Brattleboro Thermal Utility

Wood Biomass Fueled
Combined Heat and Power
Community Energy System

Request for Qualifications

Contents:

Introduction

Brattleboro Thermal Utility (BTU), a Vermont non-profit corporation, is embarking on the development of cogeneration (combined heat and power/CHP) facilities that will be fueled by wood biomass. This community energy system will serve as much of the Town of Brattleboro as possible with piped heat energy while producing electric power for the grid.

With this Request for Qualifications BTU is looking for organizations capable of carrying out a phase 1 feasibility study of this complex and ambitious Community Energy System. Subsequently (but *not* part of this RFQ), BTU will request feasibility study bids from the organizations selected via this RFQ.

BTU has begun seeking $40,000 to $60,000 to fund the subsequent Phase 1 feasibility study, including from the Town of Brattleboro, the Clean Energy Development Fund and other sources. We are open to modifying the amount necessary for the study so long as we are sure we can meet the decision threshold necessary for Phase 2.

The Scope of Services included in this document is a “work in progress scope” that may be modified based on feedback from those organizations responding to this RFQ.

Request for Qualifications
Procedures

A - Eligibility

The qualified candidates must possess and be able to demonstrate extensive knowledge of the design, construction and operation of combined heat and power (CHP) and/or community (district) heating systems in all aspects, technical, regulatory and economical. Knowledge of wood biomass or other renewables as a fuel for large scale generation systems is required. Expertise and specific experience in the implementation of CHP and district heating systems is required. Expertise and specific experience with implementation of district cooling is preferred.

The following background is all highly desirable in any Respondents we will choose to work with:

. Prior experience with the design, permitting and economics of large scale generation plants;

. Prior experience with the design, permitting and economics of extensive, in-ground infrastructure networks;

. Prior experience with the design, permitting and economics of existing in-building heating system conversion;

. Prior experience analyzing the economics of complex district/campus/municipal systems that include both generation and distribution facilities as well as multiple end-user customers;

. Specific knowledge and experience with CHP generation plants;

. Specific knowledge and experience with district heating systems, including master planning the distribution issues of such districts;

. Substantive knowledge of renewable energy fuels and technology that may be integrated into CHP and district energy systems;

. Substantive knowledge of thermal storage technology that may be integrated into CHP and district energy systems;

. Substantive knowledge of relevant electricity supply options, rates, provider options;

. Substantive knowledge of opportunities for district energy subsidies and financing through local, state and federal channels;

. Substantive knowledge of permitting, regulatory, legal and interconnection issues, most especially within state of Vermont frameworks;

. Prior experience completing similar feasibility studies, research and analysis;

. Ability to perform and deliver project deliverables on a timely basis;

Respondents may elect to assemble a team to address all requirements of this RFQ if they are not existent within a single organization. In such case the team members collectively must demonstrate the knowledge and experience noted above.

B - Submission of Responses

B-1 Schedule

a) The RFQ process will proceed according to the following anticipated schedule:

September 5 2008	RFQ issued
September 15, 2008	Deadline for all questions and clarification inquiries, submitted via e-mail to info@brattleborothermalutility.com
September 19, 2008	Deadline for distribution of all answers to questions
October 6, 2008	Responses due by 3:00 pm
November 3, 2008	Contractor selections.

b) **Responses will be due no later than 3:00 pm on October 6, 2008**. Responses received later than the date and time specified will be rejected or deemed non-conforming and returned to the Respondent unopened. BTU assumes no responsibility or liability for late delivery or receipt of responses.

c) The responses will be evaluated pursuant to the criteria set forth in this RFQ. Notification of selection or non-selection of all Respondents who submitted conforming responses will be mailed when the selection process is final.

d) If it becomes necessary to revise any part of this RFQ, addenda will be supplied to all Respondents who have notified BTU that they wish to receive all addenda.

e) There is no expressed or implied obligation of BTU to reimburse Respondents for any expenses incurred in preparing responses to this request.

B-2 Instructions for submission of responses

Respondents are cautioned to read carefully and conform to the requirements of this specific RFQ. Failure to comply with the provisions of the RFQ may serve as grounds for rejection of a response.

a) All responses must be submitted in hard copy, on 8 ½ x 11 paper (including all required submissions), with one (1) bound original, one unbound copy, six (6) bound copies (no three ring binders).

