Asia-Pacific Policy Papers Series

TOWARD A NEW ERA OF TRANS-PACIFIC ENERGY INTERDEPENDENCE

Edited by Kent E. Calder

THE EDWIN O. REISCHAUER CENTER FOR EAST ASIAN STUDIES
WASHINGTON D.C.

Johns Hopkins University The Paul H. Nitze School of Advanced International Studies
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The Edwin O. Reischauer Center for East Asian Studies

Established in 1984, with the explicit support of the Reischauer family, the Edwin O. Reischauer Center for East Asian Studies at the Paul H. Nitze School of Advanced International Studies (SAIS) actively supports the research and study of trans-Pacific and intra-Asian relations to advance mutual understanding between North-east Asia and the United States.

The first Japanese-born and Japanese-speaking US Ambassador to Japan, Edwin O. Reischauer (serv. 1961–66) later served as the center's Honorary Chair from its founding until 1990. His wife Haru Matsukata Reischauer followed as Honorary Chair from 1991 to 1998. They both exemplified the deep commitment that the Reischauer Center aspires to perpetuate in its scholarly and cultural activities today.

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TOWARD A NEW ERA OF TRANS-PACIFIC ENERGY INTERDEPEPENDENCE:

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ABOUT THE AUTHORS

KENT E. CALDER is Director of the Reischauer Center for East Asian Studies at SAIS/Johns Hopkins University. He served previously as Special Advisor to the U.S. Ambassador to Japan, and as Japan Chair at the Center for Strategic and international Studies. Before arriving at SAIS in 2003, he taught at Princeton University for twenty years, and previously also at Harvard University. He completed his PhD at Harvard University under the direction of Edwin O. Reischauer.

YUEN PAU WOO is Director of the Asia-Pacific Institute of Canada, based in Vancouver, British Columbia.

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THE PACIFIC ECONOMIC COOPERATION COUNCIL (PECC) is one of the preeminent trans-Pacific private-public cooperative research organizations. This paper is a supplement to the PECC State of the Region report for 2011-2012, coordinated by Dr. Yuen Pau Woo.

TOWARD A NEW ERA OF TRANS-PACIFIC ENERGY INTERDEPENDENCE:

FOREWORD

Three quarters of a century ago, trans-Pacific energy trade was vigorous, with the United States serving as one of Japan's principal oil suppliers. Indeed, the abrupt American oil embargo of 1941, in response to Japan's invasion of Indochina, was a major factor intensifying the downward spiral toward war between the two major Pacific powers. For six decades and more following war's end, trans-Pacific energy interdependence was limited largely to coal and nuclear power, although both Canada and the United States came to develop significant relationships with Japan in those two vital energy areas. Indeed, Canada became Japan's largest uranium supplier, while the American and Japanese civilian nuclear industries came to be tightly intertwined. Yet trans-Pacific gas trade in 2010 still accounted for only 0.3 percent of the worldwide total, while trans-Pacific oil trade only constituted 1.2 percent of global totals.

This monograph chronicles and analyzes the dawning of a historic new era of deepened and broadened interdependence in trans-Pacific energy relations. Two fateful developments divide the past of trans-Pacific energy relations clearly from its future, and thus preface that new chapter: the Fukushima nuclear tragedy, and the North American shale-gas revolution. The former has, since March, 2011, dramatically constrained Japan's energy supplies, while the latter shows significant promise of expanding them. Both developments also inspire important new trans-Pacific policy agendas who outlines and implications we are only just beginning to fully grasp.

The contributions to follow consider both the momentous technical and economic changes now newly underway in trans-Pacific energy relations, and also their policy implications for Japan, Canada, and the United States. These three countries comprise an especially important unit for energy analysis, as they are all both major democratic, capitalist nations, and also central players in the political economy of global energy. The United States and Japan, after all, are two of the three largest importers and consumers on earth. At the same time, the United States and Canada are also two of the world's largest oil and natural gas producers, whose productive roles are both being enhanced by rapidly rising shale-gas production. Meanwhile, Japan's role as the largest liquefied natural gas (LNG) importer on earth is being further enhanced by the need for alternate energy sources in the wake of the Fukushima nuclear accident, creating important new complementarities with the Canadian and American roles as major energy exporters. And the geopolitical issue of Iran sanctions, against a volatile nation that has traditionally been one of Japan's largest hydro-carbon suppliers, looms in the background as well.

The views presented are, as the reader will readily note, written from three distinctly different national perspectives: those of Japan, Canada, and the United States. Yet they are unified in their belief in the historic nature of the transformations now impending in trans-Pacific energy relations, and the importance of market tools in dealing with them. They all agree that the major changes in energy flows are likely three to four years away, at least: major capital investments in energy have long lead times. Yet they also suggest that the impending changes, especially in liquefied natural gas, could have momentous global impact. Most importantly, expanded low-cost LNG exports from North America to Japan, and also to China and Korea, could put substantial pressure on the oil price linkage in natural-gas contracts upon which Middle

Eastern suppliers have traditionally insisted, and which has kept Japanese LNG consumer prices comparatively high.

The authors all note that some domestic interests in both Canada and the United States are ambivalent about trans-Pacific hydro-carbon interdependence. Petro-chemical producers and other domestic consumers benefitting from a decline in feedstock prices due to the shale-gas revolution naturally desire to see the returns to declining hydrocarbon prices remain at home. Yet the authors note that such domestic pressures are weaker in Canada than in the United States, and that the two countries are inevitably competitors also in broader global markets. If the United States fails to see the benefits of Northeast Asian markets and investments, Canada is very likely to capitalize on U.S. inaction. The more constructive strategy for both nations, the papers conclude, is thus for both countries to maintain open trade and investment policies with respect to trans-Pacific energy, first and foremost with democratic allies such as Japan.

