On Nov. 2, 2022, Savion presented the Solar Symposium at London Elementary School in London, Ohio. A panel of subject matter experts spoke about utility-scale solar energy development in Madison County and answered questions from local residents.

The professionally moderated panel included information about the development, construction, operation, and decommissioning processes of utility-scale solar facilities in the county as well as the estimated economic and environmental benefits for the area that will accrue over the next 35 years.

After the panelists spoke, they answered questions submitted by the audience during an hour-long Q&A. All questions not answered at the event because of limited time have been answered below.

QUESTION: Joe Biden is incentivizing farmers to raise more wheat and soybeans. How are we supposed to do this if we use all our farmland for solar panels?

The total amount of agricultural land being used for solar energy is minuscule compared to the permanent conversion of agricultural land to residential housing and commercial development. Ultimately, the decision lies with the landowner.

QUESTION: (1) How many acres are currently in contract in Madison County? (2) What impact will losing these acres to solar have on our local agricultural business? Revenue loss will be in the millions - 10 million per year with 20,000 acres going to solar.

(1) This question would need to be tallied via the county recorder. Lease and options must be recorded with the deed on the property and are available publicly.

(2) Only a portion of farmland is suitable for solar energy generation. According to the National Renewable Laboratory (NREL), if the United States were to meet 100% of its electricity needs with solar energy, it would require about 0.6% of America's total land area. (Solar Energy Industries Association (SEIA), 2019). Solar projects give farmers and landowners a stable income that allows them to invest confidently in more farming operations and/or equipment. Increasing the stability of the agricultural community supports ag business and pumps money into the ag business industry. It might be necessary for ag business operations to shift their mindset slightly (smaller equipment to manage sites, different seed mixes or fertilizers available) but the same way ag has adjusted and progressed with new hybrids and increasing yields, it will find revenue from any operation using the land and not turning it into parking lots, warehouses, or housing developments. Solar projects can also allow land to recover by just letting the soil rest. When a solar project is decommissioned, farming can once again resume on that land. This is in stark contrast to other developments, which often leave land unable to easily convert back to agricultural use. (Solar Energy Industries Association (SEIA), 2019)

QUESTION: (1) How are you going to protect our endangered species in the national scenic river, the little Darby? Over 75% of the project drains into the little Darby. (2) How will you protect from bird kills?

(1) The project team has engaged in close coordination with the US Fish and Wildlife Service, the Ohio Department of Natural Resources, and the Darby Creek Association to evaluate the unique natural resources in the Darby Plains and to ensure that the project is constructed and operated to avoid impacts to these resources. In particular, the USFWS and ODNR have concurred that the project will not have a negative impact on threatened or endangered species, and these communications have been filed publicly in the OPSB docket for the project. Furthermore, the project team is working with Darby Creek and ODNR Scenic Rivers to identify additional conservation measures that can be incorporated into the project to add to the environmental benefits of the project. The project has committed to going above and beyond what is required to protect the unique ecology of the Darby Plains.

(2) Solar panels are not a cause for bird kills. As mentioned above the project has coordinated with the USFWS and ODNR to identify any direct or indirect risks to birds and other wildlife species. The recommendations from USFWS and ODNR have been documented in our application and these recommendations have been incorporated into the plans and designs for the project to minimize effects on wildlife. As highlighted in the project permit application, studies have shown waterfowl can mistake solar facilities as potential water bodies and approach and land on or near the panels causing injuries, termed as the "lake effect." The majority of these instances occur in the southwestern U.S., where solar facilities are developed in open deserts where other waterbodies are not as prevalent. Limited research has been completed for solar facilities located in the Midwest near agriculture, prairies, forested habitat, or when other waterbody resources are nearby. This issue has not been documented as a significant issue at solar projects in the Midwest. Some research had observed fewer injuries due to the "lake effect" occurring in areas where other waterbody resources are available for waterfowl (Audubon 2017; Wildlife 2021).

Audubon Society. 2017. Why solar power is good for birds. Available at: https://www.audubon.org/news/why-solar-power-good-birds. Accessed August 2022.

The Wildlife Society (Wildlife). 2021. Limited evidence birds confuse solar panels with lakes. Available at: https://wildlife.org/tws2021-limited-evidence-birds-confuse-solar-panels-with-lakes/. Accessed August 2022.

QUESTION: (1) What toxicity concerns do we have with the panels? (2) Batteries? (3) If you are moving topsoil, you are changing the flow direction and speed of water. How can you do this? Farmers cannot. (4) How does this affect landowners upstream and downstream?

