

EEVC NEWSLETTER

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21ST CAC 2015 AT PENN STATE Oliver Perry

At the end of this month a number of EEVC members will make a pilgrimage to Penn State to participate in The 2015 21st Century Automotive Challenge.

This event is an evolutionary branch of the original Tour de Sol. In the beginning the organizers pursued a public awareness path to cleaner non-polluting transportation through a traveling road trip event displaying primarily solar and battery powered vehicles. Over the years the venue expanded to include hybrid and alternative fueled vehicles as well. Contrary to the early beginnings of the tour, we now have hundreds of production hybrid vehicles on our highways as well as many production battery powered cars. Things have changed.

Presently at Penn State the theme has shifted somewhat from demonstrating that there is



top: Dr. Joel Angstrom director of 21st CAC from Penn State. above: Theresa Maher, Joel's assistant

another possible way to travel, other than by fossil fuels, to how best to utilize our 21st CAC options. One of the major goals of the event is the determination of fuel efficiency in practical everyday driving conditions with a variety of different type vehicles. On road testing and collection of transportation data from any and all types of vehicles is the theme of the 21st CAC at Penn State. We have progressed from, "Can it be done?" to "What is the best way to achieve your transportation objective?" Although cost is not

directly measured in the competitive formula, it is an "up front" realization for consideration.

So What Are the Needs For 21st CAC Transportation?

In the electric vehicle sector of transportation there is a need for a better national elec-



Vehicle lined up at the test track.



The test track facility.

tric grid system that can handle multiple fast high demand charging stations. Also there is still a need for cheaper and more efficient batteries as well as batteries that can handle quick heavy charging.

Grim Grid Concern

Even if we do not expand the grid for heavier demands there remains a need for sustained reliability. The greens demand that coal fired sources of electricity be terminated and cleaner sources be instituted. The battle with those who claim it is impossible to quickly bring new modern power stations on line is far from over. So not only do we need better batteries we need better, cleaner, and yet still inexpensive power stations, which opponents maintain is out of the question.

Consider the following fact. Recently there was an electrical blackout in the Washington, DC area. It was relative minor. A mechanical failure and fire in a transfer station in Maryland caused a dip in voltage and cascaded across the grid. The White House, Capitol, and State Department briefly lost electricity by quickly switched over to backup genera-



A competitor on the test track.



Visitors at the Penn State Morning Star Solar Home site.

tors. Thousands of other customers and drivers needing traffic lights were not so lucky. The Potomac River Generating Station in Alexandria Virginia that used to handle peak electrical demands in downtown Washington normally would have tripped in and supplied the need. While the 60 year old power station was rarely run it had been the target of anti-fossil advocates and forced to shut down in 2012, as have 188 additional coal generating plants across the nation. The greens may yell, hurray! But have they provided for margins of error and emergency needs? Replacement power plants take time and money to build and the anti-greens fear blackouts and bankruptcy are in the wake of the new grid regulations.

Air Quality

As I have mentioned a number of times, many years ago the auto shop teacher that I worked with told me that the ICE manufacturers were accomplishing amazing things when it came to cleaning up emissions. He wondered just how much difference there was going to be in the future net pollution

between electric powered cars and gasoline fueled vehicles. Carbon dioxide was not at that time considered a pollutant. The Tour de Sol at that time was advocating that we needed to clean up the visible smog in the air surrounding our large cities.

This to me raises several 21st CAC questions. What is the present difference, pollution wise, between tightly regulated passenger vehicles, and the masses of SUV and pickup trucks on our roads today? This, for some reason, has not remained a hot issue of debate. If we are concerned about air quality why are we so enamored with our SUVs and trucks? I tend to think it is because the average person does not feel that any harm is occurring to our atmosphere because of SUVs and truck emissions. If that is the general understanding of the public, then why would most people not feel relieved when they see more electric car breathing saviors on the roads? A Prius driver should be seen as a Saint not an arrogant Green.

I am motivated to learn a few more facts about our present automotive industries' tailpipe emissions. What is coming out of various tailpipes? And, how damaging is it? Evidently, not too serious of a problem in our political leader's minds, nor ours, unless we have become blinded for lack of media attention.

(In China the air pollution in some major cities is so bad that in comparison our worst cities appear pure.)

