

Malta LNG FSU Project

Gianluca Orlandi

Amsterdam
9 May 2017
FLNG Global



BUMIARMADA



Disclaimer

This presentation may contain statements of future expectations and other forward-looking statements based on management's and/or other information providers' current views and assumptions and involve known and unknown risks and uncertainties that could cause actual results, performance, or events to differ materially from those in such statements. Such forward-looking statements are subject to various risks and uncertainties, which may materially and adversely impact the actual results and performance of the Company's businesses. Certain such forward-looking statements can be identified by the use of forward-looking terminology such as "believes", "may", "will", "should", "would be", "expects" or "anticipates" or similar expressions, or the negative thereof, or other variations thereof, or comparable terminology, or by discussions of strategy, plans, or intentions. Should one or more of these risks or uncertainties materialise, or should underlying assumptions prove incorrect, actual results may vary materially from those described as anticipated, believed, or expected in this presentation. The Company does not intend, and does not assume any obligation, to update any industry information or forward-looking statements set forth in this presentation to reflect subsequent events or future circumstances.

A Global Business

- Bumi Armada Berhad is a Malaysia-based international offshore energy facilities and services provider with a presence in over 17 countries spread across five continents, supported by over 1,600 people from over 30 nationalities.

Key Regions/ Assets

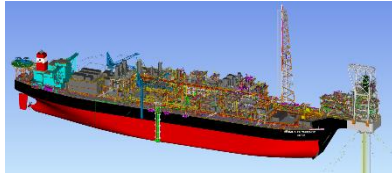
- FPSOs
- FSU
- OSVs
- SC
- ★ Headquarters
- 🏢 Offices/ Shore Bases



Global network of offices and operations.

Our Services

FLOATING PRODUCTION



OFFSHORE MARINE SERVICES



Broad range of technology and operational skill sets



LNG (Malta)



Heavy Oil and UK duty-holder
(Kraken)



Largest external turret
(Olombendo)



Molten Sulphur production from
H₂S (Madura)



BUMIARMADA

Major Projects

Armada Kraken



Armada Sterling



Armada Sterling II



Armada TGT 1



Armada LNG Mediteranna



Armada Perdana



Armada Perkasa



Armada Olombendo



Karapan Armada Sterling III

FPSO STATISTICS:

- Zero LTIs across the fleet in 2016.
- Average unit uptime of over 99% for 2016.

Major facilities in operations around the world.

Project Management Capabilities

Multi million dollar projects at various locations around the globe



More than USD \$ 1 billion per year
+ multi-location+ trusted partners +
in-house capabilities

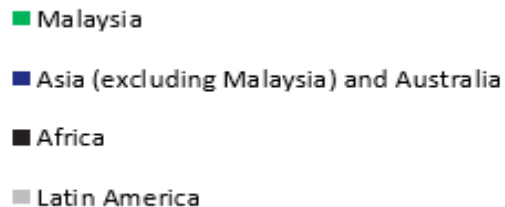
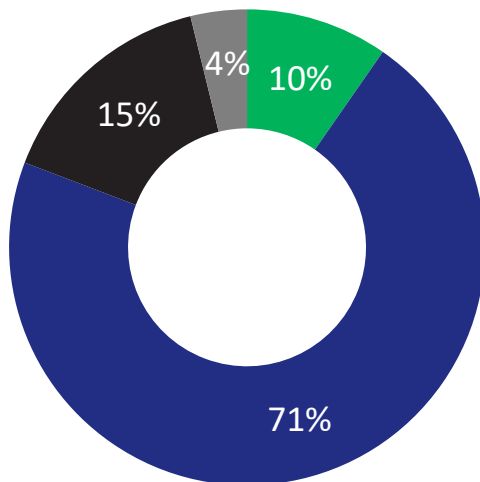
- Strong, collaborative value chain
- Unique execution
- Experienced multi-discipline project management team in Kuala Lumpur, Singapore & India



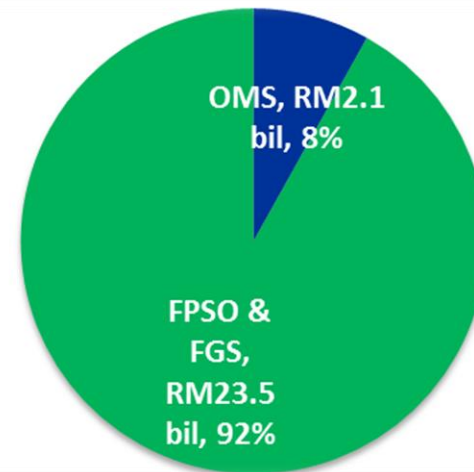
BUMIARMADA

Diversified Income Streams

FY 2016 Revenue by Geographic Location



Order Book Value By Business Unit



Firm order book: RM25.6bil

92% of future income stream from longer term FPSO contract.



