



# ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER

01 OCTOBER 2020

The ESD Newsletter is a monthly newsletter involving ALL members of ESD. Members are encouraged to forward materials, authored papers on Environmental and Environmental Systems topics, and comments on newsletter topics or current events to the Editor. Your participation is greatly appreciated.

The ESD newsletter features **Five** Sections:  
(Please use the **blue** links below to navigate within the newsletter)

## 1. ESD DIVISION NEWS

[ESD Technical Representative to Waste Information Exchange Planning Committee – Volunteer Opportunity](#)  
[Dixy Lee Ray Award Committee – Volunteer Opportunity](#)  
[ICEM 2021 Call for Abstracts](#)

## 2. ENVIRONMENTAL TECHNOLOGIES

[GMO and gene-edited biofortified crops weaken case for organic agriculture](#)  
[Inducing plasma in biomass could make biogas easier to produce](#)

## 3. ENVIRONMENTAL REGULATIONS

[The Rise of Targeted Sanctions Towards International Energy Companies & Collateral Effects](#)  
[EPA Finalizes Important Changes to Agency Guidance Procedures](#)

## 4. EDITORIAL BOARD SELECTIONS

[Why we need a global citizens' assembly on gene editing](#)  
[Big Oil's hopes are pinned on plastics. It won't end well](#)  
[Radioactive wastewater successfully taken from SRS sent to Texas for disposal](#)  
[Super surrogate livestock breeding: Research shows males can produce sperm of other males with genetic engineering](#)  
[How hydroponic farming can bring you produce that aren't locally grown](#)

## 5. READER COMMENTS TO THE EDITOR

[None received this month](#)

# 1. ESD DIVISION NEWS

## ESD Technical Representative to Waste Information Exchange Planning Committee – Volunteer Opportunity

The Environmental Systems Division (ESD), in conjunction with the ASME Materials and Energy Recovery Division, the ASME Research Committee on Energy, Environment and Waste, and the Air and Waste Management Association (A&WMA) are planning a Waste Information Exchange (WIE) in the Washington, DC area in 2021. The WIE will be based on the [Air]



# ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER

**01 OCTOBER 2020**

Information Exchange held annually in North Carolina. The main presenters will be EPA personnel.

ESD is looking for a volunteer to be the ESD Technical Representative to the Planning Committee. The individual should be familiar with the RCRA/HSWA regulatory program (including guidance and compliance/enforcement issues) on both solid and hazardous waste. Contacts in the Office of Resource Conservation and Recovery (ORCR) in DC would be a plus. Most of the work will be by telephone or electronic mail.

**Submit a letter or email of interest to** Arnie Feldman at [jjdsenv@att.net](mailto:jjdsenv@att.net) or Ryan Neil, ESD Chair, at [ryanneil84@hotmail.com](mailto:ryanneil84@hotmail.com) **[Back to Newsletter's Page 1](#)**

## **Dixy Lee Ray Award Committee – Volunteer Opportunity**

The Dixy Lee Ray Award Committee is looking for a volunteer to serve as a committee member. The Dixy Lee Ray Award is a prestigious ASME level award honoring those that have made a major impact in the environmental protection field. See <https://www.asme.org/about-asme/honors-awards/achievement-awards/dixy-lee-ray-award> for additional details.

Committee members' primary responsibility is to review nominations and select the annual Dixy Lee Ray Award winner. Committee members also help promote and publicize the award to their colleagues and friends. The committee normally meets thru conference calls and emails. Nominations are due to the committee by February 15 each year so most of the discussion and teleconference meetings occur February, March, and April. All committee members must be ASME members. The term of service is 5 years.

**Submit a letter or email of interest to** Ryan Neil, ESD Chair, at [ryanneil84@hotmail.com](mailto:ryanneil84@hotmail.com).

**[Back to Newsletter's Page 1](#)**

## **ICEM 2021 Call for Abstracts**

ASME, the Nuclear Engineering and the Environmental Systems Divisions, are pleased to announce the Call for Abstracts for the International Conference on Radioactive Waste Management and Environmental Remediation (ICEM) (Virtual, Online). The Conference is set for October 10-13, 2021 in Stuttgart, Germany. ICEM promotes a broad global exchange of information on technologies, operations, management approaches, economics, and public policies in the critical areas of environmental remediation and radioactive waste management. The conference provides a unique opportunity to foster cooperation among specialists from



# ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER

**01 OCTOBER 2020**

countries with mature environmental management programs and those from countries with emerging programs.

