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The venture on Climate Technology

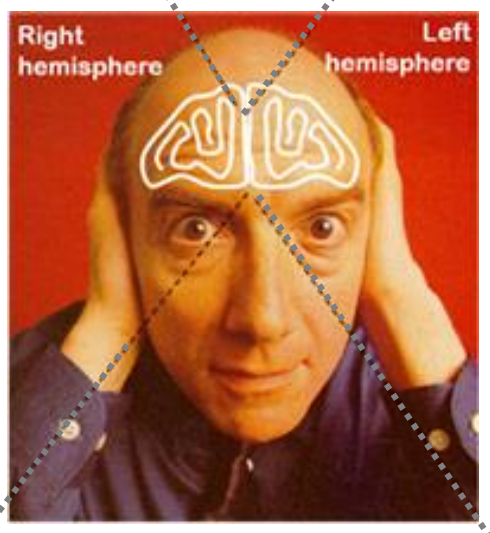
The game changer for decentralized hydrogen production and supply

Discussion Document
26 March 2026 Bangkok, Thailand

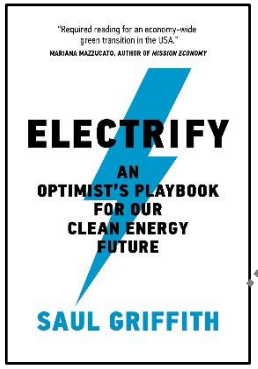
First priority is to change a mind-set on hydrogen's supply chain

The traditional mind-set to focus on centralized production of hydrogen is not the only way. We challenge a traditional thinking by new way of using decentralize production of hydrogen at site.

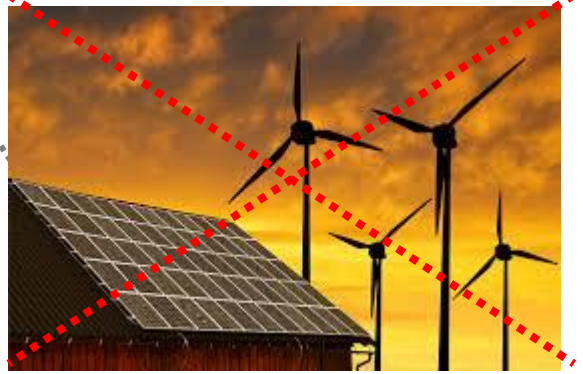
Our methodology is to use low heat to produce hydrogen where our feedstocks like ethanol or methanol are prevalent anytime and anywhere. The small production unit can be placed on site nationwide to avoid the storage and logistic that are the main cost of hydrogen supply. Total Cost of Ownership (TCO) is the key success factor.



Centralized hydrogen production faces a combination of logistical, economic, and technical challenges that make it difficult to scale efficiently. Its low density and highly flammable nature make transportation and storage costly and complex, requiring either high-pressure pipelines, cryogenic tankers, or chemical carriers, all of which introduce significant energy losses along the supply chain. Building the necessary production facilities and distribution infrastructure demands enormous capital investment, while the risk of single points of failure makes the system vulnerable. Additionally, if the hydrogen is produced from fossil fuels — as most currently is — centralizing production concentrates carbon emissions in one place, requiring expensive carbon capture technology to remain viable as a clean energy solution.



*…"Using **solar or wind** to make **hydrogen** wastes a lot more energy than just using that power directly (for example, in an electric car or heat pump). That's why the book named **Electrify** calls hydrogen a "false god" — it sounds like a clean fuel, but in practice it's inefficient as a general energy carrier."… **Saul Griffith***



SECOND PRIORITY IS TO AWARE THAT CENTRALIZE HYDROGEN FACE SEVERAL CHALLENGES

Even if there is the discussion on hydrogen initiative with ASEAN, it may be the focus on "centralized method" that may not suitable for Indonesia due to its hundred-island geographic terrain. The problem of centralized hydrogen production is the high cost and complexity of transporting and storing massive quantities of hydrogen from large production hubs to widespread end-use points, requiring extensive pipelines or energy-intensive compression/liquefaction, leading to significant energy loss, increased costs, and underdeveloped infrastructure compared to distributed models. While large-scale production offers economies of scale, the *distribution* challenge often negates these benefits, necessitating high transportation costs and energy loss due to the need to move it from large, distant production sites to end-users.

