

Strategic Transport Infrastructure Needs to 2030



Table of contents

Abbreviations	13
Executive summary.....	15
Part I The traffic growth challenge.....	25
Chapter 1 The global and regional outlook for the economy, trade and transport.....	27
Economic outlook	28
Trade growth and outlook	31
Maritime trade and transport composition	33
Trade routes: The big picture	37
Aviation.....	39
Rail	44
Oil and gas.....	46
Note	50
Chapter 2 Global infrastructure needs to 2030.....	51
Infrastructure networks	52
Infrastructure to 2030 report.....	53
The situation pre-2008	54
The impact of the crisis	54
Revised outlook.....	55
Global infrastructure investment needs to 2030.....	55
Infrastructure needs to 2030 – airports, ports, rail, and oil and gas (T&D) infrastructure	56
Concluding remarks	61
Note	62
Bibliography	63
Part II Opportunities and challenges for strategic transport infrastructure.....	65
Chapter 3 Strategic transport infrastructure case studies.....	67
Gateways, hubs and inland transport connections.....	68
Long-term opportunities and challenges: A case study approach	69
National settings for the case study work: Quality of transport infrastructure.....	70
Port of Rotterdam	71
Turkey – Bosphorus	73
The “High North”/Barents area – strategic infrastructure in Finland and Sweden	78

France – gateway ports.....	80
Denmark – Greater Copenhagen area	83
Austria/Switzerland – inland hubs	89
India’s West Coast ports: Mumbai Gateway area	93
Note	95
Chapter 4 Strategic transport infrastructure in other key economies.....	97
Quality of transport infrastructure.....	98
Australia	98
Canada.....	99
China	101
United Kingdom.....	102
United States	104
Comparing the five countries	106
Conclusion.....	106
Chapter 5 Key issues emerging from the case studies	107
Strategic policy objectives.....	108
Benefiting from future economic and trade growth	109
Increasing competitiveness.....	109
Green Transport Policy	110
Better structures and organisation.....	110
Better funding and financing.....	111
Infrastructure development.....	113
Infrastructure management.....	115
New technology aimed at improving efficiency and reducing adverse impacts	118
Improving evaluation processes	119
Greater policy coherence.....	120
Bibliography	123
Part III Meeting the challenge: Possibilities for gateway management, funding, finance and planning	125
Chapter 6 Gateway structures and organisation	127
Gateway structures and models.....	128
Gateway airports	131
International and transit infrastructure models.....	132
Gateway structure – market value considerations.....	132
Concluding remarks	133
Note	133
Chapter 7 Infrastructure funding: Gateways and inland links.....	135
Funding of strategic infrastructure	136
Infrastructure funding models – gateway ports (and airports)	137
Airport funding.....	140
Airport funding and financing.....	141
Infrastructure funding models – inland transport.....	143
Linked funding – gateways and hinterland connections	146
Infrastructure funds	147
Infrastructure funding via government-owned corporations.....	149

Funding by different levels of government	150
Innovative future funding and mobility pricing	150
The longer term funding challenges	151
Countries with good funding arrangements	152
Countries without good funding arrangements	153
Chapter 8 Infrastructure financing: Private sector involvement.....	155
Importance of financing arrangements	156
Financing models	156
Public and private financing.....	157
Private sector involvement in aviation	160
Cost of capital.....	162
Pension funds	162
Project quality and risk reduction.....	167
Debt financing.....	167
Other equity and debt financing models.....	170
Innovative financing.....	170
Concluding remarks	171
Notes	172
Chapter 9 Strategic planning and contributions to green growth.....	173
Strategic planning.....	174
Gateway area planning	177
Green growth.....	179
Chapter 10 Improving evaluation processes	191
Current evaluation processes.....	192
Need for improved evaluation processes.....	192
Competitiveness and related impacts	194
Economic versus financial evaluations	196
Chapter 11 Developing national policy frameworks	201
National policy frameworks.....	202
Improving frameworks for funding and communications.....	205
Improving strategic infrastructure	206
Concluding remarks	207
Bibliography	209
Annex A Steering group members.....	211
Annex B Airport infrastructure needs to 2030: Background to global estimates	217
Annex C Port infrastructure needs to 2030: Background to global estimates.....	223
Annex D Rail infrastructure needs to 2030: Background to global estimates.....	237
Annex E Oil and gas transport and distribution infrastructure needs to 2030:	
Global estimates	243

