



Reefer Analysis 2023

Conventional, Containers, Markets, Fleets



Dynamar B.V.

Robijnstraat 74
1812 RB ALKMAAR
The Netherlands

Tel: +31 72 514 74 00

E-mail: info@dynamar.com

Website: www.dynamar.com



Reefer Analysis 2023

Conventional, Containers, Markets, Fleets

December 2023



Dynamar B.V.
Robijnstraat 74
1812 RB ALKMAAR
Tel: +31 72 514 74 00
E-mail: info@dynamar.com
Website: www.dynamar.com

Authors

Frans Waals, Senior Shipping Consultant
Jonathan Mummery, Consultant

All rights reserved. No part of this publication may be reproduced, distributed, stored in a retrieval system or transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise without explicit permission of the publisher.

While the information contained in this report is presented in good faith, it frequently involves estimates where no current published data is available. This information, believed to be accurate, can therefore not be guaranteed. The publishers cannot accept liability of any errors or omission.



TABLE OF CONTENTS

Table of contents	5
List of tables	9
List of figures	14
1 Introduction	16
2 History and background	20
2.1 The development of reefer shipping	20
<i>The advent of reefer shipping</i>	20
<i>Refrigerated deepsea shipping takes off</i>	20
<i>Evolution of the conventional reefer ship</i>	21
<i>The refrigerated container</i>	21
2.2 Deterioration	22
<i>Introduction</i>	22
<i>Ventilation</i>	23
<i>Temperature</i>	24
<i>Relative humidity</i>	26
<i>Ripening gases</i>	26
<i>Modified and controlled atmospheres</i>	26
2.3 Reefer container technology	28
<i>Container dimensions</i>	28
<i>Refrigeration machinery</i>	28
<i>Scroll or reciprocating compressor?</i>	29
3 World perishables trades	30
3.1 Introduction and methodological issues	30
3.2 Overall trade volumes	32
3.3 Future trade volumes	33
3.4 Dairy	35
3.5 Fishery Products	37
3.6 Fruit	40
<i>Bananas</i>	41
<i>Citrus fruit</i>	43
<i>Deciduous fruit</i>	45
<i>Tropical fruit</i>	47
3.7 Meat	49
3.8 Vegetables	52
4 Major import regions	56
4.1 Introduction	56
4.2 United States	57
4.3 European Union	61
4.4 Russia	66
4.5 China	68



4.6	Japan.....	72
5	Seaborne trade	74
5.1	Introduction.....	74
5.2	Seaborne perishables volumes.....	74
5.3	Conventional reefer ships versus container vessels.....	74
5.4	Geographical coverage	76
	<i>Conventional reefer shipping</i>	76
	<i>South America</i>	78
	<i>Central America and the Caribbean</i>	81
	<i>Sub-Saharan Africa and Morocco</i>	82
	<i>Mediterranean</i>	84
	<i>Australasia</i>	85
6	Major reefer ports.....	87
6.1	Introduction.....	87
6.2	South America	87
	<i>Chile</i>	87
	<i>Peru</i>	90
	<i>Bolivia</i>	91
	<i>Ecuador</i>	92
	<i>Brazil</i>	94
	<i>Uruguay</i>	97
	<i>Paraguay</i>	98
	<i>Argentina</i>	99
6.3	Central America and Caribbean.....	101
	<i>Colombia</i>	101
	<i>Venezuela</i>	103
	<i>Guyana</i>	104
	<i>Suriname</i>	105
	<i>French Guiana</i>	106
	<i>Panama</i>	107
	<i>Costa Rica</i>	109
	<i>Nicaragua</i>	110
	<i>Honduras</i>	111
	<i>El Salvador</i>	113
	<i>Guatemala</i>	114
	<i>Mexico</i>	115
	<i>Belize</i>	118
	<i>Caribbean Islands</i>	119
6.4	Sub-Saharan Africa and Morocco	120
	<i>Kenya</i>	120
	<i>Tanzania</i>	122
	<i>Mozambique</i>	123
	<i>Zimbabwe</i>	124
	<i>Eswatini</i>	125
	<i>South Africa</i>	125
	<i>Namibia</i>	127
	<i>Cameroon</i>	128
	<i>Ghana</i>	130
	<i>Ivory Coast</i>	131
	<i>Senegal</i>	133
	<i>Mauretania</i>	134
	<i>Morocco</i>	135



