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## 1 Executive Summary

AES New York Energy Warehouse is:

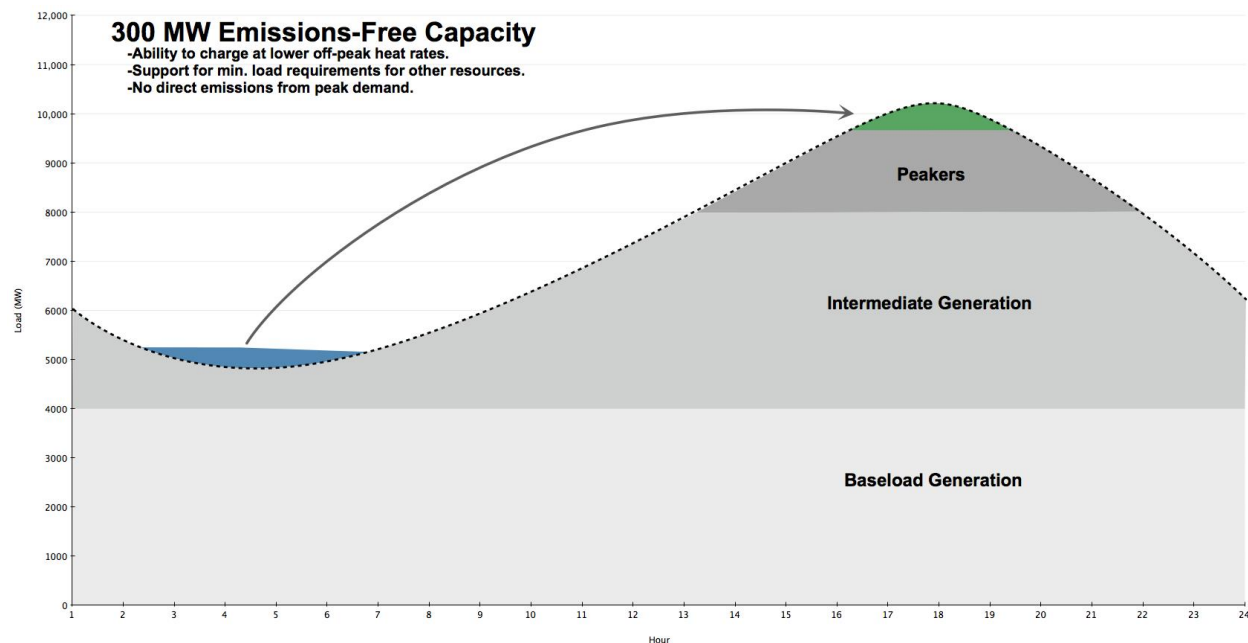
- Enhanced system reliability with no direct emissions.
- Emissions reductions greater than 174 MW solar PV.
- Efficient use of New York's transmission, generation and clean energy resources.
- Operational benefit of a pumped hydroelectric generator located in or near NYC.

### 1.1 Introduction

AES Energy Storage, LLC ("the Proposer"), a subsidiary of The AES Corporation ("AES"), is pleased to submit this proposal for 300 MW of flexible, emission-free capacity to be supplied from AES New York Energy Warehouse ("the Project") in response to the NYPA RFP No. Q13-5441LW Contingency Procurement of Generation and Transmission, dated April 3, 2013.

The Project will significantly advance New York's public policy objectives of moving toward a modern, efficient and environmentally sustainable electric power system by implementing a landmark innovative clean energy project.

The Project enhances electric system reliability without producing emissions in the New York load area, reduces overall system emissions and improves generation portfolio fuel efficiency. It catapults forward New York's public policy objectives of modernizing the generation fleet, supporting clean energy and driving technology innovation to a degree unmatched by any other cost-effective reliability project. Its 3 x 100 MW configuration of advanced battery energy storage units provides NYPA with the planning flexibility to select 100 MW, 200 MW or 300 MW of reliability across up to three distributed sites. Its development schedule places less value at risk during early stages, reducing the risk to NYPA and ratepayers of a Halting Order.





## 1.2 Project Benefits

### 1.2.1 The Project enhances reliability of the electric system in New York.

The Project will safely provide up to 300 MW of firm capacity to meet peak load requirements in or near New York City – where it is needed most. It will be interconnected across three sites in Zones I, J or K: Westchester County, New York City or Long Island. The use of advanced energy storage technology is a modern emissions-free alternative to the addition of natural gas combustion turbine power plants in urban areas. These inefficient natural gas “peaker” plants produce local emissions and are very low utilization – 0-5% for the older plants of this type and 2-15% for newer ones – due to their high cost of generation. Comparatively, the Project contributes to reliability in all hours by being continuously synchronized to the grid, available to serve peak loads while also supporting the security and efficiency of the transmission system by providing ancillary services.

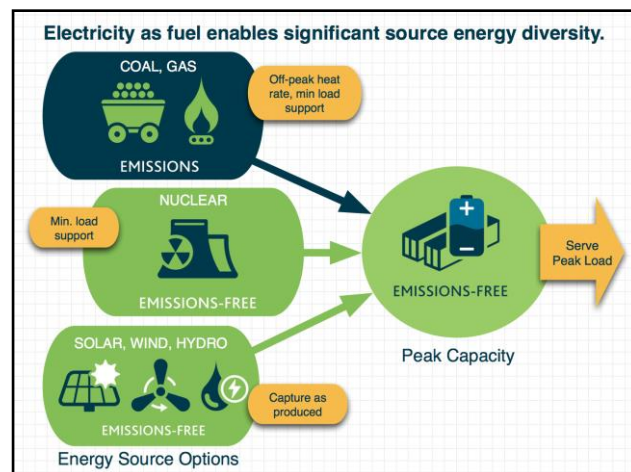
The Project provides enhanced reliability by carrying relatively fewer risks than traditional sources of capacity:

- It does not require air permits. Natural gas peaking plants are often subject to run hour limitations based on their total emissions. The Project creates no direct emissions.
- It does not have large single points of failure. Natural gas peaking plants introduce risk to system reliability of losing 100 MW of capacity at a time if a turbine equipment failure or other fault occurs. The Project is modular – each 100 MW unit is an array comprised of 2 MW building blocks. The reliability impact of any single component failure is minimal.
- It does not rely on natural gas transportation or storage. Natural gas peaking plants do not always have firm access to firm fuel supplies. The Project uses electricity as fuel, so as long as it is interconnected and synchronized to the grid, it has fuel supply.

