‘Transitioning to Cleaner Energy Won’t Happen with a Flick of a Switch’

Becoming more sustainable while remaining profitable in the transition to cleaner energy were the main points of focus at the 2024 Kellogg Climate Conference.

It was the third climate conference hosted by Northwestern University’s Kellogg School of Management in Evanston, Illinois. Kellogg alumni made up a large portion of the conference’s panelists, but it also featured leaders from the automotive, energy and beverage industries.

Shashank Sane, the executive vice president of transmission at Invenergy spoke during the Scaling the Energy Transition panel that addressed how renewable developers, transmission operators and the oil and gas industry are working to decarbonize the energy sector.

“It’s incumbent on us as developers to be much more engaged with communities early on in the process…[to] make sure we’re treating them fairly, that we’re being clear about benefits to those communities,” Sane said.

Shashank Sane speaking during the first panel at the Kellogg Climate Conference. Credit: Ryland Pietras/Medill Reports

One need not look further than to where greenhouse gases, the leading cause of climate change, come from to first understand why the transition is necessary. According to Associate Prof. of Strategy Meghan Busse, associate professor of strategy, who relied on data compiled

by the Rhodium Group and provided the morning's keynote speech, greenhouse gases can be broken down into four groups: electricity generation, transportation, industry, and agriculture and commercial residences.

In accordance with the 2015 Paris Agreement, the U.S set a target of reducing its greenhouse emissions by 50-52% relative to 2005 levels by 2030. Emissions have dropped to 17.2% since 2005 and declined for the first time since the COVID-19 pandemic, but in order to hit its target, the rate needs to more than triple and keep that momentum every year until 2030.

"That [2015 Paris Agreement] put us on a path that would curb our global emissions, and lead us to a path towards three degrees of global warming that…gets us to something that is devastating, rather than catastrophic," Busse said.

What Busse means is that the world has reached a sort of a point of no return in terms of the climate crisis. The climate is changing and that can be seen in different forms throughout the country. According to Four Twenty Seven, a climate risk data firm, how that is seen is through water stress in much of the central plains and mountain west, extreme heat in the midwest, wildfires in Arizona, California and Oregon, extreme rainfall in the Ohio River Valley and Pacific Northwest and hurricanes along the Gulf and East coasts.

"In order to preserve the world that we have become accustomed to, we need to cut our emissions to net zero by 2050," Busse said.

She said In order to attain that goal, necessary strides need to be made in all four of the previously mentioned sectors. An analysis by Cox Automotive found that sales of electric vehicles in the U.S. increased to around 8% of total car sales last year. The International Energy Agency reported that number to be over 20% in the EU and nearing 30% in China. These statistics indicate that the hunger for electric vehicles is growing globally.To meet the demand of energy consumption that EVs require, the U.S needs a much more reliant and accessible energy grid.

Sane, a 2011 graduate of Kellogg, said that is not something that will happen overnight.

"It's just so many more things to build, so much more infrastructure to build that's going to take time," Sane said. "Some of the projects we're working on originally started development in 2010, and we're just getting to construction now."

An accessible grid is only one part of the transition. Electricity production and the storage of it are two others.

"The cost of producing electricity, counting all the capital costs of building, drops the cost of generating electricity, with solar and with wind, actually below the cost of using fossil fuels," Busse said.

Andrew Flanagan, CEO of RWE Clean energy, said renewable energy production, which includes solar and wind, is at about 15% of total U.S. energy production. Wind and solar are expected to overtake coal production by 2025 per the International Energy Agency, but because neither are constantly available, that demands the need for greater capacity. For instance when an area of the country experiences less sun or wind, the energy stored in one part of the country can be diverted to it.

Andrew Flanagan said lithium-ion batteries are essential for energy storage during the Scaling the Transition panel. Credit: Ryland Pietras/Medill Reports

Currently, the main markets that are driving most of the solar penetration are California, Arizona and Texas, said Flanagan. They are demanding consumption in 8 hour, 4 hour and 2-4 hour durations, respectively. Much of the energy is being stored in lithium-ion batteries and although he said the rapid increase of EVs has benefited the production of more Li-ion batteries, it has also challenged it because of the increasing demand for EVs. He said that RWE is manufacturing 8-hour capacity batteries in Australia and foresees that continuing to grow to the 12-hour point of capacity, but doesn't see Li-ion remaining the premiere choice for storage past that point.