6.5	Mediterranean.....	137
	<i>Tunisia</i>	137
	<i>Algeria</i>	138
	<i>Libya</i>	139
	<i>Egypt</i>	139
	<i>Israel</i>	141
	<i>Lebanon</i>	142
	<i>Syria</i>	144
	<i>Turkey</i>	145
6.6	Australia and New Zealand.....	147
	<i>Australia</i>	147
	<i>New Zealand</i>	149
7	The conventional reefer ship fleet	154
7.1	Development of the reefer shipping market.....	154
7.2	Fleet overview	156
7.3	Deliveries	157
7.4	Newbuildings.....	159
7.5	Demolitions	160
7.6	Future fleet development.....	162
8	Major conventional reefer ship operators.....	163
8.1	Introduction.....	163
8.2	Africa Express Line	164
8.3	Boyang	165
8.4	Cool Carriers	166
8.5	Cosiarma.....	167
8.6	Dole Ocean Cargo Express.....	168
8.7	Fresh Carriers.....	169
8.8	Frigoship	170
8.9	Geest Line	171
8.10	Great White Fleet	172
8.11	GreenSea	173
8.12	Network Shipping	174
8.13	Seatrade.....	175
8.14	Sein Shipping	176
8.15	Shandong Zhonglu Oceanic	177
8.16	Silver Sea.....	178
8.17	Trans Wind Fleet.....	179
9	Containership fleet.....	181
9.1	Fleet developments	181
9.2	Fleet by operator	186
9.3	Reefer containers	186
10	Reefer container trades.....	190
10.1	Introduction.....	190
10.2	West Coast South America	191



<i>WCSA-Far East</i>	191
<i>WCSA-United States</i>	192
<i>WCSA-Europe</i>	195
10.3 East Coast South America trade	196
<i>ECSA-Far East</i>	196
<i>ECSA-United States</i>	197
<i>ECSA-Europe</i>	198
10.4 Central America/Caribbean	199
<i>ECCA/Caribbean-Far East</i>	199
<i>ECCA/Caribbean-United States</i>	200
<i>ECCA/Caribbean-Europe</i>	201
10.5 Africa.....	203
<i>Africa-Far East</i>	203
<i>Africa-United States</i>	206
<i>Africa-Europe</i>	207
10.6 Australia/New Zealand	210
<i>Australia/New Zealand-Far East</i>	210
<i>Australia/New Zealand-United States</i>	213
<i>Australia/New Zealand-Europe</i>	214
10.7 Summary.....	215
11 Container ship operators	217
11.1 Introduction.....	217
11.2 CMA CGM	219
11.3 Cosco Shipping.....	222
11.4 Evergreen.....	225
11.5 Hapag-Lloyd.....	227
11.6 HMM.....	230
11.7 Maersk.....	233
11.8 MSC.....	236
11.9 Ocean Network Express.....	238
11.10 PIL 240	
11.11 Yang Ming.....	243
12 Bibliography.....	246



