



HUDSON RIVER ENVIRONMENTAL SOCIETY

2017 Hudson River Symposium “Changing Energy Landscapes in the Hudson Valley and Watershed”

Student Union Building, State University at New Paltz
Wednesday May 3, 2017
9:00 AM - 5:30 PM

Over the past 30 years, while the Hudson River has grown cleaner, there is still more to be done. Steam electric generation is no longer dominant, but problems with the transportation of fossil fuels, in barges on the river, and on trains along the river bank, are a growing problem. In addition to this, the development of wind and solar power generation requires upgrades to transmission lines and corridors to get the power to the Hudson Valley and its mouth: New York City. In this one day symposium you will learn of the energy policies, demand, and change that is occurring and yet to come for the Hudson River and watershed. This will give you a knowledge base, an enhanced awareness of the state energy policies and market driven forces and what their impact will be on the Hudson Valley, which you can apply in your professional and personal life.

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Thank you!

The Hudson River Environmental Society wishes to thank the following people for their invaluable help in developing today's agenda: *Jessica Bacher, Audrey Friedrichsen, Manna Jo Greene, Maureen Leddy, Cara Lee, William Little, Karl Rabago, Karl Schoeberl, and Dennis Suszkowski.*

We also would like to thank today's speakers and poster presenters for their commitment to provide the attendees with valuable information about the ever changing energy landscape of the Hudson Valley and Hudson River watershed.

HRES is very grateful for today's sponsors whose generosity allows us to keep the costs down for all of the conference participants:

The Hudson River Foundation

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We thank the Benjamin Center and SUNY New Paltz, in particular Gerald Benjamin and Janis Benincasa for their logistical and academic support.

Finally, HRES would like to acknowledge the 2017 HRES Board of Directors:

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HUDSON RIVER ENVIRONMENTAL SOCIETY

2017 Hudson River Symposium: *Changing Energy Landscapes in the Hudson Valley and Watershed*

State University of New York at New Paltz, Student Union Building
May 3, 2017 9:00 AM-5:30 PM

- 8:00 – 8:45: Registration and Light Breakfast
- 8:45 – 9:00: Welcome – HRES and the Benjamin Center, SUNY New Paltz (15 minutes)
- 9:00 – 9:15 **The Hudson River Energy Landscape of the Past** – *Chuck Nieder, Bureau of Habitat, New York State DEC, HRES Vice-President*
- 9:15 – 9:30 **Thinking Globally: NY's Energy Transformation in Context** – *Radina Valova, Staff Attorney, Pace Energy and Climate Center at Pace Law School*
- 9:30-10:00 **The NYS Energy Plan goals move the entire state economy to 100% clean, renewable energy** - *Peter Iwanowicz, Executive Director of Environmental Advocates of New York*
- 10:00-10:20 **Energy Policy Reform and getting to 50 by 30** - *Christina Palmero, Deputy Director, Office of Clean Energy, New York State Department of Public Service.*
- 10:20 -10:50 **Coffee Break, Registration, and Poster Set-up**
- 10:50 – 11:10 **The Sustainable Approach to Closing Indian Point** - *Paul Gallay, Riverkeeper*
- 11:10 - 11:30 **Partnering for a Clean Energy Future** – *Kelly Ziegler, Consolidated Edison Company of New York*
- 11:30 – 11:50 **Balance of Power in the Hudson Valley** - *Chris Hogan, Chief Major Project Management Unit, New York State DEC*
- 12:00 – 12:30 **Panel discussion** – *William Little, Panel Moderator. Associate Counsel, Chief, Bureau of Energy and Air Resources, New York State DEC*
- 12:30 – 1:30 Lunch (Provided)**
- 1:30 – 1:50 **The Hudson Valley as a Crude Oil Superhighway** - *Andy Bicking, Scenic Hudson*
- 1:50 – 3:30 **Solar Energy and Land Use in the Hudson Valley**
Introduction – Cara Lee, The Nature Conservancy
Utility Scale Solar – Maureen Leddy, NYSERDA, New York Sun
Planning and Zoning for Solar – Jessica Bacher, Executive Director of the Land Use Law Center and Pace Law School
Solar Energy and Farm Land – Audrey Friedrichsen, Scenic Hudson
Questions for Panel
- 3:30 – 3:45 **Wrap-up and Closing Remarks** - Cara Lee
- 4:00 – 5:30 **Poster Session, Reception and Raffle**



HUDSON RIVER FOUNDATION
for Science & Environmental Research, Inc.



