ENVIRONMENTAL SYSTEMS DIVISION NEWSLETTER

MARCH 2022

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 CALL FOR NOMINATIONS

The ASME Environmental Systems Division is soliciting nominations to fill leadership positions.

Leadership Qualifications
Individuals who have demonstrated leadership ability and knowledge that allow them to achieve the goals, mandates and interests of the ESD.

- **Chair**
- **Vice Chair**
- **Secretary/Treasurer**
- **Two Members-at-Large**
- **Liaison Committee – Chair and Vice-Chair**
- **Educational Support Committee – Chair and Members**
- **Honors and Awards Committee – Members**
- **Student/Early Career Competition Committee – Members**
- **Events Committee – Chair and Members**

Please submit your nominations for the following positions to herreral@asme.org by April, 19, 2022. Contact Laura Herrera, ASME TEC Operations Manager with any questions you may have. **Back to Newsletter's Page 1**

ESD EXECUTIVE COMMITTEE GOOD-BYES

ESD is announcing the resignations of two members of the Executive Committee Ryan Neal, Chair, and Hebab Quazi, Member-at-Large. The Division and the Executive Committee are sorry to see them go and thank them for their service. **Back to Newsletter's Page 1**

ASME ESD IMECE 2022 TRACK Postponed until 2023

The ASME Environmental Systems Division has decided to hold off on the new Track until IMECE 2023. More information will follow early in 2022.
If you want to volunteer to be Chair or Co-Chair or have ideas for specific sessions, please contact Arnie Feldman (jjdsenv@att.net). **Back to Newsletter's Page 1**

ASME/A&WMA WASTE INFORMATION EXCHANGE

ESD, the Research Committee on Energy, Environment and Waste (RCEEW) and the Materials Energy Recovery Division (MER), in conjunction with the Air and Waste Management Association (A&WMA) are planning a Waste information Exchange (WIE) in 2023 in the DC Metropolitan Area. The WIE is being modeled after the [Air] Information Exchange, which has been held annually since 1975 in Research Triangle Park (RTP), NC, in which USEPA (QAQPS and ORD) are key participants. The WIE will not require a written paper and any graphics used will be made available to attendees at the discretion of the speaker. The purpose of the Information Exchange is to make participation as a speaker as easy and simple as possible. The idea is to invite experts to come talk about research or regulations on which they are working without having to spend a lot of time in preparation. The WIE will cover policy updates, regulatory changes, and research on the latest waste topics.

ESD, RCEEW and MER are looking for individuals who want to participate in the planning including Track Chairs, Session Chairs, and Panel Chairs. In addition, ESD is looking for a Technical Chair to represent them on the planning Committee.

If you are interested in volunteering or want further information, please contact Arnold Feldman at *jjdsenv@att.net*.

Look for more information on the WIE in future ESD Newsletter's and on the web in Linked-In and Facebook.

Back to Newsletter's Page 1

ICEM 2023 Call for Abstracts and Session Chairs

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). The Conference is set for Oct. 3 - 6, 2023 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 countries with mature environmental management programs and those from countries with emerging programs.

The program Tracks and Topics are shown in the attached or can be seen on the ICEM website (https://event.asme.org/ICEM/Program).

Abstracts for articles, papers and presentations are due Jan 29, 2023. Abstracts should be submitted on-line via the website at https://icem.secure-platform.com/a/organizations/main/home.

The ICEM Program Chairs, Martin Edelson and Jovica Riznic, request your help as Session Chairs or Co-Chairs. You can either volunteer for a specific Session/Topic or just in general. A "Roles of the Session Chairs" is being prepared and will be available shortly.

For additional information on volunteering or to volunteer (e.g., Session Chair) at ICEM please contact either Program Chair Martin Edelson (mcedelson@gmail.com) or Jovica Riznic (Jovica.Riznic@cnsc-ccsn.gc.ca).

