DOE/EA-1753

FINAL
ENVIRONMENTAL ASSESSMENT

FOR THE

BEACON POWER CORPORATION FLYWHEEL FREQUENCY REGULATION PLANT, CHICAGO HEIGHTS, ILLINOIS (SITE 1), AND HAZLE TOWNSHIP, PENNSYLVANIA (SITE 2)

U.S. Department of Energy
National Energy Technology Laboratory

April 2011

COVER SHEET

Responsible Agency: U.S. Department of Energy (DOE)

Title: *Final Environmental Assessment for the Beacon Power Corporation Flywheel Frequency Regulation Plant, Chicago Heights, Illinois (Site 1), and Hazle Township, Pennsylvania (Site 2)* (DOE/EA-1753)

Contact: For additional copies or more information about this environmental assessment (EA), please contact:

Mr. Fred Pozzuto
U.S. Department of Energy
National Energy Technology Laboratory
P.O. Box 880, MS B07
3610 Collins Ferry Road
Morgantown, West Virginia 26507-0880
Facsimile: (304) 285-4403
E-mail: fred.pozzuto@netl.doe.gov

Abstract: DOE prepared this EA to evaluate the potential environmental consequences of providing a financial assistance grant under the American Recovery and Reinvestment Act of 2009 in a cooperative agreement with the Beacon Power Corporation (Beacon Power) as part of the Smart Grid Demonstrations Program.

This EA evaluates two similar proposed projects in two locations:

- **Site 1** evaluates installation of a utility-scale 20-megawatt flywheel energy storage and frequency regulation plant in Chicago Heights, Illinois, to provide frequency regulation services to PJM Interconnection, the electrical grid operator. The cost of the proposed project at the Illinois location would be about $48.1 million.

- **Site 2** evaluates installation of the same system in Hazle Township, Pennsylvania. The cost of the proposed project at the Pennsylvania location would be about $53 million.

DOE could choose to provide a grant for either location. DOE's Proposed Action would provide approximately $24 million in financial assistance in a cost-sharing arrangement to Beacon Power. In addition, for the proposed project in Pennsylvania (Site 2), Beacon Power could receive a $5 million grant from Pennsylvania's Redevelopment Capital Assistance Program.

This EA evaluates the environmental resource areas DOE commonly addresses in its EAs and identifies no significant adverse environmental impacts for the proposed project. The proposed projects could result in beneficial impacts to the nation's energy efficiency and the local economy, and could contribute to a minor reduction of greenhouse gases.

Availability: The Final EA is available on DOE's National Energy Technology Laboratory website at http://www.netl.doe.gov/publications/others/nepa/ea.html and at DOE's public reading room in Washington, D.C.

FINAL
ENVIRONMENTAL ASSESSMENT

FOR THE

BEACON POWER CORPORATION FLYWHEEL FREQUENCY REGULATION PLANT, CHICAGO HEIGHTS, ILLINOIS (SITE 1)

U.S. Department of Energy
National Energy Technology Laboratory

April 2010

ACRONYMS AND ABBREVIATIONS

CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
FWS	U.S. Fish and Wildlife Service
NEPA	National Environmental Policy Act of 1969, as amended
PJM	PJM Interconnection
PM_{10}	particulate matter with median aerodynamic diameter of 10 micrometers or less
$PM_{2.5}$	particulate matter with median aerodynamic diameter of 2.5 micrometers or less
PVC	polyvinyl chloride
SHPO	State Historic Preservation Officer
Stat.	*United States Statutes at Large*
U.S.C.	*United States Code*

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDIXES

SUMMARY

The U.S. Department of Energy (DOE or the Department) proposes to award a financial assistance grant under the American Recovery and Reinvestment Act of 2009 (Recovery Act) in the form of a cooperative agreement with Beacon Power Corporation (Beacon Power) for its proposed project to construct and operate a 20-megawatt utility-scale flywheel-based frequency regulation plant in Chicago Heights, Illinois. The project would involve several support facilities. The company would use the flywheels and frequency regulation equipment to store energy during off-peak times and return it to the electrical grid during on-peak times. DOE's Proposed Action is to award a $24 million financial assistance grant to Beacon Power in a cost-sharing arrangement. The total cost of the proposed project would be approximately $48.1 million.

This environmental assessment (EA) examines the potential environmental consequences of DOE's Proposed Action, providing financial assistance, and Beacon Power's proposed project. The EA also examines the No-Action Alternative, under which DOE assumes that, as a consequence of its denial of financial assistance, Beacon Power would not proceed with the project.

DOE reviewed the *National Register of Historic Places* and determined the proposed project would not affect listed or eligible historic sites. DOE sent a consultation letter to the Illinois State Historic Preservation Officer seeking confirmation, and the State Historic Preservation Officer responded and concurred with DOE's determination.

DOE also reviewed the U.S. Fish and Wildlife Service list of federally threatened, endangered, and candidate species and determined the proposed project would not affect any such species. The Department contacted the U.S. Fish and Wildlife Service, which verified the list is accurate and that the determination of no effects is appropriate (Pollack 2010).

DOE evaluated the environmental resource categories it commonly addresses in EAs and identified no significant adverse impacts from the proposed project. For most of the resource categories, DOE determined there would be no impacts or the potential impacts would be small, temporary, or both and therefore did not carry those forward for additional analysis. DOE focused its analyses on those resources that could require new or amended permits, have the potential for significant impacts or controversy, or typically interest the public. DOE performed detailed analyses of potential impacts to air quality, socioeconomics and environmental justice, and occupational health and safety. The following paragraphs summarize the analyses.

Air Quality. Temporary air emissions from construction activities for Beacon Power's proposed project would include combustion emissions from vehicles and construction equipment and fugitive dust from site preparation activities. These emissions would have short-term adverse impacts that Beacon Power would mitigate through best management practices such as soil stabilization and watering of exposed soils. Fugitive dust emissions would end at the completion of construction, so long-term impacts would be negligible.

The proposed flywheel plant would not burn fossil fuel, so it would produce zero direct emissions of combustion gases during operations. Further, use of flywheel-based frequency regulation would reduce the amount of fossil fuels regional power plants normally use to accomplish this function, which would result in a net reduction in dependence on fossil fuels. Therefore, operation of the proposed plant would mean that coal- and gas-fired plants would be able to drop the regulation function and focus on providing wholesale energy. No new permits would be necessary for flywheel plant operation.

Socioeconomics and Environmental Justice. The proposed project would create a small number of direct jobs during construction, which would last less than a year, so there would be no changes to population, infrastructure, or the level of social services in the area. There would be minor indirect positive economic consequences as vendors and equipment suppliers would benefit from capital orders for equipment and support systems. The evaluation of impacts to environmental justice is dependent on determining if high and adverse impacts from the proposed project would disproportionately affect low-income or minority populations. DOE determined that no high and adverse impacts would occur to any member of the community, including socioeconomic impacts, so there would be no high and adverse impacts to any minority or low-income population.

Occupational Health and Safety. The work force for site preparation and installation would be small and short term. DOE expects work-related incidents would be within industry incidence rates. Beacon Power would operate the facility almost entirely by remote control with limited onsite personnel. Therefore, there would be limited exposure of workers to hazardous situations at the facility. The installed equipment would have monitors and sensors to alert responders to any accident that might occur, and Beacon Power would brief and train local first responders.

Cumulative Impacts. There would be small, positive incremental impacts to socioeconomics and air quality. DOE has determined that there would be no high and adverse impacts to any member of the community, so there would be no adverse and disproportionate impacts to minority or low-income populations. Cumulative impacts to health and safety would not be measurable.

No-Action Alternative. DOE assumed for the EA analyses that Beacon Power would not proceed with the project without DOE's financial assistance. Therefore, there would be no impacts to any resource category from the No-Action Alternative. The small, positive socioeconomic impacts and the potential to reduce conventional power plant pollutant and greenhouse gas emissions would not occur. Further, DOE's ability to achieve its objectives under the Smart Grid Demonstrations Program and the Recovery Act would be impaired.

1. INTRODUCTION

As part of the American Recovery and Reinvestment Act of 2009 (the Recovery Act; Public Law 111-5, 123 Stat. 115), the U.S. Department of Energy's (DOE or the Department) National Energy Technology Laboratory, on behalf of the Office of Electricity Delivery and Energy Reliability's Smart Grid Demonstrations Program, is providing up to $435 million in federal dollars for competitively awarded cooperative agreements for the deployment of Smart Grid Demonstrations. Smart grid projects include regionally unique demonstrations to verify smart grid technology viability, quantify smart grid costs, validate new smart grid business models at a scale that can be readily adapted and replicated around the country, and to develop new and innovative forms of energy storage The funding of the selected projects requires compliance with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 et seq.), Council on Environmental Quality regulations (40 CFR Parts 1500 to 1508), and DOE NEPA implementing procedures (10 CFR Part 1021).

To comply with NEPA, DOE prepared this *Final Environmental Assessment for the Beacon Power Flywheel Frequency Regulation Plant, Part 1, Chicago Heights, Illinois* (EA). The proposed project site is at 305 Sauk Trail Road, Cook County. The site is not currently in use but was once in use for electricity generation. This EA examines the potential environmental consequences of DOE's Proposed Action, providing financial assistance, and the Beacon Power Corporation's (Beacon Power's) proposed project, construction and operation of a 20-megawatt utility-scale flywheel-based frequency regulation plant. The project would involve several support facilities. The flywheel plant would store energy during off-peak times and return electricity to the grid during on-peak times. The EA also examines the No-Action Alternative, under which DOE assumes that, as a consequence of its denial of financial assistance, Beacon Power would not proceed with the project.

This chapter explains NEPA and related regulations (Section 1.1), the background of the Smart Grid Demonstrations Program (Section 1.2), the Department's purpose and need for action (Section 1.3), and the environmental resources DOE did not carry forward to detailed analysis (Section 1.4). Chapter 2 discusses DOE's Proposed Action, Beacon Power's proposed project, the No-Action Alternative, and DOE's Alternative Actions. Chapter 3 details the affected environment and the potential environmental consequences of the proposed project and of the No-Action Alternative, and it considers resource commitments. Chapter 4 addresses cumulative impacts, and Chapter 5 provides DOE's conclusions from the analyses. Chapter 6 lists the references for this document. Appendix A contains the distribution list, and Appendix B contains correspondence between DOE and the Illinois State Historic Preservation Officer (SHPO). Appendix C contains a copy of an environmental synopsis for projects of this type that DOE used in the evaluation of this proposed project.

1.1 National Environmental Policy Act and Related Regulations

In accordance with its NEPA implementing procedures, DOE must evaluate the potential environmental impacts of a Proposed Action that could have a significant impact on human health and the environment including decisions on whether to provide financial assistance to states and private entities. In compliance with these regulations and DOE's procedures, this EA:

- Examines the potential environmental impacts of the Proposed Action and the No-Action Alternative, as well as Beacon Power's proposed project;
- Identifies unavoidable adverse environmental impacts;
- Describes the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity;
- Characterizes any irreversible and irretrievable commitments of resources that would be involved if DOE decided to implement its Proposed Action; and
- Discusses the past, present, and reasonably foreseeable actions (cumulative impacts) to which the proposed project could contribute.

DOE must meet these requirements before it can make a final decision to proceed with a proposed federal action that could cause adverse impacts to human health or the environment. This EA meets DOE's obligations under NEPA and provides DOE with the information needed to make an informed decision about providing financial assistance to the flywheel frequency regulation plant in Chicago Heights, Cook County, Illinois.

This EA evaluates the potential direct, indirect, and cumulative impacts of the proposed project. No other action alternatives are analyzed. For purposes of comparison, this EA also evaluates the impacts that could occur if DOE did not provide funding (the No-Action Alternative), under which the Department assumes that Beacon Power would not proceed with the project. This assumption enables DOE to compare the impacts of an alternative in which the project occurs with one in which it does not.

1.2 Background of the Smart Grid Demonstrations Program

DOE's National Energy Technology Laboratory and the Office of Electricity Delivery and Energy Reliability manage the research and development portfolio of the Smart Grid Demonstrations Program. Their mission is to lead national efforts to modernize the electrical grid; enhance the security and reliability of the energy infrastructure; and improve recovery from disruptions to electricity supply. The Smart Grid Demonstrations Program will help verify the technological and business viability of new technologies and show how fully integrated smart grid systems can be readily adapted and copied around the country. Further, implementation of smart grid technologies could reduce electricity use by more than 4 percent by 2030. It is

estimated that smart grid technologies can save U.S. businesses and consumers about $20.4 billion in electricity costs (DOE 2009a).

Congress appropriated funding for the Smart Grid Demonstrations Program in the Recovery Act to stimulate the economy and reduce unemployment in addition to furthering the existing objectives of the program. DOE solicited applications for this funding by issuing a competitive Funding Opportunity Announcement (DE-FOA-0000036), "Recovery Act: Smart Grid Demonstrations," on June 25, 2009. The announcement invited applications in two areas of interest:

- Area of Interest 1, Smart Grid: Regionally unique demonstration projects to quantify smart grid costs, benefits, and cost-effectiveness; to verify smart grid technology viability; and to validate new smart grid business models at a scale that can be readily adapted and replicated around the county. Smart grid technologies of interest include advanced digital technologies for use in planning and operation of the electric power system and the electricity markets such as microprocessor-based measurement and control, communications, computing, and information.

- Area of Interest 2, Energy Storage: Demonstration projects for major, utility-scale energy storage installations to help establish costs and benefits, to verify technical performance, and to validate system reliability and durability at scales that can be readily adapted and replicated across the United States. Energy storage systems include advanced battery systems (including flow batteries), ultracapacitors, flywheels, and compressed-air energy systems. Application areas include wind and photovoltaic integration with the grid, upgrade deferral of transmission and distribution assets, congestion relief, and system regulation.

DOE prepared an environmental synopsis to evaluate and provide a comparison of potential environmental impacts for each proposal it deemed to be within the competitive range. The Department used the synopsis to evaluate appreciable differences in the potential environmental impacts from those proposals. The synopsis included: (1) a brief description of background information for the Smart Grid Demonstration area of interest, (2) a general description of the proposals DOE received in response to the Funding Opportunity Announcement and deemed to be within the competitive range, (3) a summary of the assessment approach DOE used in the initial environmental review to evaluate the potential environmental impacts associated with the proposals, and (4) a summary of the environmental impacts that focused on potential differences among the proposals. Appendix C contains a copy of the environmental synopsis for Area of Interest 2.

On November 24, 2009, DOE announced its selections of 16 projects in Area of Interest 1 and 16 projects in Area of Interest 2 based on the evaluation criteria in the funding opportunity announcement and giving special consideration to projects that promoted the objectives of the Recovery Act—job preservation or creation and economic recovery—in an expeditious manner.

Beacon Power's proposed project—construction and operation of a 20-megawatt utility-scale flywheel frequency regulation plant—was one of the 16 projects DOE selected for funding under Area of Interest 2. DOE's Proposed Action is to provide $24 million in financial assistance under a cost-sharing arrangement with Beacon Power. The total estimated cost of the project is $48.1 million.

1.3 Purpose and Need for DOE Action

In June 2009, the Department initiated a process to identify suitable projects to lead the way for deploying integrated smart grid systems by issuing Funding Opportunity Announcement DE-FOA-00000036, "Recovery Act: Smart Grid Demonstrations." This funding opportunity announcement was funded under the Recovery Act.

The purpose of the Proposed Action is to support the objectives of the Smart Grid Demonstrations Program—to demonstrate advanced smart grid technologies and integrated systems that will help build a smarter, more efficient, more resilient electrical grid—and the goals of the Recovery Act. The Program will help verify smart grid technology viability, quantify smart grid costs and benefits, and validate new smart grid business models at a scale that can be readily adapted and replicated around the country. DOE considers Beacon Power's proposed project to be one that can meet these objectives because it would (1) increase power quality and reliability of the local area, (2) reduce carbon emissions, (3) increase energy security through reduced oil consumption, and (4) further national knowledge and technology of new frequency regulation technology.

The Recovery Act enacted legislation to create jobs, restore economic growth, and strengthen America's middle class through measures that modernize the nation's infrastructure, enhance America's energy independence, expand educational opportunities, preserve and improve affordable health care, provide tax relief, and protect those in greatest need. The Recovery Act has now enabled the DOE to provide funds under this funding opportunity announcement that would partially satisfy the needs identified under the Act.

There has been chronic underinvestment and parochialism in getting energy where it needs to go through transmission and distribution, further limiting grid efficiency and reliability. While hundreds of thousands of high-voltage transmission lines course throughout the United States, only 668 additional miles of interstate transmission lines have been constructed since 2000. As a result, system constraints worsen at a time when outages and power quality issues cost American business an estimated $100 billion or more on average each year (DOE 2008). DOE's Proposed Action of providing this project with funding would help initiate modernization of a small portion of the nation's electrical grid system.

1.4 Environmental Resources Not Carried Forward

Chapter 3 of this EA describes the affected environment and examines the potential environmental impacts of the proposed project, associated actions, and the No-Action Alternative for the following resource areas:

- Air quality,
- Socioeconomics and environmental justice, and
- Occupational health and safety.

The focus of the more detailed analyses in Chapter 3 is on those resources that could require new or amended permits, have the potential for significant impacts or controversy, or typically interest the public, such as socioeconomics and occupational health and safety.

DOE EAs also commonly addresses the environmental resource areas listed in Table 1-1. However, in an effort to streamline the NEPA process and enable a timely award to the selected project, DOE did not examine the resource areas in the table at the same level of detail as the above-mentioned resources areas. Table 1-1 describes the Department's evaluation of those resource areas. In each case, there would be no impacts or the potential impacts would be small or temporary in nature, or both. Therefore, DOE determined that further analysis is unnecessary. In terms of the No-Action Alternative, the potential impacts in Table 1-1 would not occur because DOE assumes the proposed project would not proceed.

Table 1-1. Environmental resource areas with no, small, or temporary impacts.

Environmental resource area	Impact consideration and conclusions
Geology and soils	The project site is in a seismically stable area and has no known site stability issues. Geologic and soil information for Cook County is available at http://www.isgs.uiuc.edu/maps-data-pub/cook-atlas/atlas-intro.shtml. There are no onsite water bodies or channels, but Beacon Power would nonetheless use best management practices during construction to control sedimentation and soil erosion. Construction would involve excavation and laying of concrete footings to install the flywheel containers, which would be 6 feet in diameter and 8 feet deep. The company would stockpile soil and excavation debris on the site for site contouring or transport it to an approved landfill.
Land use	The proposed project site is at 305 East Sauk Trail Road, Chicago Heights, Cook County, Illinois. The property is an unutilized industrial site. The previous user was Midwest Generation, an independent power producer that operated a 60-megawatt oil-fired generator on the site. The generator and associated structures such as a large storage tank have been removed from the site. The site occupies 25 acres, of which Beacon Power would use about 3.5 acres for the proposed project. Given the site's past use hosting a power plant and industrial site characteristics, the proposed project would not alter the historical land use characteristics of the site. DOE does not expect the project would result in any changes in surrounding land uses.

Table 1-1. Environmental resource areas with no, small, or temporary impacts.

Environmental resource area	Impact consideration and conclusions
Water resources	Site preparation and construction activities could result in storm water runoff and soil erosion. Runoff during construction would be regulated and controlled under a National Pollutant Discharge Elimination System storm water construction permit and a storm water pollution prevention plan. Beacon Power would use its existing spill prevention plan to manage the use and storage of oil, gas, and other liquids for the propose project. The proposed project would require small quantities of potable water for the small onsite office and visitor center, which Beacon Power would obtain from municipal sources. During operations, Beacon Power would not use surface water, would not discharge wastewater, and would not need permits. The proposed project would not use groundwater for operations, and there would be no underground storage tanks. Beacon Power would install a monitoring system that would indicate accidental losses or leaks in the cooling loop. The proposed construction activities would not occur in a 100-year floodplain, and there are no wetlands on or near the site. Therefore, there would be no impacts to floodplains or wetlands during operations.
Biological resources	Due to recent inactivity, native plant species have reemerged in areas that were once disturbed or hosted site facilities and structures. During construction, some wildlife in the project area could leave to avoid the noise and the presence of people and vehicles. There could be a small number of wildlife deaths due to onsite vehicle use and construction equipment. Similar impacts could occur during operations. DOE reviewed the U.S. Fish and Wildlife Service (FWS) website to identify federally listed threatened, endangered, and candidate species in Cook County. The website lists four federally endangered species: the Indiana bat (*Myotis sodalis*), the Piping plover (*Charadrius melodus*), the Hines emerald dragonfly (*Somatochlora hineana*), and the leafy-prairie clover (*Dalea foliosa*). Three federally threatened species occur in Cook County: the eastern prairie fringed orchid (*Platanthaera leucophaea*), the Mead's milkweed (*Asclepias meadii*), and the prairie bush clover (*Lespedeza leptostachya*). One candidate species also occurs in Cook County, the eastern massasauga (*Sistrurus catenatus*) (FWS 2011). DOE compared the habitat requirements for each of the listed species with the available habitat on the proposed project site. No habitat capable of supporting any of the species occurs. Therefore, DOE determined that there would be no effects to any federally listed threatened, endangered, or candidate species. DOE contacted the FWS Midwest Region office to confirm the list of federally listed species and discuss DOE's determination. The FWS verified the list is accurate and that the determination of no effects is appropriate (Pollack 2010).

Table 1-1. Environmental resource areas with no, small, or temporary impacts.

Environmental resource area	Impact consideration and conclusions
Historic and cultural resources	DOE formally consulted the Illinois SHPO (Appendix B) in accordance with Section 106 of the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.) and its implementing guidelines at 36 CFR Part 800. DOE reviewed the *National Register of Historic Places* for listed properties in the Chicago Heights area and determined that none is near the site and therefore would not be impacted by the proposed project in the area of potential effect (the 3.5-acre parcel that would directly support the installation and operation of the flywheels). The site is currently vacant with no existing structures. Therefore, DOE determined there would be no impacts to federally listed or eligible historic places. DOE received a response from the Illinois SHPO that concurred with the Department's determination of no historic properties affected.
Aesthetics and visual resources	The proposed site is in urbanized Chicago Heights, Illinois. There are no nearby aesthetic features that construction and operation of the Beacon Power plant would affect. The visual characteristics of the site would change from an abandoned industrial site to one hosting new industrial utility-scale facilities. The new plant would be visually consistent with the historical use of the site. There is a 138-kilovolt transmission line adjacent to the site.
Noise	During construction, activity would typically occur on Monday through Saturday from 7:00 a.m. to 5:00 p.m. All construction activities would be in accordance with Occupational Safety and Health Administration guidelines, which address noise and hearing conservation in specific standards for the construction industry. Noise from construction would be temporary and limited to daytime hours, so DOE does not expect noise to affect nearby receptors. The principal operating elements of the facility would be the flywheels, which would be in vacuum-sealed vessels. These vessels would, in turn, be in underground precast concrete housings. Therefore, the flywheels would generate little noise during operations. The chillers and other electrical equipment necessary to support operations would generate some noise. The goal would be to maintain and control noise from the facility to a level that does not significantly increase ambient background noise levels outside the site boundary. For a similar project in Stephentown, New York, Beacon Power conducted two noise studies. The results of the studies indicated that operations would produce average noise levels under 45 A-weighted decibels. This level is below the U.S. Environmental Protection Agency (EPA) protective noise levels of 55 A-weighted decibels.
Waste	Site preparation and construction would generate small amounts of construction-related wastes such as packaging materials, concrete residues, and earthen materials. Beacon Power would send these wastes to approved local disposal facilities. The amount of waste would not affect local landfill capacities. The only known potentially hazardous material for the proposed project would be transformer oil. Current plans would be to use mineral-based oil; the specific amount is yet to be determined. Beacon Power would recycle or properly dispose of the mineral-based oil as required; it is not considered a hazardous waste under the Resource Conservation and Recovery Act regulations at 40 CFR Part 261, "Identification and Listing of Hazardous Waste."

Table 1-1. Environmental resource areas with no, small, or temporary impacts.

Environmental resource area	Impact consideration and conclusions
Utilities, energy, and materials	Beacon Power would regularly consume about 1 megawatt of power to operate the proposed frequency regulation plant. The office and visitor center would use small amounts of water and require sewage service. DOE reviewed the local capacities for water, sewer, and electricity and found them to be sufficient to support the needs for construction and operation of the plant. There are no unique materials necessary to manufacture or install plant elements or operate the proposed plant.
Transportation	Small temporary increases in local traffic to the proposed site area would occur during construction. Operation of the plant would require only a small staff, so there would be no long-term permanent increase in traffic. Existing public roads are sufficient for access to the site, and the existing onsite roads are also sufficient.

1.5 Consultations and Public Participation

1.5.1 Consultations

State Historic Preservation Office

On June 30, 2010, DOE sent a formal consultation letter to the Illinois SHPO in accordance with the review requirements of Section 106 of the *National Historic Preservation Act* (16 U.S.C. 470 et seq.) and its implementing regulations at 36 CFR Part 800. The letter detailed DOE's investigation of nearby historic properties and concluded that no historic properties would be affected by the proposed project. The Illinois SHPO responded on July 9, 2010, with the determination that no historic properties would be affected.

U.S. Fish and Wildlife Service

DOE reviewed the FWS list of federally threatened, endangered, or candidate species for the presense of any such species in the proposed project area. Based on that review, DOE determined that no impacts to federally listed threatened or endangered species are likely to occur. DOE contacted the FWS, which verified the list is accurate and that the determination of no effects is appropriate (Pollack 2010).

1.5.2 Public Participation

DOE provided copies of the Draft EA to federal, tribal, state, and local officials and announced its availability in public notices in the *Southtown Star*. In addition, DOE sent copies to the Chicago Heights Public Library. The Department invited comments about the proposed project for a period of 21 days from October 7 to 22, 2010, after publication of the public notice. DOE did not recieve comments on the Draft EA.

2. DOE PROPOSED ACTION AND ALTERNATIVES

This chapter describes DOE's Proposed Action (Section 2.1), Beacon Power's proposed project (Section 2.2), the No-Action Alternative (Section 2.3), and DOE Alternative Actions (Section 2.4).

2.1 DOE's Proposed Action

DOE's Proposed Action is to award a $24 million financial assistance grant in a cost-sharing agreement to Beacon Power through the Recovery Act to facilitate the construction and operation of a 20-megawatt flywheel frequency regulation plant in Chicago Heights, Illinois. Beacon Power estimates the total cost of the proposed project would be approximately $48.1 million.

2.2 Beacon Power's Proposed Project and Associated Activities

Beacon Power would locate the proposed plant on a vacant 25-acre industrial tract of land about 2 miles southeast of downtown Chicago Heights (Figure 2-1). Figure 2-2 is a satellite view of the site showing the approximate plant layout.

Figure 2-1. General location of Chicago Heights, Illinois.

Figure 2-2. Satellite view of the site and proposed project area.

The proposed site last hosted a 60-megawatt oil-fired generator that connected to a 138-kilovolt transmission line that still runs along the west side of the site. The generator has been retired and removed along with other support structures such as a large aboveground storage tank. Figure 2-3 shows photographs of the site area. There are two large commercial transportation companies to the west, woodlands and undeveloped land to the north, a farm and woodlands to the east, and a mixed-use area to the south with homes, a high school, and small businesses and farms.

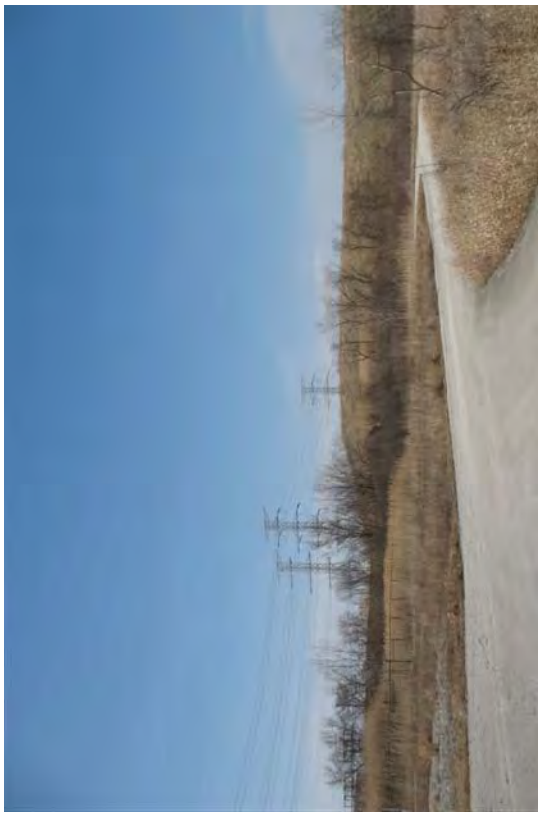
2.2.1 Flywheel Project Overview

In the United States, electric companies deliver power at a frequency of 60 hertz to comply with federal reliability standards. The supply of and demand for electricity fluctuate constantly, which causes fluctuations in the frequency. A safe, reliable, and energy-efficient electricity grid must closely balance power supply with power demand on a second-to-second basis to maintain a constant frequency. Grid operators accomplish this frequency regulation by requiring about 1 percent of their generating capacity to increase or decrease output in response to frequency changes. At present, the electric power for frequency regulation comes primarily from coal or natural gas power plants.

Beacon Power's flywheel system would provide additional electric power to the grid very quickly and, unlike fossil fuel plants, would also draw power from the grid when the supply exceeded demand. The plant would not generate electricity directly; rather, electricity from the grid would drive the flywheels at high speeds when electricity supply on the grid exceeded demand. At times when demand exceeded supply, the system would convert energy from the spinning flywheels back to electricity and supply it to the grid. A flywheel system stores energy from the grid at times when supply exceeds demand and thus alleviates the need to burn fuel to generate additional electric power at times when demand exceeds supply. The plant would absorb power from the grid when there is too much energy on the grid (which causes grid frequency to rise above 60 hertz) and reinject power back to the grid when there is not enough energy to meet load (which causes grid frequency to drop below 60 hertz). Because the plant absorbs only slightly more than it injects, its daily net energy use would be small.

A flywheel energy storage system is the basic unit of the proposed Chicago Heights frequency regulation plant. The basic idea of the technology is similar to that of a hybrid car but on a scale electric utilities can use to their advantage. A flywheel is a mechanical device that consists of a large, heavy cylinder that spins inside a vacuum-sealed housing. The flywheel is a kinetic energy storage device that rotates at high speeds. The flywheel rotor is completely enclosed in a cylindrical vessel about 7 feet high and 4 feet in diameter; it is nearly frictionless and does not require maintenance.

The proposed plant would consist of 20 frequency regulation pods, each containing 10 individual flywheels and the associated energy conversion, electrical control, and power distribution



Looking northwest

Looking southwest

Looking north

Looking west

Figure 2-3. Views of the proposed project site.

equipment. Figure 2-4 shows an artist's rendering of the array of 1-megawatt frequency regulation pods. There would be 200 flywheels in all (DOE 2009b).

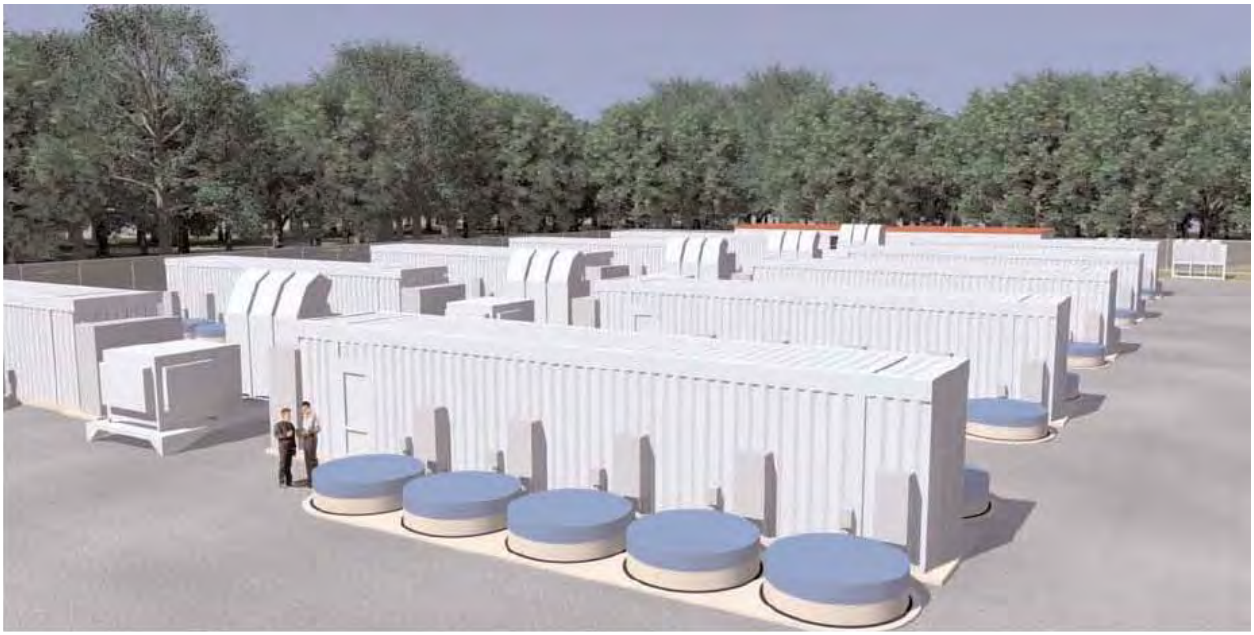


Figure 2-4. Array of 1-megawatt frequency regulation pods.