(1) The Ohio Department of Health conducted a review of solar panel and battery storage equipment and concluded that these products and projects are not a threat to people or the environment (Ohio Department of Health Solar Farm and Photovoltaic Summary and Assessments, April 2022, DPH document references from April 2022, https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-solarfarms; and Ohio Department of Health Battery Energy Storage Summary

and Assessments, April 2022, https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-batteries).

Solar panels pass the EPA Toxicity Characteristic Leaching Procedure (TCLP) and are not classified as hazardous waste. This laboratory test consists of crushing panels into small pieces, mixing in an acid bath, and testing fluid for 40 hazardous substances that must be below specific thresholds to pass the test. Materials that pass the TCLP are considered safe for disposal in standard landfills and do not pose a threat of contamination to people or the environment. The Oak Run project has committed to only using panels that pass the TCLP test, and the project has already provided the TCLP testing results for the proposed solar panels to the Madison County Commissioners at their request.

Furthermore, the project will have a decommissioning plan, approved by the OPSB prior to ever starting construction on the project. This plan will identify how the project equipment will be fully removed if the project were to stop operating for any reason. The decommissioning plan will include an estimate to deconstruct and properly recycle or dispose of the equipment. The full amount of this cost will be provided in a bond to the State, prior to construction, in order for the project to be properly decommissioned if the company was not able to do so. This decommissioning plan and financial bond will be maintained for the life of the solar project, including an update every 5 years to ensure the cost estimate and corresponding bond remain sufficient to decommission the project.

Solar panels and equipment are also recyclable. Nearly 85% of the materials are recyclable, including 100% of the metals included in solar. The non-recyclable components are generally plastic components that are consumed in the recycling process.

(2) Lithium-ion cells do not leak electrolytes during normal operation like some 'flooded' lead-acid batteries used in substations and UPS equipment. Lithium-ion battery modules will only leak if they experience catastrophic failure. Most of the leakage will be in the form of gases, and the volume of liquid electrolytes will be trace amounts of volume compared to that found in the more common flooded lead-acid batteries. The liquid electrolyte is technically in the cell itself, although cells are housed within modules, within racks, within containers which serve as secondary containment for the materials.

(3) The Project will be required by the operating permit from OPSB to maintain the existing drainage of the project site throughout the life of the solar project. The project would not have any effects on drainage upstream or downstream from the solar project; and, if any are identified as a result of the project construction, the project would be required to rectify those issues at the project's expense. The stormwater design for the project will demonstrate that the project will increase infiltration and reduce overall runoff from the site compared to current conditions.

The overall terrain of the Project consists of shallow sloped rolling hills of less than 6% so no mass grading is expected to be needed to reduce terrain slopes. Because of the rolling hills throughout the Project area, spot grading at pile locations is anticipated to reduce module-terrain collision in various areas. Topsoil from these minor areas of grading and from access roads and other areas of surface disturbance will be managed on each property and segregated where necessary to avoid mixing with subsoil.

(4) In many situations, during the development phase of a solar project, drainage studies and calculations may be conducted by third-party experts. It is typical to find that a solar project area's post-construction condition will create LESS stormwater runoff than the current pre-construction condition of cultivated ag land.

THREE SIMILAR QUESTIONS COMBINED: (1) Do any of you have 6 to 10,000 acres of solar panels in your backyard? What will happen when the solar panels are washed off and the harmful chemicals make their way into every well? (2) What will happen when hail or other disasters damage the panels and the toxic chemicals in the panel leak into the national Darby Creek. Is Savion worried about this? Probably not because they do not live here. (3) If contaminants leak into the environment from this system and cause health issues to the local ecosystem, animals, and humans, who will be legally liable for damages, or will that cost be passed back to the taxpayers?

(1) The Oak Run Solar Project's lead developer does live on Ohio's largest wind farm. She also has solar installations being built in her township. In fact, several of us do live in the country, and we do not own the land around us. Landowners surrounding us have sold off lots for houses or housing developments and put up livestock operations and wind turbines. Even a few of us who own the land around us have had it taken for power lines, highways, and railroad right of ways. Solar panels are safe, quiet neighbors. All solar panels are contained in a solid matrix, are insoluble, and are enclosed in glass and aluminum frames. Because of all of this, chemical releases are not a concern. Furthermore, rules and regulations are in place to ensure that ground-mounted solar arrays are installed in a way that protects public water supplies, wetlands, and other water resource areas. The Ohio Department of Health conducted a review of solar panel and battery storage equipment and concluded that these products and projects are not a threat to people or the environment (Ohio Department of Health Solar Farm and Photovoltaic Summary and Assessments, April 2022, DPH document references from April 2022, https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-solarfarms; and Ohio Department of Health Battery Energy Storage Summary and Assessments, April 2022, https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-batteries). (Massachusetts Department of Energy Resources; Massachusetts Department of Environmental Protection; Massachusetts Clean Energy Center June 2015)

