental Foundation, “Summary Description of BEF's Green Tag Product” October 2000.

³ www.mainstayenergy.com

The difference between traditional green pricing transactions and green tag transactions has to do with the accounting and tracking mechanisms of the green attributes themselves. With green tag transactions, the electricity is generated and delivered to the transmission system, and the utility still takes power from the system and distributes it to the customers. The Green Tags are sold as a separate commodity directly to a customer. With green pricing, the customer buys “green power” from the local utility in a bundled format. In both cases, the customer ends up with the same reliability and power quality – and the same environmental benefits – but acquires them in different ways. Table 6-1 shows the differences between green power and Green Tags.

Table 6-1. Green Power vs. Green Tags from Consumer Perspective

Green Pricing	Green Tags
Purchase from utility or power marketer	Purchased from a certified marketer, anyone who owns Green Tags. Anyone may purchase, regardless of geographic location.
Only available in some regions	Available anywhere
One transaction	Multiple transactions (energy on one bill; tags on another)
Premium determined by market. Expected range of 1/2 - 4¢/kWh	
Green premium MAY go to new renewables	Green tag premium DOES go to new renewables
Energy and green attributes paid on same bill	Energy bill unchanged. Green premium billed by wholesaler.

6.3.1 Tradable Renewable Certificates

The Center for Resource Solutions (CRS) has developed national standards for certifying and selling Green Tags. CRS calls these certified Green Tags “Tradable Renewable Certificates,” or TRCs. CRS’ guidelines can be found on line at http://www.green-e.org/pdf/trc_standard.pdf. TRCs are created when electricity is generated using renewable energy. Each TRC purchased covers a unique mega-watt hour (MWh) of electricity, generated from renewable sources. The certificate represents all of the environmental attributes or benefits of a specific quantity of renewable generation. The premium value of TRCs compensates for the extra costs associated with generating green electricity, leveling the playing field for green energy to compete with conventional types of energy production and creating revenue for green providers.

CRS also runs the Green-e program, which certifies that renewable electricity meets certain standards. Green-e has served since 1997 as a nationally recognized tool to help consumers identify environmentally superior renewable energy offerings. To earn Green-e certification, TRCs must originate from 100% new renewable facilities that generate energy from renewable sources. Once certified as new, the facility can sell TRCs throughout its lifetime. Certified TRC providers must agree to abide by the Green-e Code of Conduct and to submit its marketing materials to CRS to meet Green-e disclosure and truth-in advertising requirements.⁴ There are other requirements that are intended to avoid double counting of the benefits.

According to the CRS standards, any on-grid customer sited facility is eligible to sell its Green Tags as long as it is using an eligible resource and the system is metered if it is over 10 kW in capacity. The main goal of the standards is to make sure that if the TRCs are sold, they are

⁴ “Green-e Certifies First ‘Green Tag’ Product and Plans National Press Conference,” www.eere.energy.gov/greenpower/0402_regen_pr.html, accessed May 27, 2003. More information available at www.resource-solutions.org or www.green-e.org.

registered as having been sold, and therefore can only be sold to one party at a time. The minimum quantity of TRCs that can be sold is 150 kWh.

The market for TRCs is in the early stages of development, and range from ½ cent/kWh to 2.5 cents/kWh. The primary buyers of Green Tags right now include government agencies, environmental groups, businesses that wish to improve their public image, and utilities that need to meet state-mandated Renewable Portfolio Standards. Marketers and brokers also purchase Green Tags and then resell them to various retail level utility customers. The Western Area Power Administration is currently aggregating federal customers who may be interested in purchasing Green Tags. The contact at WAPA who is overseeing this effort is Mike Cowan. He can be reached at 720-962-7245.

A number of major issues associated with TRCs must still be resolved in the U.S. before TRCs will enjoy widespread acceptance. These issues include: standardization of definitions, information, rules, and processes; resolving property rights and other legal questions; and, development of market structures to encourage capital investment.

6.3.1.1 TRCs and Forest Biomass

Presently, CRS does NOT consider the electricity resulting from forest biomass as an eligible resource to produce TRCs. In early 2003, McNeil staff participated in a conference call with the U.S. Forest Service and CRS. The purpose of the call was to discuss why electricity produced from biomass from forest thinning/wildfire mitigation programs is not eligible to be certified as green power. The main reason stated by CRS staff is that most of the environmental groups on their advisory board are opposed to including forest thinnings.

One of the reasons for this opposition is that the groups wish to prevent the inclusion of forest biomass from non-sustainable forest management practices (primarily clear cutting) in fuel supplies for biomass energy facilities. However, many proponents of forest management recognize that there is a real difference between some timber harvesting operations and forest stewardship activities that are conducted for a variety of objectives including hazardous fuels mitigation and forest stand density reduction. Sustainable forestry guidelines and chain-of-custody tracking applied to wood products can also be applied to biomass energy feedstocks, and can help encourage biomass utilization. This would be a significant boon to the recognition of biomass by a broader constituency as a viable renewable energy resource for fuels and electricity.

This lack of recognition of forest biomass as an eligible renewable energy resource under CRS' guidelines for Green Tags transactions is a major barrier.

6.3.2 The Role of Green Tags

Green Tags have begun to be used in the U.S. in response to the evolution of both electricity and air pollution emission markets. The initial role for Green Tags is that of a tracking and verification mechanism in conjunction with RPS programs such as that being implemented in the state of Nevada (see Section 6.4 for a discussion of the Nevada RPS).

The second role for Green Tags, being a tradable commodity, is just beginning to be recognized in the U.S. Pacific Gas and Electric's (PG&E) National Energy Group is selling Green Tags from its New York wind farm throughout the northeast region. The Los Angeles Department of Water and Power is selling Green Tags to whoever is interested. Some companies are beginning to offer renewable energy certificates to retail consumers in states that do not otherwise have renewable energy facilities.

Green Tags are also being used by a few organizations (e.g., the Bonneville Environmental Foundation (BEF), the Climate Neutral Network (CNN), and Businesses for Social Responsibility) that work with business and industry to reduce their environmental footprint. In these examples, greenhouse gas offsets are being purchased (through Green Tags) to reduce a company's net global carbon impact. At this time, the use of Green Tags incorporates a patchwork of rules, processes, and terminology. With the exception of a few state RPS rule-making proceedings, green tag development in the U.S. can be characterized as being in an ad hoc, "learn by doing" mode.

BEF has been endorsing green power to utilities, government agencies, and businesses since 1998. BEF has completed transactions involving the sale of some 23 MW of green power working with the Bonneville Power Administration (BPA) and other suppliers, and supporting environmental groups. In May 2000, BEF announced its first green tag sale, to the EPA Region 10 office. The CO₂ emissions and other environmental effects of 25 percent of EPA's regional electricity use will be offset with BEF Green Tags.⁵

Table 6-2 provides a partial list of companies in the U.S. that are Green-e certified green tag providers. These providers, particularly Sterling Planet, may be a good source of information regarding selling Green Tags.

⁵ Bonneville Environmental Foundation, "Summary Description of BEF's Green Tag Product" October 2000.

Table 6-2. Partial List of Green-e Certified TRC Providers

Certificate Marketer	Contact website	Product Name	Renewable Resources	Location of Renewable Resources	Residential Price Premiums^a	Certification
3 Phases Energy Services	http://www.3phases.com/	Green Certificates	New wind	Nationwide	2.0¢/kWh	Green-e
Aquila, Inc.	http://www.theenergyteam.com/	Aquila Green (non-residential only)	New wind	Kansas	N/A	Green-e
Bonneville Environmental Foundation	http://www.greentagsusa.org/	Green Tags	99% new wind, up to 1% new solar	Washington, Oregon, Wyoming	2.0¢/kWh	Green-e
Community Energy	http://www.newwindenergy.com/	New Wind Energy	New wind	New York, Pennsylvania, West Virginia	2.5¢/kWh	Green-e
EAD Environmental	http://www.eadenvironmental.com/					
Maine Interfaith Power & Light		Green Tags (supplied by BEF)	99% new wind, up to 1% new solar	Washington, Oregon, Wyoming	2.0¢/kWh	Green-e
Mainstay Energy	http://www.mainstayenergy.com/	Mainstay Rewards	All	Nationwide		Green-e
<i>NativeEnergy</i>	http://www.nativeenergy.com/	<i>WindBuilders</i>	New wind	South Dakota	\$60-\$120 annual membership	

Table 6-2 Continued

<i>NativeEnergy</i>	http://www.nativeenergy.com/	Vermont <i>CookHome</i> (residential only)	New biomass (dairy farm methane) and new wind	Vermont (biomass), South Dakota (wind)	\$6/month or \$60/year	
PG&E National Energy Group	http://www.purewind.net/	Pure Wind Certificates	New wind	New York	4.0¢/kWh	
Renewable Choice Energy	http://www.renewablechoice.com/	American Wind	New wind	Nationwide	2.5¢/kWh	Green-e
Sterling Planet	http://www.sterlingplanet.com/	Green America	15% geothermal, 5% low- impact hydro, 5% solar (all new)	Nationwide	1.6¢/kWh on average	Green-e
Sun Power Electric Corporation	http://www.sunpower.org/	ReGen (available in New England only)	99% new landfill gas, 1% new solar	Massachusetts, Rhode Island	3.6¢/kWh	Green-e
Waverly Light & Power	http://www.waverlyvia.com/tags.htm	Iowa Energy Tags	Wind	Iowa	2.0¢/kWh	
Notes: ^a Large users may be able to negotiate price premiums. This is the price they sell their tags for. Purchase price from generators will be lower. N/A = Not available						

6.4 Evaluate Potential for Power Sales to Nevada under Nevada Renewable Portfolio Standard

Renewable Portfolio Standards (RPS) are generally established by state legislatures, often as part of electric utility restructuring, and require that a minimum amount of renewable energy be included in the portfolio of electricity resources of the state's utilities. The RPS is designed to be competitively neutral, in that it imposes an equal obligation on any company selling electricity in the state. The requirement is a tradable obligation, so that one company with more than the required amount of renewable energy could sell credits to a company with a portfolio deficient in renewable resources. Most of the states that have enacted an RPS have done so to encourage in-state power generation and some states have done so to protect existing electricity generators. In addition, these states want to ensure diversity in the fuel mix and encourage environmentally benign methods of generating electricity. States that have enacted RPS legislation include Arizona, California, Connecticut, Hawaii, Maine, Massachusetts, Nevada, New Jersey, Pennsylvania, Texas, and Wisconsin. Generally, the amount of renewables required starts at a smaller level and increases over time toward a goal established by the enabling legislation.⁶

On June 8, 2001, Nevada Governor Kenny Guinn signed SB 372. The law requires that 15 percent of all electricity generated in Nevada be derived from new renewables by the year 2013. This requirement is phased in with a five percent requirement in 2003, seven percent in 2005, nine percent in 2007, eleven percent in 2009, thirteen percent in 2011, and reaches the total of a 15 percent in 2013. Not less than 5 percent of the renewable energy must be generated from solar renewable energy systems. The law permits the Nevada Public Utilities Commission to develop a trading mechanism for renewable energy credits for the state's utilities. Penalties for failure to comply include revocation of the retailer's license to sell electricity in the state.⁷ Electricity produced from biomass, including forest thinnings, is included as an eligible resource for meeting the RPS.

