



ENVIRONMENTAL ENGINEERING DIVISION NEWSLETTER

MAY - 2017

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 **Seven** Sections:

1. ENVIRONMENTAL TECHNOLOGIES
2. ENVIRONMENTAL REGULATIONS
3. EDITORIAL BOARD SELECTIONS
4. EED CHAIRMAN/DIVISION NEWS
5. NEWSLETTER READER COMMENTS
6. EDITORIAL BOARD MEMBERS
7. NEWSLETTER ARTICLE 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

US TO ADD 7 BILLION CUBIC FEET (BCF) /DAY OF LIQUIFIED NATURAL GAS (LNG) EXPORT CAPACITY

Cheniere Energy and its engineering and procurement firm partner Bechtel completed the first three trains of the Sabine Pass Liquefaction project in Cameron Parish, Louisiana in May and September 2016, and in March 2017. The U.S. began exporting LNG when Cheniere brought these first three trains online. There are six approved LNG projects in the U.S. currently under construction. Once completed, these projects will add another 7 Bcf/Day of LNG export capacity. The six projects under construction amount to \$51 billion in total investments. (Ref.1)



1. ENVIRONMENTAL TECHNOLOGIES

US GAS USERS WARN OF LNG EXPORT IMPACT

Rising Gulf Coast LNG export capacity is opening up new trading opportunities and creating greater contract flexibility. U.S. LNG will soon pass Qatar as the largest source of flexible-LNG supply that can quickly respond to global market prices, according to S&P Global Platts. Rising LNG exports are having a growing influence on U.S. domestic natural gas prices and the Energy Information Agency (EIA) predicts gas prices will rise significantly in the coming years. Fears of domestic gas price rises have prompted industrial energy consumers to oppose what they see as excessive growth in LNG export capacity. In a letter to Energy Secretary Rick Perry on 13 April 17, the Industrial Energy Consumers of America (IECA) warned that rising LNG exports will destroy manufacturing jobs. (Ref. 2)

A NEW BATTERY DESIGN

In partnership with ThyssenKrupp System Engineering and IAV Automotive Engineering, the Fraunhofer Institute for Ceramic Technologies and Systems IKTS in Dresden is developing EMBATT - a new type of battery that would free up space to provide extra electricity storage capacity. EMBATT takes its cue from another electrical power source - the fuel cell. Fuel cells work by combining oxygen with a gas, like hydrogen or methane, across a permeable membrane, to generate electricity. One key component of such cells is what is called a bipolar plate. This plate covers both sides of the cell and has a number of functions, but its main purpose is to act as the electrodes to collect the electricity produced by the cell with one plate acting as the anode and the other as the cathode.

The EMBATT design replaced the housings and individual connectors in battery packs with similar plates. Instead of setting the battery cells next to each other, they are stacked directly one on top of the other over a large area and covered by plates, which carry the current across their surfaces. This simplified design greatly reduces resistance - making more electricity available more quickly. The upshot of this new design is that electric cars could carry bigger batteries that do not take up large spaces or add weight to the cars while giving the vehicles a range of 1,000 km (621 mi) in the medium term. (Ref. 3)



1. ENVIRONMENTAL TECHNOLOGIES

A LONG-RANGE ELECTRIC BUS

A number of autonomous bus trials have rolled into action over the last year or so, but a new one kicking off in the US this week is a little different, and not just because it involves an electric bus capable of clocking 600 miles (966 km) on a single charge. US company Proterra has gotten Nevada state authorities onboard for trials designed specifically to explore autonomous mass-transit systems by placing its long-range electric buses on the streets of Reno.

