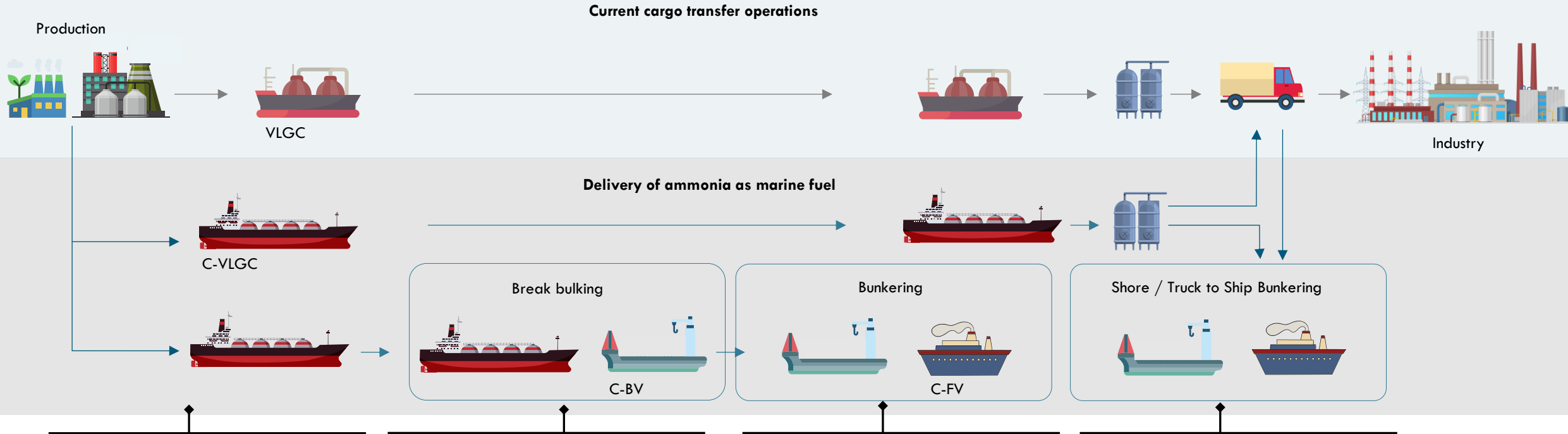




**Infrastructure for ammonia bunkering**  
**Green Fuels Transition For International Shipping Workshop**  
**Hong Kong**

*Dr Sanjay C Kuttan*  
*Chief Technology Officer*

# Delivery of chemicals as marine fuel will be more complex than current cargo transfer operations



- + Existing cargo loading procedures can be used
- + New C-VLGC with NH<sub>3</sub> or CH<sub>3</sub>OH engines
- + Engine room
  - + New designs e.g., isolation/segmentation of fuel preparation rooms
  - + Additional safety designs & procedures, remote engine monitoring
  - + Studies e.g., Castor initiative, Shell-DNV, LR

