

LNG Quality and the UK Gas Market

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Content



- Background
- Meeting the UK gas quality
- What LNG spec to design for?
- Variation of LNG quality
- Impact of weathering on LNG quality
- Gas quality solution



Isle of Grain - Background



- National Grid Grain LNG is the Terminal Owner responsible for all operations at the terminal
- Capacity rights for Isle of Grain Phase I was awarded jointly to BP and Sonatrach in October 2003
- Terminal commissioning was planned for 1Q05

The UK Gas Specification



What were the choices?

- **UK Gas Specification**

- Current restrictions to LNG import
 - wobble range 47.2 - 51.41 MJ/Sm³
 - Incomplete Combustion Factor (ICF) ≤ 0.48
- Unlikely to change in the time frame required

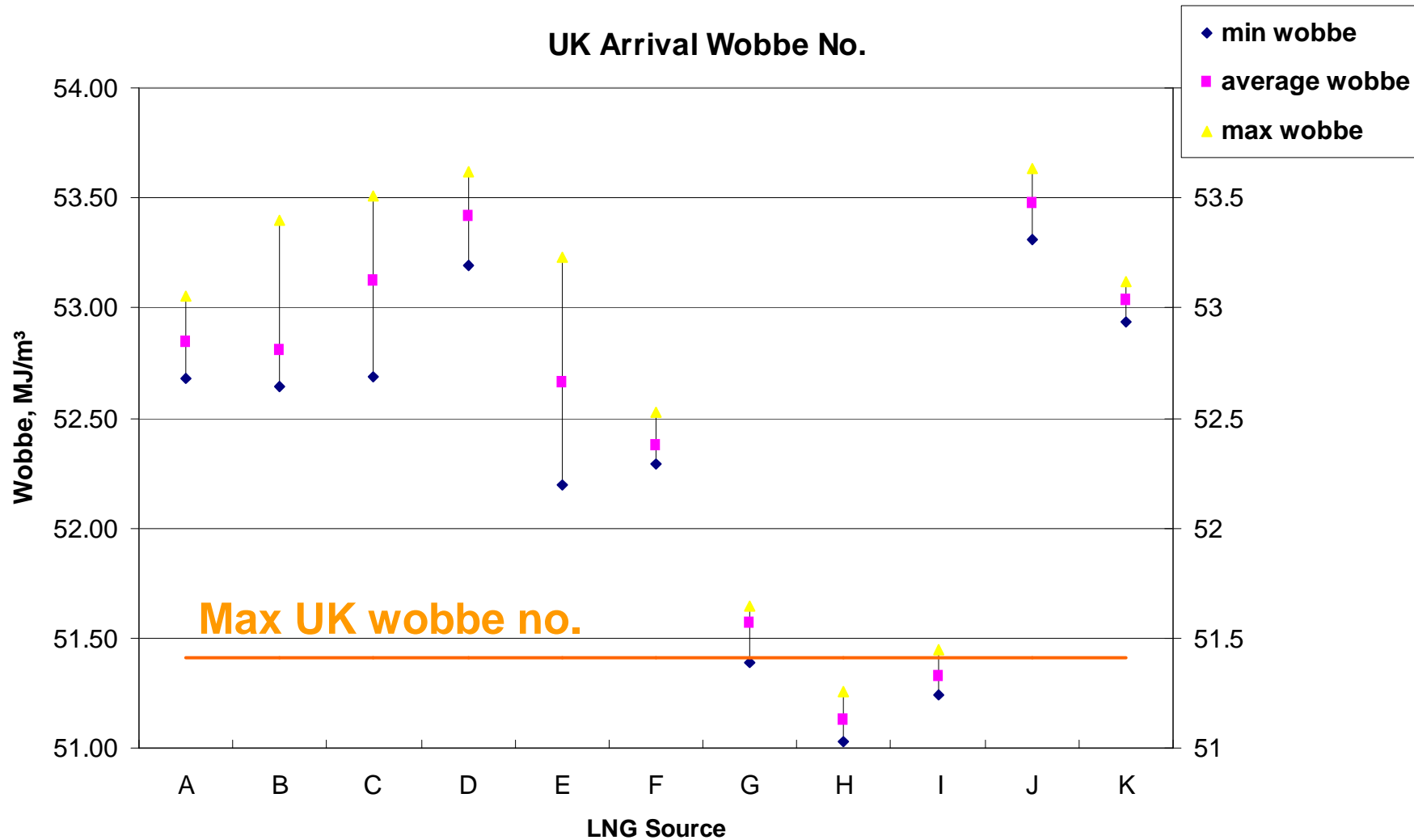
- **Pipeline mixing**

- Additional infrastructure would be required to deliver sufficient pipeline gas for blending
- Required further detailed studies with no guarantee of solution in the time frame

