Final Report: Student Scholarship Program
2022 National Biodiesel Conference & Expo

Outcome Summary

In 2022, the Biodiesel Alliance project and the National Biodiesel Board (Clean Fuels Alliance America) successfully executed another student program for members of the Next Generation Scientists for Biodiesel to attend the National Biodiesel Conference and Expo. In a survey, 100 percent of respondents answered "yes" to the question, **"Did the biodiesel conference increase your support of the use of biodiesel and Bioheat?"** Also, 80 percent answered yes to the question, **"As a result of attending the conference, do you see an opportunity where you could propose a pathway to increase the use of biodiesel?"** Several students commented on their eyes being opened to what make soybean oil a sustainable feedstock, knowledge that will hopefully stay with them as they pursue careers in renewable energy.

Dr. Robert McCormick of the National Renewable Energy Laboratory moderated a student-led session and helped lead a private mentoring mixer, telling the students NREL plans to hire an unprecedented number of scientists in the coming years. Some students commented they would like to pursue career opportunities with NREL. Due to the high number of students from Kansas, two Clean Cities Coordinators from that state attended a mentoring mixer, discussing internship opportunities with several students who remarked on their interest in this after the conference. Connections like these could prove valuable in the future by bringing young professionals into these careers with a strong pro-biodiesel disposition. Future pro-biodiesel thought leadership among scientists involved in the Clean Cities program and NREL would only help the use of and support for the fuel as a low-carbon solution grow.

In one of the most promising outcomes, Alexandra Dill, a sustainable energy major from the State University of New York, said she is researching carbon abatement pathways in the residential heating sector. Attending a Bioheat® fuel session was a highlight for her, and she expressed interest in adding it to her research. One of the carbon abatement pathways she is looking into is air source heat pumps, which create an environmental justice problem as they are expensive.

"ELE ELECTRIFYING THE HEATING SECTOR MAY DISPROPORTIONATELY AFFECT THE COMMUNITIES THAT CANNOT AFFORD TO INSTALL AIR SOURCE HEAT PUMPS AND BIOHEAT IS A GREAT FUEL THAT CAN MAKE SURE LOWER INCOME COMMUNITIES CAN STILL DECARBONIZE." – ALEXANDRA DILL, SUNY-ESF

This information has been shared with Paul Nazzaro, Bioheat lead for Clean Fuels, and will be shared with Michael Devine, incoming CEO of the National Oilheat Research Alliance. Another student from SUNY, Jenny Frank, current NGSB co-chair, has worked on similar techno-economic analysis on biodiesel now vs. electric far off in the future, and Clean Fuels has promoted the results of this research widely.

Another student, Courtney Videchak, University of Michigan - Ann Arbor, Mechanical Engineering, presented on her research with biodiesel and Detroit Diesel engines. Already aware of the research, the Clean Fuels technical team was interested to meet with her and discuss further collaboration on research that could improve OEM support.

"ONE OF THE SPECIFIC BENEFITS MENTIONED DURING A SESSION STUCK WITH ME. ANTOINE THOMPSON [D.C. CLEAN CITIES] MENTIONED THAT THERE WERE ISSUES OF ENVIRONMENTAL JUSTICE THAT BIODIESEL CAN REMEDY, SINCE THERE WILL BE EJ AREAS AROUND PORTS, RAIL AND INDUSTRY CENTERS. I LEARNED ABOUT THIS IN MY AIR QUALITY ENGINEERING COURSE, SO IT WAS INTERESTING TO HEAR SOMEONE TIE THAT TO THE USE OF BIODIESEL." -COURTNEY VIDECHAK, UNIVERSITY OF MICHIGAN

In all, nine students attended the event, supported by the United Soybean Board, the National Biodiesel Foundation, the National Biodiesel Board and Kansas Soybean Commission. Although COVID cases reduced number of attendees from what was originally planned, the students joining were:

