The Transport of Specialized Cargoes

MSc Shipping Management

Stopford, chapter 12
UNCTAD, Review of Maritime Transport 2025



Lecture roadmap

The lecture starts from one question: when does specialization earn a freight premium, and when does it only add cost? Stopford's two-front model and a worked cost exercise establish the framework. Five segments then test it: chemicals, liquefied gas, refrigerated cargo, unit load and passengers. Each pairs the book's explanation with UNCTAD's 2025 evidence.

01 The economics of specialization

02 Chemicals

03 Liquefied gas

04 Reefers and unit load

05 Passenger shipping

Learning objectives

You will explain why a specialized ship is a better service rather than simply a cheaper one, and use the two-front model to judge when it pays. You will compare specialized and conventional unit costs, read UNCTAD fleet and trade evidence, and decide where a premium remains defensible. Each objective is tested against cases in this chapter.

Explain

The two fronts of competition.

Compare

Unit transport costs in a worked case.

Read

UNCTAD fleet and trade data.

Judge

The customer’s willingness to pay.

The economics of specialization

Bulk shipping is commodity competition; specialized shipping is not

Companies carrying bulk cargoes trade in perfectly competitive markets where hundreds of similar ships compete for homogeneous cargo, so owners can do little to differentiate and rely on trading skill. Chemicals, gas, refrigerated cargo, forest products, vehicles, heavy lift and people are more demanding to carry, and that gives providers a chance to invest in ships and services that stand apart. Porter's warning applies: being both the lowest-cost and a differentiated provider is hard.

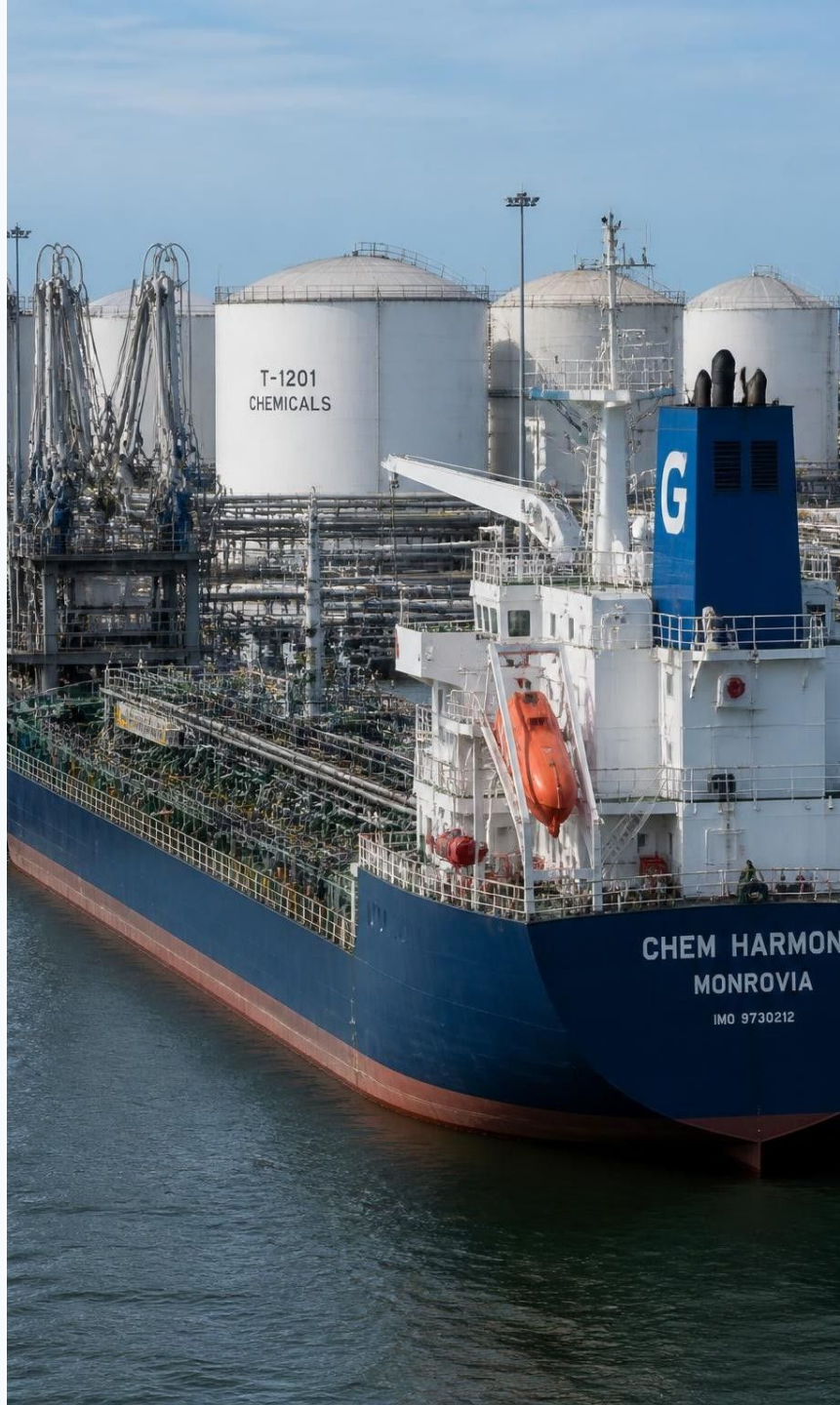
Bulk

Similar ships compete for interchangeable cargoes.

Specialized

Cargo requirements make service differences valuable.

Source: Stopford, Maritime Economics, ch. 12; 2006-2008 context.



Five groups, about 10,000 ships

Stopford groups the specialized fleet into chemical tankers, gas tankers, refrigerated ships, unit load vessels and passenger vessels. In January 2006 these amounted to about 10,000 ships, roughly 25% of the deep sea fleet. Their demanding cargo systems make them among the most expensive ships to build, tying up a substantial share of shipping's capital.

~10,000

ships, January 2006

~25%

of the deep sea fleet, January 2006

Chemicals	Gas	Reefers	Unit load	Passengers

Source: Stopford, ch. 12. Historical fleet snapshot, January 2006.

Three levers for tailoring a ship to its cargo

Specialization changes how cargo is handled, how it is stowed and how the voyage connects with the customer's inland chain. Segregated tanks, ro-ro ramps, wide hatches and advanced cranes improve handling. Refrigeration and protective coatings preserve cargo and reduce damage or deadfreight. Integration goes beyond the ship, taking some car carriers into terminals and storage.

Handling

Move cargo quickly and safely across the ship's side.

Stowage

Protect the product and use the available space.

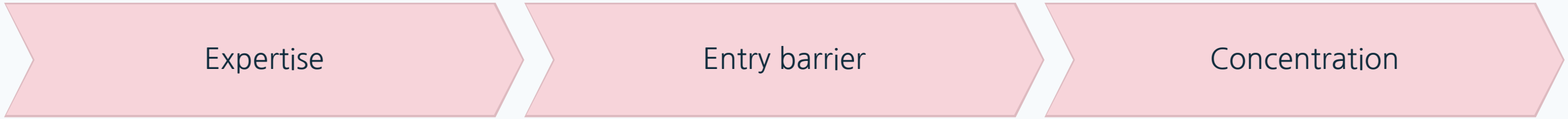
Integration

Fit the voyage into the inland distribution chain.

