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Marine Terminal and Tank Storage

Who are we…

- David Wignall
  - Twenty years in the shipping industry
  - Ex Senior Manager Stena Line
    - Concordia Maritime
  - Ex Managing Director of World's largest maritime research company
  - Advisor on marine assets
    - Goldman Sachs
    - Morgan Stanley
    - Bank of America
    - Abraaj Capital
    - Etc….

Ground Rules

- Time table is important
  - Lots to cover, limited time
  - Try and be prompt
- The aim is to build understanding
  - Interrupt with questions
  - Let everyone be heard
  - Some answers later in Workshop
- Deviation and redirection possible
  - More conversation than presentation

Overview

- Part 1
  - Tankers
  - Products/Operations
  - Marine Operations
  - Buoys
- Part 2
  - Planning
  - Tank Storage
  - Maintenance and Risk
  - Stakeholders

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Part 1, Session 1

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Part 1: Session 1, Tankers

- Types , characteristics and design innovations
  - An overview of the world fleet of tankers, how it is changing and how the design of tankers is changing
- Operation, manning and management onboard
  - Helping to understand on-board responsibilities and operations helps with ensuring and managing terminal operations
- Commercial structure of tanker operations
  - A look at the different pressures on tanker owners and operators and what this means for their ship board operations.
- Insurance and related matters
  - How are ships insured and what does this mean for marine terminals in normal operations and after an incident?

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Tankers

A new type of cargo

- The Noble Brothers not just explosives
  - first successful tanker, Nobel's *Zoroaster*
  - Built in 1878, 242 DWT
- Not a revolution a brand new cargo
  - Developed through late 19th Century
  - The Great War, “gasoline as vital as blood”
  - Mean sizes 10,000 DWT, peak 15,000 DWT
- Another World War
  - 16,500 DWT key tanker size

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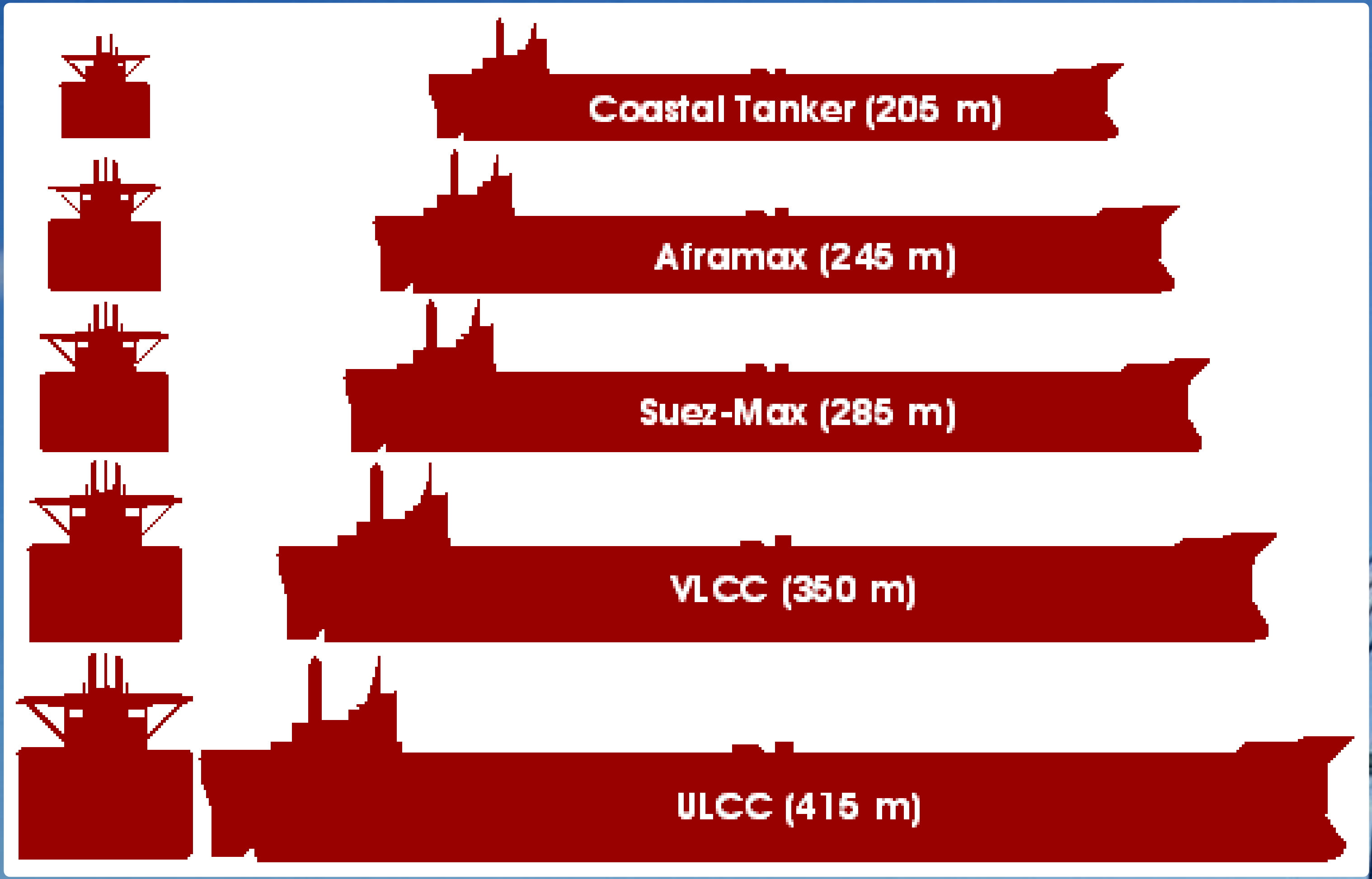
A developing market

- Reconstruction
  - 30,000 DWT tanker built 1947
- Onassis and the search for scale
  - 1957, panamax 85,000 DWT built
  - 1960, first 100,000 DWT+ tankers
  - 1967, Six day war – Closure of Suez
  - 1967 to 1973 tanker quadruple in size
- Seawise Giant 565,000 DWT
  - Unable to transit English Channel, Malacca
- ULCCs/VLCCs 300,000 to 340,000 DWT

Tankers


Coastal Tanker (205 m)
Aframax (245 m)
Suez-Max (285 m)
VLCC (350 m)
ULCC (415 m)

…and what they do

Class	Length	Beam	Draft	Overview
Coastal Tanker	205 m	29 m	16 m	Less than 50,000 DWT, mainly used for transportation of refined products (gasoline, gasoil).
Aframax	245 m	34 m	20 m	Approximately 80,000 DWT (American Freight Rate Association)
Suezmax	285 m	45 m	23 m	Between 125,000 and 180,000 DWT, originally the maximum capacity of the Suez Canal.
VLCC	350 m	55 m	28 m	Very Large Crude Carrier. Up to around 300,000 DWT of crude oil.
ULCC	415 m	63 m	35 m	Ultra Large Crude Carrier. Capacity exceeding 300,000 DWT. The largest tankers ever built have a deadweight of over 550,000 deadweight tons.

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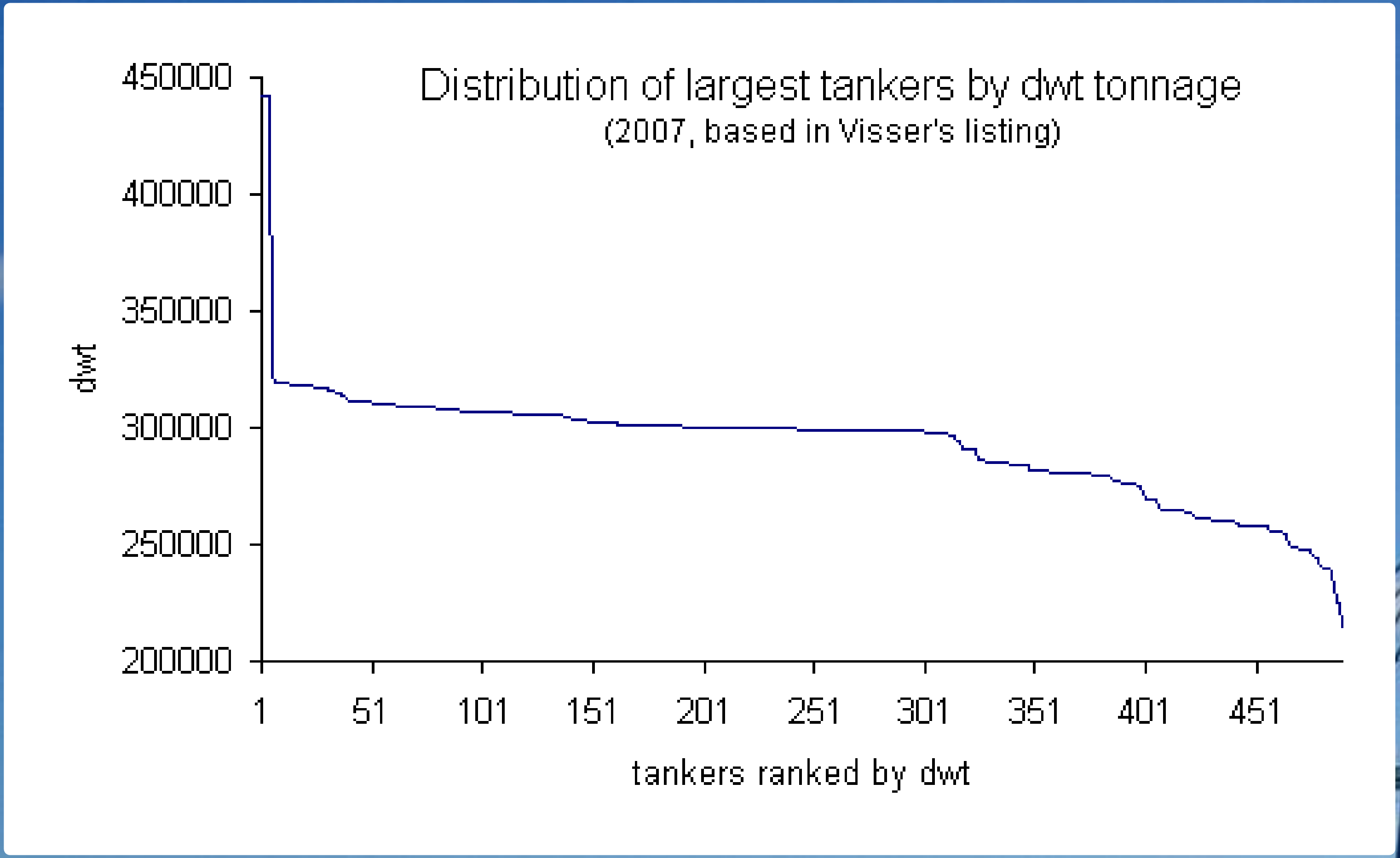
So how many of what size?



Market Development

- VLCC replacements underway
  - 300,000-340,000 DWT
  - Aframax growth
  - Replacement only in Suezmax
- Increasing product shipments
  - Middle East refining capacity expanding
  - Majors less interested refining ex Middle East
- More “smaller” ships
  - Long range trunk routes for product
  - Parcel tankers for distribution

The Shipping Market

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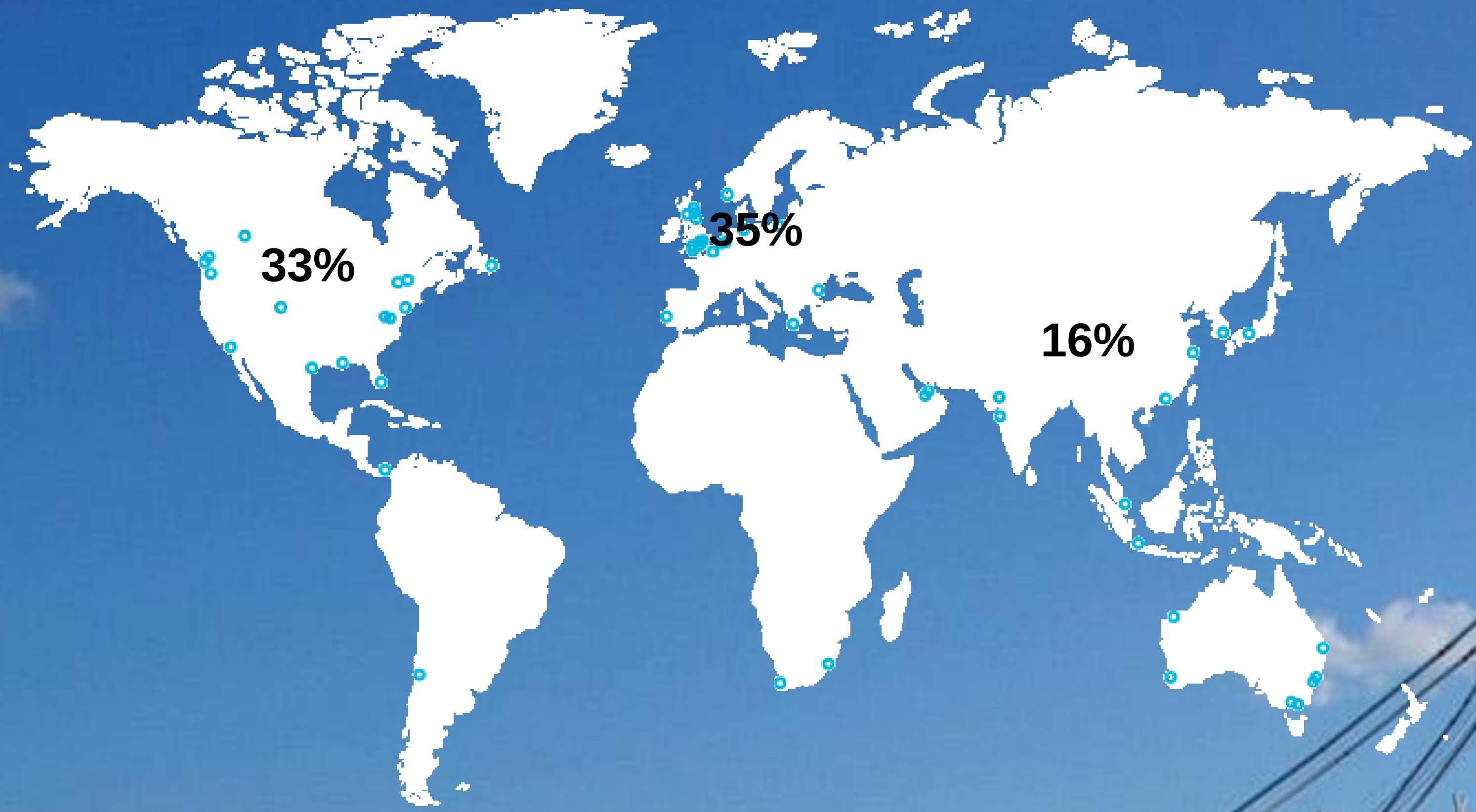
Economic Activity - 1975



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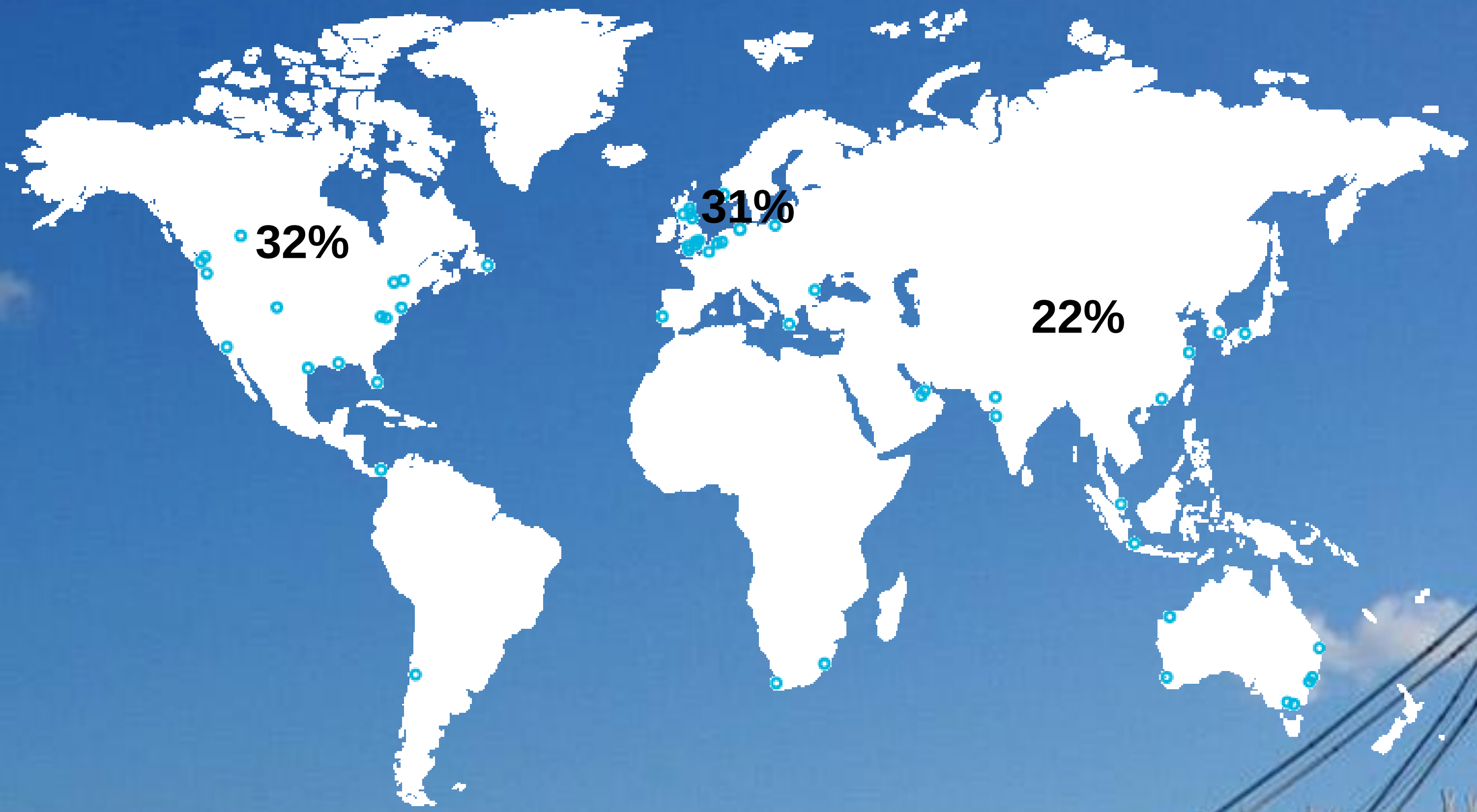
Economic Activity - 2005



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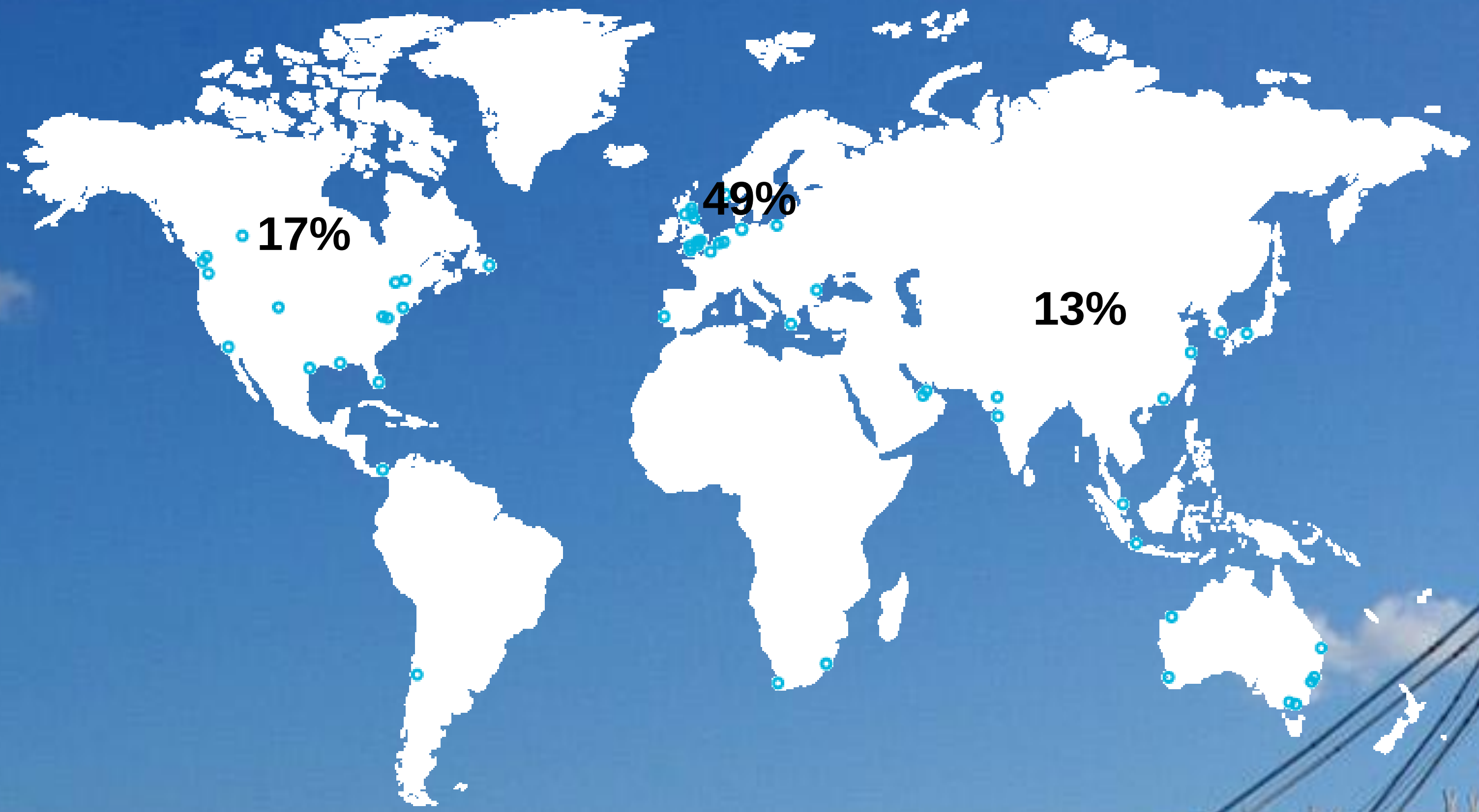
Trade - 1975



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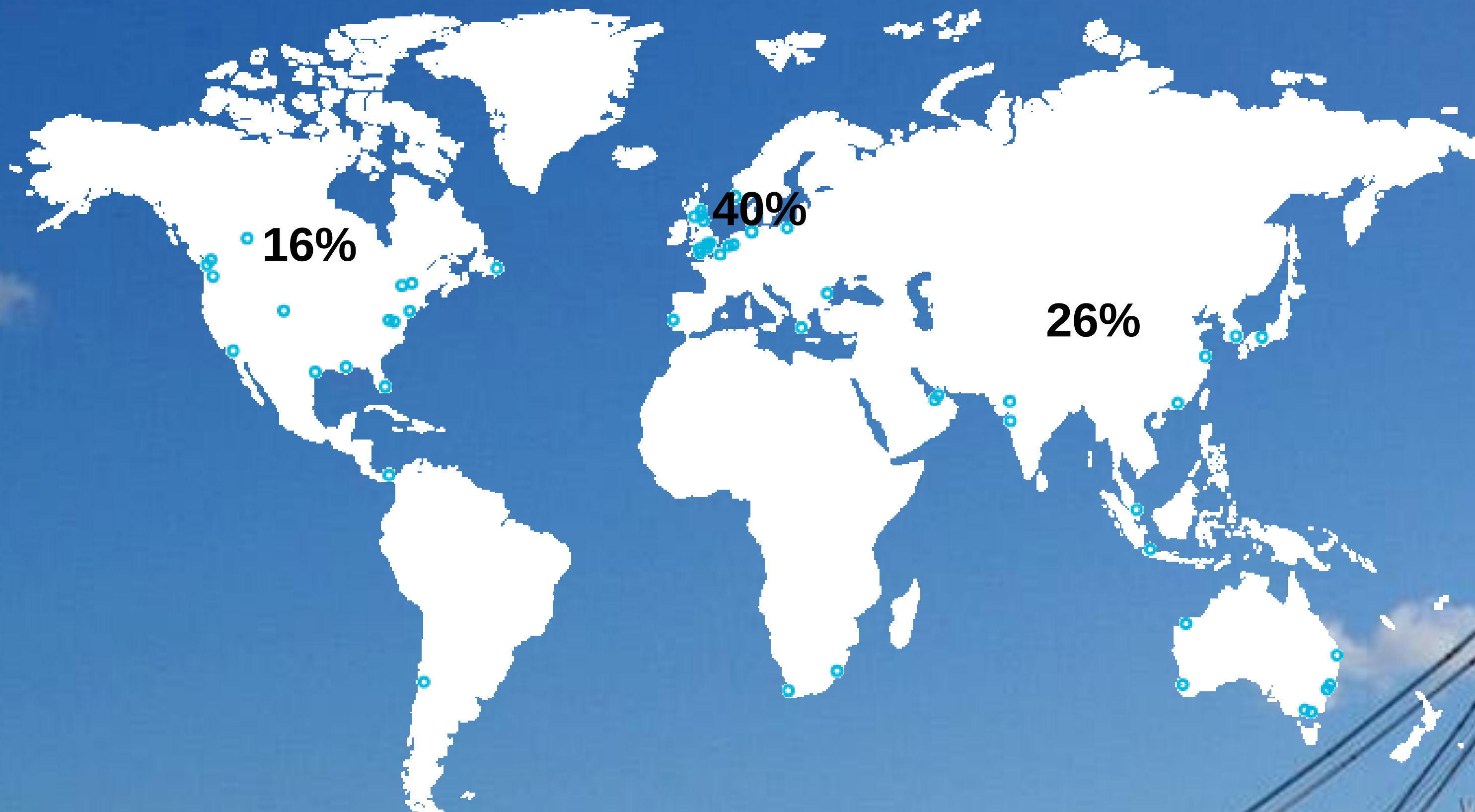
Trade - 2005



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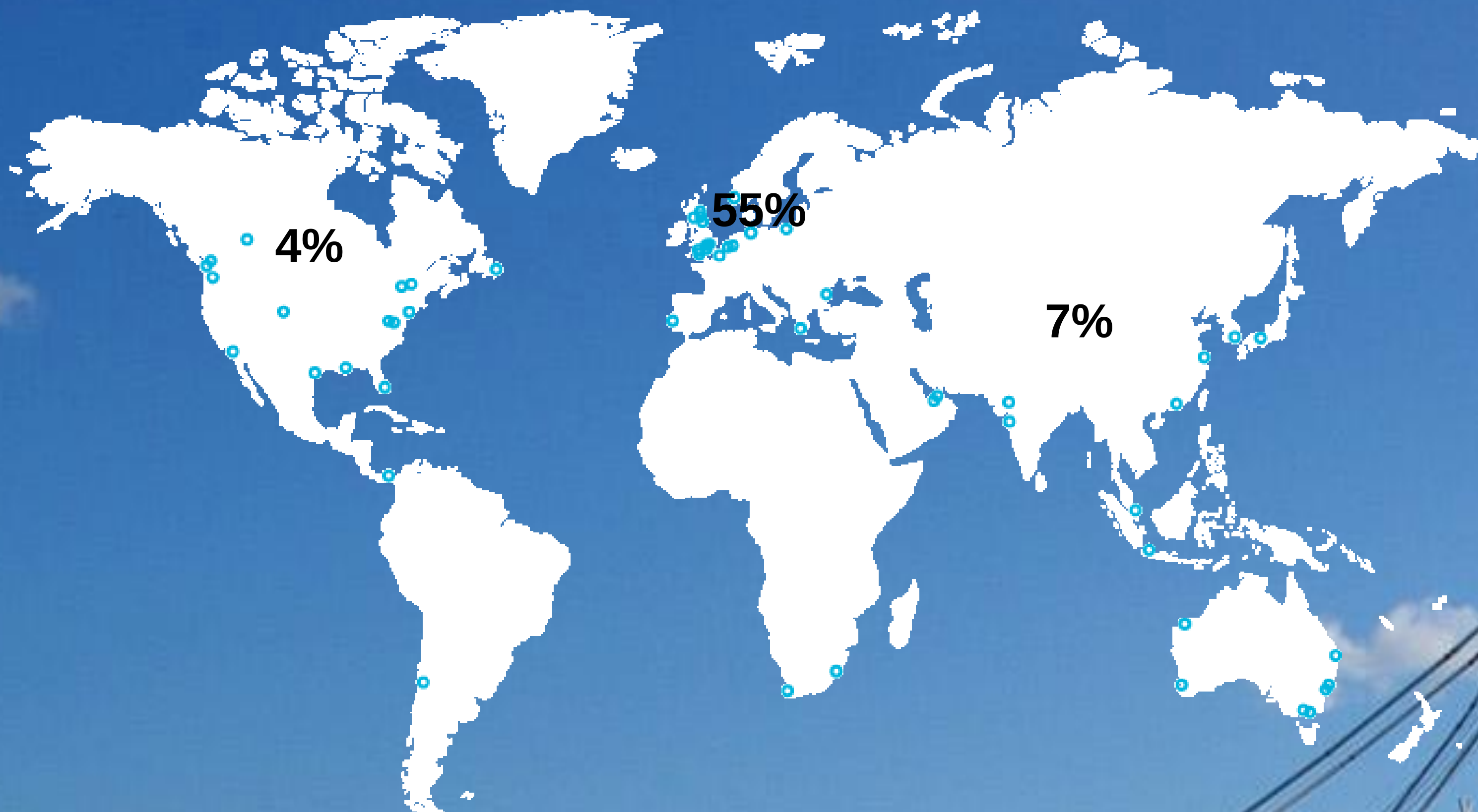
Ship Owning - 1975



22% of fleet in open registers

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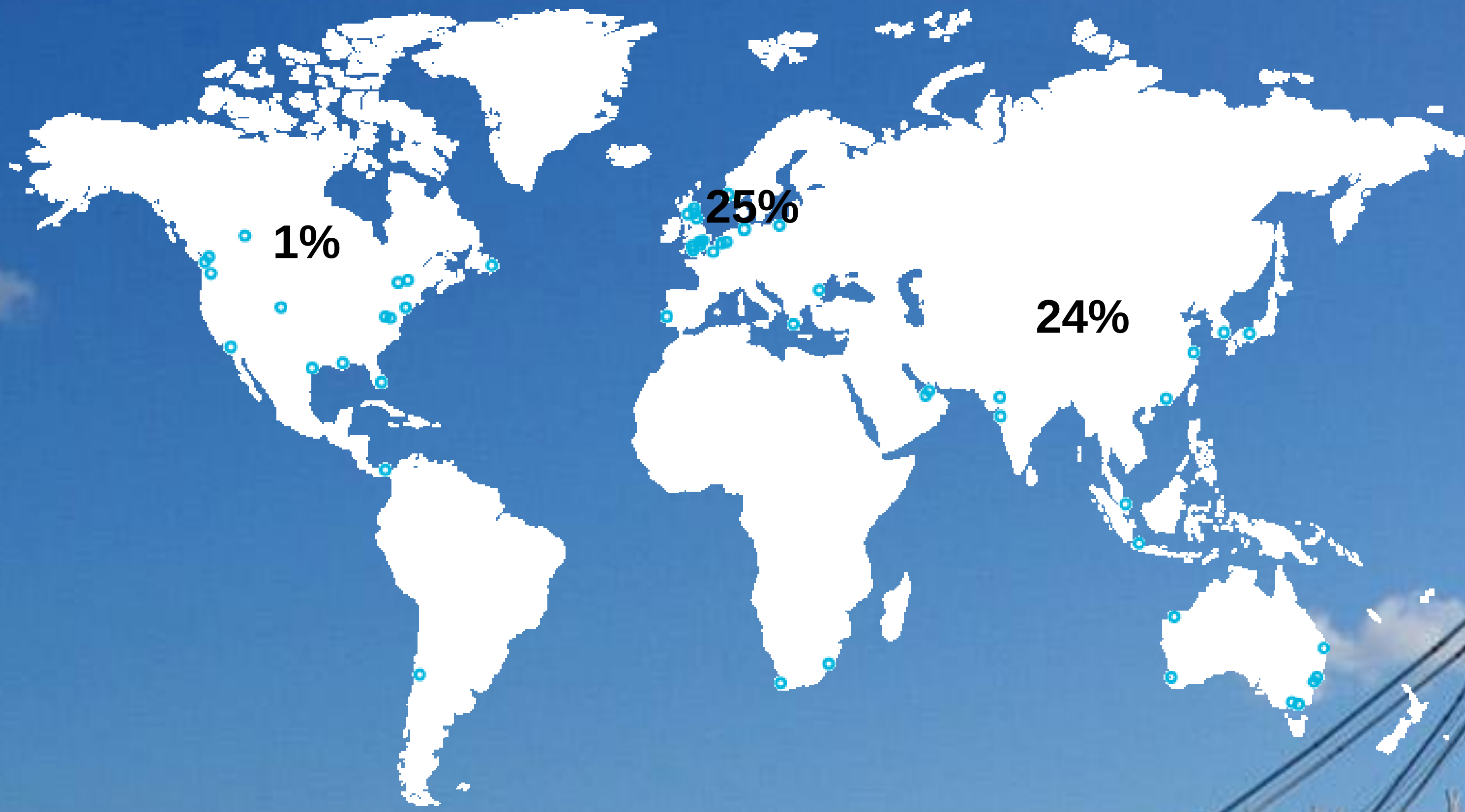
Ship Owning - 2005



45% of fleet in open registers down from 48% in 2000

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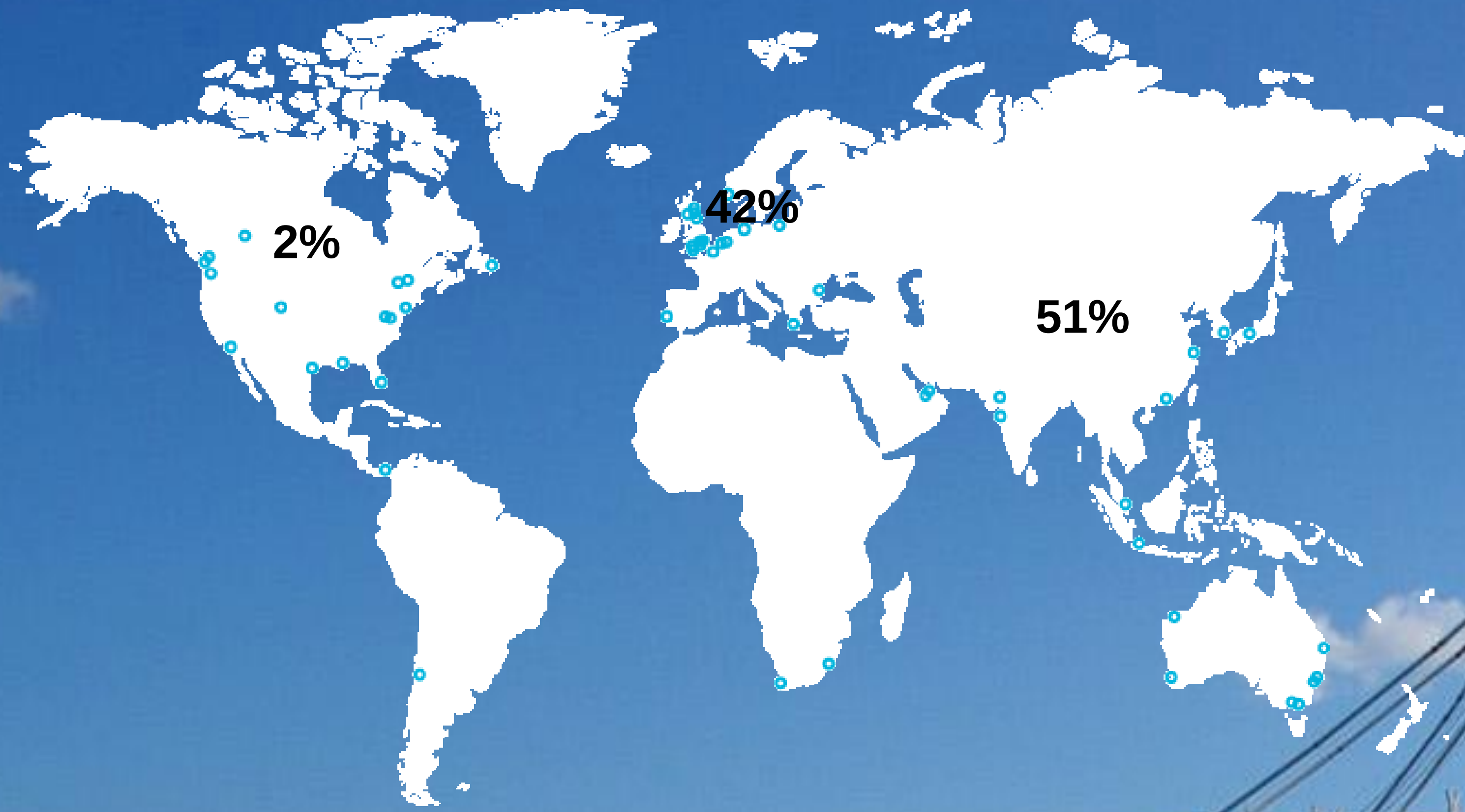
Ship Building - 1975



34 million GT delivered

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Ship Building - 2005

40 million GT delivered

Global Trends

- Globalisation is forcing the pace of growth in the transportation sector
  - Demand at times outstripping supply
  - New players, new ideas, innovation
- Supply chains shifting as companies relocate production
  - Exporting finished goods
  - Importing raw materials
  - Intra-asian trading, new markets and components

Global Trends

- Outsourcing of non-core competencies are restructuring transportation
- Consolidation is providing scale and leading to move from domain management to industrial management
- Information and data are becoming all pervasive

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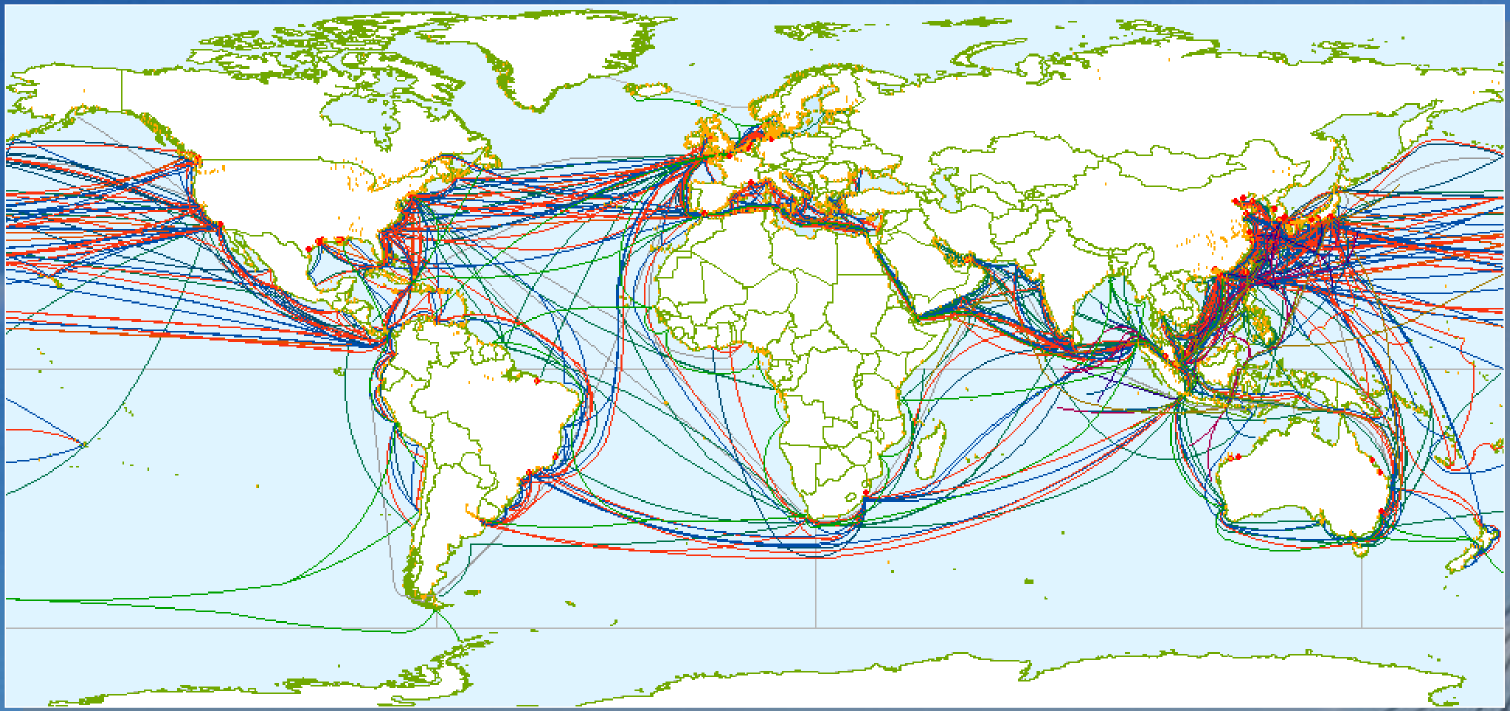
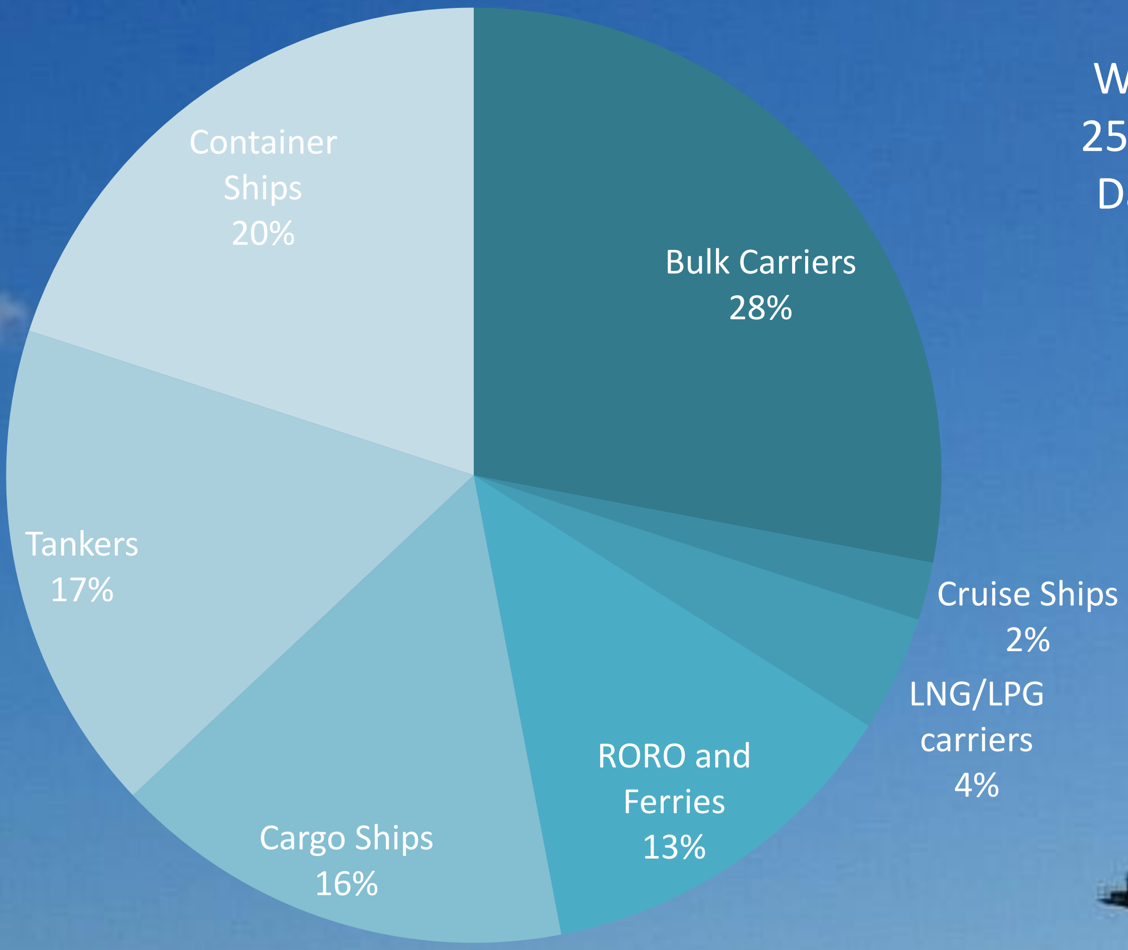
The Structure of World Trade



The Structure of World Trade



World fleet
25,000 ships
Date: 2007

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Major Ocean Transits

	Route	Ocean	Transits	'representative' ship
Tanker	Middle East - Americas	Atlantic	1,000	VLCC (280,000 dwt)
	Middle East – Asia	Indian	3,600	VLCC (280,000,dwt)
	Africa – Americas	Atlantic	1,400	Suezmax (140,000dwt)
Dry bulk	Africa – Asia	Indian	400	Capesize (150,000 dwt)
	Americas – Europe	Atlantic	2,500	Capesize (150,000 dwt)
	Americas – Asia	Pacific	3,500	Cape / Panamax (100,000 dwt)
	Australia – Europe	Indian	700	Capesize (150,000 dwt)
Container	Americas – Europe	Atlantic	4,000	2,450 TEU
	Americas – Asia	Pacific	6,000	2,900 TEU
	Europe - Asia	Indian	6,500	3,350 TEU

Ocean	Transits	Growth
Atlantic	8,900	Neutral
Indian	11,200	High
Pacific	9,500	Moderate

Industry Trends

- Transportation offering significant investment opportunities and attracting attention of the global financial services sector... why are we here?
- Need to make assets work more effectively; no compromise on safety
  - Extend lifecycle
  - Improve performance – change the equation
  - Secure long term competitive advantage by understanding market

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Industry Trends

- Manpower and expertise
  - Increasing demand for key skills
  - Shorter time at sea, less experience
  - Labour pools from Philippines, India, China
- The environment and our attitude to it is changing

LNG

- Long term contracts for supply
- Ships built for specific trades
- Stable routing structure
- Trading difficult
  - Stock supplies hard to hold
  - Breakdown difficult to achieve
  - Part load risk at sea
- Almost no spot market
- Things have shown signs of changing

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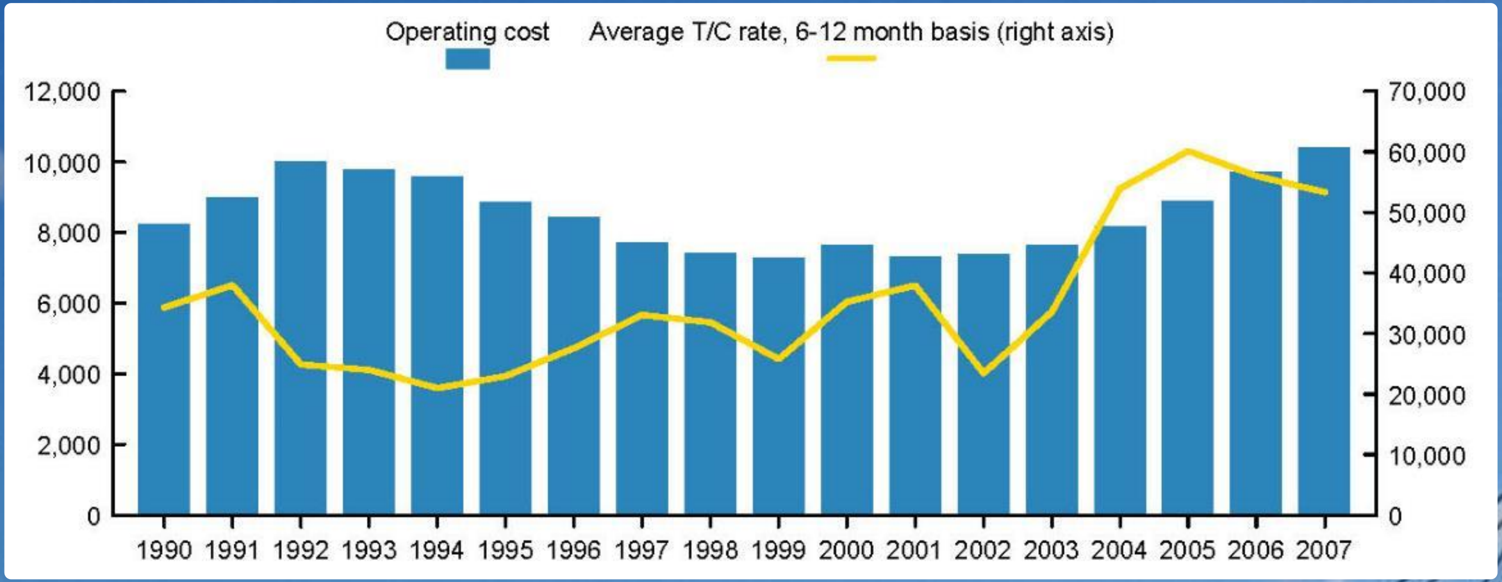
Crude/POL

- Main lines routes
  - Gulf – East coast
  - Gulf – Japan
- Evolving into more disparate trades
  - West Africa
- Houston – Rotterdam – Singapore
- The benefit of VLCCs in question
  - Why not larger?
  - Flexibility
  - Chinese and Indian Ports

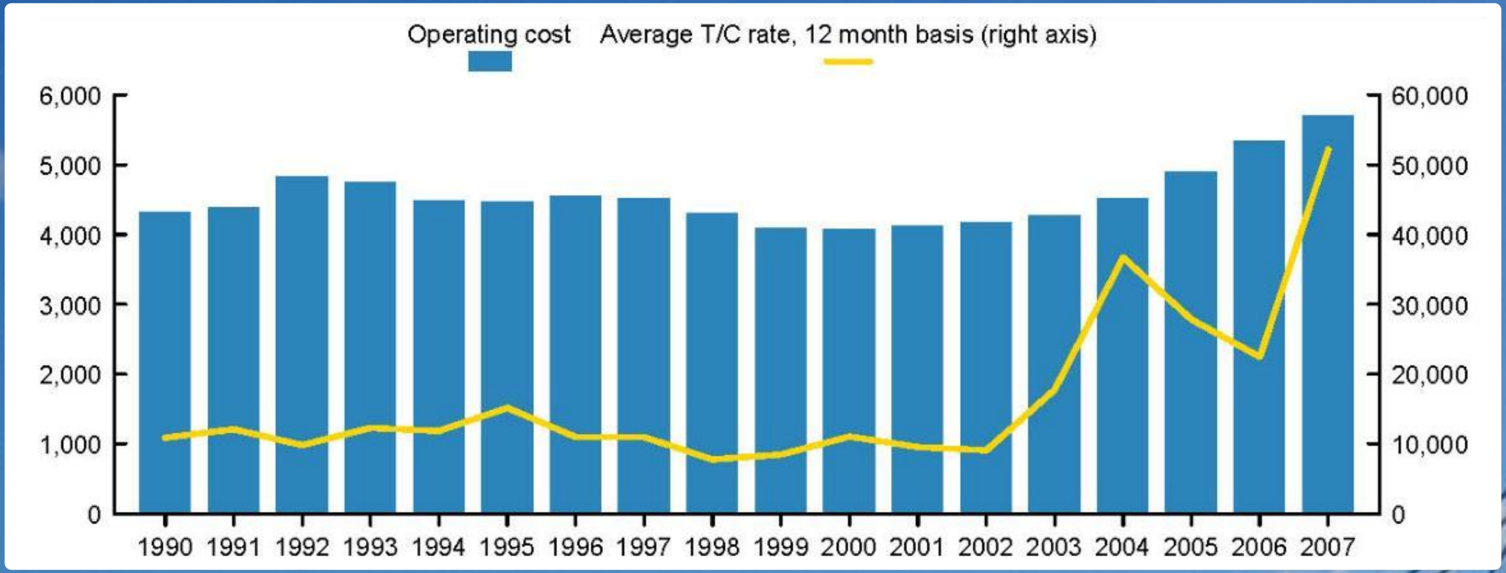
Longer term perspective

- VLCC (US$/day)



Longer term perspective

- Panamax (US$/day)



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Business Models

Fundamentals…

- Industrial based returns
  - Seeking to make money on transporting
    - Coal
    - Crude
    - Anything

- Commodity based returns
  - Making money on buying and selling ships

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The Basic Business Models

- Liner Operator
  - Cruise and container shipping
- Owner Operator
  - Traditional, spot and time charter
- Ship Owner
  - Finance
- Integrated Supply Chains
  - Oil majors (BP), LNG, Steel makers etc…
- National Carrier

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What can change in models?

