



### **Ecosystem Response**

- As part of the NYSERDA **Mercury Synthesis Project**, a special issue of *Ecotoxicology* highlighting the results of over 20 mercury studies conducted in New York State (NYS) over the last 30 years has been published (<https://link.springer.com/journal/10646/volumes-and-issues/29-10>). Over 50 percent of the manuscripts included in this special issue were supported by NYSERDA through individual contracts with these researchers. The introduction paper, which provides an overview of the impacts of mercury in NYS as well as the rest of the manuscripts included in the special issue has been published as open-access (<https://link.springer.com/article/10.1007/s10646-020-02291-4>).

*(Ecosystem Response, continued...)*

- Also, as part of the NYSERDA Mercury Synthesis Project, eight datasets, titled **“Synthesis of Mercury Loads in New York State (1969-2017)”**, have been published on the Open NY site (<https://data.ny.gov/browse?q=Mercury%20Loads&sortBy=relevance>). These datasets include data that was collected as part of 25 studies that aimed to better understand spatial and temporal trends of mercury in atmospheric deposition, water, sediment, fish, loons, eagles, songbirds, and invertebrates. The mercury data included in these datasets were collected by researchers over the last 50 years in NYS.



*Through Agreement #154265, ASGA will be analyzing the use of solar grazing with sheep and other co-location practices at multiple solar sites. Photo shows sheep grazing at a solar site in NYS.*

(Ecosystem Response, continued...)

- A final report has been published that **quantifies the past, ambient, and future acidification of streams in the Adirondack Park**, as affected by acidic atmospheric deposition (Report 20-19 - see link under Program Reports & Papers). The analysis included establishing relationships between stream chemistry, discharge, and biological conditions and using target loads (TLs) to determine thresholds of biological harm under normalized flow conditions. Building on this project, E&S Environmental Chemistry, Syracuse University, and the U.S. Geological Survey are developing a manuscript where criteria and target values to protect soils and terrestrial ecosystems in the Adirondacks from the effects of acid deposition are being evaluated. Both projects are jointly funded by the NYS Attorney General’s Office and NYSERDA.