For the latest trial, Proterra has teamed up with the University of Reno to coordinate testing of mobility technologies across the city. Other partners include the Nevada Department of Motor Vehicles and the Nevada Governor's Office for Economic Development. The team will be putting new robotic perception algorithms to the test while the endeavor will also look at how to best predict traffic flow and ways to improve safety. It will play out over three main phases. The first phase will focus on data collection and deploying Proterra's electric bus along specific city routes. The second phase will focus on developing algorithms and communications, and the third will work on licensing and commercialization. (Ref. 4)

TITANIUM TURNS CO₂ INTO SOLAR FUEL

An ability to convert carbon dioxide into energy using only the power of the sun, as plants do through photosynthesis, would be a monumental breakthrough in green energy research. More and more we are seeing promising strides in this area, the latest of which is the work of scientists at the University of Central Florida (UCF), who have come up with synthetic material that turns visible light from the sun into solar fuels while sucking harmful CO₂ out of the air.

The UCF photo-reactor resembles a tanning bed. By feeding measured amounts of carbon dioxide into the bed, the team was able to see if the material within kicked off the chemical process. It did - breaking the CO₂ into two reduced forms of carbon. The work is a definite breakthrough. Tailoring materials that will absorb a specific color of light is very difficult from the scientific point of view. From the societal point of view, the research is contributing to the development of a technology that can significantly reduce greenhouse gas emissions. (Ref. 5)



1. ENVIRONMENTAL TECHNOLOGIES

AUTONOMOUS ROBO-BUILDER THAT DESIGNS AND PRINTS HOMES

An MIT team has successfully demonstrated a 3D printing robot that rolls around on tank-style tracks at the construction site. While it's currently capable of building a simple, 50-foot diameter insulated concrete dome structure in less than 14 hours, the team has some pretty amazing ideas for its future. Powered by solar panels, the team envisions the robot as a machine that can be sent out to a remote area, where it will assess the landscape, then clear and prepare a building surface. Using what it's learned about the available space, the machine will come up with its own design for a structure tailored to that specific spot. For example, if one side of a planned building is exposed to high winds, a curved wall design would improve strength. Windows and insulation can be placed for optimal thermal efficiency. The robot will then harvest building materials from the local environment and finally build the structure.

The MIT team's vision is for "something totally autonomous, that you could send to the Moon or Mars or Antarctica, and it would just go out and make these buildings for years." The current prototype is simply able to tow its own supply of insulating foam and concrete about, spray a foam mold down and fill it with concrete, thus building the underlying structure of the dome, as well as more complex shapes like built-in benches. The foam shell can be left in place as insulation, with interior and exterior finish materials applied to the outside of it. (Ref 6)

A COAL-TO-ETHANOL PLANT

China has successfully brought on stream the world's first demonstration plant that converts coal to ethanol. Located at the Shaanxi Yanchang Petroleum site in China's Shaanxi province, the plant uses process technology that was jointly developed by the Chinese Academy of Sciences, Dalian Institute of Chemical Physics in Liaoning province and the Shaanxi Yanchang Petroleum Company. The new technology uses coal-based syngas as raw material, as well as a non-precious-metal catalyst, to produce anhydrous ethanol. The plant has the capacity to produce more than 100,000 metric tons of ethanol per year. China produces 7M Tons/Yr of ethanol, but that does not satisfy the country's industrial and energy needs. China plans to build a plant that can produce 1M Tons/Yr by 2020. (Ref 7)

1. ENVIRONMENTAL TECHNOLOGIES

UPS HYDROGEN FUEL CELL TRUCK

A new fuel cell truck is being developed in partnership with the U.S. Department of Energy and Unique Electric Solutions LLC, along with the Center for Transportation and the Environment at the University of Texas. The prototype is expected to hit the streets of Sacramento, California, later this year in the form of a Class 6 medium-duty delivery truck. UPS is calling this a first-of-its kind test because the fuel cell EV will be used in both short-haul and long-haul environments, and it will be expected to meet — or beat — the performance of conventional UPS trucks. The UPS trucks are equipped with a 32- kilowatt fuel cell coupled to 45 kilowatt-hours of battery storage and 10 kilograms of hydrogen fuel. California was chosen for the test site because it is actively promoting fuel cell EV deployment by developing a network of hydrogen fuel cell stations. (Ref 8)

