

Highlights from the Texas Industrial Energy Efficiency Program Newsletter Volume 3, Number 1, October 2021

Greetings, from the Texas Industrial Energy Efficiency Program!

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Fall Energy Forum Recap

Our Fall Energy Forum took place at the AIChE Southwest Process Technology Conference, September 30, 2021. This was our first in-person event in more than 18 months, and we were delighted with the attendance of 50 people. The theme was Energy Efficiency and Decarbonization,

continuing the theme of our Spring Energy Forum.

Two members of TIEEP's Advisory Council, James Turner (Fluor) and Jack Buehler (Shell, ret.) chaired the Fall Forum, which included four technical presentations:

An Overview of Pathways to Decarbonization; John (Jack) Buehler, Shell (Retired)



Wind power is one possible source of renewable electricity. [Source](#): US Department of Energy

Jack noted that energy efficiency is the most cost-effective way to decarbonize industrial processes, but it is not sufficient. A wide range of other options are either available or under development. These include electrification using renewable energy, low carbon hydrogen, carbon capture, utilization and storage (CCUS), biofuels, and nuclear energy. He also noted that because of Scope 3 emissions (i.e., emissions from the use of products), many oil & gas companies are transitioning to selling fuels with low carbon intensity, and petrochemical companies are transitioning to renewable feedstocks and increasing the recycle of waste plastics ("the circular economy").

Decarbonization: Challenges and Needs; Daniela Ferrari, The Dow Chemical Company

Daniela explained how The Dow Chemical Company is applying many of the techniques and technologies that Jack described within their facilities. She also singled out a couple of proprietary technologies that Dow has developed to reduce GHG emissions: fluidized catalytic dehydrogenation technology (FCDh) for on-purpose propylene, and electric cracking (together with Shell) for olefin production.

Small Modular Nuclear Reactors for Process Applications; Lorena Sullivan, Fluor

NuScale’s 77 MWe nuclear power modules are tiny compared to the South Texas Project Electric Generating Station, with its 3 GW+ capacity. However, modules can be combined to increase power output, and small modular reactors (SMRs) offer a promising new future for scalable nuclear power, which could have direct applications in the process industries. Lorena noted that the advantages include flexibility in size, cost, operational flexibility, resiliency, and unparalleled safety case. NuScale received standard design approval from the Nuclear Regulatory Commission (NRC) in September 2020.

There Is No C in Hydrogen: Low Carbon Footprint Hydrogen Production; Matt Reisdorf, Fluor

While hydrogen (H₂) contains no carbon, the methods most commonly used to produce it do release large quantities of carbon dioxide. The most common approaches to decarbonizing hydrogen production are carbon capture, utilization, and sequestration (CCUS – making so-called “blue” hydrogen), and electrolysis with renewable energy (so-called “green hydrogen”). Matt discussed the technologies, costs, applications and limitations of the various options, and the potential for hydrogen as a vehicle for industrial decarbonization.



Hydrogen Storage. Source: US Department of Energy, <https://www.hydrogen.energy.gov/index.html>

Subject to the necessary permissions, we will make the presentation materials available on the TIEEP website.

From the Casebook: The Human Face of Energy Efficiency

Where should we look to find opportunities to save energy in our industry? The engineers among us, including me, tend to turn immediately to technical options – things like new process designs, more efficient equipment, and more sophisticated control systems. However, many of the best savings come from behavioral changes. These can take many different forms. At a very basic level, do you routinely turn off unneeded lights in your house, or when you leave your office? If you do, you are acting on your awareness of the need to save energy. This awareness can readily be transferred to other areas of your life and your work – for example, by turning off process equipment when it's not needed, or thinking through operating strategies, or even making physical changes in the plant that will result in energy savings. In other words, behavioral changes often lead to technological changes. The two approaches are complementary; they do not – or should not – compete.

Positive behaviors can be harnessed and multiplied by appropriate strategies within companies. At the highest level, most companies have energy policies that are intended to integrate energy efficiency into the corporate culture. The policy then flows down to various departments and disciplines in the company for implementation. This can lead to a wide range of new practices and behavioral changes, both individually and corporately; for example:

- Engagement of executive level support for corporate energy efficiency activities.
- Enhanced data collection and analysis to support the development of energy strategies and the deployment of energy management systems.
- Engineering standards and procurement rules that require premium efficiency electric motors, enhanced insulation, and other measures that minimize energy use in new plants and revamps.
- Allocation of funds specifically for energy efficiency projects, or allowing a lower rate of return for projects that reduce energy consumption than for other types of projects. These measures can result in the implementation of energy-saving projects that would not otherwise be justified under the company's financial rules
- Implementation of site energy audits, pinch studies, and other programs designed to identify and implement energy saving opportunities.



Engineering standards and procurement practices can have a huge impact on energy efficiency. Source: US Department of Energy, <https://www.nrel.gov/docs/fy12osti/55534.pdf>

- Employee awareness programs (e.g., energy fairs and competitions) designed to raise interest in energy and environmental matters.
- Training of existing personnel, recruitment of new personnel, and/or use of contract labor, to support energy efficiency priorities. This can include specialized technical and engineering personnel, maintenance personnel, and others.
- Making energy efficiency an evaluation criterion for executive compensation and employee bonuses.
- Identification and sharing of best practices.
- Use of external resources. This includes, for example, resources from commercial entities, government agencies such as the US DOE and EPA, and the ISO 50001 international standard for energy management systems.

Energy policies are often accompanied by energy goals, either in the form of absolute energy savings or improvements in energy intensity, and these goals serve a useful role in focusing attention on an important target. As reflected in both our Spring and Fall Energy forums, this energy focus has now been largely integrated into the drive for decarbonation, which is part of an even larger ESG (environment, social and governance) movement in the industry. However, energy efficiency remains an important piece of the puzzle, and continues to be a priority in the process industries.

Adapted from: “Behold the Impact of Human Behavior,” Alan Rossiter, Chemical Processing, Vol. 83, No. 9, p. 12, September 2021.

In Closing...

Thank you for taking the time to read along with us. We hope you found the information useful, and that you’ll join us in our upcoming events.

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