LIST OF TABLES

Table 1: Classification of storage temperature	25
Table 2: Optimal transport temperatures for selected perishable products	25
Table 3: Common cooling methods	26
Table 4: Incompatibility of perishable cargoes	27
Table 5: Preferred O ₂ and CO ₂ concentration for a selection of perishable products.....	28
Table 6: Reefer container dimensions.....	28
Table 7: Overall worldwide perishables trade	33
Table 8: Forecast worldwide perishables trade	35
Table 9: Worldwide dairy trade.....	36
Table 10: Worldwide fishery products trade	38
Table 11: Worldwide fruit trade.....	41
Table 12: Characteristic differences between plantains and bananas	42
Table 13: Banana exports by commodity and by main exporting country	43
Table 14: Citrus exports by commodity and by main exporting country.....	44
Table 15: Deciduous fruit exports by commodity and by main exporting country.....	46
Table 16: Tropical fruit exports by commodity and by main exporting country.....	48
Table 17: Shelf life of chilled meat	50
Table 18: Worldwide meat trade	51
Table 19: Worldwide vegetables trade	53
Table 20: Vegetables exports by single commodity.....	54
Table 21: US imports by region, commodity and type of produce	57
Table 22: US imports by commodity and region/country of origin, 2022.....	58
Table 23: US exports by region, commodity and type of produce.....	59
Table 24: US exports by commodity and region/country of destination, 2022	60
Table 25: EU imports by region, commodity and type of produce	61
Table 26: EU imports by commodity and region/country of origin, 2022	62
Table 27: EU exports by region, commodity and type of produce.....	63
Table 28: EU exports by commodity and region/country of destination, 2022.....	64
Table 29: Intra-EU trade (imports and exports per country)	65
Table 30: Russian imports by region, commodity and type of produce	66
Table 31: Russian imports by commodity and region/country of origin, 2022.....	67
Table 32: Chinese imports by region, commodity and type of produce.....	68
Table 33: Chinese imports by commodity and region/country of origin, 2022	69
Table 34: Chinese exports by region, commodity and type of produce	70
Table 35: Chinese exports by commodity and region/country of destination, 2022.....	71
Table 36: Japanese imports by region, commodity and type of produce.....	72
Table 37: Japanese imports by commodity and region/country of origin, 2022	73
Table 38: Conventional reefer ship calls	77
Table 39: Perishable exports (tons) from South America, 2022	78
Table 40: Summary of reefer ports in South America.....	80
Table 41: Perishable exports (tons) from Central America and Caribbean, 2022.....	81
Table 42: Summary of reefer ports in Central America and Caribbean	82
Table 43: Perishable exports (tons) from Sub-Saharan Africa and Morocco 2022	83
Table 44: Summary of reefer ports in Sub-Saharan Africa and Morocco	84
Table 45: Perishable exports (tons) from the Mediterranean, 2022	84
Table 46: Summary of reefer ports the Mediterranean.....	85
Table 47: Perishables exports (tons) from Australia and New Zealand, 2022	85
Table 48: Summary of reefer ports in Australia and New Zealand	86



Table 49: Chilean perishable exports (tons).....	87
Table 50: Chilean port activity.....	88
Table 51: Peruvian perishable exports (tons).....	90
Table 52: Peruvian port activity	90
Table 53: Bolivian perishable exports (tons).....	92
Table 54: Ecuadorian perishable exports (tons).....	92
Table 55: Ecuadorian port activity.....	93
Table 56: Brazilian perishable exports (tons)	94
Table 57: Brazilian port activity.....	95
Table 58: Uruguayan perishable exports (tons)	97
Table 59: Uruguayan port activity	98
Table 60: Paraguayan perishable exports (tons).....	99
Table 61: Argentinian perishable exports (tons).....	99
Table 62: Argentinian port activity.....	100
Table 63: Colombian perishable exports (tons)	102
Table 64: Colombian port activity	102
Table 65: Venezuelan perishable exports (tons).....	103
Table 66: Venezuelan port activity.....	104
Table 67: Guyana’s perishable exports (tons).....	104
Table 68: Guyana’s port activity.....	105
Table 69: Suriname’s perishable exports (tons).....	105
Table 70: Suriname’s port activity.....	106
Table 71: French Guiana’s port activity.....	106
Table 72: Panamanian perishable exports (tons).....	107
Table 73: Panamanian port activity.....	108
Table 74: Costa Rican perishable exports (tons)	109
Table 75: Costa Rican port activity	110
Table 76: Nicaraguan perishable exports (tons)	111
Table 77: Nicaraguan port activity	111
Table 78: Honduran perishable exports (tons).....	112
Table 79: Honduran port activity	112
Table 80: El Salvadorian perishable exports (tons)	113
Table 81: El Salvadorian port activity	113
Table 82: Guatemalan perishable exports (tons).....	114
Table 83: Guatemalan port activity.....	115
Table 84: Mexican perishable exports (tons)	116
Table 85: Mexican port activity	116
Table 86: Belizean perishable exports (tons)	118
Table 87: Belizean port activity	118
Table 88: Dominican Republic perishable exports (tons).....	119
Table 89: Dominican Republic port activity	119
Table 90: Guadeloupe/Martinique port activity	120
Table 91: Kenyan perishable exports (tons).....	121
Table 92: Kenyan port activity.....	121
Table 93: Tanzanian perishable exports (tons)	122
Table 94: Tanzanian port activity	122
Table 95: Mozambique’s perishable exports (tons).....	123
Table 96: Mozambique’s port activity.....	124
Table 97: Zimbabwean perishable exports (tons).....	125
Table 98: Swaziland’s perishable exports (tons)	125
Table 99: South African perishable exports (tons).....	126
Table 100: South African port activity.....	126
Table 101: Namibian perishable exports (tons)	128
Table 102: Namibian port activity	128