- **Nitrogen ballasting**

- Feasible in time frame and provided a flexible solution with a mix of capital investment and variable costs

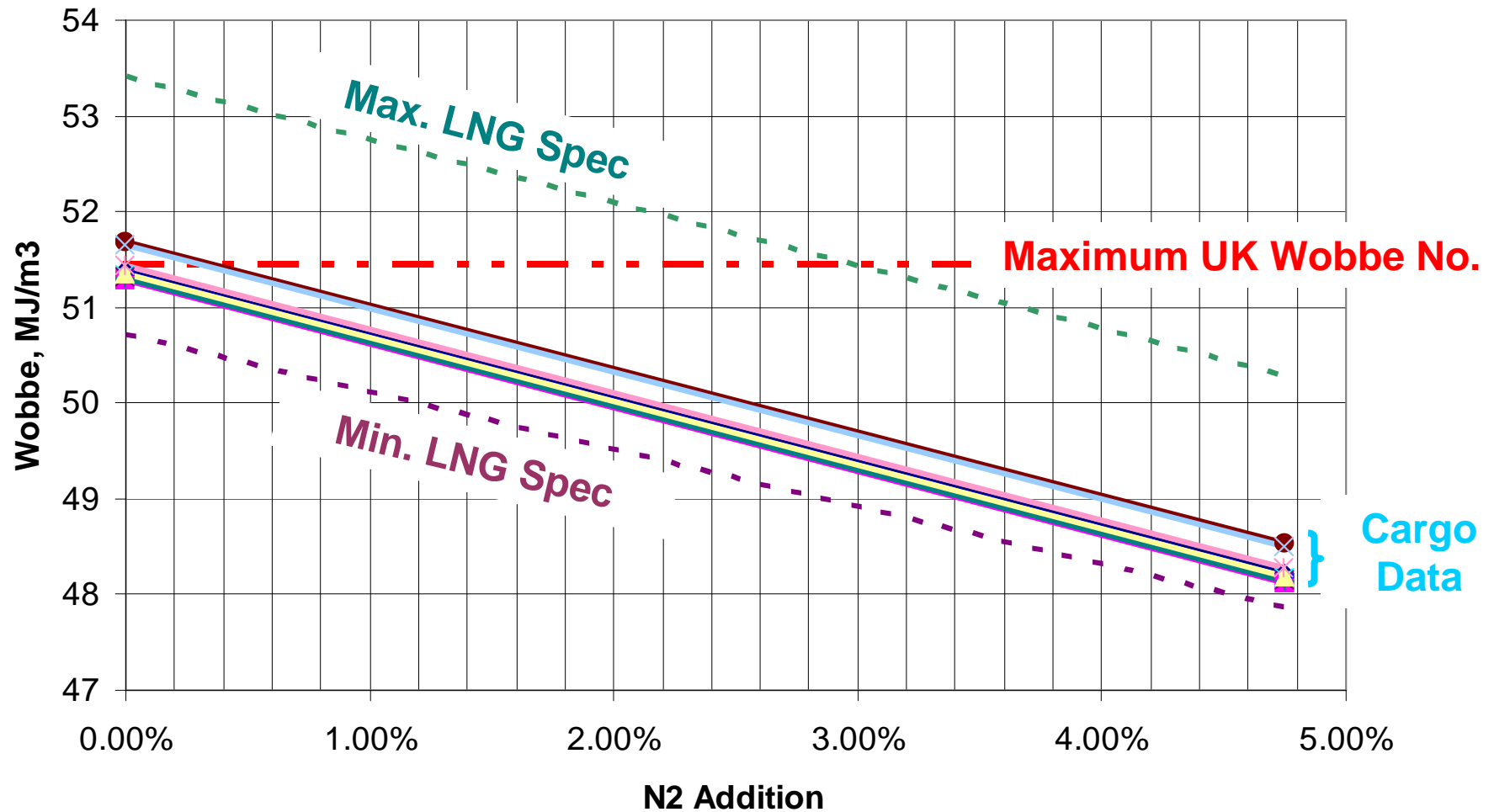
Variation of LNG Quality



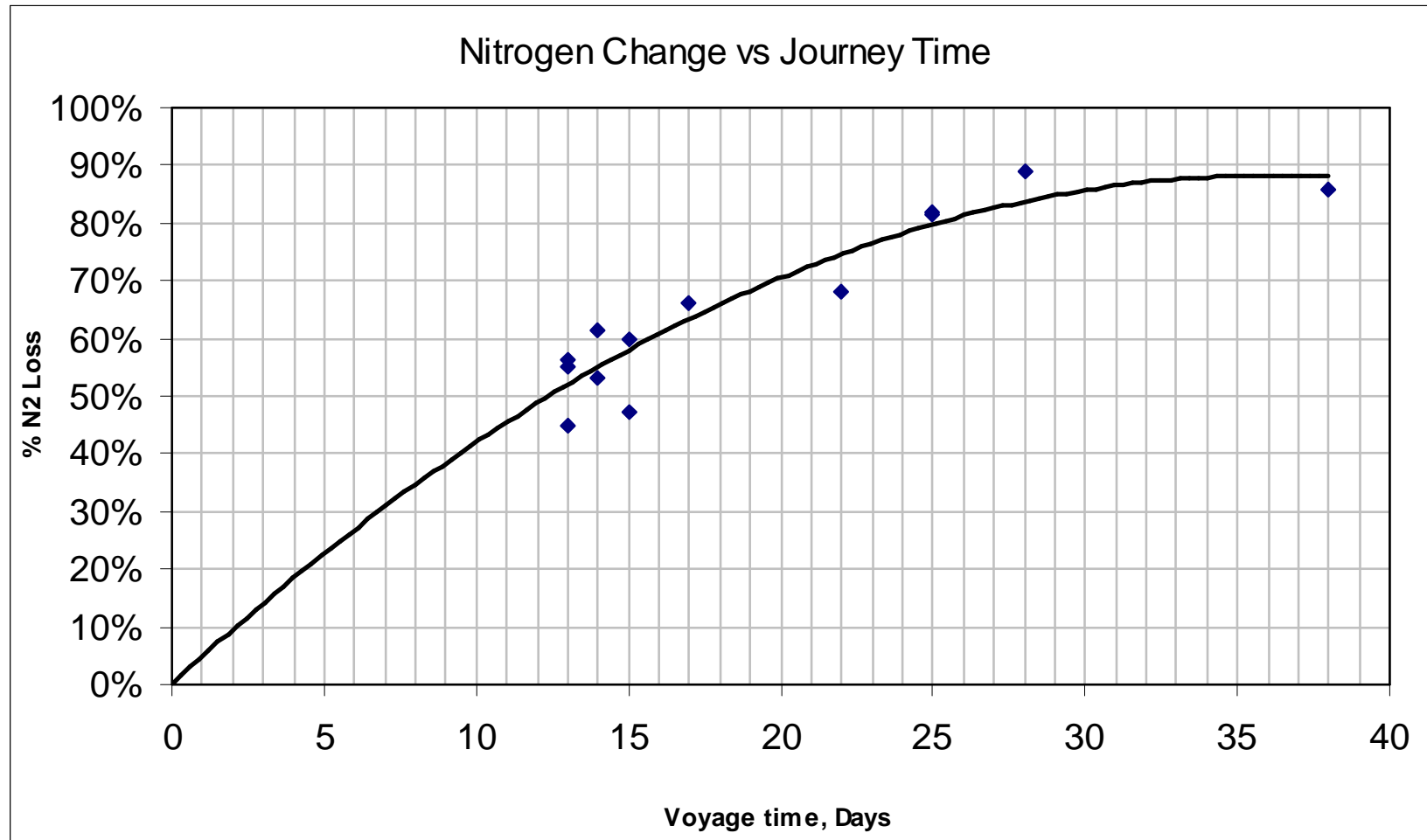
LNG Export Specification



Wobbe No. vs Nitrogen Addition



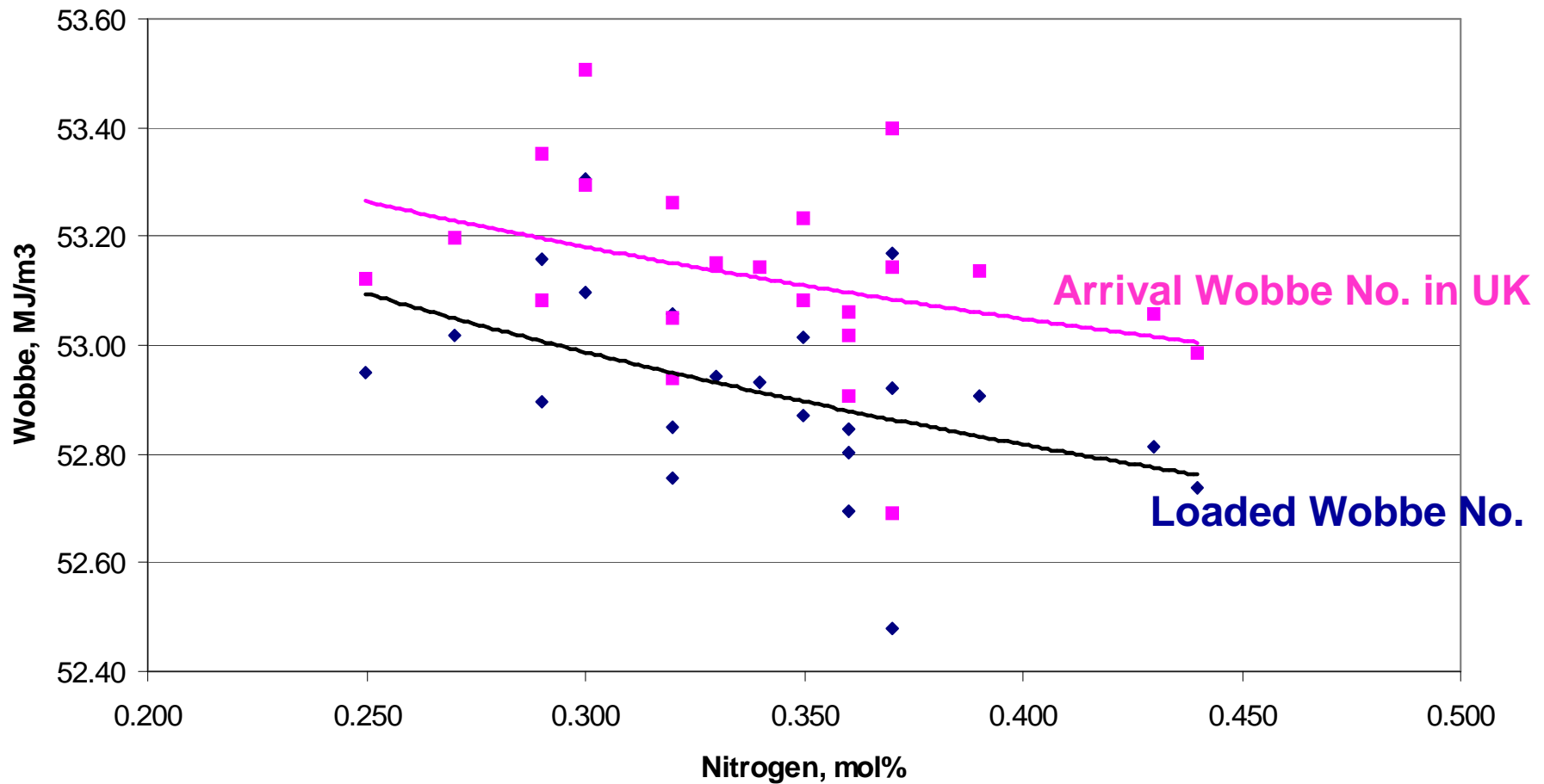
Nitrogen Loss during Shipping



Effect of Voyage on LNG Quality



Loaded and Discharge Wobbe vs Nitrogen content - Typical Middle East LNG



Gas Quality Solution



- **Nitrogen ballasting**
 - Mix of fixed pre-investment for long term nitrogen generation on site and a short term flexible supply by trucked-in liquid nitrogen
 - Enabled a two phase solution that provided a fast track solution for early terminal operation
 - Phase I – Trucked in liquid nitrogen with storage on-site
 - Delivery 1Q05
 - Phase II – On-site gaseous nitrogen production
 - Delivery 3Q05
- Combination of significant liquid storage at site combined with on-site nitrogen generation gives high availability of nitrogen
- Long term build, own and operate contract awarded to Air Products in June 04

