Feasibility Study

LIGHTOLIER®

Remit to:
LORI Solicitation
Solicitation No. 2006-GB-02
Massachusetts Technology Collaborative
Innovation Center
75 North Drive, Westborough, MA 01581-3340

Large Onsite Renewables Initiative

Feasibility Study and Design & Construction Grants (2006-GB-02)

Authorized Applicant's Signature and Acceptance Form

The undersigned is a duly authorized representative of the applicant listed below. The applicant has read and understands the Solicitation requirements. The undersigned acknowledges that all of the terms and conditions of the Solicitation are mandatory. The applicant specifically acknowledges the application of the procedures regarding submission of sensitive information as set forth in Section 7.1 of the Solicitation, and specifically agrees that it shall be bound by those procedures.

The undersigned has either: (i) specified exceptions and counterproposals to the Agreement (set forth in Attachments D and E) in Section 8 of the Application or (ii) agrees to the terms and conditions of the Agreement and has included a signed copy of the General Terms and Conditions document with its Application. The undersigned acknowledges and agrees that the failure to submit exceptions and counterproposals with this Application shall be deemed a waiver and the neither the General Terms and Conditions nor the Task Order Template shall be subject to further negotiation.

The applicant understands that, if selected by MTC, the applicant and MTC will detail and execute a Task Order that outlines the respective roles and responsibilities.

I certify that the statements made in this application, including all attachments and exhibits, are true and correct to the best of my knowledge.

Applicant: Lightolier

(Printed Name of Applicant)

By: _____

(Signature of Authorized Representative)

Name: Bob Wedekind

Title: General Manager

Date: 8/16/06

Large Onsite Renewables Initiative
Feasibility Study and Design & Construction Grants (2006-GB-02)
Application Summary Sheet
Form and Instructions

Applicant Information	
Primary Applicant – Organization (must be primary end-user): Lightolier (a division of Genlyte Thomas LLC)	**Partners (if any):**
Short Title of Project: Lightolier Wind Turbine Feasibility Study	**Grant Type (check one):** X Feasibility Study ___ Design & Construction
Applicant legal status and state of jurisdiction: A Delaware Corporation	**Applicant Taxpayer ID#:** 22-3600475
Total Project Cost (Feasibility Study or Design & Construction): $44,975	**MTC Funding Amount Sought:** $39,975
Mailing Street Address: 631 Airport Road	**City/ Town:** Fall River
State: Massachusetts	**Zip Code:** 02720
Applicant's Simple Payback Requirement for Renewable Energy System (years):	**Has Applicant previously received assistance from RET? If yes, please explain and include amount received:** No

Facility Information			
Name of Project Facility (Load): Lightolier Corporate Headquarters and Manufacturing Facility			
Facility Type (circle all that apply):			
Public *State agency building, municipal building, school, etc.*	**Commercial X** *Retail, office space, high-rise housing, multi-family homes (> 6 units), warehouse, large farm, etc.*	**Industrial X** *Manufacturing, industrial services, etc.*	**Institutional (private)** *University, museum, private school, not for profit, etc.*
Other (please describe) _____			
Facility Street Address: 631 Airport Road		**City/ Town:** Fall River	
State: Massachusetts		**Zip Code:** 02720	
Electric Utility Service Provider and Rate Class: National Grid G-3 (Time of Use)		**Average Annual Electricity Usage (kWh) and Peak Electricity Demand (kW) of Facility:** 9,980,000 kWh, Peak Demand 2502 kW	
Is the proposed location within Economic Target Area (ETA)? _X__Yes ___No		**If the applicant is different from the project owner, please summarize the type of arrangement:**	

Renewable Energy Project Technical Information	
Proposed Renewable Energy Project & System Size	**Annual Net Electricity Production Estimate (kWh) and Estimate**

Renewable Energy Technolog(ies): **One utility scale wind turbine (1.5 to 2.5 MW)** **1500-2500 kW (peak output) per manufacturers specifications** **___X__ AC or ____ DC (check one)**	**of Behind the Meter Electricity Use:** **3,300,000 kWh (1500 kW * 8760 hours * 25% Capacity Factor)**
Estimated Total Installed Cost of Renewable Energy Project (itemize if more than one tech.): **$2,900,000**	**Estimated Installation Completion Date of Renewable Energy Project: Summer 2008**
Estimated Simple Payback of Renewable Energy System without MTC Incentive: 10.4 years post-tax	**Estimated Simple Payback of Renewable Energy System with MTC Incentive: 3.5 year post-tax**
Does the Applicant intend to design and build an Advanced Building, Energy Star building, or green building to LEED Standards as part of this project? If so, specify applicable standard. **___Yes X No**	

Point of Contact Information

Primary Contact: Authorized to commit organization; notified upon decision of grant award	
Name: Robert (Bob) Wedekind	**Title: General Manager- Lytecaster/Engineering Services**
Organization: Lightolier	**Phone: (508) 646-3140**
Email Address: bwedekind@lightolier.com	**Fax: (508) 646-3163**
Mailing Street Address: 631 Airport Road	**City/ Town: Fall River**
State: Massachusetts	**Zip +4 Code: 02720-4722**
Website: www.lightolier.com	
Project Manager: Contact over course of project	
Name: Tom Michelman	**Title: Principal**
Organization: Boreal Renewable Energy Development	**Phone: (978) 580-6190**
Email Address: tmichelman@boreal-renewable.com	**Fax: (978) 246-7943**
Mailing Street Address: 6 Magnolia Dr.	**City/ Town: Acton**
State: MA	**Zip +4 Code: 01720**
Website: www.boreal-renewable.com	
Public Contact: Listed on MTC website for project information requests; contact for publicity efforts	
Name: Robert (Bob) Wedekind	**Title: General Manager**
Organization: Lightolier	**Phone: (508) 646-3140**
Email Address: bwedekind@lightolier.com	**Fax: (508) 646-3163**
Mailing Street Address: 631 Airport Road	**City/ Town: Fall River**
State: MA	**Zip +4 Code: 02720-4722**
Website: www.lightolier.com	

Applicant Verification:

I verify that I am authorized to make this application, and that the statements made herein, including all attachments and exhibits, are true and correct to the best of my knowledge.

_____ _____

(Signature of authorized individual) (Date)

Large Onsite Renewables Initiative
Feasibility Study and Design & Construction Grants (2006-GB-02)
Application Narrative
Form and Instructions

1. Proposed Project Summary

Project Title and Location (City and State)	
Organization:	*LIGHTOLIER*
Building Type:	*XXXXXX*
Technology and Project Size (kW)::	*One 1.5 to 2.5 MW wind turbine (1500 to 2500 kW)*
Grant Request:	*$39,975*
Contact:	*Robert Wedekind* bwedekind@lightolier.com **(508) 646-3140**

Lightolier, a division of Genlyte Group LLC, is a company with a rich history of growth and innovation in the electric lighting industry. Founded in 1904, Lightolier has built a reputation for leadership and success since the early days of electric lighting. Their Fall River, MA location serves as company headquarters and the central manufacturing and distribution facility. With a very large electric demand, Lightolier wishes to investigate the potential of installing a utility scale wind turbine (approximately 1.5 to 2.5 MW) to help offset electricity demand and rising energy costs.

The Lightolier site consists of 24 acres situated near the abandoned Fall River airport. There is one large building and an employee/visitor parking lot. To the west and south of the site is wooded area where a turbine would likely be constructed. The site is located in Fall River Industrial Park and has no residential neighbors in the immediate area. 2005 electricity usage at Lightolier was approximately 9,800,000 kWh with a peak demand of 2500 kW.

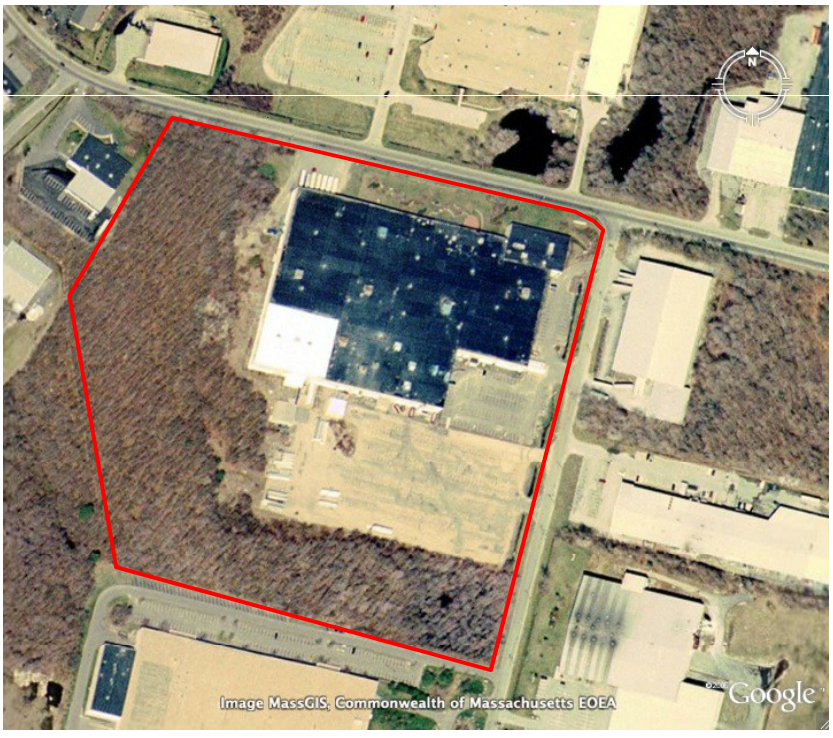


Figure 1 – Aerial view of Lightolier site showing extent of property in red. Source: Google Maps 2006.

