



## **ENVIRONMENTAL SYSTEMS**

### **DIVISION NEWSLETTER**

**JULY - 2019**

## **ESD NEWSLETTER**

ENVIRONMENTAL ENGINEERING features the Application of Environmental Technologies to ENGINEERING Systems to attain OPTIMAL Performance according to ESTABLISHED Standards.

The Newsletter of the Environmental Systems Division (ESD) will attempt to highlight a Variety of Environmental Technology Applications aimed at Enhancing Engineering Systems Performances in accordance with the Latest Standards by presenting Excerpts of and Links to Selected Articles from a variety of Websites. ESD Members are encouraged to forward materials on Environmental Engineering topics for review by the Newsletter Editorial Staff. ESD Newsletter Readers are urged to forward comments on materials that appear in its content.

The ESD Newsletter will feature presentations in **Five** Sections:

- 1. ENVIRONMENTAL TECHNOLOGIES**
- 2. ENVIRONMENTAL REGULATIONS**
- 3. EED CHAIRMAN/DIVISION NEWS**
- 4. EDITORIAL BOARD SELECTIONS**
- 5. READER COMMENTS**

It is envisioned that the ESD Newsletter will be Monthly enterprise involving ALL members of the ESD in its production. Your participation in providing and reviewing ESD Newsletter materials will be greatly appreciated.

## **1. ENVIRONMENTAL TECHNOLOGIES**

### **HOTELS ARE FINALLY BANNING MINI PLASTIC TOILETRIES – HERE ARE THE BEST ALTERNATIVES**

InterContinental Hotels Group is ditching miniature shampoo, conditioner and body-wash bottles across its 5,000-plus sites worldwide to reduce plastic waste. The owner of the Holiday Inn, Crowne Plaza and InterContinental chains will switch to bulk dispensers, refillable bottles, and ceramic containers by the end of 2021. Hotels accounting for a third of the InterContinental group, including some Holiday Inn Express sites in the Americas, Kimpton in London, the Six Senses resort spas and newer brands Voco, Even and Avid have successfully switched to bulk dispensers or refillable containers. The company says it uses about 200m bathroom miniatures every year, equivalent to about 1m kg of plastic. Though they are a popular souvenir, rising



concern about plastic waste has prompted a phasing out of bathroom miniatures, which have already been scrapped at 1,500 Marriott hotels. Many budget chains, such as Premier Inn, have never provided mini toiletries. (Ref. 1)

### **DIY Solar LEAF Project Shows the Untapped Potential of Solar EVs**

Sam Elliott, a resident of sunny Texas, who bought a \$3,000 2011 Nissan LEAF, and as the battery was already heavily degraded, he then spent another \$2,400 on solar panels, batteries, a charge controller, an inverter, and various mounting bits. While the car's panels only generate about 200 watts of electricity during the day, he does get about 10 miles of charge per day while the car sits in the parking lot at work. That might not seem like much, but it does give him enough charge to make the difference between being able to get home or having to go somewhere and charge. The system currently uses heavy 12V AGM batteries to store the collected solar energy, and they weigh in at over 200 pounds. He plans to replace those with smaller and lighter lithium-ion cells, better integrate solar cells to the car for aerodynamics, and add more cells. He's aiming for a goal of adding 20–25 miles per day. (Ref. 2)

## **2. ENVIRONMENTAL REGULATIONS**

### **Farmers are a captive audience to WOTUS rulemaking**

In their spring 2019 Regulatory Agendas, the EPA and the U.S. Army Corps of Engineers (Corps) indicated they are aiming for December 2019 to issue their final revised definition of Waters of the United States (WOTUS). The revised definition of WOTUS is intended to provide clarity to farmers and other members on the regulated community on whether they are required to obtain a federal- or state-issued permit under the Clean Water Act (CWA). If public statements by its members, organizations, and advocates in government are any indication, there is no single group that is more invested in the content and consequences of the upcoming rule, than the agricultural community is. At a hearing of the Senate Committee on Environment and Public Works (EPW) last month, Todd Fornstrom, who testified on behalf of the American Farm Bureau Federation (AFBF), said the importance of the rule for farmers could not be overstated. The permit that most concerned Fornstrom at the hearing is required by CWA Section 404, which addresses dredge and fill operations. (Ref. 3)

