Policy & Science Advisor
UPDATE

Photo Credit: NYSERDA, Greg Lampman at Long Pond

Greg Lampman, NYSERDA's new Director of Offshore Wind

We wish Greg the best of luck in his role as Director of Offshore Wind at NYSERDA!

Even though he's moving just "down the hall" and will still be an integral advisor, we are compelled to acknowledge the fifteen years of contributions Greg has made to the Environmental Research Program. Greg joined the Program in 2007 as a Project Manager where among other items he oversaw and guided the state's long-term monitoring of acid rain and climate change impacts on our most sensitive ecosystems. Over the last six years, Greg has led the research team as Program Manager and Acting Assistant Director:

> *This Program plays a unique and critical role in ensuring we are considering the full implications of our energy decisions on the environment and the people of New York. It has been my pleasure to work with such a fine group of dedicated scientists and policy makers over the years, anticipating needs and adapting the work to inform important emerging policy questions. I am sure the Team will continue the great work.*

In recent years, NYSERDA has called on Greg to develop NYSERDA's Build-Ready Program for renewable energy projects, as well as lead the State's early efforts in preparing for responsible offshore wind development.

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

Welcome Jeremy Magliaro as Program Manager

Jeremy Magliaro, Program Manager

In September, Jeremy Magliaro joined the Environmental Research team as Program Manager. A note from our new Program Manager:

I feel privileged to take the helm of the dynamic Environmental Research Program. As a former outside advisor, I've seen the Program flourish under Greg's leadership, and am thankful to build upon the strong portfolio of projects and work alongside such a committed staff. I come to NYSERDA after spending fourteen years as Environmental Scientist and Policy Advisor for the New York State Attorney General. In this era of societal and ecosystem change and energetic government, environmental research will be more critical than ever to inform sound policy. I look forward to hearing your thoughts about the focus and direction of the Program, and hope to set up some structured conversations soon. As evidenced by the projects you will read about herein, the work remains at the forefront.

Photo Credit: NYSERDA

Air Quality and Public Health

- The air quality and public health portion of the program had many publications this quarter – 13! Three new research projects resulting from Program Opportunity Notice (PON) #4895 - Related Air Quality Research are now underway:

  I. **Refined Source Apportionment of Ambient VOCs and VCPs in NYC Metro Area – Dr. Md. Aynul Bari, and Dr. Cheng-Hsuan (Sarah) Lu, State University of New York (SUNY) at Albany:** This project will engage in volatile organic carbon (VOC) and volatile chemical products (VCP) long-term trend analysis and source apportionment, investigate the ozone (O3)- and secondary organic aerosol SOA)-forming potential of major VOC/VCP groups, and improve the emissions inventory in the New York City (NYC) metropolitan area.

  II. **Ground-based and Satellite Remote Sensing of Atmospheric Dynamics and Constituents at Multiple Scales and Dimensions for an Integrated Approach to Air Pollution Characterization and Modeling – Dr. Fred Moshary, Dr. Barry Gross, and Dr. Jorge Gonzalez, The City College of the City University of New York (CUNY):** This project will validate satellite remote sensing products for urban emissions plume dynamics, ozone and aerosol formation, and downwind transport to improve high resolution modeling in the tri-state urban and coastal areas during the 2023Atmospheric Emissions and Reactions Observed from Megacities to Marine Area (AEROMMA) campaigns.

2

(Air Quality and Public Health, continued…)

III. Remote Sensing and Data-Driven Techniques Supporting Community Protection – Dr. K. Max Zhang, Cornell University: This project aims to Identify emissions-related activities in industrial areas throughout the NYC region and to improve the NYC Health Department's Land Use Regression (LUR) model by creating new covariates corresponding to the emissions sources identified in the previously mentioned industrial areas by employing advanced model interpretation techniques. This project also aims to investigate potential strategies that may arise from this research to mitigate community exposure to emissions in areas surrounding industrial sites.

Methane Technology Comparison

Photo Credit: NYSERDA

Atmospheric Science Research Center Mobile Laboratory at a Wastewater Treatment Plant

Photo Credit: ASRC

- The following are updates on existing Air Quality and Health related research projects:

I. As part of ongoing project, "Midstream Methane Emissions Characterization and Technology Assessment in NY," managed by Dr. Arvind P. Ravikumar (University of Harrisburg and UT Austin) several methane monitors from different manufacturers have been deployed at numerous locations with anemometers at a natural gas compressor station. Ellen Burkhard (NYSERDA) and members of New York State Department of Environmental Conservation (NYSDEC) visited the station to view the technology testing and methane monitoring efforts (top left figure).