- The nature and culture of the company
  - Traditional/Marine management
  - Industrial management
  - Financial management
- Type and scale of risks being taken
  - Operations
  - Financing
  - Market
- Market focus
- Level of outsourcing

What can change in models?

- Market entry threshold
  - Single ship companies
  - Product carrier market
- Security or sustainability of company
  - Quick returns
  - Building a brand
- Scale of potential reward

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Differentiation

- Ships designed on economics of 1980s
  - Speed, fuel, inventory balance had changed
  - Multi hatch trading with bulk carriers
  - Concept ships being designed
- Ship Performance Improvement
  - Forecasting capability
  - Communications
  - Analogy with airline systems
- Industrial management
- Manning, training and loyalty

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Liner Trades (COA)

- Barriers to entry
  - complex operation to establish
  - high entry cost
- Market exposure
  - high cost base for service operation
  - exposure to market risk
- Competition
  - Strong in most areas
  - Some areas tightly controlled
  - Possible new ventures

Liner Trades (COA)

- Product carrier market few major players
  - Stoldt, Jo, Odfjell…
  - anti trust actions in Europe, US
  - not as dominant in Asia
- LNG
  - More players
  - Overbuild in evidence
  - National carriers/locked in investment
- Bulk liners –
  - new concept/differentiation
  - high risk but with mitigation…

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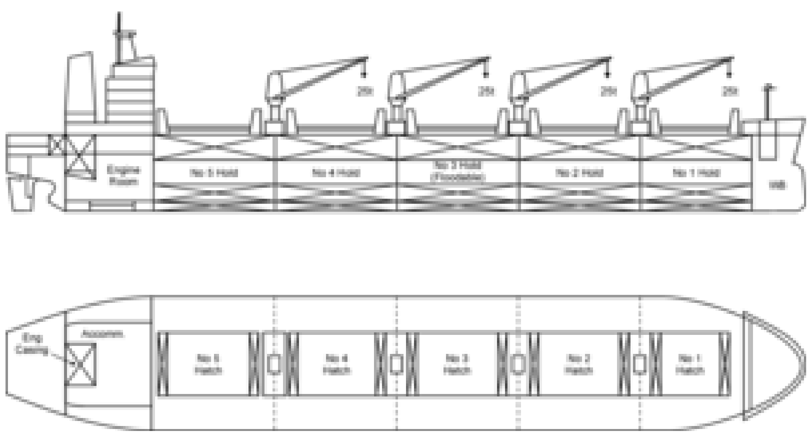
Liner Trades (COA)



Owner Operator

- Barriers to entry
  - Can be managed entry
  - Outsourcing practical
  - Building capacity possible
- Market exposure
  - Can vary with wide range of strategies
    - Long term time charters
    - High exposure to spot market
- Competition
  - Cyclic high levels of competition
  - Herd mentality…

Ship Owner

- Focus on bare boat charters
  - Quality of operators matters
  - Ship manager’s play to improve performance
- Low barriers to entry for equity
- Lower returns, lower risk
- Quick direct exit strategy
- Similar to banking, broking or trading…

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What Does it all Mean?

Glossary of Terms

Glossary of Shipping Terms

Print page | Email page

The following are definitions of certain terms that are commonly used in the shipping industry:

Annual Survey
The inspection of a ship pursuant to international conventions, by a classification society surveyor, on behalf of the flag state, that takes place every year.

Ballast
A voyage during which the ship is not laden with cargo.

Bareboat Charter
A charter of a ship under which the shipowner is usually paid a fixed amount of charterhire for a certain period of time during which the charterer is responsible for the ship operating expenses and voyage expenses of the ship and for the management of the ship, including crewing. A bareboat charter is also known as a "demise charter" or a "time charter by demise."

Bunkers
Heavy fuel and diesel oil used to power a ship's engines.

Charter
The hire of a ship for a specified period of time or a particular voyage to carry a cargo from a loading port to a discharging port. The contract for a charter is commonly called a charterparty.

Charterer The party that hires a ship for a period of time or for a voyage.

Charterhire
A sum of money paid to the shipowner by a charterer for the use of a ship. Charterhire paid under a voyage charter is also known as "freight."

Classification society
An independent organization that certifies that a ship has been built and maintained according to the organization's rules for that type of ship and complies with the applicable rules and regulations of the country of the ship's registry and the international conventions of which that country is a member. A ship that receives its certification is referred to as being "in-class."

Drydocking
The removal of a ship from the water for inspection and repair of those parts of a ship that are below the water line. During drydockings, which are required to be carried out periodically, certain mandatory classification society inspections are carried out and relevant certifications are issued. Drydockings for containerships are generally required once every five years, one of which must be a Special Survey.

Gross ton
A unit of measurement for the total enclosed space within a ship equal to 100 cubic feet or 2.831 cubic meters.

Hull
Shell or body of a ship.

IMO
International Maritime Organization, a United Nations agency that issues international standards for shipping.

Intermediate survey
The inspection of a ship by a classification society surveyor that takes place 24 to 36 months after each special survey.

Newbuilding
A new ship under construction or just completed.

Off-hire
The period in which a ship is not available for service under a time charter and, accordingly, the charterer generally is not required to pay the hire rate. Off-hire periods can include days spent on repairs, drydocking and surveys, whether or not scheduled.

Protection and indemnity insurance
Insurance obtained through a mutual association formed by shipowners to provide liability indemnification protection from various liabilities to which they are exposed in the course of their business, and which spreads the liability costs of each member by requiring contribution by all members in the event of a loss.

Scrapping
The sale of a ship as scrap metal.

Ship operating expenses
The costs of operating a ship, primarily consisting of crew wages and associated costs, insurance premiums, management fee, lubricants and spare parts, and repair and maintenance costs. Ship operating expenses exclude fuel cost, port expenses, agents' fees, canal dues and extra war risk insurance, as well as commissions, which are included in "voyage expenses."

Sister ships
Ships of the same class and specifications typically built at the same shipyard.

Special survey
The inspection of a ship by a classification society surveyor that takes place every five years, as part of the recertification of the ship by a classification society.

Spot market
The market for immediate chartering of a ship, usually for single voyages.

TEU
Twenty-foot equivalent unit, the international standard measure for containers and containership capacity.

Time charter
A charter under which the shipowner hires out a ship for a specified period of time. The shipowner is responsible for providing the crew and paying ship operating expenses while the charterer is responsible for paying the voyage expenses and additional voyage insurance. The shipowner is paid charterhire, which accrues on a daily basis.

Voyage charter
A charter under which a shipowner hires out a ship for a specific voyage between the loading port and the discharging port. The shipowner is responsible for paying both ship operating expenses and voyage expenses. Typically, the charterer is responsible for any delay at the loading or discharging ports. The shipowner is paid freight on the basis of the cargo movement between ports.

Voyage expenses
Expenses incurred due to a ship's traveling from a loading port to a discharging port, such as fuel (bunkers) cost, port expenses, agents' fees, canal dues, extra war risk insurance and commissions.

http://www.marad.dot.gov/publications/glossary/Glossary.html

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Market Terms

- Bare boat Charter
  - Demise charter
- Time Charter
  - Ship operating expenses
- Voyage Charter
  - Voyage expenses
- Spot Market
- Contract of Affreightment
- Voyage in Ballast

Regulation and Insurance

- IMO
  - Talking shop regulator
  - MARPOL, STCW, ISM, ISPS etc…
  - Flag or Port State
  - The White List
- Shipping Register
  - Closed/Open/2nd Register
- Mutual Clubs
  - The International Group
  - P&I Insurance
  - Hull & Machinery Insurance

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Shipping Terms

- Classification Society
  - IACS
  - Survey
    - Annual
    - Intermediate
    - Special
- Size is everything…
  - DWT, GT, Displacement
  - Beam
  - Draft/Air draft
  - Length Overall

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Charter Examples

Report Date	Details	Lay Days	Rate	Charterer	Terms
Voyage Charter					
25/01/08	Richards Bay to Rotterdam 150,000t Coal	12-20/02/08	$22.00/t	Cargill	Scale/ 25000 Shinc fio
Trip Charter by time					
24/01/08	Corunna/Brazil/Japan 174,083 dwt Built 2004	8-10/02/08	$127,000pd	MOL	14k/ 52.5tpd
Time Charter					
22/01/08	Cape Passero/3-5 months – 71550 dwt/built 1995	17-21/01/08	$65,000pd	Samsung	14k /32tpd

Cost Structure

Overview

- Fuel Costs
- Manning
  - Officer
  - Rating
  - Shore Staff
- Maintenance
- Stores
- Management
- Insurances

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Aframax Operating Costs

Bunker Rate (US$/day)	Daily Ops Cost (US$/day)	Ref. Year
150	14,375	Prior to 2006
300	21,575	2006
400	26,375	2007
650	38,375	Present
	64,775	High forecast

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Aframax Operating Costs

Asset Recovery (US$/day)	Daily Ops. Cost (US$/day)	Ref. Year
14,000	14,375	Prior to 2006
23,000	21,575	2006
	26,375	2007
32,000	38,375	Present
46,000	64,775	High forecast

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Aframax Operating Costs

Asset Recovery (US$/day)	Daily Ops (US$/day	Ref Year
14,000	14,375	Prior to 2006
23,000	21,575	2006
	26,375	2007
32,000	38,375	Present
46,000	64,775	High forecast

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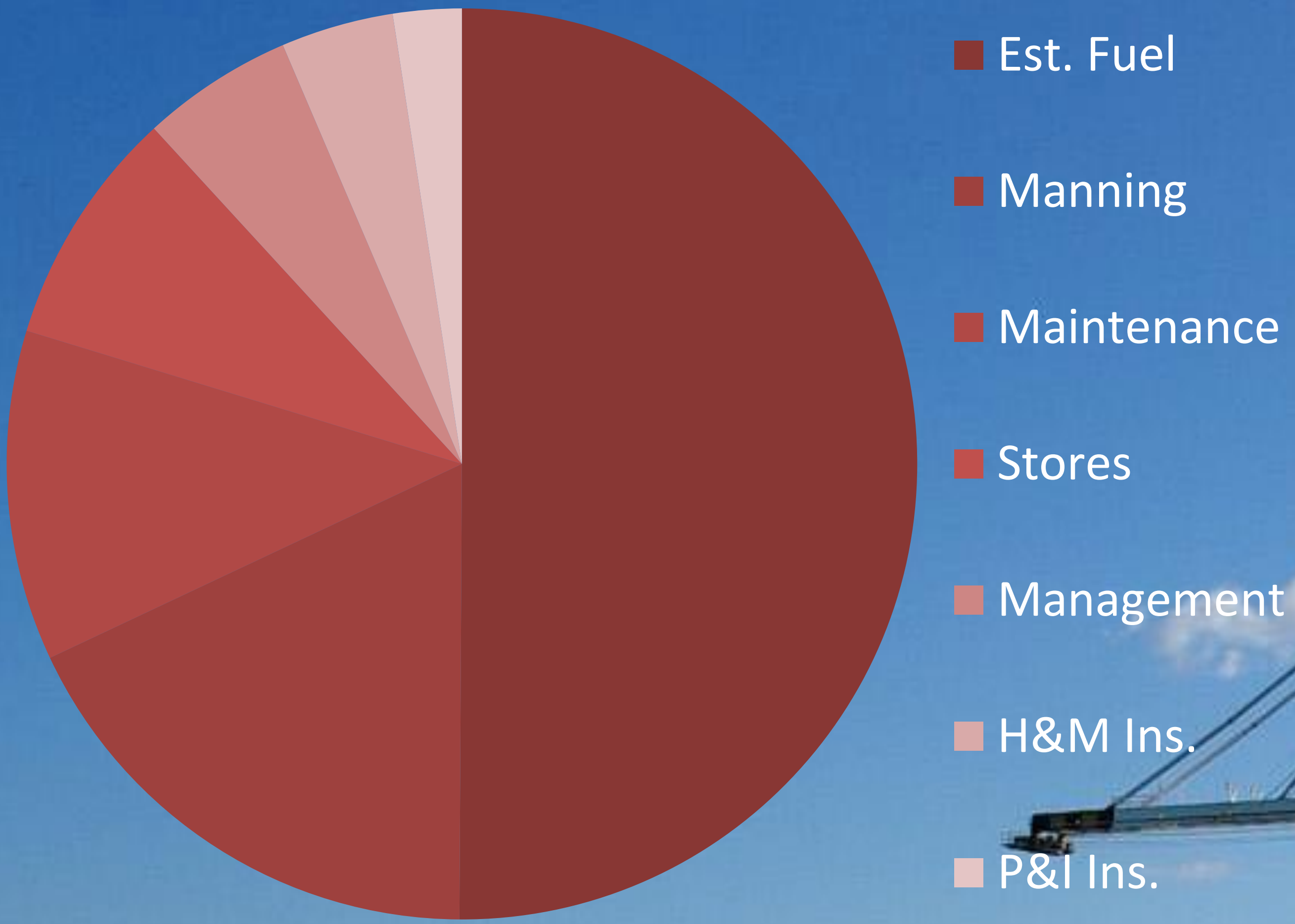
Operating Costs Breakdown



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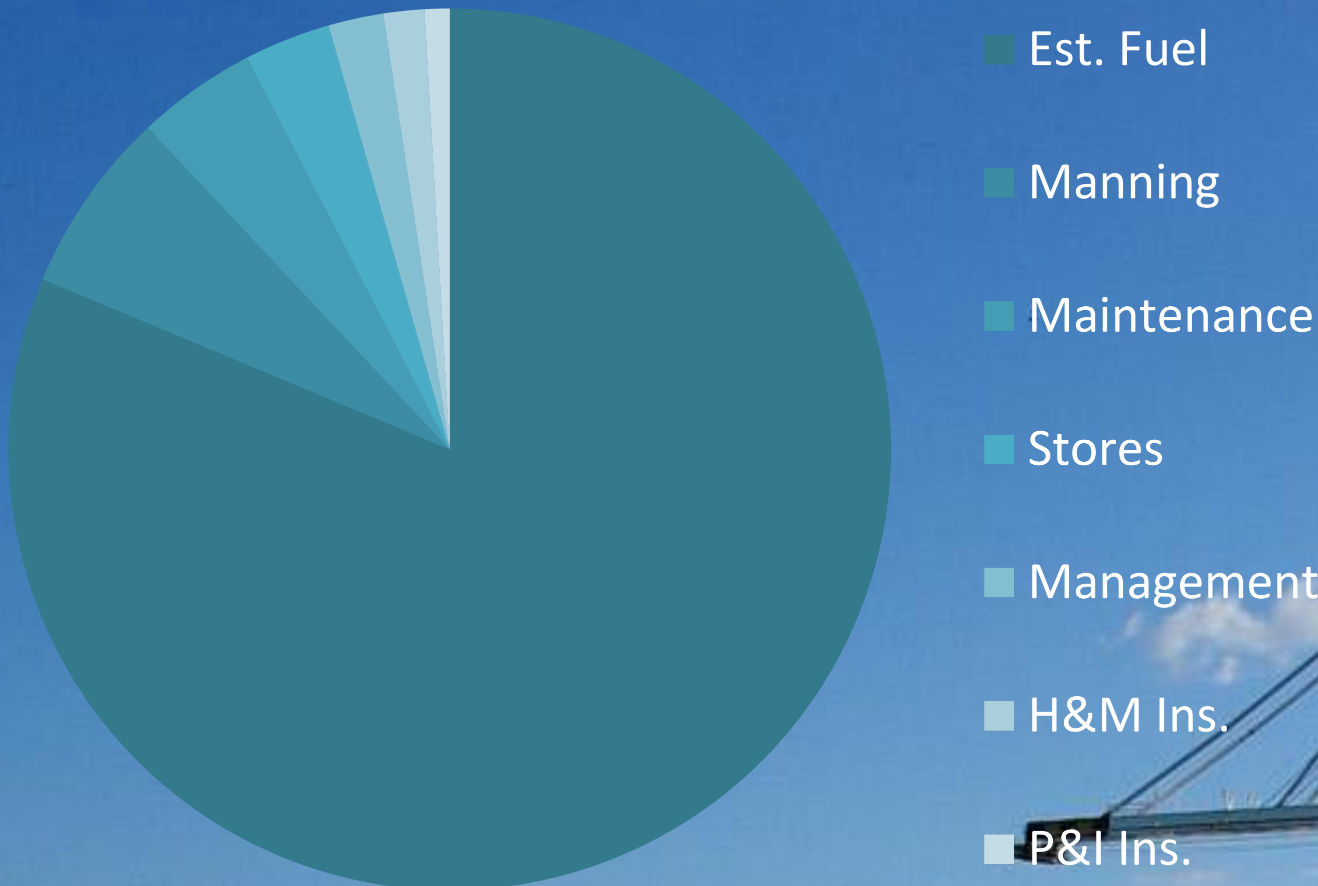
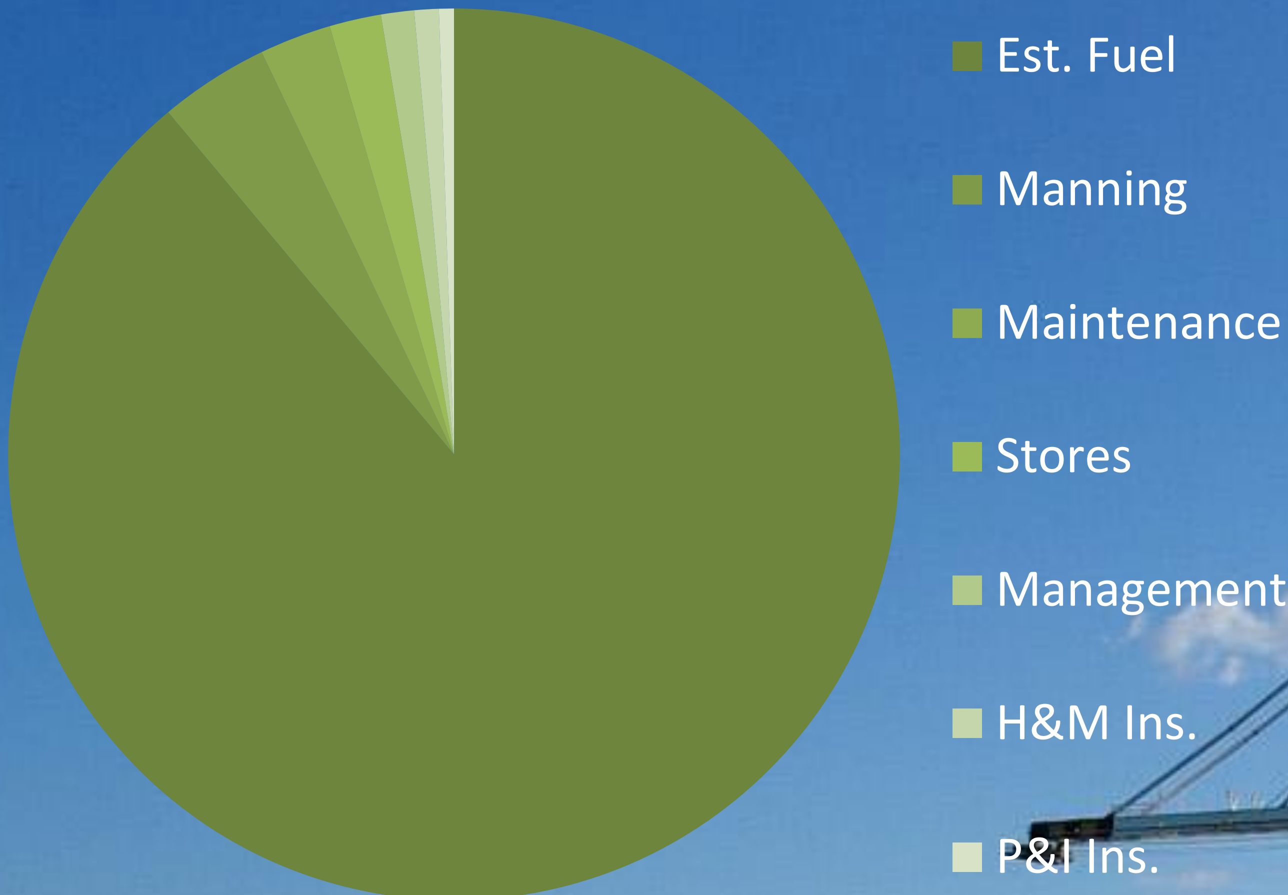
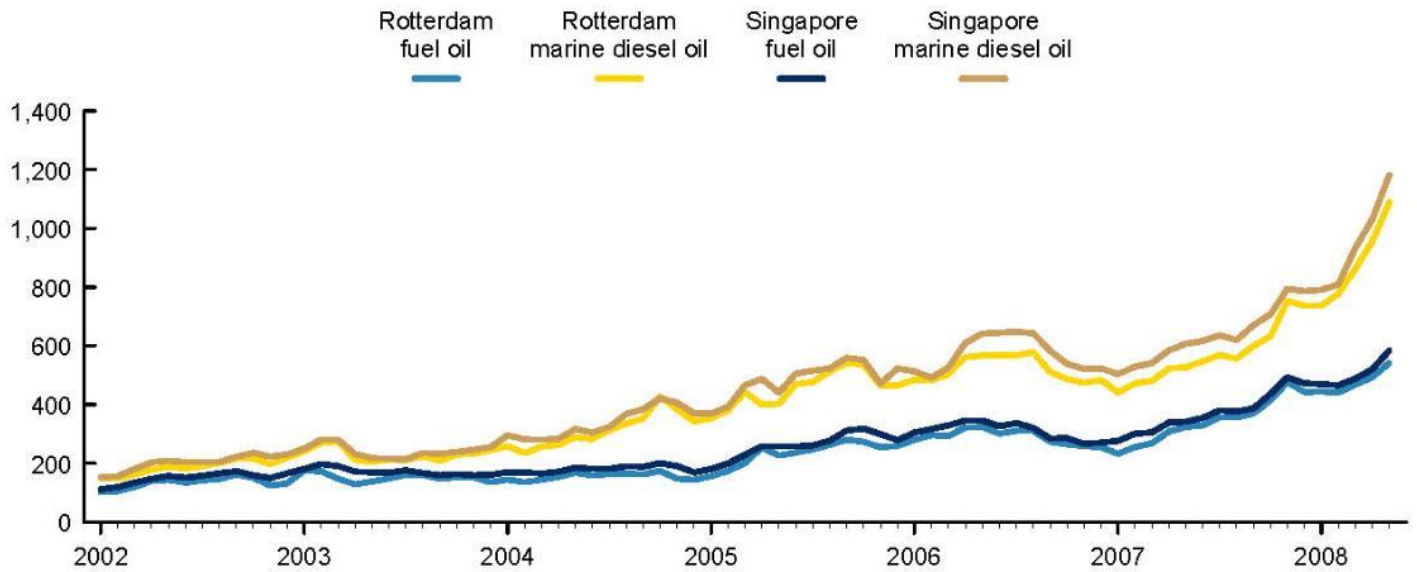
Operating Costs Breakdown



Operating Costs Breakdown



Bunker Prices (US$/ton)



Source: Drewry

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Bunker Use

- Speed matters
  - Lower speed less fuel per ton-km
- Can be made others problem
  - Charter party transfer
  - Fuel costs competitive weapon
- Hedging
  - Double edge sword
- Global deals

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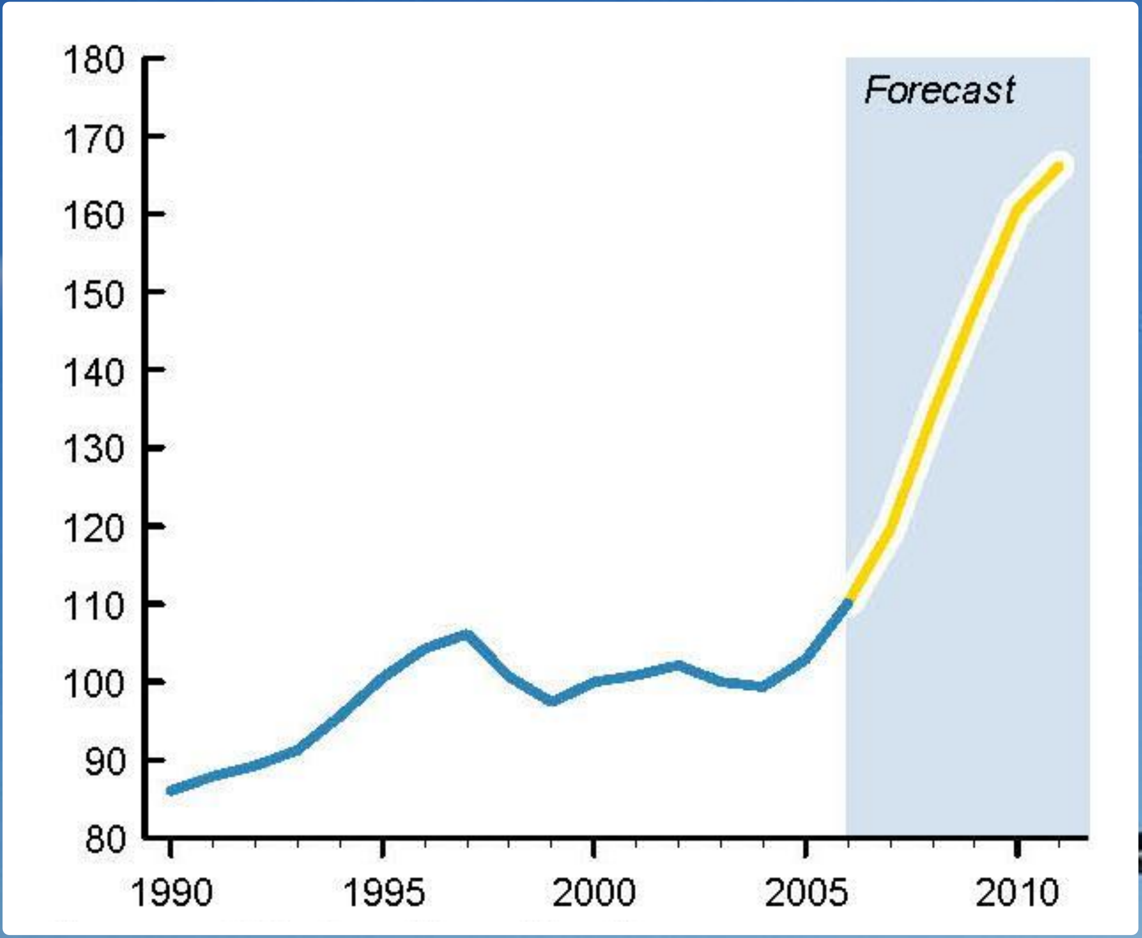
Manning (Index 100 in 2000)



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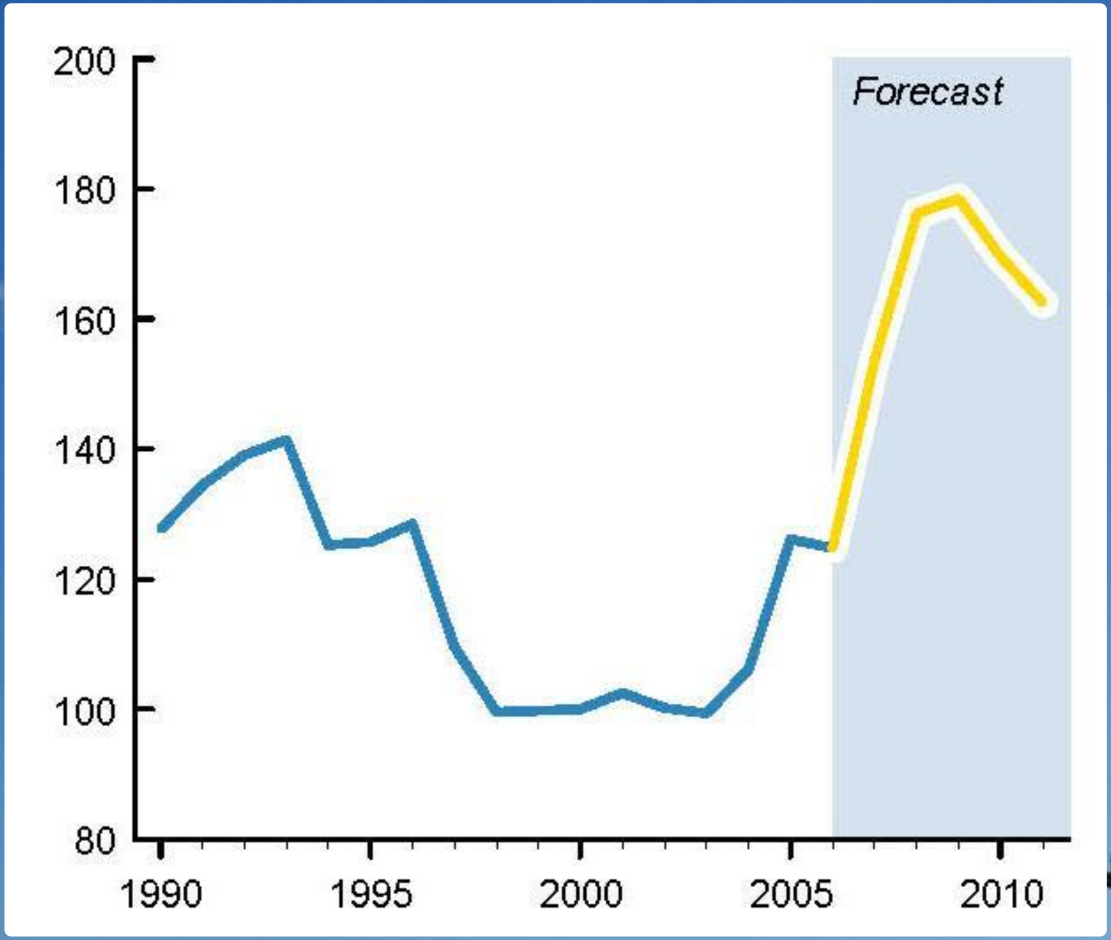
M&R (Index 100 in 2000)



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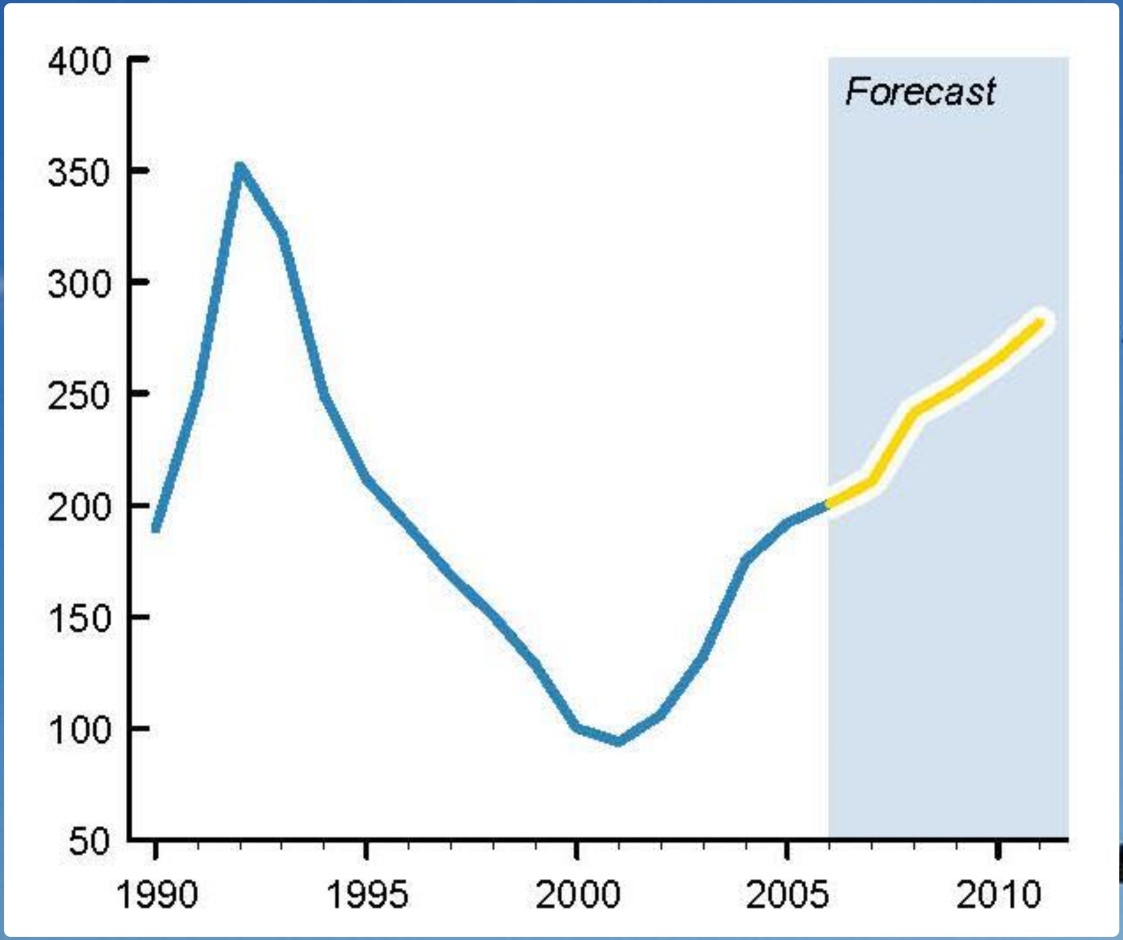
Insurance (Index 100 in 2000)



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War Risk and Terrorism…

- Developed from piracy exclusions
- Lloyds provide this through Joint War Committee by declaring Exclusions Zones
- In an Exclusion Zone, and Additional Premium is collected for extending cover
- Saudi is in an Exclusion Zone
- Additional Premiums:
  - Saudi, varies but some at 0%....
  - Somali Coast, 4% +

War Risk and Terrorism…

Africa

- **Djibouti** (excluding transit)
- **Côte d'Ivoire** (Ivory Coast)
- **Nigeria**, including offshore installations
- **Somalia** (including contiguous coast as defined, plus extension of EZ to 200 nm exclusion – 40 nm when transiting the Gulf of Aden – and within 100 nm of Socotra archipelago)

Asia

- **Pakistan**
- **Sri Lanka**
- **Thailand**, Southern Gulf coast of, between and including Songkhla and Narathiwat
- **Indonesia/Malaysia**
  - Ambon (Seram)
  - Balikpapan (SE Borneo)
  - Borneo, NE coast, between and including
- **Kudat** and **Tarakan**
  - Jakarta, port
  - Poso (Sulawesi), port
  - Sumatera (Sumatra), NE coast as defined, ex. Transit
- **Philippines**
  - Mindanao, between ports of Polloc and Mati
  - Sulu Archipelago incl. Jolo, and as defined

Middle East

- **Bahrain,** excluding transit
- **Iraq**, including all Iraqi offshore oil terminals
- **Israel**
- **Lebanon**
- **Qatar**, excluding transits
- **Saudi Arabia**, excluding transit
- **Yemen**
- **Gulf of Aden transit** (area as defined)

War Risk and Terrorism…

- Other providers follow JWC lead:
  - Hellenic Mutual War Risks Association
  - The Strike Club
  - Norwegian War Risk Club
- Fixed premium routes are falling in cost

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Case Studies

Case Study 1: Frontline

- Bermuda based company
- Operate:
  - Suez max: 120,000-170,000 DWT
  - VLCCs: 200,000-320,000 DWT
- Ships owned and under management
  - 28 Suez max (inc. OBOs)
  - 47 VLCCs
  - and 1 Afra max under management
- Reduced ships from 86 to 76 since 2006

Case Study 1: Frontline

- Owned ships are bareboat charters:
  - Subsidiary buys and fixes long term bare boat to group
  - Financing strategy
  - Risk allocation
  - Distributing subsidiary to shareholders
- Revenue generation:
  - Voyage charter focus
  - Mainly through spot market
  - Limited time charter

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Case Study 1: Frontline

- Outsource to competing suppliers:
  - Ship management
  - Accounting services
- Ship managers provide:
  - Operations
  - Maintenance
  - Crewing
  - Technical support
  - Shipyard supervision
- Benchmark on performance and cost

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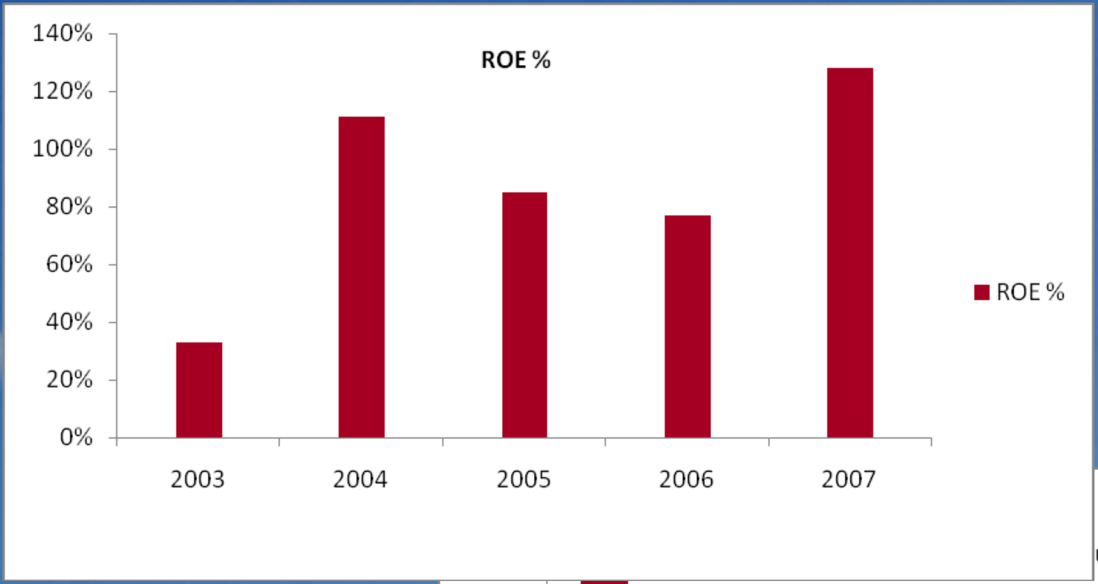
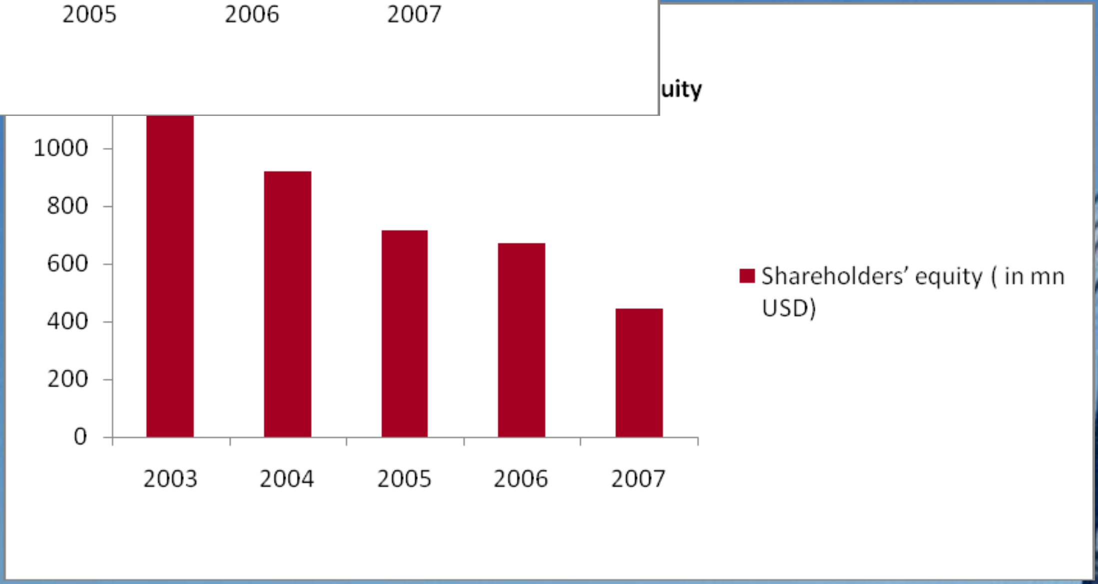
Case Study 1: Frontline





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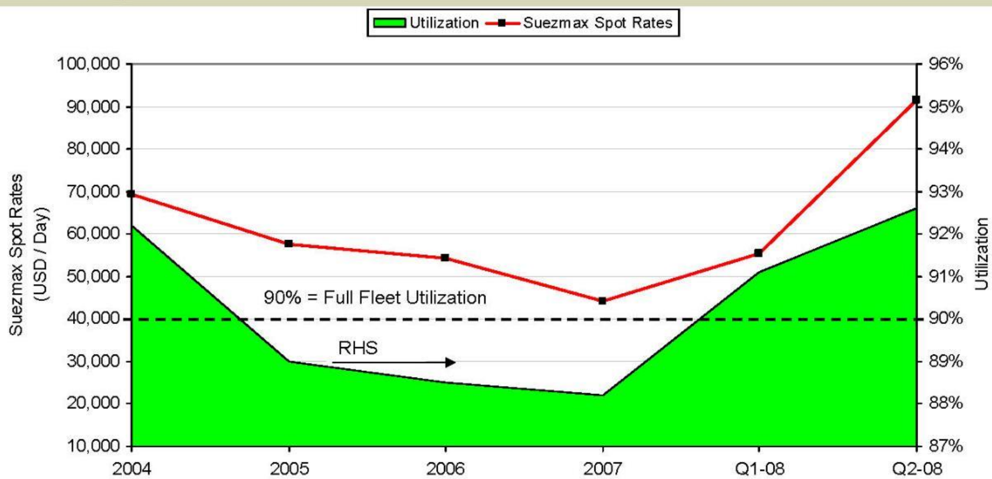
Case Study 2: Teekay Shipping

- Industrial management
  - Brand
  - Part of the energy industry
  - Focus on customers (oil majors…)
- Organized by market focus
  - Shuttle tankers
  - Gas
  - Marine services
- Strong cost control
- Excellent market intelligence

Case Study 4: Teekay Shipping

Rates Spike – A Result of a Stretched World Tanker Fleet



Source : CRS / Platou

- Q2-08 – Second highest tanker fleet utilization after Q4-04
- Platou: 1H-08 tanker demand up 6.8% vs. 2007. Fleet supply growth ~2.1% since end of 2007
- Q4-08 – IEA's global oil demand estimate is 1.9 mb/d higher than Q2-08

Tanker fundamentals in place for a strong winter market

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Case Study 2: Teekay Shipping

- Quality through professionalism, reliability and integrity
- Responsible safety and environmental practices
- Responsiveness and creativity towards customers' needs
- Loyalty to employees
- Competitive and entrepreneurial spirit
- Continuous self-improvement

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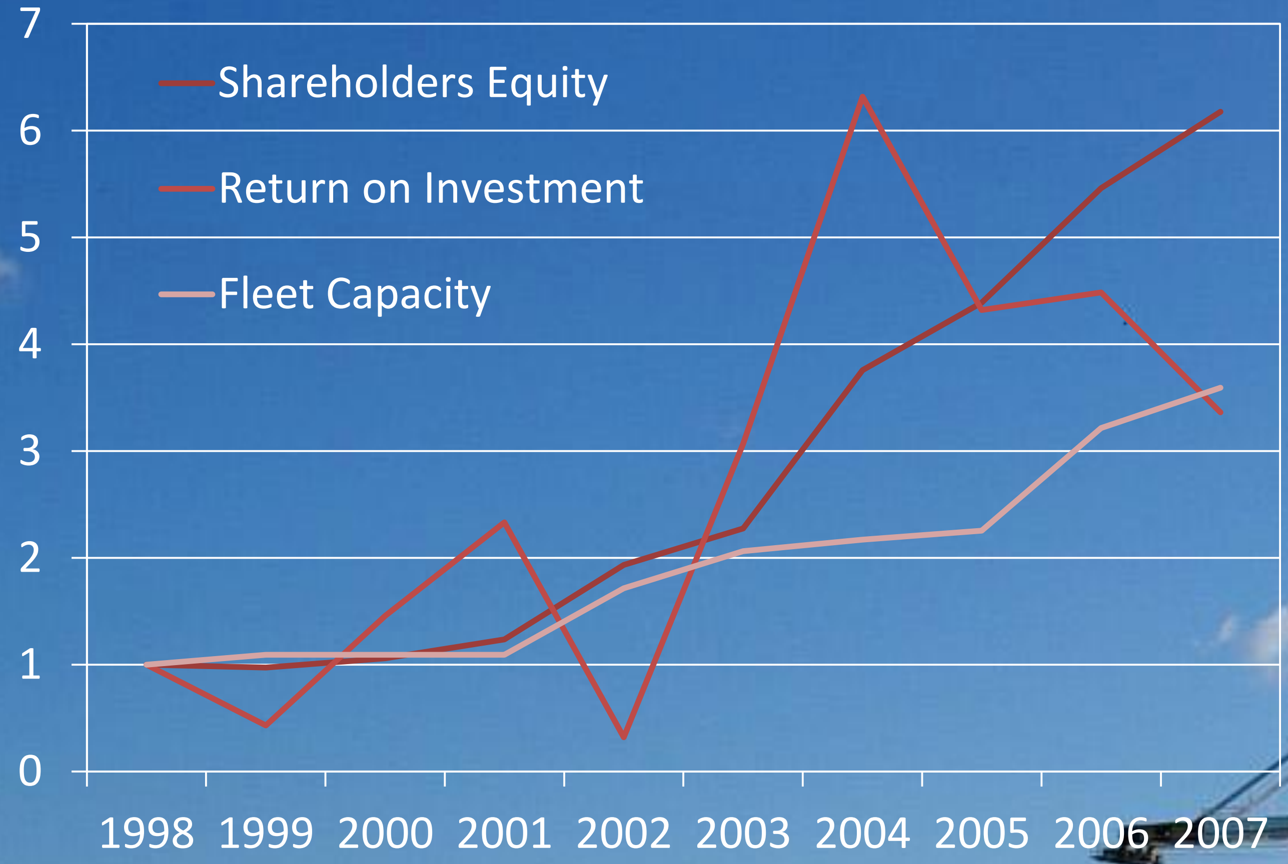
Case Study 3: Tsakos

- Focus on tankers
  - Crude Tankers
  - Petroleum Products
  - Range of sizes
- Differentiators
  - Young fleet
  - Ice class
- Cost synergies across ships
- In house ship manager
  - Long term ship management
  - Maintains asset value

Case Study 3: Tsakos (Ind. 1998)



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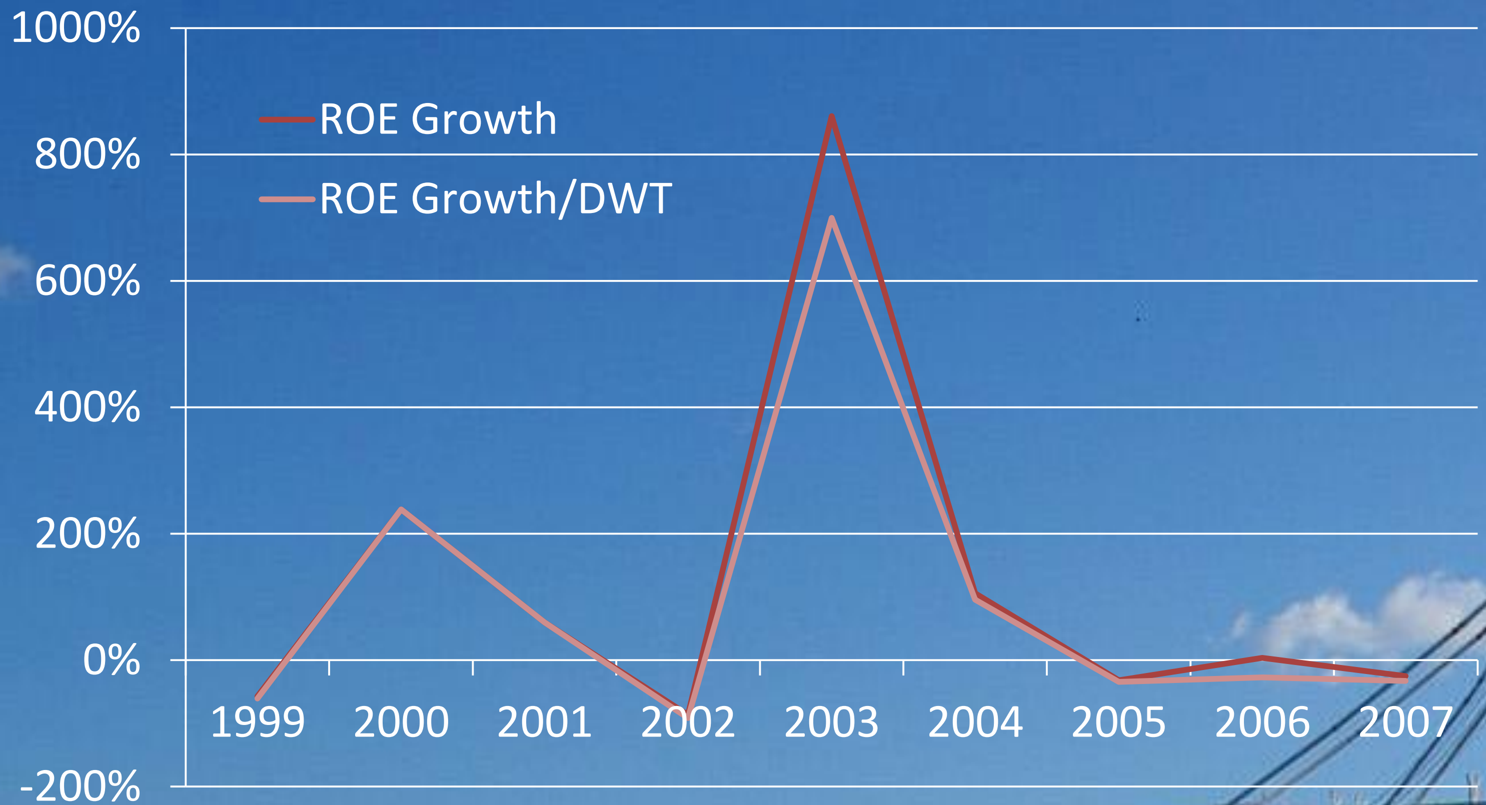
Case Study 3: Tsakos



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Case Study 3: Tsakos

- Trade characteristics
  - Crude/Products
  - Time charter focus
  - Maintains high ship utilization
  - Predictable revenue
  - Smoothes market volatility
  - Strong growth on back of volume
- Return on equity grown but volatile
  - Impact of sale and purchase on returns
- Management performance in doubt
  - Economic benefit to ship manager?

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End of Session 1!

Part 1, Session 2

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Part 1: Session 2, Product

- Business models of tank terminals and their operation
  - The business model is important in understanding why shore-side operations are structured in specific ways
- Differentiation of products
  - What products do terminals handles, what are they used for and why does this matter
- IMDG code understanding and application
  - A review of the code, creation, content, enforcement and how it may change in the future
- Pipes, pumps and pumping
  - Pump technology, design, performance and maintenance
- Contamination
  - How to manage and operate to avoid contamination, pigging and commercial ramifications of problems

Business Models for Terminals

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Business Models

- Captive
  - one built to serve the needs of a specific user where any free storage space is placed on the open market to generate additional revenue
- Semi Captive
  - where within the ownership structure there is a vested interest of some description in the ownership, trading and storage of oil products. Examples include Kuo Oil (Tankstore), FAMM, ENOC, Hin Leong, and Chemoil. Oiltanking would deny this definition as they see themselves as independent of their parent company
- Independent
  - business is solely devoted to renting out storage tanks in the open market. They have no vested interest in the products stored. Vopak claim to be the only independent tank storage company in the world.