The program Tracks below are shown below. The associated Topics for each Track can be seen on the ICEM website (<https://event.asme.org/ICEM/Program>).

Abstracts are due January 18, 2021. Abstracts should be submitted on-line via the website at <https://icem.secure-platform.com/a/organizations/main/home>. For additional information on submitting abstracts, please contact ASME at [toolboxhelp@asme.org](mailto:toolboxhelp@asme.org).

For additional general information on ICEM or to volunteer to support (e.g., Session Chair) please contact either Arnie Feldman ([jjdsenv@att.net](mailto:jjdsenv@att.net)) or Bob Stakenboroghs ([bob@advclean-energy.com](mailto:bob@advclean-energy.com)).

**[Back to Newsletter's Page 1](#)**

## 2. ENVIRONMENTAL TECHNOLOGIES

### **GMO and gene-edited biofortified crops weaken case for organic agriculture**

The organic food industry has grown rapidly in recent years. According to the Organic Trade Association, organic food sales rose by 125.1% between 2009 and 2018 to \$47.862 billion and accounted for 5.9% of total food sales. One of the major reasons for this stellar expansion is the misconception, propagated by the industry itself, that organic foods are healthier and more nutritious than conventionally grown foods. While anti-biotech activists cling to the myth that organic food is healthier and more nutritious than conventionally grown food, genetic engineering—fervently opposed by most organic advocates—is yielding a new lineup of GMO and gene-edited crops with nutrient content organic growers simply can't replicate. One such product has already hit the market and several others are expected to follow in the next few years. This development has exposed a nutrition gap between organic and genetically engineered crops and further weakened the case for organic farming. Anti-biotech activists often base their claim that organic food is healthier on the prohibition of synthetic pesticide use in organic farming. The claim that pesticide residues on conventional crops pose a health risk is not well supported by the evidence, which is quite extensive. And while there have been some studies that suggest organic foods may have higher levels of antioxidants, the vast bulk of the studies comparing organic and conventionally produced foods have concluded that there are no significant nutritional differences between the production methods. One of the most extensive studies comparing the nutritional content of organic and conventionally grown foods was conducted by Stanford University in 2012. The university explained following the study's publication:

Analyzing the data, the researchers found little significant difference in health benefits between organic and conventional foods. No consistent differences were seen in the vitamin content of organic products, and only one nutrient – phosphorus – was significantly higher in organic versus conventionally grown produce (and the researchers note that because few



# ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER

01 OCTOBER 2020

people have a phosphorous deficiency, this has little clinical significance). There was no difference in protein or fat content between organic and conventional milk, though evidence from a limited number of studies suggested that organic milk may contain significantly higher levels of omega – 3 fatty acids. (Ref. 1) [Back to Newsletter's Page 1](#)

## **Inducing plasma in biomass could make biogas easier to produce**

Producing biogas from the bacterial breakdown of biomass presents options for a greener energy future, but the complex composition of biomass comes with a long list of challenges. Cellulose and woody lignocellulose in biomass are especially hard for bacteria to digest, making the process inefficient. Chemical, physical, or mechanical processes, or several of them combined, can be used for pretreatment to make biomass easier to digest, but many of the current solutions are expensive or inefficient or rely on corrosive chemicals. In research supported by the European Regional Development Fund, published in AIP Advances, by AIP Publishing, researchers at the Leibniz Institute of Plasma Science and Technology are testing plasma formation in biomass and finding a promising method for pretreatment of biomass. "The plasma can be seen as a reactive gas, which contains populations of particles that contain several electron volts of kinetic energy. This energy can be used to break the bond of the chemicals and break the bonds of molecules with which they interact," author Bruno Honnorat said. "The most surprising thing was to be able to obtain plasma discharge conditions in a moving liquid. The presence of a flow considerably complicates the situation compared to all the other experimental setups studied in the literature."