Table 103: Cameroonian perishable exports (tons).....	129
Table 104: Cameroonian port activity.....	129
Table 105: Ghanaian perishable exports (tons)	130
Table 106: Ghanaian port activity	131
Table 107: Ivory Coast’s perishable exports (tons)	132
Table 108: Ivory Coast’s port activity	132
Table 109: Senegalese perishable exports (tons).....	133
Table 110: Senegalese port activity.....	134
Table 111: Mauritanian perishable exports (tons).....	135
Table 112: Mauritanian port activity.....	135
Table 113: Moroccan perishable exports (tons)	136
Table 114: Moroccan port activity	136
Table 115: Tunisian perishable exports (tons)	137
Table 116: Tunisian port activity	138
Table 117: Algerian perishable exports (tons)	139
Table 118: Egyptian perishable exports (tons).....	139
Table 119: Egyptian port activity.....	140
Table 120: Israeli perishable exports (tons)	141
Table 121: Israeli port activity	142
Table 122: Lebanese perishable exports (tons)	143
Table 123: Lebanese port activity	143
Table 124: Syrian perishable exports (tons).....	144
Table 125: Syrian port activity.....	144
Table 126: Turkish perishable exports (tons)	145
Table 127: Turkish port activity.....	146
Table 128: Australian perishable exports (tons)	147
Table 129: Australian port activity	148
Table 130: New Zealand’s perishable exports (tons)	150
Table 131: New Zealand’s port activity	150
Table 132: Annual average time charter equivalent (USD per cu.ft./30 days), for two ships types.....	155
Table 133: Conventional reefer ship capacity by size class, Mid-2022	156
Table 134: TEU capacity of conventional reefer ships by size class, Mid-2022.....	156
Table 135: Age by size class, Mid-2022	157
Table 136: Conventional order book for 2024-2027	159
Table 137: Demolitions 2022-2023	160
Table 138: Conventional reefer ship operators ranking	163
Table 139: Conventional reefer ship fleet of Africa Express Line, by end-2023.....	165
Table 140: Conventional reefer ship fleet of Boyang, by end-2023.....	165
Table 141: Conventional reefer ship fleet of Baltic Reefers/Cool Carriers, by end-2023	167
Table 142: Conventional reefer ship fleet of Cosiarma, by end-2023.....	168
Table 143: Conventional reefer ship fleet of Dole Ocean Cargo Express, by end-2023.....	169
Table 144: Conventional reefer ship fleet of Fresh Carriers, by end-2023	170
Table 145: Conventional reefer ship fleet of Frigoship, by end-2023	171
Table 146: Conventional reefer ship fleet of Geest Line, by end-2023.....	172
Table 147: Conventional reefer ship fleet of GreenSea, by mid-2023	174
Table 148: Conventional reefer ship fleet of Network Shipping, by end-2023.....	175
Table 149: Conventional reefer ship fleet of Seatrade, by end-2023	176
Table 150: Conventional reefer ship fleet of Sein Shipping, by mid-2023	177
Table 151: Conventional reefer ship fleet of Shandong Zhonglu Oceanic, by end-2023.....	178
Table 152: Conventional reefer ship fleet of Silver Sea, by end-2023	178
Table 153: Conventional reefer ship fleet of Trans Wind, by end-2023	179
Table 154: Cellular containership fleet by size category, 1 July 2023	181
Table 155: Top-25 container operators’ fleet and orderbook, 1 July 2023	186
Table 156: Container production by manufacturer and reefer box fleet size (at the end of each year)	189