"We don't have the solution yet for beyond that 12-hour point," said Flanagan, a 2004 Kellogg alumni.

He said that's where the Inflation Reduction Act comes in. The Act was signed into law in

August 2022, and it incentivizes companies and manufacturers to both invest in and produce clean energy with over 20 different tax credits. Some of the credits include clean hydrogen production, clean fuel production, carbon oxide sequestration and a seemingly all-encompassing investment tax credit for energy property, which can range from equipment used to generate solar energy to waste energy recovery. The only caveat to the latter is that construction must begin before January 1, 2025 or otherwise applicants will not be eligible for the credit.

Although Flanagan said Li-ion batteries are essential for electricity storage, hydrogen is seen as the alternative to fossil-fuels for industries, like long-haul transportation and industrial manufacturing, that are much harder to switch to electrification. The clean hydrogen production tax credit is estimated to produce 50-million metric tons of hydrogen by 2050 and generate $140 billion in revenue. The credit is also meant to aid the creation of 700,000 jobs by 2030, according to AP News.
“There's tremendous opportunity for us as an industry…and as a country to really capitalize on those opportunities, but also lead and deliver and drive that for future economies,” Flanagan said.

However, Mauricio Angulo, a senior global strategy advisor at ExxonMobil, said simply generating the hydrogen necessary to replace the fuel used by fossil fuel intensive industries requires loads of electricity, often powered by the fossil fuels that they are meant to replace. A determining factor of how much of the tax credit a business or company can receive is dependent on how much coal or natural gas they use to generate hydrogen. This could be a potential hindrance for the burgeoning industry, but Angulo believes that the U.S. and the world will be reliant upon natural gas for much of the transition.

Mauricio Angulo said ExxonMobil recently became involved in direct lithium extraction with a $100 million investment in Arkansas. Credit: Ryland Pietras/Medill Reports

“If you look at the globe, you know, step aside from the U.S. for a second, we certainly see renewables continuing to grow, wind solar for sure,” Angulo said. “Natural gas will probably still be playing a big role by 2050.”

The belief lies in the fact that companies like ExxonMobil are receiving tax credits to invest in areas like carbon capture and storage which uses natural gas to power the facilities that are sequestering carbon from the atmosphere and storing it underground. Busse said this process is necessary to keep us on track of achieving the goal of only raising global temperatures to three degrees of global warming by 2050.

Additionally, Angulo said ExxonMobil is investing in direct lithium extraction in Arkansas that uses a process that is meant to leave an environmental footprint 1/400 the size of traditional lithium mining. He said this process uses brine water to treat lithium, and after it is extracted, the water is returned to the earth. Traditional lithium from spodumene ore requires heavy machinery to dig up and crush the rocks that contain lithium. Direct extraction can create 11 tons of carbon dioxide per ton of lithium while traditional mining can create 37 tons of carbon dioxide per ton of lithium.

ExxonMobil purchased its lithium mine in Smackover, Arkansas in 2023. The area of Smackover, which used to be a highly-productive oil field, already has pipelines, refineries and large amounts of brine water that are necessary for lithium extraction, he said. Although the process is still relatively new, by using recycled water for the treatment of lithium, it is expected to be less water-intensive than traditional mining.

The transition to clean energy is necessary for future energy demands, but it is not one that will come quickly. The process will require a gradual phasing in of renewables simply due to a reliability standpoint. As summers become increasingly hotter, the demand for energy to cool buildings has never been higher. This not only creates a challenge for the industry to meet the demand, but also to remain efficient in transmitting energy.

“The duration for projects takes substantially longer to develop,” Flanagan said. “It’s four or five years, and if you have a transmission piece of it, you’re pushing 10 years.”

Busse said it is necessary to plan for a world that will not only be warmer, but weirder. We are witnessing climate events in areas that have not traditionally experienced them before, such as February thunderstorms in Chicago or wildfires in Denver followed by snowstorms less than 24 hours later, as Busse said.

“The climate has already changed, and it's going to continue to do so,” Busse said. “The only option for leaders going forward is to be either proactive or reactive to climate change. Those are the only two choices.”