- Atif Ali, State University of New York College of Environmental Science and Forestry, Sustainable Energy
- Alexandra Dill, SUNY- College of Environmental Science and Forestry, Sustainable Energy
- Nimesh Pasan Ranasinghe, University of Iowa, Chemistry
- Courtney Videchak, University of Michigan - Ann Arbor, Mechanical Engineering
- Mylee Godwin, University of Kansas, Chemical Engineering

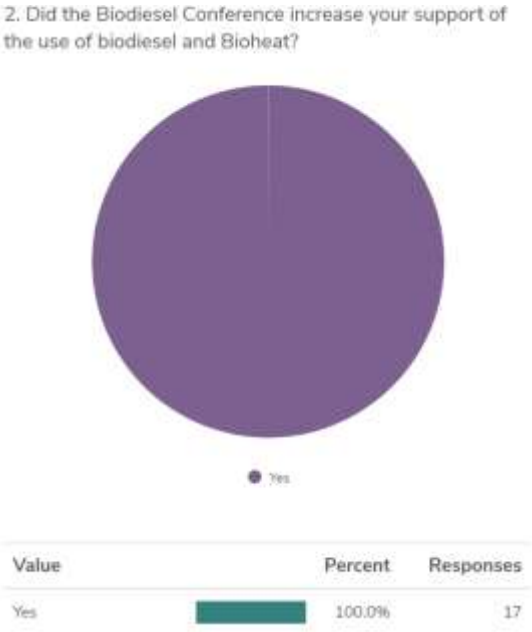
- Mary Sevart, University of Kansas, Chemical Engineering
- Kathryn Harlow, University of Kansas, Chemical Engineering
- Melvin Loo, University of Kansas, Chemical Engineering
- Stephanie Ma, Kansas State University, Chemical Engineering

The students attended a **pre-conference Biodiesel 101 session**, which included a sustainability presentation. They also attended a **mentoring science mixer** once again with experienced biodiesel scientists, a networking and mentoring highlight of the event. A breakout session led by students, "Science Aces: The Next Generation Scientists for Biodiesel," was attended by about 75 people.

Survey Results

In February, the KCE team **surveyed** members of the Next Generation Scientists for Biodiesel who attended the National Biodiesel Conference and Expo. Of the students who responded to the survey, all but one rated their experience a 4 or 5 out of 5. Also, 100 percent of respondents answered "yes" to the question, **"Did the biodiesel conference increase your support of the use of biodiesel and Bioheat?"**

About 80 percent answered yes to the question, **"As a result of attending the conference, do you see an opportunity where you could propose a pathway to increase the use of biodiesel?"** Answers given included the following:



1. “I believe biodiesel has the potential to replace the petroleum diesel in near future. impurities from biodiesel mixtures 9unsaturated fatty acids) can be use for other industries like paint, costumes etc. this will open up new job opportunities and chance for extra income for biodiesel producers.”

2. “The main pathway that I may be looking into is Bioheat as the residential heating sector is where I am currently conducting a techno economic analysis. Also just using biodiesel for heavy duty vehicles or vehicles that are on the roads for hours where EVs are not practical.”

3. “I believe that I could increase the use of biodiesel by creating more avenues for feedstocks for it and increasing public knowledge about biodiesel.”

Soybeans as a Sustainable Feedstock

The survey and a requested essay from students also asked what they learned about **soybean oil as a sustainable feedstock**. Answers included the following:

- “Soybeans are more sustainable than other feedstocks to produce biodiesel and that is the reason it is the most used feedstock for producing biodiesel. Farmers are trying to make it even more sustainable by reducing their carbon impact scores.”

- “I learned that soybeans as a feedstock can be very sustainable and create biodiesel that is economically competitive to petrodiesel.”

- “I think [soybeans] support global food security as a critical supplier of protein, oil and accompanying nutrients. People are still not ready to accept the problems led by global warming. However, soybean farmers' focus on continuous improvement makes them globally competitive. Farmers should keep innovating and adopting practices on nutrient management and greenhouse gas emissions while increasing energy use efficiency.”