Beacon Power's proposed plant would convert excess electricity on the grid during off-peak times to kinetic energy in the flywheels. When demand was higher during on-peak times, the plant would convert the stored energy back to electricity and return it to the grid. The battery would provide up to 20 megawatts of energy storage capacity. Beacon Power would use the plant in cooperation with the operator of the regional electrical grid, PJM Interconnection (PJM), and Exelon Corporation, the transmission system owner, with which Beacon Power has successful relationships in frequency regulation.

As part of its proposed project, Beacon Power would collect critical data to measure the success of the project objectives and report the information to DOE, other grid operators, and the public.

The goals of the proposed project are (BPC 2010):

- Maintain better balance between network load and generated power,
- More efficiently maintain PJM grid frequency performance to grid reliability,
- Help increase the use of intermittent renewable wind and solar power,
- Demonstrate mitigation of variations in solar energy from passing clouds,
- Reduce carbon dioxide and other air emissions,
- Lower the cost of frequency regulation to ratepayers,
- Increase regional peak power generation capacity, and
- Reduce national dependence on fossil fuel.

2.2.2 Proposed Project Elements

Major features of the plant would include (DOE 2009b; BPC 2010):

- A supplementary electric substation with an electrical connection of about 400 feet from the project transformer to the existing power line on the adjacent right of way.
- Twenty 1-megawatt frequency regulation pods, each with 10 flywheels and associated energy conversion, electrical control, and power distribution equipment in underground precast concrete housings about 25 by 70 feet at a depth of 8 to 10 feet below ground;
- An electric service equipment unit with underground electric conduit connecting to the pods;
- A cooling system with underground mechanical piping connecting to the electric service equipment unit and the pods;
- A 25- by 40-foot one-story office and visitor center;
- A driveway and parking spaces;
- A black vinyl-coated chain-link perimeter fence and entrance gate; and
- Landscaping.

2.2.3 Project Systems

Figure 2-5 is a schematic of the elements of the proposed plant. Major systems would include (DOE 2009b):

- Electric Power Supply System. The supplementary electric substation would provide the interconnection point to the high-voltage transmission lines. The transmission line voltage would be reduced to a much lower operating voltage. Switchgear would direct electric power to one pad-mounted oil-filled transformer for the building power loads and to 10 pad-mounted oil-filled transformers for the process loads, one transformer for every two pods. The power distribution conduit to the building transformer and to the transformers for the pods would be polyvinyl chloride (PVC) pipe in underground concrete duct banks.
- Cooling System. There would be a cooling loop to circulate coolant to cool the 20 pods. The coolant would be 75-percent water and 25-percent propylene glycol, a widely available biodegradable antifreeze. A central cooling system to remove heat from the cooling loop would consist of four chillers and pumps. The coolant pipelines to distribute the coolant to the pods would be underground copper pipe. The cooling loop

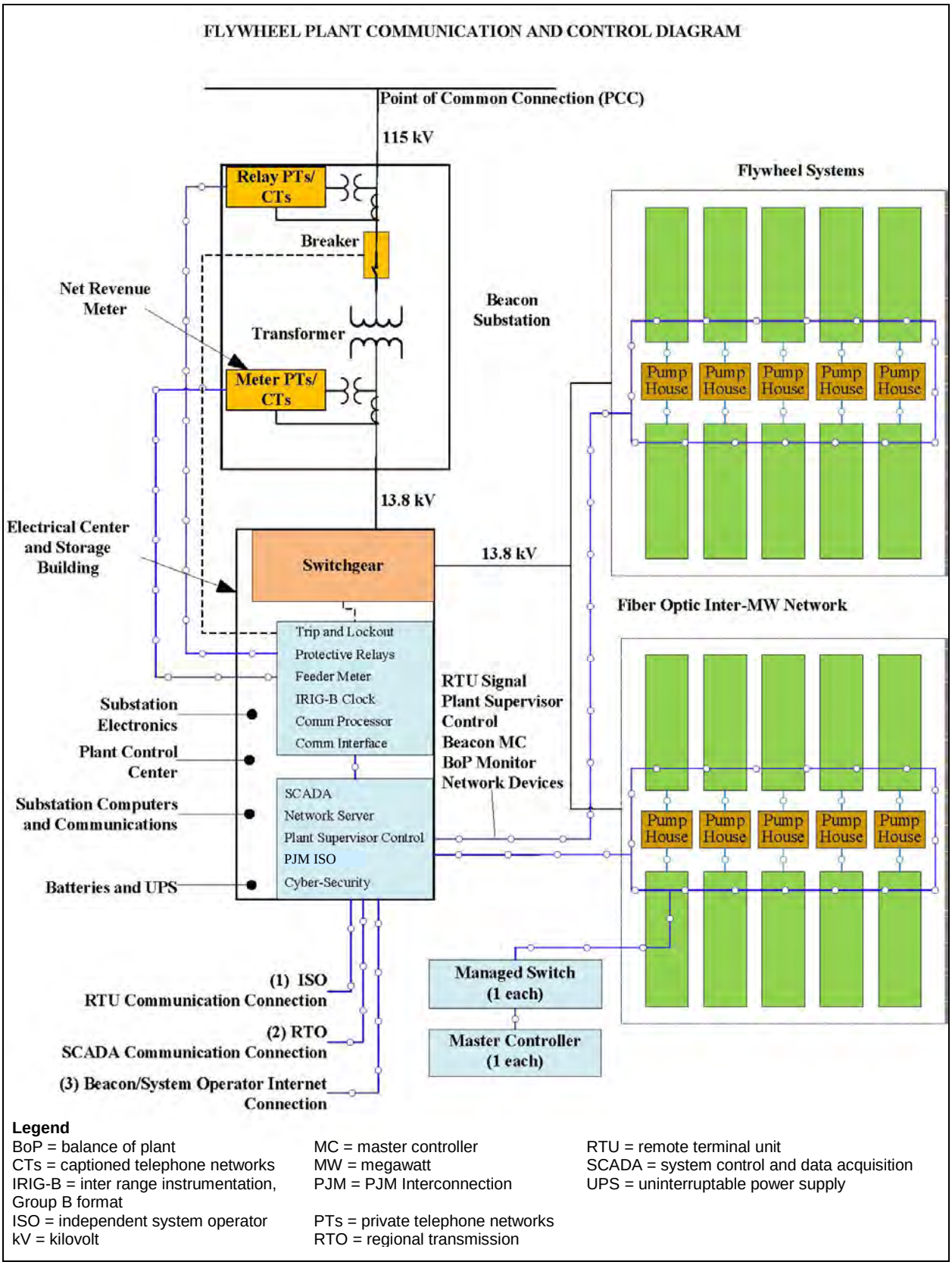


Figure 2-5. Schematic of flywheel frequency regulation plant.

would be a closed system with no waste or emissions during normal operations. A monitoring system would indicate accidental losses or leaks in the cooling loop.

- Plant Control System. Beacon Power would remotely operate the plant with only occasional site visits for monitoring operations and routine maintenance.

- Storm Water Management System. The storm water management system would consist of catch basins, manholes, PVC pipeline, a collection area, and a permitted outfall, if necessary.

- Fire Alarm System and Security System. The fire alarm and security systems would be automatic sensor-based systems.

- Water Supply System. Beacon Power would obtain water from the City of Chicago Heights. The only demand for water at the site would be for domestic use at the visitor's center and for topping off the chiller system.

- Wastewater Disposal System. The proposed project would not generate any wastewater due to operations. A small amount of wastewater would be generated at the on-site office/visitors center and discharged to municipal facilities.

2.2.4 Construction Activities

The elements of the proposed project would cover about 3.5 acres on the existing 25-acre industrial site. The site has adequate access and onsite roads for the proposed project. The following are the planned major steps in the construction of the plant (DOE 2009b, BPC 2010):

- Clearing and Excavation. Site preparation would include removal of a large water storage tank and grading to level the site. Beacon Power would strip the topsoil on the site and stockpile it for future use. The company would grade the 3.5-acre site to a uniform slope. Construction would include excavations to install the 20 flywheels underground. The project would reuse excavated material on the site. The equipment required for excavation would include routine earthwork equipment such as excavators, bulldozers, front-end loaders, uniloaders, backhoes, and dump trucks.

- Housings and Foundations. Precast concrete housings—one for each of the flywheels—would be placed at a depth of 6 to 8 feet. The housings would be modified concrete water pipes. Groundwater control could be necessary at the base of the excavations for the housings. The housings would be founded on a crushed stone base over a geo-textile fabric. Buildings and other equipment would have shallow spread footing foundations.

- Pipelines. Underground PVC pipelines would be placed for the storm water management system, the electric power distribution system, and the cooling system.

- Equipment Placement. The flywheels and other equipment that make up the pods would be on piers within the housings. Other equipment would be on foundations.

- Surfaces. Surface treatment would include impervious asphalt pavement, gravel surfaces, and loam and seed areas.

- Testing and Start-Up Process. The system would be tested in stages prior to becoming completely operational. Testing of each pod would be based on the procedure defined during the operation of Beacon's 1-megawatt pod at its Tyngsboro, Massachusetts, plant.

The proposed plant has a design lifetime of at least 20 years. The components of the system, including flywheels and electronics, can be replaced as necessary during operations. The flywheel system represents the latest technological approach in frequency regulation to this point, but new developments could supplant this technology in the future. The equipment is of such a scale that it can be readily removed from the site.

2.3 No-Action Alternative

Under the No-Action Alternative, DOE would not provide financial assistance for the proposed project. As a result, the project would be delayed as Beacon Power sought other funding sources to meet its needs or abandoned if other funding sources could not be obtained. As a result, DOE's ability to achieve its objectives under the Smart Grid Demonstrations Program and the Recovery Act would be impaired.

Although this and other selected projects might proceed if DOE decided not to provide financial assistance, the Department assumes for purposes of this EA that the project would not proceed without DOE assistance. If Beacon Power did proceed without DOE's financial assistance, the potential impacts would be essentially identical to those if the Department provided the funding. To allow a comparison between the potential impacts of a project as implemented and the impacts of not proceeding with a project, DOE assumes that, if it were to decide to withhold assistance from a project, the project would not proceed.

2.4 DOE Alternative Actions

DOE's alternatives to this proposed project consist of the 15 other technically acceptable applications it received in response to Funding Opportunity Announcement DE-FOA-0000036, *Recovery Act: Smart Grid Demonstrations.* Before selection, DOE made preliminary determinations about the level of review under NEPA based on potentially significant impacts it identified during review of the technically acceptable applications. DOE conducted these preliminary reviews pursuant to 10 CFR 1021.216 and provided them to the selecting official, who considered them during the selection process.

Because DOE's Proposed Action under the Smart Grid Demonstrations Program is limited to providing financial assistance in cost-sharing arrangements to selected applicants in response to a

competitive funding opportunity, DOE's decision is limited to either accepting or rejecting the project as proposed by the proponent, including its proposed technology and selected sites. DOE's consideration of reasonable alternatives is therefore limited to the technically acceptable applications and the No-Action Alternative for each selected project.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Sections 3.1 to 3.3 detail the affected environment and potential environmental consequences for the proposed project and the No-Action Alternative. The sections discuss air quality, socioeconomics and environmental justice, and occupational health and safety, respectively. Section 3.4 discusses resource commitments.

3.1 Air Quality

Section 3.1.1 discusses the regional air quality baseline conditions; Section 3.1.2 discusses the potential impacts of the proposed project including the potential positive impacts from operations, which could result from the reduction of electricity generation at fossil fuel plants or other carbon-based forms of generation. Section 3.1.2.2 discusses the No-Action Alternative.

3.1.1 Affected Environment

The ambient air quality in an area can be characterized in terms of whether it complies with the primary and secondary National Ambient Air Quality Standards. The Clean Air Act (42 U.S.C. 7401 et seq.) requires the U.S. Environmental Protection Agency (EPA) to set national standards for pollutants that are considered harmful to public health and the environment. The EPA established standards for six criteria pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter [both with a median aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}) and less than or equal to 2.5 micrometers ($PM_{2.5}$)], and sulfur dioxide. Primary standards define levels of air quality for each of the six criteria pollutants that would provide an adequate margin of safety to protect public health including the health of sensitive populations such as children and the elderly. Secondary standards define levels of air quality that are deemed necessary to protect the public welfare including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The Beacon Power project would be in Chicago Heights, Cook County, Illinois. EPA classifies Cook County as a moderate nonattainment area for 8-hour ozone and PM_{10}. The county is an attainment area for all other criteria air pollutants.

3.1.2 Environmental Consequences

3.1.2.1 Proposed Project

3.1.2.1.1 Construction Impacts

Air emissions from construction activities for Beacon Power's proposed project would include temporary combustion emissions from vehicles and construction equipment and fugitive dust from site preparation activities. These emissions would have short-term adverse impacts that Beacon Power would mitigate through best management practices such as soil stabilization and

watering of exposed soils. Fugitive dust emissions would end on completion of construction, so long-term impacts would be negligible.

3.1.2.1.2 Operations Impacts

The proposed flywheel plant would not burn fossil fuel, so it would produce zero direct emissions of combustion gases, which include sulfur dioxide, nitrous oxides, and carbon dioxide. Further, use of flywheel-based frequency regulation would reduce the amount of fossil fuels regional power plants normally use to accomplish this function, which would result in a net reduction in dependence on fossil fuels. Fossil fuel plants must cycle up and down to perform frequency regulation. For coal and natural gas plants, thermal cycling during frequency regulation reduces efficiency for the entire plant and consumes 0.5 to 1.5 percent more fuel than steady-state operation. Therefore, operation of the proposed flywheel plant would mean that coal- and gas-fired plants would be able to drop the regulation function and focus on providing wholesale energy.

Section 176(c)(1) of the Clean Air Act requires federal agencies to ensure that their actions conform to applicable implementation plans for the achievement and maintenance of the National Ambient Air Quality Standards for criteria pollutants (DOE 2000). To achieve conformity, a federal action must not contribute to new violations of standards for ambient air quality, increase the frequency or severity of existing violations, or delay timely attainment of standards in the area of concern. The EPA general conformity regulations (40 CFR Part 93, Subpart B) contain guidance for determining if a proposed federal action would cause emissions to be above specified levels in nonattainment or maintenance areas. Because there would be no new emissions directly attributable to plant operations, a conformity determination is not necessary.

Greenhouse Gas Emissions

The burning of fossil fuels, such as natural gas, emits carbon dioxide, which is a greenhouse gas. Greenhouse gases can trap heat in the atmosphere and have been associated with global climate change. The Intergovernmental Panel on Climate Change, in *Climate Change 2007: Synthesis Report, Summary for Policy Makers*, stated that warming of the earth's climate system is unequivocal, and that most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in concentrations of greenhouse gases from human activities (IPCC 2007). Greenhouse gases are well mixed throughout the lower atmosphere, such that any emissions would add to cumulative regional and global concentrations of carbon dioxide.

The project has the potential to reduce the carbon dioxide emissions that a base-load power plant providing equal regulation capacity would produce. Implementation of this project would equate to an annual reduction of 8,000 tons of carbon dioxide for a coal plant or 2,300 tons for a natural gas plant. Estimates of how many fossil fuel plants in the region would no longer perform regulation as a result of this project are not available.

3.1.2.2 No-Action Alternative

Under the No-Action Alternative, DOE would not provide funding to Beacon Power for the proposed project, and DOE assumed for this EA that the project would not proceed without this assistance. There would be no increase in efficiency and subsequent reduction in air pollutants for regional power plants.

3.2 Socioeconomics and Environmental Justice

Section 3.2.1 describes the existing socioeconomic environment in Cook County, and Section 3.2.2 discusses the potential impacts. Section 3.2.2.2 discusses the No-Action Alternative. Section 3.2.3 provides environmental justice data for the county.

3.2.1 Affected Environment

Chicago Heights is in Cook County, Illinois. Cook County is part of the Bureau of the Census Chicago-Naperville-Joliet, IL-IN-WI Metropolitan Statistical Area. The county's estimated population of about 5.3 million people in 2009 reflects a 1.7-percent drop in population since 2000 (Bureau of the Census 2010a). The 2008 population of the City of Chicago Heights was 30,600, a 6.7-percent drop in population since 2000 (Bureau of the Census 2010b). In 2008, the Cook County population was 66.8-percent white, 25.6-percent black, 5.8-percent Asian, and 0.4-percent American Indian or Alaskan Native. About 1.2 percent of the population reported themselves as being of two or more races. Persons of Hispanic or Latino origin made up 23.2 percent of the population (Bureau of the Census 2010a).

The county's employment figures reflect the urban nature of the community; the county hosted about 3.4 million nonfarming jobs in 2008, of which about 376,000 jobs (11 percent) were in health care and social assistance, 346,000 jobs (10 percent) were in government and government enterprises, and 304,000 jobs (9 percent) were in professional, scientific, and technical services. About 236,000 jobs (7 percent) were in manufacturing (BEA 2010a). In 2000, Cook County residents held about 81 percent of the total jobs and residents of the other 13 counties in the metropolitan statistical area held 17 percent (Bureau of the Census 2003). The county's March 2010 labor force had an unemployment rate of 11.3 percent (BLS 2010).

The 2008 per capita income in Cook County of about $46,000 was 109 percent of the State of Illinois per capita income and about 102 percent of the per capita income in the metropolitan statistical area (BEA 2010b). In 2008, about 15 percent of county residents and 12 percent of Illinois residents were living in poverty (Bureau of the Census 2010a).

Section 3.2.3 discusses racial and ethnic populations and the low-income population in more detail in relation to environmental justice.

3.2.2 Environmental Consequences

The installation of the flywheel facility would take 1 year or less and would result in a temporary demand for construction services. The existing construction labor force in the area would be available to handle this demand with no disruptions. Once constructed, the facility would have no onsite personnel and no employment demand. Necessary site services would be limited and readily be assimilated by local service providers. The construction of facility equipment would create indirect jobs. Indirect jobs include professional, skilled, and unskilled positions; they would occur among suppliers of goods and services and for the vendors of materials those suppliers would use to fashion goods and services for the installation of equipment and supporting facilities. Earnings by the workers in these indirect jobs would generate wages and other income that local, state, and federal governments would tax. In addition, these incomes would lead to an increase in banking deposits, which would increase the regional lending base, and to spending on consumable and durable goods and services. The increase in jobs and wages in the community would have a small positive impact.

While short-term construction of facilities and the installation of equipment for the proposed project would result in a small increase in jobs, the total workforce in Cook County would remain below previous levels. Therefore, DOE expects that all workers in new positions would be part of the existing labor force in the metropolitan statistical area. The additional jobs would be unlikely to cause a noticeable increase in the local population from workers moving into the area. Therefore, impacts to the existing infrastructure, housing, medical care, social services, police and fire protection, schools, or other community services would be unlikely, and DOE does not address these resources further.

3.2.2.1 Proposed Project

3.2.2.1.1 Construction Impacts

Preconstruction activities, including design and engineering tasks, procurement of materials, construction of facilities, installation of equipment, and project startup at the Chicago Heights flywheel facility would take less than a year. Construction would require several directly employed workers. Each of these positions would support about 1.4 additional indirect jobs. Therefore, the Cook County area would have several project-related jobs during construction activities.

Beacon Power estimates the cost of preconstruction activities, procurement, installation, and startup cost would be $48.1 million. The estimated final demand effect of the total earnings impact from this expenditure would be about $79.2 million in the region. Much of the construction-related spending would directly benefit the suppliers of equipment for the plant and the vendors who would provide materials and services for manufacture of the equipment. Table 3-1 summarizes this information.

Table 3-1. Earnings effects from construction.

Direct regional infusion	Indirect regional infusion	Total regional infusion
$48.1 million	$31.1 million	$79.2 million

3.2.2.1.2 Operations Impacts

DOE assumed that the proposed project would create no additional new jobs during operations; that is, the Department assumed Beacon Power would use existing personnel to operate the flywheel plant. DOE expects that residents of Cook County specifically, and of the metropolitan area in general, would continue to fill most of the direct and indirect jobs.

In summary, operation of the plant would stimulate the economic base of the region and lower the cost of frequency regulation to ratepayers.

3.2.2.2 No-Action Alternative

The No-Action Alternative would result in no short-term jobs during the construction phase of the project. In addition, the objectives of the Smart Grid Demonstrations Program and the Recovery Act would be impaired.

3.2.3 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," directs federal agencies to address environmental and human health conditions in minority and low-income communities. The evaluation of impacts to environmental justice is dependent on determining if high and adverse impacts from the proposed project would disproportionately affect low-income or minority populations in the affected community.

DOE has determined that direct socioeconomic impacts, other than an increase in final output, from the proposed project are unlikely (Section 3.6.2). The proposed project would not result in workers moving to the area, so there would be no impact to infrastructure including housing and the level of social services in the area. There would be small, positive economic impacts from indirect employment opportunities in the region and increased final output.

Table 3-2 lists racial and ethnic data about persons in Cook County and, for comparison, the state of Illinois. Cook County has a large racial minority population; Black persons made up about 26 percent of county residents in 2008. Approximately 15 percent of the Illinois residents are Black. Cook County also has a large ethnic minority population; persons of Hispanic or Latino origin made up about 23 percent of county residents in 2008. This is higher than the statewide rate of about 15 percent (Bureau of the Census 2010a).

Table 3-2. Racial and ethnic characteristics, Cook County and Illinois, 2008.

Racial and ethnic characteristics	Cook County (percent)	Illinois (percent)
White	66.8	79.1
Black	25.6	14.9
American Indian and Alaska Native	0.4	0.3
Asian	5.8	4.3
Native Hawaiian or Other Pacific Islander	0.1	0.1
Persons reporting two or more races	1.2	1.2
Persons of Hispanic or Latino Origin	23.2	15.2
White but not Hispanic	44.8	64.7

Source: Bureau of the Census 2010a.

The aggregate percent of all racial minorities (Black, American Indian or Alaskan Native, Asian, or of two or more races) was 33 percent in Cook County and 21 percent in Illinois (Bureau of the Census 2010a). Hispanics may be of any race, so are included in applicable self-reported race categories. Neither racial nor ethnic minority persons would experience adverse socioeconomic impacts from the proposed projects. There would be no direct socioeconomic impacts to any population, and the indirect impacts would be small and positive. The indirect economic impacts from the project would include indirect employment opportunities in the region and enhanced final output as a result of the infusion of project-related spending.

DOE has also determined that there would be no high and adverse impact to low-income populations. In 2008, about 15 percent of the residents in Cook County lived below the poverty level, and the statewide rate was about 12 percent (Section 3.6.1). There would be no direct socioeconomic impacts to any population, and the indirect impacts would be small and positive. The indirect economic impacts from the project would include indirect employment opportunities in the region and enhanced final output as a result of the infusion of project-related spending.

In summary, DOE determined that no high and adverse impacts would occur to any member of the community. Therefore, DOE determined there would be no adverse and disproportionate impacts to minority or low-income populations.

3.3 Occupational Health and Safety

All construction and maintenance activities would be conducted in accordance with Occupational Safety and Health Administration guidelines and Beacon Power's existing guidelines and procedures for the handling, installing, maintaining, and repairing of onsite equipment. In addition, Beacon Power would provide training to local fire and police departments to explain the features of the system and descriptions of the courses of action to follow in case of emergency. DOE expects, given the small workforce and the types of operations, that worker injury rates would be within the industry averages.

System operations would be designed to shut down a flywheel in case of a malfunction in which it becomes out of balance, and the design calls for each flywheel to be electrically isolated. Therefore, crews could replace flywheels individually without shutting down an entire pod. In addition, a monitoring system would indicate accidental losses or leaks in the cooling loop, and Beacon Power would install an automatic sensor-based fire alarm and security system.

3.4 Resource Commitments

3.4.1 Relationship Between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The construction and operation of Beacon Power's proposed project would result in short-term use of land. In this context, *short-term use* of resources means the operating life of the plant, and *long-term productivity* refers to the period after the plant has ceased operation and undergone decommissioning and demolition. At that time, the land could be occupied and used for other purposes, or it could be reclaimed and revegetated with plant species native to the area.

3.4.2 Irreversible and Irretrievable Commitments of Resources

The use of land as a resource to support the construction and operation of the proposed project would be irretrievable in the short term. Some unrecyclable construction materials, energy, and the fuel for plant construction and maintenance would be irreversible and irretrievable commitments of resources. DOE would also have expended funding on the proposed project.

3.4.3 Unavoidable Adverse Impacts

The proposed project would result in the unavoidable small adverse impacts of construction noise, fugitive dust, vehicle emissions, and possible loss of wildlife due to onsite traffic and construction equipment. These small unavoidable impacts would be offset by the positive impacts of using flywheels rather than power plants to provide frequency regulation. This could result in reduced emissions from conventional fossil fuel power plants.

4. CUMULATIVE IMPACTS

Cumulative impacts result from the incremental effects the proposed project could have in combination with the impacts of past, present, and reasonably foreseeable actions. The environmental consequences of past actions have already passed through the environment or are captured in existing baseline conditions.

Chicago Height, Illinois, was first settled in the 1830s. By the 1890s, Chicago area developers established Chicago Heights as an outer-ring industrial suburb. They successfully recruited large industries that led to steel mills and later chemical manufacturing. Today, the community hosts the greatest concentration of industry in the southern portion of the metropolitan area. The proposed site once hosted a 60-megawatt oil-fired power generation plant that has been retired; most buildings and structures have been removed.

As Table 1-1 lists, the project would have no, small, or temporary impacts to most environmental resources. As Chapter 3 discusses, there would be small potential impacts to air quality, socioeconomics and environmental justice, and occupational health and safety, but those would be unlikely to last longer than the operational life of the facility.

In terms of air quality, the potential incremental cumulative impacts would be positive. The flywheel would have no air emissions during operations. Further, because of the flywheel plant's frequency regulation function, local power generators would use less fossil fuel for this purpose. Therefore, currently operational coal- and gas-fired plants in the region would be able to operate without having to commit energy to regulate the frequency; frequency regulation has typically consumed about 1 percent of capacity of the local grid.

The potential incremental cumulative impacts to socioeconomics would be positive but small. The proposed project would create a small, short-term workforce during site preparation and installation. The small direct socioeconomic impacts would entail a small increase in indirect impacts because vendors and equipment suppliers would benefit from the capital orders.

In terms of environmental justice, DOE determined that the proposed project would neither result in high and adverse impacts nor would it disproportionately affect low-income or minority populations. Therefore, there would be no cumulative impacts.

In relation to occupational health and safety, the workforce for site preparation and installation would be small and short term. DOE expects work-related incidents would be within industry incidence rates. Beacon Power would operate the facility almost entirely by remote control with limited onsite personnel. Therefore, there would be limited exposure of workers to hazardous situations at the facility. The installed equipment would have monitors and sensors to alert responders to any accident that might occur. Beacon Power would brief and train local first responders. DOE does not expect the installation and operation of the proposed project would to contribute cumulatively to accidents or worker incident rates in a measurable way.

5. CONCLUSIONS

Beacon Power proposes to install a 20-megawatt utility-scale flywheel-based frequency regulation plant in Chicago Heights, Illinois. The system, along with a sophisticated control system, would maintain the frequency of the local electrical system at 60 hertz, which would reduce or eliminate the need for power plants to adjust their outputs for frequency regulation. The proposed project would affect about 3.5 acres within an existing 25-acre industrial parcel.

In this EA, DOE considered (1) the Proposed Action of providing a financial assistance grant under the Recovery Act in a cost-sharing arrangement with Beacon Power, (2) Beacon Power's proposed project, and (3) the No-Action Alternative.

DOE evaluated the environmental resource categories it commonly addresses in EAs and identified no significant adverse impacts from the proposed project. For most of the resource categories the Department determined there would be no impacts or the potential impacts would be small, temporary, or both and therefore did not carry those forward for additional analysis (see Table 1-1). DOE focused its analyses on those resources that could require new or amended permits, have the potential for significant impacts or controversy, or typically interest the public. The Department performed more detailed analyses of potential impacts to air quality, socioeconomics and environmental justice, and occupational health and safety.

DOE consulted with the Illinois State Historic Preservation Officer and the Midwest Region Office of the FWS. DOE determined the proposed project would not affect federally listed or eligible historic sites, and would have no effect on federally listed, threatened, endangered, or candidate species.

The proposed project would have small, positive socioeconomic impacts, a potential to reduce pollutant emissions from conventional generating sources that use fossil fuels, and a potential for reduction of greenhouse gases.

The following paragraphs discuss the results of DOE's detailed analyses:

Air Quality. Air emissions from construction activities for Beacon Power's proposed project would include combustion emissions from vehicles and construction equipment and fugitive dust from site preparation activities. These emissions would have short-term adverse impacts that Beacon Power would mitigate through best management practices such as soil stabilization and watering of exposed soils. Fugitive dust emissions would end on completion of construction, so long-term impacts would be negligible.

The proposed flywheel plant would not burn fossil fuel, so it would produce zero direct emissions of combustion gases during operations. Further, use of flywheel-based frequency regulation would reduce the amount of fossil fuels regional power plants normally use to accomplish this function, which would result in a net reduction in dependence on fossil fuels. Therefore, operation of the proposed plant would mean that coal- and gas-fired plants would be

able to drop the regulation function and focus on providing wholesale energy. No new permits would be necessary for flywheel plant operation.

Socioeconomics and Environmental Justice. The proposed project would create a small number of direct jobs during construction, which would last less than a year, so there would be no changes to population, infrastructure, or the level of social services in the area. There would be indirect economic consequences because vendors and equipment suppliers would benefit from the capital orders for the equipment and support systems. The positive economic benefits would be small.

The evaluation of impacts to environmental justice is dependent on determining if high and adverse impacts from the proposed project would disproportionately affect low-income or minority populations. DOE determined that no high and adverse impacts would occur to any member of the community, including socioeconomic impacts, so there would be no high and adverse impacts to any minority or low-income population.

Occupational Health and Safety. The work force for site preparation and installation would be small and short term. DOE expects work-related incidents would be within industry incidence rates. Beacon Power would operate of the facility almost entirely by remote control with limited onsite personnel. Therefore, there would be limited exposure of workers to hazardous situations at the facility. The installed equipment would have monitors and sensors to alert responders to any accident that might occur, and Beacon Power would brief and train local first responders.

Cumulative Impacts. There would be small, positive incremental impacts to socioeconomics and air quality. DOE has determined that there would be no high and adverse impacts to any member of the community, so there would be no adverse and disproportionate impacts to minority or low-income populations. Cumulative impacts to health and safety would not be measurable.

No-Action Alternative. DOE assumed for the EA analyses that Beacon Power would not proceed with the project without DOE assistance. Therefore, there would be no impacts to any resource category from the No-Action Alternative. The small, positive socioeconomics impacts, the potential to reduce conventional power plant pollutant and greenhouse gas emissions would also not occur under the No-Action Alternative. Further, DOE's ability to achieve its objectives under the Smart Grid Demonstrations Program and the Recovery Act would be impaired.

6. REFERENCES

BEA (Bureau of Economic Analysis), 2010a, "Table CA25N-Total full-time and part-time employment by NAICS industry, Cook County, Illinois, 2008," U.S. Department of Commerce, Washington, D.C., April 22, accessed May 25, 2010. http://www.bea.gov/regional/reis/

BEA (Bureau of Economic Analysis), 2010b, "Table CA1-3 Per Capita Personal Income, Indiana, 2008," U.S. Department of Commerce, Washington, D.C., April 22, accessed May 25, 2010. http://www.bea.gov/regional/reis/

BLS (Bureau of Labor Statistics), 2010, "Local Area Unemployment Statistics, Cook County, Illinois, 2010," U.S. Department of Labor, Washington, D.C., accessed May 25, 2010. http://data.bls.gov/cgi-bin/dsrv

BPC (Beacon Power Corporation), 2010, *Project Narrative, Beacon Power 20 MW Flywheel Frequency Regulation, Plant in Chicago, IL (Proposal 2), Program Area of Interest 2, Grid-Scale Energy Storage Demonstrations, Sub Area 2: Frequency Regulation Ancillary Services*, Tyngsboro, Massachusetts.

Bureau of Census, 2003, "County to County Worker Flow Files for Illinois, Sorted by Workplace State and County," Washington, D.C., March 6, accessed May 25, 2010. http://www.census.gov/population/www/cen2000/commuting/index.html.

Bureau of Census, 2010a, "State and County QuickFacts, Illinois, Chicago Heights Illinois, and Cook County, Illinois," Washington, D.C., April 22, accessed May 25, 2010. http://quickfacts.census.gov/.

Bureau of Census, 2010b, "Population Finder, Chicago Heights Illinois," Washington, D.C., accessed June 1, 2010. http://factfinder.census.gov/.

Pollack, B., 2010, "Threatened and Endangered Species at the Proposed Site of the Beacon Power Flywheel Frequency Regulation Plant, Chicago Heights, Illinois," personal communication with B. Craig (Dade Moeller & Associates), U.S. Fish and Wildlife Service, Barrington, Illinois, September 23.

DOE (U.S. Department of Energy), 2000, *Clean Air Act General Conformity Requirements and the National Environmental Policy Act Process*, Office of Environment, Safety and Health, Washington, D.C., April.

DOE (U.S. Department of Energy), 2008, *The Smart Grid: An Introduction*, Washington, D.C., accessed October 12, 2010. http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages(1).pdf

DOE (U.S. Department of Energy), 2009a, "President Obama Announces $3.4 Billion Investment to Spur Transition to Smart Energy Grid," Washington, D.C., October 27, accessed June 1, 2010. http://www.energy.gov/news2009/8216.htm

DOE (U.S. Department of Energy), 2009b, *Environmental Assessment for Department of Energy Loan Guarantee for Beacon Power Corporation Frequency Regulation Facility in Stephentown, N.Y.*, DOE/EA-1631, U.S. Department of Energy, Loan Guarantee Program Office, Washington, D.C., February.