The Nevada Public Utilities Commission (PUC) implemented temporary regulations on November 20, 2002 that allow energy providers to buy and sell renewable energy credits (RECs). One REC represents one kWh of electricity generated from a renewable energy resource. RECs are valid for a period of five years. After the 2003 legislative session, the PUC will need to adopt the regulations once again in order for them to become a permanent regulation in the Nevada Administrative Code.⁸

⁶ "Renewable Portfolio Standards," www.newrules.org/electricity/rps.html, accessed May 27, 2003. "Renewable Portfolio Standards (RPS)," www.eere.energy.gov/state_energy/policy_content.cfm?policyid=27, accessed May 28, 2003.

⁷ "Nevada's Renewable Portfolio Standard," www.newrules.org/electricity/rpsnv.html, accessed May 27, 2003. "Renewable Portfolio Standard (RPS)," www.eere.energy.gov/state_energy/policy_content.cfm?policyid=27, accessed May 28, 2003.

⁸ "Nevada Incentives for Renewable Energy: Renewable Portfolio Standard," www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=Nv01R&state=N..., accessed May 28, 2003. The contact for the state is provided as: Diana Howard, Office of the Governor, Nevada State Office of Energy, 727 Fairview Drive, Suite F, Carson City, NV 89701, 775-687-5975, fax 775-687-4909, dhoward@dbi.state.nv.us and web site: <http://energy.state.nv.us>

On September 12, 2002, Governor Gray Davis signed a bill (SB 1078) requiring California to generate 20 percent of its electricity from renewable energy no later than 2017. The 20 percent standard is the most stringent RPS to date in the United States. The new law requires sellers of electricity at retail to increase their use of renewable energy by 1 percent per year. Since California already generates about 10 percent of its electricity consumption by renewables, the new law will nearly double the state's existing base of wind, geothermal, biomass and solar energy resources. Under the bill, the California Energy Commission is required to certify eligible renewable resources, to design and implement an accounting system to verify compliance with the RPS, and to allocate and award supplemental energy payments to cover above-market costs of renewable energy.⁹

6.4.1 Interest of Sierra Pacific Power Company

Sierra Pacific Power Company (SPPC) (which serves customers in Nevada) plans to issue a Request for Proposals (RFP) in July 2003 seeking renewable energy to help it comply with the renewable resource levels required under the Nevada RPS. As of May 28, 2003, SPPC was still determining the level of resources that would be requested under the RFP. The RFP will be emailed and interested parties need to ensure that they have contacted SPPC in order to be put on the bidders list. Renewable facilities (including biomass) will be considered in the RFP process if it connects directly to the SPPC system. SPPC will have no price components that will be added to any bid in a proposal submitted in response to this RFP, and SPPC will offer no subsidies to any bidder.¹⁰

SPPC has a few customers in California. However, SPPC indicated in a telephone conversation with McNeil personnel that to date it has not participated in competition or deregulation in California and does not believe that it will need to comply with the new California RPS.¹¹

6.5 Facilitate Biomass Supply

In March of 2001, the project team had a meeting in Jackson, California at the Wheelabrator Martell plant. Participants were Scott Haase, McNeil Technologies; Ken Keddington, Tenderland Power Company; Jim Burke, Fuel Supply Manager, Wheelabrator Martell; and Mike Burt, Plant Manager, Wheelabrator Martell.

The plant is about 90 miles from South Lake Tahoe, and about 130 miles from Minden, Nevada. Minden has been proposed as a staging area where smaller loads of biomass can be stored until a quantity large enough to fill a chip van is collected. Wheelabrator would then have the material transported to its plant on a back-haul arrangement.

⁹ "Renewable Portfolio Standards," www.newrules.org/electricity/rps.html. "Renewable Energy Portfolio Standard – California," www.newrules.org/electricity/rpsca.html, accessed May 27, 2003.

¹⁰ Telephone conversation with Colin Duncan, SPPC, May 28, 2003. To get on the list for the RFP (which will be issued electronically), individuals should email nzunino@sppc.com and provide their name, company, type of project, email address for receipt of RFP, and phone number.

¹¹ Telephone conversation with Colin Duncan, SPPC, May 28, 2003.

Wheelabrator expressed their continued interest in the TGPP, but said that the situation in California at the time made green power difficult to sell. Wheelabrator was selling all of its power on the spot market, using Enron as a broker. The prices received (on paper anyway) were significantly higher than the 5-7 cents/kWh that Go-Green had discussed with them. However, like many generators in California, Wheelabrator was having problems with getting paid in a timely manner for its power. Wheelabrator said it might be interested in signing a longer-term contract for selling some of its power at a reduced rate as a hedge against market changes.

Wheelabrator expressed frustration with the U.S. Forest Service (USFS) in the Basin due to poorly structured contracts and excessive bureaucracy in providing access to supply. Another major challenge to using forest residue as a fuel source is that the state of California created a \$20/delivered ton credit for diverting urban wood waste from landfills. This credit is a strong incentive for the facility to use as much urban wood waste as possible, which reduces its need for forest biomass.

Wheelabrator wanted to conduct a test transaction to see how the TGPP would actually work in practice. Wheelabrator would like to work with the partners and the USFS or other land management agencies to deliver a small amount of biomass (say 100 green tons) from the Basin to the Martell plant. The original test plan called for moving some biomass to a staging area in Minden, Nevada. From there, the material would be loaded onto a back-haul truck for transport to the plant. The resulting power would then be sold to Tenderland, who would then sell it under one of its existing contracts. In this manner, all parties could have gained actual experience with the project, logistics could have been evaluated, and the economics thoroughly documented. Wheelabrator was willing to do this even if it meant it would lose some revenue on the transaction.

The test did not materialize as planned. Instead, Wheelabrator worked directly with a chipping contractor in the Basin. It secured several truckloads of biomass from the Basin and transported the material directly to the Martell plant. Wheelabrator paid more for this biomass than it would normally pay.

6.5.1 Biomass Resources in the Lake Tahoe Basin

This section summarizes the results of work recently completed for the Nevada Tahoe Conservation District.¹² Figure 6-1 shows the estimated biomass produced from land management activities in the Lake Tahoe Basin. The annual average is about 25,000 green tons per year, although this can range from 12,000 to just under 60,000 green tons per year depending on the level of activity at any one time. The USFS is by far the single largest source of biomass in the Basin.

¹² Source: Nevada Tahoe Conservation District. Biomass Energy Opportunities in and Around the Lake Tahoe Basin. August 2003

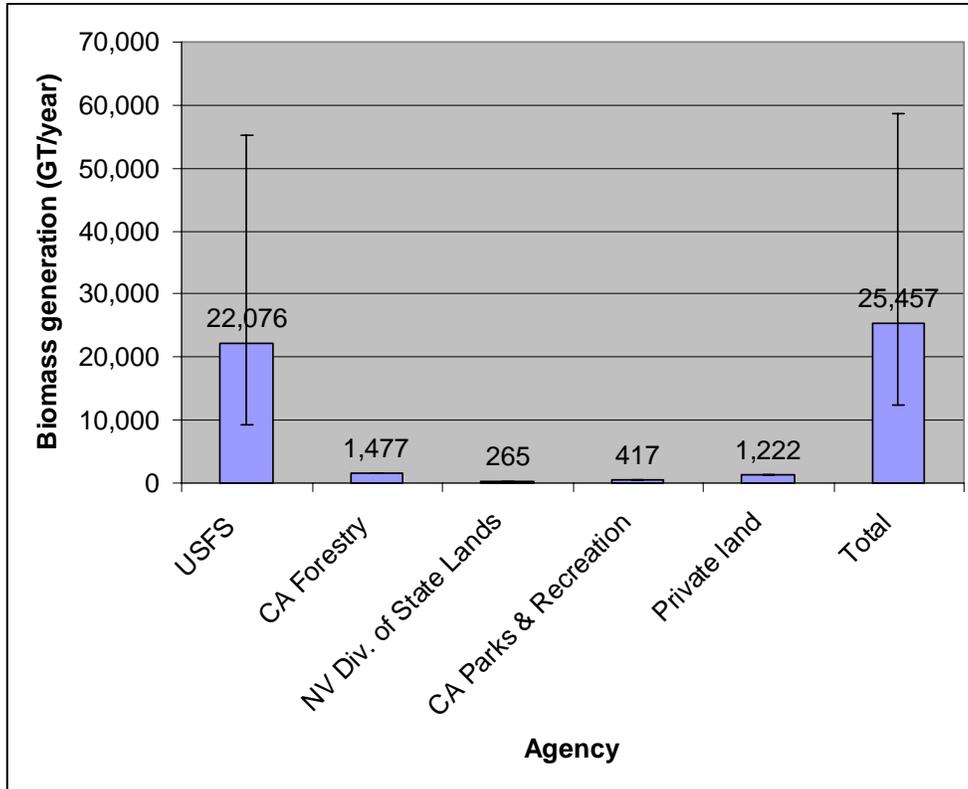


Figure 6-1. Biomass Supply Estimate for the Basin

6.5.2 Thinning Costs

This section discusses costs from both the perspective of the land management agencies and from the thinning contractor.

Table 6-3 shows the range of land treatment costs for fuels reduction activities in the Lake Tahoe Basin. The numbers are based on U.S. Forest Service data for past and planned treatment costs. Mechanical thinning with no use of the small material removed is prohibitively expensive, ranging from \$400-\$1,600 per acre, with an average cost of about \$800/acre.

Table 6-3. Average, High, and Low Treatment Acreage, Cost/Acre and Estimated Biomass Potential Based on Past and Planned Treatment (USFS Data)

	Average	High	Low
Past treatment (1992-2001)			
Area treated (acres)	1,636	3,834	639
Cost/acre (\$)¹	832	1,664	419
Estimated biomass potential (GT/year)	23,582	55,264	9,202
Planned treatment (2002-2008)			
Area treated (acres)	1,807	3,236	1,036
Cost/acre (\$)	666	846	503
Estimated biomass potential (GT/year)	26,038	46,634	14,931
All years (1992 – 2008)			
Area treated (acres)	1,617	3,834	639
Cost/acre (\$)	832	1,664	419
Estimated biomass potential (GT/year)	22,076	55,264	9,202

¹ Note: Average, high and low costs only reflect values for 1998 to 2001 due to anomalous figures in the range of \$22 to \$53 per acre for treatment listed in database for 1992 to 1997.