Anyway, our present 21st CAC competition does consider greenhouse gas emissions in the competitive scoring, but as for the hybrids we are not measuring more serious polluting gasses. And the reason for this is that as a nation we seem to be no longer concerned about tailpipe pollutants other than carbon dioxide. Our state emissions testing stations must have gotten them cleaned up!

You can understand why the guy on the street claims the whole business is just plain political.

Come to Penn State... the most completely non-political place in Pennsylvania... The home of Joe Paterno... oh oh.. here I go again, stirring up trouble.

LATEST FROM PETE GRUENDEMAN

Received on March 16:

Ollie Perry recently remarked, "I know you have been snug as a bug in a rug this past winter because you know how to conserve as well as improvise."

If you mean conserve and improvise by wearing two heavy sweaters — No. If you mean set up my own solar thermal array and improve the insulation and especially air sealing at this house — yes, I have done and continue to do that. I have just now reached 250 gallons of propane used since last fall. Converted to dollars, that is \$450 for the winter so far.

My first project this summer is to put up a 1.2 kW PV array. I put off PV for a long time because solar thermal is so much more cost effective. This is all off-topic but I'll tell you anyways. The killer application for the PV is two-fold. First is that even though Wisconsin is not approving grid-tie PV at this time (thank you Scotty boy), they have no authority when it comes to me hooking up the PV to my electric water heater. And now when it's finally installed the PV will be readily available for backup power. That's the most significant reason of the many that favor using PV for domestic hot water, even though I have solar hot water heat. I could write about that for the newsletter, but it's too far off-topic. Both the backup power and DHW from PV will require a bit of power conditioning, with devices that I and a helper are designing. And finally on-topic, with another device that won't be online until after this year (too many other projects) is a DC-DC converter to charge my Geo Metro. Then Scotty's henchmen will come snooping around as they too want the EV and hybrid owners to pay a \$50 fee for using the roads. They won't get anything out of me using the sun to charge the Metro.

I'll send more news as the projects come along, though most are beyond the scope of the Newsletter.

NEWS UPDATE



Aston Martin EV

At the 2015 Geneva Motor Show Aston Martin showed off its DBX Concept car, with the stated goal of redefining the high luxury GT segment and appealing to a wider demographic. It does change things: it's a pure EV, for one thing, with a motor in each 22-inch wheel, and it seats four. And of course it has every luxury amenity imaginable, with classic British luxury car fit and finish. Zero-to-60 time is estimated at 6.5 seconds, and top speed (again estimated) is 155 mph. No information on range seems to be available, but remember this is a concept vehicle. If they ever build it, or something like it, we may see some competition for the Tesla Model S.

Study: EVs may cost less soon

A study by Björn Nykvist and Måns Nilsson published in *Nature Climate Change* shows that, industry-wide, the cost of Li-ion battery packs declined by about 14 percent per year from 2007 to 2014, "from above US\$1,000 per kWh to around US\$410 per kWh, and that the cost of battery packs used by market-leading BEV manufacturers are even lower, at US\$300 per kWh, and has declined by 8% annually." Further, the report says, the costs to market leaders are less than reported. "This has significant implications for the assumptions used when modelling future energy and transport systems and permits an optimistic outlook for BEVs contributing to low-carbon transport," the article says.

While the full text of the study is available only for a fee, the summary is available at www.nature.com/nclimate/journal/v5/n4/full/nclimate2564.html

Oil storage crunch?

There have been multiple news stories in the past few months suggesting that the U.S. is producing/importing much more oil than it consumes, and that storage facilities (primarily in Cushing, Oklahoma) will soon reach their limit. At that point, the reasoning goes, the price of gasoline will drop as oil companies dump product onto the market to make room for the surplus. A nice theory, but is it true?

Not really, according to a piece by Christopher Helman in *Forbes* for April 1. The price of gasoline will stray down, he says, as refiners, encouraged by record differentials between the prices of crude and gasoline, run their facilities at full capacity to take advantage of the windfall. In addition, there are a lot more places to put crude than in tanks in Cushing. For one thing, he explains, citing an in-depth report by Morgan Stanley refining analyst Evan Calio,