Production Challenges:

- Most hydrogen is currently produced from fossil fuels, resulting in significant carbon emissions.
- Green hydrogen production, using renewable energy, is still expensive and limited in scale.

Infrastructure:

- Hydrogen refueling stations are scarce, making widespread adoption difficult.
- Existing infrastructure for fossil fuels would need significant modification or replacement.

Storage and Transportation:

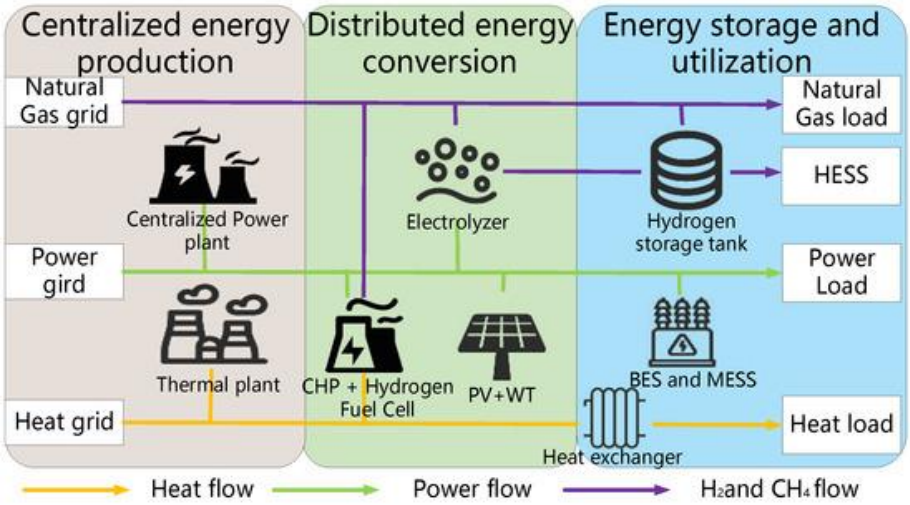
- Hydrogen is difficult to store and transport due to its low energy density and high reactivity.
- High-pressure tanks or complex storage systems are required.

Cost:

- Hydrogen production, storage, and transportation are more expensive than traditional energy sources.
- Economies of scale and technological advancements are needed to reduce costs.

Technology:

- Fuel cell technology, which converts hydrogen into electricity, is still developing and faces technical challenges.



SOURCING – PRODUCTION & STORAGE – TRANSPORT- POS

CHALLENGING ISSUES OF 3 TYPES: BATTERY vs. GREEN vs. BLUE H2 vs. H2 vs. BIO-H2

Availability of energy sources	Production & Storage	Logistic or Transportation	Point of sales & Service

1 Battery (EV)

The sources of energy somehow is not stable where the mining of rare earth materials are facing depletion. In the cold-country, the sun shine and weather are the problem. The storage of EV is also quite heavy and expensive while the obstacle is to carry heavy battery with weight is half of the automobile.




2 Green Hydrogen

Green hydrogen is H2 gas produced through (electrolysis) powered entirely by renewable energy sources such as solar, wind, or hydropower. It is much more expensive than blue or grey hydrogen due to high cost of renewable electricity and electrolyzer technology.


3 Blue Hydrogen

Natural gas process "steam methane reforming (SMR) where CO_2 produces is captured and stored using carbon capture. The production and storage are centralized with large investment and complicate while transportation make it difficult to achieve nationwide TCO.



4 Bio Hydrogen

The supply of ethanol feedstock is the challenge but solve with local production in each community. A storage of ethanol is accessible everywhere. It will have no issue on storage, logistic, transportation because ethanol can be shipped to our mobile skid unit where hydrogen will be made onsite at a point of consumption.



THREE PLAYERS IN OUR ECO-SYSTEM

Our eco-system comprises with 3 industries: feedstock – technology – off-taker.

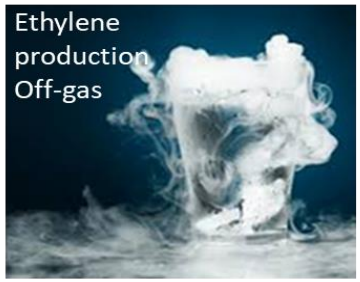
FEEDSTOCK PLAYER: Our technology requires feedstock provider who are in the "sugar-bearing" agriculture or alcohol producer. Our logic in making hydrogen is to ensure that cost to produce hydrogen must not incur the high storage nor logistic cost and has a stability of supply. The alcohol do not create high storage and logistic costs. When we distribute those feedstock (either in the form of ethanol or alcohol), we have much lower cost than the distribution of liquid hydrogen or gasified hydrogen.