Robert (Bob) Wedekind will serve as project manager for the Lightolier wind turbine feasibility study. He will work closely with Boreal Renewable Energy Development (Boreal) who will lead the technical and economic analysis for the feasibility study and manage the team of subcontractors. Team responsibilities include:

- Boreal Renewable Energy Development will lead the feasibility analysis,

		with main tasks including assessment of the site, on-site energy consumption review, screening applicable wind turbine technology, research local zoning ordinances and state and federal regulations. They will integrate the data such as wind regime, power pricing, wind turbine permitting, design and construction costs into the economic feasibility analysis, and prepare presentation materials and the draft and final reports. • Richard C. Gross, P.E., Inc. will provide an analysis of the interconnection and integration of the wind turbine and other electric engineering requirements. • KB Energy will install a meteorological tower and datalogging system. • Saratoga Associates will perform the wind turbine photo visualization. • Richard Podolski of Louis Berger Group, Inc. will research the potential avian impacts of a wind turbine at Lightolier. We will provide deliverables as described in Attachment F "Feasibility Study Requirements" of the LORI solicitation documents. Assuming an early November, 2006 kick-off date, our first major task will be to erect a meteorological tower in order to collect three months of wind resource data. Collection of wind data will be the binding constraint on schedule. During that time, we will perform the other aspects of the technical and regulatory analysis, and work that will provide the foundation of the economic analysis. After the three months of wind data are collected, we will correlate and estimate long-term wind resources using other local wind data sources. We will then integrate the wind resources with turbine power curves, with information on on-site load, retail electric costs, REC revenue, project costs, etc. to perform an economic analysis. We will deliver a draft report in March and presentation to project decision makers and final report in April 2007. The total project budget is $44,975. We request a MTC cost share of $39,975.
2.	**Team and Qualifications**	
2.1.	Applicant Commitment	Lightolier is a well-recognized, profitable, corporate leader in the manufacturing of lighting systems and fixtures. Our Fall River Corporate Headquarters location also serves as the primary manufacturing facility (accounting for approximately 30% of total production), and employs 700 workers from local and surrounding communities. Included in Lightolier's portfolio is a line of efficient (ENERGY STAR®) lighting products that reflects Lightolier's energy and environmentally conscious corporate philosophy. Lightolier is a leader in environmental stewardship through its promotion of green manufacturing. These efforts result in a safer workplace for employees and instill our leadership in the community as an environmentally conscious neighbor. Lightolier was recognized for outstanding environmental innovations on the nationally syndicated program *American Environmental Review,* hosted by Morley Safer. Lightolier's competitors are primarily located in the south or overseas, where energy costs are typically lower than in the northeast. Offsetting rising electricity costs through onsite wind turbine generation will allow Lightolier to remain a competitive, profitable business in Massachusetts offering high quality employment opportunities. Further, Lightolier recognizes the importance of renewable sources as a tool to help meet energy demand in a more sustainable fashion. In these senses, Lightolier is committed to a future generation of business and environmental leadership. Concurrently, Lightolier is also researching the opportunity to employ solar generated energy to further reduce our electrical demand and cost of operation. In just the past three years we have made significant capital investments in manufacturing that have increased our capacity, improved quality, and reduced costs. As a highly profitable and successful company, Lightolier typically adopts a payback requirement

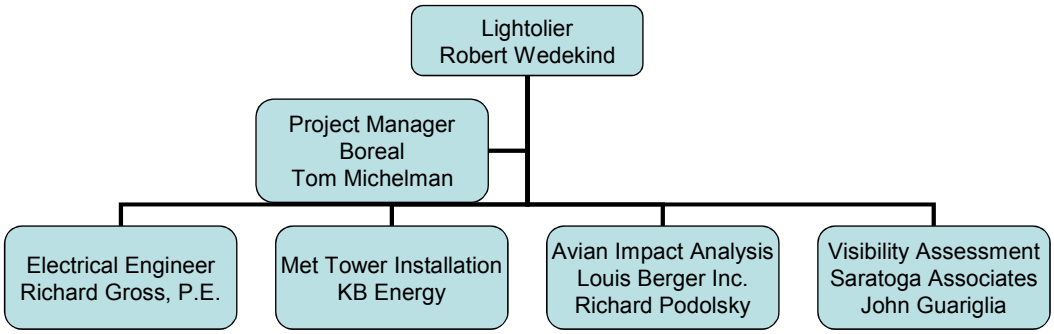
		of approximately two years. However, since we recognize the long-term value (monetary and other) associated with renewable energy projects, as well as the realistic payback periods with utility scale wind turbines, we will accept a period of 4 to 6 years.
2.2.	Host/Partner Commitment	N/A. Lightolier is both the site owner and applicant.
2.3.	Team Description and Qualifications	Boreal Renewable Energy Development (Boreal) was founded in 2003 to provide comprehensive project management and consulting services in the area of renewable energy. Their primary goal is to provide assistance to towns and commercial customers for facilitation and development of distributed generation or utility-scale wind power generation applications. Their services encompass the entire project development cycle: from project inception, feasibility, permitting, design, and construction through ongoing sale of RECs. Boreal Renewable Energy Development is a Massachusetts General Partnership between Robert A. Shatten Inc. and Thomas S. Michelman Inc. Boreal Renewable Energy Development is the legal entity that is bound by this Proposal. Mr. Michelman will be the project manager for Boreal representing Lightolier for this project. As the Principal of Richard C. Gross P.E., Inc., Richard Gross provides professional electrical power engineering services for the design and development of wind energy and other renewable energy projects. Services include project interconnection and integration, feasibility analysis, site screening, technology assessment, project support and project management. Saratoga Associates is one of the most respected providers of visual impact assessment services in the country. As landscape architects, architects, engineers and planners consideration of the aesthetic quality of the visible landscape, no matter the project type or size, is founded in our core environmental values. Saratoga has provided visual assessment services for a variety of project types including renewable energy, power transmission systems, industrial development, land and natural resource management projects, residential proposals, and transportation systems. Specifically, over the past few years Mr. John Guariglia, RLA, has assisted Boreal Renewable Energy Development in completing feasibility studies for the development of wind power. Louis Berger, Inc. is an international civil engineering and environmental science consulting firm who will assign Dr. Richard Podolsky to this assessment. Dr. Podolsky is an ornithologist and certified senior ecologist who focuses on environmental compliance including but not limited to environmental conservation, natural resource assessments, ecological/environmental restoration, site assessment/site investigations (PA/SI), habitat evaluations, resource conservation and recovery, and Migratory Bird Treaty Act. KB specializes in quality workmanship and customer satisfaction. We strive to provide our clients with unparalleled service that results in complete confidence in the setup of your wind resource assessment tools. Whether it be a turn key tower setup or a custom configuration using specialized meteorological equipment; KB is your choice for met tower services. 

Figure 2 – Lightolier wind turbine feasibility study organizational chart

3. Project Characteristics and Current Status

3.1. Site

The Fall River location is Lightolier's world corporate headquarters as well as a central manufacturing facility. The site can be considered both commercial and industrial, as corporate offices and industrial manufacturing are both present. The Lightolier site offers significant opportunity for a successful distributed generation wind energy project. It has significant wind resources (AWS Truewind annual average estimate of 6.0 m/s at 70 m height), a very large electric load on a single meter, and ample real estate for wind turbine staging and erection. The site is approximately 24 acres and consists of one large building, a large employee/visitor parking lot, and wooded area. Immediate abutters are other industrial sites and wooded area. The site is located in the center of the Fall River Industrial Park and has no residential abutters.

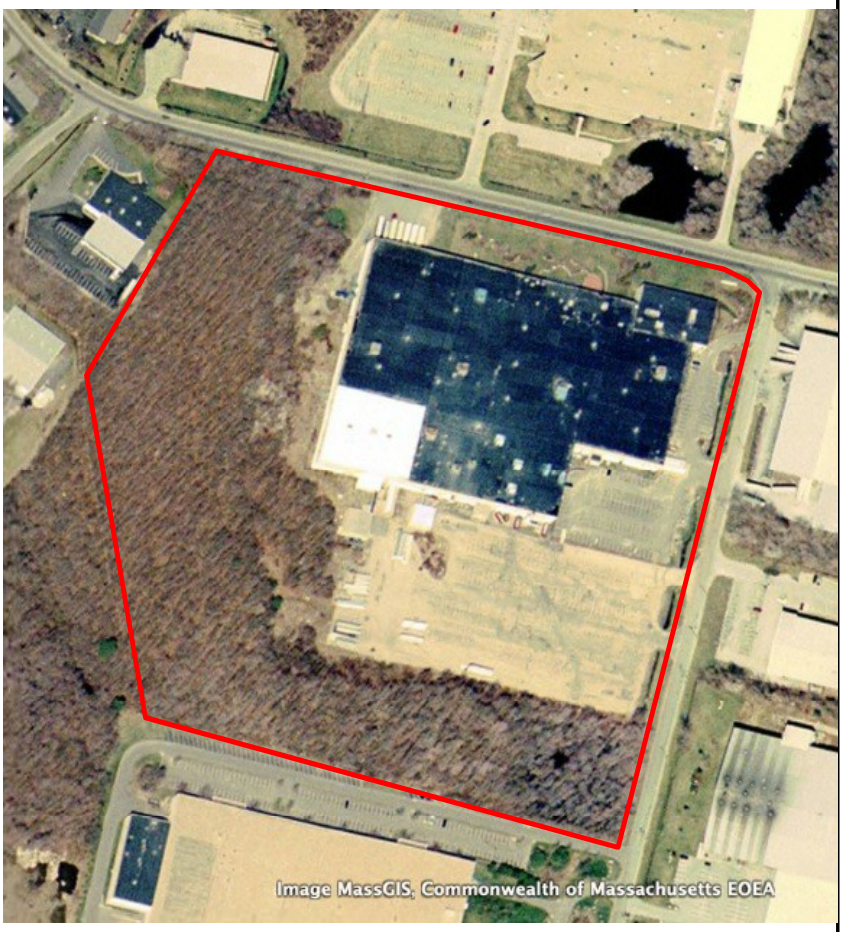


Figure 3 – Aerial view of Lightolier site showing extent of property in red and immediate industrial abutters and wooded area. Sufficient area exists on site for turbine staging and erection. Source: Google Maps 2006.

