| DOCKETED | |
|---|---|
| **Docket Number:** | 21-TRAN-02 |
| **Project Title:** | Recovery and Reinvestment Initiative |
| **TN #:** | 237432 |
| **Document Title:** | GCarbon Comments - Presentation Zero Carbon Ethanol-Water Fuel for Generators |
| **Description:** | N/A |
| **Filer:** | System |
| **Organization:** | GCarbon |
| **Submitter Role:** | Public |
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| **Docketed Date:** | 4/13/2021 |

*Comment Received From: GCarbon*
*Submitted On: 4/13/2021*
*Docket Number: 21-TRAN-02*

## re Zero Carbon Ethanol-Water Fuel for Generators

*Additional submitted attachment is included below.*

# Zero Carbon Ethanol-Water Fuel For Generators

## High Power Output, Low Capital Costs and Low Operating Cost

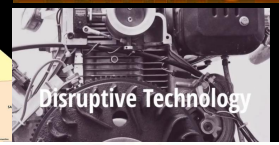
**Zero Carbon**

Next Generation Generator Technology

**MayMaan 40 kW Generator**


Thermal Efficiency 40%

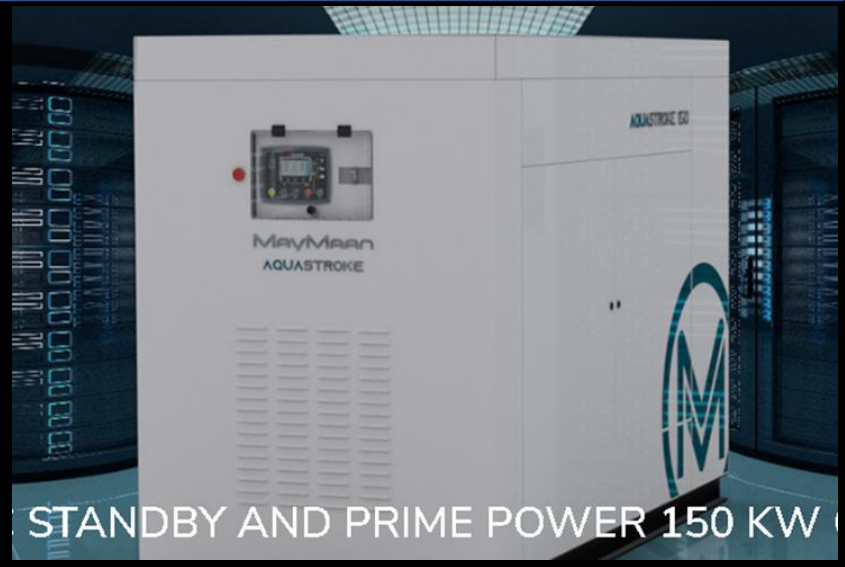
ETHANOL




MayMaan

Ethanol & Water Zero Carbon Fuel

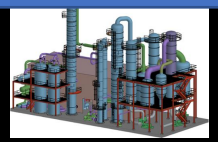
**MayMaan 150 kW Generator**





Creating CI Negative Crops, Reusing Waste

Producing Zero Carbon Ethanol & Food



Agave

carbon USA

Sweet Potatoes

# California Team:

## Working together to introduce new ethanol crops and water-ethanol fuel, engine & generator tech

Next Generation Technology


Generators

MayMaan

Motors

Super Efficient Engines Running on Ethanol & Water
Generators to provide back-up, peak and EV power

Ethanol & Water Fuel

ETHANOL e AQUA

Zero Carbon

Super Efficient Engines Running on Ethanol & Water
Generators to provide back-up, peak and EV power


Advanced technologies for crops
& ethanol /food production


New crop and planting technology
for improving yields, re-using wastewater

# MayMaan & eAQUA Zero Carbon

## Introducing engines, generators and fuel for zero carbon energy


MAYMAAN

**IC Engines**

**Generators**

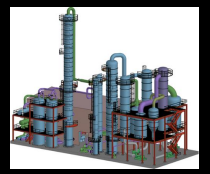
- ✓ MayMaan has spent 7 years developing an advanced engine that can use mixes of ethanol & water with 7 patents granted and 22 pending.
- ✓ The technology can be used on both gasoline and diesel engines, although most work has focused on diesel engines. There are prototypes of vehicles, generators & large engines and the company has licensed to a generator manufacturer & will have generators soon
- ✓ MayMaan has a high caliber Board of Directors consisting of leaders in the finance, high tech and business sector (see next slide)
- ✓ MayMaan has a team of dedicated engineers working at its Hollywood, FL facility on further research and demonstration applications of its engine technology in a variety of applications
- ✓ MayMaan received top tech innovation award from Jerusalem Post


**Tech Innovation Award**

eAQUA Zero Carbon

ETHANOL $H_2O$

- ✓ EAqua Zero Carbon was formed through a partnership of GCarbon USA and MayMaan to introduce water-ethanol as a zero carbon fuel
- ✓ The goal of the fuel partnership is to develop the ethanol sourcing, fuel certification and market development necessary for introducing a blend of 30% ethanol and 70% water for MayMaan engines
- ✓ eAQUA Zero Carbon is working with selected partners in the cane ethanol sector to source ethanol that have the lowest CI including a California producer and Brazilian supply. We are also developing ILUC solutions involving permanent preservation of Amazon
- ✓ eAQUA Zero Carbon has been negotiating to purchase ethanol from Enerkem which produces ethanol from post-sorting municipal waste
- ✓ GCarbon USA is developing new feedstocks with super high yields for ethanol from agave and sweet potatoes that produce food, fuel, fiber and sequester Co2



**Zero Carbon Fuel**

# MayMaan:
# Current Milestones

## PRODUCTS / PROTOTYPES:

- 4-cylinder Engine prototype + car prototype (engine replaced)
- Industrial prototype of generator
- Large bore engine demo
- Thousands of hours of internal testing showing stability and reliability
- 3rd party testing and verification - validating our claims
- 2 factories producing first marketable product - market release by Q2'21

## IP

22 patents filed, 10 granted, 7 countries

## SALES / PIPELINE –
**VALUED AT ~$50M IN PRODUCT SALES**

- Order for 150 trucks for the Eilat Port, Israel
- Licensing deal with a large Canadian Ethanol producer and Generator manufacturer
- Up to 30K units of generators for Cell tower operator

## PARTNERSHIPS

Negotiating a JV with Energy company in India

## AWARDS / ACCOLADES

Innovation and Technology Award - Jerusalem Post Diplomatic Conference

## FUNDING

$6M in funding, main investors/advisors - Nakash Brothers

# MayMaan Technology:

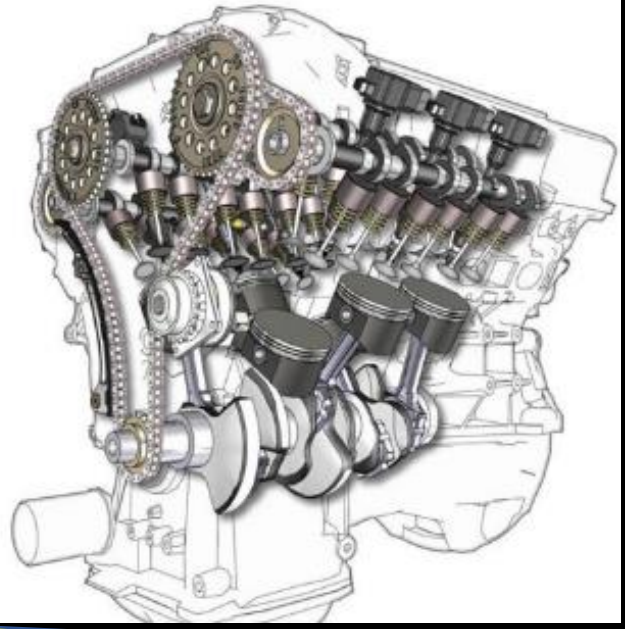
## 70% Water & 30% Ethanol with Specially Modified Engines


### (ICE) – THE MOST PREVALENT ENERGY PRODUCTION MACHINE ON THE PLANET SINCE 1876

2Billion ICE engines used all over the world for:

Cars, trucks, ships, airplanes, trains, generators, farming and construction equipment etc.

New ICE sales (units) set to grow from $200M in 2011 to $235M in 2025




**Our Approach is Simple, Keep The Engine Almost the Same,**
**Modify the Fuel Using Readily Available Ingredients:**
**ETHANOL & WATER**

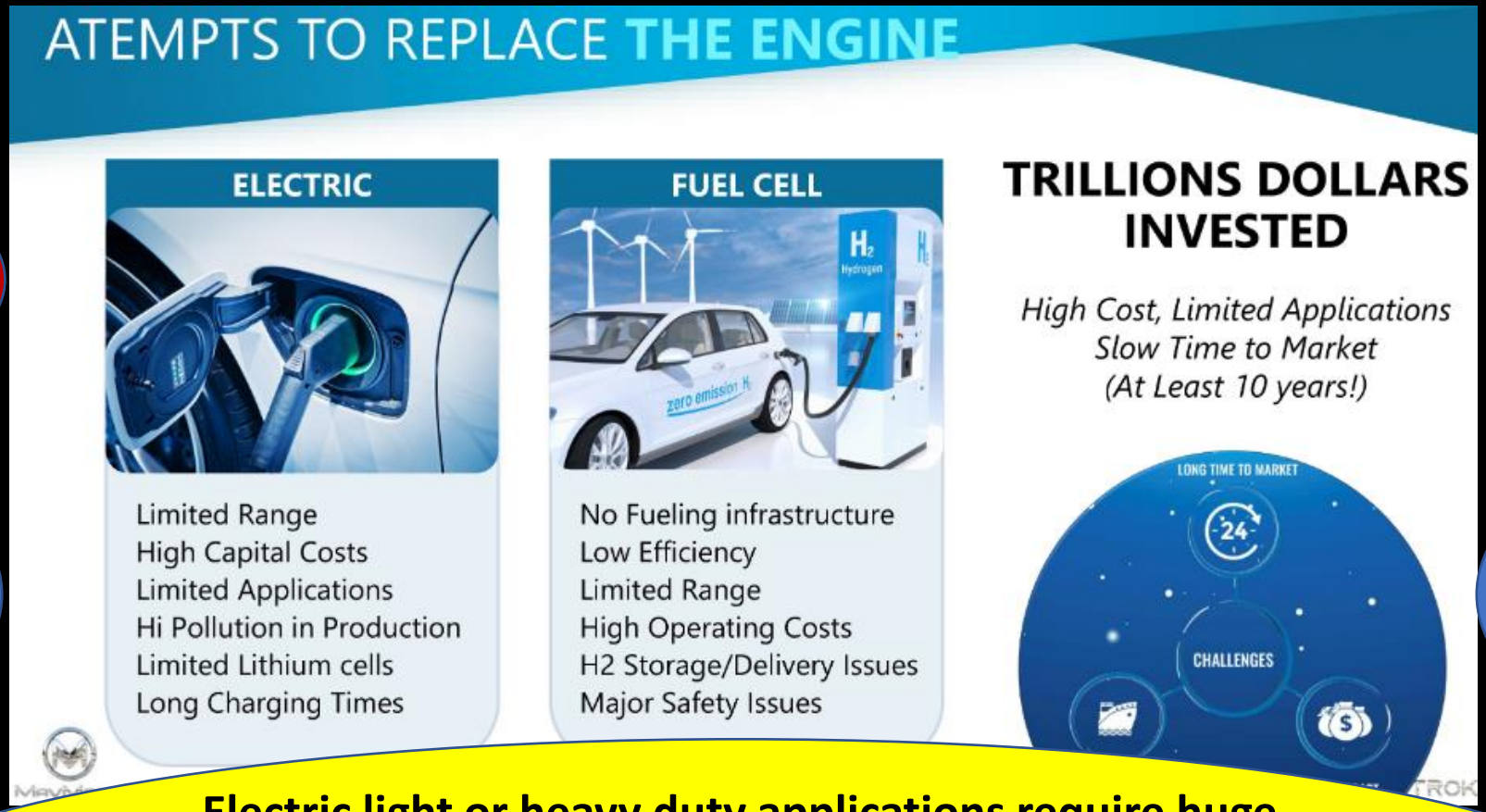
# MayMaan Is A Much Better Option than Electric or Hydrogen

## 70% Water & 30% Ethanol = Better than Electric Carbon Emissions

## ELECTRIC CARS ARE NOT ZERO CARBON!!! (29 g. Co2 per MJ)

Electric Car: Expensive & Limited Range

Ethanol & Water Fuel = Use in Diesel Engine (modified)




Hydrogen: Expensive Infrastructure & Dangerous

Ethanol & Water Fuel = Can use Diesel Tanks/Pumps

**Electric light or heavy duty applications require huge investments in vehicles & Infrastructure but do not provide any greater GHG emission benefits to MayMaan engines & ETHANOL & WATER FUEL**

# MayMaan Technology:

## 70% Water & 30% Ethanol for Specially Designed Engines

**Engines now modified are spark ignited**

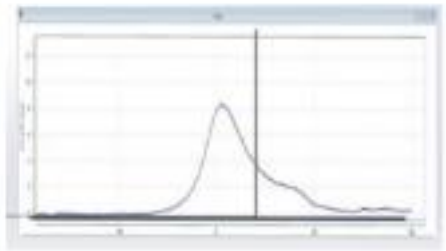
**Torque curve is same as diesel engine**

**Both gasoline & diesel engines can be modified**

# MayMaan Technology:

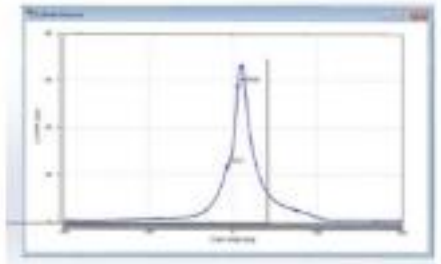
## 70% Water & 30% Ethanol for Specially Designed Engines

MayMaan technology uses otherwise lost heat and pressure to fracture the water content of the fuel, creating efficient combustion and steam



MayMaan Water Fuel Cylinder pressure Curve, 50% loss

**MayMaan FDT-70W**
**Engine Type: 4 stroke turbocharged**
Displacement: **2.0 Liter**
Maximum Output at 1800RPM: **45Kwh**
Maximum Output at 1500RPM: **40Kwh**



Typical Diesel / Gasoline Cylinder pressure Curve, 80% loss

**Fiat FTP S8000 AM1**
**Engine Type: 4 stroke Diesel turbocharged**
Displacement: **2.9 Liter**
Maximum Output at 1800RPM: **35Kwh**
Maximum Output at 1500RPM: **31Kwh**