6.5.2.1 Thinning Costs with Multiple Product Removal

As shown in the section above, it costs land management agencies about \$800/acre to pay contractors to remove small diameter biomass in the Lake Tahoe Basin. Wheelabrator’s experience in forest thinning for both public and private landowners has shown that there is a lower cost option involving mechanical thinning that can, under reasonable conditions, actually return a small profit to the landowner rather than a loss. Table 6-4 and Table 6-5 represent two thinning scenarios, one with and one without pulp chip removal, that can both result in a positive dollar return to the public landowner. According to Wheelabrator, the key to operating a cost effective thinning operation is to create no artificial or arbitrary barriers to thinning. The most important factor is to establish a “desired forest condition” that resembles presettlement conditions and thus is both healthy and fire resistant. The larger trees that are to be left in the forest are marked, providing the proper mix of sizes, spacing and desired species. Thickets or openings can be incorporated for specific wildlife purposes.

Once marked, the unit is then turned over to a thinning contractor who removes the unmarked material. The contractor then sorts through the removed material to find products having a value greater than that of mere fuel. In Wheelabrator’s experience, an acre thinned from below to produce the “desired forest condition” will yield 29 green tons of fuel and some 2-5 thousand board feet (MBF) of poles, small logs and other merchantable materials. The higher valued material covers the contractor’s thinning costs. These examples assume fuel has a zero (or negative) value and has to be delivered to a power plant for free. If the power plant can pay anything towards fuel, the economics to the landowner improve further. Any higher valued products recovered reduces the amount of remaining fuel per acre and simply allows a specific power plant to create the opportunity for more acres to be treated annually.

Table 6-4. Per Acre Economic Analysis of Biomass Harvesting Operations with Pulp Chip Removal

	Volumes			Values	Costs	Profit
	(MBF)	(GT)	(BDT)			
Logs	3	17	10	\$900	\$300	\$600
Pulp Chips		25	15	\$945	\$630	\$315
Hog Fuel		10	6	(\$63)	\$150	(\$213)
TOTALS		52	31	\$1,782	\$1,080	\$702

ASSUMPTIONS:

Moisture content (% water) = 40%
 Green ton log weight/MBF = 5.7

INCOME FROM OPERATIONS:

\$702/acre
 \$702/52 tons= \$13.50/green ton

Production Cost Assumptions (on board truck):

\$/MBF logging costs = \$100
 \$/BDT pulp chipping costs = \$42
 \$/BDT biomass fuel processing costs = \$25

Note: Biomass fuel value assumed to be \$0 minus trucking figured @ \$45 per hour for 3.5 hours (60-70 miles one way). This works out to (\$63 for 6 bdt)

Product Value Assumptions:

\$/MBF log value on truck = \$300
 \$/BDT pulp chip value in van = \$63

GT = green tons; BDT = bone dry tons.

Table 6-5. Per Acre Economic Analysis of Biomass Harvest, No Pulp Chip Removal

	Volumes			Values	Costs	Profit
	(MBF)	(GT)	(BDT)			
Logs	4	23	14	\$1,200	\$400	\$800
Pulp Chips		0	0	\$0	\$0	\$0
Hog Fuel		29	17	(\$183)	\$435	(\$618)
TOTALS		52	32	\$1,017	\$835	\$182

ASSUMPTIONS:

Moisture content (% water) = 40%
 Green ton log weight/MBF = 5.7

INCOME FROM PERATIONS:

\$182/acre
 \$182/52 tons= \$3.50/green ton

Product Value Assumptions:

\$/MBF log value on truck = \$300

Note: Biomass fuel value assumed to be \$0, minus trucking figured @ \$45 per truckload per hour for 3.5 hours (60-70 miles one way). This works out to (\$183) for 17 bdt.

Production Cost Assumptions (on board truck):

\$/MBF logging costs = \$100
 \$/BDT biomass fuel costs = \$25

Looking just at the biomass fuel portion of the above estimates, the actual cost of biomass hog fuel with pulp chip removal is \$213/6 bdt = **\$35/bdt** delivered 60-70 miles (Table 6-4). Without pulp chip removal, the costs are \$618/17 bdt = **\$36/bdt** (Table 6-5). Costs in the Basin are higher than this due to the environmental requirements imposed by the Tahoe Regional Planning Agency (TRPA). Based on an interview with a contractor operating in the Basin (see below), the costs of producing biomass in the Basin and delivering it to the Wheelabrator Martell plant are \$42-\$46/bdt (see the section below).

6.5.2.2 Interview with Chipping Contractor

McNeil staff met with Chris Kingsley of Sierra Nevada Wood Waste, a forest thinning contractor who has done work on private land in the Lake Tahoe Basin. McNeil met with him to determine his perspective on the process of working with Lake Tahoe Basin land management agencies. McNeil staff met with Mr. Kingsley at a private 300-acre parcel south of Meeks Bay on Route 89, of which approximately 45 acres was treated mechanically. This is a fairly large private land parcel for the Basin. This is the site that the contractor was using when he sent some chips to Wheelabrator Martell as an experiment. Mr. Kingsley received \$32/bdt (about \$16/green ton) for these chips, which was higher than the market price Wheelabrator was paying for biomass fuel at the time. However, Mr. Kingsley stated that he would need to receive between \$42-\$46/bdt for him to recover his costs of removing the biomass that has no market value.

Mr. Kingsley cited TRPA regulations, and in particular the application of TRPA regulations, as a primary reason for his decision not to continue to operate in the Tahoe Basin in the future - at least until some of his disputes can be resolved.

The TRPA regulations require oversnow removal to prevent soil disruption. According to the contractor, this had the effect of making him lose money since lumber prices are lower in the winter. The contractor started the project by clearing out biomass, at his own expense, with the understanding that he would be able to take a few large trees per acre and sell those so that he could offset his treatment work and make a profit. According to the contractor, he spent \$85,000 up front, took out one truck load of saw logs, and then TRPA stopped him from taking out any additional larger trees. Disputes related to the proper enforcement of diameter limitations on the removal of dead and dying trees prevented the contractor from removing salvage material from the site that would have allowed him to maintain profitability on the job. In particular, the contractor said he faced disputes with TRPA compliance officials on issues related to whether individual trees were infested and the likelihood that the pest infestation would lead to tree mortality.

According to the contractor, the primary difficulties surrounding regulatory enforcement in the area is related to wetlands regulations, road utilization and dead/dying tree removal. The regulations are changed frequently, often during the time-span of a single project. This makes the contractor run the risk of having a particular treatment that may be acceptable at the beginning of the project be subject to fines and other penalties because the regulations change during the project.

6.6 Costs of Biomass Power Production

Table 6-6 shows the economics for a 30MW biomass power plant located in the rural west and built at a cost of \$60 million. The debt is financed over a 20-year period. The total expense for the plant, on a per kWh basis, is slightly in excess of 7.85¢/kWh. The analysis assumes that the plant pays the full fuel cost of \$35/bdt (this is about 3.1 cents/kWh, assuming 9000 Btu/dry pound and a plant heat rate of 16,000 Btu/kWh). The total generation cost is 2.85¢/kWh over market wholesale prices of 5¢/kWh. The 5¢/kWh is a rate cap set by the State of California on wholesale selling prices.

Table 6-6. Sample Economics for 30 MW Biomass Plant, Paying Full Fuel Cost

Costs	¢/kWh
Debt Service	3.0
Fuel	3.1
O&M	1.25
A&G	0.50
Total	7.85¢/kWh
Revenue	5.0¢/kWh
Deficit	2.85¢/kWh

Since most of the costs of operating a biomass plant are fixed, the fuel cost is the only flexible item in the operating costs. Assuming the biomass power plant can pay the costs of

transportation only, the cost of fuel in the above table would drop to 1.3¢/kWh (assuming \$15/bdt transportation). The deficit would then be about 1.05¢/kWh. See Table 6-7.

Table 6-7. Sample Economics for 30 MW Biomass Plant, Paying Biomass Transportation Cost Only

Costs	¢/kWh
Debt Service	3.0
Fuel	1.3
O&M	1.25
A&G	0.50
Total	6.05¢/kWh
Revenue	5.0¢/kWh
Deficit	1.05¢/kWh

The analyses show that biomass power generation cannot by itself cover the total costs of forest thinning in today's power market. There is still a need for some kind of tax credit, fuel credit or premium selling price for the power. These issues are discussed in greater detail in Section 7.

6.7 Biomass Supply Companies

There are primarily five companies that are most able to collect, process and transport forest biomass in the Basin, based on their current and past working relationship with the USFS in the LTBMU and other forest landowners in the region. Table 6-8 provides contact information for each of these organizations.¹³

Table 6-8. Primary Biomass Supply Candidates in the Basin

Name	Company	Location	Phone	Company type
Jim Usher	Bently AgroDynamics	Minden, NV	(775) 782-1846	Wood recycling, arboriculture
Jeff Holland	CTL Forest Management	Placerville, CA	(530) 409-8733	Arboriculture, logging
Craig Witt	Full Circle Compost	Minden, NV	(775) 782-5305	Wood recycling, arboriculture
Chris Kingsley	Sierra Nevada Woodwaste	Marysville, CA	(800) 506-1144	Wood recycling, arboriculture, logging
Jeanne Lear	South Tahoe Refuse	South Lake Tahoe, CA	(530) 541-0366	Wood recycling, waste disposal

¹³ NTCD, August 2003

7 RESULTS

The purpose of this section is to discuss the results of the project, the significance of the work, implications for related efforts and potential next steps for Basin stakeholders.

The piecemeal electric industry restructuring that has taken place to date has clearly been a mixed blessing for renewables. Wholesale only restructuring, coupled with current wholesale prices, clearly make it difficult for many renewables to compete in a "price only" wholesale market. Conversely, the prospect of retail competition holds real promise for the renewables industry. In the long term, it is the hope of renewable advocates that consumers, given a choice, will choose renewables for their environmental and fuel diversity benefits despite having to pay a small premium.

Biomass plants need a combination of a strong stable revenue stream and low fuel cost to be viable. The numbers shown in Section 6.6 indicate that the cost of production for biopower is between 1 and 3 cents/kWh over current wholesale market prices. The actual deficit will depend on the amount paid for biomass fuel and the wholesale cost of power. Assuming that the cost of Tahoe biomass is \$44/bdt, the costs of production approach 9 cents/kWh, or about 4 cents/kWh over market price. This price disparity needs to be overcome if biomass from the Basin is to ever be used for electricity production.

