The Role For LNG As A Transitional And Transformation Fuel

- The Potential For Mauritius Power And Bunker Markets

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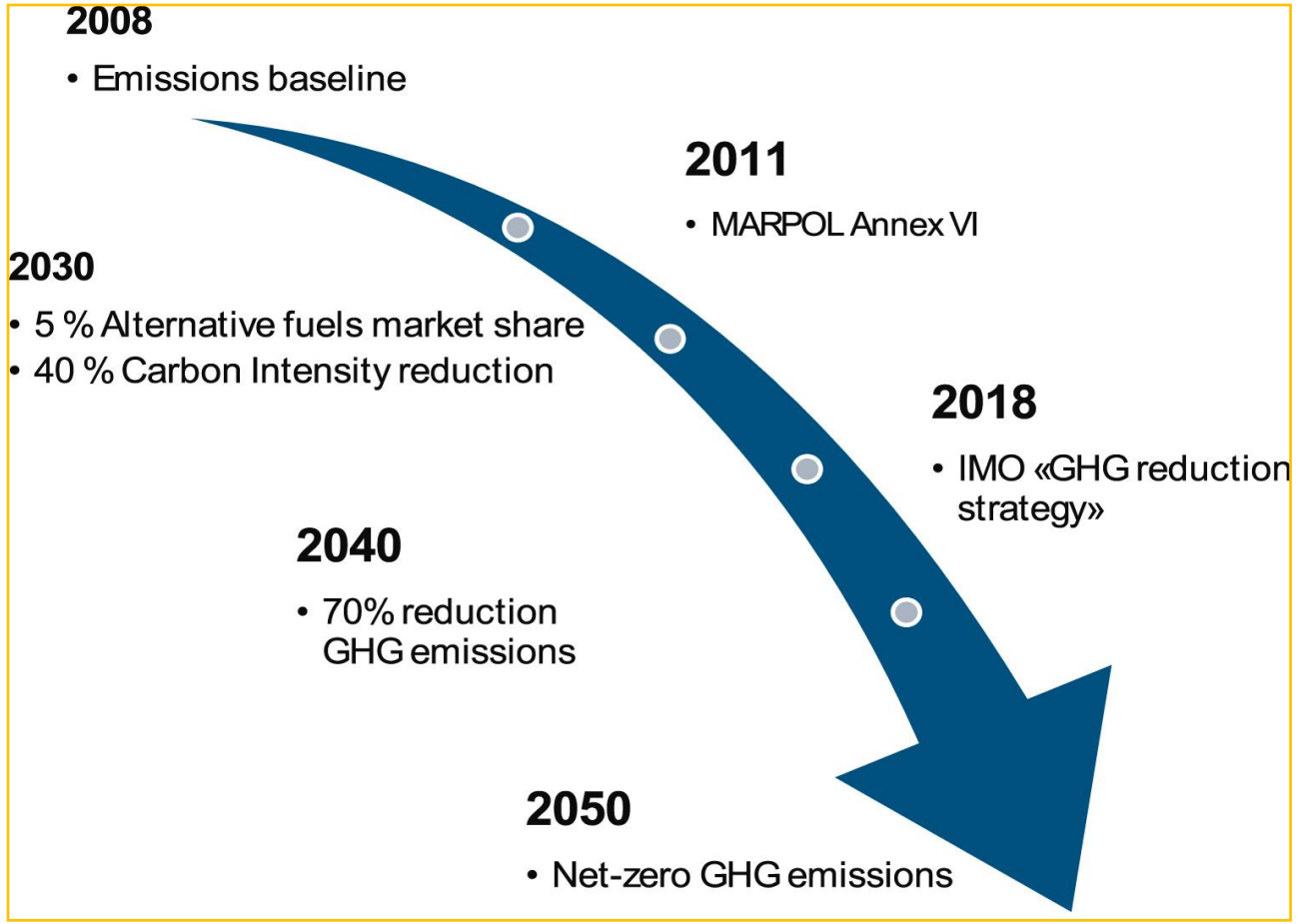
Pathway to Decarbonization