TECHNOLOGY PARTNER: The process we use for the production of hydrogen consists of the production of alcohols from the fermentation of sugars, then a distillation process to raise the alcohol level to about 40% ABV. The 40% ABV alcohol is pumped into our system producing a final product of 99.999% to 99.9999% hydrogen with less than 0.2ppm carbon monoxide fuel cell grade hydrogen. The equivalent 100%, non diluted alcohol to produce 1 kilogram of hydrogen is about 8.5 liters of alcohol. To make 8.5 liters of alcohol requires about 13.55 kilograms of sugar or sugar equivalent. For example, molasses with a 50% sugar content would require 7 kilograms of bio-ethanol to produce 1 kilogram of biohydrogen etc.

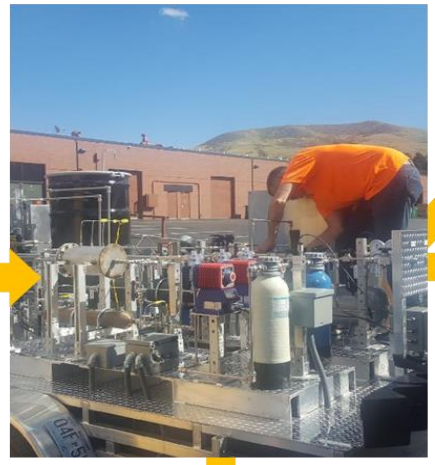
OFF-TAKER: Our off-takers are those who are in the user of a clean energy such as fuel cell vehicles, forklifts, material handling equipment and trucks. They operate at more than twice the efficiency of equivalent internal combustion engines without pollution to environment. Therefore the equivalent hydrogen price per kilogram at twice the price of a gallon of gasoline would be roughly equivalent.

FLEXIBILITY – SCALABILITY – TOTAL COST OF OWNERSHIP

BTH-CGA's decentralize hydrogen production offers advantage by using feedstocks available in each community such as: (1) ethylene by-product; (2) bio-ethanol from agriculture products (e.g. corn, casava, sugar/ molasses or even algae); (3) bio-methanol from the process of biochar. And we have the decentralize operation to avoid the high production, logistic, and storage costs. We has 3 philosophy of doing business: Flexibility, Scalability, and "Total cost of ownership or TCO".



REMARK: Our technology can use alcohol from 15 to 40 percent ABV



CARBON CREDIT

Ultra Pure Hydrogen
99.999% , < 0.2ppm CO

20% H2 exhausted available for combustion to support thermal processes

H2 remaining after separation that can be used for other thermal processes.

