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Docket Number:	17-ALT-01
Project Title:	2018-2019 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program
TN #:	225862
Document Title:	Bill Leighty Comments Renewable Hydrogen Production 2018-2019 Investment Plan Update for the ARFVTP
Description:	N/A
Filer:	System
Organization:	Bill Leighty
Submitter Role:	Public
Submission Date:	11/8/2018 11:47:40 AM
Docketed Date:	11/8/2018

Comment Received From: Bill Leighty
Submitted On: 11/8/2018
Docket Number: 17-ALT-01

Renewable Hydrogen Production 2018-2019 Investment Plan Update for the ARFVTP

Given the looming demand for renewables-source, CO₂-emission-free (CEF) carbon-free fuels (hydrogen and ammonia), motivated by SB 1505, the ARFVTP should invest more heavily in its "Low carbon fuel production program" for:

- > Hydrogen (H₂) and ammonia (NH₃) production from CEF wind and solar plants dedicated to delivery of all captured energy as fuels, via trucks or pipelines, with no connection to, nor energy delivery to, the electricity Grid; hundreds of wind and / or solar plants in CA, beyond or approaching their PTC and PPA terminations, still in serviceable condition, may be candidates for retrofit for such dedicated H₂ and NH₃ production at lower plant-gate cost than via Grid-connected plants;
- > R&D&Development of novel linepipe materials, for new gaseous hydrogen pipeline infrastructure, which are immune to hydrogen embrittlement (HE) and hydrogen corrosion cracking (HCC)
- > Analyzing the technical and economic potential, including regulatory and permitting barriers, for repurposing an extant, out-of-service, former 16" crude oil pipeline, owned by Dominion Energy, 96 miles from West Palm Springs to central Long Beach, that may be suitable for economical repurposing for transmission of gaseous hydrogen (GH₂) or liquid ammonia (NH₃) CEF fuels from wind and / or solar sources in the San Geronio Pass area and from the east of there (Palen Solar Project, for example). I've no idea what the barriers to its repurposing might be; that's why this analysis effort is needed. (We have no economic interest in this pipeline nor in its sale.) See attached file memo.

GFO-18-602 biofuels:

Additional submitted attachment is included below.

Potential Opportunity for a Pioneering Gaseous Hydrogen (GH₂) Fuel Pipeline in California, for Large-scale Renewable Energy (RE) Gathering, Transmission, Storage, Distribution, Integration

25 Sept 17 Memo to: California Hydrogen Business Council (CHBC) Summit, Sacramento, 25-27 Sep 17
From: Bill Leighty, The Leighty Foundation, Juneau, AK wleighty@earthlink.net 206-719-5554

We may have an opportunity for a pioneering, breakthrough, " beacon " R&D & Demonstration project that could:

- Jumpstart the renewables-to-Hydrogen sector in CA and in USA, for transportation and perhaps CHP fuel;
- Deliver renewables-source Hydrogen fuel to central Long Beach, for LA and LB ports air quality improvement;
- Enable demonstrating the new fuel cell trucks, including class 8 tractors by Nikola + Bosch, Toyota, et al;
- Attract the needed collaborative funding and technical expertise for safety and success of the project described below, as both a short-term demo and as a long-term "80 in 50" strategy;
- Establish CA as a world Hydrogen leader, encouraging others to emulate CA, thus interest and please Gov Brown;
- Facilitate economical additional CA retail fueling stations, attached to this pipeline along its ROW;
- Advance Hydrogen infrastructure technology, especially R&D & Demo for novel, HCC-free linepipe materials;
- Support USDOE's "H₂@Scale", "Atmosphere-To-Electrons" ("A₂e"), and ARPA-E "REFUEL" concepts and CRADA
- Be upgraded in capacity and safety by re-lining, perhaps with a polymer-metal hybrid by Smart Pipe, Houston

Dominion Energy, Salt Lake City, is eager to sell the western segment of the Questar Southern Trails Pipeline, which runs 96 miles from Whitewater (western Palm Springs) to central Long Beach. Book value \$ 21 million; offers are welcome from serious interests, to whom linepipe material, ROW, and other confidential details will be disclosed, perhaps via NDA. Contact: Jack Czapiga, Gas Business Development Manager, <jack.czapiga@dominionenergy.com> 801-324-5070

It is an out-of-service former crude oil pipeline, 16" diameter, cleaned, nitrogen-filled, without pumps or compressors or valves or meters on that 96 miles. It might be fit-for-service as a low-pressure gaseous hydrogen (GH₂) pipeline, bringing wind- and solar-source high-purity Hydrogen fuel from San Geronio Pass to the nascent "goods movement" market for fuel cell vehicles (FCV's) of all sizes at the Ports of LA and LB, and directly to retail fueling stations along its ROW. Calculate its capacity. Older wind and solar plants in this Pass, beyond PTC and perhaps beyond PPA, might be attractive H₂ fuel sources.