Source: Stopford, ch. 12; 2006-2008 context.

Expertise is a barrier to entry, so ownership concentrates

Specialized services require suitable management and proven sector expertise, discouraging newcomers and concentrating ownership. Pools and cooperative arrangements are therefore common in cars, chemicals and gas. Yet barriers to entry do not remove competition between transport systems. Chilled cargo can travel by reefer ship, refrigerated container or air freight, and market economics determine which service wins.



Proven capability

Customers need confidence in cargo care.

Harder to replicate

Capital alone cannot create a service.

Pools and cooperation

Established operators coordinate capacity.

Source: Stopford, ch. 12; 2006-2008 context.

Two fronts: undercut on unit cost, or earn a freight premium

Stopford's specialist competes with the conventional operator on two fronts simultaneously: unit transport cost and a premium for differentiated service. Neither advantage is automatic. Higher productivity must offset extra capital, while better service must matter enough for the customer to pay. Cargo value and fragility explain why fast, careful transport can command a premium in some sectors.

COST FRONT

Productivity → lower unit cost

More cargo and faster turnaround spread the ship's cost across more tonnes.

PREMIUM FRONT

Cargo care → willingness to pay

Speed, reliability and protection create value for the shipper.

The investment must work against the conventional alternative.

Source: Stopford, Maritime Economics, ch. 12; 2006-2008 context.

Worked example: forest products carrier vs conventional bulk carrier

Forest products are semi-manufactures worth up to $1,000 a tonne and vulnerable to damage. Box-shaped holds and full-width hatches allow a forest products carrier to load about 20% more cargo than a conventional bulk carrier of the same deadweight. Handling exceeds 450 tonnes an hour against 250, but capital costs are 25-50% higher. Is the investment worthwhile?



Feature	FPC	Conventional
Cargo loaded	About 20% more	Baseline
Handling rate	Over 450 t/h	250 t/h
Capital cost	25-50% higher	Baseline

Source: Stopford, ch. 12. Historical worked case, 2006-2008 context.

Exercise: is the extra capital worth it?

Two 47,000 dwt ships carry packaged forest products. At a 10,000 tonne load the FPC costs $42.30 a tonne and the conventional ship $39.70. The conventional ship is full at 24,000 tonnes, while the FPC can keep loading. Explain how utilization, handling time and cargo care affect the investment decision rather than comparing purchase prices alone.

Starting point	FPC	Conventional
Deadweight	47,000 dwt	47,000 dwt
Cost at 10,000 t	$42.30/t	$39.70/t

1. Explain why the cost gap narrows as the cargo grows.
2. What cargo size lets the FPC match or beat the conventional ship?
3. Which operating condition must the FPC meet to match cost?
4. What must the customer value for the FPC to earn a premium too?

Source: Stopford, ch. 12. Worked case, 2006-2008 context.

Solution: a better service for 9% less

Faster handling narrows the FPC's cost disadvantage as cargo grows. The conventional ship fills at 24,000 tonnes, but the FPC reaches 27,500 tonnes and $17.20 per tonne, against $18.90 for the conventional ship's full load. This is 9% cheaper, provided cargo handling takes only six days. The broader lesson is better service at comparable cost, not invariably cheaper transport.

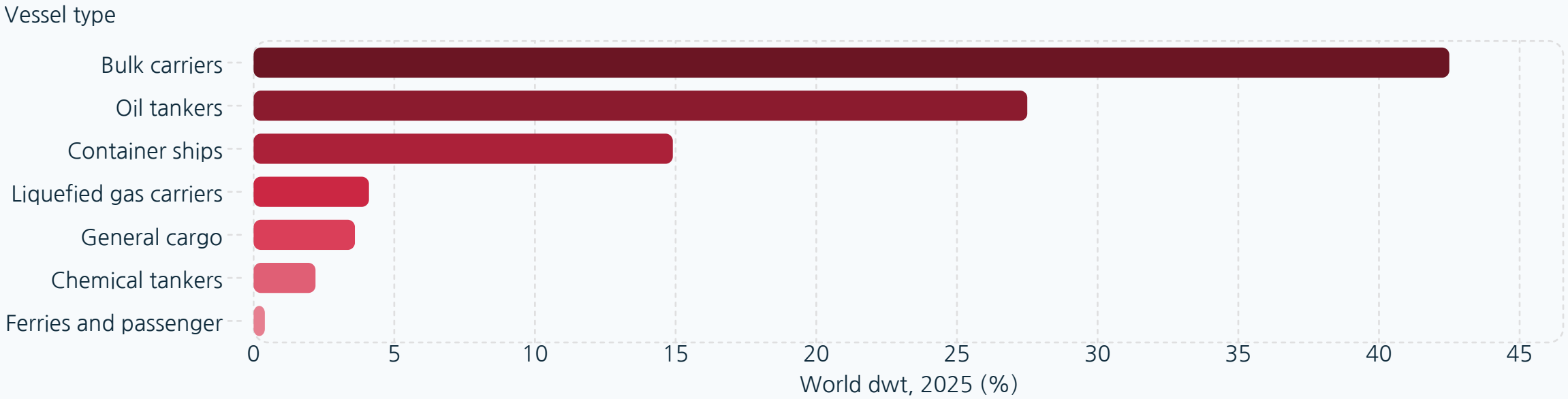
Worked comparison	FPC	Conventional
Cost at 10,000 t	$42.30/t	$39.70/t
Full cargo in this case	27,500 t	24,000 t
Cost at respective full loads	$17.20/t	$18.90/t
Operating requirement	Six handling days	Comparison baseline

$17.20 vs $18.90 per tonne

Source: Stopford, ch. 12. Historical worked case, 2006-2008 context.