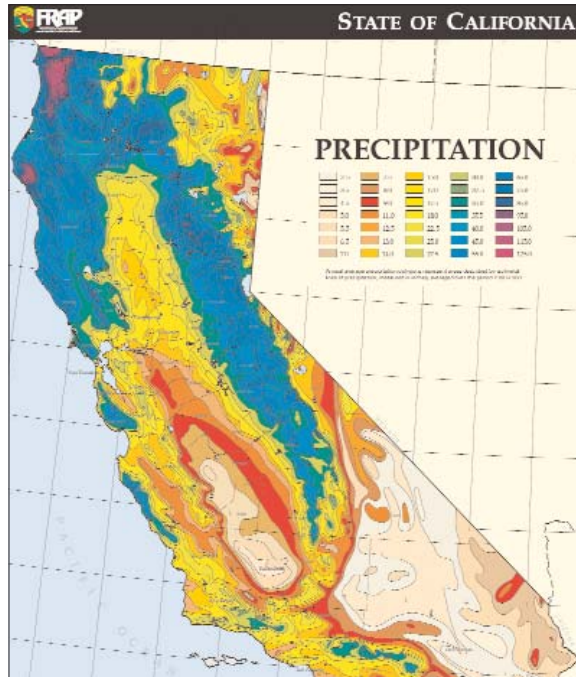
In addition, says Helman, increased pipeline capacity makes it possible to pump oil out of Cushing "down to the even bigger storage tanks surrounding the Gulf Coast refining megaplex. This wasn't possible in 2012, when Cushing reached its record fill of 88%." So don't worry: we won't soon be ankle-deep in crude.

Motor for electrically-powered airplanes

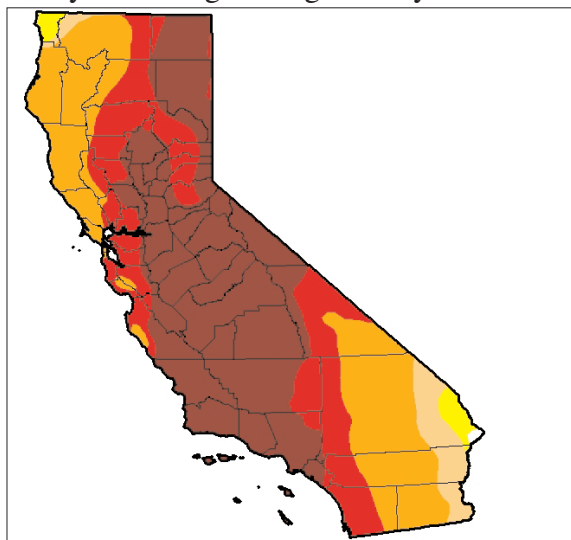


Siemens has developed an electric motor that combines high power with minimal weight. The unit sets a world record for power/weight ratio in its class. This marks a major step toward the everyday use of electrically powered aircraft and helicopters.

THOU SHALT NOT WASTE WATER By California Pete



California is in a severe (some say unprecedented) drought, which has been going on for four years now. The map above, with normal average rainfall from 1900 to 1960, shows the basic problem: Much of California (the areas ranging from almost white to bright red) are true desert, with less than 10 inches of rain per year. Much of the rest (the areas from red to lemon yellow) are semi-desert, with between 10 and 20 inches of rain per year. Note that this covers most of the agricultural Central Valley. And things have gotten dryer since:



As shown on this map from the National Drought Mitigation Center, conditions range from abnormally dry (yellow) to extreme drought (red) to exceptional drought (red-brown). The snowpack in the Sierra Nevada (in the first map, much of the blue and green area towards the eastern part of the state), which provides water to most of the state during the dry season from May to October, is at about 5 percent of normal, the lowest in recorded history. We have a really big problem, and so may you.

The governor has declared a drought emergency and put measures in place designed to reduce water consumption in urban and other areas by 25 percent from 2013 levels. Compliance varies, and some areas (Beverly Hills stands out) are ignoring it so far. How long they will continue to do so is unknown, although the Metropolitan Water District, which supplies parts of Los Angeles, Orange, San Diego, Riverside, San Bernardino and Ventura counties, is drafting plans to reduce water deliveries by 15 percent. The problem is, the enforcement mechanism consists of increasing prices to cities not in compliance by up to four times — and the most egregious offenders would probably not even notice that.

More problematically, the governor's order does not apply to agriculture, which accounts for 80 percent of state water use but only 2 percent of the economy. It also does not seem to apply to fracking, which used 70 million gallons in 2014, although it has been pointed out that this represents the amount of water used by just 514 households annually, according to the state Oil & Gas Supervisor.