Roughly 9,800,000 kWh are consumed annually at Lightolier, providing justification for as many as two utility scale wind turbines. However, due to land constraints, the feasibility study will focus primarily on the construction of one 1.5 to 2.5 MW turbine with the goal of offsetting as much electricity as possible. Figure 4 below shows monthly electricity consumption for Lightolier for the most

recent year. Overall, Lightolier's load profile is relatively flat. Usage does increase somewhat during the winter months, which corresponds nicely with the assumed increase in wind speeds that would occur during that time.

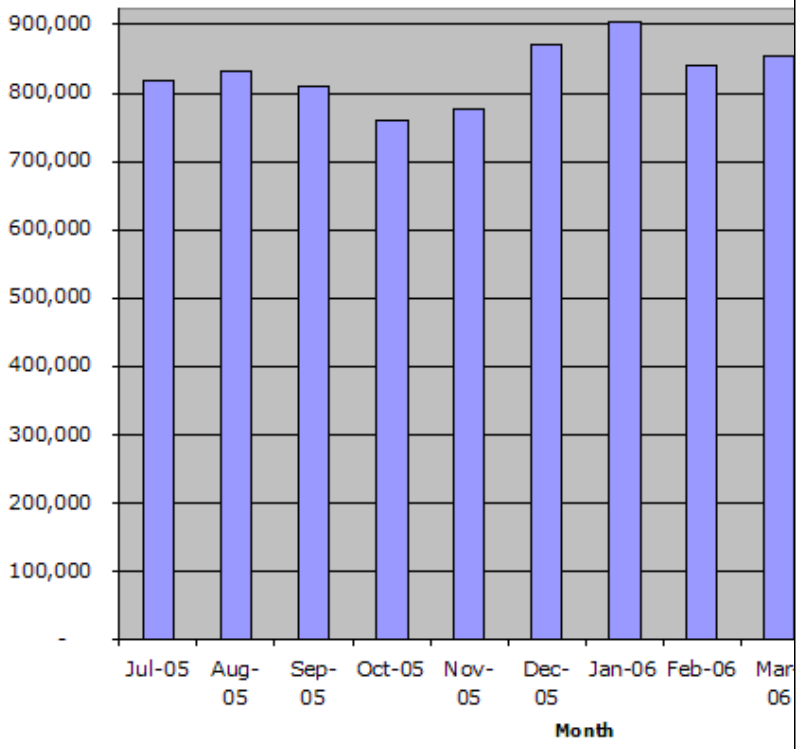


Figure 4 – Lightolier 2005-06 monthly electricity consumption, in kWh.

3.2.	The Proposed Renewable Energy System	The feasibility study will focus on the siting of one utility scale wind turbine (approximately 1.5 to 2.5 MW nameplate capacity) on Lightolier's Fall River property. The feasibility of installing all equipment associated with a wind turbine of this size (i.e., transformers, electrical cables, etc.) also will be addressed in the study. The electricity produced from the turbine will be used onsite at Lightolier, with excess being delivered back to the grid. To estimate the amount of electricity produced from a turbine at Lightolier, an initial calculation was performed by Boreal using a General Electric (GE) 1.5 MW model sle turbine. Using the AWS Truewind wind resource estimate of 6.0 m/s at 70 m hub height, a capacity factor of 25.0% was calculated. This translates into approximately 3,300,000 kWh of annual production, of which about 3,000,000 kWh (93%) would be consumed by Lightolier. About 30% of Lightolier's demand will be provided from the wind turbine. This was determined by combining Lightolier's load profile with estimated hourly wind speed data, thereby predicting production and consumption over time. To refine these system performance estimates, a custom wind resource assessment will be a component of the feasibility study. In the end it is hoped that the feasibility study will present a clear path forward for design and construction to start in Spring of 2007, with installation to occur approximately 8 -12 months following a turbine purchase order.
3.3.	Economics	Private ownership is the primary ownership structure under consideration for a wind turbine at Lightolier. Other structures, including third-party ownership, will be addressed in the feasibility report. Boreal has made an estimate of project payback using their pro-forma financial tool. An installed capital cost of $2,900,000 is

		assumed for the GE 1.5 MW model sle wind turbine. Over a project lifetime of 20 years, an internal rate of return of between 30% and 35% is calculated, with a payback period between 3 and 5 years. This calculation includes MTC funding in the amount of $575,000 for design and construction. The payback is within what would be required to make a full investment in the project.
3.4.	Project Risks	The project is not located in an "area network." We are confident that capital / financing is not a development risk. Besides the economic and financing uncertainties, we view most of the major development risks as likely local, as there is no explicit citation of wind turbines in the Fall River zoning bylaws. We believe that at the very least, a height variance will be required from the Zoning Board of Appeals. However, this process should be made easier by Lightolier's good relationships with Fall River citizens and officials. We expect that the findings from the feasibility study will be an important tool in garnering public support and approval. It provides the stakeholders metrics and background on avian, and visibility impact, and defines the environmental and economic benefits (including job creation and retention). While preliminary analyses and zoning review did not reveal any, the feasibility study will delineate any potential fatal flaws. The feasibility study will detail our financing and ownership options so we can make an informed choice on when and how to proceed with a turbine development.
3.5.	Development Progress	These aspects of the project will be established during the feasibility study.
3.6.	Energy Efficiency Requirement	We have been working with National Grid, Bluestone Energy, Action Energy and Kaiser Compressors to evaluate opportunities for power use reductions. We have implemented the replacement of many of our motors to Super E in the buffing department, and currently are reviewing proposals for plant relighting that will reduce our electricity consumption by 581,060 kWh / yr. We are well into our compressed air survey including a comprehensive demand analysis, leak repair program, and installation of a Sigma Air Manager. The repairs of the 250 cfm alone will yield a 407,400 kWh / yr energy use reduction. Other areas are being evaluated such as Power Factor Correction Equipment and multiple Variable Frequency Drive projects throughout the facility.
3.7.	High Performance Building Incentive	N/A
4.	**Project Programmatic Benefits**	
		Currently, there are no wind turbines within a close distance of Fall River in Southeastern Massachusetts. The closest large wind turbine to Fall River in Massachusetts is at Mass Maritime in Bourne (Portsmouth Abbey, in RI, is likely the closest). The benefits of electricity generation from renewable sources like wind turbines are clear; the use of wind turbines will decrease demand on the electrical grid and reduce emissions otherwise originating from fossil fuel power generation such as carbon dioxide, sulfur dioxide, particulates, mercury, and nitrous oxide. A wind turbine in Fall River will also add to the geographical diversity of renewable energy in the Commonwealth. The project will utilize Massachusetts based companies Boreal Renewable Energy Development

and electrical engineer, Richard C. Gross P.E. for the performance of this study.

This project is replicable to other "behind the meter" applications in the Commonwealth. Specific benefits from the project target the following areas:

- Emission Reductions. Pre-feasibility work predicts a significant reduction in emissions from displacement of fossil fuel generated electricity.
- Increasing Fuel diversity. The project by generating electricity by use of wind will diversify the region's fuel mix and add to the region's fuel diversity. This will assist the Commonwealth and New England in reducing dependence on oil and natural gas. Furthermore, the money spent by Lightolier to purchase wind generated electricity will remain within the state and regional economy and will not be exported to a foreign oil or natural gas producer.
- Cost savings and electricity price stability. The project will provide stabilized, lower electricity costs to Lightolier, thereby lowering operation costs. Providing Lightolier with a price stabilized electricity source will help it remain a profitable and healthy business in Massachusetts.
- RECs. The project will generate Renewable Energy Credits to help the Commonwealth achieve its Renewable Portfolio Standard requirements.
- State renewable energy goals. The project will advance the Commonwealth's Sustainable Development, Climate Change and Climate Protection Action plan initiatives.
- Visibility. The wind turbine likely will be accessible from our parking lot and will be in view of all our employees and visitors.

Lastly, the project will enhance MTC's stature by effectively carrying out its statutory responsibilities to encourage the use of wind energy by helping to finance a high profile wind energy project which is owned by a Massachusetts institution. This goes to the heart of the reason the legislature created the Renewable Energy Trust.