- **Reduced Emissions** - The MayMaan Engine and fuel combination reduce emissions by as much as 50%
- **Reduced Cost** – approx. 50% energy cost
- **Low operating Temperatures**
- **Safe Fuel –** Very high flash point, no need for special fuel tanks
- **Very low NOx**
- **No SOx output**
- **No Soot**
- **Exceed 2020 IMO regulation**

# BENEFITS:

## 100% Renewable Zero Carbon Fuel for Generators and Engines

**FUEL IS LESS EXPENSIVE, ZERO CARBON (with right ethanol) & EQUAL TO PERFORMANCE OF PETROLEUM ENGINES/Generators**

**Fuel:**

- Clean and Renewable
- Easy to deliver liquid
- Blend Flexibility
- Available in most places
- Produced from a variety of raw materials (sugar, corn, etc.)
- High flash point
- Very inexpensive
- Non geopolitical

**Engine:**

- High efficiency
- Very High Torque
- Low operating temp
- Proven Design
- Many ICE manufacturers can produce modified engine with minimal production change
- Retrofit option
- Inexpensive
- Manufacturing tooling exists
- Scalable to any size

**Environmental:**

- Renewable and green fuel
- Very low NOx - No SOx output
- No Soot
- Clean combustion
- Exceed 2020 IMO regulation
- Low noise pollution

# MayMaan Technology:

## 70% Water & 30% Ethanol Generators


70% WATER

### GENERATOR ADVANTAGES

- SMALL BUSINESS BACKUP
- ENVIRONMENTAL ACHIEVEMENTS
- REDUCED OPERATING COSTS
- REDUCED ENVIRONMENTAL FOOTPRINT
- REDUCED LOAD DEMAND


### FUEL ADVANTAGES

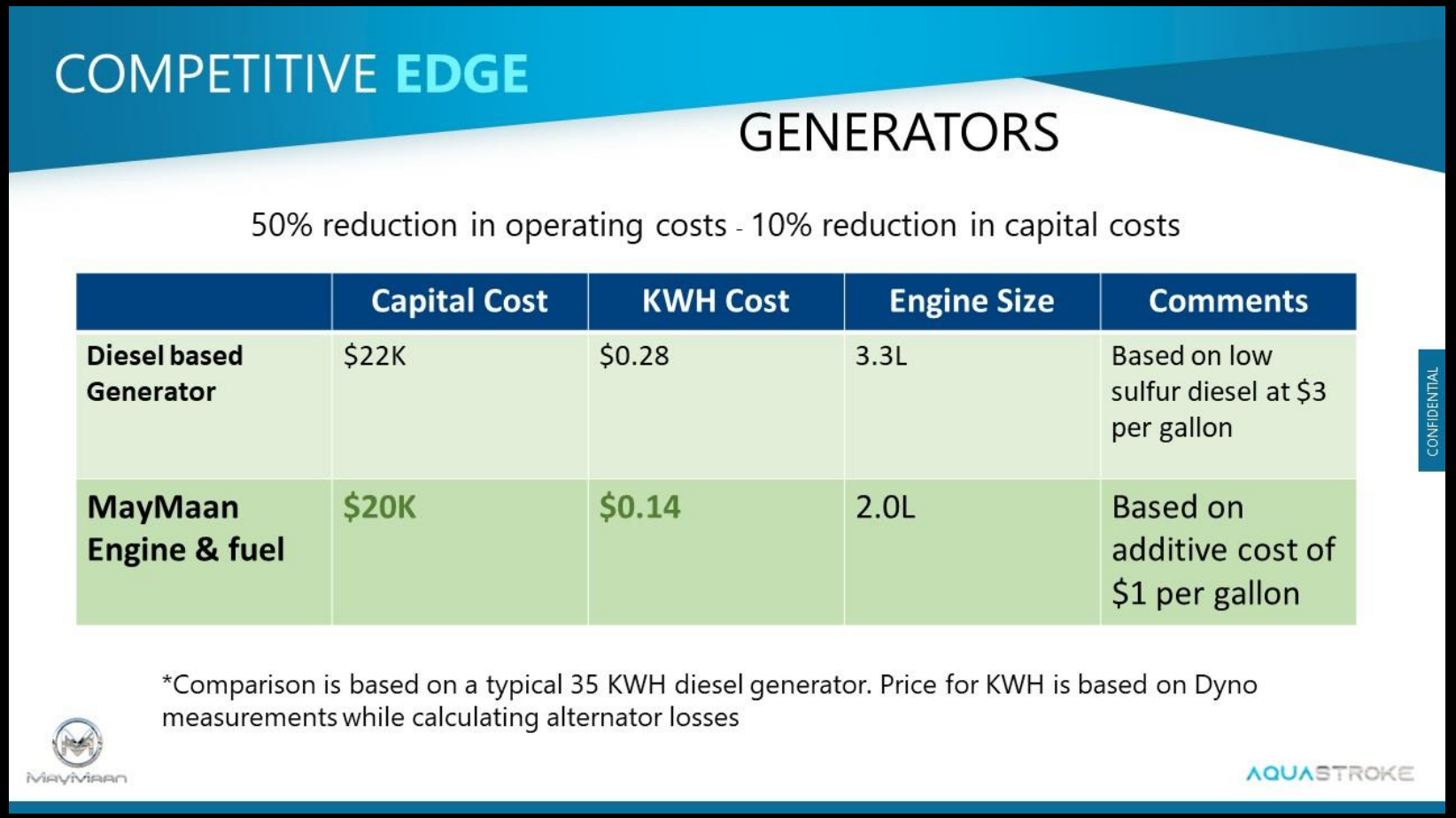
- FUEL IS CLEAN AND RENEWABLE
- AVAILABLE IN MOST PLACES
- PRODUCED FROM A VARIETY OF RAW MATERIALS
- VERY INEXPENSIVE
- EXISTING INFRASTRUCTURE
- HIGH FLASHPOINT

30% ETHANOL

# MayMaan Technology:
## Competitive Edge

Generators have same engine tech as truck or bus engine

Zero carbon, soot and SOX emissions achieved while saving money




| | Capital Cost | KWH Cost | Engine Size | Comments |
|---|---|---|---|---|
| **Diesel based Generator** | $22K | $0.28 | 3.3L | Based on low sulfur diesel at $3 per gallon |
| **MayMaan Engine & fuel** | **$20K** | **$0.14** | 2.0L | Based on additive cost of $1 per gallon |

50% reduction in operating costs can show real value in saving $$

Generators will be manufactured by major generator co. with warranty

The ability to deliver commercial generators in mid-2021 is very important to the marketing of engine technology in transportation sector since it allows customers to evaluate the efficiency and performance of the generators which use the same engine technology as larger engines in trucks, buses or tractors. MayMaan will be selling generators at a competitive capital cost by summer or fall of 2021 and save the customer about 50% on operating costs, making it a very attractive option for companies or governments needing generators

# One Solution; Microgrids, Peak Shaving, EV Charging

## 100% Renewable Zero Carbon Generators

- 100% Renewable Fuel
- Super Low NOx No Sulfur
- No Soot (PM 10 or PM 2.5) Emissions
- Zero Carbon Emissions

| MayMaan Generator Line | Voltage | Engine Type | Phases | KW rating | Availability | Application |
|---|---|---|---|---|---|---|
| **Aquastroke 40F** | 208-400V AC | 2.0L 4-cylinder, 16 valve engine, running at 1800 RPM | 1 or 3 phase | 40 Kw | 2nd or 3rd Quarter, 2021 | Peak power Backup power |
| **Aquastroke 20G** | 208-400V AC | 2.0L 4-cylinder, 16 valve engine, running at 1800 RPM | 1 or 3 phase | 20 Kw | 2nd or 3rd Quarter, 2021 | Telecom |
| **Aquastroke 150F** | 208-440V AC | 6.2L 8-cylinder, 16 valve engine, running at 1800 RPM | 3 phase | 150 Kw | 3rd Quarter 2021 | Prime power and backup |

- Fuel is not Flammable except in engine
- Fuel can be stored in standard diesel tank
- Fuel shipping can be reduced by 70%
- Fuel Efficiency Improvement of 33-50%


**High Efficiency, Zero Carbon, 100% Renewable Fuel, 100% Availability**

# MayMaan 40 kWGenerator Running on Ethanol/Water:

This new MayMaan generator was designed to provide reliable, clean power at a capital cost that is equivalent to a diesel generator but with much lower operating costs. It features an engine that is redesigned to maximize efficiency and durability while using a state-of-the-art alternator, voltage regulator and controllers. It can be configured to provide either single-phase or three phase power, including phase syncing and matching. Furthermore, multiple units can be connected in a parallel configuration for redundancy and load sharing and to provide higher capacity output.

One of the greatest benefits of our low operating cost generator technology is the potential to use if for load reduction and “peak-shaving”. When used in in conjunction with the grid supplied electricity, it can reduce or eliminate demand charges, saving a substantial part of the electric bill. In some cases it can reduce the bill by 50% (depending on utility rates and plans). This is not economic on a diesel generator because of the high fuel costs.

Aquastroke 40 – 40KWH generators – the right size for flexible application. We are marketing this generator for rural areas, backup power for mid-size businesses, telecommunication centers, off-grid primary power, and “peak-shaving” for businesses with substantial demand charges. One of the generator’s unique features is the use of a fuel explicitly designed for the Aquastroke Cycle. This discourages theft for use in other engines. The unit includes many safety features, including an emergency cutoff button and multiple sensors throughout the system.

Its enclosure is designed from durable materials, with rust, wind, and rain resistance. It is insulated in the internal walls to reduce noise levels and allows for specially designed ventilation inlets and outlets. An oil treatment system is included with all our generator lines to prolong and maintain the oil lubrication properties that ensure long engine life and reduce oil changes and maintenance.

**40 KW ENVIRONMENTALLY-FRIENDLY BACKUP & PEAK SHAVING GENERATOR**


**CUT YOUR ELECTRIC BILL BY UP TO 50%**

By eliminating demand charges

**BACK UP POWER THAT IS 100% GREEN**

70% water means no enviro impact

# MayMaan Generator 40 Kw Specifications:

## 40 KW SPECIFICATIONS BACK UP & PRIME POWER GENERATOR (110V/208V/440V)

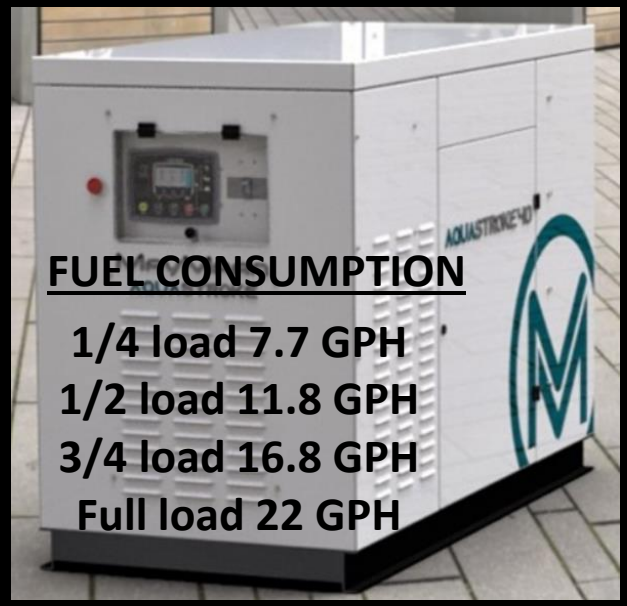
### VOLTAGE REGULATION
Type: Electronic
Sensing: Single Phase
Regulation: +- 1%

### CONTROLLER OPTIONS
Deep Sea: DS6120
Datakom: D-500
Datakom - Paralleling: D-700

### GOVERNOR SPECIFICATIONS
Type: Electronic
Frequency Regulation: Isochronous

### ALTERNATOR OPTIONS
Phases: 1 or 3
Voltage Output:110V/208V/440V
Engine speed / Frequency: 1800 RPM / 60Hz

### FUEL TANK CAPACITY OPTIONS
Premixed 100 Gallon or 200 Gallon
Not Mixed (ethanol with water supply)
100 Gallon




### ELECTRICAL SYSTEM
Battery Charge Altemator: 12V 30 Amp
System Voltage: 12V
Battery (not included) : Group size 35

### ENCLOSURE
Weather protective enclosure: Insulated
Painted Aluminum / Galvanized Steel: White

### GENERATOR SPECIFICATIONS
Type: Synhronous
Alternator Output Leads 1-Phase: 4 Wire
Alternator Output Leads 3-Phase: 6 Wire
Bearing: Sealed Ball
Coupling: Flexible Plate
Excitation System: Self

### MAXIMUM POWER OUTPUT
Backup 40 kWh
Prime Power 35 kWh

### ENGINE SPECIFICATION
Make Ford Model Druratec
Cylinders 4
Bore 87.5mm
Stroke 81.5mm
Compression Ratio 16:01
Intake Type Turbo Charged
Displacement 2.0 L
Valves pre Cylinder 4

# Dispatchable 40 kW Generator Running on Ethanol/Water:

## Dispatchable generator can last 110/250 hours full load pre-mix or add water

**Fuel is loaded in tanks and generator is on same trailer with extra tank in bed (2000 gal. capacity)**

**40 KW Generator**


**40 KW Stand-by Generator**

- ✓ MayMaan has a generator that mounts on a trailer and that comes with fuel tanks. This generator is "dispatchable" to wherever there is a need for electricity in a power outage or in providing power at a remote facility on a temporary basis. The trailer includes a 40 kW generator and two 500 gallon tanks that can either be pre-mixed water and ethanol in which case it provides about 48 to 72 hours of electricity (full load to ¾ load) with an extra 1000 gal. tank on the pickup can increase to 95 to 144 hours. This results in 100% renewable electricity with near zero carbon emissions that is dispatchable anywhere on demand. The same trailer can be parked at a permanent location to provide power for low income or indigenous communities, back-up power for a building or as power source for electric vehicle charging. It can also lower electric bills by running it daily at peak demand periods to reduce utility demand charges.

# MayMaan 150 kW Generator Running on Ethanol/Water:

**AQUASTROKE 150 KW GENERATORS: Large power output – Low environmental footprint**

The Aquastroke 150K generator is equipped with a massive 6.2L naturally aspirated engine, featuring adjustable cam phasing and dual exhaust sensors to optimize fuel economy and efficiency and minimize emissions throughout the complete load curve. It is also equipped with multiple load sensors to quickly respond to load fluctuation, maintaining a constant speed and power output. This provides super-clean electricity at drastic savings per KWH.