No faxed, emailed or late copies will be accepted.

b) Responses shall be no more than 30 pages long.

c) Responses must be delivered to:

RFQ for Community Energy System
c/o Brattleboro Thermal Utility, Inc.
Marlboro College Technology Center
28 Vernon Street
Brattleboro, VT 05301

Responses received before the time of opening will be kept unopened until then.

d) Any and all data, materials and documentation submitted to BTU in response to this RFQ shall become BTU's property and shall be subject to public disclosure.

B-3 Information Required:

The evaluation and short-list process established by this RFQ is intended to enable firms to demonstrate their qualifications to perform this study, and to enable BTU to evaluate those qualifications. Respondents are advised that the Statement of Qualifications should include specific information that will demonstrate the qualifications and experience required by this RFQ. Respondents should note that it is *not* the intention of BTU to received project-specific design or engineering recommendations as part of this RFQ.

a) Letter of Submittal: Letter of Submittal shall be on the Respondent's letterhead, and contain information on the point of contact for the Respondent including their title, address, phone, fax, and email.

b) Executive Summary: Respondents should provide a summary of their organization and their proposed approach for working with BTU. This summary should be a maximum of 2 pages.

c) Statement of Qualifications: All responses must include a statement of qualifications, experience and description of the Respondent firm and its history. The response should specifically indicate the firm's current and historical expertise in providing the consulting services identified in the RFQ. The response should also specifically indicate the strength of the firm's financial resources to provide these services.

d) Staff Qualifications: All responses must include resumes of each individual who will be providing consulting services on this project, as well as written descriptions of the individuals' experience in Combined Heat and Power and District Energy consulting.

All Respondents must identify the individual(s) who will have primary responsibility for contact and communications with BTU, and the person who is authorized to negotiate and contractually bind the Respondent.

BTU reserves the right to investigate and review the background of any or all personnel assigned to work under a contract and, based on such investigations, to reject the use of any persons within BTU's discretion. Any changes to personnel require formal written approval by BTU and BTU reserves the right to terminate a contract if changes are not approved.

e) Project Understanding and Approach: A general description of the tasks involved in this study (see Scope of Services section); a description of your approach for making decisions on the many different possible paths the study could lay out; and a description of your approach in collaborating with the interested parties on this study, most particularly BTU and the Town of Brattleboro.

f) References: All responses must include references from at least 3 clients of the firm, preferably clients who have utilized the firm on matters related to the consulting services sought herein. You must describe what the client's project was that you worked on and

what you did for the client. The references must include a contact person--most preferably the client you worked directly with on the project--, a full address, and a phone number.

If personnel who will be assigned to work under this RFQ previously participated in any of the projects performed for clients on the foregoing list, please identify the projects in which the individuals participated.

g) Equal Opportunity Employer: You must state whether you are an Equal Opportunity Employer. This will very likely be a requirement of the sources that will fund the feasibility study.

C - Proposal Evaluation Procedures

C-1 Evaluation Criteria
Selection of Respondents to provide combined heat and power & district heating consulting services will be based on the following criteria:

a) Demonstrated knowledge of the tasks identified in the Scope of Services of this RFQ.
25 points

b) Qualifications and experience of the primary personnel identified to provide the services. 25 points

c) Record and experience in providing similar services to other clients.
15 points

d) Demonstrated capacity and team structure to perform the type of services sought in this RFQ. 15 points

e) Project understanding and approach.
10 points

f) Strength of Respondent's financial resources to support the successful performance of the services sought in this RFQ.
5 points

Maximum Score: 100 points
Each criterion has an assigned maximum number of points as indicated above.

C-2 Evaluation Process
Evaluation Committee:
BTU's evaluation committee shall be comprised of a subset of BTU board members plus potential others outside the board that BTU might choose for their specific expertise or perspective.

Scoring and Ranking
Each member of the Evaluation Committee will score and rank each statement of qualifications independently, and then the entire committee will meet to discuss and determine the scores. Respondents will then be ranked from the highest to the lowest based on their scores and a short list produced.

