



What the Marine  
World Might  
Look Like in  
2025: Predicting  
the Future

R.J. Burke

Introduction

Technology

Economics

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# What the Marine World Might Look Like in 2025: Predicting the Future

Presentation to the American Institute of Marine Underwriters

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# I Make No Pretense to Prophecy...

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- I have practiced naval architecture since 1973:
  - 1 General Ship & Engine Works
  - 2 Mobil
  - 3 United States Salvage Association, Inc.
- I have taught engineering and management for twenty-seven years.
- I have several years at sea.
- I might be wrong, but...



# What I Have to Say

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**There will be changes in:**

- Technology
- Economics
- Environment
- People

*Man has an incurable habit of not fulfilling the prophecies of his fellow men.*

– Alistair Cooke



# From Automation Toward Autonomy in 2025

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**Automation** has been with us for a long time and is improving continually. The control room is moving farther away every day.

**Autonomy** is different from automation – it implies artificial intelligence that can make decisions without human interaction.

We can operate ships from shore today, relying upon automation and communications technology. During my career, crew sizes have been **reduced by more than 50%**. I predict that the automation trend will grow in concert with further reduction in crew sizes.

True autonomous operation is still farther out in the future.



# Are There Limits to Economies of Scale?

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- Four decades ago we tested the economies of scale in crude oil transport – and then we stepped **back**.
- Today, we are testing the limits of economies of scale in general cargo transport and in the cruising trade.
- By 2025 we will find those limits in concentration of risk, stresses on shoreside infrastructure, and technical feasibility – and we will step back again.
- There will be fewer ships, fewer shipping companies, and fewer shipyards.

Watch out: there also may be limits on world trade volume, based on growing international manufacturing costs, and trends toward additive manufacturing and onshoring.



# Oil & Gas: Beyond Hubbert's Peak

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- In 1956, M. King Hubbert predicted that US oil production would peak in the early 1970's, and world prices would rise. Although Hubbert was widely criticized by some, US production began to fall in 1971. But then it **rose again!** According to the USEIA:
  - 1 "Natural gas production in 2016 was the second largest amount after the record high production in 2015. More efficient and cost-effective drilling and production techniques have resulted in increased production ..."
  - 2 "Crude oil production generally decreased each year between 1970 and 2008. In 2009, the trend reversed and production began to rise. More cost-effective drilling and production technologies helped to boost production... In 2016, crude oil production was lower than production in 2015, mainly because of lower global crude oil prices."
- World prices will remain low-stable for a decade, and the US will be a net exporter.



# Environment: The Sea Is Not a Limitless Trashcan

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- All effluents from ships will be banned or regulated: air, water, solid waste, human waste, food waste, and oil.
- Liabilities and penalties for environmental damage will become more onerous.
- New technologies and new fuels will become important.
  - 1 Cryogenic liquids are dangerous and difficult to handle – LNG fuel may be supplanted by a future move to methanol.
  - 2 Air emissions will become increasingly important, addressing carbon in addition to sulphur.
  - 3 Ballast in now considered as an effluent.

Littering at sea will have consequences!



# Rapidly Changing Technology Requires Different People, Different Training

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- Engineering education was once done by experiential methods, and STCW uses that model for operational mariner training, but WWII demonstrated that experiential education is not adequate in the face of rapid technological change.
- We will need stronger foundations in math, science, information systems, and other technical subjects for mariners.
- Some modest proposals:
  - Breadth** is the antidote for rapid technological change; a broad foundation can support lifelong learning.
  - Collaboration:** Ship designers and others with strong analytical backgrounds should draw closer to mariners and other marine operators; new technology gains must result in new operational innovations.
  - Intensity** has a strong influence on the quality of operational training; gains in simulation make increased levels of operational training feasible and safe.





# Questions?

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