DEEPPFRAC - A DEEP-WATER FRACKING TOOL

The Houston oil field services firm Baker Hughes has built a new hydraulic fracturing device called DEEPPFRAC for deep-water drilling that could save offshore operators hundreds of millions of dollars. Hydraulic fracturing is a laborious, multi-stage process. DEEPPFRAC eliminates many of those steps. It uses sleeves that can be set in multiple positions and balls that control the flow of oil and fracking liquids. It also eliminates the casing and cementing operations. Baker Hughes said the device will provide “unprecedented efficiency gains.” (Ref 9)

BP FINDS OIL IN GULF OF MEXICO USING SUBSEA IMAGING

British oil major BP has discovered 200 million barrels of oil in the Gulf of Mexico, thanks to a technological breakthrough allowing the company to see beneath geological formations that had befuddled oil exploration for decades. The find is worth a potential \$2 billion in recoverable oil. Long obscured by a salt dome, which distorts seismic waves that oil companies use to map features below the surface, the oil reserves were revealed by using a supercomputer and mathematical algorithms to interpret the seismic data in a new way. BP's imaging advance could save drillers hundreds of millions of dollars in false starts and dry wells, and perhaps more importantly, prevent them from passing up billions of dollars in oil reserves hidden within reach of existing platforms and pipelines. (Ref 10)



1. ENVIRONMENTAL TECHNOLOGIES

NANOSTRUCTURED CONCRETE INCREASES LOAD-CARRYING CAPABILITY

Scientists at the Peter the Great Saint-Petersburg Polytechnic University (SPbPU) have created a new construction technique comprised of several types of building blocks based on nanostructured high-strength, lightweight concrete. The concrete is capable of increasing the load-carrying capability by more than 200 percent and decreases the specific density of the construction by 80 percent. Other advantages to the concrete include resistance to corrosion and excessive frost resistance. (Ref 11)

RENEWABLE-ENERGY BUOY MAKES WAVES AT OTC

Somewhere off the coast of Japan, a 40-foot buoy is bobbing and weaving in the ocean, dancing with the waves to generate its own electricity. As it slowly gyrates, a floating platform heaves up and down the tall stalk of the buoy, rotating an internal power generator that can feed up to 150 kilowatt-hours of electric power into a large battery, which can charge an autonomous underwater vehicle like a Tesla charging station refuels a car. The U.S. Navy funded the first iteration of the buoy in 2009. The idea was that the radar and sonar sensors would collect data off the coast of New Jersey and send it to onshore stations. In theory, it could spot things like narcotics-filled vessels that typically travel from South America. Now, the developer of the buoy – Ocean Power Technologies - is trying to commercialize the technology. The buoy could, for example, power subsea oil and gas equipment for three years without requiring any maintenance, or recharge AUVs — essentially, underwater drones — that monitor deep-sea drilling operations. (Ref 12)

AN ULTRASONIC CLOTHES DRYER

Scientists at Oak Ridge National Laboratory (ORNL) have developed an ultrasonic dryer that uses transducers instead of heat to dry clothes. The piezoelectric transducers expand and contract - vibrating to remove water from clothes. In 2015, Ayyoub Momen, a staff scientist at Oak Ridge, had created a very small prototype. Now, thanks to its partnerships with the U.S. Department of Energy and General Electric, ORNL has produced a full-scale prototype. If the final product manages to be as efficient as the prototype, the energy savings could be substantial. Right now, Americans spend almost \$9B a year drying clothes in appliances - 4% of the residential energy use in the U.S. This dryer technology has the potential to save nearly 1% of the overall energy consumption of the United States. (Ref 13)



1. ENVIRONMENTAL TECHNOLOGIES

AIRBORNE BIOFUELS

A new study led by NASA and involving agencies from Germany and Canada, shows that using biofuels to help power jet engines reduces particle emissions in their exhaust by as much as 50 to 70 percent. The tests involved flying NASA's workhorse DC-8 as high as 40,000 feet while its four engines burned a 50-50 blend of aviation fuel and a renewable alternative fuel of hydro processed esters and fatty acids produced from camelina plant oil.