For additional information on submitting Abstracts please send an email to ASME at toolboxhelp@asme.org. **Back to Newsletter's Page 1**

CALL FOR E-FEST 2022 JUDGES, March 25 & 26, 2022

The ASME Old Guard is looking for eFest judges. The Judge requirements for the Oral and Digital Poster Competitions are shown below. The Competition will be held virtually. If you are interested or want further information contact: Monica Moman-Saunders at *monicasaunders@att.net*

ORAL COMPETITION

The Oral Competition, sponsored by the Old Guard Committee of ASME, will be held during E-Fest 2022 according to the following schedule.

DATE/TIME (EST)	ACTIVITY
March 25 - 9:30 – 12:30	The Oral Competition will be held virtually
March 26 - 8:00 – 11:30	The Oral Competition will be held virtually
March 26, 2:15 pm	Winners to be announced during the E-Fest Awards Program beginning at 2:15 pm (EST)

JUDGES NEEDED (12 needed)

Right now, there are 48 students registered for the Oral Competition. This means that we will need to run four concurrent sessions on both days. This will require 12 judges per day. This year we are asking judges to volunteer only one day at a minimum. However, if someone would be inclined to volunteer both day, that will be much appreciated.

TIME COMMITMENT

- At least 30 - 45 minutes for a judge's briefing. The date to be determined, and
- Up to four hours on Friday, March 25th, **and** Saturday, March 26th

JUDGES RESPONSIBILITIES

- Listen to up to six presentations each day.
- Complete the scoring sheets and Judges feedback sheets.
- All Judges sheets are to be forwarded to the Chair of the Old Guard Committee.
- Work with the other room judges in your room to agree on the overall winners of the two days.
- There will be first, second, third place winners and a technical winner for each room.
- Each room will have a head judge who will be responsible for compiling the scores into a summary sheet and forward that sheet to the Chair of the Old Guard Committee.

DIGITAL POSTER COMPETITION

The Digital Poster Competition sponsored by the Old Guard Committee of ASME, will be held during E-Fest 2022 according to the following schedule.

DATE/TIME (EST)	ACTIVITY
March 24 - 26	Posters will be available for judging
March 26, 2:15 pm	Winners to be announced during the E-Fest Awards Program beginning at 2:15 pm (EST)

JUDGES NEEDED (3 - 5 people)

Right now, 46 students have registered for the Digital Poster Competition. We are looking for three to five judges to independently review and judge the posters. Judging can occur anytime between Thursday evening and Saturday morning at 11:00 am EST.

TIME COMMITMENT

- At least 30 - 45 minutes for a judge's briefing. The date to be determined, and
- Reviewing the 46 posters between Thursday night and Saturday morning, at your leisure.

JUDGES RESPONSIBILITIES

- Review all 46 posters and complete the scoring sheet
- Enter your results in the google summary scoring sheet.
- There will be first, second, third and fourth place winners.

The winners will be determined from the highest score, i.e., first place has the most points; second place has the next highest, etc.

Back to Newsletter's Page 1

2. ENVIRONMENTAL TECHNOLOGIES

New Research Shows Genetically Modified Crops Could Significantly Reduce Greenhouse Gas Emissions

The use of genetically modified (GM) crops in agriculture remains contentious, especially in Europe. According to surveys, many people fear that these could have negative effects for human health and the environment. However, a new study shows that genetically modified crops could actually be good for the environment, and for the climate in particular. Results suggest that the adoption of GM crops in the European Union (EU) could reduce greenhouse gas emissions considerably. The study by scientists from the Breakthrough Institute in the USA and the University of Bonn in Germany was recently published in "Trends in Plant Science."

Agriculture accounts for around 25 percent of all greenhouse gas emissions worldwide. A large share of these emissions is due to livestock production and fertilizer use. However, more than one-third of agriculture's emissions is caused by land-use change, especially the conversion of forests and other nature reserves to agricultural land in order to satisfy the rising global demand for food and feed. "Using better technologies to increase crop yields on the land already cultivated could reduce this land-use change and the associated emissions," says study author Prof. Dr. Matin Qaim, Director of the Center for Development Research at the University of Bonn.

Certain types of genetically modified crops – such as GM maize and soybean – are widely grown in other parts of the world, but hardly in Europe. "The main reasons are public acceptance issues and political hurdles," says Qaim.