From the lab stage to the pre-commercial stage

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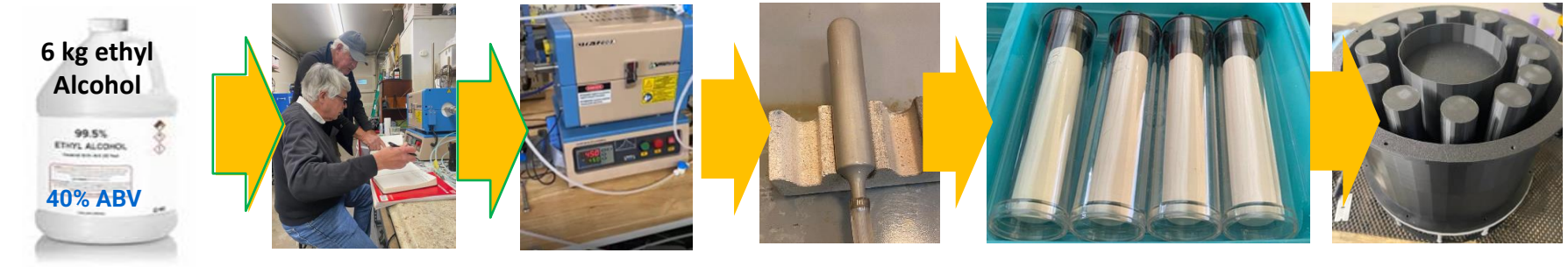
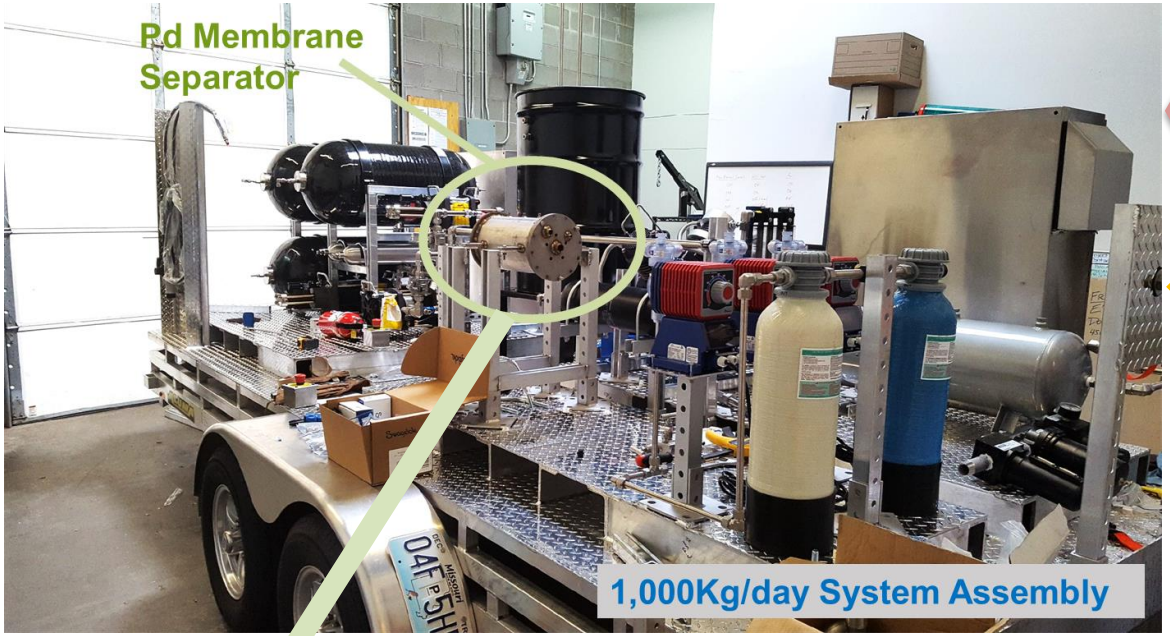
Bonne Terre Holdings, LLC (BTH) has developed never before used in the industrial gas industry, proprietary formulations, casting and firing protocols using unique, high performance, hydrogen targeted clay based ceramic structures for the production and purification of hydrogen using low grade alcohols as the hydrogen production feedstock. BTH produces, tests and operates all structures and apparatus using highly sophisticated and scalable operational and testing techniques. BTH also produces all alcohol feedstocks in-house using corn, molasses, corn syrup, sugar stocks and waste wine and beer for use and testing in our systems. These feed stocks for hydrogen production can be produced in local areas on most parts of the globe. Pictured below is a BTH hydrogen production line consisting of pumps, reformers, separation modules and mass spectrometer testing equipment used to produce and verify extremely low cost ultra pure 99.999% hydrogen production that meets the ISO and SAE standards for use in hydrogen fuel cell vehicles and material handling equipment.

Pictured shows our net zero carbon bio-alcohol derived hydrogen purity levels exceed ISO and SAE requirements and the 10 Kg.per day hydrogen “membrane separation with ceramic tubes inside”. Waste gas (slip) provides ~86.55 MJ/kg H2 — system is thermally self-sustaining.



DECENTRALIZE H2O (DBH2O): THE MOBILE SKID UNIT

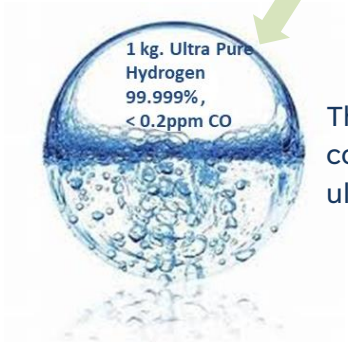
Our bio-hydrogen technology requires **NO STORAGE** and **NO LOGISTIC DISTRIBUTION** for hydrogen because we produce H2 on site where users can get feedstocks (crop wastes or alcohol waste) to generate hydrogen. People in each community act as the suppliers to bring agricultural wastes feedstock to our machine (mobile skid units) which can produce 1MW of electricity. Our mobile skid unit (1,000 kilogram per day) is the size of pick-up truck and can be moved to any corner of each community to power the homes, business or retail shops, or transportation.