### 1.2.2 The Project reduces system emissions and improves generation fuel efficiency.

AES New York Energy Warehouse provides New York with a place to “park” clean energy close to where it is used during off-peak hours when the state’s abundant clean energy resources have unused capacity and traffic on the Energy Highway is light. During these hours of low demand New York’s hydroelectric, wind, and natural gas combined cycle power plants are not fully utilized. With access to AES New York Energy Warehouse, their output can be stored and used during hours of high demand, displacing the use of 1,200 MWh of inefficient “peaking” plants that have higher emissions rates and are more sensitive to price volatility in natural gas markets. The Project provides access to a cleaner and more diverse fuel mix during on-peak hours – whether or not the Indian Point Energy Center retires.

Drawing on stored clean energy during peak hours will reduce the overall system





emissions and improve the fuel efficiency of the generation fleet. See Appendix 01 for an analysis of the Project’s air emissions benefits and fuel price volatility benefits.

**1.2.3 The Project provides NYPA with unparalleled planning flexibility.**

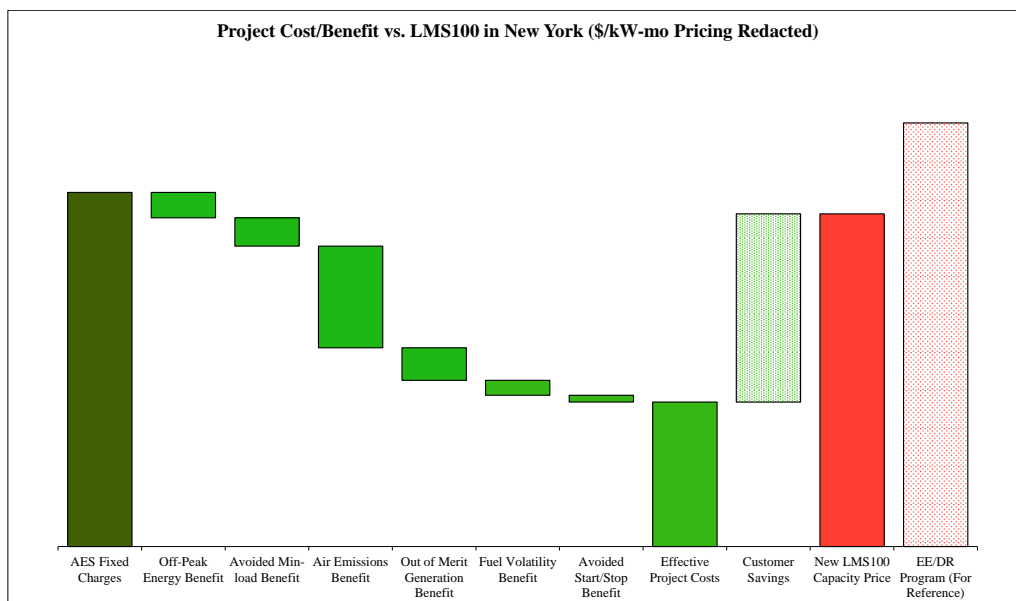
The Project provides a flexible configuration of 100 MW, 200 MW, or 300MW of capacity located within the target load zones to best suit the needs of New York and complements and enhances the value of other new resource selections. As NYPA evaluates the next generation of resources to power New York, planning flexibility is crucial to maintaining optionality and minimizing costs. The Project has the best development profile and flexibility provisions for reducing the costs associated with the Halting Order.

The limited permitting profile of the Project allows for a shorter time-to-market versus traditional generation facilities. It requires no air permits, process water use and has minimal land use, viewshed and noise impacts. The major equipment is substantially factory-built and installed on site, which shortens the lead-time and construction timeline relative to traditional generation equipment. The Proposer has industry-leading experience in the deployment and operations of similar facilities. These features improve the project feasibility, project viability, and Halting Cost risk of the Project.

**1.3 Project Cost-Effectiveness**

**1.3.1 The Project delivers more value to NYPA and ratepayers than other flexible generation alternatives.**

[REDACTED]



The following table compares the Project to potential alternatives in the areas of operational flexibility, efficiency, environmental impact and project risks.

**Comparative Characteristics of AES New York Energy Warehouse**



Characteristics		300 MW Peaker (3 x 100)	500 MW CCGT	AES 300 MW BESS (3 x 100)
Operational Flexibility	Hours Synchronized	<10%	80%	>95%
	Startup Time	15 min	Up to 4 hrs	1 min
	Regulation	30 MW/min	12 MW/min	600 MW/min
	Spinning Reserve	30 MW/min	12 MW/min	600 MW/min
	Voltage Support	Rarely Synched	Yes	Yes, ±300 MVAR
	Min. Load Req.	150 MW	200 MW	0 MW
	Primary Fuel Diversity	Gas, FO	Gas	Any base fuel, including wind
Efficiency	Heat-rate	10,500	6,765	7,731 <sup>1</sup>
	Controllable Load	No	No	Yes, 0-300 MW
Environment	Direct Emissions	Significant	Moderate	None
	Water Requirement	Yes	Yes	No
	Emissions Reduction <sup>2</sup>	Limited	Significant	75% NO <sub>x</sub> , 5% SO <sub>2</sub> , 2% CO <sub>2</sub>
Risks	Fuel supply	High	High	Low
	Fuel price volatility	High	High	Low (off-peak electricity)
	Air Permits – limited run hours	High	High	N/A
	Site Permits	High	High	Low
	Community Acceptance	High	High	Minimal
	Halting Mechanism	High	High	Low

### 1.4 Conclusion

New York has initiated a bold undertaking to modernize its electric system, and this RFP is a critical step forward in selecting a generation portfolio appropriate for a modern grid. Partnering with AES in this landmark innovative clean energy project will enhance reliability and harness the most value out of existing and future investments in clean energy and transmission. New York can expand its tradition of enjoying the value of energy storage, as it has for over 40 years with pumped hydroelectric plants in the state, but in a form suitable to power its economic growth for years to come.

