Fort Wayne Engineers' Club

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www.FortWayneEngineersClub.org

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Event Cancellations

All FWEC events have been canceled in response to the COVID-19 crisis. We appreciate your continued support of the club and look forward to resuming events in the Fall.

Local Opportunities

Ivy Tech Seeking Engineering Technology Adjunct Faculty

Ivy Tech Engineering Technology is looking for Adjunct (part-time) faculty to teach students in a variety of courses including C/C++ Programming, CAD in Mechanical

Design, Mechanical Documentation, and Electrical Engineering Technology. Adjunct faculty assist students in reaching their goals by providing effective instruction and assessment within the framework of common syllabi provided by the school. If you're interested in teaching the future engineering workforce, reach out to Cait Cramer at ccramer15@ivytech.edu. Applicants must have a bachelor's degree in Engineering or Engineering Technology and availability at least one night a week.

Tekventure
TekVenture is closed to nonmembers due to Covid-19 restrictions. Visit their website or Facebook page for updated information.

Northeast Indiana Regional Coordinating Council
The Open House for commenting on all aspects of local pedestrian to motor vehicle planning, now and into mid-century, has been postponed from April 8 to June 3, 2020. This NIRCC (Northeast Indiana Regional Coordinating Council) is held in the Omniroom (basement) of Citizens Square from 4:00-6:00 pm. It is consistently a serious opportunity to speak with and influence the individuals actually planning and designing our overall transportation infrastructure. Questions may be directed to Rod Vargo at (260) 416-0986.

EAA Chapter 2
All EAA Chapter 2 activities have been cancelled except Young Eagles flights out of Smith Field's Historic Hangar on August 8 and September 12 from 9:00 to 11:00 am, weather permitting. Young Eagles flights are free airplane rides for ages 8-17. Arriving around 9:00 will reduce your waiting time and usually increases the odds of calm weather conditions.

Interested in hosting a tour?

Contact us at info@fortwayneengineersclub.org

FWEC Board Meetings

The FWEC board meets eight times a year to plan and organize tours for our members. These meetings are open for anyone to attend. We are always looking for new members to join our team! If you are interested in being a board member please attend our next board meeting or contact us at info@fortwayneengineersclub.org.

Next Meeting
Date: Tuesday, August 25th
Time: 7:00 pm
Location: Indiana Tech (ACC-201)

FWEC roster for FY2019-2020

President: John Magsam
Vice President: Nate Berndt
Treasurer: Ryan Stark (info@fortwayneengineersclub.org, or phone 456-0809)
Secretary: Marna Renteria
First-year Board Members: John Renie, Craig Welch
Second-year Board Member: Rob Cisz, Bert Spellman
Third-year Board Member: Dave Gordon, Morgan Miller
Editor of Engineer News: Morgan Miller
Membership and Contact Chair: Dave Schaller
Northeast Indiana DiscoverE Chair: Rob Cisz

Editorials

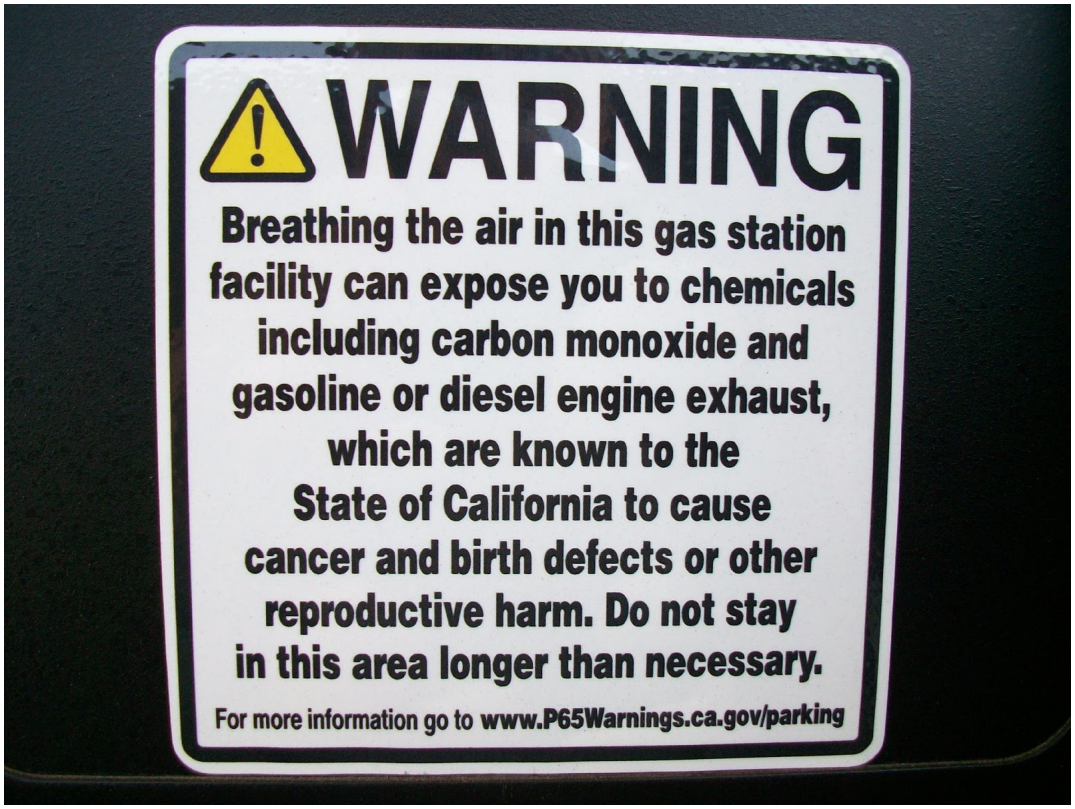
Passenger vehicle and light truck trends? In February, GM held a formal press conference to announce that an idled assembly plant near Detroit will be building, in 2021, large numbers of a fully autonomous four-passenger vehicle without steering wheel or pedals. It is branded "Cruise" with an initial model named "Orion". While the conference occurred before corona virus disruptions, it appears large numbers of