7 kg ethyl Alcohol to get 1 kg. of H2

14 kg methyl Alcohol to get 1 kg. of H2

The preferred cost of ethyl alcohol feedstock should be less than $480-550 dollar per ton to generate a competitive price of ultra-pure hydrogen at less than $5 per kilogram.



The expected whole sales price we can achieve would be $7-8 per kg of ultra-pure hydrogen.

Our decentralized bio-hydrogen production on-site technology does not require any type of storage nor logistic distribution. We either make it on site or deliver ethylene by-product or ethanol to our production site. It is anytime & anywhere model.

PROCESS TO MAKE BIO-HYDROGEN

USING MOBILE SKID UNIT (MSU)

People bring product for fermentation	Warming up mobile skid unit	MSU produce alcohol from fermentable products	Heating process	Ethanol Steam Reform	Process to make 99.999 percent hydrogen output
People in each community bring maize, molasses, sugar cane, corn, sweet sorghum, cassava, other kinds of “waste fermentable products”.	Use plug in mobile skid unit to electricity or power generator only for starting it which take 1-2 minutes (option is to use). System is warmed to operating at 800c temperature, in about 3 hours using external generator and stored hydrogen, propane, etc.	Mobile skid unit produce alcohol from the mash with an initial yield of 12 to 14 % ABV, achieved through a combination of enzyme treatment and yeast. Finally mobile skid use a soft distillation clean-up to a final alcohol concentration of 40% ABV (alcohol by volume)	The 40% ABV ethyl-alcohol is continuously heated at the reaction temperature within the **ESR** (Ethanol Steam Reform) reactor. The reactor operates at about 800 C. Lag time from alcohol injection to **UHP** (ultra-high purity) hydrogen occurs in a few seconds.	During operation, all heat is supplied by the combustion of waste gas and heat recovery. The composition of the reformate is about 73.1% H2, 13.1% CO2, 12.5% CO, and 1.31% CH4. The waste gas composition provides about 86.55MJ/kg H2 produced which is more than sufficient to support all system thermal loads.	Using palladium membrane purification our system yields greater than 99.999% ultra-pure hydrogen with CO levels less than 0.2ppm. Waste gas (slip) is used for combustion providing thermal energy for the system.

7 kg of a 40% ABV ethyl Alcohol to get 1 kg. of H2

14 kg methyl Alcohol to get 1 kg. of H2

Feedstock ratio to produce 1 kg. of ultra-pure hydrogen

Our team has been working with the liquor production companies to use their alcohol as the feedstock to make bio-hydrogen for truck fleet and forklift.

6 kg ethyl Alcohol **12 kg methyl alcohol**

40% ABV

Alcohol Feedstock for hydrogen production

40% ABV Alcohol In

Waste Gas In

1 kg. Ultra Pure Hydrogen with 99.999% , < 0.2ppm CO

H_2

The preferred cost of ethyl alcohol feedstock should be less than $500 dollar per ton to generate a competitive price of ultra-pure hydrogen at less than $5 per kilogram.

Feedstock for H2 production

20% H2 exhausted available for combustion to support thermal processes. H2 remaining after separation that investor can use for other thermal processes.

Truck & Forklift, Drone Refueling

FINANCIAL: Investor will receive up to 72% of annual output to claim Carbon Credit for each $2,000,000 System In Operation

Significant Carbon Offset Opportunities for investors

Each H2 unit of 1,000 kg H2/day system can offset at least 2,516 metric tons of CO2 per year. As seen in the graph, each $3 million investment in system can produce $395,174 up to $416,260 per year in carbon credits depending on where the credit is traded. This number could be much higher if the feed stock resulted in the reduction of methane emissions as the waste gases.