AES knows the value energy storage delivers across our own platform and to power market customers we serve, so our offering brings with it the strength of a confident value proposition, deep supply chain relationships, and unparalleled operational experience.

AES New York Energy Warehouse is:

- Enhanced system reliability with no direct emissions.
- Emissions reductions greater than 174 MW solar PV.

<sup>1</sup> Based on AC-AC round-trip efficiency of 87.5% and charging source of electricity with 6765 BTU/kWh (CCGT).

<sup>2</sup> Full year emissions reduction versus a CT unit in Zone J. See Appendix 01 for calculations.



- 
- Efficient use of New York's transmission, generation and clean energy resources.
  - Operational benefit of a pumped hydroelectric generator located in or near NYC.

**For a guide to the proposal's responsiveness to NYPA's RFP and evaluation criteria please see Appendix 12.**





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## 2 Project Description

The Project is a 300 MW advanced energy storage capacity resource located across three 100 MW sites in Zones I, J and K. It will provide unmatched reliability by remaining synchronized to the grid at near zero cost at all times, by providing a 600 MW flexible operating range that can be dispatched in under one second, and by allowing the utilization of valuable transmission and generating assets during uncongested time periods.

### 2.1 Project Location & Point(s) of Interconnection

[REDACTED]

### 2.2 Fuel Supply

The Project does not use any gas or liquid fuels. Grid electricity is the fuel for the Project, similar to a “closed loop” pumped-storage hydroelectric facility. The Project’s fuel (electricity) transportation will occur over the NYISO-operated high-voltage transmission system. Access to the transmission system will be a necessary condition for the Project to provide capacity and to operate. The Project will have access to fuel (electricity) as long as Project is able to synchronize to the transmission system.

The use of electricity as a fuel mitigates risk relative to a single fossil fuel price index, offering built-in fuel diversity. The price index for periods when the Project is withdrawing energy, likely often to be off-peak periods, will vary depending on the marginal fuel in the NYISO and the respective zone off-peak supply mix. The change over time in the supply mix allows the Project to offer NYPA a unique opportunity to procure power whose emissions profile actually improves over time, as the supply-mix is increasingly comprised of lower-emission sources.

### 2.3 Environmental Impact

The environmental benefits of the Project are discussed in more detail in Section 7, but are summarized here.

The Project will provide a dynamic power resource with no direct emissions, with limited land use and impact, and with no need for fuel or water usage. The facility will be powered by advanced battery energy storage devices that are sealed and require no handling of chemicals or fuels. There will be no air emissions or discharge of toxic chemicals. Water use will be limited to human consumption and use in an on-site restroom. Furthermore, the Project has the following environmental benefits:

- It will displace combustion turbines, eliminating their emissions;
- It will act as a dispatchable load resource, and can be used to stabilize load and reduce cycling on conventional thermal plants;
- It will follow load changes faster than conventional units, reducing emissions and inefficiencies associated with cycling thermal units;
- It will reduce out-of-merit generation allowing more efficient dispatch of the cleanest, most efficient and cheapest existing generation sources;
- It can provide frequency regulation (either primary or secondary) and allows more thermal units to operate at their optimal efficiency, reducing emissions and fuel use;





- It has no minimum load (hence no emissions) and can go from zero output to full power in as little as 200 milliseconds. It is always synchronized to the grid, 24/7, even if it is not charging or discharging, eliminating emissions from standby and reserve unit minimum generation levels.

This Project has no emissions, can be located nearly anywhere near the electric transmissions system, and will reduce generation fleet emissions through improved fuel efficiency and optimization of dispatch.

## **2.4 Community Impact**

### **2.4.1 Benefits to the Local Economy**

The Project will make a direct and an indirect contribution to property taxes in the communities where it is located. The indirect long-term property tax benefit is expected due to an increase of land value in the communities. As described in greater detail in Section 7, the Project will significantly reduce emissions.

External studies have shown that increased air and water quality increases the land value of nearby properties. In addition to a value increase of property for the landowners, the taxable base would increase at the same time. Competing conventional generation resource are likely to have negative property value impacts related to viewshed, noise, land use, emissions and fuel transportation and storage infrastructure.

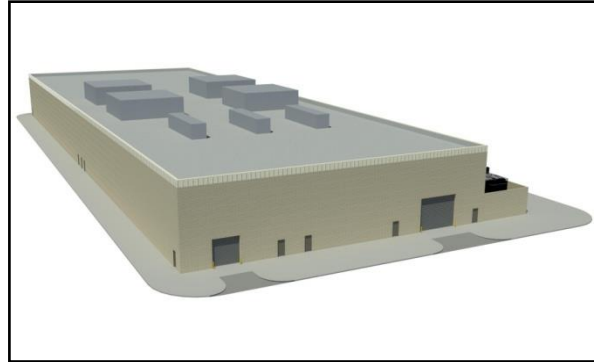
### **2.4.2 Impact on Jobs**

The project will create approximately 360 jobs during the preparation of the sites, construction of the buildings, installation of the energy storage units and integration of the facilities with the grid. Approximately 5 high-skilled jobs will be created for the operation and maintenance of the facility. Outside contractors will also be hired to provide certain highly-skilled maintenance functions. The direct and indirect effect of Project construction is estimated at \$28 million.

In addition, the Project will have positive effects on generating new energy storage and renewable energy jobs in the New York City area. This cluster effect would be supported by clean energy conferences, visiting international specialists, and other events that could occur out of an installation of the Project in New York City.