FWS (U.S. Fish and Wildlife Service), 2011, "Endangered Species, Illinois County Distribution, Federally Endangered, Threatened, Proposed, and Candidate Species," U.S. Department of the Interior, Barrington, Illinois, January 12, accessed January 20, 2011. http://www.fws.gov/midwest/endangered/lists/illinois-cty.html

IPCC (Intergovernmental Panel on Climate Change), 2007, *Climate Change 2007: Synthesis Report, Summary for Policy Makers*, Geneva, Switzerland.

APPENDIX A
DISTRIBUTION LIST

Mr. Shawn Cirton
U.S. Fish and Wildlife Service
Chicago Illinois Field Office
Biologist/Federal Activities
1250 South Grove, Suite 103
Barrington, Illinois 60010

The Honorable Pat Quinn
Governor of Illinois
207 State House
Springfield, Illinois 62706

The Honorable Alex Lopez
Mayor of Chicago Heights
1601 Chicago Road
Chicago Heights, Illinois 60411

Ms. Anne E. Haaker, Deputy State Historic Preservation Officer
Preservation Services Division
Illinois Historic Preservation Agency
1 Old State Capitol Plaza
Springfield, Illinois 62701-1507

Mr. Kevin Haggerty
U.S. Department of Energy
Freedom of Information Act Reading Room
1000 Independence Avenue, SW, 1-G-033
Washington, D.C. 20585

Mr. Chet Lyons
Beacon Power Corporation
65 Middlesex Road
Tyngsboro, Massachusetts 01879

Mr. Kenneth Westlake
Supervisor, NEPA Implementation
Office of Enforcement and Compliance Assurance
U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard, Mail Code E-19J
Chicago, Illinois 60604-3590

APPENDIX B
CONSULTATIONS

This appendix contains copies of the letter from DOE to the Illinois SHPO and the response.

NETL NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

June 30, 2010

Ms. Anne E. Haaker
Deputy State Historic Preservation Officer
Preservation Services Division
Illinois Historic Preservation Agency (IHPA)
1 Old State Capitol Plaza
Springfield, Illinois 62701-1507

RE: U.S. Department of Energy Consultation on the Proposed Installation and Operation of a Flywheel Frequency Regulation Plant in Chicago Heights, Illinois

Dear Ms. Haaker:

The U.S. Department of Energy (DOE or the Department) is proposing to provide a financial assistance grant to the Beacon Power Corporation (Beacon Power) as part of the Smart Grid Demonstrations Program. The program is funded through the American Recovery and Reinvestment Act of 2009 (ARRA). If Beacon Power is awarded the grant, it will install and operate a 20-megawatt flywheel frequency regulation plant in Chicago Heights, Illinois.

The proposed site is a 25-acre parcel of previously disturbed land that once hosted a 60-megawatt oil-fired power generator. The previous site buildings and structures have been retired and almost entirely removed from the site. A 138-kilovolt transmission line is adjacent to the property. DOE has identified the area of potential effect (APE) as being a 3.5-acre tract of land within the larger 25-acre parcel that would host the flywheel equipment and support systems.

Based on review of the federally listed and eligible historic sites in Chicago Heights, Cook County, DOE has determined that there will be no effects to federally listed or eligible historic sites. DOE is preparing to publish an environmental assessment (EA) for this proposed project for public review and comment in the next few weeks. The Department will send you a copy of the EA and include correspondence between your office and DOE in an appendix to the EA.

The following information is provided to comply with Section 106 of the Historic Preservation Act and the provisions set forth in 36 CFR Part 800:

1. Names of all funding, licensing, or permitting agencies. DOE would provide a financial assistance grant funded by ARRA; the federal funds would total approximately 50 percent of the estimated total project cost. The proposed project might require a storm water permit from the Illinois Environmental Protection Agency; the plant would have no air emissions, hazardous waste generation, or wastewater discharges as part of normal operations.

2. Description of the Proposed Undertaking. The proposed undertaking would consist of 20 1-megawatt frequency regulation pods, each containing 10 individual flywheels and the associated energy conversion, electrical control, and power distribution equipment. The

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507

plant would tie-in to the existing 138-kilovolt power line next to the proposed site. There would be a total of 200 flywheels, each capable of absorbing or discharging 100 kilowatts to achieve a total of ±20 megawatts regulation range for the plant. Figure 1 provides a rendering of how the site would look after installation of the equipment.

The plant would absorb excess energy on the grid when regional energy supply is greater than demand, and discharge energy when demand is greater than energy supply. In this way the plant would help to maintain the balance between energy supply and demand on the regional grid, which in turn would help maintain grid frequency at 60 hertz.

3. Relevant permit, project, or previous IHPA log numbers. None.

4. Maps: Figure 2 shows the location of the 25-acre parcel (bold rectangle) that will host the proposed 3.5-acre flywheel plant on the U.S. Geological Survey Dyer Quadrangle.

5. Project site plans and specifications. Figure 3 shows the 25-acre parcel with the 3.5-acre APE (Figure 1 is a rendering of the plant within the 3.5-acre tract).

6. Project address. 305 Sauk Trail Road, Chicago Heights, Illinois.

There are no structures in the project area.

1. Existing site conditions. The proposed undertaking would be located on an industrial site previously used for generating electricity via a 60-megawatt oil-fired generator. Previous site buildings and structures were retired and almost entirely removed from the site. The site is now vacant.

2. Total acreage involved in the project. The total acreage involved in the project is 25 acres. Within the 25 acres, a 3.5-acre tract of land would host the flywheel plant and is the APE.

3. Prior nonagricultural disturbance at the project site. Figure 4 shows the disturbed, currently vacant condition of the site from various vantage points.

Based on the information provided above, the Department asks for your concurrence that there would be no effects to federally listed or eligible historic properties.

If you have any questions, comments or require clarification concerning this project, please contact me using the information below:

Mr. Fred Pozzuto
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880, M/S B07
Morgantown, WV 16507-0880
Telephone: (304)-285-5219 or at
E-mail: fred.pozzuto@netl.doe.gov.

Since this is a Recovery Act project, selected on its technical merits and to assist with the nation's economic recovery, we would appreciate a quick response to our request for consultation.

Thank you for taking the time to review this letter. DOE looks forward to working with you on this and future projects.

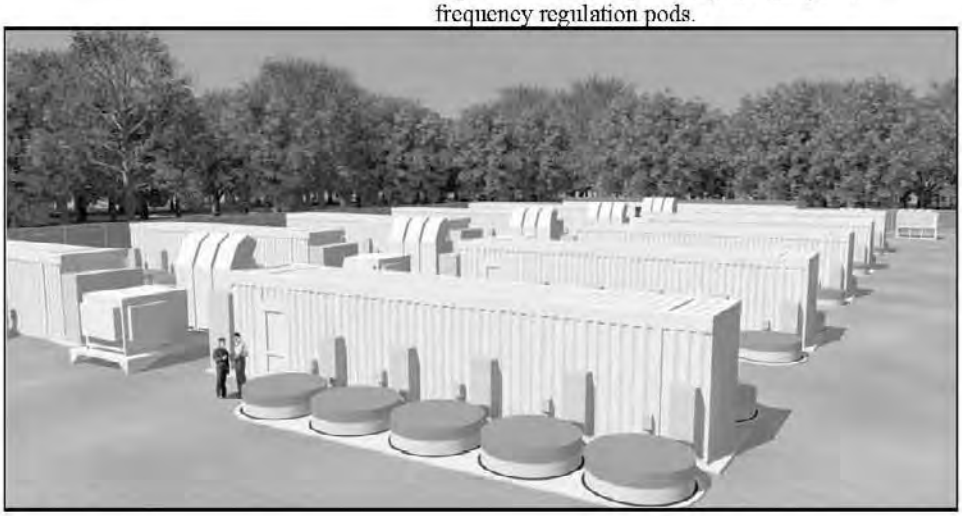
Sincerely,

Fred Pozzuto
NEPA Document Manager

Enclosed

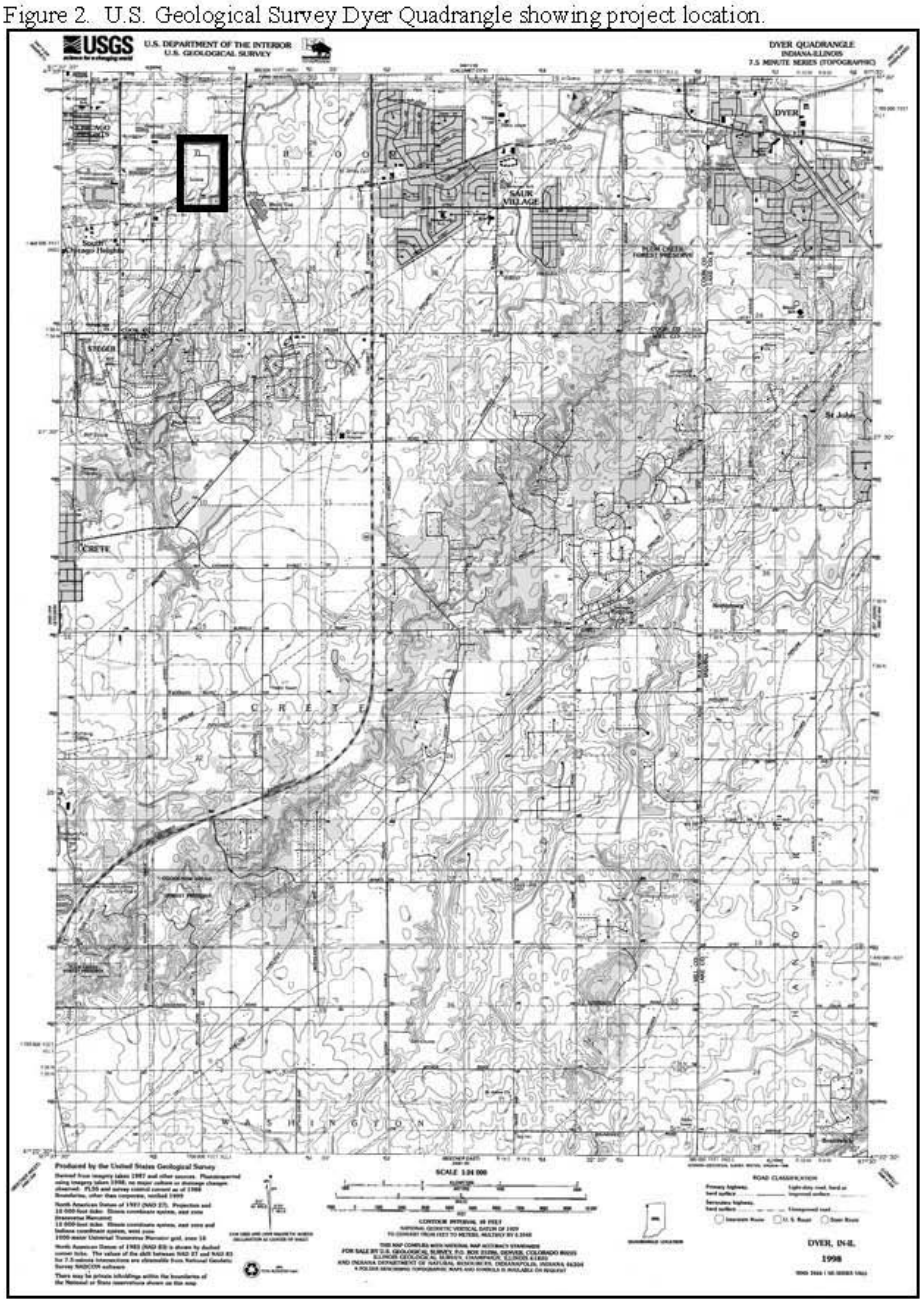
4

Figure 1. Rendering of array of 1-megawatt frequency regulation pods.



5

Figure 2. U.S. Geological Survey Dyer Quadrangle showing project location.



6

Figure 3. Satellite view showing 3.5-acre site within 25-acre parcel.

Figure 4. Views of and around the site.

Illinois Historic
Preservation Agency

1 Old State Capitol Plaza • Springfield, Illinois 62701-1512 • www.illinois-history.gov

Cook County PLEASE REFER TO: IHPA LOG #012070610
Chicago Heights
305 Sauk Trail Road
25.0-acre Flywheel Frequency Regulation Plant

July 8, 2010

Mr. Fred Pozzuto
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
Post Office Box 880, M/S B07
Morgantown, West Virginia 16507-0880

Dear Sir:

We have reviewed the documentation submitted for the referenced project(s) in accordance with 36 CFR Part 800.4. Based upon the information provided, no historic properties are affected. We, therefore, have no objection to the undertaking proceeding as planned.

Please retain this letter in your files as evidence of compliance with section 106 of the National Historic Preservation Act of 1966, as amended. This clearance remains in effect for two (2) years from date of issuance. It does not pertain to any discovery during construction, nor is it a clearance for purposes of the Illinois Human Skeletal Remains Protection Act (20 ILCS 3440).

If you are an applicant, please submit a copy of this letter to the state or federal agency from which you obtain any permit, license, grant, or other assistance.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer

AEH

A teletypewriter for the speech/hearing impaired is available at 217-524-7128. It is not a voice or fax line.

APPENDIX C
SMART GRID DEMONSTRATIONS PROGRAM
ENVIRONMENTAL SYNOPSIS

This appendix contains a copy of the 2009 environmental synopsis for Smart Grid Demonstrations Program Area of Interest 2.

Environmental Synopsis of

Smart Grid Demonstrations Program
Area of Interest Two – Energy Storage

Funding Opportunity Announcement
DE-FOA-0000036

Prepared for

U.S. Department of Energy
National Energy Technology Laboratory
Morgantown, West Virginia

October 2009

Prepared by
Jason Associates Corporation
San Diego, California

CONTENTS

LIST OF TABLES

1. INTRODUCTION AND BACKGROUND

With funds made available by the *American Recovery and Reinvestment Act of 2009*, the U.S. Department of Energy (DOE or the Department) Office of Electricity Delivery and Energy Reliability issued a competitive Funding Opportunity Announcement (FOA) (DE-FOA-0000036), *Recovery Act – Smart Grid Demonstrations* (DOE 2009). Smart grid projects funded under the FOA would include regionally unique demonstrations to verify smart grid technology viability, quantify smart grid costs and benefits, and validate new smart grid business models, all at a scale that can be readily adapted and replicated around the country. These projects would demonstrate technologies that are widely available for use in the United States.

The goal of the FOA is to demonstrate technologies in regions across the states, districts, and U.S. territories that embody essential and salient characteristics of each region and present a suite of use cases for national implementation and replication. From these use cases, the goal is to collect and provide information necessary for customers, distributors, and generators to change their behavior in a way that reduces system demands and costs, increases energy efficiency, optimally allocates and matches demand and resources to meet that demand, and increases the reliability of the grid. The social benefits of a smart grid are reduced emissions, lower costs, increased reliability, and greater security and flexibility to accommodate new energy technologies, including renewable, intermittent, and distributed sources.

To reap the full benefits of smart grid technologies, advancements in grid-scale energy storage are also needed. Electric grid operators can utilize electricity storage devices to manage the amount of power required to supply customers at times when the need is greatest, which is during peak load. Electricity storage devices can also help make renewable energy resources, whose power output cannot be controlled by grid operators, more manageable. They can also balance microgrids to achieve a good match between generation and load. Storage devices can provide frequency regulation to maintain the balance between the network's load and power generated, increase asset utilization of both renewables and electric systems, defer technology and development investments, and achieve a more reliable power supply for high-tech industrial facilities.

The FOA included two program Areas of Interest (AOIs): (1) Smart Grid and (2) Energy Storage. This environmental synopsis addresses AOI-2; a separate synopsis has been prepared to address AOI-1.

The objective of the FOA under AOI-2 for energy storage is to support demonstration projects for major, utility-scale, energy storage installations. The projects will help to establish costs and benefits, verify technical performance, and validate system reliability and durability at scales that can be readily adapted and replicated across the United States. Energy storage systems include the following technologies: advanced battery systems (including flow batteries), ultra-capacitors, flywheels, and compressed air energy systems. Project areas include wind and photovoltaic integration with the grid, upgrade deferral of transmission and distribution assets,

congestion relief, and system regulation. Projects also include demonstrations of promising utility-scale storage technologies in order to rapidly advance their market readiness in the United States.

As a federal agency, DOE must comply with the *National Environmental Policy Act of 1969* (NEPA) (42 USC 4321 et seq.) by considering potential environmental issues associated with its actions prior to undertaking those actions. The NEPA environmental review of projects evaluated under the Smart Grid Demonstrations FOA will be prepared pursuant to Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500 – 1508), and the Department's NEPA implementing procedures (10 CFR Part 1021), which provide directions specific to procurement actions that DOE may undertake or fund before completing the NEPA process. Per these regulations, DOE has prepared an environmental critique and this environmental synopsis to support the procurement selection process.

The environmental critique prepared for AOI-2 evaluated nine proposals submitted for the Smart Grid Demonstrations AOI-2. The critique was developed to meet the DOE NEPA implementing procedures and, specifically, to meet the requirements in those procedures for environmental critiques of procurements, financial assistance, and joint ventures [10 CFR 1021.216(f) and (g)].

Only those proposals for which an environmental assessment or environmental impact statement could be required were evaluated. The critique did not address proposals submitted for the FOA that could be categorically excluded in accordance with Subpart D of 10 CFR Part 1021.

The environmental critique provided an evaluation and comparison of potential environmental impacts for each proposal deemed to be within the competitive range. DOE used the critique to evaluate appreciable differences in the potential environmental impacts from those proposals. As delineated in 10 CFR 1021.216(g), the environmental critique focused on environmental issues pertinent to a decision among the proposals and included a brief discussion of the purpose of the procurement and each proposed project, a discussion of the salient characteristics of each project, and a brief comparative evaluation of the environmental impacts of the projects. The critique represents one aspect of the formal process used to select among applicants for funding under the Smart Grid Demonstration AOI-2 FOA. As such, it is a procurement-sensitive document and subject to all associated restrictions.

This document is the environmental synopsis, which is a publicly available document corresponding to the environmental critique. The environmental synopsis documents the evaluation of potential environmental impacts associated with the proposals in the competitive range and does not contain procurement-sensitive information. The specific requirements for an environmental synopsis delineated in 10 CFR 1021.216(h) are as follows:

> *(h) DOE shall prepare a publicly available environmental synopsis, based on the environmental critique, to document the consideration given to environmental factors and to record that the relevant environmental consequences of reasonable alternatives have been evaluated in the selection process. The synopsis will not*

contain business, confidential, trade secret or other information that DOE otherwise would not disclose pursuant to 18 U.S.C. 1905, the confidentiality requirements of the competitive procurement process, 5 U.S.C. 552(b) and 41 U.S.C. 423. To assure compliance with this requirement, the synopsis will not contain data or other information that may in any way reveal the identity of offerors. After a selection has been made, the environmental synopsis shall be filed with EPA, shall be made publicly available, and shall be incorporated in any NEPA document prepared under paragraph (i) of this section.

To address the above requirements, this environmental synopsis includes: (1) a brief description of background information related to the Smart Grid Demonstration AOI-2, (2) a general description of the proposals received in response to the FOA and deemed to be within the competitive range, (3) a summary of the assessment approach used in the environmental critique to evaluate the potential environmental impacts associated with the proposals, and (4) a summary of the environmental impacts presented in the critique, focusing on potential differences among the proposals. Because of confidentiality concerns, the proposals and environmental impacts are discussed in general terms.

2. DESCRIPTION OF APPLICATIONS

The environmental critique evaluated nine projects under AOI-2. The projects evaluated are large- and small-scale energy storage demonstration projects, most of which include one or more of the following activities:

- Installation of new battery storage systems, generally to be integrated with new or existing photovoltaic or wind energy systems;
- Construction of new compressed air energy storage (CAES) systems connected to the grid and including use of caverns, mines, and aquifers for the air storage component; and
- Construction of flywheel energy storage systems.

The following are brief descriptions of the characteristics of the nine projects evaluated. The aspects of the projects that could result in environmental impacts, and that were considered in the Environmental Critique, are briefly described. All procurement sensitive information has been removed from the descriptions. Most projects include other activities that would result in minor or no impacts on the environment (for example, installing control equipment meters and running electric lines in the immediate area of the energy storage devices); such activities are not described.

1. Project 1

Period: 5.5 years
Location: Texas

This project would involve the construction of one of the largest CAES facilities in the United States, at about 130 megawatts. The project would make use of an existing storage cavern in a salt dome formation nearly 3,000 feet underground. The project would include a 30-acre construction site, discharge of non-contact cooling water to a nearby tributary, and injection of brine removed from the storage cavern.

2. Project 2

Period: 4 years
Location: New York

This project would design, build, test, commission, and operate a utility-scale, 20-megawatt flywheel energy storage frequency regulation plant and provide frequency regulation services to the grid operator. Project objectives include demonstrating to grid operators the technical, cost, and environmental advantages of fast-response flywheel-based frequency regulation; lowering the cost to build a 20-megawatt flywheel energy storage plant; speeding deployment of this technology to other grid operator regions; and stimulating international market demand for flywheel energy storage. The project includes construction of the facility in an industrial park and connecting to an adjacent grid transmission line.

3. Project 3

Period: 4 years
Location: Iowa

Many high-potential wind energy areas of the Midwest are located long distances from significant electrical load. This creates instability and over-capacity for the existing transmission system. In addition, most wind energy is generated during the off-peak hours, which does not match the demands of the electrical system. This project would demonstrate the benefits of a CAES plant to allow transmission systems to efficiently absorb vast amounts of wind energy in areas of high wind penetration and low load. In addition, the applicant would demonstrate and quantify the cost savings and benefits of using a CAES plant to optimize the existing generating assets of the utility systems receiving the wind energy. The applicant proposes to build a 270-megawatt CAES facility. Air would be stored in an underground aquifer.

The project would proceed in two phases:

- Phase 1 would involve air injection tests to demonstrate and prove the capability of the geologic formation to store and release the pressurized air at the desired rates.
- Phase 2 would involve the design, construction, and startup of the 270-megawatt CAES plant on approximately 20 acres of land.

4. Project 4

Period: 2 years
Location: Illinois

The applicant would design, build, test, commission, and operate a 20-megawatt flywheel energy storage frequency regulation plant and provide frequency regulation services to the grid operator. In addition, the applicant would collect critical data needed to measure the achievement of these project objectives and organize and disseminate that data to DOE, other grid operators, and the public in appropriately useful formats. The project site would be about 3.5 acres and involve the use of 200 high-energy flywheels.

5. Project 5

Period: 3 years
Location: Ohio

The applicant would install a compressed air power generating facility, which would be capable of 268 megawatts of power generation and would be located at a limestone mine. The project would include two power generation units designed specifically for the CAES application. The facility would be designed to operate on natural gas only. The project is already permitted for up to 800 Megawatts of power generation. Construction on the 92-acre site, which is previously disturbed and zoned for heavy industry, would include the power generation building, a control building, and a cooling tower.

6. Project 6

Period: 5 years
Location: California

The applicant would install a compressed air power generating facility using a saline porous rock formation as the storage reservoir. The project would take a phased approach to build and validate the design, performance, and reliability of an advanced underground CAES plant (300 megawatts with 10 hours of storage).

7. Project 7

Period: 4 years
Location: Hawaii

The project consists of the construction of a large battery enclosure and a substation, with a combined footprint of less than an acre. These facilities would be adjacent to existing wind energy facilities.

8. Project 8

Period: 5 years
Location: New York

The proposed project would include final design, layout, and construction of a 130-megawatt electric-peaking CAES plant. The plant would use electric-drive compressors during times of low electric demand to compress air into an existing salt cavern for subsequent use to generate electricity during times of high demand. A new 1.5-mile long electric transmission line and substation would be constructed to tie the new facility into the existing electric grid. The project site would be a leased 10-acre section of a much larger parcel. The tallest structure (stack) would be about 80 feet, and a building about 60 feet tall and 130 feet long would be constructed to house large equipment. New wells would likely be drilled into the cavern. Pumps and a water line (approximately 1,600 feet long) from a nearby recreational lake would be installed to provide access to fresh water for cooling towers.

9. Project 9

Period: 4 years
Location: New Mexico

This project would combine a 2.8-megawatt hour battery system with an existing 500-kilowatt solar photovoltaic installation. The goal is to employ the battery, along with a control system, to turn solar photovoltaic into a reliable, dispatchable, distributed generation resource. Data collection and analysis based on this design would produce information for a range of possible applications. The project would also yield computer-based modeling tools that would simulate the behavior of distribution feeders under varying loads, with and without distributed generation and storage attached. Construction would be on 5 acres within a currently undeveloped 27-acre site, and would include access roads, a pad for the battery system, and a 1,000-foot line to existing transmission lines.

3. ASSESSMENT APPROACH

Each of the applicants that provided a proposal in response to the Smart Grid Demonstrations FOA was required to submit an environmental questionnaire. The questionnaires included detailed information on the project including the following:

- Project Summary and objectives
- Work locations
- Materials used and produced (e.g., water, electricity, wastewater, air emissions)
- Proposed alternatives
- Land use changes

- Proximity to local, state, or national parks, forests, monuments, scenic waterways, wilderness, recreation facilities, or Tribal lands
- Potential impacts of construction activities
- Potential impacts to surface waters , floodplains, or wetlands
- Potential impacts to any vegetation and wildlife resources
- Changes that could result in socioeconomic or infrastructure conditions
- Potential impacts to historic or cultural resources
- Attainment status for the air quality conditions for the immediate project area
- Potential air emissions from the proposed project
- Potential amounts of solid and hazardous wastes produced
- Unique health and safety factors associated with the project
- Any required permitting or other regulatory compliance activities
- Potential for public controversy

For each project considered in the environmental critique, the potential direct and indirect effects, short-term and long-term effects, and unavoidable adverse effects were identified for 20 resource areas. These resource areas are included as the first 20 entries in Table 1 in Section 4. The critique also includes a summary of project activities, mitigation measures proposed by the applicant, areas where important environmental information is incomplete and unavailable, unresolved environmental issues, and practicable mitigation measures. Also included is a list of federal, tribal, state, and local government permits, licenses, and approvals identified by the applicants or known to be required for each project.

4. SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS

This section provides a summary of potential impacts for each project. Table 1 identifies the resource areas that could be adversely or beneficially impacted for each of the nine projects. For each project, the potential direct and indirect, short-term and long-term, and unavoidable impacts were identified and classified into one of the following four color-coded categories:

- No impacts to a resource area are expected – blank
- Potential for minor adverse or beneficial impacts or unknown impacts of possible minor concern – black text or dot, no shading
- Potential for moderate adverse impacts or unknown impacts of possible moderate concern – light shading
- Potential for major adverse impacts or unknown impacts of possible major concern – darker shading

As summarized in Table 1, many of the projects have the potential to affect multiple aspects of the environment. Because of the nature of many of these projects (for example, construction of

new facilities, often with power-generating, or conversion, capabilities), many of the projects would have minor or moderate impacts on a range of environmental resource areas including aesthetics, air quality, human health and safety, land use, noise, waste and materials, transportation, and utilities. Some of the projects would also have minor or moderate impacts on cultural, biological, groundwater, and surface water resources. The geologic-based CAES are also identified as having the potential for moderate impacts on geology because of the unknowns associated with how the geologic features would respond to the repeated pressurization and release cycles. Most or all of the projects would have minor beneficial impacts on socioeconomic conditions (by increasing employment and the monetary infusion into the community) and utility operations (by improving the efficiency of the transmission system).

Many of the projects highlighted in Table 1 as having the potential for moderate adverse impacts are actually characterized in the environmental critique as having minor-to-moderate impacts. This characterization is often associated with unknowns with respect to some project quantity or the existing characteristics of the project site. The classification of these impacts may eventually be downgraded as the design of projects mature and more information becomes available.

Only one project was identified with the potential to have major adverse impacts. This was due to the projected amount of air emissions that would be involved, likely requiring a Prevention of Significant Deterioration permit for the project.

Table 1. Potential Impacts of Smart Grid Demonstration Projects Rollup – Area of Interest 2

Resource Areas	1	2	3	4	5	6	7	8	9
Aesthetics	●	●	●	●	●	●	●	●	●
Air Quality	●	●	●	●	●	●	●	●	
Biological Resources		●	●			●	●		●
Climate									
Community Services									
Cultural Resources			●					●	●
Environmental Justice									
Floodplains									
Geology	●				●	●		●	
Groundwater	●		●			●		●	
Human Health and Safety	●	●	●	●	●	●	●	●	●
Land use	●	●	●	●	●	●	●	●	●
Noise	●	●	●	●	●	●	●	●	
Wastes & Materials		●	●	●	●	●		●	●
Soils		●	●	●		●	●	●	●
Socioeconomics	●	●	●	●	●	●	●	●	●
Surface Water	●		●			●	●	●	●
Transportation/Traffic	●	●	●	●	●	●		●	●
Utilities	●	●	●	●	●	●	●	●	
Wetlands	●							●	
Public Controversy	●		●			●		●	●
Permits	●	●	●	●	●	●	●	●	●
Mitigation	●	●		●	●	●		●	●

(Blank) No impacts expected.
● Potential to be minor adverse or beneficial impacts or there are unknowns of possible minor concern.
● Potential to be moderate adverse impacts or there are unknowns of possible moderate concerns.
● Potential to be major adverse impacts or there are unknowns of possible major concerns.

5. REFERENCES

DOE 2009 U.S. Department of Energy, National Energy Technology Laboratory, *Recovery Act – Smart Grid Demonstrations, Funding Opportunity Number: DE-FOA-0000036*, June 25, 2009.

FINAL
ENVIRONMENTAL ASSESSMENT

FOR THE

BEACON POWER CORPORATION FLYWHEEL FREQUENCY REGULATION PLANT, HAZLE TOWNSHIP, PENNSYLVANIA (SITE 2)

U.S. Department of Energy
National Energy Technology Laboratory

April 2011

ACRONYMS AND ABBREVIATIONS

CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
FWS	U.S. Fish and Wildlife Service
NEPA	National Environmental Policy Act of 1969, as amended
PJM	PJM Interconnection
PM_{10}	particulate matter with median aerodynamic diameter of 10 micrometers or less
$PM_{2.5}$	particulate matter with median aerodynamic diameter of 2.5 micrometers or less
PVC	polyvinyl chloride
SHPO	State Historic Preservation Officer
Stat.	*United States Statutes at Large*
U.S.C.	*United States Code*

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDIXES

SUMMARY

The U.S. Department of Energy (DOE or the Department) proposes to award a financial assistance grant under the American Recovery and Reinvestment Act of 2009 (Recovery Act) in the form of a cooperative agreement with Beacon Power Corporation (Beacon Power) for its proposed project to construct and operate a 20-megawatt utility-scale flywheel-based frequency regulation plant at the Humboldt Industrial Park in Hazle Township, Pennsylvania. The project would involve several support facilities (see Figure 2-5). The flywheel plant would help balance energy supply with energy demand by absorbing power from the grid when the frequency of the grid was above 60 hertz and injecting energy into the grid when frequency was less than 60 hertz. DOE's Proposed Action is to award a $24 million financial assistance grant to Beacon Power in a cost-sharing arrangement. The total cost of the proposed project would be approximately $53 million. In addition, Beacon Power could receive a $5 million grant from Pennsylvania's Redevelopment Capital Assistance Program.

This environmental assessment (EA) examines the potential environmental consequences of DOE's Proposed Action, providing financial assistance, and Beacon Power's proposed project. The EA also examines the No-Action Alternative, under which DOE assumes that, as a consequence of its denial of financial assistance, Beacon Power would not proceed with the project.

DOE sent consultation letters to the Pennsylvania State Historic Preservation Officer (SHPO), the Seneca Nation of Indians, and the Tonawanda Band of Seneca. The SHPO requested further information on the project, which DOE provided. The SHPO responded to indicate there are no *National Register of Historic Places* eligible or listed historic properties or archaeological properties in the area of the proposed project. The Seneca Nation of Indians also indicated there are no properties listed or eligible for or included on the National Register, and that they had no further issues with the proposed project. At the time of publication, the Tonawanda Band of Seneca had not responded. Appendix B contains copies of these letters.

DOE also sent consultation letters to the Pennsylvania Field Office of the U.S. Fish and Wildlife Service (FWS) and the Pennsylvania Department of Conservation and Natural Resources on scrub oak shrubland habitat considerations. The Pennsylvania Department of Conservation and Natural Resources responded with the determination that no impact is likely. Appendix B contains copies of these letters. At the time of publication, DOE had not received a response from the FWS.

DOE evaluated the environmental resource categories it commonly addresses in EAs and identified no significant adverse impacts from the proposed project. For most of the resource categories, DOE determined there would be no impacts or the potential impacts would be small, temporary, or both and therefore did not carry those forward for additional analysis. DOE focused its analyses on those resources that could require new or amended permits, have the potential for significant impacts or controversy, or typically interest the public. DOE performed detailed analyses of potential impacts to air quality, biological resources, socioeconomics and

environmental justice, and occupational health and safety. The following paragraphs summarize the analyses.

Air Quality. Temporary air emissions from construction activities for Beacon Power's proposed project would include combustion emissions from vehicles and construction equipment and fugitive dust from site preparation activities. These emissions would have short-term adverse impacts that Beacon Power would mitigate through best management practices such as soil stabilization and watering of exposed soils. The applicant (Beacon Power) is also required to acquire any storm water and/or erosion and sedimentation permits that are required. Fugitive dust emissions would be controlled through best management practices and would end at the completion of construction, so long-term impacts would be negligible.

