



ENVIRONMENTAL ENGINEERING
DIVISION NEWSLETTER
FEBRUARY - 2018

EED 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 Engineering Division (EED) 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. EED Members are encouraged to forward materials on Environmental Engineering topics for review by the Newsletter Editorial Staff. EED Newsletter Readers are urged to forward comments on materials that appear in its content.

The EED Newsletter will feature presentations in **NINE** Sections:

1. ENVIRONMENTAL TECHNOLOGIES
2. ENVIRONMENTAL REGULATIONS
3. EDITORIAL BOARD SELECTIONS
4. CHAIRMAN/DIVISION NEWS
5. NEWSLETTER READER COMMENTS
6. NEWSLETTER EDITORIAL BOARD
7. NEWSLETTER REFERENCES - TECH
8. NEWSLETTER REFERENCES – REGS
9. EDITORIAL BOARD SELECTION REFERENCES

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

1. ENVIRONMENTAL TECHNOLOGIES

1. POWER GENERATION AT ROOM TEMPERATURE - 1

Recently, researchers at Osaka University, in collaboration with Hitachi, Ltd., developed a new Thermo-Electric (TE) material with an improved power factor at room temperature. They combined silicon with ytterbium, to create ytterbium silicide [YbSi₂]. Heat conduction in the compound is suppressed by controlling the structure in nano-scale. The result is an encouragingly high power factor of 2.2 mWm⁻¹K⁻² at room temperature. This is competitive with conventional TE materials based on bismuth telluride. (Ref 1)



1. ENVIRONMENTAL TECHNOLOGIES

2. MACHINE READABLE ROAD SIGNS

In the world of Intelligent Transportation Systems (ITS), drivers currently find out information about the road ahead through Variable Message Signs (VMS) or their smartphones. Recent testing by the Texas A&M Transportation Institute (TTI) has demonstrated an innovative technology that could enhance everyday traffic signs and deliver valuable information to road users.

The TTI research team demonstrated several roadway scenarios that involved machine-readable codes embedded into traffic signs that were invisible to a human driver. The road signs did not look any different from present models as they were optimized for human vision. However they had an invisible layer of information that vehicle-borne machines could read.

The effort coincided with the execution of a new research master agreement between the 3M company and Texas A&M University focused on developing and testing new highway infrastructure to support advanced vehicle technologies that will enable connected vehicles and autonomous driving. The TTI effort readily demonstrated an accident prevention scenario involving an “incapacitated driver.” A SMART Sign indicated to a Vehicle READ System that the driver was going the wrong way. The Vehicle READ System then initiated corrective activities such as automatic vehicle breaking and the initiation of a 911 call.

As this escapade indicates, for highways of the future, there are many significant capabilities to exploit from the incorporation of SMART SIGNS on the nation’s roads and by-ways. (Ref 2)



1. ENVIRONMENTAL TECHNOLOGIES

. MIT CLEAN WATER TECHNOLOGY

When it comes to removing very dilute concentrations of pollutants from water, existing separation methods tend to be energy intensive. Now, a new method developed at MIT could provide a selective alternative for removing even extremely low levels of unwanted compounds. Current systems for dealing with such dilute contaminants include membrane filtration that is expensive and has limited effectiveness at low concentrations. Other systems include electro-dialysis and capacitive deionization, which often require high voltages and tend to produce side reactions.

In the new system, the water flows between chemically treated, or “functionalized,” surfaces that serve as positive and negative electrodes. These electrode surfaces are coated with Faradaic materials, which can undergo reactions to become positively or negatively charged. These active groups can be tuned to bind strongly with a specific type of pollutant molecule. The researchers found that this process can remove such molecules even at parts-per-million concentrations. The system is inherently highly selective, but in practice it would be designed with multiple stages to deal with a variety of compounds. Such systems would be useful for water purification systems for remote areas in the developing world, where pollution from pesticides, dyes, and other chemicals are often an issue in the water supply. The highly efficient, electrically operated system could run on power from solar panels in rural areas.