Ethylene by-product
Ethanol
Any Waste Gas

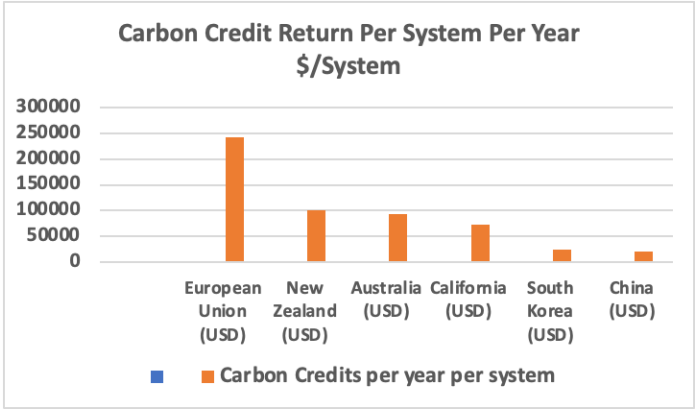
H2I Receives Carbon Credit for Offset

Fuel Cell Small Power producers

Low Carbon Electric Power Output

Our machine use Ethylene by-product, bioethanol, bio methanol as the feedstock for remote areas. A city home with air conditioning will require more power than a rural area home that may or may not use air conditioning. Then the local team can plan for the peak load and average load and size to meet the peak load.

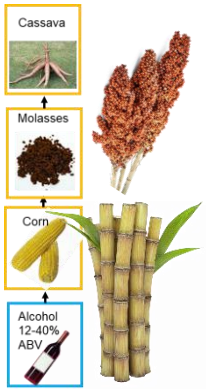
In the above example, our hydrogen can be produced in each community for homes in remote communities. This is just an example. Since we are flexible, we can engineer to meet what ever the requirements are.



POSSIBLE TARGETED INVESTORS

As the companies in the ethanol industry is the suitable investors, the below lists are the short-listing industries.

Agricultural companies
Corn (Maize)
Sugar Beet
Sugar Cane
Molasses
Cassava Starch
Throw-away Wine 12% ABV
Sweet Sorghum
Alcohols producer (40% ABV)



The large agricultural or alcohol firms who want to earn income from carbon credit or alter their outputs into H2.

Beside, the family offices who have philanthropy funds or activity relating to global warming, net zero, climate change.

Long-Distance Heavy Transport (Trucks, Buses, Trains)

Why Hydrogen Wins: Batteries become too heavy for >500 km range. Hydrogen stays light.

- Much lighter than batteries for long range
- Refuels in 5–15 minutes (like diesel)
- No long charging downtime
- Zero tailpipe emissions

Best Example

- Hydrogen trucks and buses developed by Toyota Motor Corporation, Nikola Company, and Hyundai Motor

Typical Use

- Highway freight
- Intercity buses
- Logistics fleets

Ships, Ports, and Maritime Transport

Why Hydrogen Wins: Multi-day operation, batteries are impractical.

- Batteries are too heavy for long voyages
- Diesel causes heavy pollution in ports
- Hydrogen meets future climate rules

Best Use

- Ferries
- Port equipment
- Coastal cargo ships
- Ferries

Aviation & Drones (Future & Specialized)

Why Hydrogen Wins: Batteries limit flight time. Hydrogen extends it.

- Much higher energy per kg than batteries
- Batteries too heavy for long flights
- Zero-carbon flight potential

Best Use

Regional aircraft (future)

- Long-endurance drones
- Surveillance UAVs

Industrial Power & Backup Energy

Why Hydrogen Wins: Batteries = hours. Hydrogen = weeks/months.

- Can store energy for months
- Works during blackouts
- Continuous operation

Best Use

- Data centers
- Hospitals
- Factories
- Power plants

Remote Areas & Islands (Like Parts operations)

Why Hydrogen Wins: Hydrogen stores renewable energy long-term where batteries can't

- No grid needed
- Works with solar/wind
- Easier than shipping diesel long-term
- Clean energy

Best Use

Islands

- Mountain villages
- Mining sites
- Telecom towers

Heavy Machinery & Construction

Why Hydrogen Wins: Batteries slow work. Hydrogen keeps machines running.

- 24/7 operation
- Fast refuel
- No huge battery packs

Best Use

- Excavators
- Forklifts
- Mining trucks
- Port cranes

OUR 3 PRINCIPLES TO MAKE BIO-HYDROGEN DIFFERENT

Our 3 principles to make bio-hydrogen are: (1) the consideration of total cost of ownership to make hydrogen where the cost to find feedstock, the way to convert it into ethanol and then hydrogen, and logistic/ storage cost that users or off-takers have to bear the cost; (2) the flexible or ease of getting agricultural feedstocks in each community; (3) Decentralized hydrogen production capability or the ability to produce it anytime and anywhere with low investment cost and allow community to afford the production.