A trio of research aircraft took turns flying behind the DC-8 at distances ranging from 300 feet to more than 20 miles to take measurements on emissions and to study contrail formation as the different fuels were burned. Researchers plan on continuing these studies to understand and demonstrate the potential benefits of replacing current fuels in aircraft with biofuels. It is a NASA goal to demonstrate biofuels on their proposed supersonic X-plane. (Ref. 14)

SAFER BATTERIES

Researchers at the U.S. Naval Research Laboratory's (NRL) Chemistry Division have developed a safer alternative to fire-prone lithium-ion batteries, which were recently banned for some applications on Navy ships and other military platforms. They have demonstrated a breakthrough for nickel-zinc (Ni-Zn) batteries in which a three-dimensional (3-D) Zn "sponge" replaces the powdered zinc anode traditionally used in battery designs. With 3-D Zn, the battery provides an energy content and a re-chargeability capacity that rival lithium-ion batteries while avoiding the safety issues that continue to plague the lithium products.

The NRL team demonstrated Ni-3-D Zn performance in three ways: by extending lifetime in single-use cells; by cycling cells more than 100 times at an energy content competitive with lithium-ion batteries; and by cycling cells more than 50,000 times in short duty-cycles with intermittent power bursts, similar to how batteries are used in some hybrid vehicles. With the benefits of re-chargeability, the 3-D Zn sponge is ready to be deployed within the entire family of Zn-based alkaline batteries across the civilian and military sectors. (Ref 15)



1. ENVIRONMENTAL TECHNOLOGIES

ALL-ELECTRIC AUTONOMOUS CONTAINER SHIP

Norwegian company Yara has teamed up with maritime technology company Kongsberg to build the world's first all-electric autonomous container ship, which is set to hit the high seas late in 2018. The most immediate benefit of the new operation comes from a major reduction in NO_x and CO₂ emissions as the company shifts its product transportation from what previously required 40,000 truck journeys a year to this new, all-electric shipping pathway. Norway is at the forefront of working through these issues with the Norwegian Maritime Authority. The Norwegian Coastal Administration last year signed an agreement designating the Trondheim fjord as the world's first test area specifically for autonomous ships. The advantages of autonomous or remote-controlled ships could be immense, with vessels redesigned for maximum efficiency by removing any need for human cabins or decks. (Ref 16)

NUCLEAR FUSION POWER

A Tokamak reactor uses magnetic fields to confine the plasma -- a hot, electrically charged gas that serves as the reactor fuel -- into the shape of a torus. The central solenoid, which consists of six giant coils stacked on top of one another, plays the starring role by both igniting and steering the plasma current. Since 2008, University of Tennessee (UT) engineering professors and students have been working to develop a technology that serves to insulate and provide structural integrity to the more than 1,000-ton central solenoid.

The key to unlocking the technology was finding the right materials -- a glass fiber and an epoxy chemical mixture that is liquid at high temperatures and turns hard when cured -- and the right process of inserting this material into all of the necessary spaces inside the central solenoid. Recently, the UT team tested the technology inside its mockup of the central solenoid conductor. During the epoxy impregnation, they were in a race against time. The higher the temperature, the lower the viscosity of the epoxy; but at the same time, the higher the temperature, the shorter the working life of the epoxy. It took two years to develop the technology, more than two days to impregnate the central solenoid mockup and multiple pairs of watchful eyes to ensure everything went according to plan. It did. This summer, the team's technology will be transferred to US ITER partner General Atomics in San Diego, which will build the central solenoid and ship it to France. (Ref. 17)