SPEAKER ABSTRACTS

Solar Energy and Land Use in the Hudson Valley (Planning/Zoning for Solar)

Jessica A. Bacher
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Land Use Law Center, Pace University

Jessica Bacher is the Executive Director of the Land Use Law Center at Pace Law School. She will cover information and resources on current solar topics, including techniques for developing solar policies, the legal process in plan making, and nationally accepted best practices and common features found in comprehensive and other local plans. This presentation will also review strategies and best practices for developing a clear, comprehensive, and enforceable solar permitting and regulatory framework.

The Hudson Valley as a Crude Oil Superhighway

Andy Bicking
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Scenic Hudson

Prior to 2011, crude oil shipping was almost nonexistent in New York. Since then—with little public input and no comprehensive study of risks—the state has become part of a virtual pipeline. Now, billions of gallons of explosive crude “flow” each year from the Bakken oil fields of North Dakota to the Port of Albany, and from there via train, barge or ship down the Hudson Valley. Proposed expansions of oil terminals in Albany could further increase this volume by up to 1.8 billion gallons annually, while also enabling shipments of heavy tar sands crude oil—almost impossible to clean up if spilled. As crude oil production has increased, train derailments and barge and tanker accidents throughout North America have caused dozens of deaths as well as millions of dollars in economic and environmental damage. This talk will explore the public policy and economic trends that have led to this situation and how a municipal coalition opposed to new Coast Guard Anchorages led by the Mayor of Yonkers, and the Hudson Valley’s state and federal legislative delegations are responding to the emerging threats.

Solar Energy and Land Use in the Hudson Valley (solar energy and Farm land)

Audrey Friedrichsen
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Scenic Hudson

The Hudson Valley has one of the nation’s most diverse ecosystems, and its habitats, wildlife and farmland are important for public health and economic opportunity. To mitigate climate change, New York State policy mandates that 50% of electricity generation must come from renewable energy sources by 2030. This Clean Energy Standard incentivizes the construction of many kinds of renewable energy resources, including solar photovoltaics and wind turbines. There is likely to be a rush to gain approval for such projects in the Hudson Valley, especially solar installations, driven by both state policy and financial incentives, but not necessarily based in sound planning or environmental principles. There will be pressure placed on open space, agricultural areas, forests, and other land as developers seek out least-cost options. Impacts to

agricultural lands in the Hudson Valley are of particular concern, since farmland is typically considered by developers to be the easiest and cheapest location for large-scale solar projects. This creates a tension between State goals of encouraging renewable sources of energy and protecting valuable farmland.

The Sustainable Approach to Closing Indian Point

Paul Gallay
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Hudson Riverkeeper

Riverkeeper has called for the closure of Indian Point nuclear power plant for decades – not just because of the risks it poses, but also because of the opportunities its closure would create to advance New York’s ambitious clean energy goals. Safety problems, such as the unprecedented problems with failed bolts in the core of reactor number 2 and multiple unplanned shutdowns, radioactive leaks, fires, and explosions, in addition to the ecological cost of once-through cooling, necessitate its early closure in 2021. A new study by Synapse Energy Economics, commissioned by Riverkeeper and the Natural Resources Defense Council, analyzed the feasibility of replacing the energy from Indian Point’s two operating reactors when they are shut down in 2020 and 2021. The report found that – due to plummeting prices for wind and solar energy, improvements in transmission, increase in local renewable power generation, and year by year energy efficiency increases – New York can close Indian Point while achieving and possibly even exceeding the state’s Clean Energy Standard goals. Ultimately, this latest study demonstrates New York’s multiple pathways to replacing Indian Point’s power with adequate regional power and continued state reductions in climate-warming gases.

Balance of Power in the Hudson Valley

Chris Hogan
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New York State Department of Environmental Conservation

The Lower Hudson Valley is rich with natural and scenic resources. However, due to its high population density it also has the highest demand for energy outside of New York City. As a result, the Lower Hudson Valley has seen a large number of proposed energy generation and transmission projects over the last several years. This presentation will highlight the various different energy projects that are either proposed, approved or under construction. The presentation will also identify the processes under which the different energy projects are reviewed and how the public can participate.