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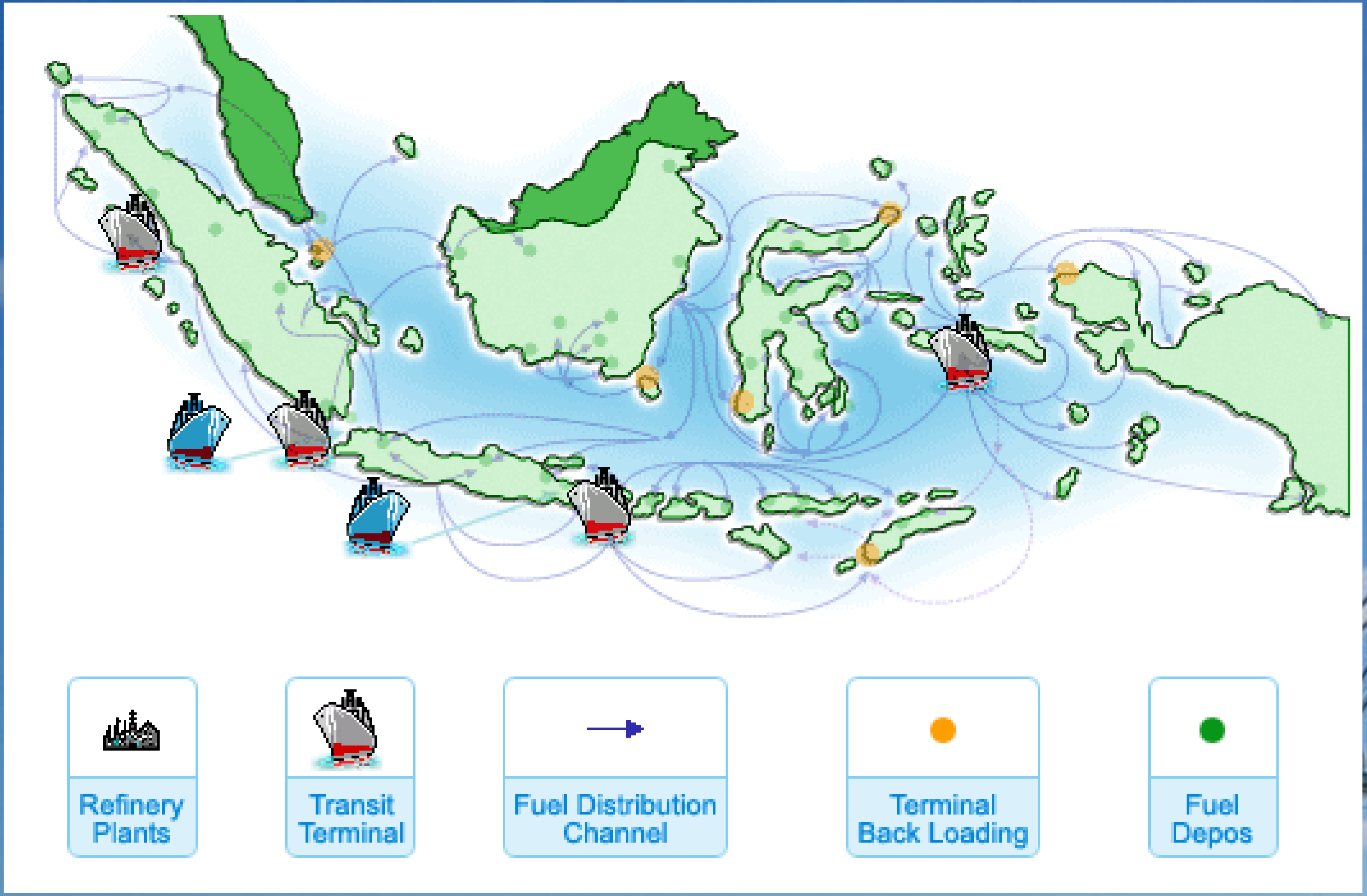
Captive: Pertamina



Downstream Distribution

- Pertamina
  - ?
- Similar models
  - Shell
  - Total
  - Petronas
- Infrastructure
  - Consumer outlets
  - Distribution

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Semi Captive: Oil Tanking?

Mercuria Energy Group

Peter Vucins
Business Development
& Commercial Manager
Tel: +31 30 608 6148
Mob: +31 6 46 088 782
pvucins@mercuria.com

Introduction to business model for 3rd party storage terminals

Introduction to business model

- Vesta is fully owned by the Mercuria Energy Group but operates each of its terminals as an independent storage terminal and profit center, offering safe and reliable logistics services to its customers, one of which is Mercuria Trading in return for financial compensation.
  - Hence, Vesta is solely responsible for the day-to-day decisions of operating the terminal.

- Each terminal is financially self-supporting, which means that all going concern CAPEX and OPEX, (including all maintenance costs, personnel costs, etc), are financed from the free cash flow that the terminal generates by the services that it offers to its customers, including Mercuria.
  - Hence, Mercuria does not subsidize the day-to-day operations of Vesta but simply rents storage capacity from Vesta as any other customer against fees that are negotiated and specified in a separate legal contract.

- Next to Mercuria, other customers include a wide variety of 3rd party users that are active in the oil and related industries, such as downstream distributors, industrial users (refiners or petrochemical companies), and national strategic stock keeping agencies (e.g. governments).

- Vesta offers its storage capacity and related services to its customers against a fixed monthly rental fee (e.g. US$ / cbm shell capacity / month). This income is stable throughout the contract period as it does not depend on the amount of oil which is present in the tanks (which of course can vary over time depending on the instructions from the customers). A certain amount of free “throughput”(e.g. oil flowing in- and out of the rented tanks) is typically included in this fee, often 8-12 times the total storage volume per 12-month period. This fixed income tends to represent around 90% of the total income of the terminal.

- In addition to the fixed rental income, the terminal generates income from services that it offers to its customers and which comes on top of having access to the storage capacity. Such additional service income tends to represent around of 10% of the total income of the terminal. Typical sources of income from additional services include (non-complete list):
  - Additional throughput (e.g. throughput on top of the free volume included in the fixed rental fees) [US$ / MT or cbm]
  - Transferring products in between tanks (often for blending an/or homogenizing purposes) [US$ / MT of cbm]
  - Loading of trucks and rail cars, and transfers by pipeline if applicable [US$ / MT of cbm]
  - Heating of products to specific temperature (e.g. for Fuel Oil) [US$ / ° C / MT or cbm]
  - Overtime work (e.g. work outside the normal opening hours of the terminal) [US$ / shift]

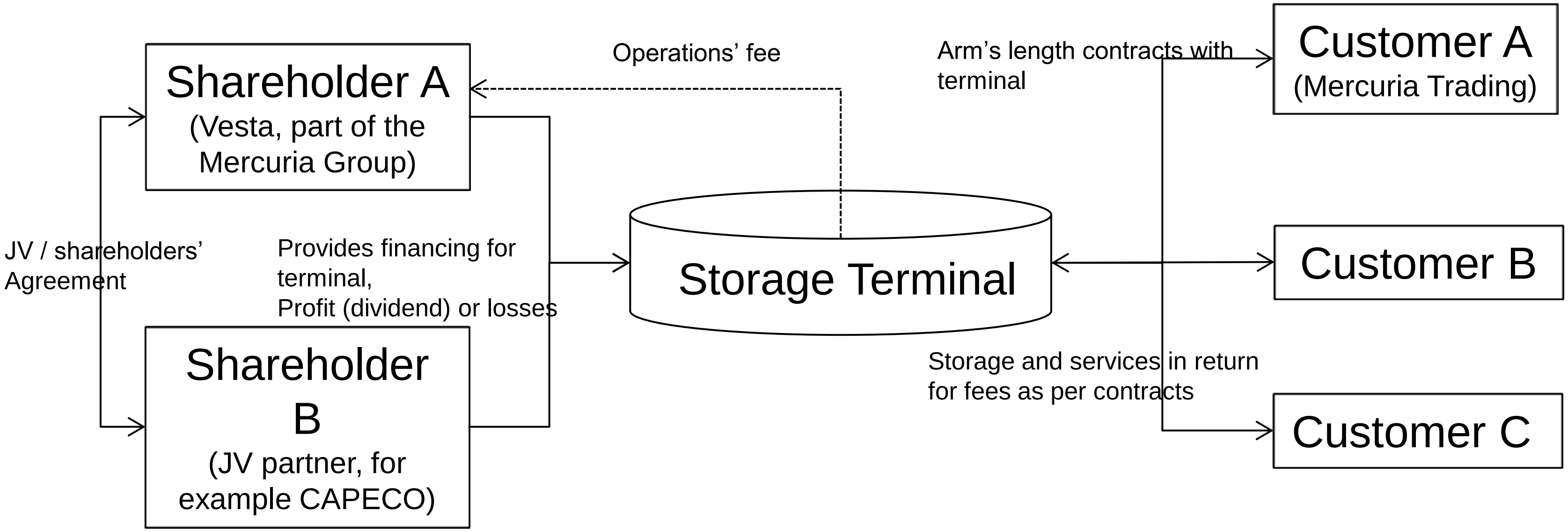
- All customers have their own rental contracts (typically 1-3 years in duration) at “arm’s length”, which means that all contracts are executed on the same legal basis (with Vesta as the counterpart) and against market related price levels which are negotiated prior to signing the contracts.

An example

1. Vesta (and the JV partner(s) if applicable) take(s) the decision invest in a new terminal. 40-50% of the needed CAPEX needed for the investment is typically financed by equity from the shareholders with the balance financed via long-term external debt (often on a nonrecourse project financing basis).

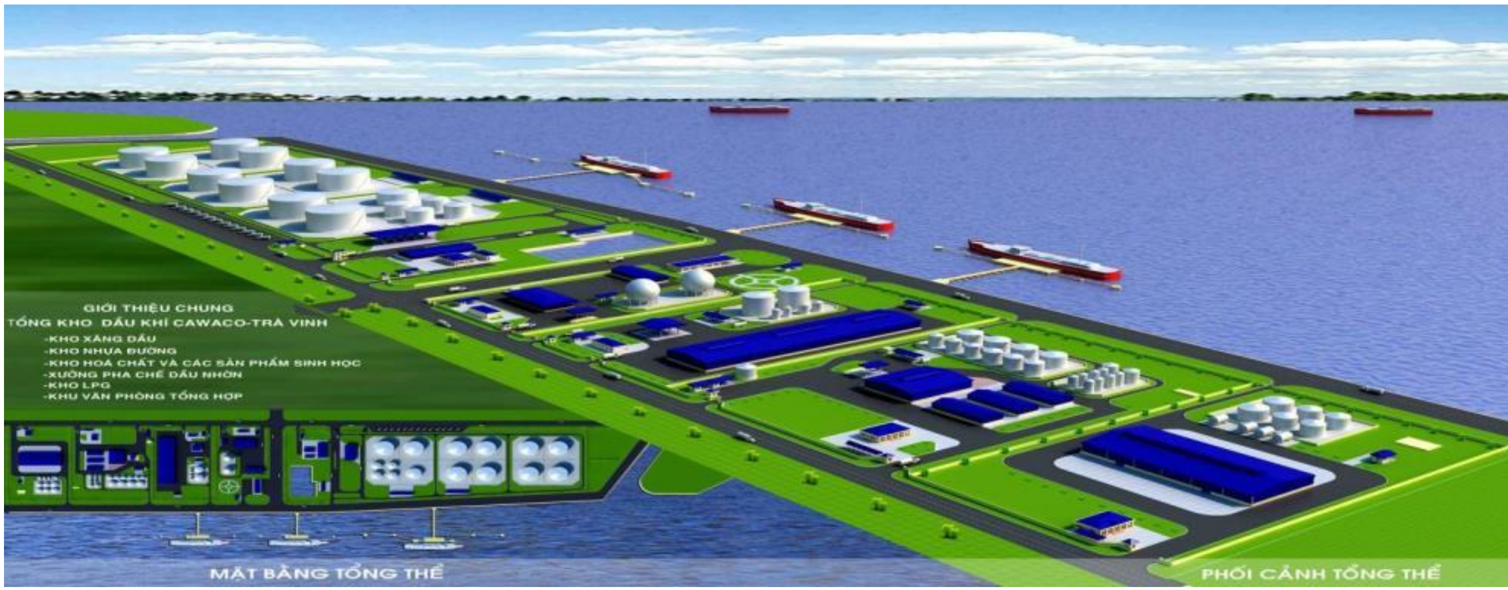
2. The terminal signs commercial storage contracts with it's customers, one of which being Mercuria Trading that uses the terminal for its trading business as it sees fit (e.g. buying or selling oil to other companies at its own discretion). The cash flow that is generated from the fixed rental fees and the additional service fees is used to finance the day-to-day operations of the terminal. Any additional profit can be transferred to the shareholders through dividends. This forms the basis for how Vesta / Mercuria calculates the return of investment of a new terminal investment project.

3. In case of a JV shareholding structure, the operator of the terminal (e.g. Vesta) will receive a predetermined fee from the JV (e.g. charged to the terminal) for taking care of the day-to-day operations.



Differentiation and Business

Tra Vinh Storage Complex

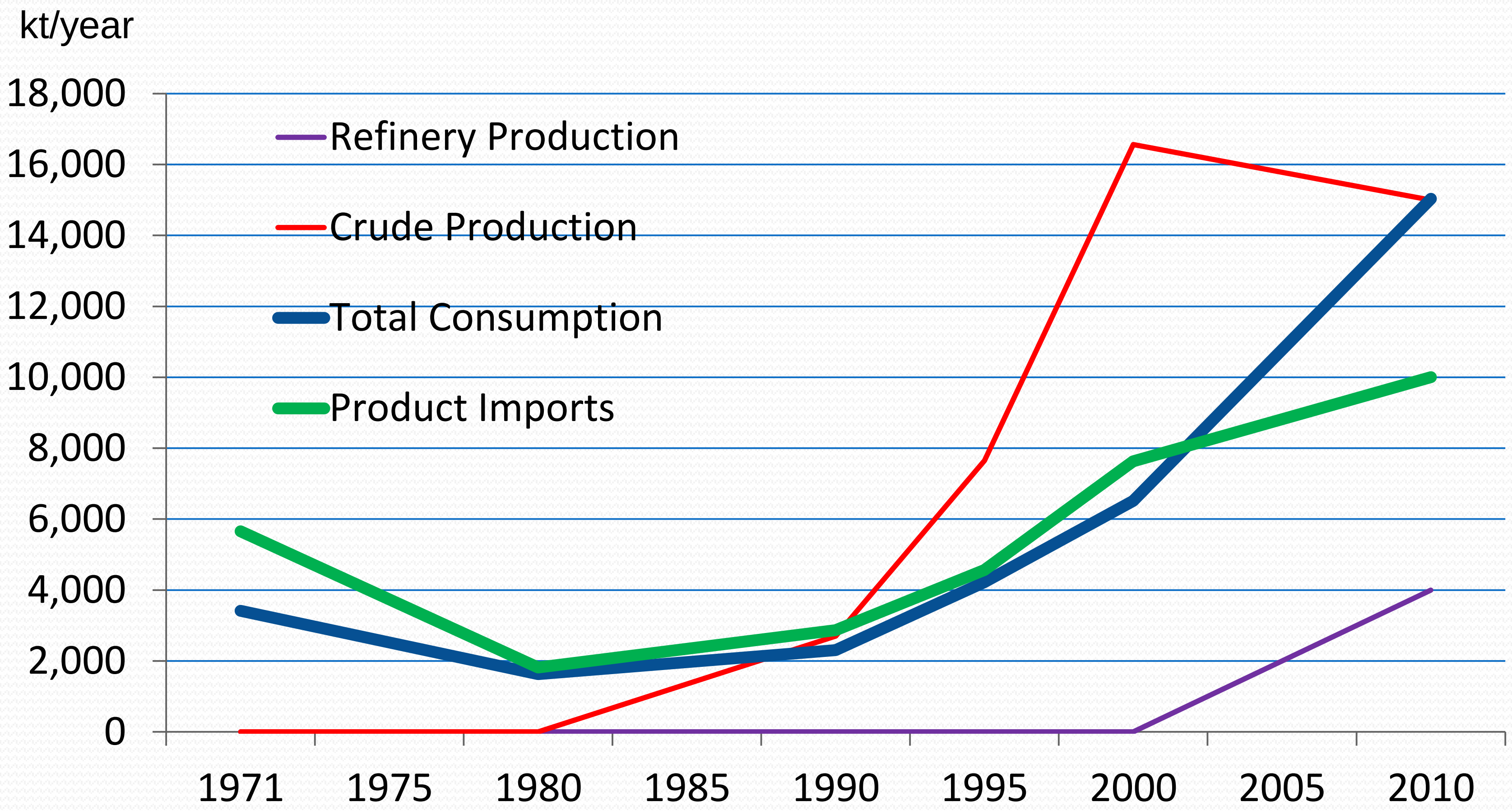


- 500,000 m^3 of storage planned
- 40 Ha land secured, options further taken
- Licensing complete
- In discussion with international contractors

Tra Vinh as a Location

- Only new petroleum storage south of HCMC
  - ✓ Commercial advantage secure in Mekong Delta
  - ✓ Competitive with all possible locations to supply HCMC
- Mekong Delta
  - ✓ Strong agricultural sector
  - ✓ Industrializing rapidly , power stations etc…
- Location close to deep water at river mouth
  - ✓ Permission for 100,000 DWT in hand
  - ✓ If feasible approval for larger will be given
- Government plan to dredge National Waterway
- River and road distribution practical
- Direct river connection for trade to Cambodia

The Market

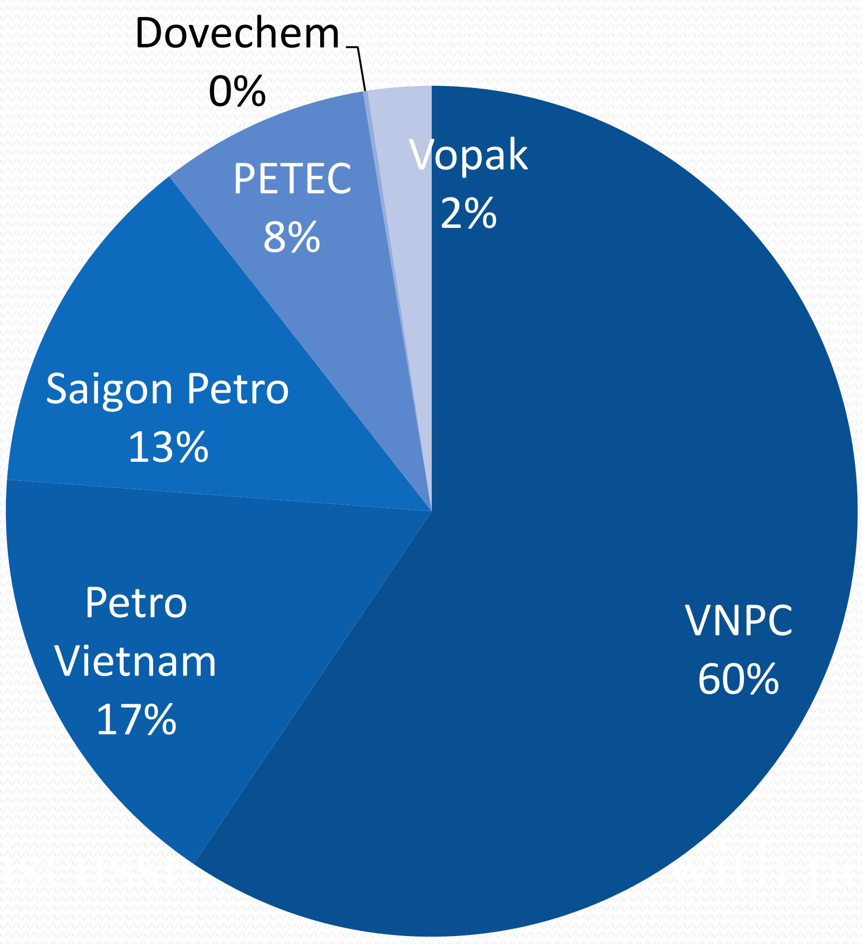

kt/year
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Refinery Production
Crude Production
Total Consumption
Product Imports
1971
1975
1980
1985
1990
1995
2000
2005
2010

Product Demand Forecast (kt/y)

Product	VPI (2020)	CAPECO (2020)
Jet A1	2,163	1,320
Petrol	14,508	13,535
Diesel/Gas Oil	17,697	14,297
Fuel Oil	6,801	3,273

Company	2000	2005	2007	2008	2010	2013	2015	Comment
Vietnam National Petroleum Company/Petrolimix								
B12 Oil Terminal	90,000	90,000	90,000	90,000	90,000	90,000	90,000	Located in northern Vietnam
Nha Be Petroleum	600,000	600,000	600,000	600,000	600,000	600,000	800,000	Located in HCMC 8,000 DWT limit up river from VICT dredging unlikely
Van Phong	-	-	-	-	500,000	1,000,000	1,000,000	Expansion to 1,000,000 m^3 probable PB Tankers from Singapore a part owner
Petro Vietnam								
Cu Lao Tao	-	-	-	-	150,000	150,000	150,000	Located in Vung Tau, difficult to expand
Hai Phong	-	-	-	-	75,000	75,000	75,000	Located in northern Vietnam
Ha Tinh	-	-	-	-	60,000	60,000	60,000	Located in northern Vietnam
Can Tho	-	-	-	-	50,000	50,000	50,000	Limited expansion possible, effective 10,000 DWT limit
Saigon Petro								
Saigon Petro Port	220,000	220,000	220,000	220,000	220,000	220,000	220,000	Located HCMC upstream of Nha Be
Can Tho	45,000	45,000	45,000	45,000	45,000	45,000	45,000	Limited expansion possible, effective 10,000 DWT limit
PETEC								
HCMC	100,000	100,000	100,000	100,000	100,000	100,000	100,000	Located in HCMC near Nha Be Petroleum
Haiphong	40,000	40,000	40,000	40,000	40,000	40,000	40,000	Located in northern Vietnam
Da Nang	10,000	10,000	10,000	10,000	10,000	10,000	10,000	Located in central Vietnam
Vinh Long	10,000	10,000	10,000	10,000	10,000	10,000	10,000	Near Vung Tau, limited capability, expansion not practical
Others								
Vopak Vietnam	0	8,200	8,200	48,200	48,200	48,200	48,200	Located in HCMC near Nha Be Petroleum Mainly focused on chemical storage
Dovechem	3,500	3,500	3,500	3,500	3,500	9,750	9,750	Located in HCMC

The Competition - 2011



Hold time 30 days approx.	2010		2020	
	Inc HCMC	Mekong	Inc HCMC	Mekong
Petroleum Product Annual Demand				
Local Demand (t)	5,678,867	2,992,615	14,481,110	7,631,167
Local Demand + Cambodia (t)	7,678,867	4,992,615	18,481,110	11,631,167
Tank Demand (m^3)				
Local	757,182	399,015	1,930,815	1,017,489
Local inc. Cambodia	1,023,849	665,682	2,464,148	1,550,822
Tank Demand at Tra Vinh (m^3)				
Existing Tank Capacity that has similar market	1,060,000	95,000	1,260,000	95,000
Tra Vinh (competition at 100%)	(302,818)	304,015	670,815	922,489
Tra Vinh inc. Cambodia (competition at 100%)	(36,151)	**570,682**	1,204,148	**1,455,822**
Tra Vinh (competition at 75%)	(37,818)	**327,765**	985,815	**946,239**
Tra Vinh inc. Cambodia (competition at 75%)	228,849	**594,432**	1,519,148	**1,479,572**

The Importance of Location

Ready to Contract

- In Vietnam
  - ✓ **Government 15% of tanks…**
  - ✓ Petrolimix
  - ✓ Saigon Petroleum
  - ✓ PetroMekong
  - ✓ Vinapco
  - ✓ Petimex
- In Cambodia
  - ✓ Sokimex
  - ✓ General Development Asia

CTY CỔ PHẦN NĂNG LƯỢNG
KHO NGOẠI QUAN CAWACO
CÔNG VĂN ĐẾN
Số: ......
Ngày 04/03/2010

GENERAL DEVELOPMENT ASIA Co., Ltd.
29A. Street 204, Group 2, Sangkat,
Teuk Laak 3, Khan Toul Kok, Phnom Penh City.
Cambodia.
Tel: +855 23 635 3435
Mobile: +855 12 353 030
+855 11 221 919

ENERGY JOINT-STOCK COMPANY
CUSTOMS STORE CAWACO
2A Tran Phu Street, Cantho City
Vietnam
Tel: +84 710 3824 757
Fax: +84 710 3827 429
Email: cawaco-cantho@vnn.vn

Date: February 27, 2010

***Respectfully addressed to*: ENERGY JOINT-STOCK COMPANY - CUSTOMS STORE CAWACO**
Re: Renting the Customs store
for temporarily admitting and re-exporting of gasoline

Dear Sir/ Madam,

We, GENERAL DEVELOPMENT ASIA Co., Ltd., have heard that Vietnam government has proved the project of "Tra Cu - Tra Vinh gasoline base depot" whose investor is your company, ENERGY JOINT-STOCK COMPANY - CUSTOMS STORE CAWACO.

To turn the Hau Giang River transportation into the advantages, we would like to use the capacity of Tra Cu - Tra Vinh gasoline base depot to admit temporarily and to re-export gasoline in order to supply gasoline into Cambodia market.

Basing on our above demand, we would like to rent a store at your gasoline base depot for temporarily admitting and re-exporting of gasoline with the estimated capacity as follow:

-From 2010 – 2015: the estimated capacity of 30,000 m^3 - 40,000 m^3
-From 2015 – 2020: the estimated capacity of 50,000 m^3 - 80,000 m^3

Renting method and other necessary procedures will be discussed and implemented after you, ENERGY JOINT-STOCK COMPANY - CUSTOMS STORE CAWACO, finish building the gasoline base depot.

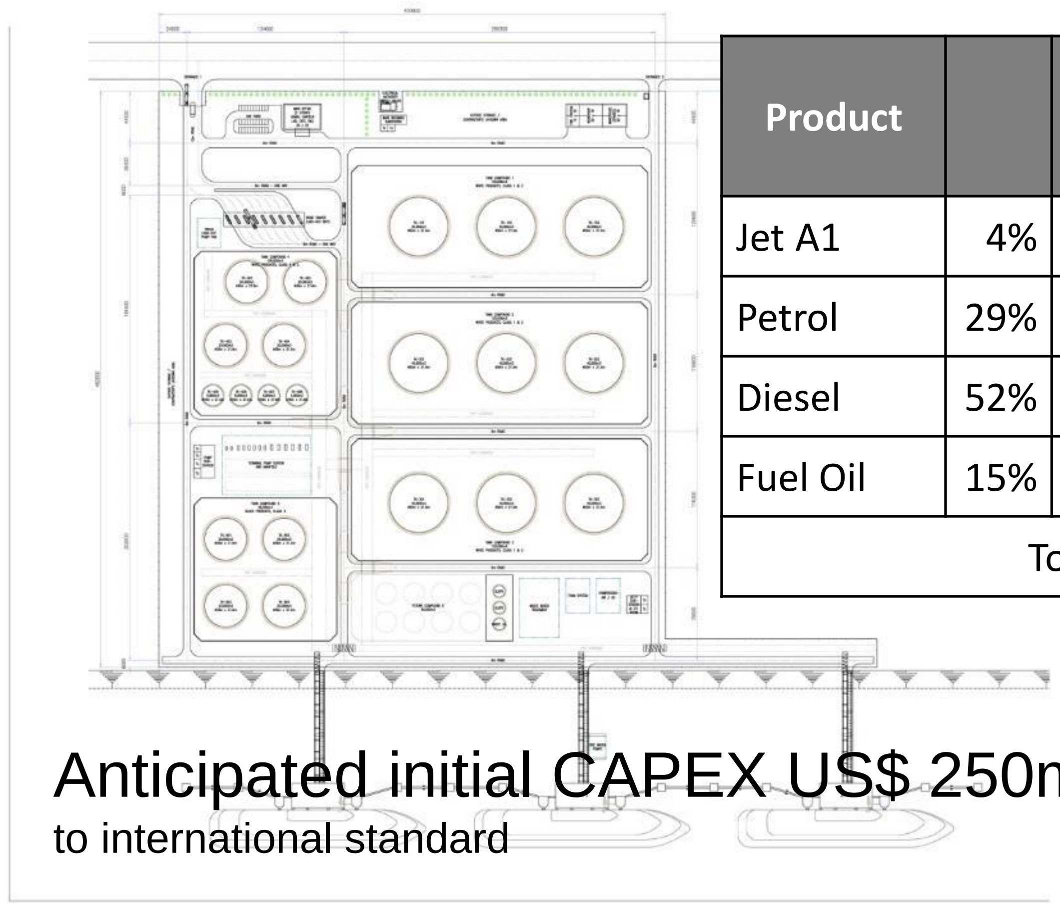
We would like to suggest you should please consider, count and choose the capacity scale of the gasoline base depot while you are carrying out the project in order to gain enough conditions and opportunities for the co-operation between Vietnam and Cambodia.

Yours faithfully,

GENERAL DEVELOPMENT ASIA Co., Ltd.

BE BUN LONG

Proposed Investment



Product		Demand (m^3)	Tanks required			
			5k	10k	20k	40k
Jet A1	4%	19,902	4	-	-	-
Petrol	29%	144,488	-	-	2	3
Diesel	52%	261,860	-	-	2	5
Fuel Oil	15%	73,750	-	-	4	-
		Total Capacity	20k	0	160k	320k

Anticipated initial CAPEX US$ 250m to 350m

to international standard

Secure Operation

- No contamination
  - ✓ White/black product segregation
  - ✓ Monitoring of flows
  - ✓ Testing and verification
- Clean down procedures
  - ✓ All lines pigged
  - ✓ Inspection and testing
  - ✓ Tank review and clean down
- Commercial guarantees
  - ✓ Product quality secured

Business Model

- Operate as 3rd Party Terminal
  - ✓ No ownership of products
  - ✓ Independence of ownership key asset
- CAPECO/Lucky Star Petroleum
  - ✓ Have distribution license
  - ✓ Want to develop own distribution network in Vietnam
- Trader is an ideal partner
  - ✓ Able to source and import products
  - ✓ Excellence in financing trades
  - ✓ Strong financial position
  - ✓ Benefits from blending…

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The IMDG Code

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IMDG Code

- International Maritime Dangerous Goods Code (IMDG)
- Started by 1960 Safety of Life at Sea Conference, 1960
  - Implementation based on SOLAS 1960
- IMO group prepared the code based on 1956 report that set minimum requirements for all modes of transport
- Adopted by 4th IMO Assembly in 1965
- Amendment 31, 2002: Mandatory from 2004
- IMDG Code has undergone many changes
  - Change not affecting principles adopted by the MSC
- Two sources of change:
  - Proposals from IMO Member States
  - Required to take account of changes to the UN Recommendations on the Transport of Dangerous Goods

Implementation

- The implementation of the Code is NOW mandatory
- Covered by obligations of:
  - International Convention for the Safety of Life at Sea (SOLAS)
  - International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)
- The international guideline on safe transportation dangerous goods or hazardous materials by sea
- To be used by mariners and all those involved in industries and services connected with shipping
- Intended to protect crew and prevent marine pollution
- It is recommended as the basis for national regulations
  - COSHH in UK, 1994 and amendments

Scope

- Scope of code covers:
  - Standard terminology
  - Packaging
  - Labeling
  - Placarding
  - Markings
  - Stowage
  - Segregation
  - Handling
  - Emergency response

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Classification

- Goods are assigned to one of nine classes according to the type of hazard or the biggest hazard
- Classes are subdivided into divisions
- The numerical order of the classes and divisions does not reflect “the degree of danger”

Class 1 to 3

- Class 1: Explosives
  - 1.1: mass explosion hazard
  - 1.2: projection hazard but not a mass explosion hazard
  - 1.3: fire hazard/minor blast hazard/minor projection hazard
  - 1.4: substances and articles which present no significant hazard
  - 1.5: insensitive substances with mass explosion hazard
  - 1.6: extremely insensitive no mass explosion hazard
- Class 2: Gases
  - 2.1: flammable gases
  - 2.2: non-flammable, non-toxic gases
  - 2.3: toxic gases
- Class 3: Flammable liquids

Class 4 to 9

- Class 4: Flammable solids; liable to spontaneous combustion; substances which, in contact with water, emit flammable gases
  - 4.1, 4.2 and 4.3…
- Class 5: Oxidizing substances and organic peroxides
  - 5.1 and 5.2
- Class 6: Toxic and infectious substances
  - Class 6.1 and 6.2
- Class 7: Radioactive material
- Class 8: Corrosive substances
- Class 9: Miscellaneous dangerous substances

Contents

- Volume 1 (parts 1, 2 and 4-7 of the Code) sections:
  - general provisions, definitions, training
  - classification
  - packing and tank provisions
  - consignment procedures
  - construction and testing of packagings, IBCs, large packagings, portable tanks and road tank vehicles
  - transport operations
- Volume 2:
  - the Dangerous Goods List presented in tabular format
  - limited quantities exceptions
- The Supplement
  - EMS Guide, Medical First Aid Guide, Reporting Procedures
  - Packing Cargo Transport Units, Safe Use of Pesticides, INF Code

Understanding/using the code

- The code comes in various forms:
  - Hard copy
  - CD
  - Web
- The web…

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End of Session 2!

Part 1, Session 3

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Part 1: Session 3, Marine Ops

- Acceptance, approach and maneuvering of ships
  - Standard and Emergency Operating Procedures how they are developed and how they can be effectively implemented including pilots and tugs
- Mooring large ships
  - Mooring technology, mooring loads and improvements in monitoring and management of lines
- LNG Carriers, safety and related matters
  - An introduction of LNG carriers, safety issues for terminal and a realistic appraisal of risks associated with their operation
- Fenders and mooring furniture
  - Different types of fenders their characteristics and maintenance
- Berthing and navigation aids
  - Best available technology to support berthing and navigation

Marine Operations

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Acceptance of Ships

- Acceptance of ships
  - COMPLIANCE IS ALL
  - Estimated time of arrival
    - 28 day booking
    - 7 days warning
    - 24/48 hour updates….
  - Security
    - Where has the ship come from?
    - Who is on board?
    - Carrying what? Checked by whom?
  - Operational
    - How is the ship loaded?
    - What equipment does it have?
  - Bureaucratic
    - National Government
    - Port Authority

SOP/EOP

- Approach and maneuvering of ships
  - Standard Operating Procedures (SOP)
  - Emergency Operating Procedures (EOP)
  - Development and implementation
- SOP
  - The procedures required for ships to safely approach
  - All states of tide, current, wind, waves
  - Set limits on tide, current, wind, waves
  - Set limits on draft, length etc…
  - Set tug requirements
  - Safety zones
  - Standard passage plans
- EOP
  - What to do when it all goes wrong

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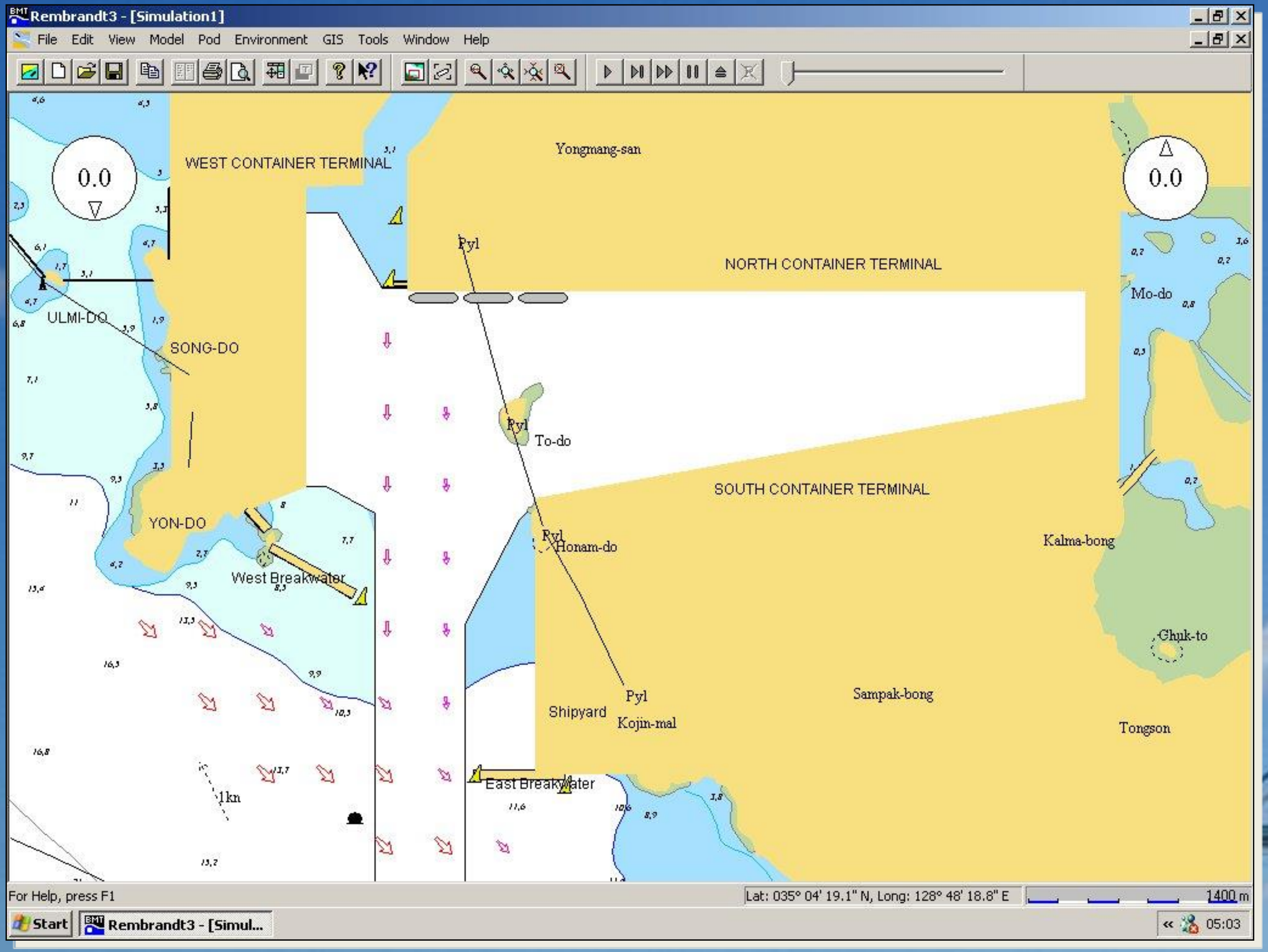

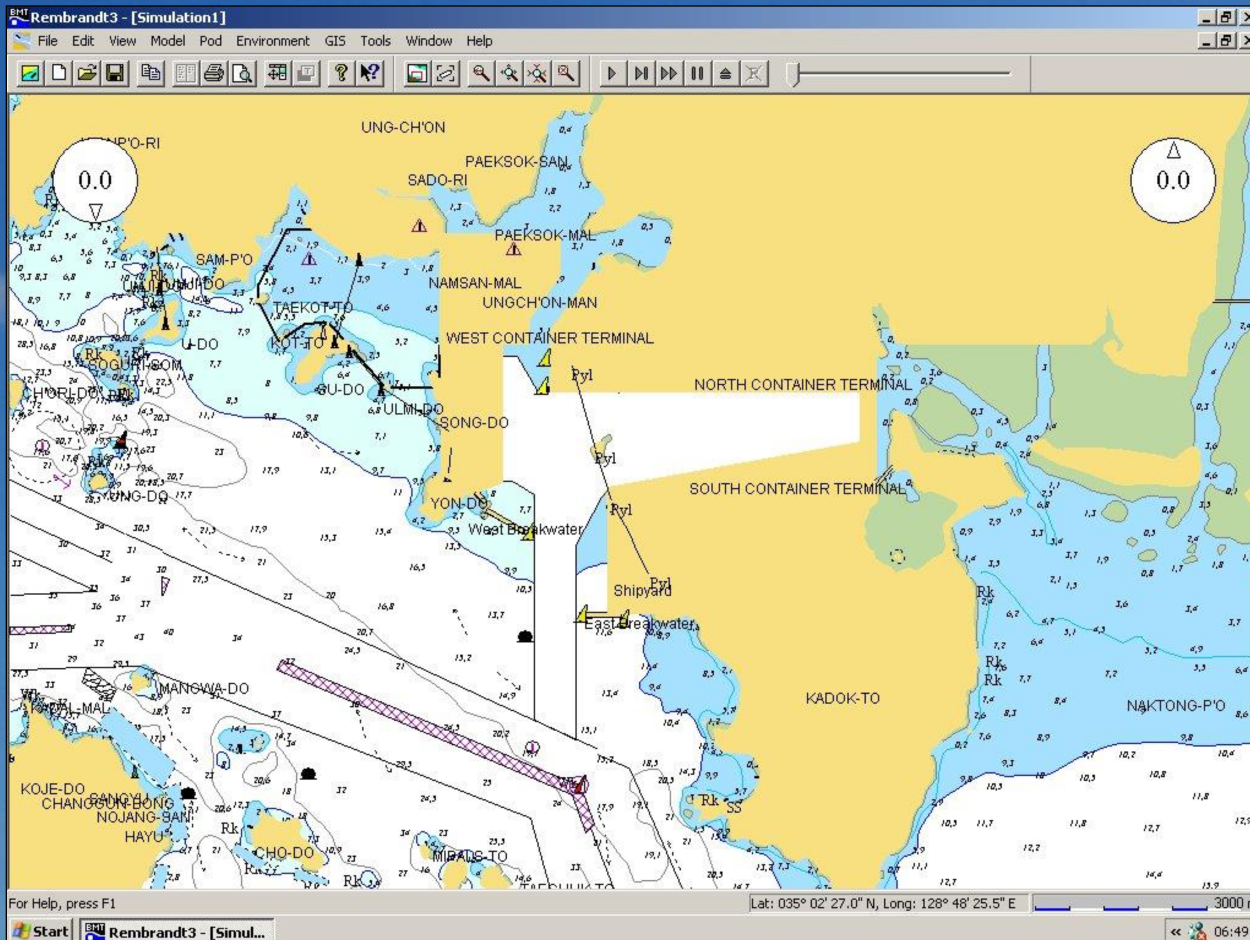
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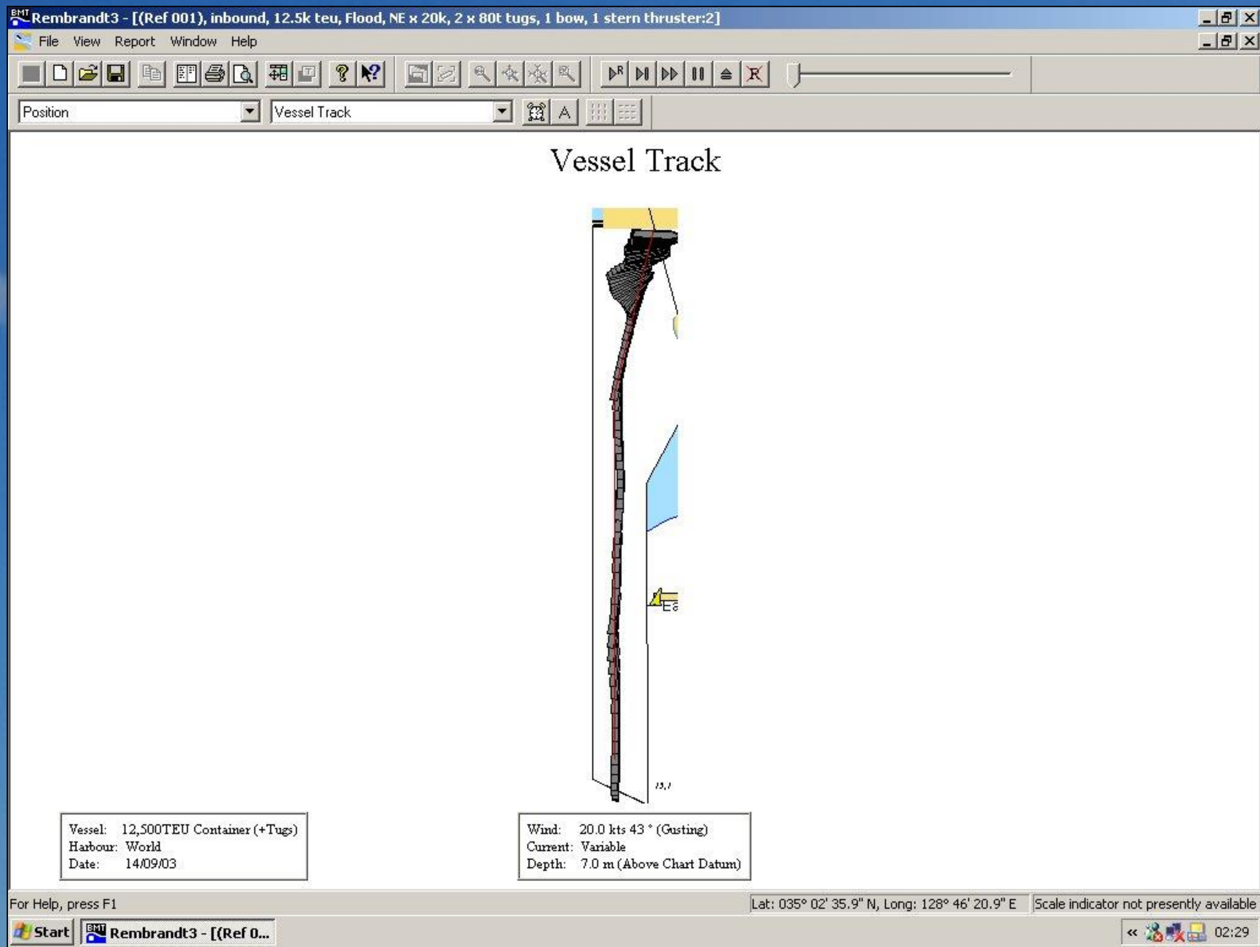
File Edit View Model Pod Environment GIS Tools Window Help
UNG-CH'ON
PAEKSOK-SAN
SADO-RI
PAEKSOK-MAL
SAM-P'O
NAMSAN-MAL
UNGCH'ON-MAN
TAEKOT-TO
WEST CONTAINER TERMINAL
U-DO
NORTH CONTAINER TERMINAL
SU-DO
ULMI-DO
SONG-DO
SOUTH CONTAINER TERMINAL
YON-DO
West Breakwater
Shipyard
East Breakwater
MANGWA-DO
KADOK-TO
NAKTONG-P'O
KOJE-DO
NOJANG-SAN
HAYU
CHO-DO
0.0
0.0
For Help, press F1
Lat: 035° 02' 27.0" N, Long: 128° 48' 25.5" E
3000 m
Start
Rembrandt3 - [Simul...
06:49


Rembrandt3 - [(Ref 001), inbound, 12.5k teu, Flood, NE x 20k, 2 x 80t tugs, 1 bow, 1 stern thruster:2]
File View Report Window Help
Position
Vessel Track
Vessel Track
Vessel: 12,500TEU Container (+Tugs)
Harbour: World
Date: 14/09/03
Wind: 20.0 kts 43 ° (Gusting)
Current: Variable
Depth: 7.0 m (Above Chart Datum)
For Help, press F1
Lat: 035° 02' 35.9" N, Long: 128° 46' 20.9" E
Scale indicator not presently available
Start
Rembrandt3 - [(Ref 0...
02:29

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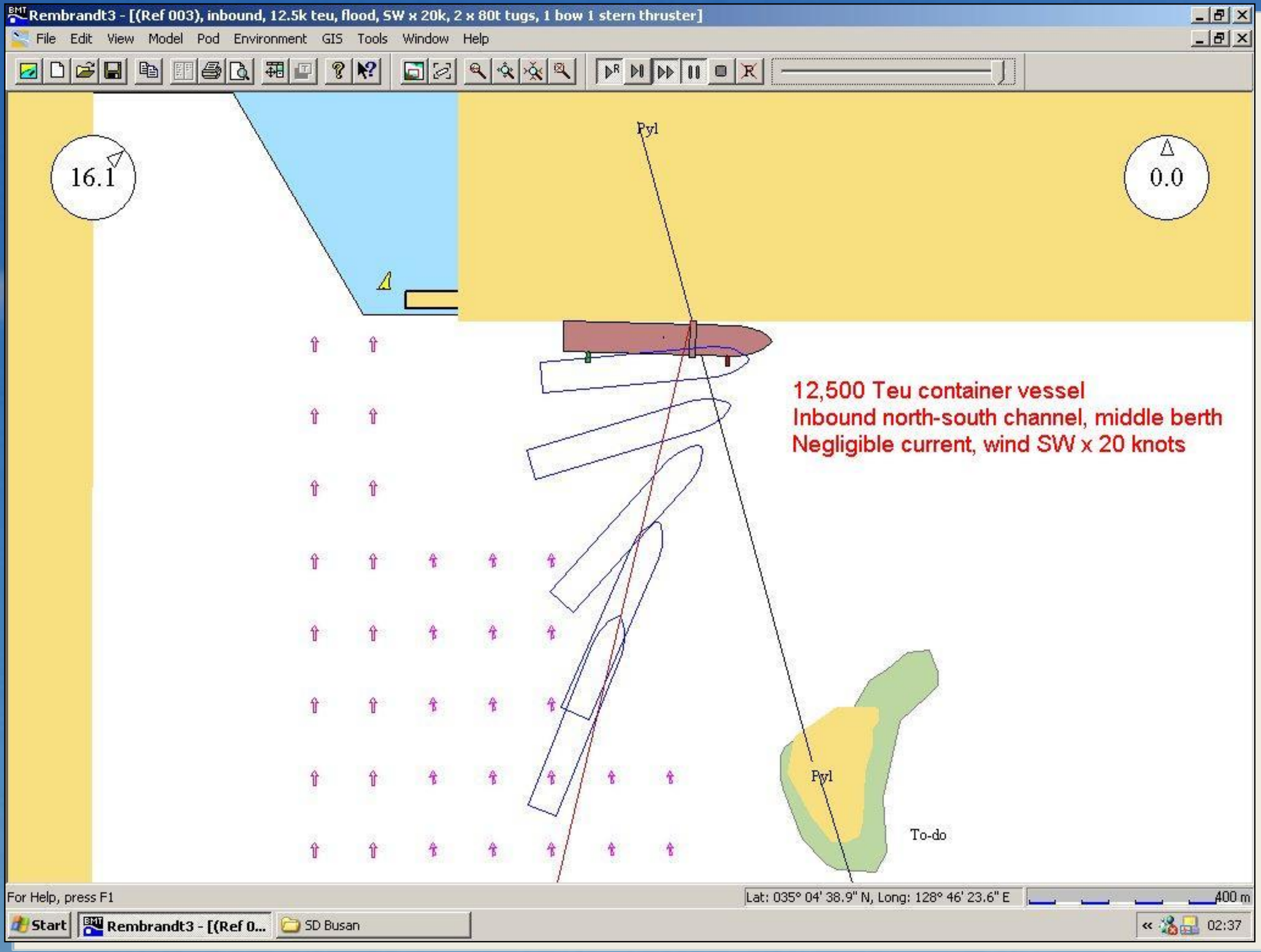

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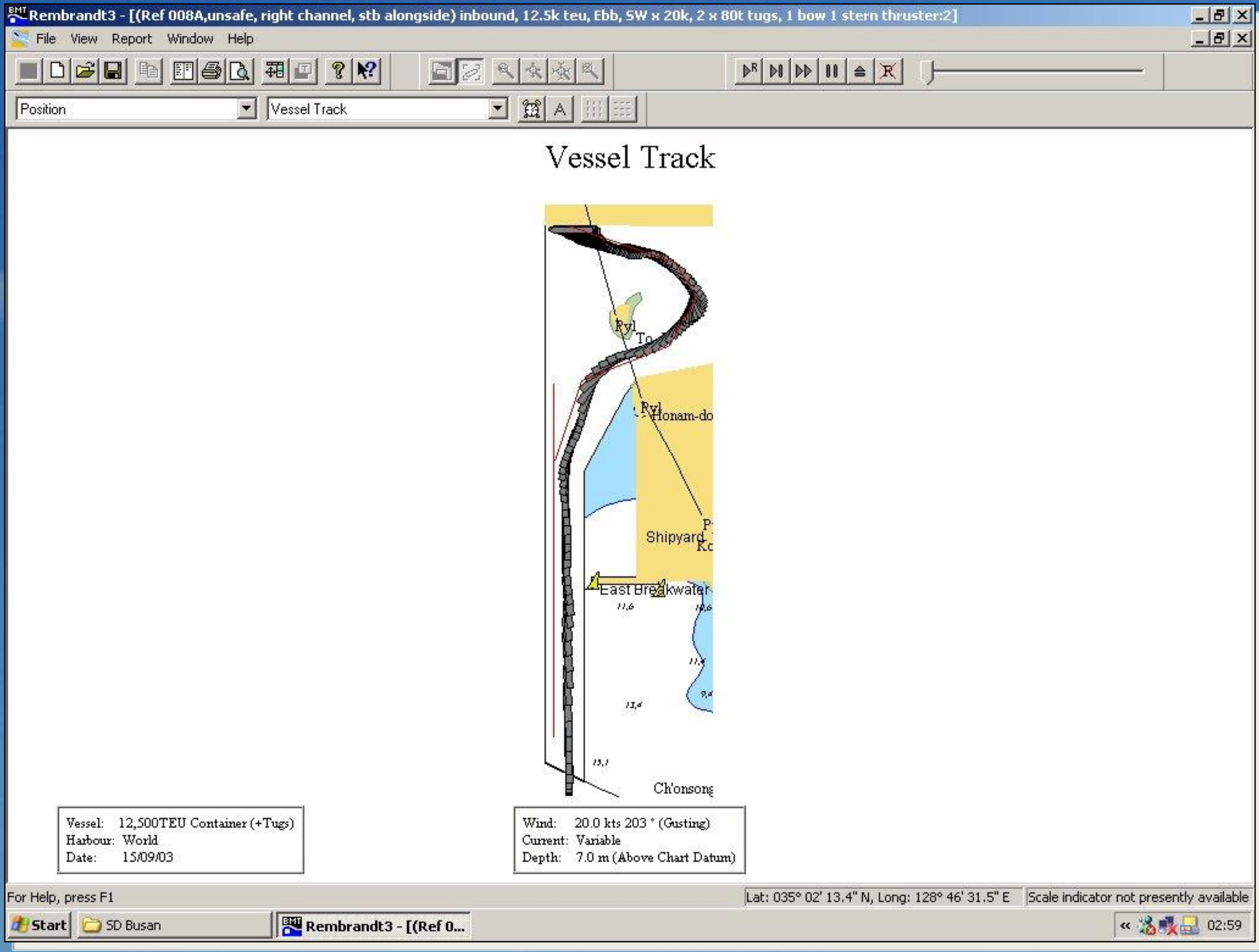

