Chapter 3

Natural Gas Investment in the East Asia Summit Region

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CHAPTER 3

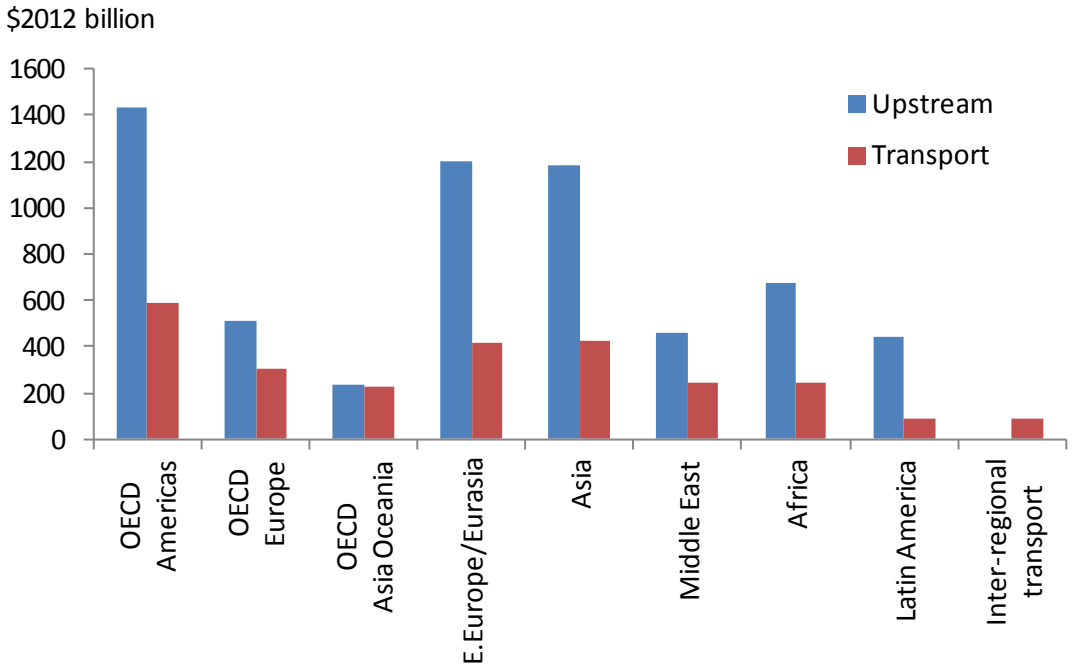
Natural Gas Investment in the East Asia Summit Region

Securing investment is the key to realising the supply potential of natural gas in the EAS countries, as earlier mentioned. Being the demand growth centre, EAS is the main region where huge amounts of investment will be required throughout the supply chain. This chapter, therefore, will examine the investment needs in the region, using the International Energy Agency's (IEA) *World Energy Investment Outlook 2014*, and the country-specific information provided by the working group members.

3.1. Upstream

According to IEA's *World Energy Investment Outlook 2014*, the annual capital expenditure on energy (oil, gas, coal, power, and bio fuel) was $1.23 trillion from 2000 to 2013. With $252 billion, natural gas accounted for 20 percent of the total energy investment for the same period. In this same document, IEA forecasts that the world fossil fuel investments from 2014 to 2035 will be as much as $23 trillion. With $8.77 trillion, natural gas shares 37 percent of the total. Region-wise, the Organisation for Economic Co-operation and Development (OECD) member countries-Americas (Canada, Chile, Mexico, and the US) require the largest amount ($2.02 trillion), followed by East Europe/Eurasia ($1.62 trillion), and by Asia ($1.61 trillion). In most regions, upstream (mainly exploration and production) investment needs to surpass significantly the needs of transport (domestic and cross-border pipelines, distribution systems, liquefaction and regasification plants, and LNG tankers). Assuming that liquefaction plants are usually considered as a part of upstream facilities, upstream gas investment could be much larger than the IEA figures.