routine fully-autonomous electric vehicles may occur sooner than thought. Many news reports had been reporting significant setbacks and delays across the industry. The Orion will likely be marketed to "transform" tourist locations, dense urban areas, and perhaps airports. GM announced May 8 that the Orion will appear on the market in 2022 in order to better manage cash flow during the pandemic.

Most of the world's leading light-vehicle manufacturers seem to be saying they will be going electric fairly soon regardless of whether consumers agree. Several printed and private sources indicate a major driver of worldwide conversion to electrics is ability to maintain unit prices while eliminating 40% of workers and parts. Another factor, The Wall Street Journal reported that prices for metals in catalytic converters have been wildly erratic over the past few years, as much as 15% of total cash flow of U.S. light vehicle manufacturers.

Automotive and light truck manufacturers are also emphasizing electrics to influence or sidestep implausible regulatory quagmires regarding engine emissions. Manufacturers have been trapped for two decades by various ever-changing goals of governments nationally and internationally, costing corporations multi-billions of dollars. A front page article in the February 2, 2020, Wall Street Journal extensively details morasses that have come to a boil regarding Obama era mandates, California mandates, other states mandates or political desires, Trump administration attempts to stabilize the situations, automotive design timeframes, and miscalculations by the various players. Currently, 14 states copy California's fluctuating politics or have their own regulations, and another three governors would like to join the fray. The fourteen states are all coastal populations with either very short-distance urban driving needs or wildly long-distance daily commutes (120-160 miles/day), either of which favors small vehicles or eliminating personal vehicles entirely. There are serious proposals in New Jersey to revert sections of Interstate 80 back to railroad (such as at Paterson, NJ, and the Delaware Water Gap). The 14 states represent 40% of U.S. "auto sales" (WSJ data) but less than 10% of U.S. land area (my data). Much of the commuting is driven by huge disparities in residential property taxes, often as much as 8-fold across 60-80 miles.

The Wall Street Journal reported in late April that Ford formally discontinued its electric Lincoln SUV joint project with Rivian, scheduled to hit showrooms in the 2020-2021 model year. Rivian responded that the project is merely delayed due to corona virus. Ford's F-150 pickup model is still scheduled for 2022. The Ram 1500 pickup has had regenerative braking and acceleration assist (generator/motor on the drive shaft) since the 2019 model year.



This 1990's-era placard is on every gasoline pump in California (photo by Rod Vargo, 2019). Californians also passed a Proposition in May, 2019, for a 60 cent increase in the gas tax to go into the State's general fund. Six months later, massive anger over gas prices had forgotten they voted for it.

Beware of recent photographs depicting air quality over Los Angeles. They are being used to promote electric vehicles. The awful air pictures are the peak heat and notoriously stagnant air of July, plus zoomed in on downtown. The clear air photo's are after several fast moving wet weather fronts cleared the air during the typically gorgeous March timeframe, plus the clear air pictures are usually a more panoramic view. Admittedly, my wife fled the region due to 1960's-era smog but, more importantly, we vamoosed the State entirely due to its ever-increasing layers of politically motivated deceptions and collusions. Virtually everyone remaining that we know in California has some tie to its pension and health care promises.