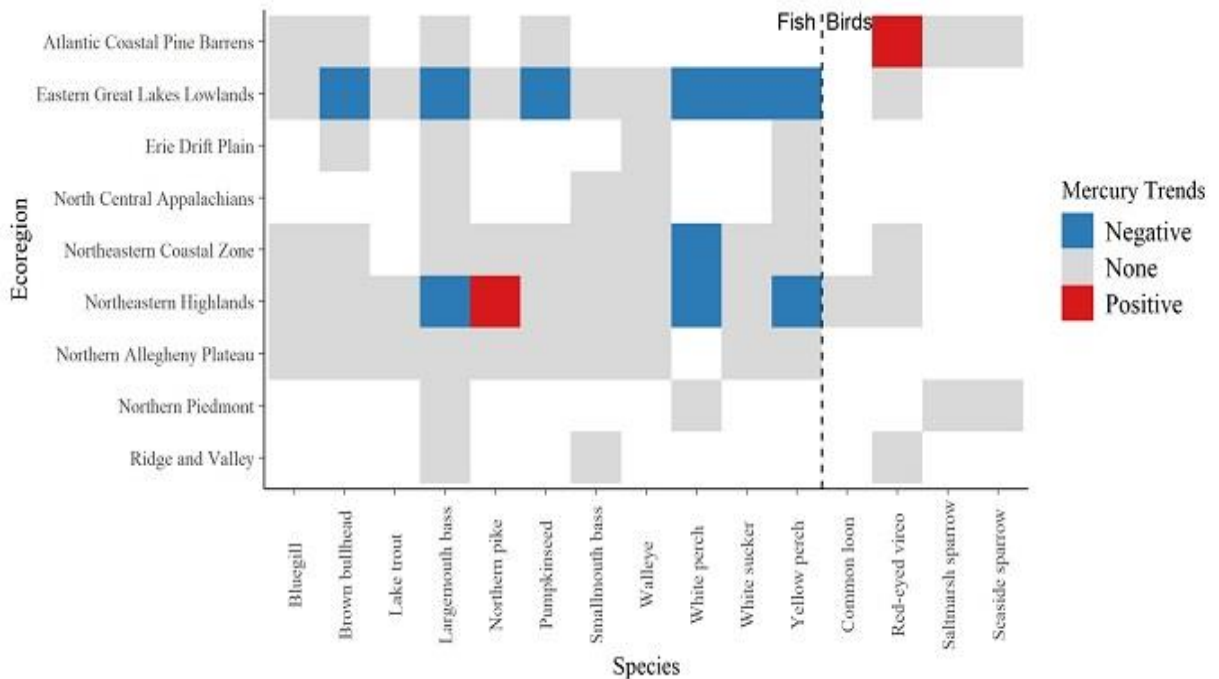


Figure from the Mercury Synthesis Project (NYSERDA Agreement #124842)



## Land Based-Renewables

- Contracts for six research projects that were competitively selected through Purchase Opportunity Notice (PON) 4270, Environmental Research – **PV Site Design, Information Gaps, and Mitigation Opportunities** have been executed. Contracts have been awarded to six organizations, totaling a little over \$1,200,000. These contracts will be addressing such topics as:
  - I. Avian biodiversity, community composition, and conservation significance (DNV GL)
  - II. Bird and insect pollinator communities (Walden Environmental Engineering)
  - III. Crop health, solar planting mixes, economics, solar equipment risk, and soil health at co-location sites (American Solar Grazing Association)
  - IV. Microclimates around solar sites (Cornell University)
  - V. Groundwater hydrology in wetland areas, winter raptor and grassland bird habitats, and decommissioning best management practices (Tetra Tech, Inc.)
  - VI. Top societal concerns of host communities (The Nature Conservancy)



*Through Agreement #154274, Tetra Tech, Inc. will be analyzing groundwater flow in a few wetland areas located at a solar site. Photo shows the drilling of a hole using an auger, in which a piezometer (slotted PVC pipe) will be installed inside of to measure groundwater levels.*



(Land Based-Renewables, continued...)

- Work on the development of an **Agricultural Technical Working Group (A-TWG)** took place this quarter. The mission and structure of the A-TWG will be similar to the New York State Offshore Wind Environmental Technical Working Group (E-TWG) and the Fisheries Technical Working Group (F-TWG), but will be a forum for stakeholders to express their thoughts and provide advice on how to responsibly advance the development of renewables (primarily solar) while being protective of the most valuable agricultural lands, their productivity, and the overall economic viability of agriculture in New York State. NYSERDA is in the process of bringing on a facilitation contractor to help support the development and design of the A-TWG as well as to facilitate meetings.



## Off-Shore Wind

- On October 20, submissions were received from three bidders (Bay State Wind LLC, Vineyard Wind LLC, and Equinor Wind US LLC) for the **2020 offshore wind solicitation**, seeking up to 2,500 megawatts of offshore wind energy. Bids include projects from up to four lease areas and include investments in port infrastructure that span Long Island to the Capital Region, helping to spur billions of dollars in private investment and create thousands of new, good paying jobs to help stimulate the state's economic recovery. Notable in this solicitation are requirements to support environmental and fisheries stewardship, including providing financial and technical support for regional monitoring of wildlife and key commercial fish stocks through a minimum contribution of \$10,000 per megawatt of operational installed capacity to understand how offshore wind energy development potentially affects the distribution and abundance of sensitive species.

(Offshore Wind, continued...)

- The [State of the Science Workshop on Wildlife and Offshore Wind Energy 2020](#) was held November 16-20 and focused on understanding cumulative impacts on wildlife from offshore wind development. Over the week, a diverse group of more than 430 people from 21 states and 20 countries attended 40+ presentations and lightning talks. Discussions focused on cumulative impact frameworks, current knowledge on different wildlife taxa, known and hypothesized cumulative effects to wildlife from offshore wind energy development, and opportunities for regional coordination and collaboration to continue improving our understanding of offshore wind and marine ecosystems. In early 2021, workshop attendees, with the guidance of technical leads, will participate in virtual work groups to identify key research priorities for the next 3-5 years to improve our understanding of cumulative biological impacts as the offshore wind industry develops in the U.S. Efforts will culminate in a final webinar in the Spring of 2021 to report the outcomes of work group efforts.

