



ENVIRONMENTAL SYSTEMS

DIVISION NEWSLETTER

AUGUST - 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

Vineyard's Delay Exposes Challenges for Fast-Moving US Offshore Wind Market

The first large-scale U.S. offshore wind project has hit a potentially serious snag. The industry is assessing the knock-on effects. Finally, on the verge of breaking into the mainstream energy sector, the U.S. offshore wind market may have suddenly hit the skids. The Trump administration's delay in granting a key permit for the first major U.S. offshore wind farm exposed several challenging realities for an industry otherwise flush with optimism. Developer Vineyard Wind confirmed that it would delay its 800-megawatt project with a contract to sell power into Massachusetts, after the federal government postponed approving the final environmental impact statement (EIS). The government will instead conduct another study



looking at the cumulative impact of the growing list of offshore wind developments proposed along the East Coast. That made it impossible for Vineyard to stand behind its construction timeline of bringing its project online in two phases over 2021-2022, the developer said. (Ref. 1)

Global Smart Waste Collection Technology Market Will Reach to USD 227 Million by 2025: Zion Market Research

Smart waste collection technology is an application of various software, sensors, and electronic equipment to improvise the waste collection process. The prime objectives of smart waste collection technique are improving the cost-efficiency of waste collection through route optimization and preventing over-filling of waste collectors. Smart waste collection aids in maintaining hygiene in cities and preventing diseases that spread through contamination in nature. Smart waste collection is an integral part of smart city management across the globe. Internet of things (IoT) has had a cardinal role in the success of smart waste collection technology. The smart waste collection technology market has witnessed robust growth in the recent past, owing to the growing trend of smart city development globally and rapid urbanization in emerging economies. Enhanced awareness about time and cost efficiency is another factor driving the smart waste collection technology market growth. However, huge capital investment and high maintenance costs may restrain the growth of smart waste collection technology market. Alternatively, tremendous potential for IoT and wireless sensing in the future is projected to fuel the market expansion for smart waste collection technology. The smart waste collection technology market is fragmented on the basis of solution, service, and end-user. By solution, the market includes reporting and analytics solutions, asset management, network management, optimization solutions, and others. In 2018, network management held the largest share of the global market. Reporting and analytics solutions will show the fastest CAGR in the years ahead, owing to the rising use of connected devices that is fueling the demand for data collection and analysis. (Ref. 2)

2. ENVIRONMENTAL REGULATIONS

Scope of regulatory engineering Martin Edelson (mcedelson@gmail.com)

Engineering and science play leading roles in societal advancement. Engineers or scientists do not govern society, but they play key roles in helping leaders achieve their aims by providing guidance to what is achievable now and potentially achievable in the future. ASME requires that its members practice their profession ethically. The first fundamental principle cited in the ASME Ethics Policy is that engineers must use "... their knowledge and skill for the enhancement of



human welfare...and the first fundamental canon of the society is that “Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.” ESD needs to operate in accord with these principles, particularly as they relate to the protection of our environment. ESD is now considering how it should support the efforts of engineers who, as a major job component, are tasked with understanding regulatory matters and advising their employers on these issues. Additionally, regulatory engineers are well positioned to recommend how industry can best react to the development of new regulations, some of which may appear onerous, and recommend how to take action against regulations that are either ineffective or outdated. ESD needs to consistently remind its members that the ethical directives of ASME bind them. Industry, the public and the engineering profession are best served when the ethical standards of the profession guide industry practices for the betterment of human health and environment.

Should We Tax Plastic Waste?

As global awareness of the devastating health effects that can result from persistent plastic pollution continues to rise, many nations around the world have developed different solutions that are expected to address this important issue. Since plastic production skyrocketed during the 1950s, it is estimated that 9.2 billion tons of plastic have been produced around the world. Of this total, approximately 6.9 billion tons of plastic have become waste and less than 600 million tons of this material have ever been recycled. As of June 2019, over 60 nations around the world have taken distinct steps in the form of partial bans, full bans, and taxes on plastic products to lessen the use of single-use plastics. For example, Canada is one of the most recent nations to declare a nationwide ban of single-use plastics such as bags, straws, cutlery, plates, and stir sticks. As compared to bans on single-use plastic, which is a command-and-control approach that governments utilize to directly regulate plastic consumption behavior; many local, state and federal policies have emerged to instead utilize a market-based approach that involves an additional fee or tax placed on plastic products. The primary goal of this market-based approach is to incentivize the individual to decide for themselves to change their behavior in relation to their plastic consumption. This approach also provides a greater amount of flexibility for the consumer to selectively reuse plastic bags as needed for garbage disposal. (Ref. 3)

Is Solar Power Adoption Hindered by an Inadequate Global Environmental Tax Policy?