Phase I - LIN tanks arriving at site



Phase II - Nitrogen production at the Isle of Grain Terminal



**Facility installed within the Grain facility
but operated by Air Products**

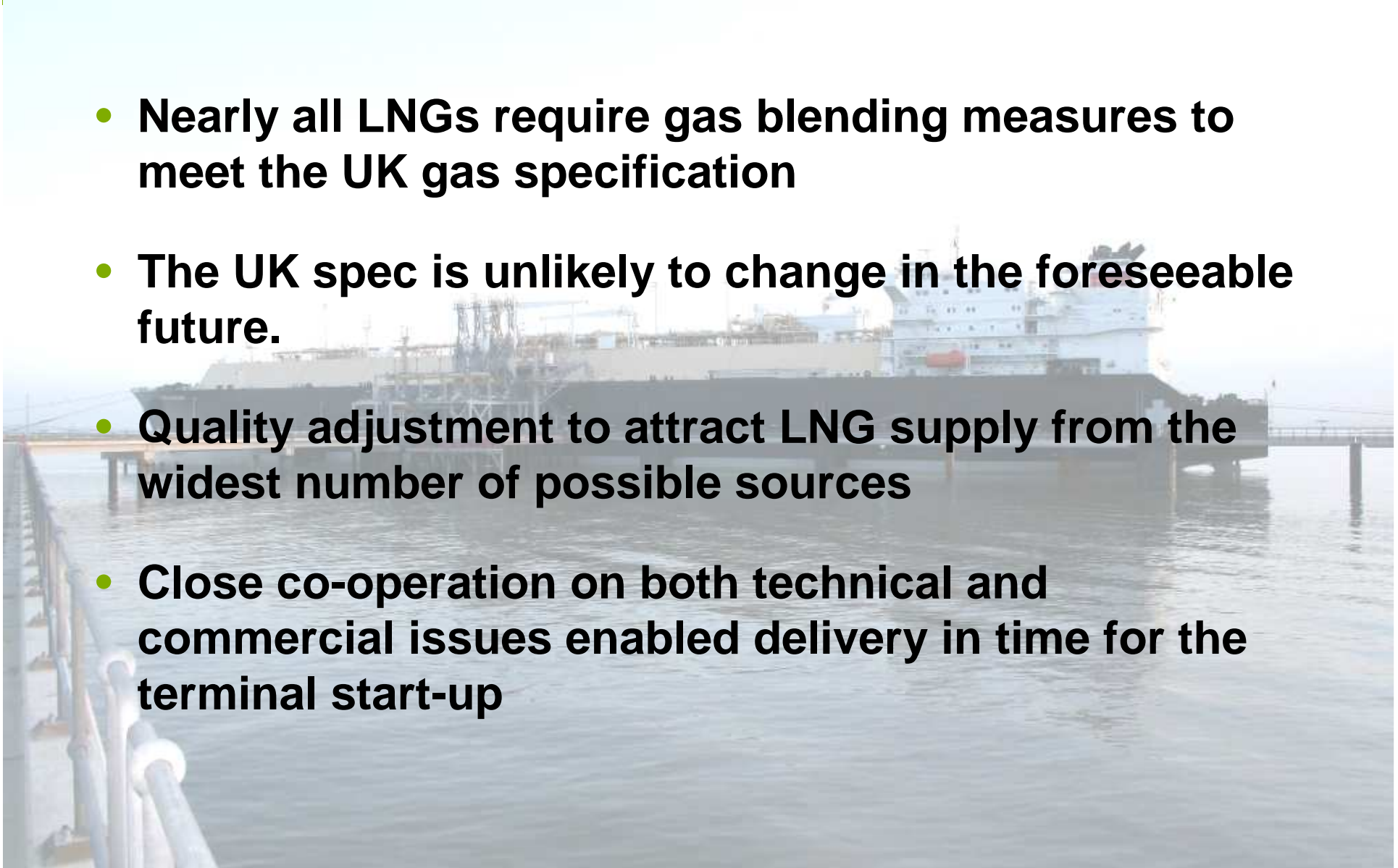
**Recondenser – due for
completion 2Q06**



Summary



- **Nearly all LNGs require gas blending measures to meet the UK gas specification**
- **The UK spec is unlikely to change in the foreseeable future.**
- **Quality adjustment to attract LNG supply from the widest number of possible sources**
- **Close co-operation on both technical and commercial issues enabled delivery in time for the terminal start-up**



End



- Thank-you for your attention

