LNG update
Current LNG initiatives and challenges

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Alessandro Bertorello
Carnival Corporation
AGENDA

- Why LNG
- Current Activities
- Future Activities
- Challenges
WHY LNG?

- Ever increasing regulatory environment
- Exceeds any current or near term emissions regulations
- Satisfies stakeholder demands
- Potential cost advantages post 2020
- Improving availability
- IGF Code agreed
- Regional incentives and encouragement
- Ship built today will still be around in 30 years time
- Demonstrates innovation
CURRENT ACTIVITIES

• AIDAprimarna will arrive in 2016
  – 7 day itineraries out of Hamburg to Southampton and North Sea
  – Fitted with dual fuel generator to allow use of LNG in port
  – Truck to ship operation
  – Simultaneous operations must be allowed
  – Challenges include inconsistent port authority approval process, but can be overcome with close cooperation

• Investigations ongoing into potential retrofits of other vessels that are significantly exposed to ECA etc

• Truck to ship only really viable for small quantities or very regular schedules
NEXT STEPS

• 4 ships on order from Meyer Werft
• First in cruise industry to use LNG for normal propulsion
• 2 ships each for AIDA and Costa
• Largest from number of passengers
• 1\textsuperscript{st} ship due to deliver end 2018 for AIDA
• All engines dual fuel and can use MGO in case of lack of LNG
CARNIVAL – NEW ORDERS
LNG AVAILABILITY AND INFRASTRUCTURE

• Gas available but not always where we need it or in the correct form (LNG)
• Ports very active and EU funding available
• Given the size of our ships and the capacity that we will need, ship to ship bunkering seems to be the only viable option (@3000m³ every 10 to 14 days)
• 70 LNG fueled ships in operation today and 80 confirmed newbuilds on order
  – Excludes LNG carriers
• 7 new dedicated LNG bunker vessels (capacity from 1,500 - 6,500m³) on order for delivery in the next two years
• LNG bunker infrastructure development
  – North Europe; Norway, Sweden, developing around the Baltic, and N Sea coast
  – West Europe; Rotterdam and Zeebrugge already underway
  – West Med; Gibraltar, Barcelona, Civitavecchia and Savona, plans being developed
  – Canaries; Tenerife actively pursuing bunker suppliers
  – Far East; Singapore, Korea, Taiwan and China already moving
  – North America; NW, Vancouver, Florida, Gulf Coast very active
  – Caribbean; significant interest being shown
LNG Challenges

• No standard set of rules or procedures for bunkering
  – ISO, IACS, SGMF working on this
• Differing local approval process – different risk acceptance criteria
  – Requires very close stakeholder engagement
• Cost models are inconsistent or non existent
• What happens in case of lack of supply or equipment downtime
• Typical port concession model will not work – at least initially
• Compatibility of bunker vessels and cruise ships may be challenging due to overhanging boats
Thank you!