Global Centre for
MARITIME DECARBONISATION

Helping to decarbonise the maritime sector through pilots and trials

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Director of Projects and lead for GCMD's "Enabling ammonia as a marine fuel" initiative
Global Centre for Maritime Decarbonisation (GCMD)

GCMD's mission

Our goal is to help international shipping decarbonise along a trajectory that meets or exceeds key targets, including reaching net zero around 2050.

We do this by:

Shaping standards	Financing projects	Deploying solutions	Fostering collaboration
We **share learnings** from our projects at relevant national and international technical committee meetings **to assist and accelerate the drafting of guidelines and standards.**	We **co-fund projects,** especially ones that lack immediate commercial viability or ones that may not lead to commercial returns, so learnings may lower the barrier for adoption.	We **rally partners** and **execute projects** to demonstrate the viability of decarbonisation solutions.	We provide **neutral ground** for stakeholders across the value chain to convene, ensuring a **diversity of inputs** to scope and operationalise pilots.

Partners support our mission

Founders/ Strategic partners

BHP · Rio Tinto · Eastern Pacific Shipping · DNV · MPA Singapore · ONE Ocean Network Express · Seatrium · bp · Hanwha Ocean · Hapag-Lloyd · NYK Line · PSA

Impact partners

BCG · the human energy company · gard · MOL Mitsui O.S.K. Lines · msc · Olympic Shipping and Management S.A.

Coalition partners

IBIA · International Chamber of Shipping (Established 1921) · IWSA International Windship Association · OGCI Oil and Gas Climate Initiative · SSA Singapore Shipping Association · SGMF

Knowledge partners

ADB · Global Maritime Forum · GSBN · KPLER · Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping · SINTEF

Enabling partners

KIRI Capital

And ~100 project partners

Enabling ammonia as a marine fuel*

ADVARIO · Asiatic Lloyd · BHP · bp · DNV · Eastern Pacific Shipping · Fratelli Cosulich · gard · Hong Lam Marine · James Fisher Fendercare · Jurong Port · Kenoil · MOL Mitsui O.S.K. Lines · National Metrology Centre · Navigator Gas · NYK Line · ONE Ocean Network Express · OSRL · Pavilion Energy · PIL · Pilbara Ports Authority · PSA · Rio Tinto · SeaTech Trusted Solutions · Seatrium · TCOMS · Viswa Group · Vopak · VPS · Yara

Assuring the quality, quantity and emissions abatement of drop-in green fuels*

Angelicoussis Group · AngloAmerican · Astomos Energy · Authentix The Authority in Authentication · AVL · BCG · BHP · bp · BunkerTrace · the human energy company · CMA CGM · Controlunion · Eastern Pacific Shipping · FincoEnergies · Hapag-Lloyd · 汇盛生物 HUISON · IDS Group · MAN Energy Solutions · MTM Maran Tankers Management Inc. · NYK Line · ONE Ocean Network Express · PIL · Saybolt · Stena Bulk · Swire Bulk · TotalEnergies · Viswa Group · VPS