Table 157: Services between West Coast South America and Far East	191
Table 158: Trade capacity development between West Coast South America and Far East	192
Table 159: Carriers involved in the West Coast South America-Far East trade	192
Table 160: Services between West Coast South America and US West Coast	193
Table 161: Trade capacity development between West Coast South America and US West Coast.....	193
Table 162: Carriers involved in the West Coast South America and US West Coast trade.....	193
Table 163: Services between West Coast South America and US East Coast	194
Table 164: Trade capacity development between West Coast South America and US East Coast	194
Table 165: Carriers involved in the West Coast South America-US East Coast trade	194
Table 166: Services between West Coast South America and Europe	195
Table 167: Trade capacity development between West Coast South America and Europe.....	195
Table 168: Carriers involved in the West Coast South America-Europe trade	196
Table 169: Services between East Coast South America and Far East	196
Table 170: Trade capacity development between East Coast South America and Far East	196
Table 171: Carriers involved in the East Coast South America-Far East trade.....	197
Table 172: Services between East Coast South America and US East Coast.....	197
Table 173: Trade capacity development between East Coast South America and US East Coast	198
Table 174: Carriers involved in the East Coast South America and US East Coast trade	198
Table 175: Services between East Coast South America and Europe	198
Table 176: Trade capacity development between East Coast South America and Europe	199
Table 177: Carriers involved in the East Coast South America-Europe trade	199
Table 178: Services between ECCA/Caribbean and Far East.....	199
Table 179: Trade capacity development between ECCA/Caribbean and Far East.....	200
Table 180: Carriers involved in the ECCA/Caribbean -Far East trade.....	200
Table 181: Services operated by conventional operators between ECCA/Caribbean and US East Coast ..	201
Table 182: Conventional carriers involved in the ECCA/Caribbean and US East Coast trade	201
Table 183: Services between ECCA/Caribbean and Europe	202
Table 184: Trade capacity development between ECCA/Caribbean and Europe	202
Table 185: Carriers involved in the ECCA/Caribbean -Europe trade	203
Table 186: Services between West Africa and Far East	204
Table 187: Trade capacity development between West Africa and Far East.....	204
Table 188: Carriers involved in the West Africa -Far East trade	204
Table 189: Services between South and East Africa and Far East.....	205
Table 190: Trade capacity development between South and East Africa and Far East	206
Table 191: Carriers involved in the South and East Africa-Far East trade.....	206
Table 192: Services between Southern Africa and US East Coast.....	206
Table 193: Trade capacity development between Southern Africa and US East Coast	207
Table 194: Carriers involved in the Southern Africa-US East Coast trade.....	207
Table 195: Services between West Africa/Morocco and Europe.....	208
Table 196: Trade capacity development between West Africa/Morocco and Europe.....	208
Table 197: Carriers involved in West Africa/Morocco-Europe trade	209
Table 198: Services between Southern Africa and Europe	209
Table 199: Trade capacity development between Southern Africa and Europe	210
Table 200: Carriers involved in the Southern Africa-Europe trade	210
Table 201: Services between Australia/New Zealand and North East Asia	211
Table 202: Trade capacity development between Australia/New Zealand and North East Asia	211
Table 203: Carriers involved in the Australia/New Zealand-North East Asia trade	212
Table 204: Services between Australia/New Zealand and South East Asia	212
Table 205: Trade capacity development between Australia/New Zealand and South East Asia.....	213
Table 206: Carriers involved in the Australia/New Zealand-South East Asia trade	213
Table 207: Services between Australia/New Zealand and United States	213
Table 208: Trade capacity development between Australia/New Zealand and United States	214
Table 209: Carriers involved in the Australia/New Zealand-United States trade	214
Table 210: Services between Australia/New Zealand and Europe	214