BUMIARMADA

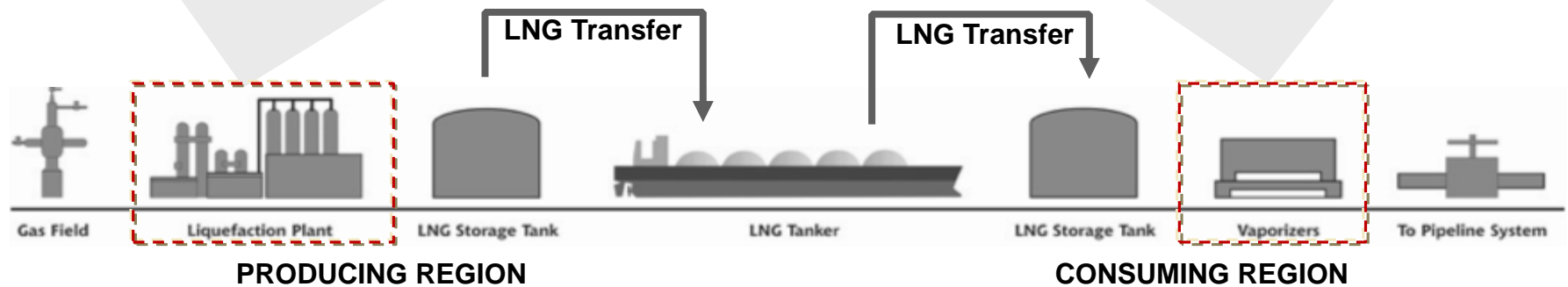
From FPSOs to FLNG – Floating Gas Solutions



LNG Production



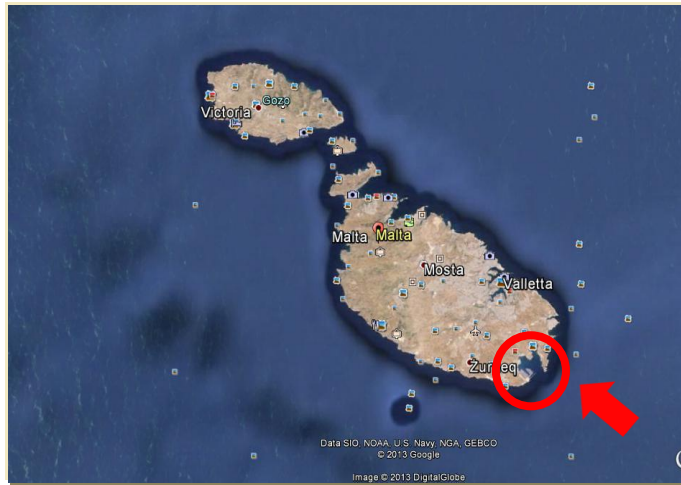
LNG Regasification



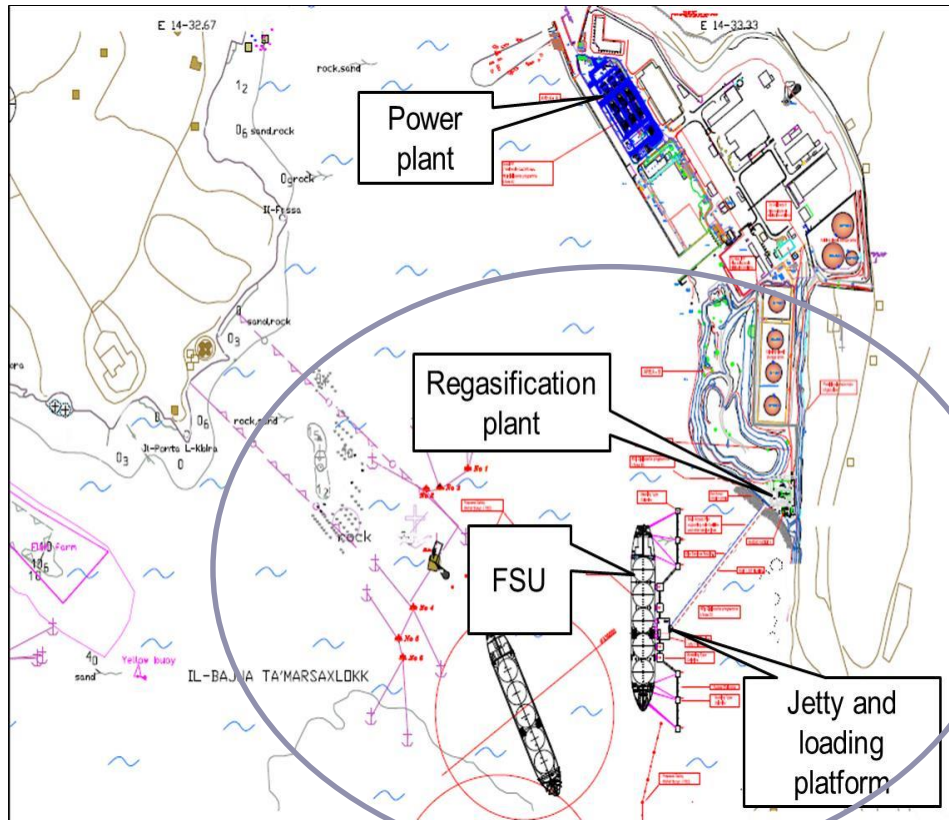
FGS Entry in the Floating LNG Market – Malta LNG FSU Location



