



# **BUSINESS CASE FOR A TMCC 400 kW PLANT Sugar Cane Bagasse**

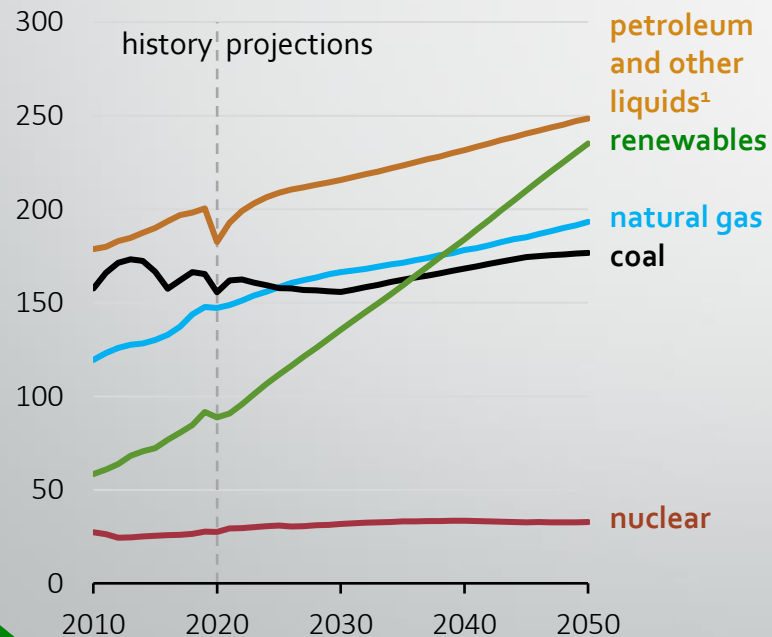
June 2024

# Executive Summary

- TMCC technology is an innovative waste management solution for the renewable energy market that manufactures turnkey plants that produce drop-in carbon neutral synthetic biofuels
- TMCC provides the highest efficiency, low-carbon renewable liquid synthetic fuel production to assist decarbonization efforts and achieve net-zero mobility
- Ecokat seeks investment in a TMCC plant for \$3.5M and offers rights to the investor for future applications and territories of the TMCC technology
- The opportunity a TMCC plant brings is \$2.0M+ USD annual cash flows
- Ecokat will be responsible for the initial development, startup, consolidation and accelerated growth to operate and scale the business
- Our business model allows the investor for any number of plants to be operated, since each site works as an independent center

# The world faces ever-rising fuel costs, scarcer resources & increased energy demand...

Primary energy consumption by energy source, world  
quadrillion British thermal units



Source: U.S. Energy Information Administration, International Energy Outlook 2021 (IEO2021) Reference case

<sup>1</sup> includes biofuels

Traditional waste management solutions have tried to address these problems

- Landfills
- Incineration
- Gasification
- Waste centralization

...But current solutions like these have failed

# Our solution is to tap into hydrocarbons contained in waste to convert them into usable energy

Energy in waste can be contained in different forms:

- Solid or liquid fuel
- Thermal energy
- Electricity

Thermal Mechanical Catalytic Cracking (TMCC) mimics the natural process that takes millions of years to create fossil fuels in nature **in minutes**:

- Using crystalline activated molecular sieve powder catalysts
- Raising the temperature up to 380 °C from 15 °C in nature
- Converting kinetic to thermal energy by friction
- Producing effective mixing and degradation of solids
- Resulting in a high energetic yield

# TMCC produces sustainable synthetic diesel fuel at a fraction of fossil fuel costs with organic material

**TMCC can process organic material like the following to produce sustainable fuels:**

- Plastics mix and rubbers
- Crude oil, refining residue oils, bitumen, waste lubricants
- Mineral carbon
- Selected municipal solid waste (RDF)
- Biomass, cardboard, paper, wood, straw, grasses, bagasse
- Animal produce and waste

**TMCC plants are 2-in-1 solution for decarbonization efforts of all industries:**

- Reduce waste through circular economy cycle
- Maintain neutral CO<sub>2</sub> balance by emitting only CO<sub>2</sub> stored in waste