The system is scalable if used in a parallel configuration. Multiple units can share loads and allow for maintenance and repair without service interruption. The Aquastroke 150 will stabilize the load curve, using single or multiple units that will automatically adjust and compensate for this demand. This allows the owner to generate 100% renewable electricity with near zero carbon emissions for the following uses; prime power and backup, midsize businesses, data centers, peak-shaving marine use, and other applications

It is versatile, efficient, and reliable. It is also very useful as a means to provide power for EV charging stations to help avoid demand fees & system stress when EV's are connected. It is the lowest cost clean solution to 'off the grid' charging stations in parking lots or remote locations.

Each of our generator units is made with high quality generator ends and voltage regulators. It is covered with a specially designed canopy, insulated to reduce noise while providing resistance to wind, water and rust. One of the generator's unique features is the use of a fuel explicitly designed for the Aquastroke Cycle. This discourages theft for use in other engines. The unit includes many safety features, including an emergency cutoff button and multiple sensors throughout the entire system.

**150KW 110V/208V/440V, Automatic Standby and Prime Power 150KW Generators**


**MayMaan150KW generator is equipped with a massive 6.2L naturally aspirated engine, featuring adjustable cam phasing and dual exhaust sensors to optimize fuel economy, efficiency and emission reductions throughout the complete load curve to deliver a clean, green power machine.**

# MayMaan Generator 150 Kw Specifications:

**150 KW SPECIFICATIONS STAND BY & PRIME POWER GENERATOR (110V/208V/440V)**

## VOLTAGE REGULATION
Type: Electronic
Sensing: Single Phase
Regulation: +- 1%

## CONTROLLER OPTIONS
Deep Sea: DS6120
Datakom: D-500
Datakom - Paralleling: D-700

## GOVERNOR SPECIFICATIONS
Type: Electronic
Frequency Regulation: Isochronous

## ALTERNATOR OPTIONS
Phases: 1 or 3
Voltage Output:110V/208V/440V
Engine speed / Frequency: 1800 RPM / 60Hz

## FUEL TANK CAPACITY OPTIONS
Premixed 100 Gallon or 200 Gallon
Not Mixed (ethanol with water supply)
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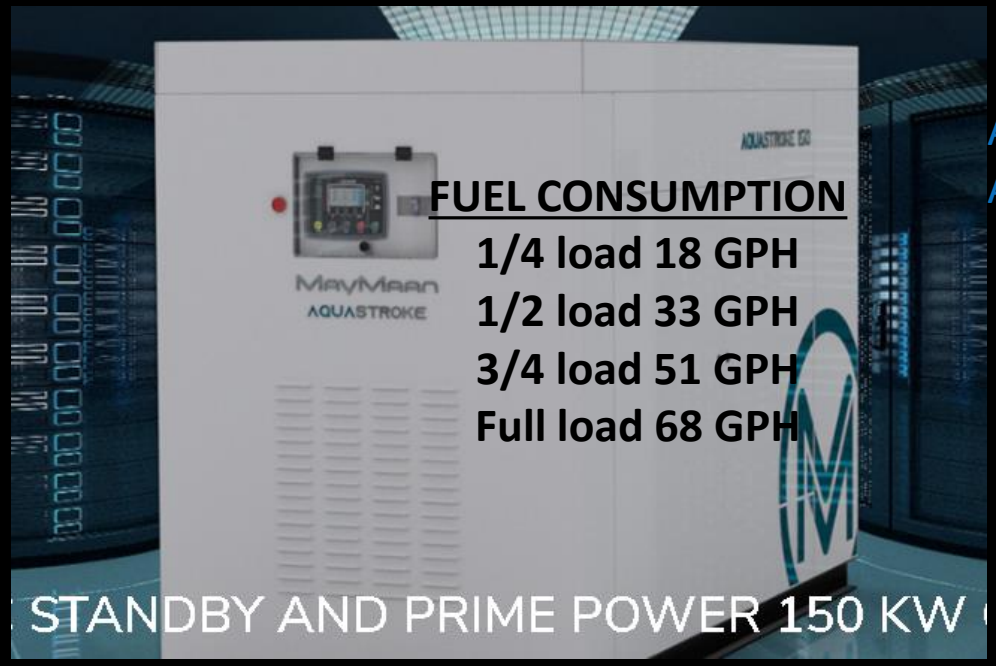


## ELECTRICAL SYSTEM
Battery Charge Altemator: 12V 30 Amp
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## ENCLOSURE
Weather protective enclosure: Insulated
Painted Aluminum / Galvanized Steel: White

## GENERATOR SPECIFICATIONS
Type: Synhronous
Alternator Output Leads 1-Phase: 4 Wire
Alternator Output Leads 3-Phase: 6 Wire
Bearing: Sealed Ball
Coupling: Flexible Plate
Excitation System: Self

## MAXIMUM POWER OUTPUT
Backup 150 Kwh
Prime Power 140 Kwh

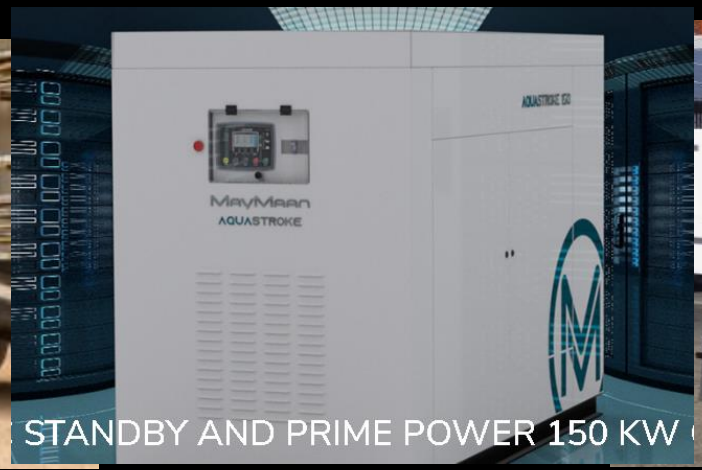
## ENGINE SPECIFICATION
Make GM | Model LT1GenV 6.2L
Cylinders V8
Bore 103.2mm
Stroke 93mm
Compression Ratio 14:01
Intake Type Naturally aspirated
Lifter Type Hydraulic
Valves pre Cylinder 2

# Dispatchable 150 kW Generator Running on Ethanol/Water:

## Dispatchable 150 kW generator can last 33 to 70 hours full load or half load

**Ford F550 truck to tow 20,000 lbs**

**150 kW generator requires big fuel tank on truck (1500 gal. capacity) gen./fuel on trailer**



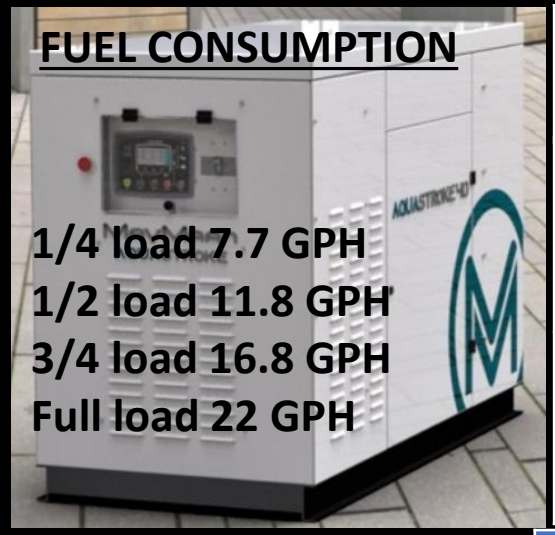

- ✓ MayMaan is also planning to build a larger mobile generator for verifying the performance of a 150 kW mobile generator running on renewable water-ethanol fuel This will require a larger pickup (Ford F550 dual wheel with dump truck bed and a gooseneck trailer hitch (B&W Turnoverball, part # BWGNRK1314) which is under bed installation so we have full use of the truck bed when we unhitch from the trailer and so we can place a large aluminum fuel tank in the bed of the dump truck. We will tow a fifth wheel trailer connected using the B7W Companion like part # BWRVK3500-5W so that we can tow 20,000 lbs on the trailer. This will provide a combined towing and payload capacity of 32,000 lbs which is within the 35,000 lb limit with a Ford F550. With this combination we can load 2200 gallons of fuel (600 trailer and 1500 gal tank on truck) which will allow the generator to operate for 33 hours of 100% load, and 70 hours at ½ load (48 hours ¾ load). The trailer includes a 150 kW generator and fuel tank that can be pre-loaded with ethanol-water mix or with pure ethanol in which case run time is increased by a factor of 2.5 times with water supplied by water tank. This results in 100% renewable electricity with near zero carbon emissions that is dispatchable anywhere on demand. The same trailer can be parked at a permanent location to provide backup power for indigenous or low income communities, a power source for electric vehicle charging or a peak shaving device for reducing demand charges.

# Volumes of Ethanol/Water Needed for Various Run Times:

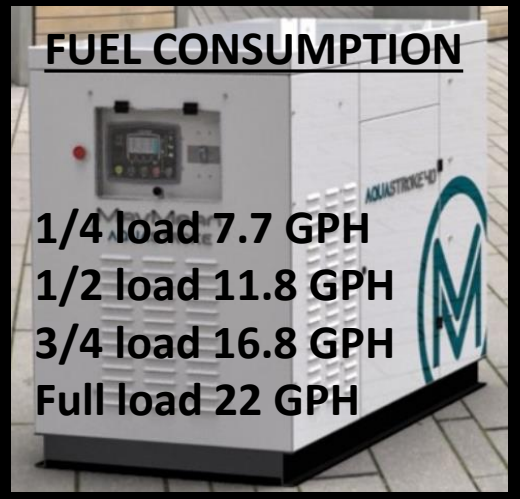
## Generator can use pre-mixed fuel or you ship 100% ethanol & blend water on site

**40 KW Generator**
**(40 kW stand-by, 35 kW at 100% load)**

**Run Times in Hours at Different Loads with Pre-Mixed or Mix Your own Fuel**




| Pre-Mix 70% water, 30% ethanol | ¼ load, 7.7 gph | ½ load, 11.8 gph | ¾ load, 16.8 gph | Full load, 22 gph |
|---|---|---|---|---|
| 1200 gallon tanks on trailer (2 tanks 600 gallons each) | 156 hours | 102 hours | 71 hours | 55 hours |
| 2100 gallons (2 tanks trailer, one 900 gal. tank pickup) | 273 hours | 178 hours | 125 hours | 95.5 hours (4 days) |




| 100% ethanol, mix in 70% water extra tank | ¼ load, 7.7 gph | ½ load, 11.8 gph | ¾ load, 16.8 gph | Full load, 22 gph |
|---|---|---|---|---|
| 1200 gallon tanks on trailer (2 tanks 600 gallons each) | 519 hours | 340 hours | 236 hours | 183 hours |
| 2100 gallons (2 tanks trailer, one 900 gal. tank pickup) | 636 hours | 593 hours | 416 hours | 318 hours (13.2 days) |

# Cost of Off Road Ethanol and Delivery Options:

## Generator is using off-road ethanol that is not taxed so cost much lower


**11,000 gallon ethanol tank = Large Jobber Fuel Truck Delivery**

Installation of an 11,000 gallon ethanol tank on the permanent site of the generator will allow for fuel delivery from a terminal. Cost to move 100 miles is about 5 cents per gallon. Smaller volume deliveries have higher costs/gal.

Ethanol fuel is about $1.50 per gallon Chicago plus 12 cents to ship to California. If you assume a 20% mark-up then fuel is $1.94 leading to a delivered cost of $2 per gallon.

Installation will also require a mixing tank so that water can be blended with ethanol prior to use in the generator. Size of this tank will depend on how often you want to blend water & ethanol

If we assume a few cents a gallon for water the cost of fuel averages out to $0.63 per gallon for the fuel and whatever the storage and blending costs are.

One truck delivery of $22,000 in fuel will provide net fuel of 36,630 gallons of fuel. This is sufficient to operate a 40 kW generator at 100% load for 1665 hours or 69 days. At ½ load it can operate 3,104 hours or 129 days

# Cost of Off Road Ethanol and Storage Options:

## In-Line blending of fuel leads to lower storage costs for fuel & water, dual uses for water

**20,000 gallon roof rainwater collection tank**

**11,000 gallon ethanol tank**

**Blending of water and ethanol can occur in-line using electronic mixing system typically used for ethanol-gasoline blending**

The two tanks above will provide a combined capacity of 33,000 gallons of fuel that will provide stand-alone power at 100% load for 69 days operating 24 hours a day (which means 5-6 months of 35 kW of electricity at normal load profiles). This type of storage can be used on larger generators such as the 150 kW in a commercial building or large emergency building system to provide power for an entire community during a power outage and on an on-going basis through integration with the grid and provision of peaking power or prime power to lower operating costs or reduce carbon footprint.

# Improving Renewable Fuel Performance with Aquastroke:

## Benefits in Automotive Applications

### Carbon Emissions Very Low Because:

Fuel Emissions Very Low or Zero

Water with Near Zero Carbon Blended at 70%

Very Low or Zero Carbon Ethanol Blended at 30%

Very Low Transport Emissions

Transport Done by Trucks, Trains, Vessels using Water-Ethanol Fuel

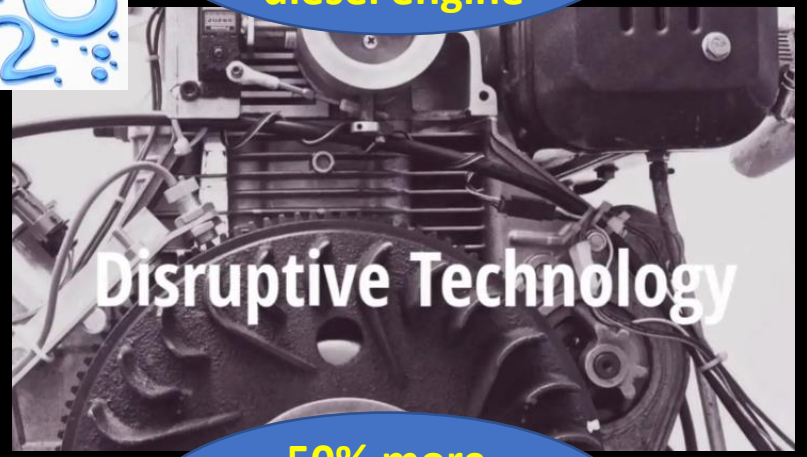
Super Low Carbon Ethanol Refinery


e

### Carbon Benefits From:

Very High Fuel Efficiency

33% more efficient than diesel engine




50% more efficient than gasoline engine

Tailpipe emissions 50% lower than ICE Engine

**ZERO CARBON EMISSIONS DUE TO EFFICIENCY OF FUEL & ENGINE**

# Competitive Edge in Automotive Applications:

## 100% Renewable Zero Carbon Fuel and Vehicles

### COMPETITIVE BENEFITS OF MAYMAAN VS. TOYOTA PRIUS AND OTHER DRIVE SYSTEMS

50% reduction in operating costs
35% reduction in capital costs

Compared to a Prius!