### **Just 10% of fossil fuel subsidy cash 'could pay for the green transition**

Switching just some of the huge subsidies supporting fossil fuels to renewables would unleash a runaway clean energy revolution, according to a new report, significantly cutting the carbon



emissions that are driving the climate crisis. Coal, oil, and gas get more than \$370bn (£305bn) a year in support, compared with \$100bn for renewables, the International Institute for Sustainable Development (IISD) report found. Just 10-30% of the fossil fuel subsidies would pay a global transition to clean energy, the IISD said. Ending fossil fuel subsidies has long been seen as vital to tackling the climate emergency, with the G20 nations pledging in 2009 to phase them out, but progress has been limited. In May, the UN secretary-general, António Guterres, attacked subsidies, saying: “What we are doing is using taxpayers’ money – which means our money – to boost hurricanes, to spread droughts, to melt glaciers, to bleach corals. In one word: to destroy the world.” The new analysis shows how redirecting some of the fossil fuel subsidies could decisively tip the balance in favor of green energy, making it the cheapest electricity available and instigating a rapid global rollout. The transition from polluting fossil fuels to clean energy is already underway. Annual investment in renewables has been greater than that in fossil fuel electricity generation since 2008 and new renewable capacity has exceeded fossil fuel power each year since 2014. (Ref. 4)

### 3. ESD CHAIRMAN/DIVISION NEWS

#### ASME Advanced Clean Energy Summit (ACES 2019)

Join global leaders and experts at the New ASME Advanced Clean Energy Summit (ACES 2019) in Denver, CO on September 16 – 17, 2019. Be part of a dynamic, new global forum for energy industry professionals and innovators in clean energy technology and management. The Summit will bring together perspectives and expertise from around the globe as we learn and network in a collaborative, open environment. Gain exclusive access to companies looking for better ways to address the challenges and opportunities for clean energy. Clean Energy applications involved at ACES include:

- Solar Energy
- Nuclear Energy
- Advanced Energy Systems
- Oil and Gas
- Gas Turbines
- Wind Energy



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- Material & Energy Recovery
- Environmental Systems
- Energy Storage

This collaborative environment will provide attendees the tools and knowledge to help their organizations overcome challenges and shape the future of clean energy around the world. Participants benefit from sessions, workshops, discussions, and panels on clean energy and will learn to:

- Build and enrich their clean energy portfolio
- Leverage transferable engineering, design, and project delivery knowledge
- Improve project and product economics
- Adopt best practices and lessons learned
- Invest and implement new technologies

To Register go to <https://event.asme.org/ACES> and use Promo Code ACES190440 to save.

## 4. EDITORIAL BOARD SELECTIONS

### Floating Solar Power System

Ciel & Terre USA innovators in floating solar power systems and the Town of Windsor officials have started construction of what will be the largest floating solar power system in the state of California. The floating solar array will be installed on the Town's largest recycled water storage pond and is expected to meet 90 percent of the Town's water treatment and pump facilities' energy needs. The Ciel et Terre solar installation will consist of 4,959 (360W) high-output solar panels mounted atop the company's patented Hydrelia floating solar racking system. The 1.78-megawatt system will generate power for the Windsor Wastewater Reclamation Facility, Public Works Corporation Yard, and the Geysers pump station, delivering approximately 90 percent of the water reclamation facilities' power requirements while saving about 30 percent of the electricity cost based on the facilities' existing grid service. The array will be floated in the pond and tethered to the shore, making it resistant to wind and seismic loads. The project is being developed and construction financed by Ciel et Terre, which has entered into a 25-year lease and



power purchase agreement (PPA) with the Town of Windsor to provide discounted clean energy. The floating solar system will allow Windsor to better control its electrical costs in the face of rising utility prices. (Ref. 5)

