Appendix H

Application Form

APPLICANT INFORMATION	
Name of Local Government Entity:	City of Dover, NH
Federal ID Number:	02-6000230
D-U-N-S Number: (Applicant must apply and have number by 3/1/2010)	099359168
Applicant has registered with the Central Contractor Registration (CCR)	☒ Yes ☐ No
If Partnering, have all Partnership Agreement Forms been included?	☐ Yes ☐ No

CONTACT INFORMATION Enter the primary contact at the Applicant Organization for this Application	
Applicant Primary Contact Name:	Rick Jones
Applicant Primary Contact Title:	CD Coordinator
Address:	288 Central Ave.
City, State, Zip Code + 4:	Dover, NH 03820-4169
Office Phone:	516-6034
Cell Phone:	
Fax:	516-6007
E-Mail Address:	r.jones@ci.dover.nh.us
APPLICANT ELIGIBILITY CHECKLIST	
Applicant is a Local Government located in New Hampshire.	☒ Yes ☐ No (applicant is not eligible)

Federal Certifications	
For any member of the Application team, have you received, or do you expect to receive, over $500,000 of Federal awards for any of the fiscal years during the term of our agreement? If yes, you are required to obtain an independent audit pursuant to the Federal Office of Management and Budget, OMB circular A-133, and provide a copy to OEP throughout the term of this Agreement.	☒ Yes ☐ No
Did your organization receive: (1) more than 80% of its annual gross revenues in Federal awards, (2) 25 million or more in annual gross revenues from Federal awards, and (3) the public does not have access to information about the compensation of the senior executives under filing requirements of the Security Exchange Act of 1934 or 780(d) or section 6104 of the Internal Revenue Code? If yes, provide the names and compensation of the five most highly compensated officers.	☐ Yes ☒ No

Proposed Project	
Brief Project Description: Installation of a micro hydro turbine at the City's Waste Water Treatment Plant	
Cost of the Project:	$142,500
Funds Requested:	$142,500

Project Category (select one) and fill in requested information.			
☐ Lighting Upgrades	estimated annual MMBTU source energy reduced	=	MMBTU
☐ Building Energy Efficiency Measures	estimated annual MMBTU source energy reduced	=	MMBTU
☐ Building Energy Audits	square footage of the facilities to be audited	=	sqft
☐ Energy Studies and Energy Planning	population affected	=	people
☐ Reducing Commuter Vehicle Fuel Use	estimated annual gallons of fuel saved	=	gallons
☐ Idling Reduction Technologies	estimated annual gallons of fuel saved	=	gallons
☐ Waste Reduction	annual tons of waste reduced	=	tons
☐ Renewable Energy	estimated annual MMBTU energy generated	=	MMBTU
☒ Other Innovative Projects	Describe conservation benefits of project in project description		

PRIMARY PLACE OF PERFORMANCE Enter the physical location of the project. For projects with multiple locations, use the location with the largest dollar amount of measures.	
Location Name:	Waste Water Treatment Plant
Address:	484 Middle Road
City, State, Zip Code + 4:	Dover, NH 03820-4169
Region number: (Refer to Appendix D)	03

PROGRESS PAYMENTS Select one
☒ Applicant requests award payment in 2 parts. At equipment delivery and/or 50% of services provide and at project completion.
☐ Applicant request award payment in 1 part. At project completion.

AUTHORIZING SIGNATURE

I have read, understood and am in compliance with all rules and regulations concerning this incentive program. I certify that all information provided is correct to the best of my knowledge. I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under this Application. Furthermore, I understand that the project is to be funded under ARRA and that additional reporting and other requirements will apply, including, but not limited to: jobs reporting requirements, Buy American, and Federal Davis-Bacon prevailing wage requirements; and other requirements as may be imposed by Federal or State oversight entities. I agree to provide to OEP any and all required materials, documentation, access to facilities, and other required information, on the schedule required by OEP to meet all requirements. I understand that this project may be audited for compliance with the requirements of this Application. I understand that failure to comply with ARRA requirements and to complete the Project by March 10, 2012 may result in loss of funding.

This Application must be signed by an authorized designee of the eligible entity. Service providers or vendors may not sign this Application.

Signature:	Date: 2/1/10
Printed Name: J.Michael Joyal	Title: City Manager

Acknowledgement: State of New Hampshire County of Strafford

On 2/1/10, before the undersigned officer, personally appeared the person identified in signature block above, or satisfactorily proven to be the person whose name is signed in signature block above, and acknowledged that s/he executed this document in the capacity indicated in the signature block.