Solar energy could provide an affordable source of power for the increasingly power-hungry digital technology industry. This article discusses the environmental tax, digital technology, and solar energy policies of the countries that are the world’s six largest carbon dioxide (CO₂) emitters. Multinational corporations should pay attention to environmental tax policy. Because in the past two years, there has been a particularly strong increase in corporate internal carbon



pricing initiatives in China, Japan, Mexico, and the U.S. Companies that have not yet adopted an internal price/tax. They will soon have to do so, as investor's demand, more and more insight into the risks of climate disruption, according to the 2019 Status Report prepared by the Task Force on Climate-related Financial Disclosures (TCFD). New digital technologies could replace a majority of jobs and necessitate very high consumptions of electric energy—currently produced with coal and fossil fuels with adverse environmental effects. According to the study The Carbon Footprint of Bitcoin, from Technical University of Munich and Massachusetts Institute of Technology, cryptocurrency mining alone generates about 22 megatons in CO₂ emissions each year. With global energy demands continually increasing, pushing CO₂ emission to its highest levels in history, methods of generating large quantities of clean energy have become a survival concern. (Ref. 4)

3. ESD CHAIRMAN/DIVISION NEWS

ASME Nominating Committee

ECS has been requested to provide potential nominees to be on the ASME Nominating Committee. The nominating committee selects nominees for the ASME BOG (Board of Governors) and President, so it is a very prestigious committee. It also requires a firm time commitment from the members. The open position is an Alternate position so there will be a 1-year commitment. They meet a number of times a year and here is some info on the ASME website. <https://www.asme.org/about-asme/governance/nominating-committee>. Please contact Mr. Bob Stakenborghs, P.E., *Email: bob@evisive.com*, ASAP if you would like to be considered for this position or if you would like further information.

Opportunities to Apply for a 2020-2021 ASME Congressional Fellowship

ASME is currently accepting applications for our 2020–2021 ASME Congressional Fellowships. We are seeking applications from qualified candidates with strong backgrounds in "Energy" and "Advanced Manufacturing." If offered a Fellowship, ASME Congressional Fellows will relocate to Washington, DC and receive a stipend of \$80K to serve for one year in the U.S. House of Representative or the U.S. Senate. The deadline to apply is January 31, 2020. More details are available on <https://lyris.asme.org/t/505399/4615455/80866/0/>.

4. EDITORIAL BOARD SELECTIONS

Eliminating the PES refinery's deadliest chemicals

The Philadelphia Energy Solutions (PES) refinery has started neutralizing and eliminating a highly toxic chemical still present at the shuttering facility. The June 21 explosion and fire that led the company to announce its closure and file for bankruptcy blew up a part of the facility that contained the chemical, called hydrofluoric acid. Philadelphia Fire Commissioner and director of Emergency Management Adam Thiel described the 33,000 gallons of HF that remain at the site as a threat to workers and the surrounding community. The good news, he said, is that the amount of acid will get reduced every day and so far, there are no signs that any of the deadly chemical has been released in the cleanup. Hydrofluoric acid is one of the most dangerous industrial chemicals in use. PES used it to make high-octane gasoline. Small amounts on the skin can be fatal and low levels of HF in the air can irritate the eyes, nose and respiratory tract. Breathing large amounts of it can cause death. To neutralize the acid it has to be mixed with a base, a process known as titration. However, things can go wrong in the process, as most of those who have mixed vinegar and baking soda know. The biggest danger in this case is that the extreme heat produced in the reaction could lead to it leaking as a gas. The process implies transferring the material from one vessel to other vessels. This is really sort of a big high-risk acid-base neutralization. The resulting products from the neutralization are not HF and can be disposed of on-site through PES' wastewater treatment plant, which is regulated and overseen by the Department of Environmental Protection. (Ref. 5)

Crop gene editing needs proactive communication plan, scientist warns!

Effective science and communication collaborations are critical to ensure gene-editing technology does not suffer from the "perception problem" now facing genetically modified organisms (GMOs), a plant pathologist warned. CRISPR technology can be used to wipe out the functions of genes in living organisms that promote diseases. It can also be used to tweak the genes to look like their wild counterparts so they are better resistant to diseases. "CRISPR and gene editing approaches have a lot of potential and promise for feeding the world sustainably,". CRISPR, which stands for Clustered Regularly Interspaced Short Palindromic Repeats, refers to specialized DNA stretches in single-celled organisms with an associated enzyme, Cas9, which works like a pair of molecular scissors capable of cutting DNA strands. When introduced in multi-celled organisms, they have the capacity to edit the genes to suit specific purposes. "GM crops got so wrapped up with herbicide usage" that it created an impression in the minds of many individuals that GMOs are about increased use of chemicals when the opposite is actually the case. Since they were first introduced into the food chain 23 years ago, GM crops have increased yield productivity by more

than 657.6 million tons. GM crops have added an estimated US\$186.1 billion in economic benefits to the wealth of farmers. Yet despite the huge benefits, only about 17 million farmers in 24 countries are able to grow GM crops out of a global total of 570 million farmers in over 180 countries. This is due largely to regulatory hurdles. (Ref. 6)

Automotive AC Filter Market Covering Developing Trends?