Comments from Students

“I believe that this conference will permit me to dedicate significantly more focused on biodiesel industry. The demand for biodiesel gradually increasing because of its' positive impact on economy and environment. This conference offers the opportunity for met professionals in the field to learn more about a specific topic, network with like-minded people and gain technical information.” -Nimesh Pasan Ranasinghe, University of Iowa, Chemistry

“Attending this conference allowed me to be surrounded by professionals who were all so passionate about what they did because they knew what they were doing was making a difference. I enjoyed the Doubling Down on Feedstock session where Kara Isaak spoke about how agriculture can be a part of the solution to climate change instead of part of the problem. We shouldn't look at it as food vs. fuel but rather food and fuel working together. My perspective was also changed throughout the session as many people mentioned how biodiesel is ready now. Often in my courses we talk about electrifying the grid but this cannot be the

only solution because it would not be ready for years yet biodiesel can start making a difference right now. Biodiesel allows for decarbonization as soon as possible. I was also interested in attending this conference to see how I could potentially conduct research on biodiesel. My favorite session of the conference was Bioheat Fuel: In It to Win It. Currently I am researching carbon abatement pathways in the residential heating sector and Bioheat seemed like a great fit to add into my research. One of the carbon abatement pathways I am looking into is air source heat pumps but they create an environmental justice problem as they are so expensive. Electrifying the heating sector may disproportionately affect the communities that cannot afford to install air source heat pumps. Electrification is not a silver bullet and Bioheat is a great fuel that can make sure lower income communities can still decarbonize. Overall the conference was a great experience and I am excited to see how the biodiesel industry develops in the coming years." - Alexandra Dill, State University of New York College of Environmental Science and Forestry, Sustainable Energy

"I came into the National Biodiesel Conference only understanding the small-scale process that my lab at the University of Kansas employs. I was very excited to learn more about the industry as a whole and new avenues of growth happening for biodiesel in the US. I thoroughly enjoyed getting to meet some incredible industry professionals through mixers and getting to listen to their ideas at their sessions and presentations. Getting to hear about the incredible growth of the industry stoked my excitement for biodiesel and inspired me to continue to help improve the biodiesel production process." -Mary Sevart, University of Kansas, Chemical Engineering

"As a student using biodiesel in a diesel engine, I already know a lot about the fuel and the benefits. I decided to take the opportunity to learn more about policies surrounding biodiesel use, so many of the breakout sessions I attended surrounded that topic. One of the specific benefits mentioned during the Improving the Hand You're Dealt session stuck with me. Antoine Thompson mentioned that there were issues of environmental justice that biodiesel can remedy, since there will be environmental justice areas around ports, rail, and industry centers. I learned about this phenomena in my air quality engineering course this semester, so it was interesting to hear someone tie that to the use of biodiesel to help improve the air quality around the areas where air quality is very poor. I was able to meet so many other people involved in the biodiesel industry, aside from academics and employees of an OEM, which I found so interesting. I found the experience of presenting my research to be confidence boosting, since I was able to handle the presentation and subsequent questions without issue. I made connections with some of the people at the Science Mixer on the final night that work with Clean Cities Coalition, which I had never heard of before the conference. They inspired me to look at alternative careers outside of academia and traditional industry, which is possible with these new connections I made at the conference." -Courtney Videchak, University of Michigan - Ann Arbor, Mechanical Engineering