IMO has developed the ambitious target to reduce at least 50% of GHG by 2050

Future Marine Fuels

Carbon Fuels	Carbon Neutral	Zero Carbon
• LNG • LPG • Methanol • Ethanol	• Bio Fuel Bio Methane • Synthetic Methane SLNG	• Hydrogen • Ammonia

Future Marine Fuels : Challenges

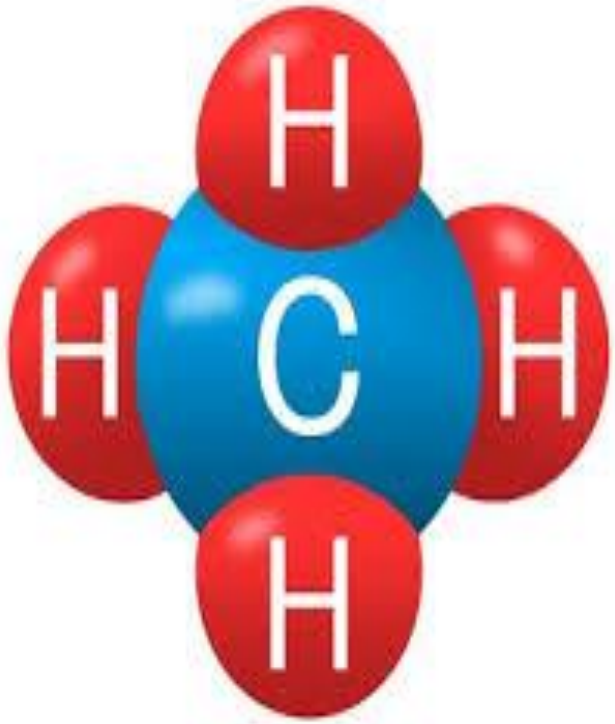
LNG /LPG	Methanol / Ethanol	Biofuel/Bio methane/ Synthetic LNG
• Increased Capex • Methane Slip (LNG)	• Increased Capex • High Fuel Cost	• Large scale production challenges and scalability • High Fuel Cost

Zero Carbon Fuels

Hydrogen	Ammonia
• Increased Capex	• Increased Capex
• High Fuel Cost	• High Fuel Cost.
• Storage Challenges, Flammable	• Limited Bunkering & Toxic effect on human health

What is LNG ?

Liquefied natural gas (LNG) is simply natural gas which has been reduced to a liquid state by cooling it to minus 162°C. The transformation to a liquid is accompanied by a volume reduction of approximately 600 to one (if the gas is initially around 15°C).



