

# Floating Modular Refinery Overview

## Floating Modular Refinery

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# Real Solution for Real Sustainable Growth



## Financial Upside

Significant financial and commercial gains can be achieved and attained by producing additional low-cost products to meet demand and to allow a new export market to be created; Processing oil locally reduces transportation costs.

## Energy Security

More than 2 Million bbl of Crude and Refined Products, meeting current and future growth demands for decades to come. Flexibility of local distribution. The Modular approach also means meeting current and future fuel quality standards.

## SDG

Producing fuels to meet the demand of growing demographics and industry while protecting the environment and meeting SDG.



# Global Vision

- What has changed is the world scene. More developing countries are caught in a vicious cycle of low credit rating, terrorism and the heavy political price for foreign investment in local infrastructure.
- Simply put, this market has an awkward size. Major IOCs, EPCs and financial institutions are focusing on bigger and safer investments. Smaller IOCs (2nd & 3rd Tier) are focusing on smaller, safer investments in familiar markets.
  - None of the technology elements are new.
  - Modules for each step of the refinery process are developed and matured.
  - Some of the new technologies will add to the optimization of the process to further reduce cost.
  - The vessel design is based on a VLCC modified as ATB.
  - In fact, this concept has been looked at since the 70s but it did not go forward due to the lack of interest or resources.
- A true win-win shift for creditors, insurers, investors, traders and customers.



# Why Floating Modular Refinery

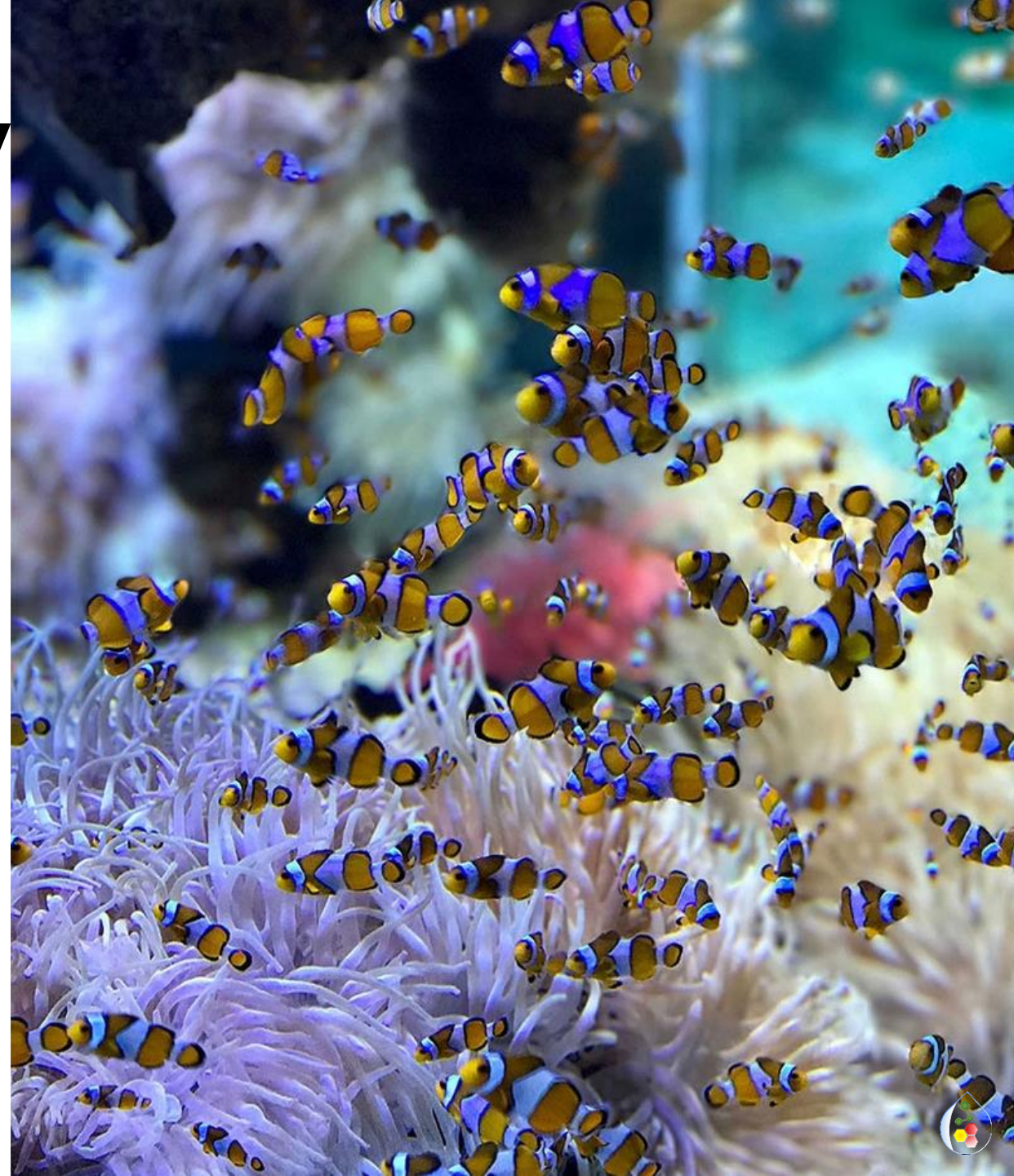
- A Floating Refinery provides financial confidence of the asset from potential political influence and security turmoil
- A Floating Refinery provides a country sustainable energy infrastructure:
  - Lowering the cost to essential refined products
  - A floating storage facility
  - Protection from global supply chain
- A Floating Refinery will enable a country with energy independence
- Conventional economics suggest that it is best to build refineries close to areas of product demand rather than near to crude supplies.