Unlocking the carbon value chain

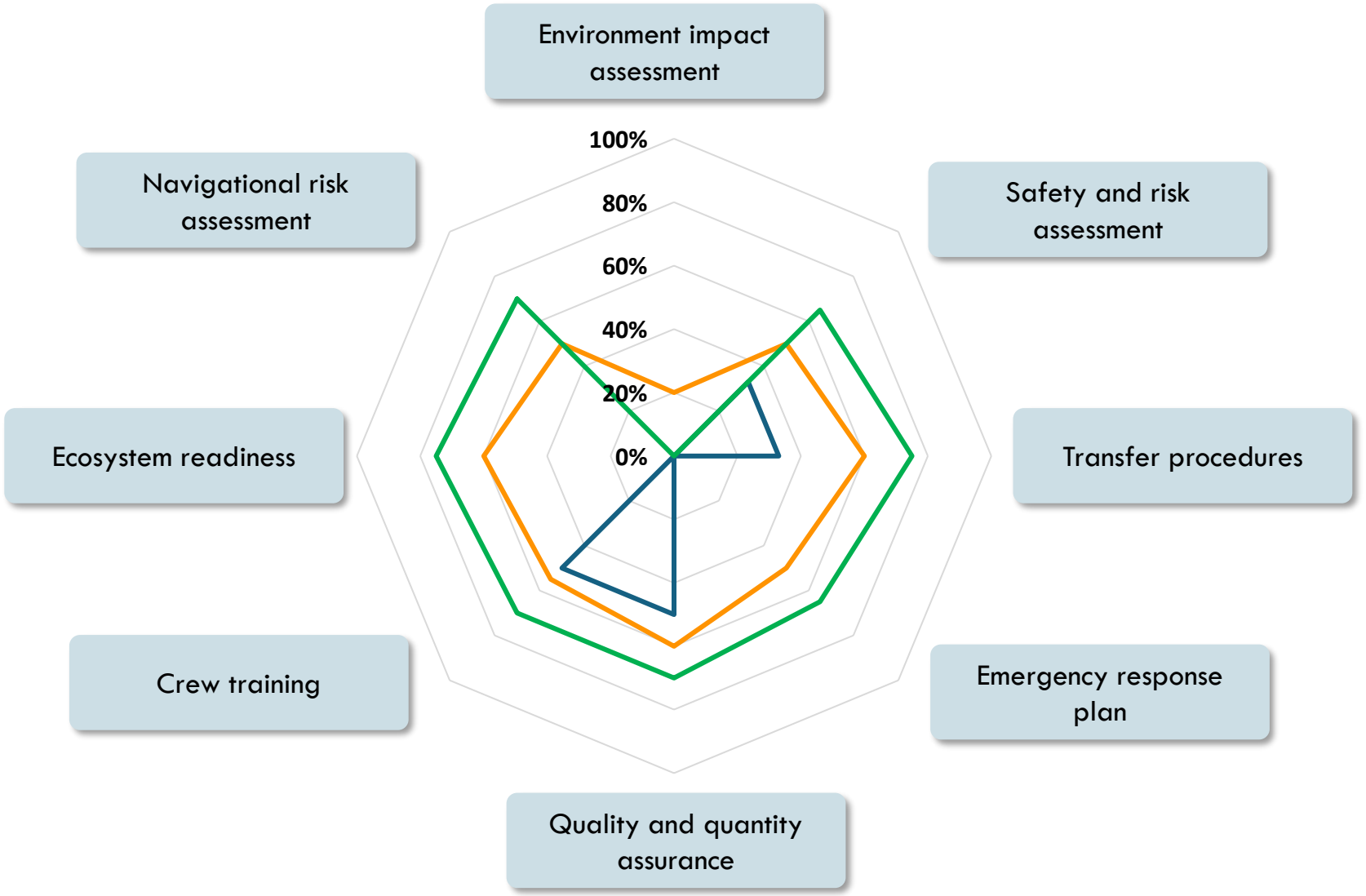
ABS · ADVARIO · Alfa Laval · BCG · BHP · BW Epic Kosan · bp · the human energy company · DELTAMARIN · Eastern Pacific Shipping · Emerson · Endress+Hauser · gard · Hapag-Lloyd · Jurong Port · K Line · Lloyd's Register · MPA Singapore · Navigator Gas · OGCI Oil and Gas Climate Initiative · Panasia · Pavilion Energy · Port of Rotterdam · PSA · SSA Singapore Shipping Association · SLNG Singapore LNG · Shell · SeaTech Trusted Solutions · Seatrium · Stena Bulk · TNO innovation for life · Woodside Energy

** Initiatives partially funded by MPA; partners for the initiative "Scaling the Adoption of Energy Efficiency Technologies" will be announced soon*