The work involves the creation of a reactor in which 2-kilowatt microwave pulses injected into a moving liquid model induce plasma formation within one millisecond. The totality of the microwave power is concentrated to a small cavity, containing less than 1 milliliter of liquid, which is heated, vaporized, and finally ignited, forming an expanding plasma bubble. The plasma-liquid interaction forms reactive species, including oxidizing agents, such as hydroxyl radicals and hydrogen peroxides that help break down the biomass and decrease the viscosity, or resistance to flow, of the biomass material. In partnership with an industrial agriculture partner, the process will be further tested at full scale in a biogas plant. The authors plan to continue their work by more closely examining whether the plasma breaks the polymer chain and investigating plasma-bubble dynamics to evaluate the size and shape evolution, lifetime, and pressure of bubbles in the plasma to better understand the reactive species created in the plasma. Their work could be used for increasing biogas production, improving the efficiency of microwave-plasma-liquid interactions, and functionalizing and modifying polymer length in polymer science. (Ref. 2) [Back to Newsletter's Page 1](#)

## **3. ENVIRONMENTAL REGULATIONS**

### **The Rise of Targeted Sanctions towards International Energy Companies & Collateral Effects**

International sanctions are becoming a major foreign policy tool against state-owned oil & gas



# ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER

**01 OCTOBER 2020**

companies in jurisdictions like Russia and Venezuela that were not used to this type of measure against its economic interest. Until a few years ago, companies like Rosneft Oil Company and Petr leos de Venezuela, S.A. (PDVSA), easily accessed the international financial markets with multibillion global bond emissions and international financings that were extremely attractive to major investment banks. The first type of applicable sanctions laws are “primary” sanctions, which are traditional U.S. sanctions, and apply only to prohibited transactions with a U.S. nexus. The second type of applicable sanctions laws is “secondary” sanctions, which apply to transactions that are entirely outside of the jurisdiction of the U.S. but seek to sanction specific types of conduct that the U.S. deems particularly contrary to U.S. policy. In other words, while the U.S. Department of the Treasury’s Office of Foreign Assets Control (OFAC) generally limits its jurisdiction to U.S. persons, in some instances the national security imperative is so great the OFAC will decide to use secondary sanctions even when there is no U.S. person involved at all, such as targeted sanctions against oil tankers delivering PDVSA’s crude oil. The sophistication of the sanctions regime is reaching new levels, specifically within the Oil & Gas sector. Notably, OFAC is targeting all types of actions that are currently seeking to circumvent its sanctions regime, with broader consequences to the targeted companies and persons.

Iran, Mexico, individuals, and companies have been trying to bypass the OFAC sanctions regime. In May 2020, the U.S. Department of State, OFAC, and the U.S. Coast Guard issued an advisory to international shipping companies to be aware of tactics to evade sanctions like ship-to-ship transfers and by not using the mandatory tracking devices. Such techniques were implemented in crude oil, refined petroleum, and petrochemicals deliveries between Iran and Venezuela. Across the Atlantic, E.U. sanctions have proven to be far less aggressive and targeted, with less notable enforcement proceedings against E.U. sanctions violations, and with no direct sanctions against PDVSA or towards oil tankers delivering Venezuelan oil.

The collateral effect of targeted U.S. sanctions designation encompasses far-reaching implications since foreign companies must withdraw their business with the sanctioned target or they could also be barred from accessing the U.S. financial system and economy. Material assistance and any transaction with a company sanctioned by the U.S. could be seen by OFAC has assistance in order to bypass the sanctions regime which is the case of the targeted sanctions against Rosneft. (Ref. 3)

**[Back to Newsletter’s Page 1](#)**

## **EPA Finalizes Important Changes to Agency Guidance Procedures**

EPA finalized new procedures for issuing, identifying, and maintaining Agency guidance documents. The regulated community and any other stakeholders who rely on EPA guidance to inform their own compliance approaches are the ones going to be impacted.

The Companies should consider doing in response to this is: Review the new procedures and EPA Guidance Portal, and identify whether key guidance on which your company relies is located in the Portal. If such guidance has been rescinded by the Portal, consider petitioning for withdrawal of any existing contrary guidance, modification to the governing guidance, or reinstatement of the earlier guidance. On September 14, 2020, the U.S. Environmental Protection Agency (EPA) finalized a new rule that significantly modifies the Agency’s procedures for issuing and maintaining guidance documents. The new requirements, which have not yet been published in the Federal Register, are intended to implement the directives



# ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER

01 OCTOBER 2020

in Executive Order (E.O.) 13891, which directs Federal agencies to finalize regulations that “set forth processes and procedures for issuing guidance documents.” First proposed by EPA on May 22, 2020, EPA’s final guidance procedures regulation will appear in a new subpart D under 40 C.F.R. Part 2. Among other things, the regulation requires EPA to use an online portal to identify all active EPA guidance documents for the public. As outlined in our prior alert, the EPA Guidance Portal was initially made available on February 28, 2020, and was fully populated to include all active guidance documents on July 31, 2020. The new rule requires all active guidance to appear in the EPA Guidance Portal and establishes that any guidance document excluded from the EPA Guidance Portal is rescinded and EPA cannot rely upon it (except to establish historical facts). (Ref. 4) [Back to Newsletter’s Page 1](#)