Table 211: Trade capacity development between Australia/New Zealand and Europe.....	215
Table 212: Carriers involved in Australia/New Zealand -Europe trade.....	215
Table 213: Overview of services by trade lane.....	216
Table 214: Carrier’s reefer capacity employed on relevant North-South trades.....	217
Table 215: Trade lanes covered by container ship operators	217
Table 216: Service co-operations as vessel operators	218
Table 217: Service co-operations as slot takers and providers.....	218
Table 218: Trade lanes covered by CMA CGM	221
Table 219: Liner fleet composition of CMA CGM, 1 July 2023	222
Table 220: Trade lanes covered by Cosco Shipping	224
Table 221: Liner fleet composition of Cosco Shipping, 1 July 2023	224
Table 222: Trade lanes covered by Evergreen	226
Table 223: Liner fleet composition of Evergreen, 1 July 2023	227
Table 224: Trade lanes covered by Hapag-Lloyd.....	229
Table 225: Liner fleet composition of Hapag-Lloyd, 1 July 2023.....	230
Table 226: Trade lanes covered by HMM	232
Table 227: Liner fleet composition of HMM, 1 July 2023	232
Table 228: Trade lanes covered by Maersk.....	235
Table 229: Liner fleet composition of Maersk Line, 1 July 2023	235
Table 230: Trade lanes covered by MSC	237
Table 231: Liner fleet composition of MSC, 1 July 2023	238
Table 232: Trade lanes covered by Ocean Network Express	239
Table 233: Liner fleet composition of Ocean Network Express, 1 July 2023	240
Table 234: Trade lanes covered by PIL.....	242
Table 235: Liner fleet composition of PIL, 1 July 2023.....	242
Table 236: Trade lanes covered by Yang Ming.....	244
Table 237: Liner fleet composition of Yang Ming, 1 July 2023.....	245



LIST OF FIGURES

Figure 1: Integral reefer container	22
Figure 2: Factors of decay	23
Figure 3: Stowage of pallets	24
Figure 4: Stuffing of containers	24
Figure 5: Reefer export forecast until 2026	34
Figure 6: Main dairy exporting countries	37
Figure 7: Dairy export forecast until 2026.....	37
Figure 8: Fish exporting countries	39
Figure 9: Crustaceans and molluscs exporting countries	39
Figure 10: Fishery products export forecast until 2026	40
Figure 11: Fruit exporting countries	41
Figure 12: Banana exporting countries	43
Figure 13: Citrus fruit exporting countries	45
Figure 14: Deciduous fruit exporting countries.....	47
Figure 15: Tropical fruit exporting countries.....	49
Figure 16: Fruit export forecast until 2026	49
Figure 17: Main meat exporting countries.....	51
Figure 18: Meat export forecast until 2026	52
Figure 19: Vegetables exporting countries	54
Figure 20: Vegetable export forecast until 2026.....	55
Figure 21: Seaborne perishables trade, 2005-2021	74
Figure 22: The share of conventional shipping in the reefer segment	75
Figure 23: Main countries for involved in conventional reefer shipping	78
Figure 24: Map of Chile	89
Figure 25: Map of Peru.....	91
Figure 26: Map of Ecuador	94
Figure 27: Map of Brazil	95
Figure 28: Map of Uruguay.....	98
Figure 29: Map of Argentina	101
Figure 30: Map of Colombia.....	103
Figure 31: Map of Venezuela	104
Figure 32: Map of Guyana.....	105
Figure 33: Map of Suriname.....	106
Figure 34: Map of French Guiana.....	107
Figure 35: Map of Panama	109
Figure 36: Map of Costa Rica.....	110
Figure 37: Map of Nicaragua	111
Figure 38: Map of Honduras.....	113
Figure 39: Map of El Salvador.....	114
Figure 40: Map of Guatemala.....	115
Figure 41: Map of Mexico	117
Figure 42: Map of Belize.....	118
Figure 43: Map of Dominican Republic	120
Figure 44: Map of Kenya	122
Figure 45: Map of Tanzania	123
Figure 46: Map of Mozambique	124
Figure 47: Map of South Africa	127
Figure 48: Map of Namibia.....	128
Figure 49: Map of Cameroon	130
Figure 50: Map of Ghana.....	131
Figure 51: Map of Ivory Coast	133