# TMCC Synthetic Fuel Specification

## Synthetic Fuel Specification ULSFO (Ultra Low Sulphur Fuel Oil)

Property	Test method	Measurement	Minimum	Maximum
Appearance	Visual	Optical	Tan/clear	clear
Color	ASTM D1500-02		0	2.5
Cetane Number	ASTM 976-91	ppm	45	none
Caloric Value	ASTM 2015	Kcal/kg	10,800	none
Sulfur Content	ASTM 4294-02	ppm	0	500
Flash point	ASTM 93-02	° C	56	none
Density	ASTM 1298-99	kg/l @ 15° C	0.82	0.86
Kinematic Viscosity	ASTM 445-03	cSt @40° C	1.5	5.5
Copper Corrosion	ASTM 130	3h @50° C (mm)	0	1.0
Ash	ASTM 482-02	% Weight	0	0.01
Water Content	ASMT 95	mg/kg	0	200
Residual Carbon	ASTM 189	10% resid, %wt	0	0.30
Distillation	ASTM 86	90% Recovery °C	0	380

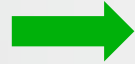
**NOTE:** This specification describes middle distillates in crude oil refining that are referring to **Diesel Fuel Grade No. 2-D S500** used for off- road engines and machinery which includes: Tractors, Harvesters, Cranes, Excavators, Boilers, Diesel power generators, Transport refrigeration units, **Marine diesel (MGO)**, and Heating applications.

# Our business model designs, manufactures, and commercializes waste to Energy TMCC plants



## Manufactures and sells TMCC plants

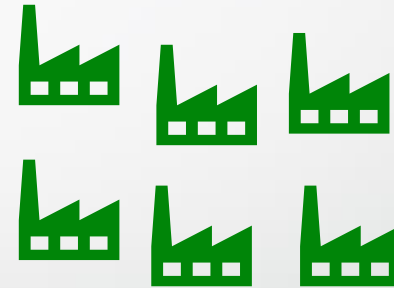
- Oversees installation, commissioning, training, and operation of turnkey plants
- Leads R&D of projects



Investor

## Purchases and operates TMCC plants

- Finances TMCC plants
- Operates own and/or third party plants
- Commercializes end products



## TMCC plants manage waste & produce energy

- Eliminates landfill pollution
- Produces sustainable synthetic diesel with net-zero carbon footprint
- Independent profit center selling products



# **Proposed investment of \$3.5M to purchase a TMCC<sub>400</sub> plant and investor rights in future projects**

Investment is set at \$3,500,000 USD:

- \$3 Million USD in one turnkey TMCC 400 kW plant
- \$500,000 USD of auxiliary equipment, commissioning and working capital during the construction period to finance the operation

**Investment provides full ownership of TMCC<sub>400</sub> plant and participation in future Ecokat projects with IRR of 25%+ in most conservative scenarios**



# Current market state & competition landscape

Competitive analysis of TMCC Diesel , in direct numerical comparison to other biofuels:

Process	Efficiency*	Yield L/Ha/Y	Hu MJ/Kg	Density Kg/L	Yield toe/Ha/Y**	Costs \$/L	Costs \$/L Diesel***
Methanol	40-50%	5,000	21.1	0.80	2.0	0.40	0.92
Ethanol	33-50%	4,200	27.7	0.80	2.2	0.48	0.84
RME <sup>1</sup>	45-54%	1,600	37	0.90	1.3	0.61	0.71
FT Diesel <sup>2</sup>	40-47%	2,000	42.5	0.85	1.7	0.77	0.83
TMCC Diesel <sup>3</sup>	75-80%	9,000	45	0.86	5.9	0.37	0.37

Source: Ekokat analysis, 2023

\* Energy efficiency = (calorific value of product – auxiliary power)/ calorific value of raw material

\*\* 1 toe = energy equivalent of 1 metric ton of oil = 41.87 GJ

\*\*\* USD \$/L Diesel = \$/Lt Diesel equivalent = \$/38.7 MJ

1. RME = Rapeseed-based Biodiesel
2. FT Diesel = Fischer-Tropsch method
3. For TMCC Diesel, costs can be substantially lowered with larger plants

# Each ton of diesel produced in TMCC prevents 3.143 tons of CO<sub>2</sub> emissions compared to incineration

CO<sub>2</sub> emissions analysis of TMCC Diesel , in direct numerical comparison to incineration:

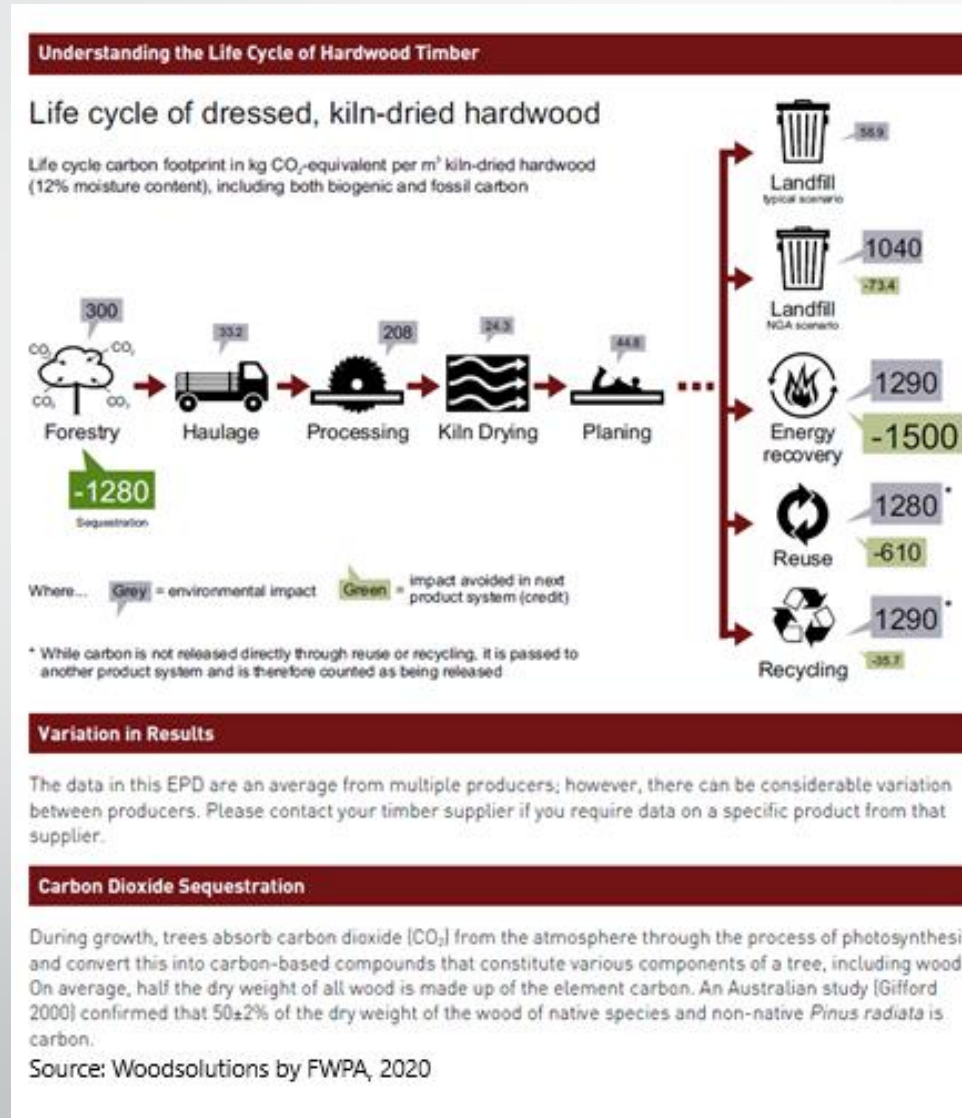
Input Material	CO <sub>2</sub> Produced by Incineration	Co <sub>2</sub> Produced by TMCC Technology	Savings CO <sub>2</sub> in %
Cellulose	100%	40.0%	60.0%
Cellulose & Rubber or Bitumen	100%	14.0%	86%
Oils and Plastics	100%	9.0%	91.0%

CO<sub>2</sub> produced in the TMCC process originates solely form the oxygen contained in biomass and the exhaust of the power plant used to run the plant

Source: Ekokat analysis, 2023

# CARBON CREDITS-2.15 kg CO<sub>2</sub>e / liter of Synthetic Diesel

## INCOME-Carbon allowance futures of \$437,000 USD+ / yr



# Financial Assumptions (1/2)

Plant Size TMCC 400 kW  
Processing capacity  
Operation Time  
Main equipment cost

671 l/h  
1,642 kg/h  
6,912 h/year  
\$3,500,000.00 USD

Per day	Per month	Per Year
16,108.75	483,262.36	4,639,318.67
39,408.00	1,182,240.00	11,349,504.00

Water content in SCB	Throughput kg/kr
0%	2000
10%	1285
20%	857
30%	571
40%	429
50%	286

Exchange Rate  
Exchange Rate

1.00 usd/Euro  
17.50 Pesos/usd

Calorific Value Sugar Cane Bagasse (SCB)  
Conversion factor  
Calorific Value SCB