There is rationale behind the need for some kind of market support for biomass power. The Department of Energy released a study in November 1999 that quantified the environmental benefits of the U.S. biomass energy industry.¹⁴ This study looked at the alternative fate of waste materials were they not to be used as fuel for a biomass plant. The conclusion reached was that the non-electric environmental benefits of reduced air emissions, landfill avoidance and improved forest health totaled the equivalent of 11.4 cents/kWh of biomass power produced. This public benefit is in addition to the domestic energy security, avoidance of fossil fuel use and rural employment benefits shared with other renewable technologies.

The problem of excess vegetation on Basin lands has not gone away since this project started in August of 2000. If biomass energy is to serve as a potential outlet for forest biomass, it is clear that there is a need for some kind of market credit to help overcome the price disparity between the costs of production and the potential revenue. Potential credits include Green Tags, a production tax credit, or a biomass fuel credit.

7.1 Potential for Green Tag Sales to support Tahoe Biopower

A national market is developing for Green Tags, as well as green power, and there are organizations that could be approached about serving as a conduit for marketing Lake Tahoe Biopower. Forest biomass, such as proposed for Lake Tahoe Biopower, may not be considered a renewable resource by all certifying or purchasing organizations, however.

¹⁴ Morris, G., "The Value of the Benefits of U.S. Biomass Power," prepared for the National Renewable Energy Laboratory, NREL/SR-570-27541, November 1999

If any biomass from the Basin is to be converted to electricity, a new generating partner needs to be located. Wheelabrator recently sold off its Martell plant to Sierra Pacific Industries (SPI). McNeil has learned that the plant is not operating now, and that SPI will most likely not start it up again unless economic conditions improve. SPI plans to re-develop the site into an industrial park. This means that the nearest biomass power plant to Lake Tahoe is the SPI plant located in Loyalton, California. This plant is still operating, but the Basin is too far away to provide a cost-effective supply.

7.2 Significance of the Work

This project has documented some of the complex issues surrounding biomass power markets, thinning on public lands, the link between improved forest health and biomass power, biomass fuel supply logistics, economics of biomass power production and the potential for Green Tags.

The authors believe that the underlying rationale for developing the Tahoe Green Power Program still exists. The main barriers to using Basin biomass for energy now are:

- Retail access in California has been suspended;
- Wholesale electricity prices are lower than the costs of production of biopower;
- Biomass from the Lake Tahoe Basin is more expensive than biomass from other regions due to environmental regulations;
- Green Tags are a newly developing market mechanism, but forest thinnings are not included as an eligible resource from which tradable renewable certificates (TRCs) can be produced; and,
- The Wheelabrator Martell plant has been shut down so there are not any current biomass generators located within a reasonable haul distance of the Basin.

The barriers are mitigated somewhat by the Renewable Portfolio Standards that have been passed in both California and Nevada. The RPS legislation will provide some incentives for project development in each state, but the projects must still be economic. There is potential in both states to develop new infrastructure that can use biomass as the fuel supply if the economics can be supported. Before investing in creating this infrastructure, investors and government need to affirmatively answer three key questions:

- Is there an assurance that the raw material will be available for the period of time required to recover the capital?
- Is there a proven technology that will eliminate risk, both in the energy/product conversion as well as in the resource procurement?
- Is there a set of project economics that will support the investment of this capital with a fair return and relatively low risk?

The assurance of long-term raw material supply was largely solved by the recent establishment of long-term stewardship contracting authority for both the U.S. Forest Service and Bureau of Land Management. Stewardship contracting allows ten-year access to excess biomass in a “goods for services” arrangement. However, although the agencies have the authority to enter

into these long-term contracts, they do not have the necessary funds to implement the stewardship contracts on a landscape level.

Technology risk is largely a non-issue in this case as burning wood for power has a 50+ year history. The technology to thin cost effectively while protecting and enhancing the environment is well proven, with individual entrepreneurs continuing to lower costs, expand range and soften the footprint.

Project economics is where the most work remains to be done. Maximum use must be made of all thinned material. Any material used for higher uses such as building material, paper, chemicals or other wood products only improve the economics of the residual fuel. Infrastructure to produce the higher valued products will develop with stable supply, as these industries are well developed and mature. However, many existing wood manufacturing mills and processing facilities have shut down over the past 5 years due to lack of access to timber. These mills will need to be re-tooled to handle the small diameter materials produced from thinning efforts.

The federal government could speed the development of new plants by expanding the Section 45 tax credit to include all biomass. The Section 45 tax credit, passed in 1992, provides 1.5¢/kWh support to wind and biomass technologies. On the wind side, generators used the credit to restart the growth of an industry that had been virtually stagnant since 1987. By 1994, the effect of the credit and further technical innovation had again restarted wind development, and the industry in 2003 is clearly benefiting from the credit. In the case of biomass, the definition of closed loop biomass was so restrictive as to eliminate all waste forestry, agricultural and urban fuels now used by the industry. As a consequence, no biomass facility owner has ever been able to collect any payments under the closed loop biomass tax credit. The problem is that the credit applies only to "closed loop biomass," which refers to agricultural products grown exclusively for combustion in a power plant. There has not been such an undertaking in the U.S. in the eleven-year life of the credit, as economics simply will not support it, even with the credit.

There are provisions in the current Energy Bill before the Congress that would expand the credit to all biomass facilities. This would help overcome the price disparity between the generation costs and the cost of wholesale power. Another potential credit, contained in the President's Healthy Forest Initiative, would provide a \$20/ton biomass fuel credit to generators.

7.3 Implications for Related Efforts

Truckee-Donner Public Utility District (TDPUD), located just north of the Basin, is presently investigating biomass power options for their utility. The California Energy Commission (CEC) is funding this work. In 2004, TDPUD will conduct a biomass/forest health survey of their customers to determine local interest in biomass energy, forest health and green power. The survey will also determine whether customers would be willing to pay a premium on their monthly electricity bill to help support the development of a small biomass plant in the region. As part of the project, TDPUD is conducting a detailed feasibility study for a 1-3 MW biomass power plant to be located in Truckee.

TDPUD is also going to be sponsoring a demonstration project of a 15 kW small modular biomass power system. Community Power Corporation of Littleton, Colorado has designed and developed the system (www.gocpc.com). The unit will use forest biomass from local fuels

reduction efforts, and be located on property owned by the Truckee Recreation District. The host site is a high-profile public location that will allow the public to view the technology and learn about biomass energy and forest health. TDPUD hopes that the demonstration project will educate the public and help promote local support for the 1-3 MW plant. The contact at TDPUD is Scott Terrell. He can be reached at: ScottTerrell@TDPUD.ORG

South Tahoe High School recently completed a feasibility study for installing an automated wood chip heating system at the facility. Over 20 schools in Vermont use this technology to meet their heating needs. The school is presently in the process of filing for their emissions permit for the system. Although the system may exceed the peak emissions limits set by TRPA, TRPA is willing to make an allowance for this technology to be sited in the Basin as long as the fuel comes from Basin biomass that would otherwise be open burned. El Dorado County will have the final say in permitting. The school facility manager is confident that the permits will be obtained. They expect to start construction in the summer of 2004.

The Nevada Fire Safe Council (NFSC) is presently conducting a biomass resource assessment for Carson City and the surrounding region. The work will determine all of the biomass resources within a 50-mile radius of Carson City. Several sites in Carson City are interested in installing a biomass energy plant (either heat alone and/or combined with power generation). The Carson City landfill and prison are two key potential sites. The resource assessment will quantify urban wood waste, wood manufacturer residues, forest thinning waste, urban forestry materials and agricultural residues. The contact for NFSC is Elwood Miller, who can be reached via email at: firesafe@renonevada.net

As mentioned earlier, the Nevada Tahoe Conservation District (NTCD) recently completed a biomass resource assessment and biomass technology opportunity study for the Basin. The report is available from Jason Drew at NTCD. He can be reached at: jason-drew@ca.nacdnet.org

7.4 Suggestions for Future Work

Agencies interested in supporting biomass utilization in the Lake Tahoe Basin should continue to monitor the on-going efforts to develop a local biomass energy industry. In particular, the efforts by TDPUD and South Lake Tahoe High School will be leading to hardware on the ground, albeit on a small scale. These projects will provide an outlet for biomass and offer important opportunities for public education about the link between forest health and biomass power. The work being sponsored by the NFSC could lead to the development of larger-scale plants in the region, including power generation. There would then be opportunities for sale of Green Tags from these plants.

Clearly, work remains to be done to certify electricity produced from forest thinnings as green power under the TRC Program. CRS is willing to work towards including forest biomass in the definition, but they feel that they will need to do a pilot project with a local utility first. Truckee-Donner Public Utility District is one utility that may be interested, and some of the biomass for such a project would come from the Basin. In order to certify forest biomass as an eligible resource under the TRC program, local environmental groups would have to give their approval to the process. The utility, CRS and the environmental groups would all have to agree on the details of the project.

Appendix A. Tahoe Green Power Program Marketing Plan

Vision/Mission

In June 1997, the Tahoe Green Power Program (TGPP) was conceived by the Nevada State Energy Office to support a plan for the cost-effective, market-based conversion of biomass generated from public forestland management in the Lake Tahoe Basin into green power (electricity generated using renewable resources). The resulting power would then be sold through green power marketers to electric utility customer in deregulated utility markets in California.

Overall, the Tahoe Green Power Program can be characterized as an alternative to piling and burning biomass on site, thereby reducing air pollution and reducing the threat that uncontrolled wildfire poses to human life, property, water quality and the economic health of the Basin community. The Program's drivers include a desire to promote forest health, air quality and water quality in the Lake Tahoe Basin, thereby improving the sustainability of communities and ecosystems in the region.

It is hoped this program will serve as a model for similar future regional efforts throughout the Western United States needing to dispose of low to negative value biomass.

Background

In the Lake Tahoe Basin, significant quantities of biomass are generated from public forestland that is managed to reduce the risk of wildfire and achieve the "desired future conditions" for forest ecology as determined by the Forest Health Consensus Group. The desired future conditions for the Tahoe Basin forest ecosystem is similar to that of the region's forests prior to the 20th century. However, current practices of piling and burning the slash (biomass) left from forest health restoration and wildfire risk reduction operations pose health, economic and environmental risks that are becoming increasingly hazardous to Tahoe residents and Lake Tahoe itself.

The TGPP Team

Wheelabrator Martell Inc. will generate the bio-power and Go-Green.com will serve as retailer of the generated power.

Products and Services

Go-Green.com will market and re-sell Tahoe Green Power to the general public. They will bundle the product into their existing renewables program, or package as a boutique product.

Market Environment

The national movement toward producing electricity using renewable resources such as forest and agricultural by-products (biomass), wind, solar, geothermal and small-scale hydroelectric, make this program attractive to conventional energy consumers.

The State of California is among the largest markets for green power in the world. This is in part due to deregulation of electric utilities in 1998 with the passage of AB1890. The State of Nevada is currently in the process of deregulating its electric utilities. In response to deregulation, many retail power marketers are offering green power at competitive pricing to their customers as a clean alternative to power generated from conventional fuels.