The research team involved in the development included MIT and the Technical University of Darmstadt. The work was supported by a seed grant from the Abdul Latif Jameel World Water and Food Security Lab (J-WAFS) at MIT. (Ref 3)



1. ENVIRONMENTAL TECHNOLOGIES

CATALYST TURNS NITRATES INTO WATER AND AIR

In collaboration with chemical engineering colleagues at Purdue University and the University of Houston, a Rice University team at the Nanotechnology Enabled Water Treatment (NEWT) Center has found a catalyst that cleans toxic nitrates from drinking water by converting them into air and water. The team found that the indium speeds up the breakdown of nitrates while palladium apparently keeps the indium from being permanently oxidized.

From in-situ studies, they found that exposing the catalysts to solutions containing nitrate caused the indium to become oxidized. But when they added hydrogen-saturated water, the palladium prompted some of that oxygen to bond with the hydrogen and form water, and that resulted in the indium remaining in a reduced state where it's free to break apart more nitrates. The team is now working with industrial partners to turn the process into a commercially viable system for global application.

NEWT is a multi-institutional engineering research center based at Rice that was established by the National Science Foundation in 2015 to develop compact, mobile, off-grid water-treatment systems that can provide clean water to millions of people and make U.S. energy production more sustainable and cost-effective.

NEWTs is expected to leverage more than \$40 million in federal and industrial support by 2025 and is focused on applications for humanitarian emergency response, rural water systems and wastewater treatment and reuse at remote sites - including both onshore and offshore drilling platforms for oil and gas exploration at global sights on the world's oceans, waterways and coastal zones. (Ref 4)



1. ENVIRONMENTAL TECHNOLOGIES

WORLD IS RUNNING OUT OF SAND?

According to a 2014 UN report, sand and gravel – which have surpassed fossil fuels and biomass to become the world’s most extracted materials - are now being extracted at a rate far greater than their renewal. Sand and gravel are the main commodities used for human activities everywhere: roads, dams, buildings, airports and land reclamation.

Asian countries have been some of the main contributors to sand scarcity as development booms. Beijing’s urban growth quadrupled from 1999 to 2009, while New Delhi tripled its population in 25-years. Singapore increased its territory through land reclamation by 25 per cent over the past 200 years. More than 70 per cent of total sand mined for construction in 2014 was used in Asia, mainly in China, according to the market-research firm Freedonia Group. The amount of concrete used by China in the last 4 years is equal to the quantity used by the USA in 100 years.

The shortage is also driving illegal sand extraction in the region, which can compromise the quality of the materials used in construction and the stability of the structures built with such materials. In India, when there is an acute shortage sand is extracted from seasonal riverbeds. That high-moisture sand typically has very high silt content and this could lead to the detriment of the strength of the concrete that is made from that riverbed sand.

The world will face an environmental] impact from sand extraction depending on where the sand is being extracted. In China, sand extraction has caused a dramatic decline in the water levels of Poyang Lake - the country’s largest

freshwater lake. In Cambodia, sand extraction in Koh Kong province has displaced fishing stocks – leading to a massive decrease in the crab populations. (Ref 5)

1. ENVIRONMENTAL TECHNOLOGIES

ANOTHER NEW CATALYST TURNS CO₂ INTO PLASTIC

Scientists at the University of Toronto in Canada have created a catalyst that can efficiently convert carbon dioxide to ethylene, which is used to produce plastic. At the heart of this work is the carbon dioxide reduction reaction in which CO₂ is converted into other chemicals through the use of an electrical current and a chemical reaction, aided by a catalyst. However, controlling the interaction of copper with various materials is difficult. The Toronto team was able to design a catalyst and pinpoint the ideal conditions to maximize ethylene production while minimizing methane output. Paired with carbon capture technology, their technique could lead to an incredibly green production mechanism for plastics. (Ref 6)

NEW RECHARGEABLE BATTERIES

A type of battery first invented nearly five decades ago could catapult to the forefront of energy storage technologies, thanks to a new finding by researchers at MIT. The battery - based on electrodes made of sodium and nickel chloride and using a new type of metal mesh membrane - could be used for grid-scale installations to make intermittent power sources such as wind and solar capable of delivering reliable base load electricity. After experimenting with various compounds, the team found that an ordinary steel mesh coated with a solution of titanium nitride could perform all the functions of the previously used ceramic membranes - but without their brittleness and fragility. Their strong point is in large, fixed installations where cost is paramount, but size and weight are not, such as utility-scale load leveling. In those applications, inexpensive battery technology could potentially enable a much greater percentage of intermittent



renewable energy sources to take the place of base load power sources, which are now dominated by fossil fuels. (Ref 7)

1. ENVIRONMENTAL TECHNOLOGIES

BIG DATA = SMART CITIES

The world is experiencing a data-driven revolution. There are over 3.8 billion Internet users in the world and global data storage is expected to grow to 40 trillion gigabytes by 2020. In the future, about 1.7 megabytes of new information will be created every second for every person alive, and there will be over 50 billion smart connected devices globally within five years, geared to collect, analyze and share data. Big data-driven innovations can also improve the quality of life.