4,550 Mcal/ton  
4,1858 J/Cal  
19.05 MJ/kg

Inert content other than sulfur and/or halogens  
Content of sulfur and/or halogens in SCB  
SCB Cost

3.66%  
0.1%  
\$0.00 usd/ton

Calorific Conversion to NON-CONDENSABLES  
Calorific Conversion to DIESEL

20.0%  
80.000% MJ-Diesel/MJ-SCB  
2.94 kg-SCB/kg-Diesel  
2.45 kg-SCB/l-Diesel

80.000% 0.00

Diesel Density  
Diesel calorific value HHV  
Diesel calorific value LHV

0.832 kg/l  
44.8 MJ/kg  
43.4 MJ/kg

Diesel Retail price pesos/l w/IVA  
Diesel Retail price pesos/l w/o IVA  
Diesel wholesale discount  
Diesel Net Selling price  
Diesel Net Selling price

\$25.00 pesos/l with IVA  
\$21.55 pesos/l without IVA  
25%  
\$0.92 usd/l  
\$1.11 usd/kg

descuento  
0%

Catalyst Price  
Catalyst Price  
Catalyst use

€ 3.30 euro/kg  
\$3.30 usd/kg  
11.594 kg-zeolite/h (at steady state)

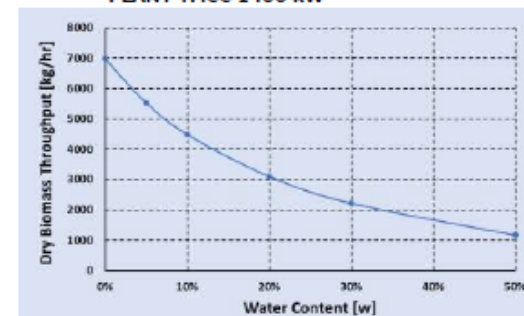
Lime Price  
Lime Price

\$3.60 pesos/kg  
\$0.21 usd/kg

Kg Lime needed / kg sulfur and/or halogens in SCB  
Lime consumption

3.41  
2.32 kg-lime/h

PLANT TMCC 1400 kW



# Financial Assumptions (2/2)

Ash production (kg/h)  
Hydrocarbon content in ash %  
Hydrocarbon content in ash (kg/h)

77.29 kg/h  
0.0%  
0.00 kg/h

Inorganic content in ash (kg/h)

	kg/h	Concentración
Ash from inerts in SCB	60.10	
Ash from sulfur or halogen	3.28	
Total Ash	63.38	82.00%
Zeolite	11.59	15.00%
Unreacted Lime	2.32	3.00%

Asphalt selling price (usd/ton)

\$0.00 usd/ton

descuento  
100%

cemento asfáltico ac-20  
finos pasan malla 200 hasta 12 a 14 %

Electricity Generation Efficiency  
Electricity Generation Efficiency

36% MJ-Electricity/MJ-Diesel (LHV)  
40% MJ-Electricity/MJ-Gas (LHV)

Electricity use

20% of Diesel Output  
134.2395448 l-diesel/h  
7,002.40 Thermal MJ-Diesel/h  
2,520.86 Electric MJ/h  
700.24 kw

Gas consumption  
Gas Cost

6,302.16 Thermal MJ-Gas (LHV)/h  
7,029.74 Thermal MJ-Gas (HHV)/h  
26.65 usd/h

NYMEX Natural Gas Price  
Conversion Factor  
NYMEX Natural Gas Price  
Natural Gas LHV/HHV Ratio  
Distribution Cost Factor  
Natural Gas Price Mexico

\$2.50 usd/MMBtu-HHV  
947.82 BTU/MJ  
\$2.37 usd/GJ-HHV  
89.65%  
60%  
\$3.79 usd/GJ-HHV

Primary Diesel Production (l)  
Secondary Diesel Production from Asphalt (l)  
Total Revenue

Qty	Price	usd	%	kg / kg SCB
4,639,319	\$0.92	\$4,285,085		34.01%
0	\$0.92	\$0		0.00%
		\$4,285,085	100.0%	34.01%

0.0% % de recuperación diesel secundario de cenizas

SCB (ton)  
Catalyst (kg)  
Lime (kg)  
Gas (GJ-HHV)  
Waste disposal of ashes (kg)  
Total Variable Material Costs

11,350	\$0.00	\$0	0.0%	100.00%
80,139	\$3.30	(\$264,457)	-6.2%	0.71%
16,028	\$0.21	(\$3,297)	-0.1%	0.14%
48,590	\$0.00	\$0	0.0%	0.43%
534,257	\$0.09	(\$45,793)	-1.1%	4.71%
		(\$13,548)	-7.3%	

\$1.50 costo de confinamiento, MXP/kg de residuos

Marginal Contribution

3,971,537 92.7%

NOTES:

The plant consumes electricity equivalent in natural gas to 20% of the diesel production.  
The price of natural gas in Mexico (including distribution cost) is equal to 1.6 times NYMEX Natural Gas Price.