"Since I started attending the national conferences and local consortium meetings, I have vastly improved my industry knowledge. I always look forward to an opportunity to listen to and speak with industry professionals that can shed light on the application of what I am practicing and learning in my research lab to

industry. This year, the thing that has piqued my interest the most has been learning about Optimus Technologies and other industry milestones. The first I heard about the B100 dual tank technology was at a Kansas biodiesel consortium meeting, but its application was brought up several times throughout the national conference. I had no idea that B100 was in use and that municipalities were transitioning their fleets to use this technology. This was very exciting to hear and has sparked conversations for potential pilot projects. I also enjoyed learning about Bioheat as I did not know anything about heating oil in general, let alone a bio version. I had no idea this was such a large market and it was exciting to learn about how much greener Bioheat is and the potential for continued development and outreach in this industry. Additionally, the representatives speaking about Bioheat and its utilization in the Northeast were very inspiring. It was great to hear about a normally environmentally negative heat source being transitioned to a biofuel based energy source by family owned businesses. This was encouraging both by showing me that established businesses are capable of environmentally positive change and that a stubborn customer base is able to slowly adapt to greener products. This experience showed me that the possibilities for career paths in biofuels are more extensive and versatile than I originally thought." – Kathryn Harlow, University of Kansas, Chemical Engineering

"At the conference, I learned a lot more about biofuels on an industry level and in real-world applications extending beyond lab research at a university. I had no idea how large the soybean and biodiesel industry truly was. It was very interesting to learn about the challenges facing the biofuels and soybean markets on an industrial level, as I have been mostly familiar with the challenges faced in our research lab and in using biodiesel in consumer engines. I didn't know that biodiesel could be used for home heating, and I learned a lot about the shortcomings of switching to electrical systems versus paying extra money to use biofuels. I really enjoyed getting to hear from a variety of backgrounds in the industry, including farmers, engineers, business executives, and even vehicle sales representatives; it greatly diversified my knowledge of the industry. I found the university student research panel to be very interesting, and each of the projects they presented about were very inspiring. Overall, I found the conference to be very inspiring in terms of my career aspirations." -Melvin Loo, University of Kansas, Chemical Engineering

"I learned at National Biodiesel Conference & Expo that how resilient biodiesel sector is and how an organization set up by farmers from scratch three decades earlier became leading biofuels organization in the US. It was inspirational and motivational to hear the experiences and challenges from past chairpersons of National Biodiesel Board (NBB) that how in difficult situations they stood tall and made decisions that have shaped the bright future of NBB, now Clean Fuels Alliance America. It was great to witness the optimism of farmers that more than enough feedstock will be available to produce biodiesel, renewable diesel, and sustainable aviation fuels; this makes me believe that biofuels are here to stay for a long time. I met many inspirational people from industry and also the other students who attended conference with me, hearing about their work was also inspiring. The science mixer reception was a great networking experience, and I had the opportunity to connect with Robert McCormick from National Renewable Energy Laboratory (NREL) who was kind enough to share his personal journey how he ended up working at NREL and how is work life there. I want to work at NREL since it is one of the most prestigious national labs in the US. Before the conference, I thought biofuels industry might not stay in business because everyone is talking about electrification, but NBB conference have changed my perspective and now I am not only optimistic but

confident that biofuels industry is there to stay, and I want to play my part in transition of transportation sector by working in this industry." -Atif Alii, State University of New York College of Environmental Science and Forestry, Sustainable Energy

Future Webinar Suggestions

- How biodiesel , RD and SAF impact the farm.
- Session on Bioheat and all of the speakers on that panel. Mahanth Joishy/City of Madison who was an actual customer.
- Robert McCormick where he talks about the opportunities at NREL and tips for students to successfully land a work position there.
- ASTM session! I would love to hear more about future research being done on biodiesel and have a session, maybe just for students, that explains the current stance of biodiesel.
- A combination of topics that would paint a total picture of the industry, including some information on policy and standard, information about current uses and research, and a projection of where the industry is heading.
- A session where students can discuss their research, future plans, and new ideas for their labs would be great. It would give us all time to brainstorm new research areas.
- Beyond the Road: New and Expanding Markets and Bioheat Fuel: In it to Win it
- Discussing how university research can be applied to the industry would have been beneficial.