Figure 52: Map of Senegal.....	134
Figure 53: Map of Mauretania	135
Figure 54: Map of Morocco.....	137
Figure 55: Map of Tunisia.....	138
Figure 56: Map of Egypt	141
Figure 57: Map of Israel	142
Figure 58: Map of Syria	145
Figure 59: Map of Turkey	146
Figure 60: Map of Australia.....	149
Figure 61: Map of New Zealand	152
Figure 62: Time Charter Equivalent for reefer ships (2017-2023)	154
Figure 63: Time Charter Equivalent for reefer ships (2023).....	155
Figure 64: Number of ships in service, by year of build	157
Figure 65: Total capacity of ships in service, by year of build	158
Figure 66: Average capacity of ships delivered, by year of build	158
Figure 67: Number of ships demolished, by year of demolition	161
Figure 68: Capacity of ships demolished, by year of demolition	161
Figure 69: Conventional reefer fleet development.....	162
Figure 70: Number of cellular container ships currently in operation and order book, by year-of-build ..	182
Figure 71: Total capacity of the container ship fleet and order book, by year of build	182
Figure 72: Average size of container ships in operation and order book, by year of build	183
Figure 73: Scrapping by year and TEU capacity.....	184
Figure 74: Relation between the number of reefer plugs and ship size, by year of build	184
Figure 75: Number of reefer plugs per ship, by year of build	185
Figure 76: (Projected) development of the cellular container ship fleet (as at the end of year)	185
Figure 77: Reefer container fleet (TEU), by year.....	187
Figure 78: Reefer container production (TEU), by year	187
Figure 79: Reefer container fleet versus total number of reefer plugs of the fleet (TEU/Plug), by year	188
Figure 80: Actual reefer carrying capacity.....	188



1 INTRODUCTION

The year 2023 will be seen as a transitional year from the heady days of 2022 to, hopefully, business as usual in 2024. In the good times, due to an exceptionally tight and imbalanced container shipping market, the conventional reefer sector was able to attract lots of cargo at very attractive rates. Time charter equivalent rates reached a peak of almost two US dollars per 30 days per cu.ft. in the first half of 2022. Once the container market relaxed, these slid to less than half a US dollar per cu.ft. come the end of 2023.

With the conventional reefer sector booming in the wake of an overheated container market, scrapping in 2022 was low, with just twelve units going to the breakers. With their ages ranging from thirty-two years to forty-five years, they were presumably technically unfit. Scrapping has remained modest into the first half of 2023, despite the normalising market and the introduction of the new CII regulations forcing old and fuel hungry vessels to sail at reduced speed. Only eight vessels of thirty to fifty years old were broken up. However, in the second half of 2023, scrapping accelerated with ten ships demolished between July and October. With an average age of thirty-seven years, again they were very old and probably at the end of their technical life. Surely, many more will follow in the not-too-distant future.

A surprising development, though, is an ordering spree of new conventional reefer ships taking place in 2023. At the time of the analysis, the orderbook comprised twenty-seven ships with combined capacity for 15.2 million cu.ft., with deliveries scheduled between end-2023 and 2027. To put this into perspective, by capacity, this is almost 10% of the current fleet, albeit just 5% by the number of vessels.

The main driver behind this development is Cool Carriers, which is awaiting the handover of eleven chartered ships (7.3 million cu.ft.) between 2025 and 2027. Most of these orders were placed in the course of 2023. Africa Express Line is another operator still investing in new (chartered) tonnage. It awaits the delivery of four ships of around 600,000 cu.ft in 2024, whereupon they will be deployed in the West Africa-Europe trade.

Also very active in the newbuilding market are Chinese interests with at least nine units destined for their deployment. Traditionally, these owners order only small ships for the fish trade, including those used for bringing the catch from the fishing vessel ashore. This time, though, the Chinese related order book also includes some vessels of over 600,000 cu.ft., a size generally associated with the fruit and vegetable trade.

In the container sector, business is also back to normal, or whatever can be considered normal. On the one hand, due to deteriorating economies and stocks being rationalised, demand for container space dropped quite substantially. Also, sanctions placed on Russia in the aftermath its invasion of Ukraine has helped changing the container shipping landscape. Alongside, the disappearance of congestion freed up many containerships previously caught in the queues to enter ports for unloading. Finally, the supply of containership capacity is increasing substantially and continually, with new deliveries pouring in and much new capacity still in the pipeline. And yet, this does not stop the carriers, awash with money, to continue ordering.

