

PITCH FOR SUGAR CANE BAGASSE

About Thermal Mechanical Catalytic Cracking (TMCC)

ECOKAT is pioneering **TMCC** technology as a new solution for decarbonizing transport systems by the production of drop-in carbon neutral second-generation biofuels, in the form of Diesel, Marine Gas Oil, or Sustainable Aviation Fuel (SAF). Our revolutionary low temperature technology and pressure-less chemical catalytic oiling of organic waste materials have the potential to be one of the largest scale and lowest cost approaches for assisting the decarbonization efforts of transport systems, and for achieving net-zero CO2 mobility.

1. About the founder and the team

WHO

Team has 30+ years experience in the production of biofuels & waste management industries



Marcelo Fernandez

- Founder of Ecokat (2007) as a producer of sustainable fuels with net-zero carbon footprint
- Patent holder as Inventor (US10953381 B1, Mar 2021), Chemical Reactor for Catalytic Conversion of Organic Material into Diesel and other Liquid Fuels
- Chemical reactor developed for original patent holder of catalytic conversion originated at Siemens' R&D labs with Federal funding from Germany (1980's)
- 2x Founder of waste management companies : Aquarec (2017), Ecoquim (1990)
- BS in Chemical Engineering and Computer Systems ITESM
- MBA University of Texas at Austin



Thermtech AS

- Norwegian Technology with patented thermal desorption technology (Thermomechanical Cuttings Cleaner or TCC)
- Plant manufacturers with 60+ plants operating around the world
- Global Operations include Norway, UK, Netherlands, Nigeria, Egypt, Kazakhstan, Kuwait, Russia, Turkmenistan, Argentina and Germany.
- Customers include big players such as M-I SWACO, Halliburton, SAR Kuwait, Scomi Oil Tools, Veolia and the Total Waste Management Alliance (TWMA), which brands it as "TCC RotoMill" for offshore use.



- Technology alliance with **Thermtech AS**, leader in production of hot swirling fluidized bed plants, with 60+ plants operating around the world.
- Responsible for the initial development, startup, consolidation, and accelerated growth to operate and scale the business.

WHY THE PITCH

- Growing concerns on climate change, the search for renewable sources of energy has intensified.

- b) Biofuels are playing a significant role in the shift towards a more sustainable energy future derived from renewable sources like biomass and waste materials, offering a potential alternative to fossil fuels.
- c) Ensuring truly sustainable production methods needs to be addressed by the market to maximize the benefits of biofuels in the energy revolution.
- d) Pioneering a new solution for decarbonizing transport systems by the production of drop-in carbon neutral second-generation biofuels, in the form of diesel and marine gas oil.
- e) Helping transport companies comply with the renewable energy regulations Maritime (MARPOL) and Aviation Jet fuel (SAF) regulatory obligations (Mandates) and reduce emissions without sacrificing performance.

2. The problem

WHAT IS THE PROBLEM

- a) Transportation sectors account for more than 15% of total global emissions today.
- b) Alternatives to fossil fuels are needed to decarbonize hard-to-abate sectors that cannot be electrified, including aviation, shipping, and heavy-duty road transport.
- c) Sustainable fuels include drop-in fuels and non-drop-in fuels that require engine or infrastructure retrofits.
- d) To bring costs down and increase availability of biofuels, innovation is required.
- e) The planet cannot wait for zero carbon fuels to reach technological maturity. The transportation sectors need low-carbon fuels now.

SIZE OF THE PROBLEM

- a) US Diesel consumption: 600 million liters/day; +76,000 TMCC500 plants required.
- b) US Marine gas oil (MGO) consumption: 24 million liters/ day.
- c) US Jet fuel consumption: 197 million liters/ day.
- d) Production of US renewable diesel: 31 million liters/day; less than 5% of total consumption of diesel and marine gas oil.

3. Solution to the problem

HOW

- a) The TMCC process is based on a rapid through contact of hot flowing catalytic swirling bed (Fluidized Bed) with the biomass and waste materials, which quickly fragments the solid feedstock into vapors, gases, and ashes.
- b) The vapors are rapidly quenched, or cooled, and recovered as a renewable diesel.
- c) The by-product gas is used as fuel for complementary applications such as biomass and waste materials drying.

- d) The ashes and spent catalyst (inorganic material contained in the feedstock) are retired from the plant and disposed of as non-hazardous material free of organic material.