UNCTAD 2025: specialized ships are a small slice of a 2.44 billion dwt fleet

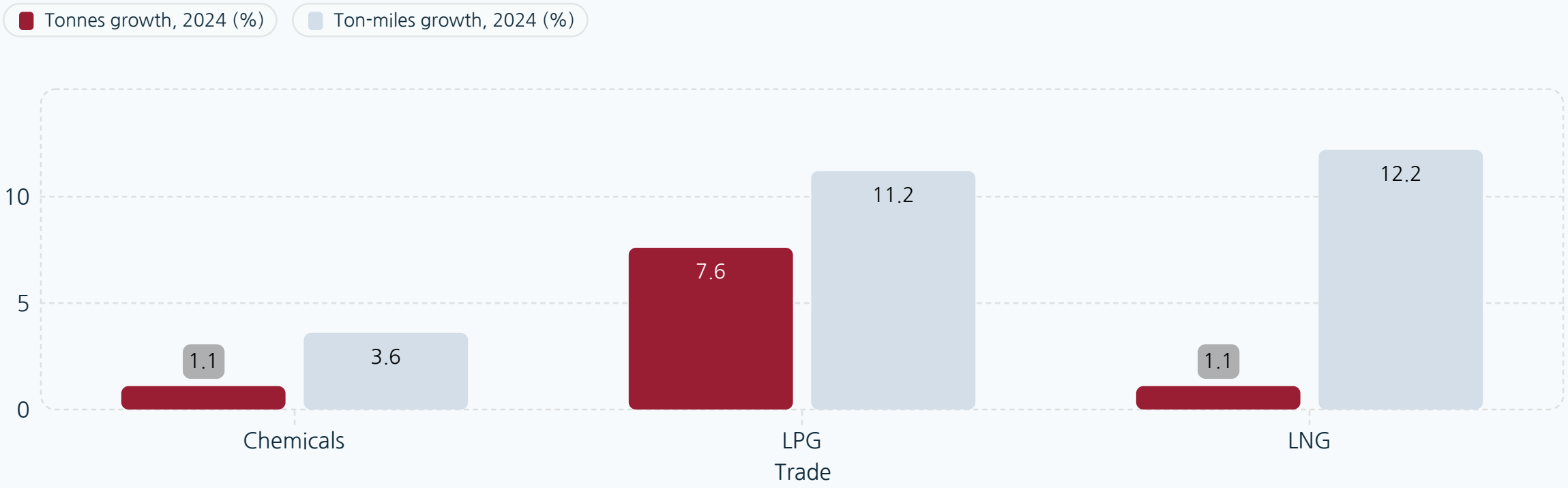
At 1 January 2025 the world fleet reached about 2.44 billion dwt, up 3.4%. Bulk carriers (42.5%) and oil tankers (27.5%) dominate. The specialized segments are small: liquefied gas carriers hold 4.1% of capacity, general cargo ships 3.6%, chemical tankers 2.2% and ferries and passenger ships 0.4%. Specialization is capital-heavy but numerically a niche.



Source: UNCTAD, Review of Maritime Transport 2025. Selected vessel types, 1 January 2025; shares do not sum to 100%.

UNCTAD 2024: specialized trades grew unevenly

In 2024 LPG was the best-performing commodity in tonnes, up 7.6%, while chemicals and LNG were among the weakest at +1.1% each. Measured in ton-miles the picture changes: LNG rose 12.2% and LPG 11.2%, because longer hauls from Africa and the United States to Asia and Europe absorbed more ships. Distance, not only tonnage, drives demand for specialized tonnage.



Source: UNCTAD, Review of Maritime Transport 2025; trade growth during 2024.

Chemicals



What chemical tankers carry

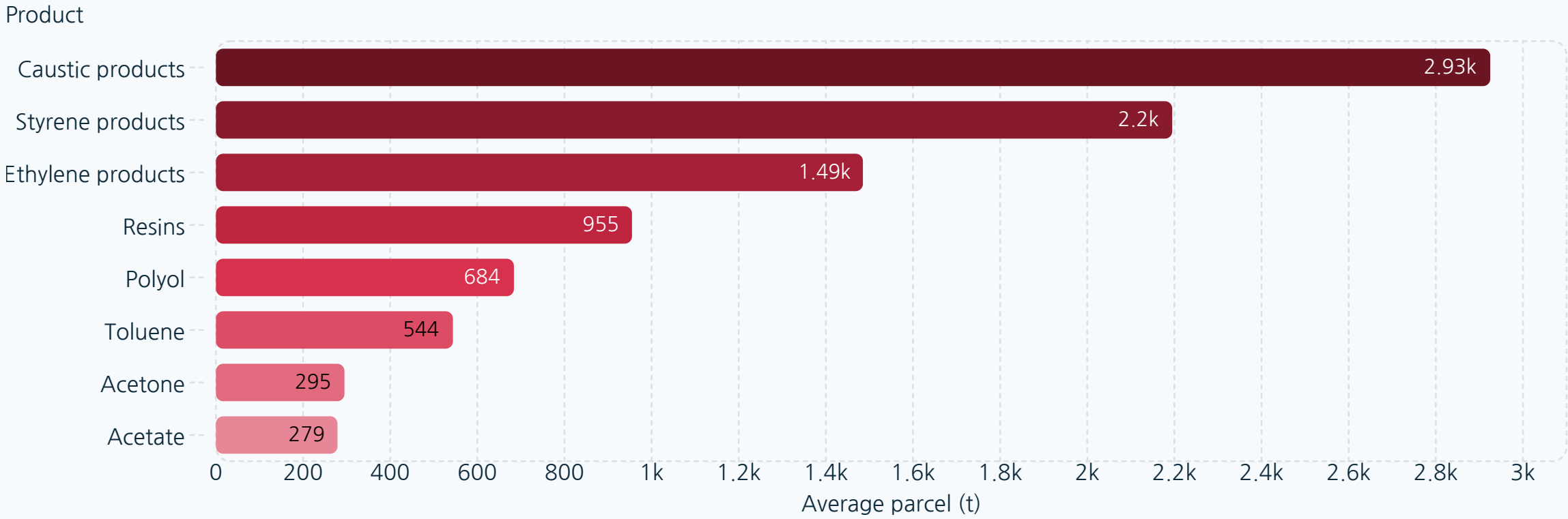
Chemical tankers carry organic and inorganic chemicals alongside vegetable oils, alcohols, molasses and lube oils. Organic chemicals derived from oil, gas or coal feed plastics and fibres. Inorganic cargoes such as phosphoric and sulphuric acid can be dense and corrosive, requiring coated or stainless steel tanks. The cargo's compatibility with the containment system is central to the service.

~60 Mt chemicals + 40 – 45 Mt oils

Source: Stopford, ch. 12. Annual cargo estimates, 2006 vintage.

The parcel problem: many products, small lots

Chemicals travel in small parcels that require segregation and cleaning between cargoes. In Stopford's sample of 3,000 parcels, the average was 1,475 tonnes, yet over half were below 500 tonnes across more than a hundred products. Caustic products averaged 2,925 tonnes against 279 for acetate. Small route-specific flows make assembling a commercially efficient voyage particularly demanding.



Source: Stopford, ch. 12; parcel sample reported in the 2006-2008 context.