Because the proposed flywheel plant would not burn fossil fuel, it would produce zero direct emissions of combustion gases during operations. Further, use of flywheel-based frequency regulation could reduce the amount of fossil fuels regional power plants normally use to accomplish this function, resulting in a net reduction in dependence on fossil fuels. Moreover, operation of the proposed frequency regulating plant would mean that coal- and gas-fired plants would be able to reduce their regulation function in order to focus on providing wholesale energy. No new permits would be necessary for flywheel plant operation.

Biological Resources. There would be small but temporary impacts to wildlife on or near the proposed project site during the construction period. Wildlife could be displaced from the area due to the presence of people, vehicles, and operating equipment and, in some circumstances, could be killed by cars and construction equipment. The Indiana bat, a federally threatened species, occurs in Luzerne County, but it is unlikely they are present at the proposed project site because it is in an existing industrial park and lacks much of the requisite habitat. If Beacon Power encountered Indiana bats during the construction of the proposed project, Beacon Power wildlife biologists would consult with the FWS about conservation and avoidance measures for protection of the species. Beacon Power would avoid activities that could disturb the bats (that is, potential tree removal) during the summer months when bats, if they were present, would reside at the site.

Bald eagles, protected under the Bald and Golden Eagle Protection Act, have been observed in the general area, but there are no known nests within 1 mile of the site. If a bald eagle nest was discovered near the site, Beacon Power would cease construction activities and notify the appropriate authorities. Beacon Power would not conduct activities that could affect the eagles during nesting season.

Construction activities could affect the extent of scrub oak shrubland on the site. Beacon Power would be mindful of the affected shrubland and would minimize impacts to the extent practicable. However, construction activities could affect some wildlife species in the short term that inhabit the shrubland. The Pennsylvania Department of Conservation and Natural

Resources responded to DOE's consultation letter with the determination that the proposed project is not likely to affect Pennsylvania species and resources of concern (Appendix B).

Operation of the flywheel frequency regulation plant is not likely to affect the Indiana bat or have any continuing effect on scrub oak shrubland. However, there could be some effect on bald eagle populations due to electrical equipment. For new aboveground electrical line construction, Beacon Power would include appropriate protections in the design of the proposed project to minimize potential impacts on bald eagles (see Section 3.2.2.1.2).

Socioeconomics and Environmental Justice. The proposed project would create a small number of direct jobs during construction, which would last less than a year, so there would be no changes to population, infrastructure, or the level of social services in the area. There would be minor indirect positive economic consequences as vendors and equipment suppliers would benefit from capital orders for equipment and support systems. The evaluation of impacts to environmental justice is dependent on determining if high and adverse impacts from the proposed project would disproportionately affect low-income or minority populations. As DOE determined in the environmental justice analysis (Section 3.3), there would be no high and adverse impacts to any member of the community, including socioeconomic impacts, so there would be no high and adverse impacts to any minority or low-income population.

Occupational Health and Safety. The work force for site preparation and installation would be small and short term. DOE expects work-related incidents would be within industry incidence rates. Beacon Power would operate the facility almost entirely by remote control with limited onsite personnel. Therefore, there would be limited exposure of workers to hazardous situations at the facility. The installed equipment would have monitors and sensors to alert responders to any accident that might occur, and Beacon Power would brief and train local first responders.

Cumulative Impacts. There would be small, positive incremental impacts to socioeconomics and air quality. DOE has determined that there would be no high and adverse impacts to any member of the community, so there would be no adverse and disproportionate impacts to minority or low-income populations. Cumulative impacts to health and safety would be negligible.

No-Action Alternative. DOE assumed for the analyses of this EA that Beacon Power would not proceed with the project without DOE's financial assistance. Therefore, there would be no impacts to any resource category from the No-Action Alternative. The small, positive socioeconomic impacts and the potential to reduce conventional power plant pollutant and greenhouse gas emissions would not occur. Further, DOE's ability to achieve its objectives under the Smart Grid Demonstrations Program and the Recovery Act would be impaired.

1. INTRODUCTION

As part of the American Recovery and Reinvestment Act of 2009 (the Recovery Act; Public Law 111-5, 123 Stat. 115), the U.S. Department of Energy's (DOE or the Department) National Energy Technology Laboratory, on behalf of the Office of Electricity Delivery and Energy Reliability's Smart Grid Demonstrations Program, is providing up to $435 million in federal dollars for competitively awarded cooperative agreements for the deployment of Smart Grid Demonstrations. Smart grid projects include regionally unique demonstrations to verify smart grid technology viability, quantify smart grid costs, validate new smart grid business models at a scale that can be readily adapted and replicated around the country, and to develop new and innovative forms of energy storage The funding of the selected projects requires compliance with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 et seq.), Council on Environmental Quality regulations (40 CFR Parts 1500 to 1508), and DOE NEPA implementing procedures (10 CFR Part 1021). DOE's Proposed Action for this project is to award a $24 million financial assistance grant to Beacon Power in a cost-sharing arrangement. The total cost of the proposed project would be approximately $53 million. In addition, Beacon Power could receive a $5 million grant from Pennsylvania's Redevelopment Capital Assistance Program.

To comply with NEPA, DOE prepared this *Final Environmental Assessment for the Beacon Power Flywheel Frequency Regulation Plant, Part 2, Hazle Township, Pennsylvania* (EA). The proposed project site is a 5.5-acre parcel in the Humboldt North area of the Humboldt Industrial Park in Hazle Township, Luzerne County. The site is currently undeveloped (see Figure 2-4). This EA examines the potential environmental consequences of DOE's Proposed Action, providing financial assistance, and the Beacon Power Corporation's (Beacon Power's) proposed project, construction and operation of a 20-megawatt utility-scale flywheel-based frequency regulation plant. The project would involve several support facilities. The flywheel plant would help balance energy supply with energy demand by absorbing power from the grid when the frequency of the grid was above 60 hertz and injecting energy into the grid when frequency was less than 60 hertz. The EA also examines the No-Action Alternative, under which DOE assumes that, as a consequence of its denial of financial assistance, Beacon Power would not proceed with the project.

This chapter explains NEPA and related regulations (Section 1.1), the background of the Smart Grid Demonstrations Program (Section 1.2), the Department's purpose and need for action (Section 1.3), and the environmental resources DOE did not carry forward to detailed analysis (Section 1.4). Chapter 2 discusses DOE's Proposed Action, Beacon Power's proposed project, the No-Action Alternative, and DOE's Alternative Actions. Chapter 3 details the affected environment and the potential environmental consequences of the proposed project and of the No-Action Alternative, and it considers resource commitments. Chapter 4 addresses cumulative impacts, and Chapter 5 provides DOE's conclusions from the analyses. Chapter 6 lists the references for this document. Appendix A contains the distribution list, and Appendix B contains correspondence between DOE, the Pennsylvania State Historic Preservation Officer (SHPO), the U.S. Fish and Wildlife Service (FWS) Pennsylvania Field Office, the Pennsylvania

Department of Conservation and Natural Resources, the Seneca Nation of Indians, and the Tonawanda Band of Seneca. Appendix C contains a copy of an environmental synopsis for projects of this type that DOE used in the evaluation of this proposed project.

1.1 National Environmental Policy Act and Related Regulations

In accordance with its NEPA implementing procedures, DOE must evaluate the potential environmental impacts of a Proposed Action that could have a significant impact on human health and the environment including decisions on whether to provide financial assistance to states and private entities. In compliance with these regulations and DOE's procedures, this EA:

- Examines the potential environmental impacts of the Proposed Action and the No-Action Alternative, as well as Beacon Power's proposed project;
- Identifies unavoidable adverse environmental impacts;
- Describes the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity;
- Characterizes any irreversible and irretrievable commitments of resources that would be involved if DOE decided to implement its Proposed Action; and
- Discusses the past, present, and reasonably foreseeable actions (cumulative impacts) to which the proposed project could contribute.

DOE must meet these requirements before it can make a final decision to proceed with a proposed federal action (expenditure of federal dollars) that could cause adverse impacts to human health or the environment. This EA meets DOE's obligations under NEPA and provides DOE with the information needed to make an informed decision about providing financial assistance to the flywheel frequency regulation plant in Hazle Township, Luzerne County, Pennsylvania.

This EA evaluates the potential direct, indirect, and cumulative impacts of the proposed project. No other action alternatives are analyzed. For purposes of comparison, this EA also evaluates the impacts that could occur if DOE did not provide funding (the No-Action Alternative), under which the Department assumes that Beacon Power would not proceed with the project. This assumption enables DOE to compare the impacts of an alternative in which the project occurs with one in which it does not.

1.2 Background of the Smart Grid Demonstrations Program

DOE's National Energy Technology Laboratory and the Office of Electricity Delivery and Energy Reliability manage the research and development portfolio of the Smart Grid Demonstrations Program. Their mission is to lead national efforts to modernize the electrical

grid; enhance the security and reliability of the energy infrastructure; and improve recovery from disruptions to electricity supply. The Smart Grid Demonstrations Program will help verify the technological and business viability of new technologies and show how fully integrated smart grid systems can be readily adapted and copied around the country. Further, implementation of smart grid technologies could reduce total electricity use by more than 4 percent by 2030. It is estimated that smart grid technologies can save U.S. businesses and consumers about $20.4 billion in electricity costs (DOE 2009a).

Congress appropriated funding for the Smart Grid Demonstrations Program in the Recovery Act to stimulate the economy and reduce unemployment in addition to furthering the existing objectives of the program. DOE solicited applications for this funding by issuing a competitive Funding Opportunity Announcement (DE-FOA-0000036), "Recovery Act: Smart Grid Demonstrations," on June 25, 2009. The announcement invited applications in two areas of interest:

- Area of Interest 1, Smart Grid: Regionally unique demonstration projects to quantify smart grid costs, benefits, and cost-effectiveness; to verify smart grid technology viability; and to validate new smart grid business models at a scale that can be readily adapted and replicated around the county. Smart grid technologies of interest include advanced digital technologies for use in planning and operation of the electric power system and the electricity markets such as microprocessor-based measurement and control, communications, computing, and information.

- Area of Interest 2, Energy Storage: Demonstration projects for major, utility-scale energy storage installations to help establish costs and benefits, to verify technical performance, and to validate system reliability and durability at scales that can be readily adapted and replicated across the United States. Energy storage systems include advanced battery systems (including flow batteries), ultracapacitors, flywheels, and compressed-air energy systems. Application areas include wind and photovoltaic integration with the grid, upgrade deferral of transmission and distribution assets, congestion relief, and system regulation.

DOE prepared an environmental synopsis to evaluate and provide a comparison of potential environmental impacts for each proposal it deemed to be within the competitive range. The Department used the synopsis to evaluate appreciable differences in the potential environmental impacts from those proposals. The synopsis included: (1) a brief description of background information for the Smart Grid Demonstration area of interest, (2) a general description of the proposals DOE received in response to the Funding Opportunity Announcement and deemed to be within the competitive range, (3) a summary of the assessment approach DOE used in the initial environmental review to evaluate the potential environmental impacts associated with the proposals, and (4) a summary of the environmental impacts that focused on potential differences among the proposals. Appendix C contains a copy of the environmental synopsis for Area of Interest 2.

On November 24, 2009, DOE announced its selections of 16 projects in Area of Interest 1 and 16 projects in Area of Interest 2 based on the evaluation criteria in the funding opportunity announcement and giving special consideration to projects that promoted the objectives of the Recovery Act—job preservation or creation and economic recovery—in an expeditious manner.

Beacon Power's proposed project—construction and operation of a 20-megawatt utility-scale flywheel frequency regulation plant—was one of the 16 projects DOE selected for funding under Area of Interest 2. DOE's Proposed Action is to provide $24 million in financial assistance under a cost-sharing arrangement with Beacon Power. In addition, Beacon Power could receive a $5 million grant from Pennsylvania's Redevelopment Capital Assistance Program. The total estimated cost of the project is $53 million.

1.3 Purpose and Need for DOE Action

In June 2009, the Department initiated a process to identify suitable projects to lead the way for deploying integrated smart grid systems by issuing Funding Opportunity Announcement DE-FOA-00000036, "Recovery Act: Smart Grid Demonstrations." This funding opportunity announcement was funded under the Recovery Act.

The purpose of the Proposed Action is to support the objectives of the Smart Grid Demonstrations Program—to demonstrate advanced smart grid technologies and integrated systems that will help build a smarter, more efficient, more resilient electrical grid—and the goals of the Recovery Act. The Program will help verify smart grid technology viability, quantify smart grid costs and benefits, and validate new smart grid business models at a scale that can be readily adapted and replicated around the country. DOE considers Beacon Power's proposed project(s) to be one that can meet these objectives because it would (1) increase power quality and reliability of the local area, (2) reduce carbon emissions, (3) increase energy security through reduced oil consumption, and (4) further national knowledge and technology of new frequency regulation technology.

The Recovery Act enacted legislation to create jobs, restore economic growth, and strengthen America's middle class through measures that modernize the nation's infrastructure, enhance America's energy independence, expand educational opportunities, preserve and improve affordable health care, provide tax relief, and protect those in greatest need. The Recovery Act has now enabled the DOE to provide funds under this funding opportunity announcement that would partially satisfy the needs identified under the Act.

There has been chronic underinvestment and parochialism in getting energy where it needs to go through transmission and distribution, further limiting grid efficiency and reliability. While hundreds of thousands of high-voltage transmission lines course throughout the United States, only 668 additional miles of interstate transmission lines have been constructed since 2000. As a result, system constraints worsen at a time when outages and power quality issues cost American business an estimated $100 billion or more on average each year (DOE 2008). DOE's Proposed

Action of providing this project with funding would help initiate modernization of a small portion of the nation's electrical grid system.

1.4 Environmental Resources Not Carried Forward

Chapter 3 of this EA describes the affected environment and examines the potential environmental impacts of the proposed project, associated actions, and the No-Action Alternative for the following resource areas:

- Air quality,
- Biological resources,
- Socioeconomics and environmental justice, and
- Occupational health and safety.

The focus of the more detailed analyses in Chapter 3 is on those resources that could require new or amended permits, have the potential for significant impacts or controversy, or typically interest the public, such as socioeconomics and occupational health and safety.

DOE EAs also commonly addresses the environmental resource areas listed in Table 1-1. However, in an effort to streamline the NEPA process and enable a timely award to the selected project, DOE did not examine the resource areas in the table at the same level of detail as the above-mentioned resources areas. Table 1-1 describes the Department's evaluation of those resource areas. In each case, there would be no impacts or the potential impacts would be small or temporary in nature, or both. Therefore, DOE determined that further analysis is unnecessary. In terms of the No-Action Alternative, the potential impacts in Table 1-1 would not occur because DOE assumes the proposed project would not proceed.

Table 1-1. Environmental resource areas with no, small, or temporary impacts.

Environmental resource area	Impact consideration and conclusions
Geology and soils	The project site is in a seismically stable area and there are no known site stability issues. Geologic information for Luzerne County is available from the Pennsylvania Department of Conservation and Natural Resources at http://www.dcnr.state.pa.us/topogeo/index.aspx; soils information is available from the Natural Resources Conservation Service Web Soil Survey at http://websoilsurvey.nrcs.usda.gov/app/. There are no onsite water bodies or channels, but Beacon Power would nonetheless use best management practices during the construction phase to control sedimentation and soil erosion. Construction would involve excavation and laying of concrete footings to install the flywheel containers, which would be 5 feet in diameter and at a depth of 8 to 10 feet below ground. The company would stockpile soil and excavation debris on the site for site contouring or transport it to an approved landfill.

Table 1-1. Environmental resource areas with no, small, or temporary impacts.

Environmental resource area	Impact consideration and conclusions
Land use	The proposed project site is in the Humboldt Industrial Park, Hazle Township, Luzerne County, Pennsylvania. The site is an undeveloped industrial site within the 3,000-acre Humboldt Industrial Park complex, which lies just east of Interstate Highway 81 along both sides of State Route 924 and currently hosts over 50 companies and nearly 7,000 employees (H&CD 2011). The site consists of 5.5 acres in the Humboldt North portion of the park; Beacon Power would use about 3.5 acres for the proposed project. The closest developed sites host Archer Daniels Midland and Vita-Line Products plants (Figure 2-2). Given that the site is within the Humboldt Industrial Park, the proposed project would be within the designated land use of the site. DOE does not expect the project would result in any changes in surrounding land uses.
Water resources	The nearest surface water body to the site is Stoney Creek about one-quarter mile to the west (FWS 2011a). The site is not in a 100-year floodplain (FEMA 1981), and the closest wetland is an area of freshwater emergent shrub about 900 feet to the north (FWS 2011b). Site preparation and construction activities could result in storm water runoff and soil erosion. Runoff during construction would be regulated and controlled under a National Pollutant Discharge Elimination System storm water construction permit and a storm water pollution prevention plan. Beacon Power would use its existing spill prevention plan to manage the use and storage of oil, gas, and other liquids for the proposed project. The proposed project would require small quantities of potable water for the small onsite office, which Beacon Power would obtain from municipal sources, and there would be a connection to the local municipal wastewater treatment system. During operations, Beacon Power would not use surface water, would not discharge wastewater, and would not need water-related permits. The proposed project would not use groundwater for operations, and there would be no underground storage tanks. Beacon Power would install a monitoring system that would indicate accidental losses or leaks in the cooling loop. DOE concluded there would be no impacts to water resources.
Historic and cultural resources	DOE formally consulted the Pennsylvania SHPO (Appendix B) in accordance with Section 106 of the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.) and its implementing guidelines at 36 CFR Part 800. DOE reviewed the *National Register of Historic Places* for listed properties in the area of the proposed project and determined that none is near the site and therefore would not be impacted by the proposed project in the area of potential effect (the 3.5-acre site that would directly support the installation and operation of the flywheels). The site is currently vacant with no existing structures. Therefore, DOE determined there would be no effects on federally listed or eligible historic places. The SHPO requested additional information, which DOE sent in a followup letter, and the SHPO responded to indicate there are no National Register eligible or listed historic or archaeological properties in the area of the proposed project. Appendix B contains copies of the letters.

Table 1-1. Environmental resource areas with no, small, or temporary impacts.

Environmental resource area	Impact consideration and conclusions
Aesthetics and visual resources	The proposed site is in urbanized Hazle Township, Pennsylvania. There are no nearby aesthetic features that construction and operation of the Beacon Power plant would affect. The visual characteristics of the site would change from an undeveloped vegetated industrial site to one hosting new industrial utility-scale facilities. The new plant would be visually consistent with the designated use of the site. There are 230-kilovolt transmission lines adjacent to the site.
Noise	During construction, activity would typically occur on Monday through Saturday from 7:00 a.m. to 5:00 p.m. All construction activities would be in accordance with Occupational Safety and Health Administration guidelines, which address noise and hearing conservation in specific standards for the construction industry. Noise from construction would be temporary and limited to daytime hours, so DOE does not expect noise to exceed what would be expected in an industrial park setting. The principal operating elements of the facility would be the flywheels, which would be in vacuum-sealed vessels. These vessels would, in turn, be in underground precast concrete housings. Therefore, the flywheels would generate little noise during operations. The chillers and other electrical equipment necessary to support operations would generate some noise. The goal would be to maintain and control noise from the facility to a level that does not significantly increase ambient background noise levels outside the site boundary. For a similar project in Stephentown, New York, Beacon Power conducted two noise studies. The results of the studies indicated that operations would produce average noise levels under 45 A-weighted decibels. This level is below the U.S. Environmental Protection Agency (EPA) protective noise levels of 55 A-weighted decibels.
Waste	Site preparation would involve clearing brush and trees. Construction would generate small amounts of construction-related wastes such as packaging materials, concrete residues, and earthen materials. Beacon Power would send these wastes to approved local disposal facilities. The amount of waste would not affect local landfill capacities. The only known potentially hazardous material for the proposed project would be transformer oil. Current plans would be to use mineral-based oil; the specific amount is yet to be determined. Beacon Power would recycle or properly dispose of the mineral-based oil as required; it is not considered a hazardous waste under the Resource Conservation and Recovery Act regulations at 40 CFR Part 261, "Identification and Listing of Hazardous Waste."
Utilities, energy, and materials	Beacon Power would regularly consume about 1 megawatt of power to operate the proposed frequency regulation plant. The office would use small amounts of water and require sewage service. DOE reviewed the local capacities for water, sewer, and electricity and found them to be sufficient to support the needs for construction and operation of the plant. There are no unique materials necessary to manufacture or install plant elements or operate the proposed plant.

Table 1-1. Environmental resource areas with no, small, or temporary impacts.

Environmental resource area	Impact consideration and conclusions
Transportation	Small temporary increases in local traffic to the proposed site area would occur during construction. Operation of the plant would require no permanent staff, so there would be no long-term permanent increase in traffic. Existing roads are sufficient for access to the site.

1.5 Consultations and Public Participation

1.5.1 Consultations

State Historic Preservation Office

On January 20, 2011, DOE sent a formal consultation letter to the Pennsylvania SHPO in accordance with the review requirements of Section 106 of the *National Historic Preservation Act* (16 U.S.C. 470 et seq.) and its implementing regulations at 36 CFR Part 800. The letter detailed DOE's investigation of nearby historic properties and concluded that no historic properties would be affected by the proposed project. The SHPO requested further information on February 8, 2011, which DOE provided on February 17. The SHPO indicated on March 4 that it had no knowledge of *National Register of Historic Places* eligible or listed historic properties or archaeological sites in the area of the proposed project. Appendix B contains copies of these letters.

U.S. Fish and Wildlife Service

DOE sent a consultation letter on January 20, 2011, to the Pennsylvania Field Office of the FWS on scrub oak shrubland habitat considerations. At the time of publication, DOE had not received a response. Appendix B contains a copy of the letter.

U.S. Fish and Wildlife Service

DOE sent a consultation letter on January 19, 2011, to the Pennsylvania Department of Conservation and Natural Resources on scrub oak shrubland habitat considerations, which responded on February 3 with the determination that no impact is likely. Appendix B contains copies of these letters.

Federally Recognized Tribes

DOE sent consultation letters on January 20, 2011, to the Seneca Nation of Indians and the Tonawanda Band of Seneca to determine if there could be properties of traditional religious or cultural significance or other tribal interests near the proposed facility. After receiving the Draft EA, the Seneca Nation of Indians indicated on March 24, 2011, that there are no properties eligible for or included on the National Register in the project area, and that they had no further

issues with the proposed project. At the time of publication, the Tonawanda Band of Seneca had not responded. Appendix B contains copies of these letters.

1.5.2 Public Participation

DOE provided copies of the Draft EA to federal, tribal, state, and local officials and announced its availability in public notices in *The Standard-Speaker* of Hazleton, Pennsylvania. In addition, DOE sent copies to the Hazleton Area Public Library. The Department invited comments about the proposed project for a period of 15 days from March 13 to 27, 2011, after publication of the public notice. DOE received one reply, the above-mentioned letter from the Seneca Nation of Indians that there are no properties eligible for or included on the National Register in the project area, and that they had no further issues with the proposed project. Appendix B contains a copy of that letter.

2. DOE PROPOSED ACTION AND ALTERNATIVES

This chapter describes DOE's Proposed Action (Section 2.1), Beacon Power's proposed project (Section 2.2), the No-Action Alternative (Section 2.3), and DOE Alternative Actions (Section 2.4).

2.1 DOE's Proposed Action

DOE's Proposed Action is to award a $24 million financial assistance grant in a cost-sharing agreement to Beacon Power through the Recovery Act to facilitate the construction and operation of a 20-megawatt flywheel frequency regulation plant in Hazle Township, Pennsylvania. Beacon Power estimates the total cost of the proposed project would be approximately $53 million.

2.2 Beacon Power's Proposed Project and Associated Activities

Beacon Power would locate the proposed plant on a vacant 5.5-acre industrial parcel (Parcel 30-A) about 3 miles southwest of Hazleton, Pennsylvania (Figure 2-1). The site is west of Interstate Highway 81 and north of State Road 924. Figure 2-2 is a satellite view of the general area of the Humboldt Industrial Park, and Figure 2-3 is a closer view of the site and proposed project area.

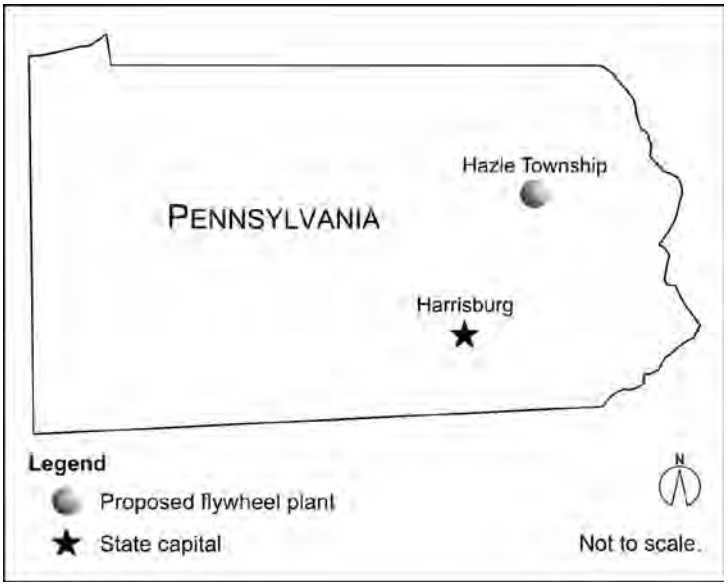


Figure 2-1. General location of Hazle Township, Pennsylvania.

The proposed site is a heavily vegetated and undeveloped industrial site next to 230-kilovolt transmission lines that run along the northeast side of the site. Figure 2-4 shows photographs of the site area. There is a large industrial building to the northeast and a smaller facility to the

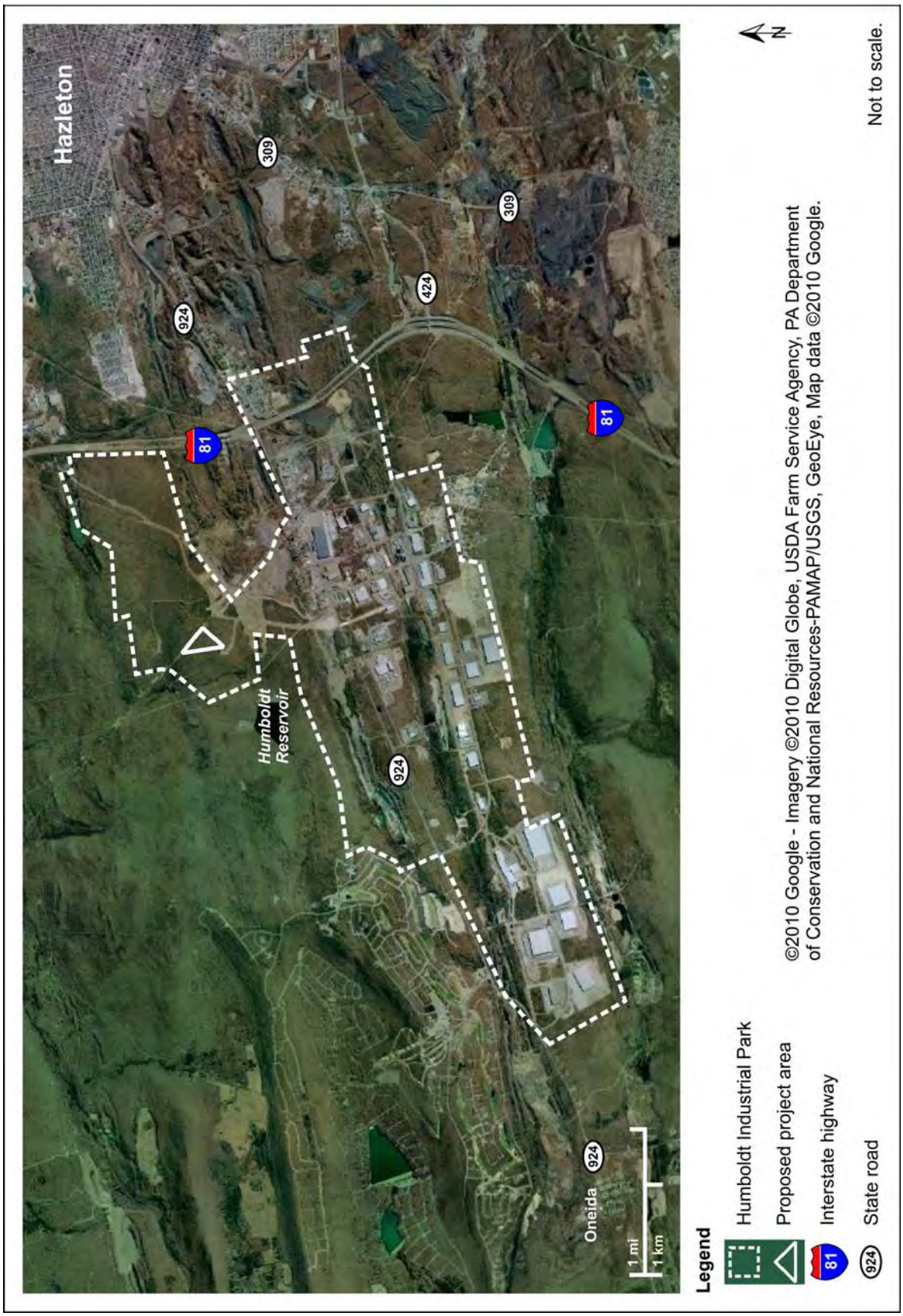


Figure 2-2. General area of the proposed project.

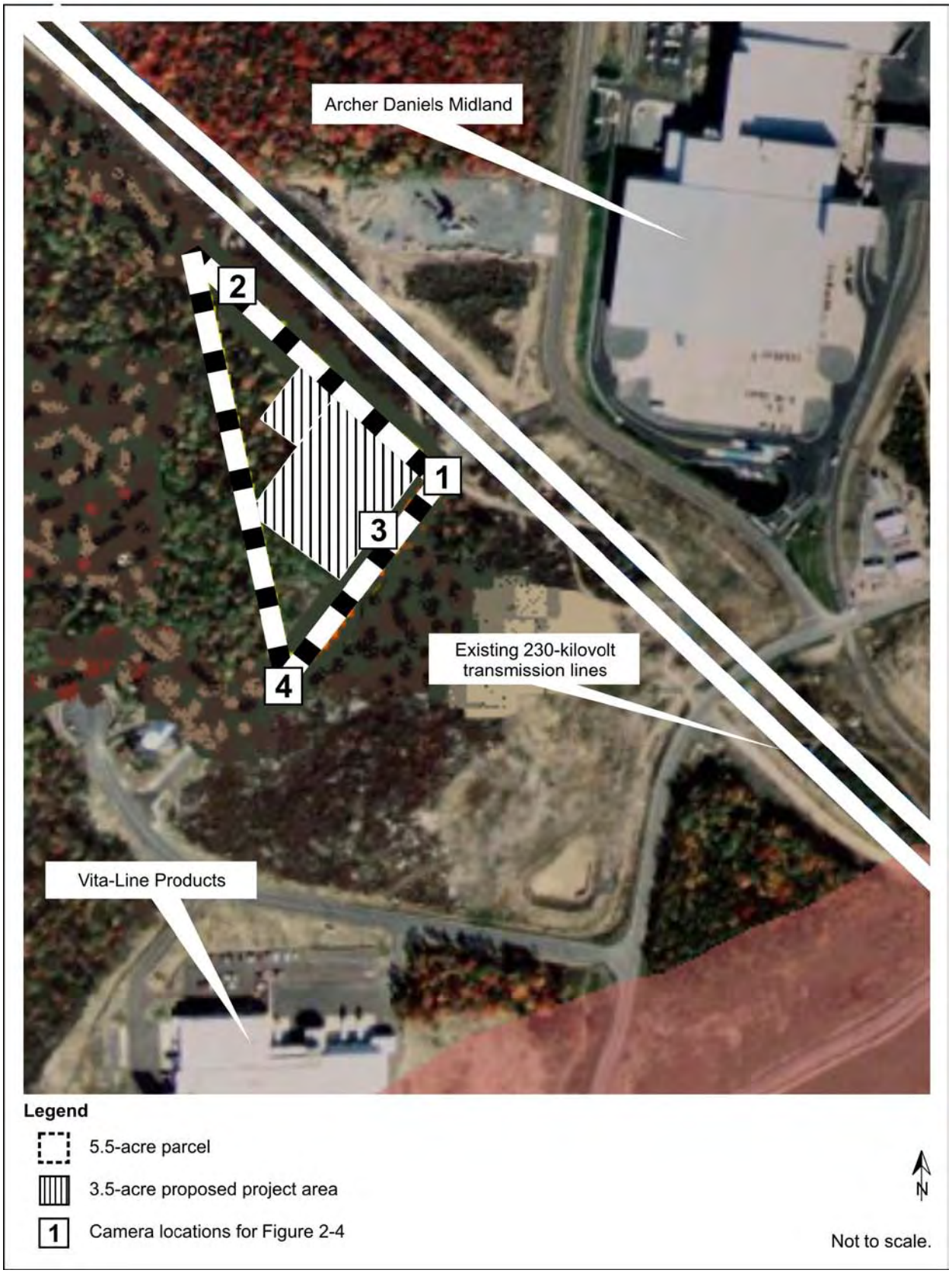


Figure 2-3. Close-up of the site and proposed project area.

Location 3 looking northwest

Location 4 looking north

Location 1 looking northeast

Location 2 looking southwest

Figure 2-4. Views of the proposed project site.

south. The remainder of the area is a mix of developed and undeveloped sites in the Humboldt North portion of the Humboldt Industrial Park.