Zoom In

| | Capital Cost | Cost per Mile | Comments |
|---|---|---|---|
| Gasoline | $18K | $0.085 | Based on regular unleaded at $2.5 per gallon |
| Hybrid | $28K | $0.072 | Based on regular unleaded at $2.5 per gallon - Toyota Prius V |
| Electric | $40K | $0.045 | Based on KWH price of $0.12 |
| Hydrogen Cell | $45K | $0.095 | Based on published info |
| MayMaan | $18K | $0.038 | Based on additive cost of $1 per gallon |

# Possible Uses of MayMann Engines in CA Transportation:

## 100% Renewable Zero Carbon Engines in Cars, Trucks, Buses, Trains, Vessels, Tractors

### DRAYAGE TRUCKS

MayMaan has already modified a 6.2 liter engine and is in design stage on a 12 liter engine depending on match to replacement engine markets in USA and Canada. Drayage trucks are the most obvious near term market focus in CA in all of the major ports .

### VESSELS

The largest source of air pollution in major CA air basins is now vessels. Fuel and port power restrictions will ease emissions but efforts are needed to introduce technology quickly. Vessels are responsible for 2-3% of global Co2.

### BUSES

School and municipal buses are grappling with how to electrify their bus fleet given certain long routes and high capital costs. MayMaan offers a zero carbon solution with little impact on cost & much lower operating costs that competes with Elec. & Ren. Gas.

### LOCOMOTIVES

We are in discussions with Vale in Brazil about initiating a program to modify locomotive engines with MayMaan technology. This will provide a solution for US locomotives and help lower pollution and carbon emissions when operating in CA.

### CARS & PICKUPS

MayMaan is in discussions with major auto companies in Brazil/USA about incorporating MayMaan technology in their next generation of production engines. At 40% thermal efficiency we are very competitive

### TRACTORS & OFF ROAD VEHICLES

We are approaching various tractor engine manufacturers about use of MayMaan engines in their tractors. USA is a major ethanol producer and there is an obvious market in Midwest and in CA where carbon emissions from operations are important.

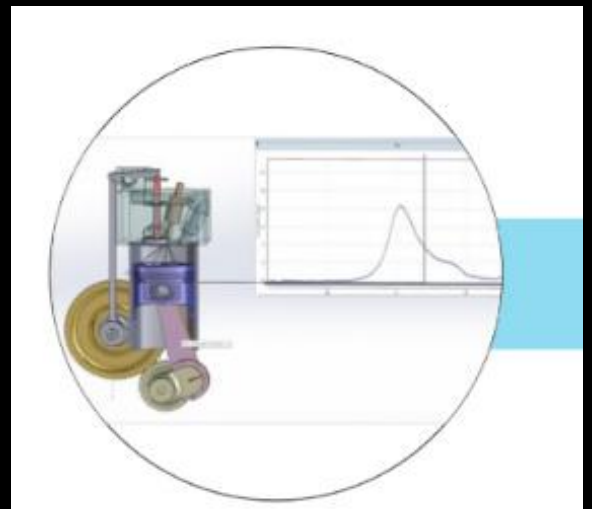
# Modification of Ford Focus & With Others Coming Soon:

## Ford Focus Has Been Modified & Tested for Several Years

**MODIFICATIONS ALREADY COMPLETED FORD FOCUS 2.0 LITER & 6.2 LITER**

**Modified Ford Engine Using AquaStroke: MR FDT-70W**

Engine Type: 4 stroke turbocharged
Displacement: 2.0 Liter
Maximum Output at 1800RPM: 45Kwh



**Typical Pressure Curve of the AquaSroke Cycle**

Cylinder pressure throughout the combustion stroke, producing high torque in low to mid RPM

**COMING SOON IS A 12.0 LITER TRUCK ENGINE**

- ✓ MayMaan has a dedicated staff of automotive engineers and research specialists that have the experience in modifying various engines from 2 to 6 liter and are now taking on much larger engines for truck, locomotive and vessel applications. We are interested in working with specific customers to tailor a development program to match their requirements, starting with generators and shifting to modification of specific engines matching their fleets and climate change & air pollution goals.

# eAQUA Zero Carbon Fuel – Solution to Pollution

## Pollution is the Main Benefit, Why eAQUA Zero Carbon Fuel is Critical to Reaching Goal

✓ Medium & heavy duty vehicles are a small portion of CAs registered vehicle stock (1 million trucks, 30 million cars), yet they are responsible for a disproportionate amount of fossil fuel use and emissions. Trucks represent only 3 % of vehicles but are responsible for 21 percent of on-road GHG emissions, 71 percent of on-road NOx emissions, and 98 percent of on-road diesel PM2.5 emissions. This is because they are only 1% of vehicle trips but 6% of vehicle miles travelled and cause 70% of pollution. CARB classifies diesel particulate emissions as "carcinogenic toxic air contaminants," with diesel engine emissions responsible for 70% of the state's estimated known cancer risk attributable to toxic air pollution. (CEC-IEPR, 2020)

✓ The main advantage MayMaan can bring to the table is speed of transition to near zero tailpipe emissions and better than electric carbon emissions. Electric trucks are only worth considering in new truck sales in looking at how to meet mandated goals. Most firms delay new truck purchase as long as possible and continue to operate very dirty older trucks. In the case of MayMaan technology there are zero PM 2.5 emissions and very low NOx and the technology is cost effective when engine replacement is needed. This is common in truck fleets since engines need to be replaced every 200,000 miles and trucks only every 600K.

✓ Offering a zero carbon fuel that allows for continued use of diesel engines means the fleet operator can meet near term air quality goals and qualify for lower port fees or other incentives while not having to understand all of the complexities of electric truck ownership. It means entire fleets can be converted to save on fuel that will also rapidly lower pollution.

# Target CEC Project: Replacement Engines, Drayage Trucks

## Market Acceptance; Class 8 Drayage Truck Study in LA

- A drayage truck study looking at alternative fuel viability was completed by CALSTART in 2013. While the study is a little dated there is a lot of similarity in the type and routing of trucks between LA and other CA ports that make data relevant.
- A typical drayage truck in LA has a daily range of about 200 miles and a distance per trip of 40 miles. Number of turns is about 3 with 4 or 5 on a good day. Refueling occurs every 2-4 days with diesel and turn time for refueling is about 30 min.
- Most drayage truck operations do not have centralized fueling at their facility and rely on fuel from a nearby refueling station. Any commercial effort will require a water-ethanol tank and pump set up at a commercial truck stop near the port
- Fuel economy of most trucks we are targeting is about 4.5 to 5.5 miles per gallon and are under risk of losing access to the port because of air pollution. We anticipate being able to match fuel economy of even the more efficient new trucks thereby providing at least 50% fuel savings per truck and emissions of zero SOX, zero PM 2.5 & PM 10 and zero carbon.

Table 2. Key Performance Parameters Related to Driving Range and Refueling

| Key Performance Parameter | Baseline Values |
|---|---|
| Daily Range | Up to 200 miles. |
| Distance per-trip | 40 mi, for example from the ports to the Inland Empire. |
| Number of turns per day | 3 is typical, 4-5 on a good day |
| Refueling interval | Baseline 2-4 days for diesel, daily for LNG. Varies greatly on number of turns daily and the container destinations. |
| Fuel economy | 4.5-5.5 MPG is typical; some new trucks up to 8 MPG. |
| Range per tank of diesel | 400 miles typical for diesel trucks |
| Availability of refueling infrastructure | On-site refueling is best, either through depot fueling infrastructure or a contractor traveling to the yard to fill up the trucks. Otherwise centralized infrastructure is important. |

**Engine rebuild with MayMaan ethanol/water engines will allow for a 33-50% improvement in fuel consumption with comparable performance to diesel drayage trucks**

# MayMaan Engines offer Quick Fix to Reach Zero Carbon

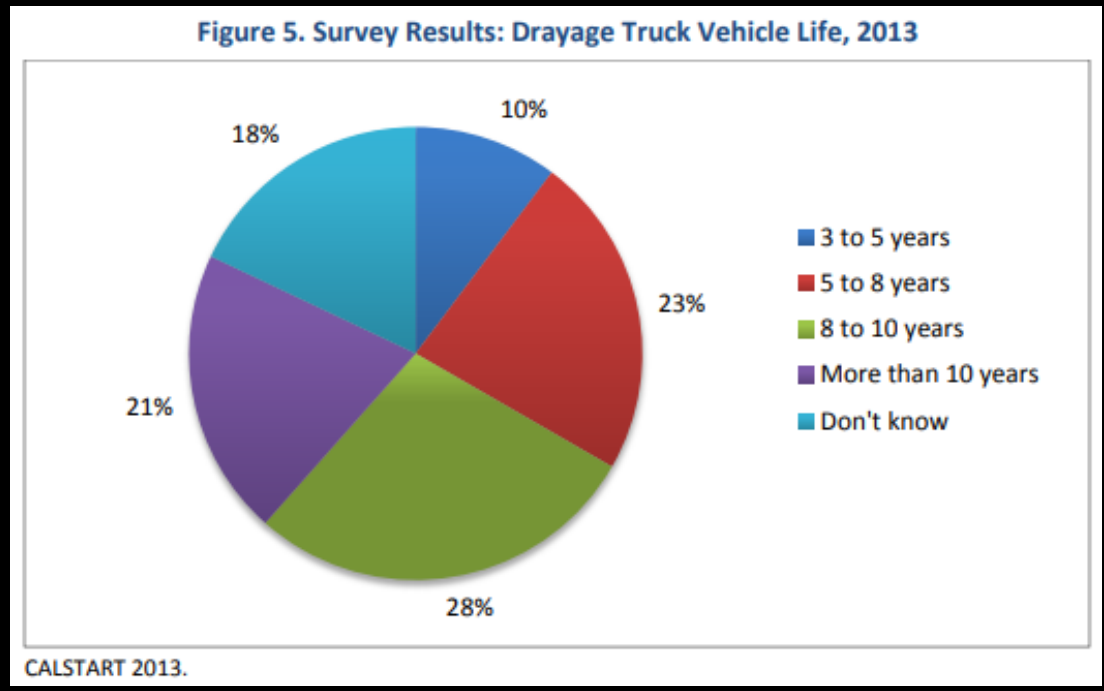
## Age of Trucks & Why Trucks are Replaced or Rebuilt

- A typical new truck costs about US$120,000 and an engine rebuild costs US$20-40,000. So truck companies are highly motivated to keep their trucks in service as long as possible.

- Typical life of a truck in drayage in LA is 8 years or older with only 33% between 1-8 years. A regulation that requires trucks be 8 years or less puts major strain on the trucking industry as there are not many alternative compliance strategies.

- Class 8 trucks are a major source of air pollution & fuel use in California. About half of the trucks are not covered under California regulations because they are registered out of state. While there are regulations requiring CA new truck sellers to sell increasing percentages of electric trucks, those regulations do not apply to out of state suppliers, leading to even greater sales and licensing of trucks in other states

- An alternative compliance strategy involving 30% ethanol and 70% water would not require any shift to out of state licensing and would allow for a rapid shift to zero carbon fuel & super low emissions to meet air pollution goals much faster than ZEV's. This can involve the replacement of engines when needed to MayMaan engines. Major benefit to truck fleets is the ability to continue using older trucks with new super-low emission engines



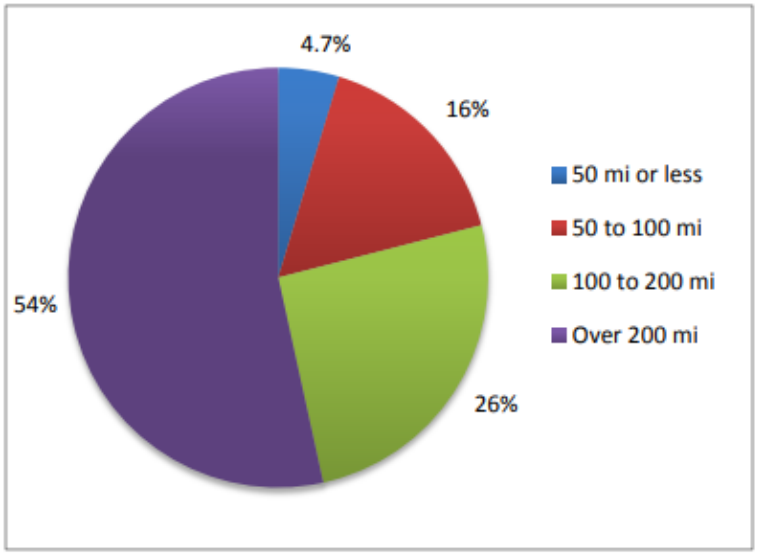

**About half of the trucks in LA in 2013 were 8 years or older and 18% were unknown age. Typical mileage before replacement is 600,000 miles. This means truck owners are motivated to replace engines vs. buying new trucks and need to do it regularly.**

# MayMaan Engines = Same Performance, Better Efficiency

## Performance Requirements of Class 8 Drayage Trucks can be fully met by MayMaan

- The requirements for gradeability and startability of drayage trucks is set by bridges trucks must cross at the Port. A truck must overcome a 6% grade, starting from a stop on that grade while fully loaded. Truck container weights vary from 10-90,000 lbs.
- Dray operators when interviewed expect a rebuilt engine to provide the same performance as a new truck engine. This is about 400 hp and 1,200-1,800 ft-lbs of torque. LNG trucks are unable to meet this performance standard so use is limited.
- Range of the truck will need to be equivalent to a diesel truck so that changes are not needed to refueling schedule. This is about 400 miles between refueling or every 2 days. Electrics not there yet. MayMaan range is better than diesel.
- MayMaan engine technology will be able to meet all of these performance parameters and deliver a longer range because of the improved fuel economy. We anticipate being able to match performance of 400 hp & 1200-1800 ft. lbs of torque with either a new or rebuilt engine. This will be accomplished while providing very large regulated emission reductions and a truck meeting zero emission GHG criteria
- MayMaan is planning to work with a fleet partner to evaluate a MayMaan engine in their truck in 2021 so we are ready for major commercial launch in 2022

Figure 4. Survey Results: Minimum Acceptable Distance Before Refueling




CALSTART 2013.