The NYS Energy Plan Goals Move the Entire State Economy to 100% Clean, Renewable Energy

Peter Iwanowicz
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Energy Advocates of New York

The 2015 State Energy Plan reaffirmed the bold goals set in 2009 that New York has for curtailing the pollution that is fueling climate change and dramatically ramping up our use of clean technologies in all sectors. By 2030, half of our electricity must be generated from renewable energy sources. By 205 80-percent of overall greenhouse gases will be reduce with half of that reduction to be achieved by 2030. These goals and standards set the state on the path to an economy that is powered by non-fossil fuel sources. The challenge is enormous, but the economic opportunity is there for the taking. Needed now is sustained political will, deep engagement at the local state and federal levels and the recognition that this effort will involve every home, every business, every institution in this vast state. As is often the case, New York is going to have become the true leader this nation needs. If we do, we can demonstrate the pathway to act and we can win the global race for clean energy investment.

Solar Energy and Land Use in the Hudson Valley (utility scale solar)

Maureen Leddy
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New York State Energy Research & Development Authority

Governor Cuomo has taken actions to place New York State at the forefront of national climate change mitigation through ambitious clean energy policies that fight climate change, reduce harmful air pollution, and ensure a diverse and reliable energy supply. This presentation will discuss two of these programs, the NY Sun Initiative, a public-private partnership to add 3 gigawatts of distributed solar electric generation across the state by 2023, and the Clean Energy Standard which requires 50 percent of New York's electricity come from renewable energy sources, like wind and solar, by 2030. These policies are accelerating the pace of large-scale solar development throughout the state. NYSERDA works to support local and regional decision making to encourage renewable energy development that is compatible with local priorities.

Solar Energy and Land Use in the Hudson Valley

Cara Lee
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The Nature Conservancy

New York's Clean Energy Standard, a mandate to meet the State's goal of generating 50% of electricity from renewable sources by 2030, will require a rapid build-out of solar and wind power across New York. Offshore wind, land-based wind and solar at different scales will all be important contributors to meeting the state's renewable energy goals. Solar energy is expected to be the predominant renewable resource in the Hudson Valley due to a convergence of physical, economic, technical and land use factors. What can communities do to plan for solar development and protect agricultural lands while helping to meet New York's clean energy goals? These questions are being explored by diverse stakeholders taking part in the Renewables

on the Ground Roundtable. The Roundtable, convened by The Nature Conservancy, aims to develop principles and recommendations for state agencies, developers, municipalities and conservationists.

The Hudson River Energy Landscape of the Past

Chuck Nieder

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New York State Department of Environmental Conservation

The energy landscape of the Hudson River in the past was centered on the withdrawal of billions of gallons of water from the Hudson River daily to condense steam used to drive massive stream electric turbines or potentially be stored for pumped-storage hydroelectric generation (*i.e.*, Storm King Mountain Pumped-storage Facility). Combined, the existing steam electric power plants of the time would withdrawal over six billion gallons of water every day and if the Storm King facility were built, this would triple to over 19 billion gallons. Included in the withdrawal of Hudson River water were billions of fish of all life stages whose ability to survive being impinged on intake screens or entrained through cooling systems was largely unknown. The Hudson River Settlement Agreement in 1982 resulted in the surrendering of the federal license to construct the Storm King facility. Today, much of the steam electric power being generated along the Hudson River requires little to no water for cooling. When Indian Point Nuclear Power Plant closes in 2021, the steam electric industry will have reduced its use of Hudson River water by over 90 percent from the total permitted in the 1970s, nearly eliminating the impact the electric generating industry has had on Hudson River fisheries and other aquatic organisms.

Energy Policy Reform and getting to 50 by 30

Christina Palmero

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New York State Department of Public Service

The Clean Energy Standard mandates that 50% of all electricity consumed in New York by 2030 result from clean and renewable energy resources. With one of the most aggressive renewable energy goals in the nation, what will our energy supply look like in the future compared to today and how will we meet this ambitious goal?