5. Work Plan and Schedule

5.1.	Required Deliverables	We have reviewed Attachment F, and as is required we will deliver a draft report, a final report, and make a presentation of technical and economic analyses to project decision makers. The project decision maker will be Zia Eftekhar, Lightolier President.

5.2. Work Plan and Schedule

Below we provide additional detail on the Feasibility Study tasks that will be performed:

1. Kick-off Meeting
    a. Collect site plans: building, electrical, plot, septic, confirm ownership structure
    b. Detailed site walk, the focus will be on four areas, 1) electrical systems, both in-house, and utility owned, and 2) identification of sensitive environmental resources (e.g. wetlands etc.) if any and 3) scoping a preliminary location(s) for a wind turbine, exact locations will be detailed via GPS, 4) neighboring properties
    c. Collect latest electric billing data
    d. Relate changes in operations that may change electric consumption. (e.g., equipment additions, multiple shifts)
    e. Memo summarizing kick-off meeting and effect on project scope of work and schedule.
2. Perform Technical Feasibility Analysis
    a. Erect meteorological tower and install datalogger and anemometer
    b. Site Evaluation
        i. Description of current energy infrastructure will include electrical transformers, electric panels, wiring configuration.
        ii. Site ownership will look at abutting properties and the potential of placing a turbine in the fall

zone of an abutter.
iii. Environmental resource survey
iv. Stakeholder identification

c. Analyze Energy Use Opportunities:
   i. Collect data. Process hourly load data.
   ii. Data will be incorporated into the pro-forma tool for analysis

d. Create Base Concept Cases (e.g., scenarios) for Different Technology:
   i. Given the energy consumption and wind resources we will choose wind turbine systems over 500 kW and where at least 50% of the production is consumed on-site as the systems to analyze more closely. Various manufacturer tower heights will be analyzed.

e. Perform Environmental Impact Analysis
   i. Perform avian study
   ii. Perform visualization study
   iii. Analyze potential impacts, their severity, with mitigation options
   iv. Analyze required environmental approvals and permits, processes and procedures and timeframes

f. Analyze Engineering and Interconnection Requirements.
   i. Analyze engineering requirements
      1. Geotechnical. While no borings will be completed, we will assess the likely geological characteristics of the site (in all likelihood terminal moraine), and its affect on foundation design and wiring runs.
      2. Electrical. We will analyze the electrical interconnection requirements of the supplying electric utility and specify the characteristics of the required wire runs, protective relays, transformers, and metering.
      3. Staging / Erection. Appropriate staging areas will be assessed. Erection needs, including crane capacities will be determined.
   ii. Analyze required building approvals and permits, processes and procedures and timeframes

g. Write up findings into Technical Analysis

3. Perform Economic Feasibility Analysis
   a. Collect for major scenarios major costs. Estimated costs will be collected in parallel to the technical analysis. Major costs (e.g., turbine, tower, transformer, construction) will be estimated for each wind turbine system
   b. Perform Wind Resource Assessment.
      i. Review existing site-specific anemometers data
      ii. Gather, correlate and analyze wind resources from other local data sources
   c. Research different financing options
      i. Hosts financial strengths, weaknesses and preferences.
      ii. Potential financing options to match host
   d. Investigate potential and need for long-term contracts, and likely price points.
      i. Inquiries will be made to RECs wholesalers on the availability, interest and price of long-term contracts.
      ii. For third party ownership options, price points and terms of power purchase agreements, where Lightolier is the “off-taker” at a fixed price will be collected.
   e. Project Costs and Revenues for combination of development, financing, and revenue scenarios
      i. Update and modify pro-forma tool to include analysis third-party ownership of turbine
      ii. Numerous scenarios will be run investigating financial reward in terms IRR, NPV, and years to positive cash flow. Scenarios will be run varying numerous aspects, including financing options, and system configurations.
      iii. Sensitivity analysis will be run for variation in major factors, including wind resources, cost of avoided generation, REC and LMP revenue, construction costs, interest and inflation rates, etc.
   f. Provide project pro-forma(s) for recommended or alternative structures. Detailed cash flows will provided for selected primary alternatives.
   g. Write up findings into Economic Analysis. Model details and assumptions, charts and tables will make clear the potential project financial impacts.
4. Presentation of Analysis to Decision Makers
   a. A draft PowerPoint presentation will be reviewed and crafted together, primarily by Boreal Renewable Energy Development

b. A presentation of results will be made before the project decision makers as noted in Section 5.1.

5. Package Findings and Analysis into Feasibility Study with Recommendations
    a. Draft Final Report
    b. Final Report

Feasibility Study Schedule			
Task/ Milestone	**Start Date**	**End Date**	**Responsible Party**
1. Project Kick Off Meeting	11/06	11/06	
2. Technical Feasibility Analysis	11/06	02/07	Boreal
3. Economic Feasibility Analysis	02/07	03/07	Boreal
4. Presentation of Analysis to Decision Makers	03/07	03/07	Boreal
5. Package Findings	03/07	04/07	Boreal
Draft Feasibility Report	03/07	03/07	Boreal
Final Feasibility Report	04/07	04/07	Boreal

6. Incentive Calculation (Design and Construction Only)

N/A

<table>
<tr><td colspan="2">7. Budget</td></tr>
<tr><td>7.1. Budget Form</td><td>The budget should be prepared and included as an attachment using the attached Standard Budget Form. Please follow the associated instructions. Supporting documents, descriptions, and/or worksheets that provide additional budget detail should be attached to the application.</td></tr>
<tr><td>7.2. Prevailing Wage (For Design and Construction Only)</td><td>N/A</td></tr>
<tr><td>7.3. Payment Schedule</td><td>The following tables represent the MTC required payment schedules for each of the grant phases. Delete any payment schedules that are not applicable to your application, add appropriate dates from the work plan and schedule, and indicate that you agree to the required payment schedule.
<table>
<tr><td colspan="3">Feasibility Study Payment Schedule</td></tr>
<tr><td></td><td>Grant Payment (%)</td><td>Due Date</td></tr>
<tr><td>Draft Feasibility Report</td><td></td><td>(3/07)</td></tr>
<tr><td>Final Feasibility Report</td><td>100%</td><td>(4/07)</td></tr>
</table>
We DO NOT accept the above payment schedule for the feasibility study. We counter propose the following payment schedule.
<table>
<tr><td colspan="3">Feasibility Study Payment Schedule</td></tr>
<tr><td></td><td>Grant Payment</td><td>Due Date</td></tr>
<tr><td>Installation of Meteorological Tower and Equipment</td><td>Up to $20,000 for appropriately documented costs directly associated with lease and erection with the meteorological tower installation.</td><td>(11/06)</td></tr>
<tr><td>Final Feasibility Report</td><td>100% less payment above</td><td>(4/07)</td></tr>
</table>
The reasoning behind this counter proposal is that a large portion of the cost of the Feasibility Study will be associated with the wind resource assessment. Our schedule is five months between tower installation and delivery of the Final Report. Add on 45 days for MTC payment, and that will mean six months between payments for meteorological equipment and reimbursement by the MTC. As such data are valuable to the public and the MTC regardless of whether the feasibility study is completed, and that such data must be made public as per the terms and conditions, we feel it only fair that the MTC pay for such data in a timely manner.</td></tr>
<tr><td>7.4. Alternative Payment Request (Optional)</td><td>No alternative payment request made.</td></tr>
<tr><td colspan="2">8. Exceptions to the General Terms and Conditions and Task Order Template</td></tr>
<tr><td></td><td>No exceptions or proposed changes other than payment schedule (see section 7.3).</td></tr>
<tr><td colspan="2">9. Required Attachments (in addition to Authorized Applicants Signature and Acceptance Form)</td></tr>
</table>

9.1.	Feasibility Attachments	The following attachments must be included in the proposal. • Budget Forms • Signed General Terms and Conditions (unless exceptions are noted in Section 8) • Site Owner Commitment Letter. This letter should demonstrate commitment to the project, including cost share, payback requirements, and willingness to share data (e.g., wind data) collected during feasibility and design (if applicable). • Partner Commitment Letter(s). This letter(s) should demonstrate commitment from other partners involved in project success, such as consultants, power customers, etc. • Resumes of key team members • Site Plan and Photos • Electricity bill for load (or estimates for new construction)
9.2.	Design and Construction Attachments	N/A
9.3.	Optional Attachments	None

See Solicitation for Application due date and submittal Requirements.