2.2.1 Flywheel Project Overview

In the United States, electric companies deliver power at a frequency of 60 hertz to comply with federal reliability standards. The supply of and demand for electricity fluctuate constantly, which causes fluctuations in the frequency. A safe, reliable, and energy-efficient electricity grid must closely balance power supply with power demand on a second-to-second basis to maintain a constant frequency. Grid operators accomplish this frequency regulation by requiring about 1 percent of their generating capacity to increase or decrease output in response to frequency changes. At present, the electric power for frequency regulation comes primarily from coal or natural gas power plants (peaking plants).

Beacon Power's flywheel system would provide additional electric power to the grid very quickly and, unlike fossil fuel plants, would also draw power from the grid when the supply exceeded demand. The plant would not generate electricity directly; rather, electricity from the grid would drive the ultra low friction flywheels at high speeds when electricity supply on the grid exceeded demand. At times when demand exceeded supply, the system would convert energy from the spinning flywheel's inertia back to electricity and supply it to the grid. A flywheel system stores energy from the grid at times when supply exceeds demand and thus alleviates the need to burn fuel to generate additional electric power at times when demand exceeds supply. Fundamentally, the flywheel plant would absorb power from the grid when there is too much energy in the system (which causes grid frequency to rise above 60 hertz) and reinject power back to the grid when there is not enough energy to meet load (which causes grid frequency to drop below 60 hertz). Because the plant absorbs only slightly more than it injects, its daily net energy use would be small. The reduction of these peaks and valleys throughout daily power usage would make for a more energy efficient system that ultimately reduced fossil energy consumption at the power plants.

A flywheel energy storage system is the basic unit of the proposed Hazle Township frequency regulation plant. The basic idea of the technology is similar to that of a hybrid car but on a scale electric utilities can use to their advantage. A flywheel is a mechanical device that consists of a large, heavy cylinder that spins inside a vacuum-sealed housing. The flywheel is a kinetic energy storage device that rotates at high speeds. The flywheel rotor is completely enclosed in a cylindrical vessel about 7 feet high and 4 feet in diameter; it is nearly frictionless and does not require maintenance.

The proposed plant would consist of 20 frequency regulation pods, each containing 10 individual flywheels and the associated energy conversion, electrical control, and power distribution equipment. Figure 2-5 shows an artist's rendering of the array of 1-megawatt frequency regulation pods. There would be 200 flywheels in all (DOE 2009b).

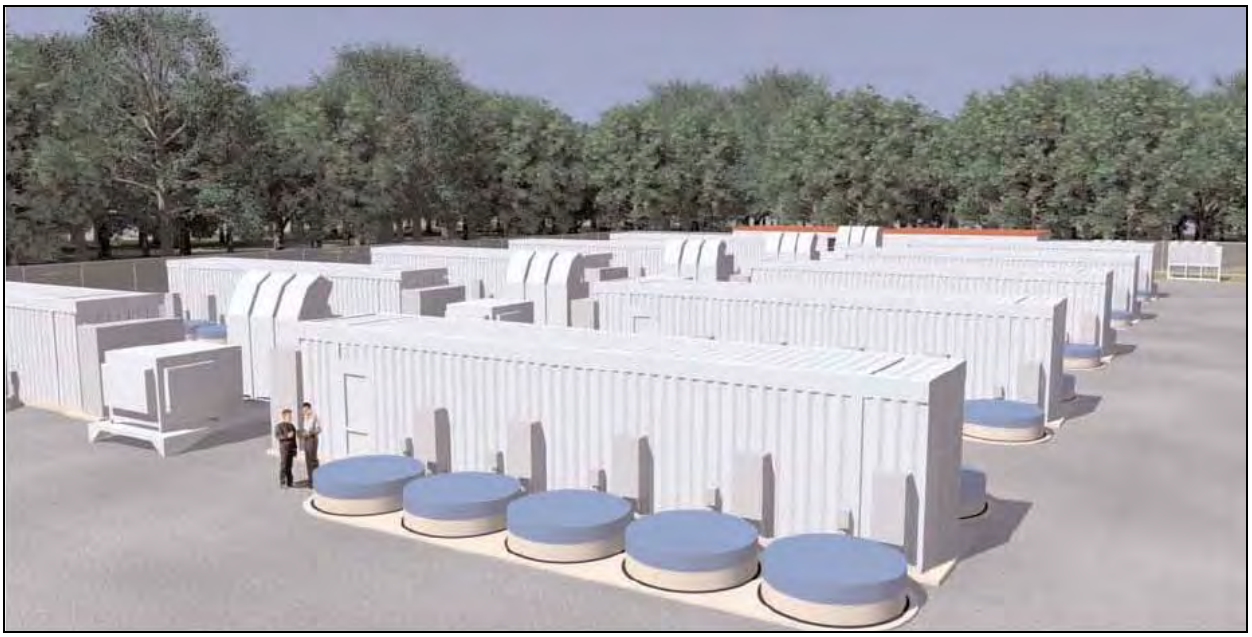


Figure 2-5. Array of 1-megawatt frequency regulation pods.

Beacon Power's proposed plant would convert excess electricity on the grid during off-peak times to kinetic energy in the flywheels. When demand was higher during on-peak times, the plant would convert the stored energy back to electricity and return it to the grid. The batterywould provide up to 20 megawatts of energy storage capacity. Beacon Power would use the plant in cooperation with the operator of the regional electrical grid, PJM Interconnection (PJM).

As part of its proposed project, Beacon Power would collect critical data to measure the success of the project objectives and report the information to DOE, other grid operators, and the public.

The goals of the proposed project are (Lyons 2010):

- Maintain better balance between network load and generated power,
- More efficiently maintain PJM grid frequency performance to grid reliability,
- Help increase the use of intermittent renewable wind and solar power,
- Demonstrate mitigation of variations in solar energy from passing clouds,
- Reduce carbon dioxide and other air emissions,
- Lower the cost of frequency regulation to ratepayers,
- Increase regional peak power generation capacity, and
- Reduce national dependence on fossil fuel.

2.2.2 Proposed Project Elements

Major features of the plant would include:

- A supplementary electric substation with an electrical connection would tie into the existing electrical grid.

- Twenty 1-megawatt frequency regulation pods, each with 10 flywheels and associated energy conversion, electrical control, and power distribution equipment in underground precast concrete housings 5 feet in diameter and 9 feet tall at a depth of 8 to 10 feet below ground;

- An electric service equipment unit with underground electric conduit connecting to the pods;

- A cooling system with underground mechanical piping connecting to the electric service equipment unit and the pods;

- A 25- by 40-foot one-story office;

- A driveway and parking spaces;

- A black vinyl-coated chain-link perimeter fence and entrance gate; and

- Landscaping.

2.2.3 Project Systems

Figure 2-6 is a schematic of the elements of the proposed plant. Major systems would include (DOE 2009b):

- Electric Power Supply System. The supplementary electric substation would provide the interconnection point to the high-voltage transmission lines. The transmission line voltage would be reduced to a much lower operating voltage. Switchgear would direct electric power to one pad-mounted oil-filled transformer for the building power loads and to 10 pad-mounted oil-filled transformers for the process loads, one transformer for every two pods. The power distribution conduit to the building transformer and to the transformers for the pods would be polyvinyl chloride (PVC) pipe in underground concrete duct banks.

- Cooling System. There would be a cooling loop to circulate coolant to cool the 20 pods. The coolant would be 75-percent water and 25-percent propylene glycol, a widely available biodegradable antifreeze. A central cooling system to remove heat from the cooling loop would consist of four chillers and pumps. The coolant pipelines to distribute the coolant to the pods would be underground copper pipe. The cooling loop would be a closed system with no waste or emissions during normal operations. A monitoring system would indicate accidental losses or leaks in the cooling loop.

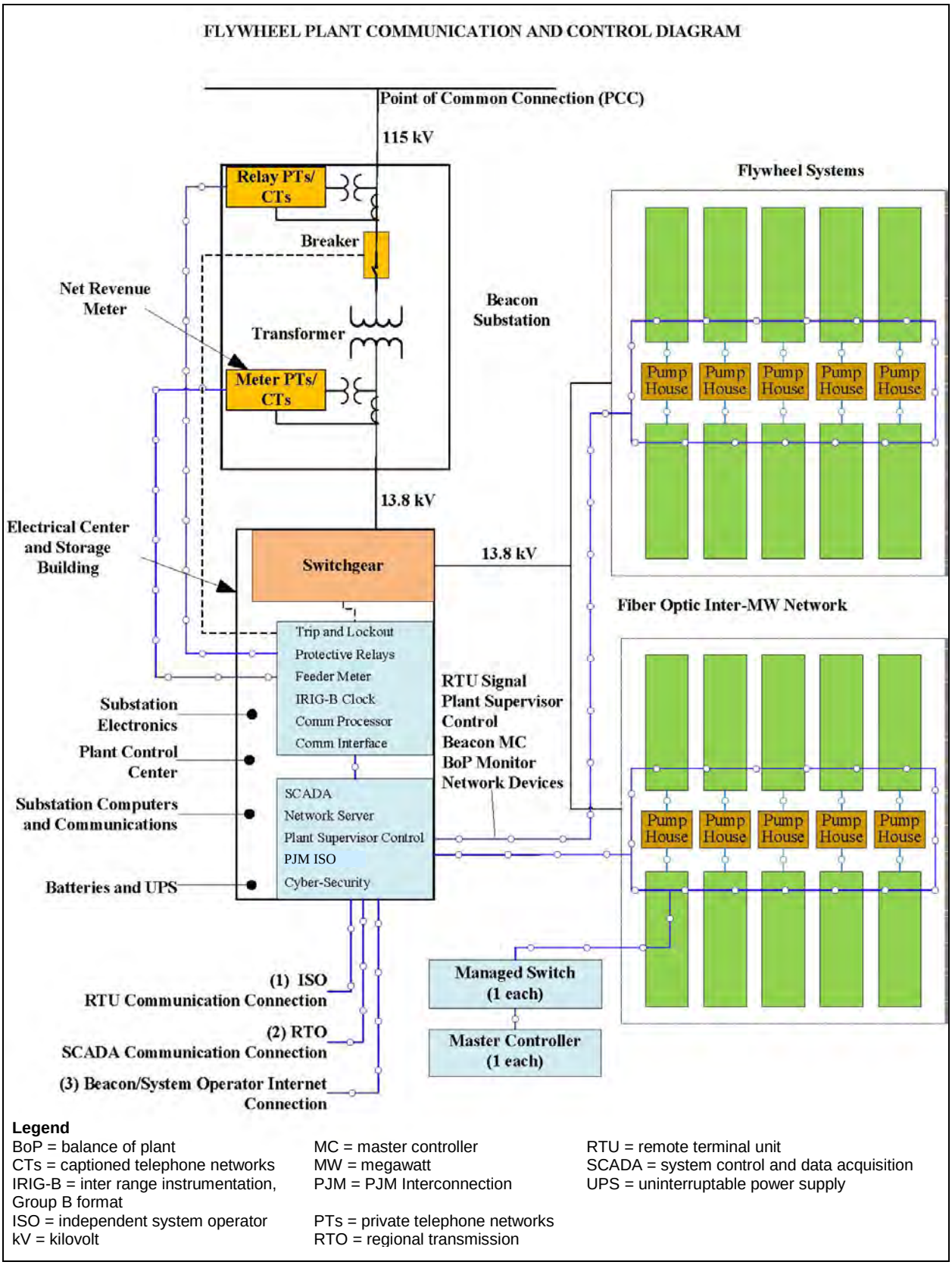


Figure 2-6. Schematic of flywheel frequency regulation plant.

- Plant Control System. Beacon Power would remotely operate the plant with only occasional site visits for monitoring operations and routine maintenance.

- Storm Water Management System. The storm water management system would consist of catch basins, manholes, PVC pipeline, a collection area, and a permitted outfall, if necessary.

- Fire Alarm System and Security System. The fire alarm and security systems would be automatic sensor-based systems.

- Water Supply System. Beacon Power would obtain water from the local provider. The only demand for water at the site would be for topping off the chiller system.

- Wastewater Disposal System. The proposed project would not generate any wastewater due to operations.

2.2.4 Construction Activities

The elements of the proposed project would cover about 3.5 acres on the 5.5-acre industrial site. Existing roads would provide adequate access to the site. The following are the planned major steps in the construction of the plant (DOE 2009b, Lyons 2010):

- Clearing and Excavation. Beacon Power would clear the vegetation on the 3.5-acre site and grade it to a uniform slope. Construction would include excavations to install the 20 flywheel pods underground. The project would reuse excavated material on the site to the extent possible and dispose of any remainder in compliance with state and local regulations. The equipment required for excavation would include excavators, bulldozers, front-end loaders, uniloaders, backhoes, and dump trucks.

- Housings and Foundations. Precast concrete housings—one for each of the flywheels—would be placed at a depth of 6 to 8 feet. The housings would be modified concrete water pipes. Groundwater control could be necessary at the base of the excavations for the housings. The housings would be founded on a crushed stone base over a geo-textile fabric. Buildings and other equipment would have shallow spread footing foundations.

- Pipelines. Underground PVC pipelines would be placed for the storm water management system, the electric power distribution system, and the cooling system.

- Equipment Placement. The flywheels and other equipment that make up the pods would be on piers within the housings. Other equipment would be on foundations.

- Surfaces. Surface treatment would include impervious asphalt pavement, gravel surfaces, and loam and seed areas.

- Testing and Start-Up Process. The system would be tested in stages prior to becoming completely operational. Testing of each pod would be based on the procedure defined during the operation of Beacon's 1-megawatt pod at its Tyngsboro, Massachusetts, plant.

The proposed plant has a design lifetime of at least 20 years. The components of the system, including flywheels and electronics, can be replaced as necessary during operations. The flywheel system represents the latest technological approach in frequency regulation to this point, but new developments could supplant this technology in the future. The equipment is of such a scale that it can be readily removed from the site.

2.3 No-Action Alternative

Under the No-Action Alternative, DOE would not provide financial assistance for the proposed project. As a result, the project would be delayed as Beacon Power sought other funding sources to meet its needs or abandoned if other funding sources could not be obtained. As a result, DOE's ability to achieve its objectives under the Smart Grid Demonstrations Program and the Recovery Act would be impaired.

Although this and other selected projects might proceed if DOE decided not to provide financial assistance, the Department assumes for purposes of this EA that the project would not proceed without DOE assistance. If Beacon Power did proceed without DOE's financial assistance, the potential impacts would be essentially identical to those if the Department provided the funding. To allow a comparison between the potential impacts of a project as implemented and the impacts of not proceeding with a project, DOE assumes that, if it were to decide to withhold assistance from a project, the project would not proceed.

2.4 DOE Alternative Actions

DOE's alternatives to this proposed project consist of the 15 other technically acceptable applications it received in response to Funding Opportunity Announcement DE-FOA-0000036, *Recovery Act: Smart Grid Demonstrations.* Before selection, DOE made preliminary determinations about the level of review under NEPA based on potentially significant impacts it identified during review of the technically acceptable applications. DOE conducted these preliminary reviews pursuant to 10 CFR 1021.216 and provided them to the selecting official, who considered them during the selection process. Appendix C of this EA contains DOE's environmental synopsis related to Beacon Power's proposed project.

Because DOE's Proposed Action under the Smart Grid Demonstrations Program is limited to providing financial assistance in cost-sharing arrangements to selected applicants in response to a competitive funding opportunity, DOE's decision is limited to either accepting or rejecting the project as proposed by the proponent, including its proposed technology and selected sites. DOE's consideration of reasonable alternatives is therefore limited to the technically acceptable applications and the No-Action Alternative for each selected project.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Sections 3.1 to 3.4 detail the affected environment and potential environmental consequences for the proposed project and the No-Action Alternative. The sections discuss air quality, biological resources, socioeconomics and environmental justice, and occupational health and safety, respectively. Section 3.5 discusses resource commitments.

3.1 Air Quality

Section 3.1.1 discusses the regional air quality baseline conditions; Section 3.1.2 discusses the potential impacts of the proposed project including the potential positive impacts from operations, which could result from the reduction of electricity generation at fossil fuel plants or other carbon-based forms of generation. Section 3.1.2.2 discusses the No-Action Alternative.

3.1.1 Affected Environment

The ambient air quality in an area can be characterized in terms of whether it complies with the primary and secondary National Ambient Air Quality Standards. The Clean Air Act (42 U.S.C. 7401 et seq.) requires the U.S. Environmental Protection Agency (EPA) to set national standards for pollutants that are considered harmful to public health and the environment. The EPA established standards for six criteria pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter [both with a median aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}) and less than or equal to 2.5 micrometers ($PM_{2.5}$)], and sulfur dioxide. Primary standards define levels of air quality for each of the six criteria pollutants that would provide an adequate margin of safety to protect public health including the health of sensitive populations such as children and the elderly. Secondary standards define levels of air quality that are deemed necessary to protect the public welfare including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The Beacon Power project would be in Hazle Township, Luzerne County, Pennsylvania. EPA classifies Luzerne County as in attainment for all criteria pollutants.

3.1.2 Environmental Consequences

3.1.2.1 Proposed Project

3.1.2.1.1 Construction Impacts

Air emissions from construction activities for Beacon Power's proposed project would include combustion emissions from vehicles and construction equipment and fugitive dust from site preparation activities. These emissions would have short-term adverse impacts that Beacon Power would mitigate through best management practices such as soil stabilization and watering

of exposed soils. Fugitive dust emissions would end on completion of construction, so long-term impacts would be negligible.

3.1.2.1.2 Operations Impacts

The proposed flywheel plant would not burn fossil fuel, so it would produce zero direct emissions of combustion gases, which include sulfur dioxide, nitrous oxides, and carbon dioxide. Further, use of flywheel-based frequency regulation would reduce the amount of fossil fuels regional power plants normally use to accomplish this function, which would result in a net reduction in dependence on fossil fuels. Fossil fuel plants must cycle up and down to perform frequency regulation. For coal and natural gas plants, thermal cycling during frequency regulation reduces efficiency for the entire plant and consumes 0.5 to 1.5 percent more fuel than steady-state operation. Therefore, operation of the proposed plant would mean that coal- and gas-fired plants would be able to drop the regulation function and focus on providing wholesale energy.

Section 176(c)(1) of the Clean Air Act requires federal agencies to ensure that their actions conform to applicable implementation plans for the achievement and maintenance of the National Ambient Air Quality Standards for criteria pollutants (DOE 2000). To achieve conformity, a federal action must not contribute to new violations of standards for ambient air quality, increase the frequency or severity of existing violations, or delay timely attainment of standards in the area of concern. The EPA general conformity regulations (40 CFR Part 93, Subpart B) contain guidance for determining if a proposed federal action would cause emissions to be above specified levels in nonattainment or maintenance areas. Because there would be no new emissions directly attributable to plant operations, a conformity determination is not necessary.

Greenhouse Gas Emissions

The burning of fossil fuels, such as natural gas, emits carbon dioxide, which is a greenhouse gas. Greenhouse gases can trap heat in the atmosphere and have been associated with global climate change. The Intergovernmental Panel on Climate Change, in *Climate Change 2007: Synthesis Report, Summary for Policy Makers*, stated that warming of the earth's climate system is unequivocal, and that most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in concentrations of greenhouse gases from human activities (IPCC 2007). Greenhouse gases are well mixed throughout the lower atmosphere, such that any emissions would add to cumulative regional and global concentrations of carbon dioxide.

The project has the potential to reduce the carbon dioxide emissions that a base-load power plant providing equal regulation capacity would produce. Implementation of this project would equate to an approximate annual reduction of 8,000 tons of carbon dioxide for a coal plant or 2,300 tons for a natural gas plant. Estimates of how many fossil fuel plants in the region would no longer perform regulation as a result of this project are not available.

3.1.2.2 No-Action Alternative

Under the No-Action Alternative, DOE would not provide funding to Beacon Power for the proposed project, and DOE assumed for this EA that the project would not proceed without this assistance. There would be no increase in efficiency and subsequent reduction in air pollutants for regional power plants.

3.2 Biological Resources

Section 3.2.1 discusses existing biological resources in the proposed project area; Section 3.2.2 discusses the potential impacts of the proposed project. Section 3.2.2.2 discusses the No-Action Alternative.

3.2.1 Affected Environment

The site of the proposed project is undeveloped and mostly wooded and shrubbed. While there are several species of plants, animals, and insects that occur on the site, this section focuses mainly on special-status species and resources. Special-status species are protected under Federal or Commonwealth of Pennsylvania law and regulation. There have been sightings of the Indiana bat (*Myotis sodalis*) and the bald eagle (*Haliaeetus leucocephalus*) in Luzerne County. The FWS lists the Indiana bat as endangered under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.). The bald eagle, which used to be a listed endangered species, was delisted by the FWS on June 28, 2007, but continues to be protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). Pennsylvania listed the bald eagle as endangered until the fall of 2004, when it changed to the eagle's status to threatened (Gross and Brauning 2009). In addition to these species, the proposed site has scrub oak shrubland, which is a special-concern resource under Commonwealth of Pennsylvania regulations (PDCNR 2010) and could host several Commonwealth of Pennsylvania priority species.

Indiana bats are quite small, weighing only one-quarter ounce. They hibernate during the winter in caves or abandoned mines. In Pennsylvania these include both limestone and coal mines (Boland 2009). After hibernation the bats migrate to summer habitat in wooded areas where they usually roost under tree bark, in crevices of dead or dying trees, and beneath loose bark of living trees, preferring trees standing in sunny openings.

The FWS estimates that about 1,000 Indiana bats hibernate in Pennsylvania. They are known to hibernate at 18 locations in 11 counties including Luzerne County. Nine Indiana bat summer maternity sites have been found in seven counties (Butchkoski 2010). Live captures of the bats in summer have been made in Luzerne County, which indicates the existence of maternity sites in the county. Protection from disturbance of hibernation sites is the most important factor in the conservation of the species.

Bald eagles generally nest near coastlines, rivers, and large lakes where there is an adequate food supply. In Pennsylvania, their preferred nesting trees are the eastern white pine (*Pinus strobus*),

sycamore (*Platanus occidentalis*), northern red oak (*Quercus rubra*), red maple (*Acer rubrum*), and tulip poplar (*Liriodendron tulipifera*) (Gross and Brauning 2010, p. 4).

Bald eagle nesting consists of five phases: courtship and nest building, egg laying, incubation and hatching, early nesting period, and late nesting period. Eagle sensitivity to humans varies among these five phases, with eagles being most sensitive to human disturbance during the courtship and nest building phases.

Bald eagles generally rebuild or refit their old nests each year. The normal time for this activity in this area is December through February, but they may begin nest repair earlier in the fall or when the nest is in use. In Pennsylvania, most egg sets are laid between mid-February and mid-March, with early March as the peak period. Eagles can lay eggs through April in Pennsylvania (Gross and Brauning 2010, p. 9).

In 2009 Luzerne County had two active bald eagle nests (Gross and Brauning 2010, p. 19). According to a recent article in *The Times Leader* of Wilkes-Barre, Pennsylvania, bald eagle sightings have been reported throughout Luzerne County, mainly near the Susquehanna and Lehigh rivers (*The Times Leader* 2011). The Susquehanna River is about 9.6 miles from the site, and the Lehigh River is over 10 miles away.

Eagles forage near their nests and tend to be very efficient hunters that do not wander far (more than a mile or two) from the good foraging opportunities where they nest. A Pennsylvania Game Commission officer reported seeing a bald eagle flying over the Humboldt North Industrial Park in December 2010 (Allen 2010).

A recent set of guidelines proposed by the FWS serves as a model for avoiding disturbance of bald eagle nesting sites within the context of the landscape and the human activity that is being considered (FWS 2007). The FWS suggests that each bald eagle nest should be protected by a buffer distance of 1,000 feet. Any substantial form of existing human development such as paved roads and buildings, including houses, within that distance would be exempt from the buffer protections.

Scrub oak shrublands are generally dominated by scrub oak but also have other low shrubs and impenetrable thickets. They occur either on sandy soils or on thin soils over bedrock. They often occur on sites where frequent or recent disturbance has removed the tree layer. Tree species may occur as scattered individuals. According to the *Pennsylvania Comprehensive Wildlife Conservation Strategy*, the shrubland can provide habitat for various Commonwealth of Pennsylvania priority species (PGC & PFBC 2005). None of the Commonwealth priority species are federally listed as threatened or endangered.

3.2.2 Environmental Consequences

3.2.2.1 Proposed Project

3.2.2.1.1 Construction Impacts

There would be small but temporary impacts to wildlife on or near the proposed project site during the construction period. Wildlife could be displaced from the area due to the presence of people, vehicles, and operating equipment and, in some circumstances, could be killed by cars and construction equipment.

There are no appropriate cave or mine hibernation sites for the Indiana bat at the proposed project site, nor do trees of appropriate species and sufficient size exist to support roosting. Protection of these hibernation sites is the most important factor in conservation of the species. The FWS recovery plan for the Indiana bat includes protection of forests at wildlife refuges, military areas, and other locations the U.S. Forest Service manages. Due to the small population of the bats in Pennsylvania, the lack of old growth forest, and the scarcity of dead or dying trees, it is unlikely that the proposed site harbors individuals or a maternity colony of the Indiana bat. However, if Beacon Power encountered Indiana bats during the construction of the proposed project, Beacon Power wildlife biologists would consult with the FWS about conservation and avoidance measures for protection of the species. Beacon Power would also avoid activities that could disturb the bats residing at the site during the summer months if they were present, however, due to the lack of proper vegetation this scenario is unlikely to occur.

DOE sent a consultation letter to the FWS to confirm its determinations on the above protected species but had not received a response at the time of publication.

The known bald eagle nest sites are not near the proposed project site, although bald eagles have been observed in the general area (*The Times Leader* 2011). *The Bald Eagle Management Plan for Pennsylvania (2010-2019)* suggests that both major and minor construction activities should be avoided within 1 mile of a nest or delayed until after nesting season because noises from these operations often disturb eagles and disrupt nesting activities (Gross and Brauning 2010, p. 43). If a bald eagle nest was discovered near the site, Beacon Power would cease construction activities until after the nesting season.

Construction activities could affect the extent of scrub oak shrubland on the site. DOE has consulted with the Commonwealth of Pennsylvania about the potential for this habitat type to exist on the proposed project site. The Pennsylvania Department of Conservation and Natural Resources responded on February 3, 2011, with the determination that no impact is likely (Appendix B). If the habitat exists, Beacon Power would be sensitive to the potential to affect shrubland and would minimize impacts to the extent practicable. Construction activities could affect some wildlife species that live in the shrubland, possibly including those identified in the *Pennsylvania Comprehensive Wildlife Conservation Strategy* (PGC and PFBC 2005, pp. 21–30).

3.2.2.1.2 Operations Impacts

Operation of the flywheel frequency regulation plant is not likely to affect the Indiana bat or have any continuing effect on scrub oak shrubland or Commonwealth of Pennsylvania priority species. The Pennsylvania Department of Conservation and Natural Resources indicated on February 3, 2011, that no impact is likely (Appendix B) on Pennsylvania species and resources of concern. However, according to the *Bald Eagle Management Plan for Pennsylvania (2010-2019),* it is possible there could be some effect on bald eagle populations as a result of connected actions (*electrical lines*) (Gross and Brauning 2010). DOE sent a consultation letter to the FWS but had not received a response at the time of publication.

The management plan notes that the placement of electrical lines is increasingly understood to be a factor for avian mortality, including for eagles (Gross and Brauning 2010, p. 43). Eagles provide a special challenge with electrical equipment because of their large size and extensive wingspan, which are greater than that of other Pennsylvania species that use such equipment as perches or nesting sites. The bald eagle's wingspan is large enough to bridge the distance between two conductors, which could cause electrocution. Because dry feathers provide insulation, birds usually are electrocuted only by contacting the equipment with their fleshy parts (bill, mouth, feet, and wrists) (Gross and Brauning 2010, p. 44). Basic principles of avian-safe electrical structures are to enhance isolation and insulation. Isolation provides a minimum separation of at least 60 inches between phase conductors and grounded hardware or conductor. Insulation covers the live conductors or grounds where adequate separation is not feasible. For any new aboveground electrical tie-ins to the existing grid, Beacon Power would include these protections in the design of the proposed project to minimize potential impacts on bald eagles.

DOE sent a consultation letter to the FWS to confirm its determinations on the above protected species but had not received a response at the time of publication.

3.2.2.2 No-Action Alternative

Under the No-Action Alternative, DOE would not provide funding to Beacon Power for the proposed project, and DOE assumed for this EA that the project would not proceed without this assistance. There would be no impacts to biological resources.

3.3 Socioeconomics and Environmental Justice

Section 3.3.1 describes the existing socioeconomic environment in Luzerne County, and Section 3.3.2 discusses the potential impacts in the county. Section 3.3.2.2 discusses the No-Action Alternative. Section 3.3.3 provides environmental justice data for the county.

3.3.1 Affected Environment

Hazle Township is in Luzerne County, Pennsylvania. Luzerne County is part of the Scranton-Wilkes-Barre Pennsylvania Metropolitan Statistical Area (metro code 42540). The county's

estimated population of about 313,000 people in 2009 reflects a 2-percent drop in population since 2000 (Bureau of the Census 2010a). The 2009 population of Hazle Township was about 9,400, a 4.7-percent increase in population since 2000 (Bureau of the Census 2010b). In 2009, the Luzerne County population was 95.1-percent white, 3.1-percent black, 0.9-percent Asian, and 0.1-percent American Indian or Alaskan Native. About 0.8 percent of the population reported themselves as being of two or more races. Persons of Hispanic or Latino origin made up 5.2 percent of the population (Bureau of the Census 2010a).

The county's employment figures reflect the urban nature of the community; the county hosted about 178,000 nonfarming jobs in 2008, of which about 25,000 (14.3 percent) were in health care and social assistance, 22,000 (12.2 percent) were in retail trade, 20,000 (11.1 percent) were in government and government enterprises, and 12,000 (6.9 percent) were in accommodations and food services. About 17,000 jobs (9.7 percent) were in manufacturing (BEA 2010a). In 2000, Luzerne County residents held about 85 percent of the total jobs, and residents of the other two counties in the metropolitan statistical area held 6.5 percent (Bureau of the Census 2003a). About 86 percent of commuting Luzerne County residents worked in Luzerne County (Bureau of the Census 2003b). The county's September 2010 labor force had an unemployment rate of 9.4 percent (BLS 2010a). The national unemployment in September 2010 was 9.2 percent (BLS 2010b).

The 2008 per capita income in Luzerne County of about $35,000 was 88 percent of the Commonwealth of Pennsylvania per capita income and about 99 percent of the per capita income in the metropolitan statistical area (BEA 2010b). In 2008, about 14 percent of county residents and 12 percent of Pennsylvania residents were living in poverty (Bureau of the Census 2010a).

Section 3.3.3 discusses racial and ethnic populations and the low-income population in more detail in relation to environmental justice.

3.3.2 Environmental Consequences

The installation of the flywheel facility would take 1 year or less and would result in a temporary demand for construction services. The existing construction labor force in the area would be available to handle this demand with no disruptions. Once constructed, the facility would have no onsite personnel and no employment demand. Necessary site services would be limited and would readily be assimilated by local service providers. The construction of the facility would create indirect jobs. Indirect jobs include professional, skilled, and unskilled positions; they would occur among suppliers of goods and services and for the vendors of materials those suppliers would use to fashion goods and services for the installation of equipment and supporting facilities. Further indirect jobs could occur outside of the Scranton-Wilkes-Barre Metropolitan Statistical Area where flywheel components and control equipment are manufactured. Earnings by the workers in these indirect jobs would generate wages and other income that local, state, and federal governments would tax. In addition, these incomes would lead to an increase in banking deposits, which would increase the regional lending base, and to

spending on consumable and durable goods and services. The increase in jobs and wages in the community would have a small positive impact.

While short-term construction of facilities and the installation of equipment for the proposed project would result in a small increase in jobs, the total workforce in Luzerne County would remain below previous levels (BLS 2010a). Therefore, DOE expects that all workers in new positions would be part of the existing labor force in the metropolitan statistical area. The additional jobs would not cause a noticeable increase in the local population from workers moving into the area. Therefore, impacts to the existing infrastructure, housing, medical care, social services, police and fire protection, schools, or other community services would be unlikely, and DOE does not address these resources further.

3.3.2.1 Proposed Project

3.3.2.1.1 Construction Impacts

Preconstruction activities, including design and engineering tasks, procurement of materials, construction of facilities, installation of equipment, and project startup for the proposed flywheel facility at the Humboldt North Industrial Park in Hazle Township would take less than a year. Construction would require several directly employed workers (Lyons 2010). Each of these positions would support about 0.9 additional indirect jobs. Therefore, the Luzerne County area would have several project-related jobs during construction activities.

DOE's Proposed Action is to award a $24 million financial assistance grant to Beacon Power in a cost-sharing arrangement. The total cost of the proposed project would be approximately $53 million. In addition, Beacon Power could receive a $5 million grant from Pennsylvania's Redevelopment Capital Assistance Program.

Beacon Power estimates the cost of preconstruction activities, procurement, installation, and startup would be $53 million. The estimated final effect, or dollar infusion, from the total earnings impact from this expenditure would be about $67.8 million in the region. Much of the construction-related spending would directly benefit the suppliers of equipment for the plant and the vendors who would provide materials and services for manufacture of the equipment. Table 3-1 summarizes this information.

Table 3-1. Earnings effects from construction.

Direct regional infusion	Indirect regional infusion	Total regional infusion
$53 million	$14.8 million	$67.8 million

The proposed project would create a small number of direct jobs during construction, which would last less than a year, so there would be no changes to population, infrastructure, or the level of social services in the area. There would be indirect economic consequences because vendors and equipment suppliers would benefit from the capital orders for the equipment and support systems. The positive economic benefits would be small. There would be small,

positive economic impacts from indirect employment opportunities in the region and increased final output.