In the new study, he and his colleagues from the Breakthrough Institute used global agricultural data and estimates of the yield effects of GM crops to model how increased technology adoption in the EU would affect production, land use, and greenhouse gas emissions. The estimates suggest that more widespread use of genetically modified crops in the EU could prevent the release of 33 million tons of CO2 equivalents, which corresponds to 7.5 percent of the EU's total annual greenhouse gas emissions from agriculture. "Most of these positive climate effects are attributable to reduced land-use change", says Dr. Emma Kovak from the Breakthrough Institute, the study's first author. The conclusion of the research team: "The EU imports a lot of maize and soybean from Brazil, where the expansion of agricultural land contributes to tropical deforestation. Higher yields in the EU could reduce some of these imports and thus help preserve the Amazon rainforest."

The authors stress that in their analysis they only look at already-existing genetically modified crops. "New genomic breeding technologies are currently being used to develop a wide range of new crop applications that could lead to additional climate change mitigation and adaptation benefits in the future", says Matin Qaim. The agricultural economist is a member of the Transdisciplinary Research Area "Sustainable Futures" and Cluster of Excellence

"PhenoRob - Robotics and Phenotyping for Sustainable Crop Production" at the University of Bonn. (Ref. 1) **Back to Newsletter's Page 1**

Freshwater from thin air: Hydrogels containing a hygroscopic salt can harvest freshwater from dry air

Hydrogels can absorb and store many times their weight in water. In so doing, the underlying polymer swells considerably by incorporating water. However, to date, use of this property to produce freshwater from atmospheric water has not been feasible, since collecting moisture from the air is still too slow and inefficient.

On the other hand, moisture absorption could be enhanced by adding hygroscopic salts that can rapidly remove large amounts of moisture from the air. However, hygroscopic salts and hydrogels are usually not compatible, as a large amount of salt influences the swelling capability of the hydrogel and thus degrades its properties. In addition, the salt ions are not tightly coordinated within the gel and are easily washed away.

The materials scientist Guihua Yu and his team at the University of Texas at Austin, USA, have now overcome these issues by developing a particularly "salt-friendly" hydrogel. As their study shows, this gel gains the ability to absorb and retain water when combined with a hygroscopic salt. Using their hydrogel, the team were able to extract almost six liters of pure water per kilo of material in 24 hours, from air with 30% relative humidity.

The basis for the new hydrogel was a polymer constructed from zwitterionic molecules. Polyzwitterions carry both positive and negative charged functional groups, which helped the polymer to become more responsive to the salt in this case. Initially, the molecular strands in the polymer were tightly intermingled, but when the researchers added the lithium chloride salt, the strands relaxed and a porous, spongy hydrogel was formed. This hydrogel loaded with the hygroscopic salt was able to incorporate water molecules quickly and easily.

In fact, water incorporation was so quick and easy that the team were able to set up a cyclical system for continuous water separation. They left the hydrogel for an hour each time to absorb atmospheric moisture, then dried the gel in a condenser to collect the condensed water. They repeated this procedure multiple times without it resulting in any substantial loss of the amount of water absorbed, condensed, or collected.

Yu and the team say that the as-prepared hydrogel "should be optimal for efficient moisture harvesting for the potential daily water yield." They add that polyzwitterionic hydrogels could play a fundamental role in the future for recovering atmospheric water in arid, drought-stricken regions. (Ref. 2) **Back to Newsletter's Page 1**

3. ENVIRONMENTAL REGULATIONS

U.S. Actions to Address Plastic Pollution

The United States welcomes the historic opportunity at the United Nations Environment Assembly (UNEA 5.2), February-March 2022, to start a process with other nations and stakeholders to fight plastic pollution. The United States is already acting both domestically and internationally to address this global challenge.