Pricing and Profitability

In January 2000, the TGPP partners secured the interest and desire of San Jose, California based Go-Green.com to purchase the retail green power generated from Basin area residues. Tahoe Green Power will be made available at a slight premium over current electric rates through Go-Green.com to help cover the additional costs of processing and transporting biomass from the Lake Tahoe Basin.

Target Customers

Currently, Basin residents and commercial customers may not purchase Tahoe Green Power at this time because their current power provider, Sierra Pacific Power Company is not participating in California's deregulated utilities market. However, California customers in Pacific Gas & Electric, Southern Cal Edison, and San Diego Gas and Electric territories are eligible to participate through Go-Green.com. Initial target customers include corporations with an interest in the Basin (i.e. offices or clients in the area) who are currently purchasing their electrical power from deregulated electrical utilities. Additional targets are residential or corporate users who own second homes in the Basin.

Samplings of the following commercial markets were targeted as part of the study:

- Banks/Lending Institutions Wells Fargo, Bank of America
- Computer Companies & .coms Apple, C/Net
- Grocers/Natural Food Stores Trader Joes, Wild Oats, Safeway
- Wineries Kendall Jackson
- Business Supply Stores Office Depot, Staples
- Recreational Clothing Companies REI, North Face
- Environmental Organizations Sierra Club, Audubon
- Booksellers Barnes & Noble, Amazon.com
- Restaurants Chart House
- Recreational Manufacturers Mtn Bikes, Sunglasses, etc.
- Car Dealers Suburu, Ford, Saturn
- Medical Facilities Kaiser
- Investment Companies Caldwell Banker, Paine Webber

Distribution

The biomass must be processed on site and transported to an existing co-generation plant for conversion into electrical power. Several California power generators in the Sacramento valley were identified as being eligible to receive the material. During the development of the commercialization plan, it was determined that Wheelabrator Martell, Inc., a Waste Management Company subsidiary, was identified as the generator of choice. The plant is located in Martell, California, approximately 70 miles from the Lake Tahoe Basin.

Roles and Responsibilities of TGPP Team Members

Go-Green.com

Go-Green.com (formerly clean 'n green energy) has been a provider of 100% renewable power to California small commercial and residential consumers since deregulation began in March of 1998. They have been involved with joint development efforts on the Tahoe Green Power Program since shortly after its inception. Once the program is fully operational, Go-Green.com will handle the retail process from the purchase of power from Wheelabrator Martell, Inc. to marketing the power to the public.

Go-Green.com has provided assistance in getting information about the TGPP on their web site and having the initial query letters mailed to corporations on their letterhead. Go-Green.com will handle follow up procedures with the corporations after the letters have been received and marketing the program before it goes on line.

Wheelabrator Martell, Inc.

A strategic alliance was formed with Wheelabrator Martell, Inc. An on-site 18 MW, 205,000 pound-per-hour wood waste-fuel cogeneration plant located in Martell, California, produces steam and electricity. The electricity is sold in California's deregulated power markets as Green Power. Wheelabrator will transport the biomass to their plant where it will be stored until converted into electrical power.

Wheelabrator will coordinate fuel purchases and pick-up via commercial chip van in the Lake Tahoe area, track the quantities of biomass that get converted to electricity, coordinate sale of the resulting power to Go-Green.com, keep track of the amount of Tahoe Green Power that is generated, and provide documentation to the CEC for renewable generator credits.

Strategic Alliances and Joint Marketing Opportunities

Although Basin electrical power customers are excluded at the present time from purchasing Tahoe Green Power, the potential to enlist their support as program champions was explored as part of our study. Several Basin industry leaders (ski companies, casino owners) were identified and interviewed as to interest in TGPP sponsorship including Heavenly Ski Resort and Harvey's Hotel & Casino. Corporate Sponsors will be offered exclusivity in their industry in return for their endorsement/sponsorship/joint marketing of the TGPP.

Through a strategic alliance with Heavenly Ski Resort, the Tahoe Green Power Program has initiated its first joint marketing relationship with major companies in the Lake Tahoe Basin.

It is proposed that joint marketing with established companies in the Basin will provide TGPP customer incentives, promote the program to customers outside the Basin, lend added credibility, and greater marketing presence.

The TGPP is pursuing joint marketing agreements with other organizations and businesses in the Basin to further the name of Tahoe Green Power in both the Basin and Northern California. Plans include having the companies with whom the TGPP has joint marketing agreements, market the program on their websites, include incentives in their promotional materials and in turn, the TGPP will include the companies as project sponsors on the TGPP website.

Additional target companies include:

- Any Mountain
- REI
- North Face
- Old Navy

Sponsorship Program

There are three levels of sponsorship available for the Tahoe Green Power program: Corporate Sponsors, Community Sponsors and Conservation Partners. Each level of sponsorship has varying degrees of commitment and market exposure. All sponsors/partners will be listed on the TGPP website as sponsors/ affiliates with links to their web sites if available.

Corporate Sponsors

Incentives - will be given to consumers who choose to purchase power from the Tahoe Green Power Program as a thank you gift. The incentive package will also be structured in a way that causes the consumer to visit the sponsors repeatedly. Incentive ideas - 2nd or 3rd day free lift tickets or ski rentals, 2nd or 3rd nights stay at a local resort, sightseeing tours, boat rides, discounts on equipment rentals, purchases at local stores (i.e. R.E.I. or Any Mountain), discounts on clothing purchases (i.e. North face, Old Navy).

Annual Sponsorship Fees - Corporate sponsors are requested to provide an annual sponsorship fee of \$5,000.

Benefits

Name recognition - having name and/or logo on print ads, radio/TV spots, billboards, banners and/or links on website. Mention as a main supporter of the program in all press releases/conferences.

Exclusivity - one company shall be represented from each industry (i.e. ski resorts, casino/hotels, outdoor outfitters, sports equipment rental/sales companies, etc.).

Exposure - High profile exposure through the incentives program. Each company that provides a consumer incentive will be mentioned in as many spots (all advertising) as possible as well as having contact information made available to consumers for ease of use of the incentives.

Community Sponsors

Incentives - will be given to consumers who choose to purchase power from the Tahoe Green Power Program as a thank you gift. The incentive package will also be structured in a way that causes the consumer to visit the sponsors repeatedly. Incentive ideas - 2nd or 3rd day free lift tickets or ski rentals, 2nd or 3rd nights stay at a local resort, sightseeing tours, boat rides, discounts on equipment rentals, purchases at local stores, discounts on clothing purchases.

Annual Sponsorship Fees - Annual sponsorship fees are suggested at \$1,000 per year, but are voluntary.

Benefits:

Name recognition - having name and/or logo on print ads, radio/TV spots, billboards, banners and/or links on website. Mention as a main supporter of the program in all press releases/conferences.

Exposure - High profile exposure through the incentives program. Each company that provides a consumer incentive will be mentioned in as many spots (all advertising) as possible as well as having contact information made available to consumers for ease of use of the incentives.

Conservation Partners

Will be mainly non-profit organizations with an environmental focus, which will promote TGPP to their constituents who are eligible to purchase the green power. Conservation partners will receive a set dollar contribution for each person that signs up as a result of the NPO's own marketing efforts.

Benefits:

Name recognition - having name and/or logo included in brochures and direct mailings as a supporter of TGPP.

Exposure - High profile exposure in press releases (hopefully reciprocal in nature) and in some advertising.

Monetary - Receiving a donation to further environmental programs throughout the states of California and Nevada.

Community Sponsors

- Similar to Corporate Sponsors

Conservation Sponsors

- Set dollar contribution to the organization for each person that signs up as a result of the NPO's own marketing efforts
- Articles on TGPP in NPO's newsletters
- Provide mailing list of members to TGPP

TGPP/Stakeholders Endorsement

Tahoe Regional Planning Agency

After two decades of rapid growth in the Basin, conservationists lobbied in the late 60's for environmental protection to preserve Lake Tahoe. The governors and lawmakers in California and Nevada approved a bi-state compact, which created a regional planning agency to oversee development at Lake Tahoe. In 1969, the United States Congress ratified the agreement and created the Tahoe Regional Planning Agency (TRPA).

The Compact, as revised in 1980, gave TRPA authority to adopt environmental quality standards, called thresholds, and to enforce ordinances designed to achieve the thresholds.

Lake Tahoe property owners who build or add on to a home or business pay air and water quality mitigation fees which help offset the impacts of the new development. In late June of 2000, the TGPP team met with Carl Hasty, Acting Chief of the TRPA. Hasty is very supportive of the

TGPP and the idea of crediting financial support for the program against the required local community cost share required for EIP implementation.

If local supporters (i.e. hotel/casino industry members) were able to utilize the dollars they spend in support of the TGPP to offset a portion of their mitigation credits, this would definitely increase local business sponsorships.

Tahoe Re-Green

The Tahoe Re-Green Project is a consortium of 19 government and private agencies and individuals. Each member has a stake in the well being of the Tahoe forest and the people in the Basin. The group consists of foresters, firefighters, land managers, water quality experts, environmentalists and more. Tahoe ReGreen and their partnering agencies are supporters of the TGPP and will assist in coordinating biomass material availability.

Forest Service

The United States Forest Service is in charge of the thinning operations for 80% of the Tahoe Basin. The TGPP will work with the Forest Service to coordinate material pick-up from USFS treatment project locations and coordinate transportation through Wheelabrator Martell, Inc.

League to Save Lake Tahoe

The League to Save Lake Tahoe is a privately funded, non-profit, public benefit, membership organization, founded in 1957. The league is dedicated to preserving the environmental balance, scenic beauty and recreational opportunities in the Tahoe Basin. Membership includes over 4,500 concerned families. At their June Board Meeting the League voted to support the TGPP.

Target Markets

By 2001 the Tahoe Green Power Program will be a highly visible alternative energy choice in the Bay Area. Energy consumers will come to know Tahoe Green Power as a boutique product appealing to individuals and organizations with an interest in Lake Tahoe. The TGPP will have developed and marketed these products through Go-Green.com, becoming a leading choice for green energy including biomass. Sales will exceed 2,000 customers and the TGPP will be actively promoted in California and hopefully by 2001, Nevada.

Corporate

The TGPP's corporate targets (located in San Francisco Bay or deregulated areas of California outside the Basin) are the large energy users with an office or interest in the Lake Tahoe Basin. As part of the study, we identified potential users in the following subcategories:

- Banks/Lending Institutions
- Computer Companies & .coms
- Grocers/Natural Food Stores
- Wineries
- Business Supply Stores
- Recreational Clothing Companies
- Environmental Organizations

- Booksellers
- Restaurants
- Recreational Manufacturers
- Car Dealers
- Medical Facilities
- Investment Companies
- Real Estate Agencies

Government

Several Executive Orders (Eos) and changes to federal procurement procedures mandate forest restoration efforts in the Basin and encourage the use of renewable energy and bio-based products by Federal agencies:

EO13057 – Federal Actions in the Lake Tahoe Region, issued July 26, 1997. Requires the U.S. Forest Service to conduct mechanical thinning and prescribed burning on up to 3,000 acres of forestland in the Basin per year.