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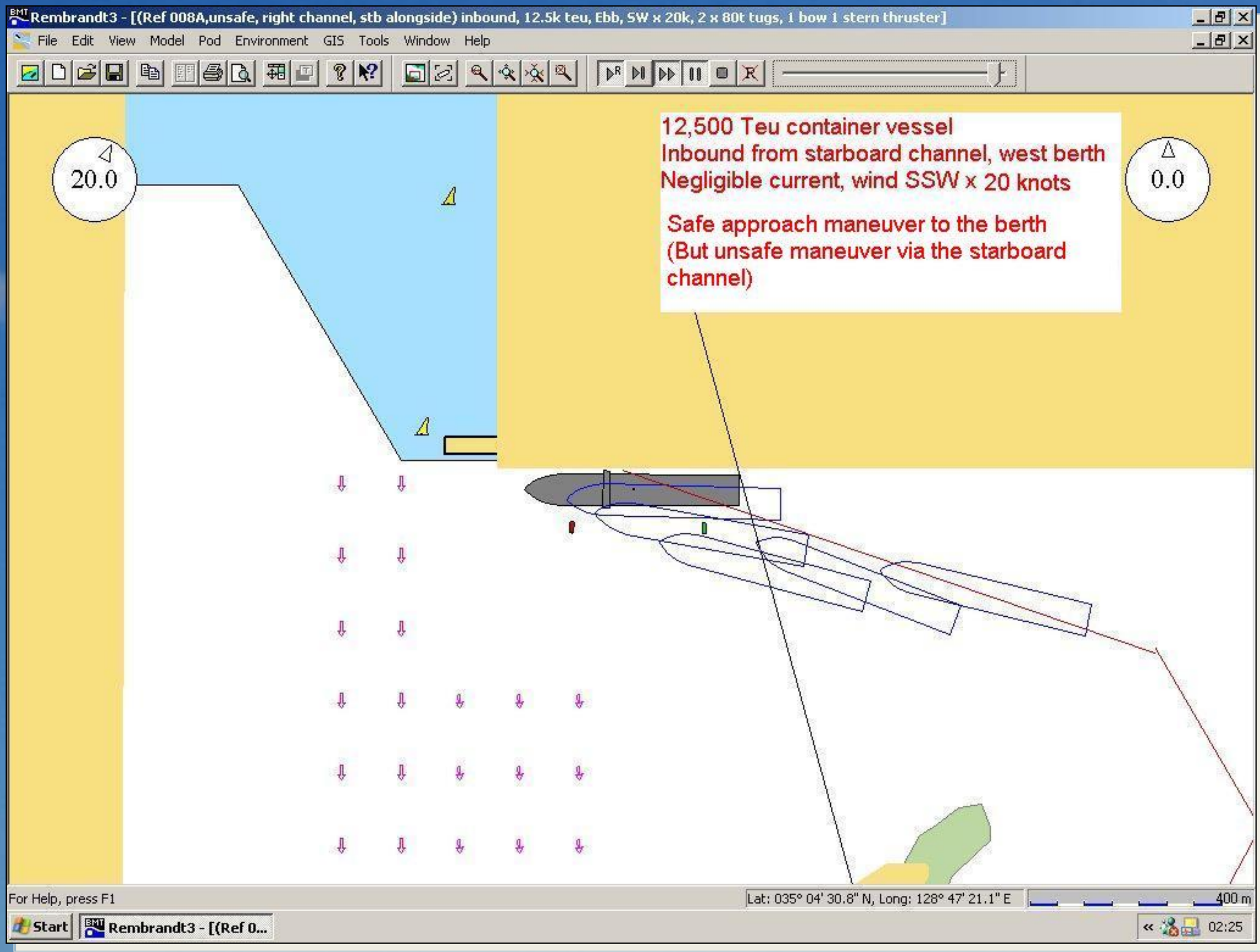

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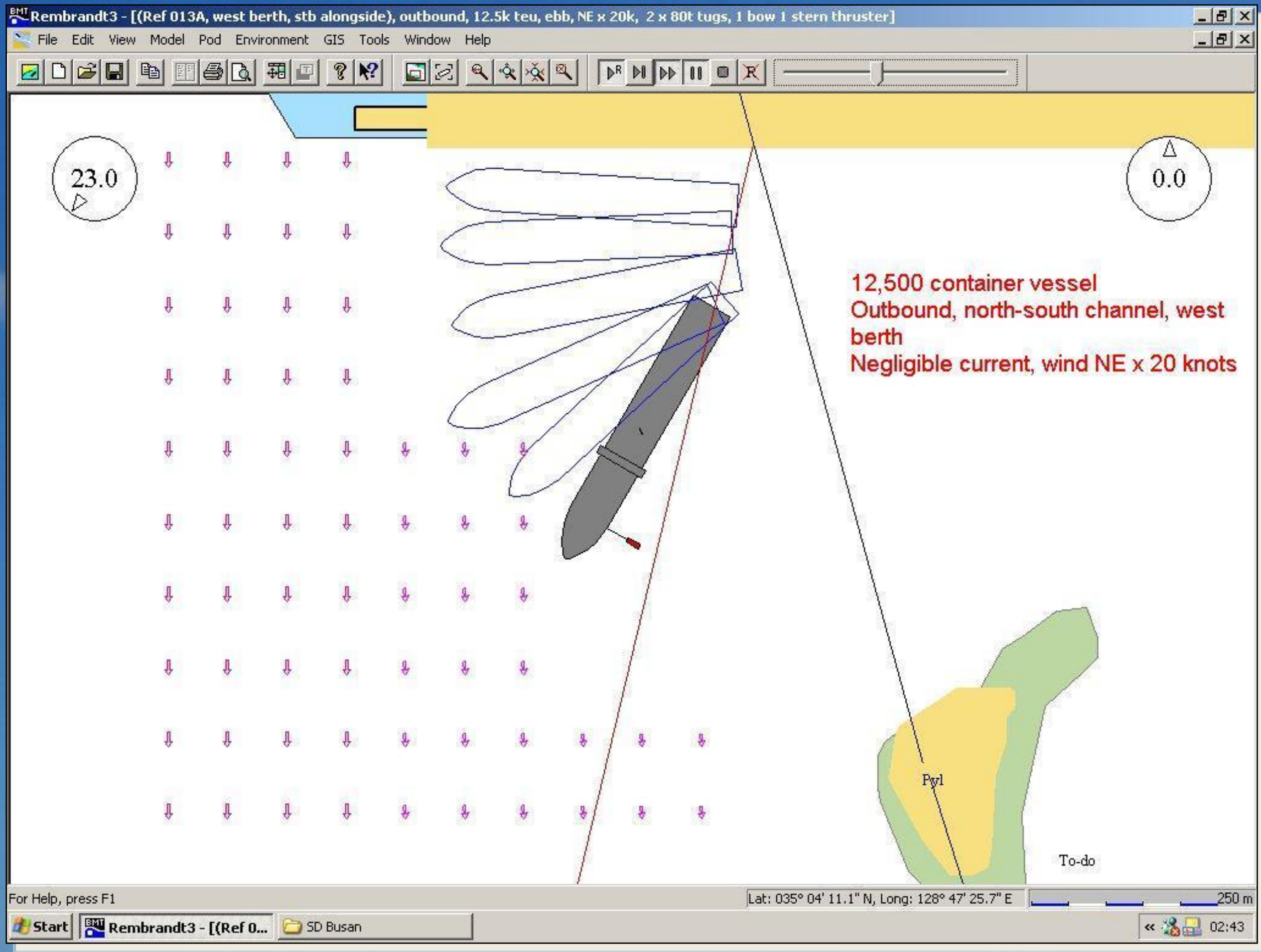

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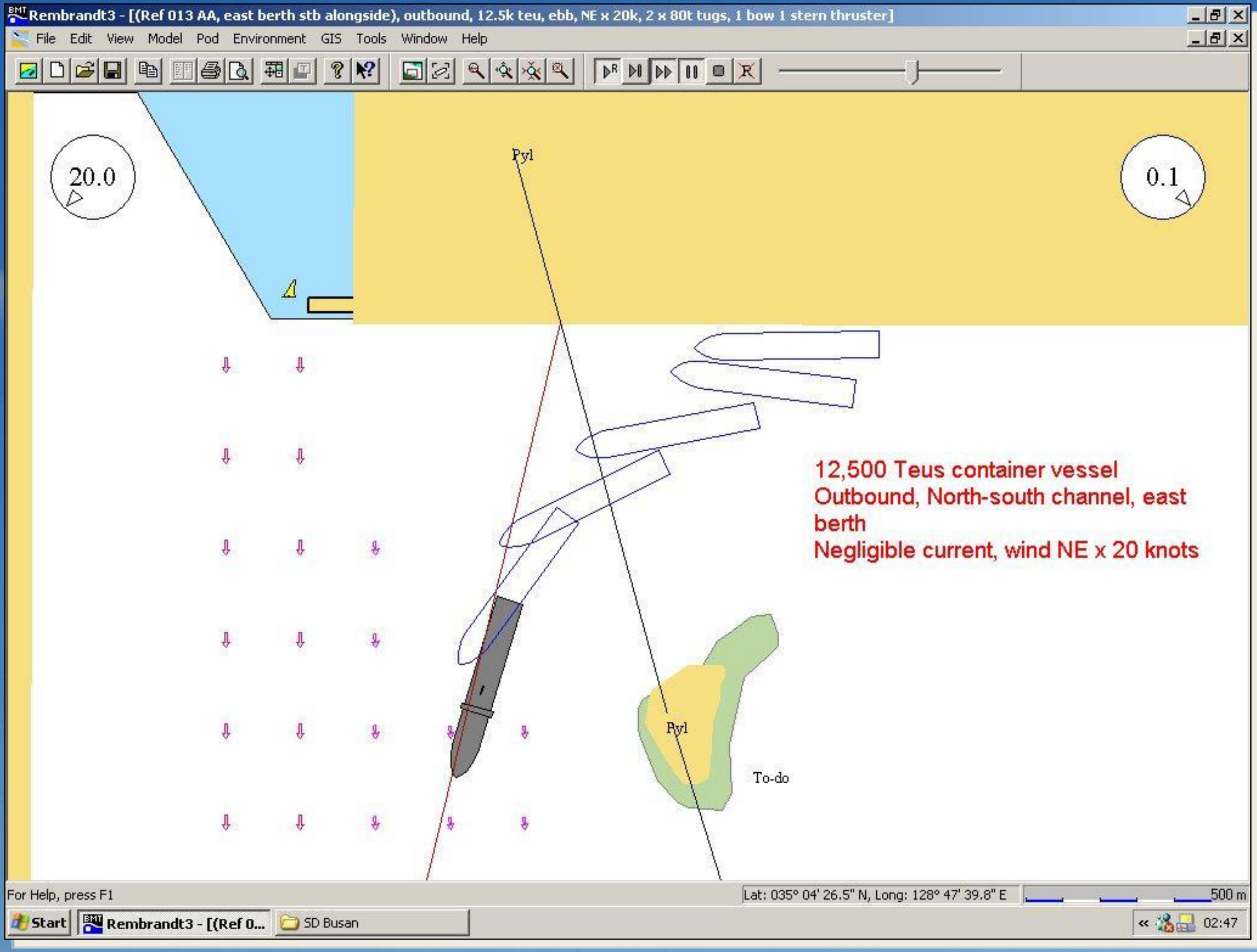

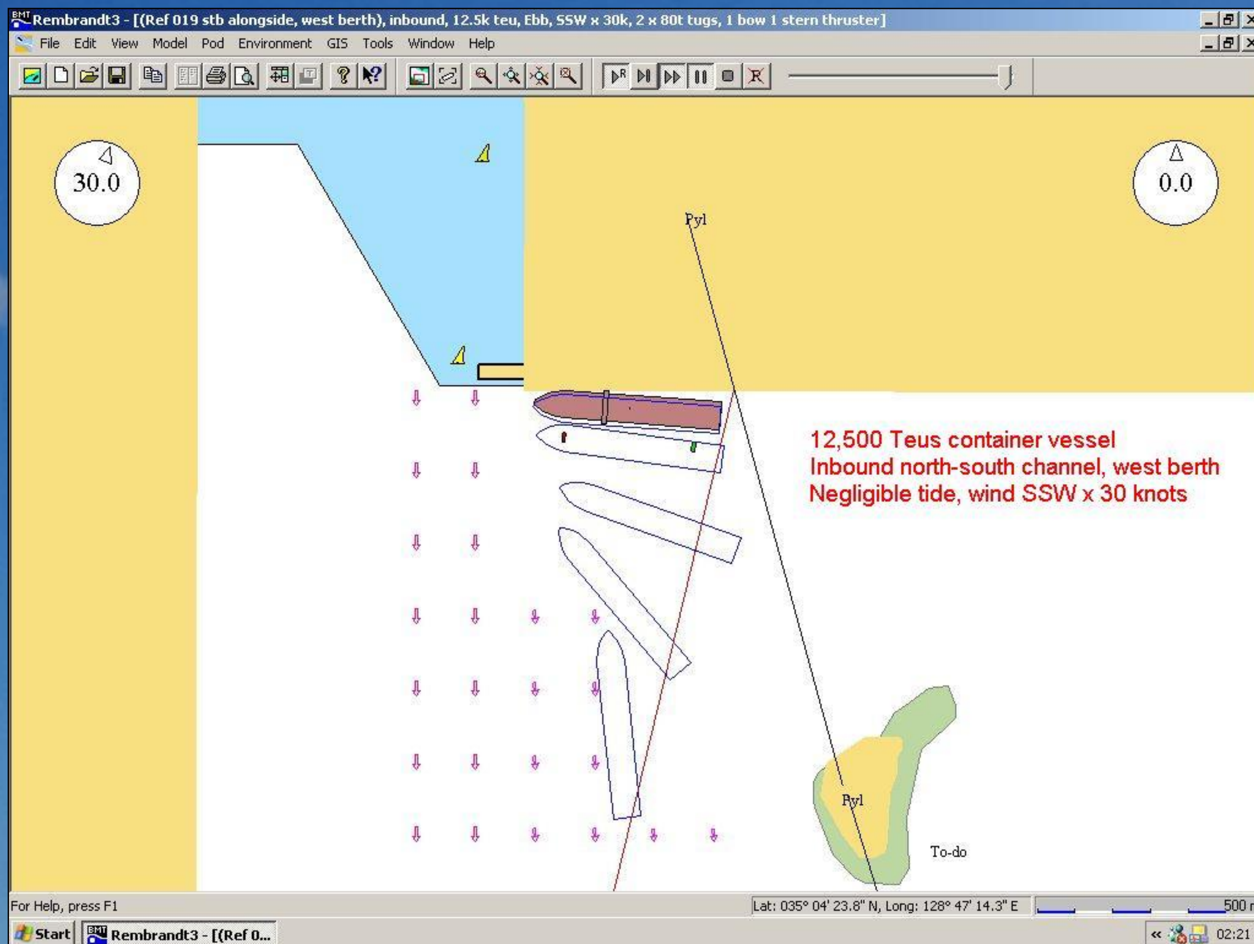
Rembrandt3 - [(Ref 019 stb alongside, west berth), inbound, 12.5k teu, Ebb, SSW x 30k, 2 x 80t tugs, 1 bow 1 stern thruster]
File Edit View Model Pod Environment GIS Tools Window Help
30.0
0.0
Pyl
12,500 Teus container vessel
Inbound north-south channel, west berth
Negligible tide, wind SSW x 30 knots
Pyl
To-do
For Help, press F1
Lat: 035° 04' 23.8" N, Long: 128° 47' 14.3" E
500 m
Start
Rembrandt3 - [(Ref 0...
02:21

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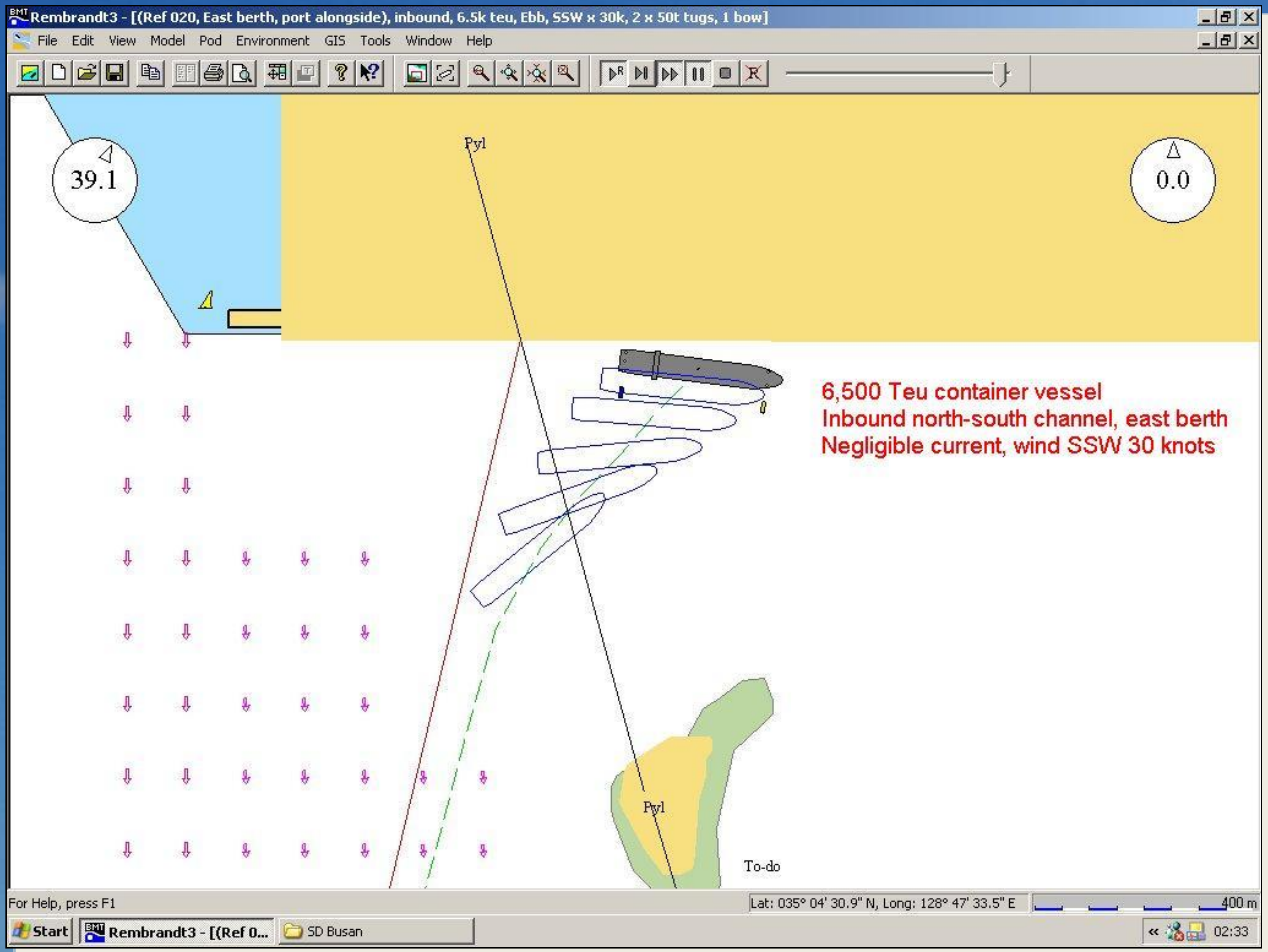

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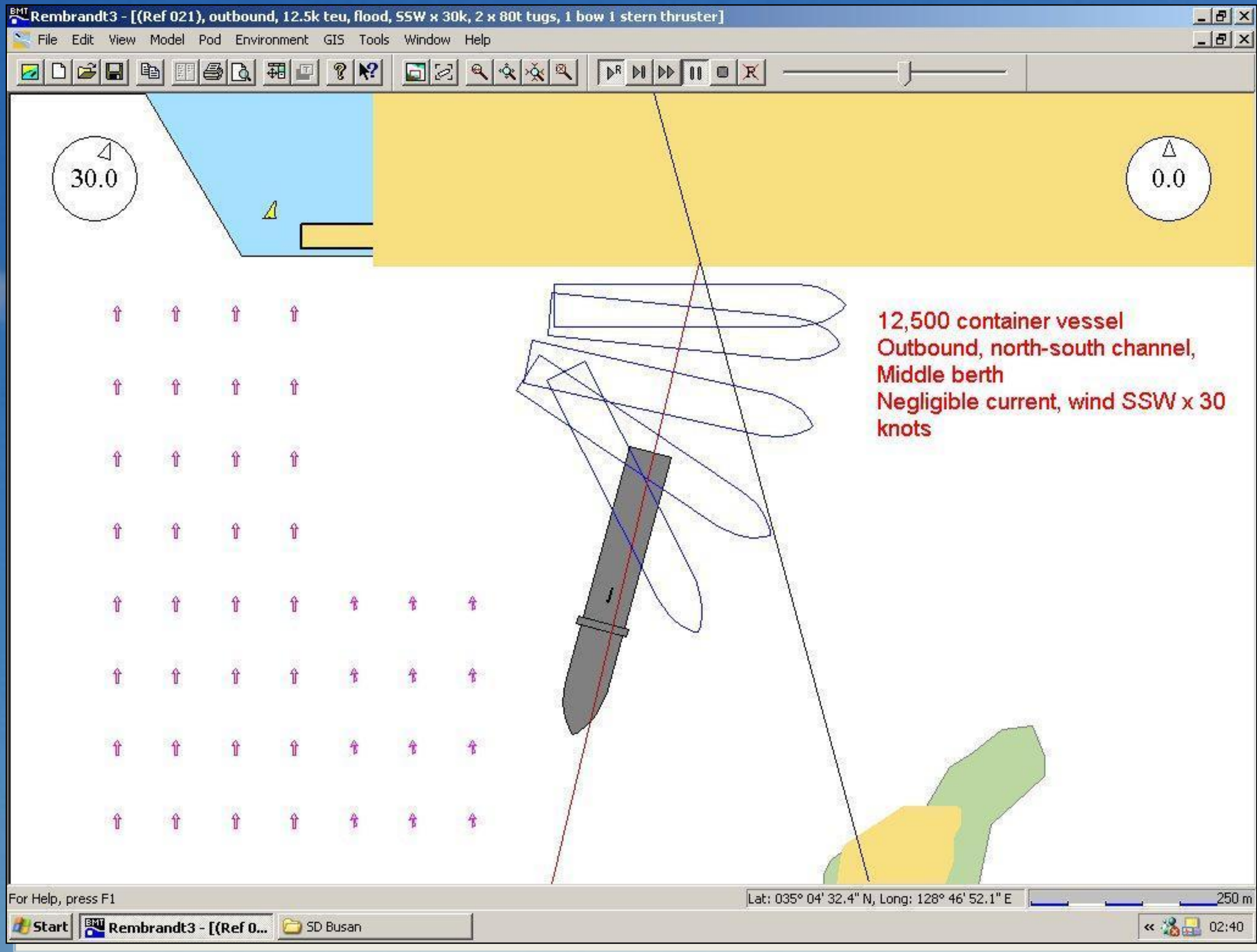

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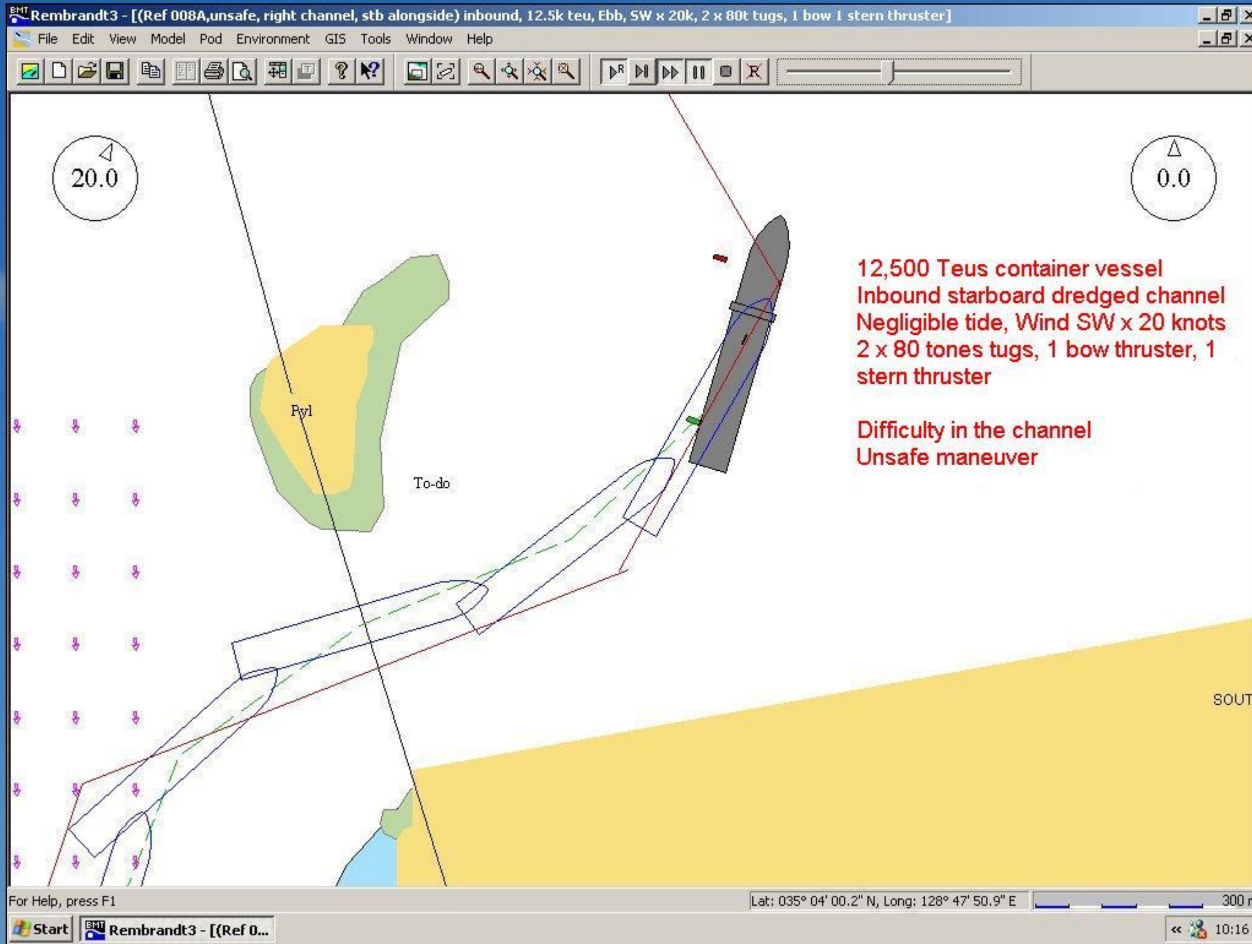

Pilots and Masters

- Pilot
  - May not plan arrival far in advance
  - May be restricted in knowledge of ship
  - Understands tidal, visual and motion clues
  - Predicts course deviation and reacts in advance
  - Part of the port team (port focus)
- Master
  - Can plan for specific arrival well in advance
  - Understands ship
  - Reacts to course deviation
  - Leads his team on board (ship focus)
  - Commercial pressure on speed

Marine Operations

- The players and their roles
  - Harbour Master
  - Port Captain
  - Ships Master
  - Pilot
  - Mooring Master/Gang

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Improving Marine Operations

- Take a holistic view on safety
  - Harbour Master
  - Terminal Manager
- Mooring and navigation aids
  - VTS/VTMS
  - Laser monitoring
  - Position indicators (visual)
  - Current meters
  - Digital tidal atlas
- Dynamic Under Keel Clearance
  - Measurements
  - Forecasts
  - Integrated analysis

Safe berthing

- Newest systems use distance lasers
- Systems computes:
  - speed of approach
  - angle of approach
  - distance off
- Displayed for information
  - Harbour control
  - Display on the jetty visible from ship
  - Provided via a data link to ship
- Same system provides information on movements after berthing/fender compression

Take a Holistic View of Safety

- Regulation

"75% of the propeller must be in the water when the ship comes alongside"

- Reason

"to ensure that the ship can maneuver and exit the terminal safely"

- The impact
- The cost…
- What options?

Under Keel Clearance

- Under Keel Clearance
  - from lowest part of hull to sea bed
- International Guidelines – PIANC
  - 10% of draft, say 1.8 to 2.0 m
- Important Factors
  - Swell/Sea state
  - Tidal cycle
  - Channel layout
  - Speed of ship (squat)
  - Nature of seabed

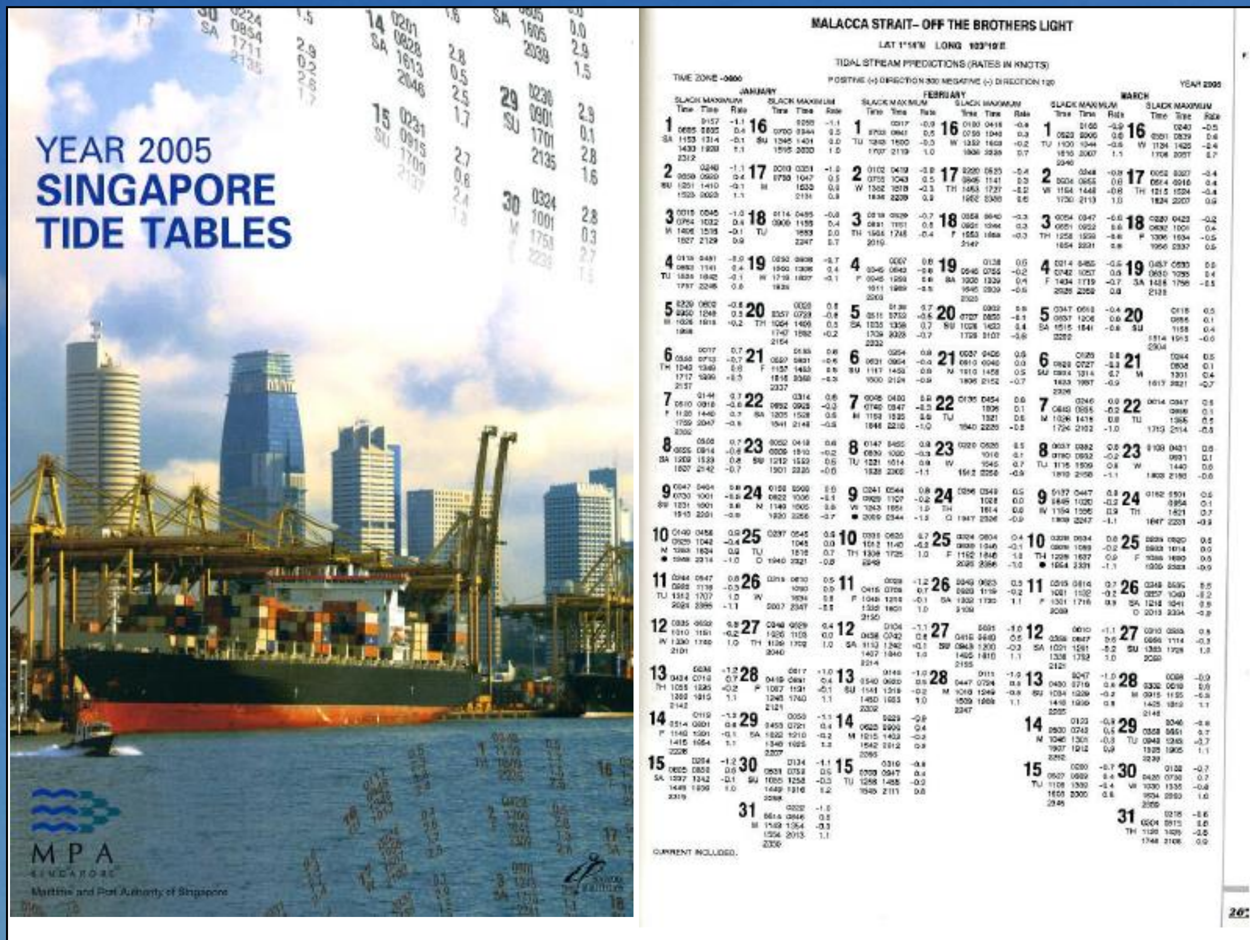
Economics and UKC

- 0.5m additional draft
  - 12,000 t
  - US$ 2m to 20m in sales
  - 5 to 20% lower freight rate
  - 50 ship terminals it all adds up…
- Risk
  - Grounding
  - Closure of terminal
  - Environmental disaster
  - Insurance?

Managing UKC

- The basics
  - Surveying, data collection
  - Tidal height predictions
  - Can mean surprises: swell, surge, weather
- Real time systems
  - Safe and reliable
  - No assistance in load management
- Dynamic UKC
  - Peak performance
  - Must be well validated

The Basics


YEAR 2005
SINGAPORE
TIDE TABLES
MPA
Maritime and Port Authority of Singapore
MALACCA STRAIT– OFF THE BROTHERS LIGHT
TIDAL STREAM PREDICTIONS (RATES IN KNOTS)
JANUARY
FEBRUARY
MARCH
CURRENT INCLUDED.

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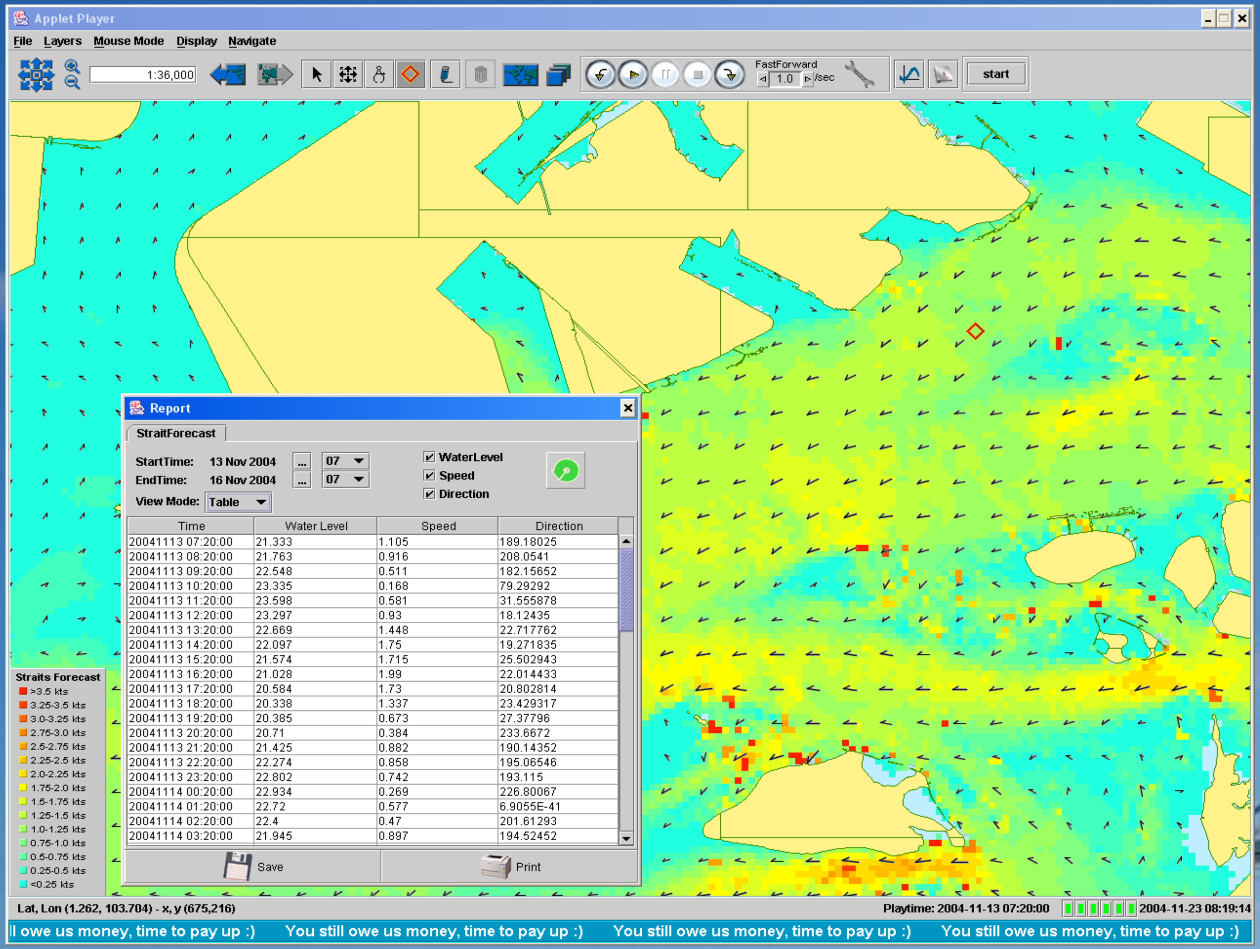
Digital Tidal Atlas



Time	Water Level	Speed	Direction
20041113 07:20:00	21.333	1.105	189.18025
20041113 08:20:00	21.763	0.916	208.0541
20041113 09:20:00	22.548	0.511	182.15652
20041113 10:20:00	23.335	0.168	79.29292
20041113 11:20:00	23.598	0.581	31.555878
20041113 12:20:00	23.297	0.93	18.12435
20041113 13:20:00	22.669	1.448	22.717762
20041113 14:20:00	22.097	1.75	19.271835
20041113 15:20:00	21.574	1.715	25.502943
20041113 16:20:00	21.028	1.99	22.014433
20041113 17:20:00	20.584	1.73	20.802814
20041113 18:20:00	20.338	1.337	23.429317
20041113 19:20:00	20.385	0.673	27.37796
20041113 20:20:00	20.71	0.384	233.6672
20041113 21:20:00	21.425	0.882	190.14352
20041113 22:20:00	22.274	0.858	195.06546
20041113 23:20:00	22.802	0.742	193.115
20041114 00:20:00	22.934	0.269	226.80067
20041114 01:20:00	22.72	0.577	6.9055E-41
20041114 02:20:00	22.4	0.47	201.61293
20041114 03:20:00	21.945	0.897	194.52452

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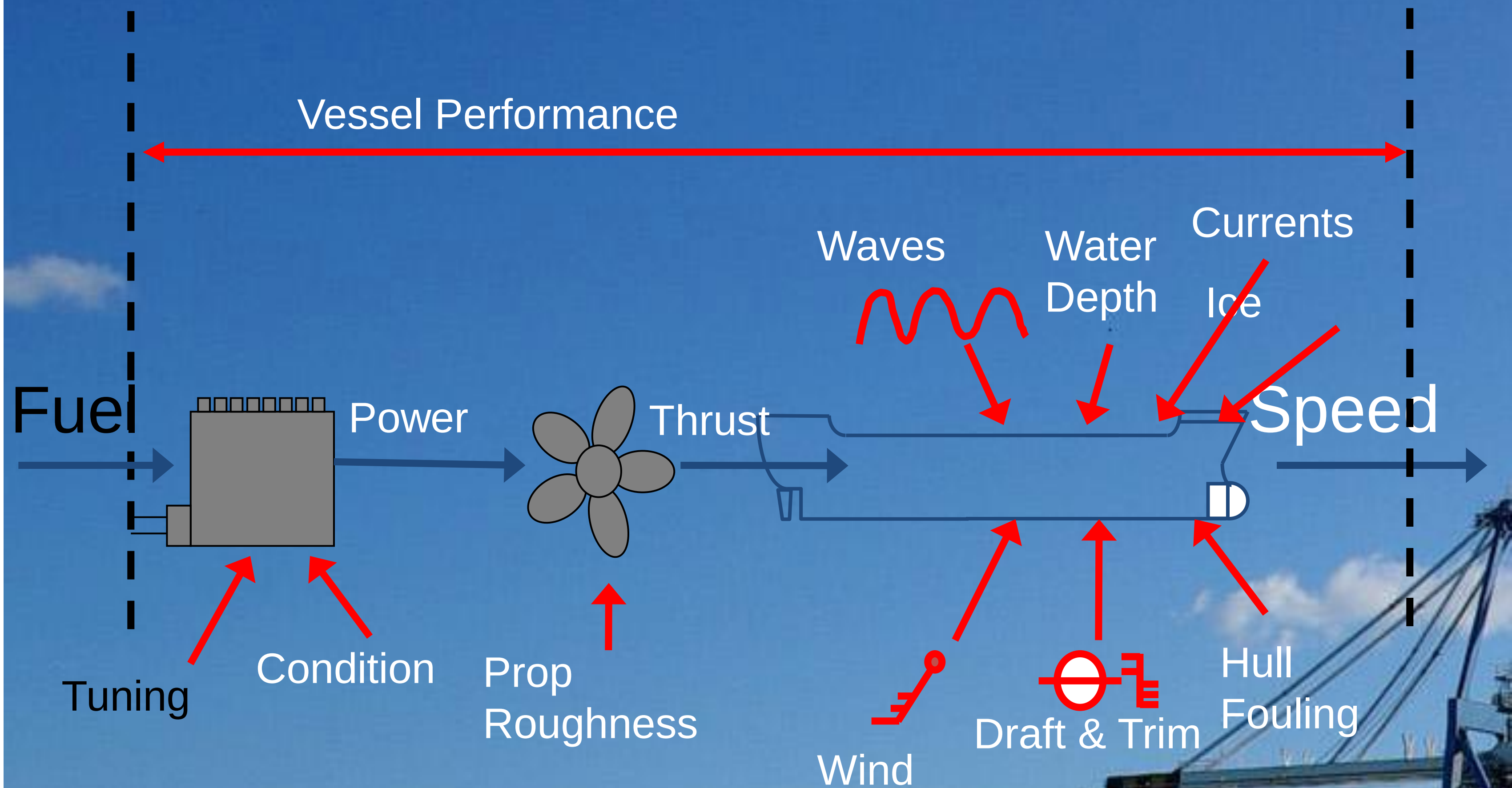
And what about the ship...



Mooring

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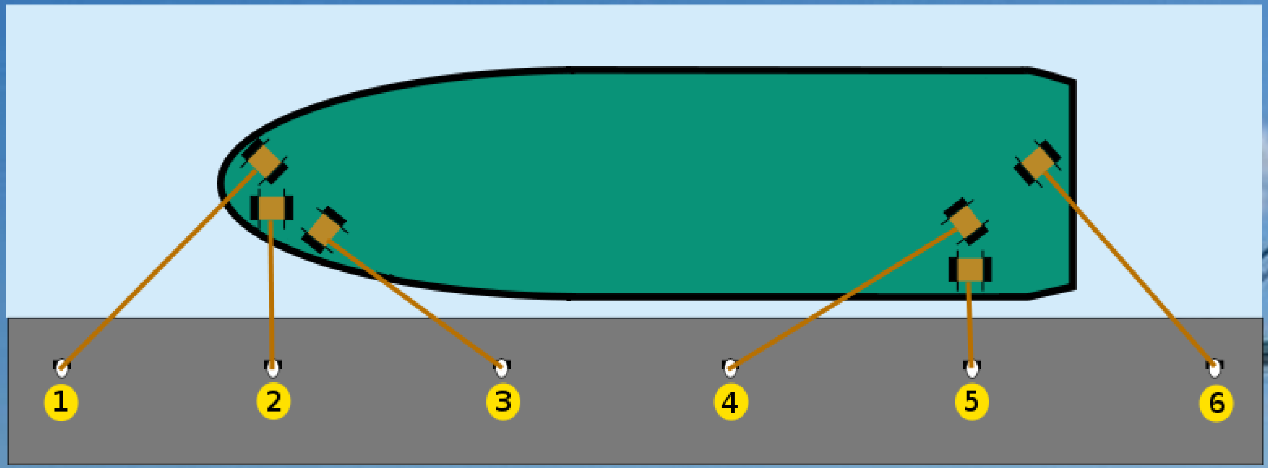
How to moor a ship

Number	Name	Purpose
1	Bow line	Prevent backwards movement
2	Forward Breast line	Keep close to pier
3	After Bow Spring line	Prevent from advancing
4	Forward Quarter Spring line	Prevent from moving back
5	Quarter Breast line	Keep close to pier
6	Stern line	Prevent forwards movement



The basics

- Balance of forces
  - Hold the ship on to the berth, breast lines
  - Restrict ranging along the berth, springs
  - Physics matters, the angle of the rope matters…
- Types of Mooring Line (Hawser)
  - SWL matters, when a rope gives people die…
  - Wire, heavier, stronger less give (elasticity, stretch)
  - Rope, lighter, more give
  - Chain, used for buoys, anchoring and leaders
- Deck furniture
  - Bollards
  - Quick release hooks

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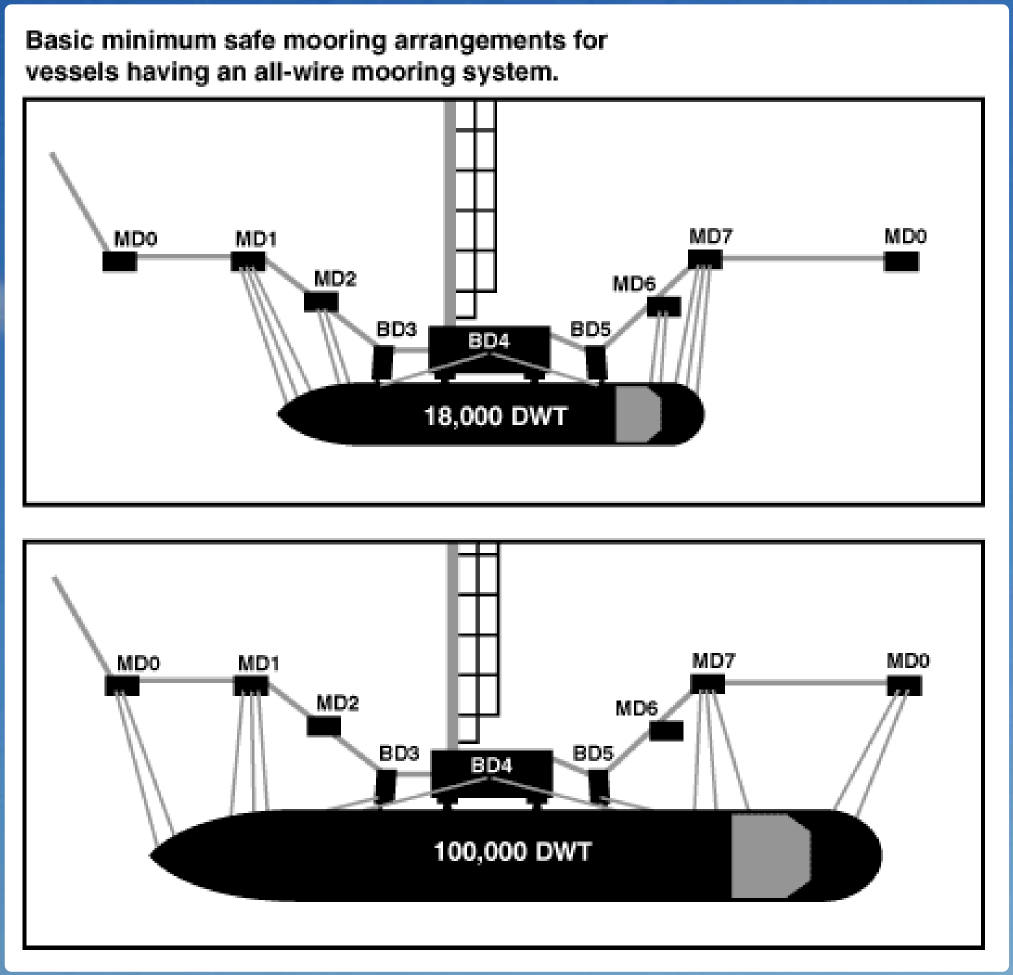
Moorings – advice



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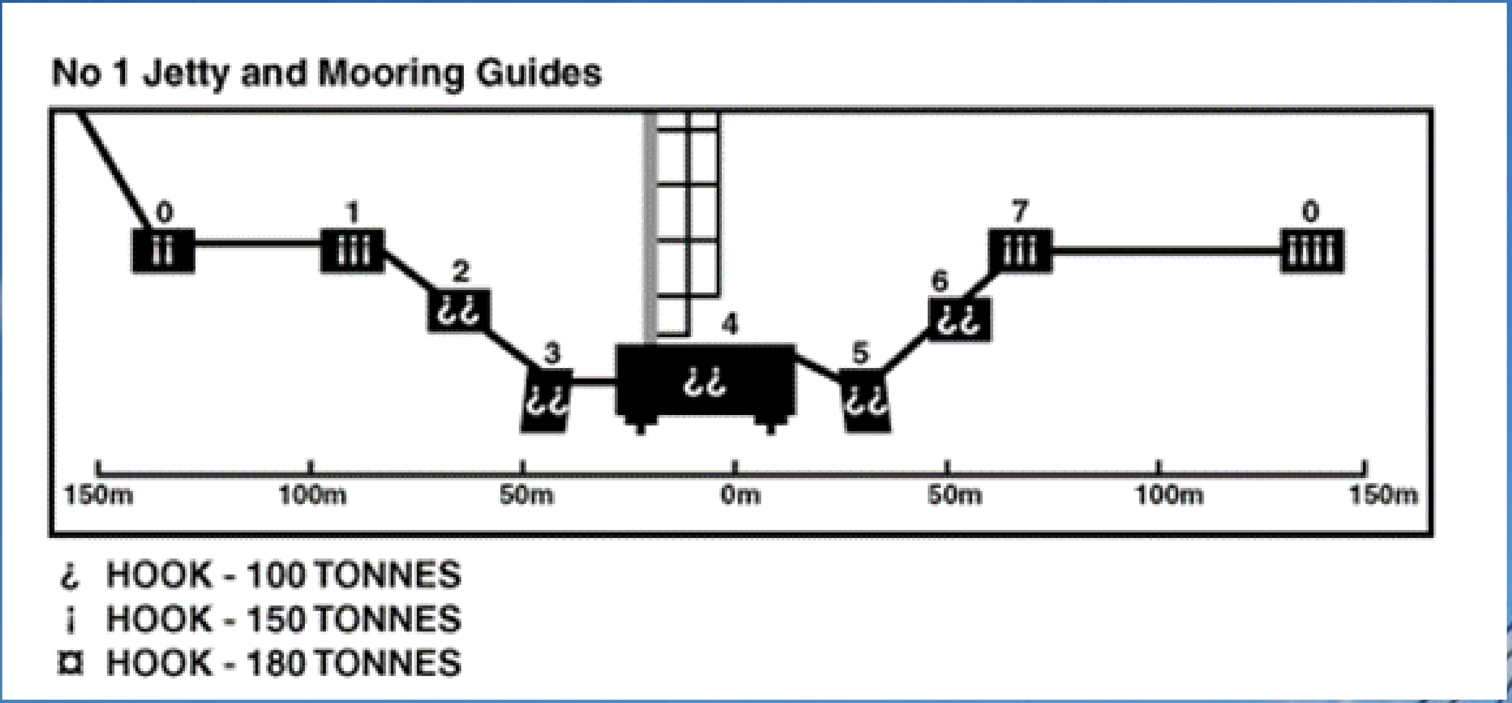
Moorings – information