ADVANTAGES

- a) The TMCC process is similar to Fluid Catalytic Cracking, or FCC, a common and mature process used by most refineries to convert petroleum feedstocks to gasoline, diesel, and other products.
- b) Using a revolutionary principle of pressure less, low temperature, highly efficient chemical catalytic oiling process and an unconventional friction reactor, producing drop-in carbon neutral diesel and marine gas oil.
- c) These factors, coupled with very short processing time, translate into attractive capital and operating costs.
- d) Over 30 years of process development has led to processing equipment that is simple, robust, and reliable.
- e) TMCC technology is supported by a portfolio of patents on a variety of significant aspects of the process.

FEEDSTOCKS

TMCC plants efficiently convert a wide range of pure feedstocks and multiple mixes to valuable renewable diesel.

- a) Biomass and energy crops.
- b) Mill and forest residues.
- c) Agricultural residues from palm oil, sugar cane, corn, agave, rice, sorghum sunflower, wheat, etc.
- d) Selected municipal solid waste refuse derived fuel (RDF).
- e) Plastics mix and rubbers.
- f) Crude oil, refining residue oils, bitumen, waste lubricants.

4. Monetize the solution

PRODUCT MARKET FIT

Using a range of low-cost feedstocks producing carbon neutral diesel, jet fuel and marine gas oil.

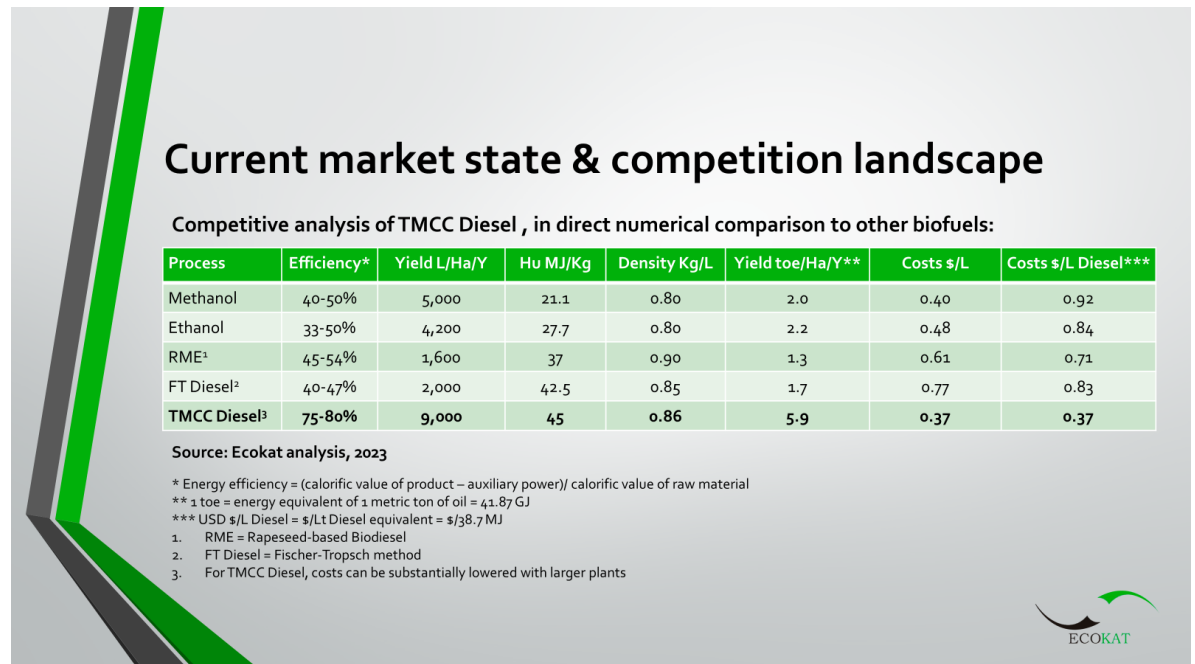
- a) Pure drop-In fuel that can be blended in any proportion with fossil fuel.
- b) High cetane and low density enhance diesel performance characteristics.
- c) Requires no changes to fuel infrastructure or vehicle technology.
- d) Up to 80% lower greenhouse gas emissions.
- e) Excellent performance at both cold and warm temperatures.
- f) Stable, not oxygenated biofuel.

PRODUCT MONETIZATION

Scaling fuel production and supply needs to overcome bottlenecks in the construction of production facilities and the supply of feedstocks.

- a) Developed modular production technology.
- b) Plants are smaller, more flexible, mobile, and easier to build.
- c) Unlock a new, decentralized model for sustainable drop-in fuels based on widely available local feedstock, which is replicable and scalable anywhere in the world.
- d) Reduction of the length of the overall fuel supply chain by being close to feedstock suppliers & off takers, reducing environmental impact and contributing to a circular economy.

COMPETITION



- a) TMCC technology offers the highest energy efficiency compared to other first and second-generation biofuels technologies.
- b) We offer the lowest equivalent production costs to other technologies.