Figure 3.1: Cumulative Fossil Fuel Investment by Region, 2014–2035



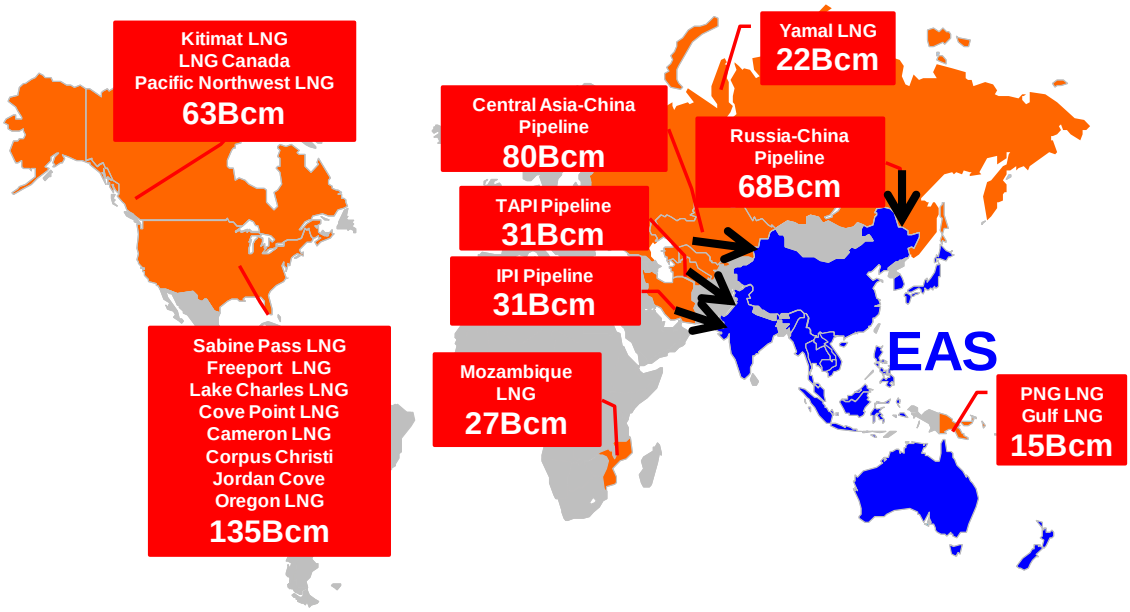
Note:OECD = Organisation for Economic Co-operation and Development.
Source: *World Energy Investment Outlook 2014* of the International Energy Agency (IEA).

The IEA expects that Asia and the OECD-member countries of Asia-Oceania—Australia, Japan, South Korea, and New Zealand—which largely correspond to EAS countries will account for a significant portion of 18 percent of the world's energy investment during 2014–2035. Within the EAS region, $657 billion of investment is needed in China, followed by the Association of Southeast Asian Nations (ASEAN) with $529 billion, and OECD's Asia-Oceania with $463 billion. Generally speaking, the upstream sector in China, ASEAN, and OECD's Asia-Oceania (mostly Australia) is the main area where heavy investment will be made in the coming decades in the EAS region. For instance, China has an ambitious policy to develop domestic shale gas resources to reach an annual production of 230 bcm in 2035. Indonesia has been working to develop its rich gas potential, conventional or unconventional, to satisfy its rapidly increasing domestic demand, as well as for export. LNG projects become more important in the country comprised of a number of islands to transport gas from the East Indonesia to energy hungry west Indonesia. Significant upstream investments are also being made in Malaysia, such as in Kinabalu and Kebabangan, as well as in LNG projects like FLNG Satu and Dua, and MLNG Train 9.

While EAS countries will invest aggressively within the region, it is important to note that investing outside the region is equally important since many upstream projects plan

to supply EAS countries, at least partly.

Figure 3.2: Major Natural Gas Supply Sources for the EAS Region



Source: The Institute for Energy Economics, Japan (IEEJ).

An LNG offers greater mobility than pipeline gas in terms of supply destination. Especially since after the series of Ukrainian gas crises, it has become clearer than before that LNG is more advantageous than pipeline gas in terms of security of supply. In any case, a large number of LNG projects are planned outside the EAS region, especially in North America. Considering that the total capacity of those projects is as large as 224 MT (304 bcm) and that the increasing dependency on non-EAS supplies is expected in the future, the extent of gas supply security in the EAS region will depend on whether these projects will be commercialised in a timely manner to meet increased demand.

