Energy & Us

Classroom materials from the Jones Beach Energy & Nature Center

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ABOUT THE CENTER

The Power of Nature and the Nature of Energy

The Jones Beach Energy & Nature Center is a pioneering facility that explores the interplay between human action, energy use, and environmental conservation.

Located on the West End of Long Island's iconic Jones Beach State Park, the Center activates and interprets the coastal landscape in which it is situated. Exhibits, educational programs, and events explore how energy is transferred in nature and transformed into power for human use, and how energy consumption shapes the natural environment. As climate change reshapes landscapes on Jones Beach and across the globe, the Center brings energy, nature, and society together under the same roof, providing space for education, reflection, and inspiration about some of the most critical issues today.

The state-of-the-art facility is made possible through a partnership between the Long Island Power Authority (LIPA), the New York State Office of Parks, Recreation and Historic Preservation, and a consortium of public and private partners. As a primary sponsor of the Jones Beach Energy & Nature Center, LIPA provides operational support for the Center alongside New York State Parks. The Center serves a unique role in engaging the public around one of LIPA's most important priorities: transitioning to a clean, low-carbon energy future for Long Island and the Rockaways.

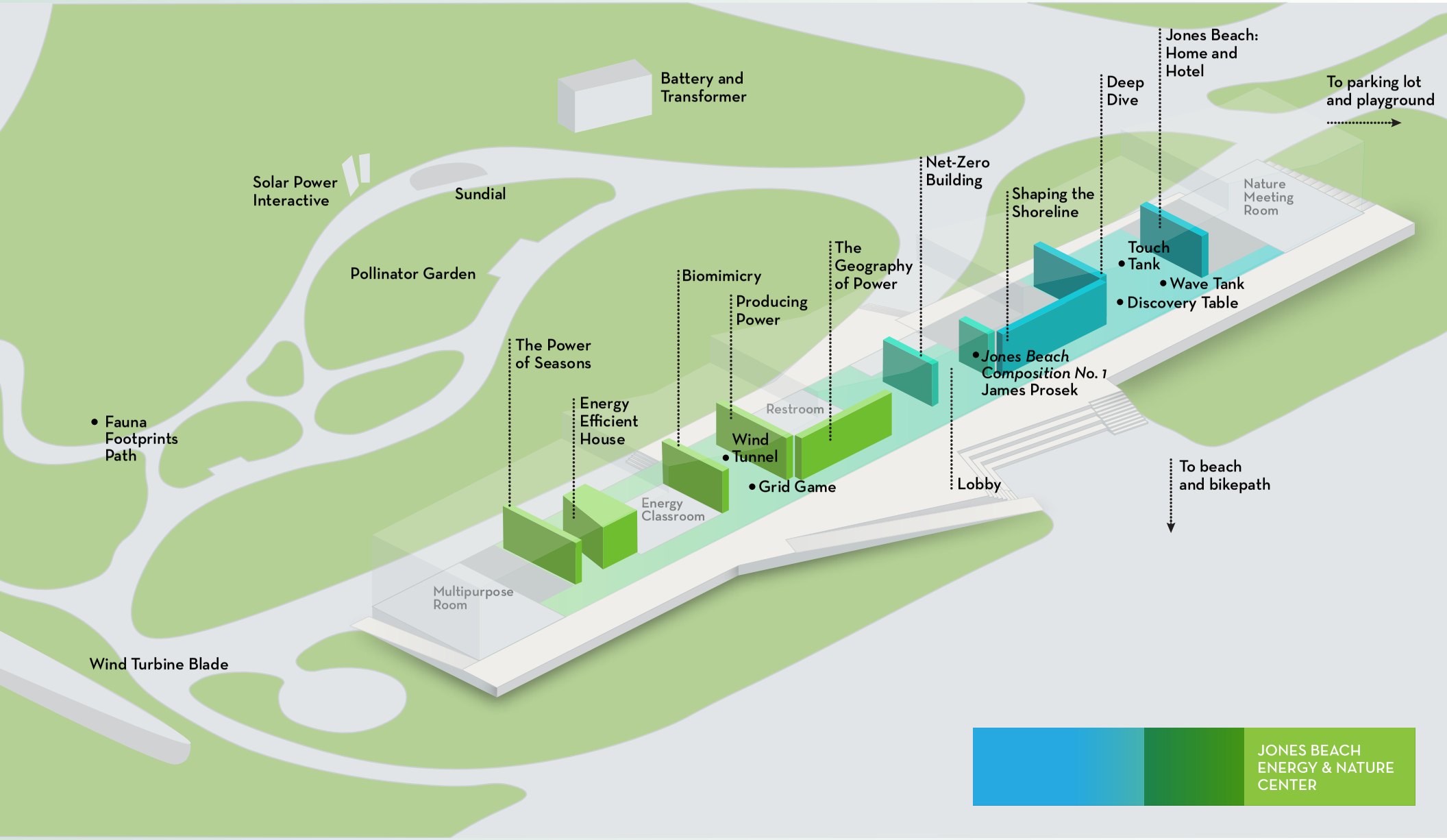
Visit the Center online:

jonesbeachenc.org

LIPA is a not-for-profit, publicly owned utility with a mission to provide clean, reliable, and affordable electric service to over 3 million people on Long Island and the Rockaways. LIPA contracts with PSEG Long Island to operate LIPA's transmission and distribution system under a long-term contract. For more information, visit:

lipower.org

Jones Beach Energy & Nature Center
Map of Exhibits



INTRODUCTION TO THE CURRICULUM

What is "energy"? Ask a physicist or a chemist, a biologist or a climatologist, an historian or a geographer, and each will give a different answer. This one enigmatic word can describe the force that heats or lights our homes, or the natural resources that are frequent subjects of public debate; it might be an ephemeral phenomenon of the natural universe, or a material good conveyed by human-made systems. It can even be an abstract concept, describing a sense of possibility that flows through individual and collective bodies. *Energy & Us* is an interdisciplinary curriculum that draws on all of these perspectives in order to investigate one big question. How does energy shape the environments in which we live, and how do we shape our environments through energy?

At the heart of this inquiry is Jones Beach. One of a chain of barrier islands off Long Island's southern coastline, and located just 20 miles from New York City, Jones Beach has been a beloved New York State Park for almost a century. The opening of the Jones Beach Energy & Nature Center in September 2020 marked a new era for Jones Beach State Park, in recognition of the fundamental ways that human beings impact the environment, especially through the consumption of energy, the construction of energy systems, and the stewardship of landscapes impacted by these systems. With the beach itself as a classroom, the Center seeks to develop the next generation of environmental stewards and responsible energy consumers. *Energy & Us* is a project in this spirit, one that hopes to inspire readers to think critically about the role of energy in their lives, as well as their own roles in the energy systems and ecosystems that surround them.

New Yorkers understand the urgency of developing a new relationship to the rich resources and delicate dynamics of our natural environment. The passage of the Climate Leadership and Protection Act in 2019 established more aggressive greenhouse gas emission reduction targets than those of any other state, and New York continues to lead the country in developing an adaptive, resilient, and environmentally just renewable energy system. *Energy & Us* is a project in that spirit, too. This curriculum seeks to equip readers, especially young people, with information and frameworks to understand the impact of humans' historical and ongoing energy use on the global climate. But it also seeks to inform readers of the wide range of actions toward mitigation and adaptation that are possible and even underway in different places throughout the world. In so doing, we hope to spark clear-eyed, creative, and ambitious re-imagining of a collective future shaped by climate change.

Illustrations by Ink Dwell Studio

OVERVIEW

1 | Energy & the environment

Energy is a quantity of potential distributed throughout the environment and studied by physicists and chemists at the molecular, atomic, and subatomic scale. Energy in this sense cannot be created or destroyed, and on Jones Beach, energy transfer is everywhere and ongoing: it moves from atom to atom as waves crash, sea breezes blow, and sunlight warms the sand. The energy that occurs "naturally" in the environment can also be transformed into electricity or other forms of power through systems designed and constructed by human beings, each element of which also impacts the environment.

2 | Energy & the ecosystem

At the level of the ecosystem, energy is essential for the function of individuals and communities of living things, including humans. In the salt marshes, dunes, and gardens of Jones Beach, energy is what enables Eelgrass to grow, Horseshoe Crabs to spawn, Great Egrets to hunt, and Monarch Butterflies to migrate. Solar energy is transformed through photosynthesis and travels within and among organisms, and between organisms and their environments, in a complex network of interdependence. Energy in the air, ground, and water further shapes ecosystems by determining local climate, topography, and conditions.