Ammonia transfers between the Green Pioneer and the Navigator Global at the outer anchorage of Port Dampier

4,000 m^3 (2,700 MT) of liquid ammonia was transferred at 700-800 m^3/h from the Green Pioneer to the Navigator Global and back

Enabling port readiness for ammonia bunkering



+ **Singapore Phase 1**
  (generic safety study)

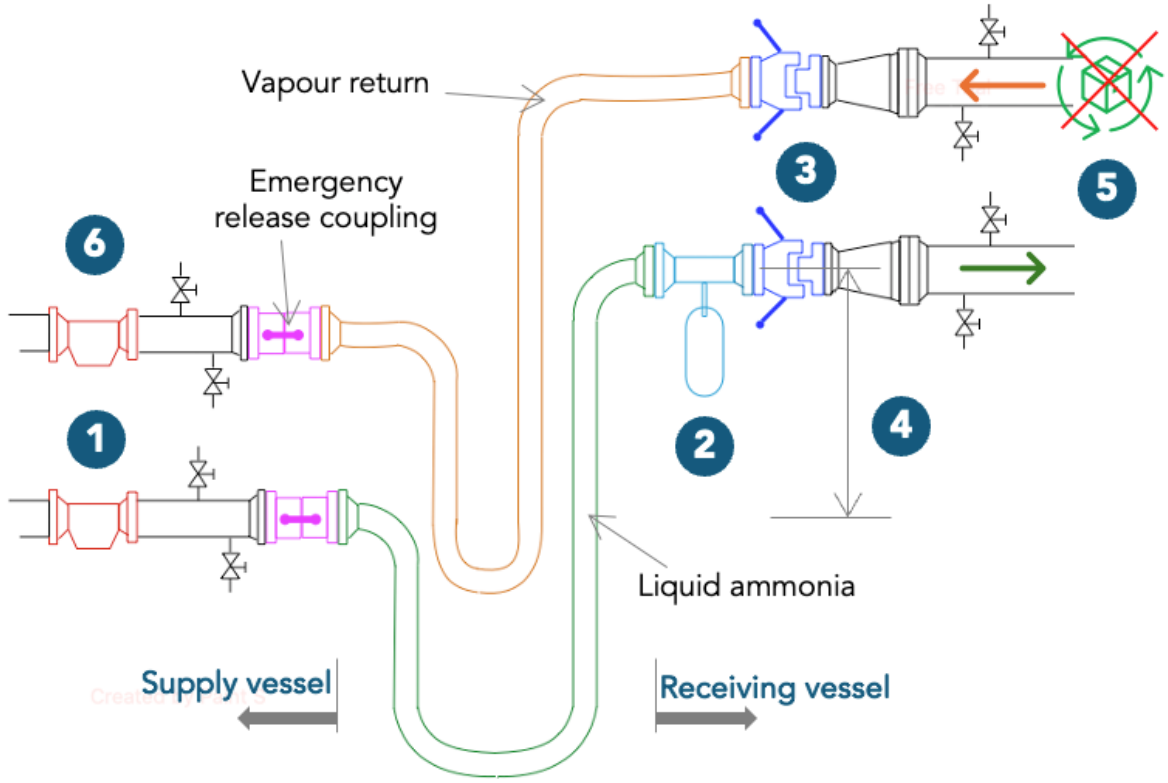
+ **Singapore Phase 2a**
  (vessel-specific safety study)

+ **Pilbara transfer**
  (vessel-specific safety study and trials)

Future trials

Operational adjustments to further represent bunkering

1. In-line quantity measurement using mass flow meter
2. In-line intermittent or continuous sampling
3. Dry disconnect coupling for hose disconnection
4. Higher freeboard difference using VLGC as a receiving vessel
5. Receiving vessel reliquefaction plant is turned off to allow vapour return to supply vessel
6. Vapour return quantity measurement



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