



# WORLD'S FIRST FLNG CONVERSION

Kyle Haberberger, Process Engineer

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 m<sup>3</sup> cargo capacity
- Construction and demolition Q4 2014 for FLNG conversion
  - Keppel Shipyard, Singapore

Golar LNG



**BLACK & VEATCH**

**Keppel Shipyard**



## 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



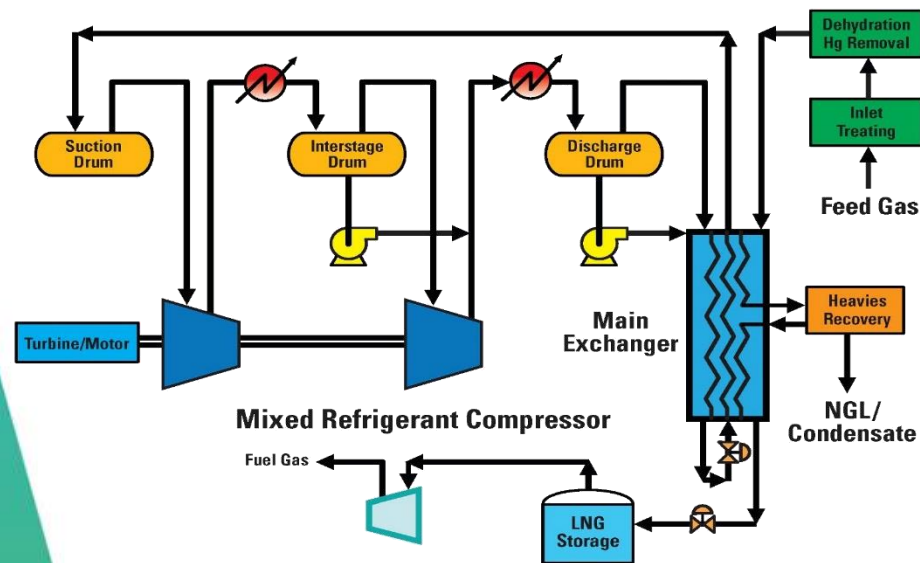


# Technology Selection





## 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