U.S. Environmental Protection Agency (EPA) published the National Recycling Strategy November 2021 and reaffirmed the goal to increase the U.S. recycling rate to 50 percent by 2030. EPA releases an annual report, Advancing Sustainable Materials Management: Facts and Figures, to provide information on Municipal Solid Waste (MSW) generation, recycling, composting, combustion with energy recovery and landfilling. The report analyzes MSW trends in generation and management, materials and products, and economic indicators affecting MSW. Further EPA works with businesses, governments, and nonprofit organizations to promote the use and reuse of materials more productively over their entire life cycles. Partners demonstrate how they reduce waste, practice environmental stewardship and incorporate sustainable materials management into their business model, including their waste-handling processes. Trash Free Waters is a voluntary program that emphasizes stakeholder engagement to assist U.S. and international communities with addressing primarily land-based sources of marine litter. Best Practices for Solid Waste Management is a Guide for Decision-Makers in Developing Countries – The Guide covers a diverse set of important topics for city-level decision-makers around the world.

U.S. Department of Energy (DOE) launched the Plastics Innovation Challenge in 2018 to coordinate the many initiatives across the department on plastic recycling, degradation, upcycling, and design for circularity. The goals of this program are to develop solutions that deliver greater than 50 percent energy savings, address greater than 90 percent of plastics, reduce greenhouse gas emissions by more than50 percent, and achieve at least 75 percent carbon utilization.

U.S. Department of Agriculture (USDA) offers support and programs to increase the research, development and buyer/consumer awareness of bioplastics. USDA's BioPreferred Program works to increase the purchase and use of biobased products through federal procurement and a certification and labeling initiative. The program's USDA Certified Biobased Product label is a market development initiative to increase consumer and buyer recognition, and the purchase of bioproducts.

U.S. Department of Interior's (DOI) Bureau of Safety and Environmental Enforcement (BSEE) has Marine Trash and Debris Prevention standards that require offshore energy companies to conduct annual training for all Outer Continental Shelf (OCS) employees and to adopt best practices to reduce marine debris. National Park Service (NPS) cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world. The NPS actively works with local, state, and other federal partners on beach clean-ups and educational products and programs to help make

visitors aware of environmental impacts of plastics pollution and marine debris, and how individual choices and actions can make a difference. U.S. Fish and Wildlife Service (USFWS) manages more than 180 coastal national wildlife refuges and five marine national monuments across the United States. USFWS, partners, and numerous volunteers, work to perform cleanups of plastic pollution on the reefs and beaches. The USFWS also collaborates with the National Oceanic and Atmospheric Administration (NOAA) and others to remove fishing nets and plastic debris (more than 950 metric tons, since 1996) from the Papahanaumokuakea Marine National Monument.

U.S. Food and Drug Administration (FDA) assists manufacturers in safely using recycled plastics for food contact articles. The program helps divert plastic food contact articles from ending up in landfills or polluting the marine environment, while ensuring that the high-quality plastics previously used for food contact articles are safely used to produce new food contact articles.

National Aeronautical and Space Agency (NASA) funded a project to investigate the capability of using satellite remote sensing to detect microplastics in our oceans using hyperspectral remote sensing, an important capability of NASA's upcoming PACE mission. Microplastics form when plastic trash in the ocean breaks down from the sun's rays and the motion of ocean waves and can be carried hundreds or thousands of miles away from the source by ocean currents, making it difficult to track and remove them. Researchers are also using current NASA satellite data to track the movement of microplastics in the ocean, using data from NASA's Cyclone Global Navigation Satellite System (CYGNSS).

National Institute for Standards and Technology (NIST) supports U.S. work on documentary standards, reference materials, and reference data and serves as a diverse stakeholder-convenor on manufacturing and technology innovation needs in the U.S. economy and conducts work on the thermal and mechanical properties of polymers at different stages in the recycling process, including studying depolymerization and degradation of polymers in both manufacturing and natural environments.

National Oceanic and Atmospheric Agency (NOAA) Marine Debris Program was established in 2006 to address the adverse impacts of marine debris on the U.S. economy, the marine environment, and navigation safety. To prevent marine debris, the Program forms partnerships across the United States and internationally through outreach and education initiatives and supports locally driven, community-based marine debris removal projects .

