

Green Freedom™

Los Alamos National Laboratory and The University of Texas Permian Basin
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Los Alamos National Laboratory developed Green Freedom as the shortest path to affordable, large-scale, clean, carbon-neutral, synthetic gasoline and jet fuel production. As developed, its “typical” plant could fulfill the liquid fuel needs of a city the size of Louisville, KY or Albuquerque, NM. Ironically this practical but transformational concept depends on low-risk technology. Almost all the technologies already exist today and operate at large scale. Furthermore a close cousin to the “new” technology also already exists and is widely used today. As such, Green Freedom is free of scaling limitations and most of its plant could be designed and built today because the principle focus would be on the unique integration of known technologies rather than their development.

Green Freedom works by extracting carbon dioxide from the atmosphere and hydrogen from water to serve as feedstocks. Depending on the desired end product(s), these are converted, emissions free, to fuel by any of a number of established methods, such as Fischer-Tropsch¹ or through a methanol-to-gasoline based process. This is not a new idea. At the heart of Green Freedom is a new electro-chemical process that reduces the energy required to capture and recover production quantities of carbon dioxide from the atmosphere by 96%. As a bonus, it also yields large quantities of pure hydrogen gas as a byproduct, which is also needed by Green Freedom for fuel production. This is the breakthrough that makes Green Freedom affordable.

For example, preliminary analysis, done in 2007, puts the price for Green Freedom™ gasoline, fully tax burdened and “at the pump” at ~\$5/gal. This is without benefit of optimization or carbon credits. When considering the extended system costs, it is uniquely even more valuable, which translates into real savings in money and lives. Green Freedom:

- creates the means and capacity for benign, major, new domestic fuels production;
- neutralizes destabilizing threats of unfriendly suppliers;
- doesn’t consume agricultural capacity or land;
- has a very small physical and environmental footprint;
- doesn’t compete for scarce water supplies due to flexibility to site all facilities near abundant sources;
- isn’t dependent on rare metals such as platinum;

¹ Fischer-Tropsch in combination with Green Freedom is carbon-neutral.

- reduces solid waste streams to a relative trickle;
- doesn't require revamping our fuel distribution infrastructure or retooling our engines; and
- produces an inherently cleaner fuel because its sulfur free.

Rather than consuming its feedstock for the significant energy needed to refine products, as is done at refineries, Green Freedom uses clean electricity from carbon-neutral power sources such as wind, nuclear, or hydropower.

Los Alamos National Laboratory and the University of Texas Permian Basin are working under a Cooperative Research and Development Agreement (CRADA) to develop, prove and integrate the Green Freedom™ technology in conjunction with the High Temperature Teaching and Test Reactor (HT³R) Program. We are currently performing "bench scale" testing and will transition into a pilot plant located in West Texas. If the transition through pilot plant tests continues successfully, Green Freedom offers a timely, if not the most promising, concept for using low risk technologies to provide security and economic stability for US energy supplies.

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