Any Respondent that submits a Statement of Qualifications may be required to make an on-site presentation of its capability to perform as described in its statement. Such a presentation will be at the Respondent's expense and will provide an opportunity for the Respondent to clarify its statement to ensure a thorough mutual understanding.

D - Preservation of Rights

BTU reserves the right to:
a. Accept or reject any and all Statements of Qualifications received in response to the RFQ, and to re-advertise for new submittals.
b. Waive or modify any irregularities in Statements received after prior notification to the Respondent.
c. Request the submission of Statements modifications at any time before the selection is made, if such is in the best interest of BTU.
d. Consider Statements or modifications received at any time before the selection is made, if such is in the best interest of BTU.
e. Request clarification and/or additional information from the Respondent during the evaluation process.
f. Utilize any and all ideas submitted in the Statements received unless those ideas are covered by legal patent or proprietary rights and the patent of those rights is indicated by the Respondent. Statements will become the property of BTU.
g. Negotiate with the selected Respondent(s) to include further services not identified in this RFQ.

This RFQ does not commit BTU to select any Respondent, award any work, pay any costs incurred in preparing a response, or procure or contract for any services or supplies. BTU reserves the right to accept or reject any or all submittals received, cancel or modify the RFQ in part or in its entirety, or change the RFQ guidelines, when it is in the best interests of BTU to do so.

Appendix

Phase 1 Scope of Services

Synopsis

Brattleboro Thermal Utility (BTU), a Vermont non-profit corporation, is embarking on the development of cogeneration (combined heat and power/CHP) facilities that will be fueled by wood biomass. This community energy system will serve as much of the Town of Brattleboro as possible with piped heat energy while producing electric power for the grid.

It is assumed that the electricity produced can be sold to Vermont regulated utilities or to the NE ISO grid. BTU will push for and highly desire an agreement with those utilities to give priority to Brattleboro needs with this power supply.

The thermal commodity (steam and/or hot water) is to be transported through a new infrastructure (piping) network to the districts to be served within the Town.

In support of this development effort BTU requires investigation, reporting and recommendations of promising and viable project structures and their components including fuel supply, technology, vendors, contract vehicles, economics and regulatory framework. The Task Summary is as follows:

1. Investigate and report on possible CHP options
2. Detail and report the options for thermal distribution system and components
3. Describe thermal point of use conversion and maintenance issues
4. Provide sensitivity analysis and pro-forma(s)

<u>The study should refer to the best available technologies on a global basis, including those being used in district energy systems in northern Europe. Information on technologies in use in the U.S., however, should also be included.</u>

The study should result in a model run through for all the aspects listed above, and for understanding how they may result in multiple related business units. It should lay the ground work for subsequent multiple business plans.

The study should result in enough information to make a “go/no go” decision for the subsequent phase. It will involve a complex set of factors--technical, organizational, environmental, economic and regulatory--, and a matrix is essential for making sense of how those factors relate and will drive the decision.

The results should also be highly useful for other communities to look at.

Task 1. Investigate and report on possible CHP options

Brattleboro Thermal Utility wants to develop one or more wood biomass fueled, combined heat and power plants that will produce both steam/hot water for district heating and electricity for the grid. It realizes that the configuration of such plant or plants can vary by size and location and sections of the town to be served, and that the design of such a plant is affected by the demand for electricity versus demand for steam/hot water.

Deliverables

a1) Review biomass fueled CHP technology options and estimate the cost of the most viable options to construct a (net) 5 MWe CHP plant (discounting land acquisition and preparation). Estimate the cost to construct a 15 MWe CHP plant. Estimate the cost to construct a 25 MWe CHP plant. Explain your assumptions including thermal commodity production level.