3.3.2.1.2 Operations Impacts

DOE assumed that the proposed project would create no additional new jobs during operations; that is, the Department assumed Beacon Power would use existing personnel to operate the flywheel plant. DOE expects that residents of Luzerne County specifically, and of the metropolitan area in general, would continue to fill most of the direct and indirect jobs.

In summary, operation of the plant would stimulate the economic base of the region and could lower the cost of frequency regulation to ratepayers.

3.3.2.2 No-Action Alternative

The No-Action Alternative would result in no short-term jobs during construction for the project. In addition, the objectives of the project (demonstrating the technical, cost, and environmental advantages of fast response flywheel-based regulation) and the Recovery Act would be impaired.

3.3.3 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," directs federal agencies to address environmental and human health conditions in minority and low-income communities. The evaluation of impacts to environmental justice is dependent on determining if high and adverse impacts from the proposed project would disproportionately affect low-income or minority populations in the affected community.

Table 3-2 lists racial and ethnic data about persons in Luzerne County and, for comparison, the Commonwealth of Pennsylvania. Luzerne County has a very small racial minority population; the nonwhite population is 4.9 percent. Approximately 15 percent of the Pennsylvania residents are of a racial minority. Luzerne County's ethnic minority population, persons of Hispanic or Latino origin, was approximately 5.2 percent of county residents in 2009. This is essentially the same as the statewide rate of about 5.1 percent (Bureau of the Census 2010a).

The aggregate percent of all racial minorities (Black, American Indian or Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, or of two or more races) was 4.9 percent in Luzerne County and 14.8 percent in Pennsylvania (Bureau of the Census 2010a). Persons of Hispanic or Latino origin may be of any race, so are included in applicable self-reported race categories. Neither racial nor ethnic minority persons would experience adverse socioeconomic impacts from the proposed projects. There would be no direct socioeconomic impacts to any population, and the indirect impacts would be small and positive. The indirect economic impacts from the project would include indirect employment opportunities in the region and enhanced final output as a result of the infusion of project-related spending.

Table 3-2. Racial and ethnic characteristics, Luzerne County and Pennsylvania, 2009.

Racial and ethnic characteristics	Luzerne County (percent)	Pennsylvania (percent)
White	95.1	85.2
Black	3.1	10.9
American Indian and Alaska Native	0.1	0.2
Asian	0.9	2.5
Native Hawaiian or Other Pacific Islander	(a)	(a)
Persons reporting two or more races	0.8	1.1
Persons of Hispanic or Latino Origin	5.2	5.1
White but not Hispanic	90.3	80.9

a. Greater than zero but value undetermined.
Source: Bureau of the Census 2010a.

DOE also determined that there would be no high and adverse impact to low-income populations. In 2008, about 14.1 percent of the residents in Luzerne County lived below the poverty level, and the statewide rate was about 12.1 percent (Section 3.3.1). There would be no direct socioeconomic impacts to any population, and the indirect impacts would be small and positive. The indirect economic impacts from the project would include indirect employment opportunities in the region and enhanced final output as a result of the infusion of project-related spending.

In summary, DOE determined that no high and adverse impacts would occur to any member of the community. Therefore, DOE determined there would be no adverse and disproportionate impacts to minority or low-income populations.

3.4 Occupational Health and Safety

All construction and maintenance activities would be conducted in accordance with Occupational Safety and Health Administration guidelines and Beacon Power's existing guidelines and procedures for the handling, installing, maintaining, and repairing of onsite equipment. In addition, Beacon Power would provide training to local fire and police departments to explain the features of the system and descriptions of the courses of action to follow in case of emergency. DOE expects, given the small workforce and the types of operations, that worker injury rates would be within the industry averages.

System operations would be designed to shut down a flywheel in case of a malfunction in which it becomes out of balance, and the design calls for each flywheel to be electrically isolated. Therefore, crews could replace flywheels individually without shutting down an entire pod. In addition, a monitoring system would indicate accidental losses or leaks in the cooling loop, and Beacon Power would install an automatic sensor-based fire alarm and security system.

3.5 Resource Commitments

3.5.1 Relationship Between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The construction and operation of Beacon Power's proposed project would result in short-term use of land. In this context, *short-term use* of resources means the operating life of the plant, and *long-term productivity* refers to the period after the plant has ceased operation and undergone decommissioning and demolition. At that time, the land could be occupied and used for other purposes, or it could be reclaimed and revegetated with plant species native to the area.

3.5.2 Irreversible and Irretrievable Commitments of Resources

The use of land as a resource to support the construction and operation of the proposed project would be irretrievable in the short term. Some unrecyclable construction materials, energy, and the fuel for plant construction and maintenance would be irreversible and irretrievable commitments of resources. DOE would also have expended funding on the proposed project.

3.5.3 Unavoidable Adverse Impacts

The proposed project would result in the unavoidable small adverse impacts of construction noise, fugitive dust, vehicle emissions, and possible loss of wildlife due to site clearing, onsite traffic, and construction equipment. These small unavoidable impacts would be offset by the positive impacts of using flywheels rather than power plants to provide frequency regulation. This could result in reduced emissions from conventional fossil fuel power plants.

4. CUMULATIVE IMPACTS

Cumulative impacts result from the incremental effects the proposed project could have in combination with the impacts of past, present, and reasonably foreseeable actions. The environmental consequences of past actions have already passed through the environment or are captured in existing baseline conditions.

The Humboldt Industrial Park occupies about 3,000 acres in five areas as shown in Figure 4-1: the Humboldt section along the southeast side of State Route 924, Humboldt West, Humboldt North, Humboldt East, and Humboldt Northwest. The park currently hosts over 50 companies that employ nearly 7,000 people. Humboldt North, which is the location of the proposed project, is a newer phase of the park that is not fully occupied. The park has been developed with rail-served sites, roads, infrastructure, and utilities already installed. Humboldt North is the home of companies such as Archer Daniels Midland, Vita-Line Products, AutoZone, Gonnella Frozen Products, and U.S. Cold Storage (H&CD 2011). The Archer Daniels Midland factory employs about 200 people in cocoa processing; Vita-Line employs about 40 people in the making of dry dog and cat food. There are about 300 employees at the AutoZone automobile parts and accessories distribution facility, and U.S. Cold Storage provides cold storage and distribution services and employs about 30 people.

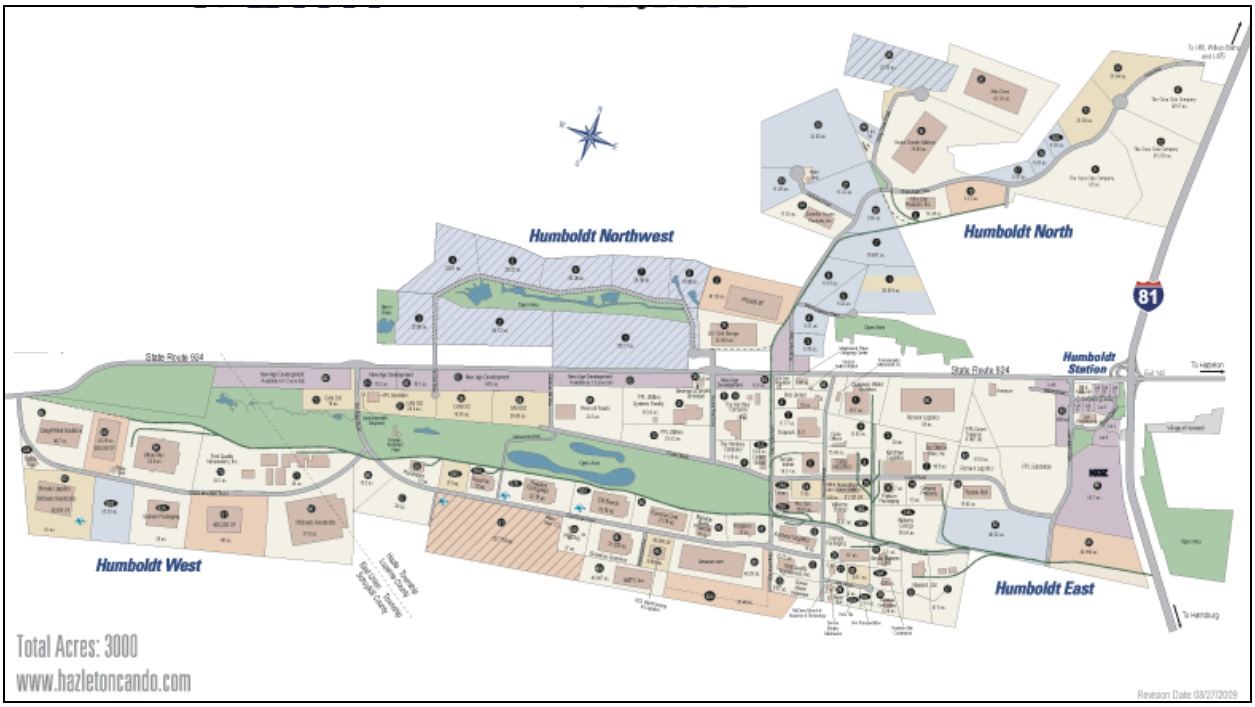


Figure 4-1. Humboldt Industrial Park (H&CD 2011).

As Table 1-1 lists, the project would have no, small, or temporary impacts to most environmental resources and therefore would not measurably add to incremental cumulative impacts.

In terms of air quality, the potential incremental cumulative impacts would be positive. The flywheel would have no air emissions during operations. Further, because of the flywheel plant's frequency regulation function, local power generators would use less fossil fuel for this purpose. Therefore, currently operational coal- and gas-fired plants in the region would be able to operate without having to commit energy to regulate the frequency; frequency regulation has typically consumed about 1 percent of capacity of the local grid.

The potential incremental cumulative impacts to socioeconomics would be positive but small. The proposed project would create a small, short-term workforce during site preparation and installation. The small direct socioeconomic impacts would entail a small increase in indirect impacts because vendors and equipment suppliers would benefit from the capital orders.

In terms of environmental justice, DOE determined that the proposed project would neither result in high and adverse impacts nor would it disproportionately affect low-income or minority populations. Therefore, there would be no cumulative impacts.

In relation to occupational health and safety, the workforce for site preparation and installation would be small and short term. DOE expects work-related incidents would be within industry incidence rates. Beacon Power would operate the facility almost entirely by remote control with limited onsite personnel. Therefore, there would be limited exposure of workers to hazardous situations at the facility. The installed equipment would have monitors and sensors to alert responders to any accident that might occur. Beacon Power would brief and train local first responders. Cumulative impacts to health and safety would be negligible.

5. CONCLUSIONS

Beacon Power proposes to install a 20-megawatt utility-scale flywheel-based frequency regulation plant in Hazle Township, Pennsylvania. The system, along with a sophisticated control system, would maintain the frequency of the local electrical system at 60 hertz, which would reduce or eliminate the need for power plants to adjust their outputs for frequency regulation. The proposed project would affect about 3.5 acres of an undeveloped 5.5-acre industrial parcel within the existing 3,000-acre Humboldt Industrial Park complex.

In this EA, DOE considered (1) the Proposed Action of providing a financial assistance grant under the Recovery Act in a cost-sharing arrangement with Beacon Power, (2) Beacon Power's proposed project, and (3) the No-Action Alternative.

DOE sent consultation letters to the Pennsylvania SHPO, the Seneca Nation of Indians, and the Tonawanda Band of Seneca. The SHPO requested further information on the project, which DOE provided. The SHPO responded to indicate there are no *National Register of Historic Places* eligible or listed historic or archaeological properties in the area of the proposed project. Appendix B contains copies of these letters. At the time of publication, the American Indian tribes had not responded.

DOE also sent consultation letters to the Pennsylvania Field Office of the FWS and the Pennsylvania Department of Conservation and Natural Resources on scrub oak shrubland habitat considerations. The Pennsylvania Department of Conservation and Natural Resources responded with the determination that no impact is likely. Appendix B contains copies of these letters. At the time of publication, DOE had not received a response from the FWS.

DOE evaluated the environmental resource categories it commonly addresses in EAs and identified no significant adverse impacts from the proposed project. For most of the resource categories, DOE determined there would be no impacts or the potential impacts would be small, temporary, or both and therefore did not carry those forward for additional analysis. DOE focused its analyses on those resources that could require new or amended permits, have the potential for significant impacts or controversy, or typically interest the public. DOE performed detailed analyses of potential impacts to air quality, biological resources, socioeconomics and environmental justice, and occupational health and safety. The following paragraphs summarize the analyses.

Air Quality. Temporary air emissions from construction activities for Beacon Power's proposed project would include combustion emissions from vehicles and construction equipment and fugitive dust from site preparation activities. These emissions would have short-term adverse impacts that Beacon Power would mitigate through best management practices such as soil stabilization and watering of exposed soils. The applicant (Beacon Power) is also required to acquire any storm water and/or erosion and sedimentation permits that are required. Fugitive

dust emissions would be controlled through best management practices and would end at the completion of construction, so long-term impacts would be negligible.

Because the proposed flywheel plant would not burn fossil fuel, it would produce zero direct emissions of combustion gases during operations. Further, use of flywheel-based frequency regulation could reduce the amount of fossil fuels regional power plants normally use to accomplish this function, resulting in a net reduction in dependence on fossil fuels. Moreover, operation of the proposed frequency regulating plant would mean that coal- and gas-fired plants would be able to reduce their regulation function in order to focus on providing wholesale energy. No new permits would be necessary for flywheel plant operation.

Biological Resources. There would be small but temporary impacts to wildlife on or near the proposed project site during the construction period. Wildlife could be displaced from the area due to the presence of people, vehicles, and operating equipment and, in some circumstances, could be killed by cars and construction equipment. The Indiana bat, a federally threatened species, occurs in Luzerne County, but it is unlikely they are present at the proposed project site because it is in an existing industrial park and lacks much of the requisite habitat. If Beacon Power encountered Indiana bats during the construction of the proposed project, Beacon Power wildlife biologists would consult with the FWS about conservation and avoidance measures for protection of the species. Beacon Power would avoid activities that could disturb the bats (that is, potential tree removal) during the summer months when bats, if they were present, would reside at the site.

Bald eagles, protected under the Bald and Golden Eagle Protection Act, have been observed in the general area, but there are no known nests within 1 mile of the site. If a bald eagle nest was discovered near the site, Beacon Power would cease construction activities and notify the appropriate authorities. Beacon Power would not conduct activities that could affect the eagles during nesting season.

Construction activities could affect the extent of scrub oak shrubland on the site. Beacon Power would be mindful of the affected shrubland and would minimize impacts to the extent practicable. However, construction activities could affect some wildlife species in the short term that inhabit the shrubland. The Pennsylvania Department of Conservation and Natural Resources responded to DOE's consultation letter with the determination that the proposed project is not likely to affect Pennsylvania species and resources of concern (Appendix B).

Operation of the flywheel frequency regulation plant is not likely to affect the Indiana bat or have any continuing effect on scrub oak shrubland. However, there could be some effect on bald eagle populations due to electrical equipment. For new aboveground electrical line construction, Beacon Power would include appropriate protections in the design of the proposed project to minimize potential impacts on bald eagles (see Section 3.2.2.1.2).

Socioeconomics and Environmental Justice. The proposed project would create a small number of direct jobs during construction, which would last less than a year, so there would be no

changes to population, infrastructure, or the level of social services in the area. There would be minor indirect positive economic consequences as vendors and equipment suppliers would benefit from capital orders for equipment and support systems. The evaluation of impacts to environmental justice is dependent on determining if high and adverse impacts from the proposed project would disproportionately affect low-income or minority populations. As DOE determined in the environmental justice analysis (Section 3.3), there would be no high and adverse impacts to any member of the community, including socioeconomic impacts, so there would be no high and adverse impacts to any minority or low-income population.

Occupational Health and Safety. The work force for site preparation and installation would be small and short term. DOE expects work-related incidents would be within industry incidence rates. Beacon Power would operate the facility almost entirely by remote control with limited onsite personnel. Therefore, there would be limited exposure of workers to hazardous situations at the facility. The installed equipment would have monitors and sensors to alert responders to any accident that might occur, and Beacon Power would brief and train local first responders.

Cumulative Impacts. There would be small, positive incremental impacts to socioeconomics and air quality. DOE has determined that there would be no high and adverse impacts to any member of the community, so there would be no adverse and disproportionate impacts to minority or low-income populations. Cumulative impacts to health and safety would be negligible.

No-Action Alternative. DOE assumed for the analyses of this EA that Beacon Power would not proceed with the project without DOE's financial assistance. Therefore, there would be no impacts to any resource category from the No-Action Alternative. The small, positive socioeconomic impacts and the potential to reduce conventional power plant pollutant and greenhouse gas emissions would not occur. Further, DOE's ability to achieve its objectives under the Smart Grid Demonstrations Program and the Recovery Act would be impaired.

6. REFERENCES

Allen, R. 2010, personal communication with S. A. Frank (Dade Moeller & Associates), Pennsylvania Game Commission, Harrisburg, Pennsylvania, December 28.

BEA (Bureau of Economic Analysis), 2010a, "Table CA25N-Total full-time and part-time employment by NAICS industry, Luzerne County Pennsylvania, 2008," U.S. Department of Commerce, Washington, D.C., Revised April, accessed December 7, 2010. http://www.bea.gov/

BEA (Bureau of Economic Analysis), 2010b, "Table CA1-3 Per Capita Personal Income, Pennsylvania, 2008," U.S. Department of Commerce, Washington, D.C., Revised April, accessed December 7, 2010. http://www.bea.gov/

BLS (Bureau of Labor Statistics), 2010a, "Local Area Unemployment Statistics" for Pennsylvania, Luzerne County Pennsylvania, Scranton-Wilkes-Barre Pennsylvania Metropolitan Area, 2010," U.S. Department of Labor, Washington, D.C., accessed December 7, 2010. http://data.bls.gov/

BLS (Bureau of Labor Statistics), 2010b, "Labor Force Statistics from the Current Population Survey" U.S. Department of Labor, Washington, D.C., accessed December 7, 2010. http://data.bls.gov/

Boland, M., 2009, "Indiana Bat on Endangered Species List in Pa," Mother Nature Network, November 19, accessed January 19, 2011. http://www.mnn.com/local-reports/pennsylvania/local-blog/indiana-bat-on-endangered-species-list-in-pa

Bureau of the Census, 2003a, "County to County Worker Flow Files for Pennsylvania, Sorted by Residence State and County," Washington, D.C., March 6, accessed December 20, 2010. http://www.census.gov/population/

Bureau of the Census, 2003b, "County to County Worker Flow Files for Pennsylvania, Sorted by Workplace State and County," Washington, D.C., March 6, accessed December 20, 2010. http://www.census.gov/

Bureau of the Census, 2010a, "State and County QuickFacts" for Luzerne County, Pennsylvania, Washington, D.C., August 16, accessed May 25, 2010. http://quickfacts.census.gov/

Bureau of the Census, 2010b, "Table 5. Annual Estimates of the Resident Population for Minor Civil Divisions in Pennsylvania, Listed Alphabetically Within Counties, April 1, 2000, to July 1, 2009," Washington, D.C., September, accessed December 20, 2010. http://factfinder.census.gov/

Butchkoski, E., 2010, *Indiana Bat*, Myotis sodalis, Pennsylvania Game Commission, Harrisburg, Pennsylvania, February 10, 2010, accessed January 19, 2011. http://www.naturalheritage.state.pa.us/Factsheets.aspx

DOE (U.S. Department of Energy), 2000, *Clean Air Act General Conformity Requirements and the National Environmental Policy Act Process*, Office of Environment, Safety and Health, Washington, D.C., April.

DOE (U.S. Department of Energy), 2008, *The Smart Grid: An Introduction*, Washington, D.C., accessed October 12, 2010. http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages(1).pdf

DOE (U.S. Department of Energy), 2009a, "President Obama Announces $3.4 Billion Investment to Spur Transition to Smart Energy Grid," Washington, D.C., October 27, accessed June 1, 2010. http://www.energy.gov/news2009/8216.htm

DOE (U.S. Department of Energy), 2009b, *Environmental Assessment for Department of Energy Loan Guarantee for Beacon Power Corporation Frequency Regulation Facility in Stephentown, N.Y.*, DOE/EA-1631, U.S. Department of Energy, Loan Guarantee Program Office, Washington, D.C., February.

FEMA (Federal Emergency Management Agency), 1981, *FIRM -Flood Insurance Rate Map, Township of Hazle, Pennsylvania, Luzerne County*, Panel 15 of 15, Community Panel Number 421830 0015 A, U.S. Department of Homeland Security, Washington, D.C., April 1.

FWS (U.S. Fish and Wildlife Service), 2007, *National Bald Eagle Management Guidelines*, U.S. Department of the Interior, Portland, Oregon, May, accessed November 19, 2011. http://www.fws.gov/pacific/eagle/NationalBaldEagleManagementGuidelines.pdf

FWS (U.S. Fish and Wildlife Service), 2011a, "National Wetlands Inventory," U.S. Department of the Interior, Washington, D.C., accessed January 6, 2011. http://www.fws.gov/wetlands/data/mapper.html

FWS (U.S. Fish and Wildlife Service), 2011b, "National Wetlands Inventory," U.S. Department of the Interior, Washington, D.C., accessed January 5, 2011. http://www.fws.gov/wetlands/data/mapper.html

Gross, D., and D. Brauning, 2009, *Bald Eagle*, Haliaeetus leucocephalus, Pennsylvania Game Commission, Harrisburg, Pennsylvania, November 12, accessed January 19, 2011. http://www.naturalheritage.state.pa.us/Factsheets.aspx

Gross, D. A., and D. W. Brauning, 2010, *Bald Eagle Management Plan for Pennsylvania (2010-2019)*, Pennsylvania Game Commission, Harrisburg, Pennsylvania, November, accessed via title search January 19, 2011. http://www.dcnr.state.pa.us/

H&CD (Hazleton, Pennsylvania and Can Do), 2011, "Humboldt Industrial Park," Hazleton, Pennsylvania, accessed January 5, 2011. http://www.hazletoncando.com/Humboldt-Industrial-Park/humboldt-industrial-park.html

IPCC (Intergovernmental Panel on Climate Change), 2007, *Climate Change 2007: Synthesis Report, Summary for Policy Makers*, Geneva, Switzerland.

Lyons, C., 2010, "Environmental Questionnaire," Beacon Power Corporation, Tyngsboro, Massachusetts, August 27.

PDCNR (Pennsylvania Department of Conservation and Natural Resources), 2010, "PNDI Project Environmental Review Receipt, Project Search ID: 201001229276338," performed on December 29, 2010. http://www.gis.dcnr.state.pa.us/hgis-er/Login.aspx

PGC (Pennsylvania Game Commission) and PFBC (Pennsylvania Fish and Boat Commission), 2005, *Pennsylvania Comprehensive Wildlife Conservation Strategy*, Version 1.0, September, accessed November 19, 2011.
http://www.wildlifeactionplans.org/pdfs/action_plans/pa_action_plan.pdf

The Times Leader, 2011, "Managing Bald Eagles," Wilkes-Barre, Pennsylvania, May 9, accessed January 19, 2011.
http://www.timesleader.com/sports/outdoors/Managing_bald_eagles_01-09-2011.html

APPENDIX A
DISTRIBUTION LIST

Mr. Randal Duke Adams
Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street, 16th Floor
Harrisburg, Pennsylvania 17105-2063

Ms. Carole Copeyon
Supervisory Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801

The Honorable Edward G. Rendell
Governor of Pennsylvania
225 Main Capitol Building
Harrisburg, Pennsylvania 17120

Mr. Bernie DeBias
Director of Economic Development and Energy Solutions
CAN DO, Inc.
One South Church Street, Suite 200
Hazleton, Pennsylvania 18201

The Honorable William Gallagher
Chairman of the Board
Hazle Township
P.O. Box 506
Harleigh, Pennsylvania 18225

Mr. Kevin Haggerty
U.S. Department of Energy
Freedom of Information Act Reading Room
1000 Independence Avenue, SW, 1-G-033
Washington, D.C. 20585

The Honorable Roger Hill
Chief, Tonawanda Band of Seneca
7027 Meadville Road
Bason, New York 14013

Mr. Brad John
Treasurer, Seneca Nation of Indians
William Seneca Administration Building
12837 Route 438
Irving, New York 14081

Mr. Chet Lyons
Beacon Power Corporation
65 Middlesex Road
Tyngsboro, Massachusetts 01879

Mr. Doug McLearen
State Historic Preservation Officer
Chief, Division of Archeology and Protection
Bureau for Historic Preservation
Pennsylvania Historical and Museum Commission
400 North Street
Commonwealth Keystone Building, 2nd Floor
Harrisburg, Pennsylvania 17120-0093

The Honorable Robert Odawi Porter
President, Seneca Nation of Indians
Seneca Allegany Administration Building
P.O. Box 231
Salamanca, New York 14779

Ms. Barbara Rudnick
NEPA Program Team Leader
U.S. Environmental Protection Agency, Region 3
Philadelphia, Pennsylvania 19103
1650 Arch Street, 3EA30
Philadelphia, Pennsylvania 19103-2029

Ms. Lana Watt
Tribal Historic Preservation Officer
Seneca Nation of Indians
Seneca Allegany Administration Building
P.O. Box 231
Salamanca, New York14779

The Honorable Joseph Yannuzzi
Mayor, City of Hazleton
40 North Church Street
Hazleton, Pennsylvania 18201

APPENDIX B
CONSULTATIONS

This appendix contains copies of DOE's consultations with:

- The Pennsylvania SHPO (page B-2), the officer's request for further information (page B-11), DOE's followup letter (page B-14), and the final SHPO response (page B-17);
- The FWS (page B-18);
- The Pennsylvania Department of Conservation and Natural Resources (page B-30) and the response (page B-42), and
- The Seneca Nation of Indians and the Tonawanda Band of Seneca (page B-43) and the reply from the Seneca Nation of Indians (March 4).

NETL NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

January 20, 2011

Mr. Doug McLearen
State Historic Preservation Officer
Chief, Division of Archeology and Protection
Bureau for Historic Preservation
Pennsylvania Historical and Museum Commission
400 North Street
Commonwealth Keystone Building 2nd Floor
Harrisburg, Pennsylvania 17120-0093

RE: U.S. Department of Energy Consultation on the Proposed Installation and Operation of a Flywheel Frequency Regulation Plant in Hazle Township, Luzerne County, Pennsylvania

Dear Mr. McLearen:

The U.S. Department of Energy (DOE or the Department) is proposing to provide a financial assistance grant to the Beacon Power Corporation (Beacon Power) as part of the Smart Grid Demonstrations Program, which is funded through the American Recovery and Reinvestment Act of 2009 (ARRA or Recovery Act). If Beacon Power is awarded the grant, it would install and operate a 20-megawatt flywheel frequency regulation plant at the Humboldt North Industrial Park in Hazle Township, Pennsylvania.

The proposed site is a 5.5-acre parcel of undisturbed land contained within the 3,000-acre Humboldt Industrial Park. Beacon Power would use approximately 3.5 acres of the parcel for development of the flywheel facility. A description of the proposed project with maps and photographs of the site are included in the attached Request to Initiate Consultation in Compliance with the State History Code and Section 106 of the National Historic Preservation Act and Project Narrative.

The Department reviewed the *National Register of Historic Places* and determined that there are no listed resources for Hazle Township, Pennsylvania. Based on this review and the undeveloped nature of the site, DOE has determined that there would be no effects to federally listed or eligible historic sites.

The Department also is initiating informal consultation with the Seneca Nation of Indians and the Tonawanda Band of Seneca based on information obtained from the Bureau of Indian Affairs. If the construction would uncover artifacts or remains, Beacon Power would cease those activities and contact your office and the American Indian tribes before proceeding.

If you have any questions or comments or require clarification concerning this project, please contact me using the information below:

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507

Mr. Fred Pozzuto
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880, M/S B07
Morgantown, WV 16507-0880
Telephone: (304) 285-5219
Facsimile: (304) 285-4403
E-mail: fred.pozzuto@netl.doe.gov

Because this is a Recovery Act project, selected on its technical merits and to assist with the nation's economic recovery, we would appreciate a quick response.

DOE is preparing a draft Environmental Assessment (EA) for this project under the *National Environmental Policy Act of 1969* (NEPA). Further, DOE intends to send your office a copy of the draft EA when it is complete, where you may once again comment on any concerns you may have with the project. DOE will include correspondence with your office in the EA, address any comments you may have in response to this letter in the EA, and send you a copy when it is complete.

Thank you for taking the time to review this letter. Based on the information provided above, the Department is requesting your concurrence that there would be no effects to federally listed or eligible historic properties. DOE looks forward to working with you on this and future projects.

Sincerely,

Fred Pozzuto
Environmental Manager
NEPA Document Manager

Enclosures: 1. Request to Initiate Consultation in Compliance with the State History Code and Section 106 of the National Historic Preservation Act
2. Project Narrative

Pennsylvania Historical & Museum Commission
Bureau for Historic Preservation

BHP Use Only
ER #

Request to Initiate Consultation in Compliance with the State History Code and Section 106 of the National Historic Preservation Act

Applicant Information (print neatly, this will be used in the return envelope)			
Applicant Name	U.S. Department of Energy		
Street Address	3610 Collins Ferry Road		
City	Morgantown	Phone Number	304-285-5219
State/ZIP	West Virginia 26507-0880		

Contact Person to Receive Response (if applicable) (print neatly, this will be used in the return envelope)			
Name/Company	Fred Pozzuto, DOE National Energy Technology Laboratory		
Street Address	3610 Collins Ferry Road		
City	Morgantown	Phone Number	304-285-5219
State/ZIP	West Virginia 26507-0880	Fax Number	304-285-4403

Project Information			
Project Title	Beacon Power Corporation Flywheel Frequency Regulation Plant		
Project Location and/address	Humboldt Industrial Park, Site 30-A		
Municipality	Hazel Township	**County Name**	Luzerne County
If this project was ever reviewed before, include previous ER #			

Project Type (Check all that apply)			
Will Your Project Be Government Funded/Sponsored or On Government Land? ☒ **Yes** ☐ **No** **Specify Agency and Program Name Below**			
State Agency:		Program:	
Federal Agency:	Department of Energy	Program:	Smart Grid Demonstrations
		Local/Other:	
Will Your Project Require Permits or Approvals? ☐ **Yes** ☒ **No** **Specify Agency and/or Program Name Below**			
Anticipated Permits:			
State Agency:		Program:	
Federal Agency:		Program:	

Agency Office to Receive Copy of Response (Check all that apply)			
Army Corps of Engineers: ☐ Philadelphia ☐ Baltimore ☐ Pittsburgh			
DEP Office:	☐ Central Office	☐ Regional Office:	
☐ District Mining Office:		☐ Oil & Gas Office:	
☐ **Other:** (provide address)			

Pennsylvania Historical & Museum Commission
Bureau for Historic Preservation

BHP Use Only
ER #

Required Project Information for BHP/SHPO Review

☒ Total Acres in the property under review:: 5.5

☒ Total acres of earth disturbance for this proposed activity 3.5

☐ Are there any buildings or structures within the project area? ☐ Yes ☒ No
Approximate age of buildings:

☐ Project located in or adjacent to a historic district? ☐ Yes ☒ No ☐ Unsure

Name of Historic District _____

Submissions Must Also Include:

☒ MAP LOCATION: A 7.5 USGS Map showing the project boundary and the Area of Potential Effect (APE). The APE should include indirect effects, such as visual and audible impacts. Federal Projects must provide an explanation of how the APE was determined.
A USGS 7.5 map is attached. The estimated APE is the 5.5-acre site with proposed site disturbance of about 3.5 acres. No visual or noise impacts are anticipated offsite.

☒ PHOTOS: Photos of all buildings or structures in the APE. If the property is over 50 years old submit a Historic Resource Survey Form with this initial request. The forms are available at http://www.phmc.state.pa.us/bhp, under "Forms and Guidance" link.
There are no structures within the APE. Photographs of the existing site conditions are attached.

☒ PROJECT DESCRIPTION NARRATIVE: Provide a detailed project description describing the project, any ground disturbance, any previous land use, and age of all effected buildings in the project area. Attach a site map showing the location of all buildings in the project area.
See attached.

☒ I have reviewed all DEP Permit Exemptions listed on the DEP website www.dep.state.pa.us.

In addition, federal agencies must provide:

☒ Measures that will be taken to identify consulting parties including Native Americans.
DOE reviewed the listing of federally recognized tribes that have interest in Pennsylvania projects and have has initiated contact with those tribal leaders.

☒ Measures that will be taken to notify and involve the public.
DOE is preparing an environmental assessment (EA) for this proposed project. A notice of availability for the Draft EA will be published in the local newspaper of record and copies distributed to the local library and others including the Governor, federal, state, and local agencies, and individuals and groups who have stated an interest in the project. A public comment period will be established to solicit public comment, and DOE will revise the EA as appropriate.

The information on this form is needed to determine whether potential historic or archaeological resources are present. Additional historic information or investigation may be requested to determine the significance of the resources or the effects of the project on those resources. ***Form and attachments must be submitted by mail. Submissions via e-mail will not be accepted.***

Signature Block

Applicant's Signature Date

Project Narrative

Beacon Power Corporation Flywheel Frequency Regulation Plant

The U.S. Department of Energy (DOE or the Department) proposes to provide financial assistance to the Beacon Power Corporation (Beacon Power) for its proposed project to construct and operate a 20-megawatt utility-scale flywheel-based frequency regulation plant on a vacant industrial tract at the Humboldt North Industrial Park, Site 30-A, Hazle Township, Luzerne County, Commonwealth of Pennsylvania. Figure 1 is a copy of the U.S. Geological Survey 7.5-minute quadrangle map that shows the site location. The funding would be provided through the American Recovery and Reinvestment Act of 2009. The company would use the flywheels and frequency regulation equipment to store energy during off-peak times and return it to the electrical grid during on-peak times. Figure 2 is a rendering of the proposed facility, and Figure 3 is a closeup of the project area and identifies the area of potential effect (APE). Figure 4 shows views of and around the site.

