

By Donald Piscitelli.

First, I hope everyone had a wonderful Easter Holiday. I'm sure you all heard of the Stone Age and the Bronze Age did you ever give any thought to what they may call this age we're living in? Let me offer a few suggestions "The age when brains stop working", or "The age of when all the marbles left", or "The age of Machiavelli". For those of you who don't know or remember Niccolo Machiavelli was a 16th century Italian diplomate, that was attributed for coining the phrase, "The Ends Justify the Means". As I watch the news these days it seems more of, this is what I want, than this makes sense to do. Let me give a couple examples.

In November of 22 Governor Newsom signed a bill requiring all cars sold in California be Zero Emission by 2035. Worthy goal yes, however afterwards they were having brownouts and ask people not to charge their cars during early evenings. Now California always had power and water issues. The 2 largest customers of power from the Hoover Dam are San Diego and Los Angeles power companies. Have you seen the photos of Lake Mead drying up? Another 100 foot drop and they won't be able to generate power. To add fuel to this some cities have even banned building new gas stations.

I added these 2 news snippets yesterday after I found them in the news.

The first was titled: Biden Admin Outlines Plan to Cut Vital Water Supplies to Western States.

<https://www.foxnews.com/politics/biden-admin-outlines-plan-cut-vital-water-supplies-western-states>

"As a result of decades of drought conditions, both Lake Powell and Lake Mead have dropped to lower levels, nearing so-called dead pool

levels when water is unable to flow from a reservoir through its dam, threatening water supplies and the hydropower-generated electricity for tens of millions of Americans”.

The second was titled: Biden unveils toughest ever car emission rules bid force electric vehicle purchases

<https://www.foxnews.com/politics/biden-unveils-toughest-ever-car-emissions-rules-bid-force-electric-vehicle-purchases>

“If the regulations are finalized, a staggering 67% of new sedan, crossover, SUV and light truck purchases could be electric by 2032, the White House projected. In addition, up to 50% of bus and garbage truck, 35% of short-haul freight tractor and 25% of long-haul freight tractor purchases could be electric by then”.

This next example I heard on the news a few weeks ago, was about a breakthrough by a company named Universal Hydrogen. They developed a method for shipping hydrogen and a conversion kit for airplane engines. The news anchors thought this was the greatest invention of all time, because the only output of a hydrogen engine is water. This is great for the environment. The only issue is although hydrogen is the most abundant element in the universe, however on earth it is never found alone. The two methods for extracting hydrogen are steam-methane reforming or electrolysis. The steam-methane method takes natural gas, steam and a catalyst (nickel or platinum) to produce hydrogen, and the by products are carbon monoxide and carbon dioxide. The second method electrolysis uses more energy and is more expensive. Currently the 4 sources used for hydrogen generation are Natural Gas 48%, oil 30%, coal 18% and electrolysis 4%. This company plans on using the electrolysis method with renewable energy. I think the big banner on their web site that states “Fueling

carbon-free flight”, might be an overreach but please draw your own conclusions. I will say Jetblue and Airbus are on board with the project.

On the lighter side I’m sure all of you have seen at least some of the articles regarding AI in the news as of late. So, to test it I figured I would ask it to write this report for me, and this was the result:

My question was: *Write a report on why hydrogen power planes have a larger carbon footprint than combustion jet engines.*

I’m going to read the sources it used for the report first:

(1) Estimating The Carbon Footprint Of Hydrogen Production - Forbes.

<https://www.forbes.com/sites/rpapier/2020/06/06/estimating-the-carbon-footprint-of-hydrogen-production/> Accessed 3/27/2023.

(2) How Hydrogen-Powered Aircraft Work - The Aero Engineer.

<https://www.theaeroengineer.com/post/hydrogen-powered-aircraft> Accessed 3/27/2023.

(3) Hydrogen Combustion Engines: What Are The Benefits? -

carandbike. <https://www.carandbike.com/news/hydrogen-combustion-engines-what-are-the-benefits-2807864> Accessed 3/27/2023.

(4) Quiet and green: Why hydrogen planes could be the future of

aviation. <https://ec.europa.eu/research-and-innovation/en/horizon-magazine/quiet-and-green-why-hydrogen-planes-could-be-future-aviation> Accessed 3/27/2023.

(5) Skies Begin to Clear for Hydrogen-Powered Flight - IEEE Spectrum.

<https://spectrum.ieee.org/hydrogen-powered-planes-fuel-cells>
[Accessed 3/27/2023.](#)

This was the report it wrote:

Hydrogen-powered planes have a larger carbon footprint than combustion jet engines because of the way hydrogen is produced. Hydrogen is usually produced through steam methane reforming (SMR), which involves reacting methane with steam to produce hydrogen and carbon dioxide². This process releases carbon dioxide into the atmosphere, which contributes to global warming. The carbon footprint of hydrogen production is greater than that of natural gas-fired power but less than that of coal-fired power².

Hydrogen combustion still creates Nitrogen Oxide (NOx) emissions, and a lot more water vapor (contrails). A hydrogen-burning engine can operate at much higher air-to-fuel ratios than typical jet fuel – this means a leaner mixture and lower Nitrogen Oxide (NOx) emissions. However, this also means lower power output. H₂ is much more flammable than jet fuel³. A hydrogen-air mixture will require less ignition energy than a jet fuel-air mixture. H₂ has a much higher flame speed than jet fuel. This can lead to combustion instabilities such as flashback or blow off due to differences in local flow velocities and flame velocities³.

I hope this helps you with your report! Let me know if you have any other questions.

I think our time would be better spent figuring out our current electrical issues, rather than figuring out how to tax the fragile system further. Until PSE&G stop asking everyone to conserve because they're afraid of not having enough power, or the brownouts in California and Texas, are resolved then we could figure out the next step. Not start with the end game. You'll probably all think that I probably don't care about conservation, however the opposite is true, I've had solar panels on my house for over 15 years.