II. The Atmospheric Science Research Center (ASRC) research van was deployed to support the project, "Mobile Laboratory Measurements of Methane, Ethane, and Co-pollutants from Landfills, Oil and Gas Systems and Other Sources in New York State," managed by Dr. James Schwab (bottom right figure).

III. Ithaca College students have been testing a drone to measure methane in a pilot project, "Observations in Support of Methane Source Characterization in NYS," managed by Dr. Eric Leibensperger.

(Air Quality and Public Health, continued…)

Atmospheric Science Research Center Mobile Laboratory Crossing Long Island Sound


Photo Credit: ASRC

- Dr. Jie Zhang and Ali Catena of the Atmospheric Sciences Research Center at SUNY Albany made extensive field monitoring efforts as part of the project, "Mobile Laboratory Measurements of the Atmospheric Chemical Evolution in Urban Outflow Plumes and their Interplay with Coastal Meteorology over Long Island." The measurements made in August and September 2022 are to obtain preliminary results in order to better support the 2023 intensive field program. Measurements included daytime-on-road measurements, scanning Long Island from south to north to capture the interplay between the urban plumes and the sea breeze, and nighttime-on-road measurements, crossing Long Island Sound to capture the influence of the transported urban plume on the nighttime air pollution of the NYC-downwind regions.

Biomass

- It was a busy quarter for researchers focused on wood combustion with many projects finishing-up and publishing 13 articles!

- NYSERDA organized a special issue on Residential Wood Combustion in the Journal of the Air & Waste Management Association (Volume 72, Issue 7, https://www.tandfonline.com/toc/uawm20/72/7). This issue was written in collaboration with the Northeast States for Coordinated Air Use Management (NESCAUM), Brookhaven National Laboratory (BNL), Clarkson University, ClearStak LLC, Cornell University, New York State Department of Health (NYSDOH), New York State Department of Environmental Conservation (NYSDEC), State University of New York at Stony Brook, and other partners. Topics discussed in this issue include emissions, air quality, and exposure considerations of wood combustion, regulations, the development of a new Integrated-Duty-Cycle cordwood stove test protocol, stove fueling protocols, wood combustion conditions, a newly developed technique for real-time particle measurements critical for characterizing variable conditions during emissions testing, and computational modeling of stove emissions.

- Additionally, Barbara-Panessa Warren and collaborators from NanoAnalytics and BNL published their work on wood combustion nanoparticles emitted by conventional and advanced technology cordwood boilers, and their interactions in vitro with human lung epithelial monolayers. Ferro et al. also published work using low-cost monitors and found wood-burning appliances increase indoor exposures to airborne particles in homes.
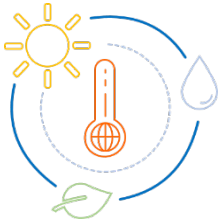
Climate Change

- During this quarter, the eight technical workgroups (TWGs) of the NYS Climate Impacts Assessment delivered updated chapter drafts for review. Although there is much work still ahead, the chapters are well on their way. Complete drafts are anticipated next quarter. Additional meetings with Sector Advisors occurred for most sectors this quarter; the Sector Advisors are bringing additional perspectives to the work and providing feedback and input to their respective sectors.

- Staff have been working closely with colleagues at New York State Department of Environmental Conservation (NYSDEC) and other agencies on the Extreme Heat Action Plan, which was a directive of the State of the State by Governor Hochul earlier this year. Interim recommendations were released in July of this quarter. Work will continue in the coming months on development of an adaptation plan focused on extreme heat.

Ecosystem Response

- NYSERDA issued Request for Proposals 5200: Routine Sampling of Adirondack Long Term Monitoring (ALTM) Lakes and Streams. NYSERDA seeks proposals from knowledgeable and experienced organizations or teams interested in conducting the routine sampling of Adirondack lakes and streams as part of the ALTM Program. NYSERDA anticipates selecting up to three contractors for this effort. Proposers may elect to submit a proposal for any combination of, or for all of the following ALTM Program components: ALTM Lake Monitoring, ALTM Bi-Weekly Stream Monitoring, and ALTM Spatial Stream Monitoring. Additional details including the project scope, budget, and scoring criteria can be found on NYSERDA's Funding Opportunity page

Loon Banding during Loon Observation Night

- The Adirondack Center for Loon Conservation hosted loon banding observation nights in July and August. These observation nights serve as an opportunity to view loon banding and sample collection techniques used by the Adirondack Center for Loon Conservation field crew to monitor the health, exposure to contaminants, and reproductive success of the Adirondack loon population.