Thinking Globally: NY's Energy Transformation in Context

Radina Valova

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Pace University

The electric utility industry is in a state of flux across the U.S. and abroad. New York is leading the grid transformation charge through the Reforming the Energy Vision process, but regulatory action is not the only driver of change—technology and market forces are also reshaping the way electric utilities do business. Grid transformation touches on every aspect of the utility business model, including new earnings opportunities, rate design reforms, and the technologies and processes necessary for the integration of distributed energy resources. The industry shake-up presents a critical opportunity to rebuild the electric system on the foundation of clean, local, distributed energy.

Partnering for a Clean Energy Future

Kelly Ziegler
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Con Edison

When we think about what will drive New York's Energy future, the answer is clear – energy customers. Utilities across New York are exploring new ways to work in partnership with customers – and also with the DER providers who help meet customers' energy needs. New investments in energy efficiency, alternatives to traditional infrastructure, and partnerships with renewables companies are providing key insights on how this partnership- and customer-centric future will develop.

POSTER ABSTRACTS

Protecting Winter Flounder in NY/NJ Harbor Using Long-Term Fishery Resource Data: Past, Present, and Future

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Doug Clarke, Dara Wilber, Sarah Zappala,
HDR Engineering

Catherine Alcoba, Jenine Gallo
US Army Corps of Engineers

The US Army Corps of Engineers, in partnership with the Port Authority of New York and New Jersey, has completed the congressionally authorized Harbor Deepening Project (HDP). The scale of the HDP required extensive interagency coordination to ensure that environmental impacts were minimized. Prior to construction, knowledge gaps related to the protection of biological resources in the Harbor were identified with NOAA, and the states of New York and New Jersey. Long-term sampling programs were established to ensure sustainability of key habitats in the harbor. The Aquatic Biological Survey (ABS) was developed to assess the seasonal distributions and abundances of aquatic species with a focus on winter flounder. Initiated in 1998, the ABS has characterized winter flounder essential fish habitat (EFH) using systematic ichthyoplankton and trawling surveys. The ABS program has improved our understanding of when and where winter flounder eggs and larvae are present in the harbor and how their presence is related to environmental factors. Because all winter flounder life history stages are demersal, they are susceptible to benthic impacts, such as dredging. A harbor wide dredge-plume characterization study was conducted to quantify spatial scales of potential impacts. Investment in these long-term studies has provided enhanced and more effective resource protection within the harbor as dredging requirements transition from deepening to maintenance of the navigation infrastructure.

Microplastic Distribution in the Hudson River Park, New York City

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Densely populated urban rivers such as the Hudson Estuary may play a key role in the influx of plastics into the world's ocean. While recently the abundance and distribution of microplastic particles (<5mm in diameter) in the American Great Lakes region and marine environments worldwide has been quantified, very little data of this type exist for the Lower Hudson River. At

the mouth of the Hudson River, within Hudson River Park's estuarine sanctuary (59th Street to Chambers Street), we measured the concentration of microplastics at off shore and near shore sites in both downtown and midtown locations. This survey will help to establish baseline data on the abundance and distribution of microplastics in the Hudson Estuary. Future surveys following implementation of the The Microbead-Free Waters Act in 2017 and 2018 and other floatable discharge reduction measures in New York City will allow the effectiveness of these measures to be assessed.

StreamWatch: A Citizen Science Based Approach to Assessing Stream Water Quality in the Kleine Kill and Coxing Kill Watersheds

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SUNY New Paltz

Natalie Feldsine, Elizabeth Long
Mohonk Preserve

Among the 8,000 acres of the Shawangunk Mountain Region's Mohonk Preserve are the vernal pools, permanent springs, tributaries, Humpo Marsh, and the Humpo Kill, and parts of the Kleine Kill and Coxing Kill watersheds within the Hudson River Drainage Basin. A conservation plan must be implemented such that the mission of Mohonk, to connect the community with the environment, will be affirmed. Identifying the immediate and long-term conservation needs of the streams in this region using volunteer data collection will solidify our understanding of which environmental threats to this area should be prioritized. A Citizen Science program called "StreamWatch" will be the newest addition to an array of volunteer research areas, which include collection of weather data, phenology observations, monitoring of peregrine falcon breeding activities, and monitoring of fall hawk migration. StreamWatch will evaluate water quality using an array of parameters specific to streams on the Preserve. Following thorough observation and assessment, water quality will be evaluated by means of temperature, width, depth, dissolved oxygen, pH, and turbidity measurements, in addition to a macroinvertebrate count. The StreamWatch protocol aims to create a simple procedure that will yield accurate and useful data collection by community members to confirm relevant needs for riparian buffers, changes in nearby agricultural practices, and protection against invasive species. Volunteer involvement in this stream water sampling process will encourage the concept of stewardship among visitors to the Preserve, while simultaneously honing in on and pursuing viable conservation goals.