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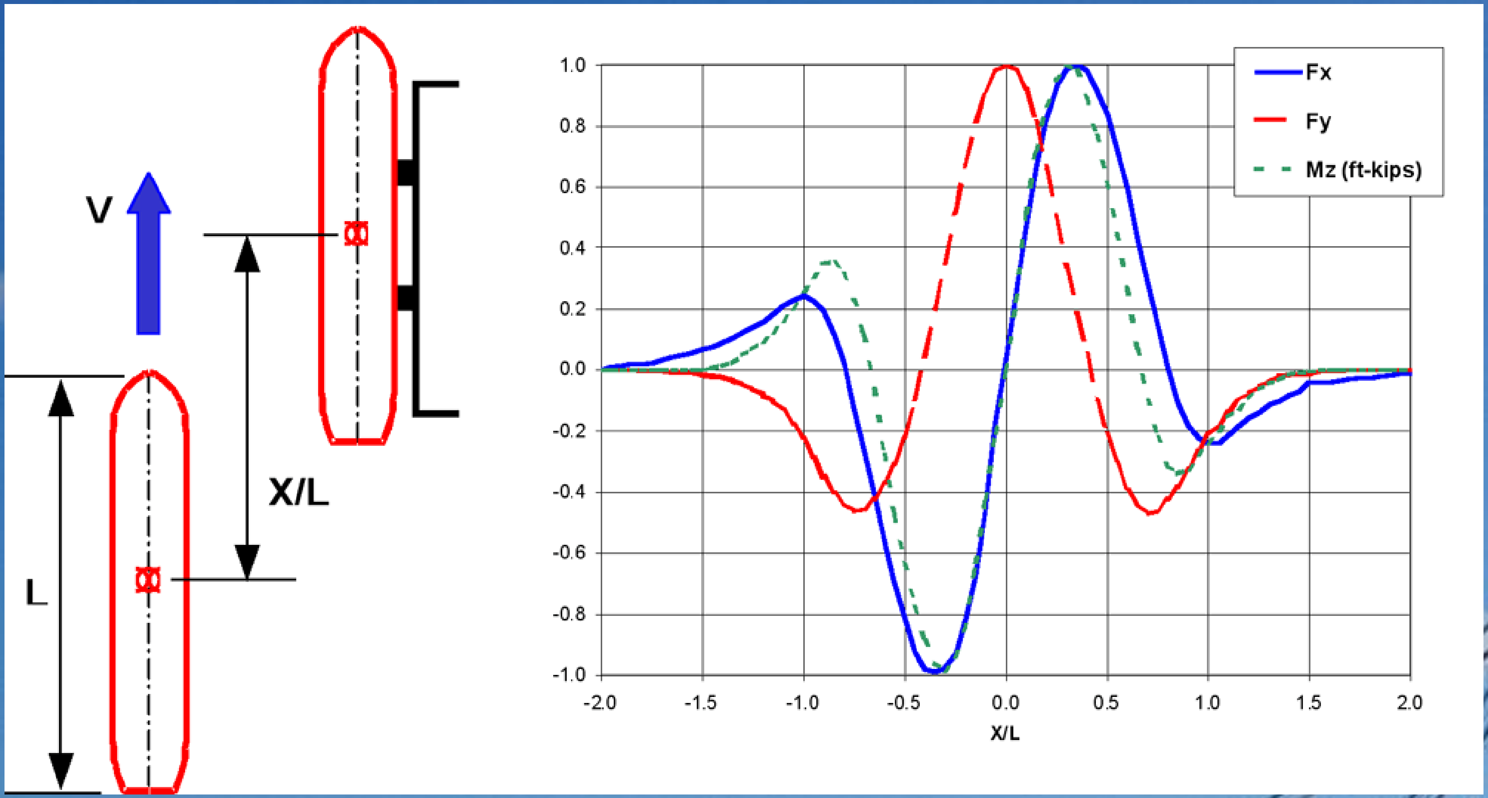
Monitoring of moorings



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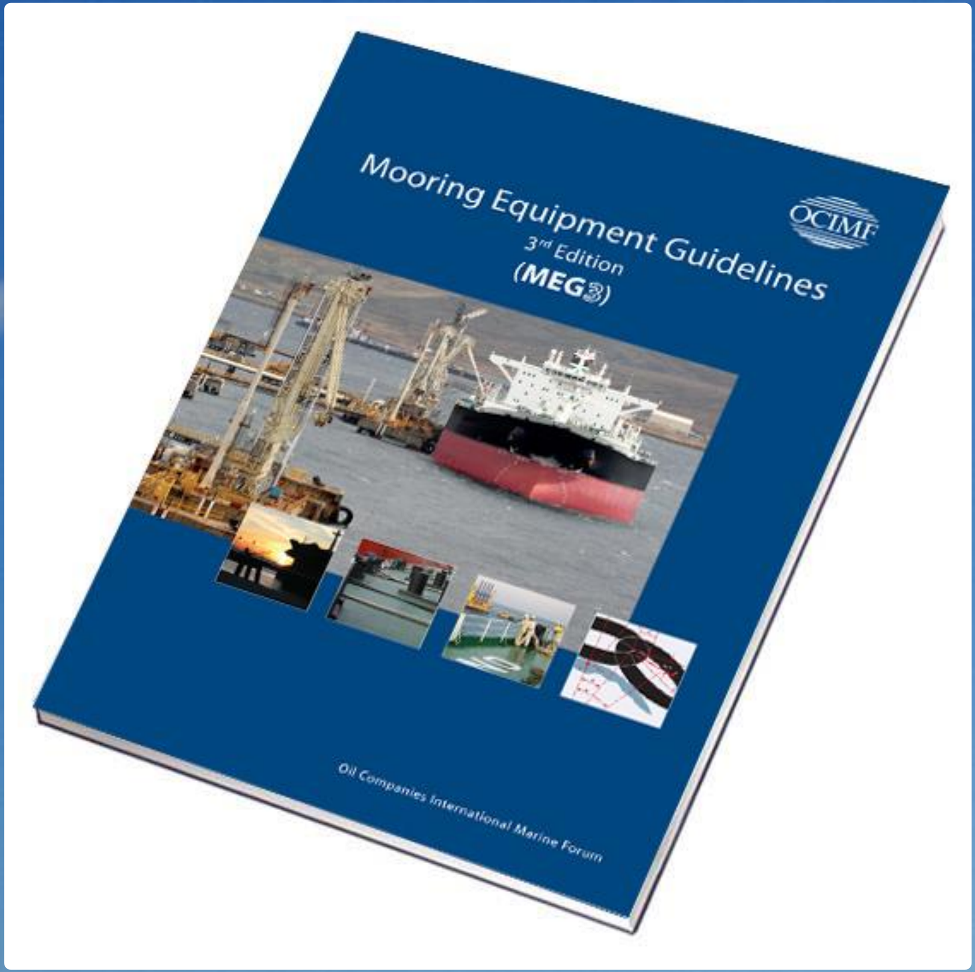
Bollards

Quick release hooks

Best for monitoring of moorings…

The best guide…



Fenders

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Fendering

- The role of a fender
  - Absorb energy as ships berth
  - Absorb energy as moored ship moves
    - Waves, winds, current
    - Cargo operations
- Types of fenders
  - Cone/Cell
  - Leg/Arch
  - Profile
  - Pile wraps
  - Floating/Pneumatic/Foam Filled

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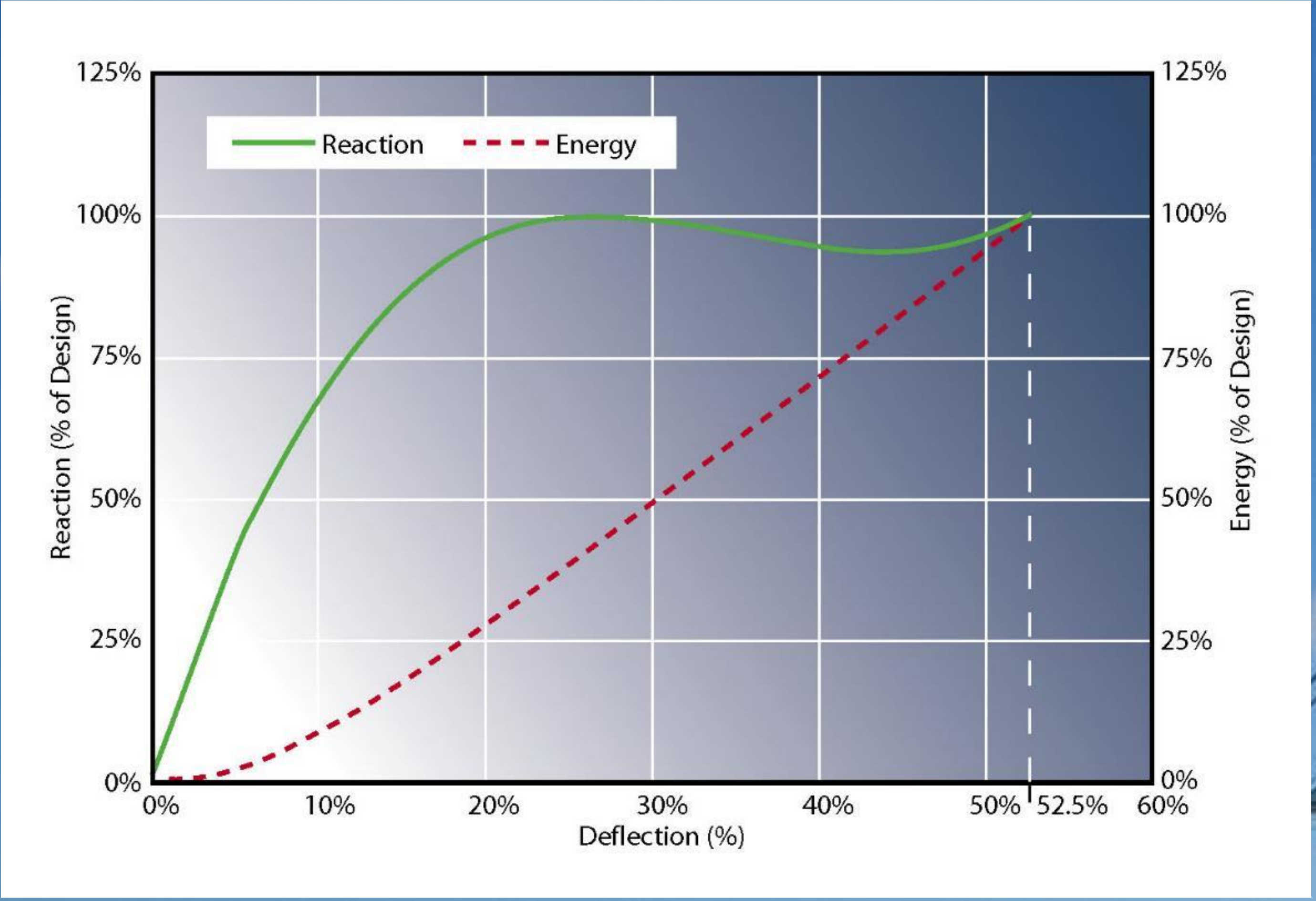
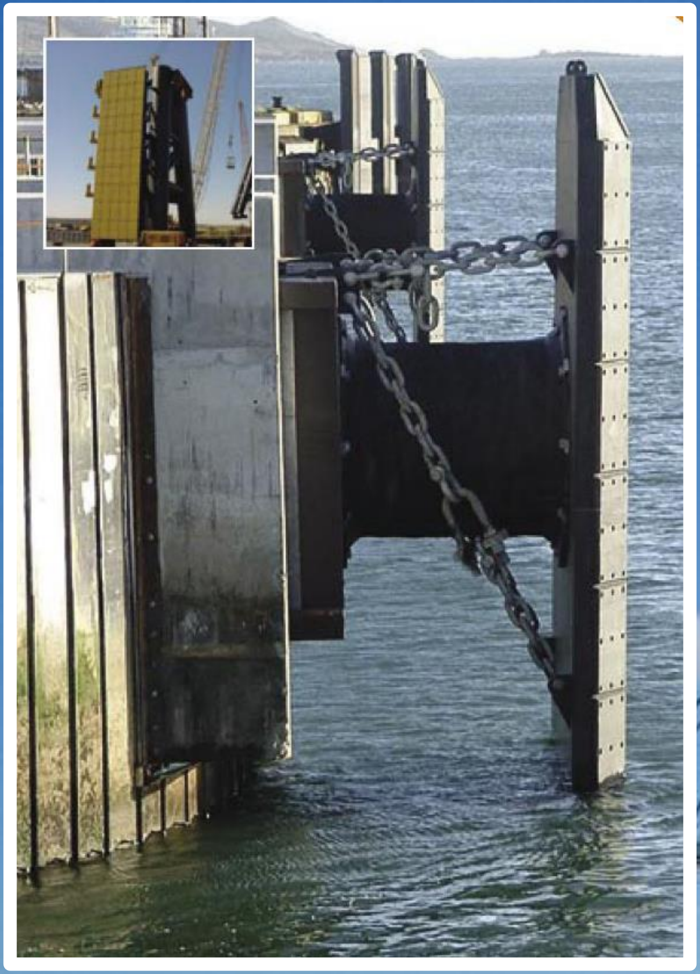
Deflection/Energy Absorption



Cone/Cell



Leg/Arch Fenders

Profile

Pile wraps/emergency piles

Pneumatics/Foam filled

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Design Features

- The type/design of ship
  - Tanker
  - Ferry
- Design forces
- Layout/spacing/angles
- Tidal range
  - Fender panels
  - Length
- Durability
  - Fender panels
  - Securing to quays

A footnote on LNG

LNG

- What are the real differences?
  - It is hard to explode an LNG carrier
- Sensitivity, perceived and real
  - Wider margins of error
  - Higher factors of safety
  - More tugs
  - Better planning
- Safety distances
  - Specific statements on safety zones are difficult to justify
  - US and European standards use a site specific risk assessment
  - 1,000 yards not uncommon for arrival/departure
  - Fixed exclusion zones of 100 yards at all times
  - Europe arrival/departure subject to a 1,800 yard zone
  - Fixed 100m exclusion zone at all times
  - Safety zones around LNG tanks can be up to a kilometer

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End of Session 3!

Part 1, Session 4

Part 1: Session 4, Buoys

- Types of buoy moorings and their operating characteristics
  - What options are available and when should they be considered and used
- Maintenance of moorings
  - What needs to be done to inspect and maintain moorings effectively
- SBM operations
  - Typical operating procedures what is and isn’t done and an assessment of the level of risk associated
- MBM operations
  - Typical operating procedures what is an isn’t done and an assessment of the level of risk associated

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Buoy moorings

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Anchorages and buoys

- Types of buoy moorings
  - Anchorages (and associated Ship to Ship transfers)
  - Single buoy moorings (CALM, CALRAM…)
  - Multiple buoy moorings (or conventional buoy mooring)
  - Tower moorings
- The main difference is between
  - Anchorages/SBM/Tower and Multiple Buoy Mooring (MBM)
  - Anchorages/SBM rely on ship swinging
  - MBM restrict movement of ship
- Ground conditions matter for design/operation
  - Restriction of drag/security of position
- Wind, waves, currents and ship determines loads
  - Operational loads (movement), Survival load

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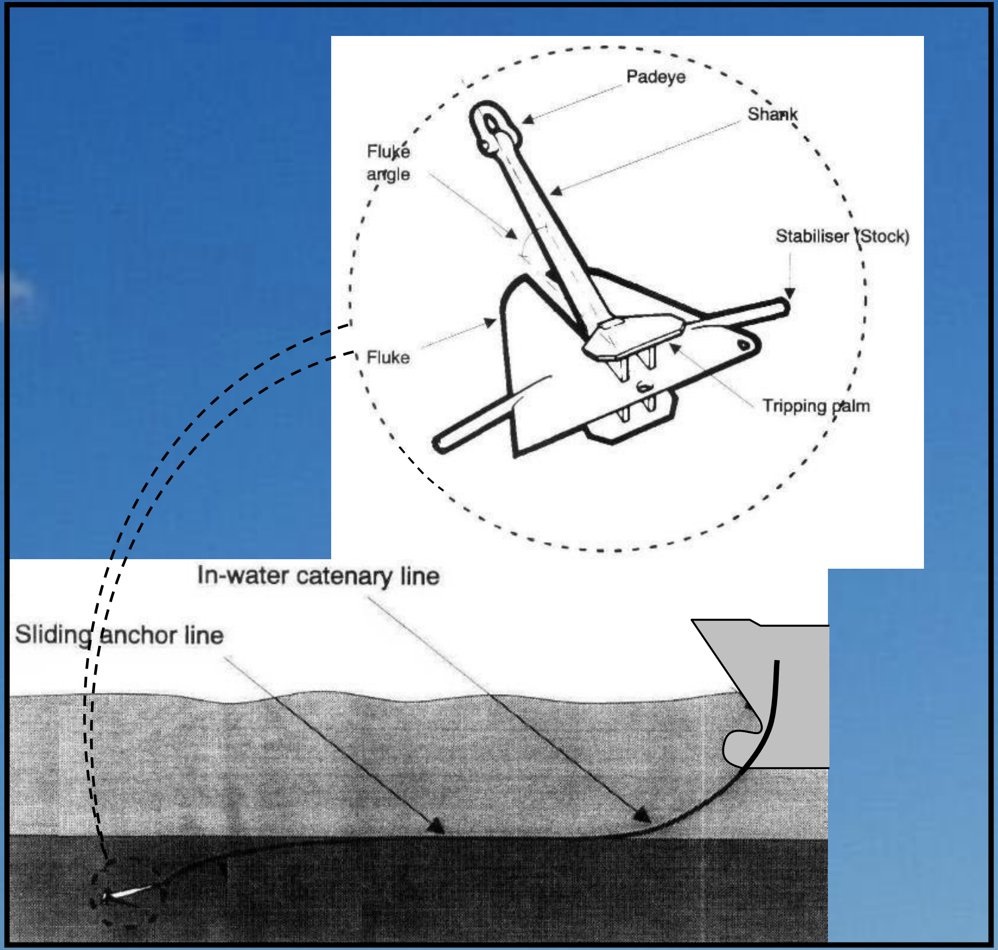
Swinging Distances

Ship LOA	Depth of Water								
	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00
150	1,296	1,365	1,431	1,493	1,553	1,610	1,665	1,719	1,770
175	1,321	1,390	1,456	1,518	1,578	1,635	1,690	1,744	1,795
200	1,346	1,415	1,481	1,543	1,603	1,660	1,715	1,769	1,820
225	1,371	1,440	1,506	1,568	1,628	1,685	1,740	1,794	1,845
250	1,396	1,465	1,531	1,593	1,653	1,710	1,765	1,819	1,870
275	1,421	1,490	1,556	1,618	1,678	1,735	1,790	1,844	1,895
300	1,446	1,515	1,581	1,643	1,703	1,760	1,815	1,869	1,920
325	1,471	1,540	1,606	1,668	1,728	1,785	1,840	1,894	1,945
350	1,496	1,565	1,631	1,693	1,753	1,810	1,865	1,919	1,970

The Anchor System



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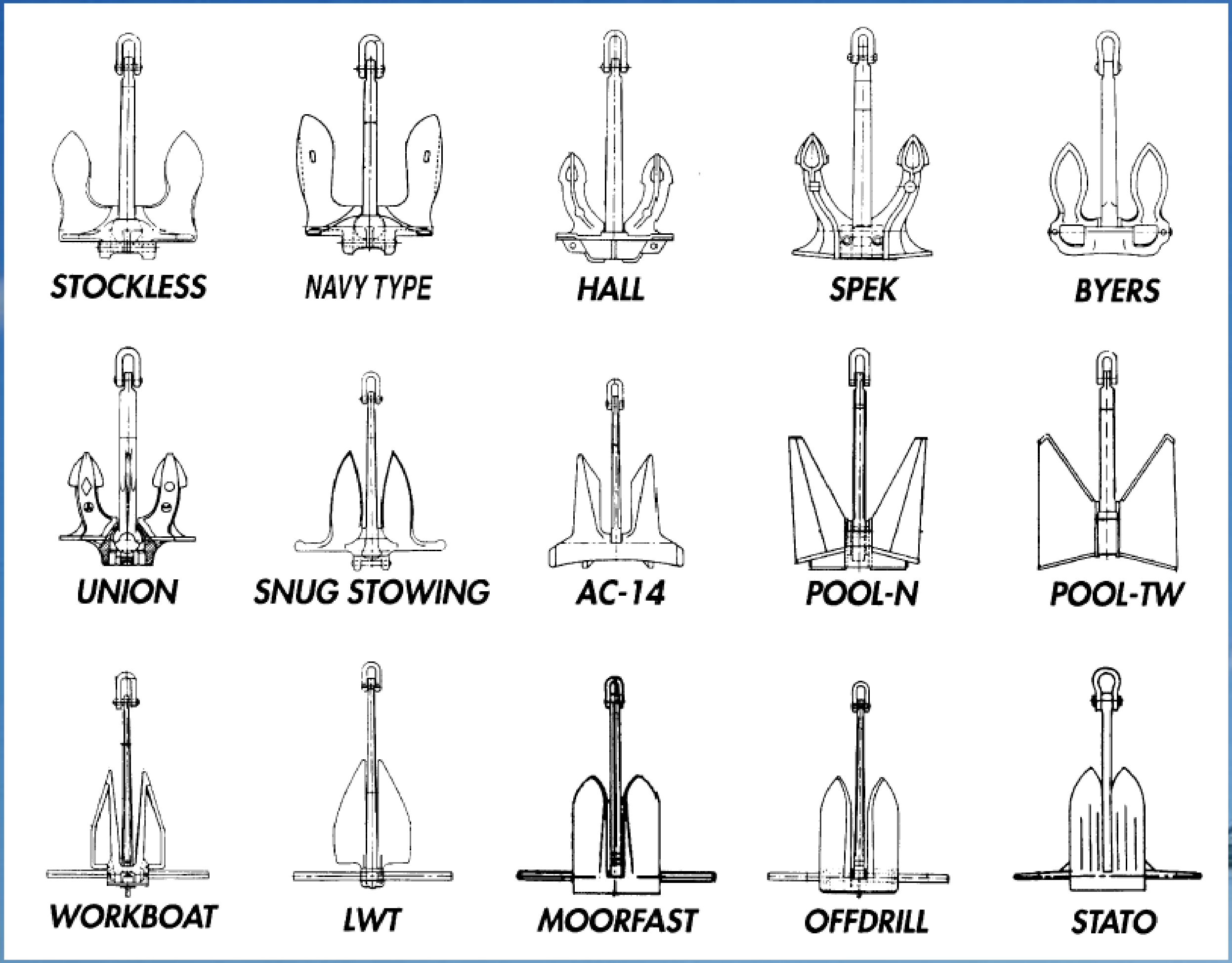
Anchors



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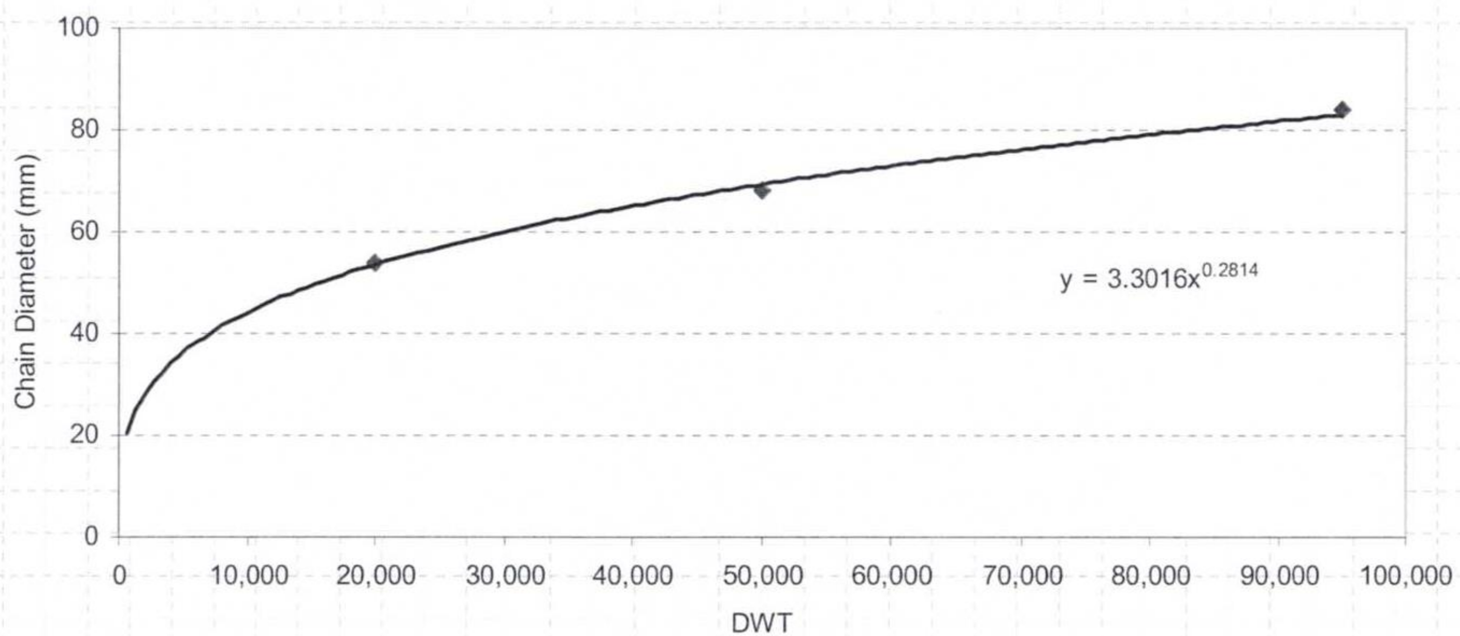
Anchoring

- Piles are more reliable and more costly than anchors

Soils	Phase of Kinematics				
	Tripping	Pen.	Burial	Stability	Holding
Sands	(1) +	+	-	+	-
Soft soils	(1) +	+	+	+	(5) -
Stiff clays	(2) +	(3) -	-	(3) -	(3) -
Soil with coarse elements	-	(4) -			

	General Anchoring Behaviour
Sand	Holding capacity is consistent provided sand fluke angle is used.
Soft Clays/Silts	Holding capacity is reasonably consistent provided anchor flukes trip open. Certain anchors require special care during installation to ensure tripping.
Firm Clay (C_u = 25 – 100kPa)	Good holding capacity which will range between that provided for sand and mud. Use mud value conservatively or linearly interpolate between sand and mud anchor capacity.
Hard Soils (C_u > 100kPa)	Holding capacity is consistent provided anchor penetrates. May have to fix flukes open at sand fluke angle to enhance embedment.

Chains



Approximate weight (kg/m) = $0.0219\ d^2$ (d in mm),

Multiple Buoy Moorings

- Anchorage systems
  - Anchors or piles, Anchor Chain, Chainstopers
- Hawser arrangement, six to ten+ ropes
  - Purchased as a unit, operated as a unit…
- Product transfer system – similar to SBM
  - Pipeline end manifold (PLEM)
  - Flexible Subsea Hoses, “Risers”
  - Floating Hose String(s)
  - Product Swivel, Valves and Piping
- Other Components
  - A Boat Landing, providing access to the buoy deck
  - Fendering to protect the operating buoy
  - Lifting and Handling Equipment
  - Navigational Aids for maritime visibility for all buoys

CBM/MBM in action…

Characteristics

- Restrained system that causes operational limitations
  - Environmental conditions are moderate
  - Frequency of offloading operations is limited
  - Smaller tankers
- Single commodity…
- Specialist suppliers
- Maintenance sensitive
  - Anchor chain inspection
- Oil sheen detection
- SOP/EOP specific to each buoy system
  - Sensitive to changes in current/tidal regime
  - Harmonics and responses can be critical

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Single Buoy Moorings

- Anchorage systems
  - Anchors or piles, Anchor Chain, Chainstopers
- Hawser arrangement, one or two ropes
  - Purchased as a unit, operated as a unit…
- Product transfer system
  - Pipeline end manifold (PLEM)
  - Flexible Subsea Hoses, “Risers”
  - Floating Hose String(s)
  - Product Swivel, Valves and Piping
- Other Components
  - A Boat Landing, providing access to the buoy deck,
  - Fendering to protect the buoy,
  - Lifting and Handling Equipment
  - Navigational Aids for maritime visibility

SBM - CALM

SBM - CALRAM

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Tower

Characteristics

- Flexible system
  - Based on movement rather than restraint of tanker
  - Large area of water depth required
- Single commodity…
- Specialist suppliers
- Maintenance sensitive
  - Anchor chain inspection
- Oil sheen detection
- SOP/EOP specific to each buoy
  - Sensitive to change in current/tide
  - Resonant responses can be critical

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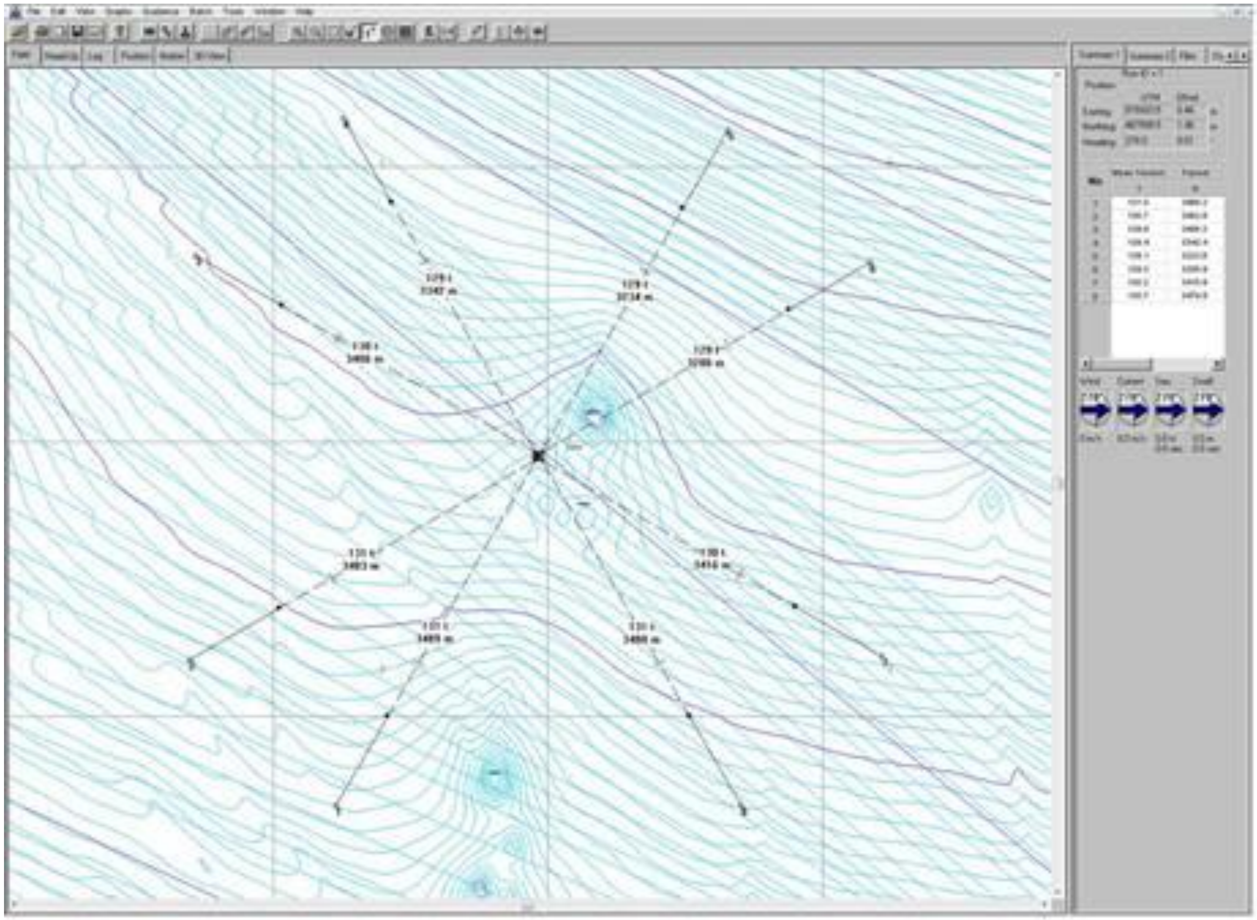
CALM Layouts



Leg numbers

- Four legs
  - Early CALM buoys moored in the fashion
  - Can lead to large load difference
  - Only for calm conditions
- Six legs
  - More standard
  - Able to distribute loads
  - Cost effective (buoy smaller, fewer chains)
- Eight legs
  - Harsh environments
  - Unusual load characteristics

End of Session 4!

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Part 2, Session 1

Part 2: Session 1, Planning

- The development process
  - How do you go about developing a new terminal or extending an existing terminal?
- Approvals
  - What approvals do you need and the problems of securing them together with how these can be overcome?
- Specification and procurement
  - Options for procurement of new terminals how to accelerate the process and how to do it most efficiently
- Cost estimating and through life costs
  - The dos and don’ts of getting the budget right, where to go for the best information and how to use it effectively

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Planning a development

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The Opportunity

- Improving the economy
  - Access
    - Coal mines
    - Markets, concentration/scale
  - Freight rates
    - Direct shipping of container
    - Ability to generate competition
    - Capacity surplus
- Commercial reasons
  - Investment return, Capital gain
  - Cash generation
  - Security of logistics, Cost reduction

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What matters most?

- The market…
  - Access
  - Sustainability
  - Volumes, Tariff rates and structure
- Regulatory position and approvals
- CAPEX
  - What is sensitive and what is not
- Business, Commercial and Financial Structure
  - Business Model
  - Partners
  - How you fund
- and the others…
  - OPEX
  - Tax etc…

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the others first…

- OPEX
  - Should be “deterministic”
- Tax
  - Land tax, income tax, duties etc…
    - Opportunities to invest/FDI competition
  - Holidays and incentives
    - Capital allowances
- Regulations
  - Same for everyone?
  - Impacts on structure of business important
    - Fuel subsidies
    - Restrictions on what can be done
  - Direct impact but concern is also potential for change
  - Represents a risk

Markets

- What does an opportunity look like?
  - Market, by sectors
    - Containers
    - Petroleum/Vegetable Oils/Bio Diesel
    - Coal
    - Grain/Fertilizer
- Long term/Sustainable
  - Iron ore in India?
- Competition
  - Existing players
  - Change of use
  - Alternative logistics routes
  - Greenfield
  - Market changes

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Oil Tanking

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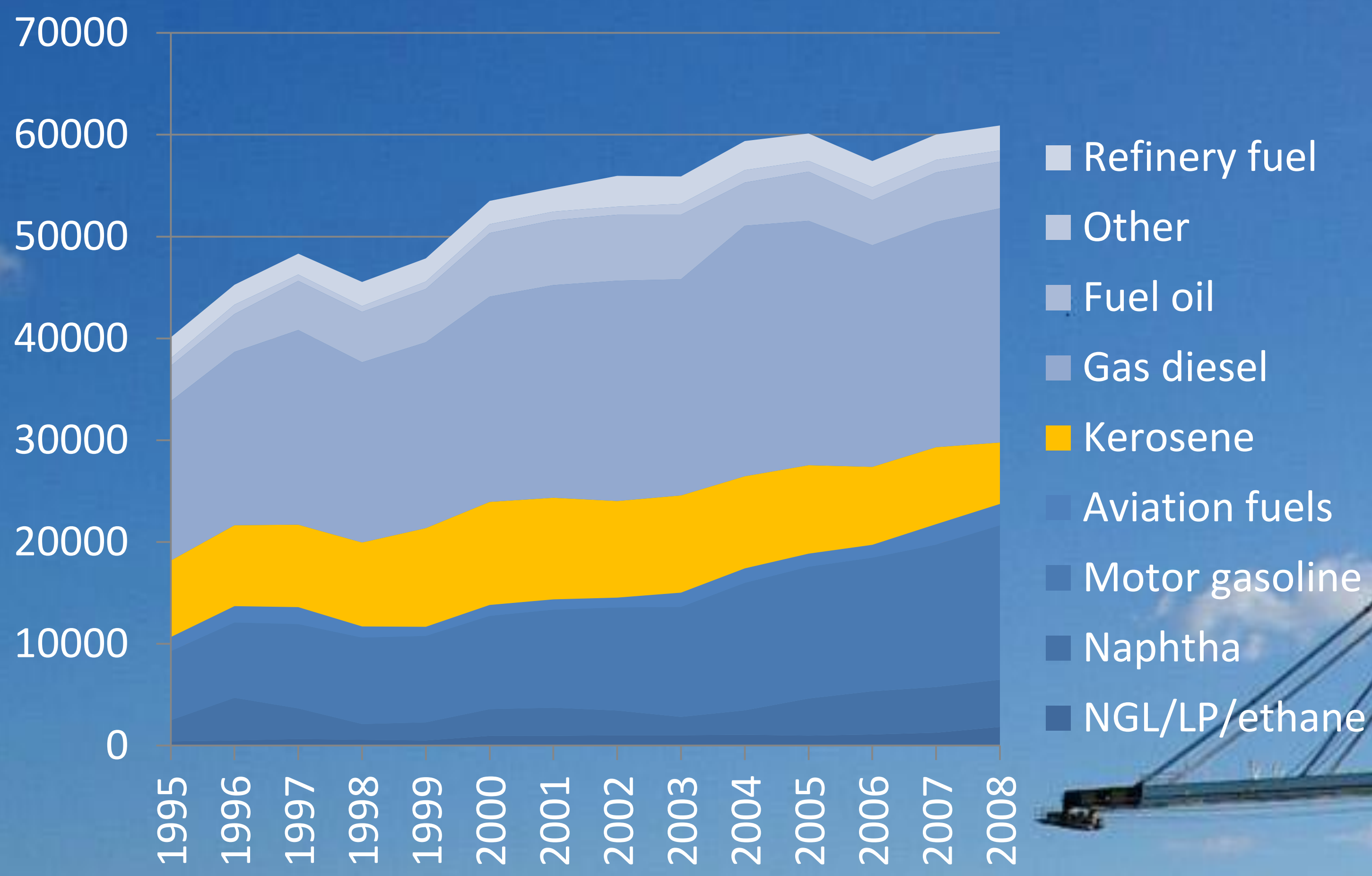
Product demand



Strategic Storage

- Requirements of IEA:
  - 90 storage for energy requirements
- Current capability:
  - 28 days or less for members
  - 14 days of less for non members
- Korea, China & Japan ahead
- Other contracts out everywhere
  - Europe to Asia etc…

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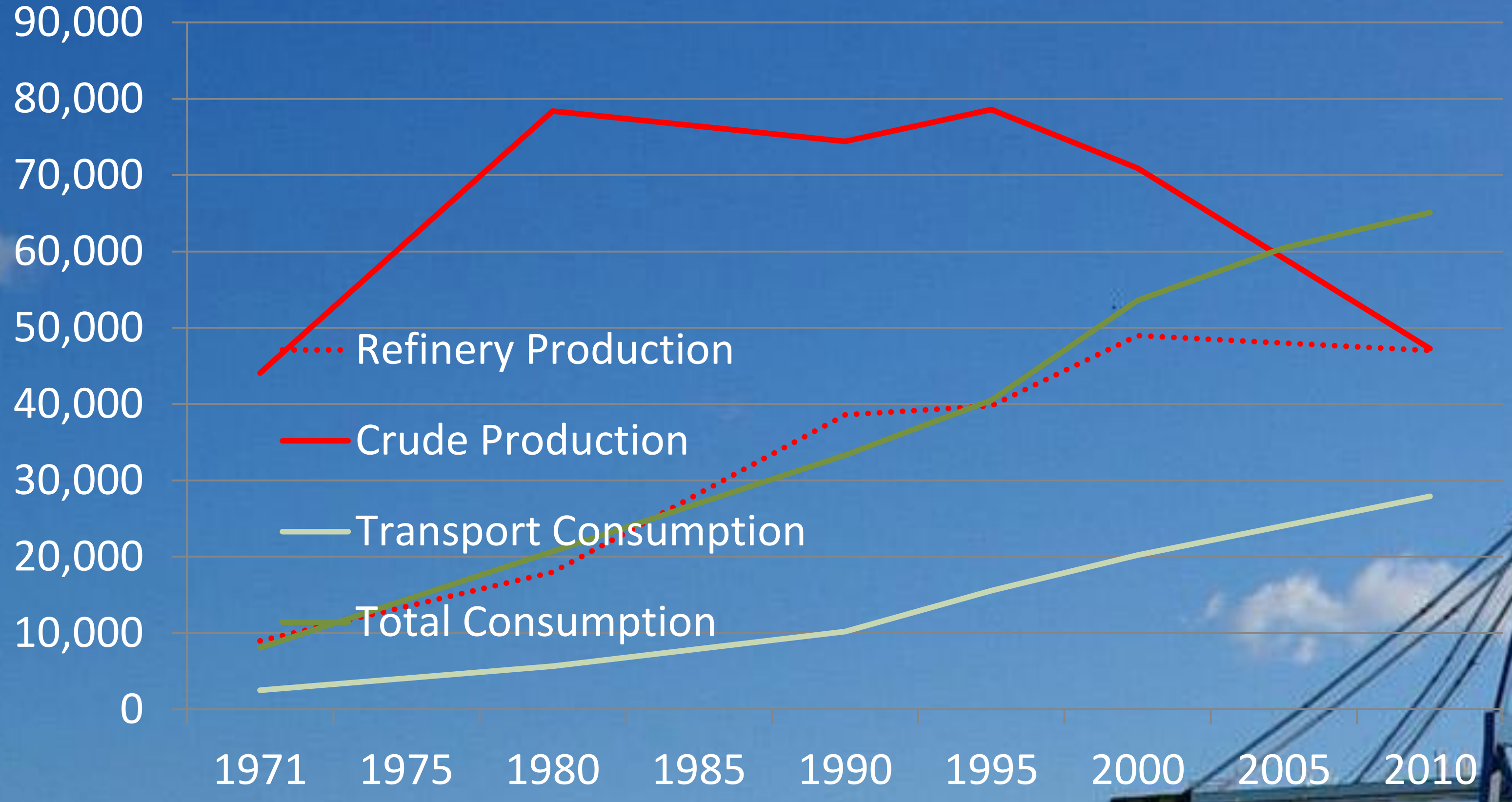
Forecast of demand

	Two Crises One Recovery			One Crisis One Recovery		
	Growth Rate	2020	2030	Growth Rate	2020	2030
NGL/LP..	9.9%	5,713	14,660	12.2%	7,343	23,225
Naphtha	4.0%	7,445	11,041	11.6%	17,350	52,071
Motor gas	5.7%	29,334	50,834	6.0%	30,425	54,351
Av. Gas	2.1%	2,692	3,319	6.7%	4,559	8,722
Kerosene	-2.6%	4,380	3,353	-3.1%	4,153	3,041
Gas diesel	1.7%	28,144	33,301	2.7%	31,491	40,919
Fuel oil	-0.5%	4,326	4,124	-0.8%	4,179	3,871
Other	5.4%	2,072	3,500	6.8%	2,441	4,727
Ref. Fuel	1.6%	2,969	3,485	0.3%	2,545	2,627
	Forecast	87,074	127,616	Forecast	104,484	193,555
	Bunkers	440	440	Bunkers	440	440
		87,514	128,056		104,924	193,995

Crude and refining statistics



Refineries…

- *"Although there will still be a gap between supply and demand in 2017, we won't have to import refined products"* April 2010

- *"A study suggests the project is not economically viable. But, we are not saying we will drop the project as we still need to discuss this with our partners"* September 2010

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Demand forecast

Description	Two Crisis		One Crisis	
	2020	2030	2020	2030
Total forecast consumption	87,514	128,056	104,924	193,995
Existing Refinery Capacity	47,000	47,000	47,000	47,000
Existing net imports	13,000	13,000	13,000	13,000
New domestic capacity	20,000	20,000	20,000	20,000
Forecast of net imports	33,514	74,056	50,924	139,995

- 5 million m^3 storage required over next 10 years maintain status quo in supply security and quality
- To meet “real” demand efficiently in the order of 15 million m^3 required

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Competition

Company/Development	2000	2006	2010	2013	Comment
Grand Total	15,078	15,078	15,717	18,517	Mostly crude storage
Pertamina	14,888	14,888	14,914	14,914	Mostly crude storage
Oiltanking	0	0	283	283	Facility being used for trading
TEP	0	0	100	100	Small scale operations
Vopak	0	0	198	198	
Dovechem	62	62	62	62	Small scale operations
Sinopec JV				2,600	Permissions not complete
Bangka (Mberutu)				100	SBM /50,000 DWT tanker
East Java (Mberutu)				100	50,000 DWT largest tanker
Others	128	128	160	160	Shell, BP and Petronas etc.
Effective 3rd Party Storage	190	190	803	3,603	

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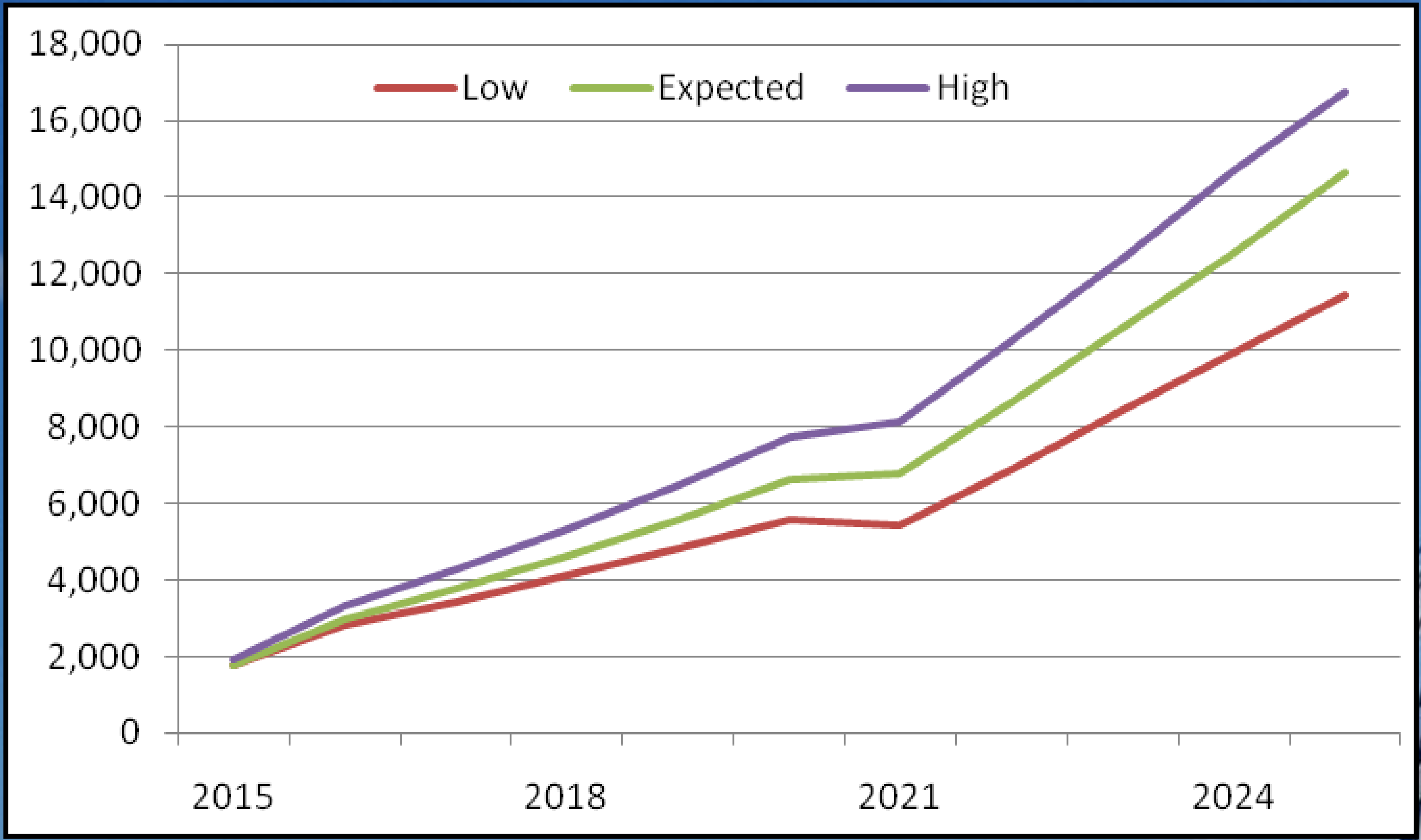
Competition…



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Tariff forecast

	Penang	PTP	Singapore	North-port	West-port	Tanjung Priok
20' FCL	$ 66	$ 57	$ 107	$ 73	$ 73	$ 83
40' FCL	$ 94	$ 83	$ 154	$ 110	$ 110	$ 125
20' EMT	$ 66	$ 32	$ 57	$ 73	$ 73	$ 62
40' EMT	$ 94	$ 45	$ 84	$ 110	$ 110	$ 93

- Supply of capacity restricted
- Utilization rates high
- Discounts
  - Terminal operators resistant due to change in returns
  - Capacity constraints make them difficult to obtain
- Forecast for the future
  - Difficult to see rapid change to existing level of competition
- Long term Tariff Levels
  - Full TEU US$ 84, Full FEU US$ 125

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Competition in Shipping/Ports

- Between shipping lines
  - Who are their market?
  - What is its nature?
  - Key competition factors
- Between ports
  - Who are their market?
  - What is its nature?
  - Key competition factor
- Between terminals
  - Who are their market?
  - What is its nature?
  - Key competition factors
  - Equivalence in capability
  - Ship size, routings, productivity
  - Available capacity
  - Price

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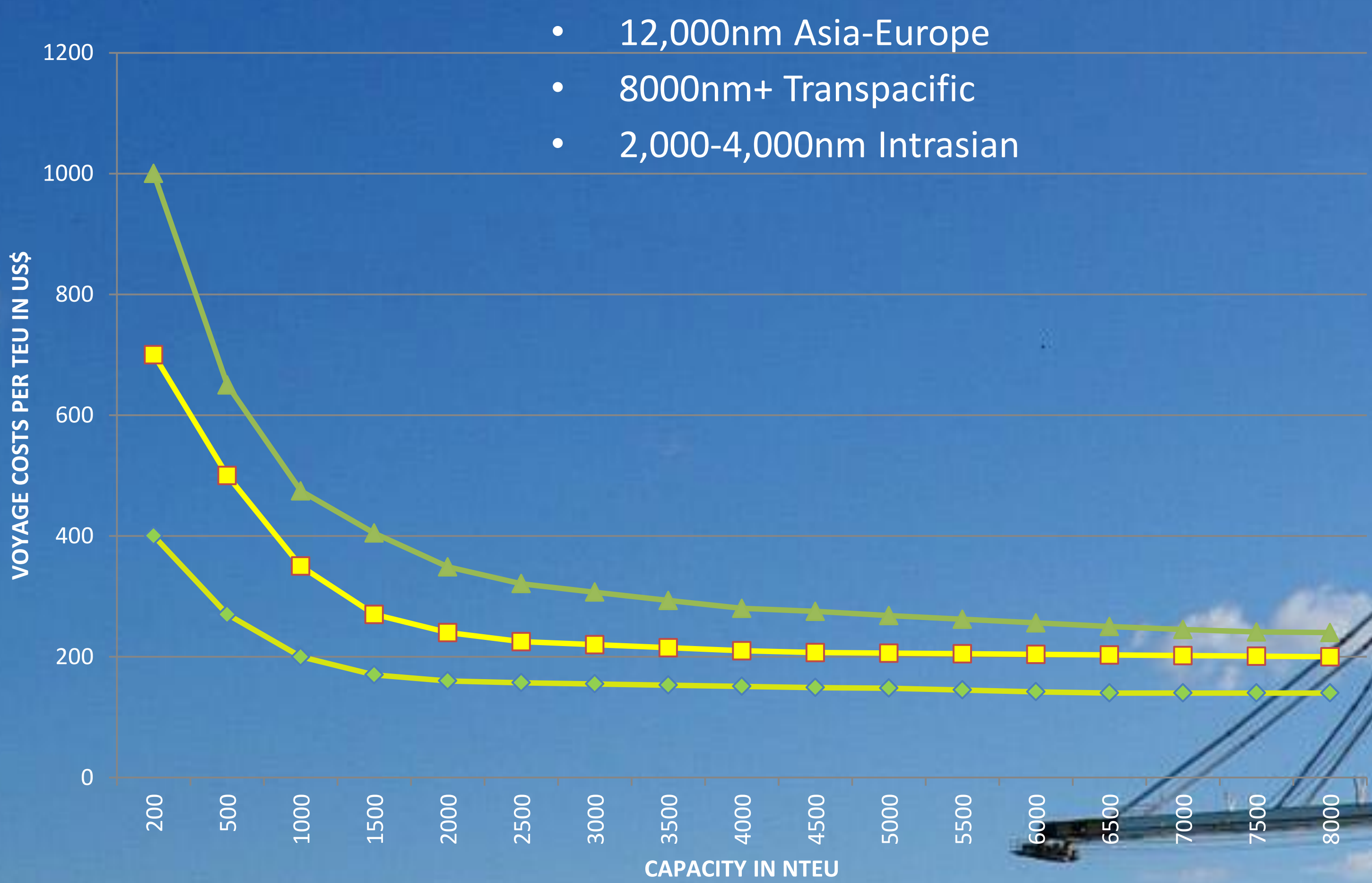
Understanding the market…