These papers were presented at the third trilateral conference on prospects for US-Japan-Canada mini-lateral cooperation, hosted by the SAIS/Johns Hopkins University Reischauer Center for East Asian Studies in Washington, D.C., and co-sponsored by the Japan Institute of International Affairs (JIIA), and the Asia-Pacific Institute of Canada. The Washington conference followed parallel sessions in Vancouver, Canada (October, 2009); and Tokyo, Japan (August, 2010), from which many of the key ideas originally evolved. All three conferences featured trans-Pacific energy issues as a central concern. The co-sponsors are deeply grateful for the generous support, over the past three years, of the Japan Foundation's Center for Global Partnership. The editor is personally grateful, in particular, to three members of the Reischauer Center, Mika Brooks, Shinichiro Ichiyama, and Izumi Sano, who contributed greatly to research and publication. The editor is also most grateful to key colleagues in this project—JIIA director

Ambassador Yoshiji Nogami and Deputy Directors Naoko Saiki and Hideki Asari, as well as Research Fellow Asuka Matsumoto, together with Asia Pacific Institute Director Dr. Yuen Pau Woo, as well as to Ambassadors Jonathan Fried and Sadaaki Numata, who played a catalytic and inspirational role at the very beginning.

Kent E. Calder
Washington, D.C.
June 23, 2012

Trans-Pacific Energy Trade: A Canadian Perspective

YUEN PAU WOO

PRESENTATION TO JAPAN-US-CANADA TRILATERAL COOPERATION PROJECT
WASHINGTON, DC
8 MAY 2012

Asia Pacific Foundation of Canada
Fondation Asie Pacifique du Canada

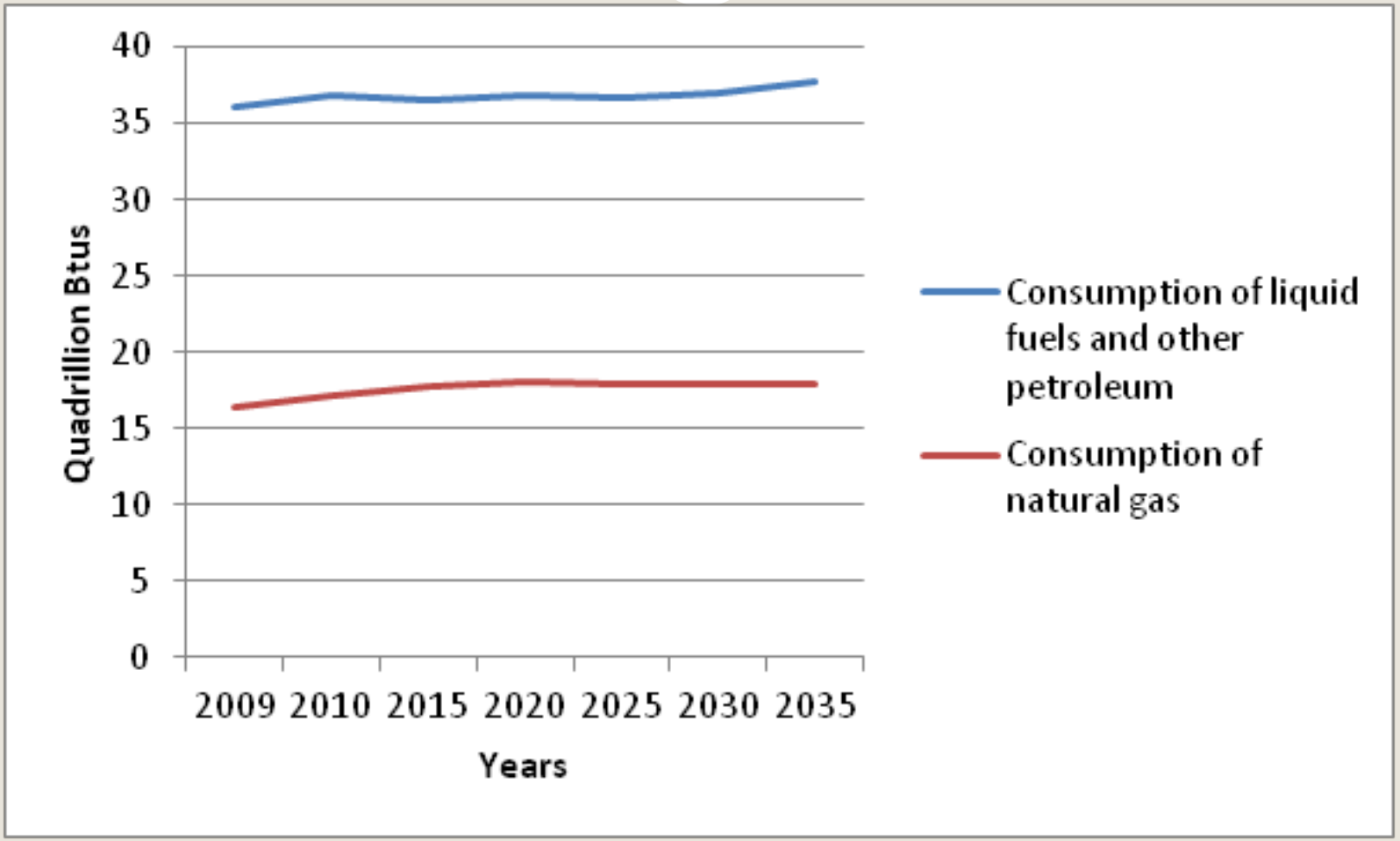
The Canadian Oil and Gas industry

- Accounts for about 7% of GDP and 23% of export sales, and employs more than 350,000 Canadians. In 2011, crude oil was Canada's most valuable export commodity with sales of $50 billion. Government revenues generated from the industry – close to $22 billion in 2011 -- provide indispensable support for the social programs Canadians cherish.
- Oil and natural gas development will play a role in generating government revenues well into the future. The economic contribution of the natural gas industry is expected to be $1.3 trillion over a 25 year period, while oil sands and conventional oil developments are expected to make a combined contribution of $3.2 trillion.
- For an energy exporting country with abundant natural resources, Canada's ***biggest challenge is security of international demand for our resources.*** This sets us apart from other G7 countries and emerging economies which are more concerned with security of supply.
- The key to security of demand is **diversification of markets**