Methane Slip

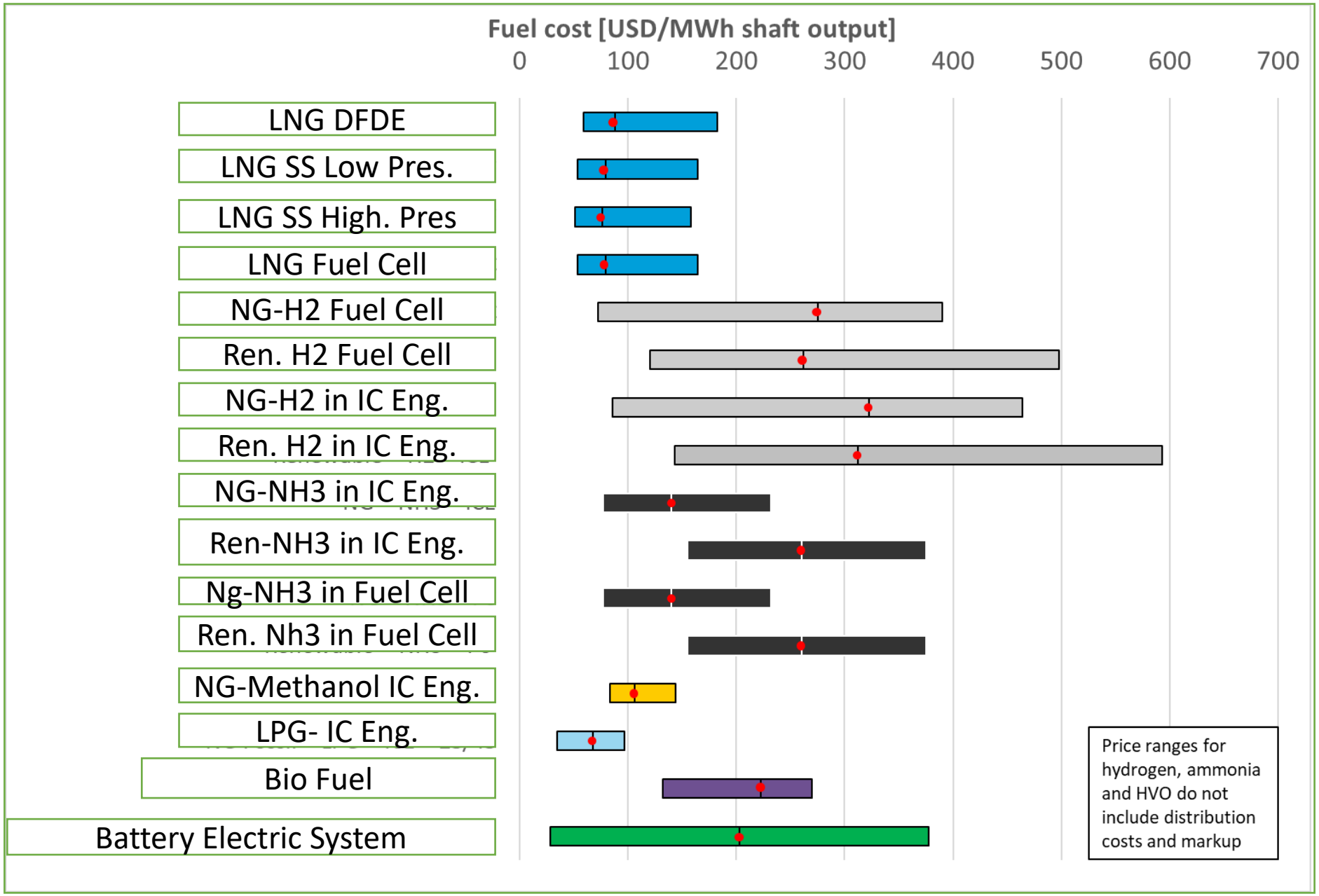
- Methane slip is an event whereby gaseous methane escapes into the atmosphere. This can happen anytime methane is stored, transported, or used.
- Methane has a greenhouse effect roughly 28 times as strong as an equivalent amount of CO2 (over a 100 years timespan).
- Potential reduction of methane slip up to 70% through aftertreatment solutions like oxidation catalysts on four-stroke engines.
- The average atmospheric lifetime of methane is 12 years, compared to 1,000 years for carbon dioxide.