Business Opportunities

	Existing Services	Extended services	New services
Existing Markets	Share of Customer New Customer Penetrate catchment area	Extended reefer services Empties depot Lashing	Local transport Container repair Port Services
Extended Markets	Extend catchment area Develop shipper relations New feeders	Inspection services Administration services	Built network Intermodal services
New Markets	Penetrate emerging areas	CFS Cold Storage	Warehousing Distribution centres

The Strategy

- Develop Relay Transshipment
  - Must have better Middle East
  - Develop as a foci for specific lines
- Hub and Spoke
  - Inbound as General Cargo?
  - Inbound as RORO
- Extend the Hinterland
  - Myanmar
  - Bangladesh
- Go for niche markets

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Extending the Hinterland

- New area…
  - 20m people with strong resource base
  - Significant domestic trade with high costs
  - Still heavily General Cargo (LCL/stuffing)
- Further extension
  - Can only feed containers (draft issues)
  - Very substantial market 1.2m TEU (2009)
  - Domestic links and networks count
  - Big pipe issue is relevant

Target Shipping Lines

- Not Asia-Europe focused
  - 2nd tier operators
  - Not general feeders
- Serve cargo from hinterland
  - Rubber, CPO etc…
  - High value logistics niches – car parts
  - Bring empties/hub empties
- Middle East
- In-bound dedicated feeds
  - RORO and consolidation

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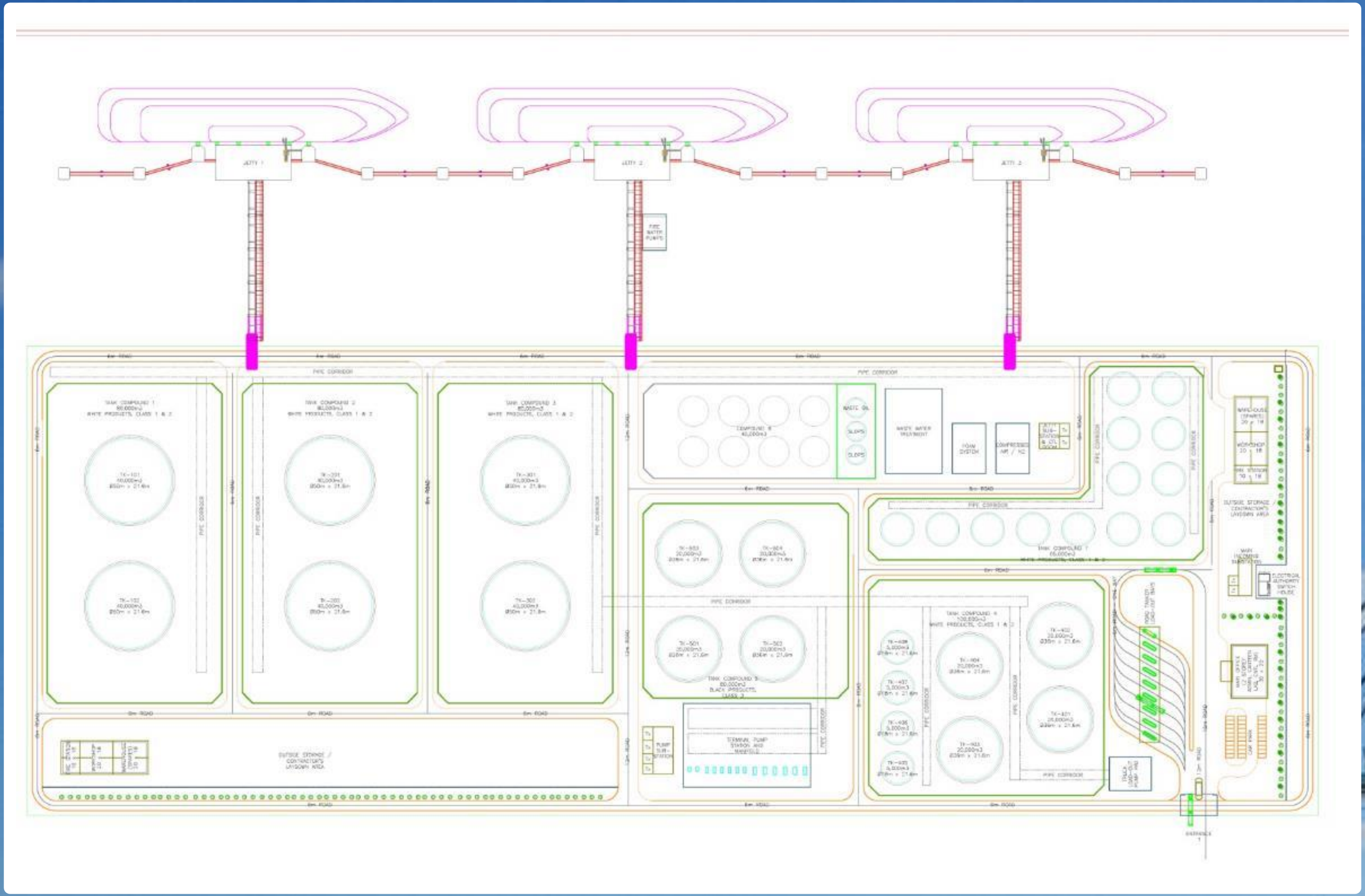
Physical & Ops. Planning



Physical & Ops. Planning

- Layout decisions
  - Interior channel width, turning circles
  - Layout, equipment, terminals
- Dredging
  - Scale
  - Pump ashore/dump
  - Contaminated spoil?
- Breakwater
  - Wave climate requirements
- Form of structure
  - Suspended deck makes/reclaim example
  - Cost based decision
- Contract strategy…
  - Design, build, finance

Design & Planning Parameters

- Design ship
  - 2,000 to 4,000 TEU
  - 280 m LOA
  - 32.8 m beam
  - Draft required 14 m
- Ship to shore
  - Mobile harbour cranes, more flexible
  - Gantries, statement of intent
- Storage yard
  - Reach stackers
  - Fork lift trucks
  - Rubber tired gantries

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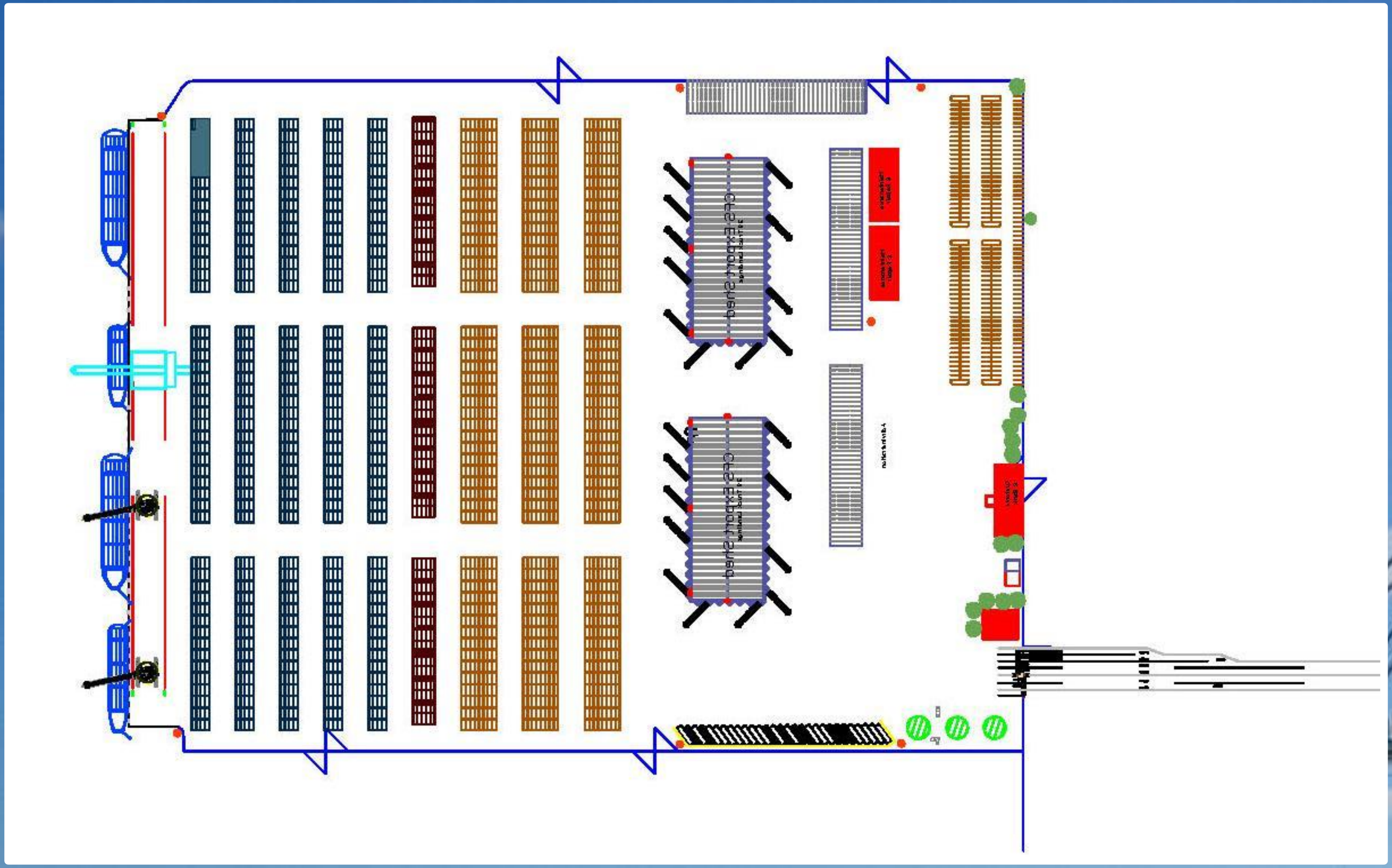
Initial layout



Initial strategy

- 2020 target volume 300,000 to 350,000 TEU
- Traffic to be 80% transhipment with 20% coming in or out as general cargo; 20% local traffic by road to Sorong or West Papua…
- Initial terminal area to be developed in phases over 20 years, 500 by 500m with target capacity 500,000 TEU/year
- Initial phase 320m long with yard depth of 250 to 320m
- A series of yard extensions and improvements
- A long term development area (for 20 years onward) to be reserved adjacent to the terminal this to be a 500 by 500m plot
- Logistics support areas required outside the terminal
- Initial ship to shore equipment MHCs rails built into terminal
- Initial yard equipment to be reach stackers and fork lifts
- A staged program to be developed to upgrade to gantries and RTGs over a five to twenty year period

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Phase 1 Cost Estimate

No	Description	Unit	Rate	Quantity	US$
Infrastructure					
1	Dredging	m^3	$5	0	$0
2	Reclamation	m^3	$10	300,800	$3,008,000
3	Quay	M	$60,000	320	$19,200,000
4	Coastal Protection	M	$12,500	320	$4,000,000
5	Roads	M	$1,000	640	$640,000
6	Stack Yard	m^2	$80	134,400	$10,752,000
7	Buildings	m^2	$250	5,000	$1,250,000
8	Electrical	Sum	5%	-	$1,942,500
9	Miscellaneous	Sum	10%	-	$4,079,250
10	Access Road	Km	$500,000	5	$2,500,000
Equipment					
1	MHC	Nos.	$1,750,000	2	$3,500,000
3	Road Units	Nos.	$80,000	12	$960,000
4	EC	Nos.	$250,000	5	$1,250,000
5	TOS		$500,000	1	$500,000
				Total	$53,581,750

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Phase 2 Cost Estimate

No	Description	Unit	Rate	Quantity	US$
Infrastructure					
1	Dredging	m^3	$5	0	$0
2	Reclamation	m^3	$10	369,000	$3,690,000
3	Quay	M	$60,000	180	$10,800,000
4	Coastal Protection	M	$12,500	180	$2,250,000
5	Roads	M	$1,000	0	$0
6	Stack Yard	m^2	$80	147,600	$11,808,000
7	Buildings	m^2	$250	5,000	$1,250,000
8	Electrical	Sum	5%	-	$1,489,900
9	Miscellaneous	Sum	10%	-	$3,128,790
10	Access Road	Km	$500,000	0	$0
Equipment					
1	STS	Nos.	$6,000,000	3	$18,000,000
3	RTGs	Nos.	$1,250,000	5	$6,250,000
4	Road Units	Nos.	$80,000	12	$960,000
5	EC	Nos.	$175,000	2	$350,000
				Total	$60,476,690

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Financial Assessment

- The key elements financial assessment
  - The revenue of the development
  - The capital cost of the development
  - The operating margin of the development
- Revenue is the main risk
- Capital costs
  - Site selection not confirmed
  - +/- 25% maybe…
- Operating margin
  - Key risk from external financiers perspective?
  - 40% standard assumptions
  - JICT and others outperform
  - Check based on staffing etc… suggest Sorong to outperform

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Capital Expenditure (CAPEX)

- Capital expenditure
  - The total matters, obviously
  - The breakdown matters almost as much
- Time and timing
  - When the money needs to be spent
  - Large contract cash flow
  - Maximum negative cash flow
  - First revenue and build up of revenues
    - Working capital requirement

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The nature of Capex

Description	US$ (million)	When	Cost overrun	Time overrun	Importance at Pre-FS
Studies	$ 1 or 2	Early and continuing	Small	High	Insignificant
Approvals	$ 5 to 10	Early	Small	High	Marginal
Dredging	$150	Construction	High	Moderate	Significant
Reclamation	$720	Construction	High	Moderate	Significant
Quay	$400	Construction	High	Moderate	Significant
Breakwater	$305	Construction	High	Moderate	Significant
Roads	$5	Construction	Moderate	Moderate	Marginal
Stack Yard	$160	Late	Moderate	Moderate	Marginal
Buildings	$63	Late	Small	Small	Marginal
Electrical	$90	Late?	Small	Small	Marginal
Equipment	$ 300	Late?	Small	Moderate	?
Reserves…	$190	-	-	-	-

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CAPEX Sensitivity

- Super-structure
  - Buildings
  - Tanks
  - Roads
- Equipment/M&E
  - Should be deterministic
- Sub structure
  - Reclamation
  - Foundations
  - Dredging
  - Cause of most cost and delay problems
    - Can be mitigated by procurement strategy
    - Design to minimize risk
    - Soil/Ground Investigations

and its distribution

- Super-structure
  - 40%
- Equipment/M&E
  - 25%
- Sub structure
  - 35%

Business and Financial Model

- Corporate finance
- Local capital markets
  - Equity Market
  - Bonds
  - Banks
  - Infrastructure funds/Private investors (major and small)
- International capital markets
  - Banks
  - Bonds
  - Infrastructure investors
- Multi-lateral institutions
- Bilateral aid
- Government…
- Construction financing…

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Business Plan - Mission

"to develop, operate and expand a container terminal near Sorong to serve local container demand and to consolidate container demand across Eastern Indonesia whilst expanding the operating envelop of Pelindo II and creating an investment return for the company"

Strategy – 1 of 3

- Form a development company to act as the focus for its commercial investment in the proposed terminal
- Inject US$ 4,000,000 as equity into the company to act as seed funding for the company
- Recruit or contract a Project Development Director to support the President Director of the development company as they lead the development company
- Sell 10% of the shares in the company to a co-investor for US$ 1,000,000. The co-investor to bring specific additional skills into the company
- Enter into an agreement with the Province of West Papua for them to acquire the land required for the terminal and lease over a long term period to Pelindo II

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Strategy – 2 of 3

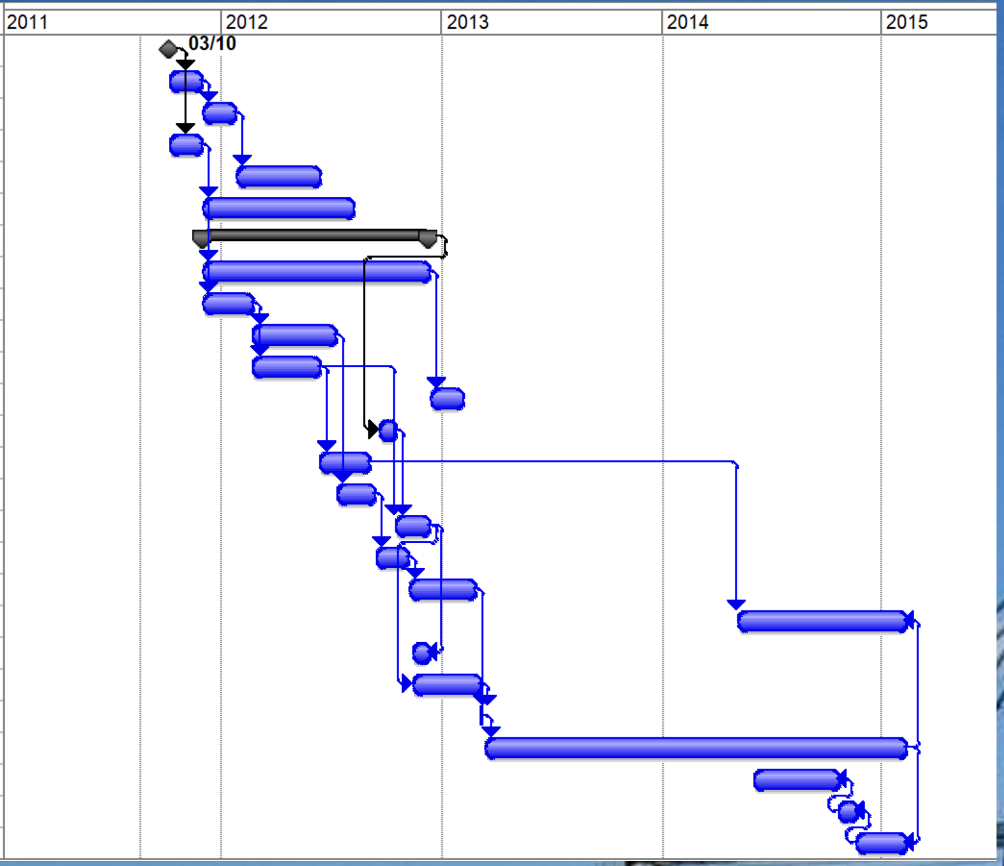
- Undertake appropriate studies and development work to secure appropriate approvals and to develop a detailed business plan
- Appoint an environmental/social advisor to present development effectively to the local communities
- Appoint a financial advisor
- Recruit a business development team
- Appoint a project management consultant to oversee the physical development of the terminal
- Review term sheets from banks for
- Prepare tender documents on an EPC basis
- Seek tenders on an EPC basis with structured finance

Strategy – 3 of 3

- Enter into contracts with shipping lines
- Review term sheets from additional investors
- Complete on bank loans in the order of US$ 25 m (?)
- Award EPC contracts for the development of the terminal with if required structured finance
- Tender an management or training contract to secure operational setup support
- Takeover terminal from EPC contractor
- Setup commercial operations at the terminal

Initial program

ID	Task Name
1	Approve Action Plan for company
2	Form a development company
3	Inject US$ 4,000,000 as equity
4	Contract a Project Development Director
5	Sell 10% of the shares in the company
6	Agreement with the Province of West Papua
7	**Studies and Approvals**
8	AMDAL
9	Site Investigations
10	Detailed FS
11	Detailed Business Plan
12	Appoint an environmental and social advisor
13	Appoint a financial advisor
14	Recruit a business development team
15	Appoint a project management consultant
16	Review term sheets from banks for debt
17	Prepare tender documents on an EPC basis
18	Seek tenders for EPC contracts
19	Enter into contracts with shipping lines
20	Review term sheets from additional investors
21	Complete finance on bank loans
22	Award EPC contracts
23	Construction
24	Seek operations setup/support tenders
25	Takeover terminal from EPC contractor
26	Prepare commercial operations at the terminal



Through Life Costs

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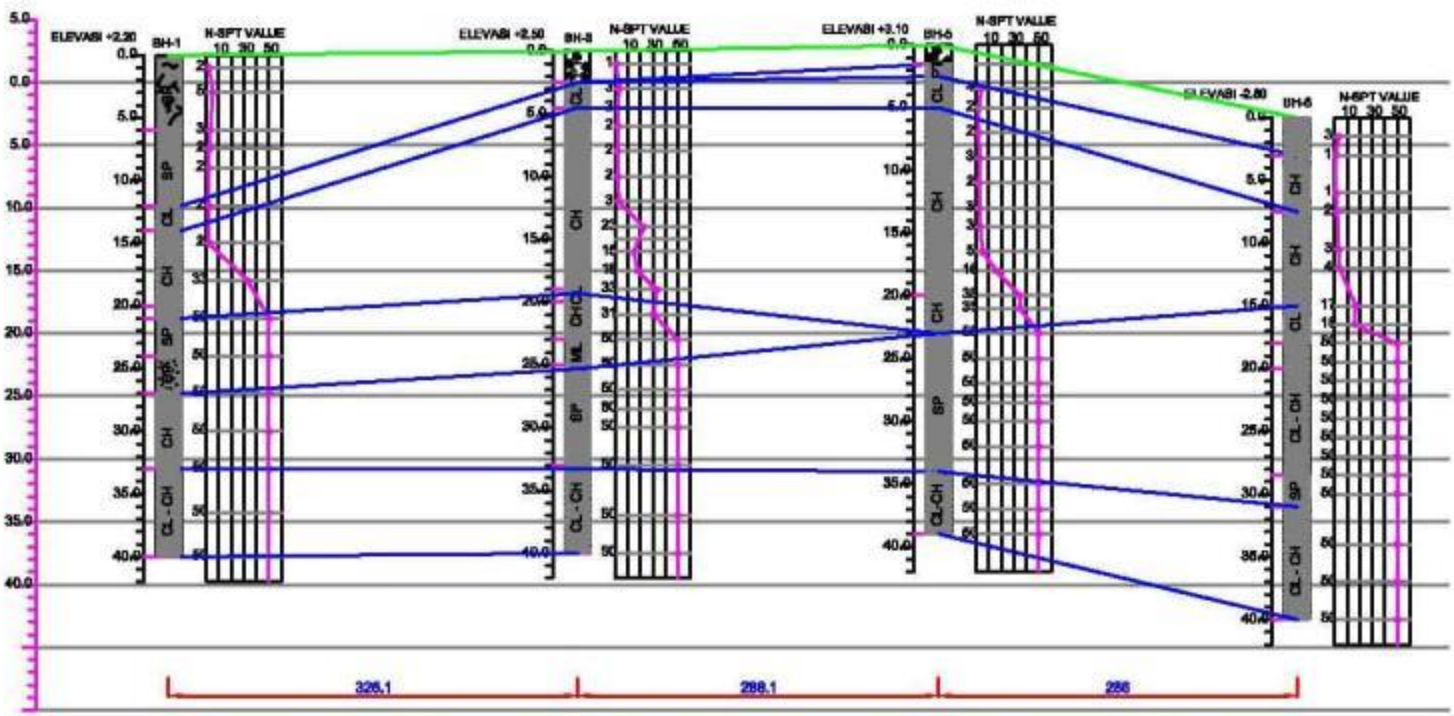
Soil conditions



BORING PROFILE BH-1, BH-3, BH-5, DAN BH-6

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Bearing loads

UDL (kN/m^2) over full stacking area				
One high containers	16	10	11	5
Two high containers	33	20	21	11
Three high containers	49	30	32	16
Four high containers	65	40	42	21
Five high containers	82	49	53	26
Six high containers	98	59	63	32
Pile Loads (t)				
One high containers	167	101	108	54
Two high containers	333	201	215	108
Three high containers	500	302	323	161
Four high containers	667	403	431	215
Five high containers	833	503	538	269
Six high containers	1,000	604	646	323

Crane loads

Ship to Shore Cranes				
Size	**Weight Range (mt)**		**Wheel Loads (mt)**	
	Min	**Max**	**Min**	**Max**
Panamax	500	800	31	50
Post Panamax	800	900	50	56
Super Post Panamax	1,600	2,000	100	125

- Crane rail tolerance +/- mm…
- No settlement acceptable
- Even on reclaimed land piles essential
- 4 rows of cranes, 12km+ of crane rail…

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Ship berthing loads

	12,500 TEU Ship	6,500 TEU Ship
Berthing Velocity (m/s)		
Outside breakwater	0.095	0.125
Inside Breakwater	0.030	0.050
Factors		
C_m	1.516	1.631
C_b	0.650	0.650
K	91.065	70.027
C_E	0.334	0.334
C_s	1.000	1.000
C_c	1.000	1.000
Berthing Energy (kNm)		
Outside breakwater	989	951
Inside Breakwater	99	152

Reclamation or piling

- Very soft silt
  - Low SPT values
  - Possibility of silt volcanoes and slip failures
    - Thin layers of reclaim, 300mm lifts(?)
    - Delay to permit reduction in pore pressure
  - High and continuing settlement – years…
    - High pore pressures build up
    - Slow dissipation
  - Risk hard to manage
- Stiff and then cemented clays from 16 to 20m onward
  - Harder to dredge
  - Ideal for founding high capacity piles
  - May be difficult to drive?
  - Bored piles slower but more rigs practical
  - Geophysics good for defining interface level
  - Risk can be managed

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Cost differential

- Reclamation
  - 3 years minimum, probably longer
  - Controlled by rate of settlement as well as equipment
  - Accelerating settlement expensive (IF it can be done)
  - Continuing maintenance issues that disrupt operations
  - Estimate costs, US$ 1.20 billion
- Pile deck
  - 2 years and possibly quicker (saves US$ 50 million in interest)
    - Controlled by equipment used
  - Fewer maintenance issues and they don’t disrupt operations
  - Estimated costs, US$ 1.25 billion
- Difference in costs within error margin
- Interest costs make pile deck cheaper
- Risk waited in favour of piled deck

Regulations and Approvals

Regulations

- Same for everyone?
- Impacts on structure of business important
  - Fuel subsidies
  - Restrictions on what can be done
- Need to consider potential for change
- Represents a risk
- Offers delays

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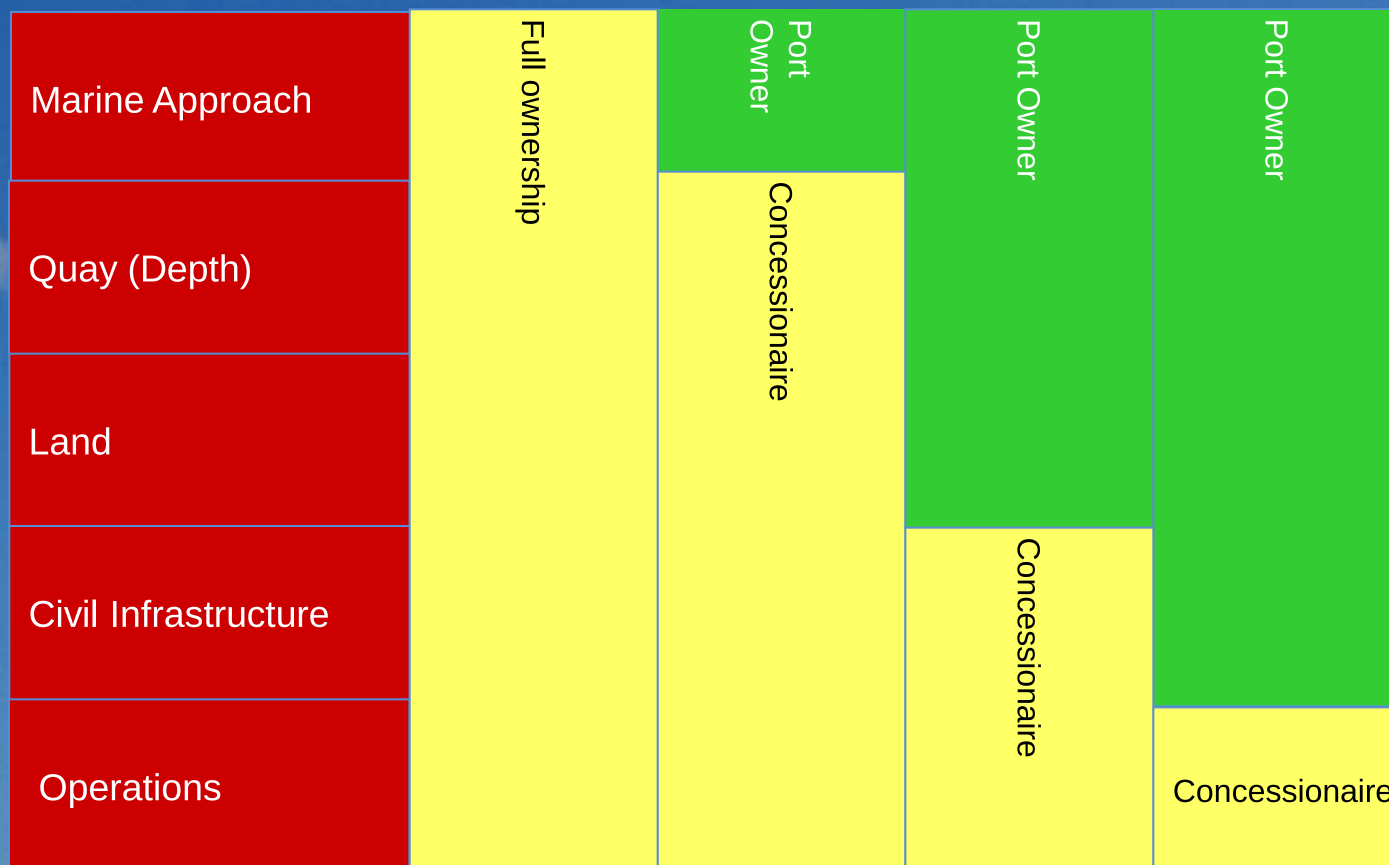
Regulatory Models

- There are many different Port Authority models
- The key components of the models are:
  - Land ownership
  - Terminal Infrastructure
  - Cranes/Yard Equipment
  - Quayside operations
  - Landside operations
- Last twenty years has seen much port reform
  - More private sector operators
  - Concessions for terminals
  - More private investment in terminals

Regulatory Structures



Standard(ish) options

Mode of Ownership	Land Area	Terminal Infrastructure	Cranes / Yard Equipment	Quayside Operations	Landside Operations
100% state owned & Operated	State owned	Port Authority, build and own	State owned	Port Authority	Port Authority
"Suitcase" Stevedores	State owned	Port Authority, build and own	State owned	Port Authority	Private Stevedores
Terminal Services Agreements	State Owned	Port Authority, build and own	Some State Owned	Private Stevedores	Private Stevedores
Leased terminals	State owned	Port Authority, build and own	Private or rented from Port Authority	Terminal operator	Terminal operator
Concession agreement	State owned	Port Authority, build and own	Privately owned	Terminal operator	Terminal operator
BOT concession	State owned	Construction privately funded	Privately owned	Terminal operator	Terminal operator
100% privately owned	Privately owned	Privately owned	Privately owned	Terminal operator	Terminal operator

Has become best practice for ports

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Example Structures

- Government owned and operated ports
  - Central, provincial or city owned?
  - Central, provincial or city regulated?
  - Regulation and operations mixed
  - Lack of accountability
- Government regulated, privately operated
  - How tight the regulation?
  - Tariff, competition
- Government regulation, landlord, private operations
- Many structures and confusion generally reigns

Approvals and more…

- Agreements with Ministries and Port Authorities
  - In place
  - Needs tight legal wording
    - Remove doubt
  - Needs to cover
    - Scale and location
    - Duration
    - Termination
    - Payments
- Environmental
  - Social
  - Environment
  - Gap assessment for Equator Principles
    - Gaps need to be filled
    - Commitments and implementation of mitigation critical

other approvals

- Land rights
- Company Law
  - Right for foreigners to own
- Work place and union positions
- Health & Safety Law

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Indonesian example

- Agreement with MOT or Law 17/2008
  - Needs tight legal wording
  - DGST HQ
  - Adpel
  - Must tie in Port Authority
- Ocean Law
  - Adat or Law 27/2007
  - Fisheries and fishing of local communities
  - Implications unclear
- PPP Regulations
  - Tender regulations 61/2005
- Negative investment list
  - Oil, 95%?
  - Others 49%?

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and the environment…

- Amdal – in place before construction
  - Cannot proceed until:
    - SEA complete (Local Government)
    - REA complete
  - Minimum time frame
    - 12months
    - More realistic 18 months
  - Advanced studies
    - Drainage/Hydraulics
    - Land acquisition/Resettlement
  - Scope and sub-division
    - Can be critical to success

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Specification and procurement

Corporate Philosophy

- Select a suitable contract from the application with a balanced distribution of risk
- Apply the adopted risk management philosophy consistently in procurement and application

Risk Transfer

- Centralise project insurance to ensure adequacy of cover, and avoid policing multiple policies
- Ensure Reinsurers do not control insurance response
- Ensure insured sums include value of free issue materials; check third party indemnity limits
- Ensure the capacity of Indemnifier to satisfy his obligations

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Design Process

- Identify, assess and look to engineer out inherent project risks
- Invest in site investigation and instrumentation
- Audit design buildability (consider life cycle cost minimisation and design durability audits)
- Allow adequate time for design development to avoid “defensive” designs
- Allow value engineering enabling identification of acceptable alternative solutions to particular risks

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Specialist Suppliers/Contractors

- Ensure supplier awareness of key material purpose; obtain recommendations as to product suitability
- Be aware of the last shot doctrine and avoid the use of acknowledgement slips
- Cross-check arrangements to ensure other direct contractors will carry out their work to suit the progress of the Works and contractor's contemporary working programme

Documentation

- Audit contract documentation, in order to avoid inconsistencies and ambiguities
- Record the basis of calculation of liquidated damages and of the underlying premises
- Standardise documentation, wherever practicable, to ensure team familiarity in administration
- Make full disclosure of available information and check that data is accurately replicated
- Retain a copy of all drawings made available for inspection with the tender enquiry

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Contractual Framework

- Allow a realistic construction timescale
- Retain a right to extend time for employer or agent default
- Provide a right to occupy part of the works other than a section, and a mechanism for the proportioning down of liquidated damages
- Require estimates of time and / or cost for variations, delaying events and changed circumstances
- Ensure document precedence and the mechanism for resolving discrepancies is clear

Contractual Framework

- Ensure interim milestones / key dates are necessary and are not simply mid-term progress checks
- Make it clear any failure to notify delay and / or cost in due time prevents the employer and his agents from mitigating the effects of the particular event or verifying associated records
- Ensure that the contract represents an entire agreement
- Check that the completion obligations are clear and workable

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Contractual Framework

- Require disclosure of full pricing details, and that contractor demonstrates this information is the genesis of the accepted price, dividing preliminary and other general costs into fixed and recurrent cost elements; in event of adjustment in tender price, record details and implications of the related calculation
- Avoid Nominated Subcontractor arrangements
- Ensure precise allocation of the obligation to co-ordinate the works with those of others

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Contractual Framework

- Ensure responsibilities for incorporation of advance works and allowing defect remedying are clear
- Ensure that, save as may expressly be provided, award of an extension of time is in full satisfaction of the consequences of a delaying event
- Ensure a right to have work completed to the requisite standard irrespective of inconvenience or cost
- Establish a real time dispute resolution process

Tender Process

- Pre-qualify tenderers where appropriate; apply tests of technical and financial competence consistently
- Require presentations to ensure tenderers understand the project and have devised workable risk solutions
- Record and photograph the status of advance and other works at time of tender inspection
- Identifying employer-deliverable dates and check these can be met before award
- Check acceptability of tenderer’s planned means of access, site road layout and area utilisation

Letters of Intent

- Ensure that the extent of authority to access site and work to be done is defined
- Ensure the extent of work that can be carried out without further instruction is identified
- Ensure a right to order vacation of the site at any time is retained
- Ensure the payment mechanisms and manner of computation are adequately defined
- Ensure the LOI is clear as to any implications that work done will have to the contract duration
- Ensure that the LOI is subsumed in any subsequent contract

Award

- Ensure all factors prerequisite to award are in place
- Bring any change in site conditions post-tender to contractor’s attention before acceptance of his tender
- Adopt a “wrap-up” letter approach to tender negotiations

Commencement

- Ensure full joint site inspection at hand-over and that photographic records are maintained
- Require adequate contractor method statements and check planned work solutions, employer-deliverable times and required performance by others are acceptable / achievable
- Introduce an electronic document management system if project scale is suitable for this

Contractor Submission

- Require submission of a developed network programme and statement of underlying logic, with details of planned outputs and resource capacity; if changes arise between award and commencement, require an acceptable programme for each situation and identification of the nature and reasoning for all changes between the programmes
- Ensure all key activities are identified and linked to s how relationships; check for resource leveling, ensure work affected by restricted access / work hours or by working under dangerous or unpleasant conditions are highlighted and linked and identify false logic / constraints and float

Contractor Submission

- Check all employer-deliverable dates etc. are consistent with earlier notices and can still be met
- Ensure the planned time for completion and related cash draw-down model are acceptable
- In cases of phased possession, check each site area is to be used meaningfully as from date of possession and the programme is not arranged to set up unmeritorious claims for non possession
- Review and respond to contractor submissions (shop drawing, etc) promptly and fully; ensure that design consultants observe the "one bite at the cherry" principle
- Deal promptly with requests for information

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Administration

- Provide competent, experienced field personnel and adequate resources for effective day to day administration of the project
- Ensure records of resources deployed and work in progress are entered into a suitable database
- Ensure accurate records are maintained identifying ongoing work and the resources applied to this
- Ensure the record regimen enables measurable yardstick performance checks on key activities

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Administration

- Carry out periodic “health checks” to identify and deal with emerging risk and identify measures with the contractor to minimise impact of slippage or the like
- Alert the contractor as early as practicable to any significant variation contemplated to avoid abortive work / redeployment costs
- Review contractor rolling programmes for slippages and record causation of these
- Ensure that contractor’s monthly reports are fully vetted and are accurate; ensure that minutes of meetings are generated by the employer’s team

Administration

- Respond promptly to claim notifications; check submitted records, even if claim entitlement is contested
- Ensure meaningful feedback of data to avoid future replication of claims

End of Session 5!

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Part 2, Session 2

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Part 2: Session 2, Tanks

- Layout, design and construction of storage tanks
  - Different types of tanks, roofs, foundations and how this impacts land areas and costs
- Operations and monitoring of storage tanks
  - What to monitor, how monitoring can be best accomplished and how to turn monitoring into real knowledge about your storage
- Blending and value addition
  - What is blending, how to adapt your terminal to undertake blending and what value can it add to your storage
- Automation
  - Is it worth being automated? What are the advantages? What are the disadvantages?

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Target Users

- Trader
  - 250,000 m^3
- Strategic Storage
  - 50,000 to 75,000 m^3
- Re-export to another country
  - 50,000 to 75,000 m^3
- Another 150,000 m^3 from
  - Local distributors

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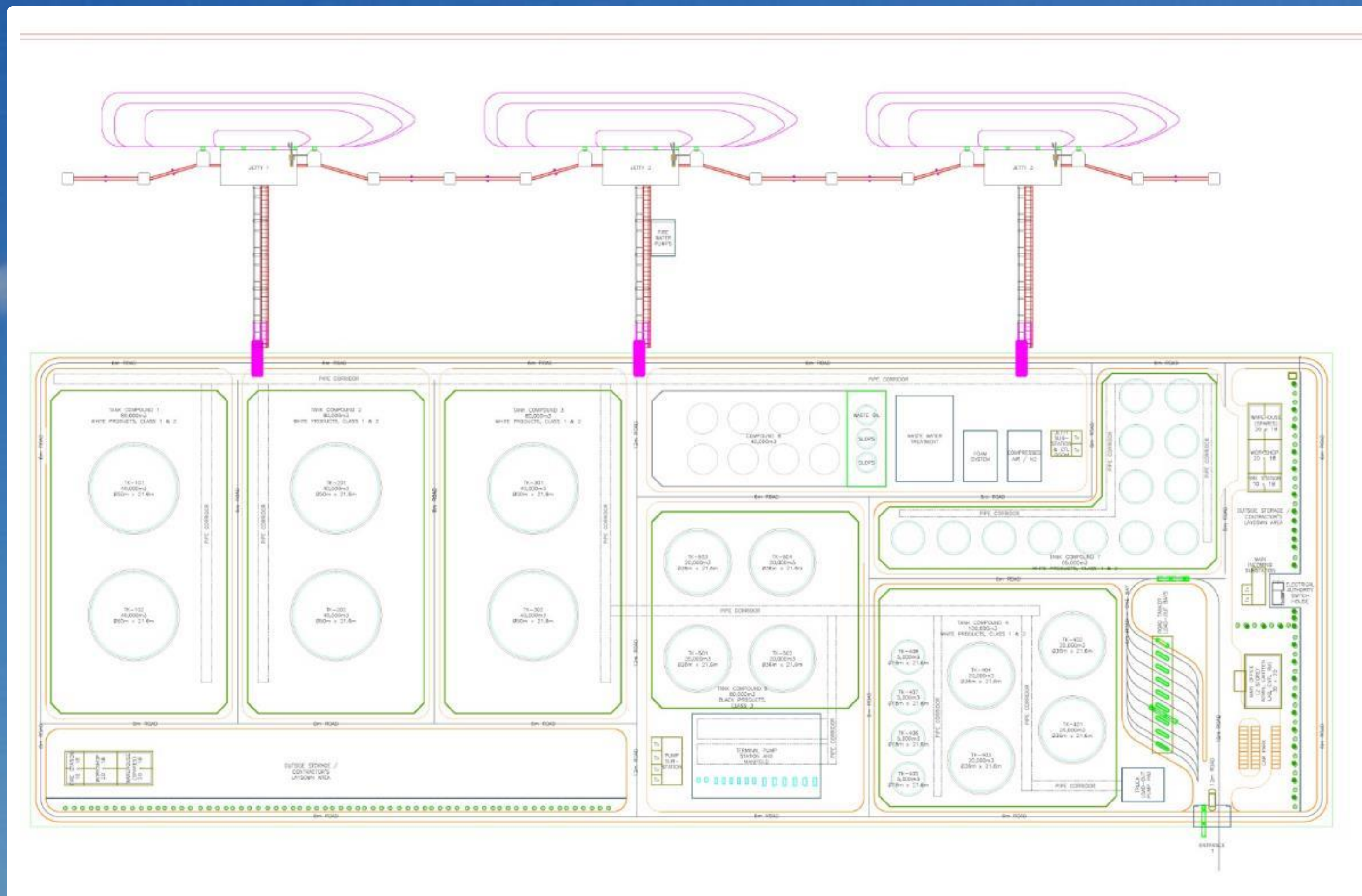
Physical & Ops. Planning



Types of Tanks

- Spherical storage tanks
- Hemi spherical storage tanks
- Horizontal Cylindrical Storage Tanks
- Storage tanks with fixed roof, design pressure should not exceed weight of the roof
- Storage tanks with floating roof, at atmospheric pressure
- Internal floating roof tanks with an external fixed roof
- Bolted Storage Tanks

Special Types of Tanks

- Pipes etc…
- Storage tanks flats
- Lined ponds
- Storage pits

Floating Roof Tanks

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Fixed Roof Tanks

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Tank Capacities

Capacity Approximately		Diameter	Height
US Barrels	m^3	Meters	Meters
500	75	4.6	4.9
1.000	150	6.4	4.9
2.000	300	7.6	7.3
5.000	750	9.2	12.2
10.000	1500	12.8	12.2
12.000	1800	12.8	14.6
15.000	2250	14.6	14.6
20.000	3000	18.3	12.2
30.000	4500	22.3	12.2
40.000	6000	26.0	12.2
50.000	7500	27.5	14.6
90.000	12000	36.6	12.2
100.000	15000	41.0	12.2
120.000	18000	41.0	14.6
140.000	21000	49.8	12.2

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Layout & Spacing of Tanks

- Spacing, physical limits
  - Need to control spread of fire
  - Product, roof types, construction etc…
- Layout, where the tanks are located
  - Ability for fire services to access tanks
  - Provision of secondary bunds, how many tanks rupture?
  - Flows away from tanks, secure tanks from further damage
  - Not above pumps, ignition sources etc…

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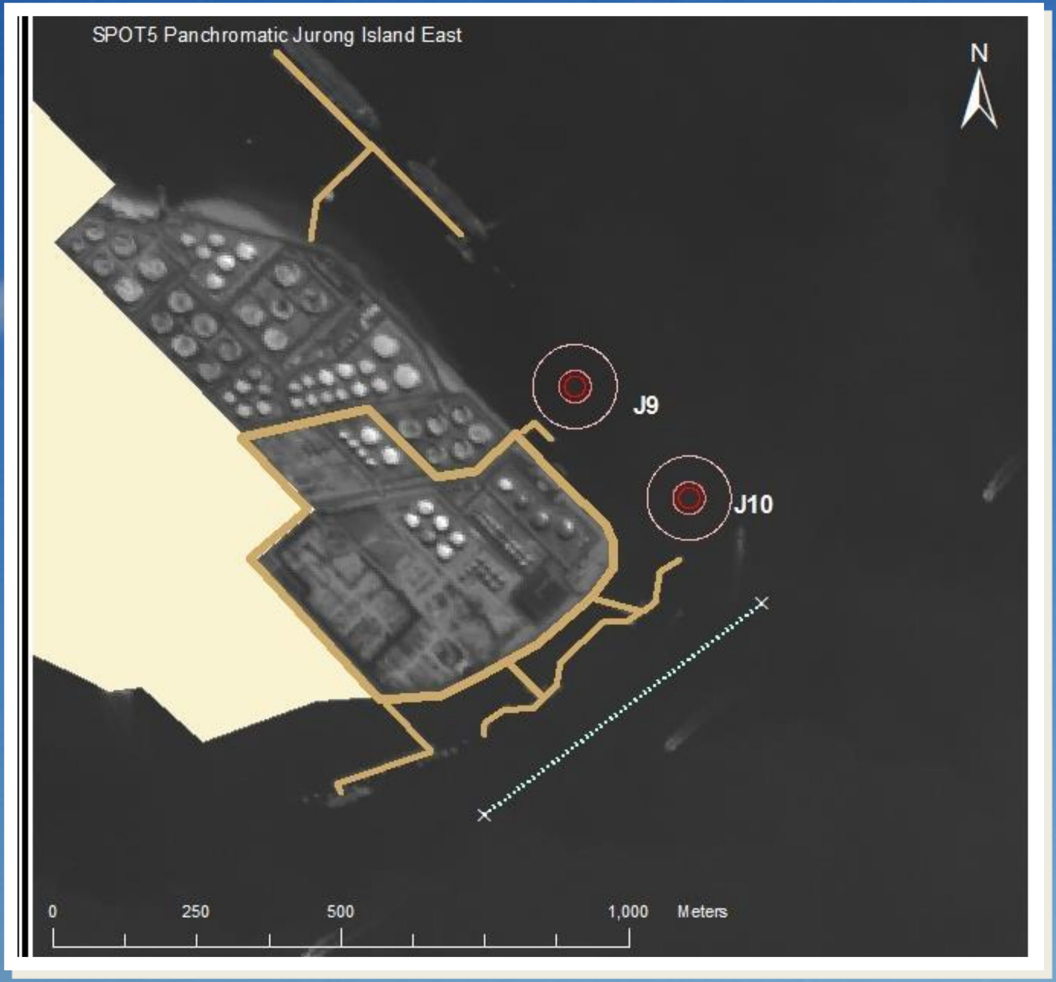
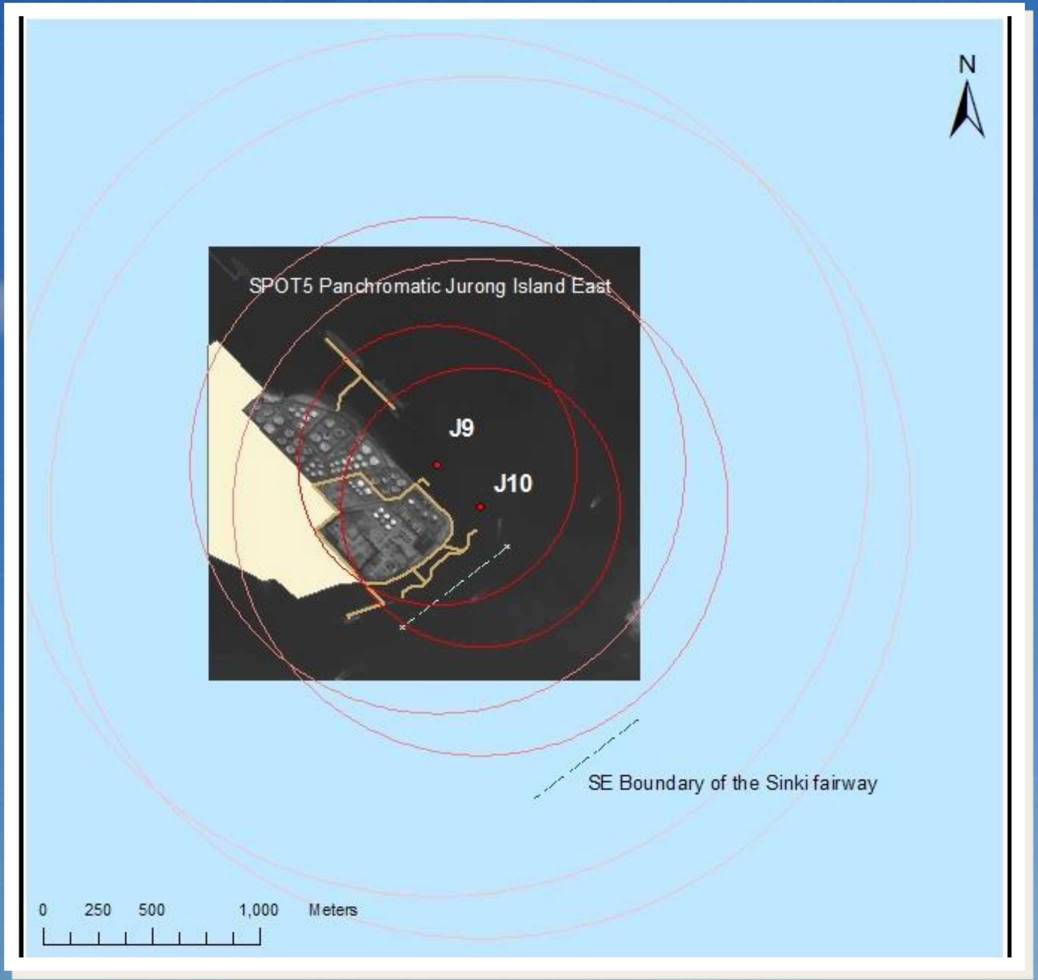
Risk Contours: Benzene Fire



Risk Contour: Propylene Fire



Institute of Petroleum: Classes…

Class	Description
Class 0	Liquified petroleum gases (LPG)
Class I	Liquids which have flash points below 21 ^{o}C
Class II	Liquids which have flash points from 21 ^{o}C upto and including 55 ^{o}C handled, below flash point
Class II	Liquids which have flash points from 21 ^{o}C upto and including 55 ^{o}C handled, at or above flash point
Class III	Liquids which have flash points above 55 ^{o}C upto and including 100 ^{o}C handled, below flash point
Class III	Liquids which have flash points above 55 ^{o}C upto and including 100 ^{o}C handled, above flash point
Unclassified	Liquids with flash points above 100 ^{o}C

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Institute of Petroleum: Spacing

Spacer Requirement	Tank Roof	Minimum Distance
Within a group of small tanks	Fixed or Floating	Determined solely by construction / maintenance operational convenience
Between a group of small tanks or other larger tanks.	Fixed or Floating	10 M minimum, otherwise determined by the size of the larger tanks (see 3 below)
Between adjacent tanks	Fixed	Half the diameter of the larger tank, but not than 10 M and need not be more than 15 M.
Between tank and top of wall of its bund	Fixed or Floating	Half the height of the tank (Access around the tank at compound grade level must be maintained)
Between a tank and a public boundary fence	Fixed or Floating	Not less than 30 M
Between top of wall of a bund and public boundary fence or fixed ignition source	-	Not less than 15 M

Bunds and bund options

- Tanks for Class I, II and III should be surrounded by a bund wall or walls able to contain leaks
- OR arrangements are made that leaks from any tank are directed by gravity to an impound area
- The bund wall should afford protection for fire fighting
- Roads over bund walls into large compounds are helpful
- Separate walls around each tank are not necessary but volume restrictions are suggested:

Single tanks	No restriction
Groups of floating roof tanks	120,000 m^3
Groups of fixed roof tanks	60,000 m^3
Crude tanks	Not more than two tanks of greater individual capacity than 60,000 m^3

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Piping

- Stresses imposed are within the tank design limits
- The settlement of the tank and the outward movement of the shell under the full hydrostatic pressure should be taken into account.
- The first pipe support from the tank should be located at a sufficient distance to prevent damage both to the line and to tank connections
- Consideration may be given to installing spring supports near to tank connection for large bore pipe work.