1955: deep-well pumps create the parcel tanker

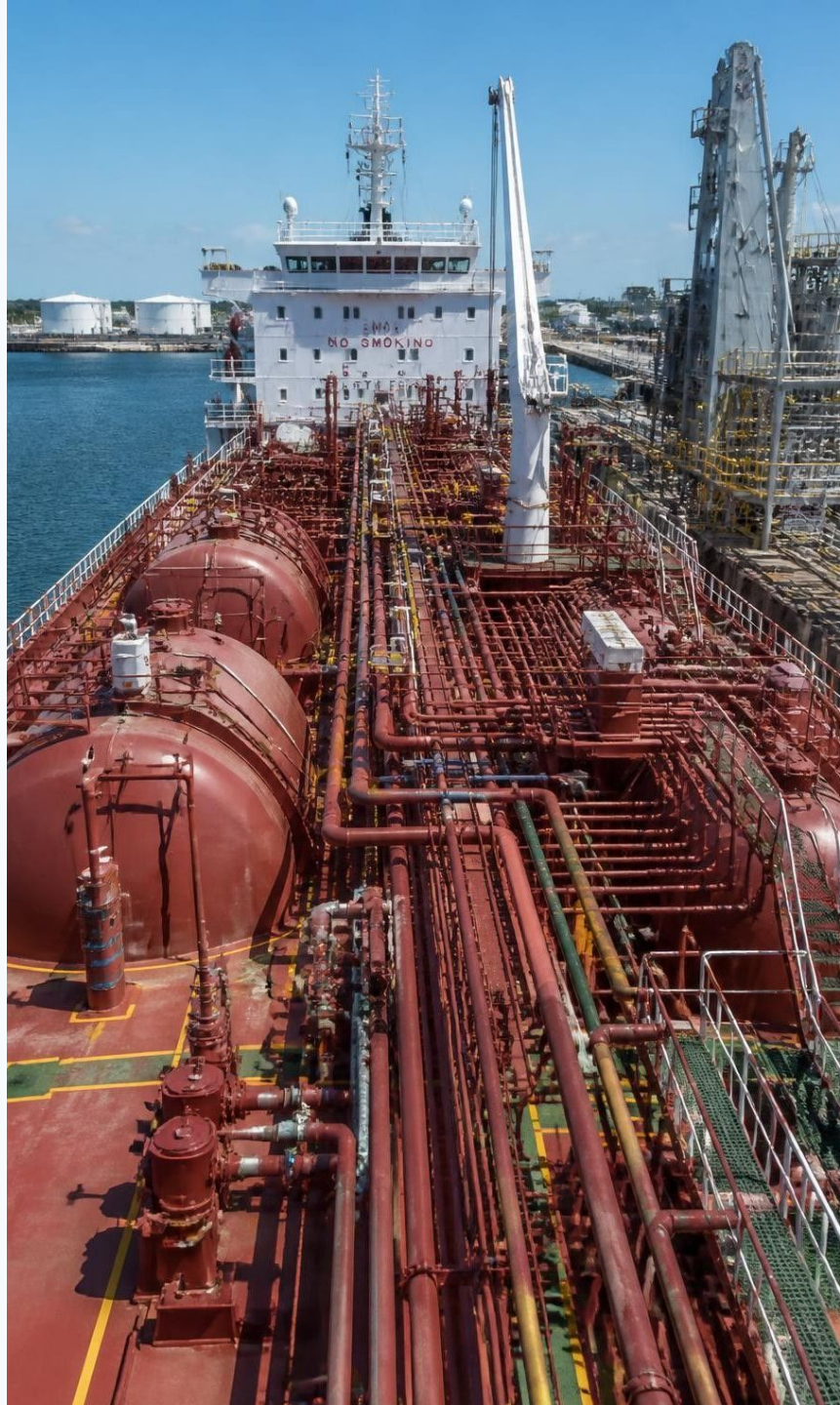
Before 1955, small chemical tankers had leaking cast-iron lines and could separate only one grade forward and one aft. Jacob Stolt-Nielsen refitted the 13,000 dwt Freddy with 18 deep-well pumps, allowing as many grades as tanks. Stolt-Nielsen and Odfjell, both established in the 1950s, refined the parcel tanker over the following two decades.

18

deep-well pumps

Freddy, 13,000 dwt · 1955

Source: Stopford, ch. 12; historical account in the 2006-2008 context. Image illustrates the resulting ship type.



Three kinds of operator share the market

Chemical transport combines tanker-style spot trading with liner-style scheduling. Parcel tanker pools such as Stolt and Odfjell offer scheduled services, often through contracts of affreightment. Tramp operators assemble spot parcels voyage by voyage in 10,000-20,000 dwt bulk chemical tankers. Independent small-tanker owners serve regional spot markets, particularly in Europe and Asia. Each model solves a different cargo-assembly problem.

Parcel pools

Scheduled networks and contracts of affreightment.

Tramp operators

Spot parcels grouped for each voyage.

Regional owners

Small tankers trading within regional markets.

Source: Stopford, ch. 12; market structure and vessel sizes, 2006-2008 context.

The chemical fleet is a fuzzy category

Stopford counted about 2,575 chemical tankers totalling 43.3 million dwt in 2006. The fleet included parcel tankers, bulk chemical tankers and chemical/product ships with fewer segregations. Many vessels can switch between chemicals and clean petroleum products, so the category has no precise boundary. Analysing supply therefore requires attention to actual cargo capability, rather than relying only on a fleet label.

1,015

Parcel tankers

Average 15,000 dwt.

179

Bulk chemical

A distinct operating group.

682

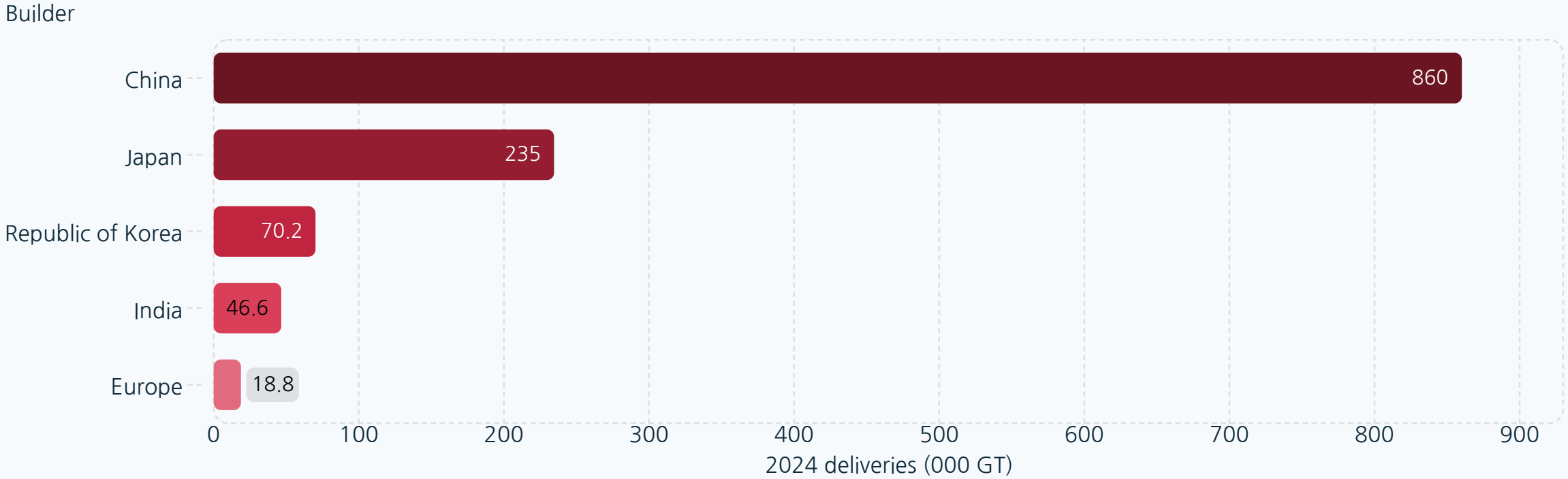
Chemical/product

Fewer segregations; crossover capability.