LNG : A Bridge To Energy Transition

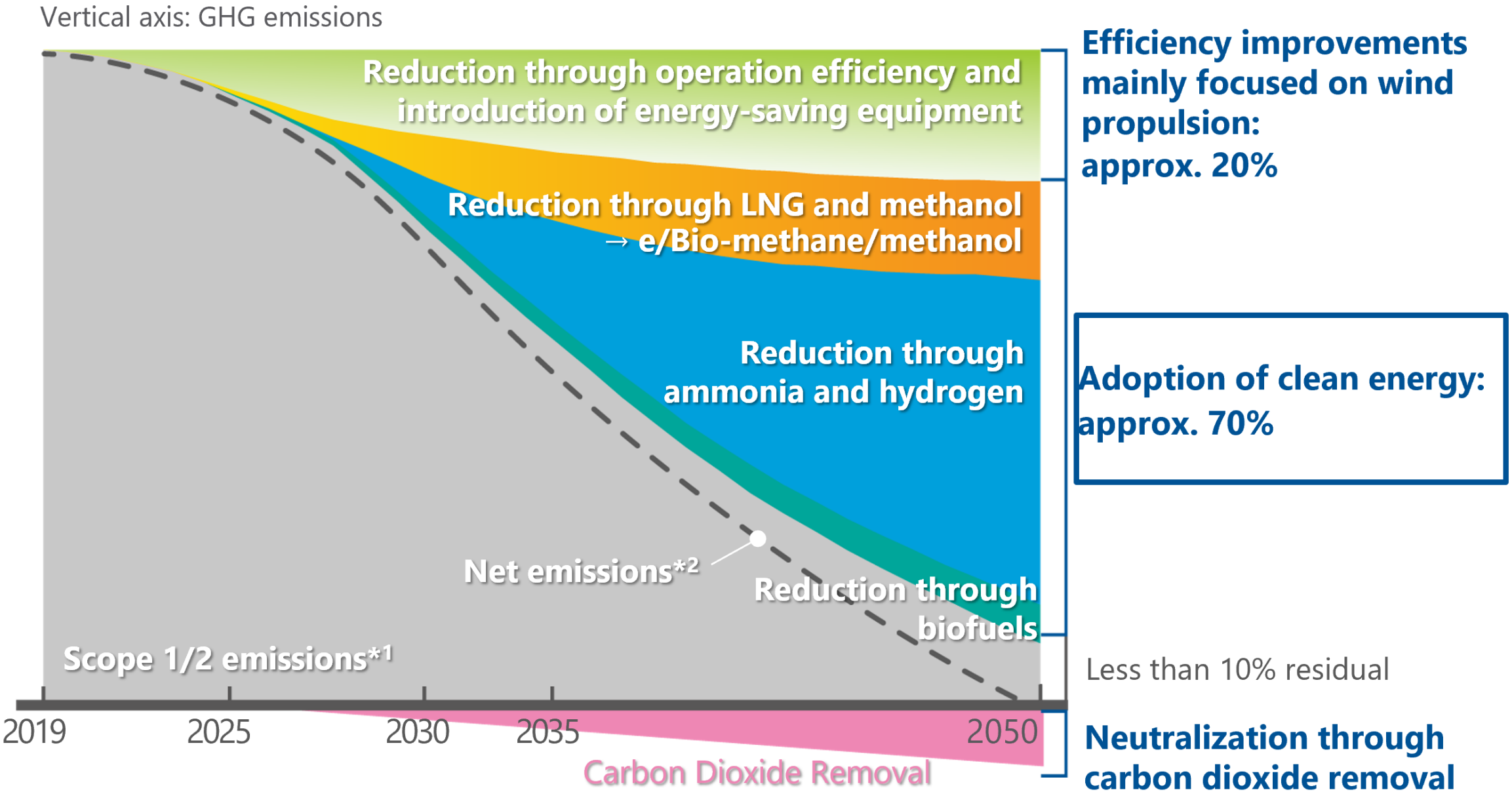
- Low Carbon Intensity makes it an appealing alternative to coal
- It is a readily available feedstock for Hydrogen Production
- LNG can replace more emissions-intensive fuels until renewable energy technologies evolve to provide a true net-zero energy alternative.
- Natural gas power generation may still be needed as back-up for variable wind and solar power.

CO_2 Reduction	SO_2 Reduction	NO_2 Reduction
50%	100%	90%

Liquefied natural gas (LNG) is a perfect transition fuel on the path to clean energy production. It is already much cleaner than other fossil fuels and its dependability makes it a good partner for fluctuating renewables.