## 4. EDITORIAL BOARD SELECTIONS

### Why we need a global citizens’ assembly on gene editing?

Developments in gene editing are often met with moral panic. Every new announcement raises outrage over the audacity of scientists “playing God”. The existence of mutant mosquitoes and designer babies are often framed as threats – evidence that science fiction has crossed over into real life. There are clear dangers when the language of fear and scandal hijack public conversations on complex matters. But this doesn’t mean we should leave the discussion on genome editing – the process of altering an organism’s genetic sequence to produce favorable characteristics or remove unwanted ones – solely to scientists. That danger was sharply underscored in 2018 when a young Chinese researcher announced he had engineered the birth of what may very well be the first genetically modified humans. As global leaders face pressure to regulate genome editing, questions about who drives these ethical debates persist. In recent years, ordinary citizens have become more empowered to collectively learn, deliberate, reflect, and put forward recommendations on divisive and technical policy issues. The OECD calls this the “deliberative wave”. Processes like citizen juries or online town halls have been used to provide public input not only on topical issues such as e-health or waste management but also on issues that affect future generations, like mitochondrial donation. Citizens’ assemblies are forums in which a randomly selected, demographically diverse group of laypeople come together, typically for several days at a time, to deliberate over a policy issue. This allows them to learn more about the issue, scrutinize expert information, engage the arguments of advocates representing different sides, and deliberate with their fellow participants about possible ways forward. (Ref. 5)

[Back to Newsletter’s Page 1](#)

### Big Oil’s hopes are pinned on plastics. It won’t end well

The fossil fuel industry has not been doing well lately. Even before the Covid-19 pandemic hit, growth in global demand had slowed to 1 percent annually. Now, lockdowns and distance to stop the spread of the coronavirus have decimated the industry. The International Energy Agency (IEA) recently released projections of rapid short-term decline in global demand, to the tune of 9 percent for oil, 8 percent for coal, and 5 percent for gas. Depending on how long and severe the economic crisis proves to be, it will take years for demand to recover. Indeed,



## ENVIRONMENTAL SYSTEMS DIVISION

### NEWSLETTER

01 OCTOBER 2020

with electric vehicles cutting into oil demand by the end of the decade, it may never fully recover. Industry analysts like Carbon Tracker's are speculating that 2019 may turn out to be the peak of fossil fuel demand, and historically, in other industries, a peak in demand tends to mark the beginning of a period of low prices and poor returns. But the industry has a response to this dire forecast, and it can be summarized in one word: plastics. Overall, plastics represent a fairly small sliver of oil demand. Annually, the world consumes around 4,500 million tonnes (mt) of oil but only around 1,000mt of petrochemicals (oil and natural gas used to make chemical products), and of that 1,000mt, only about 350mt are plastics. (A tonne is a metric ton, about 1.1 US tons.)

Nonetheless, plastics are commonly projected to be the biggest source of new demand for oil over the coming decades — in some projections, the only real source. It is these projections that the industry is using to justify billions in new projects, as oil companies across the world shift investment toward petrochemicals. And Big Oil is working its hardest to make the projections come true: The New York Times just ran an investigative piece revealing the industry's plans to push more plastic and plastic waste, into Kenya. Plastics are the thin reed upon which the industry is placing all its hopes. But a new report released this week by Carbon Tracker throws a big bucket of cold water on these hopes. It argues that, far from a reliable source of growth, plastics are uniquely vulnerable to disruption. They are coming under increasing scrutiny and regulation across the world. Huge consumer product companies like Unilever are phasing them out. And the public is turning against them. If existing solutions are fully implemented, growth in plastics could fall to zero. And if that happens, then there is no remaining source of net oil demand growth and 2019 will almost certainly prove to be the year of peak fossil fuels. (Ref. 6)

[Back to Newsletter's Page 1](#)