Take [traffic congestion](#): some mobile app developers have devised an idea to crowd source drivers' information over mobile networks, to provide road users with a real-time navigation service and traffic guide. Though widely adopted in many countries, the service has a serious limitation – the data mainly depends on the number of service subscribers, and thus cannot be comprehensive.

If the government can facilitate the opening up and sharing of big data on traffic, data from public transport companies and government road sensors would be useful sources of information. Together with drivers' input, this can form a complete traffic picture. The strategic move would be to set up Common Spatial Data Infrastructure (CSDI) to provide information to government departments, as well as to public and private organizations.

Data sharing can support better decision-making and realize greater efficiency, as proven by the Los Angeles CSDI portal, GeoHub. China is planning a nationwide information-sharing platform with e-government and smart city systems. Big



data management will become a key driver for future sustainability. In Hong Kong, the strategic CSDI is intended to be available by 2023. (Ref 8)

1. ENVIRONMENTAL TECHNOLOGIES

CHINA PLANS TECHNOLOGY LEADERSHIP

China has unveiled a three-year plan to increase the country's economic competitiveness by developing "key technologies" in nine industrial sectors, from robotics to railways. The initiatives mark Beijing's latest efforts to develop industries it deems will play a significant role in the country's economic development in the future. Among the plans published by the National Development and Reform Commission is one to develop magnetic levitation trains able to travel at up to 600km/h by 2020. Other areas include smart cars, robotics, advanced shipbuilding and maritime equipment, modern agricultural machinery, advanced medical devices and drugs, new materials, smart manufacturing and machine tools. The aim is "To Make China a Powerful Manufacturing Country" and to upgrade the nation's industrial power through "the Internet, Big Data and Artificial Intelligence". (Ref 9)

INTERNATIONAL FINANCE INVESTS IN SOLAR

Oxford Photovoltaics of Germany has received \$US17.8 million in financing from the European Investment Bank (EIB) to support commercialization of its perovskite on silicon tandem solar cell technology. EIB also put in place US\$350 million in financing to support solar projects in India and Peru. The investment bank joined YES BANK - a private sector bank in India - in a US\$400 million initiative, pledging US\$200 million for solar projects already identified in the states of Rajasthan, Telangana, Maharashtra and Karnataka.

In Peru, EIB will also provide US\$150 million in financing to the Enel Group subsidiary - Enel Green Power Peru - for two renewable energy generation plants,



ENVIRONMENTAL ENGINEERING
DIVISION NEWSLETTER
FEBRUARY - 2018

including a new solar power plant being built in the Moquegua region, close to the Chilean border. (Ref 10)

2. ENVIRONMENTAL REGULATIONS

CLEANER AIR, LONGER LIVES

The air we breathe contains particulate matter from a range of natural and human-related sources. Particulate matter is responsible for thousands of premature deaths in the United States each year, but legislation from the US Environmental Protection Agency (EPA) is credited with significantly decreasing this number, as well as the amount of particulate matter in the atmosphere. However, the EPA may not be getting the full credit they deserve. New research from the MIT Department of Civil and Environmental Engineering (CEE) proposes that the EPA's legislation may have saved even more lives than initially reported.

Using data from the Interagency Monitoring of Protected Visual Environments (IMPROVE) network, the researchers found that organic aerosol decreased across the entire country in the winter and summer seasons. This decline in organic aerosol is surprising, especially when considering the increase in wildfires. But the researchers found that despite the wildfires, organic aerosols continue to decline.