Automotive AC filter is responsible for reducing impurities and pollutants entering into the engine through air condition system, air circulation, and heating. This is an important part of a vehicle that helps to protect passengers against harmful bacteria, dust, and smog. This in turn reduce dust accumulation in vehicles and enhances the performance of engines. Various economies are imposing stringent norms related to emission of CO₂, which is also accelerating automotive AC filter adoption worldwide. For instance, California legislature passed a bill establishing the most extensive carbon dioxide (CO₂) emission controls. The law requires a 25% reduction in state CO₂ emissions by 2020, with the first major cut taking effect in 2012. In addition, presence of various environment regulatory bodies such as Environmental Protection Agency (EPA), offers legal authority to monitor and regulate greenhouse gas emissions. Moreover, rapid urbanization and industrialization in various emerging economies such as India and China is one of the key drivers for growth of the market. Increase in GDP is supporting growing urbanization. For instance, according to the World Bank Group, GDP per capita has increased globally from US\$ 9509.4 in 2010 to US\$ 10,150.8 in 2016. This is an indicator of increased standard of living, which has significantly affected affordability and expenditure on luxury vehicles. (Ref. 7)

Reactor turns greenhouse gas into pure liquid fuel

An electro catalysis reactor built at Rice University recycles carbon dioxide to produce pure liquid fuel solutions using electricity. The scientists behind the invention hope it will become an efficient and profitable way to reuse the greenhouse gas and keep it out of the atmosphere. A common greenhouse gas could be repurposed in an efficient and environmentally friendly way with an electrolyzer that uses renewable electricity to produce pure liquid fuels. The catalytic reactor developed by the Rice University lab uses carbon dioxide as its feedstock and, in its latest prototype, produces highly purified and high concentrations of formic acid. Formic acid produced by traditional carbon dioxide devices needs costly and energy-intensive purification steps. The direct production of pure formic acid solutions will help to promote commercial carbon dioxide conversion technologies. In tests, the new electro catalyst reached an energy conversion efficiency of about 42%. That means nearly half of the electrical energy can be stored in formic acid as liquid fuel. Formic acid is an energy carrier. It is a fuel-cell fuel that can generate electricity and emit carbon dioxide, which can be captured to recycle again. (Ref. 8)



Long Live Microbiomes!

Nourishing microbial communities both inside our bodies and on our farms could be crucial to the health of humans and the planet we live on. Our food system is arguably at risk for several reasons, including the increasing use of herbicides and pesticides; the rise of genetically modified organisms (GMOs); and climate change. Since 1892, the U.S. Department of Agriculture has been collecting data on the nutritional composition of our foods. Over the decades since, there has been enough variability in how samples have been harvested, stored, prepared and analyzed to make it hard to tease out exact trends or causes of them. Given how fundamental nutrition is to our health, it is surprising there is so little robust research on how agricultural practices affect the nutrient content of crops. Recent studies have shown, for example, that the increase in atmospheric carbon dioxide is accelerating photosynthesis. It means that while plants are growing faster, they also contain more carbohydrates but fewer nutrients, which could ultimately lead to worldwide nutrient deficiencies. In addition, many crops are being sprayed more and more heavily with pesticides and weed killers. About 90 percent of the corn grown in the U.S. has been altered adding protective genes from other species. These modifications allow corn to be sprayed repeatedly with herbicides including glyphosate, 2, 4-D and dicamba. Nature does not take this affront lying down, and weeds quickly evolve herbicide resistance, leading to a chemical arms race. All three of these herbicides are water-soluble, meaning they can dissolve and can go anywhere water goes. They are also systemic (they can get inside plants, so they cannot be washed off before eating). (Ref. 9)

5. ESD NEWSLETTER READER COMMENTS

- Expecting the reader comments and views on the newsletter.

ESD NEWSLETTER EDITORIAL BOARD

EDITOR: DR. K. J. SREEKANTH – (sreekanthkj@kisar.edu.kw)

ASSOC: DR. MALIK M. USMAN – (malik_muhammed_usman@bat.com)

ASSOC: DR. JAMES ZUCHETTO – (jimzuc@comcast.net)

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