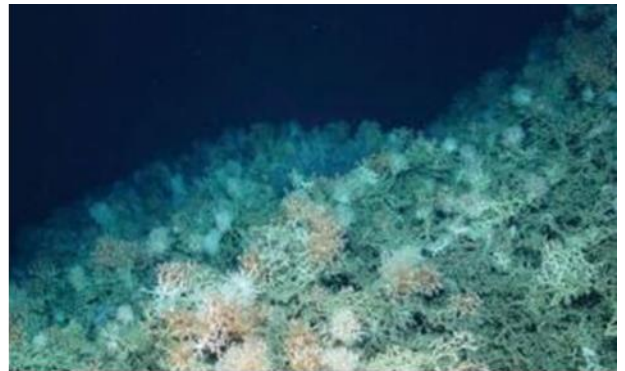
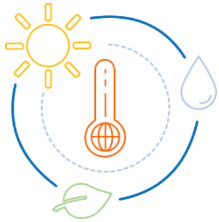


Photo credits: [State of the Science Workshop on Wildlife and Offshore Wind Energy 2020](#)

*(Offshore Wind, continued...)*

- NYSERDA continues to develop a cabling document for regulators and fishermen, pulling together concerns and information about the many variables (environmental, technological, fishing) that are considered during project development. This in-depth document will help improve conversations that both regulators and stakeholders have regarding this topic. The draft document has been reviewed by stakeholders and is being revised accordingly with the final version scheduled for public distribution in Q1 of 2021.
- NYSERDA continues to advance the Opportunity for Experienced Mariners Study to identify additional job opportunities and training measures for mariners (including fishermen) needed to capitalize on new jobs that result from OSW development to supplement their income. This includes an analysis of forecasted job availability and accessibility, a synthesis of available job training and/or certifications needed to be qualified, and recommendations for next steps. The final document is completed and will be released as part of a larger workforce development and OSW announcement centered around the 2020 OSW RFP. This is expected in the early part of 2021.
- A virtual F-TWG meeting is scheduled for the week of February 15th. Topics for discussion will include an update on the status of the 2020 OSW RFP, updates on NYSERDA funded projects of interest to the F-TWG - the Fisheries Knowledge Trust and Fishing Access within Turbine Arrays, an overview of the final cabling activities document (mentioned above), next steps from the ROSA Synthesis of the Fisheries Science Workshop held in October 2020, and an update from NMFS on their progress of adjusting surveys to perform within turbine arrays.

## Climate Change



- Work has continued on the **statewide climate impacts assessment**, with detailed plans for the overall assessment work nearing completion. A workplan for the climate projections has been developed, which will be using the new CMIP6 global climate models. Similarly, a workplan for economic component has been developed, which lays out the specific subsectors and methodologies to be used for modeling the economic impacts of climate change on NYS. Implementation of all aspects of the assessment work will begin early next quarter.



## Air Quality & Public Health

- Five new research projects resulting from PON have now begun.
  - I. Mobile Laboratory Measurements of Methane, Ethane, and Co-pollutants from Landfills, Oil and Gas Systems and Other Sources in New York State, PI: James Schwab, SUNY Albany
  - II. Midstream Methane Characterization and Technology Assessment in NY, PI: **Arvind P. Ravikumar** Harrisburg University of Science and Technology
  - III. Energy-Related Air Quality: Temporal and Spatial Characterization of Trends and their Health Effects, PI: **Ariel Spira-Cohen**, Fund for Public Health in NYC
  - IV. Changes in PM Composition in NYS & Triggering of Acute Cardiorespiratory Events, PI: David Rich, University of Rochester
  - V. Combining Low-Cost Air Quality Sensors with High Quality Meteorological Network for Fine-Scale Monitoring in NYS, PI: Scott Miller, SUNY Albany
- Alex Li, a Cornell University undergraduate student working on woodsmoke analysis with Professor K. Max Zhang was named a [Merrill Presidential Scholar](#). This is the highest honor for a graduating senior at Cornell. Alex was also awarded [the Schwarzman Scholarship](#) and will attend Tsinghua University in Beijing for a one-year master's program in global affairs. He hopes to build bridges between China and the United States so both countries can lead a global effort in decarbonization and collaborate on cleantech solutions that address the climate crisis.