Piping: Best practice!

- Tank farm piping should be run above ground on concrete or steel supports
- Ground beneath piping should prevent the accumulation of surface water or product leaks
- Manifolds should be located outside the tank bunds.
- Piping should pass over earth bund walls
- Walkways should provide access over pipelines
- Pipelines should be protected against uneven settlement
- Pipe racks carried across paths or roads should have adequate clearance from grade
- Adequate access should be provided to facilitate operation and maintenance at tanks
- All outlets, including drains should have block valves adjacent to the tank

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Piping: Operational practice!

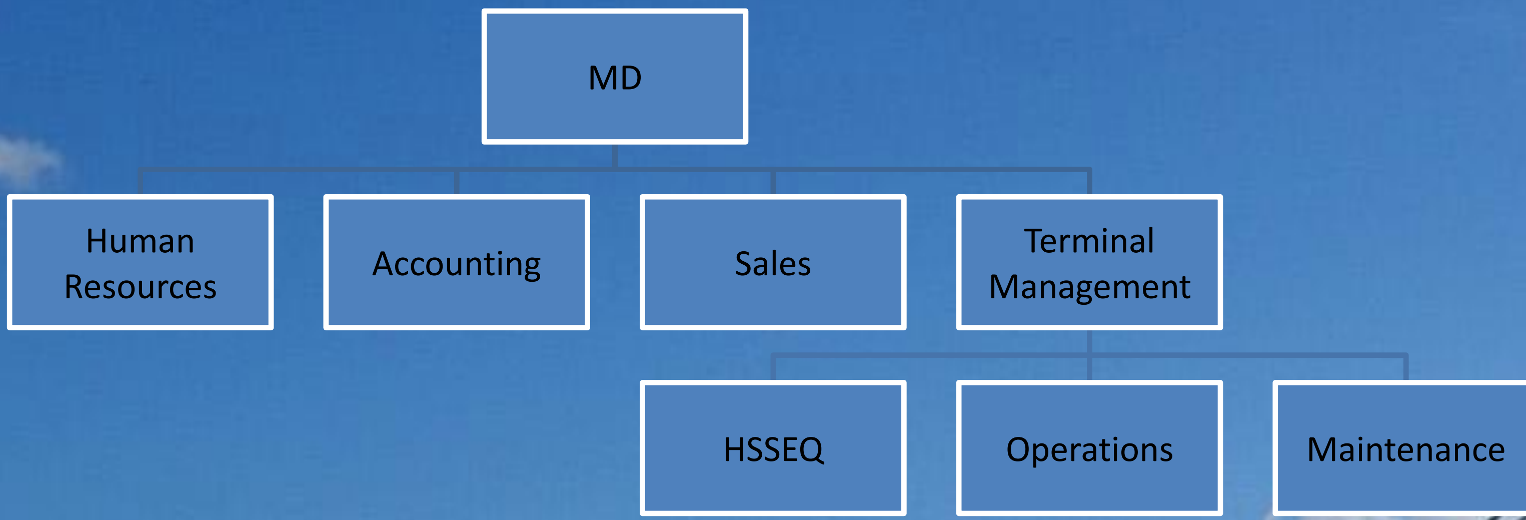
- Segregate black and white products
- Allow for blending from all tanks
  - All white to all white
  - All black to all black

Piping

- Stresses imposed are within the tank design limits
- The settlement of the tank and the outward movement of the shell under the full hydrostatic pressure should be taken into account.
- The first pipe support from the tank should be located at a sufficient distance to prevent damage both to the line and to tank connections
- Consideration may be given to installing spring supports near to tank connection for large bore pipe work.

Tank Terminal Operation

- Finance
- IT
- Engineering
- Business Dev.



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Operations

- Planning of product moves and storage
  - Maintenance of single product tanks
- Implementation of product moves and blending
  - Confirmation of procedures
  - Setting of valves
  - Confirmations of readiness
- Monitoring of product
  - Sampling and testing (commercially driven)
  - Remote/automatics and dip test
    - Head room
    - Free surface
    - Depth
    - Sludge surface

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Operations

- Inspections
  - Seals on floating tanks
  - Valves and flanges
- Cleaning of tanks
  - Prior to inspection
  - Prior to repair
  - Sludge build up
  - Change of product
- Automation
  - No great value except improved monitoring ?
  - Small cost saving on labour
  - Speed of operations enhance

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Pumps & Pumping

Impellor pumps

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Screw pumps

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Selection of pump

- Select for purpose
- Offloading – ship based (hopefully)
  - Must be able to handle large solids
  - Special steel blades or crews
- Blending/Circulation
  - Needs to ensure consistency of mix
  - Speed and volume balanced
- Loading (road or rail)
- High speed
- Stripping
  - Low speed
  - High suction
  - Dry running

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End of Session 6!

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Part 2, Session 3

Part 2: Session 3, Risk etc…

- Maintenance systems
  - Different ways of arranging for maintenance, preventive maintenance, reactive maintenance, contract maintenance etc…
- Reliability centered maintenance
  - An instruction to reliability centered maintenance, its benefits and an implementation process
- Quantitative Risk Assessment/ALARP and Security
  - An introduction to QRA, As Low a Reasonably Practical Risk? The relationship between operations, safety and security?
- Risk identification and quantification
  - How you can identify and quantifying your risks an effective process and suggestions on how to document the process

Maintenance

Terminal Equipment

- The Equipment
  - Tanks
  - Pipes, Valves etc…
  - Loading Arms
  - Sensors, support systems
- Maintenance
  - Reliability Centered Maintenance
- Operational Performance
  - Automation and Training

Reliability

The probability that equipment will not fail in a given time period

A measure of the frequency of downtime

Maintenance

Any activity carried out on an asset in order to ensure that the asset continues to perform its intended functions

Repairs to the asset

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Our vital equipment…

There is a lot of it…

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and it can be complicated

What is RCM

- Reliability Centered Maintenance (RCM) is a methodology used to determine the right maintenance tasks to ensure that any physical asset or system continues whatever its users want it to do, in its present operating context

Where does it come from?

- 1960's: RCM development by airlines
- 1970's: RCM used by military
- 1978: first use of the term "Reliability Centered Maintenance" in book showing strong correlation between age and failure rate did not exist
- 1990's: The start of transfers of the RCM methodology to other sectors

Objectives (1)

- Use optimum maintenance program
- Optimize maintenance efforts
  - focus on the important functions
  - avoid maintenance actions that are not strictly necessary
- Strive for the required reliability
  - at the lowest cost
  - without sacrificing safety
  - without sacrificing the environment

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Objectives (2)

- Maintenance practices which focus on
  - the functional importance of a piece of equipment and its failure/repair history
- Not on
  - vendor PM recommendations
  - traditional “time-directed”overhaul tasks

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RCM principles

- Maintenance is business oriented (not only technical oriented):
  - operations efficiency
  - quality
  - cost
  - safety
  - environment

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Functional Orientation

- RCM focuses on preserving the functions of equipment, not on preserving the equipment itself
- Equipment function: what users wants
- 2 function categories
  - primary functions: speed, output, product quality
  - secondary functions: safety, comfort, environmental integrity

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System Focus

- RCM is more concerned with maintaining the system function, than individual component function
- If the system still provides its primary function if a component fails, the component is allowed to run to failure

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Investigate how equipment fails

- Failure patterns:
  - the relationship between the probability of failure of an item, and its age (see Maintenance Management Guide)
  - RCM seeks to know the probability of failures at specific ages

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Eliminate Failures

- Failure:
  - the inability of equipment, system or plant to fulfill its intended functions
- Failure mode:
  - what is wrong
  - what we need to prevent or physically fix
- Failure cause:
  - why it went wrong
- Failure effect:
  - the consequence of the failure

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Define Maintenance Strategy

- Based on the consequences of failures, the best maintenance strategy is?
  - Run to Failure (RTF)
  - Preventive Maintenance (PM)
  - Predictive Maintenance (PDM)
  - Proactive Maintenance (PAM)
- Condition-based or predictive maintenance strategies are favored over traditional time-based methods

Recognize Design Limitations

- A maintenance program can only maintain the level of reliability inherent in the system design
- No amount of maintenance can overcome poor design
- Maintenance knowledge is fed back to designers to improve the next design

RCM is an ongoing task

- The full benefit of RCM is only achieved when operation and maintenance experience is continuously fed back into the analysis process.

RCM analysis

- Preparation
- System selection and definition
- System function definition
- Functional failures definition
- Failure modes analysis
- Failure consequences assessment
- Selection of maintenance actions
- Data collection and documentation

Study Preparation

- Establishment of an RCM project group
  - one person from maintenance function
  - one person form operations function
  - an RCM specialist
- Definition of objectives and scope of the analysis
- Definition of boundary conditions with respect to safety and environmental protection

System Definition

- The plant register is a good starting point for system definition
- Tools:
  - Pareto analysis (The 80-20 rule)
  - Reliability Block Diagram analysis
  - Fault Tree Analysis

Functional Definition

- Identify and describe the system's required functions and performance standards in its present operating context
- Describe input interfaces required for the system to operate

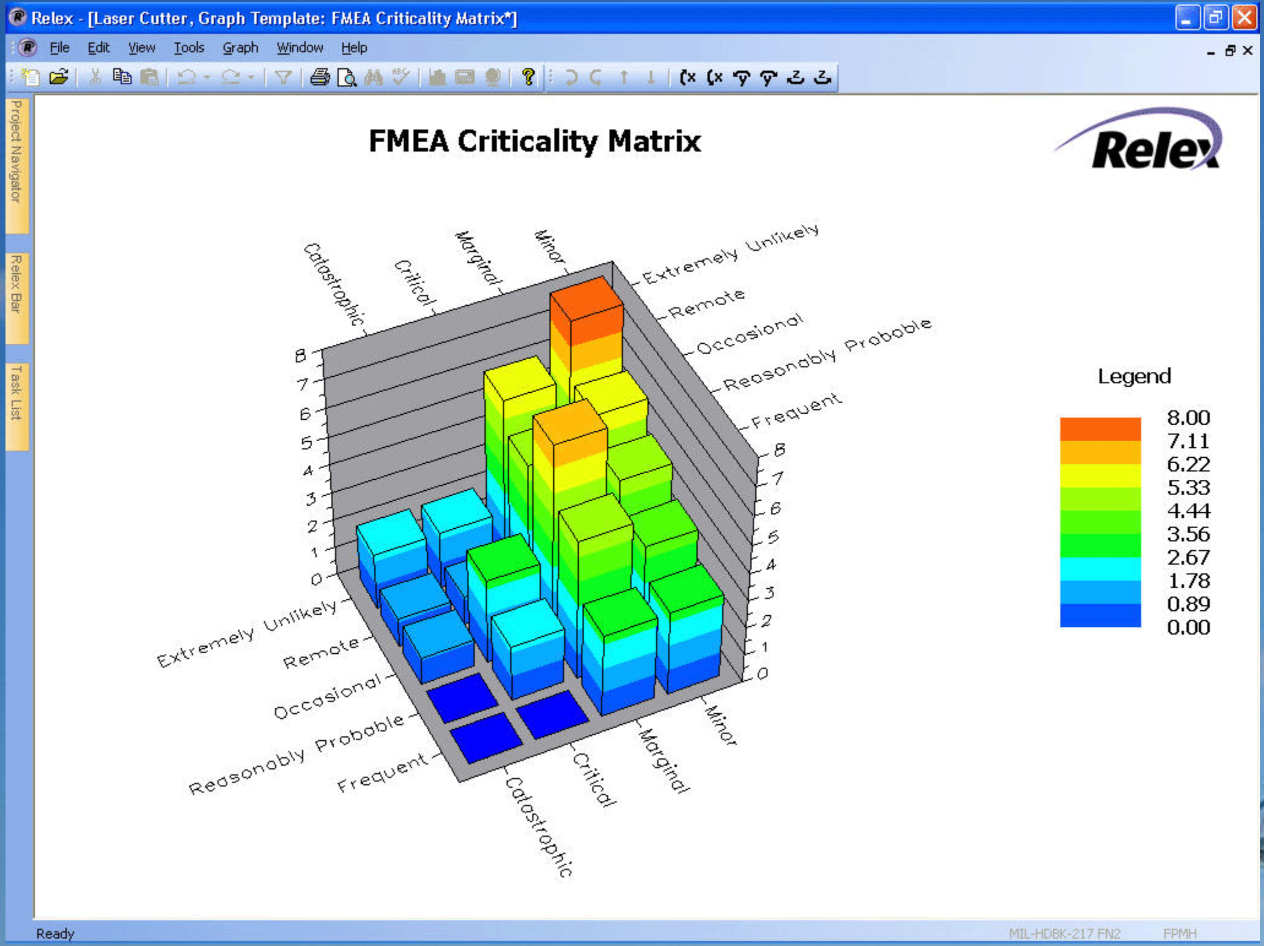
Failure Definition

- Identify the ways in which
  - the system might fail to fulfill its functions
  - the system functions at an unacceptable level of performance

Failure Mode Analysis

- The objective of this step is to identify the events the cause of the failure
  - normal wear
  - human errors
  - design
- FMECA (Failure Mode Effects Criticality Analysis)

FMEA/FMECA


Relex - [Laser Cutter, Graph Template: FMEA Criticality Matrix*]
File Edit View Tools Graph Window Help
Project Navigator
Relex Bar
Task List
FMEA Criticality Matrix
Relex
Catastrophic
Critical
Marginal
Minor
Extremely Unlikely
Remote
Occasional
Reasonably Probable
Frequent
0 1 2 3 4 5 6 7 8
Legend
8.00
7.11
6.22
5.33
4.44
3.56
2.67
1.78
0.89
0.00
Ready
MIL-HDBK-217 FN2
FPMH

Consequence Assessments

- Failures which affect production / operations
- Failures which threaten
  - safety
  - the environment
- Failures which entail the direct cost of repair
- Tool: FMECA

Select Maintenance Actions

- Only applicable and cost-effective tasks may be selected
  - *Applicability: a* preventive maintenance task will be applicable if it can eliminate a failure, or at least reduce the probability of occurrence to an acceptable level - or reduce the impact of failures!
  - *Cost-effectiveness:* the cost of performing the maintenance is balanced with the "cost" of not performing it.

Select Maintenance Actions

- Tool: Decision Tree analysis
- Options
  - do nothing: run to failure
  - prevent: scheduled or non-scheduled tasks
  - predict: checking the condition of equipment and detecting failure
  - Redesign (equipment, process, procedure)

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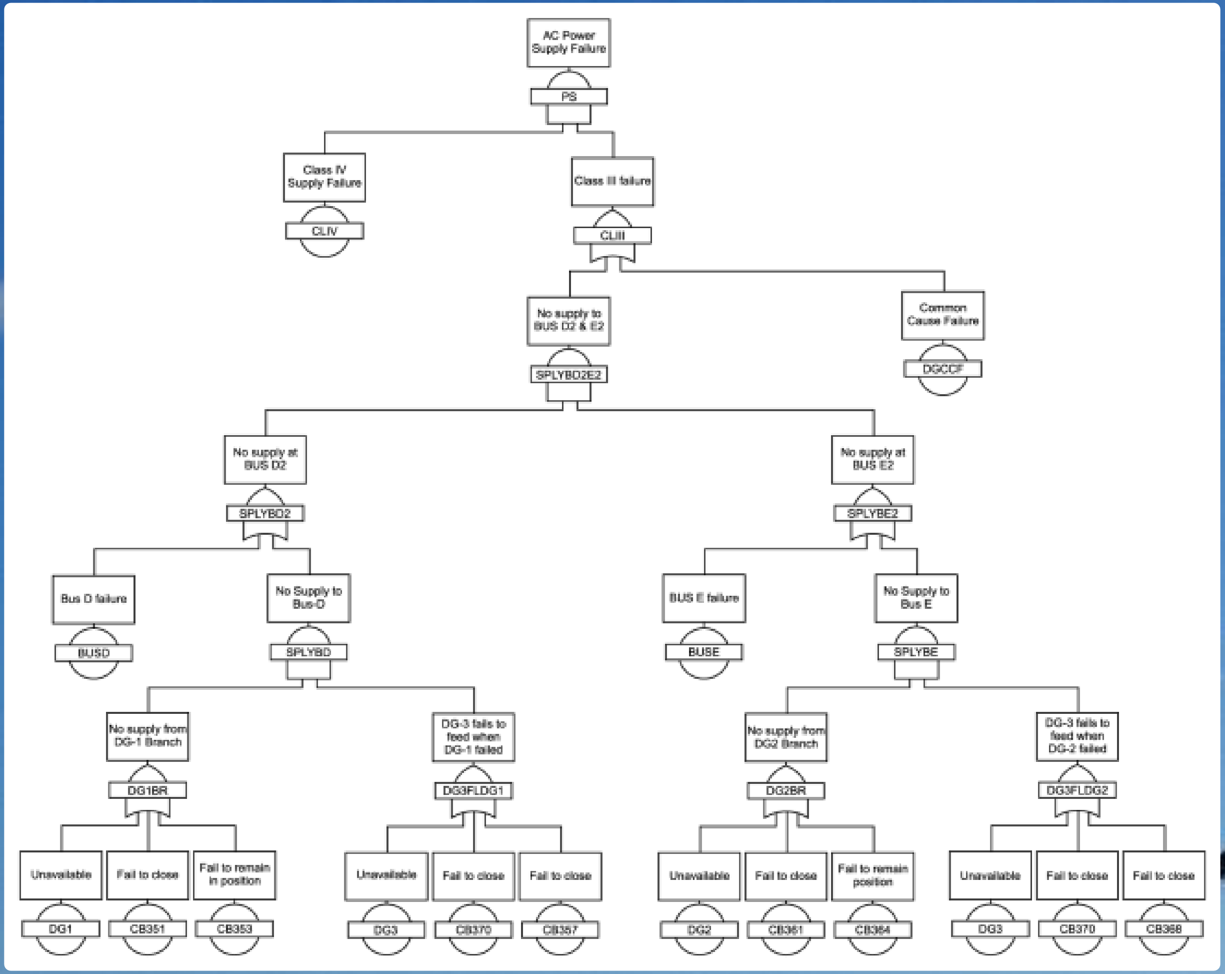
Decision Trees



Data Collection/Documents

- The data necessary for the RCM analysis may be categorized and collected in the following three groups:
  - Design data
  - Operational data
  - Reliability data
- The revised tasks and procedures must be documented to ensure they will be easily understood and performed by the people who do the work

RCM Benefits (1)

- Cost saving
  - shift from time based to condition based work
  - improved operation performance
- Rationalization
  - unnecessary preventive work is eliminated
- Improved safety
- Improved environmental integrity

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RCM Benefits (2)

- A precise and comprehensive maintenance database
  - during the analysis, information is gathered in a coherent form
- Education
  - improved overall level of skill and technical knowledge
- Improved teamwork
- Greater motivation of individuals

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Formal Safety Assessment

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Formal Safety Assessment

- Formal Safety Assessment (FSA) is now being applied to the sector in the IMO rule making process…
- Guidelines for FSA approved in 2002
  - Includes Quantitative Risk Assessment
  - Includes ALARP concept
- Identifies five stages as part of an FSA:
  - Identification of hazards
  - Assessment of risks
  - Identification of control options
  - Cost benefit assessment
  - Recommendations for decision-making

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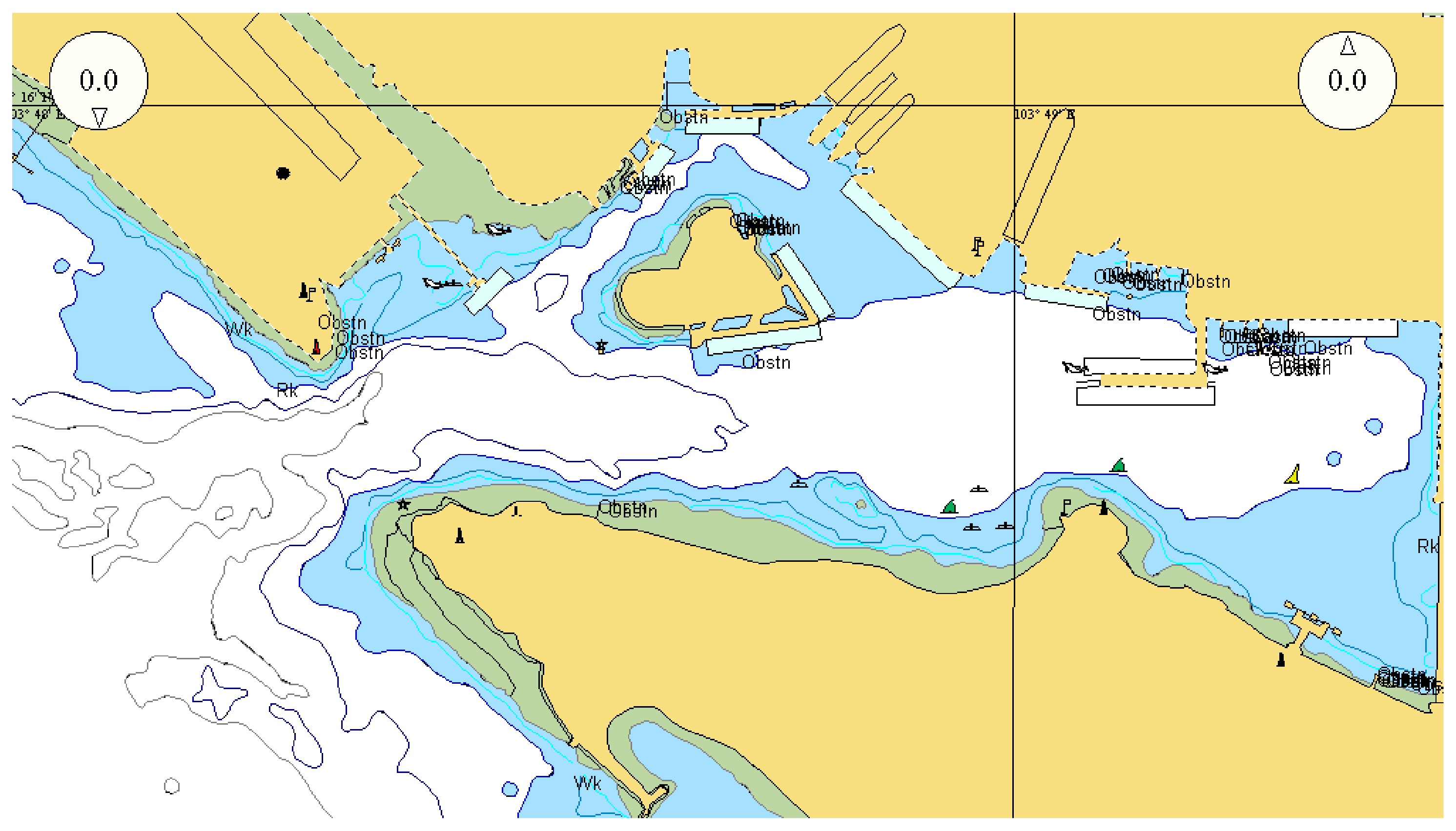
Example FSA, or nearly…



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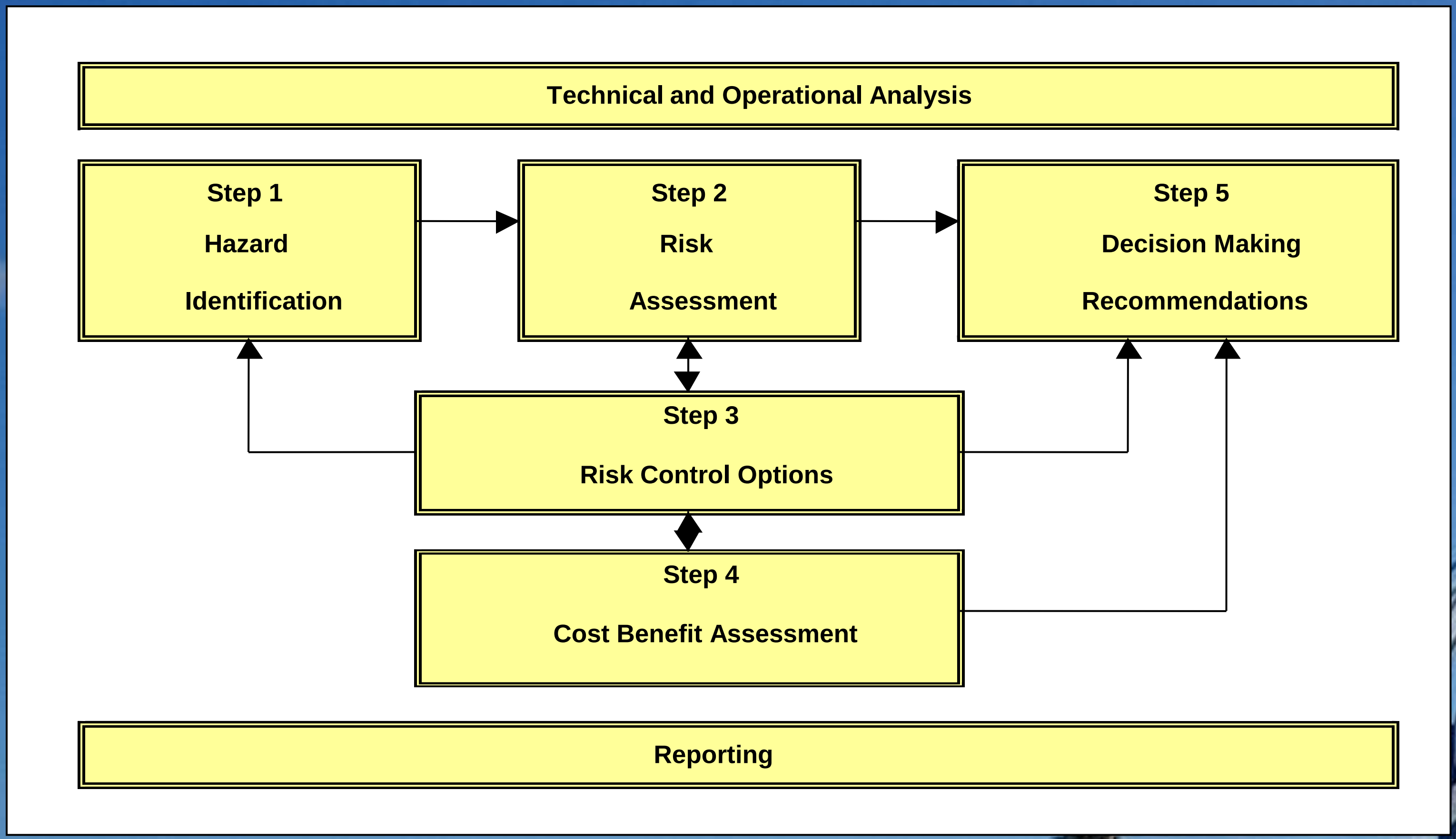
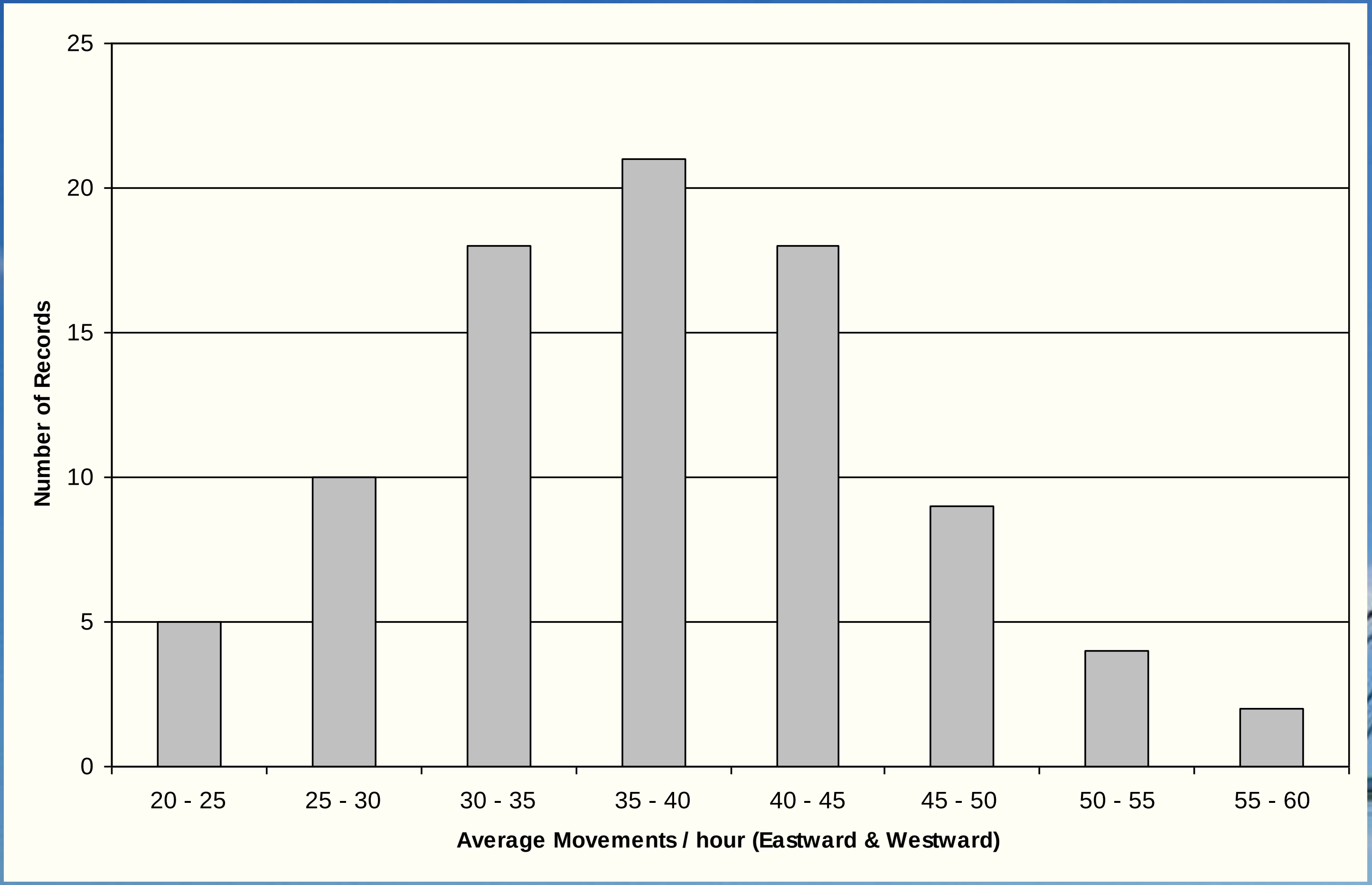
Method



Hazard Identification

- Video Surveys
  - Multiple positions
  - Direct measurement of all traffic
- VTS Surveys
  - All radar tagged traffic
- Accident records
- Discussions with interested parties

Video surveys



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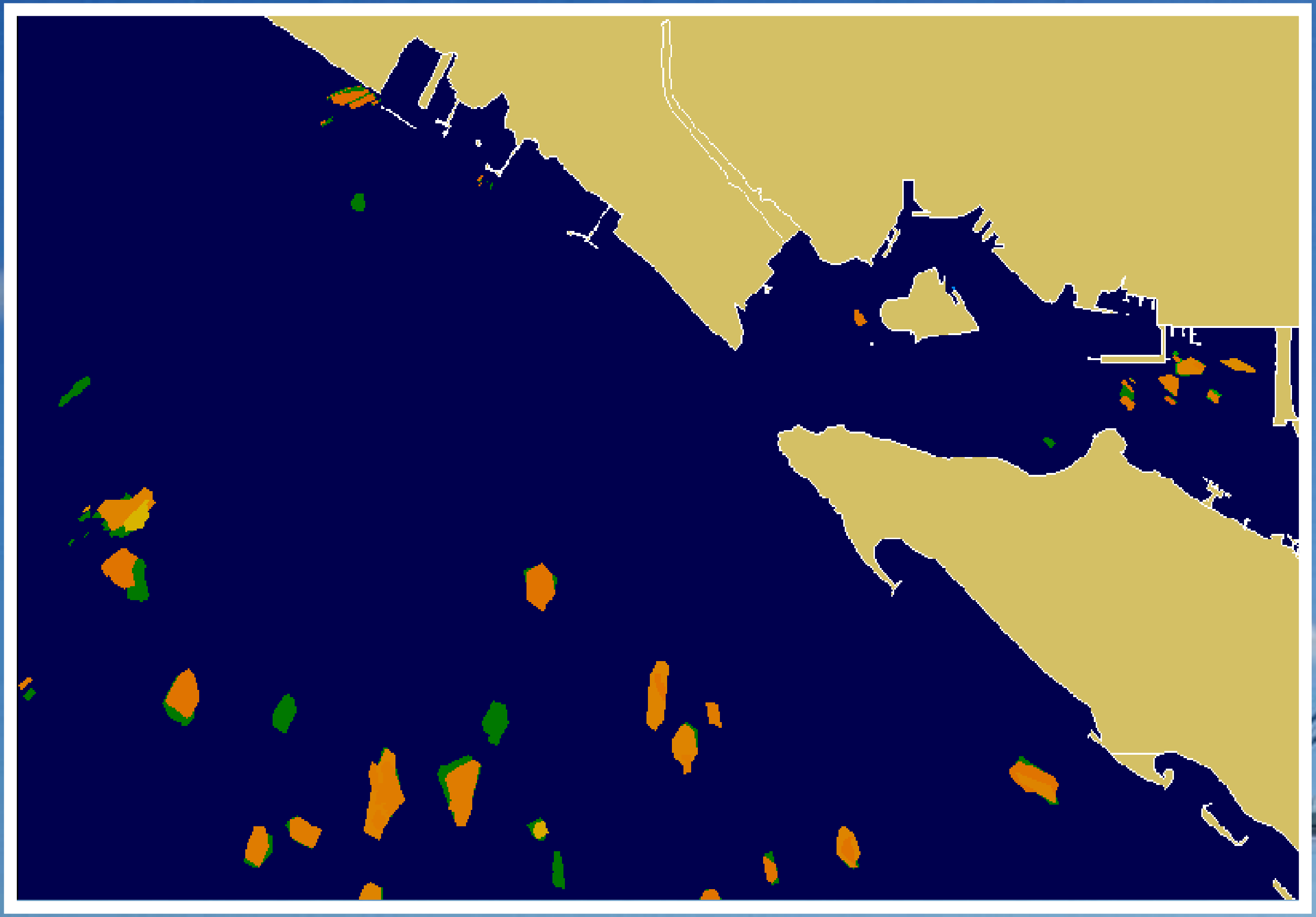
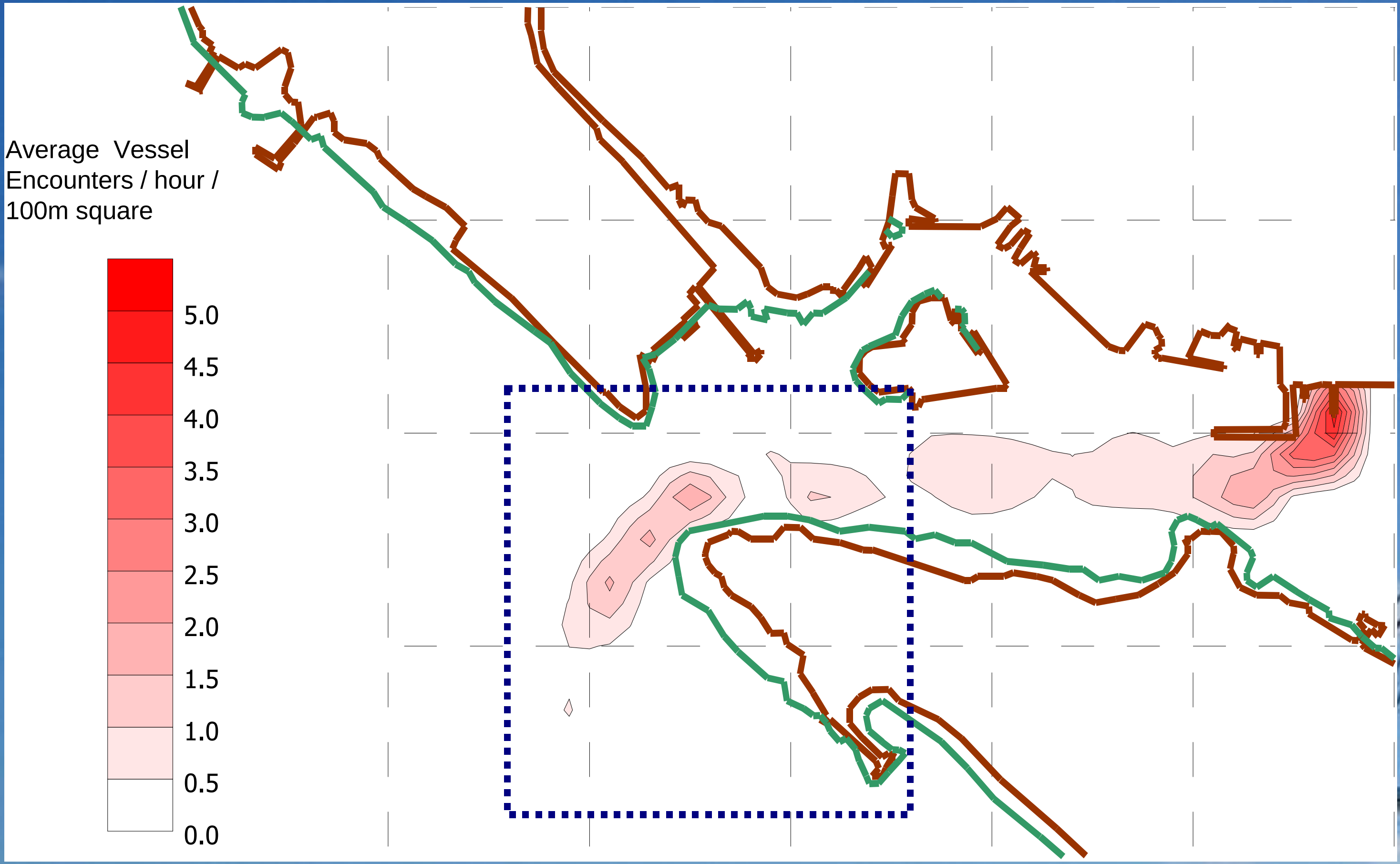
VTS Surveys



Traffic Levels



Interested parties

- Cruise Ships – No safety problems
  - Small cruise ships, concerned about poor navigation discipline amongst ferries and communications with ferries.
  - Differing pilot standards
  - Anchorage restricting approach angle to bay in high currents
- Pilots – No safety problems
- Tugs, Workboats etc. – No safety problems
  - Delays caused by cruise ships (commercial cost)
- Ferries
  - Speed limits and inappropriate control response by Masters
  - Concern for passenger comfort and safety at holding positions
  - Delays caused by cruise ships (commercial cost)

Hazard assessment

Description	Category	Priority
Traffic Density	A	High
Heaving to outside Cruise Bay	A	High
Ferry speed regulations	B	Medium
Poor navigation discipline	B	Medium
Western anchorage	B	Medium
Differing pilot standards	B	Medium
Entrance to Cruise Bay	E	Low
Limited manoeuvring room	E	Low
Emergency positions	C	Low
An air draft restriction	D	Low

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Risk Assessment

- Frequency Estimation
- Severity Estimation
- Risk Classification
- Risk Toleration

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Frequency Assessment

Class		enc / hr / 100 m sq
F1	Frequent	10.00
F2	Common	5.00
F3	Likely	2.50
F4	Possible	1.00
F5	Unlikely	0.50
F6	Rare	0.10
F7	Improbable	0.01

Actual 2.5 to 3.0 enc / hr / 100 m sq

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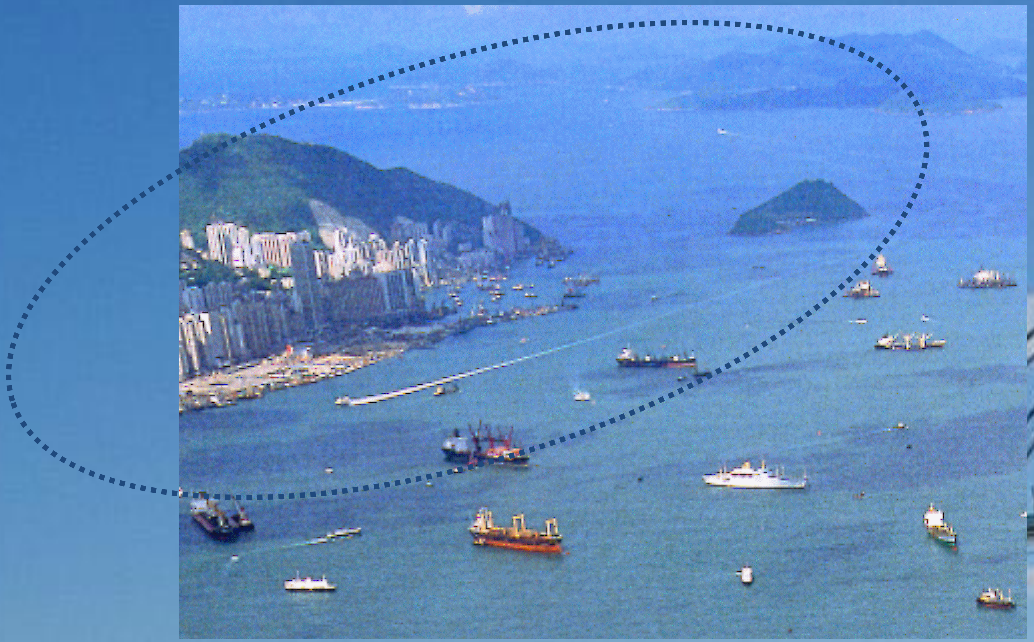
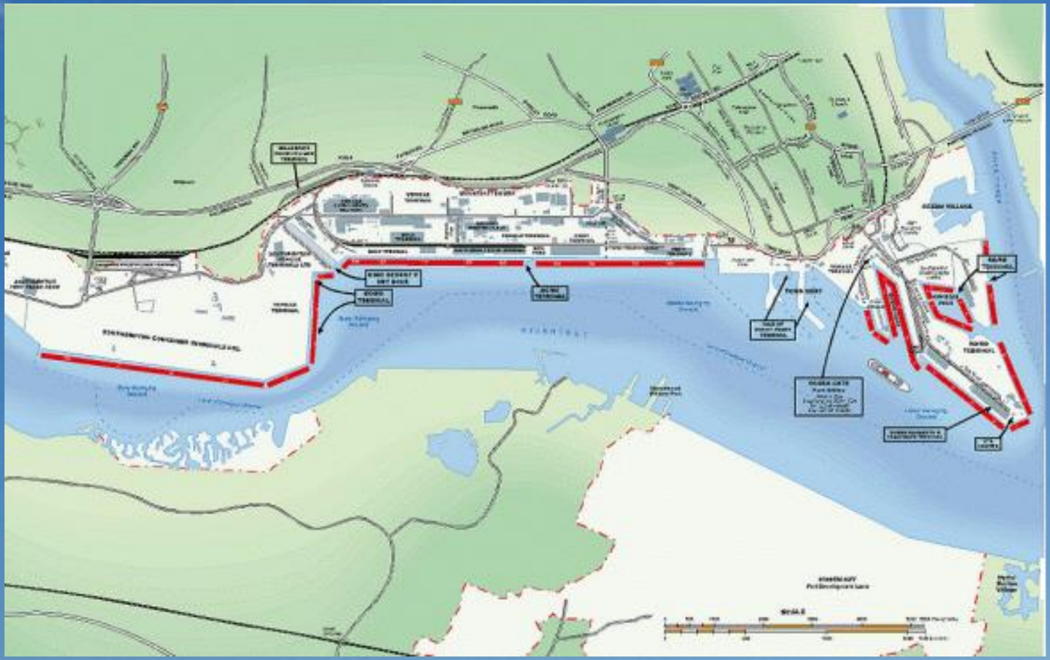
Green Island

- Similar traffic mix
- Similar encounter rate to Cruise Bay
- Higher Incident Rate



Southampton Water

- Complex traffic mix
- Encounter rate lower than Cruise Bay
- Incident Rate Lower



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Severity Assessment

Class		Definition
S1	Negligible	No injury, or injuries that do not require first-aid treatment
S2	Minor	Injuries to crew or staff resulting in 7 days or less off work
S3	Moderate	Injuries to crew or staff resulting in more that 7 days, but less that 1 year off work. The effects are not likely to be long-term and do not affect quality of life, e.g. broken bones.
S4	Severe	Injuries to crew or staff resulting in 1 year or more off work. The effects are long-term and affect quality of life, e.g. loss of limb, loss of eyesight.
S5	Fatal	Resulting in death (less than 10 fatalities)
S6	Disastrous	Resulting in 10 or more fatalities

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ALARP… or acceptable risk

	Frequency of Encounters	S1	S2	S3	S4	S5	S6
	10.00 (F1)	Undesirable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable
Green Island	5.00 (F2)	Acceptable with Controls	Undesirable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable
Study site	2.50 (F3)	Acceptable with Controls	Acceptable with Controls	Undesirable	Not Acceptable	Not Acceptable	Not Acceptable
London, New York and Rotterdam	1.00 (F4)	Acceptable	Acceptable with Controls	Acceptable with Controls	Undesirable	Not Acceptable	Not Acceptable
	0.50 (F5)	Acceptable	Acceptable	Acceptable with Controls	Acceptable with Controls	Undesirable	Not Acceptable
	0.10 (F6)	Acceptable	Acceptable	Acceptable	Acceptable with Controls	Acceptable with Controls	Undesirable
	0.01 (F7)	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable with Controls	Acceptable with Controls

Risk Measurement…

	Hong Kong waters, all incidents (1993 - 2002)	US Recreation Boating Safety	US Personal Watercraft Safety
Fatalities	11	802	57
Injured persons	40	4,171	1,389
Accidents	368	7,369	3,081
Fatality Rate	3%	11%	2%

Fatality Rate Comparison

ALARP


1x10 -2
1x10 -3
1x10 -4
1x10 -5
1x10 -6
1x10 -7
1x10 -8
1x10 -9
Frequency of Incidents (per year)
UNACCEPTABLE
ALARP
ACCEPTABLE
1
10
100
1,000
10,000
Number of Fatalities (N)

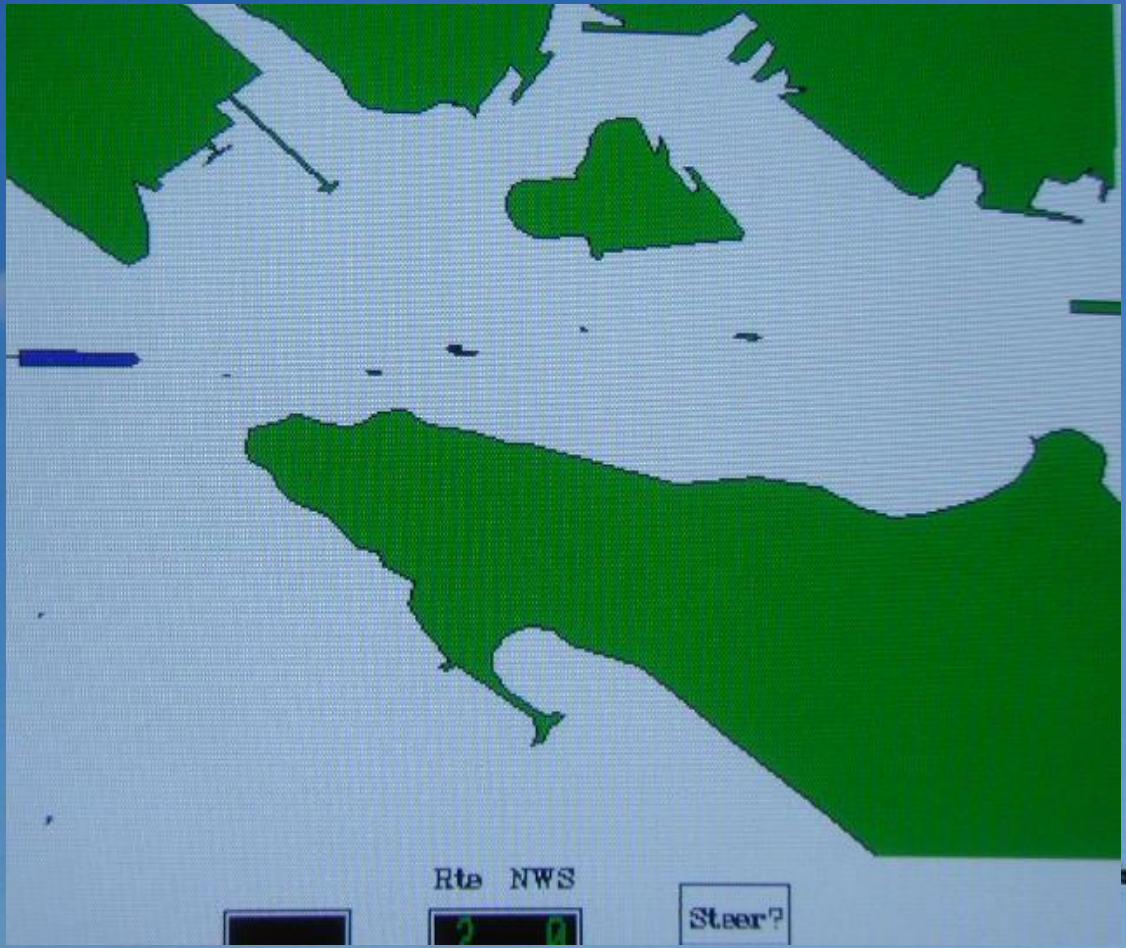
Risk Levels

- Aversion and acceptable level of risk
  - Man made disaster 2.2
  - Natural disasters 10.0
  - Daily accidents 580.0
  - Other similar marine traffic areas 40.0
  - PLL limit proposed $2.5*10^{-7}$

Risk Control Options

- Segregation of Cruise and Ferry traffic:
  - Reopening of alternative channel
  - Relocate ferry or cruise operations
- Amendment to speed limits
  - Increase speed limit,
  - reduce time at risk improve maneuverability of ferries
- Improved monitoring of cruise ships
- Reduce time delays to ferries and hence bunching

Simulator for Assessment



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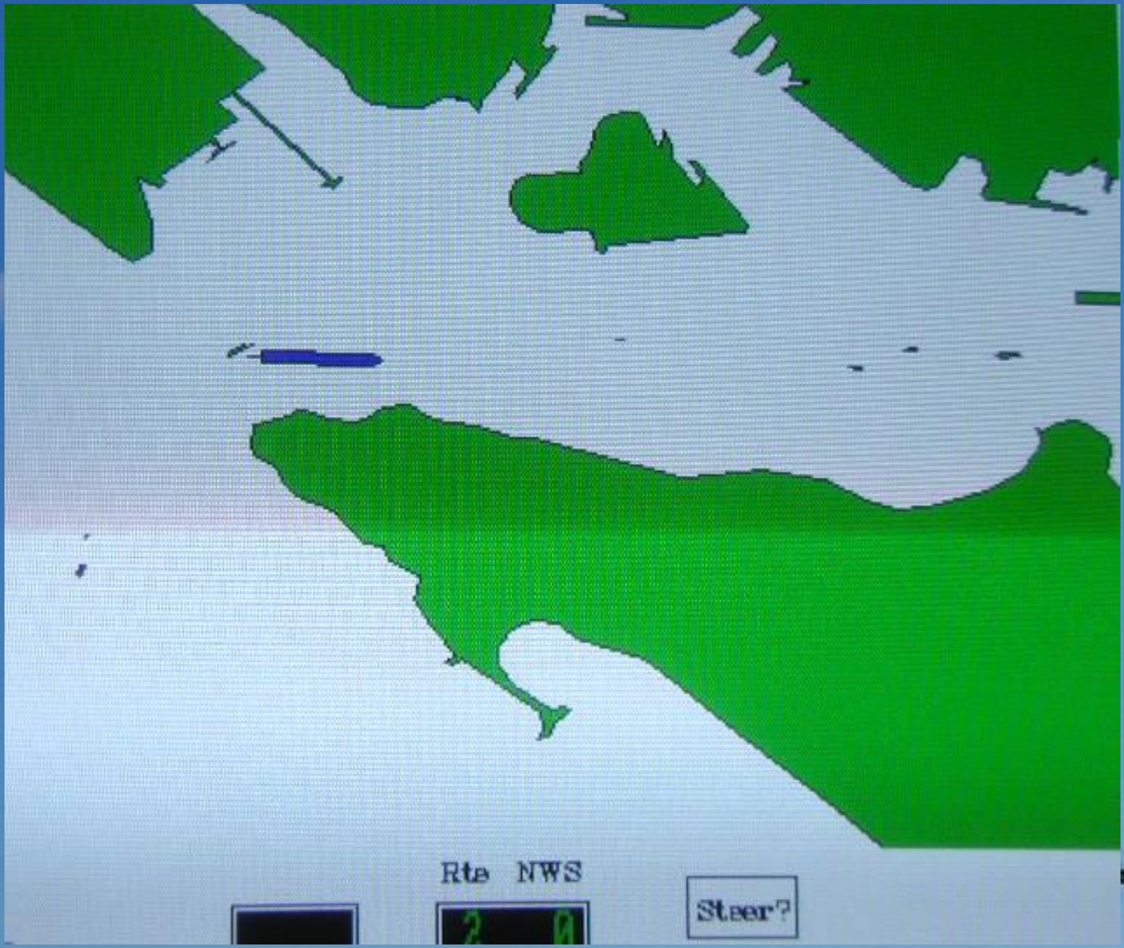
Simulator for Assessment