# Why Floating Modular Refinery

## Benefits and Upsides

- **Reduces the risk associated with the investment** since it reduces the requirements associated with an on-shore facility, such as land purchase, stick-build construction capability, decommissioning costs.
- Thus, **reducing the CAPEX requirement by as much as 30 - 40%** compared to a conventional onshore Refinery.
- These savings will return **higher margins** in the Refining Technical Fee and higher IRR in the total investment.
- The host country retains the sovereignty of any hydro-carbons processed and **maintain control of blending and distribution.**
- **Modular:** This approach resolves issues such as post-customization to fit new crude specifications, scalability, versatility of end products, and the time required to become fully operable.



# World is Going Mobile

- **Mobility**

- enables greater security thus reducing insurance costs and risk of losing the investment.
- extends the life of the investment as it can be redeployed. Simply, Mobility, is build once, use it everywhere.

- **Modularity**

- Is the next industrial evolution. From computers to space (Cube satellites!)
- Enables flexibility, simplification and most importantly significant reduction of costs.

- **Mobility and Modularity Together**

- overcome the traditional requirement of high CAPEX, stable economy and high complexity to make a refinery profitable.
  - Further enhances the value proposition by fundamentally changing the underlying economics.
- A true win-win shift for creditors, insurers, investors, traders and customers.



# Floating Modular Refinery – The Difference

## Shared Value & Commercial Innovation

- **Shared Value:** It is the underlying philosophy that makes all the difference in the world of business today.
  - In the simplest definition, Shared Value is to generate profits from solving major social and economic problems rather than creating them.
  - Shared Value goes beyond Corporate Social Responsibility or philanthropy to encompass global values such as transnational environmental impact and prosperity. Rather than promoting growth, Shared Value is now seen as the correct criteria for measuring the true value of an activity.
- **Commercial Innovation:** Capturing the full value of the Mobility / Modularity Factor requires innovative commercial structures. At the same time, it is a prerequisite to achieving Shared Value
  - Commercial Innovation is needed to reflect the interests of all stakeholders as one.
  - In order to change the very definition of profit and success, new and borrowed concepts would be adapted and adopted
  - In the age of global social media, post COVID-19 and highly aspirational younger generations, businesses cannot run as usual and hope to maximize profits without real social participation and engagement.