A May 2-3, 2020, Wall Street Journal vignette on clearer air over San Francisco bay cited a 70% reduction in diesel-engine miles driven in the region during the pandemic.

According to ongoing news reports, the long term future of electric vehicles depends on the premise that battery materials will become less expensive with increased demand and that market forces will drive a quadrupling of mining/processing capacities for those materials. Since it is easier in most countries to get permits for mining capacity than for processing capability, development of appropriate bulk international shipping and docks have become a factor. Reports in April claim that costs are declining on raw materials

for alternative energy and suitable batteries. But, environmental opposition is increasingly transitioning from NIMBY to BANANA worldwide, typically driven by people who are already relatively affluent and are increasingly paid professional disrupters. On the other hand, indigenous governing bodies have been increasingly printing items in the Wall Street Journal which welcome development and specifically disparage well-funded outsiders trying to prevent badly needed change. Germany seems to be a model for all these factors. Its eight year-old energy policies already seem technologically dated, electric-grid-scale electrical storage of any kind is still severely uneconomic, and dependence is increasing on Russian natural gas while distribution projects stall across Eurasia for a host of political and economic reasons. Venting of natural gas (for lack of viable transport, including within the U.S.) is a measurable climate factor, which has been occurring since the 1880's even in boom times.

Worldwide, recycling capacity is half what is needed for residential and industrial wind and solar installations now coming offline. The U.S. Farm Report indicates corn to ethanol plants are simply uneconomic long term and being mothballed, perhaps abandoned, during the Covid-19 downturn despite normally consuming 40% of U.S. corn production. "We are perhaps a year away from discussing organized retirement of farm land." Another discussion is that wind turbine installations will be useful long after the turbines are retired, including high-quality gravel roads for farming and augmenting farm income through public recreation. Each wind turbine also has a massive and electrically well-grounded foundation of reinforced concrete underground.

My wife and I drove a camper van around the U.S. and Canada during 2016-2019. Our travels revealed that most everything becomes culturally and technologically outdated roughly every four years. This has been true since at least the 1830's. Entire cities and towns come and go. Harvard's School of Forestry has superb 1930's-era dioramas depicting land and cultural cycling between human and wild in the northeast. There are also major weather, disease, or volcanic disruptions at least every eight years in our lower 48 states.

Designers are increasingly getting a handle on the consequences of modern battery failures. Failures in vehicles currently result in intense and uncontrollable fires for up to 30 hours. This is a limiting factor in adequate vehicle range for safety purposes across most of North America, along with the additional battery weight as range increases. Fires have destroyed concrete bridges.

Beware of smartphones, on or off, plugged into vehicles without the engine running. Phones are somehow discharging vehicle batteries rapidly without warning. Many people have been marooned in remote places or spent months trying to identify a short circuit in their vehicle.

Almost behind the scenes, European and California regulators continue to force changes in the long-haul trucking industries, which have rapid fleet turnover rates of

about every three years. A small article on page B12 of the April 23 Wall Street Journal details ongoing global corporate reorganizations to facilitate conversion of long-haul trucking to fuel-cells powered by hydrogen, instead of batteries, for at least the next two decades. Fort Wayne Engineers Club has been approached to maybe host a presentation next Fall regarding locating nuclear fusion in Allen or Huntington Counties to provide hydrogen fuel for trucks and railroads, additionally electricity as needed for our 750,000 volt grid and ammonia for agriculture and local industry. Anything mentioned in this paragraph may or may not become reality, but electric vehicles are likely to become more common while batteries appear to have inherent physical and environmental limitations.

(Photo by Rod Vargo, 2019, with many thanks to the mine's excellent visitor's center.)

This picture depicts heavy hauling in the mid-late 1880's. Twenty-mule team rigs could haul 62,000 pounds of ore at about 3 mph with three men to manage the mules' tractive effort through curves, maintain steering, care for the animals en route, and fend off attackers. That payload was a full unit trainload at the time. Freight trains averaged 12 mph, passenger trains 25 mph, including water stops every 10-12 miles. Today, a suitably equipped modern semi-truck could move the load at normal speeds. Boron mining consolidated and relocated from Death Valley to northeast of (and overlooking) Edwards Air Force Base. These minerals pervade modern life worldwide. The modern mine ships about 20% more ore per day than the entire seven years of hauling by mule out of Death Valley. The modern open pit mine is immediately alongside the same Route 58/I-15 corridor as the reviving Mountain Pass Mine (strategic rare earth minerals) and the defunct molten-sodium solar array (discussed below).