Signature of Notary Public or Justice of the Peace

[SEAL] Colleen E.A. Bessette

Name and Title of Notary Public or Justice of the Peace

Colleen Bessette, Executive Assistant

COLLEEN E. A. BESSETTE, Notary Public
My Commission Expires October 22, 2013

As can be readily seen replacing the existing positive displacement blowers with Turbine Blowers can reduce electricity consumption by about 1/3rd making this a viable economic investment with an approximate 10.8 year repayment from savings accrued on electricity.

This economic analysis does not include any government or utility grants or incentives that may be available for this type of project.

(B.) *Alternative Energy Technology Evaluation*

As a component of the EPC evaluation for the Dover, NH wastewater treatment facility, the following alternative energy technologies were evaluated for implementation at the project site:

- Micro-hydro turbine.
- Natural gas fuel cell.

The objective of this alternative energy evaluation was to determine the applicability and economic feasibility of implementing one or both of these technologies at the project site to provide alternative sources for electrical power and combined heat and power (CHP) energy, respectively. Successful implementation of a micro-hydro turbine and/or fuel cell could replace the purchase of electrical power from the utility grid and/or fossil fuels (#2 heating oil and liquid propane gas) for heating and hot water needs at the project facility.

1.0 Micro-hydro Turbine

a) Description/Specification of the Proposed System

The geomorphic attributes of the site on which the Dover, NH municipal wastewater treatment facility is located are atypical of most municipal wastewater treatment facilities. Typically, municipal wastewater treatment facilities are located on sites contiguous to the wastewater discharge receiving water and at a low elevation differential to the receiving water. At the Dover, NH municipal wastewater treatment facility, the differential elevation between the water surface leaving the final process operation (UV disinfection/step aeration chamber) and the effluent discharge pipe invert at the facility's downstream outfall transition structure provides a static elevation head of 61.53 head. This elevation differential in the facility's effluent discharge conveyance system was evaluated as a source of potential energy to drive a micro-hydro turbine to generate electricity for use at the wastewater treatment facility.

Consultation with Canyon Hydro of Deming, WA (hydro-turbine system integrator) and Cornell Pump Company of Portland, OR (manufacturer of small [micro-] hydro turbines) determined that using the available potential energy from the elevation difference between the UV disinfection/step aeration chamber and the effluent discharge outfall transition structure, 11KW of electricity could be generated from the wastewater treatment facility's average discharge flow of 2 MGD to 3 MDG and using an effluent discharge penstock configuration as described in the following discussion.

In order to implement a micro-hydro turbine at the Dover municipal wastewater treatment facility site, modification of the effluent discharge pipe would be required to provide the turbine with the proper application of water to the turbine blades. The turbine recommended by Canyon Hydro for the subject application (Cornell 5 TR1-A) requires a full flowing pressurized penstock (full flowing feed piping to the turbine nozzles). The effluent from the UV disinfection/step aeration chamber is currently conveyed by gravity to the effluent outfall transition structure

in a 24" diameter pipe which is only partially full during normal effluent flow conditions. Only during periods of heavy precipitation does the 24" diameter effluent discharge pipe experienced full flow conditions.

To provide the required hydraulic flow conditions to the turbine's nozzles and blades, the effluent discharge pipe would require modification as described in the following:

- Install a 12" diameter pipe as a penstock to convey the wastewater effluent to the turbine. The penstock would begin at a transition manhole to be located adjacent to and down gradient from the existing effluent discharge manhole at Station 5+ 52. The transition manhole would be connected to the Station 5 + 52 manhole using a 12" diameter pipe.
- Modify the existing Station 5+52 manhole with an internal diversion dam. The function of the diversion dam will be to route the normal plant effluent flow to the new diversion manhole and 12" penstock. During high effluent flow conditions (e.g., heavy precipitation events where flows are in excess of 3 MGD), any excess flow entering the Station 5+52 manhole above the capacity of the penstock and turbine would overflow the diversion dam and be conveyed in the existing 24" effluent discharge line to the outfall transition structure, bypassing the penstock and turbine.
- The 12" penstock would run parallel to the existing 24" effluent discharge line from the transition manhole and connect to the turbine water inlet. The turbine would be located just up gradient from the existing outfall transition structure.

The turbine will be housed in a weather tight, heated and ventilated enclosure (turbine house) that will also contain the power related components of the system.

The effluent from the turbine must be discharged to atmosphere (i.e., the effluent must be conveyed in an open [non-pressurized] conveyance tailrace so that the water discharge from the turbine does not impart any backpressure on the turbine blades). This tailrace configuration would be provided as part of the turbine house slab design. The tailrace and associated turbine house slab will be designed to convey water effluent from the turbine to the existing outfall transition structure.