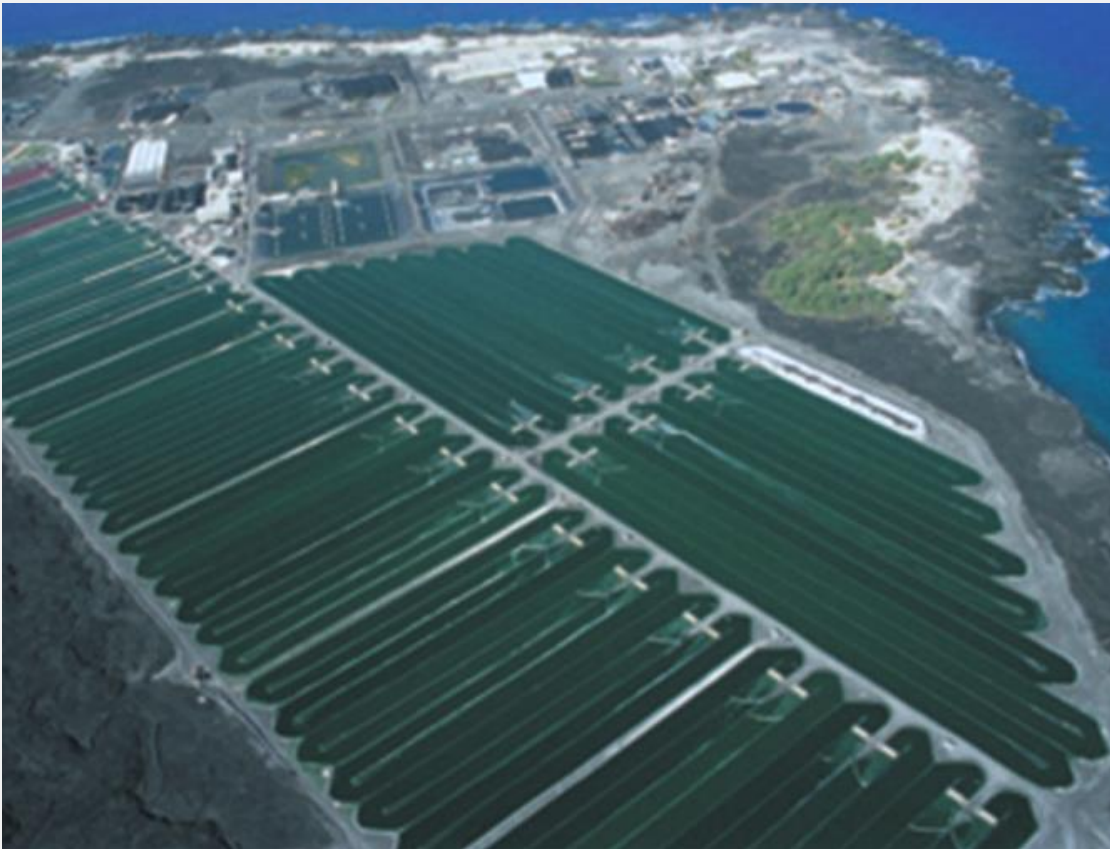
# Green Fossil Fuel

The Green Fossil Fuel - A Bridge to a Clean Future



# A Truly Zero Footprint

## Negative Impact – Positive Value



## Capturing Emissions – Capturing Value

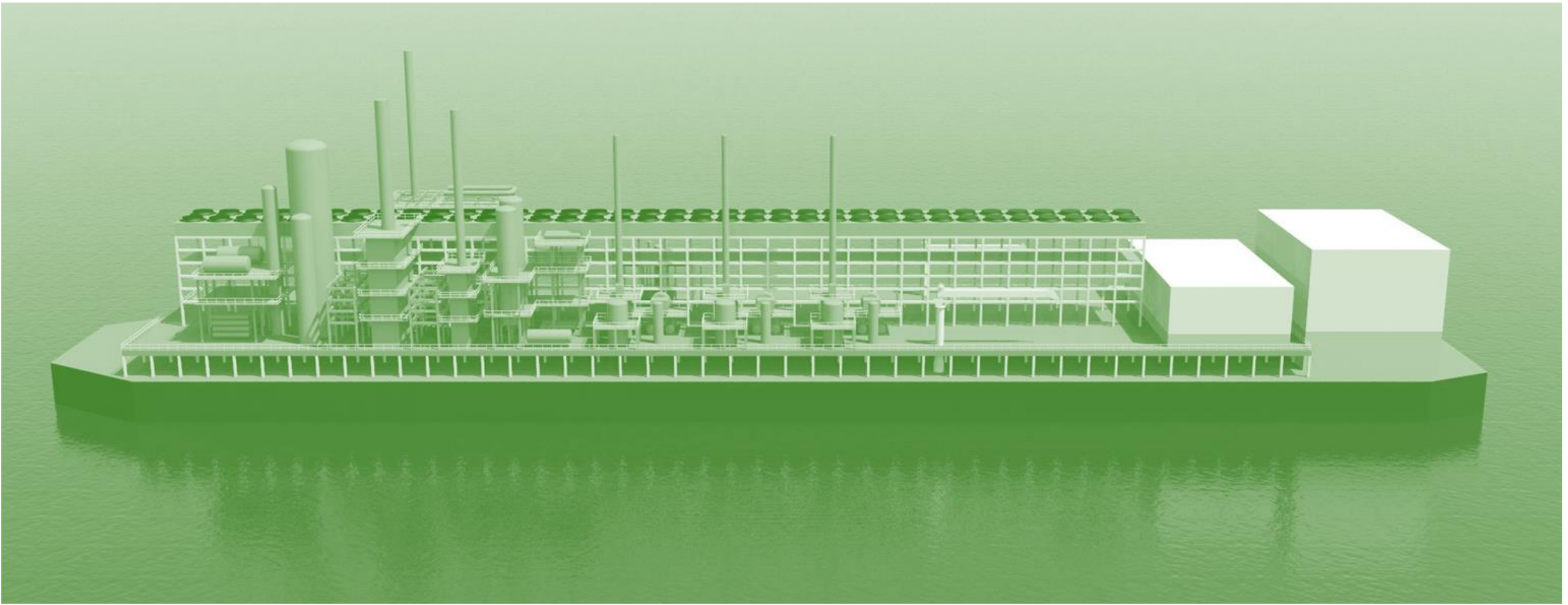
- Capturing emissions is the starting point. In order to truly have a neutral footprint, we need to capture and process emission and waste from source to customer.
- We treat emissions by applying the most efficient natural process of algal sequestration turning harmful emissions to useful products.
- We treat generated wastes such as metals and inorganic materials to transform it back to its elemental components (i.e. Metals and inert elements) that can be used effectively and safely as recycled products.
- Our approach enables us to carbon offset the crude, the refining process and even offset some of the carbon footprint of our refined products.



# Environmental Performance Principles

- Our Floating Refinery is a zero toxic emissions unit, to air, ground, and sea. The Project Units will be positioned such that the structure cannot move even in the most violent storms or cyclones.
- It is also designed to conserve all waste products on the barge, with North Sea and Gulf of Mexico standards of zero emissions to sea being fully implemented. These small amounts of wastes such as, dirty water, chemical residues, oil impurities will be recovered and disposed of safely in line with local and international regulations.
- In terms of emissions to air, the design removes Carbon Oxides, Nitrous Oxides, Sulphur, Sulphur Dioxides to minute trace levels and any other metals or other contaminants are completely removed from the flue gases using modular scrubbing technology.
- Captured CO2 emissions will be processed by an algal processing adjunct facility with a wide option of final products ranging from bio-fuel additives to algae-based food products. While this is becoming a recognized approach to treat CO2 emissions in other industries, the integration of algal processing will make the Floating Refinery the first truly Zero Emission Facility of its kind in the world.
- The minimal onshore footprint ensures minimum effects resulting from EPC activities including emissions and pollution affecting the surrounding communities and the local environment.





# Project Description



# The Floating Infrastructure Evolution

**Floating Modular Refinery:** The proposed unit will comprise a Floating Refinery, a Floating Storage Unit & can utilize a Single Buoy Mooring for Crude and products offloading



- **Floating Production and Storage and Offloading (FPSO) vessels:** FPSOs are designed to receive hydrocarbons produced by itself or from nearby platforms or subsea template, process them, and store oil until it can be offloaded onto a tanker or, less frequently, transported through a pipeline.