Fuel cost [USD/MWh shaft output]
0
100
200
300
400
500
600
700
LNG DFDE
LNG SS Low Pres.
LNG SS High. Pres
LNG Fuel Cell
NG-H2 Fuel Cell
Ren. H2 Fuel Cell
NG-H2 in IC Eng.
Ren. H2 in IC Eng.
NG-NH3 in IC Eng.
Ren-NH3 in IC Eng.
Ng-NH3 in Fuel Cell
Ren. Nh3 in Fuel Cell
NG-Methanol IC Eng.
LPG- IC Eng.
Bio Fuel
Battery Electric System
Price ranges for hydrogen, ammonia and HVO do not include distribution costs and markup

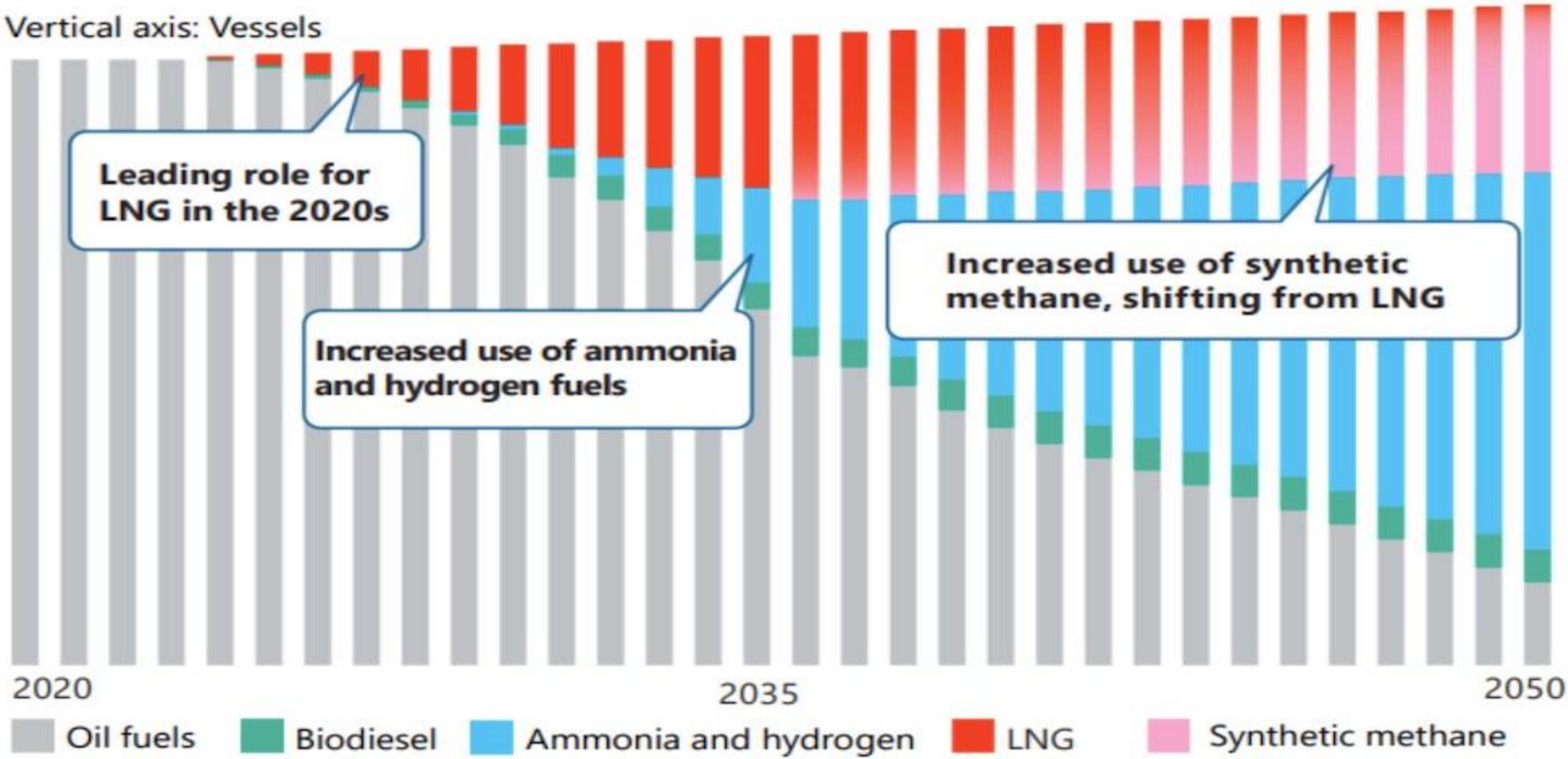
Source: DNV



*1 Scope: MOL and all consolidated subsidiaries. Scope 3 emissions are also included in the 2050 net zero target.