Photo Credit: NYSERDA

Land Based-Renewables

- A team at DNVGL and University of Massachusetts Amherst are conducting research on the avian use of operational solar facilities in New York and Western Massachusetts as part of their agreement (#154247) awarded through PON 4270: Environmental Research – PV Site Design, Information Gaps, and Mitigation Opportunities. The project conducted surveys at 9 PV solar and paired reference sites from May to June in 2021. The team found that bird species richness was higher at PV solar facilities compared to paired reference sites in hay/pasture and cultivated crop fields, yet lower at solar sites in shrub habitats and bird abundance increased as vegetation height increased. Preliminary results indicate that maximum vegetation height was the best predictor for species abundance.

  This year, the team completed two field visits at 11 solar sites and nine (9) paired reference sites, and two new solar sites in the Finger Lakes region were added. The team is currently reviewing the data collected during this summer's field season.

- The Agricultural Technical Working Group (A-TWG) convened in April and September 2022. The A-TWG finished its development of the 2022 version of the Smart Solar Siting Scorecard (the "Scorecard") for NYSERDA to consider incorporating into its annual Tier 1 solicitations for large-scale renewable projects. This past Climate Week, Governor Hochul announced the launch of NYSERDA's sixth annual solicitation for large-scale renewable projects, which requires all proposers of solar projects to submit the Scorecard. Scorecards will be used in the evaluation for the first time and Scorecards of awarded projects are planned to be made public. Additionally, the A-TWG is considering future roles for its Specialist Committees to continue advancing policy relevant research in the agrivoltiacs space and to better understand the potential localized cumulative impacts and benefits of solar development with respect to the state's agricultural economy. Keep up to date with what the A-TWG is up to by visiting the A-TWG website.

Offshore Wind

- New York State's third offshore wind solicitation, seeking at least two gigawatts of new projects was announced at the State of the Science Workshop by NYSERDA President and CEO Doreen M. Harris. These projects will provide enough clean energy to power at least 1.5 million homes. The solicitation includes the first phase of a $500 million investment in offshore wind ports, manufacturing, and supply chain infrastructure. Environmental and fisheries stewardship continues to be supported in this solicitation through a required developer commitment of at least $10,000 per megawatt dedicated to regional monitoring of wildlife and key commercial fish stocks, and through environmental and fisheries mitigation plans.

(Offshore Wind, continued…)

- The [2022 State of the Science on Wildlife and Offshore Wind Energy](#) was held in Tarrytown, NY from July 26 to 28. More than 230 people attended the workshop in person and an additional 220 attended virtually. The workshop included twelve presentation sessions and symposia, 51 oral presentations, and 29 posters. The workshop agenda, abstracts, and video recordings of sessions are now available on the Environmental Technical Working Group [website](#). Major themes emerged around continued regional collaboration, the value of multiple modalities, autonomous and machine learning methods, and data sharing. offshore wind industry.

- Morgan Brunbauer, NYSERDA's Offshore Wind Marine Fisheries Manager, attended the June meeting of the Mid-Atlantic Fisheries Management Council and the September meeting of the New England Fisheries Management Council. At this meeting, the Bureau of Ocean Energy Management (BOEM) staff were in attendance to discuss updates on the development of offshore wind in the Mid-Atlantic and Gulf of Maine. Developers also hosted an open house at each meeting to answer questions related to offshore wind development and fisheries impacts. This meeting provided a unique opportunity for Mr. Brunbauer to represent the State of New York and engage with BOEM staff while also interacting with regional offshore wind developers, commercial fishermen, and council members to strengthen regional collaboration and partnerships necessary for co-existence in the NY Bight while also promoting the goal of developing offshore wind in an environmentally responsible manner.

