



ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER

01 APRIL 2020

This ESD Newsletter is a monthly enterprise involving ALL members of ESD. ESD Members are encouraged to forward materials, authored papers for publishing on Environmental Engineering topics, and comments on newsletter topics or current events to the Editor. Your participation in submitting materials for the newsletter is greatly appreciated.

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1. ENVIRONMENTAL TECHNOLOGIES

Mapping the Cannabis Genome to Improve Crops and Health

Unlocking the full potential of cannabis for agriculture and human health will require a coordinated scientific effort to assemble and map the cannabis genome, according to a recently published international study led by the University of Saskatchewan (USask) researchers. In a major statistical analysis of existing data and studies published in the Annual Review of Plant Biology, the authors conclude there are large gaps in the scientific knowledge of this high-demand, multi-purpose crop. “Considering the importance of genomics in the development of any crop, this analysis underlines the need for a coordinated effort to quantify the genetic and biochemical diversity of this species,” the authors state. The team, which includes scientists in the Netherlands, Germany, and the United States, found



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that less than 50 percent of the cannabis genome is accurately mapped, with about 10 percent of the genome missing, and another 10 to 25 percent unmapped. This means that it lacks the foundation on which to build a molecular breeding program for cannabis comparable to what exists for other crops. Developing a high-quality genetic blueprint would provide the building blocks for genomics-based breeding and applications to human and animal health while strengthening university-industry partnerships. The findings will serve as a cornerstone for various types of research conducted through the USask-led Cannabinoid Research Initiative of Saskatchewan (CRIS). The multi-disciplinary team also involved USask researchers from the College of Pharmacy and Nutrition, College of Medicine, and the School of Environment and Sustainability. (Ref. 1) [Back to Newsletter's Page 1](#)

LED light source enables mobile spectroscopy for industry use

The food industry sometimes comes under fire for its use of genetically modified organisms, inaccurate labeling, or insufficient quality control, which can lead to product recalls. As a result, consumers have an incentive to check for themselves whether the items they eat really contain the ingredients listed on the packaging. The good news is that technology is allowing this to happen: so-called ag-tech (agricultural technology) is now a rapidly growing industry because it can offer an increasingly detailed understanding of the qualitative and quantitative composition of food and other agricultural products. Some of the biggest advances in the food industry are being made possible by technological innovations such as near-infrared spectroscopy, which can identify certain compounds like fat, sugar, water, and proteins in food, leading to information about calorie content, freshness, and quality of food that can help consumers make better choices.

By analyzing the absorption spectrum of an unknown material and matching this measurement with a database of known molecules, it is possible to determine the presence and quantity of certain ingredients—for example, the percentage of cocoa in a chocolate bar. In terms of food analysis, one of the goals is to determine the percentage of corresponding ingredients, such as sugar, fat, or water content. This method is called quantitative spectroscopy. However, in most cases, the object to be analyzed does not consist of a laboratory-pure mixture. As a result, the identification of the ingredients in complicated and unknown substances can be difficult to pinpoint because the individual oscillations can overlap in the overall spectrum. In contrast to the quantitative analysis mentioned above, this is a qualitative analysis. As a result, there has not yet been a release of a handy spectrometer that consumers can carry in their pockets to get an immediate, detailed analysis of every piece of food they eat. Fortunately, however, the first steps toward this reality are now being made. In the near future, a mobile handheld spectroscope could ultimately be used to scan a wide range of materials—foods, medicine, even the human body—and analyze them in real-time. (Ref. 2) [Back to Newsletter's Page 1](#)



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2. ENVIRONMENTAL REGULATIONS

EPA Aims to Allow Some Project Work Without Clean-Air Permits

Reversing a long-standing interpretation of its own regulations, the U.S. Environmental Protection Agency has issued "guidance" to its regional offices and states and seeks public comment on its intent to ease air-pollution permit rules for facility construction under the federal Clean Air Act. The guidance, sent March 25, would allow work to begin on major projects that would be new stationary air pollution sources—such as power plants, industrial boilers, and manufacturing facilities, or modifications to those—before obtaining pre-construction permits required under the federal law's New Source Review program. That program is a set of regulations under the law to protect public health and the environment from air pollution when major new air emissions sources are built or modified. Most states administer their own programs under the law, but some are EPA-managed, according to the program website. Industry groups and construction firms say EPA's draft guidance would enable projects on tight timelines to move forward in a timely manner, particularly those that are non-controversial. As the guidance document is non-binding, however, state air administrators that oversee construction permitting have significant latitude as to whether they must follow it. Environmental groups contend the policy change is just the latest in a series of moves by the administration to roll back important environmental protections under the NSR construction permitting program. (Ref. 3) [Back to Newsletter's Page 1](#)