National Science Foundation (NSF) supports basic research that develops fundamental knowledge and engineering advances pertaining to recycling, polymer chemistry and physics, alternative materials, sustainable and circular processes, the fate and impact of plastic materials lost to the environment, and pollution mitigation, control systems, and remediation. (Ref. 3)

Back to Newsletter's Page 1

Improving Environmental Regulatory Enforcement with Tech in the U.S.

Environmental enforcement agencies are charged with monitoring more than 40 million U.S. facilities, from large, privately owned industrial campuses to municipal wastewater treatment plants and even local farms. While environmental enforcement efforts are critical to human health and environmental safety, the sheer number of facilities and scope of the oversight required makes enforcement inherently challenging. At the same time, many enforcement organisations often lack the technology assets required to effectively manage their fundamental activities.

In many cases, field inspectors still use pen and paper to collect information, experts rely upon human-generated spreadsheets to track information and manually analyse data and mobile inspection capabilities are often limited to simple electronic data collection, meaning inspectors must still create reports manually. Lack of easy, digital access to findings from past inspections means regulatory agents may spend hours conducting painstaking analysis.

The following five technology priorities can serve as force multipliers for the environmental enforcement community.

Mobile inspections: Mobile inspection apps can eliminate manual, paper-intensive, desk-dependent data entry and access. Smartphones and tablets allow inspectors to capture inspection results directly into the record with associated photo and video evidence as well as geo-referenced data. When data is compiled digitally at the source, inspectors can readily generate corrective action reports to be reviewed with the facility after the inspection.

Remote inspections: COVID moved many government inspection processes from in-person to remote. Increasingly, agencies are introducing workflows that allow inspectors to conduct collaborative virtual inspections via online meeting tools.

Unmanned aerial systems: UAS technology allows environmental enforcement agencies to collect data from remote locations. The use of UAS, such as drones and small unmanned aircraft, enable a swifter and safer response to emergencies. In some cases, drones can be more cost-effective than in-person inspections or other aerial methods. In situations where an agency seeks to monitor a site over time, such as targeted environmental justice sites, the return on drone investment can be significant.

Artificial intelligence and machine learning: Today, inspections are routinely scheduled as a result of evidence of a possible violation, in response to a citizen or employee complaint. A risk-based, data-driven model, powered by AI could replace, or augment, this reactive approach. Tapping into the wealth of information available in past inspection reports, photos and videos, satellite images and sensor data, enforcement agencies could apply AI and ML to identify trends and prioritise inspection activities according to risk. By combining data from various sources—such as air sensor data and satellite imagery—inspectors can proactively identify potential non-compliance that requires human follow-up.

Tailored, integrated solutions: While new technology investments can deliver significant gains in productivity, environmental enforcement agencies must continue to evolve their IT solutions to more tightly integrate their end-to-end enforcement business processes. The biggest barrier to scaling the use of data across the enforcement process is a lack of integration. To harness the power of data, systems must be more tightly integrated, with a seamless workflow between connected systems. (Ref. 4)

Back to Newsletter's Page 1

4. EDITORIAL BOARD SELECTIONS

Plastic pollution is growing relentlessly as waste management and recycling fall short, says OECD

The world is producing twice as much plastic waste as two decades ago, with the bulk of it ending up in landfill, incinerated or leaking into the environment, and only 9% successfully recycled, according to a new OECD report. Ahead of UN talks on international action to reduce plastic waste, the OECD's first Global Plastic Outlook shows that as rising populations and incomes drive a relentless increase in the amount of plastic being used and thrown away, policies to curb its leakage into the environment are falling short.

Almost half of all plastic waste is generated in OECD countries, according to the Outlook. Plastic waste generated annually per person varies from 221 kg in the United States and 114 kg in European OECD countries to 69 kg, on average, for Japan and Korea. Most plastic pollution comes from inadequate collection and disposal of larger plastic debris known as macroplastics, but leakage of microplastics (synthetic polymers smaller than 5 mm in diameter) from things like industrial plastic pellets, synthetic textiles, road markings and tyre wear are also a serious concern.