Percentage of Canada's energy commodity exports, by value, destined for the US

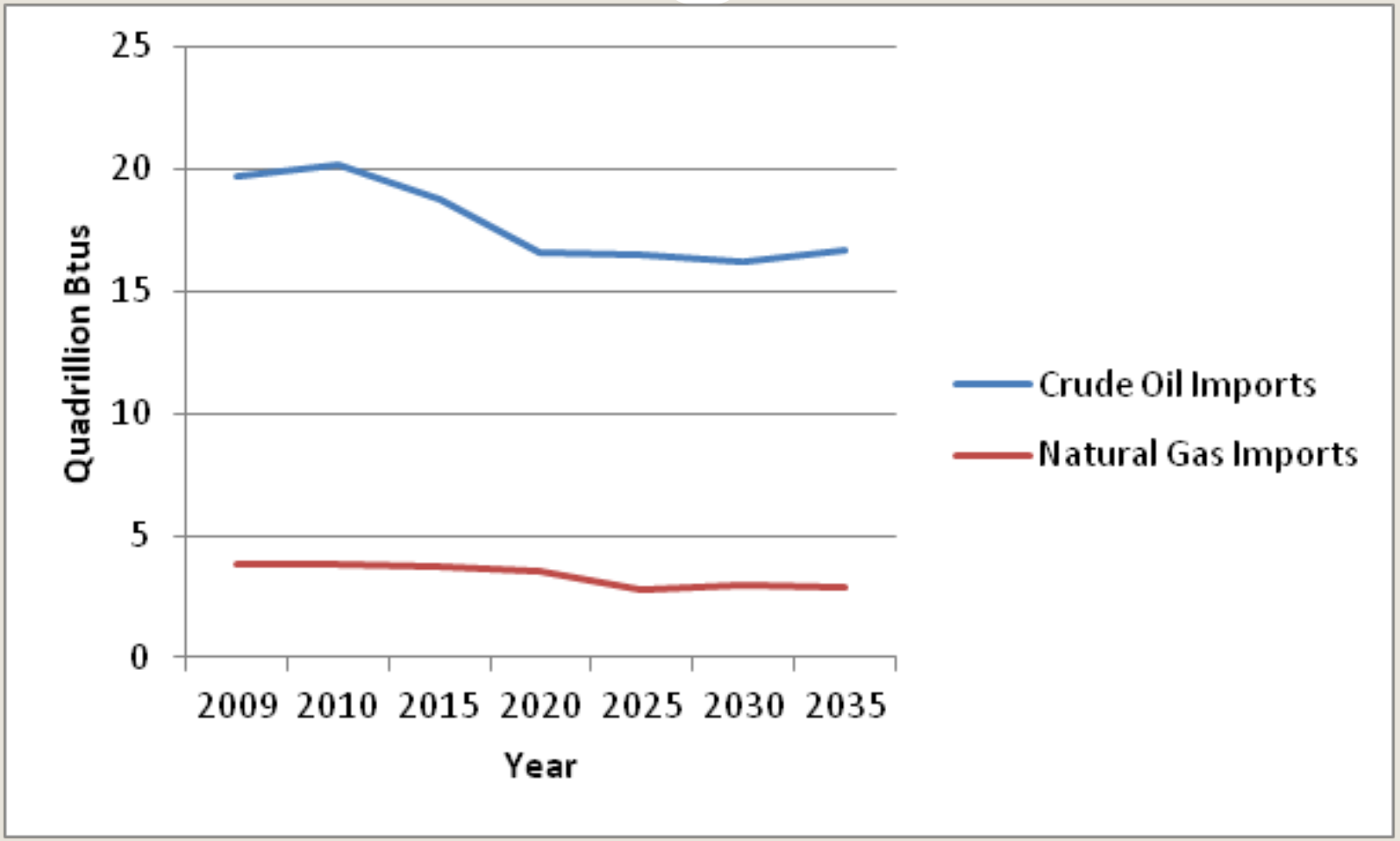
	2006	2007	2008	2009	2010
Coal	7.7%	6.6%	3.9%	3.2%	5.2%
Crude Oil (including Oil Sands)	99.8%	99.4%	99.9%	99.2%	99.5%
Natural Gas	100.0%	100.0%	100.0%	100.0%	100.0%
Total	95.6%	95.9%	94.3%	91.9%	91.9%

Projected US consumption of oil and natural gas.



Source: Energy Information Administration

Projected US crude oil and natural gas imports.