### **2.4.3 Aesthetic Issues**

We expect the Project to be located close to existing substations. It will resemble a data center or warehouse building in design, so it can jump-start or contribute to the revitalization of a community. A rendering of a representative building is shown in the graphic below. In other New York developments, this type of facility was considered attractive to local economic development leaders since it improved power quality for nearby industrial customers, added an attractive facility to the community, replaced less desirable land uses, and had a low need for community services.



## **2.5 Electrical Characteristics**

[REDACTED]



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## **3 Proposer Experience**

### **3.1 Business and History**

#### **3.1.1 The AES Corporation**

The AES Corporation is a US-based, Fortune 500 power company that owns and operates a diverse portfolio of electricity generation and distribution businesses. AES provides reliable, affordable energy to customers in 25 countries on five continents. AES's electric power generating assets include facilities totaling 38,425 MW of capacity and 13 distribution utility businesses. AES is a reliable partner for utilities, power system operators, and financing institutions worldwide. A more complete listing of AES's generation and utilities businesses can be found in Appendix 09: AES Corporation Fact Sheet.

AES built its first power plant in 1985 in Texas, which was also one of the first competitive power plants in the United States. During AES's initial five years, it added an additional three plants in three states in the US and began looking for opportunities to take its financing, construction and operational know-how global. Within ten years, AES was a publicly traded company (NYSE: AES) with assets of \$1.4 billion. Over the past three decades, AES has helped drive electric energy sector growth and pioneered advances in many markets, generating global industry leadership from innovation and operational excellence.

Today, AES' power plants encompass a broad range of technologies and fuel types, from coal to gas to renewables such as wind, solar, hydro and biomass, and energy storage. Our utilities power major cities from São Paulo to Indianapolis, imbuing us with the insights necessary to meet the needs of unique customers such as NYPA.

AES' work safely brings sustainable and affordable energy – and a better quality of life – to people throughout the world. AES derives satisfaction from knowing that what the company does improves millions of lives around the world. It commits corporate resources to social responsibility initiatives where the company does business and empowers its people to contribute their time and effort in support of local programs for social improvement.

Throughout the history of the company, the people of AES have always stayed at the forefront of change, working as a positive force in the energy sector as well as the communities in which they work and live. With significant global reach, deep local knowledge and distinctive operational skills, AES will continue to expand into new energy and infrastructure markets worldwide.

#### **3.1.2 AES Energy Storage**

Established in 2007, AES Energy Storage is a wholly owned subsidiary of The AES Corporation. This company is a leader in the development, construction, and operations of advanced storage projects that provide emissions-free capacity to improve the performance and reliability of today's power grid. Emissions-free capacity is a clean, fast and flexible power system resource that helps utilities, power markets and generators manage the variability of electric supply and demand on the grid, reduce operating costs, and meet future power system needs.



AES has accumulated an unmatched record of safely deploying advanced energy storage projects at increasing scale in five different Regional Transmission Operator systems within the United States, as well as in the northern grid of Chile. AES currently has 150MW resource equivalent of energy storage in commercial operations and over 1,000 MW in development. Over five years of operations, AES’s energy storage facilities have achieved equivalent availability in excess of 95%, comparable to the best performing thermal power units. A complete list of AES energy storage projects is shown below:

Project Name / Location (ISO)	Interconnection Capacity	Resource Capacity	COD
<b>Commercial Projects</b>			
Cochrane Atacama, Chile (CDEC-SING)	20 MW	40 MW	2014 (expected)
PJM (Unannounced)	20 MW	40 MW	2013 (expected)
Angamos Atacama, Chile (CDEC-SING)	20 MW	40 MW	2011
Laurel Mountain Elkins, WV (PJM)	32 MW	64 MW	2011
Johnson City Johnson City, NY (NYISO)	8 MW	16 MW	2010
Los Andes Atacama, Chile (CDEC-SING)	12 MW	24 MW	2009
<b>Total Commercial Projects</b>	<b>112 MW</b>	<b>224 MW</b>	
<b>Pilot Projects</b>			
Barbados Norristown, PA (PJM)	1 MW	2 MW	2008
Redstone Pasadena, TX (ERCOT)	1 MW	2 MW	2010
Sano Huntington Beach, CA (CAISO)	2 MW	4 MW	2008-2012
Carina Indianapolis, IN (PJM)	2 MW	4 MW	2007-2008
<b>Total Demonstration Projects</b>	<b>6 MW</b>	<b>12 MW</b>	

AES has developed a strong network of qualified technology suppliers under preferential terms. The company has worked closely with power system operators to model and implement dispatch approaches that take advantage of the unique characteristics of fast-response storage. This work has led to the creation of patented control protocols that enable the most effective use of storage on the grid. These capabilities provide unmatched benefits to leading power systems customers within established industry contracting structures.

AES performs a detailed analysis of the customer utility’s generation supply and transmission reliability needs in order to develop an energy storage project proposal. The Proposal uniquely combines the wholesale provision of capacity, energy and ancillary services with avoided cost value derived from the locational benefits of having capacity resources embedded within the



transmission network. These benefits include transmission upgrade avoidance and deferral, avoided emissions and avoided cost of operating and maintaining expensive out-of-merit or must-run generation.

### **3.2 Generation and Transmission Experience**

As of March 2013, AES owns and manages \$43 billion in assets, with a total generating capacity of 38,425 MWs across 25 countries and 5 continents, including 13 utilities. AES also has 2,443 MW of new generation under construction. A more complete listing of AES’s generation and utilities businesses can be found in Appendix 09: AES Corporation Fact Sheet.

AES businesses have repeatedly been recognized with prestigious industry awards such as the Edison Electric Institute’s Edison Award and *Project Finance* magazine’s Power Deal of the Year award. Selected examples are below.