- **Floating LNG Vessels:** FLNG units are essentially the same as FPSOs but they process gas into a liquid form for onward transportation. The latest one "Shell Prelude" is over 400 m long and has a displacement equivalent to 6 of the largest aircraft carriers.



- **Floating Power Barges:** These are floating units with up to 400 Mw gas fired power generator installed on topside. The power **units are modular** in the same way as the FMR refining unit design and the integration of the units is basically the same technically.



- **Floating Regasification Units:** These units do the opposite of an FLNG unit, they receive products from an LNG transporter in liquid form and reconvert it back into gas for use in power and petrochemicals processes.



# Project Description & Scope

The project aims to create an oil products manufacturing, storage and offloading facility as a long-term major infrastructure development. The development comprises a Mobile Modular Refinery unit located near to shore within port limits. It will be connected to an integrated Floating Storage Unit (FSU). The refinery complex will be supplied with crude oil from an offshore Single Buoy Mooring (SBM) and will offload products from the SBM or FSU as operators dictate.

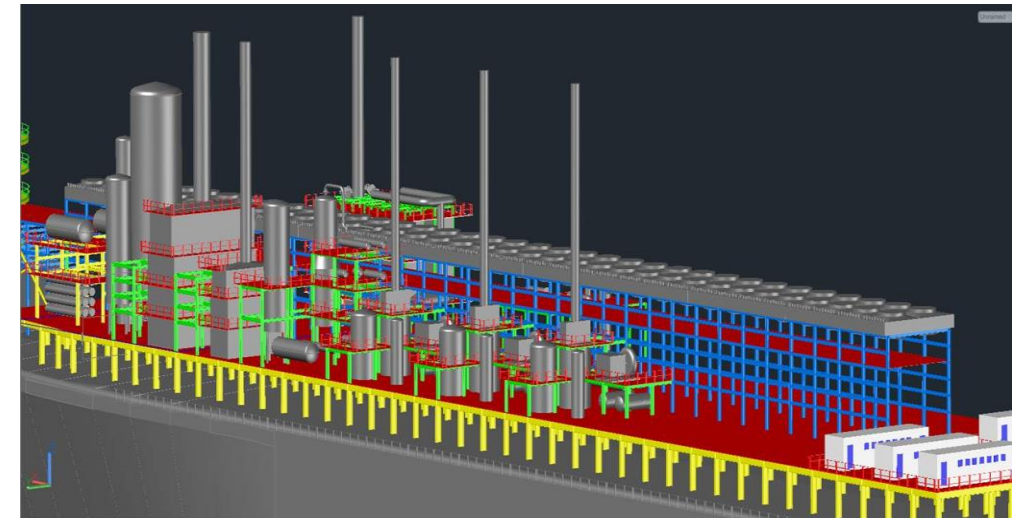
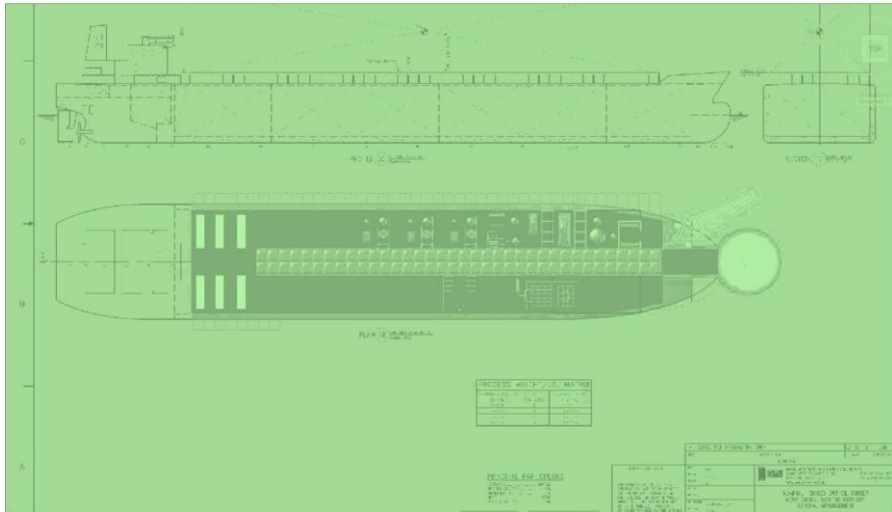
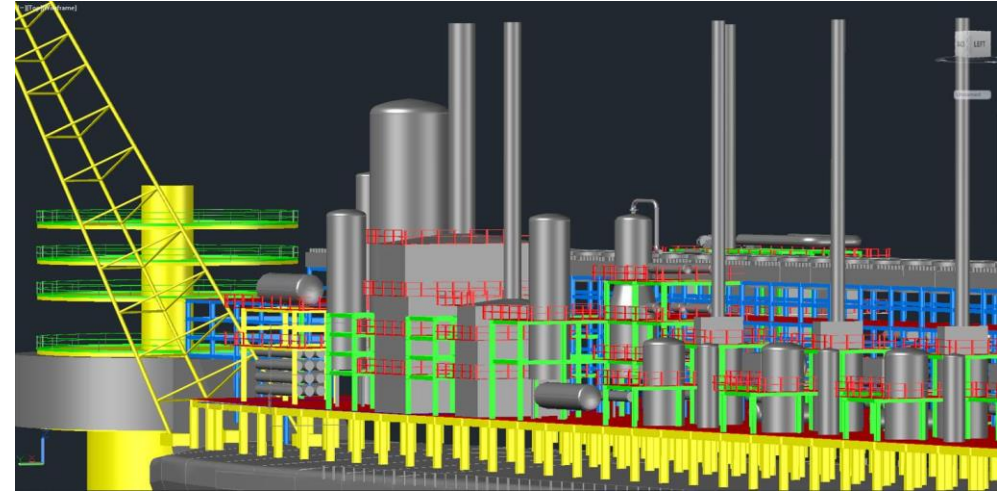
The refiner will process 1 Million bbl/month of a standard basket of crude oil feedstock into the main product of LS-380 bunker fuel, and lesser amounts of gasoline, diesel, kerosene and small amounts of fertilizer. The product slate will be further optimized to suit the target market during the FEED phase. The barge will be stationed in a purpose-built berth and is designed to have sufficient weight over buoyancy to maintain the barge firmly on its resting place, even when the cargo tanks are empty, especially with tropical cyclonic weather patterns in mind.