New York Initiatives: Spotlight on Climate and Energy

Cara Lee
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The Nature Conservancy

Anne Reynolds
Alliance for Clean Energy- NY

To help meet New York's ambitious goal and support the responsible development of clean energy, The Nature Conservancy, along with the Alliance for Clean Energy NY, is convening the *Renewables on the Ground Roundtable*. The Roundtable brings together diverse stakeholders to develop a set of principles and policy recommendations to achieve multiple mutual gains by reducing barriers to large-scale renewable energy siting while mitigating impacts on the ground.

The Consensus Building Institute is the Roundtable facilitator. Dialogue among diverse interests can help determine a path forward to help ensure the success of the Clean Energy Standard while preserving New York's vital natural, agricultural and community resources. These principles can help build support for new energy infrastructure that both provides the greatest benefit to the grid, the developer and the surrounding natural and community resources. The Roundtable's recommendations will play an important role in shaping New York's ability to reach its clean energy goals.

**Continuous Monitoring on the Hudson and Beyond with HRECOS:
The Hudson River Environmental Conditions Observing System**

Gavin M. Lemley

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Stuart Findlay

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The Hudson River Environmental Conditions Observing System (HRECOS) is a robust river monitoring network operated and managed by a consortium of 15 governmental, academic, and private institutions with shared interest in high-frequency monitoring in the Hudson River watershed. Monitoring stations geographically distributed along the Hudson and Mohawk Rivers are equipped with sensors that continuously record a suite of water quality and weather parameters, with most stations operating year-round. Remote telemetry at each station transmits data in near real-time for the public to download and plot graphs at www.hrecos.org. HRECOS works to improve the capacity of regional river and watershed stakeholders to: understand the ecosystem and manage water resources, provide baseline monitoring data for applied research and modeling, promote the use of real-time data in educational settings, provide policy makers and emergency managers with data products to guide decision making, and provide information for safe and efficient commercial use and recreational activities. HRECOS synergizes upon long-standing monitoring programs of its partner organizations, such as the Hudson River National Estuarine Research Reserve (HRNERR), NYSDEC's Rotating Integrated Basin Studies (RIBS), USGS monitoring programs, Stevens Institute of Technology's New York Harbor Observing and Prediction System (NYHOPS), Cary Institute of Ecosystem Studies monitoring, and several others.

**Hudson River Bottom Disturbances Due to Commercial Vessel Anchoring:
Implications for Submerged Electric-Power Transmission Cables**

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Dewayne Fox

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Amanda Higgs

New York State Department of Environmental Conservation

In order to connect renewable sources of power generation in Canada with load centers in the New York City metropolitan area, a high-voltage direct current transmission line has been planned. The line would include underwater portions buried to proposed minimum depths of 1.2

to 2.4 m beneath the bottoms of Lake Champlain and the Hudson, Harlem, and East Rivers. While conducting side-scan sonar surveys of the Hudson River Hyde Park Reach, as part of a collaborative project to better constrain the abundance and critical habitat of endangered Atlantic Sturgeon, numerous disturbances to the bottom were observed within, and in the vicinity of, the Hyde Park Anchorage Ground. Including oblong-shaped depressions 1-2 m deep, 1-3 m wide, and 5-10 m long, likely caused by anchors of commercial vessels settling into the river bottom with minimal drag. Even more pronounced were linear depressions of similar depths and widths with lengths up to 300 m, attributed to dragging of anchors during the process of setting or during periods of high flows/winds while vessels are at anchorage. Disturbances to depths of 1-2 m and *outside* of the designated anchorage ground are of particular concern given the proposed burial depths of the planned electric-power transmission cable and its proximity to anchoring activities. Constraints on bottom disturbances due to commercial vessel anchoring have recently come to the fore given the United States Coast Guard's initial interest in designating an additional ten anchorage grounds in the Hudson River, some in the vicinity of the planned transmission cable.