## Biomass

- Brookhaven National Laboratory completed a study on **the impact of thermal storage on the performance of wood pellet-fired residential boilers** (see figure below). In steady state, pellets are the cleanest form of direct biomass combustion, but during the startup and shutdown phases of cyclic operation, emissions increase while efficiency decreases dramatically. The use of thermal storage greatly reduces cycling, particularly during times of the year when the load is lighter, and analysis has shown this is most of the year. BNL tested the pellet boiler under steady-state low-load conditions (15 percent of full-load output). Without external thermal storage, the boiler cycles frequently to meet this load. The total cycle period is 23 min without storage, and the processes associated with startup and shutdown are significant parts of this total period. The addition of external thermal storage greatly increases the total cycle period and reduces the startup and shutdown transients. The volume of water in the storage and the range of temperature set in the control system also determine the cycle time. With a storage volume of 450 L and a temperature differential of 11.1 °C, the total cycle period in this load condition was 228 min. With a storage volume of 795 L and a similar temperature range, the total cycle period was 373 min. Increasing the cycle period over this range increased the efficiency from 56 to 74 percent under this load condition and reduced particulate emissions by 66 percent from 176 to 60 mg/MJ. These results demonstrate the need for thermal storage as part of a low emission strategy with pellet-boiler heating systems.

(Biomass, continued...)

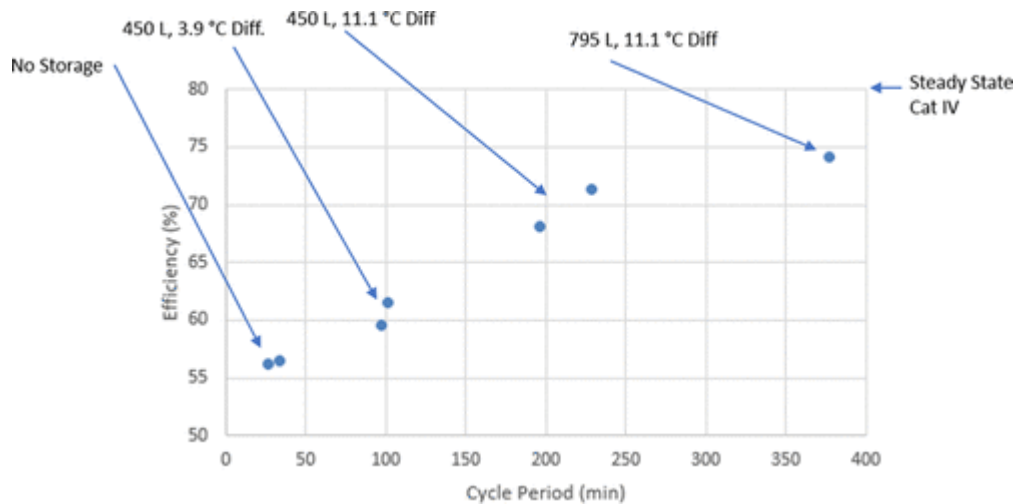


Figure 1. Category I runs, illustration of the relationship between the cycle period and efficiency. Increasing storage increases the cycle period and improves efficiency. At the highest value for the cycle period, the efficiency approaches that of high-load steady-state operation.