3 | Energy & the history of the region

Humans are different from other living beings because we employ energy as a tool, using it to expand our communities and shape our environments. Human societies have developed numerous methods to extract natural sources of energy and put them to work, and in the process, energy has become an object of trade, accumulation, and conflict. Jones Beach and the surrounding region have borne witness to this history and its geographical consequences, from Native American fishing and farming practices, to colonial whaling and agriculture, to industrialization, electrification, suburbanization, and the expansion of infrastructure.

4 | Energy & 21st-century America

Today, the systems that transport and transform energy are all around us, forming in aggregate a vast and complex Grid that feeds buildings like the Jones Beach Energy & Nature Center, as well as students' homes and school buildings. But energy consumption goes beyond the direct consumption of electricity and fuel, to include the energy involved in the manufacture of goods, the construction of the built environment, and the transportation of people and commodities. In all of these dimensions, energy consumption structures daily life and shapes contemporary culture in the United States.

5 | Energy & the changing global climate

Finally, the consumption of energy in the form of fossil fuels intensifies global warming and spurs climate change, with wide-ranging environmental consequences. In the last two decades, as it experiences faster-than-average sea level rise and increasingly extreme seasonal storms, Long Island and Jones Beach have come to exemplify the local impacts of global climate change. Meanwhile, the Center itself is an example of net-zero, adaptive building design that incorporates renewable energy sources and models a future in which humans, energy systems, and the environment exist in sustainable equilibrium.

STRUCTURE AND PHILOSOPHY

About this document

The five Units of *Energy & Us* trace the intersection of humans, energy, and the environment from the atomic to the global. The curriculum has been written with high school students in mind, but teachers may find parts suitable for students both younger and older. Likewise, *Energy & Us* is anchored by the exhibits of the Jones Beach Energy & Nature Center and rooted in the geography of Jones Beach, Long Island, New York State, and the region, but also strives to provide teachers elsewhere with frameworks and resources to engage energy landscapes closer to home.

Each Unit is divided into three Core Concepts, each of which contains several activities: typically, a primer, a discussion, a hands-on or interactive activity, and a take-home research or writing project. Each Unit also has an associated Appendix, in which can be found all readings, data sets, handouts, or other documents necessary for the completion of the activities. Connections between sections are noted in the margins; although the text intends to accumulate over the five Units, teachers are encouraged to take whatever is useful to them, in whatever order suits their needs. Connections to exhibits at the Jones Beach Energy & Nature Center are also noted. There are opportunities throughout the Curriculum for small-group "break outs" where students can work together to examine primary documents and data sets, or engage in critical conversation. Teachers are encouraged to use their best judgment and knowledge of their students in deciding how to structure each activity.

Sources of information

This curriculum cultivates students as critical consumers of information, who are cognizant of their own and others' biases, and who understand how scientists and other researchers deal with uncertainty and articulate the confidence of their claims. The primary sources used in the development of each section are listed on the last page of each Unit. Furthermore, as students work through research-driven activities, there may be occasion to discuss the standards by which the validity or usefulness of any given source can be judged. Energy consumption and its role in climate change can be an especially contentious subject, and not all stakeholders are transparent about their vested interests. Some energy industry actors — corporations or lobby groups — maintain websites that appear to present neutral, scientific fact, but in fact relay subtly biased narratives in order to argue for one energy source or technology over another.

Prompt students to notice the sources that they encounter, and make note of the strategies industry actors use to portray energy sources or technologies in a positive light or downplay environmental concerns. Discuss what makes a source of scientific information reliable. It may be acceptable to draw information from journalistic reports, but students should be able to trace claims back to peer-reviewed academic research using Google Scholar or a similar database. They may also look for research reports from academic institutes or governmental entities like NASA, the US Geological Survey, the Environmental Protection Agency, the US Department of Energy, the National Oceanic and Atmospheric Administration, or the UN Intergovernmental Panel on Climate Change. If internet resources like Wikipedia are used to get the lay of the land, claims on these sites should be cross-checked with other reliable sources.

For more information on uncertainty and scientific confidence, see the American Association for the Advancement of Science:

scienceintheclassroom.org/collections/scientific-confidence

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NB: Correlations between curriculum materials and New York State Learning Standards are noted in the Introduction of each Unit.


JONES BEACH
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