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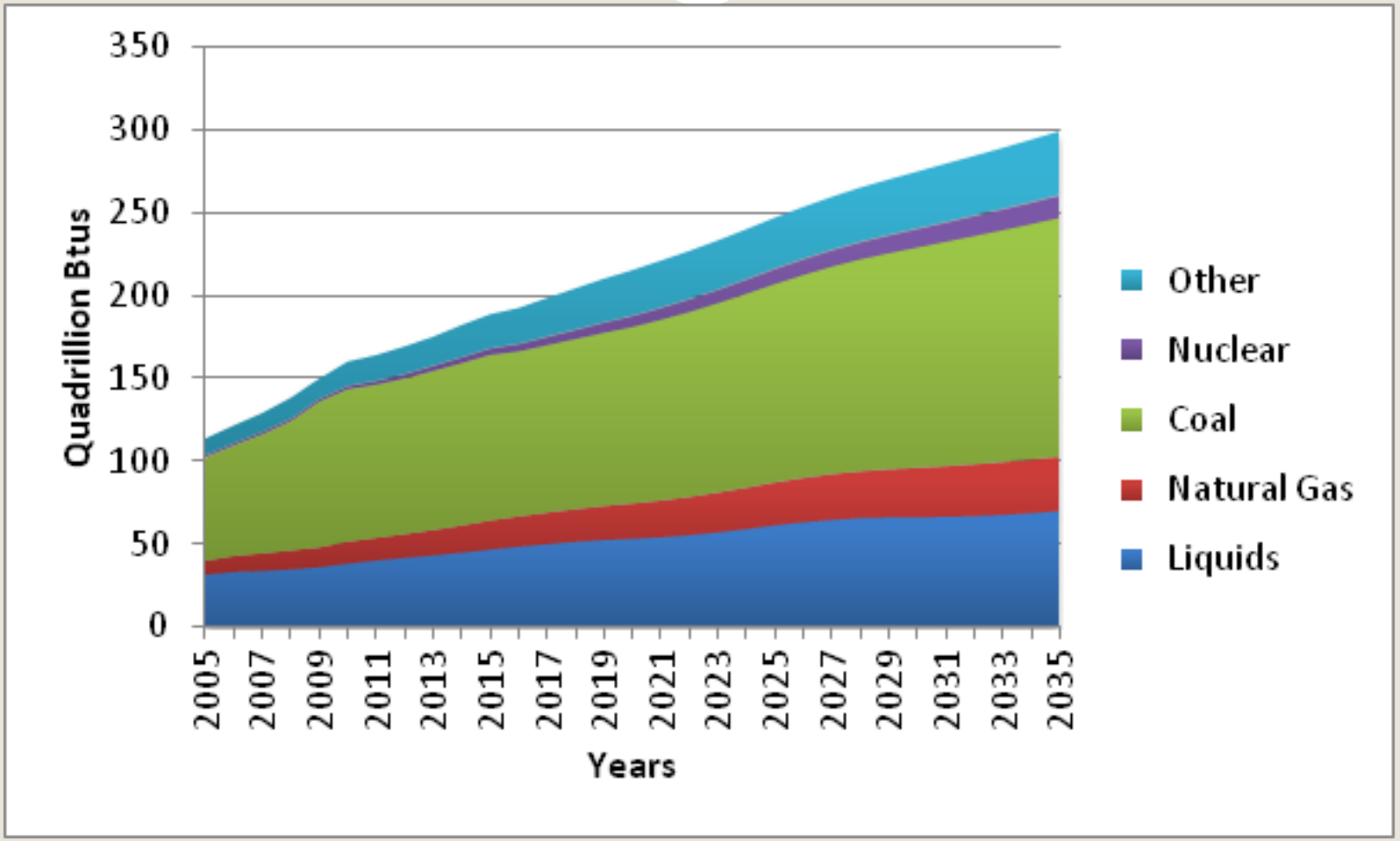
Source: Energy Information Administration

Non-OECD Asia's projected demand by fuel type.