Relaxation in Environmental Regulations To Counter Coronavirus Impact

As the COVID-19 outbreak continues to weigh on the global economy, the administration has quietly relaxed regulatory measures meant to protect the environment from unnecessary air and water pollution. The Environmental Protection Agency announced a sweeping relaxation of environmental regulations in order to combat the impact of the coronavirus pandemic on businesses. The order enables power plants, manufacturing facilities, and various other facilities to determine whether they are meeting the legal requirements on reporting air and water pollution. The struggling oil and gas sector was taking the lead in pushing for the relaxation of regulations during the on-going COVID-19 crisis and an escalating price war between Saudi Arabia and Russia. The policy establishes new guidelines for companies to monitor themselves for an undetermined amount of time throughout the coronavirus outbreak. It also claims that the agency will not dole out penalties for violations of any specific pollution reporting requirements. The statement from the E.P.A. reads, "In general, the E.P.A. does not expect to seek penalties for violations of routine compliance monitoring, integrity testing, sampling, laboratory analysis, training, and reporting or certification obligations in situations where the E.P.A. agrees that COVID-19 was the cause of the noncompliance and the entity provides supporting documentation to the E.P.A. upon request." The order urges companies to "act responsibly" if they cannot currently follow guidelines. (Ref. 4) [Back to Newsletter's Page 1](#)



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3. ESD CHAIRMAN/DIVISION NEWS

ESD Technical Representative to WIE Planning Committee

Why: 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. The WIE will be based on the [Air] Information Exchange held annually in North Carolina. The main presentations will be by EPA personnel.

How: 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 Nominations: please contact Arnie Feldman at jjdsenv@att.net or Ryan Neil, ESD Chair, at ryanneil84@hotmail.com

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ICEM 2021 ANNOUNCEMENT

ASME, the Nuclear Engineering and the Environmental Systems Divisions, are pleased to announce the return of the International Conference on Radioactive Waste Management and Environmental Remediation (ICEM). The Conference is set for Oct 10-13, 2021, in Stuttgart, Germany. As with past, ICEM's the Conference will feature Plenary and Luncheon speakers, breakout sessions and a large exhibit hall suitable for equipment displays for radioactive D/D&D tasks. The breakout sessions will feature panel discussions, invited speakers, articles, and presentations, as well as peer-reviewed papers.

The Tracks for ICEM 2021 include:

Track 1 Robotics and Remote Handling and Viewing Technologies

Track 2: Facility Decommissioning, Decontamination & Demolition (D/D&D) Overall (Plan, Decommissioning, Demolition, R&D)

Track 3: Major facilities experience in handling accidents and D/D&D

Track 4. Spent Fuel, Fissile Material, TRU, and HLW Management:

Track 5. L/ILW Radioactive Waste Management:

Track 6. Environmental Remediation (ER) including Activities at NORM/TENORM Sites

Track 7. Special Topics 1 - Public Involvement/ Crosscutting Issues/Global Partnering/Human Resource Development

Track 8. Special Topics 2 - New Facility Planning/ Environmental Management (EM)/ Health & Safety

Track 9. Student/Young Engineers Program

Track 10. D/D&D Research & Development Activities

If you are interested in being a Track Chair, a Session Chair, or helping to develop the conference, please do not hesitate to contact Arnie Feldman (jjsenv@att.net) or Bob Stakenborogh (bob@evisive.com). **[Back to Newsletter's Page 1](#)**

4. EDITORIAL BOARD SELECTIONS

How Genetically Modified Seeds Market Will Dominate In Coming Years?

Among crop types, corn and soybean are expected to cover the largest share in the global genetically modified (GM) seed market. The introduction of genetically modified technology in the agriculture sector is a primary factor driving the growth of these two segments. In 2018, corn crops accounted for a share of 48.9% in the global market. Countries such as Argentina, Brazil, and the U.S. are increasingly adopting GM crop technology and these crops cover a share of around 85-85% of the total corn and soybean crop harvested area. The genetically modified canola crop is also expected to register a higher CAGR in the forecast years with its increasing cultivation in countries such as Australia, the U.S., and Canada. Recent developments in biotechnology are likely to expand the global genetically modified (GM) seed market. GM seeds help to multiply crop yield and aid in the cultivation of robust



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crop variations. This information was published by Fortune Business Insights in a report, titled "Genetically Modified Seeds Market: Global Market Analysis, Insights and Forecast, 2019-2026" which offers an elaborative analysis on the drivers and restricts prevailing in the market. In 2018, the overall valuation of the market stood at US\$ 20.07 Bn. With breakthroughs in technology and the introduction of genetically engineered crops are expected to help the global market reach US\$ 30.24 Bn by 2026. In addition, the global market is anticipated to expand at a CAGR of 5.3% during the forecast period.