Award		Project/Business	Year
Edison Award	EEI	AES Gener Angamos	2012
Edison Award	EEI	AES Philippines Masinloc	2010
Edison Award	EEI	AES Latin America	2007
Plant of the Year	<i>Power</i>	AES Gener Angamos	2012
Wind Project of the Year	<i>Renewable Energy World</i>	AES Laurel Mountain	2012
Power Deal of the Year: Asia Pacific	<i>Project Finance</i>	AES Vietnam Mong Duong	2011
Power Deal of the Year: Latin America	<i>Project Finance</i>	AES Gener Nueva Ventanas	2008
Power Deal of the Year: EMEA	<i>Project Finance</i>	Maritza East 1 (Bulgaria)	2006
Power Deal of the Year: Latin America	<i>Project Finance</i>	AES Argentina Parana	2000

### **3.3 NYISO Membership and Experience**

AES is a member of the NYISO and currently operates a battery-based storage facility near Binghamton, NY. This facility provides services into the NYISO power market and was the first battery based resource to achieve Exempt Wholesale Generation status. The proposer commits that the Project entity will also become a member of NYISO as required.

AES has previous experience as a generation owner and operator in the New York market. In 1999, AES acquired four coal-fired power plants from NYSEG, totaling 1,169 MW of generating capacity. These plants were operated in the NYISO by AES through 2012.



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### **3.4 Environmental Permitting Experience**

In 2010, the Proposer received a negative declaration pursuant to New York’s State Environmental Quality Review Act (SEQRA) for the construction of a battery energy storage facility. The proposed Project would similarly not result in any significant adverse environmental impacts. Battery energy storage resources emit no air emissions, do not consume process water, and have minimal noise and viewshed impacts.

The New York Public Service Commission, as lead agency, issued the negative declaration pursuant to New York’s State Environmental Quality Review Act (SEQRA) upon review of a completed long form Environmental Assessment Form (EAF) submitted by a subsidiary of the Proposer in development of the Proposer’s Johnson City project. The Johnson City project also obtained the following permits from the Town of Union:

- Aquifer Permit;
- Special Permit for floodplain development;
- Site Plan Approval; and
- Building Permit.

Below are select excerpts from New York Public Service Commission case 10-E-0042, Order Granting a Certificate of Public Convenience and Necessity, April 15, 2010:

- “As Lead Agency, we determine that the proposed action will not have a significant impact on the environment and adopt a negative declaration pursuant to SEQRA.”
- “NOTICE is hereby given that the Public Service Commission as lead agency has determined that the action under consideration in this proceeding, the granting of a Certificate of Public Convenience and Necessity for the construction of an electrical energy storage facility and ancillary structures, will not have significant adverse impacts on the environment. An Environmental Impact Statement will not be prepared in connection with the potential action. This determination is made pursuant to Part 617 of the implementing regulations pertaining to the State Environmental Quality Review Act, Article 8 of the Environmental Conservation Law.”
- “A review of the environmental assessment form (EAF) prepared regarding the action contemplated, and the other supporting documentation, demonstrates that the action under consideration would not result in any significant adverse environmental impacts.”

A similar AES Energy Storage project was permitted in California with a finding of no significant impact under the California Environmental Quality Act (CEQA). Battery energy storage projects at existing generation facilities in West Virginia and Ohio received waivers of filing site certificate amendments with the West Virginia Public Service Commission and the Public Utilities Commission of Ohio because they were not considered major modifications to the existing permitted facilities.

### **3.5 Project Management Team**

AES has developed new power resources in New York, throughout the United States, and in many countries worldwide for more than thirty years. For the Project, the team will draw on expertise in construction, permitting, development, financing, and operations from across AES.



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The core AES Project Team has an unmatched track record for project design, permitting, construction and long-term operational management successes related to advanced storage capacity resources. The experience of AES Energy Storage personnel is outlined in the brief individual resumes below.

**Chris Shelton, President, AES Energy Storage**

As President of AES Energy Storage, LLC, Chris Shelton leads the AES Corporation business unit. He has over 18 years of technology related development and systems architecture experience at AES and has been a leader in the origination of new business efforts at AES. These efforts include the launch of a retail electricity business where he pioneered the bundling of environmental offsets with customer electricity consumption and began the first AES wind development efforts. He holds a Bachelor of Science in Physics and is currently serving as the Chairman of the Board of the Electricity Storage Association and a member of the Department of Energy Electricity Advisory Committee.

**John Zahurancik, Vice President, Development and Deployment, AES Energy Storage**

As a co-founder of the AES storage business, Mr. Zahurancik has been involved in the construction and operation of grid scale storage projects from Chile to New York. Among his recent projects, he has permitted the first storage system to qualify as an exempt wholesale generator, managed the installation of the largest lithium-ion battery system on the grid, and is in active development of advanced storage projects globally. Since joining AES in 2000, he has managed early and growth stage efforts in the U.S. retail electricity markets, wholesale telecom services, and smart grid. Mr. Zahurancik holds a Master of Public Policy from the University of Michigan and a Bachelor of Science in Economics and Social Science from the Florida State University.

**Praveen Kathpal, Vice President, Market Development, AES Energy Storage**

Mr. Kathpal's responsibilities span energy storage project development and market development globally across AES's platform. In addition to storage project development, Mr. Kathpal is active with FERC, state PUCs, and state energy officials in the design of programs to realize the benefits of energy storage for utilities, power systems, and their customers. Prior to joining AES, Mr. Kathpal was a consultant in the wholesale power group at ICF International, performing economic analyses for clients in every major U.S. market, Latin America and the Middle East. He holds a BA in Economics from the University of Virginia. Mr. Kathpal is currently serving as the Vice Chair of the Electricity Storage Association Advocacy Council.

**Brett Galura, Vice President, Solution Development, AES Energy Storage**

In his 18 years at AES, Mr. Galura has architected and managed the deployment of multiple, global, information technology projects, overseen commercial operations development in an AES retail electricity business, co-founded an AES telecom business and directed AES' IT operations expansion in Asia and the Middle East. In his current role with AES Energy Storage he is responsible for technology selection, integration design, controls development and market and system modeling.