Source: Stopford, ch. 12; 2006 fleet. Selected subgroups shown, not an exhaustive reconciliation of the total.

UNCTAD 2025: slow trade growth, China builds the ships

The chemical tanker fleet reached 54.3 million dwt in 2025, up 3.3%. Trade grew only 1.1% in tonnes and 3.6% in ton-miles in 2024, held back by lower Chinese imports as China expanded its own petrochemical capacity. China also delivered about 72% of the chemical tanker gross tonnage built in 2024, so both demand and supply are shifting east.



Source: UNCTAD, Review of Maritime Transport 2025. Fleet: 2025; trade and deliveries: 2024.

Liquefied gas



LPG: a feedstock and fuel trade

LPG tankers carry propane, butane and ethane, together with ammonia and olefins such as ethylene. Liquefaction cuts gas volume by 99.8%, making sea transport practical. Demand comes from petrochemical feedstock and domestic or commercial heating and fuel. In Stopford's account, Japan was the largest single market, served by large LPG carriers and a coastal distribution fleet.

99.8%

volume reduction through liquefaction

Source: Stopford, ch. 12; trade description and figure, 2006 vintage.

Ship size follows the liquefaction system

Gas stays liquid through pressure, refrigeration or a combination of both. Small tankers are generally pressurized, intermediate ships semi-refrigerated and the largest fully refrigerated. Above 5,000 cubic metres, fully pressurized tanks become uneconomic because their size and weight rise too far. The largest ships therefore use refrigeration at ambient pressure, linking cargo technology directly to the economics of scale.

Type	Ships	Capacity (000 m³)
Pressurized	516	1,252
Semi-refrigerated	280	2,052
Fully refrigerated	197	11,308
Total	**993**	**14,612**

Source: Stopford, ch. 12. LPG tankers by type, 2006.

Four size segments, from short-sea to VLGC

Ship size follows the parcel and route. Stopford's 592 smallest LPG tankers, below 5,000 cubic metres, served short-haul cross-trades. Ships of 20,000-60,000 cubic metres carried ammonia and medium-haul LPG. At the other extreme, 106 VLGCs above 60,000 cubic metres represented 56% of capacity, serving long routes such as the Middle East to Japan. VLGC ownership was concentrated, with several pools.

Small

Under 5,000 m³

Short-haul cross-trades.

Intermediate

Between small and mid-size

Regional distribution.

Mid-size

20,000-60,000 m³

Ammonia and medium-haul LPG.

VLGC

Over 60,000 m³

Long-haul LPG.

Source: Stopford, ch. 12; fleet and capacity shares, 2006. Intermediate segment shown qualitatively.

LNG is a project, not a market

LNG links gas production, liquefaction, shipping and regasification in a capital-intensive chain. Cooling gas to −163°C reduces its volume to 1/630, but requires dedicated infrastructure at both ends of the voyage. Sea transport accounts for roughly a quarter of total chain costs. Compared with coal, the system is inflexible: investment must make sense across the whole project, not only aboard ship.

01

Pipeline to plant

15%

Production and transport to terminal.

02

Liquefaction

40%

Convert gas into a shippable liquid.

03

Shipping

25%

Dedicated cryogenic sea transport.

04

Regasification

20%

Restore gas at the receiving terminal.

Source: Stopford, ch. 12; approximate chain cost split, 2006-2008 context.

LNG took twenty years longer than forecast

The first LNG cargo sailed in 1959 aboard the converted Methane Pioneer, a technical success but too small and slow to pay. The first large liquefaction plant followed at Arzew, Algeria, in 1964, and forecasters expected 100 million tonnes by 1980. The 1973 oil crisis stalled projects, and the target was only reached in 2000.

1959 first cargo; 100 Mt reached in 2000

Source: Stopford, ch. 12; historical chronology in the 2006-2008 context.



From 20-year contracts to a more flexible market

Early LNG projects relied on 20-year contracts with fixed prices and rigid volumes, making price negotiations difficult. Oil indexation subsequently changed pricing, while forward markets introduced opportunities to hedge. As the terminal network expanded, investment and trading became more flexible. The important shipping question is how greater choice of destination changes vessel employment, scheduling and the allocation of commercial risk.

PROJECT EMPLOYMENT

Dedicated chain

Long commitments and rigid volumes support infrastructure investment.

GREATER FLEXIBILITY

More trading options

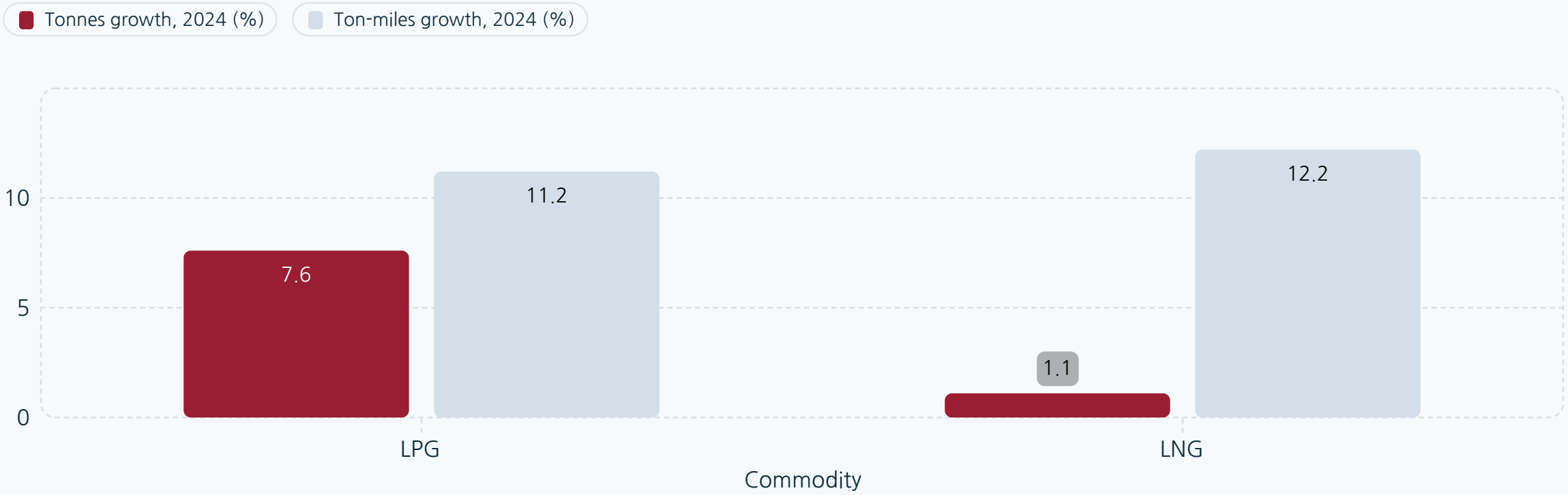
More terminals and hedging widen choices of destination and employment.