Table 3.1: Major Liquefied Natural Gas Projects for the East Asia Summit Region

Region	Country	Project	Capacity (MT/y)	Start up	Investors	Investment Amount ($ billion)
Africa	Mozambique	Mozambique LNG	20.0	2020	Anadrko, Mitsui, ENH, Bharat Petroleum, Videocon, Cove Energy	30?
	Sub-total		20.0			
FSU	Russia	Yamal LNG	16.5	2017	Novatek, Total, CNPC	27
	Sub-total		16.5			
Americas	USA	Sabine Pass	9.0	2016	Cheniere Energy	11
			9.0	2017		
		Freeport	8.8	2018	Freeport LNG, ZHA FLNG, Dow Chemical, Osaka Gas	4
			4.4	2019		
		Cameron	8.0	2018	Sempra, GdF Suez, Mitsubishi, NYK Line, Mits	6
			4.0	2018		
		Cove Point	5.3	2018	Dominion Resources	3-4?
		Lake Charles	15.0	2018	Southern Union, BG	3-4?
		Corpus Christi	15.7	2018	Cheniere Energy	12?
		Jordan Cove	9.2	2020	Fort Chicago, Energy Projects Development	8?
	Canada	Pacific Northwest	12.0	2018	Petronas, SINOPEC, JAPEX, IOC, Dhina Huadian, Petroleum Brunei	9-11?
		LNG Canada	24.0	2023	Shell. Mitsubishi, KOGAS, CNPC	32?
		Kitimat LNG	10.0	2023	Chevron, EOG Resources, Encana	28?
	Sub-total		134.4			
Asia Oceania	Indonesia	Donggi Senoro LNG	2.0	2015	Mitsubishi, KOGAS, Pertamina, Medco	3
		Tangguh (Train 3)	3.8	2019	BP, MI Berau, CNOOC, Nippon Oil Exploration, KG Berau, KG Wiriagar, Indonesia Natural Gas Resources Muturi, Talisman Wiriagar	12?
	Malayisa	Petronas LNG	3.6	2015	Petronas	0.4-0.6
		Petronas FLNG	1.2	2015	Petronas	0.8
		Petronas FLNG	1.5	2018	Petronas	2
	Australia	Australia Pacific LNG	9.0	2015	Origin Energy, ConocoPhillips, Sinopec	20
		Gorgon	15.6	2015	Chevron, Shell, ExxonMobil, Osaka Gas, Tokyo Gas, Chubu Electric	54
		GLNG	7.8	2015	Santos, Petronas, Total, KOGAS	19
		Prelude	3.6	2017	Shell, INPEX	34
		Wheatstone	8.9	2016	Chevron, Apach, Tokyo Electric, KUFPEC, KOGAS, Kyushu Electric	29
		Ichthys	8.4	2016	INPEX, Total, Tokyo Gas, Osaka Gas, Toho Gas	20<
	Sub-total		53.3			
Total			224.2			

Source: Compiled by The Institute for Energy Economics, Japan (IEEJ).

3.2. Downstream

The previous section mentioned that downstream gas investment in the EAS region is likely to be smaller than upstream during 2014–2035. The IEA expects that the gas transport sector in Asia and the OECD's Asia-Oceania might need $658 billion, which is less than half of the upstream investment during the period. This is not to dismiss the importance and difficulty of downstream investment in the EAS region. Many EAS countries are just beginning to gasify and are not necessarily capable of financing large-scale gas infrastructure projects, partly because of the non-profitability of the gas supply business, which often stems from the low-priced gas set for political and social welfare objectives.

Nevertheless, with increasing demand and environmental advantages that natural gas can bring about, significant downstream gas developments are underway in many EAS countries. LNG regasification facility is one of the major areas of such development. While Northeast Asia is expected to be the largest LNG importer in the world, India plans to expand its existing LNG import capacity from 22 MT during 2014–2015 to 30 MT during 2018–2019, and to develop new capacity at Ennore, Gangavaram, and Kakinada by 2020. Southeast Asia is transforming itself into a major LNG-importing region. Singapore and Malaysia started to import LNG in 2013, and both countries plan to build second or third regasification terminals. Indonesia already has three regasification terminals and many other regasification terminal and pipeline projects are planned to fulfil domestic demand. Other countries, such as the Philippines, Viet Nam, and Myanmar, also have plans to build regasification terminals.