1. ENVIRONMENTAL TECHNOLOGIES

PLASTIC OIL

By 2050, plastic will outweigh fish in the oceans, according to a study presented at this year's World Economic Forum by the Ellen MacArthur Foundation. At a dump about 80 miles west of London, Adrian Griffiths is testing an invention he's confident will save the world's oceans from choking in plastic waste. His machine, about the size of a tennis court, churns all sorts of petroleum-based products -- cling wrap, polyester clothing, carpets -- back into oil. It takes less than a second and the resulting fuel, called Plaxx, can be used to make plastic again or to power ship engines. The machine uses a feedstock recycling technique developed at Warwick University to process plastic waste without the need for sorting - a major hurdle that has prevented economically viable recycling on a grand scale.

A former car assembly-line designer, Griffiths wants to mass-produce his machines, called RT7000, and then lease them. They can fit into five shipping containers, a fraction of the size of standard recycling systems. The idea is for the RT7000 to be transported to the site of the recycling, like a beach in a developing country where garbage washes up regularly and local recycling is limited. (Ref 18)

SOLAR WINDOW BLINDS

Regular window blinds already help people to save electricity – by keeping incoming sunlight from heating a room - they reduce the need to run an air conditioner. SolarGaps window blinds, however, take things a step further. Each slat is equipped with an array of mono-crystalline solar panels, which *generate* electricity via the very sunlight that they're blocking. Additionally, the blinds use a light sensor to track the sun, automatically changing the angle of the slats in order to best absorb its rays.

Invented by entrepreneur Yevgen Erik, SolarGaps are reportedly able to generate up to 100 watt-hours of energy for every square meter when mounted on the outside of a window, or up to 50 watt-hours when mounted inside. The energy that they produce can be fed into the municipal grid and sold to the local utility company, stored in a battery for later use, or it can be



1. ENVIRONMENTAL TECHNOLOGIES

used as it's being generated, for purposes such as charging electronic devices. Although the slats do automatically change their angle to track the sun, the blinds can also be manually operated via an iOS/Android app. Not only does the software allow users to open and close the blinds at will, but it also lets them set the blinds on a schedule, monitor how much energy they're producing, or even set them so that they open whenever someone enters the room with a built-in motion sensor. (Ref 19)

GROW YOUR NEXT SET OF CAR TIRES

A team of researchers from the Center for Sustainable Polymers (CSP) at the University of Minnesota, has invented a new technology to produce automobile tires from trees and grasses in a process that could shift the tire production industry toward using renewable resources found right in our own backyards. Conventional car tires are viewed as environmentally unfriendly because they are predominately made from fossil fuels. The car tires produced from biomass that includes trees and grasses would be identical to existing car tires with the same chemical makeup, color, shape, and performance.

Currently, isoprene is produced by thermally breaking apart molecules in petroleum that are similar to gasoline in a process called "cracking." The isoprene is then separated out of hundreds of products and purified. In the final step, the isoprene is reacted with itself into long chains to make a solid polymer that is the major component in car tires.

The first step of the new process is microbial fermentation of sugars, such as glucose, derived from biomass to an intermediate, called itaconic acid. In the second step, itaconic acid is reacted with hydrogen to a chemical called methyl-THF (tetrahydrofuran). This step was optimized when the research team identified a unique metal-metal combination that served as a highly efficient catalyst.

The process technology breakthrough came in the third step to dehydrate methyl-THF to isoprene. Using a catalyst recently discovered at the University of Minnesota called P-SPP (Phosphorous Self-Pillared Pentasil), the team was able to demonstrate a catalytic efficiency as high as 90 percent with most of the catalytic product being isoprene. By combining all three steps into a process, isoprene can be renewably sourced from biomass. (Ref 20)



2. ENVIRONMENTAL REGULATIONS

HIGH QUALITY SOLAR MAPS

New high quality solar maps - essential to securing financing for major solar projects - show Pakistan to be one of the world's best countries for producing solar energy because of its arid climate and latitude. Until now, the country's lack of detailed solar maps - needed by major investors, especially U.S. companies - has held back development of renewable energy. That changed in March, when Pakistan became one of the few developing countries to produce solar maps.