What does flexible gas trade mean for how LNG ships are employed?

Source: Stopford, ch. 12; evolution described in the 2006-2008 context.

UNCTAD 2024: LNG and LPG, tonnes vs ton–miles

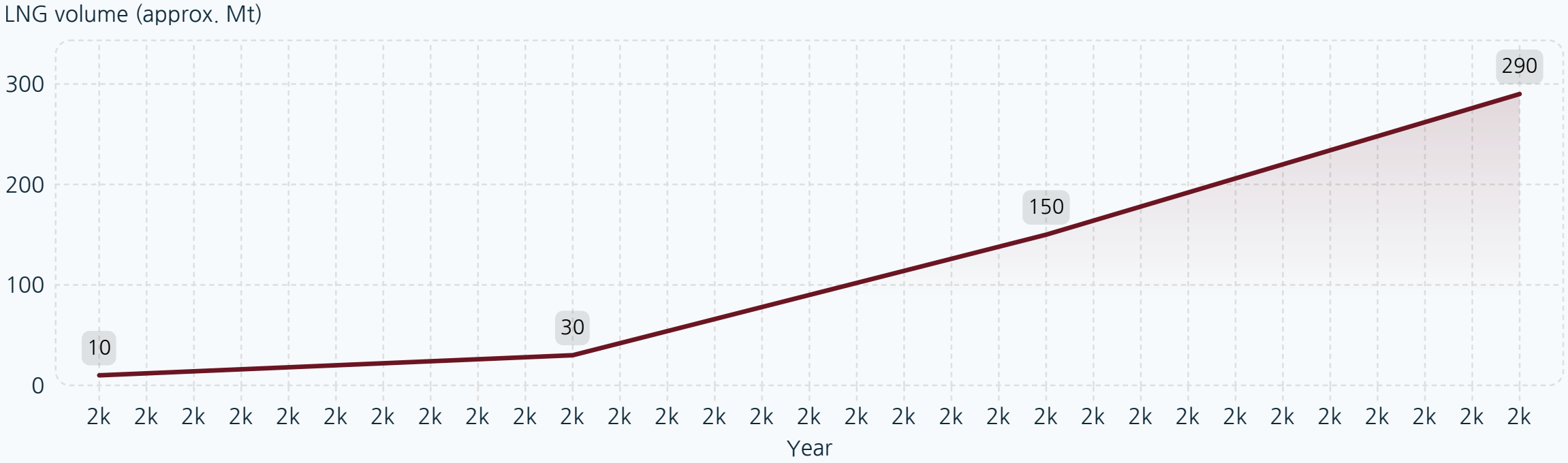
LPG volumes rose 7.6% in 2024, supported by US and Middle East exports and demand in China and India. LNG volumes grew only 1.1%, yet ton-miles increased 12.2% as longer flows linked Africa and the United States with Asia and Europe. UNCTAD's 2025 forecast put LNG volume growth at 5.8% as new liquefaction capacity entered service.



Source: UNCTAD, Review of Maritime Transport 2025. Chart: 2024 growth; 2025 outlook is a forecast.

Gas has become a major seaborne energy trade

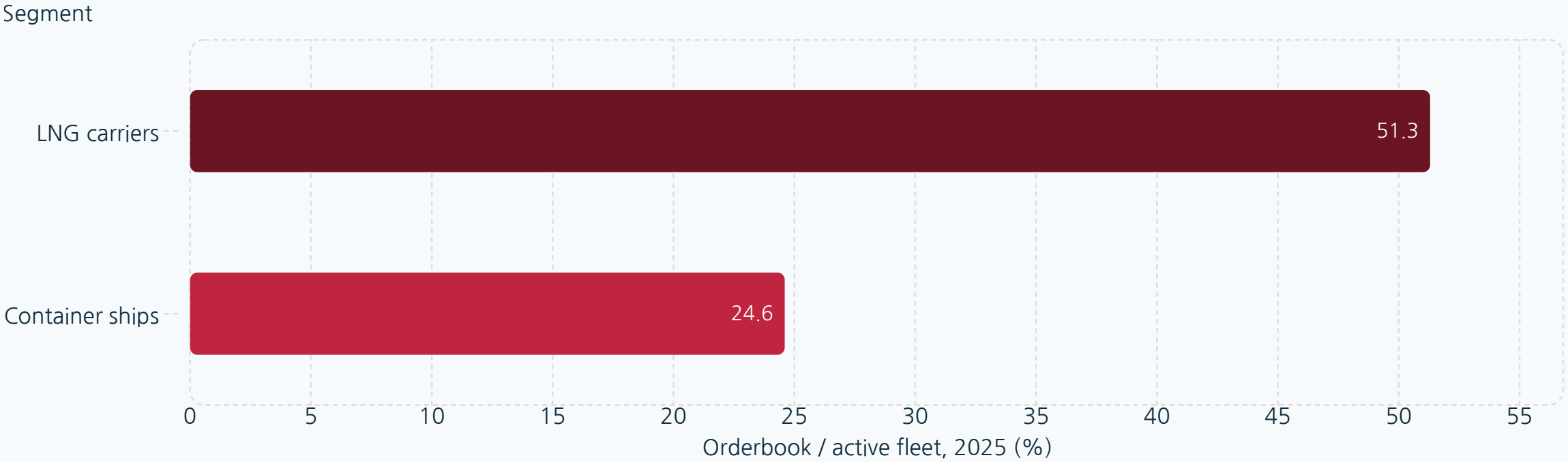
Since 1990 LNG volumes have quadrupled and LPG volumes nearly tripled. In ton-miles LNG has grown nearly tenfold since 1999, reflecting demand in China, Japan and Korea and new suppliers in the United States, Mozambique and Nigeria. Gas trade networks have become more diverse and geographically dispersed.



Source: UNCTAD, Review of Maritime Transport 2025. Approximate readings supplied from the UNCTAD chart; 2025 is forecast.

UNCTAD 2025: gas carrier fleet and orderbook

The gas carrier fleet reached 100.5 million dwt in 2025, growing 7.0%, led by LNG carriers and Qatar Energy's expansion project. The LNG orderbook equalled 51.3% of the active fleet, compared with 24.6% for container ships. Construction was concentrated too: Korea delivered 6.8 million gross tons of gas carriers in 2024 and China 1.7 million.



Source: UNCTAD, Review of Maritime Transport 2025. Orderbook and fleet: 2025; deliveries: 2024.

Chokepoints: Hormuz and the gas trade

The Strait of Hormuz carries 11% of global maritime trade by volume, including 34% of seaborne oil exports and 30% of LPG exports. Pipeline capacity cannot offset a disruption, and changed sourcing would lengthen voyages and raise ton-miles and the need for ships. Stopford's point about inflexible gas chains shows why such concentration of risk matters.