### **Supercomputing improves biomass fuel conversion**

Fuels made from agricultural or forestry wastes known as lignocellulosic biomass have long been a champion in the quest to reduce the use of fossil fuels. However, plant cell walls have some innate defenses that make the process to break them down more difficult and costly than it could be. In a leap forward, that could be a game-changer for understanding how plant biomass can be more efficiently broken down, a research team at the University of California, Riverside have joined forces with teams at Oak Ridge National Laboratory and the University of Central Florida to create a chemical roadmap to breach these defenses. In order to access the energy-rich sugars found in the plant cell walls, researchers have renewed focus on solvating lignin, a complex polymer also found in plant cell walls that act as a natural shield, blocking both chemical and biological attack. Lignin is particularly effective in preventing commercial enzymes from digesting cellulose, which makes up the bulk of sugars found in biomass. In the past, different specialized chemicals and pretreatment methods have been used to improve enzyme access to cellulose but were ineffective at removing lignin. The use of strong acids, ionic liquids, ammonia, and sulfite treatments have somewhat improved the digestibility of cellulose, but these methods also leave lignin behind, making cellulose expensive to recover. Other methods have applied co-solvents such as ethanol and acetone solvate to remove lignin, but they require very high reaction temperatures that also cause the remaining sugars to degrade. As a result, economically viable methods of transforming biomass into biofuels have yet to be realized. (Ref. 6)

### **Shared E-scooters are not always as 'green' as other transport options**

People think of electric scooters, or e-scooters, as environmentally friendly ways to get around town. Nevertheless, a new study from North Carolina State University finds it is not that simple: shared e-scooters may be greener than most cars, but they can be less green than several other options. "E-scooter companies tout themselves as having little or no carbon footprint, which is a bold statement," says Jeremiah Johnson, the corresponding author of the study and an associate professor of civil, construction and environmental engineering at NC State. To capture the impact of e-scooters, researchers looked at emissions associated with four aspects of each scooter's life cycle: the production of the materials and components that go into each scooter; the manufacturing process; shipping the scooter from the manufacturer to its city of use; and collecting, charging and redistributing the scooters. The researchers also conducted a small-scale survey of e-scooter riders to see what modes of transportation they would have used if they had not used an e-scooter. The researchers found that 49% of riders would have biked or walked;



34% would have used a car; 11% would have taken a bus, and 7% would not have taken the trip at all. These results were similar to those of a larger survey done by the city of Portland, Oregon. (Ref. 7)

#### **New Sensor Network Reveals Telltale Patterns in Neighborhood Air Quality**

Black carbon, commonly known as soot, is a significant contributor to global warming and is strongly linked to adverse health outcomes. Produced by the incomplete combustion of fuels — emitted from large trucks, trains, and marine vessels — it is an air pollutant of particular concern to residents in urban areas. Sensors available on the market today are expensive, making black carbon difficult to track. Researchers at the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab), collaborating with UC Berkeley, have developed a new type of sensor network that is much more affordable, yet capable of tracking this particulate matter. With more than 100 custom-built sensors installed across West Oakland for 100 days, the team created the largest black carbon-monitoring network to be deployed in a single city. The project was launched to address a persistent concern in the community: the need for better tools to monitor black carbon across time and space. Expanding on prior research at Berkeley Lab, the team addressed this challenge by building the Aerosol Black Carbon Detector (ABCD). Small and inexpensive, the ABCD is a compact air quality monitor that can measure the concentration of black carbon in an air sample. Thanks to design, innovations that help the sensors withstand changes in temperature and humidity, the ABCD can produce reliable data when left outside for extended periods of time. The materials for each ABCD cost less than \$500. In comparison, commercially available instruments that measure black carbon cost many thousands of dollars. (Ref. 8)

#### **Novel catalysis approach reduces carbon dioxide to methane**

A growing number of scientists are looking for fast, cost-effective ways to convert carbon dioxide gas into valuable chemicals and fuels. Now, an international team of researchers has revealed a new approach that utilizes a series of catalytic reactions to electrochemically reduce carbon dioxide to methane, the main ingredient in natural gas, eliminating an intermediate step usually needed in the reduction process. The team's results were published in the journal *Nature Communications* on July 26, 2019. To convert carbon dioxide into valuable fuels, you have to start with a surface made of copper, the metal famous for its use in pennies and electrical wiring. Copper can be used to reduce carbon dioxide into carbon monoxide, which can then be further transformed into substances such as methane. This process is relatively simple, but it requires two reactors and costly separation and purification steps. The research team used computations and experiments to design a one-pot catalysis system. Add carbon dioxide, and a series of chemical reactions will happen without the need to stop and add more chemicals. (Ref. 9)



## **5. ESD NEWSLETTER READER COMMENTS**

- Expecting the reader comments and views on the newsletter.

## **ESD NEWSLETTER EDITORIAL BOARD**

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## **NEWSLETTER ARTICLE REFERENCES**

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## **DISCLAIMER**

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