"Hydrogen" is languishing in obscurity behind the rush to BEV's as "transportation electrification". The Hydrogen industry needs a prudent, visible, medium-to-large-scale project as a pioneering "beacon" to demonstrate Hydrogen's long-term advantages as a complete, integrated, optimized, renewable energy system and strategy, to recapture our imagination for the deep-decarbonization task ahead. This might be it. I have no economic interest in this potential opportunity.



Figure 1. Eastern terminus, 16" Questar pipeline west of Palm Springs, near junction of I-10 and state highway 62

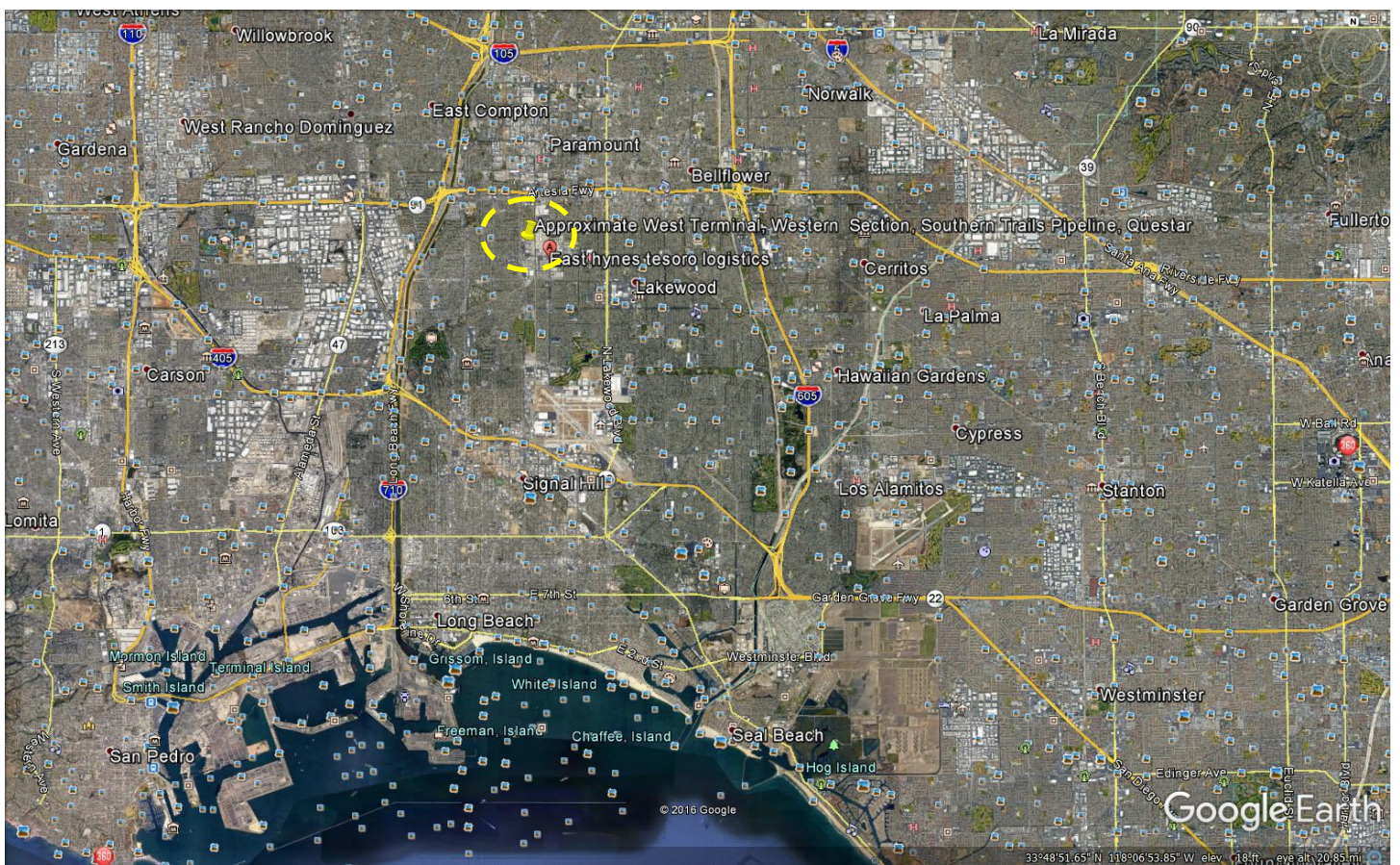
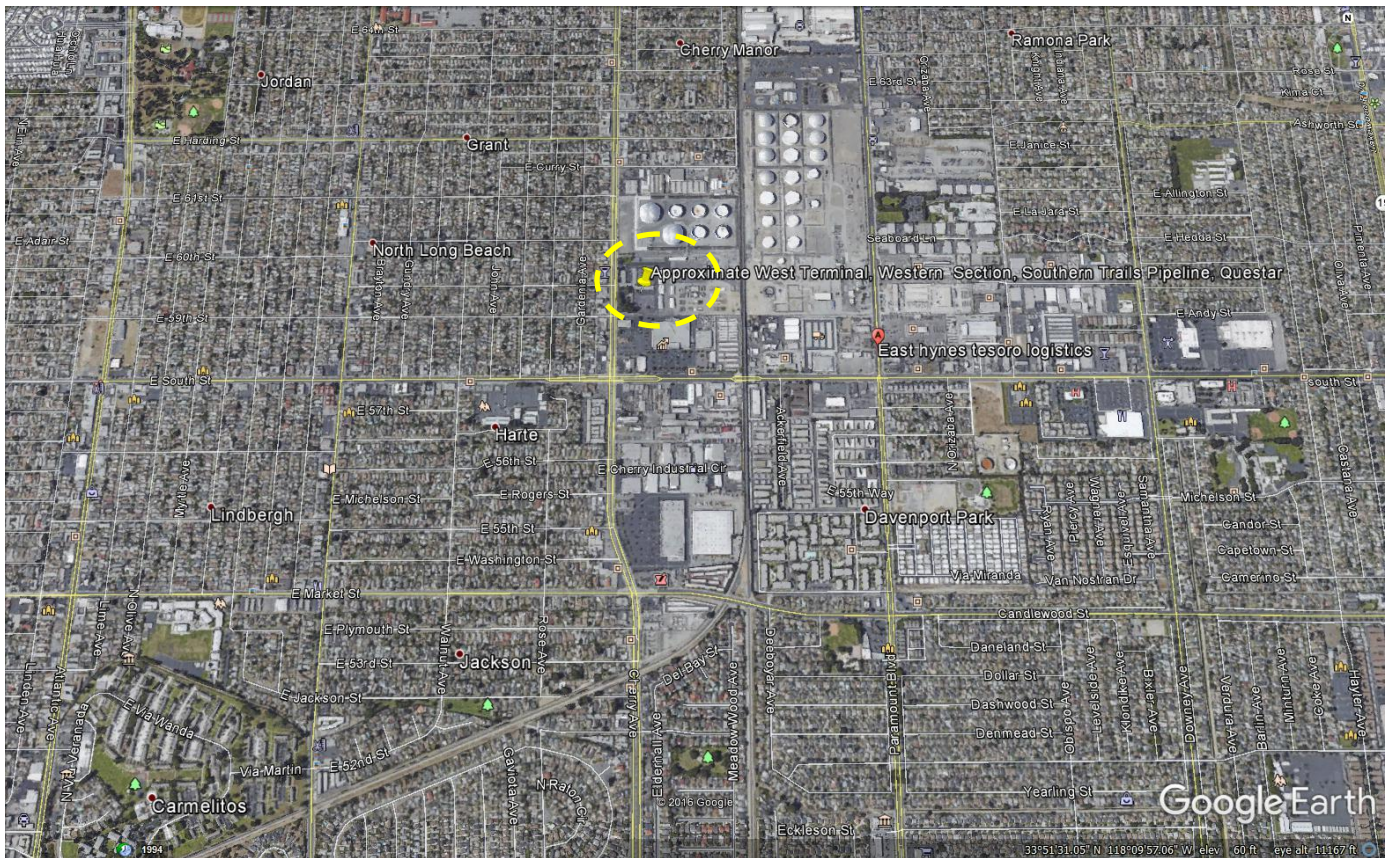


Figure 2. Approximate western terminus, West Hynes Terminal, central Long Beach, at yellow pins. Two scales, for perspective. Dominion Energy, Inc., current pipeline owner, reports: The majority of the West Hynes terminal is owned by Plains All American pipeline, adjacent to their offices on Cherry Avenue. There are currently no pump stations or measurement facilities on the pipeline, which is packed with nitrogen and has cathodic protection.