**MayMaan ethanol/water engines will allow older drayage trucks to meet same performance standard as new truck but with zero emissions of GHGs and super low air pollution emissions**

# Drayage Truck Engine Replacement: Ports in LA:

## Target is to use Port Regulations to Justify Engine Facility in LA Port Region

- ✓ The two San Pedro Bay ports — Los Angeles and Long Beach — form the largest container port complex in North America. Concern about public health and climate impacts has resulted in mayors of Los Angeles and Long Beach setting a goal to transition the fleet to 100% zero-emission vehicles by 2035.

- ✓ There are numerous challenges with replacing diesel drayage trucks with zero-emission trucks include nascent technology not yet proven in drayage operations; limited vehicle range; high capital costs for trucks and charging infrastructure; uncertainty about which entity would shoulder the upfront costs; and space and time constraints for vehicle charging. This will limit the adoption curve and slow down efforts to control pollution using this strategy alone. This provides an opportunity for a better-cheaper Zero Carbon alternative.

- ✓ MayMaan is in negotiations with various companies in the San Pedro Port area as well as the Ports of LA and Long Beach about an alternative that involves allowing water-ethanol engine trucks to qualify for the same port fees and incentives as zero emission electric or near zero emission gas trucks. In particular, this would involve preferential port fees and regulations that allow continued use of older model trucks if they put in new MayMaan engines that meet the air quality, carbon and renewable energy goals of the ports.

- ✓ Once we have the regulatory support, MayMaan will approach the major drayage truck fleets and get commitments to replace engines in their trucks consistent with the Port incentives. We will be doing a pilot program in 2021 so we are ready for a major engine replacement effort in 2022. We are confident we can sell about 1000 engine replacements or engine rebuilds with the fleets.

- ✓ To suppor this effort MayMaan will install an engine replacement facility and possibly an engine rebuilding facility to support the sale of these 1000 truck engines to drayage fleets. This may be done with a partner or as a stand-alone investment. This will result in about 1000 trucks by the end of 2022 that will require water-ethanol fuel delivery. We are interested in working with CA Energy Commission to make sure this infrastructure is in place in conjunction with this regulatory, sales and economic development effort in the LA port region.

# MayMaan Engines = Same Engine Replacement Cost

## Class 8 Engine Overhaul Cost Effectiveness & Benefits

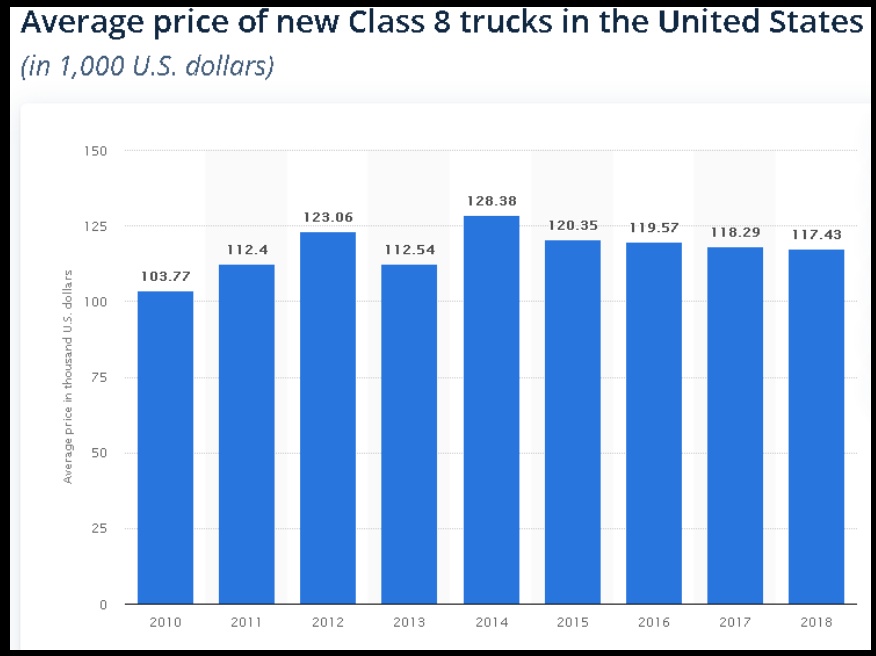
It is highly cost effective to use MayMaan technology vs. normal diesel engine replacement. To certify to 2014 or better standards requires both an engine rebuilt and an upgrade of oxidation catalyst to trap particulates. This is also true if new engine is installed.

The typical rebuild cost for a Class 8 engine is about US$20-$40,000 for the engine only with additional costs for oxidation catalyst. For drayage vehicles it is probably at the lower end. New truck engines are double this cost.

The rebuild or new engine cost for MayMaan technology will be equal or less because there is no need to replace the catalyst in the oxidation catalyst system. This should cut costs by $3-4000.

The rebuilt Class 8 truck will have much lower fuel costs and will be able to stay in drayage service at the port. The cost of a new truck is averages US$117-$120,000 so this is a big savings. Fuel efficiency of trucks before 2012 standards was 24% lower than new trucks so fuel savings are much greater. Fuel savings from MayMaan technology are 33-50% better than 2011 trucks.

MayMaan is planning to install an engine installation and rebuilding facility in LA to accommodate the truck industry. This will initially involve only new engine replacement in older model trucks but may shift to rebuilding engines depending on regulations and other variables.




**Rebuilding a Class 8 engine with MayMaan will not add to cost (US$20-40,000) as the only change is different piston design and fuel lines & pumps.**

# ZEV Buses or Trucks or Tugs; Range Extender, Power Boost

## MayMaan offers generator to extend range of EV Trucks, Buses, Tugs

- ✓ One major cost to electric trucks, tugs and buses is the large battery packs required to provide adequate range or torque. MayMaan has developed a generator system for heavy duty applications that can extend the range of torque of trucks, tugs,
- ✓ MayMaan generators are installed in the vehicle and integrated with the battery management system and automatically turn on when the battery discharge reaches levels that would be harmful to battery life. This allows the truck, bus or van to complete their delivery of people or goods without service interruption and provides greater vehicle flexibility.
- ✓ An analysis of the cost savings in a typical electric bus ordered from China suggested net savings on the order of 25% of the capital cost of the bus by reducing the size of the battery pack. Given costs in the $350,000 range, this is a big savings.
- ✓ Operation of the generator requires only water and E100 ethanol. Better fuel economy than diesel will provide fuel savings from the combination of electric and the generator at a lower cost than a diesel hybrid or all electric bus, truck, train or tug.



**Zero or Negative Carbon Emissions**
**CI (Life cycle Co2e – LCFS, estimated)**

**Up to 50% Better Fuel Economy**

# All Electric Trucks; Huge Impact on BC Grid Requirements

## Zero Emission Trucks; Impacts of All-Electric Trucks on Grid Meeting 2045 Zero Power Goal

A model study conducted by the Clean Energy Research Centre and the University of British Columbia investigated the impact of all-electric freight trucks (all classes, from light to heavy-duty) on greenhouse gas (GHG) emissions. To achieve a target of 64 percent reduction in GHG emissions in British Columbia by 2040, over 65 percent of freight trucks in B.C. would have to switch to all-electric powertrains, meaning all trucks being purchased from now on would need to be electric. California is targeting 100% ZEV trucks by 2045 and has even more trucks on the road.

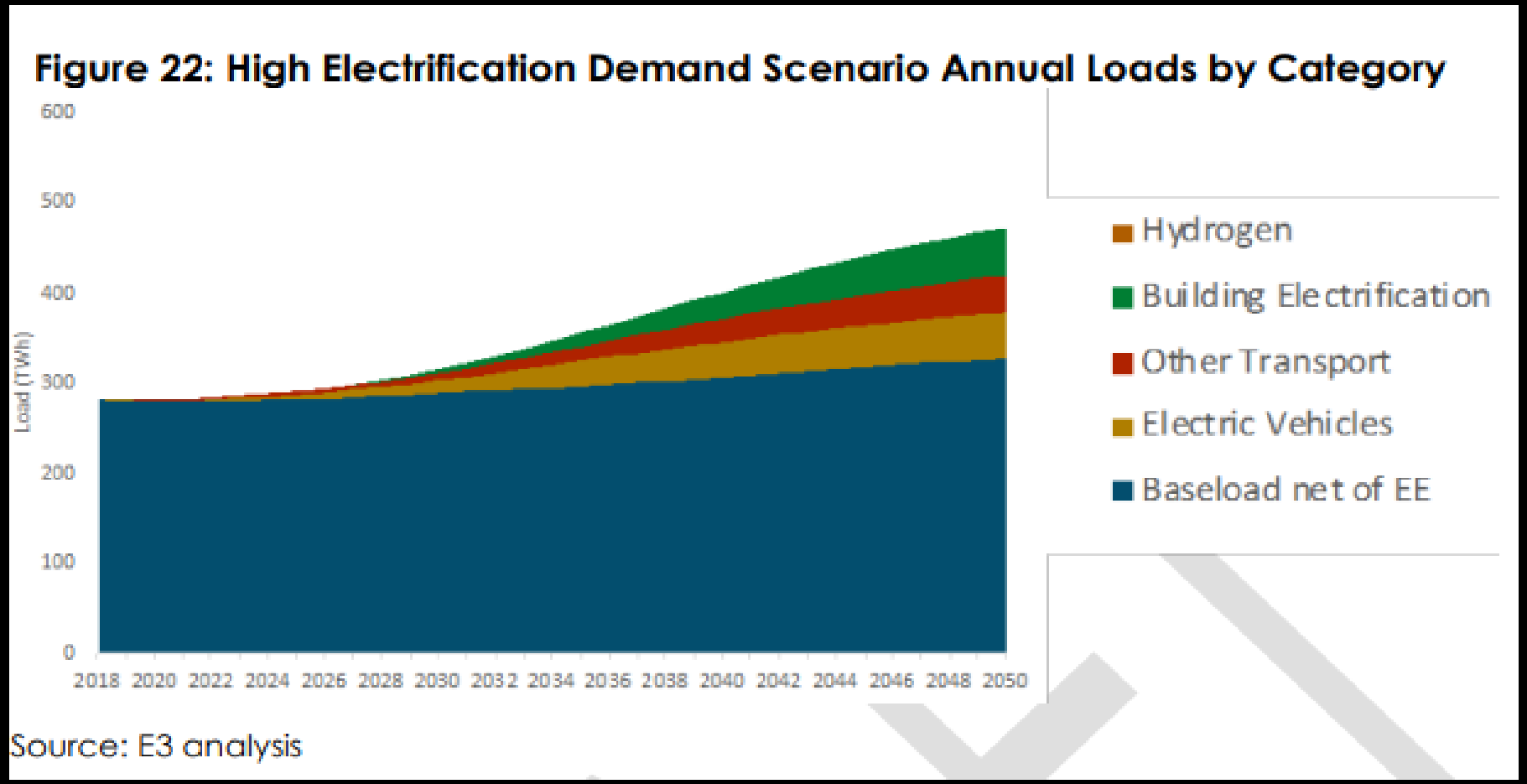
The study estimated that for every 1% reduction in greenhouse gas emissions, 1.5-3.8 % additional hydroelectric generation would be needed by 2040. Reducing GHG emissions via all-electric freight trucks would mean that B.C.'s electric grid would need to generate 12-33 TWh of electricity by 2040. This 2.5-6.5 times the projected generation of B.C.'s largest hydroelectric project in decades. Similar problems will exist with renewable supply in CA.

No electric trucks currently available can meet the range and performance requirements of drayage trucks and electric trucks have a cost differential similar to electric buses which have a $387,368 cost difference (based on Translink, BC study). This is not counting the charging infrastructure which triples this cost


**All electric trucks have been developed at a prototype scale (Hyzon class 8 truck above). Huge electric requirement needed for trucks to go electric and high capital cost/truck makes this option difficult to rely on by 2045**

# ZEV Trucks/Buses; Huge Impact on CA Grid Requirements

## ZEV Trucks & Buses; Adds a load to CA grid in 2045 almost equal to passenger cars

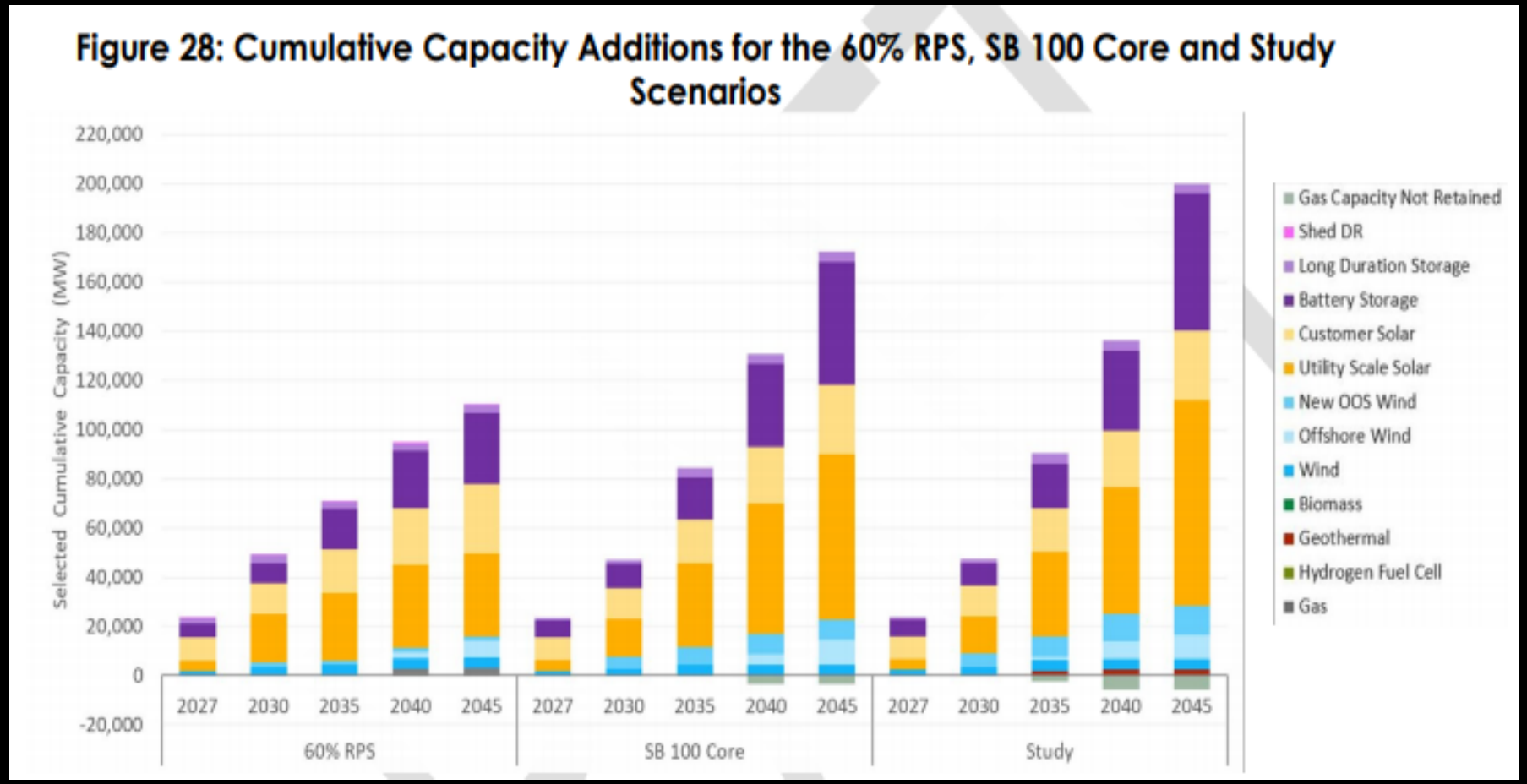



**Large energy requirements of electric or hydrogen trucks and buses will put major strain on grid addition requirements with an increase in load of about 20% from EV's, hydrogen and other transport and load management problems if recharging occurs at peak demand periods.**