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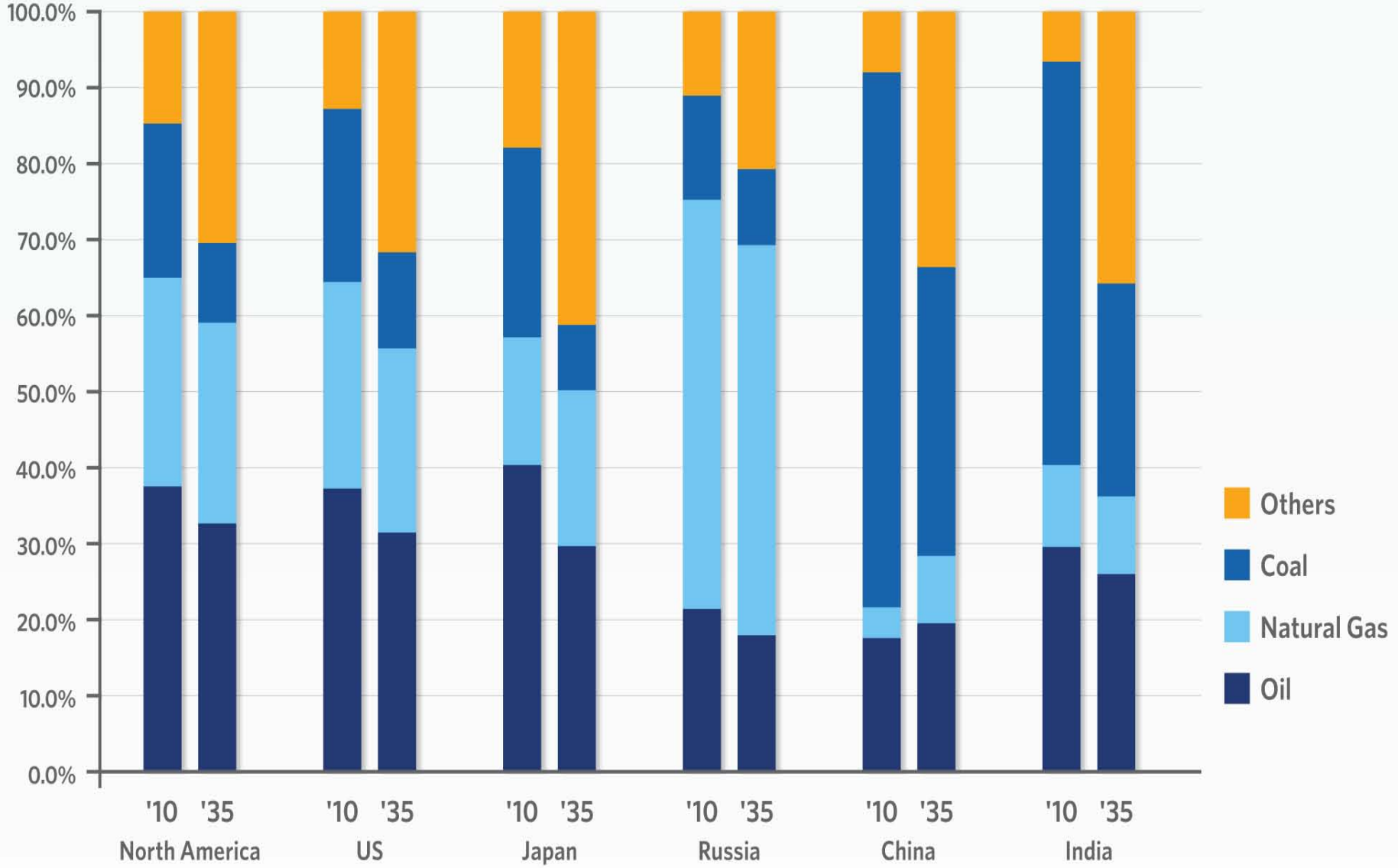
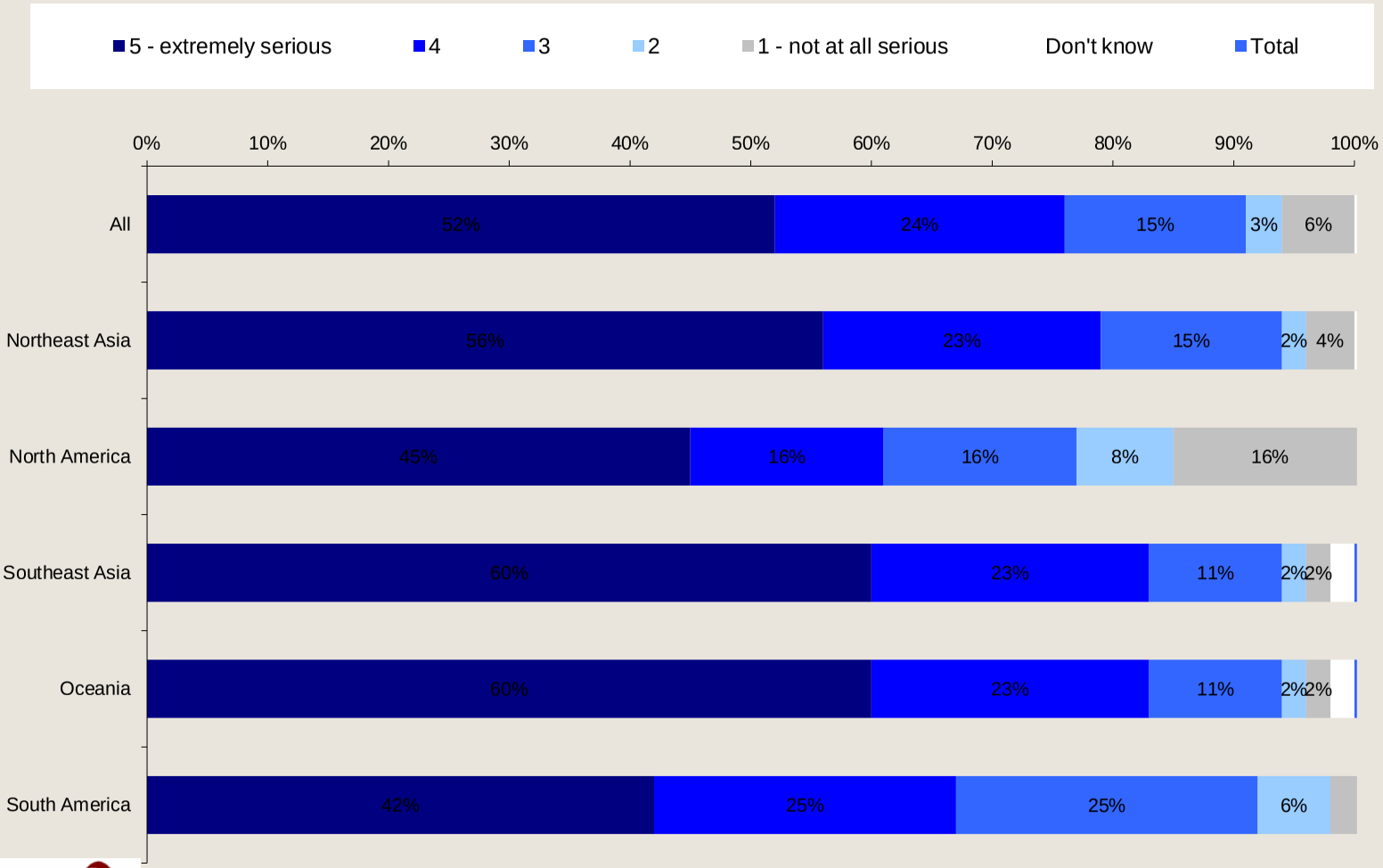
Source: Energy Information Administration

Figure 2: *Energy mix of selected economies in 2010 and 2035* **Source:** *BP Statistical Review of World Energy 2011*



How serious is the issue of safe and secure access to energy for your economy?