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**Brian Perusse, Director, Development, AES Energy Storage**

Working with leading utilities, Mr. Perusse focuses on identifying and developing proposed capacity projects, quantifying the benefits of emissions-free capacity, negotiating power purchase agreements (PPAs), selecting and permitting each site, and arranging financing. He is the Project Director for the company's proposed 400 MW energy storage project in Long Island. Previous roles at AES Energy Storage include Project Director for the company's 32 MW energy storage project in West Virginia, USA and the 20 MW energy storage project in Ohio, USA. Prior to joining AES Energy Storage, Mr. Perusse worked for a number of renewable energy firms such as AES Solar, SunEdison, and the Alternative Energy Store. He holds an MBA from Georgetown University and a Mechanical Engineering Degree from Cornell University. Mr. Perusse is currently serving as a Board Member of the New York Battery & Energy Storage Technology Consortium (NY-BEST).

**Chad Canfield, Director, Project Finance, AES Corporation**

Mr. Canfield joined AES in September 2006 and has 13 years of experience in project finance. In addition to structuring and execution, Mr. Canfield is responsible for managing and coordinating international banking relationships, including multilateral and development bank relationships, and supporting subsidiaries with non-recourse debt compliance. Mr. Canfield's experience covers transactions across all fuel types, including gas and coal fired facilities, plus wind and solar financings. Executed deals have also been geographically diverse, covering the Americas, Europe, the Middle East, Africa and Asia. Prior to joining AES, Mr. Canfield worked as Vice President at Union Bank of California in Los Angeles. During his seven years in the Power & Utilities group, Mr. Canfield originated, structured and underwrote corporate, utility and non-recourse financings. Mr. Canfield holds a Bachelor's degree in Accounting and Finance from the University of Montana.

**Piers Lewis, Director, Program Management, AES Energy Storage**

Piers Lewis is Director of Program Management at AES Energy Storage. Mr. Lewis is responsible for the delivery of energy storage projects from development handover through to commercial operations. Mr. Lewis maintains the deployment program to drive late stage development, permitting, interconnection, procurement, construction, and commissioning works, and implements this program for delivery of projects. Mr. Lewis has more than 20 years of experience in the global electricity industry, and has proven success in developing, constructing and operating renewable generation and new technology projects. Mr. Lewis holds a Master's degree in Energy and Resources from UC Berkeley, and a BSE in Mechanical Engineering from the University of Michigan at Ann Arbor.

**Dauren Kilish, Director, Operations, AES Energy Storage**

Dauren Kilish is the Director of Operations for AES Energy Storage. Mr. Kilish will coordinate system start-up and commissioning, as well as managing ongoing operations. He has been instrumental in developing, connecting, and creating operational management plans for energy storage projects with an unmatched safety and operational performance record. Mr. Kilish is the former plant manager of AES Placerita in Southern California and has held positions as the Manager of Instrumentation and Electrical Maintenance. He has a Bachelor's degree in Mechanical Engineering and a Master's of Business Administration from University of



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California Irvine. He has been in power generation business for 13 years and was previously involved in power plant O&M, business development and project management.

**Jay Geinzer, Technical Modeling Director, AES Energy Storage**

Mr. Geinzer is a Director of Solution Development for AES Energy Storage. He conducts engineering studies and technical analysis of battery energy storage systems for AES Energy Storage, and is responsible for writing the Storage Operating System that is used in its energy storage facilities. He has several patent applications pending, including one for integrating energy storage devices with intermittent renewable generation.

**Casey Jacobson, Solution Development Manager, AES Energy Storage**

Casey Jacobson is in the Solution Development group at AES Energy Storage, and primarily works on supplier selection and equipment specification of battery and inverter systems. He has been in the power industry for 8 years and has a background in power converter design and utility-scale power systems modeling. Mr. Jacobson holds a Bachelor's degree in Electrical Engineering from Princeton University.



## 4 Project Information

### 4.1 Contact Information

Proposer :  AES Energy Storage, LLC 4300 Wilson Boulevard Suite 1100 Arlington, VA 22203 703-522-1315 <a href="http://www.aesenergystorage.com">www.aesenergystorage.com</a>	Parent Company :  The AES Corporation 4300 Wilson Boulevard Suite 1100 Arlington, VA 22203 703-522-1315 <a href="http://www.aes.com">www.aes.com</a>	Contact Person :  Brian Perusse 4300 Wilson Boulevard Suite 1100 Arlington, VA 22203 703-682-4635 brian.perusse@aes.com
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### 4.2 Legal Status, Ownership Status and DUNS Number

<b>Proposer</b>	<b>AES Energy Storage, LLC</b>
Sponsor	AES Energy Storage, LLC
Legal Status	Limited Liability Company
Date Formed	May 11, 2007
Jurisdiction	State of Delaware
Ownership Status	Wholly owned subsidiary of The AES Corporation, a publicly traded company (NYSE: AES), incorporated in the State of Delaware.
Relevant Affiliates	The Proposer will create a special-purpose Project entity to serve as the Seller, which is represented by the Proposer in this proposal.
DUNS Number	828373329
Federal EIN	26-3304129



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## 5 Disclosure Statements

### 5.1 Disclosure of Defaults or Noncompliance

The Proposer is an indirect subsidiary of The AES Corporation. The AES Corporation operates a portfolio of electricity generation and distribution businesses on five continents in 25 countries. From time to time subsidiaries of The AES Corporation may be in default or noncompliance with obligations related to the sale or purchase of power but these events are not material to the Proposer or The AES Corporation. AES Energy Storage, LLC and its subsidiaries (the “Energy Storage Entities”), including the officers, directors, or partners of the Energy Storage Entities have not defaulted and are not in noncompliance with any obligation related to the sale or purchase of power, transmission or natural gas.