EO – Greening the Government through Efficient Energy Management, issued June 3, 1999. Charges agencies with increasing the purchase of energy from renewable sources such as biomass.

EO13134 – Developing and Promoting Bio-based Products and Bio-energy, issued August 12, 1999. Charges the Department of Agriculture and the Department of Energy with identifying biomass and bio-energy research and demonstration projects.

In light of the Federal Government’s emphasis on the purchase of alternative energy for their offices, the TGPP team approached numerous governmental agencies with offices in Northern California and having an interest in the Basin. A partial list follows:

- U.S. Forest Service
- EPA
- BLM
- U.S. Fish & Wildlife Service
- U.S. Parks Service

Residential

Residential customers have not been contacted as part of this study. However, the availability of recreation/tourism industry customer lists of second homeowners in the Basin with residences in the Bay Area would be the first groups to be contacted by direct mail marketing.

Marketing Materials

The TGPP has developed a variety of collateral materials to support commercialization efforts. These items include:

Corporate Capabilities Brochure

To introduce Tahoe Green Power to possible purchasers, the TGPP developed an Introductory Letter and Brochure covering:

- Program Introduction
- Photographic Tour
- Tahoe Green Power Program Profile
- Information Request Form

Upon commencement of the project a new brochure will have been created to include names and logos of all applicable sponsors.

Web Site

McNeil Technologies developed the initial web site. The temporary site can be viewed at <http://www.state.nv.us/b&i/eo/tahoe/index.htm>. The final site will be hosted by the NSEO and have links to the program partners and organizations. Other web sites linked to the TGPP site at this writing include:

- Go-Green.com
- Heavenly Ski Resort
- League to Save Lake Tahoe
- Nevada State Energy Office
- Tahoe ReGreen
- U.S. Forest Service
- Western Regional Biomass Energy Program/DOE
- Wheelabrator Martell

Advertising and Promotion

Tahoe Green Power Program recognizes the key to success at this time requires extensive promotion and exposure. To strategically maximize the limited marketing budget, this must be done aggressively and on a wide scale; yet with an educational twist to add value to the program.

Once the program is turned over to Go-Green.com, a comprehensive advertising and promotion plan will be drafted. Go-Green.com may advertise in major trade and environmental magazines such as EIR, Yes, and the various Sierra Club Newspapers. Advertising will be done independently and cooperatively with Program Sponsors with whom Go-Green.com establishes joint marketing/sales relationships.

Advertising Campaign - Save the Basin, Buy Tahoe Green Power

The best way to reach our potential customers is to develop an intense advertising campaign promoting our basic premise to save the Basin by purchasing Tahoe Green Power.

To establish our Tahoe Green Power Program image, the delivery and tone of our statements will be recreational and educational in nature. Because biomass and Green Power is so intangible, it

is important to develop a promotional campaign that is consistent and easy to understand. Ads will convey the look and feel of active, urban professionals participating in outdoor sports activities like mountain biking, skiing, snowboarding, or hiking in the Lake Tahoe Basin.

Ideally, after becoming familiar with our product, the consumer will visit the programs website and sign-up to purchase renewable power. To eliminate the biggest opposition to action, the advertisements must address how to begin using Tahoe Green Power immediately.

Promotion

In addition to standard advertising practices, we will gain considerable recognition through press releases, and links to the website, banners on program sponsors/partners websites, banners at ski lifts, bumper sticker with the programs slogan, shirts, hats, and other tangible products that can increase consumer awareness of the program.

Tahoe Green Power will be displayed as a sponsored service at locations in Lake Tahoe Basin — providing exposure for Tahoe Green Power Program to users of the Lake Tahoe Basin.

Consumers will be encouraged to obtain more information by calling Go-Green.com's toll free number, or by visiting the program's website.

Advertising & Promotion Marketing Objectives

- Position Tahoe Green Power Program as the original "boutique" green energy power choice in the Bay Area.
- Increase Tahoe Green Power Program's awareness and name recognition among business managers, corporate power purchasers, federal agencies and residential consumers.
- Generate qualified sales leads and potential new targets in and around the Bay Area and Southern California.
- Develop, through market research, significant information to create immediate and long-term marketing plans for Go-Green.com to use in promoting TGPP.
- Create product-advertising programs supporting the Tahoe Green Power marketing position as regional power supply with a regional ecosystem effect.
- Coordinate sales literature, demonstration materials, website, telemarketing programs, and direct response promotions.

Target Advertising Methods

Area Coverage

Regional target areas where sales would begin include the greater Bay Area as the primary location and Southern California as a secondary target area. Due to the large concentration of environmentally conscious consumers these areas will generate the highest level of consumer interest.

Consumer Incentives

Working with our Program Sponsors, we hope to provide incentives to customers when they sign on to buy Tahoe Green Power. Incentives may include lift ticket discounts, room reduction at hotels/casinos, discounts on, purchases at local stores, sightseeing tours, boat rides, equipment rentals, etc.

Direct Response Mail

Initially the TGPP team is sending introductory letters to 100 contacts. Once Go-Green.com has the program up and running, an incremental and coordinated direct mail program will begin two times a year. As we strengthen our direct response capabilities, we anticipate a strong potential for market and revenue development. The Direct Response Mail program will be approached scientifically, and modified to improve our customer targeting capabilities.

The initial direct mail campaign will begin in early October (to coincide with ski season advertising) to about 500,000 residents. Mass mailings will be broken up into four groups: two test groups of 5,000 each and two mass groups of 200,000 each. The results of the two test groups will indicate the level of further advertising necessary.

Print Ads - will be taken out in major business papers (Silicon Valley Business Journal, Business sections of San Jose Mercury News, San Francisco Chronicle, SF Examiner...) and environmental publications (EIR, Sierra Club news, YES). Ads will be run for extended periods (2-3 months) to add to the program's available market presence.

TV/Radio Spots - will begin with small sponsorship spots on news radio stations to reach the business community. Dependent upon outcome of direct mail results larger full commercials will be run on major stations that reach the same demographics as the ideal TGPP customer. Television spots will need to be researched further.

Telemarketing

Once the initial direct mailings (one test & one full) have been completed. Telemarketers maybe called in to cover the areas that had just been sent the mailings, as a follow up. Outside sales staff will be on hand to reach all small commercial, industrial and corporate companies that are eligible to purchase renewable power through this program.

Media Objectives

- Gain awareness of Tahoe Green Power Program among Lake Tahoe-oriented recreation/tourism industry groups, environmental organizations, and all manner of residential, commercial and government utility customers.
- Establish an image of Tahoe Green Power Program as an alternative green power choice that preserves the Lake Tahoe Basin and supports a cleaner environment.
- Maximize efficiency in selection and scheduling of published ads in publications to cover the corporate decision makers who vacations and/or owns a second home in the Lake Tahoe Basin.

Media Strategy

To target primary business publications with high specific market penetration such as the San Francisco Business Times, San Jose Business Journal, SF Chronicle, San Jose Mercury News. To get the most out of our promotional budget, our media coverage will need to focus on a large corporate user audience.

The media campaign will begin with interviews on FOX affiliate KTUV in Oakland and C/NET broadband radio in the Bay Area. The goal with these interviews is to reach the majority of Lake Tahoe second homeowners who are congregated in the metro area to sign up for the program.

Budget Estimates

Initial Materials

	Circulation	Budget	Distribution
Introductory Brochure	100 @\$3/ea	\$300	June 2000
Web Site	N/A	<u>\$500</u>	June 2000
Total		\$800	

Go-Green.com Marketing Budget Estimates

Printing Costs (brochures, mailers, stickers, etc.)	40,000
Mailing Costs (envelopes, postage)	19,000
Advertising (initial 3 months of TV/Radio & print ads)	35,000
Salaries	30,000
Misc. Overhead (magnets, shirts, hats)	<u>25,000</u>
	\$149,000

Product Pricing

At a \$.02 per kWh mark-up, 1,000 MWh per month will need to be sold in order to recoup the initial net loss. That is equivalent to 2,000 residential customers buying Tahoe Green for at least 3 months. A \$.02 mark-up may mean a premium of \$.04 per kWh over present utility pricing (\$20 per month or a 30% increase on their bills). Should the product contain only 50% Tahoe Green, then roughly 4,000 customers would need to sign up for the premium to only be a 15% increase or \$10 more a month

Appendix B. Carson Tahoe Biomass Energy Initiative Website

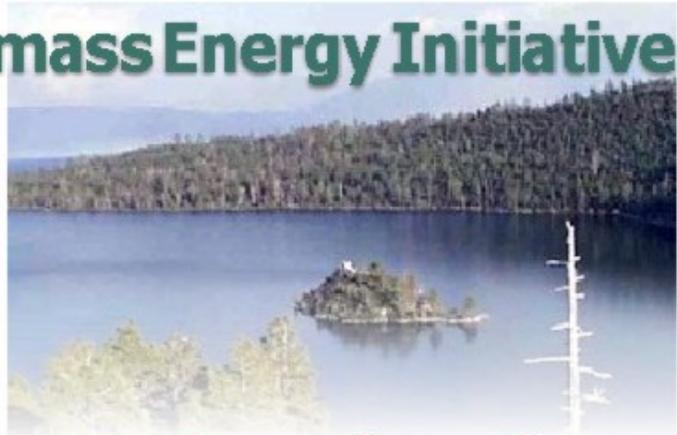
The pages shown here are printouts from the website. The links are not active in this report

The website can be reached by going to the Nevada State Office of energy main site at:

<http://energy.state.nv.us/>

Carson-Tahoe Biomass Energy Initiative

The **Carson-Tahoe Regional Biomass Energy Initiative** provides businesses, residents, and communities an opportunity protect forest health, reduce wildfire risks, and preserve air and water quality in Carson City, Lake Tahoe Basin and surrounding region by choosing to use renewable biomass to meet part of their heating and electricity needs.



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Funding for development of this website provided by the [Nevada State Office of Energy](#). For more information, contact Dave McNeil by e-mail at dmcneil@dbi.state.nv.us.

What is Biomass Power?



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Biomass is a renewable resource that includes organic byproducts of forest management and agricultural operations. Using biomass for heating and power generation helps lessen dependence on fossil fuels such as coal, natural gas and oil and reduces emissions of nitrogen oxides, carbon dioxide and sulfur dioxide to the atmosphere.