The Floating Storage Unit (FSU) is envisaged as follows:

- The FSU combined with refinery vessel will provide approximately 2.5 million barrels of storage capacity.
- The FSU will provide storage for all the crude with the exception of the daily capacity needed by the refinery.
- The FSU will also store all the bunker LS 380 FO, which will be transferred to smaller bunker vessels for offshore bunkering.
- Warehouse space will be created for storage of spare parts and materials and potential space reserved for sally-port activities.



# Main Design Components





# Benefits

Real Solution for Sustainable Growth and Profitability



# Project Value Proposition

- **Economic benefits:** contributing more than \$700 Million USD Dollar in FDI, as capex and generating more than a billion US Dollars per annum of hard currency from sales export of bunker and refined fuels to the regional and international markets initially. This will grow to more than \$3 Billion USD per annum turnover in the Project's future expansion possibilities.
- **Social investment:** The commitment to a large long-term project of this nature will allow for spin-off social investment in the local communities. A training centre for Oil & Gas industry technicians and professionals, community facilities and wider environmental protection investments are typically envisaged.
- **Environmental performance:** The vessels design presents minimal environmental exposures due to the state-of-the-art modern design and operation.
- **Enhanced Crisis Management and Emergency Response capability (Tier 1, Tier 2 and Tier 3) :** Such enhanced capability combined with Mauritius' current Tier 1 capability will provide protection to manage or avoid any crisis.





# Commercial Attractiveness – Why Floating Modular Refinery

- The “First Refinery Conundrum”
  - Low demand economies cannot justify large refineries
  - Small refineries onshore do not get invested due to long pay-back times, high maintenance costs and painful National fiscal burden
  - A Floating Modular mobile unit resolves this conundrum
- Modularization allows for the first time, economic scale on a vessel
- Land use advantages (land is precious, make the most of it):
  - Greatly reduced land area required
  - Reduced construction disruption
  - More space available for bunkering & storage (and other developments)
- Cost advantages:
  - Low-cost re-configuration can be done in cheapest place
  - Reduction in de-commissioning costs
  - Reduced insurance premiums
  - Greater range of interested investors
- Quality advantages:
  - LS 380 bunker fuel meet new IMO standards and creates new market
- Construction, Environmental and Operational risks are more easily managed



# Main Advantages and Benefits

- Significant financial and commercial gains can be achieved and attained by producing additional low-cost products to meet demand and to allow a new export market to be created;
- Processing oil locally reduces transportation costs, particularly for the heavier fractions of the crude barrel;
- The source product (crude oil) is traded on transparent international markets which provide favorable contractual advantages compared to refined products supply contracts;
- The contract is fixed over a longer period so re-negotiation / tendering risks are reduced;
- The product slate can be optimized to fit areas of increasing local demand and meet bunkering/export opportunities;
- Additional national employment is created to run the local component of the project;
- Design integrates security in a novel approach to ensure that all the threats and challenges are met and handled in accordance with the highest international security standards;
- Plant has no flaring and is zero emissions.



# MARPOL VI and The Future of Bunkering

- **Increasing bunkering capacity:** in addition to the current bunkering capacity, the Project will bring an additional 1 million MT per year, thus tripling the overall bunkering capacity.
- **Quality of products:** All products will meet the MARPOL VI and ready for future standards.
- **Direct employment:** The final number of direct local employments will be decided during the FEED phase but not less than few hundreds of specialised Oil & Gas professionals.
- **Indirect employment and benefits:** In addition, the International Bunkering Association reports that for every \$100 spent on bunker fuel, indirect local spending of \$100 is generated, due to the creation of high value-added ancillary businesses such as ships supplies, re-crewing, spare parts and maintenance. **Thus, the majority of this spending will benefit the local suppliers and services such as restaurants, farmers, change of crew, food stalls and provision shops etc.**
- **Port dues and anchorage fees:** The Project will pay normal port dues and anchorage fees for the Project vessels, while the proposed site allows for additional bunkering to be added to the scope of the Project attracting additional port dues and anchorage fees.