Large Onsite Renewables Initiative
Feasibility Study and Design & Construction Grants (2006-GB-02)
Budget Form

General Cost Information (BUDGET FORM IS AN EXCEL SPREADSHEET: SEE INSTRUCTIONS FOR FILLING OUT BUDGET FORM)		
Applicant: Lightolier	**Title of Proposed Project:** Lightolier Wind Turbine Feasibility Study	**Type of Project:** Feasibility Study
Total Project Budget: $44,975	**Total MTC Grant Request:** $39,975	

I. Direct Labor (Direct Labor and Overhead can not exceed 5% of total budget)			
name/title	*hours*	*rate/hr*	*Total Cost*
			$ -
Total Direct Labor			**$ -**

II. Subcontractors/Consultants			
name/title	*hours*	*rate/hr*	*Total Cost*
Thomas S. Michelman - Boreal	75	125	$ 9,375.00
Robett A. Shatten - Boreal	68	125	$ 8,500.00
Richard C. Gross P.E.	34	140	$ 4,760.00
Louis Berger - Richard Podolsky - Avian			$ 5,000.00
Saratoga Associates - 4 Photosimulations			$ 3,500.00
Total Subcontractors/Consultants			**$ 31,135.00**

III. Direct Materials (Not Applicable for Feasibility and Design Grants)	
Item	*Total Cost*
	$ -
Total Direct Materials	**$ -**

IV. Travel	*Total Cost*
Boreal - Three Trips @ $70 / Trip	$ 210.00
Richard C. Gross P.E. - Two Trips @ $65 / Trip	$ 130.00

V. Other Direct Costs (list by type)	*Total Cost*
Met Tower Installation & Lease	$ 13,500.00
	$ -
Total Other Direct Costs	**$ 13,500.00**

VI. General & Administrative Expense/Overhead	*Rate (% of DL only):*	*Total Cost*
$ -	0.00%	$ -

Cost Summary	
I. Direct Labor (Direct Labor and Overhead can not exceed 5% of total budget)	**$ -**
II. Subcontractors/Consultants	**$ 31,135.00**
III. Direct Materials (Not Applicable for Feasibility and Design Grants)	**$ -**
IV. Travel	**$340.00**
V. Other Direct Costs (list by type)	**$ 13,500.00**
VI. General & Administrative Expense/Overhead	**$ -**
Total Project Costs	**$ 44,975.00**
Total MTC Grant Request	**$ -**
Total Cost Share	**$ 44,975.00**
Cost Share as a Percentage of Project Cost	**100%**
Direct Labor and Overhead as a Percentage of Project Cost	**0%**
MTC Grant Request as a Percentage of Project Cost	**0%**

Cost Sharing	
Source	*Amount*
	$ -
	$ -
Total Cost Share	**$ -**
Cost Share Budget Check	**Calculation**

I certify that this budget has been completed according to the instructions provided by MTC and that all information provided in this budget, including any attachments, is true and correct to the best of my knowledge.

Typed Name and Title:	**Signature:**	**Date:**
Robert Wedekind / General Manager		

Supporting Schedule - Budget Form		
Element No.	Item Description	Amount

Appendix A – Recent Electric Bill

AUG.14.2006 16:34 5086463163 LIGHTOLIER SBU #0736 P.002 /004

JUN 06

Account Number 26288 00300 02

Pay This Amount

PAGE: 2

Amount Enclosed

$

nationalgrid

Pg. 2 of 4

#BWNFKKP **C022
#2628800300026#
LIGHTOLIER
631 AIRPORT RD
FALL RIVER MA 02720-4722

605262880030002 0002780657
18
1 B2 MRANNACHER@GENLYTE.COM

nationalgrid

503508 790984

To Reach Us
Customer Service: 1-800-322-3223
Credit Department: 1-866-395-0315
E-mail: CustomerService@us.ngrid.com
Website: www.nationalgrid.com

Pay This Amount
$27806.57

Account Number
26288 00300 02

Bill Date
JUN 23 2006

NEXT METER READING DATE
JULY 24

MONTH	TOTAL KWH
J 06	831000
M	818000
A	860000
M	855000
F	840000
J 06	904000
D	872000
N	776000
O	761000
S	811000
A	834000

BILLED DEMAND LAST 12 MTHS

MIN	2205.0
MAX	2502.0
AVG	2322.8

SERVICE ADDRESS 631 AIRPORT RD FALL RIVER MA
LOAD ZONE SEMASS
605262880030002 LIGH, CY. 18

NATIONAL GRID
RATE: TIME OF USE G-3

PREVIOUS BALANCE					$ 26906.71
PAYMENT-THANK YOU 06/13/06					-26906.71
BALANCE FORWARD					.00
DELIVERY SERVICES:					
CUSTOMER CHG					69.62
DISTRIBUTION CHG					
DEMAND	3.75000 X	2412.0	KVA=	9045.00	
ENERGY PEAK	.01171 X	439000	KWH=	5140.69	
ENERGY OFF-PEAK	- .00035 X	392000	KWH=	-137.20	
					14048.49
TRANSITION CHG					
DEMAND	.90000 X	2412.0	KVA=	2170.80	
ENERGY	.00324 X	831000	KWH=	2692.44	
					4863.24
TRANSMISSION CHG	.00762 X	831000	KWH=		6332.22
ENERGY CONSERVATION	.00250 X	831000	KWH=		2077.50
RENEWABLE ENERGY CHG	.00050 X	831000	KWH=		415.50
TOTAL DELIVERY SERVICES					$ 27806.57
ACCOUNT BALANCE					$ 27806.57

020000 200205

Account Number

JUN 06 26288 00300 02

Pay This Amount
$27806.57
Amount Enclosed:
$

nationalgrid

JUN 28 2006

Pg. 3 of 4

#BWNFKKP **C022
#26288003000026#
LIGHTOLIER
631 AIRPORT RD
FALL RIVER MA 02720-4722

605262880030002 0002780657

18
1 B2 MRANNACHER@GENLYTE.COM

nationalgrid

To Reach Us
Customer Service: 1-800-322-3223
Credit Department: 1-866-395-0315
E-mail: CustomerService@us.ngrid.com
Website: www.nationalgrid.com

Pay This Amount
$27806.57

Account Number
26288 00300 02

Bill Date
JUN 23 2006

SERVICE ADDRESS LOAD ZONE SEMASS 605262880030002
631 AIRPORT RD FALL RIVER MA ITGH, CY. 18

* * * * SUPPLIER SWITCH NOTIFICATION * * * *

OUR RECORDS INDICATE THAT YOU HAVE SWITCHED YOUR SUPPLIER OPTION TO CONED SOLUTIONS

IF YOU HAVE BEEN SWITCHED WITHOUT YOUR AUTHORIZATION, YOU CAN FILE A FORMAL COMPLAINT WITH THE DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY. IF YOU NEED ASSISTANCE OR WISH TO DISCUSS YOUR OPTIONS PLEASE CALL US AT 1-800-322-3223.

NEXT METER READING DATE
JULY 24

MONTH	TOTAL KWH
J 06	831000
M	818000
A	860000
M	855000
F	840000
J 06	904000
D	872000
N	776000
O	761000
S	811000
A	834000

BILLED DEMAND LAST 12 MTHS

MIN	2205.0
MAX	2502.0
AVG	2322.8

SERVICE PERIOD MAY 23 TO JUN 22 2006 30 DAYS
TYPE OF METER READING FINAL DUE TO SUPPLIER SWITCH

METER NUMBER	RATE	METER PRESENT	READING PREVIOUS	METER CONST	KWH USAGE	ACTUAL DEMAND
A33333380	PEAK	31111	30672	1000	439000	
	OFF PK	28977	28585	1000	392000	
M33333380	G-3			1000		2000.0 KW
Q33333380	G-3			1000		2680.0 KV
					831000	

Page 1

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JUN 0 9 2006

8698

788111

SUEZ Energy Resources NA

58838-18009

Summary Page

Balance as of Jun 2, 2006	**$ 121,139.23**
Charges:	
Total SUEZ Energy Res Charges	$ 55,098.56
Total Charges	$ 176,237.79
Pay This Amount No Later Than Jul 5, 2006	$ 176,237.79
Account Balance	$ 176,237.79

Service Address:
LIGHTOLIER
631AIRPORT RD
FALL RIVER MA 02720
Utility Acct Number:
05262880030002

Questions about this bill? Please contact us **at 1-888-232-6206**

or write to:
SUEZ Energy Res
P.O. Box 25225
Lehigh Valley, PA
18002-5225
Internet:
www.suezenergyresources.com
E-mail:
custserv@suezenergyna.com

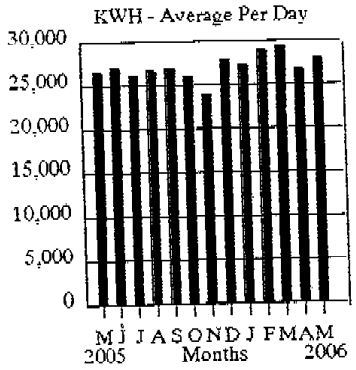
8/21/00 200205

SM

Energy Usage History

This graph shows your electric use over the last 13 months.

Types of Meter Readings:
Actual
Estimated



	2005	2006
Average - May KWH Per Day	26710	28207

	Total Use	Average Monthly
Yearly Use: Jun 05 To May 06	9941000	828417

To pay electronically and other important information, see back →

Return this part to address below with a check payable to SUEZ Energy Resources NA

Your Billing Account Number	Please Pay By	Amount Enclosed
58838-18009	Jul 5, 2006	$ 176,237.79

Amount Enclosed: 55098.57

LIGHTOLIER
ATTN GAIL MORREIRA
631 AIRPORT RD
FALL RIVER MA 02720

SUEZ Energy Resources NA
P.O. BOX 25237
LEHIGH VALLEY, PA 18002-5237

Appendix B – Resumes of Major Participants

Tom Michelman - Boreal Renewable Energy Development

Expertise

- Over 15 years energy industry experience
- In-depth knowledge of retail and wholesale electric markets, and renewable energy certificate markets
- Exceptional analytic, spreadsheet modeling and quantitative skills
- Winning track record of proposal and grant writing
- Manager of dozens of energy industry consulting projects

On-site Renewable Generation:

Partner in Boreal Renewable Energy Development – Please refer to the firm's qualifications below.