- Delimara LNG Import Terminal, Marsaxlokk Bay, Malta
- EU Regulatory Regime
- Local Authorities: Environment and Resources Authority (ERA) and Transport Malta (TM)

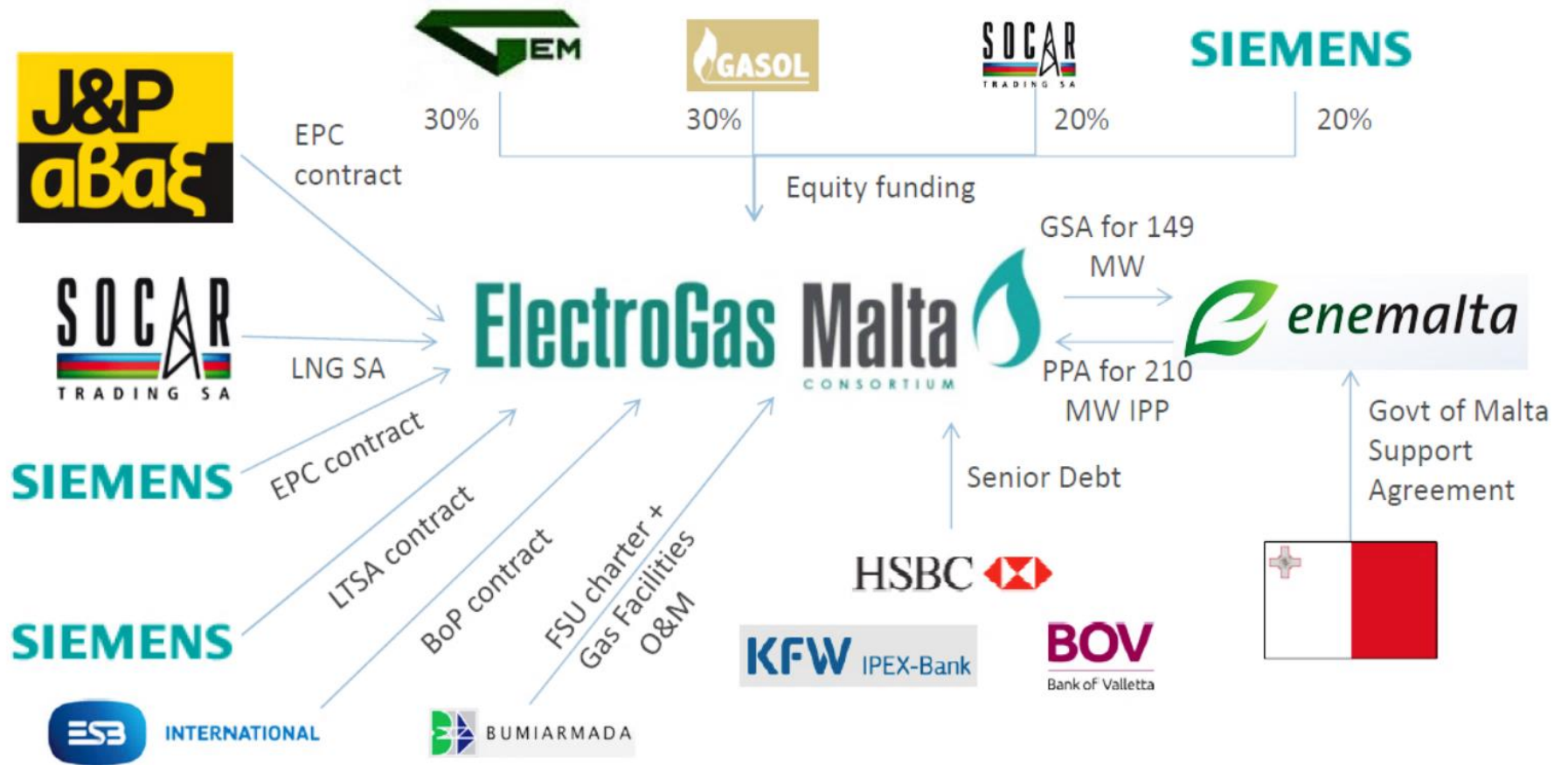


Malta LNG FSU Project Description

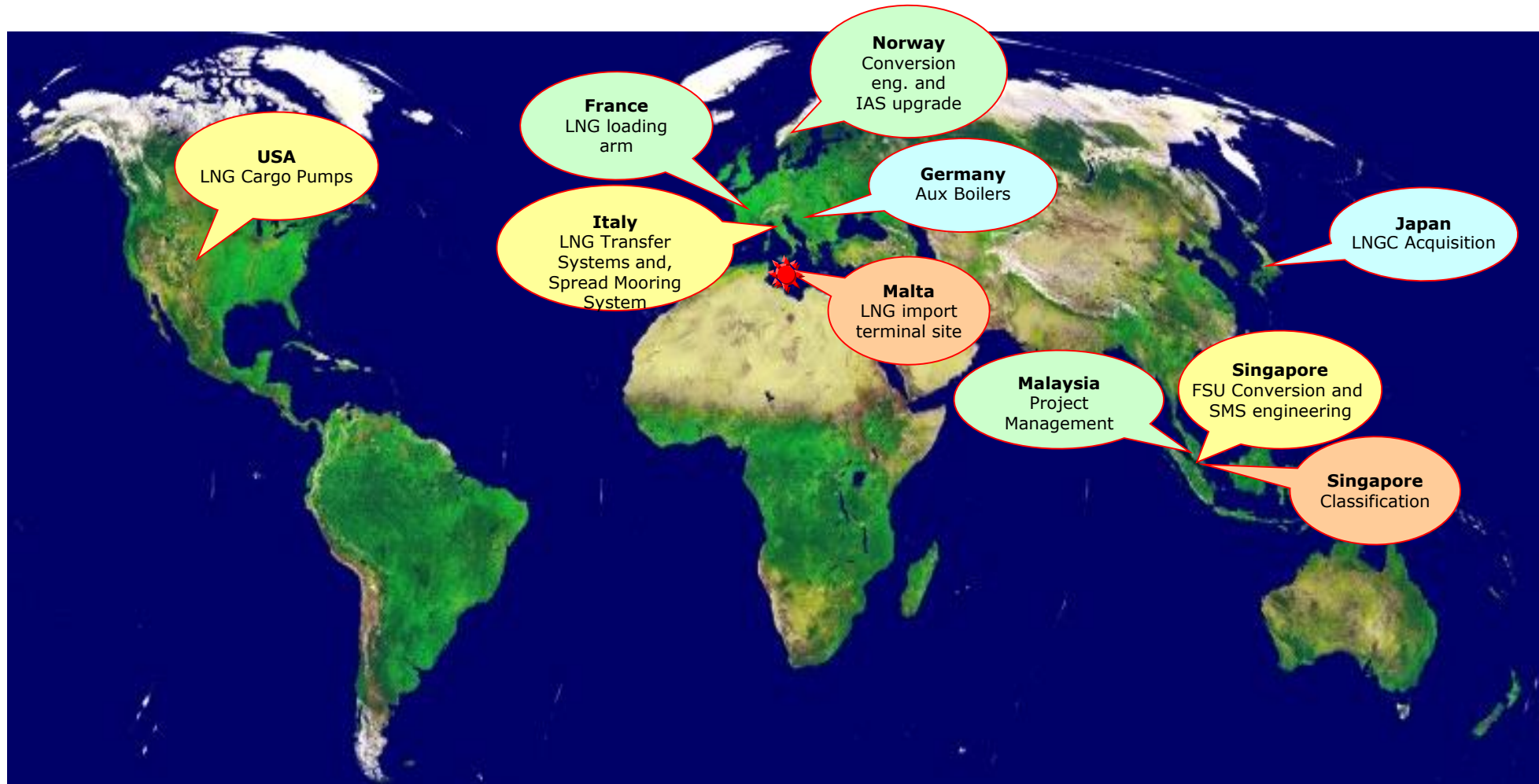


- End-client: Enemalta (National Electricity Co.)
- Client: Electro Gas Malta = SPC including SOCAR, Siemens, and GEM Holding)
- LNG SPA with SOCAR Trading
- New 215 MW Power Plant EPC by Siemens
- EGM entered into a GSA and PPA with Enemalta
- Small scale capacity terminal (0.3 MPTA)
- FSU with onshore regasification plant
- FSU Charter Agreement 18 years + 10 months (Fixed)
- FSU O&M Agreement (Fixed)
- FSU delivery to Malta: 14 months from Contract Award