The researchers also used information from the NASA Modern-Era Retrospective Analysis to analyze the impact of other natural influences on organic aerosol, such as precipitation and temperature, and found that the decline would be occurring despite cloud cover, rain, and temperature changes. The changes in organic aerosol emissions are likely to be indirectly driven by controls by the EPA on different species, like black carbon from fuel burning and nitrogen dioxide from



vehicles. The research was funded, in part, by the National Science Foundation, the National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration. (Ref 1)

2. ENVIRONMENTAL REGULATIONS

CA UTILITIES look TO MEET RENEWABLE POWER GENERATION GOAL

A new report from the California Public Utilities Commission (CPUC) has concluded that the state's major utilities will likely meet the 2030 target of 50% by 2020. California is well-known as a world leader in clean energy technology deployment, but the CPUC annual Renewables Portfolio Standard (RPS) report for 2017 shows that state utilities are well ahead of the RPS targets — specifically, to source 33% of retail sales per year from renewable energy sources by 2020 and 50% by 2030.

As can be seen below, California's investor-owned utilities have already surpassed their interim targets and, according to the CPUC, "have sufficient resources under development to exceed the 33% by 2020 RPS requirement."

- Pacific Gas and Electric Company: 32.9%
- Southern California Edison: 28.2%
- San Diego Gas & Electric: 43.2%

On top of the fast pace of renewable energy deployment, California's RPS program has similarly helped reduce the cost of renewable electricity. The price of utility solar contracts between 2008 and 2016 fell by 77%, while the price of wind contracts between 2007 and 2015 fell by 47%.



ENVIRONMENTAL ENGINEERING
DIVISION NEWSLETTER
FEBRUARY - 2018

The CPUC further predicts that, on aggregate, California's utilities will meet 2030 RPS requirements of 50% by 2020! (Ref 2)

2. ENVIRONMENTAL REGULATIONS

FCC APPROVED WIRELESS CHARGER

On December 26, 2017, the Federal Communications Commission (FCC) approved a power-at-a-distance wireless charging certification to a device called the WattUp Mid-Field transmitter. Developed by the San Jose-based startup Energous, the device uses radio frequencies to charge mobile devices at a distance of up to 3 feet.

The transmitter converts electricity to radio frequencies that are then beamed into devices that have a corresponding receiver. Energous is the first company to have their technology officially approved by the FCC. The WattUp transmitter can also simultaneously charge several devices — phones, tablets, keyboards, — at the same time, provided that they're paired with compatible receivers. Further, the WattUp ecosystem allows it to work even if the device and the transmitter manufacturers are different entities. (Ref 3)

ALASKAN MICROGRIDS

Unlike the Lower 48, Alaskan terrain makes it difficult and cost prohibitive to establish a large-scale electrical grid. Instead, micro-grids provide permanent, self-sufficient islands of electricity that can produce up to 2 MW of electricity for each of more than 200 communities and generate more than 2 million hours of operating experience annually.

Reducing energy costs is the driving factor for implementing renewable energy in the remote grids. Many Alaskan communities are motivated to find local energy solutions to reduce the cost of shipping expensive diesel fuel to power their micro-grids. Even above the Arctic Circle, where the region is cloaked in darkness for a portion of the year, communities harness seasonal renewable resources by



switching between solar power during summer months and wind power during the winter months. In the past decade, Alaska has invested over \$250 million to develop renewable energy plants to power municipal micro-grid systems. (Ref 4)

3. EDITORIAL BOARD SELECTIONS

TESLA BATTERY OPERATIONS IN AUSTRALIA

Less than a month after Tesla Inc. unveiled a new backup power system in South Australia, the world's largest lithium-ion battery is already being put to the test. It appears to be far exceeding expectations. In three weeks alone, the Power Reserve has smoothed out at least two major energy outages, responding even more quickly than the coal-fired backups that were supposed to provide emergency power. Tesla's battery last week kicked in just 0.14 seconds after one of Australia's biggest plants, the Loy Yang facility in the neighboring state of Victoria, suffered a sudden, unexplained drop in output. State officials have called the response time "a record."