Provided expert testimony on proposed NSTAR distributed generation (DG) standby rates (Massachusetts DTE Docket 03-121) and their effect on the economics of DG wind turbine installations for Conservation Law Foundation and Solar Energy Business Association of New England. DTE accepted a settlement to which NSTAR as a signatory exempts wind turbine and other renewable installations from the standby rates.

Managed a comprehensive review of available wind turbine technology in terms of its economic, siting and performance for the Cape Cod Commission and Cape Light Compact of Cape Cod, Massachusetts. Information synthesized and integrated in Cape-wide planning efforts for the optimal adoption of wind turbines. See http://www.capecodcommission.org/windenergy/AssessmentofDGTechnology.pdf. Currently assessing the economics of wind powered greenhouses for the Cape Cod Cooperative Extension.

Retail Energy:

Senior consultant specializing in retail energy, price responsive load, demand side management, and renewable energy. Responsibilities included managing millions of dollars of consulting projects and key developer of retail energy consulting practice. Leveraged multi-client subscription studies as springboard to over $3 million of new consulting work. Considered industry expert in retail energy field, presenting at dozens of conferences and meetings, and authoring dozens of articles and reports. Originator, managing editor, and contributor of KEMA-XENERGY's Retail Energy Foresight. Bimonthly periodical publishes the only comprehensive updates on U.S. retail energy switching.

Education:

M.S., Resource Economics, University of Rhode Island, 1992 (Thesis, *Contingent Valuation and the Bounded Rationality Perspective* winner of award of merit at AAAE and NAREA conferences.)

B.A., Mathematical Methods in the Social Sciences/Political Science, Northwestern University, 1983.
Additionally, master's level continuing education classes in wind power, finance, statistics, and management.

Selected Energy Related Papers / Publications / Presentations:

As Important as Wind: The Structure of Utility Tariffs on Behind-the-Meter Community Scale Wind Projects. Presented at American Wind Energy Association Annual Conference. May 2005 Denver, CO.

The Wild, Wild East: REC Price and Supply / Demand Dynamics in ISO-NE, NYISO, and PJM. Presented at American Wind Energy Association Annual Conference. May 2005 Denver, CO.

Switching Trends column in Retail Energy Foresight, and author / contributor to numerous additional articles and analyses. 2000 to 2004.

Robert A. Shatten - Boreal Renewable Energy Development

Expertise

- Over 20 years of professional environmental experience
- Expertise in all aspects of renewable energy and power plant development including project management, Clean Air Act, Water/Wetland regulations, RCRA, and CERCLA
- Multidisciplinary experience in power plant siting, feasibility, environmental assessments/impact studies and permitting
- Ongoing multiple renewable energy developments throughout the U.S.

On-site Renewable Generation:

Partner in Boreal Renewable Energy Development – Please refer to the firm's qualifications below.

Power Plant Development:

Responsible for all aspects of the planning and siting of a state-of-the-art, $300 million natural gas combined cycle power plant in Londonderry, New Hampshire. Specifically managed Federal, State and local regulatory permitting process for the siting, design and operation of the facility. Achieved unanimous regulatory approval from the New Hampshire Site Evaluation Committee. Led facility design team to implement the requirements of the Londonderry Eco-Industrial park including land use considerations, conservation, recycling, energy efficiency and "green" architecture. Effort led to $3.5 million in cost savings.

Led environmental due diligence for power plant acquisitions in New England, New Jersey and Pennsylvania. Prepared environmental permitting plan for the development of a combined cycle power plant in Cartagena, Spain. Led brownfield power plant siting development.

Other Siting/Development Experience:

Directed Federal, State and local regulatory permitting and compliance for an innovative environmental recycling technology from a patented concept through project siting, research and development to full-scale operation of multiple commercial facilities.

Obtained Federal and/or State authorizations for four separate facilities. Approvals obtained under the following regulations: Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA), and the Atomic Energy Act.

Remedial Investigation/Feasibility Study:

While Project Manager at US EPA, managed the investigation and cleanup activities at three toxic waste sites in Massachusetts. Responsibilities: directed remedial investigation and feasibility study efforts, including: supervision of financial expenditures for government contractors; construction oversight; technical assistance to attorneys; intergovernmental coordination; participation in and organized public meetings; and, interaction with print and TV media. Developed conceptual cleanup plans and remedial cost estimates for waste sites.

Environmental Due Diligence:

Managed and performed environmental due diligence assessments and audits throughout Europe, Canada and the U.S. for multiple clients. Assessments included facility inspections, review of environmental compliance history and management systems, operations, waste disposal practices, liability identification and remedial cost estimation.

Performed environmental audits at U.S. Department of Energy facilities. Examined inactive waste sites for regulatory compliance and best management practices.

Performed environmental audits/assessments of lighting manufacturing facilities in Hungary. Functional area experience included solid and hazardous waste management, soil and groundwater contamination, underground storage tanks and water pollution control.

Education:

M.S., Civil Engineering, Stanford University, 1988

B.S., Environmental Engineering, Northwestern University, 1983

Selected energy related papers / Publications / Presentations:

1995-2003 Guest Lecturer – Northwestern University Kellogg School of Business; Boston University School of Business; University of Michigan Business School – Molten Metal Technology Case Study

U.S. Patent 6,668,562 – Issued December 30, 2003; Inventors: Shatten, Carrier, Jackson – "A System and Method for Cryogenic Cooling Using Liquefied Natural Gas";

Fall 2004 – Teaching Assistant, Mechanical Engineering Processes; Massachusetts Institute of Technology

Boreal Renewable Energy Development Qualifications

Boreal Renewable Energy Development founded in 2003 implements land-based wind, hydroelectric, and other renewable energy projects from inception to commissioning and beyond. For our clients, we perform feasibility studies, meteorological studies, environmental permitting, economic analysis of electric rates, research of "green" electricity certification and air emission credits, pro forma development, and project management.

Our business strategy is to align our services with our client's goals and, in the process, aid in the growth of renewable energy technology when it is economically and environmentally feasible.

Varian Semiconductor Equipment Corporation Gloucester, MA – Wind Feasibility Study – A wind feasibility study determined the technical, environmental and economic feasibility of a wind turbine to offset electrical costs at Varian. Included in the evaluation was deployment of anemometers to analyze wind resources analysis of site characteristics, an environmental impact and regulatory analysis and economic pro-forma evaluation for the recommended alternative. The project is in the design phase.

Falmouth Technology Park - Falmouth, MA – Wind Feasibility Study – A wind feasibility study determined the technical, environmental and economic feasibility of a wind turbine to offset electrical costs for multiple buildings within the Technology Park. Tasks included a review of meteorology and other site characteristics, an environmental impact and regulatory analysis and economic pro-forma evaluation for the recommended alternative. The project is now in the design phase.

Assessment of Distributed Generation Technology – Cape Cod Commission/Cape Light Compact *– A comprehensive review of available wind turbine technology in terms of its economic, siting and performance was performed for the regional planning agency and an intergovernmental agency representing 21 Cape Cod and Martha's Vineyard towns. Non-wind systems such as microturbines, fuel cells and photovoltaic systems were also reviewed. It assisted a Cape Cod-wide effort to develop model zoning bylaws to govern wind turbine development.*

Raytheon Naval Integration Center, Portsmouth, RI – Wind Feasibility Study – A wind feasibility study to determined the technical, environmental and economic feasibility of wind turbines to offset electrical costs. Tasks included deployment of anemometers to analyze wind resources, analysis of site characteristics, a public outreach campaign, an environmental impact and regulatory analysis and economic pro-forma evaluation for the recommended alternative.

Leviathan Mine Site, Sierra Nevada Mountains, California *– Boreal staff developed a wind feasibility study report for the Leviathan Mine Site located in Northern California. The study analyzed innovative renewable and hybrid energy systems to provide economic, off-grid electricity to power a planned contaminated surface water remedial pump and treat system relating to the long term cleanup of runoff from historic mining. Systems reviewed included wind turbines, wind-diesel hybrids and solar power. A long term meteorological study and revisions to the feasibility study are ongoing.*

Wrights Mill – W. Warren, MA - Hydroelectric Refurbishment Study – A feasibility study determined the technical, environmental and economic feasibility of re-powering two dams at an historic operating textile mill. Tasks included a review of hydrologic resources, geotechnical and dam safety aspects, an environmental impact and regulatory analysis and economic pro-forma evaluation.

Falmouth Hospital - Falmouth, MA – Wind Feasibility Study – A wind feasibility study determined the technical, environmental and economic feasibility of a wind turbine to offset electrical costs at the Falmouth Hospital. Tasks included a review of meteorology, avian impacts and other site characteristics, an environmental impact and regulatory analysis and economic pro-forma evaluation for the recommended alternative.

Cape Cod Cooperative Extension - Operating Wind Powered Greenhouses – A study determined the technical and economic feasibility of operating wind powered greenhouses on Cape Cod. The primary goal of the study provided thorough analysis of wind turbines with packaged greenhouse energy applications that can be used as a guide for potential host facilities. See http://www.umassd.edu/semap/wind.cfm

NBC-10 Transmitter - Rehoboth, MA – Wind Feasibility Study – Completed a wind feasibility study to determine the technical, environmental and economic feasibility of a wind turbine to offset electrical costs for multiple transmitters. Tasks

included deployment of anemometers to analyze wind resources, analysis of site characteristics, an environmental impact and regulatory analysis and economic pro-forma evaluation for the recommended alternative.