North America is expected to lead the global GM seed market owing to the rising adoption of GM crops. As per a study by Acquisition of Agri Biotech Applications or ISAAA, North America and South America together account for over 90% of the share in the global market. Overseas demand for soybean and corn crop types is the primary factor creating growth opportunities for the market in these two regions. Canada produced five genetically modified crops, which include canola, sugar beet, soybean, alfalfa, and corn. The Asia Pacific is also anticipated to register the fastest growth over the forecast years mainly because of developments in biotechnology. The fluctuating weather conditions and low productivity of crops in countries such as India and China affect the quantity and quality of crops. GM seeds are expected to help produce a better quality of crop yield in these regions, thus driving the market. Also, farmers are becoming more aware of the benefits of genetically modified seeds. This is expected to fuel demand for GM seeds in this region. (Ref. 5) [Back to Newsletter's Page 1](#)

Measuring the carbon footprint of offshore production

Global attention around carbon emissions is influencing how hydrocarbons are used and produced. This means major operators are looking at how carbon dioxide (CO₂) releases can be reduced in offshore production, power generation and directing power to water reinjection. This has been demonstrated by major oil brands such as Equinor (formerly known as Statoil), which has issued plans to cut carbon intensity in half by 2050, and Lundin Petroleum announcing carbon neutral targets and a name change to remove the 'petroleum' reference to reflect the industry's energy transition. In line with this, earlier this year BP also set out its ambition to become a 'net zero company' by 2050 or sooner. When launching its 'Energy Transitions' report in January 2020, the International Energy Agency (IEA) emphasized that all stakeholders must play a significant role in the offshore industry's decarbonization journey.

Societal pressure is driving many of these initiatives with hydrocarbons producers seen by some as a leading source of increasing CO₂ emissions. According to the IEA, 2018 saw the highest levels of CO₂ introduced into the atmosphere for three million years, which remained the same in 2019. Quantifying the carbon impact of hydrocarbon production itself is essential if the impact is to be meaningfully measured across the supply chain. To better understand the landscape, this should be compared with emerging technologies that also have carbon footprints. The hydrocarbons industries and the offshore sector are not solely responsible for CO₂ emissions – the focus of this article – or the other greenhouse gases, but it is within their power to publish how much they are producing in what stages of the project life cycle and to state the measures they can take at each of these stages to eliminate, reduce or mitigate the impact of CO₂ emissions. (Ref. 6) [Back to Newsletter's Page 1](#)



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Government braces for increasing medical waste during pandemic

As medical workers treat more and more COVID-19 patients, concerns are growing over how to deal with the medical waste that is expected to pile up. The virus spreads from people to people through droplets from infected persons. It is unclear how long the virus from the droplets survives on surfaces, but various studies suggest it may persist up to 72 hours on hard shiny surfaces and up to 24 hours on porous surfaces depending on the temperature and humidity. According to data from the Health Ministry, 2,820 hospitals and 9,884 community health centers (Puskesmas) in Indonesia produce up to 290 tons of medical waste every day. There are 10 licensed medical waste processing plants in Indonesia with a total combined capacity of 170 tons of waste per day; meanwhile, only 87 hospitals have incinerators to process waste on-site, with a combined daily capacity of up to 60 tons. There is no data on how much medical waste is being produced because of COVID-19, but the Environment and Forestry Ministry predicted that medical waste would increase during the pandemic, particularly from the use of protective gear and other single-use medical equipment. Not to mention the medical waste from the 132-referral hospitals for COVID-19 patients and the increasing public use of facemasks and gloves. It recommends methods to dispose of waste from health centers, waste from people under surveillance (ODP) under home care and regular household waste with disposable facemasks and other protective gear. It says that "infectious waste" from health facilities must be collected from closed containers at least once every two days. The waste must later be destroyed using an incinerator or autoclave with a shredder function. The residue left after the processing must be labeled as hazardous waste (B3) to be later transported to a hazardous waste processing plant. (Ref. 7) [Back to Newsletter's Page 1](#)