Kate McClellan Press acknowledging stakeholders at State of the Science
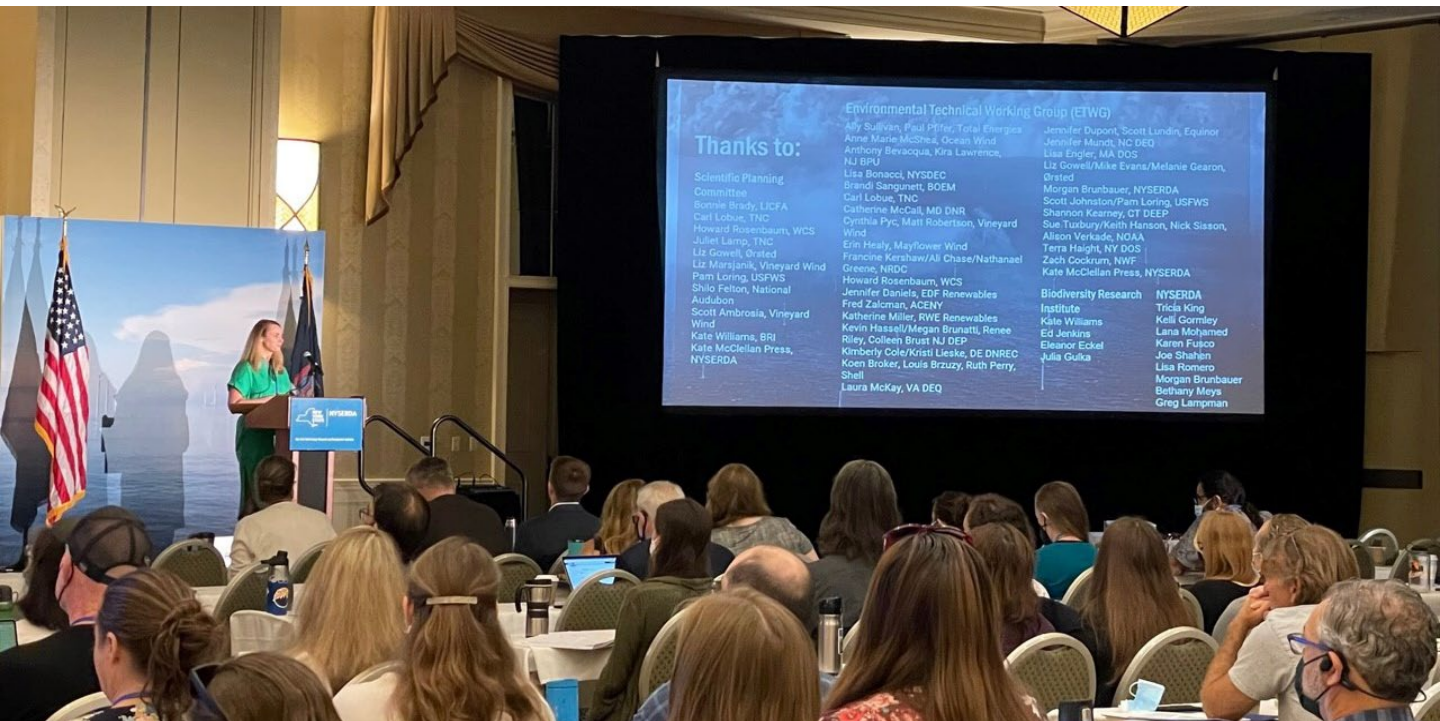

Photo Credit: NYSERDA

(Offshore Wind, continued…)

Presentation Discussion Panel at State of the Science

Photo Credit: NYSERDA

- NYSERDA continues to lead ongoing discussions with the BOEM, National Marine Fisheries Service (NMFS), other states, and stakeholders in regards BOEM's draft framework on avoiding, minimizing and if needed, compensating for impacts from offshore wind energy projects to commercial and recreational fisheries. Further details can be found here, including information about planned public webinars.

- A final Project Advisory Committee (PAC) meeting was held for the Addressing Commercial Fishing Access within Wind Energy Areas Study. The project team, led by Rebecca Green at the National Renewable Energy Laboratory, provided final findings from the project and presented a structured approach that will be used for the final report. The final study report is on target to be published in the fourth quarter of 2022.

- A final PAC meeting was held for the Fisheries Knowledge Trust Project. The project team is led by Annie Hawkins, Executive Director of the Responsible Offshore Development Alliance. At the meeting, the final structure of the report was discussed which included information on the development of governance documents, trust infrastructure, a go-forward plan, and result from two pilot projects using herring and surf clam fleet data. The final project report is scheduled to be published in the fourth quarter of 2022.