(2) When panels are damaged, they will be replaced, and the damaged panel(s) will be recycled. Leaking is not a concern due to the solid state of the materials involved in solar panels. Solar projects are monitored and if individual panels or strings of panels are damaged or stop producing energy, they will be replaced. There are many solar panel projects in operation throughout the state and throughout the country, and environmental contamination from solar project equipment has not been found to be an issue at other projects. Panels do not leak therefore health issues are not a concern for anyone in the local community or ecosystem. The Ohio Department of Health conducted a review of solar panel and battery storage equipment and concluded that these products and projects are not a threat to people or the environment (Ohio Department of Health Solar Farm and Photovoltaic Summary and Assessments, April 2022, DPH document references from April 2022, https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-solarfarms; and Ohio Department of Health Battery Energy Storage Summary and Assessments, April 2022, https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-

batteries). Furthermore, the project will have a decommissioning plan, approved by the OPSB prior to ever starting construction. This plan will identify how the project equipment will be fully removed if the project were to stop operating for any reason. The decommissioning plan will include an estimate to deconstruct and properly recycle or dispose of the equipment. The full amount of this cost will be provided in a bond to the State, prior to construction, in order for the project to be properly decommissioned if the company is not able to do so. This decommissioning plan and financial bond will be maintained for the life of the solar project, including an update every five years to ensure the cost estimate and corresponding bond remain sufficient to decommission the project.

QUESTION: What do you do when deer get into the enclosure?

Large-scale ground-mounted arrays are enclosed by fencing. This is to prevent children, the general public, and large wildlife such as deer from damaging the installation. If a deer jumps the fence to get in, it will likely do the same to exit.

QUESTION: If this project goes forward, where and how will the panels and batteries be disposed (because it is currently about 25 times less costly to put these in a landfill than to recycle them (up to 99%), and according to a representative of yours, this project is "market-driven")?

According to Green Tech Media research, modern photovoltaic crystalline silicon panels (PV panels) are largely composed of glass (76%) and include plastic (10%), aluminum (8%), silicon (5%), and very small amounts of copper, silver, tin, and lead (collectively, 1%). Nearly 85% of the materials in PV solar panels are fully recyclable at the end of the project's life. Importantly, 100% of the metals in solar panels are reusable. The 10% plastic component of the panels is consumed in the recycling process, so less than 6% of the of the total panel materials may need to be disposed of at a regulated waste facility. Overlooking that the "market driven" remark is taken out of context and was applied to the choice a farmer makes to commit to panels versus corn and soybeans, solar operators do have economic incentives to reuse and recycle PV panels at the end of the project life in addition to the environmental reasons for responsible disposal of PV panels. While the percentage of PV panels that can be recycled varies based on the type of panel and recycling process used, approximately 85% of all PV solar panels are **fully** recyclable. In summary, glass and metal components are entirely reused to make new solar panels. Plastic components melt, evaporate, and are then reused as a heat source in the recycling process.

QUESTION: Please define clean energy.

Clean energy refers to energy generated from recyclable sources without emitting greenhouse gases. [Last updated in June of 2021 by the Wex Definitions Team] Retrieved from https://www.law.cornell.edu/wex/clean_energy

Clean energy comes from natural sources or processes that are constantly replenished. Retrieved from https://www.nrdc.org/stories/renewable-energy-clean-facts

Clean energy is energy from sources not requiring the release of pollutants, including energy generated from recyclable sources which do not emit greenhouse gases. We can really get into the weeds with this answer because everyone wants to discuss the manufacturing and lifecycle emissions of PV technology. Several studies have covered methods of quantifying the energy payback time (EPBT) and life cycle GHG emissions resulting from solar PV technology referring back to the last 40 years (Celik et al., 2018; Laleman, Albrecht, & Dewulf, 2011; Louwen, Van Sark, Faaij, & Schropp, 2016; Nugent & Sovacool, 2014; Peng, Lu, & Yang, 2013). Knapp and Jester (2000, 2001) investigate the EPBT for crystalline silicon photovoltaic panels by conducting an empirical study and find that, in general, these panels achieve an energy break-even in three to four years. Bhandari, Collier, Ellingson, and Apul (2015) conduct a systematic review and meta-analysis of EPBT and energy return on energy invested (EROI) metrics while focusing on crystalline silicon and thin film solar PV panels. Kato, Murata, and Sakuta (1998) quantify the environmental impacts in terms of EPBT and life cycle GHG emissions for various solar PV module technologies such as mono-crystalline, poly-crystalline, and amorphous silicon modules, where their study reveals that mono-crystalline silicon modules are accompanied by the shortest EPBT and GHG emission compared to other PV technologies. Peng et al. (2013) conduct a review study on the assessment of EPBT and GHG emissions of various solar PV systems. In their study, results indicate that the average life cycle energy requirement for mono-crystalline solar PV modules varies between 2860 and 5253 MJ/m^2 and that the harmonized EPBT varies between 1.7 and 2.7 yr. Ultimately, YES, there are emissions during the manufacturing and delivery of renewable energy systems (RES). However, as all the processes become more green (i.e. manufacturing facilities with solar panels on the roof or electric vehicles for delivery) and the recycling of panels increases, the lifecycle GHG of solar will plumet and be even better than advertised.