Planting Blind: Why Some Farmers Don't Know What's on Their Seeds

With seed treatment use on the rise, farmers and regulators are becoming hard-pressed to keep track of the rising number of pesticide ingredients added to seeds before planting. As companies bundle ingredients that are more active together and treat seeds farther upstream from the farm, growers' knowledge of their personal on-farm pesticide inputs is becoming less accurate, a new study found. Moreover, they are not alone -- U.S. regulators do not have good data on how many pesticides are used in seed treatments, either. The result is that many farmers may be using more pesticides than they realized -- and perhaps more than they need -- at a time when profit margins are slim and uncertain. Most seed treatments consist of a fungicide, insecticide, nematicide, plant growth regulator, biologicals or some combination of those. Scientists at the University of Wisconsin have created a single chart, updated yearly, that breaks down the active ingredients of most commercially available seed treatments.

Seed treatment products can hold anywhere from one active ingredient up to six or more. Companies often offer the same active ingredient or a mix of active ingredients under different brand names, which can create confusion. For example, the Wisconsin researchers document 143 different seed treatment products, but only about 40 unique active ingredients. Just one active ingredient, the common fungicide metalaxyl, is sold fewer than 11 different brand names. Therefore, it's not surprising that farmers could be confused about what pesticides they're using each year. A group of federal, private and academic scientists



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recently analyzed private and government survey data and found that many growers struggled to identify which insecticides or fungicides they applied via seed treatments to their acres. In the study, published in a journal called BioScience, researchers found that 16% of the responding cotton growers, 35% of corn growers, 38% of the soybean growers, 43% of winter wheat growers and 57% of spring wheat growers were unable to provide the name of the seed treatment product used on their crops. (Ref. 8) [Back to Newsletter's Page 1](#)

Solutions for a Circular Plastics Economy

The consumer movement against plastics uses as its rallying cry images of beaches littered with mountains of plastic bottles and sea turtles and other marine life entangled in plastic ring carriers. Dubbed “the Blue Planet effect” or “the Attenborough effect,” the consumer movement against plastics uses as its rallying cry images of beaches littered with mountains of plastic bottles and sea turtles and other marine life entangled in plastic ring carriers. Consumers also have a very hard time differentiating between different types of plastics, leading to confusion over which materials are recyclable. Moreover, realistically, while some plastics are easy to recycle, e.g., PET bottles, others, such as multilayer pouches, are not. In some cases, it is a lack of education—even regarding the most-recyclable packaging materials. 81 % of consumers believe the most important thing beverage companies can do to make them feel good about the product they are consuming is to ensure that the packaging is 100% recyclable, including the cap. Another reason for sustainability’s leap is the aforementioned “Blue Planet effect,” or plastic leakage. Putting a number on this leakage, globally, in 2016, 300 million metric tons of plastic was used to create durable and non-durable goods. At end-of-life, about 16% was recovered for recycling, approximately 12% of that was recycled, 25% was incinerated, 40% ended up in landfills, and 19% leaked into the environment or went into unmanaged dumps. (Ref. 9) [Back to Newsletter's Page 1](#)

Our future will depend on whether governments prevent or permit more environmental vandalism

Recent photos taken by astronauts in the orbiting space station show an amazing improvement in Earth's atmosphere. The sharp reduction of carbon dioxide emissions from factories, motor vehicles, ships, planes, and fossil fuels reveals a planetary surface whose clarity had been obscured by industrial pollutants. This long-delayed abatement of global warming stems from the COVID-19 pandemic. A worldwide pestilence could have been averted if humans had heeded the repeated warnings of scientists to stop contaminating the planet's water, soil and atmosphere. Mother Earth would then not have been compelled to take such extreme curative measures in self-defense. The April issue of National Geographic offers two projected forecasts of the future that awaits humankind -- one from a pessimistic outlook and one from an optimistic outlook. Having perused these two conflicting perspectives, they might better be described as either realistic or idealistic. Although the up rise in planet-saving activism is to be applauded and encouraged, the prospect that it can actually prod the world's economic and political leaders to join such a global save-the-planet crusade remains highly unlikely. Their acclaim for the activists has been strictly verbal, with no sign that it will ever be transmuted into corporate and political activism. There are three major impediments to their becoming genuine green activists. (Ref. 10) [Back to](#)



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5. ESD NEWSLETTER READER COMMENTS

None received this week.

Expecting the reader's comments and views on the newsletter. [Back to Newsletter's Page 1](#)



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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.

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