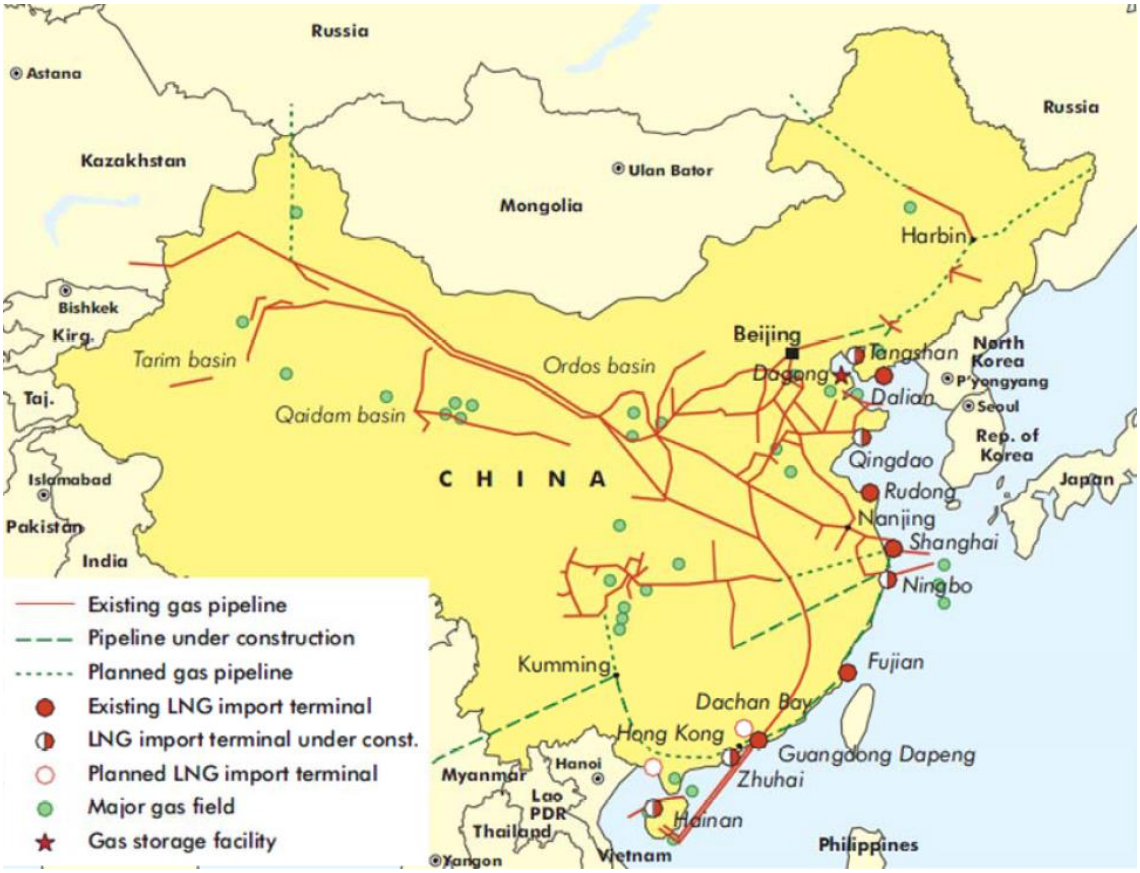
Table 3.2: Major Regasification Projects in the East Asia Summit Region

Country	Name/Location	Capacity (MT/y)	Start up	Investors	Cost estimate ($ billion)
China	Guangdong, Shenzen/Diefu	4	2015	CNOOC, Shenzhen Energy Group	1.3
	Jiangsu, Yancheng	3	2015	CNOOC	1.9
	Guangxi, Beihai	3	2015	Sinopec	2.8
	Jiangsu, Lianyungang	3	2015	Sinopec	N.A.
	Guangdong, Jieyang	2	2015	CNOOC, Guangdong-Yuedong LNG	4.8
	Guangdong, Shantou	1	2016	Sino Gas, Guodian	N.A.
	Jiangsu, Qidong	1	2016	Guanghui Energy, Shell	N.A.
	Zhejiang, Zhoushan	3	2016	ENN Energy	N.A.
	Fujian, Zhangzhou	3	2017	CNOOC	1.1
	Guangdong, Maoming	3	2017	CNOOC	18
India	Ennore	5	2017-18	IOC, TIDCO	0.5
	Gangavaram	5	2018-19	Petronet LNG	9.2
	Kakinada	5	2017-18	APGDG	N.A.
Indonesia	Arun	3	2015	Pertamina	N.A.
	Central Java, Semarang	3	2016	Pertamina	0.4
	Central Java, Cilacap	2	N.A.	Pertamina	0.2
Japan	Hachinohe	1	2015	JX	0.4
	Shinsendai	N.A.	2015	Tohoku Electric	N.A.
	Souma	N.A.	2018	JAPEX	0.5
	Toyama Shinko	N.A.	2018	Hokuriku Electric	0.9
	Hitachi	N.A.	2016	Tokyo Gas	1
South Korea	Boryeong	3	2016	SK, GS Energy	0.7
	Jeju	N.A	2017	KOGAS	0.1
Malaysia	Pengerang ,Johor	4	2018	Petronas, Dialog LNG, Johor government	0.8
Myanmar	N.A.	N.A	N.A.	N.A.	N.A.
New Zealand	New ZeaLand	1	N.A.	Contact Energy, Genesis Energy	0.4
Phillipines	Pagbilao, Quezon	1	2015	Energy World International	0.2
	Limay, Bataan	N.A.	2017	GN Power	N.A.
	Tbangao, Batangas	4	2017	Shell	1.6
	San Gabriel, Btangas	1	2019	First Gen	N.A.
Singapore	(Second terminal)	N.A.	N.A.	N.A.	N.A.
Viet Nam	Thi Vai	1	2017	PetroVietnam Gas	N.A.
	Son My ,Binh Thuan	2	2020	PetroVietnam Gas, Shell	N.A.