Renewable energy is gained from sources that regenerate (renew) over short periods of time.

Green energy is derived from natural (green) sources like low-impact hydropower, water, bioenergy, geothermal, wind, and solar.

By most common definitions, clean energy is energy generated from sources that do not emit air pollutants. At the most basic level, this means clean energy results in clean air.

As you can see, renewable and green energy are focused on the source (fuel) that generates the energy. Clean energy is focused on the result of energy generation. Here's an easy way to remember the distinctions:

- Renewable Energy = Regenerative Sources
- Green Energy = Natural Sources
- Clean Energy = Clean Air

In terms of the promised potential, *clean, green, renewable energy* provides an essentially limitless source of power and gives us cleaner air and all the associated benefits. This seems especially true when considering solar or wind power which the U.S. Energy Information Administration projects will make up almost 40% of U.S. electricity generation by 2050. Retrieved from https://www.trccompanies.com/insights/a-conversation-about-clean-energy/

QUESTION: Where does all the topsoil go?

All of the topsoil is stockpiled on site according to the property where it originally laid.

QUESTION: Have the Madison County commissioners put a moratorium on solar panels yet?

No.

QUESTION: (1) Where will all the lithium be mined from for the batteries? (2) Is lithium safe?

(1) Currently, the global lithium supply for electric vehicles, stationary storage, and consumer electronics is mined from one of the following four countries: Australia, Chile, Argentina, and China. Currently, major manufacturers do not offer any origin information to the end customer.

(2) As discussed in previous responses, the Ohio Department of Health conducted a review of solar panel and battery storage equipment and concluded that these products (including batteries containing lithium) and projects are not a threat to people or the environment (Ohio Department of Health Solar Farm and Photovoltaic Summary and Assessments, April 2022, DPH document references from April 2022, https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-solarfarms; and Ohio Department of Health Battery Energy Storage Summary and Assessments, April 2022, https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-batteries).

FOUR SIMILAR QUESTIONS COMBINED: (1) Google World Food Crisis! I have never seen grain prices this high. And, you are taking the best farmland out of production. Why? (2) How many acres of prime farmland are we going to destroy before we say enough is enough? (3) How will equipment dealers, seed dealers, crop insurance agents, etc. be compensated for the loss of farmland? (4) Will Savion subsidize the companies that lose out on seed purchasing and fertilizer purchasing? The question was never answered. We here in Madison County do not need the power or the money.

(1) The choice to participate in solar continues to be the farmer's decision. Farmers know their land and yields best. They study the markets and make the best decisions for their families and livelihoods based on their expertise. Renewable energy simply offers a choice for land use that landowners may or may not take.
(2) In reality, the total amount of agricultural land being used for solar energy is minuscule compared to the permanent conversion of agricultural land to residential housing and commercial development. When the project is responsibly decommissioned at the end of its life, the land can be returned to

farming, unlike other development conversions. In fact, should a food crisis become critical, decommissioning is possible at any stage of project life.

(3) Solar projects give farmers and landowners a stable income that allows them to invest confidently in more farming operations and/or equipment. Increasing the stability of the agricultural community supports ag businesses and pumps money into the ag business industry. It might be necessary for ag business operations to shift their mindset slightly (smaller equipment to manage sites, different seed mixes or fertilizers available). The same way ag has adjusted and progressed with new hybrids and increasing yields, it will use the land to find revenue instead of turning it into parking lots, warehouses, or housing developments. Solar projects also allow land to recover by letting the soil rest. When a solar project is decommissioned, farming can once again resume on that land. This is in stark contrast to other developments, which often leave land unable to easily convert back to agricultural use. (Solar Energy Industries Association (SEIA), 2019)

(4) Not to be repetitive but increasing the stability of the agricultural community supports ag businesses and pumps money into the ag business industry. It might be necessary for ag business operations to shift their mindset slightly (smaller equipment to manage sites, different seed mixes or fertilizers available), but the same way ag has adjusted and progressed with new hybrids and increasing yields, it will use the land to find revenue and not turn it into parking lots, warehouses, or housing developments. Local companies will need to reflect market demands the same way we all do.