California has already experience rolling blackouts in 2019 and 2020 from extreme heat and fires that affected grid supply of power. Climate change will make these events occur more often and at heat levels even more extreme than in 2019-20. This will put strain on the system Electric trucks, even with Time of Use charging rates, are likely to recharge in the afternoon to increase range and turns of freight. Quck charging of trucks and buses will put a huge strain on the electric grid. (CEC draft study, 2021)

# Plan to Meet 2045 60% Renewable Elec.= Expensive Batteries

## Additional Capacity of Renewables to Meet 60% goal = $8 billion added cost (batteries)




About 1/3rd of the capacity additions to meet the 60% Renewable Portfolio Standard will need to come from batteries. This will greatly increase the cost of RPS compliance and could be avoided if alternate tracks are taken to meet truck, bus and other heavy duty vehicle loads.

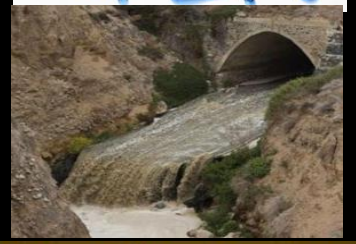
Also it could be 100% renewable if water ethanol distributed generation is added as it is cost-effective today.

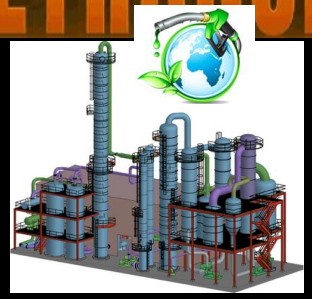
California SB100 requires CA utilities to meet a 60% renewable portfolio standard goal by 2045. Much of the cost of compliance is the neeed for batteries to cover load spikes during peak demand periods and this adds substantially to costs ($8 billion). More importantly this still leaves 40% of the grid non-renewable meaning that Zero Emission Vehicles will not be zero carbon even in 2045. (CEC draft study, 2021)

# New Crops, Jobs, Profit & Revival from Ethanol & Wastewater Re-use

## Cane, Sweet Potato, Agave, Integrated Ethanol Plants & Wastewater Re-use

Sweet Potatoes | Sugar Cane | Agave



Ethanol Plants | Renewable Power | Meat Co-Production




***Grow Back Better***

***Wastewater Re-use***

***Yield Enhancement, ILUC Solutions***

***Super-High Yield Crops***

***Build Back Better***

***Zero Carbon Ethanol***

***Integrated Food-Fuel Plants***

***Biogas/Solar Steam, Water Ethanol Trucks***

# Will There Be Enough Low CI Ethanol & Water?

## One CEC & Cal EPA concern is availability of low CI ethanol & water for fuel

### Ethanol Availability

- ✓ The slides that follow detail availability of plenty of low Carbon Intensity (CI) ethanol from California and Alberta. There is 68 million gallons available from sugar cane ethanol from Imperial Valley and 40 million gallons from MSW ethanol in Edmonton.
- ✓ Blending of 108 million gallons of ethanol at a 30% ratio would result in 360 million gallons of ethanol which is much greater than any requirement for the initial business focus on 1000 drayage trucks, which would only require 14.6 million gallons of fuel
- ✓ Increased demand for the fuel may occur quickly because of its competitive carbon and air quality benefits and capital costs that are a fraction of the requirements for electric or natural gas trucks
- ✓ To meet the larger demand as the technology gets adopted by engine and auto companies, we have detailed where long term supplies of ethanol will come from and how we can keep CI numbers very low from improving efficiency of each targeted feedstock for ethanol (sweet potato, agave & cane).
- ✓ Just one set of projects we are planning in Sonora, Baja California and California can provide up to 467 million gallons of ethanol/yr. When blended 70% with water this is 1.56 billion gallons of fuel.

### Water Availability

- ✓ The other major concern in California is water availability in light of the continued drought. This is a reasonable concern in some areas where new industrial projects must secure water permits to start-up
- ✓ The problem with this reasoning is that while clean water is a valuable resource, there is a lot of waste of water that is occurring that offers opportunities for use in fuel if water is a real concern.
- ✓ The most obvious example of water waste is the USEPA preference for building a wastewater plant in San Ysidro, CA to process Tijuana, Baja wastewater. This would require spending $400 million to process 2.2 Cubic Meters per second of wastewater that would be discharged after treatment to the Pacific Ocean. **This is 18.3 billion gallons of fresh water that is going to waste at a great cost to USA.**
- ✓ While we expect to initially rely on well water for meeting the requirements of any water-ethanol fuel, it would certainly be possible to use wastewater from CA waste plants. Water can also be collected in tanks from roof runoff and simply filtered. This has almost zero energy or resource cost and provides a huge supply of water depending on tank size.

# N. A. Sources & Volumes of Near or Zero Carbon Ethanol:

## MSW, CA Cane Ethanol, S. Potato Ethanol, Agave Ethanol

**ENERKEM**
Edmonton, AB
MSW 40 Mil.Gal

**CA Energy & Power**
Imperial Valley, CA
Cane Ethanol
M.Gal

**GCARBON USA**
Field trials Agave & S. Potato Ethanol Vol. ?

**GCARBON USA**
Mexicali & TJ , Baja
S. Potato & Agave
60 to 450 Mil. Gal

**GCARBON MEX**
Sonora, Mexico
S. Potato & Agave
60 to 450 Mil. Gal

- ✓ Enerkem has a plant coming on line in Edmonton, Alberta at the end of 2021 that will have 40 million gallons per year of ethanol from post sorting municipal solid waste. We are in discussions about using ethanol in projects in BC and CA.
- ✓ CA Energy & Power is building an ethanol plant in Imperial Valley, CA in 2021 that will have 68 million gallons per year of ethanol from sugar cane grown in Imperial Valley. We are negotiating what percent of this total might be available in 2022 when the plant comes on-line CEP-Unisystems- rev3 2015 from Conveyor Group on Vimeo
- ✓ GCarbon USA is initiating field trials in Imperial Valley, CA at the end of 2021 that will evaluate the feasibility of growing sweet potatoes and agave on 400 acres of land it is negotiating to lease from Imperial Irrigation District. Additional land may be available for purchase or lease for agave and total land for purchase being evaluated.
- ✓ GCarbon USA is negotiating with USEPA and NADB to recycle industrial wastewater and utilize treated municipal water to grow sweet potatoes and agave on 62,000 acres of leased coop land and install several ethanol plants and integrated hog facilities in Baja California.
- ✓ GCarbon Mex (under formation) is negotiating an agreement to grow sweet potatoes and agave on 25,000 hectares of leased coop land and install an ethanol plants and integrated hog facilities in Sonora, Mexico. The land is in the hill regions of Eastern Sonora.

**Various sources of ethanol will be obtained (up to 500 million gallons in 6 years) in connection with LCFS certification of the water-ethanol fuel that are close to CA users & currently have or will have super low CI scores**

# Brazil Sources of Near Zero Carbon Ethanol & Strategy:

## GCarbon Brazil involved in various programs to improve CI & export ethanol

**Coop Etanol**
Maranhao, Brazil
S. Pot. 2 Mil.Gal

**Coop Sisal**
Agave Validation
2 towns in MA

**GCarbon Brazil**
Two ethanol plants in MA. 388 Mil. Lit./yr.
S. Potato & Agave

**GO3 Carbon Coin**
Carbon Coin to preserve Amazon with SP for food/fuel

**UNICA-Ethanol Co's**
Program to improve CI using water-ethanol Coin to lower ILUC

- ✓ GCarbon Brazil is involved in a program to introduce sweet potato as a feedstocks for ethanol in conjunction with Coop Etanol. Funding of $6 million USD has been obtained and a 2 million gallon/year sweet potato ethanol pilot plant is being built in Maranhao.
- ✓ Coop Sisal is working with EMBRAPA , the Brazilian national research agency, to validate yields and suitability of agave varieties from our source. We are working with Coop Sisal to free up funds already appropriated that are in the bank and to initiate the project in 2021. We are planning to plant agave in 2 locations near ethanol plants planned by GCarbon Brazil.
- ✓ GCarbon Brazil is closing on financing for initiating a much larger sweet potato and agave ethanol plants starting in 2022. Two plants are planned with a combined capacity of 388 million liters of capacity. Planting of sweet potatoes will occur on 25,000 ha. of small farmer land in MA. Fish and hog production will utilize ethanol residual and vines/leaves. Both plants are on rail and ethanol will be exported to CA, OR, WA & BC. CI score will be very low from biogas & solar. Agave feedstock will be phased in from planting starting in 2022 by 2027 when capacity will triple.
- ✓ GCarbon Brazil/GO3 Carbon are in negotiations with Brazil Govt. and FUNAI (national indigenous organization) about a program to both provide food, fuel & power for indigenous tribes and preserve Indigenous intact jungles. The concept is to steer tribes away from supporting illegal logging & mining and towards planting potatoes & using water ethanol fuel for power & equipment while working on crypto coin carbon trading program to preserve jungles
- ✓ GCarbon Brazil/GO3 Carbon are working with UNICA and ethanol companies to introduce a program to improve CI of ethanol plants by using water-ethanol technology in tractors, trucks, locomotives and generators. We are also discussing participation in a carbon coin program for Amazon preservation in conjunction with deals to phase out ILUC in various export markets for ethanol. We are also introducing agave & s. potato as off season crops.

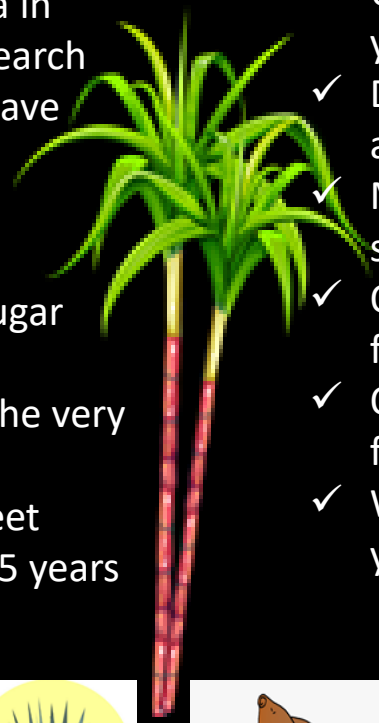
**Brazil will have a large surplus of ethanol as water-ethanol technology takes away market share over 10 years.**
**Plan is to improve CI of Brazil ethanol by introducing sweet potato & agave and a carbon coin to preserve Amazon**

# Improving Ethanol Crop Options for CA & Mex:

## Grow Back Better; Super High Yield Crops

### Better Crops

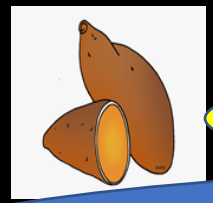
- ✓ GCarbon USA has access to super high yield crops such as sweet potatoes and agave from global sources
- ✓ We will be introducing both crops to California and Baja in conjunction with a test program with USDA Desert Research
- ✓ Sweet potatoes grown in Brazil for producing ethanol have achieved yields of 70-100 MT per ha./year
- ✓ A special variety of agave that has undergone selective breeding for a decade is reaching 100 to 700 MT/ha/yr.
- ✓ Agave requires only 1/3rd fertilizer and 1/3rd water of sugar cane and can grow on marginal land
- ✓ Sweet potatoes require better land & more water but the very high yield reduces land use impacts
- ✓ We plan on introducing both crops to the region as sweet potatoes can be harvested year 1 while agave requires 5 years to reach maturity



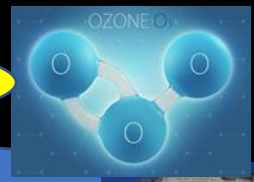
### Improving YIelds

- ✓ Go3 Carbon will couple crop introduction with new technologies to improve yield, reduce diseases & losses
- ✓ Use of diatomaceous earth with one farmer in Mexico led to corn yield of 12.8 MT/acre (2nd highest yield globally)
- ✓ Diatomaceous earth can be applied to control insects & worms as a dry application and enhances yield in soil
- ✓ Micro-organisms can be used to solve specific problems with salinity, disease resistance or to enhance yields
- ✓ Ozone can be used to treat diseases particularly viruses and fungus at the root level (verticillium,etc.) (organic)
- ✓ Ozone can also reduce crop losses in storage by eliminating fungus, bacteria & viruses on grains, potatoes
- ✓ We will use all existing and new technologies jointly with super yield varieties to achieve yield & organic goals

**High yield = -85-120% Co2**

**Less Disease = Higher Yields**




**High Yield Food, Fuel & Fiber Crops**
**Cane, Agave and Sweet Potatoes**

**Better Yields, Less Loss, Higher Value**
**Diatomaceous Earth, Micronutrients, Ozone**

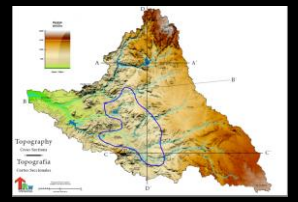
# Crossroads & Challenge:

**CA & US Govt. will spend $400 Mil+ on TJ River. Will it Sequester CO2 & Create Biofuel/Jobs or Emit Co2e?**

Sequester Zero, cause major Co2e emissions

Create 250 temp. jobs, 50 permanent

Sequester 9 million MT Carbon/year



Create 12,000 permanent jobs

## Option 1: Treatment at IWBC 50% of TJ Wastewater Only

| Item to Consider | Volume or $ amount | Benefit |
|---|---|---|
| **Wastewater treated** | 1,100 liter/sec now, will increase to 2,200 lit./sec. | Treat half of TJ wastewater, no Mexicali treated |
| **Co2e impact & sequestration** | Large methane emissions | No sequestration |
| **Re-use & sequestration** | none | No benefit |
| **Cost** | $400 million USD $30 mil./yr operat. | High risk invest if water reused later |
| **Jobs** | About 250 construction jobs, 50 operator jobs | Short term income from construction |

## Option 2: Recycle & Re-use, TJ & Mexicali Wastewater

| Item to Consider | Volume or $ amount | Benefit |
|---|---|---|
| **Wastewater treated** | 4,200 liter/sec by upgrade of existing and new bio-plant | Treat all of TJ and all of Mexicali wastewater |
| **Co2e impact & sequestration** | 60-80 MT/ha/yr soil – 2-3 mil. T/yr. | 200 MT/ha/yr. = 6 mil MT/yr. fibers |
| **Re-use & sequestration** | Reuse almost all wastewater | No benefit |
| **Cost** | $300 million USD l | Lower risk investment |
| **Jobs** | About 12000 jobs from planting, processing, comp. | Huge regional job & economic impact |

# Reversing Flow of Pumps So Water Goes to Desert Saves Money

## High electric costs & Co2 emissions avoided that save millions in OPEX, CAPEX

### LOWER OPERATING COST MEANS MORE WASTEWATER TREATED AT SAME COST

- 2.9 pesos per CMS to pump wastewater to San Antonio costs $9.6 mil. USD
- We can pump all the way to Las Palmas same wastewater and save half of costs
- Will move all 3.4 cubic meters instead of 1.7 cubic meters now moved at same cost
- This will allow Tijuana to treat all of its wastewater instead of counting on USA

### LOWER CAPITAL COST BY BUILDING WASTEWATER TREATMENT IN LAS PALMAS

- 3.4 cubic meters sent to desert , 1 cubic meter treated, 2.4 CMS new treatment
- System design is based on assumption that industrial treatment will occur at separate waste recycling plant and almost all chemicals kept out of treatment
- We will upgrade plants like La Morita to treat industrial separately
- We will improve Arturo Herrera and send treated water in same pipe
- We will use Las Palmas storage l for treatment by using natural grading for cascading ponds that will use biological system of water lilies to eliminate dissolved solids – dual benefit of wastewater storage and treatment using plants
- System design includes equalization tanks in front end and different treatments as sewage moves through biological system
- Ozone will sterilize wastewater at end of process so there are no viruses, bacteria
- Semi-treated water will be moved out to agave fields partly through processing when water no longer smells and after sterilizing
- Fully treated water meeting irrigation standards will be sent to Guadalupe Valley

### Upgrade will Double Capacity

**Old Capacity: 2 CMS**
**New Capacity: 2.4 CMS**
**Co2 emissions: low**
**Energy Cost low**

LOW ELEC.
LOW CO2

### Allmost All Wastewater Reused

**Capital Cost Indu.: $60 million**
**Capital Cost Res.: $60 mil**
**Piping/dam cost: $60 mil**
**Operating Cost: low**
**Reuse Rate > 80%**
**New Capacity: 2.4 CMS**
**293 million gal./day used for agriculture**

LOW COST
80% Waste Water REUSED

Large Volume of Water for Ag. = JOBS

# 3 Project Sites to Use Waste & Irr. water for Agave, Potato

## MEXICO

1) **Tijuana-Las Palmas & Guadalupe Valley**
3400 LPS wastewater
2900 LPS for agave
500 LPS for grapes-other
12,000 ha. agave
Low yield – 63 mil gal./yr
High yield – 252 mi, gal/yr

2) **Mexicali Valley**
1888 LPS wastewater
1888 LPS for agave/potato
7,552 ha. agave
Low yield – 40 mil gal./yr
High yield – 150 mi, gal/yr


## USA

3) **Imperial Valley**
121,000 acre feet irri. water
Future growth- wastewater
10,000 acres agave ph.ase 1
Low yield – 24 mil gal./yr
High yield – 72 mi, gal/yr

## TOTAL

**Wastewater & Water Use**
4,788 lit./sec. wastewater
+ 121,000 acre feet water

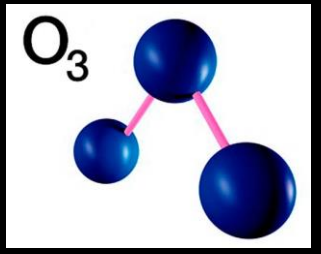
**Agave Growing Area**
23,552 ha. of Agave (Baja/CA)
25,000 ha. possible in Son.

**Agave Ethanol Production**
Low yield 127 mil. gal/yr.
High yield 467 mil. gal/yr.

# Introducing New Agricultural Tech to Imperial Valley & Baja

## Will use new technologies to lower disease, increase yield, lower salinity for all crops

- An important objective in introducing agave to Imperial Valley, Mexicali Valley and Tinuana Valley is to simultaneously look at other technologies that can help reduce agricultural risks, augment farm product values and eliminate problems like disease, soil salinity, drought, etc.
- In the technology section we provide a description of three technologies that we will be using in Mexico to enhance yields of agave and other crops and provide other benefits. These three technologies include diatomaceous earth, ozone and micro-organisms. The combined technologies can help eliminate disease, improve crop value and increase yield by acting on different parts of plants to augment their defenses and growth process.
- The proximity of a diatomaceous earth mine in Baja California will make it feasible to truck the product to the farming land in all 3 spots. This will help control insects, worms and improve yield. We will also be using ozone to treat root diseases like verticillium and fusarium, some of the toughest diseases now affecting crops globally. We will also demonstrate the use of micro-organisms to enhance growth rates of crops, lower salinity levels of soil and improve resistance to diseases
- The use of these strategies will not just be for agave. It is impossible for GO3 Carbon to plant 75,000 acres of agave in one year. The plan is to plant a total of 75,000 acres by year 5 in intervals of 15,000 acres per year. By year 5 we will have this total amount of agave planted but until then will have idle land. In the interim we plan on planting sweet potatoes to produce ethanol and will define benefits of two crops to balance how much of each crop to keep in permanent production
- The main advantage of the product line is that it can be grown organically as the micro-organisms can breakdown any agro-toxins that might be in the soil and provide the same level of plant protection using natural mechanisms. We will use the same approach to eliminate salt from the soil. More importantly, the end products such as vegetables and fruits will have high levels of minerals and vitamins that come from the micro-organisms. The combination of organic produce and higher levels of minerals and vitamins will increase market value. This will demonstrate new methods to turn marginal land into high value agriculture




**OZONE IN AG. = FUNGUS, VIRUS & BACTERIA CONTROL**

**DIATOMACEOUS EARTH = INSECT CONTROL, YIELDS ++**

**MICRO-ORGANISMS = HIGH YIELD, SALT CONTROL**

# Sweet Potatoes: Coop Etanol, GCarbon USA, Tech Partner

## Sweet Potatoes can Provide High Yields, Year Round Harvest

Gcarbon USA and its subsidiary companies in Brazil are working jointly with our tech supplier to introduce sweet potato tecnology to Maranhao and Brazil through coops and with high level technical assistance and new yield improvement technology

A very special variety of sweet potatoes developed by our tech partner and U. of Tocantins in Palmas can achieve yields of 70-100 tons/ha/year (higher yields require irrigation) This is a huge yield increase over normal crops in Brazil (corn 6 MT/ha, soy 4 MT/ha).

Gcarbon USA will duplicate this program in Baja California, Sonora and California by assisting coop farmers with irrigation, fish ponds, fish feed, yield improvement technologies and methods to prevent disease (ozone, diatomaceous earth, micro-organisms, integrated pest management). This will result in year-round, highly profitable, high yield farming that is also very low carbon.

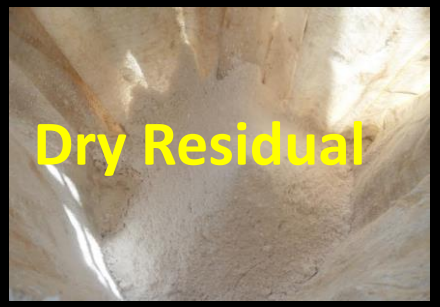
Coop Etanol do Brasil has received $R30 million from Min of Agriculture in Brazil and plans to initiate the first project in Bom Jesus das Selvas with a group of indigenous farmers and 10 cities. This will provide a model for farmers in CA & MX.

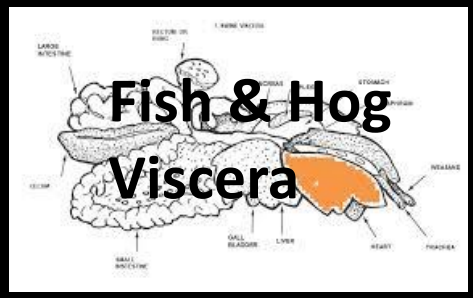
Gcarbon USA is confident this crop introduction effort Will result in much higher revenues for farmers and a steady supply of potatoes to produce etanol & hogs.

# Growing Hogs & Fish Because of Feed Availability



GCarbon USAis incorporating hog production in ethanol plants because of the large amount of wet residual available that can be used in a wet form if hogs are grown right next to the plant. Even at the initial pilot scale plant of 2 million gal./year this allows us to grow 2500 hogs and help the coop grow 2500 additional hogs. This will allow us to verify the increase in profitably versus the normal drying of residuals into DDG's. This can eliminate 28% of the capital cost in a large ethanol plant and can eliminate energy needed for drying which improves carbon impact of ethanol production.




GCarbon USA will also be assisting farmers to enter into on the farm aquaculture. This is aided by the ability to produce fish pellets locally using a combination of dried sweet potato residues, corn for flotation, soy meal and fish & hog viscera. This will lower the cost of fish production since this is 65% of the operating costs of an aquaculture operation.

# Summary: Waste Water Biologically Treated & Agave Results

**Type of crop & Min. Water**: Blue Agave, special hybrid variety, 600 mm per year

**Irrigation Volume Available:** 1 liter/second of irrigation water equivalent to 8.6 mm of rain/day

1 liter/sec = 8.6 mm/day * 365 = 3,139 mm per year
To achieve 600 mm/ha need 0.2 liters/sec. + evaporative loss, 0.5 l/sec

**Rainfall Available:** Mexicali: 71 mm/year Tijuana: 231 mm/year (not counted in total)

**Area Can Irrigate:** 2900 liters per second will allow for irrigation of 12,000 hectares in TJ
1888 liters per second will allow for irrigation of 7552 ha. in Mexicali

**Ethanol from 19,500 ha.** **harvest 3,910 ha. yr.= 103 million to 402 million gallons per year**

**Total Water/Agave TIJUANA** **2900 lit/second = 12,000 ha. = 2400 ha./year = 2.1-8.4 mil. MT agave**
**Low Yield Estimate - 880 T/ha: 420,000 MT sugar, 210,000 MT ethanol (63 million gal/year)**
**High Yield Estimate -3500 T/ha: 1.7 million MT of sugar, 840,000 MT of ethanol (252 mil gal./year)**

**Total Water/Agave MEXICALI** **1888 liters/second =7,552 ha. = 1510 ha./yr.= 1.3-5.3 mil MT agave**
**Low Yield Estimate - 880 T/ha: 266,000 MT of sugar, 133,000 MT of ethanol (40 million gal/year)**
**High Yield Estimate -3500 T/ha: 1.06 million MT sugar, 500,000 MT of ethanol (150 mil. gal/year)**

# Comparison of Yields of Agave Vs. Cane & Sorghum

## Variety Y & Z are hybrids only in 2nd year of evaluation so data is not validated yet

AGAVE VS OTHER CROPS

| | agave X | agave Y | agave Z | sugar cane | energy cane | sorghum |
|---|---|---|---|---|---|---|
| yield/ha (tons) | 880 | 2000 | 3500 | 100 | 200 | 70 |
| growth cycle (yrs) | 5 | 5 | 5 | 1 | 1 | 0.5 |
| yield/ha/yr (tons) | 176 | 400 | 700 | 100 | 200 | 140 |
| | | | | | | |
| fermentable sugars % | 20% | 25% | 20% | 14% | 8% | 10% |
| sugar/ha/yr (tons) | 35.2 | 100 | 140 | 14 | 16 | 14 |
| | | | | | | |
| fiber % | 30% | 30% | 30% | 25% | 30% | 15% |
| DryMatter/ha/yr (tons) | 52.8 | 120 | 210 | 25 | 60 | 21 |
| | | | | | | |
| Type land use | semi-arid | semi-arid | semi-arid | optimal | optimal | optimal |
| | | | | | | |
| Water requirement (mm/year) | 500 | 600 | 600 | 2,000 | 2,000 | 875 |
| | | | | | | |
| Fertilizer requirement (N:P:K) | 0:00:00 | 100:50:50 | 100:50:50 | 300:150:150 | 300:150:150 | 100:50:50 |