OECD countries are behind 14% of overall plastic leakage. Within that, OECD countries account for 11% of macroplastics leakage. The Outlook notes that international co-operation on reducing plastic pollution should include supporting lower-income countries in developing better waste management infrastructure to reduce their plastic leakage.

The report finds that the COVID-19 crisis led to a 2.2% decrease in plastics use in 2020 as economic activity slowed, but a rise in littering, food takeaway packaging and plastic medical equipment such as masks has driven up littering. As economic activity resumed in 2021, plastics consumption has also rebounded.

Reducing pollution from plastics will require action, and international co-operation, to reduce plastic production, including through innovation, better product design and developing environmentally friendly alternatives, as well as efforts to improve waste management and increase recycling.

Bans and taxes on single-use plastics exist in more than 120 countries but are not doing enough to reduce overall pollution. Most regulations are limited to items like plastic bags, which make up a tiny share of plastic waste, and are more effective at reducing littering than curbing plastics consumption. Landfill and incineration taxes that incentivise recycling only exist in a minority of countries. The Outlook calls for greater use of instruments such as Extended Producer Responsibility schemes for packaging and durables, landfill taxes, deposit-refund and Pay-as-You-Throw systems.

Global production of plastics from recycled – or secondary – plastics has more than quadrupled from 6.8 million tonnes (Mt) in 2000 to 29.1 Mt in 2019, but this is still only 6% of the size of total plastics production. Setting recycled content targets and investing in improved recycling technologies could help to make secondary markets more competitive and profitable. (Ref. 5)

Back to Newsletter's Page 1

Breakthrough gene-editing technology belongs to Harvard, MIT -US tribunal

A U.S. tribunal overseeing patent disputes ruled on Monday that patents on the breakthrough gene-editing technology known as CRISPR belong to Harvard University and the Massachusetts Institute of Technology. The U.S. Patent and Trademark Office's decision is a defeat for the University of California, Berkeley; the University of Vienna and Nobel Prize-winning researcher Emmanuelle Charpentier. Harvard's and MIT's Broad Institute, which obtained the first CRISPR patent in 2014 and later obtained related patents, said the decision confirmed its patents were properly issued.

CRISPR lets scientists edit genes by using biological "scissors" that can edit DNA. The technology is being tested in clinical trials to potentially help cure diseases caused by genetic mutations and abnormalities.

Jennifer Doudna of UC Berkeley and Charpentier of the University of Vienna had been first to seek a CRISPR patent in 2012. Eight years later they shared the Nobel Prize in Chemistry for their CRISPR work.

Broad, however, said its 2014 patent was distinct from the earlier invention because it concerned the use of CRISPR in so-called eukaryotic cells, such as for genome editing. The tribunal said there was "no dispute" the California and Vienna schools first conceived of a CRISPR system, but they failed to demonstrate that they created a system that works with eukaryotic cells before Broad's patented invention. This decision can be appealed to the U.S. Court of Appeals for the Federal Circuit, which handles patent cases.

In a statement, the University of California said it was reviewing "various options" to challenge this decision, and that along with its partners it owned more than 40 other CRISPR patents. Editas Medicine Inc, which licenses CRISPR technology from the Broad Institute, said in a statement that the decision reaffirms the strength of the patents, which it uses to develop medicines for people with serious diseases. (Ref. 6) **Back to Newsletter's Page 1**

New state-of-the-art technology collects a unique time series from methane seeps in the Arctic

At the forefront of ocean observatory technologies is the K-Lander -- an innovative ocean observatory equipped with many ocean sensors, designed in collaboration between the water column group at CAGE and Kongsberg Maritime. This observatory was designed to monitor methane release from the seabed to the water column under challenging environments, providing invaluable information on temporal and spatial variability of natural methane release that can potentially reach the atmosphere.

A new study published in Ocean Science conducted by CAGE PhD candidate Knut Ola Dølven and co-authors presents time-series data from two methane seep sites offshore western

Svalbard, in the Arctic. These unique results show high variability both on hourly and seasonal time-scales and describe the interconnectivity between methane seepage and the ocean.