When producing these costs, express them in both "Overnight Capital Cost" form (as if the plant could be built instantaneously) and "All-in Real Levelized Cost" form ($/MWh). These are approaches used by Concentric Energy Advisors in their January 18, 2008 report: Vermont Utilities - Technical and Cost Issues of Generation Alternatives. (See p. 11 of that report.)

a2) The ratio of electric to thermal output (MWe to MWth) is a key part of the plant design. Describe the possibilities for this relationship in various plant designs.

a3) No matter what size CHP plant is built, will a backup generator and/or a backup fuel source be needed? If so, how much will these add to the construction cost of each size plant?

a4) Are there fuel price vs capital cost tradeoffs? That is, can a backup generator be avoided if the anticipated price of fuel is high?

b) Estimate the footprint needed for a 5 MWe CHP plant (including backup generator if needed). Estimate the footprint needed for 15 MWe and 25 MWe plants.

c) Determine how many days supply of wood biomass is advisable to keep on hand for a CHP plant. Would this answer be different if the plant is meant to serve base load electricity needs? To serve peak load electricity needs?

d) Given the answers directly above, answer what land area is needed for a storage facility for the wood biomass supply. Describe options for storage with cost and benefit implications.

e) Determine the likely total lot size needed for a 5 MWe plant, a 15 MWe plant and a 25 MW plant. (Include the main plant itself, any backup facility, storage facility, office space, traffic turnaround space, etc.)

f) Convert the thermal energy produced by a 5 MWe CHP plant into capacity of million Btu's (MMBtu) for district heating. Also do so for 15 and 25 MWe CHP plant.

g) Describe and recommend options to fund the construction of a CHP plant. What is the likely cost (or likely range of costs) of that money, and number of years for any loan? For different ownership structures report on incentives and grant(s) availability from government and other sources.

If the funding sources are a combination because of the combination of heat and electric power production, clearly define those subsections of funding.

h) Review and recommend legal structures for owning the CHP plant, and the pros and cons of each.

i) Determine at least two but preferably more locations in Brattleboro where a CHP plant could most easily tie into the electricity grid. These locations should have sufficient vacant or developable land and should be accessible to truck delivery.

j) For each of those locations, determine the best route for delivery of wood biomass by truck. Do so as if the supply were coming from Rte 9 in VT, Rte 30, Rte 9 in NH, I91 or other likely directions.

k) For each of those locations, determine whether there is a nearby rail spur that can be used to deliver wood biomass.

l) State what factors come into play in determining whether the CHP plant will be more feasible if built as electric production based versus thermal production based.

Please keep in mind that chilled water, especially in the summer, can also be a service delivered by the community energy system. Also, there may be important uses -- such as new or expanding greenhouses -- that are not as prevalent today.

m) State what factors come into play in determining whether the CHP plant is more feasible if built for peak electrical demand or for base-load electrical demand.

n) Estimate the market price of electricity in 2012, 2016 and 2020, under 2 scenarios:
- Selling that electricity directly to the NE ISO grid.
- Selling that electricity to Vermont regulated utilities.

o1) What local, regional and state permitting steps will be necessary in order to build a CHP plant? What is the likelihood of acquiring an air pollution permit.

o2) Since federal funding may be used to support the project, report on NEPA requirements.

p) Discuss the issue of "thermal following" related to base load electric operation. Does it make sense to design and size a CHP plant to provide the expected heating load, and have the electric production follow that? Or does it make more sense to design and size the CHP plant based on the electric output. If the latter, the feasibility study should address what to do with excess heat in the summer--or any time of year when the waste heat generated exceed the thermal demand.

Scope of Services (cont'd)

Task 2. Detail and report the options for thermal distribution system and components

It is a given, with a community energy system for heat, that new piping infrastructure is needed. Assume that the delivery system is using hot water as the thermal commodity. The hot water must be delivered to or near multiple buildings within one or more districts of the town.

Deliverables

a1) Estimate the cost of materials per linear foot for the hot water pipe infrastructure in trunk lines. Specify the pipe size for trunk lines. Assume pre-insulated pipe. What standards should be used?

It is assumed that both outbound and inbound pipelines (in parallel) will be necessary. State whether you agree, and for either steam or hot water.

Cite sources of pricing and compare to most recent RS Means data.

a2) Estimate the cost of materials per linear foot for the hot water pipe infrastructure in spur lines. Specify the pipe size for spur lines.
Cite sources of pricing and compare to most recent RS Means data.

a3) Estimate the cost of materials per linear foot for the hot water pipe infrastructure for connector lines to buildings (or building complexes). Specify the pipe size for connector lines. If this varies based on the size of the buildings to be served, state what variables would be used to determine the pipe size.