Project Structure



Key Project Locations

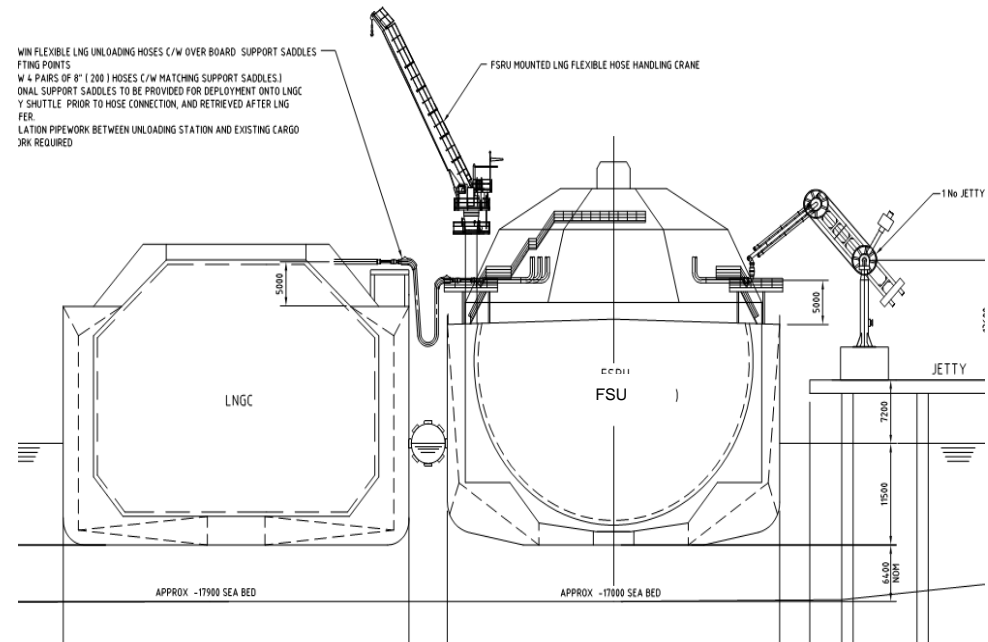


Malta LNG FSU – Functional Specification

- Armada LNG Mediterrana – 125,000m³ conversion from “Wakaba Maru” Moss vessel
- Jetty moored FSU with spread mooring system for extreme weather
- Single Berth, S-t-S LNG loading by hoses
- Ship to jetty LNG export by single loading arm, backup with hybrid hose
- Power and utilities from shore normal operations
- FSU can power all systems from own power when disconnected from jetty
- LNG send out from 10-150m³/hour
- Min LNG Loading Rate = 4,000 m³/hr
- Boil Off Gas sent to Shore for power plant use
- No dry docking for 18 years by using Long-Term coatings and UWILD philosophy



BUMIARMADA



Donor Vessel Details

Description	Current Specifications
Name	WAKABA MARU
Port of Registry/ Flag	Nassau, Bahamas
Year Built	April 1985
Hull	Double
Shipyard	Mitsui Eng. & Shipbuilding, Chiba
Length	283 m
Breadth (Moulded)	44.80 m
Depth (Moulded)	25 m
Gross Tonnage	102,511 MT
Net Tonnage	30,753 MT
Cargo Total capacity LNG 98.6% (at -160°C)	123,780.103 m3
Type of LNG containment system	Spherical Independent Tanks (MOSS)
Main Propulsion	Mitsui STAL-LAVAL AP
Classification Society	Nippon Kaiji Kyokai
Last Dry Dock Year	2012



RLE Scope



ENGINE ROOM / MARINE

- Power systems
- Main boilers
- Sea water systems
- Fresh Water
- Engine Control Room
- Ship utilities



DRY DOCKING

- Steel Renewal
- Opened and refurbished sea chests
- Hydro-cleaning and painting hull
- Sacrificial zinc anodes
- Hull skin valves overhauling
- aluminium covers for main hull openings in way of in-water survey



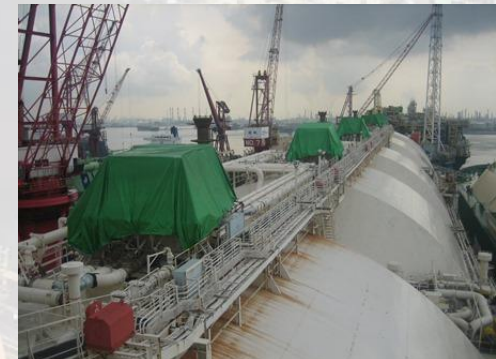
MAIN DECK

- Renew cryogenic piping (BOG/LNG)
- Mooring equipment
- Full fire line renewal
- Ballast and fuel tanks vent heads
- Overhaul cryogenic valves
- Main deck blast and paint
- Tank domes renewal



