JANUARY 31, 2020
WORLDWIDE USE OF CRUDE OIL

The number of barrels (42 U.S. GALLONS) per day demand for crude oil (Statista.com) for the last ten (10) years is:

YEAR	BARRELS USED PER DAY	U.S. GALLONS PER DAY	U.S. GALLONS PER YEAR
2010	86,400,000	3,628,800,000	1,324,512,000,000
2011	89,000,000	3,738,000,000	1,364,370,000,000
2012	89,800,000	3,771,600,000	1,376,634,000,000
2013	91,800,000	3,855,600,000	1,407,294,000,000
2014	92,700,000	3,893,400,000	1,421,091,000,000
2015	94,900,000	3,985,800,000	1,454,817,000,000
2016	96,200,000	4,040,400,000	1,474,746,000,000
2017	97,900,000	4,111,800,000	1,500,807,000,000
2018	99,300,000	4,170,600,000	1,522,269,000,000
2019*	100,300,000*	4,212,600,000*	1,537,599,000,000*
2020*	101,600,000*	4,267,200,000*	1,557,528,000,000*

*PROJECTED

Normally, the U.S. Gallons per day and the U.S. Gallons per year would be shown exponentially (10^x power), but for the average non-scientific person, (the climate change primer by Dr. D. Michael Schafer was written for the average non-scientific person) showing these numbers written out long hand will have more of an impact.

For example, the 2020 estimated U.S. Gallons per year would be 1 trillion, 557 billion, 528 million gallons of crude oil used per year. Think about this number when you buy your next gallon of milk or water.

Another Google search of how many U.S. Gallons of gasoline, diesel fuel and jet fuel can be obtained from refining one (1) barrel of (42 U.S. Gallons) of crude oil:

Gasoline: 19-20 U.S. Gallons (multiple sources - 45% to 47.6%)

Diesel Fuel: About 12 U.S. Gallons (multiple sources - 28.6%)

Jet Fuel: About 4 U.S. Gallons (multiple sources – 9.5%)

The following chart applies these percentages to the worldwide gallons of crude oil used per year:

YEAR	WORLDWIDE U.S. GALLONS PER YEAR	45% FOR GASOLINE	28.6% FOR DIESEL FUEL	9.5% FOR JET FUEL
2010	1,324,512,000,000	596,030,400,000	378,810,432,000	125,828,640,000
2011	1,364,370,000,000	613,966,500,000	390,209,820,000	129,615,150,000
2012	1,376,634,000,000	619,485,300,000	393,717,324,000	130,780,230,000
2013	1,407,294,000,000	633,282,300,000	402,486,084,000	133,692,930,000
2014	1,421,091,000,000	639,490,950,000	406,432,026,000	135,003,645,000
2015	1,454,817,000,000	654,667,650,000	416,077,622,000	138,207,615,000
2016	1,474,746,000,000	663,635,700,000	421,777,356,000	140,100,870,000
2017	1,500,807,000,000	675,363,150,000	429,230,802,000	142,576,665,000
2018	1,522,269,000,000	685,021,050,000	435,368,934,000	144,615,555,000
2019*	1,537,599,000,000*	691,919,550,000*	439,753,314,000*	146,071,905,000*
2020*	1,557,528,000,000*	700,887,600,000*	445,453,008,000*	147,965,160,000*

*PROJECTED

Between 83.1% and 85.7% of the crude oil being pumped out of the ground is refined to produce liquid fuels which are being burned, releasing their carbon dioxide (CO_2) into our atmosphere.

It is time to do another Google search to find out how much carbon dioxide (CO_2) is being released into our atmosphere by burning these liquid fuels (Gasoline, Diesel and Jet Fuels). Multiple sources reveal the following:

- **Gasoline - About 19.64 U.S. Pounds of CO_2 Per Gallon**
- **Diesel Fuel - About 22.38 U.S. Pounds of CO_2 Per Gallon**
- **Jet Fuel - About 20.00 U.S. Pounds of CO_2 Per Gallon**

Since the Bourke Engine cannot replace a jet engine, the following chart only calculates the carbon dioxide (CO2) released into our atmosphere from the burning of gasoline and diesel fuel:

YEAR	GASOLINE – U.S. GALLONS PER YEAR X 19.64 POUNDS	U.S. POUNDS/U.S. TONS OF CO_2 RELEASED INTO OUR ATMOSPHERE PER YEAR – BURNING GASOLINE
2010	596,030,400,000 x 19.64 =	11,706,037,056,000 LBS. OR 5,853,018,528 U.S. TONS
2011	613,966,500,000 x 19.64 =	12,058,302,060,000 LBS. OR 6,029,151,030 U.S. TONS
2012	619,485,300,000 x 19.64 =	12,166,691,292,000 LBS. OR 6,083,345,646 U.S. TONS
2013	633,282,300,000 x 19.64 =	12,437,664,372,000 LBS. OR 6,218,832,186 U.S. TONS
2014	639,490,950,000 x 19.64 =	12,559,602,258,000 LBS. OR 6,279,801,129 U.S. TONS
2015	654,667,650,000 x 19.64 =	12,857,672,646,000 LBS. OR 6,428,836,323 U.S. TONS
2016	663,635,700,000 x 19.64 =	13,033,805,148,000 LBS. OR 6,516,902,574 U.S. TONS
2017	675,363,150,000 x 19.64 =	13,264,132,266,000 LBS. OR 6,632,066,133 U.S. TONS

Computations continued from previous page

YEAR	GASOLINE – U.S. GALLONS PER YEAR X 19.64 POUNDS	U.S. POUNDS/U.S. TONS OF CO_2 RELEASED INTO OUR ATMOSPHERE PER YEAR – BURNING GASOLINE
2018	685,021,050,000 x 19.64 =	13,453,813,422,000 LBS. OR 6,726,906,711 U.S. TONS
2019*	691,919,550,000* x 19.64 =	13,589,299,962,000 LBS. OR 6,794,649,981 U.S. TONS*
2020*	700,887,600,000* x 19.64 =	13,765,432,464,000 LBS. OR 6,882,716,232 U.S. TONS*

*ESTIMATES

YEAR	DIESEL – U.S. GALLONS PER YEAR X 22.38 POUNDS	U.S. POUNDS/U.S. TONS OF CO_2 RELEASED INTO OUR ATMOSPHERE PER YEAR – BURNING DIESEL
2010	378,810,432,000 x 22.38 =	8,477,777,468,000 LBS. OR 4,238,888,734 U.S. TONS
2011	390,209,820,000 x 22.38 =	8,732,895,771,600 LBS. OR 4,366,447,885 U.S. TONS
2012	393,717,324,000 x 22.38 =	8,811,393,711,120 LBS. OR 4,405,696,855 U.S. TONS
2013	402,486,084,000 x 22.38 =	9,007,638,559,920 LBS. OR 4,503,819,280 U.S. TONS
2014	406,432,026,000 x 22.38 =	9,095,948,741,880 LBS. OR 4,547,974,371 U.S. TONS
2015	416,077,622,000 x 22.38 =	9,311,817,180,360 LBS. OR 4,655,908,590 U.S. TONS
2016	421,777,356,000 x 22.38 =	9,439,377,227,280 LBS. OR 4,719,688,614 U.S. TONS
2017	429,230,802,000 x 22.38 =	9,606,185,348,760 LBS. OR 4,803,092,674 U.S. TONS
2018	435,368,934,000 x 22.38 =	9,743,556,742,920 LBS. OR 4,871,778,371 U.S. TONS
2019*	439,753,314,000* x 22.38 =	9,841,679,167,320 LBS. OR 4,920,839,584 U.S. TONS*
2020*	445,453,008,000* x 22.38 =	9,969,238,319,040 LBS. OR 4,984,619,160 U.S. TONS*

*ESTIMATES

The following chart takes the U.S. tons of carbon dioxide dumped into our atmosphere by the burning of Gasoline and Diesel fuel in our ***existing Internal Combustion Engines*** (ICE-Gas and Diesel), adds them together and using online conversion, converts U.S. TONS to GIGATONNES:

YEAR	U.S. TONS OF CO_2 FROM GASOLINE	U.S. TONS OF CO_2 FROM DIESEL FUEL	TOTAL U.S. TONS CO_2 FROM GASOLINE & DIESEL	GIGATONNES
2010	5,853,018,528	4,238,888,734	10,091,907,262	9.155
2011	6,029,151,030	4,366,447,885	10,395,598,915	9.431
2012	6,083,345,646	4,405,696,855	10,489,042,501	9.515
2013	6,218,832,186	4,503,819,280	10,722,651,466	9.727
2014	6,279,801,129	4,547,974,371	10,827,775,500	9.823
2015	6,428,836,323	4,655,908,590	11,084,744,913	10.056
2016	6,516,902,574	4,719,688,614	11,236,591,188	10.194
2017	6,632,066,133	4,803,092,674	11,435,158,807	10.374
2018	6,726,906,711	4,871,778,371	11,598,685,082	10.522
2019*	6,794,649,981*	4,920,839,584*	11,715,489,565*	10.628
2020*	6,882,716,232*	4,984,619,160*	11,867,335,392*	10.766