Cite sources of pricing and compare to most recent RS Means data.

a4) Describe the variables (such as demand for the materials that go into a pipe) that may substantively affect the price of pipe materials.

b) Estimate the labor and overhead cost per linear foot for installing the pipe. What variables (e.g., number of streets crossed, soil types, machinery needed) might affect these costs? Cite sources and comparison with most recent ***RS Means*** data.

c) Determine the feasible ways to recover the costs of the commodity distribution system. For example, should it be through one-time fees charged at time of connection? Or, should the debt on the infrastructure be recovered through monthly fees? Or a combination of the two?

d) Given the likely CHP plant sites listed in Task 1, total the size of the potential to-be-heated building spaces within half a mile of those sites. Also, within a mile of those sites.

> If you think it advantageous to have access to local information to help answer these questions, please contact Rod Francis at Brattleboro's Planning Services Department at (802) 251-8154.

e) List the types of heating systems already in use in those buildings, with percentage by type

f) Recommend one or more legal structures for owning the pipe infrastructure, and the pros and cons of each.

g) What local, regional and state permitting steps will be necessary in order to build the pipe infrastructure?

h) Determine the cost of materials per linear foot for conduit for potential future fiber optic lines.

i) Determine the additional labor and overhead cost per linear foot for installing conduit for potential future fiber optic lines, assuming the trenching has already occurred for the pipe infrastructure.

Scope of Services (cont'd)

Task 3. Describe thermal point of use conversion and maintenance issues

Most buildings in Brattleboro currently would not be able to accept the steam/hot water thermal energy that a district energy system would provide. Each of those buildings has one or more boilers or furnaces or other means for its building specific heating system. Various degrees of conversion at point of use to new or modified systems to accept the district heat will be necessary, and maintenance personnel may have to gain new skills to effectively install the systems.

Deliverables

a) Determine an average thermal point of use conversion cost (i.e. per square foot of a building). Describe the variance of cost for the different types of existing heating systems.

b) Research and list the local companies, both large and small, that could take on thermal point of use conversion and maintenance work.

c1) Estimate the likely cost to convert a 100,000 square foot commercial/industrial/institutional building, assuming it currently runs one primary and one backup boiler or furnace. Provide breakout for:

- new heating unit(s)
- hot water lines within the building
- labor costs

Will there be a significant variation based on what type of internal heat distribution system is currently in use in a building and what it would connect to? For example, a building with a hot water system connecting to a steam source vs a building with a steam system connecting to a hot water source, etc.

c2) Determine the optimal size for commercial, industrial, and/institutional buildings in Brattleboro that can possibly connect to the thermal commodity service. Estimate the likely cost to convert these buildings. Is there a minimum size that can be considered given cost/benefit? Is there a maximum size given the ability of the system to serve it?

c3) Estimate the likely cost to convert a multi-unit residential building with 25 units, assuming it currently runs one primary and one backup boiler or furnace.

c4) Estimate the likely cost to convert a multi-unit residential building with 10 units.

c5) Estimate the likely cost to convert a single-family home currently served by one boiler or furnace.

d) Estimate likely cost per employee to train heating professionals in new conversion and maintenance skills.

Scope of Services (cont'd)

Task 4. Provide sensitivity analysis and pro-forma(s)

District energy systems are complex entities, but they are technically and economically feasible since they have been successfully built and operated in North America and Europe.

Sizing the CHP plant(s) is one challenge, planning an appropriate piping infrastructure is another. The associated costs of fuel and point of use conversion are also parts of the equation. And of course the classic supply and demand variables of the market place are applicable to all of this.

BTU wants guidance on whether to take the next step. That is, is such a system feasible economically in Brattleboro? And can it be beneficial to customers not just now but in the future? And will it be beneficial to the environment?