OTHERS

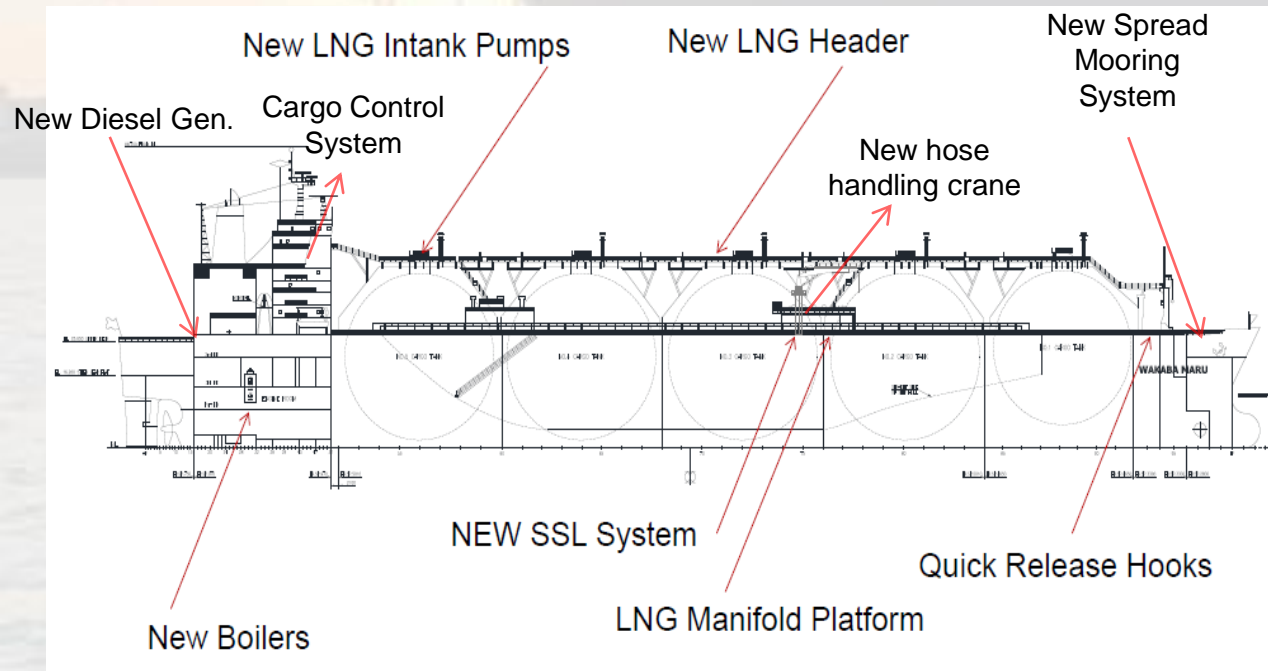
- Full refurbishment of ballast tanks
- Side-shell water curtain
- Full asbestos removal
- Full accommodation refurbishment
- Telecomm. systems
- Renewal life-saving eqpt



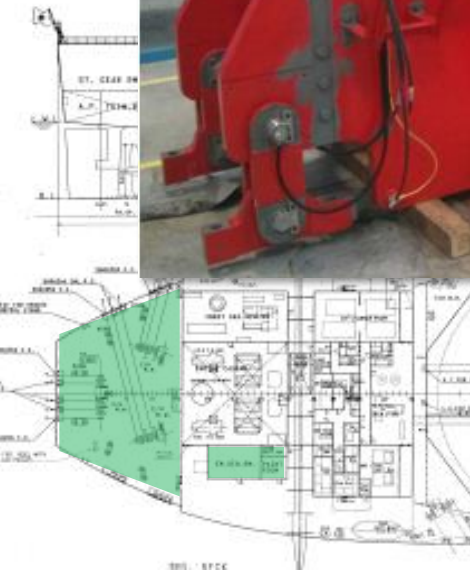
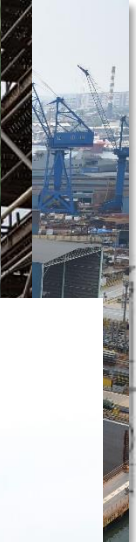
BUMIARMADA