- The Environmental and Fisheries Technical Working Groups held a joint session led by Equinor on the mitigation plans for the Empire Wind I and II projects as well as Beacon Wind I. The purpose of this meeting was to re-engage with the working groups to discuss project updates, philosophy to the development and evolution of the mitigation plans. Equinor also introduced the concept of a regional monitoring fund which is associated with the $10,000 per MW that the winning contracts needed to set aside for regional wildlife and fisheries monitoring as part of the 2020 offshore wind solicitation. Future technical working group meetings will be held this fall to dive further into survey plans and other project specific interests associated with the evolution of the mitigation plans.

Program Reports and Papers

Program Reports & Papers posted recently include:

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

Catena, A.M.; Zhang, J.; Commane, R.; Murray, L.T.; Schwab, M.J.; Leibensperger, E.M.; Marto, J.; Smith, M.L.; Schwab, J.J. "Hydrogen Sulfide Emission Properties from Two Large Landfills in New York State." Atmosphere 2022, 13, 1251. https://doi.org/10.3390/atmos13081251

Chen, Y., Rich, D.Q., & Hopke, P.K. (2022). Long-term $PM_{2.5}$ source analyses in New York City from the perspective of dispersion normalized PMF. A*tmos. Environ., 272,* 118949. https://doi.org/10.1016/j.atmosenv.2022.118949.

Chen, Y., Rich, D.Q., & Hopke, P.K. (2022). Long-term trends of ultrafine and fine particle number concentrations in New York State: Apportioning between emissions and dispersion. *Environmental Pollution* 310, 119797. https://doi.org/10.1016/j.envpol.2022.119797.

Civerolo, K.L., Rattigan, O.V., Felton, H.D., Schwab, J.J., "Ambient total Oxidized Nitrogen Monitoring in New York State", EM (AWMA), September 2022, https://www.awma.org/content.asp?admin=Y&contentid=XXX

Deng X., Brotzge J., Tracy M., Chang H.H., Romeiko X., Zhang W., Ryan I., Yu F., Qu Y., Luo G, Lin S. (2022). Identifying joint impacts of sun radiation, temperature, humidity, and rain duration on triggering mental disorders using a high-resolution weather monitoring system. Environ. Int. (167):107411. https://doi.org/10.1016/j.envint.2022.107411

Lei, L., Berkoff, T.A., Gronoff, G., Su, J., Nehrir, A.R., Wu, Y., Moshary, F., & Kuang, S. (2022). Retrieval of UVB aerosol extinction profiles from the ground-based Langley Mobile Ozone Lidar (LMOL) system. Atmos. Meas.Tech., 15, 2465–2478. https://doi.org/10.5194/amt-15-2465-2022.

Li, A.F., Zhang, K.M., Allen, G., Zhang, S., Yang, B., Gu, J., Hashad, K., & Sward, J. (2022). Ambient sampling of real-world residential wood combustion plumes. *Journal of Air and Waste Management, 72*(7), 710-719. https://doi.org/10.1080/10962247.2022.2044410.

Lin S., Ryan I., Paul S., Deng X., Zhang W., Luo G., Dong G., Nair A., Yu F. (2022). Particle surface area, Ultrafine Particle number concentration, and cardiovascular hospitalizations. Environ. Pollution: 119795. https://doi.org/10.1016/j.envpol.2022.119795

Luo, G., Yu, F., and Schwab, J.: Increasing influence of Canadian anthropogenic and the Great Lakes Region shipment SO2 emission on ultrafine particle number concentrations in New York State. Environmental Research Communications, 4(7), 071003. https://doi.org/10.1088/2515-7620/ac82a9, 2022.

M. V. Liu, B. Yuan, Z. Wang, J. A. Sward, K. M. Zhang and C. L. Anderson (2022) An Open Source Representation for the NYS Electric Grid to Support Power Grid and Market Transition Studies, IEEE Transactions on Power Systems, https://doi.org/10.1109/TPWRS.2022.3200887

Sward, J. A.; Ault, T. R.; Zhang, K. M. (2022) Genetic algorithm selection of the weather research and forecasting model physics to support wind and solar energy. Energy, 254,124367. https://doi.org/10.1016/j.energy.2022.124367

Sward, J. A.; Ault, T. R.; Zhang, K. M. (2023) Spatial biases revealed by LiDAR in a multiphysics WRF ensemble designed for offshore wind, Energy, 262, 125346, https://doi.org/10.1016/j.energy.2022.125346

Program Reports and Papers

Program Reports & Papers posted recently include:

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

Yu, F., Luo, G., Nair, A. A., Tsigaridis, K., Bauer, S. Use of machine learning to reduce uncertainties in particle number concentration and aerosol indirect radiative forcing predicted by climate models. Geophysical Research Letters, e2022GL098551, doi:10.1029/2022GL098551, 2022.