30%

of LPG exports

34%

of seaborne oil exports

Source: UNCTAD, Review of Maritime Transport 2025. Chokepoint shares reported in 2025.



Refrigerated cargo

Three reasons perishables travel

Refrigerated trade links regions with different production costs, seasons and climates. New Zealand can produce meat and dairy competitively; South African fruit supplies northern consumers during their winter; bananas depend on tropical growing conditions. These differences create demand for fresh food throughout the year. The transport service must preserve the product's condition while connecting geographically separated production and consumption.

Cost

New Zealand meat and dairy exploit production advantages.

Season

South African fruit reaches the northern winter market.

Climate

Tropical bananas serve consumers beyond their growing zone.

Source: Stopford, ch. 12; trade explanation, 2006-2008 context.



Shippers made the running

Refrigerated sea transport began with meat. In 1880, Strathleven delivered Australian beef and mutton frozen aboard ship to London in perfect condition. New Zealand's first frozen cargo followed in 1882 and sold for twice its local price. Sea-Land introduced refrigerated containers in 1956, creating the competing system that would eventually overtake dedicated reefer ships.

1880

Strathleven's frozen meat.

1882

New Zealand's first cargo.

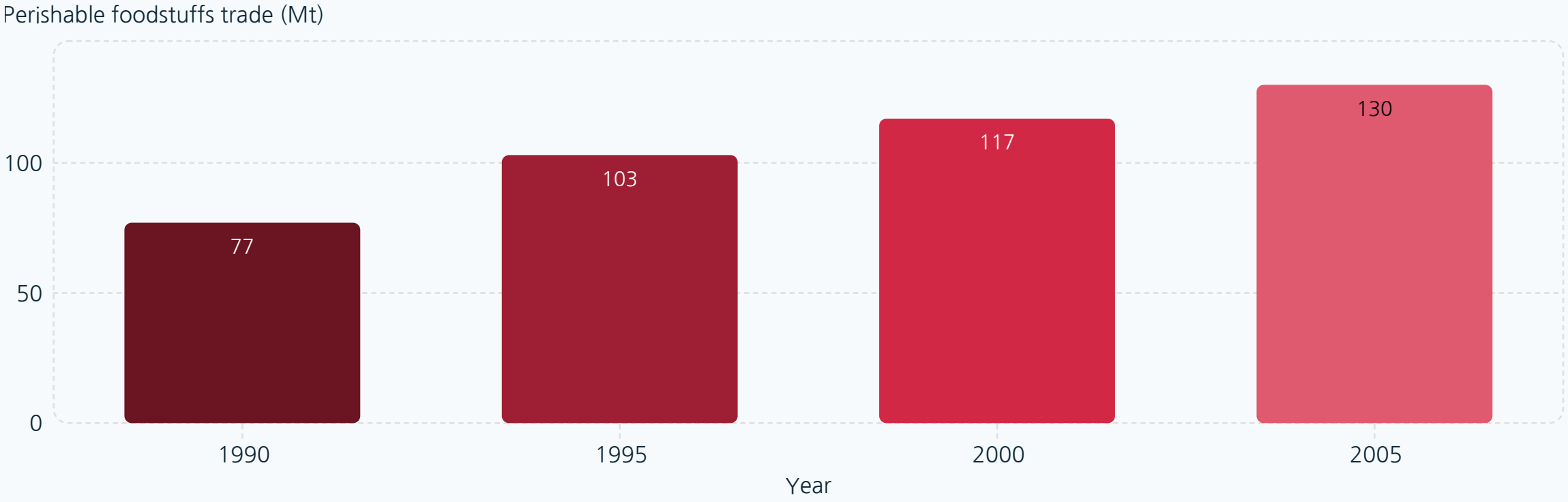
1956

Sea-Land reefer containers.

Source: Stopford, ch. 12; historical account, 2006-2008 context. Image is an illustrative reconstruction.

130 million tonnes of perishables, growing 3.6% a year

About 130 million tonnes of perishables were traded in 2005, including some land trade. Roughly a third comprised deciduous fruit, a third meat and dairy, and the remainder fish. Between 1990 and 2005 the total grew by an average 3.6% annually. High income elasticity for fruit and vegetables in developed countries helped sustain this expansion in temperature-sensitive food demand.



Source: Stopford, ch. 12; 1990-2005 series, 2006 vintage. Includes some land trade.

Temperature is the product

Refrigerated cargoes fall into three groups: frozen cargo such as meat and fish travels at temperatures down to −26°C; chilled cargo such as dairy is kept cold but above freezing to prevent decomposition; fruit is picked semi-ripe and ripened at sea under controlled conditions, so bananas need precisely 13°C. Even small deviations can ruin tropical fruit.

Frozen

−26° C

Meat and fish.

Chilled

Above freezing

Dairy cargoes.

Bananas

13° C

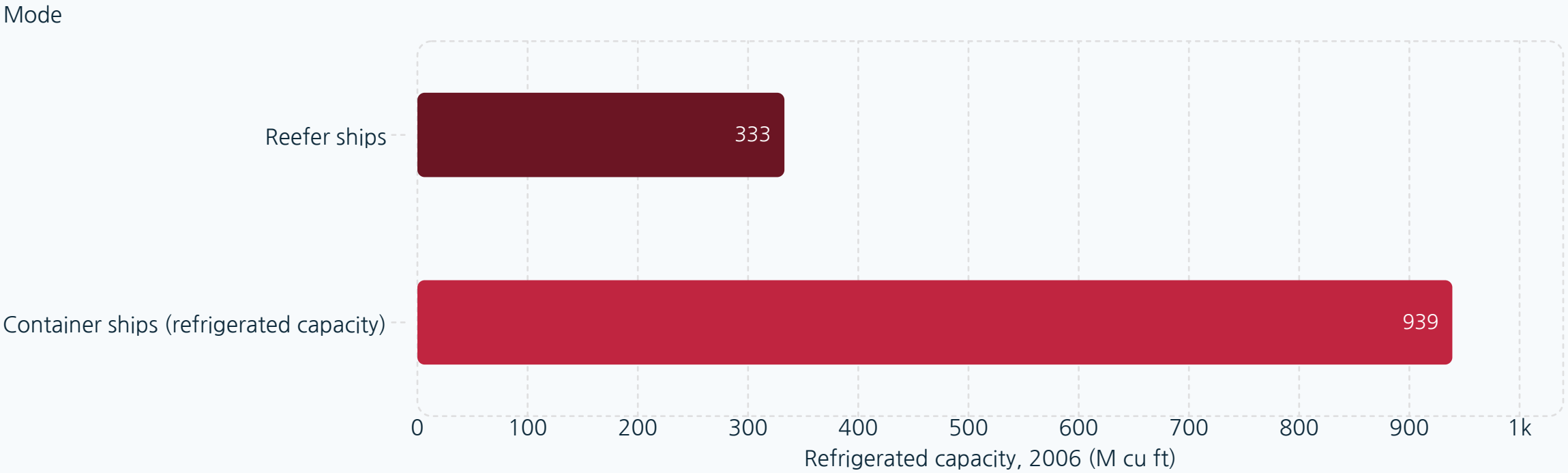
Controlled ripening.