The effectiveness of Tesla's battery is being closely watched in a region that is in the grips of an energy crisis. The price of electricity is soaring in Australia, particularly in the state of South Australia, where a 2016 outage led 1.7 million residents to lose power in a blackout. Storms and heat waves have caused additional outages, and many Australians are bracing for more with the onset of summer. Fed by wind turbines at a nearby wind farm, the battery stores excess energy that is produced when the demand for electricity isn't peaking. The Tesla battery reserve has shown that it can provide "contingency" service — keeping the grid stable in a crisis and easing what otherwise would be a significant power failure. More importantly, the project is the biggest proof of concept yet that batteries such as Tesla's can help mitigate one of renewable energy's most persistent problems: how to use it when the sun isn't shining or the wind isn't blowing. (Ref 1)



ENVIRONMENTAL ENGINEERING
DIVISION NEWSLETTER
FEBRUARY - 2018

(CONTRIBUTED BY DR. JAMES ZUCCHETTO, EED NEWSLETTER ASSOCIATE ED)

4. CHAIRMAN/DIVISION NEWS

PLEASE REVIEW THE MATERIALS THAT APPEAR IN THE FINAL PAGES OF THE PRESENT NEWSLETTER CONCERNING THE ENVIRONMENTAL ENGINEERING EDUCATION SUPPORT PROGRAM. THIS PROGRAM WILL FUND A MAXIMUM OF \$25,000 PER YEAR. NO MORE THAN FIVE PROPOSALS WILL BE FUNDED WITH A LIMIT OF \$5,000 PER AWARD TO STUDENTS, EDUCATORS AND EED MEMBERS WHO PROPOSE INTERESTING WAYS TO IMPACT ENVIRONMENTAL EDUCATION IN THEIR COMMUNITIES.

[PROPOSAL DUE DATE: FEBRUARY 15, 2018](#)

5. EED NEWSLETTER READER COMMENTS

YOU ARE ENCOURAGED TO FORWARD YOUR COMMENTS ON THE TOPICS AND DISCUSSIONS PRESENTED IN THE EED NEWSLETTER. PLEASE FORWARD YOUR COMMENTS BY EMAIL TO ANY MEMBER OF THE EED NEWSLETTER EDITORIAL BOARD. THEIR EMAIL ADDRESSES APPEAR IN THE SECTION BELOW

6. EED NEWSLETTER EDITORIAL BOARD

EDITOR: DR. THOMAS HOULIHAN – USA (tmhoulihan@aol.com)

ASSOCIATE EDITORS:

DR. K. J. SREEKANTH – KUWAIT (sreekanthkj@kisir.edu.kw)



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

DR. JAMES ZUCCHETTO – USA (jimzuc@comcast.net)

7. NEWSLETTER REFERENCES - TECHNOLOGIES

1. <https://www.sciencedaily.com/releases/2017/12/171226154043.htm>
2. <http://www.trafficechnologytoday.com/news.php?NewsID=88924>
3. <http://news.mit.edu/2017/electrochemical-clear-pollutants-water-0510>
4. <https://www.sciencedaily.com/releases/2018/01/180104160819.htm>
5. <http://www.scmp.com/week-asia/society/article/2126207/world-running-out-resource-and-its-not-oil>
6. <http://zeenews.india.com/environment/new-catalyst-can-help-turn-carbon-dioxide-into-plastic-2074332.html>
7. <https://www.sciencedaily.com/releases/2018/01/180122150816.htm>
8. <http://www.scmp.com/comment/insight-opinion/article/2126132/hong-kongs-smart-city-dreams-can-move-faster-big-data>
9. <http://www.scmp.com/news/china/economy/article/2125765/chinas-latest-plans-dominate-robot-smart-car-and-railway>
10. http://www.renewableenergyworld.com/articles/2017/12/finance-institutions-are-making-a-massive-investment-in-solar.html?cmpid=enl_rew_solar_energy_news_2017-12-26&email_address=tmhoulihan@aol.com&eid=403565777&bid=1957982%205.%20FCC%20APPROVED%20CHARGER

8. NEWSLETTER REFERENCES - REGULATIONS

1. <https://www.sciencedaily.com/releases/2017/12/171226105042.htm>
2. <https://cleantechnica.com/2017/11/21/california-meet-2030-renewable-energy-targets-2020/>
3. <https://futurism.com/fcc-approved-world-first-wireless-charger/>
4. <https://www.sciencedaily.com/releases/2017/12/171222092734.htm>



9. EDITORIAL BOARD SELECTION REFERENCES

1. <http://www.latimes.com/business/la-fi-tesla-battery-australia-20171226-story.html>

NOTE: IN ORDER TO VIEW THE REFERENCES LISTED ABOVE, IT IS NECESSARY TO SWIPE OVER THE REFERENCE TEXT ON YOUR SCREEN – THEN COPY THE REFERENCE TEXT – AND THEN ENTER THE TEXT COPY INTO A WEB ADDRESS AREA ON A SECOND WINDOW SCREEN TO VIEW THE REFERENCE MATERIAL.