Electrical power that is generated from the turbine would be available for use in the wastewater treatment facility, replacing a portion of the electrical power currently being purchased from the grid (Public Service of New Hampshire). The electrical power wiring would be required to be run from the proposed turbine house (to be located adjacent to the existing outfall transition structure) back to the wastewater treatment facility Process Building where it would be integrated into the existing incoming power interface. This evaluation assumes that the power wiring from the turbine house to the electrical power panel in the Process Building will be installed in underground conduit.

b) Proposed Implementation Economic Evaluation

The projected power output of the proposed micro-hydro turbine under normal effluent flow conditions at the treatment plant is 11 KW of electricity. Assuming continuous operation of the turbine, the annual output of the turbine should be 96,360 KWH of electricity per year (displacement of approximately 5.5% of the 1,750,000 KWH consumed by the wastewater treatment facility – based on average electrical consumption per month for Y2007-Y2008). The avoided cost (benefit) of replacing this electrical power as purchase from grid would be

$11,833/year, based on the current (2008 year to date) price per KWH being paid to PSNH by the City of Dover Wastewater Treatment Facility of $0.1228/KWH delivered.

Table 4 provides an opinion of the costs associated with the implementation of a micro-hydro turbine at the project facility.

The payback estimated for implementing this has been estimated at 12 years.

[Implementation Cost ($142,500)/ avoided electrical power cost ($11,833/year]

This economic analysis does not include any government or utility grants or incentives that may be available for this type of project.

Table 4

Micro-hydro Turbine Implementation Cost Opinion

Dover, NH Wastewater Treatment Facility

Cost Component	Cost	Remarks
Turbine equipment	$ 50,000.00	Cornell 5 TR1-A
Turbine installation	$ 12,500.00	
Diversion Manhole	$ 2,500.00	4" dia., 8 ft. deep (F&I)[1]
MH Sta. 5+52 diversion structure modification	$ 500.00	
Penstock	$ 29,500.00	12" dia. F&I
Turbine house and tailrace	$ 7,500.00	10'X10' F&I
Power wiring to Process Building	$ 11,500.00	
Contingency (25%)	$ 28,500.00	
TOTAL	**$142,500.00**	

Notes: 1. F&I = Contractor Furnish and Install

2.0 Hydrogen Fuel Cell

a) Description/Specification of the Proposed System

The implementation of a hydrogen fuel cell was evaluated as means of generating both electrical power and heat for the Dover Wastewater Treatment facility. Utilizing hydrogen as a fuel, a fuel cell will generate electrical power through an electrochemical reaction. As a consequence of the electrochemical reaction that occurs in the fuel cell, heat energy is generated as a byproduct; and when a fuel cell is operated in combination with heat energy recovery, the efficiency of the process converting hydrogen (from fuel) to electricity and heat (Combined Heat and Power – or CHP mode) approaches 75% to 80% (compared to approximately 50% when a fuel cell is used to produce electricity only.

The typical sources of hydrogen that can be utilized to power a fuel cell include, but are not limited to:

- Methane gas (from the anaerobic processing (digestion) of municipal wastewater treatment sludge or mined from a municipal landfill).
- Hydrogen gas, as produced from the electrolysis of water or from steam reforming from natural gas.

DOVER'S COMMITMENT TO SUSTAINING ENERGY EFFICIENCY

This past January, The City of Dover entered into a Energy Services Agreement with Johnson Controls to perform energy upgrades to the City's Waste Water Treatment Plant.(WWTP)

The project involved replacing the three (3) existing blowers, replacing transformers with high efficiency transformers and performing other weatherization & lighting improvements to the buildings at the plant. These projects are being completed with a combination of direct EECBG funds, DES stimulus funds and City of Dover funding. The project is a part of a master energy services contract that the City has with Johnson Controls and was separated from the other energy upgrades being performed by the city to comply with all of the ARRA funding requirements.

Due to budget constraints the total recommended energy efficiency improvements and renewable energy projects had to be scaled back. Two of the projects eliminated from the WWTP facility included installation of PV panels and installation of a micro turbine at the site to take advantage of the treated waste water flow daily from the plant. The City feels that the micro turbine is a very worth wile project and the energy generated by the turbine will reduce the overall energy costs to operate the plant.

The City has and is committed to replacing outdated equipment and making energy efficiency improvements to its buildings. The overall Energy Contract with Johnson Controls is just over $2.4 million dollars, with the majority coming from City bonding. The payback for the entire project is estimated at 7.21 years.

Although the City would like to do more projects than currently under contract, a combination of the payback length on some of the items, ineligibility to use ARRA funding for other conservation measures and City spending limits implemented by the voters forced us to curtail some of the desired projects. In addition, Dover has an Energy Advisory Committee that is fully supportive of this project.