The solar maps were developed using data from 9 solar stations and 12 wind masts installed across the country. The data has been made public as part of the Global Solar Atlas website giving commercial scale projects ready-to-use seasonal and monthly data. This means investors do not have to spend significant time and money gathering data for their projects. Instead, they can readily acquire certified data of 'bankable' quality that should be acceptable to commercial financing institutions. (Ref 21)

FEDERAL/STATE INCENTIVES FOR SOCIAL ENTREPRENEURS

Financing tools like the US New Market Tax Credit Program can make the choice to locate in a rural area a very smart investment. The decision to site the Ehrmann Commonwealth Dairy yogurt processing plant in Vermont was driven in large part by the financing incentives offered by the federal program and a state of Vermont economic development program. Ehrmann leadership committed to return 5 percent of company net profits to the small family farmers who produce the milk for the facility. Commonwealth Dairy provided those funds to the Farm and Forest Viability Program of the Vermont Housing and Conservation Board — which, in turn, distributed them as grants to eligible farms. As of July 2016, Commonwealth Dairy awarded \$769,631 in funds and leveraged an additional \$3.4 million from other sources. These funds went to 30 different farms, 90 percent of which have herds smaller than 500. The fund has been used to reinvest throughout the value chain — for barn construction, milking equipment, and milking parlor renovations, among other uses.

Similarly, the Axio Green project brought new meaning to the term “Community Solar” in the former mill town of Greenfield, MA. Its forward-thinking leadership led to the installation of a privately run solar farm at a capped landfill on the outskirts of the town. The 2 MW facility not only supplies nearly half of the electricity for city buildings but also saves the city approximately \$175,000 in annual electricity costs which further results in reduced property taxes. (Ref 22)



2. ENVIRONMENTAL REGULATIONS

FORTUNE 500 COMPANIES SET CLIMATE CHANGE, CLEAN ENERGY TARGETS

Almost half of Fortune 500 companies (48 percent) have at least one climate change or clean energy target on the books, an increase from years past. These findings and more comprise a joint report from the World Wildlife Fund, Calvert Investments, CDP and Ceres. Both the largest and smallest Fortune 500 companies are leading the way. The Fortune 100, the largest companies in the index, continue to be the leaders: 63 percent of them have set one or more clean energy targets. Forty-four percent of the smallest 100 companies in the index have set goals in one or more categories, a 19 percent increase from 2014.

Almost two dozen Fortune 500s committed to power all of their corporate operations with 100 percent renewable energy, mainly wind and solar. Last year, only a handful of companies made such a commitment. Some of the companies pledged to 100 percent renewables are Walmart, Bank of America, Google and Facebook. (Ref 23)

BAY AREA SUBURB MANDATES SOLAR PANELS ON NEW HOMES

Fremont, a suburb of San Francisco, is making a strong move to become the regional clean energy leader by mandating solar panels on all new home and business developments as part of its goal to be a net-zero-energy city by 2020. Existing homes will be exempt, but new developments will have to take the costs of installing solar panels – the number of which will be determined by the square footage of the construction – into account.

Fremont also wants to expand the number of electric vehicle charging stations in the city. Each new single family home will have to one EV-ready parking spot, and multifamily and non-residential projects will need to include at have at least 10 percent of parking lots EV-ready. This is no accident, of course. Fremont also happens to be home of a large Tesla factory which is, as we speak, churning out far fewer electric vehicles than the market demands. Many Tesla workers live in Fremont - one of the reasons that the city already has a high EV ownership rate with the city estimated 5,000 drivers to date. (Ref 24)



3. EDITORIAL BOARD SELECTIONS

HOW SAFE ARE SELF-DRIVING CARS?