For purpose of this study assume multiple potential price points for delivered wood chip fuel:
- $30 per ton
- $45 per ton
- $60 per ton

Deliverables

a) Given the information determined in Tasks 1 through 3, create an analysis that includes a matrix of the variables that will determine the economic feasibility of a wood biomass fueled community energy system in Brattleboro. Given this matrix, state what combination of values in these variables will most likely lead to a successful project. If there is more than one combination of values that will work (for example, for different plant sizes but serving different customer bases), state that as well. State whether a 5 MWe plant is likely to be feasible. State whether a 15 MWe plant is likely to be feasible. State whether a 25 MWe plant is likely to be feasible.

b) The analysis should point out how its conclusions are affected by potential market changes. For example, while a comparison to today's price points for heating oil and electricity are important to the feasibility of building this system, the likely future price points are even more important.

c1) The analysis should point out how its conclusions are affected by the cost of money, for both the CHP plant(s) and the pipe infrastructure.

c2) The analysis should demonstrate whether and how the cost of money will likely vary depending on the business unit. For example, the CHP plant itself will likely have a big dose of private investment while the distribution piping system might include more public money, and the money borrowed might well be for different periods and at different rates.

c3) The analysis should reflect other potentially applicable revenue streams, such a renewable energy credits, carbon credits, and other similar tradable securities.

d) The analysis should then be extended to include additional potential local benefits.
- For example, what will be the amount of employment created, for CHP plant construction, for pipe infrastructure installation, and for ongoing maintenance and administration?

e1) After analyzing the rest of the information, what are the likely savings generated by the district energy system compared to today's customer costs? For example, what are the likely savings for heating a commercial/industrial/institutional building of 100,000 square feet? (Include of course all costs that will initially or eventually be reflected in customer bills, such as any tie-in fees, debt payback and covering of ongoing costs, conversion costs.)

e2) Estimate the savings and simple payback for a 10,000 square foot commercial/industrial/institutional building.
e3) Estimate the savings and simple payback for a 25-unit residential building.
e4) Estimate the savings and simple payback for a 10-unit residential building.
e5) Estimate the savings and simple payback for a single-family home.

f) Provide a quantification of environmental effects of any emissions the CHP plant might generate, on a lbs/MWh basis. (E.g., CO2, SO2, NOx, particulate matter.)

g) Determine the green-house gas reductions brought about by replacing 1 MW of oil-fired thermal generation with 1 MW of (locally harvested) wood biomass fueled thermal generation. Use ***total cost accounting methodology*** (raw materials to deconstruction) in the determination. Also determine for replacing the same amount of gas-fired generation, and replacing the same amount of nuclear generation.

Alternative: Quantify the greenhouse gas emissions benefits, relative to both heating and electricity generation for a CHP district energy plant.

h) Determine whether there is a business case for building two CHP plants in Brattleboro. If so, the study should show whether building the 2nd CHP will be less expensive than building the first, and whether building two at once makes more sense than building them in phases. Address economies of scale and plant operating costs.

i) Produce a 10-year cash flow analysis covering:
- Income from electricity sold to the grid.
- Income from the hot water sold to customers. Justify assumptions regarding how many square feet of space will get added to the customer base month by month until break even is reached.
- Cost of wood biomass fuel per month.
- CHP plant debt to be repaid each month.

- Costs from ongoing construction of new pipe infrastructure. Justify assumptions regarding how many feet of such infrastructure will get added each month.
- Pipe infrastructure debt to be repaid each month.
- Cost of maintenance operations.
- Cost of administrative operations and expenses.

j1) Determine what customer base in electricity demand plus MMBtu of heating demand will be needed to cover the debt on a 5 MWe plant. And on a 15 MWe plant. And on a 25 MWe plant. Or on a per MW rule of thumb basis.

j2) What percentage of district heating infrastructure needs to be constructed to ensure sufficient ROI to get the district energy system started?

k) Determine what customer base in MMBtu per foot of pipe will be needed to cover the initial and ongoing costs of installing that pipe.

l) Assuming your analysis shows that one or more scenarios for wood biomass-fueled CHP district heating are viable in Brattleboro, recommend a work plan for the next steps to make it happen. This should include an outline for potential Phase 2 studies of the various aspects/business units.

m) Produce an inventory of state and federal funding sources that could support both development and operation of this community energy system.