The AES Corporation and its affiliates are involved in certain claims, suits and legal proceedings in the normal course of business. A description of some of these proceedings can be found in its Form 10-K for the year ending December 31, 2012, which can be found under SEC Documents on AES’s web site ([www.aes.com](http://www.aes.com)) or the electronic submissions accompanying Appendix 08: AES Corporation Audited Financial Statements. The Energy Storage Entities, and the officers, directors, and partners of the Energy Storage Entities are not the subject of a civil proceeding for conversion, theft, fraud, business fraud, misrepresentation, false statements, unfair or deceptive business practices, anticompetitive acts or omissions, or collusive bidding or other procurement- or sale-related irregularities.

### 5.2 Disclosure of Convictions

The Energy Storage Entities, and the officers, directors, and partners of the Energy Storage Entities have not been convicted of any felony or any crime related to the sale or purchase of power (capacity, energy and/or ancillary services), transmission, or natural gas, conversion, theft, fraud, business fraud, misrepresentation, false statements, unfair or deceptive business practices, anti-competitive acts or omissions, or collusive bidding or other procurement- or sale-related irregularities.



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## **6 Financial Capacity**

[REDACTED]



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## 7 Environmental Benefits

### 7.1 Environmental Benefits

The Project will have both direct and indirect environmental benefits. The direct environmental benefits include:

- **Zero air emissions:** The Project is powered by advanced battery energy storage units and does not have direct emissions. The Project does not emit any air pollutants or greenhouse gases.
- **Zero water consumption/emissions:** The Project does not use or consume water as part of its operation. Water usage is an environmental attribute that must be accounted for when evaluating new power generation options. The Project exhibits a unique water consumption profile that is limited to human consumption and use in the on-site bathroom.
- **No Toxic Chemicals:** No toxic chemicals will be stored on site; the batteries are sealed and their chemistry is not toxic.

Because of its zero emission profile the Project can be located nearly anywhere. For example, it can be located in a NO<sub>x</sub> non-attainment zone, where it can charge during off-peak hours using electricity from more efficient upstate generation, and then discharge on-peak without adding to local NO<sub>x</sub> emissions. It will also be unaffected by any local water shortages.

The indirect benefits result from the effect that the Project will have on emissions from the existing generation fleet. The Project will increase the efficiency and reduce emissions from existing generators by allowing them to run at more optimal generation setpoints, avoiding cycling of units, and displacing the need for generation from the least efficient units during peak hours. These benefits are discussed below.

#### 7.1.1 Benefits During Peaking

As part of a typical dispatch day, the Project would be expected to operate as a peaking power resource during on-peak hours and a load resource during off-peak hours. This means it would charge off-peak and discharge on-peak, in addition to performing grid support services around the clock.

As a load resource during off-peak hours, the Project can provide minimum load support to increase the capacity factor of combined cycle units. The high-speed response of the Project allows it to follow load faster and more effectively than a thermal unit, so it can also reduce or eliminate thermal unit cycling. This will minimize emissions from the combined cycle fleet off-peak.

On-peak the Project is a zero-emissions peaker. The 300 MW Project will replace 300 MW of peaking capacity, which will generally be the oldest, least efficient and dirtiest units in the fleet,



with power that was generated off-peak by the newest, cleanest, most efficient generation in the fleet. For example, if the Project charged from the Astoria combined cycle units off-peak and offset generation from some of the Astoria combustion turbine units on-peak then the Project would save 1,291 tons of NO<sub>x</sub> and over 172,000 tons of CO<sub>2</sub> emissions annually.

### **7.1.2 Benefits During Frequency Regulation**

Fast-ramping thermal generation units have typically provided frequency regulation services due to the intense demands of the AGC dispatch signal sent by NYISO. New gas turbines, such as the LMS100, have been optimized to manage the requirements of this service but are still less efficient than when running at full load or than it would be to run other more efficient units for the related energy. The Project is capable of delivering 300 MW of frequency regulation during the hours it is not charging or discharging at full capability. At least 1200 MW nameplate of gas turbines would be required to provide this same service since each 100 MW gas turbine has a minimum generation set point of 50 MW. The regulation capability of the Project is beyond the demands of the 200 MW NYISO market and thus the Project would only be able to sell a fraction of its ancillary services capabilities into the system. Assuming the Project will only sell 100 MW of frequency regulation, it would take 400 MW of inefficient, combustion turbines to provide the same amount of frequency regulation as the Project. The emissions benefit of providing this service from the Project versus inefficient thermal generation is significant. Some studies such as the KEMA study “Emissions Comparison for a 20 MW Flywheel-Based Frequency Regulation Power Plant” (January 18, 2007) show that the CO<sub>2</sub> emissions reduction from using energy storage for frequency regulation in place of a gas peaker plant ranges from 43% to 70%, depending on the average emissions in the different systems.

### **7.2 Project Emission Profile**

The Project has no direct emissions.

### **7.3 Greenhouse Gas Emissions**

The Project has no greenhouse gas emissions.

### **7.4 Air Toxic Emissions – Mercury**

The Project has no mercury or other air toxic emissions.

### **7.5 Criteria Air Pollutants**

The Project has no criteria air pollutants.

### **7.6 Energy Highway Blueprint Clean Energy Goals**

The Energy Highway Blueprint clean energy goals fall into three categories: supporting repowering, encouraging renewables and reducing greenhouse gas emissions. The Project supports all three of the goals and effectively serves as an Energy Warehouse along the Energy Highway.





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### 7.6.1 Supporting Repowering

The previous discussion of the environmental benefits of supplying peaking power from the Project illustrates how this project supports repowering. The addition of the Project to New York's generation fleet will simultaneously reduce the need for peaking generation and provide off-peak support for combined cycle generation. This will facilitate the replacement of the older combustion turbine units with new state-of-the-art combined cycle units and will result in dramatic reductions in fleet emissions.

### 7.6.2 Encouraging Renewables

The Project will reduce technical barriers to increased renewable energy generation in New York. In the case of wind or solar power generation, output can vary substantially, unpredictably, and quite rapidly depending on weather conditions. For example, this unpredictability (and the rate of change in output) has become a significant challenge in Texas, which has the highest concentration of wind energy power in the United States. (See, e.g., ERCOT, Operational Requirements for Managing Wind Generation, July 20, 2010, available at <http://www.ercot.com/news/presentations/>.) The Project would provide fast control and ramping capability to mitigate this concern as the penetration of wind and solar generation increases in New York.