Although profits of container carriers reduced massively in 2023, their performance is often still better than before corona. Spot rates may have dropped rapidly at the end of 2022, but it took quite some time for the decline to trickle down to contract rates. Consequently, in the first half of 2023, the big carriers still recorded multi-billion dollar profits, and it is only now, as 2023 is closing, that they are starting to realise they need to take action.

Whilst there was no real peak season and only occasional sailings were cancelled, in most trades it was not until the end of the year that some of the major East-West strings finally were being withdrawn. Rather than entering lay-up, ironically, some of this capacity was moved to North-South trades, Latin America in



particular. For example, ZIM withdrew most of its Australia network and started three new services to and from South America. Such a relocation of significant chunks of capacity will impact the typical fruit corridors, leading to transport prices going down further.

Another topic is the shift to alternative fuels. Whilst a few years ago, CMA CMG was the first one to bet on LNG, methanol and ammonia are now in vogue. Many newbuilding orders are for methanol/dual fuel tonnage, whilst others are classified as methanol-ready or ammonia-ready. The 'ready' means the ship still needs conversion (and investment) before it can sail on that fuel, even though the engineering technology to sail on ammonia has yet to be developed. Methanol/dual fuel ships are already sailing and there are many more to come. Whilst hydrogen or electricity are being tested, those technologies are likely to only be suitable for short distances.

With all this happening in parallel to a small contraction of perishable transport volumes, 2024 is likely to become an interesting year. Will trade start to grow again? Will the decline of the conventional segment accelerate? Will container carriers be able to adapt to their new situation. Those are just a few questions to be answered in due course.

Dynamar is proud to present its fourteenth consecutive, annual, extensive specialist report:

REEFER Analysis 2023 - Market Structure, Conventional, Containers

This publication builds upon the analysis of the previous years. The study comprises three parts: two separate sections on the different and container reefer trades, based on an extensive write up and one section analysing the structure of the market conventional.

Part 1 - Reefer market structure(s)

After a historical overview on the background and development of reefer shipping, this chapter provides extensive summaries, statistics and concise descriptions of:

- The world perishable trades: volumes by main produce and export regions;
- Transport modes and characteristics: transport conditions - modern techniques;
- The world's main import regions: United States, European Union, Russia, China and Japan;
- Trading patterns: conventional ships versus container vessels - main export areas - exports by product and individual country;
- Major reefer ports: perishable exports by country - description of relevant reefer handling facilities by mode of transportation - port throughput statistics.

Part 2 - Conventional reefer shipping

This section opens with a review of recent developments in the conventional reefer sector (including those affecting reefer container transports), including statistics and graphs of relevant time charter equivalents, as well as:

- Extensive conventional reefer ship overviews and statistics (existing IMO-registered fleet, orderbook, age profile, demolition, future development);
- Structured profiles of the world's 15 largest conventional reefer ship operators, including markets/trade lanes served and their operated fleet (whether owned or chartered).

Part 3 - Container reefer shipping

This section provides insight into the main containerised reefer routes and services, invariably part of the South-North trade structure. Compared to previous versions of this publication, coverage has been expanded by even more trading areas. Furthermore, this section comprises:

- Extensive overviews and statistics on the composition and development of the container vessel fleet and orderbook, reefer TEU capacity, plugs/capacity ratios by size category;



- Refrigerated container box fleet, size categories, production data, capacity by carrier;
- Structured profiles of the world's 10 largest reefer container carriers.

This publication uses the most recent trade statistics (up to 2021) on reefer commodities by country and area, supplemented with up-to-date port, vessel, box and carrier fleet statistics and gives a profound insight into the background, characteristics, developments and present status of the worldwide shipping market of perishables and the relevant players.

All information for the report has been collected, researched and processed in the third and fourth quarters of 2022. As sources often differ on the same topics, we have endeavoured to provide the reader with the most accurate estimates. Analyses are based on the best available professional databases and media, complete with data originating from carriers, operators, port authorities and a great many other industry players.

Alkmaar/the Netherlands

December 2023

Frans Waals, Senior Shipping Consultant

Jonathan Mummery, Consultant