Woods Hole Oceanographic Institution and Williams Stone Co, Inc. Managing ongoing wind turbine feasibility studies

World Energy – Worcester, MA – Renewable Energy Purchase Support. Currently ongoing and for the Maryland Department of General Services, Boreal with the Greene Energy Company is working with World Energy researching, analyzing, and crafting alternatives for long-term procurement of renewable energy for State of Maryland accounts.

Richard C. Gross P.E., Inc. Qualifications

As the Principal of Richard C. Gross P.E., Inc., I provide professional electrical power engineering services for the design and development of wind energy and other renewable energy projects. Services include project interconnection and integration, feasibility analysis, site screening, technology assessment, project support and project management.

My wind energy project experience includes the site review, analysis and development of the conceptual design of the electrical collection system and high voltage electric utility interconnection for a number of projects in the United States and Europe. My role in these projects has typically included the development of the wind farm collection system and high voltage interconnection substation electrical one line diagrams, development of technical specifications for major electrical equipment, preparation/review of electrical power system engineering analyses, preparation of electrical construction cost estimates and interactions with electric utility engineers for the high voltage interconnection.

I am presently involved with the Phase 1 feasibility analysis of a proposed 400 MW off-shore wind energy project in the Baltic Sea off the coast of Poland. For this phase of the project, I am responsible for the conceptual design of the 36 kV off-shore collection system, the off-shore 36 kV – 110 kV substation, the 110 kV submarine cables, and an on-shore 110 kV – 400 kV interconnection substation.

For wind power projects in the United States, I have represented the technical interests of the project team during meetings and negotiations with electric utilities, local, state, and federal agencies, and interested third parties. I have also worked with submarine cable manufacturers and installers in developing the conceptual layouts and construction cost estimates for submarine cables at voltages ranging from 35 kV to 138 kV. That work has also included the review of alternative high voltage interconnection plans and alternative submarine cable/off-shore substation plans.

Ongoing renewable energy project assignments in New England include the design of the electrical interconnection, protective relaying, and revenue metering package for a run-of-the-river hydro-electric generation project in Whitinsville, MA and a wave-energy project in Point Judith, Rhode Island. I am also performing similar services for a landfill gas project to be located in New Bedford, Massachusetts.

Description of the Company

Richard C. Gross P.E., Inc. is a Massachusetts corporation located in Westborough, Massachusetts and is insured for General Liability, Professional Liability, and Worker's Compensation. I am the company founder and the individual who has day-to-day responsibility for all work. I am a licensed Professional Engineer in the states of Massachusetts and New York and have been a practicing engineer continuously since 1980.

The primary service focus of the company is to provide feasibility analyses, conceptual design services, utility interconnection studies, and project management services for renewable energy projects. These services may be performed for government agencies, developers, electric utilities, and other consulting firms.

Description of Company Services

Conceptual design of the electrical power systems features of renewable energy projects.
Screening of electric utility system transmission and distribution facilities for new renewable energy resource interconnection capability.
Submit applications for electrical interconnection of renewable energy projects to transmission/distribution providers.
Develop the electrical relay and metering one line diagram for renewable energy project interconnection facilities.
Review the reasonableness of electric utility transmission and distribution system impact analyses and the associated construction cost estimates.

1. Represent the technical interests of the project development team in discussions and negotiations with electric utilities, government agencies, and interested third parties.
2. Owner's Engineer and construction observation services for renewable energy projects to represent the Owner's interests during project design, construction, and commissioning.

Career Background

Mr. Gross is an electrical engineer specializing in the conceptual design, planning, and analysis of renewable energy projects. He has worked in the electric utility industry for over 20 years providing system planning, electrical design, and project management services for high voltage electrical power systems and renewable energy projects.

For wind generator projects, Mr. Gross develops conceptual designs for wind farm electrical collection systems and high voltage electric utility interconnection substations. He prepares technical specifications for major electrical equipment and develops project construction cost estimates for inclusion in wind generator project technical and financial feasibility analyses. He provides electrical engineering expertise to project developers from site assessment and transmission/interconnection analyses through permitting and plant design.

Mr. Gross provides comprehensive technical due diligence reviews in support of renewable energy project planning, design, and construction monitoring. He has an extensive background as a project manager and Owner's Engineer for major electrical utility system design and construction projects. He has prepared detailed design drawings for electrical utility substations, transmission interconnections, and distribution systems. He has designed the electrical interconnection of dispersed generation resources including fuel cells, induction generators, and synchronous generators. These projects typically included evaluations of the impact on electric utility operations and system protection schemes.

Mr. Gross has prepared numerous electrical utility system planning studies to define the features of power system upgrades and to evaluate system performance during normal and contingency conditions. Mr. Gross routinely modeled electrical power systems and electrical machines for load flow and short circuit analysis, investigated system disturbances, and developed solution plans.

Mr. Gross received his BSEE with high honors from the Northeastern University Power Systems Program in 1980. After graduation, he joined a national consulting firm where he provided electrical power system engineering consulting services. Mr. Gross continued consulting to the electric utility industry, which led to the ownership of a Massachusetts engineering and consulting firm in 1987 where he remained an active engineer and Principal through 2001.

Mr. Gross received his MSEE from Northeastern University concentrating in power systems in 1983. He is a licensed Professional Engineer in the states of Massachusetts and New York. Mr. Gross is a member of the IEEE and was the 1995-1996 Chairman of the Boston Chapter of the IEEE Power Engineering Society.

Representative Listing of Wind Energy Projects and References

Mr. Skip Brennan, Director of Operations
AWS Scientific, Inc.
255 Fuller Road
Suite 274
Albany, NY 12203-3656
Tel. No. 518-437-8649
Services provided 2003-present:

1. Conceptual design of the 36 kV off-shore collection system, an off-shore 36 kV – 110 kV substation, the 110 kV submarine cables, and an on-shore 110 kV – 400 kV interconnection substation for a proposed 400 MW off-shore wind energy project in the Baltic Sea.

Mr. William Hubbard, President
Applied Wind Technology, Corp.
1 Brookline Street
Townsend, MA 01469
Tel. No. 978-597-8637
Services provided 2002-2003:

1. Electrical power engineering consultant to the project development team for onshore and offshore wind energy facilities.
2. Performed analyses to determine electrical performance of various offshore and onshore wind farm electrical collection systems and interconnection facilities. Investigations have included the determination of wind

generator short circuit contributions to electric utility systems during fault conditions, high voltage interconnection system protective relaying and metering requirements, and cable sizing, voltage drop, and system energy loss calculations.
3. Conducted research of electric utility interconnection requirements for wind power projects in several electric utility service areas and developed interconnection plans and construction cost estimates.
4. Represented the technical interests of the project development team for various wind power projects in meetings and negotiations with electric utilities, local, state, and federal agencies, and interested third parties.

Mr. Robert Putnam, Jr., Vice President
AWS Scientific, Inc.
255 Fuller Road
Suite 274
Albany, NY 12203-3656
Tel. No. 518-437-8652
Services provided 2002-2003:

1. Conceptual design of the wind farm electrical collection system and electric utility interconnection substation for four wind energy projects in Suwalki, Poland.
2. Prepared technical specifications for major electrical equipment and construction cost estimates for U.S. and European wind farm collection systems and interconnection substations.
3. Researched Horns Rev, Denmark offshore wind project for use in evaluating electric system planning studies for the LIPA offshore wind project in the U.S.

<u>The following are long-term clients of Richard Gross from prior employment:</u>

Mr. David Sweetland, Manager
North Attleborough Electric Department
275 Landry Avenue
North Attleborough, MA 02761
Tel. No. 508-643-6312
Services provided 1988-2001:

1. Engineering design for expansion of 115 kV – 13.8 kV Sherman Substation.
2. Development of technical specifications for 115 kV and 13.8 kV substation equipment.
3. Development of construction specifications and contract documents for Sherman Substation general construction contracts.
4. Review of contractor submittals and change orders, development of agendas and records for construction progress meetings, performance of construction observation activities, and monitoring of remedial action plans during three-year construction process.
5. Engineering design for 13.8 kV distribution feeder getaway construction for Sherman Substation including development of construction specifications.
6. Engineering design for the installation of two (2) 13.8 kV substation capacitor banks, 13.8 kV vacuum switches, and capacitor controllers.
7. Load flow and short circuit analysis of the North Attleborough Electric Department 13.8 kV distribution system.
8. Lightning shielding analysis and shielding design for the Sherman Substation.

Mr. James Lisowski, Engineering & Substation Supervisor
Chicopee Electric Light Department
725 Front Street
Chicopee, MA 01020
Tel. No. 413-598-8311
Services provided 1988-2001:

1. Engineering consultant to the electric utility for the interconnection of an ONSI 250 kW fuel cell to the 4.8 kV distribution system at Westover Air Force Base.

2. Engineering consultant to the electric utility for BFI landfill gas-fired distributed generation interconnection to 4.8 kV distribution system.
3. Engineering design and Owner's Engineer for control system replacement for the 4.16 kV Front Street Generation Plant.
4. Distribution system load flow, short circuit and relay coordination analysis for numerous projects involving the 13.8 kV and 4.16 kV distribution system.
5. Technical specifications for 4.16 kV circuit breakers. 13.8 kV reclosers, and switched capacitor banks.