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Source: PECC (2011) Prospects for Transpacific Energy Trade /State of the Region Report

Trans-Pacific Energy Trade Virtually Non-Existent

- Energy is the world's most traded commodity by value, yet there is virtually no trans-Pacific trade in energy products.
- Oil trade across the Pacific accounts for only 1.2% of global oil trade in 2010. Trans-Pacific natural gas trade is only 0.3% of the global total
- Trans-Pacific coal trade is slightly more significant, but even so, it only accounts for 4.6% of overall trade in coal. Aggregating across all three fossil fuels, trans-Pacific energy trade only accounts for 1.4% of global energy trade

Pattern of Global Oil Trade

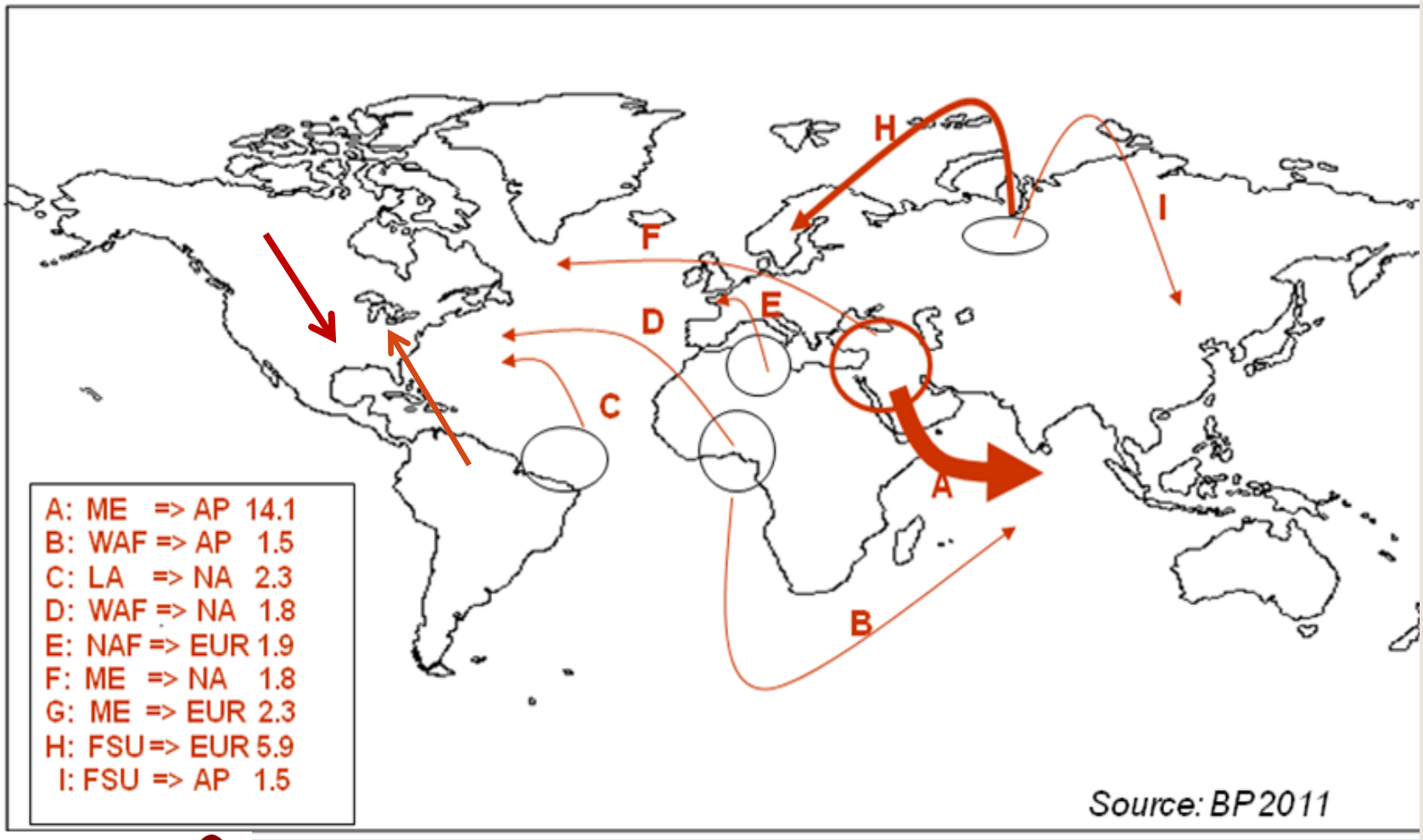
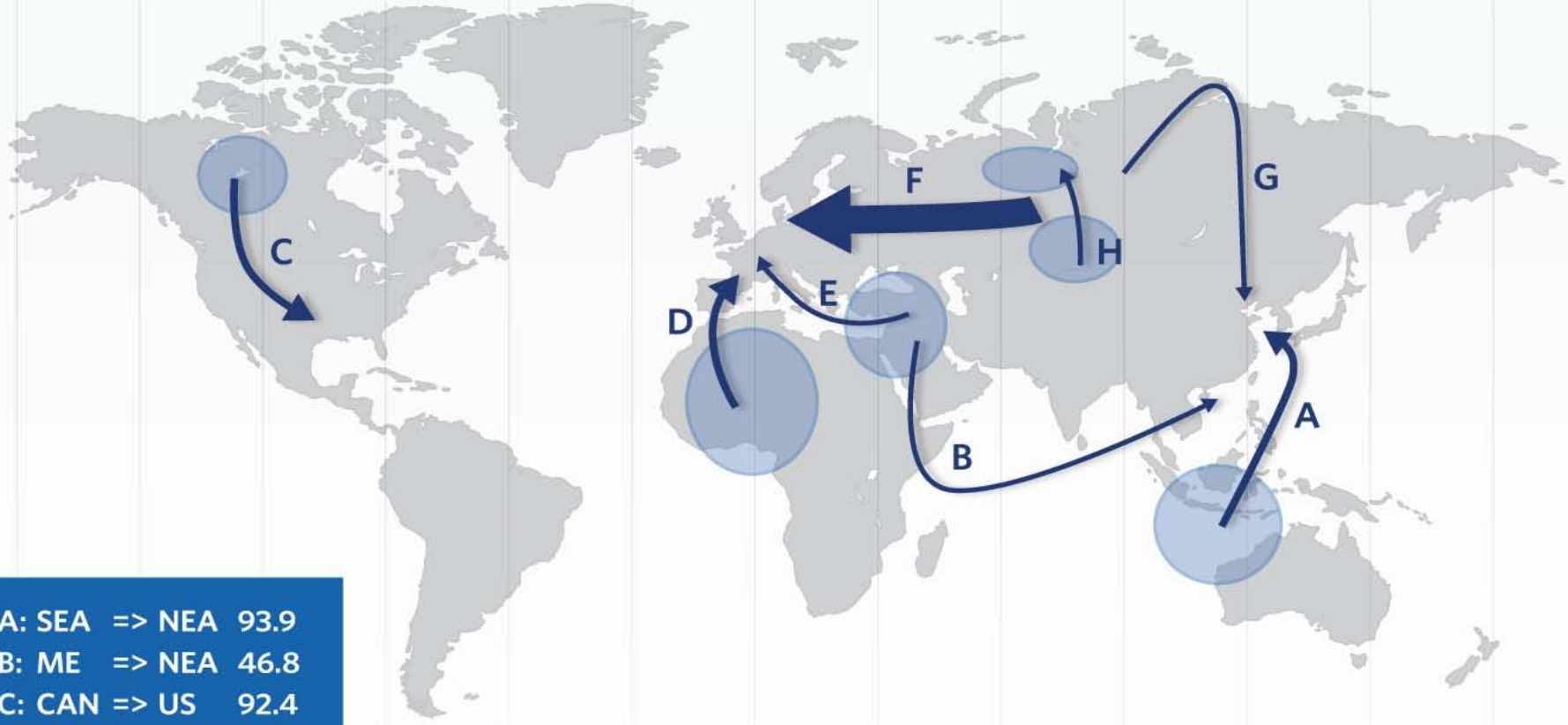