Tables

Table 1.1.	Intra- and inter-regional merchandise trade flows (2006).....	32
Table 1.2.	Estimated cargo flows on major east-west container trade routes	34
Table 1.3.	World port container handling (including trans-shipment).....	35
Table 1.4.	Airline passenger traffic by region in 2009 and 2029.....	42
Table 1.5.	Primary oil demand by scenario (millions of barrels/day).....	48
Table 2.1.	Annual and aggregate investment needs in selected economic infrastructure, 2009-2030	56
Table 2.2.	Global airport infrastructure investment needs, 2009-2030.....	56
Table 2.3.	Global port infrastructure investment needs, 2009-2030	57
Table 2.4.	Total port container investment needs (new berths and rehabilitation)	57
Table 2.5.	Global rail infrastructure investment needs, 2009-2030	58
Table 2.6.	Rail infrastructure investment needs, 2009-2030.....	59
Table 2.7.	G20 countries – rail infrastructure investment needs, 2009-2030	60
Table 2.8.	Revised estimates for infrastructure investment in oil and gas transport and distribution, 2009-2030	61
Table 3.1.	WEF rankings: Transport infrastructure quality by mode	70
Table 4.1.	Transport infrastructure quality by mode (2010-2011).....	98
Table 6.1.	Models of ports	128
Table 7.1.	Models of international gateways	137
Table 7.2.	Models of inland transport	143
Table 7.3.	Austria’s road and rail network funding	150
Table 8.1.	Models of financing	157
Table 8.2.	A selection of major airports with significant private ownership	160
Table 8.3.	Indicative advice on the weighted average cost of capital (WACC) in the United Kingdom.....	162
Table B.1.	Terminal air passenger forecasts, 2007-2027 (millions).....	217
Table B.2.	Airport capital expenditure (Capex) by region	218
Table B.3.	Planned airports investments – including major upgrades/extensions at existing airports and possible major greenfield site investments	219
Table C.1.	Port container handling – projections to 2014	223
Table C.2.	World container port handling projections to 2015 (millions TEUs per annum)	224
Table C.3.	World’s ten busiest container ports.....	224
Table C.4.	World port container handling (including trans-shipment).....	227
Table C.5.	Port classification and indicative throughput per berth.....	229
Table C.6.	Total port container berths (2009-2030)	230
Table C.7.	Total port container berth and investment requirements (2009-2030).....	231
Table C.8.	US ports – actual and projected port capital expenditures over the period 2006-2011	232
Table C.9.	India’s 12 major ports – consolidated cargo forecast in M tonnes	233
Table E.1.	Cumulative investment in gas supply infrastructure by region and activity in the New Policies Scenario (2010-2035).....	244
Table E.2.	Oil and gas investment needs – upstream and downstream (2010-2035).....	245
Table E.3.	Revised estimates for infrastructure investment in oil and gas “transport and distribution” (2009-2030).....	245
Table E.4.	Average annual investment by sector – baseline and BLUE map scenarios	245
Table E.5.	Average annual investment by the energy sector – BLUE map scenario	246

Figures

Figure 1.1.	Global GDP growth	29
Figure 1.2.	GDP growth rates per annum: Major economies	30
Figure 1.3.	World economic growth (GDP) and world merchandise exports (volumes).....	31
Figure 1.4.	Growth in trade exports as a share of GDP	32
Figure 1.5.	World trade – annual exports of goods	33
Figure 1.6.	World port container handling – higher, medium, lower TEU growth scenarios.....	35
Figure 1.7.	Diversifying inland and sea routes between Asia and Europe.....	37
Figure 1.8.	The emerging global maritime freight system	38
Figure 1.9.	International air freight and passenger traffic volumes (seasonally adjusted).....	40
Figure 1.10.	ICAO world air traffic forecasts to 2030	41
Figure 1.11.	International air cargo growth 2009-2028	43
Figure 1.12.	Annual rail freight – projected increases from 2005-2035 (million tonne-kilometres).....	45
Figure 1.13.	Annual rail freight – projected overall growth (%).....	45
Figure 1.14.	Oil outlook – forecast growth in primary demand (2000-2008-2015).....	46
Figure 1.15.	World primary oil demand by scenario.....	47
Figure 1.16.	Gas outlook – forecast growth in primary demand (2000-2007-2015).....	48
Figure 1.17.	World primary natural gas demand by scenario	49
Figure 1.18.	Relationship between world GDP growth and transport demand.....	50
Figure 2.1.	Competitiveness and quality of overall infrastructure	53
Figure 3.1.	Port of Rotterdam’s historical and current development areas	71
Figure 3.2.	Marmaray project showing at-grade, bored and immersed sections.....	74
Figure 3.3.	Mersin Container Port – hinterland traffic.....	75
Figure 3.4.	Nabucco gas pipeline route via Turkey to Vienna	77
Figure 3.5.	Developing and new clusters in the Barents region.....	78
Figure 3.6.	Trends in container traffic across western European ports (Le Havre-Hamburg).....	82
Figure 3.7.	1947 Finger Plan (stylised).....	85
Figure 3.8.	2007 Finger Plan.....	85
Figure 3.9.	Decided infrastructure projects in Copenhagen over the period to 2020.....	86
Figure 3.10.	Possible fixed link Aarhus-Zealand (Kalundborg)	88
Figure 3.11.	Transalpine rail freight flows (2004)	89
Figure 3.12.	Transalpine road freight flows (2004)	90
Figure 5.1.	Increasing size and capacity of container vessels	118
Figure 7.1.	Switzerland’s infrastructure funds and their sources and allocation of revenue	148
Figure 9.1.	Northwest European and Mediterranean gateway areas and inland corridors...	183
Figure 9.2.	CO ₂ multi-modal equivalence classes emissions (sea and railways) from Port Said to main European destinations.....	184
Figure 9.3.	Multiple strategic transport objectives – current and 2030 (indicative values only).....	189
Figure C.1.	World port container handling: Higher, medium, lower TEU growth scenarios.....	228
Figure C.2.	Regional distribution of container berth requirements, 2005-2015	230