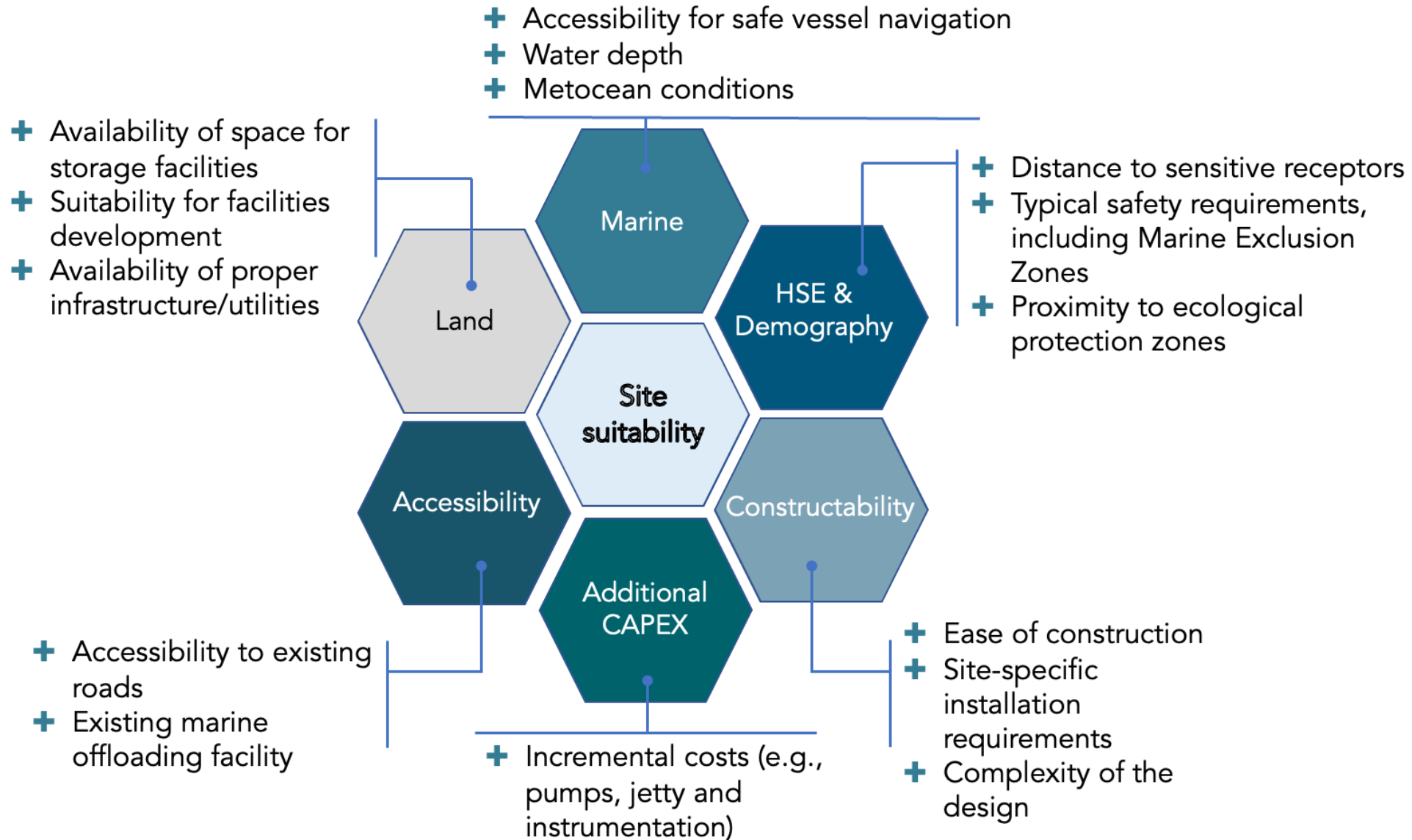
- + Limited NH<sub>3</sub> StS transfer operations
- + New C-BV designs with or without NH<sub>3</sub> / CH<sub>3</sub>OH engines with additional safety guidelines
- + STS procedures between C-VLGC and C-BV to be established
- + Emergency response plans to be developed and refined using STS cargo transfer as a trial – interim step to build confidence in safety procedures

- + No operationalization of NH<sub>3</sub> related bunkering procedures
- + New C-FV with NH<sub>3</sub> engines
- + New C-FV engine room with additional safety designs & procedures, remote engine monitoring
- + Bunkering procedures and emergency response plans to be refined when vessels are available