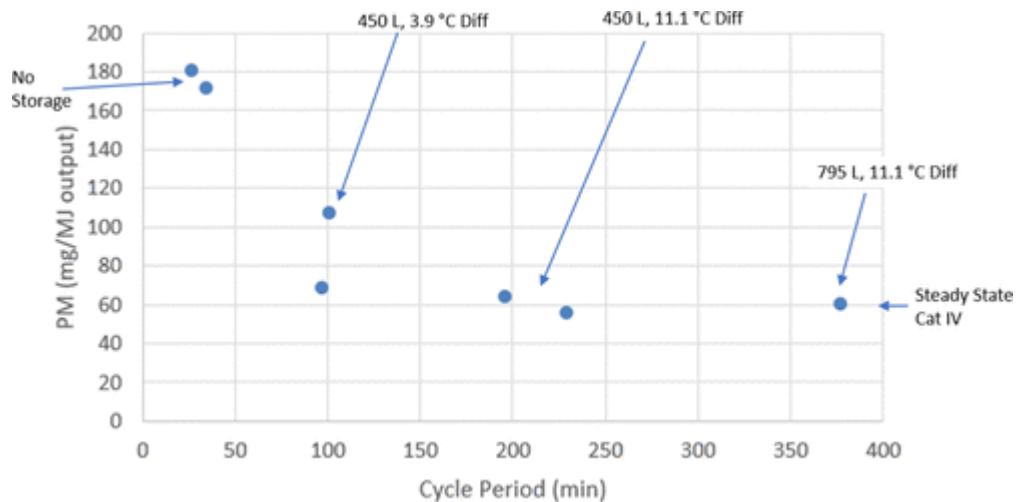


Figure 2. Category I runs, illustration of the relationship between the cycle period and particulate emission factor. Increasing storage increases the cycle period and reduces particulate emissions. At the highest value for the cycle period, the particulate emission factor equals that of high-load steady-state operation.

(Biomass, continued...)

- The Northeast States for Coordinated Air Use Management (NESCAUM), Alaska Department of Environmental Quality, and Fairbanks North Star Borough finished a major research project that assessed the **EPA/ International Organization for Standardization (ISO) third-party review process's efficacy**. The review came out of a meeting that was held in Albany in mid-2019, where representatives from 14 state and local agencies in attendance expressed concern about federal program oversight of the residential wood heater program. Residential wood heating supplies approximately 2-5 percent of the nation's energy needs yet represents 95-98 percent of the particulate matter emissions from the residential fuel combustion sector.
- One of the meeting recommendations included completing a **desk audit of all Step 2-certified appliance test reports**. This review followed a similar process completed by NYSERDA in 2012 to assess US EPA's voluntary outdoor wood boiler program. The project team reviewed over 230 test reports, compiling data into a workbook for public access. The review identified significant deficiencies in both the ISO and EPA programs. The project team has been briefing high-level EPA staff on their findings. Many states, including NYS, rely on Step-2 emissions standards to reduce the impact of residential wood heating.
- The Alaska Department of Environmental Protection **formally requested US EPA to accept the Integrated-Duty-Cycle (IDC) Cordwood Stove Protocol** as an alternative test method to determine compliance with the federal NSPS Step-2 standards. If accepted, this will be the second IDC protocol accepted for use under the current federal regulatory program. NYSERDA and its researchers continue to work with EPA to develop data to support the use of IDC protocols in the next federal regulation. Work in this area focuses on method validation and precision metrics.

## Program Reports & Papers posted recently include:

### ***Air Quality and Related Health Research: Particulate Matter (PM), Ozone and Co-Pollutants***

[Enhancing the Evaluation and Interpretability of Data-Driven Air Quality Models](#)

[Estimation of PM<sub>2.5</sub> Concentrations in New York State: Understanding the Influence of Vertical Mixing on Surface PM<sub>2.5</sub> Using Machine Learning](#)

[On the Importance of Surface-Enhanced Renoxification as an Oxides of Nitrogen Source in Rural and Urban New York State](#)

[Long Island enhanced aerosol event during 2018 LISTOS: Association with heatwave and marine influences](#)

[Estimation of aerosol liquid water from optical scattering instruments using ambient and dried sample streams](#)

[Fog processing of aerosols in a rural forest environment: insights from high resolution aerosol mass spectrometry](#)

[Mobile laboratory measurements of high surface ozone levels and spatial heterogeneity during LISTOS 2018: Evidence for sea-breeze influence](#)

### ***Biomass***

[Effect of Thermal Storage on the Emissions and Efficiency Performance of a Wood-Pellet-Fired Residential Boiler](#)

### ***Ecosystem Response to Atmospheric Deposition of Sulfur, Nitrogen and Mercury***

[Overview of the CPOC Pilot Study at Whiteface Mountain, NY: Cloud Processing of Organics within Clouds \(CPOC\)](#)

[A Synthesis of Patterns of Environmental Mercury Inputs, Exposure and Effects in New York State](#)

[20-27 Assessment of Methods for Soil Monitoring in the Adirondack Region of New York State \[PDF\]](#)