In forests in the Lake Tahoe Basin and near Carson City, significant quantities of biomass are generated from forest management designed to reduce wildfire risks and improve forest ecological conditions. Currently, most forest biomass is piled and burned on site, contributing to air pollution and wasting a valuable energy resource. Agricultural residues are also generated following crop harvest. Heat and electricity could be generated using this biomass, thereby reducing air pollution and reducing the threat that uncontrolled wildfire poses to human life, property, water quality and the economic health of communities.

Other sources of information on biomass include the joint U.S. DOE/Department of Agriculture [Biomass Research and Development Initiative](#), the [National Renewable Energy Laboratory](#) for resource data, the [Greenpower Network](#) for renewable power market information, the [Nevada State Office of Energy](#) for initiatives based in Nevada and the [California Energy Commission](#) for California based activities.

Visit [Green-e](#) to find out more about renewable energy products.



Purpose

Federal, state and local government and private landowners have stepped up efforts to reduce the threat of wildfire around communities in the Tahoe Basin, Carson City and surrounding areas. Land managers are doing this by employing a combination of prescribed fire and forest thinning to reduce fuel loads and reduce forest density. While not entirely preventing forest fires, this helps create a forest structure that poses a reduced threat to communities and watersheds. On the federal level, [Executive Order 13057](#) charged the U.S. Forest Service with conducting mechanical thinning and prescribed burning on up to 3,000 acres of Federal forest land in the Lake Tahoe Basin. State agencies in both and California are conducting thinning in and around communities in state forest lands and parks, and assisting private landowners with developing forest management plans for their property. Private landowners also are thinning trees in and around structures to reduce risks to their property.

Forest management efforts generate substantial quantities of wood biomass, most of which is piled and burned on-site, creating [air quality](#) problems for residents in the Basin. There is currently little or no market outlet for these materials. Using the biomass for energy production can create a market outlet for forest biomass, simultaneously lowering forest management costs and reducing the amount of smoke produced by open burning of biomass in the forest.

The Carson-Tahoe Biomass Energy Initiative (Initiative) was started in 1997 to address the need for market outlets for biomass from forest management by the U.S. Forest Service and other land management agencies in the Lake Tahoe Basin. It has since expanded in geographic scope to include Carson City and the Carson Valley. The Initiative's drivers include a desire to promote [forest health](#), [air quality](#) and [water quality](#), thereby improving the sustainability of communities and ecosystems in the region. The Initiative participants hope to demonstrate that using biomass from forest restoration and fuels reduction activities for producing heat and power can support forest management activities designed to reduce wildfire risks and increase forest resilience to insects and disease.

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Past efforts

Several studies have investigated the size of the resource, evaluated biomass conversion technologies and assessed barriers to biomass technology deployment in the region. In 1997, an

environmental [summit](#) headed by then Vice-President Al Gore in the Basin highlighted a new commitment of federal funds to support environmental improvements designed to improve watershed health in the Tahoe Basin. Among these were directives to increase forest management to improve forest health and reduce fire risks. The summit coincided with the release of [Executive Order 13057](#), which created the Tahoe Federal Interagency Partnership to address environmental and infrastructure degradation in the Lake Tahoe Basin. The U.S. Forest Service provides more detail on the initiative on its [website](#) .

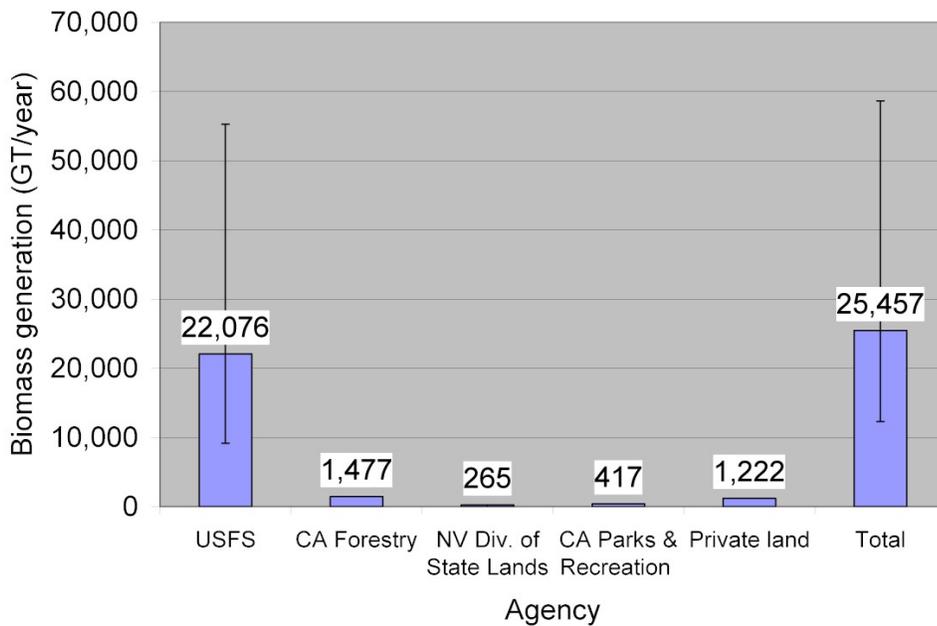
The results of an initial biomass resource and technology assessment in the region, funded through the U.S. DOE Western Regional Biomass Energy Program (WRBEP) were released shortly following the summit. In February 2000, the WRBEP released the results of a [green power market assessment](#) that focused on the Lake Tahoe Basin in February 2000. This study evaluated the potential to develop a biomass-based green power program to sell renewable energy to electric utility customers in the Tahoe Basin. A 1998 Nevada State Office of Energy project created a marketing strategy for biomass-based green power in and near the Tahoe Basin and developed marketing materials for a biomass power program. Most recently, the Nevada Tahoe Conservation District completed an updated biomass resource, technology and market assessment for the Basin in August, 2003, with funding provided by the U.S. Forest Service National Fire Plan. This publication is available through the [Nevada Tahoe Conservation District](#).

In May, 1999 joint U.S. DOE/California Energy Commission conference held at Squaw Creek Resort, "Diverse Interests, Collaborative Solutions: A dialogue on Bioenergy and Sustainable Forest Health in the West," brought together forest managers, energy and environmental policy officials, energy service providers, equipment manufacturers, public interest groups, national laboratories and other interested stakeholders to examine the prospects for bioenergy development in the Western U.S. Conference sessions included an overview of challenges and issues facing forest health management and bioenergy development; a community perspective on forest health and biomass; environmental perspectives; a case study on the Lake Tahoe Basin; and a roundtable discussion focused on future directions for biomass. For more information, download the conference [materials](#).

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Biomass resources

The 2003 Nevada Tahoe Conservation District study provides estimates of annual biomass generation from various landowners. The figure below shows estimated average biomass generation from forest management in the Lake Tahoe Basin. Error bars show estimated maximum and minimum annual values that range from as little as 12 thousand to as much as 59 thousand green tons per year. Developing a consistent biomass supply is one of the challenges facing bioenergy industry development.



The cost to collect and process and transport forest biomass ranges from \$18 to \$37 per green ton. Instead of leaving biomass on-site and burning it in the open, producing smoke emissions, this material could be used to provide heat and power to homes, schools and businesses in the region.

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Ongoing efforts

A wide range of activities related to biomass technology deployment are ongoing in the region, including demonstration of small modular biopower systems, assessment of potential transmission and distribution system benefits of biomass power systems and evaluation of commercial biomass heating applications. Most recently, a biomass resource assessment being conducted by the Nevada Fire Safe Council is extending the biomass resource assessment to include Carson City and the surrounding region in Nevada. See [regional efforts](#) for a more detailed description of these efforts and their participants.

Visit [Green-e](#) to find out more about renewable energy products.

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This section provides technical and economic information on the types of technologies that are available to produce heat, power and value-added products using biomass. The following topics are covered:

- [Biomass power](#)
- [Biomass heating](#)
- [Biomass-based liquid fuels and chemicals](#)
- [Biomass technology manufacturers and vendors](#)

Installation of a biomass power or biobased product manufacturing facility will require a site-specific feasibility study to determine technical and economic feasibility.

Biomass Power Generation

The most common approach to convert biomass into electricity is to burn solid biomass in a combustor, use the heat generated in a boiler to produce steam, then convert steam in a steam turbine to electricity. Biomass can also be converted into a combustible producer gas in a gasifier and used for heating purposes. This producer gas can also be used in a reciprocating engine to produce power in near-commercial small modular systems or further refined into liquid fuels and chemicals.

Electricity generation alone is typically only 15-25% efficient using stoker or fluidized bed combustion technology. Therefore, power plants lose up to 85% of their energy potential through heat loss by generating electricity alone. In cogeneration, or combined heat and power (CHP) systems, both heat and power are produced simultaneously, increasing the amount of energy available to a building or facility by recovering heat. CHP applications can increase the overall energy efficiency to 70-90%.

Existing biomass power plants range in size from 0.5 megawatt (MW) to 75 MW. Most operating biomass plants are in the 20 - 30 MW range. Emerging biomass gasification systems are suitable for much smaller application in the 4 kilowatt (kW) - 1 MW range (microgeneration). Biomass power generation technologies can be broadly divided into the following size categories:

- Microgeneration (< 1 MW electric capacity);
- Mid-scale biomass power generation (1 to 25 MW electric capacity); and
- Large-scale biomass power generation (> 25 MW electric capacity).

Microgeneration technologies that use biomass are mostly emerging technologies, but hold great potential for use in residential and small- to mid-size commercial applications. Microgeneration technologies that can use biomass include reciprocating engines, microturbines and steam turbines. One near-commercial [reciprocating engine system](#) integrates a mobile gasifier with a modified reciprocating engine that could be used to produce electricity or mechanical power. The systems can range from 4 kW to approximately 150 kW in electric generating capacity. Other microgeneration technologies are further from commercialization. Mid-scale biomass power generation technologies can be used for large commercial or industrial applications and for grid-support for utility transmission and transmission systems. Large-scale biomass technologies are utility-scale technologies.

Mid- and large-scale generation technologies include steam turbines and gasifiers. Steam turbines are readily available commercially. Using producer gas to generate electricity on a mid- to large-scale is still in the demonstration stage. Fuel use for commercially available mid-scale biomass power systems can range from approximately 9,000 GT per year for a 1 MW steam turbine system to over 120,000 GT per year for a 10 MW direct-fired steam turbine system. The cost-effectiveness of cogeneration systems is much better than electricity-only systems, so siting a mid-scale biomass system should look at sites that have a significant heating or steam load, such as schools, municipal buildings, resorts, casinos, hotels, hospitals and other similar applications.