Note:N.A. = not applicable.
Source: Compiled by The Institute for Energy Economics, Japan (IEEJ).

Domestic pipeline is another major area of investment in downstream gas. With the huge demand growth expected in the future, China is the country that has undertaken and will implement the largest scale of pipeline investment in EAS countries. With two West–East lines as backbone, a number of pipelines—such as the Shaan-Jing line and Sichuan–Eastern line—have been built. With increasing imports from Central Asia, the Third West–East lines will be completed in 2015 and the fourth line is under planning.

Figure 3.3: Natural Gas Pipeline Network in China



Source: International Energy Agency (IEA).

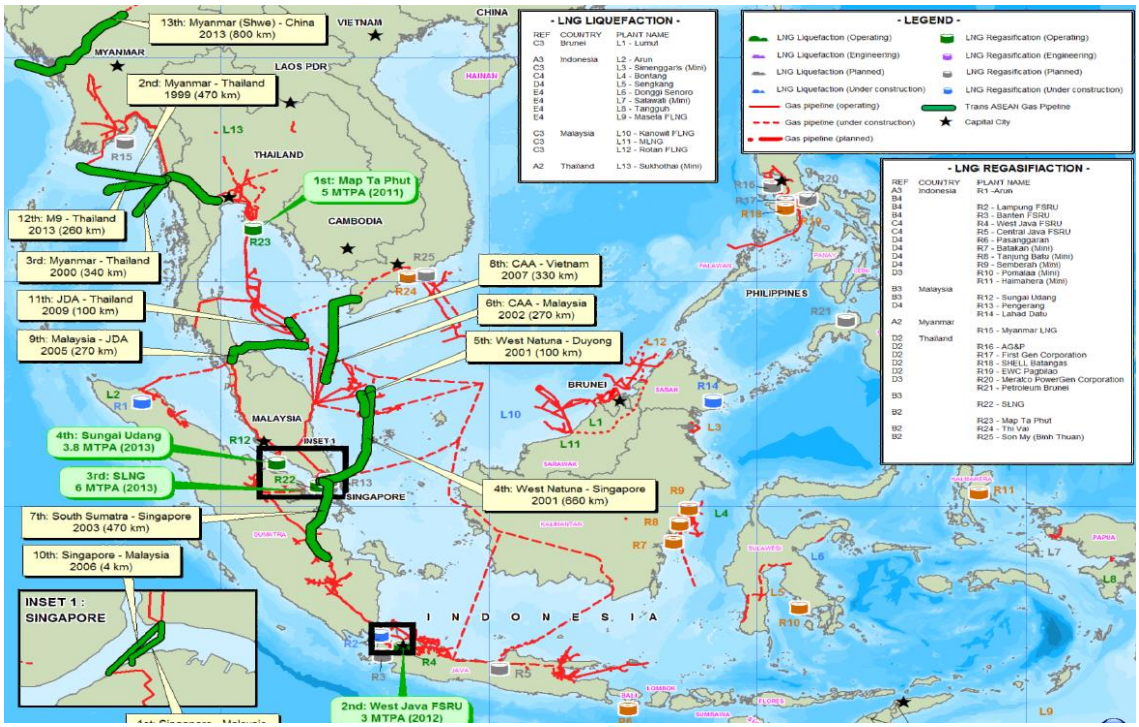
Other countries have also expanded their pipeline networks significantly. In India, the main lines so far include the HBJ (Hazira Bijaipur Jagdispur) gas pipeline, which connects Hazira and Jagdishpur and the East–West line that brings gas from the Krishna Godavari basin to Gujarat. India plans to invest $7.3 billion on gas transmission network by 2017.

Figure 3.4: Natural Gas Pipeline Network in India

Source: International Energy Agency (IEA).

The ASEAN countries have been working on the Trans-ASEAN Gas Pipeline to realise the interconnecting arrangements of natural gas in the region. According to the ASEAN Council on Petroleum (ASCOPE), 12 bilateral connections have been established with a total length of 3,279 kilometres (km). ASCOPE estimates that $7 billion will be needed to complete the TAGP (Trans ASEAN Gas Pipeline) projects with a total length of 4,500 km.

Figure 3.5: Trans-ASEAN Gas Pipeline



Source: ASEAN Council on Petroleum (ASCOPE).