### 7.6.3 Reducing Greenhouse Gas Emissions

The previous discussion in Section 7.1 has described how the Project can produce immediate reductions in greenhouse gas emissions in New York by displacing the need for the least efficient thermal generation units during peak hours, allowing existing units to run at more efficient operating points, and minimizing cycling of thermal units.



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## 8 Development Plans and Schedule

[REDACTED]



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## **9 Environmental Review**

[REDACTED]



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## **10 Pricing**

[REDACTED]



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## **11 Contract Exceptions**

[REDACTED]



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## **12 Halting Costs**

[REDACTED]



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## 13 Other Requirements

### **13.1 Easements and Right-Of-Way Requirements**

The Proposer expects that rights-of-ways between 0.2 miles and 1.5 miles will be required to connect the 100MW units to the 69kV and 138kV interconnection points. The Proposer plans to work with neighboring land owners, ConEd or LIPA, and the local municipality to identify and procure the necessary easements and rights-of-way during the interconnection process. The siting flexibility permitted by the modular storage unit configuration will allow multiple parcels of land to be considered for siting at each interconnection point, which is likely to reduce the cost of right-of-way acquisition.

### **13.2 Economic Development and Job Creation**

The project will create approximately 360 jobs during the preparation of the sites, construction of the buildings, installation of the energy storage units and integration of the facilities to the grid. Approximately 5 high-skilled jobs will be created for the operation and maintenance of the facility. Outside contractors will also be hired to provide certain highly-skilled maintenance functions. The direct and indirect effect of Project construction is estimated at \$28 million.

In addition, the Project will have positive effects on generating new energy storage and renewable energy jobs in the New York City area. This cluster effect would be supported by clean energy conferences, visiting international specialists, and other events that could occur related to an installation of the Project in New York City.

The Project will make a direct and indirect contribution to property taxes. AES will discuss the components of a community benefits package, including a payment in lieu of taxes agreement (PILOT) with the local communities. This agreement will bring significant revenues to the local communities for the next 15 years.

An additional indirect long-term property tax benefit is expected due to an increase of land value in the communities. As laid out in more detail in the environmental benefit section, the Project will significantly reduce emissions in the New York City area. External studies have shown that lower air, water and other emissions increases the land value of affected properties. In addition to a value increase of property for landowners, the taxable base would increase at the same time. Further, any other resource is likely to have a negative property value impact related to viewshed, transportation of fuels by pipeline, rail and truck, and the large land use.





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## **14 Compliance Statement**

The Project will qualify as an "Installed Capacity Supplier" and the Project's expected output will qualify as "Installed Capacity." This status will be achieved because the Project will qualify as an "Energy Limited Resource" under the NYISO Rules as it will have the capability to operate at least 4 consecutive hours each day. Therefore, all products or services provided by its Project will be in compliance with all applicable legal and regulatory requirements.



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## **Appendix 01: Project Benefits Analysis & Calculations**



**AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability**



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[REDACTED]



AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability



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**Appendix 02: Article: *Energy and Infrastructure* "The Largest Plant"**



AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability



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## Appendix 03: NYPA Attachment 8: Pro Forma PPA and Exceptions



**AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability**



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[REDACTED]



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**Appendix 04: NYPA Attachments 2, 4 and 6**

***Appendix 04-A: Generation Project Data Sheet***

***Appendix 04-B: Pro Forma Financial Statements -- Generation***

***Appendix 04-C: Pricing Data Sheet -- Generation***





**AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability**



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[REDACTED]



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**Appendix 05: NYPA Appendices**

***Appendix 05-A: Non-Collusive Proposal Certification***

***Appendix 05-B: P.O. Address of the Bidder***

***Appendix 05-C: DUNS Number Information Form***

***Appendix 05-D: New York Power Authority Supplier Diversity Program Preliminary Subcontracting Form***

***Appendix 05-E: New York Power Authority Supplier Diversity Program Utilization Plan Form***

***Appendix 05-F: New York Power Authority Geographic Origin Form***

***Appendix 05-G: New York Power Authority Documentation Checklist***

***Appendix 05-H: New York Power Authority Contractor Staffing Plan***

***Appendix 05-I: Bidder/Contractor Disclosure of Contacts Form***

***Appendix 05-J: Contractor Disclosure of Prior Non-Responsibility Determination***

***Appendix 05-K: Contractor Certification of Compliance***

***Appendix 05-L: Contractor Disclosure of Accuracy Form***

***Appendix 05-M: Tax Law Requirements***



AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability



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## Appendix 06: 100MW Unit One Line Diagram



**AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability**



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[REDACTED]



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## Appendix 07: 100MW Unit Layout



**AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability**



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[REDACTED]



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## Appendix 08: AES Corporation Audited Financial Statements

***Appendix 08-A: AES Corporation 10-K (2012)***

***Appendix 08-B: AES Corporation 10-K (2011)***

***Appendix 08-C: AES Corporation 10-K (2010)***

Available in electronic submission:

Appendix 08-A: AES Corporation 10-K (2012)	[Appendix 08-A - AES Corporation 10-K (2012).pdf]
Appendix 08-B: AES Corporation 10-K (2011)	[Appendix 08-B - AES Corporation 10-K (2011).pdf]
Appendix 08-C: AES Corporation 10-K (2010)	[Appendix 08-C - AES Corporation 10-K (2010).pdf]

Also available on-line at [investor.aes.com](http://investor.aes.com).



AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability



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## Appendix 09: AES Corporation Fact Sheet





AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability



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## Appendix 10: Contractor Experience: Owner's Engineer



AES New York Energy Warehouse  
3 x 100 MW Capacity Resource  
Delivering Least-Cost Local Reliability



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## Appendix 11: Contractor Experience: EPC



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## Appendix 12: Responsiveness to RFP and Evaluation Criteria