DISCLAIMER

Disclaimer: This Newsletter may contain articles that offer differing points or views regarding energy and environmental engineering issues. Any opinions expressed in this publication are the responsibility of the Editor, Editorial Board and the Environmental Engineering Division and do not represent the positions of the American Society of Mechanical Engineers (ASME).



DIVISION NEWS – SPECIAL ANNOUNCEMENT

ASME Enhances Environmental Impact Through EED Education Support Program

PROPOSAL DUE DATE: FEBRUARY 15, 2018

Environmental engineers use the principles of engineering, soil science, biology, and chemistry to make the air, water and land better and safer for humans. To engage students and educators in this discipline, and foster the impact of environmental engineering education in communities around the world, the **ASME Environmental Engineering Division (EED) Announces the 2018 Environmental Engineering Education Support Program.** This program will fund a maximum of \$25,000 per year. No more than five proposals will be funded with a limit of \$5,000 per award to students, educators and EED members who propose interesting ways to impact environmental education in their communities. **Based upon judgment of final reports, at least one proposer will be invited to discuss their project at the annual EED meeting. All travel expenses will be provided.**

Examples of Environmental Engineering Education Support Program Proposals

- **Funding an EED Member Paired with a Local Educator to Develop a Curriculum Unit Over a Summer that can be Put Into Practice the Following School Year. EED Members will Share Units that are Successful with Other Educators.**
- Funding support for a non-ASME member educator (Primary and/or Secondary School Teacher) to Attend an ASME Sponsored Environmental Event (e.g., Conference, Training/Certification Program, Workshop, etc.) in Support of Curriculum Development.
- Funding of a Project Based on Environmental Engineering and Mechanical Engineering Principles that Appears Promising for Enhancing Environmental Education.
- Funding Support for a College, or a Graduate Student to Attend an ASME Sponsored Environmental Event (e.g., Conference, Training/Certification Program, Workshop, etc.).



DIVISION NEWS – SPECIAL ANNOUNCEMENT

ASME Enhances Environmental Impact Through EED Education Support Program

This will be the THIRD YEAR that EED has funded an Education Support Program.

Projects supported in the first two years of the program were:

- *“Wind Energy Student Organization;”* Iowa State University (ISU)
- *“Lab Component for Sustainability Course,”* Philadelphia University
- *“Using Interactive iPython Simulations to Model Life Cycle Analysis of Ethanol Production,”* Marshalltown High School (Iowa), ISU
- *“High School Student Laboratory Education Module: Use of Abundant Waste Materials in Concrete Mix Design,”* University of Akron
- *“Education of Rural Community Members and Leaders About the Health Effects, Current State, and Minimizing of Particulate Matter Exposure in Rural Households that Use Biomass for Cooking,”* FEU Institute of Technology, Manila, Philippines
- *“Experimental Design: Development of a High School Environmental Research Program,”* Hope College, Holland, MI.
- *“Water for Life: A Project-Based Approach to the 7th Grade Classroom,”* Mission Achievement & Success Charter School, Albuquerque, NM
- *“Citizen Science: Effects of Stream Restoration on Water Quality,”* George Mason High School, Falls Church, VA
- *“Designing a Sustainability Makerspace,”* Rose-Hulman Institute of Technology, Terre Haute, IN.

PROPOSALS - INCLUDING A BUDGET - MAX 5 PAGES - MUST BE
SUBMITTED ELECTRONICALLY BY 15 FEB 2018 TO:

edelsonm2@asme.org

PROJECTS THAT PAIR AN EED MEMBER WITH AN EDUCATOR WILL RECEIVE THE HIGHEST PRIORITY. EXPECTATION IS THAT THE MAJOR SHARE OF FUNDING WOULD SUPPORT EFFORTS OF THE EDUCATOR.



ENVIRONMENTAL ENGINEERING

DIVISION NEWSLETTER

FEBRUARY - 2018