# Project Economics

# Main Financial Components

Depending on the location, final Products Slate of Refined Products, the cost of the floating refinery can vary from \$650-750+ Million USD. WE&B has conducted several design options. To calculate the ROI, WE&B used the following Assumptions:

Total Project Capex	<b>US\$ 700m</b>
Refining Capacity	<b>37,500 barrels/day</b>
Debt Equity Basis	70 debt, 30 Equity.
Total Equity Required	<b>US\$210m</b>
Debt Required	<b>US\$ 490m (US\$ denominated)</b>
Development Period	<b>24-36 months</b> (finalized during FEED stage)



# Main Financial Components

- **Expected Returns on Investment**

- The projected Net Profit of the MMR once commissioned is at least \$150 Million USD/ Year based on a fixed Technical Fee\* Revenue Model.

<b>Revenue</b>	<b>Technical Fee</b>	<b>\$250m / Year</b>
<b>Cost</b>	<b>OPEX</b>	<b>\$50m / Year</b>
	<b>DEBT (Loan repayment for 10 years)</b>	<b>\$50m / Year</b>
<b>Profit (year 3)</b>	<b>ROI</b>	<b>\$150m / Year</b>

- Revenue recognition: (Revenue recognized based on the following)
  - Technical Fee:\* \$250m / Year (based on US\$ 20 per bbl as Technical / Processing Fee)
  - Trading:<sup>f</sup> The above does NOT include any revenues from trading the products or crude.

\* Technical Fee is based on a consistent and R-Factored FEE (not Gross Refining Margin nor Processing Fee).

This makes the investment significantly de-risked and impervious to market fluctuation.

<sup>f</sup> Revenue from Trading Activities can vary dependent on market fluctuation. Estimated Trade Revenue: \$50- 100 Million USD / Year



# Main Financial Components

**Projected Net Profit of the MMR once commissioned is at least \$150 Million USD/ Year based on a fixed Technical Fee\* Revenue Model.**

- **Revenue Recognition:** (Revenue recognized based on the following)

TECHNICAL FEE	PER BBL	PER DAY	PER YEAR (USD MILLION)
TECHNICAL FEE BASE	\$ 20	\$700,000	\$250 M
TECHNICAL FEE HIGH	\$ 25	\$875,000	\$315 M
TECHNICAL FEE LOW	\$ 15	\$525,000	\$190 M

Technical Fee\*: \$260m / Year (based on US\$ 20 per bbl as Technical / Processing Fee)

Potential Revenue from Trading / Refining closer to market

POTENTIAL REVENUE FROM TRADING, REFINING CLOSER TO MARKET	PER DAY	PER YEAR (USD MILLION)
Upside from Products Trading Base Case	\$420,000	\$150 M
Upside from Products Trading High Case	\$595,000	\$214 M
Upside from Products Trading Low Case	\$245,000	\$88 M





# Bunker Fuel and Bitumen– Overview

Economics Review and Studies





# Technical Fee & Pricing

Our Technical Fee (TF) is not a “Gross Refining Margin”, it is calculated simply as the difference between the price of crude oil and the price of refined products. (This includes OPE and all other costs relating to the refining process).

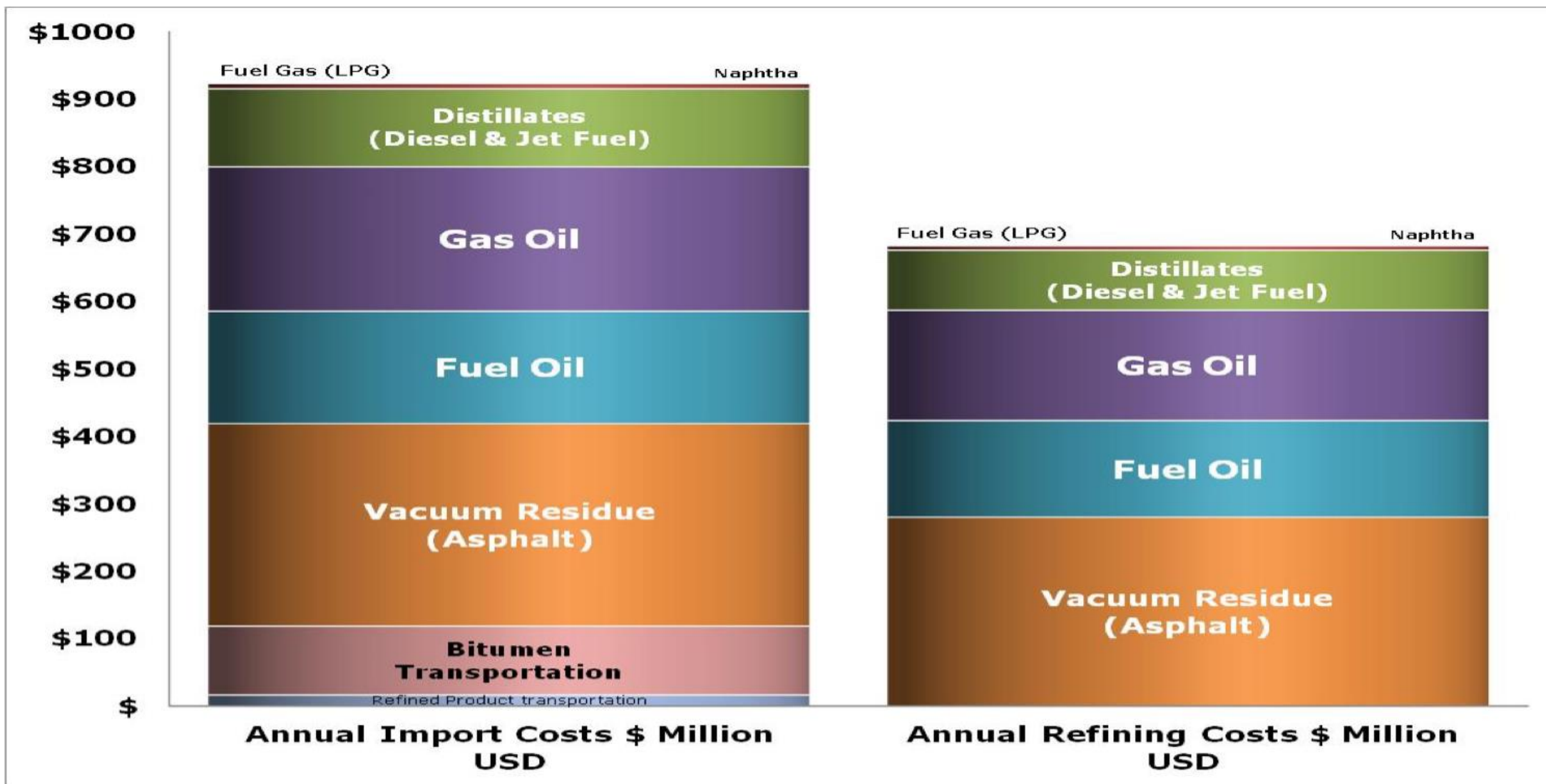
The size of the market and the nature of the product slate determines the market price (smaller market size usually adds a premium not only because of shipping costs, but other factors such as priority of delivery etc.). This market premium is not easily changed due to global market conditions (i.e., the total refining capacity of the FMR per month is equal to the total refining capacity of mega refinery per day.). While this is counter intuitive, bigger refineries depend on volume and huge off-takers rather than niche markets that only supply smaller amounts. As a result, Mauritius and other African countries are not considered important markets and are left to small and medium brokers who add all these premiums through the value chain.

