Annex E

Oil and gas transport and distribution infrastructure needs to 2030: Global estimates

Background

The IEA World Energy Outlook 2008 included advice on global energy trends, inter-regional trade, energy security and oil "shipping" and gas "transport and distribution" infrastructure needs.

The IEA has since then published two further reports that provide insights and estimates. These are *Energy Technology Perspectives 2010* (IEA, 2010a) and *World Energy Outlook 2010* (IEA, 2010b).

IEA World Energy Outlook, 2010

Oil investment needs to 2035

The IEA *World Energy Outlook 2010* includes some advice and indications of breakdowns of infrastructure investment needs for oil and gas.

It notes that:

> The projected trends in oil supply in the New Policies Scenario call for cumulative infrastructure investment along the oil-supply chain of around USD 8 trillion over 2010-2035, or USD 310 billion per year.
>
> About 85% of this investment is needed in the upstream. Including upstream investment needs for gas yields a total annual upstream oil and gas capital spending requirement of about USD 440 billion – slightly less than the USD 470 billion the industry is planning to spend in 2010.
>
> This fall in the overall level of upstream investment, mainly in the latter part of the projection period, is caused by the shift in investment towards the Middle East and other regions, where finding and development costs are generally lower. This, together with lower unit costs as technology progresses, more than offsets cost increases due to resource depletion. Around three-quarters of global cumulative oil investment to 2035 is needed in non-OECD countries in the New Policies Scenario. Investments in OECD countries are large, especially in the upstream, despite the small and declining share of these countries in world production. In contrast, investment in Middle East countries – the biggest contributor to production growth –

accounts for only 12% of total investment, because costs are lowest in this region. IEA, 2010b)

The report also notes that the world total includes an additional USD 241 billion investment in inter-regional transport infrastructure.

Natural gas investment needs to 2035

The IEA WEO 2010 notes that:

> The projected trends in gas demand in the New Policies Scenario would require a cumulative investment along the gas-supply chain of about USD 7.1 trillion (in year 2009 dollars), or around USD 270 billion per year (see Table E.1). Roughly two-thirds of that capital spending, or USD 175 billion per year, is needed upstream, for new greenfield projects and to combat decline at existing fields. Six LNG facilities account for about 9% of the total, and transmission and distribution networks for the rest. Unsurprisingly, the majority of the investment is needed in non-OECD countries, where local demand and production grows the most.

Table E.1. **Cumulative investment in gas supply infrastructure by region and activity in the New Policies Scenario (2010-2035)**

USD billions in year 2009 prices

	Exploration and development	Transmission and distribution	LNG[1]	Total	Annual average
OECD	1 863	862	150	2 875	111
North America	1 263	459	24	1 746	67
Europe	419	320	11	751	29
Pacific	180	83	114	378	15
Non-OECD	2 680	1 074	397	4 152	160
Eastern Europe/Eurasia	797	383	33	1 213	47
Caspian	227	84	–	311	12
Russia	525	234	33	792	30
Asia	721	321	94	1 136	44
China	180	132	48	360	14
India	129	58	29	216	8
Middle East	261	221	104	586	23
Africa	583	60	122	764	29
Latin America	319	89	44	452	17
World[1]	4 543	1 936	622	7 101	273
European Union	179	305	11	496	19

Note: 1. World total includes an additional USD 74 billion of investment in LNG carriers.

Source: IEA (2010), *World Energy Outlook*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/weo-2010-en*.

The advice provided in the *World Energy Outlook 2010* points towards the following estimates of oil and gas sector investment needs over the period 2010-2035 and the breakdowns shown between upstream and downstream investment needs.

Table E.2. **Oil and gas investment needs – upstream and downstream (2010-2035)**

USD billions 2009

	Oil		Gas	
Breakdown	Annual	Cumulative	Annual	Cumulative
Upstream	263	6 300	177	4 700
Downstream	47	1 700	95	2 400
World total	310	8 000	273	7 100

Source: Project estimates, based on above advice from IEA (2010), *World Energy Outlook*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/weo-2010-en*.

Revised estimates for oil and gas "transport and distribution" infrastructure investment over the period 2010-2030 are set out in the Table E.3.

Table E.3. **Revised estimates for infrastructure investment in oil and gas "transport and distribution" (2009-2030)**

USD billions 2009

	Oil		Gas	
Breakdown	Annual	Cumulative	Annual	Cumulative
Downstream	47	987	95	1 995
Additions	10	210[1]	3	63[2]
World total	57	1 197	98	2 058

Note: 1 World total includes USD 241 billion investment in inter-regional transport infrastructure (2010-2035). 2. World total includes an additional USD 74 billion of investment in LNG carriers (2010-2035).

Source: Project estimates, based on above advice from IEA (2010), *World Energy Outlook*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/weo-2010-en*.

Infrastructure investment estimates – IEA Energy Technology Perspectives 2010

The IEA *Energy Technology Perspectives 2010* estimates of total energy infrastructure investment needs are set out in Table E.4.

Table E.4. **Average annual investment by sector – baseline and BLUE map scenarios**

USD billions

	Baseline			BLUE map		
	2010-2015	2015-2030	2030-2050	2010-2015	2015-2030	2030-2050
Power generation	210	360	430	270	470	640
Transmission and distribution	170	220	210	270	260	350
Industry	130	150	290	150	170	340
Transport	3 800	4 490	7 220	4 028	4 760	8 080
Total investment (excluding buildings)	4 310	5 210	8 150	4 720	5 660	9 400

Source: IEA (2009), *Energy Technology Perspectives 2010: Scenarios and Strategies to 2050*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/energy_tech-2010-en*.

The IEA noted that investment needs in the BLUE Map Scenario would be 8.6% higher between 2010 and 2030 than in the baseline scenario.

Table E.5 highlights the IEA's findings for all fuels (i.e. not just oil and gas) on the average annual and cumulative investment by energy sector all fuels. Oil and gas transport and distribution investments (as estimated from IEA, 2010b report) make up a significant share of the energy transmission and distribution costs set out in Table E.5.

Table E.5. **Average annual investment by the energy sector – BLUE map scenario**

USD billions

Region	Infrastructure investment needs all fuels (2009-2030)				
	Annual investment requirements		Aggregate investment requirements		
Worldwide	2010-2015	2015-2030	2010-2015	2015-2030	2010-2030
Power generation	270	470	1 300	7 050	8 350
Transmission and distribution	270	260	1 350	3 900	5 250
Industry	150	170	750	2 550	3 300
Transport[1]	4 028	4 760	20 140	71 400	91 540
Total	4 720	5 660	23 600	84 900	108 500

Note: 1. "Transport" investments refer to vehicles (cars, tankers, etc.).

Source: IEA (2009), *Energy Technology Perspectives Report 2010: Scenarios and Strategies to 2050*, OECD Publishing, Paris, page 524, *http://dx.doi.org/10.1787/energy_tech-2010-en*.

Bibliography

IEA (2008), *World Energy Outlook 2008*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/weo-2008-en.*

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