# 10-year financial valuations sees ROE of 55%

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
= EBITDA		-1,066,498	2,613,502	2,613,502	2,613,502	2,613,502	2,613,502	2,613,502	2,613,502	2,613,502	2,613,502
- Taxes & PTU		0	465,315	785,565	786,115	786,665	787,216	787,767	788,319	788,871	789,423
= EBI after Taxes		-1,066,498	2,148,188	1,827,937	1,827,387	1,826,837	1,826,286	1,825,735	1,825,183	1,824,631	1,824,079
+ Depreciation		3,500,000	0	0	0	0	0	0	0	0	0
+ Income Plant Sales		0	0	0	0	0	0	0	0	0	0
= EBI after Depreciation		2,433,502	2,148,188	1,827,937	1,827,387	1,826,837	1,826,286	1,825,735	1,825,183	1,824,631	1,824,079
+ Increase Acc. Payable		26,129	0	0	0	0	0	0	0	0	0
- Increase Cash		30,701	0	0	0	0	0	0	0	0	0
- Increase Acc. Receivable		428,508	0	0	0	0	0	0	0	0	0
- Increase Inventory		22,313	0	0	0	0	0	0	0	0	0
= Operating Cash Flow after Taxes		1,978,109	2,148,188	1,827,937	1,827,387	1,826,837	1,826,286	1,825,735	1,825,183	1,824,631	1,824,079
- Investment in Fixed Assets	3,500,000	0	0	0	0	0	0	0	0	0	0
= Free Cash Flow after Taxes	-3,500,000	1,978,109	2,148,188	1,827,937	1,827,387	1,826,837	1,826,286	1,825,735	1,825,183	1,824,631	1,824,079
Terminal Value in 2034											3,265,600
Cash Flows for Project IRR calculation	-3,500,000	1,978,109	2,148,188	1,827,937	1,827,387	1,826,837	1,826,286	1,825,735	1,825,183	1,824,631	5,089,678

## Internal Rate of Return (IRR)

55.86%

55.86%

0.00 Goal seek = 0

## CALCULATION OF RETURN ON EQUITY (ROE)

Weighted Average Capital Cost (WACC)	55.86%
Bank Loan Interest Rate	10.00%
Effective Rate Taxes + PTU	30.13%
Leverage Liabilities / Capital	0.0
<b>Return on Equity (ROE)</b>	<b>55.86%</b>

Present Value FCF 2025 - 2034	3,461,391
Present Value Terminal Value	38,609
Present Value of the Business	3,500,000
Bank Debt 31 Dic 2024	0
Net Present Value FCF for Shareholders	3,500,000
Cash Investments ST 2024	0
<b>Net Present Value of the Capital</b>	<b>3,500,000</b>

# P&L Statement (1/2)

[illegible]



# P&L Statement (2/2)

[illegible]