"The length and location are what makes these time-series unique, as they answer old and raise new questions related to this variability and how we can better constrain it in future emission estimates," says Knut Ola Dølven.

In 2015 and 2016, two K-Lander observatories were deployed over distinct intensive methane seepage sites west of Prins Karls Forland, where thousands of gas bubble streams originating from the seafloor were observed. Despite the knowledge that methane seep sites likely experience high temporal and spatial variability, our understanding of the amount, distribution, and release of methane in the Arctic Ocean has largely relied on studies that were undertaken in the late spring to early autumn due to better weather conditions until now.

Using data from the K-Lander, Dølven and co-authors processed a unique long time-series that spanned 10 months, measuring methane, carbon dioxide and physical parameters at each site. These measurements provided important insights into the short-term and seasonal variations of methane emissions and concentrations.

"It was interesting to observe that, despite the very high short-term variability in methane release, the source of methane emission seemed to be relatively unchanged throughout the 10-month deployment. This has strong implications on future interpretations of methane concentration in seep areas." Says Dølven.

There is also increased potential for methane release to the atmosphere during the fall and winter, if seepage persists, due to the weaker water column stratification (increased mixing of the layers in the ocean).

While seabed seepage is considered a minor natural source of atmospheric methane, there are large uncertainties related to the current and predicted emission estimates. Dølven and co-authors were, therefore, able to highlight and constrain uncertainties related to variability in methane inventory estimates from seabed methane seepage.

This work highlighted the successful cooperation between maritime industry and research teams, providing cutting edge technology for monitoring methane to help explain questions on oceanic greenhouse gas emissions. This is the first long term data series providing exceptional multi-sensor data on methane release and other ocean physical and chemical conditions in the Arctic. (Ref. 7) **Back to Newsletter's Page 1**

Building a planter system using waste materials using value engineering environmental assessment

Environmental challenges are significant threats to the planet; most of them are human-made hazards. Researchers are studying various environmental threats and trying to flourish sustainable policy for protecting the environment from various challenges worldwide. In Kuwait, researchers are paying attention to these various challenges and trying to reduce

these issues in the most effective, economically innovative, and localized ways. Desertification and lack of water are the major significant examples of natural challenges faced by the environment. The fundamental goal of this study was to propose and implement a more cost-effective and economical alternative to the commercial Waterboxx kits technology. In this proposed work, the research team rebuilt a new prototype based on Value Engineering, whose functionalities are homogeneous to the most popular Waterboxx kits technology. Unlike the Waterboxx kits method, the new proposed framework decreased operational and capital expenditures and reduced the complexity of development and implementation by regular farmers. Since recycled plastic sheets and used tires are employed in the new method as grist, this method helps us fight against desertification and provide a better way to handle the ever-growing massive dumpsters of tires in the region of Kuwait; hence it helps us in getting rid of hazards due to the tire fires and bring in a more safe and friendly environment. A better substitute has been identified concerning the value from various substitutes considered for developing the prototype using a thorough examination with the help of the Function Analysis System Technique (FAST). A prototype of the proposed method was constructed and tested in a controlled lab atmosphere followed by an actual environment. Analysis of both soil and water on the experiment site was performed before and after the proposed prototype testing for conducting a cross-comparison of soil. This evaluation was performed to ensure the method we fabricated and tested is an effective environment-safe model. The simulation and analysis of the proposed method are very effective as the already existing model reduced and saved the cost of implementation. The cost reduced by the new proposed VE method than the already available model was 43.84% without paying attention to the intangible costs related to another environmental challenge, recycling waste materials that may also build up the cost-saving. This study illustrates how the proposed Value Engineering-based model became the foremost baseline method for developing a new innovative model to reduce cost and patentable design. (Ref. 8)

Back to Newsletter's Page 1

5. ESD NEWSLETTER READER COMMENTS

None received this month.

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.

DISCLAIMER

Disclaimer: This newsletter may contain articles that offer differing points of view. Any opinions expressed in this publication do not represent the positions of the ESD Executive Board members of the American Society of Mechanical Engineers (ASME).

Upcoming ASME Conferences

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