Any model of a 20 mule team rig is valuable regardless of its condition. Even the museum's gift shop cannot find new ones after the original molds disintegrated while in use some years ago. The Edwards Air Force Base museum is effectively closed to outside visitors.

The molten-sodium solar array, southwest of Las Vegas has been formally declared a total loss and may or may not become a superfund site.

(photo by Rod Vargo, 2016)

This project is also known as the Ivanpah Solar Electric Generating System; as the Crescent Dunes Project; as a concentrated-solar electric power (CSP) installation; as ultra-high temperature molten salts electric generation; and initially as a Sandia National Labs concept experiment.

More than a square mile of mirrors served each of two towers. The mirrors were kept focused on the top of their respective towers (bright spots in the photo) in order to heat a sodium salt concoction being circulated from storage vaults underground. The liquid salt was intended to remain boiling hot overnight and eliminate any need for batteries in solar-powered electric-generating facilities. Predictably, there were recurrent and finally catastrophic leaks. Two-thirds of the $1.2 billion to build and keep it operating was loan guarantees and grants through the U.S. government prior to 2016.

Heated debate over nuclear power versus solar/wind power has resurfaced in media. Various sources seem to confirm that the U.S. has a huge nuclear waste problem

because research and recycling were essentially outlawed during the Carter Administration. I've repeated asked for 30 years why we cannot make use of something projected to boil for 100,000 years and have gotten the same answer regardless of who is asked. France reportedly generates 1/6 of the waste per megawatt than the U.S. does, mostly because France recycles its nuclear waste.

The disruption in airline traffic due to Covid-19 may be a climate experiment. Decades of studies concluded that aircraft contrails increase night temperatures, such as currently 4-5 degrees on average in the U.S. southeast and upper Midwest. The contrails spread out into a virtually invisible reflector that bounces infra-red radiation back to the Earth's surface. Aircraft would not have to be eliminated, rather procedures have long been available to substantially reduce formation of contrails since at least World War II. Increased night temperatures mean the air packs much more moisture and energy. When I was a graduate student at Penn State's Center For Air Environment Studies in 1974-76, contrail effects were widely presumed but little research was done until the grounding of all commercial aircraft during the September 11 attack. It produced startling data and a search for more.

The contrail effect occurs anywhere air traffic occurs at appropriate altitudes. I wrote in an earlier newsletter about recent availability of nonstop polar flights to literally other sides of the world. North pole melting abruptly accelerated during the same period, and the flights now abruptly tapered off, with initial weather reports already indicating much lower temperatures. (Experienced military sources tell me that north-polar flights are not an aerial sightseeing opportunity due to pernicious cloud cover.)

The U.S. Farm Report indicates that certain farming regions are also unexpectedly drying out. I caution that a classic volcanic cycle should be phasing out of a very wet period about now.

It should be a fair question whether people would tolerate returning our climate to "normal". A recent historical society article discussed -20 to -40 degrees F on multiple occasions in the early to mid 1900's where I grew up in northwestern New Jersey. I remember zero being normal.

Earth's human population is nearly 7.9 billion, which is >4 billion less than legitimately predicted by now. Federal and private funding throughout the last half of the 20th Century was geared to supplying 12 billion people by 2020, 24 billion by 2035, and 48 billion before 2050. I was part of that PhD research community, including aggressive transfer of agricultural technology overseas. Population hit 6 billion in 1999, a bit sooner than predicted, but then abruptly broke below classic logarithmic growth (the "Population Bomb"). Collapse of projected demand by 12-24 billion people is a reason the globe now seems to have a glut of basic items (media reports notwithstanding). The number of people living in extreme poverty has fallen from 30%

to 8%, and "middle class or above" has risen to 51%, in 20 years. Recent predictions are for 10 billion people around 2030, but that was before corona virus which has official mortality rates (deaths/cases) ranging 5.97% (U.S.) and 7.02% (worldwide) as of May 7. Of course, fear or sheltering in place could induce a baby boom.

Official mortality rates were 2.96% (U.S.) and 5.55% (worldwide) on April 7. Nursing home deaths are now better scrutinized, as are unexpected losses of younger adults. My medical research contacts suggest COVID-19-inducing viral strain(s) were affecting the U.S. by Thanksgiving, 2019. In due course, there will be retrospective studies. Actual mortality rates have probably been higher than official rates, but the gap is closing. At this point in time, precautions and care have in fact improved everywhere within the United States.

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