



WORLD'S FIRST FLNG CONVERSION

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Black & Veatch

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Agenda

- Benefits of FLNG
- Golar Hilli Episeyo FLNG
 - Generic Design Basis
 - Midscale
 - Multi-Train Design
 - Hilli at Site
- Conclusions

FLNG Benefits

FLNG has long been sought after for advantages over onshore designs:

- Minimizes subsea pipelines
- Promotes consistent quality
- Requires no construction camp
- Allows asset to be redeployed
- Presents less risk to speculate on future facilities
- Offers a greater number of available gas reservoirs



Exmar Floating LNG

FLNG Conversion Benefits

Further benefit can be found in an FLNG conversion:

- Utilizes an existing floating asset
- Reduces capital expenditure (CAPEX)
- Improves speed to the market
 - No onshore site
 - No new ship to construct



Golar Hilli Episeyo FLNG

- Golar Hilli LNGC
 - Entered service 1975
 - 125,000 m³ cargo capacity
- Construction and demolition Q4 2014 for FLNG conversion
 - Keppel Shipyard, Singapore

Keppel Shipyard



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Topsides Capabilities

- Mounted on sponsons
- Starboard Side - Common facilities
 - Acid gas removal
 - Dehydration
 - BOG handling
 - Heavies handling
- Port Side - Liquefaction
 - 4 x 0.6 MTPA Trains