By having the FMR designed to deliver a bespoke basket of refined products, meeting local market demand, WE&B FMR can provide the same huge refineries discounts to premium markets.



# Technical Fee & Products' Slate Pricing–Bitumen

Our base case scenario for processing lower crude indicates a whopping saving of over \$131 million USD P/A.



# Technical Fee & Products' Slate Pricing–Bitumen

Products (refined/imported)	Volume (US BBL)
Fuel Gas (LPG)	0
Naphtha	315
Distillates (Diesel and Jet Fuel)	4095
Gas Oil	7560
Fuel Oil	6615
Vacuum Residue (Asphalt)	12915
Total Product Slate	31500

- \$131,000,000 in savings
  - by using the FMR instead of typical importation process of today
- \$227,000,000 in revenue
  - to the FMR to product the defined product slate of 31,500 US BBL.

	Per BBL	Per day	Per Year
Processing Fee	\$20	\$630,000	\$227,000,000
Net Saving of refining vs. importation			\$131,000,000
Total:			\$358,000,000

- \$358,000,000 revenue difference
  - between FMR process and importation
- Project cost estimated at \$700,000,000
  - ROI in 1 year





# Commercial Elements

Real Solution for Sustainable Growth and Profitability



# The Role of the EPCM Contractor (WE&B)

WE&B will draft and negotiate the EPC Contracts to construct, deliver and commission the Vessel on behalf of the Investor and Customer. Once signed the role of WE&B would be defined as follows:

## 'E' – Engineering services

- This is the integrated design of the vessel, the near shore berthing, the storage and transfer facilities and any associated infrastructure. WE&B will have been involved in all aspects of producing the basic designs at the feasibility and concept study stage.
- WE&B will assure on behalf of the Investor and the Customer that the accuracy and completeness of the basic design is verified.
- WE&B would be allocated responsibility for overall co-ordination of delivery for the project to ensure that the completed works meet the required schedule, technical and performance specification. Subject to normal limits to liability.

## 'P' – Procurement services

- WE&B will agree with EPC contractors and monitor the overall procurement strategy for the Vessel.
- WE&B will also source necessary sub-contractors, consultants and services that are required for, delivery of the Vessel, in addition to those covered under the EPC contracts.
- Where necessary, WE&B can act as Investor and / or Customer's agent for certain aspects of the project procurement, as required.

## 'CM' – Construction Management services

- WE&B will assume responsibility for overall management of the carrying out and completion of the Vessel construction, delivery and commissioning. This will include the co-ordination of the works and services being procured on the Investor's behalf to achieve completion of the works in accordance with the project schedule, the project budget and to meet the required technical and performance specification. Subject to normal limits to liability.
- As part of the overall management of the project, WE&B will be responsible for the management of health and safety of the Vessel construction, delivery and commissioning and will offer advice to Customer for the related onshore elements of the works.
- WE&B will also work closely with the Customer's contractors tasked with delivery of the onshore and port elements of the project. The option to request WE&B management of these elements is also possible.



# Project Summary



## **THE MARKET:**

COUNTRIES WITH; EXISTING COMMERCIAL PORTS, NONE OR INSUFFICIENT REFINING CAPACITY, WHO IMPORT SIGNIFICANT VOLUMES OF REFINED PRODUCTS AT PREMIUM PRICES. THESE COUNTRIES CANNOT ATTRACT FOREIGN INVESTMENT FOR A RANGE FINANCIAL REASONS.