# Agave Farm

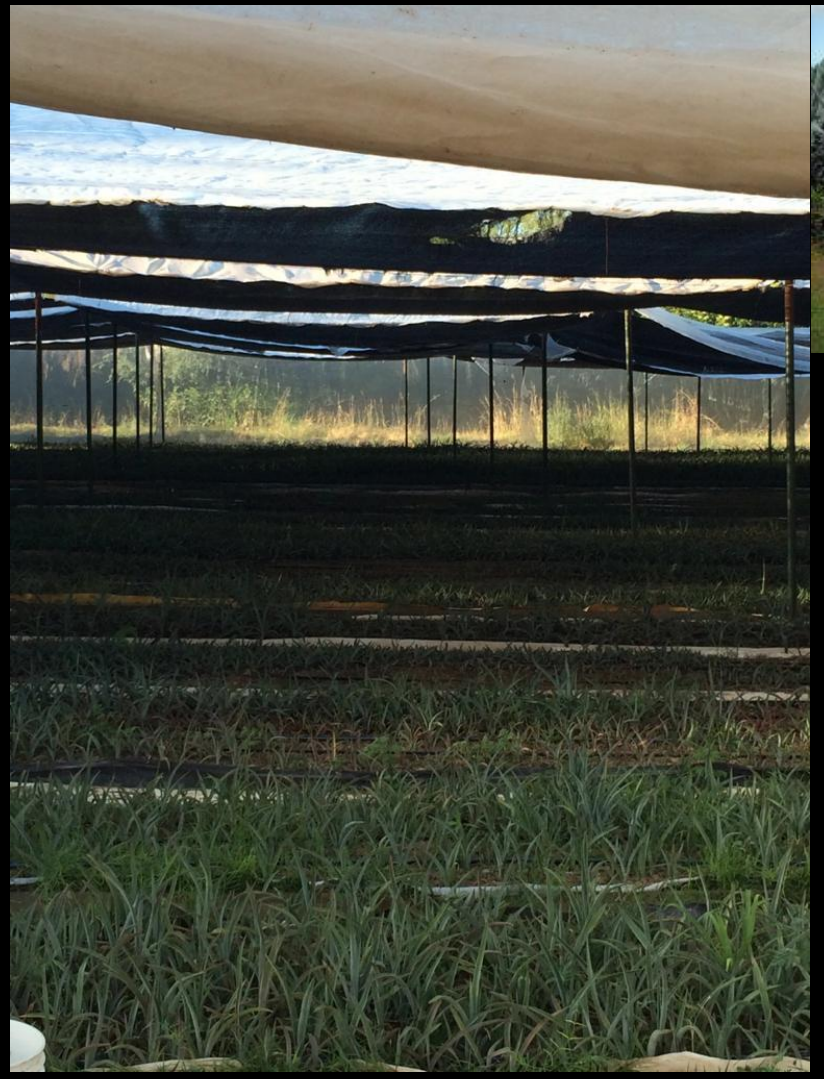
# Life Cycle of Agave

## Nursery, field planting, maturing, harvest of bulb with sugar

# Agave Project in Sonora: Large Opportunities for Growth

## Potential to plant 25,000 ha. agave in Sonora with river water

- ✓ The farming company we are working with in Sonora has a strong interest in expanding its production of agave to meet demands in etanol markets
- ✓ Sonara has large land áreas that are under-utilized because it is far from major population centers and population density is low. There is a lot of wáter at certain times of the year from full rivers catching rainfall in the mountains.
- ✓ We estimate that about 25,000 hectares of land is available for growing agave (now used mostly for cattle at very low density). This would provide between 25 million to 75 million MT of raw material a year which would produce 12.5 to 37.5 million MT of sugar and 6.25 to 18.8 million MT of etanol (1.9 to 5.6 billion gallons of etanol worth $5.5 to $17 billion USD). This is a much higher value than any other use of farm land in the región and Will provide Good profits for farmers and lots of zero emisión ethanol for California



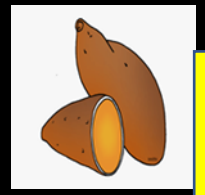
# How Can eAQUA have Zero Carbon Fuel?

## Lowering CI to Zero will require very low emissions & by-product allocations

### How can we reach a Carbon Intensity (CI) of zero or negative with ethanol?

- ✓ Carbon Intensity (CI) is the score given a fuel that is based on carbon emissions from crop, fuel and transportation versus carbon benefits based on the efficiency of the fuel in an engine or drive system. It is used to compare alt. fuels & gas/diesel
- ✓ Ethanol from corn had a high CI score (80-85 grams of Co2e per MJ/energy) although it dropped to below 80 with a change in ILUC scoring. Corn ethanol sold in CA is now averaging about 70 gr. Co2e/MJ due to mixed feedstocks (less corn, more sorghum).
- ✓ CA Ethanol market share has declined due to competition from renewable diesel and blend cap on ethanol of 10% (gasoline)
- ✓ Ethanol carbon intensity can be improved by using higher yield crops, reducing energy used for drying residuals, eliminating indirect land use change penalties (due to super high yields), co-product allocations (for example feed), renewable steam
- ✓ eAQUA Zero Carbon is confident that it can reduce CI to zero or negative numbers by both super-high yields from crops and by an integrated approach to use of wet ethanol residuals and crop residues for animal feed and biogas capture & solar for steam. Also ethanol/water in all trucks will reduce transport emissions and these numbers will be even lower when locomotives and ships run on the same fuel.

### Super High Yield Crops




No Indirect Land Use Change Penalty 10x yield of corn

**Sweet Potatoes 28-40 MT Acre**

**Agave 40-280 MT/ Acre/Year**

### Renewable Energy

No natural gas use

**Solar Thermal, Renewable Elec**

Avoided Methane Credit

**Biogas from Hog Wastes**

### By-Product Allocation

No Drying, More Feed

**Wet Residuals & Crop Residues for Feed**

Easier to Get ByProduct Allocation

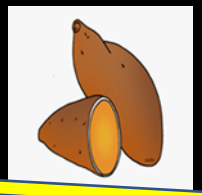
**Hog Plant Integrated with Ethanol Plant**

# Achieving Zero Carbon Ethanol:

## Why eAqua is Zero Carbon Fuel as a Result of GCarbon Innovations in Production

### Carbon Emissions Very Low Because:

Very High Crop Yields



Sweet Potatoes
70-100 MT Ha. =
10X Corn


Agave
100-700 MT/Ha./Yr
10-100X Corn

No Indirect Land Use Change Penalty

No or low Chemical Fertilizer

Digestate from Biogas Plant

Hog Plant Integrated with Ethanol Plant

No other feed needed

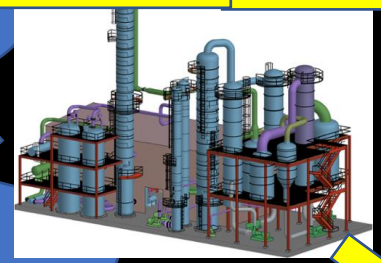
### Carbon Benefits From:

MayMaan Electric Generator

No natural gas use

Solar Thermal

Agave = 60-80 MT/ha/yr carbon sequestration



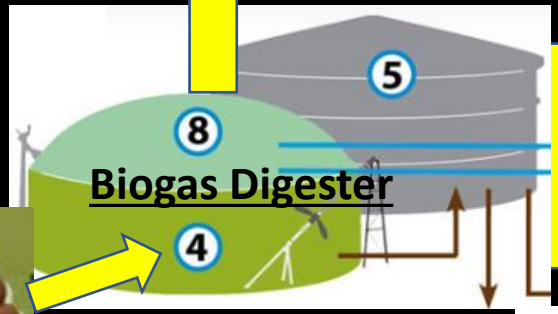
Renewable Energy for Steam


Biogas from Hog Wastes

Wet Residuals & Crop Residues for Feed

No Drying Energy

Avoided Methane Credit = 25x Co2




Easier to Get ByProduct Allocation

**By-Product Allocation**

**Hogs Eat Wet Residual Leaves = Poop = Biogas**

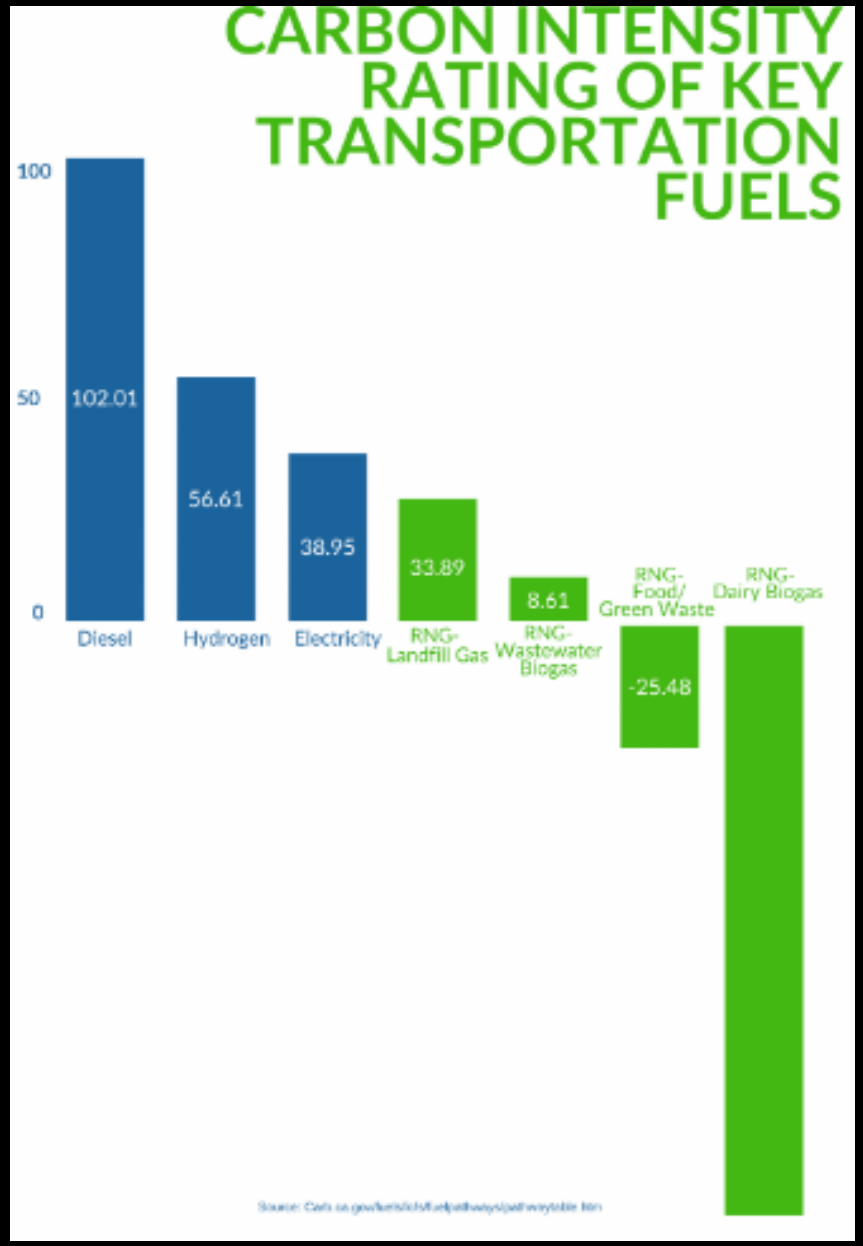
# Improving Ethanol as a Fuel:

## Biggest CI Negative Fuel Dairy Biogas- Hogs Less Methane, but Still High Value

- ✓ Methane is a highly reactive greenhouse gas (GHG) that is not in the atmosphere as long but has 21 times the GHG impact of Co2. This has a big impact if methane is avoided in the production of the fuel. We are planning to capture biogas from hog production which will occur at same facility as the ethanol plant. The gas will be used for the steam boiler in the ethanol plant and displace need for natural gas

- ✓ The main benefit for calculating CI is in the avoided methane emissions from hog production, since we will be producing meat with very low methane. Hog production volumes are expected to be very large because of the availability of meal at near zero cost (ethanol residual, vines & leaves). Planting of 25,000 hectares of sweet potatoes is planned by year 5. The production of 388 million liters of ethanol will result in up to 750,000 tons of ethanol residual and 625,000 tons of vines and leaves. This will provide enough feed for 2.75 million hogs per year. At 150 Kg/hog, this will result in production of 413 million Kg of pork

- ✓ Swine, since they are not ruminants, have lowest enteric fermentation of any livestock. The IPCC methane emission factor used by EPA to estimate enteric fermentation from swine is 1.5 kg methane/head/year. This means a 2,5 million head facility is estimated to emit, 3,750 metric tons of methane per year. Manure management is main source of emissions. Total per head manure emissions were .28 MT Co2e per head of swine in 2019. Based on 2.5 million hogs, this is 700,000 MT Co2e. At $200/MT = $140 million/388 mil. gal.= $0.36 /liter We expect to be able to reduce emissions by 70% so net benefit is $0.36 +$0.01= $0.37 *.7 = $0.26/liter x 3.79 lit./gal = $0.99 per gallon. This benefit is added to any other GHG reductions from sweet potato ethanol that is exported to California or West Coast markets.



# GCarbon USA & Go3 Carbon:

Bill Wason has been involved in US and global biodiesel/biofuel and veg. oil industry since 1998 and has helped build or design biodiesel and oil crush plants in USA, Poland and Canada. Mr. Wason also has extensive experience in sourcing & bidding for purchase of fuels and use of biofuel.

Bill Wason was President of the company that built the first large biodiesel plant in CA (10 mil. gal/yr.) (BioClean Fuels) & built EV's in 1996.

Bill Wason was an intervenor in a utility proceeding on EV's and introduced a bill the first bill in CA to provide EV access to HOV lanes.

Bill Wason has prior experience in running biofuel plants & designing large biofuel projects including a 75 million gal. Polish biodiesel plant

Bill Wason is a recognized thought leader in collection, purchase and processing of vegetable oils, UCO & Yellow Grease and all requirements for conversion to biodiesel, renewable diesel or jet fuel. He has a bio-psych degree from U. of Colorado & various othercerts.

Bill Wason is an expert in how to plant, process and co-feed various feedstocks into an ethanol, biodiesel or jet fuel plants. He helped a national coop in Brazil with evaluation of various new crops to improve farm income in semi arid and tropical climates. Options evaluated were sisal, agave, macauba and sweet potatoes. This has led to 6.3 million USD in funding for a pilot project (2 mil gal/yr) being built now.

Mr. Wason worked with the agronomist who introduced camelina to North America on the designing and finance package for a 1 million MT canola-camelina crush plant in Saskatchewan, Canada.

Mr Wason is familiar with both oil and ethanol pathways to make jet fuel, having designed and promoted the financing of two 100 million gallon renewable jet fuel plants in Houston, TX and Ferndale, WA and presented projects to all of the major airlines in 2008-2012.

Mr. Wason was the principal author of a study of renewable energy and alternative fuels for the State of Virginia Dept. of Mines & Energy

Mr. Wason is currently negotiating with Brazilian government about setting up a crypto coin tied to Amazon indigenous forest preservation

Mr. Wason completed a 130 page study submitted to US EPA on re-use of wastewater for production of agave & ethanol in Baja, Mexico

Lorenzo Payan has been involved in water and wastewater treatment for 35 years and has worked for various wastewater treatment plants, industrial parks and as a wastewater consultant for corporate clients. Mr. Wason and Mr. Payan worked together to build ozone units in 2002-2004 and utilized the systems in water and wastewater treatment in Mexico. Mr. Payan has an in-depth understanding of the entire water and wastewater system in Northern Baja California and Sonora. Mr. Payan is also a co-owner of a diatomaceous earth mine in Baja California and has been conducting crop yield studies in Baja and Sonora on diatomaceous earth, ozone root and irrigation treatments, micro-nutrient applications and other mechanisms to improve yield and reduce diseases on commercial farms.