Upgrade Scope

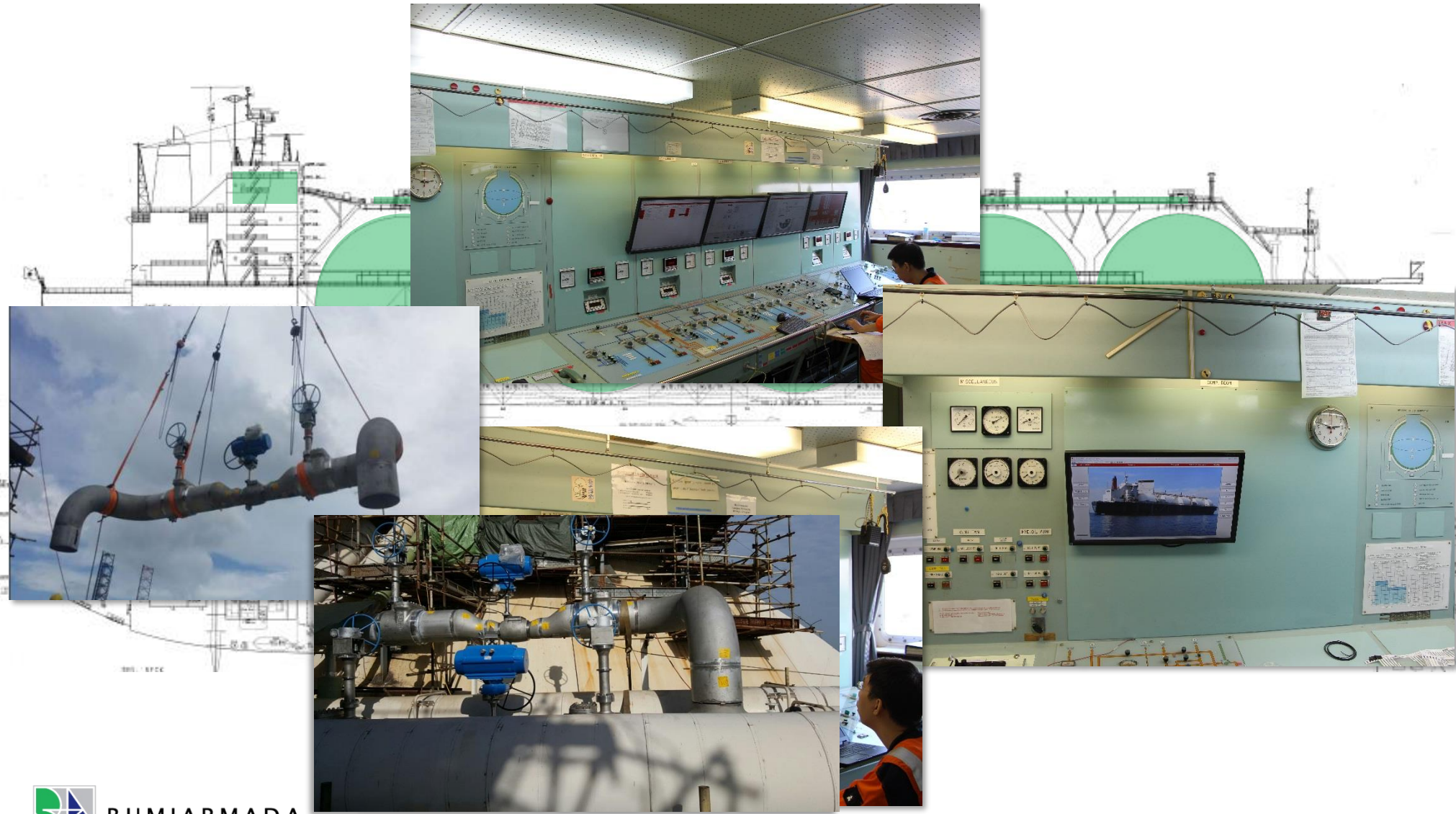
- Spread mooring system
- LNG transfer hoses
- LNG export by loading arm (on jetty)
- Power for FSU from shore
- New Cryogenic valves
- New Hose Handling Crane
- LNG in-tank pumps
- New auxiliary boilers
- Cargo Control System upgrade
- New diesel generator
- New HVAC compressors



Upgrade Scope Infographic (I)



Upgrade Scope Infographic (II)



BUMIARMADA

Upgrade Scope Infographic (III)



BUMIARMADA

HSE Indicators - Execution

Organisation	Man-hours
BUMI	192,851
Moss Maritime	20,082
Shipyard	1,570,326
Others	22,863
Crew	49,080
TOTAL	1,855,202



Accidents/Incidents	Index
Lost time from work	0
Fatality	0
Near Miss Incidents	3
First Aid Incidents	0
Medical treatments	0