Figure 4: *Pattern of global gas trade in 2010*



A: SEA	=> NEA	93.9	
B: ME	=> NEA	46.8	
C: CAN	=> US	92.4	
D: AF	=> EUR	84.3	
E: ME	=> EUR	45.0	
F: FSU	=> EUR	185.7	
G: FSU	=> NEA	16.0	
H: CA	=> RUS	31.9	

ME = Middle East **NEA** = Northeast Asia **SEA** = ASEAN+Australia **AF** = North and West Africa
CAN = Canada **EUR** =Europe **FSU** = Former Soviet Union **CA** = Central Asian FSU members

All figures are in Bcm (Billions of cubic metres)

Source: *BP Statistical Review of World Energy 2011*

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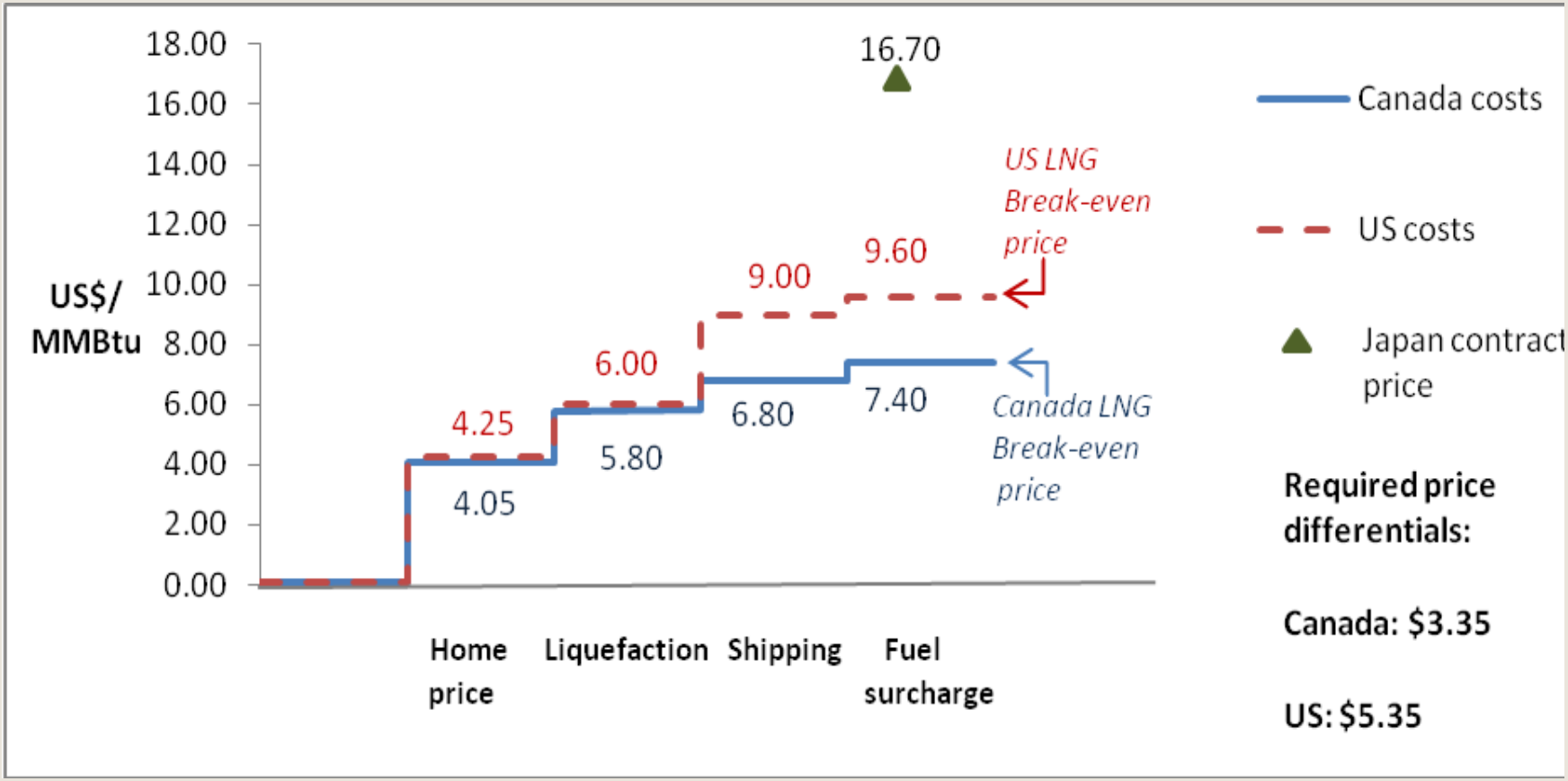
Choke Points in International Oil and Gas Trade