*2 For the calculation of emissions for years prior to the target year of 2050, emissions will not be offset with carbon dioxide removal.

Composition the MOL Ocean-Going Fleet by Fuel Type Going Forward



LNG

LIQUEFIED BIO-METHANE

LIQUEFIED E-METHANE

GHG Reduction 23%

NOX Reduction 95%

SOX and PM Reduction 99%

Reduction in GHG Emission by 65%-100%

Reduction in GHG Emission up to 92% and Potential to reach 100 %

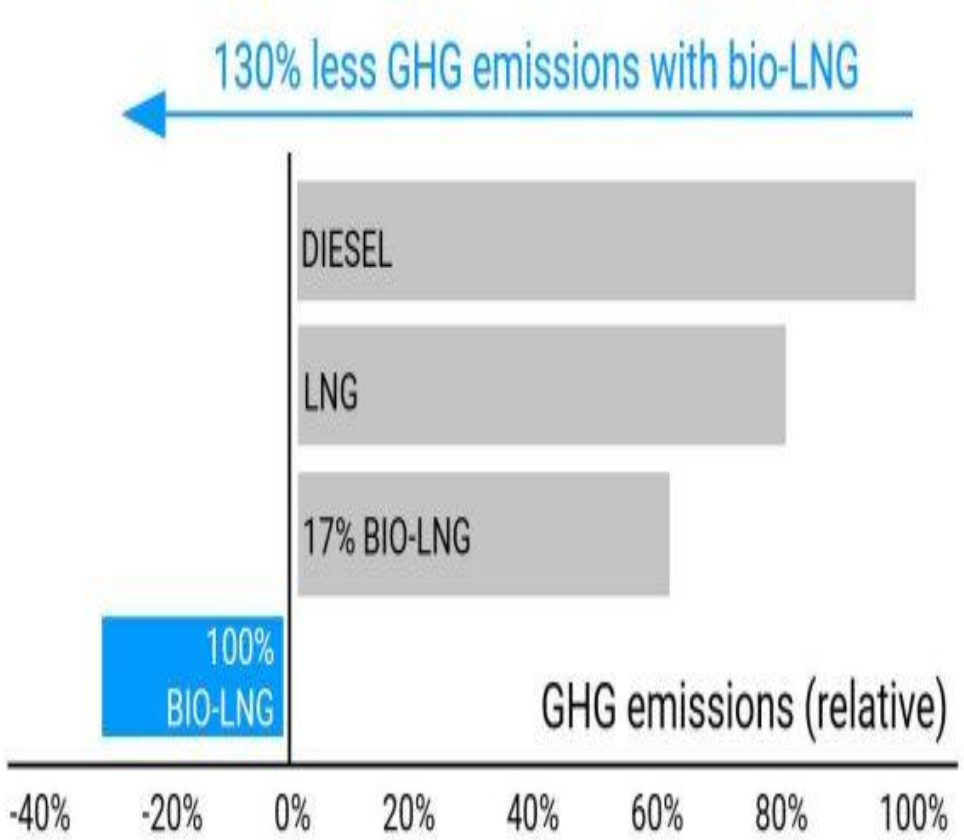
E-Methane (LNG)

- Liquefied e-methane, also known as e-LNG, is chemically identical to LNG (liquefied natural gas). It is produced from renewable electricity. It is also known as liquefied synthetic methane, or natural gas