Timeline - Milestones



Contract
Award
13-Apr-15



Arrival
Keppel Yard
27-Sep-15



Dry-Dock
Works
08-Apr-16



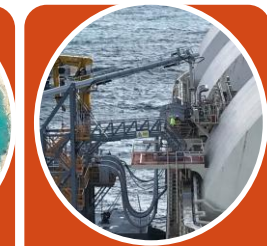
Sailaway
10-Sept-16



Arrival at
Malta
09-Oct-16



1st LNG in
Malta
16-Jan-17



Performan
ce Test
3-Apr-17



BUMIARMADA

Project Photos – Dry Dock Works



BUMI ARMADA

Project Photos – Voyage to Malta



Project Photos – Installation at the Terminal



Project Photos – FSU at Spread Mooring Position



Project Photos – 1st LNG Cargo



BUMIARMADA

Project Photos – 1st StS Operations

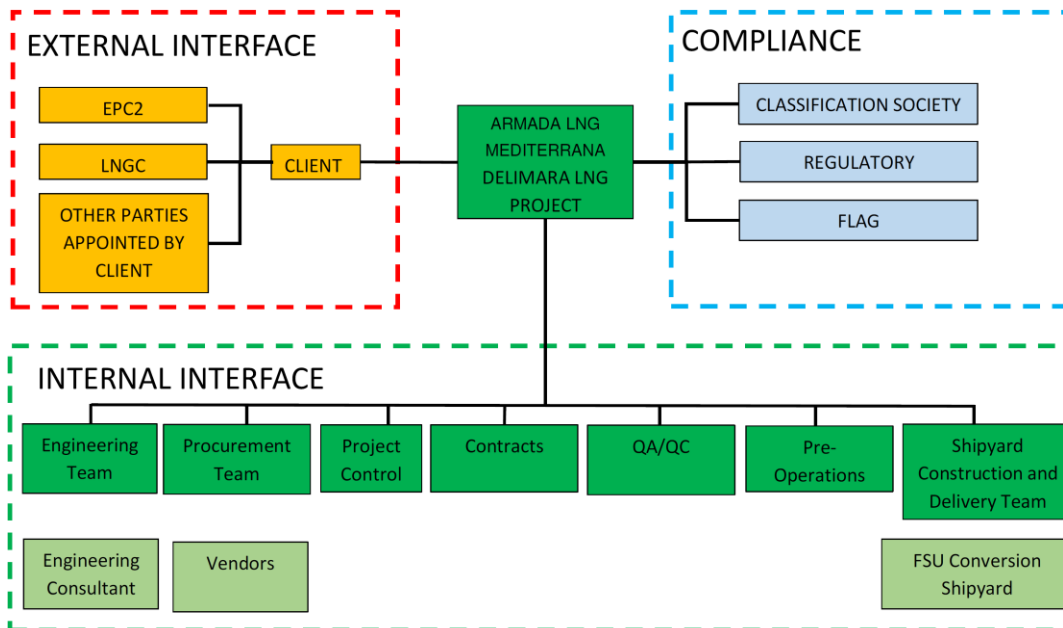


Scope Split

Scope	Location	Responsible Party
Project Management	KL	BAB
Conversion Engineering	Oslo	Moss Maritime
Mooring System Engineering	Singapore	BAB
FSU Classification	Singapore	BAB/BV
Safety Studies	KL/Singapore	BAB/BV/MMI
Procurement	KL	BAB
Conversion, Life Extension and Integration	Singapore	Keppel Shipyard
Mechanical Completion	Singapore	Keppel Shipyard
Onshore Commissioning and Sea Trials	Singapore	BAB
Sailing to Malta	Malta	BAB
Spread Mooring System Hook-Up of FSU	Malta	BAB/Client
Installation and the Terminal	Malta	BAB/Client
Start-Up and Offshore Commissioning / Acceptance Test	Malta	BAB/Client

Interface Battery Limit

Scope	Construction Period	O&M
FSU	BAB	BAB
Jetty / Terminal	Client's Group	Client's Group
Onshore Regasification Plant	Client's Group	Client's Group
New Power Plant	Client's Group	Client's Group
Overall Terminal Design	Client (PMC Company)	N/A



- Client's PMC strong LNG engineering know-how necessary
- LNG Terminal Integrated HAZID / HAZOP mandatory
- Regular Technical Interface Meetings among parties (client's PMC to lead)
- Integrated focus on impacting interfaces and fast decision making by all parties (client's PMG leading)
- Major interfaces to focus on: C&E logics (ship/shore link for comms.), shore power configuration, LNG/BOG ship-to-shore arrangements
- In-country presence if not co-located

Malta LNG FSU – Project Results

- Malta FSU is a part of one of the world's smallest LNG import flow rate in MMscfd
- This project demonstrates that life extension of first generation Moss LNG Carriers is a sound basis for conversion
- The specification of the FSU is completely customised to the needs of the terminal
- A challenging location and marine environment can be managed by an innovative storm mooring system

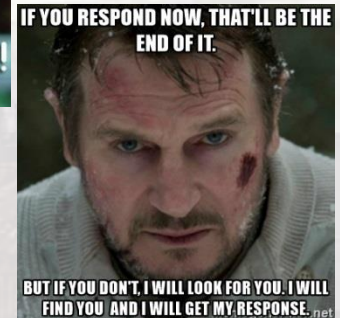


Achievements

1. Outstanding Safety Performance with zero LTI (\approx 2 million man-hours)
2. Novel Risk successfully managed: first LNG project for BAB
3. EU Regime: proactive regulatory compliance management (flag, port authority alignment key)
4. Project executed without any FEED performed (!!!) → see next slide
5. FSU refurbishment and upgrade done in 11 months (incl. asbestos removal campaign)
6. FSU delivered to Malta 3 months ahead of Client's requirement
7. 1st application with double mooring system configuration (jetty + storm)
8. 1st use of composite hose for permanent LNG send-out to shore (back up to arm)

Lessons Learned – What Could Have Gone Better?

- Get familiar with the donor vessel if not owned and operated before (RLE !)
- Final Met-ocean & site conditions provided?
- Is a FEED useful? ensure new equipment actually fit in !
- Proactive interface management with client (terminal owner) is a must!
- Do we need the operating crew on-board that early?
- Prepare a regulatory compliance plan ASAP and ensure in-country presence !



THANK YOU

Questions?