Mr. Savas C. Danos, General Manager
Littleton Electric Light and Water Departments
P.O. Box 2406
39 Ayer Road
Littleton, MA 01460
Tel. No. 978-486-3555
Services provided 1988-2001:

1. Utility electrical engineering representative for DEC-Taylor Street distributed generator interconnection to 24.9 kV distribution system.
2. General electrical power systems engineering consulting for numerous projects involving the Littleton Electric Department 115 kV – 24.9 kV supply substation and the 24.9 kV electrical distribution system.

Mr. Mark T. Kelly, General Manager
Middleton Municipal Electric Department
197 North Main Street
Middleton, MA 01949
Tel. No. 978-774-4313
Services provided 1992-2001:

1. Engineering design for modifications to 115 kV - 23 kV Essex Substation.
2. Short circuit and relay coordination analysis for 23 kV distribution system.
3. General electrical power systems engineering consulting for numerous projects involving the Middleton Electric Department 115 kV – 23 kV supply substation, 23 kV – 4.16 kV distribution substations, and the 23 kV and 4.16 kV distribution circuits.

John Guariglia, RLA
Alliance Principal

Education
State University of New York, College of Environmental Science & Forestry
Bachelor of Landscape Architecture

Monroe Community College
Associate in Science

Registration
New York

Professional Experience
John brings over ten years experience in the field of Landscape Architecture to Saratoga Associates. During his career he has worked on a variety of site development, planning and aesthetic projects throughout the Northeast.

Specifically, over the past seven years, John has become a recognized expert in conducting visual impact assessments utilizing standard methodologies including the New York State Department of Environmental Conservation's Program Policy "Assessing and Mitigating Visual Impacts." In addition to his many years of project management, John is skilled in a variety of software programs and has served as an expert witness.

Representative Project Experience
>Beech Ridge Wind Farm, Greenbrier County, WV
>100 Turbine Wind Farm – Western New York, Client and Location Confidential
>Varian Wind Power, Gloucester, MA
>Windfarm Prattsburgh, Prattsburgh/Italy, NY
>Industrial Wind Power - Massachusetts, Client and Location Confidential
>Falmouth Hospital Wind Power, Falmouth, MA*
>CapeWind Wind Farm, Cape Cod, MA*
>Flat Rock, Lowville, NY*
>345kV Electrical Transmission Line (Art VII Application), Rensselaer County, NY*
>Neptune Regional Transmission System (AC/DC Converter Station – Art VII Application), Long Island, NY*
>Trigen Power Plant Expansion, Long Island, NY*
>Empire Newsprint Recycling and Power Plant (Art X Application), Rensselaer, NY*
>Empire Newsprint Recycling and Power Plant, Kingston, NY*
>Conectiv Power Plant, Bordentown, NJ*
>Con-Ed Repowering, Manhattan, NY*
>Syracuse Area Industrial Waste Cell (Landfill), Syracuse, NY*
>Chaffe Landfill, Chaffe, NY*

**Prior to association with Saratoga Associates.*

RESUME AND PROFESSIONAL PROFILE

NAME:	**Dr. Richard H. Podolsky**
TITLE	Senior Ecologist
FIRM:	The Louis Berger Group
CONTACT:	Email: rpodolsky@louisberger.com T: (207) 236-8877 Cell: (207) 475-5555
EDUCATION:	B.A. Biology. University of Wisconsin, WI M.S. Ecology, Rutgers University, NJ Ph.D. Ecology, Fisheries and Wildlife, University of Michigan, MI Post Doctoral Research, Charles Darwin Station – Galápagos Islands
CERTIFICATIONS:	Registered Senior Ecologist, Ecological Society of America Society for Conservation Biology American Ornithological Union National Wind Coordinating Committee
NUMBER OF YEARS EXPERIENCE:	22
EXPERIENCE SUMMARY:	*Dr. Podolsky has completed numerous projects that pertain to endangered birds and mammals for developers, oil, gas, and wind generation companies, and government agencies to assess environmental impacts of a wide range of coastal-zone projects and achieve regulatory compliance. He has expertise researching and successfully applying cost-effective, state-of-the-art environmental techniques, materials and software to new development and mitigation projects especially in the coastal zone; is a strong team leader and communicator with substantial staff and fiscal management skills; and is experienced at proactively addressing marine environmental concerns, and cooperating with governmental officials to achieve regulatory compliance.*

RELEVANT PROJECT EXPERIENCE:

- Contributed substantially to over 20 on shore and offshore wind power projects and directed the siting and design and prepared State and Federal permits and conducted pre-construction bird, bat and wildlife studies at wind projects ranging in size from 1-10 wind turbines to in excess of 230 turbines.

- Key team member on coastal-zone projects involving all aspects of environmental compliance including but not limited to environmental conservation, natural resource assessments, ecological/environmental restoration, site assessment/site investigations (PA/SI), habitat evaluations, resource conservation and recovery, Migratory Bird Treaty Act (MBTA), Marine Mammal Protection Act (MMPA), National Environmental Policy Act (NEPA), Endangered Species Act (ESA) and in particular Section 7 Consultations pertaining to ESA.

- Led and managed numerous domestic and international projects for land developers, electrical (conventional and renewable) power and oil companies, conservation organizations, government agencies and other large landholders; analyze potential adverse impact of light and sound pollutants and biodiversity loss from development; particular emphasis on migratory shore and seabirds and impacts within the coastal zone; special expertise includes birds and lighthouses, communication towers, wind turbines and the modeling and surveying methods associated with these and other large structures in the coastal zone.

- Involved broadly in Hawaii environmental science and conservation. Directed numerous field projects on the Hawaiian Islands of Kauai and Oahu, Hawaii and Maui related to endangered marine and shorebird species at sites with the greatest concentration of endangered marine species in the United States. Conducted similar projects pertaining to endangered coastal birds and mammals in ME, CA, NY and NJ.

- Analyzed satellite imagery of over one million acres in Alaska impacted by the Exxon-Valdez Oil Spill to identify and quantify the habitats of shorebirds most impacted by the spill.

- Conceived and authored chapters in; *Cape Cod to the Bay of Fundy: Environmental Atlas of the Gulf of Maine* (MIT Press, 1996).

- Senior ornithologist on the Project Puffin, which successfully used social attraction techniques to restore puffin and other seabird populations to islands in The Gulf of Maine. Led numerous ecological research/restoration teams in Maine, Hawaii, and the Galápagos Islands. Taught summer courses to educators at the Audubon Ecology Workshop. Led ecotours to Central and South America, Antarctica, and the Galápagos Islands.

MAJOR CLIENTS AND PROJECTS

- Boreal Renewable Energy Development, Inc. Bird/Bat Fatal Flaw Assessments at Wind Power Projects (2006).
- Lorax Energy Systems, Inc. Bird/Bat Fatal Flaw Assessments at Wind Power Projects (2006).
- UPC, Inc. Senior Scientist on Avian Assessments at wind power project (2005-2006).
- WindKraft Nord, Inc. Senior Scientist on Avian Assessments at wind power project (2005).
- Community Energy, Inc. Senior Scientist on Avian Assessments at wind power project (2005).
- The National Park Service. Resource Specialist analyzing the impacts of off-road vehicle and recreation on federally and state protected shorebird species for the Environmental Assessments of the Cape Hatteras and Cape Lookout National Seashores Protected Species Interim Management Plans (2005).
- Silverstein Properties, Inc. Senior Ornithologist to Freedom Tower–Lower Manhattan (2004).
- US WindForce. Environmental Consultant–Wind Power Planning and Management (2004).

- UPC and Green Energy Harvest. Environmental Consultant–Wind Power Planning (2004).
- The Hastings Companies. Energy Consultant–Wind Power Planning and Management (2004).
- Hamilton Capital, LLC. Environmental Contractor-Avian Restoration and Management (2004).
- Columbia University (CIESEN). Ecological Biodiversity Hotspot Mapping in Brazil (2004).
- Winergy, LLC. Lead Scientist–Offshore Wind Power Design and Permitting (2003).
- Institute of Ecosystem Studies. Visiting Scientist and Consultant (2000-2002).
- Friends of Ballona Wetland & Playa Vista Corporation. Environmental Consultant (2001).
- National Audubon Society. Consulting Ornithologist & Antarctic Expedition Leader (1978-2001).
- Bard College. Graduate School of Environmental Studies. Faculty (2000).
- New York Academy of Science. Industrial Ecology Project Manager (1999).
- Electric Power Research Institute (EPRI). Consulting Scientist (1994-1999).
- American Museum of Natural History. GIS/Biodiversity Consultant (1998).
- Columbia University Lamont Doherty Earth Observatory. Software Consultant (1994-1998).
- United Nations Development Program (UNDP/GEF). Biodiversity Consultant (1994-1997).
- Point Reyes Bird Observatory. Research Associate (1993-1995).
- Cornell University Laboratory of Ornithology. Research Associate (1991-1992).
- Bigelow Laboratory for Ocean Sciences. Adjunct Scientist (1990-1992).
- Charles Darwin Research Station-Galápagos Islands. Postdoctoral Scientist (1988-1991).

PROFESSIONAL REFERENCES

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