### **Radioactive wastewater successfully taken from SRS sent to Texas for disposal**

The U.S. Department of Energy this week wrapped its effort to remove from the Savannah River Site and ship out of state a batch of radioactive waste that had earlier this year been categorized as less hazardous. Eight gallons of Defense Waste Processing Facility recycle wastewater has been trucked to western Texas, to a Waste Control Specialists facility, for commercial treatment and disposal. The wastewater, where nuclear sludge is encased in glass, rendering it safer for long-term storage and handling represents the first real-world application of the Energy Department's revised definition of high-level radioactive waste, toxic material considered too dangerous to be kept anywhere but deep underground. For years, the department defined waste by its source. Critics denounced that approach as unscientific and archaic. Under the reinterpretation, the Defense Waste Processing Facility wastewater, plucked from an underground tank at the Savannah River Site, was reclassified as low-level waste. Characterizing a waste chiefly by its contents – by its radioactivity and the health risks it poses, among other factors – aligns the U.S. with international standards. It could also begin to solve a nationwide nuclear-waste conundrum engendered by a lack of repositories like the always-controversial Yucca Mountain. Energy Department environmental reviews initially considered the disposal of 10,000 gallons of grouted wastewater. Both Citizens for Nuclear Technology Awareness and the Savannah River Site Community Reuse Organization backed



# ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER

01 OCTOBER 2020

the high-level radioactive waste reinterpretation. (Ref. 7)

[Back to Newsletter's Page 1](#)

## **Super surrogate livestock breeding: Research shows males can produce sperm of other males with genetic engineering**

A US scientist says new research shows it is possible to use CRISPR genetic engineering (CRISPR gene editing is a genetic engineering technique in molecular biology by which the genomes of living organisms may be modified. It is based on a simplified version of the bacterial CRISPR-Cas9 antiviral defense system) to sterilize males and make their bodies produce the sperm of other males. While the livestock could not produce enough sperm to impregnate females, farmers could one day use the technology to breed animals that produce more food or fiber. This type of technology is something that can be a game-changer in how we're shaping the genetics of livestock populations, and it's going to help us improve the efficiency by which we produce products for human consumption for the growing global population. Selective breeding is big business, with a batch of bull semen selling for \$67,000 last year in Adelaide.

It's very common in dairy cattle production because animals are in a very confined environment but in beef cattle, where the majority of beef cattle production is done in a range or pasture-based setting, it's quite difficult to track the reproductive cycles of females. In fact, around the world, roughly 80 percent of all dairy cattle are bred with artificial insemination, which has greatly impacted the efficiency of milk production — but only 7 percent of beef cattle around the world are bred by artificial insemination. The University of New England said it would all come down to how much it cost compared with artificial insemination, conventional breeding, or cloning. "It's a more expensive technology but some people are producing clone daughters of elite animals and depending on the price of cloning if you needed lots of elite bulls you could just clone one. "What it comes down to is the relative costs of cloning, as opposed to doing this CRISPR treatment, and cloning is nearly cost-effective now at least in sort of high-value animals so I think there'll be alternatives. (Ref. 8)

[Back to Newsletter's Page 1](#)

## **How hydroponic farming can bring you produce that aren't locally grown**

When we think of farming or planting, the basic ideas that come to mind are digging up soil, dumping in seeds, sprinkling it with some water, and letting the power of nature turn the seed into a plant. Of course, humans take part in the process. But looking at the big picture, the soil plays the most crucial role in growing plants and vegetables. It's going to be their cradle and, for some, their longtime home. Its quality and location will determine the life of a seedling and affect the fruits it will bear. After all, as a soil scientist, Charles E. Kellogs said, "all life depends upon the soil... There can be no life without soil and no soil without life."

But what if the soil is taken out of that picture? Now that is what we call hydroponics. Thanks to the advancements made in science and agriculture, we can now manage to cultivate crops without soil. Derived from Greek terms hydro (water) and pono (work), hydroponics literally means "working water" as plants are grown in water beds, with liquid solution feeding them the minerals and nutrients they need. This method of horticulture may sound like a recent



# ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER

01 OCTOBER 2020

breakthrough, but studies about soilless farming dates back to the 1600s with works of English philosopher Francis Bacon and geologist John Woodward. According to a 1981 article in The New York Times, since nutrients are brought right to the roots, plants do not have to branch out and fight for food. Unlike farming on soil, hydroponics allows plants to be placed closer together as nutrients are equally distributed. In the Philippines, many have adopted the hydroponic way of farming, as it offers vegetables that are safe from soil-related disease and typhoon damages. (Ref. 9)

[Back to Newsletter's Page 1](#)

## 5. ESD NEWSLETTER READER COMMENTS

None received this month.

[Back to Newsletter's Page 1](#)

## ESD NEWSLETTER BOARD

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## NEWSLETTER ARTICLE REFERENCES

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## ABOUT 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.



# **ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER**

**01 OCTOBER 2020**

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