- Liquefied e-methane is produced by combining hydrogen and carbon dioxide. the hydrogen is from electrolysis, the carbon dioxide is obtained from biogenic sources, or captured from the atmosphere

Bio- Methane (LNG)

- *Bio-Methane is a biofuel made by processing organic waste flows, such as organic household and industrial waste, manure, and sewage sludge.*



Mauritius : Ambitions to develop Port Louis as a Bunkering Hub

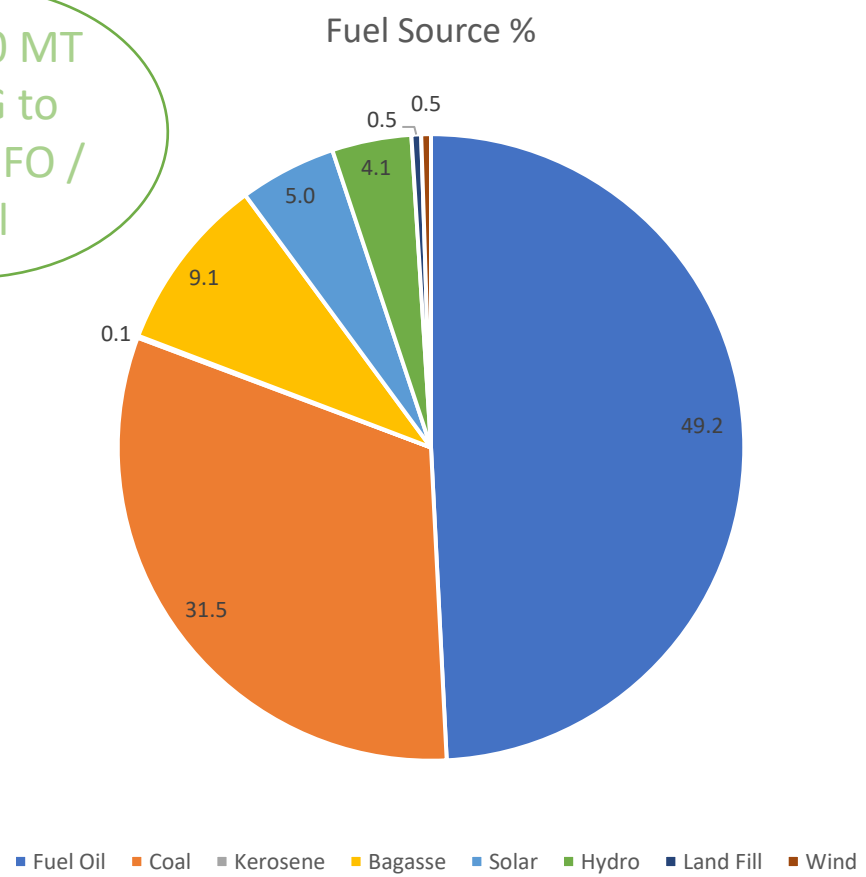
- The island nation of Mauritius can develop its capital and largest city Port Louis into a global ship refueling hub.
- Leading bunker suppliers are being attracted to Port Louis to provide an alternative to South Africa for reliable and quality bunker supply.