A Comparison between streamflow ensemble forecasts of an extreme hydrological event using inputs from the ECMWF and GEFS ensemble weather models

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*Firas Saleh, Alan Blumberg, Julie Pullen
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This work examines the effect of uncertainty from ensemble weather prediction models, namely ECMWF (European Center for Medium Range Weather Forecast) and GEFS (Global Ensemble Forecast System), on streamflow hydrological predictions for an extreme hydrological event, Hurricane Irene. An automated hydrological ensemble prediction framework was implemented using GIS and a regional scale hydrological model (HEC-HMS). The upland hydrologic framework was applied to the Hudson River Basin, USA (~36,000 km²) using gridded precipitation data from the National Centers for Environmental Prediction (NCEP) North American Regional Reanalysis (NARR), and was validated against streamflow observations from the United States Geologic Survey (USGS). Forced by 125-member precipitation ensemble, the automated framework now runs operationally every 6 hours to predict hourly ensemble streamflow discharges from the Hudson and its tributaries that feed into the New York Harbor Observing and Prediction System (NYHOPS), with a 96-hr forecast horizon. NYHOPS was developed at Stevens Institute of Technology's Davidson Laboratory to generate marine and coastal forecasts for the New York Harbor, Atlantic Coast, and Hudson River region through in-situ monitoring equipment and hydrodynamic modeling. A probabilistic comparison between streamflow predictions during Hurricane Irene generated by forcing the hydrologic model with 51 ECMWF meteorological members versus 21 GEFS meteorological members is presented. The visual and statistical comparison offers interesting perspectives on the spatio-temporal resolution of meteorological inputs that are used in this hydrological ensemble prediction system.

Hudson River Estuarium: Making the Invisible Visible

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Tellart Inc.

Hudson River Park Trust, NY Hall of Science

This poster describes the current planning for the exhibit space at the Hudson River Estuarium, to be operated by Clarkson University at Pier 26. The fundamental desire is to make the invisible visible through state of the art interactive dynamic digital exhibits incorporating augmented reality to enable visitors to explore and learn by answering their own “what if” questions. The Estuarium exhibits will examine the estuary on multiple scales – in time, space and biological complexity. The anticipated opening date is in 2019. The mission statement includes the following: “Engaging an audience from kindergarten through the most advanced levels of graduate research, the Estuarium makes possible an unprecedented experiential exploration of epochs of natural history through augmented reality. The physical and virtual space allows the visitor to experience the Hudson on many levels: in it, around it, above it. Time as well as space is visualized and personalized, from the pristine primordial past to the river’s vulnerable present and onward into a range of its possible futures. The most advanced interactive digital technology deployed in a museum-level exhibition space (created by the internationally renowned architect Rafael Vinoly), the Estuarium represents a new kind of education center to inspire and enlighten visitors of all ages and levels of thought. Drawing on current estuarine science and data, the fullest possible picture of the river’s history and prognosis are made vividly real.”

WaterSense Accomplishments, U.S. Environmental Protection Agency

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U. S. Environmental Protection Agency

Water is a finite resource, and even though about 70% of the Earth’s surface is covered by water, less than 1% is available for human use. Among the water supply and infrastructure challenges faced by many communities across the US, is the information that each American uses an average of 88 gallons of water each day at home. Water managers in at least 40 states expect local, statewide, or regional water shortages to occur over the next several years. All Americans can understand the importance of water efficiency and take positive actions to reduce their water use – in their homes, outdoors, and at work. Learn how to take steps each day to save water and protect the environment by choosing WaterSense labeled products in your home, yard, and business. WaterSense, a voluntary partnership program sponsored by the U.S. Environmental Protection Agency (EPA), is both a label for water-efficient products and a resource for helping you save water. The WaterSense label makes it simple to find water-efficient products, new homes, and programs that meet EPA’s criteria for efficiency and performance. WaterSense-labeled products and services are certified to use at least 20% less water, save energy, and perform as well as or better than regular models. WaterSense partners with manufacturers, retailers and distributors, homebuilders, irrigation professionals, and utilities to bring WaterSense to your community. Our partnerships encourage innovation in manufacturing and support sustainable jobs for American workers.