## **THE PROJECT:**

DEVELOP THE FIRST OF MANY **MOBILE MODULAR** REFINERY VESSELS LOCATED NEAR-SHORE, MITIGATING MUCH OF THE RISK ASSOCIATED WITH AN ON-SHORE FACILITY.

THE VESSELS WILL BE COST COMPETITIVE COMPARED TO ALTERNATIVES AND WILL OFFER INVESTMENT AND UTILISATION FLEXIBILITY NOT AVAILABLE WITH AN ONSHORE PLANT.



## **DEVELOPER:**

AN INTERNATIONAL ENGINEERING, MARINE AND SECURITY CONSORTIUM, LED BY WATER ENERGY & BEYOND FZLLC.



## **LOCATION:**

A TOTAL OF 19 COUNTRIES THAT ARE PRIME CANDIDATES FOR THE FIRST VESSEL.

SEVERAL LOCATIONS HAVE ALREADY BEEN IDENTIFIED AND ENGAGEMENT IN PLACE FOR DEPLOYMENT.

TWO COUNTRIES ARE IN ADVANCED DISCUSSIONS.



## **ECONOMICS:**

PROJECT EQUITY IRR > 20%

TECHNICAL FEE: \$20/BBL EQUITY/DEBT RATIO: 30/70

ANNUAL NET PROFIT: 150 MILLION USD (PROJECT ECONOMICS)

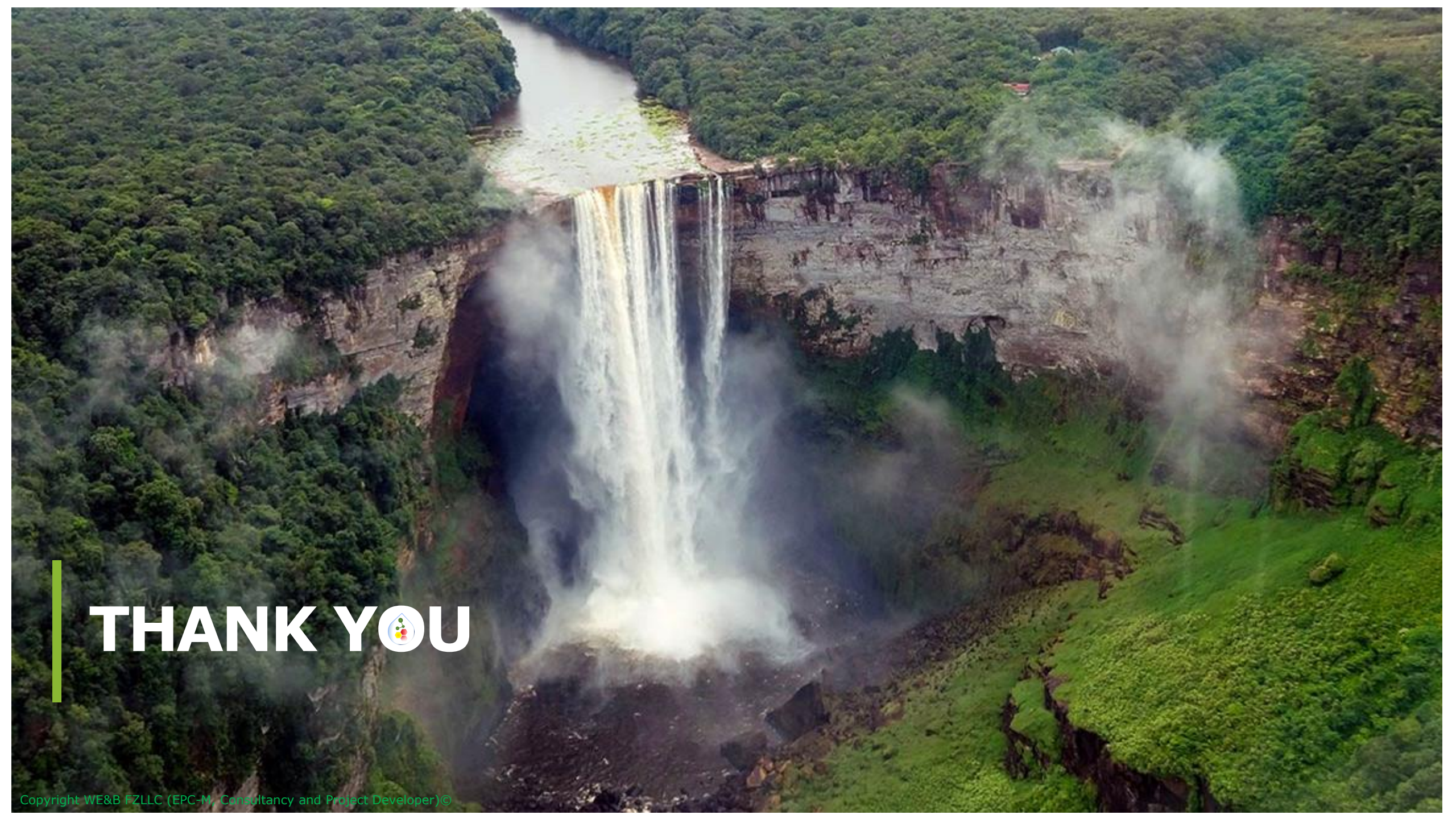


## **PROJECT COSTS:**

\$US 500 - 750 MILLION.

SEVERAL FLEXIBLE COMMERCIAL STRUCTURES ARE POSSIBLE.





**THANK YOU** 