On 2 May 17, Waymo announced a bold new step in the deployment of electric automated mobility services. Hundreds of Arizonans will be accepted into a pilot program to use Waymo autonomous vehicles to go about their daily business within several areas near Phoenix. But how safe is it for people to ride in autonomous vehicles? The qualitative answer is “pretty darn safe.” Waymo has logged over two million miles on U.S. streets and has only had fault in one accident - making its cars by far the lowest at-fault rate of any driver class on the road—about **10 times lower** than our safest demographic of human drivers (60–69 year-olds) and **40 times lower** than new drivers, not to mention the obvious benefits gained from eliminating drunk drivers.

However, Waymo vehicles have a knack for getting hit by human drivers. When we look at total accidents (at fault and not), the Waymo accident rate is higher than the accident rate of most experienced drivers. Most of these accidents are fender-benders caused by humans, with no fatalities or serious injuries. The leading theory is that Waymo vehicles adhere to the letter of law - leading them to brake for things they are legally supposed to brake for (e.g., pedestrians approaching crosswalks). Since human drivers are not used to this lawful behavior, it leads to a higher rate of rear-end collisions - where the human driver is at-fault.

A 2017 study by Deloitte found that three-quarters of Americans do not trust autonomous vehicles. Perhaps this is unsurprising as trust in new technology takes time. Comparably, air flight took many years before most people lost fear of being rocketed through the stratosphere at 500 mph in a pressurized tube propelled by exploding jet fuel. But few air travelers bat an eyelash now, calmly completing crossword puzzles and productively working on wifi as if it's normal for humans to fly.

The trust in technology takes time. However, with five automobile fatalities occurring every hour, we do not have time for fear to delay autonomous vehicle deployment. While autonomous vehicles may still be in their equivalent of Drivers Ed, we must embrace this phase of autonomous vehicle deployment in order to reap the potential benefits of tens of thousands of saved lives and millions of avoided accidents. (Ref 25)

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



4. CHAIRMAN/DIVISION NEWS

EED Environmental Panel Discussion

EED will hold a panel discussion at the ASME Power Conference in Charlotte, NC on Tuesday June 25th from 11 AM to 2:30 PM. Potential discussion topics include but are not limited to:

- Status of the Clean Power Plan
- Water Conservation in Power Plants
- Emissions/Waste Reduction in Carbon Capture and Storage (CCS) Units
- Role of ASME Codes & Standards in Environmental Regulations
- Environmental Impacts/Mitigation of Renewable Energy Sources (Solar, Wind, Hydro)
- Startup/Shutdown/Malfunction (SSM) on Plant Operations and Emissions Control
- Life Cycle Analysis and Supply Chain Analysis
- Role of Research in Environmental Topics Affecting the Power Industry

The list of initial topics will be finalized just before the Conference. The panelist include: George Koperna, Adv Resources Int'l Margaret Thompson, Clemson University
Frank Princiotta, Retired – USEPA Robert Sommerlad, ASME Tom Houlihan, Moderator

Questions - Contact T. Houlihan (tmhoulihan@aol.com) or A. Feldman, (jjdsenv@att.net)

Environmental Engineering Division Open Meeting

The EED Executive Committee will hold an Open Meeting for EED members and guests at the ASME Power Conference in Charlotte, NC on Monday June 24th between 9 AM and 11 AM. You do NOT have to register at the Conference to attend and there is NO charge. Subjects to be discussed include:

Division Status - Path Forward

Dixy Lee Ray Award

Technical Subcommittees

Input/Ideas from EED members

Environmental Education Support Program

Upcoming EED Sponsored Events

EED & Section Meetings – Possible Locations

The EED Exec Committee encourages you to attend if you are in (or near) Charlotte in order to get your input to Divisions activities. If you have any thoughts or questions please contact Arnie Feldman, EED Chair (jjdsenv@att.net) or Ryan Neil, EED Vice-Chair (ryanneil84@hotmail.com)



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

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