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Senate Bill 100 Concept Technology

On-Demand Hydrogen Fuel - \$.75 per kilogram

E-Fuel Corporate has created an autonomous fuel and energy reactor known as the Rejected Energy Reactor (RER). The RER creates "green fuels" such as Ethanol, Kerosene Jet Fuel and Hydrogen, all on demand. The RER system exceeds DOE's ambitious goals by producing green Hydrogen fuel for an estimated cost of \$.75 per kilogram. E-Fuel's RER technology produces carbon-negative fuel and power, which can be scaled to any level of production.

The Path to Affordable, Safe and Abundant supply of Carbon-Negative Hydrogen

REJECTEDENERGY

67.5%

E-Fuel Corporation has aggressively pursued and identified the problems associated with current Hydrogen fuel production and provides the correct solution, clean hydrogen, affordably produced and delivered for decarbonizing During our research U.S. energy use in 2019in 2008 we came across the adjacent Lawrence Livermore National Laboratory and U.S. Department of Energy's Energy Consumption Rate Chart that contained a disturbing category titled "Rejected Energy" which astonished us in two ways. First, the level in 2019 was listed as 67.5%, which is the subtotal percentage amount taken from the total 100.2 Quadrillion consumed but unused U.S. energy that was rejected along with carbon and greenhouse gases into the atmosphere. Second, the annual Rejected Energy rate had been increasing by 0.3% for the past 12 years since 2008 which is substantially worse than other reported Climate Change science data. This DOE data clearly identifies real culprit behind earth's Climate Change. Hydrogen's number one cost driver has been the electrolysis energy required to power the catalyst. So, the obvious solution is to repurpose the zero-cost Rejected Energy into useful Mechanical energy to produce zero-cost hydrogen. In addition, if the energy used to make the hydrogen came from E100 ethanol, the fermentation and engine combustion carbons could then be captured in a reactor to produce carbon-negative hydrogen.

To put this in simple terms, if you placed three gallons of fuel into your vehicle, only one gallon provides mechanical energy to rotate the wheels and the remaining two gallons are rejected through the radiator, tailpipe, and engine friction heat into the atmosphere. Even electric vehicles reject energy constantly during battery charge and discharge

cycles which accelerates as the battery ages. Every commercial manufactured product on earth either directly or indirectly requires fuel during the production process, especially renewables, and that is not going to change. Tragically, rejected energy is the largest untapped energy source on the planet that society has ignored.

HYDROGEN SOLUTION: Graphical user interface, text, whiteboard

Description automatically generated E-Fuel has been able to solve the Hydrogen problems by creating a small reactor (Rejected Energy Reactor) containing both fuel and power production processes (using electrolysis or thermo-chemical to eliminate the catalyst) into one system so that the rejected energy can be repurposed. In simple terms, now 3 gallons (or kilograms) are used when running at full efficiency to produce both fuel and power which reduces past fuel consumption and emissions by two-thirds. E-Fuel believes this technology solution is the most aggressive and likely the only viable choice for a viable Hydrogen marketplace to exist along with reducing energy poverty and Climate Change. Consumers and commercial businesses could benefit from a substantial reduction in energy prices not seen since the late 1960s along with rapid decline in oil demand and abiotic strip mining for renewable energy materials or operating dangerous nuclear power plants.

Remember according to the DOE chart above, the world spent \$trillions during the past twelve-years that increased Global Warming emissions by 0.3% per year which Einstein would have defined as insanity.

E-Fuel Hydrogen Advantages

Conversion Process: The only way to achieve the carbon-negative source of Hydrogen is through the usage of ethanol, via electrolysis or thermo-chemical, which requires both fermentation and combustion power carbons to be contained within the same reactor process in real-time. These carbons are stored in liquid form then condensed to be used for ethanol Ag feedstocks to complete the environmental cycle.

Cost: As of 2020 green hydrogen costs between \$2.50-6.80 per kilogram. Using the E-Fuel RER process the hydrogen Est., cost \$.75 per kilogram. Initial hydrogen reactor development within 3-year period costing \$125 million.

Portability and Safety: RER dimensions are 10'™Lx8'™Hx6'™W which consume one average parking space. The RER also operates like an automated ice maker, it can

produce additional hydrogen on demand from inert enhanced ethanol beer. Because the RER can produce-on-demand hydrogen, storage levels are kept low and remain safe to the public. RER can easily be installed and operated at existing gas-stations or airports. The RER™s power production can produce, per RER module, 240kW for the electrolysis process. RER™s can also be daisy-chained to produce Gigawatts of hydrogen energy.

Science Data for Converting 23kWh/ethanol gln of Rejected Energy into Mechanical Energy to produce Hydrogen:

25% as electrolysis power (5.75kWh).

21.5% as ethanol distillation heat (1 gln).

53.5% unused Rejected Energy for producing additional hydrogen and power @ 100% Zero production cost.

Background: E-Fuel Corporation has been developing fuel and energy technology which combats the causes of climate change. Our autonomous/scalable production solution yields, “green” fuels and power which are carbon-negative. E-Fuel technology is the only company in the world who can meet and exceed the goals of RFI # DE-FOA-0002529 by producing cost-effective Hydrogen fuel, while decarbonizing the climate. “By producing our own carbon-negative electrical power, we can produce low-cost of Hydrogen fuel.” Tom Quinn, E-Fuel Corp.

Low-Cost “ Initially, E-Fuel has focused on the creation of Ethanol. Ethanol is easily distilled from agricultural waste matter. It’s abundant. Henry Ford once said, “There’s enough alcohol in one year’s yield of an acre of potatoes to drive the machinery necessary to cultivate the fields for a hundred years.” E-Fuel’s distillation technology utilizes low-cost Ethanol fuel to power our Rejected Energy Reactor (RER) and produce low-cost electrical power and fuels (Hydrogen).

Installations: Our distillation technology has been deployed in Fuel facility in South Wales Australia producing one million gallons of Ethanol annually. For the past twelve years, our Rejected Energy Reactor (RER) technology has been producing fuel and power on the campus of the Historical Black Institution Southern University in Baton Rouge, LA. The program grows every year and would be a valued partner in the development of our Hydrogen production.

Footprint: From the beginning, E-Fuel has believed that the production of fuels and power, could be and should be localized (microgrid). The E-Fuel microgrid approach to fuel and power creation provides individuals, corporations, municipalities, even the US military offer many advantages (security, scalability, low cost, low emissions). We have strived to reduce the physical footprint of our technology, currently, the size of a typical parking space.

Independence & Security – The E-Fuel solution operates autonomously. It offers independence from a traditional electrical grid. But it can also serve as an integral component of a grid system producing constant wave, low-cost, green (carbon-negative) power. Redundancy makes the E-Fuel system fail-proof much like a Google data center. These are the goals of solar and wind systems, but neither achieves their power expectations or green energy hopes. Both fail to produce desired power, and both require hazardous battery-backup, making their overall approach to sufficient green energy an environmental disaster.