The plant would not generate electricity directly; rather, electricity from the grid would drive the flywheels at high speeds when electricity supply on the grid exceeded demand. At times when demand exceeded supply, the system would convert energy from the spinning flywheels back to electricity and supply it to the grid. The proposed plant would consist of 20 frequency regulation pods, each containing 10 individual flywheels and the associated energy conversion, electrical control, and power distribution.

Major features of the plant would include:

- A supplementary electric substation with an electrical connection would tie into the existing electrical grid.
- Twenty 1-megawatt frequency regulation pods, each with 10 flywheels and associated energy conversion, electrical control, and power distribution equipment in underground precast concrete housings 5 feet in diameter at a depth of 8 to 10 feet below ground;
- An electric service equipment unit with underground electric conduit connecting to the pods;
- A cooling system with underground mechanical piping connecting to the electric service equipment unit and the pods;
- A driveway and parking spaces;
- A black vinyl-coated chain-link perimeter fence and entrance gate; and
- Landscaping.

The elements of the proposed project would cover about 3.5 acres on the existing 5.5-acre industrial site. The site has adequate access and onsite roads for the proposed project. The following are the planned major steps in the construction of the plant:

- Clearing and Excavation. Beacon Power would clear the vegetation on the 3.5-acre site and grade it to a uniform slope. Construction would include excavations to install the 20 flywheel pods underground. The project would reuse excavated material on the site to the extent possible and dispose of any remainder in compliance with state and local regulations. The equipment required for excavation would include excavators, bulldozers, front-end loaders, unloaders, backhoes, and dump trucks.

- Housings and Foundations. Precast concrete housings—one for each of the flywheels—would be placed at a depth of 6 to 8 feet. The housings would be modified concrete water pipes. Groundwater control could be necessary at the base of the excavations for the housings. The housings would be founded on a crushed stone base over a geo-textile fabric. Buildings and other equipment would have shallow spread footing foundations.

- Pipelines. Underground PVC pipelines would be placed for the storm water management system, the electric power distribution system, and the cooling system.

- Equipment Placement. The flywheels and other equipment that make up the pods would be on piers within the housings. Other equipment would be on foundations.

- Surfaces. Surface treatment would include impervious asphalt pavement, gravel surfaces, and loam and seed areas.

- Testing and Start-Up Process. The system would be tested in stages prior to becoming completely operational. Testing of each pod would be based on the procedure defined during the operation of Beacon's 1-megawatt pod at its Tyngsboro, Massachusetts, plant.

The plant has a design lifetime of at least 20 years. The components of the system, including flywheels and electronics, could be replaced as necessary during operations. The flywheel system represents the latest technological approach in frequency regulation to this point, but new developments could supplant this technology in the future. The equipment is of such a scale that it could be readily removed from the site.

Figure 1. U.S. Geological Survey Conyngham 7.5-Minute Quadrangle.

Figure 2. Array of 1-megawatt frequency regulation pods.

Figure 3. APE with locations from which photographs were taken (Figure 4).

Figure 4. Site photographs.

Location 1 looking northeast toward nearest building.

Location 3 looking northwest across proposed project site.

Location 2 looking southwest across transmission line right-of-way.

From Location 4 looking north across proposed project site.

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

February 8, 2011

Mr. Fred Pozzuto
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880, M/S B07
Morgantown, WV 16507-0880

Re: File No. ER 2011-0877-079-A
DOE Smart Grid Demonstrations Program: Proposed Installation & Operation of Flywheel Frequency Regulation Plant, Hazle Twp., Luzerne Co.

Dear Mr. Pozzuto:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation. These requirements include consideration of the project's potential effect upon both historic and archaeological resources.

All federal agency permitted/licensed/funded projects requiring the comments of the Pennsylvania State Historic Preservation Officer should include the funding program, a project description, project location, and cultural resource site information as outlined in 36 CFR Part 800.4 (Identifying Historic Properties). Because your request does not include sufficient information, we are unable to proceed with our review until the information on the attached form is provided. The 30 day review period required by the regulations (36 CFR Part 800.4(d)(i) and Part 800.11) does not begin until adequate information to complete our review is provided.

If you need further information regarding archaeological survey please contact Steve McDougal at (717) 772-0923. If you need further information concerning historic structures please consult Ann Safley at (717) 787-9121.

Sincerely,

Douglas C. McLearen, Chief
Division of Archaeology & Protection

Attachment
DCM/tmw

PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION
BUREAU FOR HISTORIC PRESERVATION

INFORMATION REQUEST SHEET
(Revised 4/07)

Please submit checked items for PHMC to proceed with review.

PROJECT INITIATION

A. FUNDING/PERMITTING/LICENSING/APPROVAL PROGRAM

( ) 1. Contact person for federal/state/local agency, address, phone number.
( ) 2. Letter from federal agency initiating consultation, or a letter from federal agency authorizing an alternate agency or a consultant to initiate consultation.
( ) 3. Identify the Federal/State Agency and funding program or permit/license.

B. PROJECT DESCRIPTION

( ) 1. Narrative description of the project and related actions resulting from the project.
( ) 2. Proposed boundary of the project's Area of Potential Effect (APE) (remember to consider visual impacts)
( ) 3. Description and Justification of selection of the Area of Potential Effect
( ) 4. Architectural plans of existing conditions (as-built or as-found)
( ) 5. Preliminary architectural drawings or plans (floor plans, elevations, specifications)
( ) 6. Work write-ups
( ) 7. Plans and specifications
( ) 8. Site plans of existing conditions
( ) 9. Site plans of proposed development

C. PROJECT LOCATION

(X) 1. U.S.G.S. 7.5 min. series quadrangle with the **PROJECT LOCATION(S) AND LIMITS CLEARLY MARKED** using a colored pen. Please include name of the quadrangle
( ) 2. U.S.G.S. 7.5 min. series quadrangle with Area of Potential Effect marked (potential area of direct effect can be delineated inside area of indirect effect)
( ) 3. Street map (for properties in densely populated areas)
( ) 4. Street map showing location and historic district boundaries (if appropriate)
( ) 5. Street address of property
( ) 6. Municipality in which project is located (not mailing address location)

D. PROJECT SIZE (supply as appropriate for project)

( ) 1. Acreage of project area
( ) 2. Miles/feet of project and right-of-way width
( ) 3. Extent and nature of ground disturbing activities (i.e. grading, trenching, foundation excavation)

(over)

E. PHOTOGRAPHS (no Polaroids, or photocopies. Clear, high resolution digital images accepted.)

( ) 1. Exterior of building(s)/structures in project area
( ) 2. Interior of building(s) in project area
( ) 3. Interior of building(s) illustrating the proposed work areas/features
( ) 4. Buildings, streetscape, setting of features in Area of Potential Effect (APE)
( ) 5. Views of project site
( ) 6. Other_____

PUBLIC PARTICIPATION

( ) 1. Measures which will be/or have been taken to identify consulting parties.
( ) 2. List of proposed consulting parties.
( ) 3. Measures which will be/or have been taken to notify and involve the public.

RESOURCE IDENTIFICATION, EVALUATION AND PROJECT EFFECT

A. CULTURAL RESOURCE IDENTIFICATION

( ) 1. Description of methodology used for identification and sources examined.
( ) 2. Plan proposed for identification of historical (including historic districts, buildings, structures, objects) and archaeological resources and proposed methodology to be used.
( ) 3. Pennsylvania Historic Resource Survey form(s) for all properties 50 years or older and potentially eligible for the National Register identified in the APE. (See our website at: www.phmc.state.pa.us click on "Preservation Programs" and then "Forms")
( ) 4. Historical background/context report/information for historic resources identified.

B. EFFECTS

( ) 1. How will the project affect building(s) over 50 years old?
( ) 2. National Register listed/eligible property(s) exists in project area. How will the project affect this historic property(s)?

C. Other:_____

_____

NETL NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

February 17, 2011

Ms. Ann Safley
Bureau for Historic Preservation
Pennsylvania Historical and Museum Commission
400 North Street
Commonwealth Keystone Building 2nd Floor
Harrisburg, Pennsylvania 17120-0093

RE: Additional nformation as per requested in your comment letter on February 8, 2011 regarding the U.S. Department of Energy's Proposed Installation and Operation of a Flywheel Frequency Regulation Plant in Hazle Township, Luzerne County, Pennsylvania

Dear Ms. Safley:

The U.S. Department of Energy (DOE) is proposing to provide a financial assistance grant to the Beacon Power Corporation (Beacon Power) as part of the Smart Grid Demonstrations Program. The program is funded through the American Recovery and Reinvestment Act of 2009. If Beacon Power is awarded the grant, it would install and operate a 20-megawatt flywheel frequency regulation plant at the Humboldt North Industrial Park in Hazle Township, Pennsylvania.

As per our telephone conversation on February 16, 2011, I am furnishing the requested additional mapping for the project on the correct U.S.G.S. mapping suitable to your office's requirements.

Thank you for taking the time to review this follow-up information in addition to our original package. Moreover, based upon the information provided above, as well as, previously supplied information, DOE is requesting your concurrence that there would be no effects to federally listed or eligible historic properties. DOE looks forward to working with you on this and future projects.

Sincerely,

Fred Pozzuto
Environmental Manager / NEPA Document Manager

Enclosures: 1. Additional U.S.G.S project location mapping

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
Fred.Pozzuto@netl.doe.gov • Voice (304) 285-5219 • Fax (304) 285-4403 • www.netl.doe.gov

Figure 1. USGS 7.5-Minute Quadrangle, 1989.

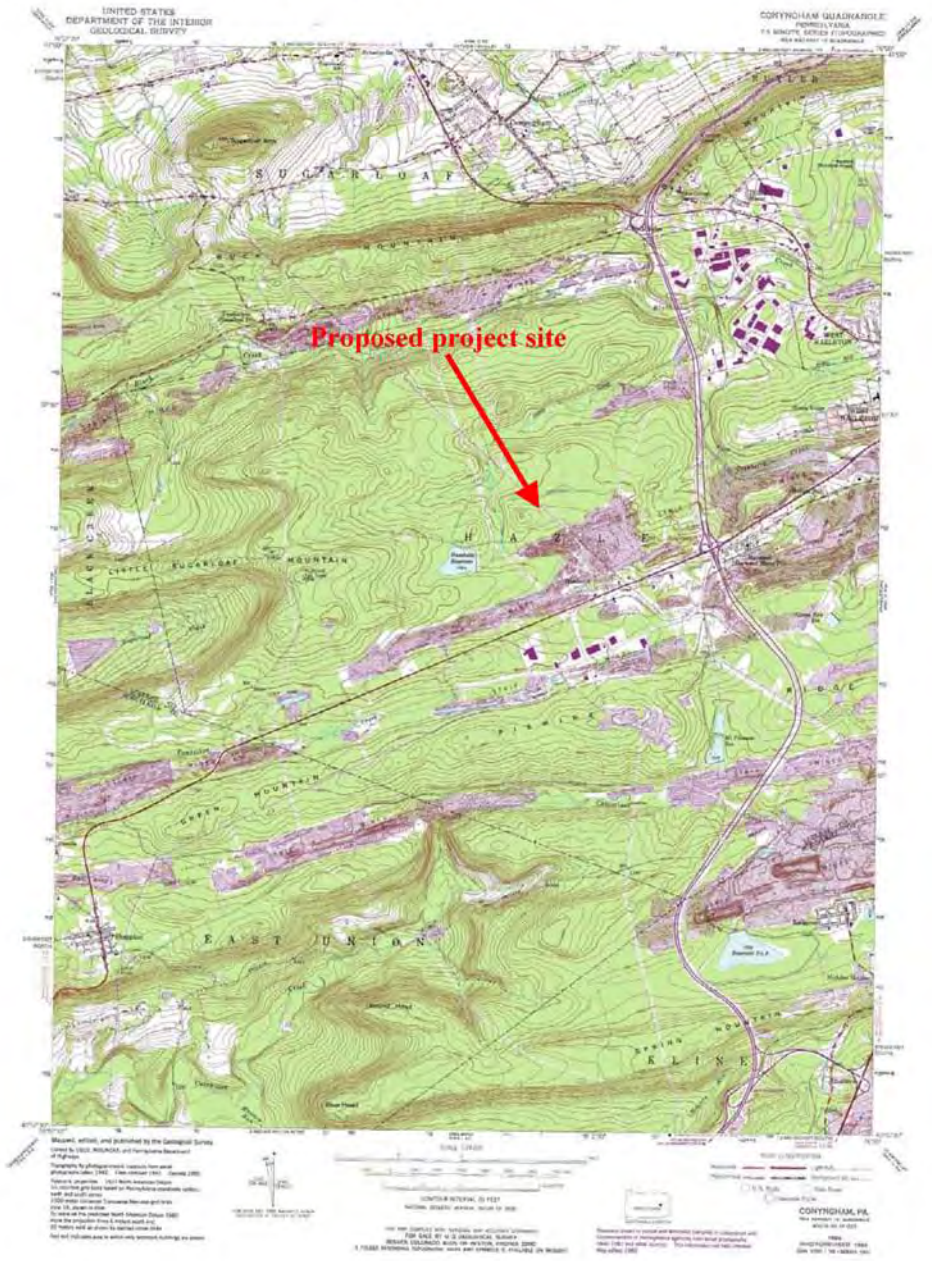
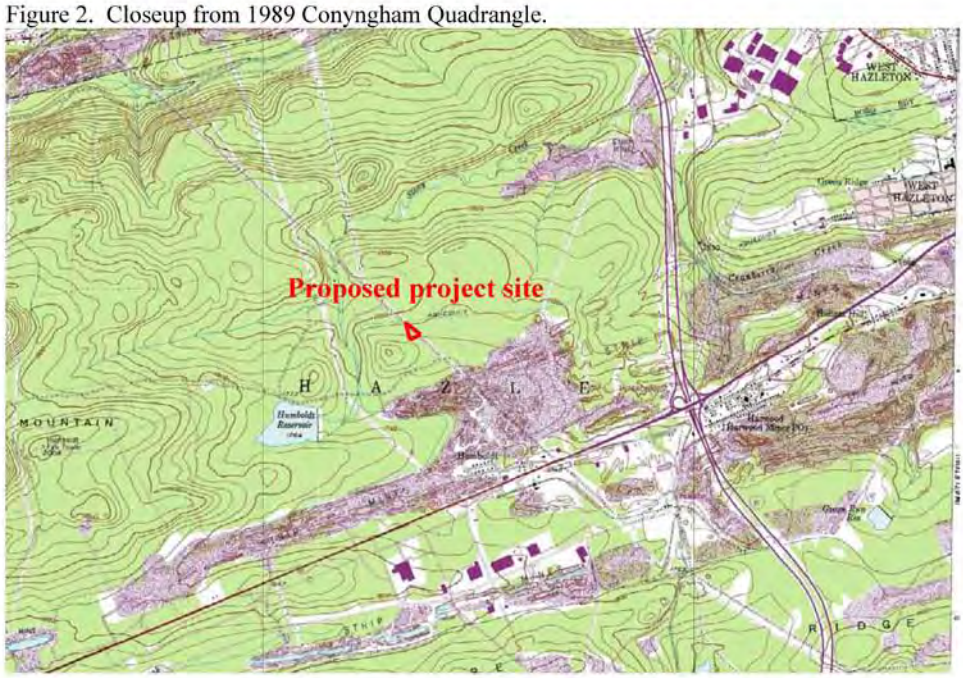


Figure 2. Closeup from 1989 Conyngham Quadrangle.



Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

March 4, 2011

Fred Pozzuto
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507

Re: File No. ER 2011-0877-079-B
DOE Smart Grid Demonstrations Program: Beacon Power Corporation, Proposed Installation & Operation of Flywheel Frequency Regulation Plant, Hazle Twp., Luzerne Co.

Dear Mr. Pozzuto:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation. These requirements include consideration of the project's potential effect upon both historic and archaeological resources.

Based on our survey files, which include both archaeological sites and standing structures, there are no National Register eligible or listed historic or archaeological properties in the area of this proposed project. Therefore, your responsibility for consultation with the State Historic Preservation Office for this project is complete. Should you become aware, from any source, that historic or archaeological properties are located at or near the project site, please notify the Bureau for Historic Preservation at (717) 783-8946.

Sincerely,

Douglas C. McLearen, Chief
Division of Archaeology & Protection

DCM/tmw

NETL NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

January 20, 2011

Endangered Species Biologist
U.S. Fish and Wildlife Service (USFWS)
Pennsylvania Ecological Services Field Office
315 South Allen Street, Suite 322
State College, PA 16801-4850

RE: U.S. Department of Energy Request for Review of the Proposed Installation and Operation of a Flywheel Frequency Regulation Plant in Hazle Township, Luzerne County, Pennsylvania

Dear USFWS Biologist:

The U.S. Department of Energy (DOE) is proposing to provide a financial assistance grant to the Beacon Power Corporation (Beacon Power) as part of the Smart Grid Demonstrations Program, whichis funded through the American Recovery and Reinvestment Act of 2009 (ARRA or Recovery Act). If DOE awards the grant, Beacon Power would install and operate a 20-megawatt flywheel frequency regulation plant in the Humboldt North section of the Humboldt Industrial Park in Hazle Township, Pennsylvania.

The proposed site is a 5.5-acre parcel of undisturbed land contained within the 3,000-acre Humboldt Industrial Park. Beacon Power would use approximately 3.5 acres of the parcel for development of the flywheel regulation plant.

A search for the project, using the Pennsylvania Natural Diversity Index (PNDI), resulted in a finding that "Further Review Is Required" by the USFWS. However, the results did not indicate which species, if any, might occur at or near the proposed site. Based on a review from the USFWS website, the bald eagle (*Haliaeetus leucocephal*), which is protected by the Bald and Golden Eagle Act and the Indiana bat (*Myotis sodalis*), protected under the Endangered Species Act of 1973, do occur in the county. The PNDI Project Environmental Review Receipt (Number 2010122926338) notes that DOE should provide additional information to your agency for review. These materials are attached.

The nearest wetlands are listed as freshwater emergent shrub and are located approximately 900 feet north of the proposed project area, according to a National Wetlands Inventory map of the project area. The enclosed map shows that the project would not affect wetland habitats, or require any Section 404 permitting.

DOE is preparing a draft Environmental Assessment (EA) for this project under the *National Environmental Policy Act of 1969* (NEPA) and include correspondence with your office in an

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507

appendix to the EA, addressing any input you might have in the EA. Further, DOE intends to send your office a copy of the draft EA when it is complete.

If you have any questions or comments or require further information about this project, please contact me using the information below:

Mr. Fred Pozzuto
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880, M/S B07
Morgantown, WV 16507-0880
Telephone: (304) 285-5219
Facsimile: (304) 285-4403
E-mail: fred.pozzuto@netl.doe.gov

Thank you for your review. DOE looks forward to working with you on this project.

Sincerely,

Fred Pozzuto
Environmental Manager
NEPA Compliance Officer

Enclosures:
1. Signed copy of the PNDI Project Environmental Review Receipt
2. Project Narrative
3. U.S. Geological Survey Conyngham 7.5-Minute Quadrangle with site location identified
4. Aerial photograph showing the site boundaries and locations where site photographs were taken
5. Color photographs of the current site with notation indicating the direction which each photo was taken
6. National Wetlands Inventory map indicating the location of the site
7. Artist rendition of the proposed project

PNDI Project Environmental Review Receipt Project Search ID: 20101229276338

1. PROJECT INFORMATION

Project Name: **Beacon Power**
Date of review: **12/29/2010 11:51:29 AM**
Project Category: **Energy Storage, Production, and Transfer,Energy Storage,Other**
Project Area: **N/A**
County: **Luzerne** Township/Municipality: **Hazle**
Quadrangle Name: **CONYNGHAM** ~ ZIP Code: **18202**
Decimal Degrees: **40.945060 N, -76.054873 W**
Degrees Minutes Seconds: **40° 56' 42.2" N, -76° 3' 17.5" W**

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

Page 1 of 4

PNDI Project Environmental Review Receipt Project Search ID: 20101229276338

RESPONSE TO QUESTION(S) ASKED

Q1: Will the project require permanent alteration or removal of natural vegetation, soils, water (streams, ponds, vernal pools, etc.)?
Your answer is: **3. Unknown**

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for one year** (from the date of the review), and are based on the project information that was provided, including the exact project location, the project type, description and features, and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jurisdictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE: No impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

DCNR Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Scrub oak shrubland
Common Name:
Current Status: Special Concern Resource*
Proposed Status: Special Concern Resource*

PA Fish and Boat Commission

RESPONSE: No impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send

PNDI Project Environmental Review Receipt Project Search ID: 20101229276338

project information to the agency for review (see WHAT TO SEND).

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictional agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

_x_ **SIGNED** copy of the Project Environmental Review Receipt
___ Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted
_x_ Project location information (name of USGS Quadrangle, Township/Municipality, and County)
_x_ USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process
_x_ A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
_x_ Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
_x_ Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist). If wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams.
___ The DEP permit(s) required for this project

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt, a completed PNDI form and a USGS 7.5 minute quadrangle map with the project boundaries delineated on the map. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us

Page 3 of 4

PNDI Project Environmental Review Receipt Project Search ID: 20101229276338

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA 17105-8552
Fax (717) 772-0271

U.S. Fish and Wildlife Service
Endangered Species Section
315 South Allen Street, Suite 322, State College, PA 16801-4851
NO Faxes Please.

PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane, Bellefonte, PA 16823-7437
NO Faxes Please

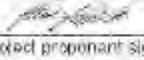
PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA 17110-9797
Fax (717) 787-6957

7. PROJECT CONTACT INFORMATION

Name:	Fred Pozzuto
Company/Business Name:	U.S. Department of Energy, National Energy Technology Laboratory
Address:	3610 Collins Ferry Road, P.O. Box 880, MS B07
City, State, Zip:	Morgantown, WV 16507-0880
Phone:	(304) 285-5219 Fax: (304) 285-4403
E-mail:	fred.pozzuto@netl.doe.gov

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.



applicant/project proponent signature

January 10, 2011
date

Page 4 of 4

Project Narrative

Beacon Power Corporation Flywheel Frequency Regulation Plant

The U.S. Department of Energy (DOE or the Department) proposes to award a financial assistance grant in the form of a cooperative agreement with Beacon Power Corporation (Beacon Power) for its proposed project construction and operation of a 20-megawatt utility-scale flywheel-based frequency regulation plant on a vacant industrial tract at the Humboldt North Industrial Park, Site 30-A, Hazle Township, Luzerne County, Commonwealth of Pennsylvania. The project would involve several support facilities. The company would use the flywheels and frequency regulation equipment to store energy during off-peak times and return it to the electrical grid during on-peak times.

The plant would not generate electricity directly; rather, electricity from the grid would drive the flywheels at high speeds when electricity supply on the grid exceeded demand. At times when demand exceeded supply, the system would convert energy from the spinning flywheels back to electricity and supply it to the grid.

The proposed plant would consist of 20 frequency regulation pods, each containing 10 individual flywheels and the associated energy conversion, electrical control, and power distribution. An aerial view of the proposed site and a schematic of the proposed plant are attached.

Features of the plant would include:

- A supplementary electric substation with an electrical connection would tie into the existing electrical grid.
- Twenty 1-megawatt frequency regulation pods, each with 10 flywheels and associated energy conversion, electrical control, and power distribution equipment in underground precast concrete housings 5 feet in diameter at a depth of 8 to 10 feet below ground;
- An electric service equipment unit with underground electric conduit connecting to the pods;
- A cooling system with underground mechanical piping connecting to the electric service equipment unit and the pods;
- A driveway and parking spaces;
- A black vinyl-coated chain-link perimeter fence and entrance gate; and
- Landscaping.

The elements of the proposed project would cover about 3.5 acres on the existing 5.5-acre industrial site. The site has adequate access and onsite roads for the proposed project. The following are the planned major steps in the construction of the plant:

- Clearing and Excavation. Beacon Power would clear the vegetation on the 3.5-acre site and grade it to a uniform slope. Construction would include excavations to install the 20 flywheel pods underground. The project would reuse excavated material on the site to the extent possible and dispose of any remainder in compliance with state and local regulations. The equipment required for excavation would include excavators, bulldozers, front-end loaders, uniloaders, backhoes, and dump trucks.

- Housings and Foundations. Precast concrete housings—one for each of the flywheels—would be placed at a depth of 6 to 8 feet. The housings would be modified concrete water pipes. Groundwater control could be necessary at the base of the excavations for the housings. The housings would be founded on a crushed stone base over a geo-textile fabric. Buildings and other equipment would have shallow spread footing foundations.

- Pipelines. Underground PVC pipelines would be placed for the storm water management system, the electric power distribution system, and the cooling system.

- Equipment Placement. The flywheels and other equipment that make up the pods would be on piers within the housings. Other equipment would be on foundations.

- Surfaces. Surface treatment would include impervious asphalt pavement, gravel surfaces, and loam and seed areas.

- Testing and Start-Up Process. The system would be tested in stages prior to becoming completely operational. Testing of each pod would be based on the procedure defined during the operation of Beacon's 1-megawatt pod at its Tyngsboro, Massachusetts, plant.

The plant has a design lifetime of at least 20 years. The components of the system, including flywheels and electronics, could be replaced as necessary during operations. The flywheel system represents the latest technological approach in frequency regulation to this point, but new developments could supplant this technology in the future. The equipment is of such a scale that it could be readily removed from the site.

The proposed site at the Humboldt Industrial Park has not been previously developed and does not contain any buildings.

U.S. Geological Survey Conyngham 7.5-Minute Quadrangle with site location identified
County: Luzerne Township/Municipality: Hazle Township
Quadrangle Name: CONYNGHAM ~ ZIP Code: 18202
Decimal Degrees: 40.945060 N, -76.054873 W
Degrees Minutes Seconds: 40° 56' 42.2" N, -76° 3' 17.5" W

Aerial photograph showing the site boundaries and locations where site photographs were taken

Color photographs of the current site with notation indicating the direction which each photo was taken

Location 1 looking northeast toward nearest building.

Location 3 looking northwest across proposed project site.

Location 2 looking southwest across transmission line right-of-way.

From Location 4 looking north across proposed project site.

National Wetlands Inventory map indicating the location of the site

\

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

January 19, 2011

Mr. Rich Shockey
Bureau of Forestry, Ecological Services Section
Pennsylvania Department of Conservation and Natural Resources
400 Market Street
P.O. Box 8552
Harrisburg, Pennsylvania 17105-0271

RE: U.S. Department of Energy Request for Review of the Proposed Installation and Operation of a Flywheel Frequency Regulation Plant in Hazle Township, Luzerne County, Pennsylvania

Dear Mr. Shockey:

The U.S. Department of Energy (DOE) is proposing to provide a financial assistance grant to the Beacon Power Corporation (Beacon Power) as part of the Smart Grid Demonstrations Program. The program is funded through the American Recovery and Reinvestment Act of 2009 (ARRA). If DOE awards the grant, Beacon Power would install and operate a 20-megawatt flywheel frequency regulation plant in the Humboldt North section of the Humboldt Industrial Park in Hazle Township, Pennsylvania.

The proposed site is a 5.5-acre parcel of undisturbed land contained within the 3,000-acre Humboldt Industrial Park. Beacon Power would use approximately 3.5 acres of the parcel for development of the flywheel regulation plant.

A search for the project using the Pennsylvania Natural Diversity Index (PNDI) resulted in a finding that "Further Review Is Required" by the Pennsylvania Department of Conservation and Natural Resources. The additional review, according to the PNDI, relates to scrub oak shrubland as a Special Concern Resource. The PNDI Project Environmental Review Receipt (Number 20101229276338) notes that DOE should provide additional information to your agency for review. These enclosures to this letter contain that additional information.

The nearest wetlands are listed as freshwater emergent shrub and are located approximately 900 feet north of the proposed project site, according to a National Wetlands Inventory map of the project area. The enclosed map shows that the project would not affect wetland habitats, or require any Section 404 permitting.

DOE is preparing a draft Environmental Assessment (EA) for this project under the *National Environmental Policy Act of 1969* (NEPA) and will include correspondence with your office in an appendix to the EA, addressing any input you might have in the EA. Further, DOE intends to send your office a copy of the draft EA when it is complete.

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507

If you have any questions or comments or require further information about this project, please contact me using the information below:

Mr. Fred Pozzuto
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880, M/S B07
Morgantown, WV 16507-0880
Telephone: (304) 285-5219
Facsimile: (304) 285-4403
E-mail: fred.pozzuto@netl.doe.gov

Thank you for your review. DOE looks forward to working with you on this project.

Sincerely,

Fred Pozzuto
Environmental Manager
NEPA Compliance Officer

Enclosures:
1. Signed copy of the PNDI Project Environmental Review Receipt
2. Project Narrative
3. U.S. Geological Survey Conyngham 7.5-Minute Quadrangle with site location identified
4. Aerial photograph showing the site boundaries and locations where site photographs were taken
5. Color photographs of the current site with notation indicating the direction which each photo was taken
6. National Wetlands Inventory map indicating the location of the site
7. Artist rendition of the proposed project

PNDI Project Environmental Review Receipt Project Search ID: 20101229276338

1. PROJECT INFORMATION

Project Name: **Beacon Power**
Date of review: **12/29/2010 11:51:29 AM**
Project Category: **Energy Storage, Production, and Transfer,Energy Storage,Other**
Project Area: **N/A**
County: **Luzerne** Township/Municipality: **Hazle**
Quadrangle Name: **CONYNGHAM** ~ ZIP Code: **18202**
Decimal Degrees: **40.945060 N, -76.054873 W**
Degrees Minutes Seconds: **40° 56' 42.2" N, -76° 3' 17.5" W**

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates 'No Further Review Required' no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

Page 1 of 4

PNDI Project Environmental Review Receipt Project Search ID: 20101229276338

RESPONSE TO QUESTION(S) ASKED

Q1: Will the project require permanent alteration or removal of natural vegetation, soils, water (streams, ponds, vernal pools, etc.)?
Your answer is: **3. Unknown**

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for one year** (from the date of the review), and are based on the project information that was provided, including the exact project location, the project type, description, and features, and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jurisdictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE: No impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

DCNR Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Scrub oak shrubland
Common Name:
Current Status: Special Concern Resource*
Proposed Status: Special Concern Resource*

PA Fish and Boat Commission

RESPONSE: No impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send

PNDI Project Environmental Review Receipt Project Search ID: 20101229276338

project information to the agency for review (see WHAT TO SEND).

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictional agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

_x_ **SIGNED** copy of the Project Environmental Review Receipt
___ Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted
_x_ Project location information (name of USGS Quadrangle, Township/Municipality, and County)
_x_ USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process
_x_ A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
_x_ Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
_x_ Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist). If wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams.
___ The DEP permit(s) required for this project

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt, a completed PNDI form and a USGS 7.5 minute quadrangle map with the project boundaries delineated on the map. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at: http://www.naturalheritage.state.pa.us.

Page 3 of 4

PNDI Project Environmental Review Receipt Project Search ID: 20101229276338

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA 17105-8552
Fax (717) 772-0271

U.S. Fish and Wildlife Service
Endangered Species Section
315 South Allen Street, Suite 322, State College, PA 16801-4851
NO Faxes Please.

PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane, Bellefonte, PA 16823-7437
NO Faxes Please

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA 17110-9797
Fax (717) 787-6957

7. PROJECT CONTACT INFORMATION

Name:	Fred Pozzuto
Company/Business Name:	U.S. Department of Energy, National Energy Technology Laboratory
Address:	3610 Collins Ferry Road, P.O. Box 880, MS B07
City, State, Zip:	Morgantown, WV 16507-0880
Phone:	(304) 285-5219 Fax: (304) 285-4403
E-mail:	fred.pozzuto@netl.doe.gov

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

applicant/project proponent signature — January 10, 2011 — date

Page 4 of 4

Project Narrative

Beacon Power Corporation Flywheel Frequency Regulation Plant

The U.S. Department of Energy (DOE or the Department) proposes to award a financial assistance grant in the form of a cooperative agreement with Beacon Power Corporation (Beacon Power) for its proposed project construction and operation of a 20-megawatt utility-scale flywheel-based frequency regulation plant on a vacant industrial tract at the Humboldt North Industrial Park, Site 30-A, Hazle Township, Luzerne County, Commonwealth of Pennsylvania. The project would involve several support facilities. The company would use the flywheels and frequency regulation equipment to store energy during off-peak times and return it to the electrical grid during on-peak times.

The plant would not generate electricity directly; rather, electricity from the grid would drive the flywheels at high speeds when electricity supply on the grid exceeded demand. At times when demand exceeded supply, the system would convert energy from the spinning flywheels back to electricity and supply it to the grid.

The proposed plant would consist of 20 frequency regulation pods, each containing 10 individual flywheels and the associated energy conversion, electrical control, and power distribution. An aerial view of the proposed site and a schematic of the proposed plant are attached.

Features of the plant would include:

- A supplementary electric substation with an electrical connection would tie into the existing electrical grid.
- Twenty 1-megawatt frequency regulation pods, each with 10 flywheels and associated energy conversion, electrical control, and power distribution equipment in underground precast concrete housings 5 feet in diameter at a depth of 8 to 10 feet below ground;
- An electric service equipment unit with underground electric conduit connecting to the pods;
- A cooling system with underground mechanical piping connecting to the electric service equipment unit and the pods;
- A driveway and parking spaces;
- A black vinyl-coated chain-link perimeter fence and entrance gate; and
- Landscaping.