Biomass

Allen, G., Morin, B., Ahmadi, M., & Rector, L. Online measurement of PM from residential wood heaters in a dilution tunnel. *Journal of Air and Waste Management, 72*(7), 662-678. https://doi.org/10.1080/10962247.2022.2049927.

Allen, G., Morin, B., & Rector, L. (2022). *ASTM E3053 Test Method Study.* New York State Energy Research and Development Authority (NYSERDA). https://www.nescaum.org/documents/nescaum-3053-based-test-assessments-final-20220310-final.pdf/.

Burkhard, E. (2022). Introduction to Special Issue on Residential Wood Combustion. *Journal of Air and Waste Management, 72*(7), 617-618. https://doi.org/10.1080/10962247.2022.2060647.

Ferro, A., Zíková, N., Masiol, M., Satsangi, G., Twomey, T., Chalupa, D., Rich, D., & Hopke P. (2022). Residential Indoor and Outdoor PM Measured Using Low-cost Monitors during the Heating Season in Monroe County, NY. *Aerosol and Air Quality Research, 22*(9), 220210. https://aaqr.org/articles/aaqr-22-05-oa-0210

Lindberg, J., Vitillo, N., Wurth, M., Frank, B.P., Tang, S., LaDuke, G., Fritz, P.M., Trojanowski, R., & Butcher, T. (2022). Characterization of in-stack particulate emissions from residential wood hydronic heater appliances under different combustion patterns. *Journal of Air and Waste Management, 72*(7), 720-737. https://doi.org/10.1080/10962247.2022.2049398.

Lindberg, J., Vitillo, N., Wurth, M., Frank, B.P., Tang, S., LaDuke, G., Fritz, P.M., Trojanowski, R., Butcher, T., & Mahajan, D. (2022). Realistic operation of two residential cordwood-fired outdoor hydronic heater appliances – Part 2: Particle number and size. *Journal of Air and Waste Management, 72*(7), 762-776. https://doi.org/10.1080/10962247.2022.2056661.

Marin, A., Rector, L., Morin, B., & Allen, G. (2022). Residential wood heating: An overview of U.S. impacts and regulations. *Journal of Air and Waste Management, 72*(7), 619-628. https://doi.org/10.1080/10962247.2022.2050442.

Morin, B., Ahmadi, M., Rector, L., & Allen, G. (2022). Development of an integrated duty cycle test method to assess cordwood stove performance. *Journal of Air and Waste Management, 72*(7), 629-646. https://doi.org/10.1080/10962247.2022.2057615.

Morin, B., Allen, G., Marin, A., Rector, L., & Ahmadi, M. (2022). Impacts of wood species and moisture content on emissions from residential wood heaters. *Journal of Air and Waste Management, 72*(7), 647-661. https://doi.org/10.1080/10962247.2022.2056660.

O'Brien, K., Rector, L., Marin, A., & Allen, G. Impact of fueling protocols on emission outcomes for residential wood-fired appliances. *Journal of Air and Waste Management, 72*(7), 679-699. https://doi.org/10.1080/10962247.2022.2070297.

Program Reports and Papers

Program Reports & Papers posted recently include:

Biomass Continued

Panessa-Warren, B., Butcher, T., Warren, J. B., Trojanowski, R., Kisslinger, K., Wei, G., & Celebi, Y. (2022). Wood combustion nanoparticles emitted by conventional and advanced technology cordwood boilers, and their interactions in vitro with human lung epithelial monolayers. *Biofuel Research Journal*, 9(3), 1659–1671. https://doi.org/10.18331/BRJ2022.9.3.3

Rousta, F., Ahmadi, G., & Allen, G. (2022). Computational modeling of woodstove pollutants in dilution tunnels. *Journal of Air and Waste Management, 72*(7), 700-709. https://doi.org/10.1080/10962247.2022.2038308.

Trojanowski, R., Lindberg, J., Butcher, T., & Fthenakis, V. (2022). Realistic operation of two residential cordwood-fired outdoor hydronic heater appliances – Part 1: Particle and gaseous emissions. *Journal of Air and Waste Management, 72*(7), 738-761. https://doi.org/10.1080/10962247.2022.2044409.