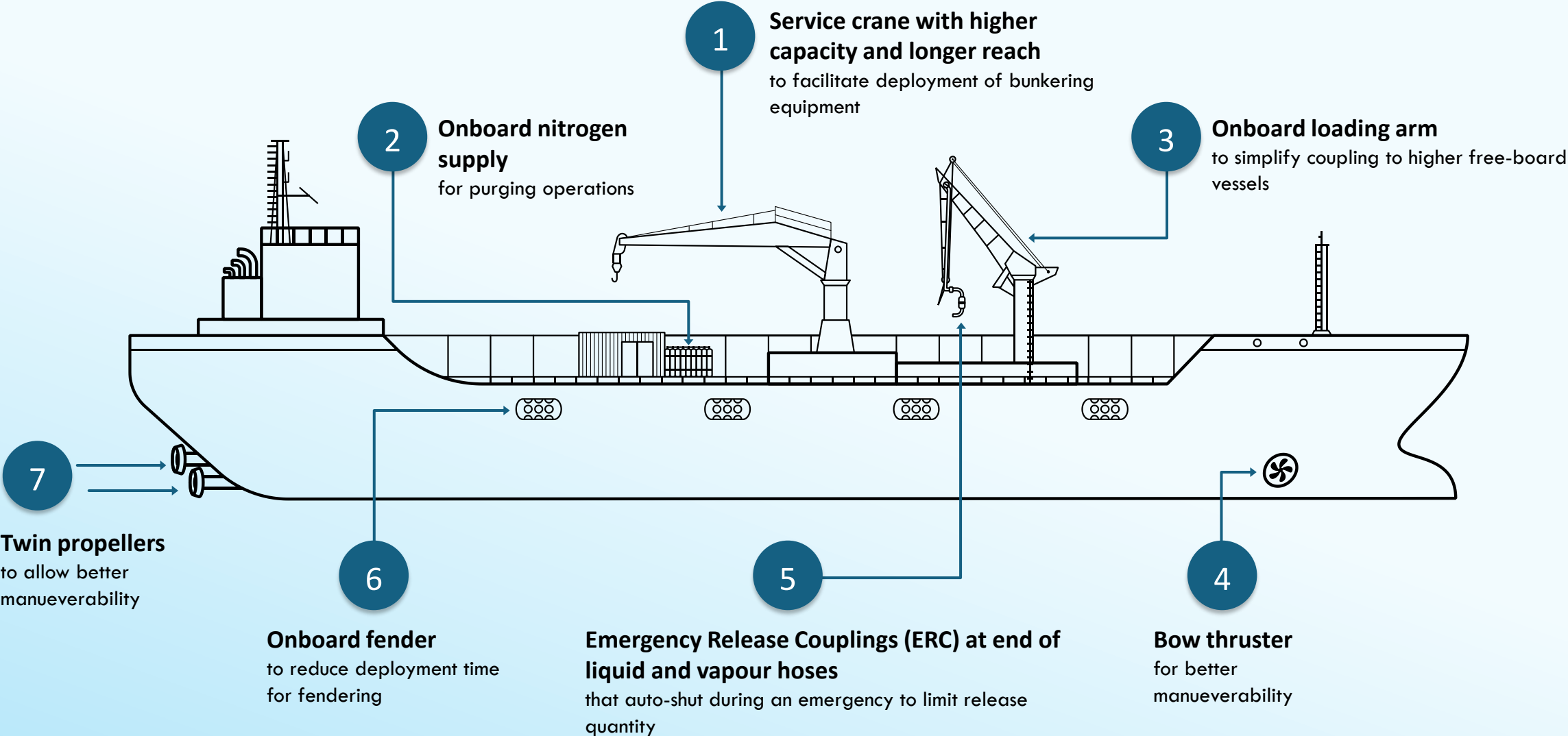
- + New NH<sub>3</sub> / CH<sub>3</sub>OH related bunkering procedures
- + Existing storage to truck can be used
- + Bunkering procedures and emergency response plans to be refined when vessels are available

C-VLGC: Ammonia / Methanol -Fueled Very Large Gas Carrier  
 VLGC: Very Large Gas Carrier  
 C-BV: Ammonia / Methanol Bunkering Vessel  
 C-FV: Ammonia / Methanol -Fueled Vessel

# Evaluating site suitability for infrastructure development requires a holistic approach for both brown and green field



# Elements to facilitate ammonia bunkering




All images used are for illustrative purposes only. Individual features, as well as sizes and fittings, are not drawn to scale and will vary.



 10 Pasir Panjang Road #17-02 Mapletree Business City | Singapore 117438

 [www.gcformd.org](http://www.gcformd.org)

 [projects@gcformd.org](mailto:projects@gcformd.org)

 +65 6979 7660