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Simulator for Assessment

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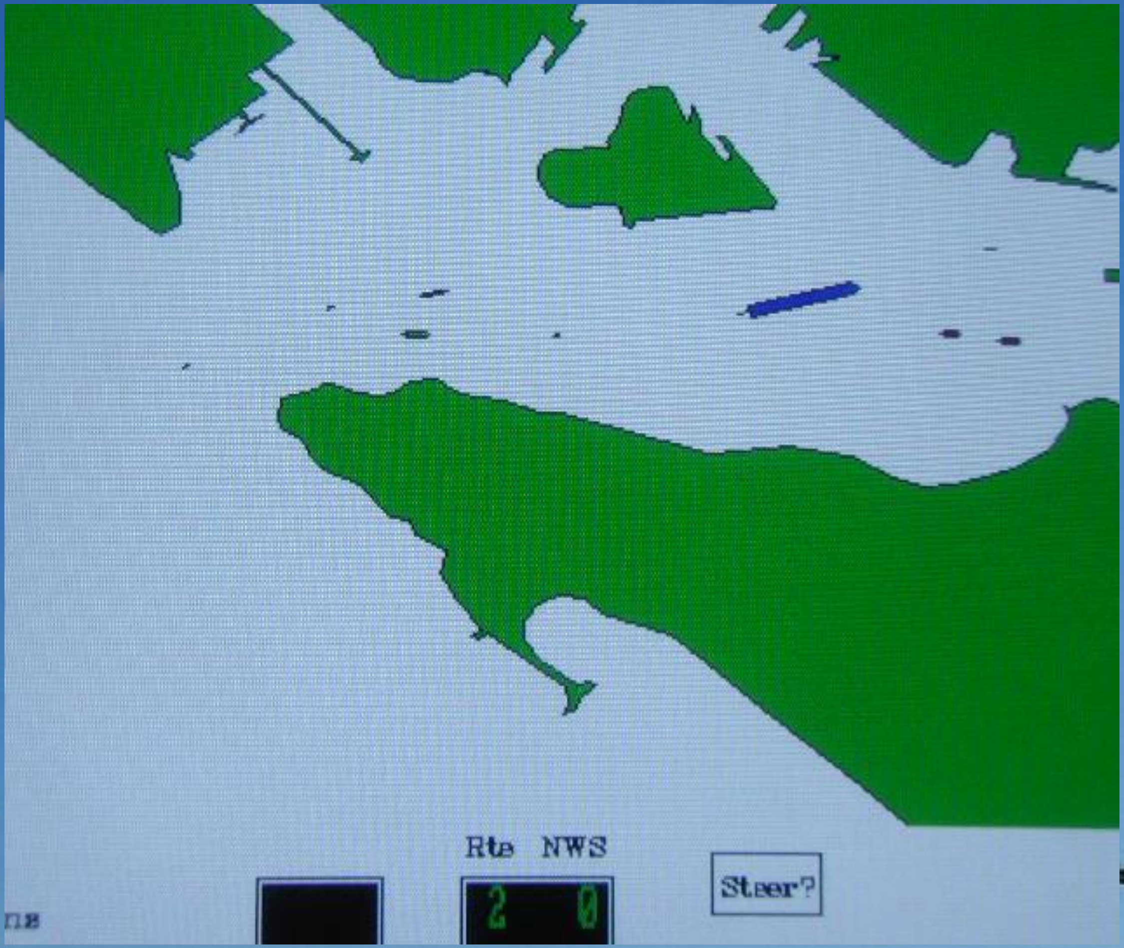
Simulator for Assessment



Simulator for Assessment

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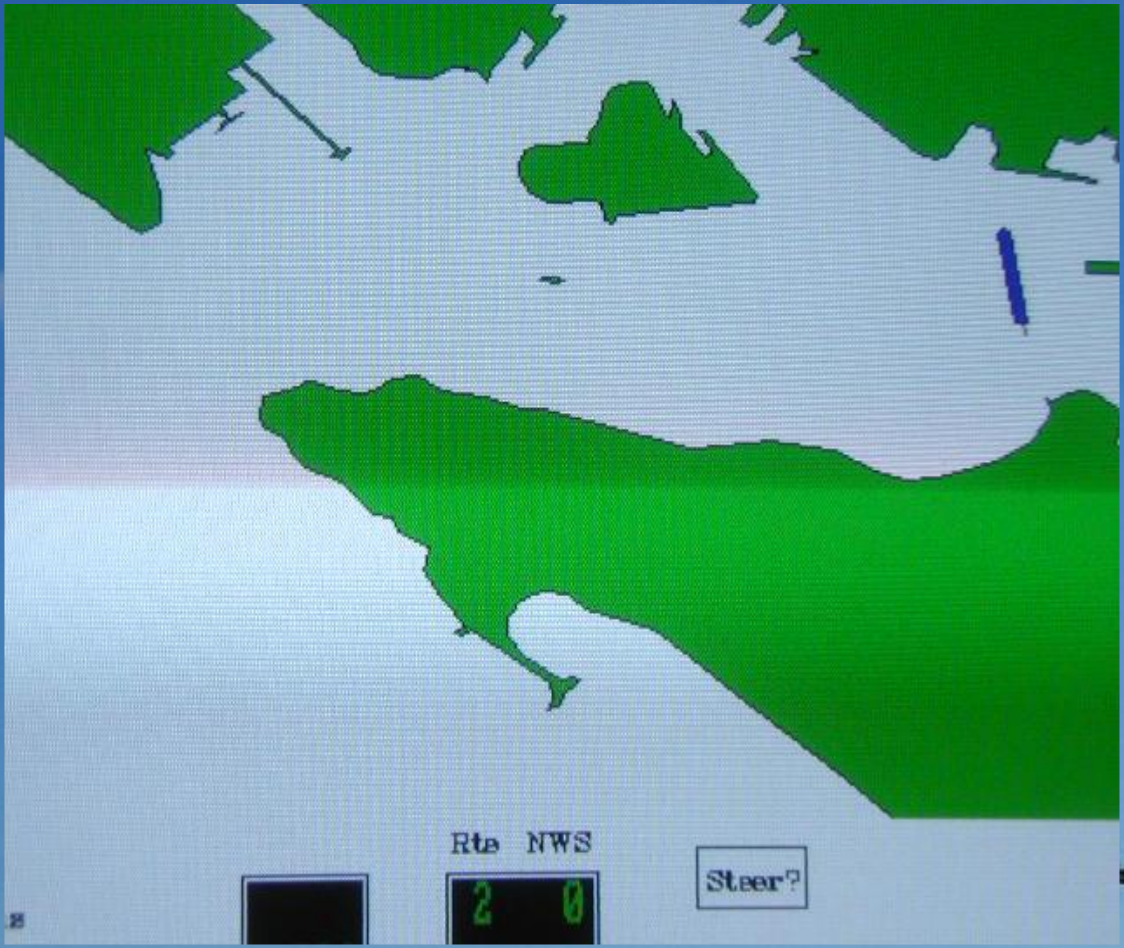
Simulator for Assessment



Simulator for Assessment

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Impact Assessment

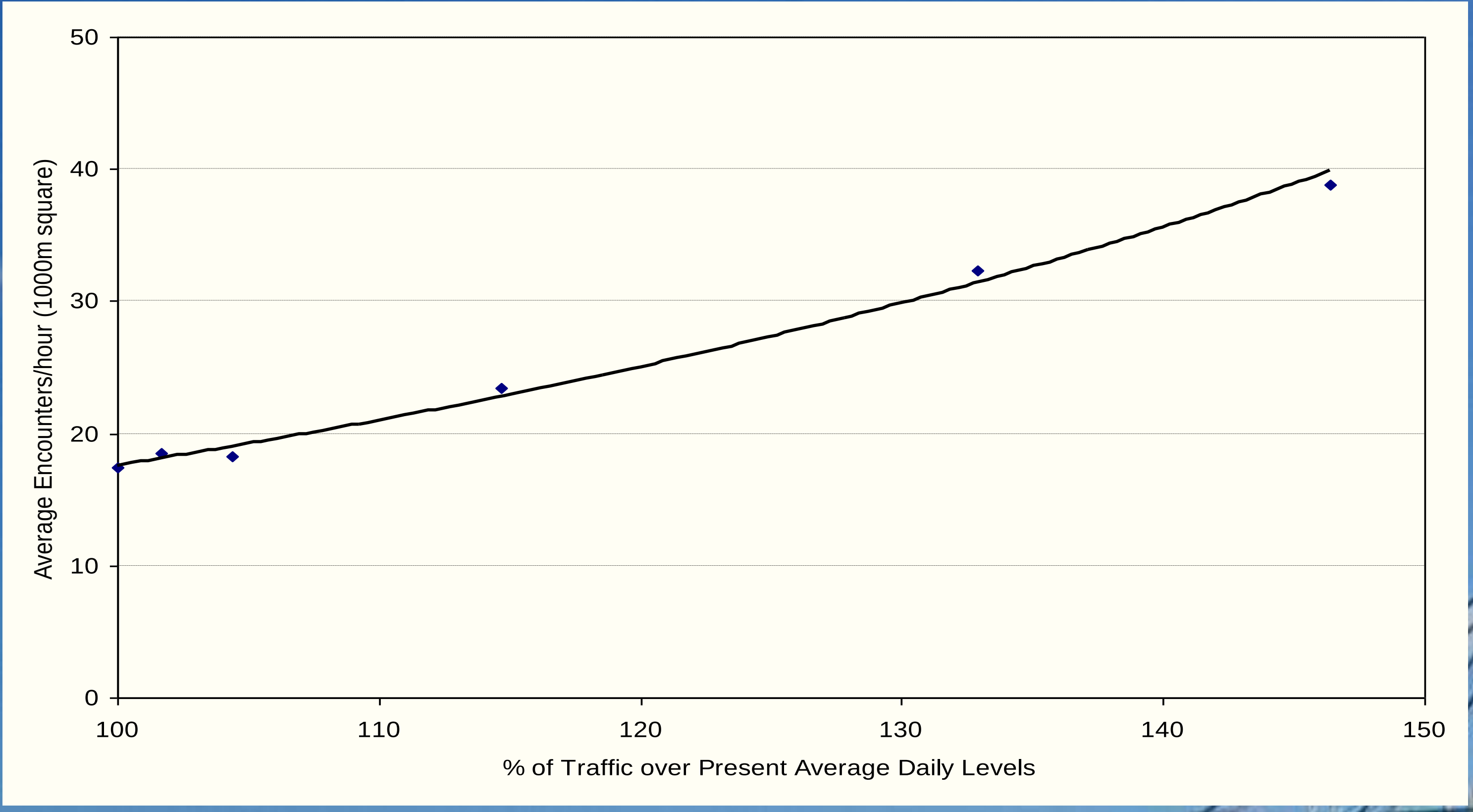
Ferry traffic growth:

Run 1 - Present traffic
Run 2 - Present traffic + 5% Ferry growth
Run 3 - Present traffic + 10% Ferry growth
Run 4 - Present traffic + 15% Ferry growth
Run 5 - Present traffic + 20% Ferry growth
Run 6 - Present traffic + 25% Ferry growth

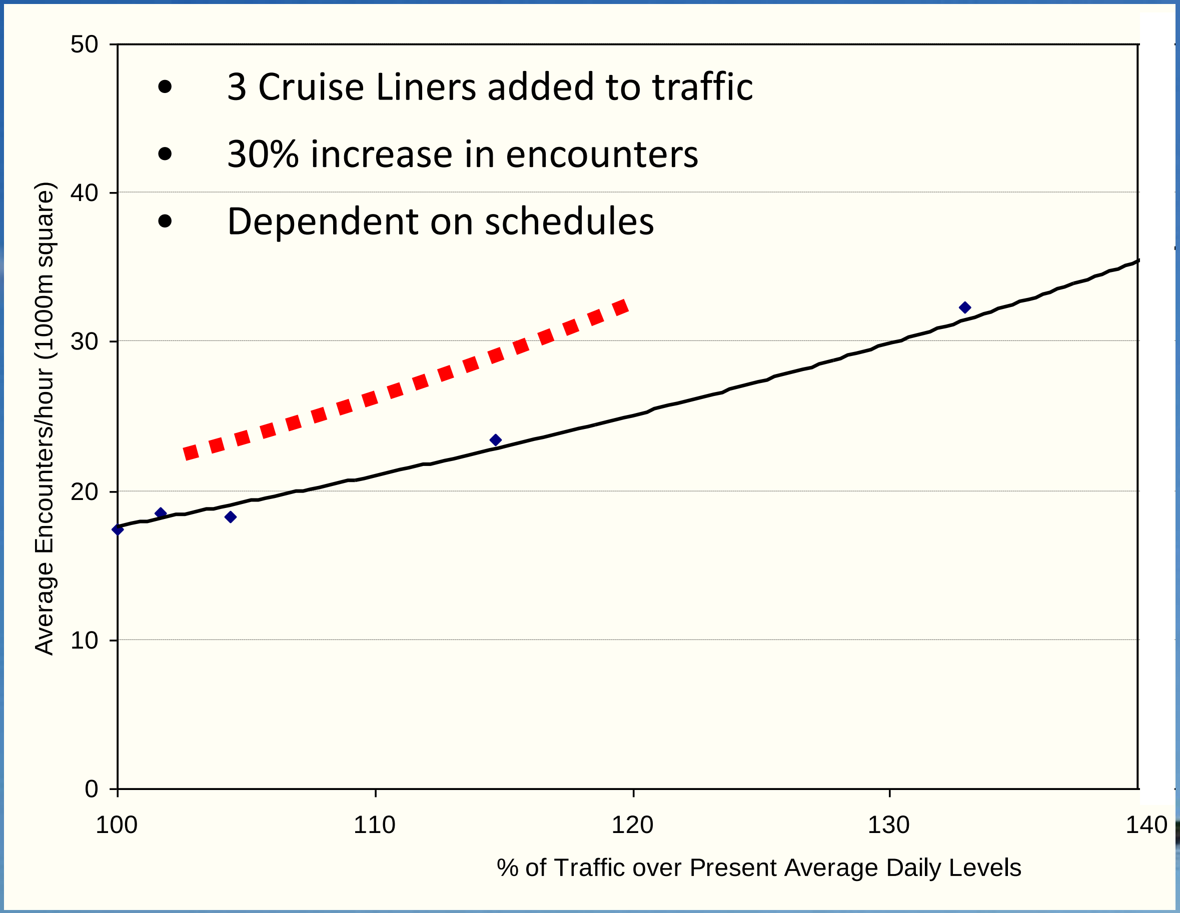
Cruise traffic growth:

Run 7 - Present traffic + 33% Cruise Growth
Run 8 - Present traffic + 66% Cruise Growth
Run 9 - Present traffic + 100% Cruise Growth

Risk Profile



Cruise Impact



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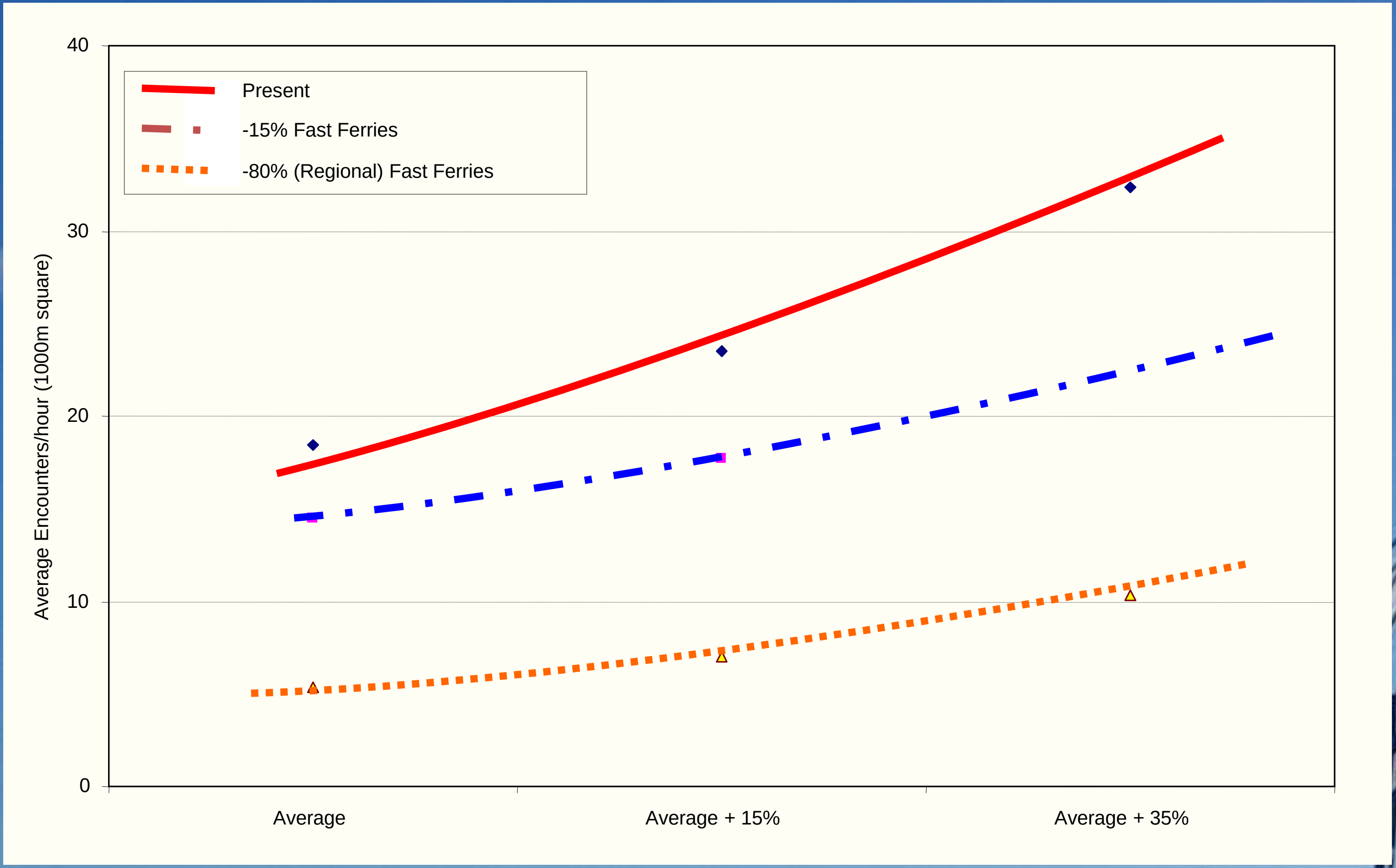
Ferry Diversion



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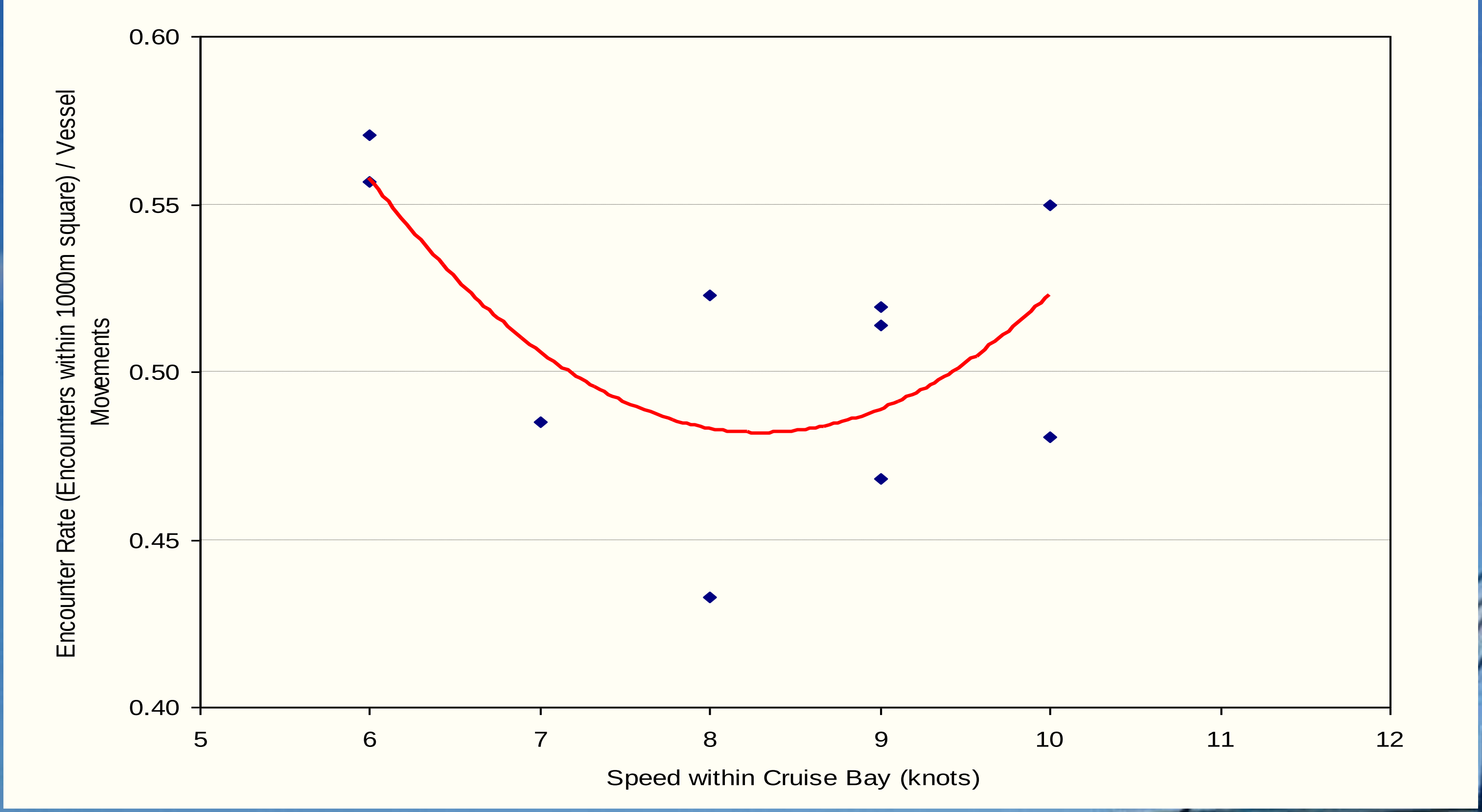
Speed Control



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Changes noted…

Present Encounter Rate 2.5 to 3.0

Traffic growth Scenario One,		
no cruise growth, 10% overall ferry growth:		4.5 to 6.0
Traffic growth Scenario Two,		
two new berths, 10% overall ferry growth:		5.6 to 7.5
Remove Regional Ferry Traffic	0.8	
Remove West Bound Ferry Traffic	2.2	
Divert Traffic to reopened channel	2.2	
Remove Bum Boats		1.6
Adjust to Optimun Speed Regulation		2.4
Improved Monitoring		2.3

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Cost Benefit Analysis

Reopening of Channel
Cost high – Sing$ 25 million plus
Benefit – marginal, IRR 20%

Relocation of ferry operation
Cost moderate – Sing$ 10 million (if existing terminals adequate)
Benefit – good, IRR 50%

New Cruise Terminal
Cost high – Sing$ 200,000,000
Benefit – marginal, IRR 23%

Amendment to speed limit
Cost small
Benefit – high

Improved monitoring
Cost small
Benefit – high

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Conclusions

- Risk on the borderline of being acceptable
- The primary causes risk, entrance width and traffic
- Effective regulation is controlling other causes of risk
- There is a different risk perception between Stakeholders
- Growth in ferry traffic is unacceptable
- Growth in cruise traffic at peak times is unacceptable
- Increased monitoring reduces risk
- Optimum speed regulation in 8.0 knots…an increase
- Removing ferries reduces risk
- Removing Bumboats reduces risk
- Removing Cruise ships does not reduce risk

Recommendation

Speed control regulation to be amended

Improve monitoring to be implemented ASAP

No developments impacting traffic growth to be approved by MPA in Cruise Bay

Formal Safety Assessment

- Formal Safety Assessment (FSA) is now being applied to the sector in the IMO rule making process…
- Guidelines for FSA approved in 2002
  – Includes Quantitative Risk Assessment
  – Includes ALARP concept
- Identifies five stages as part of an FSA:
  – Identification of hazards
  – Assessment of risks
  – Identification of control options
  – Cost benefit assessment
  – Recommendations for decision-making

End of Session 7!

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Part 2, Session 4

Part 2: Session 4, Stakeholders

- Stakeholder Management
  - How to deal with stakeholders effectively and respond to their needs to ensure your interests are defended
- Legal and regulatory controls
  - How legal and regulatory authorities can be managed and assisted to deliver effective ports and terminals
- Protecting the environment
  - What do you really need to do, how to contribute and how can you try and avoid being blamed for problems you did not create
- Overcoming NIMBY
  - Trying to engage and gain the support of local residents and maintaining this as you expand and develop over time

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Guidelines

- Transparency
  - Must convince all stakeholders that the process is “fair”
- Clarity
  - All users and stakeholders must have similar understanding
- Consistency
  - Cannot be changed very often investors committing to long term investment

Stakeholder Engagement

"Stakeholder engagement comes in many forms, in the Public and Private Sectors, who are often compelled to engage their internal and external stakeholders for reasons of good governance to
achieve performance assurance."

It requires a Commitment to Thinking and Planning
how to conduct a stakeholder engagement.

Who are Stakeholders?

"Genuine stakeholders are those could affect and/or could be affected by your activities"

You don't have to talk to everyone but you must consult wide enough to get the whole picture and you MUST consult those who have high level of influence over the successful deployment of policies.

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Stakeholder Mapping

"A way of identifying, engaging and listening to those people who may genuinely influence the successful development, deployment and adoption of policies"

You must listen for Key Issues of Concern that represent Material Risks and Opportunities for developing policies that can be effectively deployed.

Stakeholder Engagement Plan

"Engagement is the process of exchanging information, listening to and learning from stakeholders, with the goal of building knowledge and understanding of risks and opportunities and trust on key issues of concern."

It requires a Commitment to preparing by knowing who you should talk to, why you should talk to them, what you need to tell them and what you need to know from them.

Reducing the Risk Of Failure

"It is a process through which to develop detailed knowledge of risks and opportunities which only stakeholders may know"

You need to consistently communicate the same information to everyone you consult in terms of what you are doing and why you are doing it.

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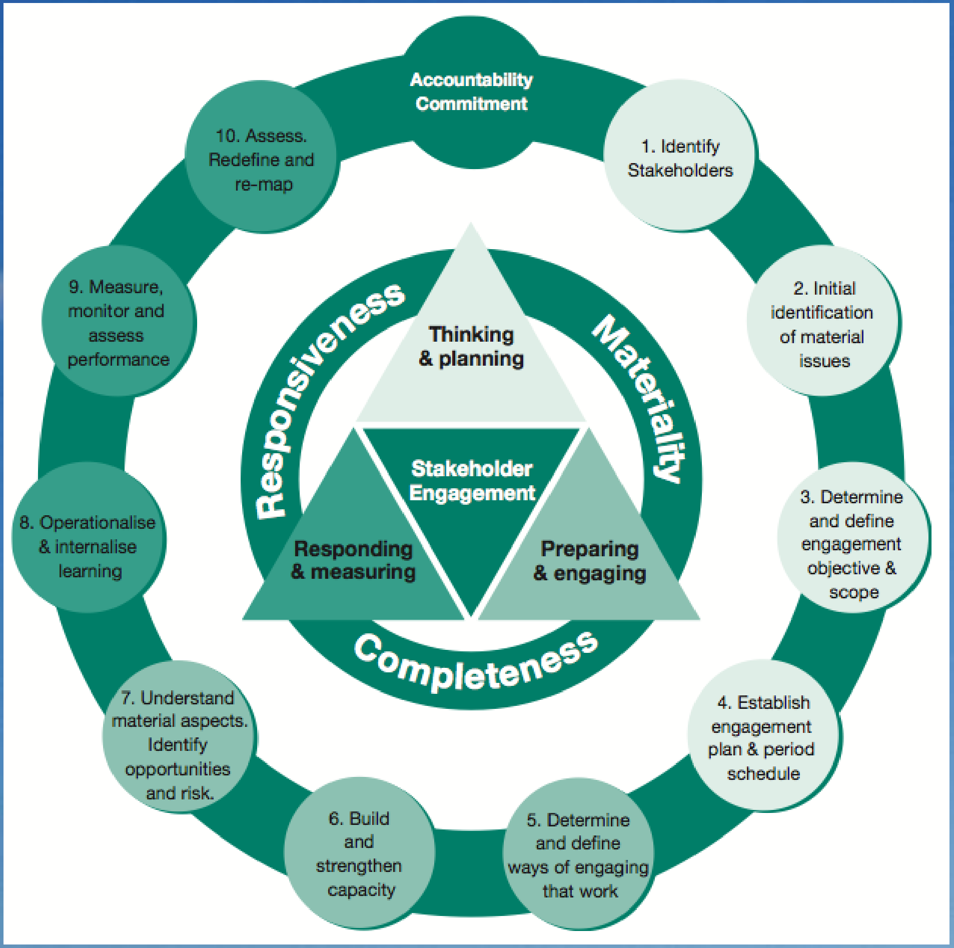
Stakeholder Engagement



Stakeholder Engagement

- A way of consulting widely and understanding the concerns of genuine stakeholders i.e. understand their needs, manage their expectations and influence their perceptions
- A way to systematically consider and respond to those concerns by identifying material risks and opportunities that may influence the development of your activities
- A way of identifying and understanding the social, environmental and economic performance and impacts of your activity
- A process through which you can reflect this understanding in policies and decision making

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Recognizing Stakeholders

Criterion	Description
Responsibility	Stakeholders to whom you have a responsibility
Influence	Stakeholders with influence or decision-making power
Proximity	Stakeholders with whom you interact most, including internal stakeholders, those with long-standing relationships and those on whom you depend for day-to-day operations
Dependency	Stakeholders who are directly or indirectly dependent on your activities
Representation	Stakeholders who through regulation or custom or culture can legitimately claim to represent a constituency (including especially our clients)
Policy and strategic intent	Stakeholders whom we directly or indirectly address by policy or practice

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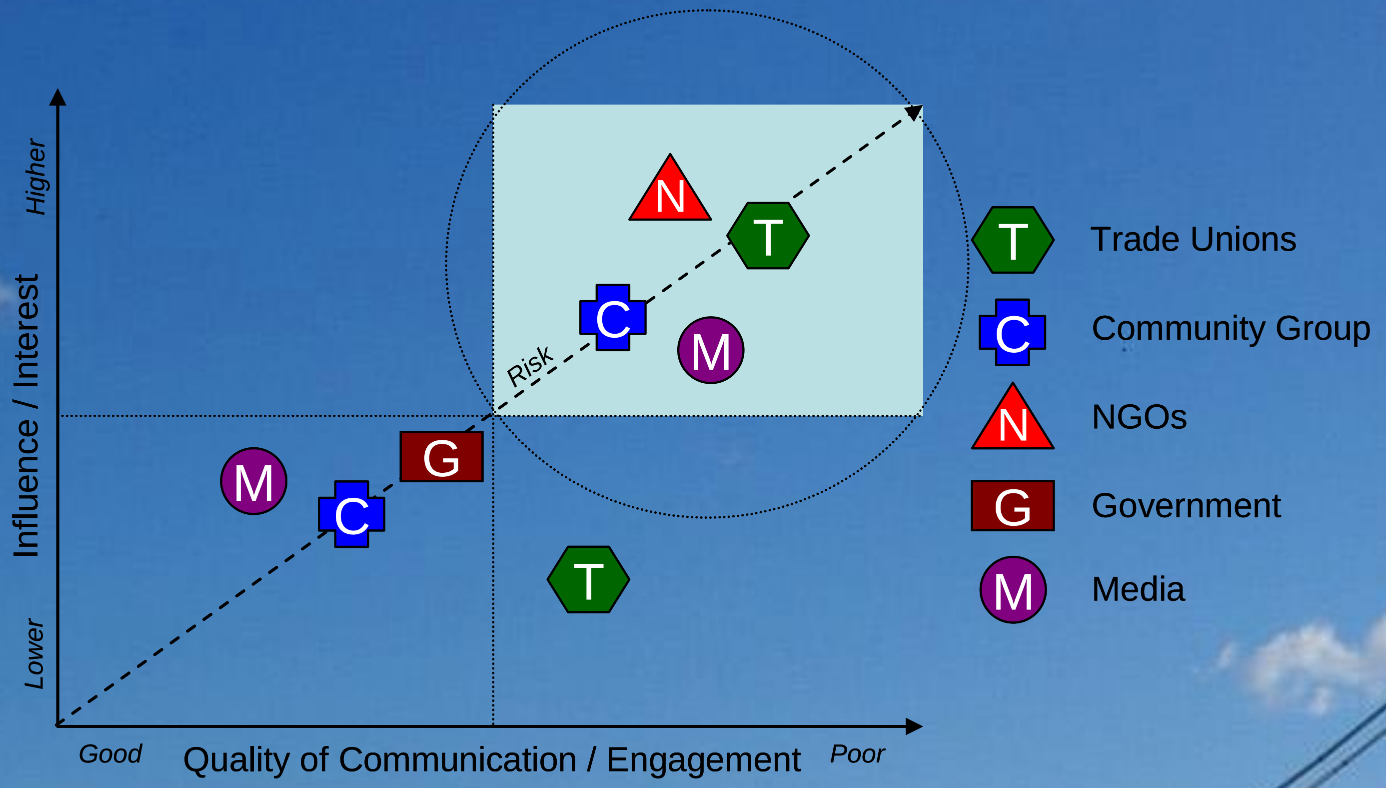
Stakeholder Communication



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How Much to Communicate?

Level of Stakeholder Engagement	Objective	Direction of Information Exchange
Inform	To provide balanced and objective information to improve understanding of the issues, alternatives and/or solutions.	ONE WAY
Consult	To obtain feedback from stakeholders on issues, alternatives and/or decisions.	TWO WAY
Involve	To work directly with stakeholders throughout the process to ensure that issues and concerns are consistently understood and considered.	
Collaborate	To partner with stakeholders in each aspect of a decision-making process.	
Empower	To place final decision-making in the hands of the stakeholders.	

Source: International Association for Public Participation, (IAP2), 2000

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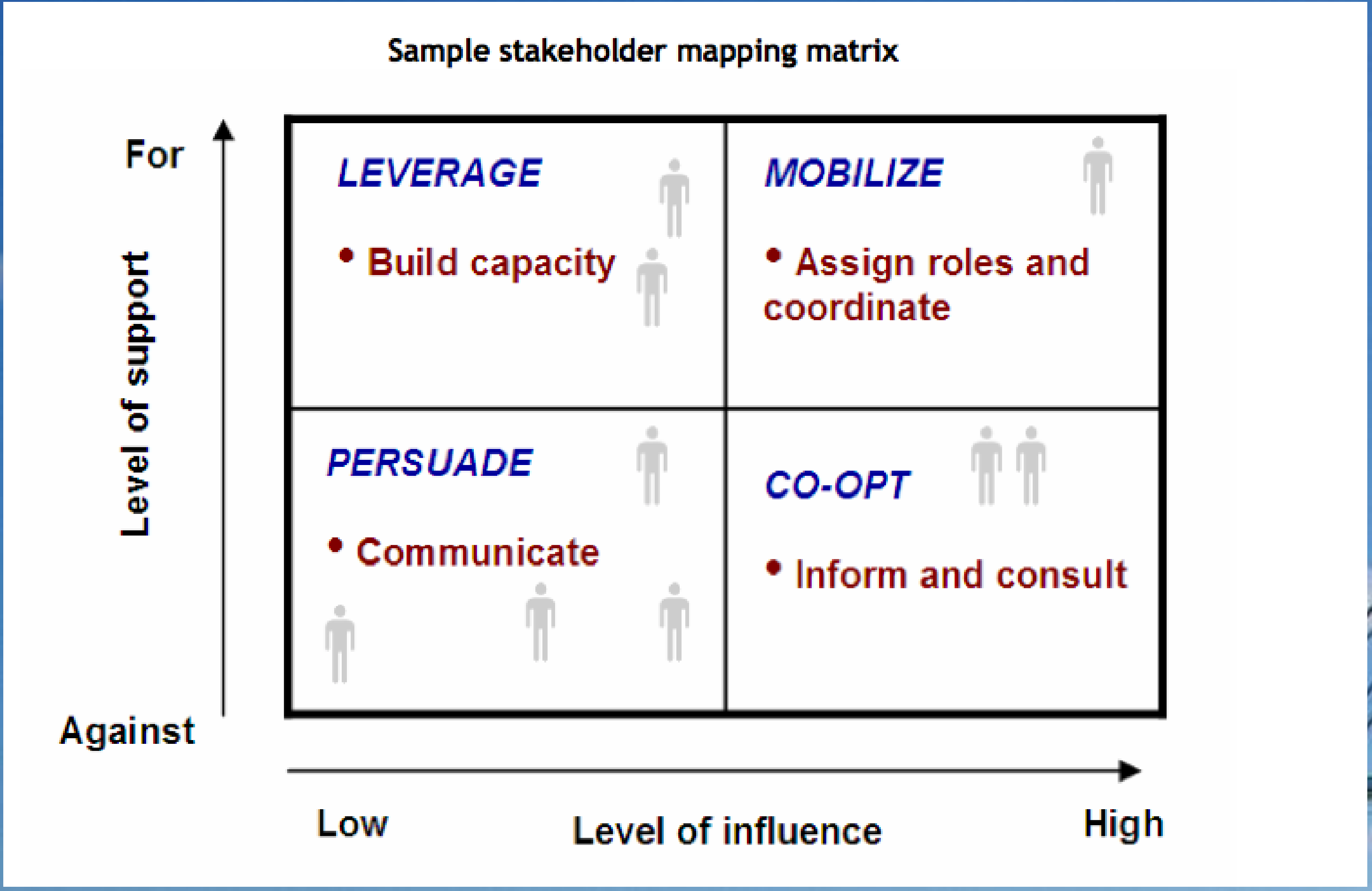
Engaging Stakeholders



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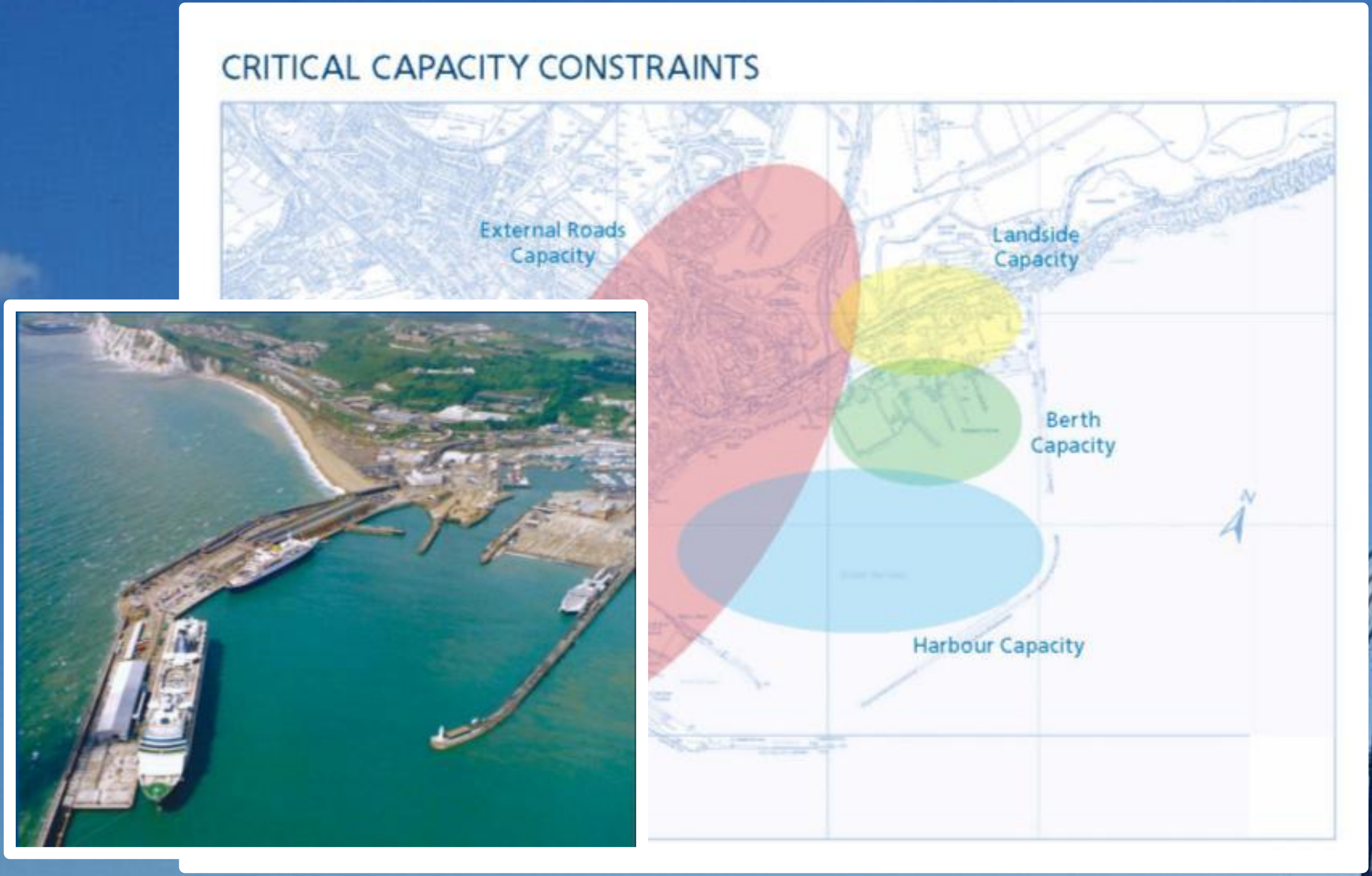
Dover Harbour



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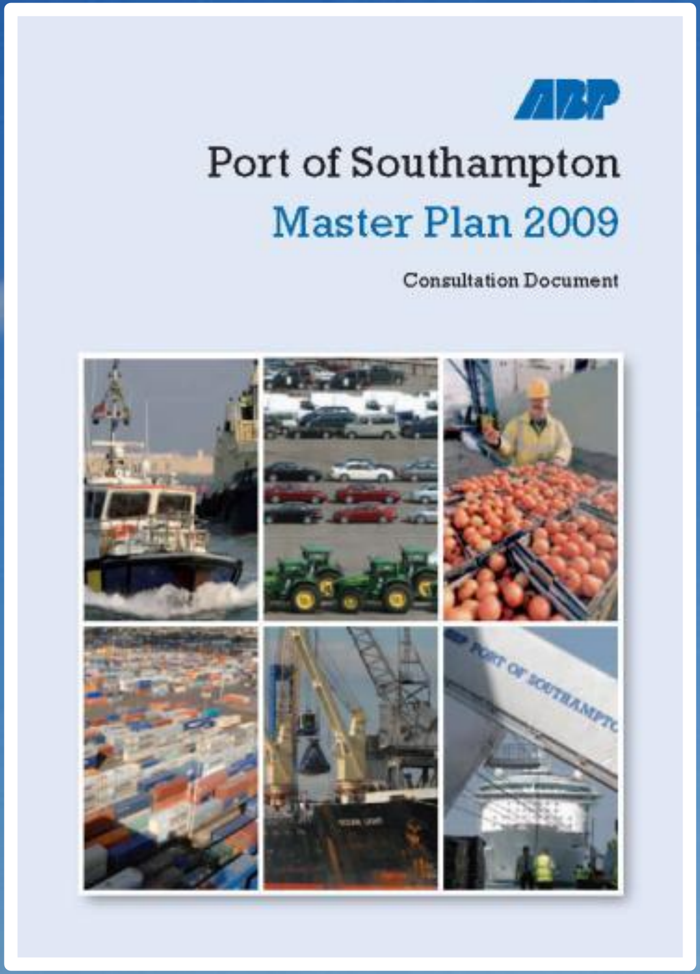
Port of Southampton



Port of Southampton

- Consultation
  - Web based process
  - Open Meetings
  - Direct engagement of key stakeholders
- Aim of process
  - Identify/accommodate opposition views
  - To reduce opposition to final plan
- Detailed published proposals
  - Seeking detailed responses
- Defined program and process

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Old Port of Brisbane

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New Port of Brisbane

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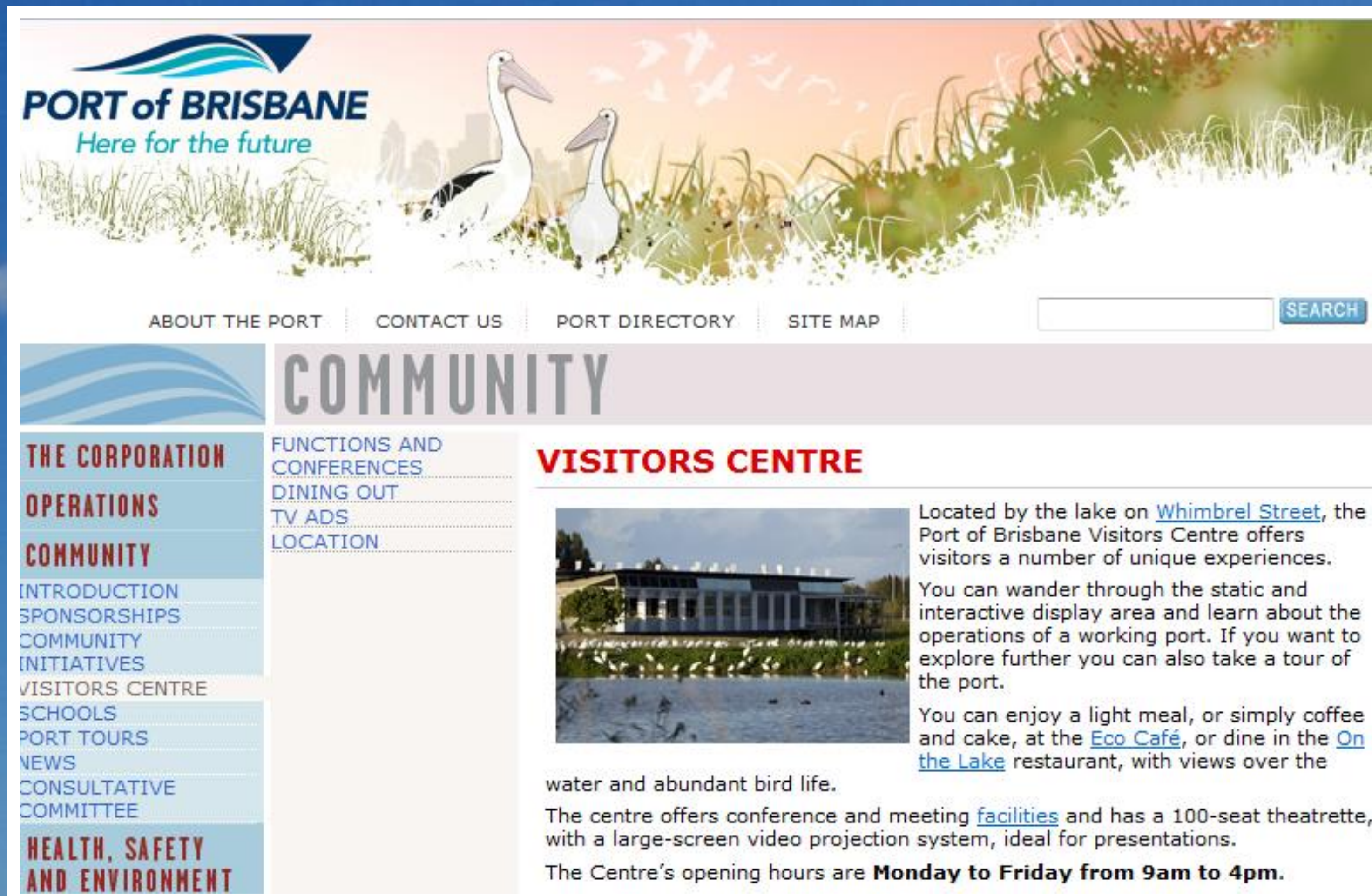
Community Involvement



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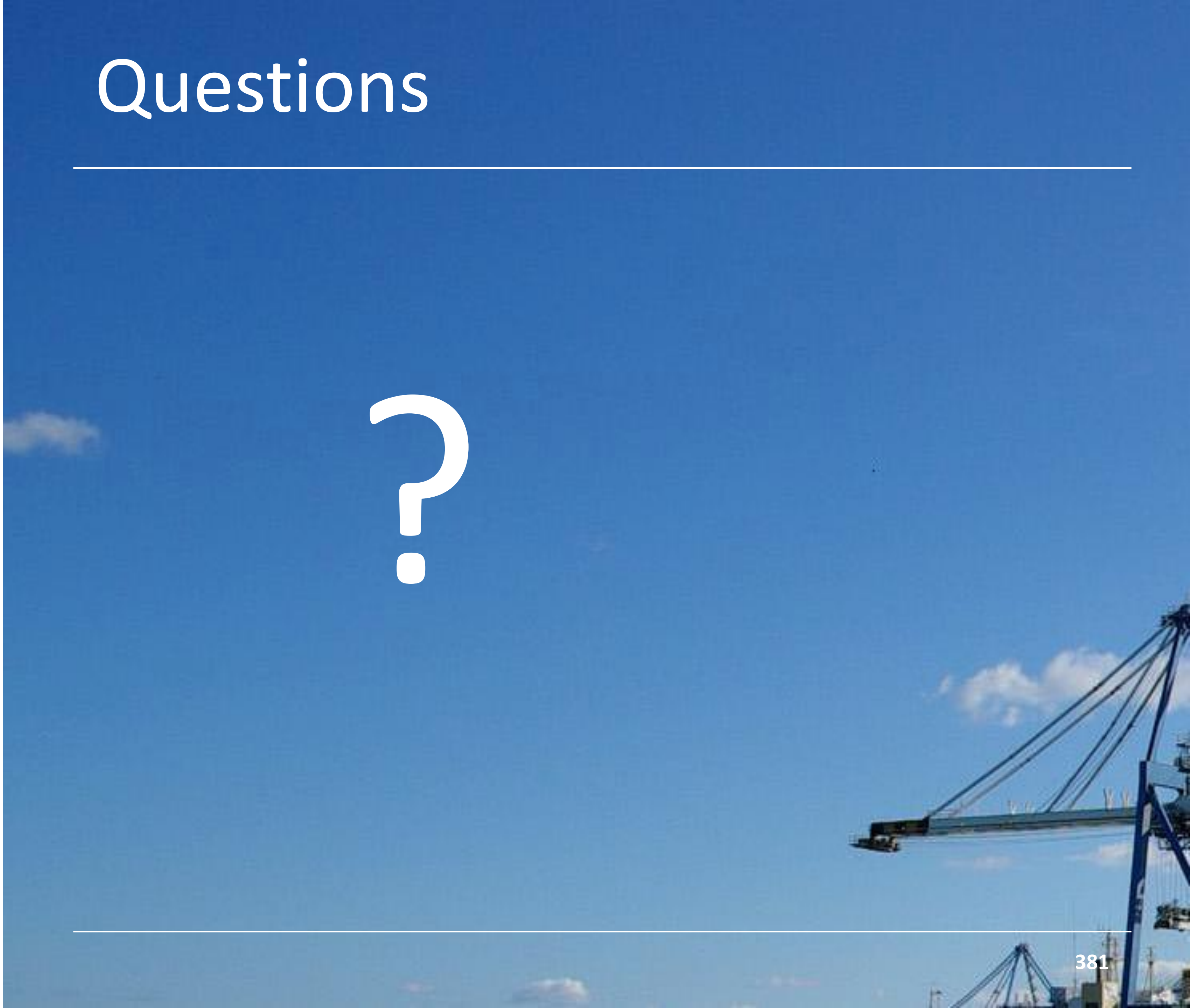
End of Session 8!


Questions
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Thank you for your attention