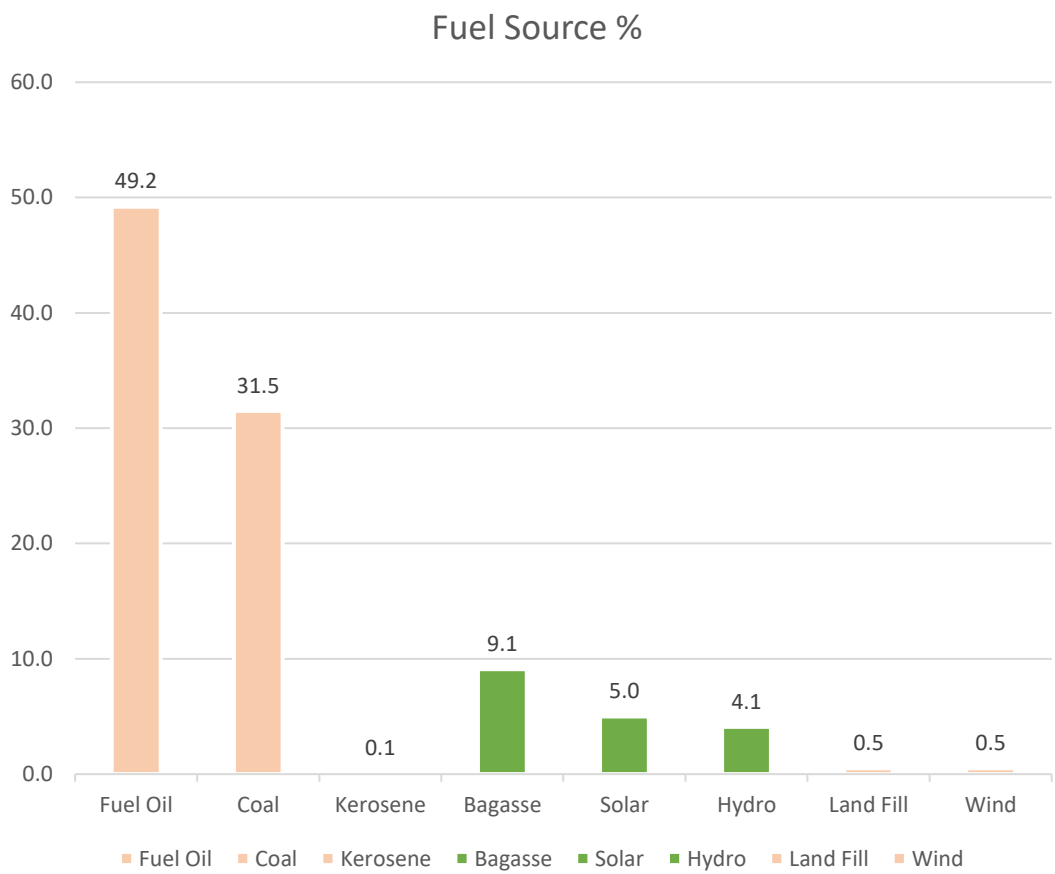
LNG Bunker Demand Estimation

	No of Bunkering / Month Presuming Cape Size, Large Tankers, Containers, Car Carriers	Estimated LNG MT/ Month	Estimated LNG MT / Year
1	5	4000 MT	48000 MT
2	10	8000 MT	96000 MT
3	15	12000 MT	144,000 MT
4	20	16000 MT	192,000 MT
5	25	20,000 MT	240,000 MT
6	30	24,000 MT	288,000 MT

Fuel Source for Power Generation in Mauritius (Installed Capacity 852 MW)

800,000 MT of LNG to replace FO / Coal





LNG for Power and Bunkering

FSRU

- Low Pressure R-LNG suitable for Power Generation
- 135K – 150 K FSRU Low Pressure suitable for Power Plant
- 16-20 LNG Cargo required in a year to meet Power Generation and Bunkering Demand .
- FSRU capable of unloading small LNG parcels to LNG Bunker Barge.

Small Scale- LNG Terminal

- Phase 1- 50,000 CBM LNG Tank
- Shuttle Tanker to be used as LNG Bunker Barge and STS for LNG transfer from LNG Carrier to shore terminal.
- Phase 2- Additional tank to augment capacity of the terminal.

Conceptual Idea : Mini LNG Terminal + 20,000 CBM Shuttle

LNG Bunkering

UNLOAD

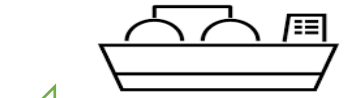
Onward Voyage

50,000

Regas

Power Plant

Conceptual Idea : FSRU + 20,000 CBM Shuttle



LNG Bunkering

FSRU

U N L O A D

Power Plant


ANY
QUESTIONS