KEY FEATURES

- Total cost of ownership for biohydrogen
  - Production cost to do hydrogen
    - Cost per kilogram to produce of H2
    - Purity & Claimable carbon credit
  - Logistic & Storage
    - No Logistic cost to deliver hydrogen
    - Short-cycle and low storage cost
- Flexible feedstocks (crop/ chemical) found in each community
  - Cost of local feedstocks
    - Price & availability in each community
    - Conversion ratio to make ethanol
- Decentralized H2 production in the multiple-locations
  - Affordability & flexibility
    - Quick Scalability
    - Financing machine
    - Affordable cost for production per site
  - Ease of use & maintenance
    - Low cost of machine maintenance.
    - Ease for a common people to run machine

INFLUENCES FACTORS

- Carbon Credit refund
- Participation of industrial communities
- Government subsidies & support

The “Business Model” – seeking implementing partners in selected countries

We have business model similar to “coffee machine and coffee shops” where investor (or implementing partner) acts as the shop offering hydrogen output to off-takers (or end user) with a reasonable cost of hydrogen energy. We are doing the best in selected countries who use the final outputs for truck fleet, forklift, crane, rural households, and remote residences.

Early trial product of mobile skid unit can generate 50 kilogram of H2 per day. It can bring revenue for our investor/partner, apart from earning from carbon trading.

The role of investor is to act as the coffee shop by using our machine to produce hydrogen using alcohol as feedstocks to offer H2 to users (off-takers) in each community or each type of business.

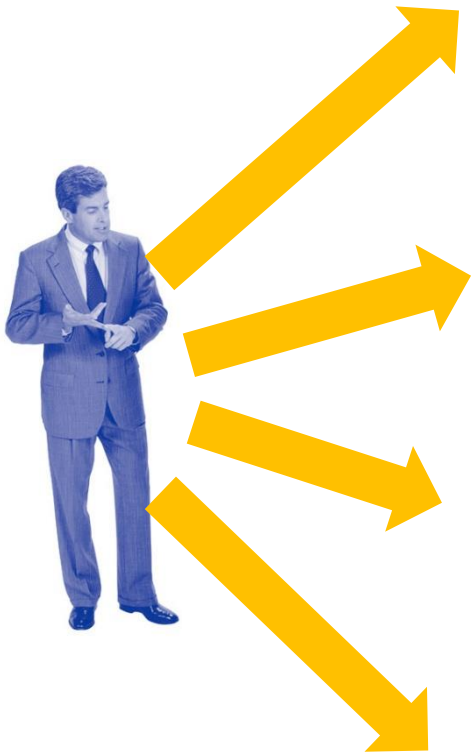
Every 7 kilogram of alcohol (ethanol) can offer 1 kilogram output **of H2.** Our technology can allow the partner to collect carbon credit around 72 percent of total tonnage of output per year.

Dan Pratte explained in the video as the link below:

https://vimeo.com/1023617609?share=copy#t=0

THE LOGIC BEHIND OUR BIO-HYDRFOGEN

The logic behind our decentralize bio-hydrogen technology are: bio-based hydrogen by the decentralize production, Modular Scalability, Ultra-pure with ability to monetize the carbon credit.



Decentralized Production: Producing hydrogen using ethanol or other renewable sources can reduce transportation costs and make hydrogen more affordable. We achieve to make 1 ton of ultra-pure hydrogen using only 7 ton of alcohol. of hydrogen from various agricultural or waste alcohol, making people in small city to act as feedstock .

Modular Scalability: BTH-CGA has been developing mobile skid unit (MSU) that is modular and scalable hydrogen production systems with high energy balance. MSU can be deployed in urban and remote areas, reducing costs and increasing flexibility while allowing the people in community to act as the feedstock providers.

Ultra-pure H2 – Total Cost of Ownership: Our methodology can generate ultra-pure hydrogen at 99.999 percent because our proprietary technology is the world's first invention to achieve ultra-purity with low total cost of ownership (TCO) to match end-to-end costs with grid power or diesel costs.

Claimable Carbon Credit: Our method is to focus making "bio-hydrogen from ethanol or agricultural feedstocks" with ability to claim carbon credits because crops input can actually be carbon-negative, meaning it removes more CO_2 from the atmosphere than it emits.