Other information resources on biomass power technologies include:

- Joint USDA/DOE [Biomass Research and Development Initiative](#)
- The [National Renewable Energy Laboratory](#)
- Nevada Tahoe Conservation District [biomass resource and technology assessment](#) (Requires Adobe Acrobat, which can be downloaded free from [Adobe](#))

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Biomass Heating

Biomass heating and cooling systems convert the energy stored in wood fuel into a more convenient form of energy for heating and cooling. Wood-fired boilers offer automated operation, low emissions, and potentially lower costs than conventional alternatives. Biomass heating systems are most cost-effective for facilities that will be replacing propane, fuel oil or electricity as the existing heat source. However, wood fuel costs are relatively constant, so biomass heating can be a hedge against volatile natural gas prices. Wood boilers produce hot water or steam that can be used for facility or district heating, cooling and hot water needs. The basic components of wood boiler systems are the wood receiving/storage area, combustion system, boiler system, ash handling system, and pollution control equipment. Wood can also be gasified and the resulting fuel burned in a furnace for heating. Cooling can be accomplished using absorption chillers. Absorption chillers can use heat from a boiler to provide cooling.

For more information about biomass heating, see:

- Natural Resources Canada's [Biomass Heating](#) software
- The [National Renewable Energy Laboratory](#)

- Nevada Tahoe Conservation District [biomass resource and technology assessment](#) (Requires Adobe Acrobat, which can be downloaded free from [Adobe](#))
- For gasification information, see [Wood Gas](#)

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Biomass Liquid Fuels and Chemicals

Biomass can be converted into a variety of value-added fuels and chemicals, including transportation fuels, heating oil, green chemicals and renewable plastics. Many of these products can replace products derived from petrochemicals, but some require new and improved processing technologies.

The [National Renewable Energy Laboratory \(NREL\)](#) and a variety of private partners have been developing conversion technology to produce fuel-grade ethanol from biomass. One focus of research has been on the conversion of cellulose to sugars, followed by fermentation of sugars into ethanol. To be commercially viable, such an ethanol conversion plant must be able to produce approximately 25 million gallons of ethanol per year to be profitable. The feedstock requirements for a 25 million gallon per year plant are an estimated 720,000 green (wet) tons of biomass per year. There are smaller-scale biomass to ethanol technologies that are under development that involve reforming producer gas from a gasification system into a bio-oil, followed by further refining into bioethanol. The smaller technologies still would require 100 - 150 green tons per day, or approximately 30,000 to 50,000 green tons per year to be economically viable.

In addition to ethanol, bio-oils can be produced from biomass. These bio-oils can be further refined to produce industrial lubricants, a replacement for certain types of diesel fuel, and a variety of other value-added chemicals. Bio-oils can also be used as a heating oil and in low-speed diesel engines to produce power. Bio-oils can not be used in high-speed diesel engines such as those used in transportation applications. Resins made with biomass extracts can also substitute in producing certain molded plastics and foam insulation. The main process for producing bio-oils is called pyrolysis. Pyrolysis is the process of converting biomass into three main products: liquid oil, char (which can be combusted or activated to make activated carbon) and a combustible gas. Leading companies for this technology include Renewable Oil International, Ensyn and Dynamotive.

For more information on liquid fuels and chemicals that can be produced from biomass, see:

- [National Renewable Energy Laboratory](#)
- [Forest Products Laboratory](#)
- Joint USDA/DOE [Biomass Research and Development Initiative](#)

Biomass Technology Vendors and Manufacturers

For more information about biomass technology vendors and manufacturers, see the [Vendor database](#)

Visit [Green-e](#) to find out more about renewable energy products.

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The benefits of biomass energy include:

- Reduced air emissions from open biomass burning
- Diminished risks of wildfire
- Job opportunities
- Energy self-sufficiency and price stability

Using biomass for heating and electricity generation can support forest management that reduces the risk of wildfire, while reducing smoke emissions associated with open-burning of biomass that can cause [air quality](#) problems.

Good forest management practices that include the appropriate use of thinning, prescribed fire and environmental monitoring can help improve [forest health](#) and reduce the risk of wildfire that threatens the unique natural resources and communities of Lake Tahoe, Carson City and the surrounding area. Forest management can do this by helping mimic more ecologically sound conditions observed prior to the extensive logging that occurred at the end of the 19th century and the near-total fire suppression of the 20th century. Treated forest stands are characterized by more frequent, low-intensity understory fires that promote forest regeneration and growth. This type of low-intensity fire reduces fuel loads in the forest that otherwise contribute to an increased risk of wildfire that could devastate Lake Tahoe's [water quality](#). Appropriate forest management can also help forests perform their day-to-day role maintaining Lake Tahoe's watershed through erosion prevention.

This type of forest stewardship is expensive. Without incentives, public and private land managers cannot afford to manage forests where conditions dictate that active management should be employed. In addition, forest management generates large quantities of wood biomass in the Lake Tahoe Basin, much of which is currently disposed of by open burning in the forest. The smoke from this practice is an ongoing [air quality](#) issue for residents in and near the Basin. Developing outlet markets for biomass can help defray substantial forest restoration costs in the Lake Tahoe Basin and alleviate the problems associated with biomass disposal.

Agricultural residues from harvesting crops such as corn, wheat, small grains and orchard crops can also be used for biomass energy, and can help increase farm incomes in the process. Some farmers burn crop residues following harvest to help prepare the land for planting in the subsequent season, which creates a smoke issue for nearby communities similar to that for pile burning of forest biomass. Alternatively, agricultural residues can be collected, baled and used for heating and power generation, creating an additional revenue stream for farmers while reducing smoke generation from pile burning.

Developing a biomass energy industry creates good-paying jobs for rural communities in natural resources, forestry, engineering, biomass fuel procurement, and power generation professions. In California, the biomass energy industry (excluding natural resources and forestry professionals that manage the land) supports 5 jobs for every megawatt of installed power generation capacity. The total employment impact is even larger, when all of the industries impacted are taken into account.

Biomass as an energy source is also a hedge against rising fossil fuel prices. While natural gas prices are historically volatile, biomass costs have remained relatively stable over the past several decades. Biomass can be a stable, predictably priced fuel for both heating and power generation compared with natural gas. As a replacement fuel for propane, oil or electric heating, biomass can prove a cost-competitive substitute heating fuel for homes and businesses that use a hot-water heating system. An added benefit is that biomass is a local renewable energy resource, allowing companies to become more self-reliant in meeting their energy needs.

Visit [Green-e](#) to find out more about renewable energy products.

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Efforts to develop market outlets for biomass have been expanded beyond the Lake Tahoe Basin to include the Carson City area. The Nevada Fire Safe Council is currently evaluating biomass resources in the Carson City area, with funding from the U.S. Forest Service through the National Fire Plan. The Nevada State Office of Energy has been a consistent advocate and supporter of biomass energy development, through financial and in-kind support for resource assessment, site identification and outreach efforts. The Nevada Fire Safe Council is working in cooperation with state and federal land management agencies and private landowners to evaluate planned forest management projects and to assess clean wood biomass generation from urban tree residues and wood products manufacturers.

In addition, South Lake Tahoe Unified School District has demonstrated interest in using a biomass heating system as a replacement for an aging natural gas system at South Lake Tahoe High School. The school district commissioned a feasibility study for installing a biomass heating system at South Lake Tahoe High School. The results of the study indicate that such a system is technically feasible, and could contribute to development of an energy and natural resource management curriculum for the student body.

The California Energy Commission is currently sponsoring a demonstration of a [small modular biomass power system](#) in the Truckee-Donner area, within the service area of and with the participation of the Truckee-Donner Public Utility District.

A wide range of stakeholders have contributed time, money, effort and interest to the development of this initiative. While many others have also contributed to this Initiative, key stakeholders include:

- [Nevada State Office of Energy](#)
- [California Energy Commission](#)
- [Nevada Fire Safe Council](#) Contact: Elwood Miller, ph: 775-322-2413, e-mail: firesafe@renonevada.net
- [U.S. Forest Service](#)
- [Western Regional Biomass Energy Program, U.S. Department of Energy](#)
- [Carson City, Nevada](#)
- [Nevada Tahoe Conservation District](#)
- [Nevada Division of Forestry](#)

- [Nevada State Parks](#)
- [California Department of Forestry and Fire Protection](#)
- [Community Power Corporation](#) - small modular biomass system manufacturer
- [McNeil Technologies, Inc.](#)

Visit [Green-e](#) to find out more about renewable energy products.



Publications

- Nevada Tahoe Conservation District. August 2003. [Biomass Energy Opportunities in and Around the Lake Tahoe Basin](#). Funding by the U.S. Forest Service National Fire Plan.
- U.S. DOE, Western Regional Biomass Energy Program. February 2000. [Development of a Green Power Program Using Biomass from the Lake Tahoe Basin](#).
- Tahoe Federal Interagency Partnership; [Lake Tahoe Presidential Forum](#). Discusses efforts to address environmental and infrastructure degradation in the Lake Tahoe Basin.
- [Executive Order 13057](#), a Presidential requirement for actions to reduce environmental degradation in the Lake Tahoe Basin.
- Diverse Interests, Collaborative Solutions: A dialogue on Bioenergy and Sustainable Forest Health in the West. Conference at Squaw Creek Resort. Information [on-line](#).
- Four Corners Sustainable Forests Partnership. April 2003. [Biomass Resource and Technology Assessment for the Four Corners Region](#). Resource and technology assessment for the Southwestern U.S.

Some documents may require the use of Adobe Acrobat Reader(tm), which can be downloaded for free from [Adobe](#).

Biomass technology and research information

Other information resources on biomass power technologies include:

- Joint USDA/DOE [Biomass Research and Development Initiative](#)
- The [National Renewable Energy Laboratory](#)
- Natural Resources Canada's [Biomass Heating](#) software
- Visit the [Forest Products Laboratory](#) for more information on biomass fuels, chemicals and products
- Visit [Green-e](#) to find out more about renewable energy products.

Biomass technology vendors and manufacturers

For more information about biomass technology vendors and manufacturers, see the [Vendor database](#)

Links to other Initiative participants

- [Nevada State Office of Energy](#)
- [California Energy Commission](#)
- [Nevada Fire Safe Council](#) Contact: Elwood Miller, ph: 775-322-2413, e-mail: firesafe@renonevada.net
- [U.S. Forest Service](#)
- [Western Regional Biomass Energy Program, U.S. Department of Energy](#)
- [Carson City, Nevada](#)
- [Nevada Tahoe Conservation District](#)
- [Nevada Division of Forestry](#)
- [Nevada State Parks](#)
- [California Department of Forestry and Fire Protection](#)
- [Community Power Corporation](#) - small modular biomass system manufacturer
- [McNeil Technologies, Inc.](#)

Other local and regional partnerships

- [Four Corners Sustainable Forests Partnership](#)
- [Greater Flagstaff Forests Partnership](#)
- [Sustainable Forests Alliance](#)

For more information

Contact Dave McNeil at the Nevada State Office of Energy, phone: 775-687-4909, e-mail: dmcneil@dbi.state.nv.us

Visit [Green-e](#) to find out more about renewable energy products.