# Balance Statement

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Cash		30,701	30,701	30,701	30,701	30,701	30,701	30,701	30,701	30,701	30,701
Investments Short Term	0	1,979,098	4,130,340	5,963,325	7,797,592	9,633,145	11,469,982	13,308,106	15,147,517	16,988,216	18,830,204
Accounts Receivable		428,508	428,508	428,508	428,508	428,508	428,508	428,508	428,508	428,508	428,508
Inventory		22,313	22,313	22,313	22,313	22,313	22,313	22,313	22,313	22,313	22,313
Current Assets	0	2,460,621	4,611,863	6,444,847	8,279,115	10,114,667	11,951,505	13,789,629	15,629,040	17,469,739	19,311,727
Land		0	0	0	0	0	0	0	0	0	0
Buildings		0	0	0	0	0	0	0	0	0	0
Plant and Equipment	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
Accumulated Depreciation		3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
Plant and Equipment Net	3,500,000	0	0	0	0	0	0	0	0	0	0
Fixed Assets	3,500,000	0	0	0	0	0	0	0	0	0	0
<b>TOTAL ASSETS</b>	<b>3,500,000</b>	<b>2,460,621</b>	<b>4,611,863</b>	<b>6,444,847</b>	<b>8,279,115</b>	<b>10,114,667</b>	<b>11,951,505</b>	<b>13,789,629</b>	<b>15,629,040</b>	<b>17,469,739</b>	<b>19,311,727</b>
Accounts Payable		26,129	26,129	26,129	26,129	26,129	26,129	26,129	26,129	26,129	26,129
Bank Loans Short Term		0	0	0	0	0	0	0	0	0	0
Current Liabilities		26,129	26,129	26,129	26,129	26,129	26,129	26,129	26,129	26,129	26,129
Bank Loans Long Term	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL LIABILITIES</b>	<b>0</b>	<b>26,129</b>	<b>26,129</b>	<b>26,129</b>	<b>26,129</b>	<b>26,129</b>	<b>26,129</b>	<b>26,129</b>	<b>26,129</b>	<b>26,129</b>	<b>26,129</b>
Common Stock	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
Retained Earnings		-1,065,508	1,085,734	2,918,718	4,752,986	6,588,538	8,425,376	10,263,500	12,102,911	13,943,610	15,785,598
<b>NET WORTH</b>	<b>3,500,000</b>	<b>2,434,492</b>	<b>4,585,734</b>	<b>6,418,718</b>	<b>8,252,986</b>	<b>10,088,538</b>	<b>11,925,376</b>	<b>13,763,500</b>	<b>15,602,911</b>	<b>17,443,610</b>	<b>19,285,598</b>
<b>TOTAL LIABILITIES + NET WORTH</b>	<b>3,500,000</b>	<b>2,460,621</b>	<b>4,611,863</b>	<b>6,444,847</b>	<b>8,279,115</b>	<b>10,114,667</b>	<b>11,951,505</b>	<b>13,789,629</b>	<b>15,629,040</b>	<b>17,469,739</b>	<b>19,311,727</b>

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



## Marcelo Fernandez

- Founder of Ekokat (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
- 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



# Associated risks & mitigation strategies



## Risks

- All tests conducted to date performed in limited scale environment and not tested on large-scale commercial basis
- Never utilized the TMCC technology under the conditions or in volumes that will be required to be profitable and cannot predict difficulties that may arise
- May require regulatory approvals and environmental permits by application and by country



## Mitigation

- Strength of intellectual property rights related to this technology patented by inventor Thermtech in Norway
- Proprietary and confidential Catalytic *know-how* developed by ECOKAT
- Full (EcoKat & Thermtech) technical support to take client from regulatory (permits) and proof of concept, to validation of technology, optimization of process, and plant scalability to large-scale commercial basis
- Catalyst used in TMCC technology is not protected by patent and is readily available worldwide

# Multipurpose TMCC Plant applications

1. Chemical catalytic oiling and liquid fuel synthesis process
2. Thermal desorption of sludges and muds in multiple industries
3. Thermo mechanical dryer for treatment of sticky materials
4. Upgrading for heavy oils, crude conversion, vacuum bottoms, and bitumen

# Large-scale commercial example

## TMCC 400 kW FUTURE PLANT SALES FOR MSW - Total 96

A future business opportunity for the Client includes plant operation earnings from the future sale of TMCC Plants in the Latin America region for processing and servicing MSW:

- 2 TMCC 400 kW Plants in year 1
- 8 TMCC 400 kW Plants in year 2
- 16 TMCC 400 kW Plants in year 3
- 32 TMCC 400 kW Plants in year 4
- 38 TMCC 400 kW Plants in year 5

The installation of 96 TMCC 400 kW Plants in the region in a span of 5 years **represent the coverage of 6% of the total MSW produced** and sent to official landfills in Mexico, and **around 20% of the total RDF that can be produced from MSW**.

The selling of the diesel produced by the 96 TMCC 400 kW plants represents the coverage of **less than 3.5% of the total diesel consumed in Mexico**. For the investor, **96 plants represent total sales of \$500M USD**.

# TMCC technology offers the most effective, efficient, ethical and ecological solutions with high returns

- Effective: Positive energy balance, energetic yields of 80%, flexible organic feedstock.
- Efficient: Cost competitive, scaling/modular operations, simple process.
- Ethical: Not competing with food chain
- Ecological: Environmentally friendly (process emissions free, type of chemicals used, by-products produced)

# Thank you

For more information contact:

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