Many farmers, facing a cutoff of state and federal water, are pumping groundwater, but this is running dangerously low and causing land subsidence as well — subsidence that cannot be corrected by pumping water into the ground, if such water could be found. Once the underground structures collapse they don't come back.

Global warming may or may not be causing this particular drought, but the climate in California has been much dryer in the past — the comparatively wet 20th century was an anomaly. So even if we return to conditions that prevailed a few thousand years ago, things could get really bad. We're already talking about re-use of wastewater, desalination and

even capturing water from fog and dew, but given the seemingly-inexorable increase in population, it will not be enough. And it will likely reduce the amount of food delivered to the rest of the country and shipped overseas.

Two informative articles on the topic: http://dotearth.blogs.nytimes.com/2015/04/05/californias-wasteful-water-habits-run-up-against-a-dry-future-and-past/?_r=0 and www.nytimes.com/2015/04/08/business/economy/in-parched-california-innovation-like-water-has-a-limit.html.

COMING EVENTS

SAE 2015 World Congress & Exhibition

April 21-23, Detroit. www.sae.org/congress

BCSEA Vancouver's Electric Vehicle Fair

April 24, Vancouver, BC. Go to <http://www.bcsea.org/events/bcsea-vancouver-electric-vehicle-fair-2015>

Electric Vehicles: Everything is Changing **Read more at:**

<http://www.idtechex.com/electric-vehicles-europe/conference.asp>

April 28-29, Berlin. Go to www.idtechex.com/electric-vehicles-europe/conference.asp

21st Century Automotive Challenge (21st CAC)

May 1-3, State College, PA. Go to www.eevc.info/2015-21st-century-automotive-challenge.html

EVS28 — The 28th International Electric Vehicle Symposium and Exhibition

May 3-6, Goyang, Korea. Go to www.evs28.org/

ACTExpo (Alternative Clean Transportation Expo)

May 4-7, Dallas. Go to www.actexpo.com/

5th China International New Energy Vehicle Forum

May 18-19, Shanghai, China. Go to <http://www.ourpolaris.com/nev2015/>

The WAVE – World Advanced Vehicle Expedition electric vehicle rally

June 12-21, from eastern Germany into the Alps. Go to <http://www.wavetrophy.com/en/>
EV Fest 2015

June 14, Flamborough (Hamilton), Ontario. Go to www.evfest.ca

E Rider Electric Car Show Ohio

June 21, Clayton, OH. Go to <http://ohio-evshow.weebly.com/>

EVs and the Grid Summit

July 8-9, Los Angeles. Go to www.info-castinc.com/events/ev-grid/agenda

Formula Sun Grand Prix

July 26-31, Austin, TX. <http://americansolar-challenge.org/the-competition/fsgp-2015>

SAE 2015 New Energy Vehicle Forum

Sept 3-4, Shanghai, China. Go to <http://www.sae.org/events/nev/>

2015 Electric & Hybrid Vehicle Technology Expo

Sept 15-17, Novi, MI. www.evtechexpo.com/
The Battery Show (colocated with the event above).

Go to www.thebatteryshow.com/exhibition/about-the-battery-show

ALTCAR Expo

Sept 18-19, Santa Monica, CA. Go to www.altcarexpo.com

2015 World Solar Challenge

October 6-13, Australia. Go to www.world-solarchallenge.org

Engine Expo 2015 (with an electric and hybrid pavilion).

Oct. 20-22, Novi, MI. Go to www.engine-expo.com/usa/pavilion.php

SAE 2015 Electric Powertrain Technologies Symposium

Nov 17, Stuttgart, Germany. Go to <http://www.sae.org/events/epts/>

SAE International Vehicle Electric Powertrain Forum

Dec 3-4, Shanghai, China. Go to <https://www.sae.org/events/vept/>

NOTICE ON DUES

Annual eevc dues are \$20 with electronic delivery of the Newsletter, or \$25 for a printed copy. Mail checks payable to EEVC to James Natale, 3307 Concord Dr, Cinnaminson NJ 08077, or pay via PayPal to jnatalemicro@comcast.net.

MEETING SCHEDULE

Meetings are held in Room 49, Plymouth-Whitemarsh High School, 201 East Germantown Pike in Plymouth Meeting, PA, and begin at 7:00 p.m. Note there are no meetings in July and August

May 13

June 10