*ESTIMATES

A final Google search is odne for carbon dioxide (CO_2) emissions from fossil fuel sources. The Global Carbon Project provides the following informtation for 2010 through 2018:

YEAR	CO_2 EMISSIONS (GIGATONNES) FROM FOSIL FUEL SOURCES	TOTAL GIGATONNES OF CO_2 FROM GASOLINE & DIESEL	PERCENTAGE OF TOTAL CO_2
2010	33.1	9.155	27.66%
2011	34.4	9.431	27.42%
2012	35.0	9.515	27.19%
2013	35.3	9.727	27.56%
2014	35.6	9.823	27.59%
2015	35.5	10.056	28.33%
2016	35.7	10.194	28.55%
2017	36.2	10.374	28.66%
2018	37.1	10.522	28.36%

Since the Bourke Engine uses less than ½ as much fuel as a conventional ICE, swirching to the Bourke Engine coupled with a Permanent Magnet AC (PMAC) motor/generator starting with all 2021 engine manufacturing will start the world down the path to significantly less CO_2 emissions (average of 9.866 Gigatonnes per year over the last 9 years if the engine had been in use during that time frame). The use of fossil fuel (crude oil) would continue until fuel from algae can come on line (the topic for the next blog posting).

Companies would also have to develop conversion kits for converting existing vehicles to electric with Bourke Engine/PMAC range extenders. Here is some food for thought:

- In 2018, the estimated world population was 7,500,000,000 x 1.984 LBS. Of CO_2 exhaled per person, per day, 365 days of the year = 5,431,200,000,000 LBS. Of CO_2 for all of the people of this world (Google Searches).
- In 2018, burning Gasoline and Diesel pumped 23,197,370,164,920 LBS. Of CO_2 into our atmosphere, 4.27 times as much as the people of the world exhaled.

Russell Bourke attempted to lead the world down a different path with the invention of his engine in the 1930's. The world chose not to listen.

Greta Thunberg, you have captured the world's attention (especially the youth) about a problem that has been around for a long time. Maybe the world will listen this time, because if it doesn't, we will destroy our planet.

Energy is a precious thing and we have used it like there is no end. Even the energy we get from our sun will be gone at some point in the future. **The video referenced in the website, Crude: The Incredible Journey of Oil**, describes a super greenhouse world would not be a habitable place for human beings, with the posible exception of Anartica or Northern Greenland. A quote from K. Smith taken from Dr. D. Michael Schafer's climate change primer says it all:

> *"The rich will find their world to be more expensive, inconvenient, uncomfortable, disrupted and colourless; in general more unpleasant and unpredictable, perhaps greatly so. The poor will die."*

The problem, the world is addicted to crude oil and other fossil fuels, but there is a solution:

- Cut the use of liquid transportation fuels in half (or more), with the use of the Bourke Engine coupled with a PMAC motor/generator.

- Stop pumping crude oil from the ground and shift to bio-crude made from algae. Exxon Mobil and Synthetic Genomics, Inc. (SGI) are targeting the production of 10,000 barrels per day of bio-crude, made from algae, by 2025. During World War II, 1.89 billion dollars was spent on the Manhatten Project (21.3 billion in 2019 u.s. dollars) to develop a weapon of mass destruction that could destroy our world. The world needs to spend 100 times that much (if necessary) to do the research and develop the infrastructure to support the production of bio-crude to replace crude oil that we are pumping from the ground. While making 10,000 barrels per day of bio-crude by 2025 is a small start, the target needs to be 100 million barrels per day by 2023. All of the money big oil is investing in pumping oil from the ground needs to be diverted to the production of bio-cude. For the average family that is spending $2.50/gal for gasoline, they can afford to spend $5.00/gal for algae fuel if they are getting twice the mileage from a Bourke Engine coupled with a PMAC motor/generator.

The next blog posting will go into more detail on bio-fuels from algae.