Source: Stopford, ch. 12; cargo temperatures, 2006-2008 context.



Reefers lost to the container in 1999

Reefer operators palletized cargo and built ships to handle pallets, a defence that worked at first. In 1999 container capacity overtook conventional reefer capacity, and the dedicated reefer fleet declined. In 2006 there were 1,242 reefers with 333 million cubic feet of capacity, against 939 million cubic feet of container capacity.



Source: Stopford, ch. 12. Capacity comparison, 2006.

UNCTAD 2025: the container won the competition

UNCTAD counts reefers within its "other ships" group, so it publishes no separate reefer series. What it does show confirms Stopford's story: the container fleet reached 30.3 million TEU by April 2025, up 10.1% in a year, and containerized trade grew 6.2% in 2024. The capacity that carries refrigerated boxes keeps expanding while dedicated reefer ships fade.

30.3

million TEU, April 2025

+10.1%

container fleet capacity over one year

Source: UNCTAD, Review of Maritime Transport 2025. Total container fleet, not reefer-only capacity.

Unit load cargo



Deep-sea ro-ro: pushed aside by the container

Deep-sea ro-ros combine multi-deck ramps with the ability to carry cars, forest products, containers and heavy lift. That versatility is expensive. By 2006, the 1,040-ship fleet had grown only 1.7% annually over a decade, against 10% for container ships. Atlantic Container Line began with ten ro-ros in 1967, but the concept survived chiefly in car carriers and short-sea ferries.

1.7% a year vs 10% for container ships

Source: Stopford, ch. 12. Fleet: 2006; annual growth over the preceding decade.



Car carriers: a scheduled industrial service

Vehicles are light, damage-sensitive and stow at about 12 cubic metres per tonne, making conventional freight expensive. Exporters therefore developed dedicated ships. In January 2008, the fleet numbered 634 vessels and 9.1 million dwt; the largest carried 7,000 vehicles. Eight operators controlled about 90% of capacity, running carefully scheduled services aligned with manufacturers' distribution systems.

~90%

of capacity controlled by eight operators

Source: Stopford, ch. 12. Fleet and concentration, January 2008 context.

Open hatch, heavy lift and MPP

Open hatch carriers exceed 400 tonnes an hour, handling a 25,000 tonne forest cargo in 2.4 days rather than four. Heavy lift serves cargo above 26 tonnes or 40×8×8.5 feet, using tug barges, semi-submersibles and crane vessels. Stopford's 2,533-ship multi-purpose fleet continued growing while conventional tramp and liner multi-deckers declined. Specialization survives where standard handling systems struggle.



Open hatch

Fast handling of packaged forest cargo.



Heavy lift

Oversized and unusually heavy cargo.



MPP

Flexible service across cargo types.

Source: Stopford, ch. 12; fleet, thresholds and handling case, 2006-2008 context.

UNCTAD 2025: policy hits car carriers directly

US port fee proposals would charge foreign-built car carriers $14 per net ton, replacing an earlier $150 per car-equivalent unit proposal. Their broad application leaves operators little scope to avoid the charge by switching ships. UNCTAD also reports 87.4 million dwt of general cargo capacity in 2025, up 1.9%, while forest products ton-miles declined 1.6% in 2024.

EARLIER PROPOSAL

$150

per car-equivalent unit

REVISED PROPOSAL

$14

per net ton

Different charging bases. These are proposals, not equivalent rates.

Source: UNCTAD, Review of Maritime Transport 2025. Policy proposals as reported in 2025.

Passenger shipping

Seven passenger vessel types on two axes

Stopford classifies seven passenger vessel types by accommodation and accompanying cargo. Accommodation ranges from seats through cabins to a full hotel; cargo ranges from hand baggage through cars to lorries. Harbour, Channel and Baltic ferries illustrate the transport end of the spectrum. Cruise liners are exclusively leisure vessels, while the other types combine transport with differing amounts of leisure service.

Accommodation axis

Seating → cabins → full hotel

Accompanying cargo axis

Hand baggage → cars → lorries

Source: Stopford, ch. 12; seven-type framework, 2006-2008 context. Axes shown, not a full seven-type matrix.





Cruise: size and onboard spending drive returns

Over 15 million people cruised in 2006, about 60% from North America. Carnival controlled 46% of capacity and the top three groups 77%. Ships cost around $280,000 per berth, while onboard spending could reach 25% of revenue, making occupancy crucial. Cruise operators compete for holiday spending against other leisure providers, rather than competing primarily with freight shipping companies.

$280,000

capital cost per berth

Up to 25%

of revenue from onboard spending

Source: Stopford, ch. 12. Cruise market figures, 2006 vintage.

UNCTAD 2025: small in tonnage, built in Europe

Ferries and passenger ships total 8.9 million dwt, only 0.4% of the world fleet, and grew 1.5% in 2025. European yards in Italy, Germany, Finland and France keep the cruise and high-end passenger niche, while China and Korea dominate bulk shipbuilding. Passenger shipping is small in tonnage but a specialist, high-value corner of the industry.

8.9M

dwt, ferries and passenger ships

0.4%

of world fleet dwt, 2025

Italy · Germany · Finland · France

Source: UNCTAD, Review of Maritime Transport 2025. Fleet and shipbuilding assessment, 2025.

Where does specialization still earn a premium?

Gas is the strongest case: project finance, long hauls and an LNG orderbook equal to half the fleet keep ship demand rising. Chemicals are contested, with a fuzzy fleet definition and Chinese self-sufficiency. Reefers lost to the container, ro-ro survives in niches such as car carriers and heavy lift, and cruise competes for holiday spend rather than freight. The premium survives where cargo is valuable, demanding and hard to containerize.

Segment	Position	Test of the premium
Gas	Strong demand case	Do projects and deliveries stay aligned?
Chemicals	Contested	Does segregation expertise earn its cost?
Reefers	Container displaced the ship	Can a dedicated service beat the network?
Unit load	Niches remain	Is standard container handling unsuitable?
Cruise	A distinct leisure business	Will guests pay enough for the experience?

Gas strong; chemicals contested; reefers lost; cruise distinct

Synthesis: Stopford, ch. 12, 2006-2008 context; UNCTAD, Review of Maritime Transport 2025, 2024-2025 evidence.

Discussion questions

Each question asks you to reason from the chapter rather than from opinion.

1 Which segment would you invest in today, weighing Stopford's two fronts against UNCTAD's 2025 data?

2 How should a car carrier owner respond to the proposed US port fees?

3 Why did LNG take twenty years longer than forecast, and what has changed?

Reading: Stopford, Maritime Economics, chapter 12; UNCTAD, Review of Maritime Transport 2025, chapters I and II.