The elements of the proposed project would cover about 3.5 acres on the existing 5.5-acre industrial site. The site has adequate access and onsite roads for the proposed project. The following are the planned major steps in the construction of the plant:

- Clearing and Excavation. Beacon Power would clear the vegetation on the 3.5-acre site and grade it to a uniform slope. Construction would include excavations to install the 20 flywheel pods underground. The project would reuse excavated material on the site to the extent possible and dispose of any remainder in compliance with state and local regulations. The equipment required for excavation would include excavators, bulldozers, front-end loaders, uniloaders, backhoes, and dump trucks.

- Housings and Foundations. Precast concrete housings—one for each of the flywheels—would be placed at a depth of 6 to 8 feet. The housings would be modified concrete water pipes. Groundwater control could be necessary at the base of the excavations for the housings. The housings would be founded on a crushed stone base over a geo-textile fabric. Buildings and other equipment would have shallow spread footing foundations.

- Pipelines. Underground PVC pipelines would be placed for the storm water management system, the electric power distribution system, and the cooling system.

- Equipment Placement. The flywheels and other equipment that make up the pods would be on piers within the housings. Other equipment would be on foundations.

- Surfaces. Surface treatment would include impervious asphalt pavement, gravel surfaces, and loam and seed areas.

- Testing and Start-Up Process. The system would be tested in stages prior to becoming completely operational. Testing of each pod would be based on the procedure defined during the operation of Beacon's 1-megawatt pod at its Tyngsboro, Massachusetts, plant.

The plant has a design lifetime of at least 20 years. The components of the system, including flywheels and electronics, could be replaced as necessary during operations. The flywheel system represents the latest technological approach in frequency regulation to this point, but new developments could supplant this technology in the future. The equipment is of such a scale that it could be readily removed from the site.

The proposed site at the Humboldt Industrial Park has not been previously developed and does not contain any buildings.

U.S. Geological Survey Conyngham 7.5-Minute Quadrangle with site location identified
County: Luzerne Township/Municipality: Hazle Township
Quadrangle Name: CONYNGHAM ~ ZIP Code: 18202
Decimal Degrees: 40.945060 N, -76.054873 W
Degrees Minutes Seconds: 40° 56' 42.2" N, -76° 3' 17.5" W

Aerial photograph showing the site boundaries and locations where site photographs were taken

Color photographs of the current site with notation indicating the direction which each photo was taken

Location 1 looking northeast toward nearest building.

Location 3 looking northwest across proposed project site.

Location 2 looking southwest across transmission line right-of-way.

From Location 4 looking north across proposed project site.

National Wetlands Inventory map indicating the location of the site

FEB-03-2011 14:47 PNDI 717 772 0271 P.01/01

pennsylvania
DEPARTMENT OF CONSERVATION
AND NATURAL RESOURCES

BUREAU OF FORESTRY

February 3, 2011 **PNDI Number: 20101229276338**

Fred Pozzuto
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507
Fax: 304-285-4403 (hard copy will not follow)

Re: Proposed Installation and Operation of Flywheel Frequency Regulation Plant
Hazle Twp., Luzerne County

Dear Mr. Pozzuto,

Thank you for your submission of the Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review Receipt Number **20101229276338** for review. PA Department of Conservation and Natural Resources screened this project for potential impacts to species and resources of concern under DCNR's responsibility, which includes plants, terrestrial invertebrates, natural communities, and geologic features only.

No Impact Anticipated

PNDI records indicate species or resources of concern are located in the vicinity of the project. However, based on the information you submitted concerning the nature of the project, the immediate location, and our detailed resource information, DCNR has determined that no impact is likely. No further coordination with our agency is needed for this project.

Our records show that a terrestrial invertebrate species of concern known in the vicinity of the project, and in general, the scrub-shrub barrens in the Humboldt Barrens are habitat for a number of barrens moths. *Lycaena epixanthe*, Bog Copper butterfly, is a PA species of special concern. The bog copper butterfly utilizes acidic bogs with cranberries and other ericaceous shrubs. Its larval host is shrubby cranberries or other species in the heath family (*Ericacaea*). The habitat for this species is not present on the site, however bog coppers may benefit from habitat enhancement as a result of this project, by using cranberries or other heath shrubs as a part of the revegetation plan. Our office encourages you to consider this option.

This response represents the most up-to-date summary of the PNDI data files and is valid for one (1) year from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on-site. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered. Should the proposed work continue beyond the period covered by this letter, please resubmit the project to this agency as an "Update" (including an updated PNDI receipt, project narrative and accurate map).

This finding applies to impacts to DCNR only. To complete your review of state and federally-listed threatened and endangered species and species of special concern, please be sure the U.S. Fish and Wildlife Service, PA Game Commission, and the Pennsylvania Fish and Boat Commission have been contacted regarding this project as directed by the online PNDI ER Tool found at www.naturalheritage.state.pa.us.

Sincerely,

Rebecca H. Bowen

Rebecca H. Bowen, Environmental Review Manager FOR Chris Firestone, Wild Plant Program Mgr.
Ph: 717-772-0258 ~ c-rbowen@state.pa.us

conserve sustain enjoy

P.O. Box 8552, Harrisburg, PA 17105-8552 717-787-3444 (fax) 717-772-0271

02/03/2011 02:38PM

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

January 20, 2011

Mr. Brad John
Treasurer, Seneca Nation of Indians
William Seneca Administration Building
12837 Route 438
Irving, New York 14081

RE: U.S. Department of Energy Consultation on the Proposed Installation and Operation of a Flywheel Frequency Regulation Plant in Hazle Township, Luzerne County, Pennsylvania

Dear Mr. John:

The U.S. Department of Energy (DOE) is proposing to provide a financial assistance grant to the Beacon Power Corporation (Beacon Power) as part of the Smart Grid Demonstrations Program, which is funded through the American Recovery and Reinvestment Act of 2009 (ARRA or Recovery Act). If Beacon Power is awarded the grant, it would install and operate a 20-megawatt flywheel frequency regulation plant at the Humboldt North Industrial Park in Hazle Township, Pennsylvania.

DOE is requesting your input on this proposed project in terms of archaeological or cultural resources important to your tribe. The proposed site is a 5.5-acre parcel of undisturbed land contained withinthe 3,000-acre Humboldt Industrial Park. Beacon Power would use approximately 3.5 acres of the parcel for development of the flywheel facility. A description of the proposed project with maps and photographs of the site are included in the attached Project Narrative.

DOE also is initiating consultation with the Pennsylvania Historical and Museum Commission and the Tonawanda Band of Seneca. We have included a copy of the Request to Initiate Consultation in Compliance with the State History Code and Section 106 of the National Historic Preservation Act sent to the Commission along with the Project Narrative. If the construction uncovered artifacts or remains, Beacon Power would cease those activities and contact you and the Commission.

If you have any questions or comments or require clarification concerning this project, please contact me using the information below:

Mr. Fred Pozzuto
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880, M/S B07
Morgantown, WV 16507-0880

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507

Telephone: (304) 285-5219
Facsimile: (304) 285-4403
E-mail: fred.pozzuto@netl.doe.gov

Because this is a Recovery Act project, selected on its technical merits and to assist with the nation's economic recovery, we would appreciate a quick response.

DOE is preparing a draft Environmental Assessment (EA) for this project under the *National Environmental Policy Act of 1969* (NEPA). Further, DOE intends to send your office a copy of the draft EA when it is complete, where you may once again comment on any concerns you may have with the project. DOE will include correspondence with you in the EA, address any comments you may have in response to this letter in the EA, and send you a copy when it is complete.

Thank you for taking the time to review this letter. DOE looks forward to working with you on this and future projects.

Sincerely,

Environmental Manager
NEPA Compliance Officer

Enclosures: 1. Request to Initiate Consultation in Compliance with the State History Code and Section 106 of the National Historic Preservation Act
2. Project Narrative

Pennsylvania Historical & Museum Commission
Bureau for Historic Preservation

BHP Use Only
ER #

Request to Initiate Consultation in Compliance with the State History Code and Section 106 of the National Historic Preservation Act

Applicant Information (print neatly, this will be used in the return envelope)			
Applicant Name	U.S. Department of Energy		
Street Address	3610 Collins Ferry Road		
City	Morgantown	Phone Number	304-285-5219
State/ZIP	West Virginia 26507-0880		

Contact Person to Receive Response (if applicable) (print neatly, this will be used in the return envelope)			
Name/Company	Fred Pozzuto, DOE National Energy Technology Laboratory		
Street Address	3610 Collins Ferry Road		
City	Morgantown	Phone Number	304-285-5219
State/ZIP	West Virginia 26507-0880	Fax Number	304-285-4403

Project Information			
Project Title	Beacon Power Corporation Flywheel Frequency Regulation Plant		
Project Location and/address	Humboldt Industrial Park, Site 30-A		
Municipality	Hazel Township	**County Name**	Luzerne County
If this project was ever reviewed before, include previous ER #			

Project Type (Check all that apply)			
Will Your Project Be Government Funded/Sponsored or On Government Land? ☒ **Yes** ☐ **No** **Specify Agency and Program Name Below**			
State Agency:		Program:	
Federal Agency:	Department of Energy	Program:	Smart Grid Demonstrations
		Local/Other:	
Will Your Project Require Permits or Approvals? ☐ **Yes** ☒ **No** **Specify Agency and/or Program Name Below**			
Anticipated Permits:			
State Agency:		Program:	
Federal Agency:		Program:	

Agency Office to Receive Copy of Response (Check all that apply)			
Army Corps of Engineers: ☐ Philadelphia ☐ Baltimore ☐ Pittsburgh			
DEP Office:	☐ Central Office	☐ Regional Office:	
☐ District Mining Office:		☐ Oil & Gas Office:	
☐ **Other:** (provide address)			

Pennsylvania Historical & Museum Commission
Bureau for Historic Preservation

BHP Use Only
ER #

Required Project Information for BHP/SHPO Review

☒ Total Acres in the property under review:: 5.5

☒ Total acres of earth disturbance for this proposed activity 3.5

☐ Are there any buildings or structures within the project area? ☐ Yes ☒ No
Approximate age of buildings:

☐ Project located in or adjacent to a historic district? ☐ Yes ☒ No ☐ Unsure

Name of Historic District _____

Submissions Must Also Include:

☒ MAP LOCATION: A 7.5 USGS Map showing the project boundary and the Area of Potential Effect (APE). The APE should include indirect effects, such as visual and audible impacts. Federal Projects must provide an explanation of how the APE was determined.
A USGS 7.5 map is attached. The estimated APE is the 5.5-acre site with proposed site disturbance of about 3.5 acres. No visual or noise impacts are anticipated offsite.

☒ PHOTOS: Photos of all buildings or structures in the APE. If the property is over 50 years old submit a Historic Resource Survey Form with this initial request. The forms are available at http://www.phmc.state.pa.us/bhp, under "Forms and Guidance" link.
There are no structures within the APE. Photographs of the existing site conditions are attached.

☒ PROJECT DESCRIPTION NARRATIVE: Provide a detailed project description describing the project, any ground disturbance, any previous land use, and age of all effected buildings in the project area. Attach a site map showing the location of all buildings in the project area.
See attached.

☒ I have reviewed all DEP Permit Exemptions listed on the DEP website www.dep.state.pa.us.

In addition, federal agencies must provide:

☒ Measures that will be taken to identify consulting parties including Native Americans.
DOE reviewed the listing of federally recognized tribes that have interest in Pennsylvania projects and have has initiated contact with those tribal leaders.

☒ Measures that will be taken to notify and involve the public.
DOE is preparing an environmental assessment (EA) for this proposed project. A notice of availability for the Draft EA will be published in the local newspaper of record and copies distributed to the local library and others including the Governor, federal, state, and local agencies, and individuals and groups who have stated an interest in the project. A public comment period will be established to solicit public comment, and DOE will revise the EA as appropriate.

The information on this form is needed to determine whether potential historic or archaeological resources are present. Additional historic information or investigation may be requested to determine the significance of the resources or the effects of the project on those resources. ***Form and attachments must be submitted by mail. Submissions via e-mail will not be accepted.***

Signature Block

Applicant's Signature Date

Project Narrative

Beacon Power Corporation Flywheel Frequency Regulation Plant

The U.S. Department of Energy (DOE or the Department) proposes to provide financial assistance to the Beacon Power Corporation (Beacon Power) for its proposed project to construct and operate a 20-megawatt utility-scale flywheel-based frequency regulation plant on a vacant industrial tract at the Humboldt North Industrial Park, Site 30-A, Hazle Township, Luzerne County, Commonwealth of Pennsylvania. Figure 1 is a copy of the U.S. Geological Survey 7.5-minute quadrangle map that shows the site location. The funding would be provided through the American Recovery and Reinvestment Act of 2009. The company would use the flywheels and frequency regulation equipment to store energy during off-peak times and return it to the electrical grid during on-peak times. Figure 2 is a rendering of the proposed facility, and Figure 3 is a closeup of the project area and identifies the area of potential effect (APE). Figure 4 shows views of and around the site.

The plant would not generate electricity directly; rather, electricity from the grid would drive the flywheels at high speeds when electricity supply on the grid exceeded demand. At times when demand exceeded supply, the system would convert energy from the spinning flywheels back to electricity and supply it to the grid. The proposed plant would consist of 20 frequency regulation pods, each containing 10 individual flywheels and the associated energy conversion, electrical control, and power distribution.

Major features of the plant would include:

- A supplementary electric substation with an electrical connection would tie into the existing electrical grid.
- Twenty 1-megawatt frequency regulation pods, each with 10 flywheels and associated energy conversion, electrical control, and power distribution equipment in underground precast concrete housings 5 feet in diameter at a depth of 8 to 10 feet below ground;
- An electric service equipment unit with underground electric conduit connecting to the pods;
- A cooling system with underground mechanical piping connecting to the electric service equipment unit and the pods;
- A driveway and parking spaces;
- A black vinyl-coated chain-link perimeter fence and entrance gate; and
- Landscaping.

The elements of the proposed project would cover about 3.5 acres on the existing 5.5-acre industrial site. The site has adequate access and onsite roads for the proposed project. The following are the planned major steps in the construction of the plant:

- Clearing and Excavation. Beacon Power would clear the vegetation on the 3.5-acre site and grade it to a uniform slope. Construction would include excavations to install the 20 flywheel pods underground. The project would reuse excavated material on the site to the extent possible and dispose of any remainder in compliance with state and local regulations. The equipment required for excavation would include excavators, bulldozers, front-end loaders, unloaders, backhoes, and dump trucks.

- Housings and Foundations. Precast concrete housings—one for each of the flywheels—would be placed at a depth of 6 to 8 feet. The housings would be modified concrete water pipes. Groundwater control could be necessary at the base of the excavations for the housings. The housings would be founded on a crushed stone base over a geo-textile fabric. Buildings and other equipment would have shallow spread footing foundations.

- Pipelines. Underground PVC pipelines would be placed for the storm water management system, the electric power distribution system, and the cooling system.

- Equipment Placement. The flywheels and other equipment that make up the pods would be on piers within the housings. Other equipment would be on foundations.

- Surfaces. Surface treatment would include impervious asphalt pavement, gravel surfaces, and loam and seed areas.

- Testing and Start-Up Process. The system would be tested in stages prior to becoming completely operational. Testing of each pod would be based on the procedure defined during the operation of Beacon's 1-megawatt pod at its Tyngsboro, Massachusetts, plant.

The plant has a design lifetime of at least 20 years. The components of the system, including flywheels and electronics, could be replaced as necessary during operations. The flywheel system represents the latest technological approach in frequency regulation to this point, but new developments could supplant this technology in the future. The equipment is of such a scale that it could be readily removed from the site.

Figure 1. U.S. Geological Survey Conyngham 7.5-Minute Quadrangle.

Figure 2. Array of 1-megawatt frequency regulation pods.

Figure 3. APE with locations from which photographs were taken (Figure 4).

Figure 4. Site photographs.

Location 1 looking northeast toward nearest building.

Location 3 looking northwest across proposed project site.

Location 2 looking southwest across transmission line right-of-way.

From Location 4 looking north across proposed project site.

SENECA NATION OF INDIANS
TRIBAL HISTORIC PRESERVATION OFFICE
90 OHI:YO' WAY
SALAMANCA, NY 14779
PHONE: (716) 945-1790 FAX: (716) 945-8133

March 24, 2011

Fred Pozzuto
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880, M/S B07
Morgantown, WV 16507

Re: Flywheel Frequency Regulation Plant
Hazle Township, Luzerne County, PA
Reference #DOE/EA-1753D

Dear Mr. Pozzuto,

Thank you for providing the information for the above referenced project. Pursuant to Section 106 of the National Historic Preservation Act (36 CFR § 800) as a consulting party, the SNI Tribal Historic Preservation Office has a finding of "No Effect" on historical properties eligible for or included on the National Register of Historic Places.

We have no further issues if the proposed plans are followed. If at any time your scope of work changes or you become aware of any archaeological, scientific, pre-historical, or historical sites or cultural resources which might be affected by the proposed work, please notify our office as soon as possible. Thank you.

Sincerely,

Lauren Waldinger
Tribal Archaeologist
Lauren.Waldinger@sni.org

THPO Ref. 11-3644

APPENDIX C
SMART GRID DEMONSTRATIONS PROGRAM ENVIRONMENTAL SYNOPSIS

This appendix contains a copy of the 2009 environmental synopsis for Smart Grid Demonstrations Program Area of Interest 2.

Environmental Synopsis of

Smart Grid Demonstrations Program
Area of Interest Two – Energy Storage

Funding Opportunity Announcement
DE-FOA-0000036

Prepared for

U.S. Department of Energy
National Energy Technology Laboratory
Morgantown, West Virginia

October 2009

Prepared by
Jason Associates Corporation
San Diego, California

CONTENTS

LIST OF TABLES

1. INTRODUCTION AND BACKGROUND

With funds made available by the *American Recovery and Reinvestment Act of 2009*, the U.S. Department of Energy (DOE or the Department) Office of Electricity Delivery and Energy Reliability issued a competitive Funding Opportunity Announcement (FOA) (DE-FOA-0000036), *Recovery Act – Smart Grid Demonstrations* (DOE 2009). Smart grid projects funded under the FOA would include regionally unique demonstrations to verify smart grid technology viability, quantify smart grid costs and benefits, and validate new smart grid business models, all at a scale that can be readily adapted and replicated around the country. These projects would demonstrate technologies that are widely available for use in the United States.

The goal of the FOA is to demonstrate technologies in regions across the states, districts, and U.S. territories that embody essential and salient characteristics of each region and present a suite of use cases for national implementation and replication. From these use cases, the goal is to collect and provide information necessary for customers, distributors, and generators to change their behavior in a way that reduces system demands and costs, increases energy efficiency, optimally allocates and matches demand and resources to meet that demand, and increases the reliability of the grid. The social benefits of a smart grid are reduced emissions, lower costs, increased reliability, and greater security and flexibility to accommodate new energy technologies, including renewable, intermittent, and distributed sources.

To reap the full benefits of smart grid technologies, advancements in grid-scale energy storage are also needed. Electric grid operators can utilize electricity storage devices to manage the amount of power required to supply customers at times when the need is greatest, which is during peak load. Electricity storage devices can also help make renewable energy resources, whose power output cannot be controlled by grid operators, more manageable. They can also balance microgrids to achieve a good match between generation and load. Storage devices can provide frequency regulation to maintain the balance between the network's load and power generated, increase asset utilization of both renewables and electric systems, defer technology and development investments, and achieve a more reliable power supply for high-tech industrial facilities.

The FOA included two program Areas of Interest (AOIs): (1) Smart Grid and (2) Energy Storage. This environmental synopsis addresses AOI-2; a separate synopsis has been prepared to address AOI-1.

The objective of the FOA under AOI-2 for energy storage is to support demonstration projects for major, utility-scale, energy storage installations. The projects will help to establish costs and benefits, verify technical performance, and validate system reliability and durability at scales that can be readily adapted and replicated across the United States. Energy storage systems include the following technologies: advanced battery systems (including flow batteries), ultra-capacitors, flywheels, and compressed air energy systems. Project areas include wind and photovoltaic integration with the grid, upgrade deferral of transmission and distribution assets.

congestion relief, and system regulation. Projects also include demonstrations of promising utility-scale storage technologies in order to rapidly advance their market readiness in the United States.

As a federal agency, DOE must comply with the *National Environmental Policy Act of 1969* (NEPA) (42 USC 4321 et seq.) by considering potential environmental issues associated with its actions prior to undertaking those actions. The NEPA environmental review of projects evaluated under the Smart Grid Demonstrations FOA will be prepared pursuant to Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500 – 1508), and the Department's NEPA implementing procedures (10 CFR Part 1021), which provide directions specific to procurement actions that DOE may undertake or fund before completing the NEPA process. Per these regulations, DOE has prepared an environmental critique and this environmental synopsis to support the procurement selection process.

The environmental critique prepared for AOI-2 evaluated nine proposals submitted for the Smart Grid Demonstrations AOI-2. The critique was developed to meet the DOE NEPA implementing procedures and, specifically, to meet the requirements in those procedures for environmental critiques of procurements, financial assistance, and joint ventures [10 CFR 1021.216(f) and (g)].

Only those proposals for which an environmental assessment or environmental impact statement could be required were evaluated. The critique did not address proposals submitted for the FOA that could be categorically excluded in accordance with Subpart D of 10 CFR Part 1021.

The environmental critique provided an evaluation and comparison of potential environmental impacts for each proposal deemed to be within the competitive range. DOE used the critique to evaluate appreciable differences in the potential environmental impacts from those proposals. As delineated in 10 CFR 1021.216(g), the environmental critique focused on environmental issues pertinent to a decision among the proposals and included a brief discussion of the purpose of the procurement and each proposed project, a discussion of the salient characteristics of each project, and a brief comparative evaluation of the environmental impacts of the projects. The critique represents one aspect of the formal process used to select among applicants for funding under the Smart Grid Demonstration AOI-2 FOA. As such, it is a procurement-sensitive document and subject to all associated restrictions.

This document is the environmental synopsis, which is a publicly available document corresponding to the environmental critique. The environmental synopsis documents the evaluation of potential environmental impacts associated with the proposals in the competitive range and does not contain procurement-sensitive information. The specific requirements for an environmental synopsis delineated in 10 CFR 1021.216(h) are as follows:

> *(h) DOE shall prepare a publicly available environmental synopsis, based on the environmental critique, to document the consideration given to environmental factors and to record that the relevant environmental consequences of reasonable alternatives have been evaluated in the selection process. The synopsis will not*

contain business, confidential, trade secret or other information that DOE otherwise would not disclose pursuant to 18 U.S.C. 1905, the confidentiality requirements of the competitive procurement process, 5 U.S.C. 552(b) and 41 U.S.C. 423. To assure compliance with this requirement, the synopsis will not contain data or other information that may in any way reveal the identity of offerors. After a selection has been made, the environmental synopsis shall be filed with EPA, shall be made publicly available, and shall be incorporated in any NEPA document prepared under paragraph (i) of this section.

To address the above requirements, this environmental synopsis includes: (1) a brief description of background information related to the Smart Grid Demonstration AOI-2, (2) a general description of the proposals received in response to the FOA and deemed to be within the competitive range, (3) a summary of the assessment approach used in the environmental critique to evaluate the potential environmental impacts associated with the proposals, and (4) a summary of the environmental impacts presented in the critique, focusing on potential differences among the proposals. Because of confidentiality concerns, the proposals and environmental impacts are discussed in general terms.

2. DESCRIPTION OF APPLICATIONS

The environmental critique evaluated nine projects under AOI-2. The projects evaluated are large- and small-scale energy storage demonstration projects, most of which include one or more of the following activities:

- Installation of new battery storage systems, generally to be integrated with new or existing photovoltaic or wind energy systems;
- Construction of new compressed air energy storage (CAES) systems connected to the grid and including use of caverns, mines, and aquifers for the air storage component; and
- Construction of flywheel energy storage systems.

The following are brief descriptions of the characteristics of the nine projects evaluated. The aspects of the projects that could result in environmental impacts, and that were considered in the Environmental Critique, are briefly described. All procurement sensitive information has been removed from the descriptions. Most projects include other activities that would result in minor or no impacts on the environment (for example, installing control equipment meters and running electric lines in the immediate area of the energy storage devices); such activities are not described.

1. Project 1

Period: 5.5 years
Location: Texas

This project would involve the construction of one of the largest CAES facilities in the United States, at about 130 megawatts. The project would make use of an existing storage cavern in a salt dome formation nearly 3,000 feet underground. The project would include a 30-acre construction site, discharge of non-contact cooling water to a nearby tributary, and injection of brine removed from the storage cavern.

2. Project 2

Period: 4 years
Location: New York

This project would design, build, test, commission, and operate a utility-scale, 20-megawatt flywheel energy storage frequency regulation plant and provide frequency regulation services to the grid operator. Project objectives include demonstrating to grid operators the technical, cost, and environmental advantages of fast-response flywheel-based frequency regulation; lowering the cost to build a 20-megawatt flywheel energy storage plant; speeding deployment of this technology to other grid operator regions; and stimulating international market demand for flywheel energy storage. The project includes construction of the facility in an industrial park and connecting to an adjacent grid transmission line.

3. Project 3

Period: 4 years
Location: Iowa

Many high-potential wind energy areas of the Midwest are located long distances from significant electrical load. This creates instability and over-capacity for the existing transmission system. In addition, most wind energy is generated during the off-peak hours, which does not match the demands of the electrical system. This project would demonstrate the benefits of a CAES plant to allow transmission systems to efficiently absorb vast amounts of wind energy in areas of high wind penetration and low load. In addition, the applicant would demonstrate and quantify the cost savings and benefits of using a CAES plant to optimize the existing generating assets of the utility systems receiving the wind energy. The applicant proposes to build a 270-megawatt CAES facility. Air would be stored in an underground aquifer.

The project would proceed in two phases:

- Phase 1 would involve air injection tests to demonstrate and prove the capability of the geologic formation to store and release the pressurized air at the desired rates.
- Phase 2 would involve the design, construction, and startup of the 270-megawatt CAES plant on approximately 20 acres of land.

AOI-2 4

4. Project 4

Period: 2 years
Location: Illinois

The applicant would design, build, test, commission, and operate a 20-megawatt flywheel energy storage frequency regulation plant and provide frequency regulation services to the grid operator. In addition, the applicant would collect critical data needed to measure the achievement of these project objectives and organize and disseminate that data to DOE, other grid operators, and the public in appropriately useful formats. The project site would be about 3.5 acres and involve the use of 200 high-energy flywheels.

5. Project 5

Period: 3 years
Location: Ohio

The applicant would install a compressed air power generating facility, which would be capable of 268 megawatts of power generation and would be located at a limestone mine. The project would include two power generation units designed specifically for the CAES application. The facility would be designed to operate on natural gas only. The project is already permitted for up to 800 Megawatts of power generation. Construction on the 92-acre site, which is previously disturbed and zoned for heavy industry, would include the power generation building, a control building, and a cooling tower.

6. Project 6

Period: 5 years
Location: California

The applicant would install a compressed air power generating facility using a saline porous rock formation as the storage reservoir. The project would take a phased approach to build and validate the design, performance, and reliability of an advanced underground CAES plant (300 megawatts with 10 hours of storage).

7. Project 7

Period: 4 years
Location: Hawaii

The project consists of the construction of a large battery enclosure and a substation, with a combined footprint of less than an acre. These facilities would be adjacent to existing wind energy facilities.

AOI-2 5

8. Project 8

Period: 5 years
Location: New York

The proposed project would include final design, layout, and construction of a 130-megawatt electric-peaking CAES plant. The plant would use electric-drive compressors during times of low electric demand to compress air into an existing salt cavern for subsequent use to generate electricity during times of high demand. A new 1.5-mile long electric transmission line and substation would be constructed to tie the new facility into the existing electric grid. The project site would be a leased 10-acre section of a much larger parcel. The tallest structure (stack) would be about 80 feet, and a building about 60 feet tall and 130 feet long would be constructed to house large equipment. New wells would likely be drilled into the cavern. Pumps and a water line (approximately 1,600 feet long) from a nearby recreational lake would be installed to provide access to fresh water for cooling towers.

9. Project 9

Period: 4 years
Location: New Mexico

This project would combine a 2 8-megawatt hour battery system with an existing 500-kilowatt solar photovoltaic installation. The goal is to employ the battery, along with a control system, to turn solar photovoltaic into a reliable, dispatchable, distributed generation resource. Data collection and analysis based on this design would produce information for a range of possible applications. The project would also yield computer-based modeling tools that would simulate the behavior of distribution feeders under varying loads, with and without distributed generation and storage attached. Construction would be on 5 acres within a currently undeveloped 27-acre site, and would include access roads, a pad for the battery system, and a 1,000-foot line to existing transmission lines.

3. ASSESSMENT APPROACH

Each of the applicants that provided a proposal in response to the Smart Grid Demonstrations FOA was required to submit an environmental questionnaire. The questionnaires included detailed information on the project including the following:

- Project Summary and objectives
- Work locations
- Materials used and produced (e.g., water, electricity, wastewater, air emissions)
- Proposed alternatives
- Land use changes

- Proximity to local, state, or national parks, forests, monuments, scenic waterways, wilderness, recreation facilities, or Tribal lands
- Potential impacts of construction activities
- Potential impacts to surface waters , floodplains, or wetlands
- Potential impacts to any vegetation and wildlife resources
- Changes that could result in socioeconomic or infrastructure conditions
- Potential impacts to historic or cultural resources
- Attainment status for the air quality conditions for the immediate project area
- Potential air emissions from the proposed project
- Potential amounts of solid and hazardous wastes produced
- Unique health and safety factors associated with the project
- Any required permitting or other regulatory compliance activities
- Potential for public controversy

For each project considered in the environmental critique, the potential direct and indirect effects, short-term and long-term effects, and unavoidable adverse effects were identified for 20 resource areas. These resource areas are included as the first 20 entries in Table 1 in Section 4. The critique also includes a summary of project activities, mitigation measures proposed by the applicant, areas where important environmental information is incomplete and unavailable, unresolved environmental issues, and practicable mitigation measures. Also included is a list of federal, tribal, state, and local government permits, licenses, and approvals identified by the applicants or known to be required for each project.

4. SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS

This section provides a summary of potential impacts for each project. Table 1 identifies the resource areas that could be adversely or beneficially impacted for each of the nine projects. For each project, the potential direct and indirect, short-term and long-term, and unavoidable impacts were identified and classified into one of the following four color-coded categories:

- No impacts to a resource area are expected – blank
- Potential for minor adverse or beneficial impacts or unknown impacts of possible minor concern – black text or dot, no shading
- Potential for moderate adverse impacts or unknown impacts of possible moderate concern – light shading
- Potential for major adverse impacts or unknown impacts of possible major concern – darker shading

As summarized in Table 1, many of the projects have the potential to affect multiple aspects of the environment. Because of the nature of many of these projects (for example, construction of

new facilities, often with power-generating, or conversion, capabilities), many of the projects would have minor or moderate impacts on a range of environmental resource areas including aesthetics, air quality, human health and safety, land use, noise, waste and materials, transportation, and utilities. Some of the projects would also have minor or moderate impacts on cultural, biological, groundwater, and surface water resources. The geologic-based CAES are also identified as having the potential for moderate impacts on geology because of the unknowns associated with how the geologic features would respond to the repeated pressurization and release cycles. Most or all of the projects would have minor beneficial impacts on socioeconomic conditions (by increasing employment and the monetary infusion into the community) and utility operations (by improving the efficiency of the transmission system).

Many of the projects highlighted in Table 1 as having the potential for moderate adverse impacts are actually characterized in the environmental critique as having minor-to-moderate impacts. This characterization is often associated with unknowns with respect to some project quantity or the existing characteristics of the project site. The classification of these impacts may eventually be downgraded as the design of projects mature and more information becomes available.

Only one project was identified with the potential to have major adverse impacts. This was due to the projected amount of air emissions that would be involved, likely requiring a Prevention of Significant Deterioration permit for the project.

Table 1. Potential Impacts of Smart Grid Demonstration Projects Rollup – Area of Interest 2

Resource Areas	1	2	3	4	5	6	7	8	9
Aesthetics	●	●	●	●	●	●	●	●	●
Air Quality	●	●	●	●	●	●	●	●	
Biological Resources		●	●			●	●		●
Climate									
Community Services									
Cultural Resources			●					●	●
Environmental Justice									
Floodplains									
Geology	●				●	●		●	
Groundwater	●		●			●		●	
Human Health and Safety	●	●	●	●	●	●	●	●	●
Land use	●	●	●	●	●	●	●	●	●
Noise	●	●	●	●	●	●	●	●	
Wastes & Materials		●	●	●	●	●		●	●
Soils		●	●	●		●	●	●	●
Socioeconomics	●	●	●	●	●	●	●	●	●
Surface Water	●		●			●	●	●	●
Transportation/Traffic	●	●	●	●	●	●		●	●
Utilities	●	●	●	●	●	●	●	●	
Wetlands	●							●	
Public Controversy	●		●			●		●	●
Permits	●	●	●	●	●	●	●	●	●
Mitigation	●	●		●	●	●		●	●

(Blank) No impacts expected.
● Potential to be minor adverse or beneficial impacts or there are unknowns of possible minor concern.
● Potential to be moderate adverse impacts or there are unknowns of possible moderate concerns.
● Potential to be major adverse impacts or there are unknowns of possible major concerns.

5. REFERENCES

DOE 2009 U.S. Department of Energy, National Energy Technology Laboratory, *Recovery Act – Smart Grid Demonstrations, Funding Opportunity Number: DE-FOA-0000036*, June 25, 2009.