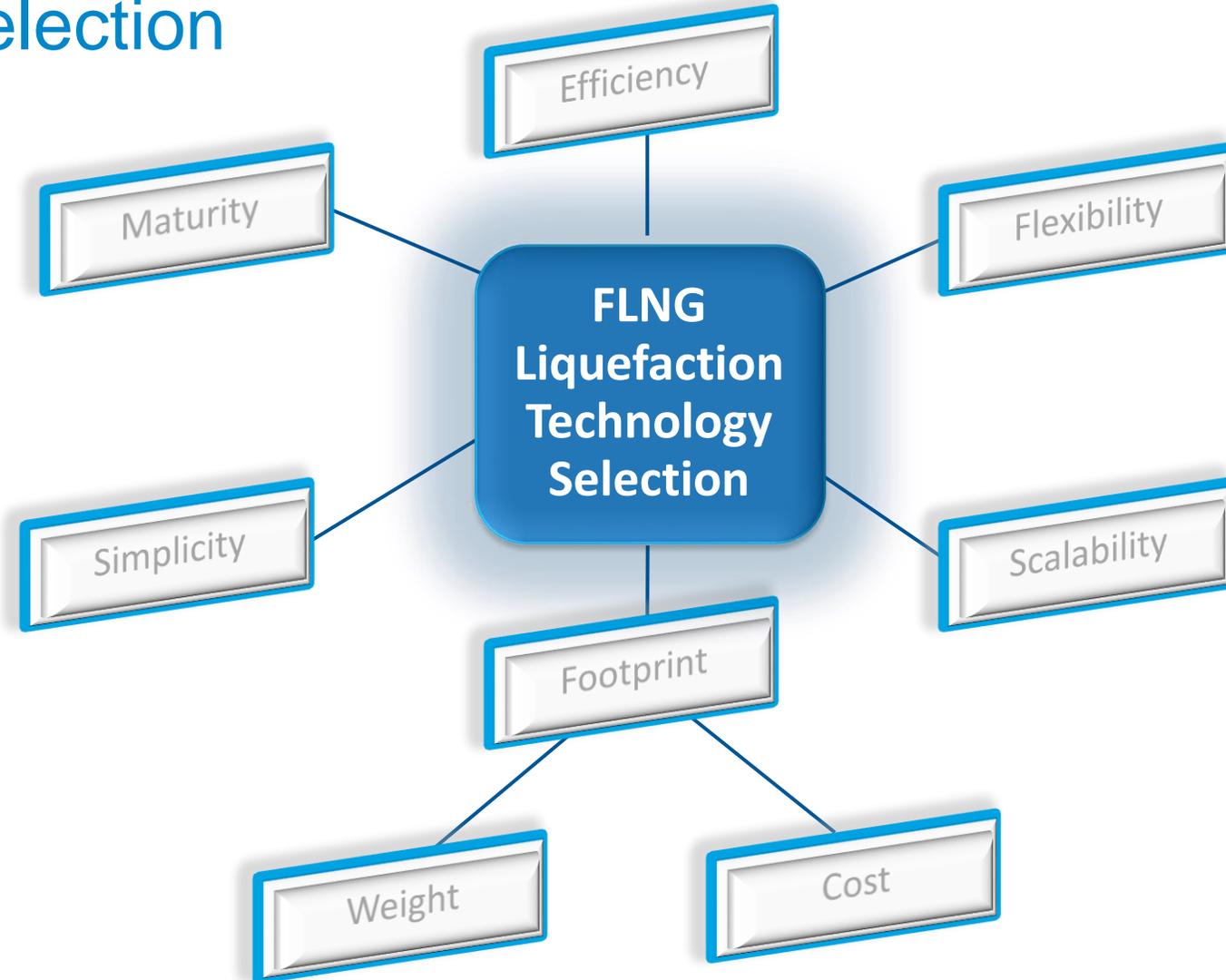


Generic Design Basis

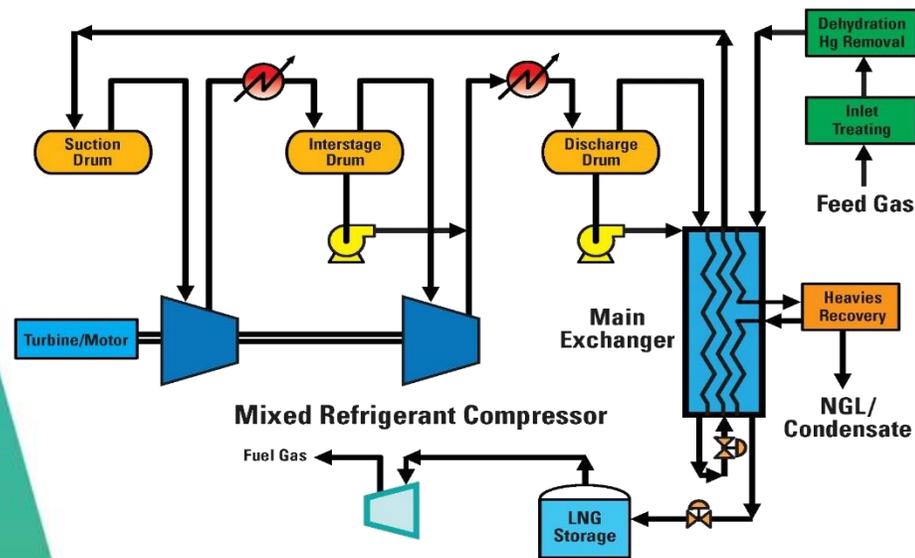
- Operation flexibility
 - Varying or depletion of gas field
 - Range of heavy hydrocarbon handling
- Location flexibility
- Repeatable design
- Possible to start construction without final location



Technology Selection



Black & Veatch PRICO® Liquefaction



- Simplest form of single mixed refrigerant (SMR) cycle
- Single cycle refrigeration system
 - No series systems
 - Reduced equipment
 - Compact BAHX cold box
 - Compact layout
 - Simplified operation – quick startup
 - Refrigerant inventory – lowest in the industry
 - Hold refrigerant on shutdown

Mid-scale Design

**Offers manageable
offtake capacity**

**Easier sales
contracts**

**Avoids
“mega project”
commercial and
cooperation issues**

**Provides access
to more
financing options**

**“Bite-sized”
CAPEX**

Multi-train Design

- Easier turndown capability
 - More potential fields
 - Early deployment to partially developed fields
- Fits within smaller footprint
 - Compact SMR design
- Planned maintenance flexibility
 - Less total facility downtime

Hilli Episeyo at Site

- 20 km off coast of Cameroon
- Arrived on site Q4 2017
- LNG produced March 2018
- First cargo shipped and performance test passed May 2018



Conclusion

- FLNG provides many benefits over traditional onshore design
 - FLNG conversion can provide further benefit
- Keys to successful design:
 - Flexibility
 - Manageable CAPEX
 - Small footprint
 - Repeatable design
- Golar Hilli Episeyo changes the industry