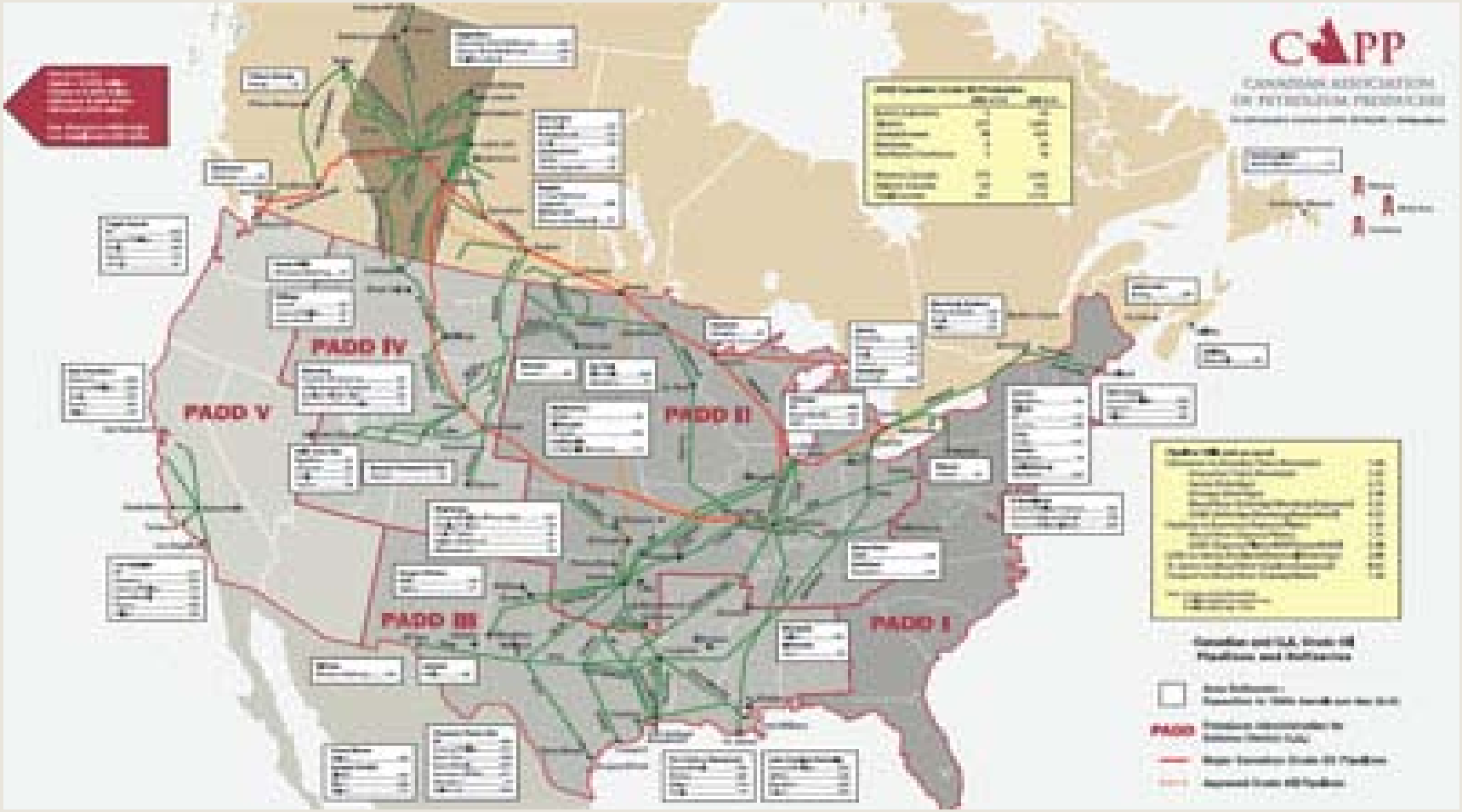
Natural Gas Prices in North America and Asia

Cost buildup for breakeven prices for US and Canada LNG exports to Japan, 2011

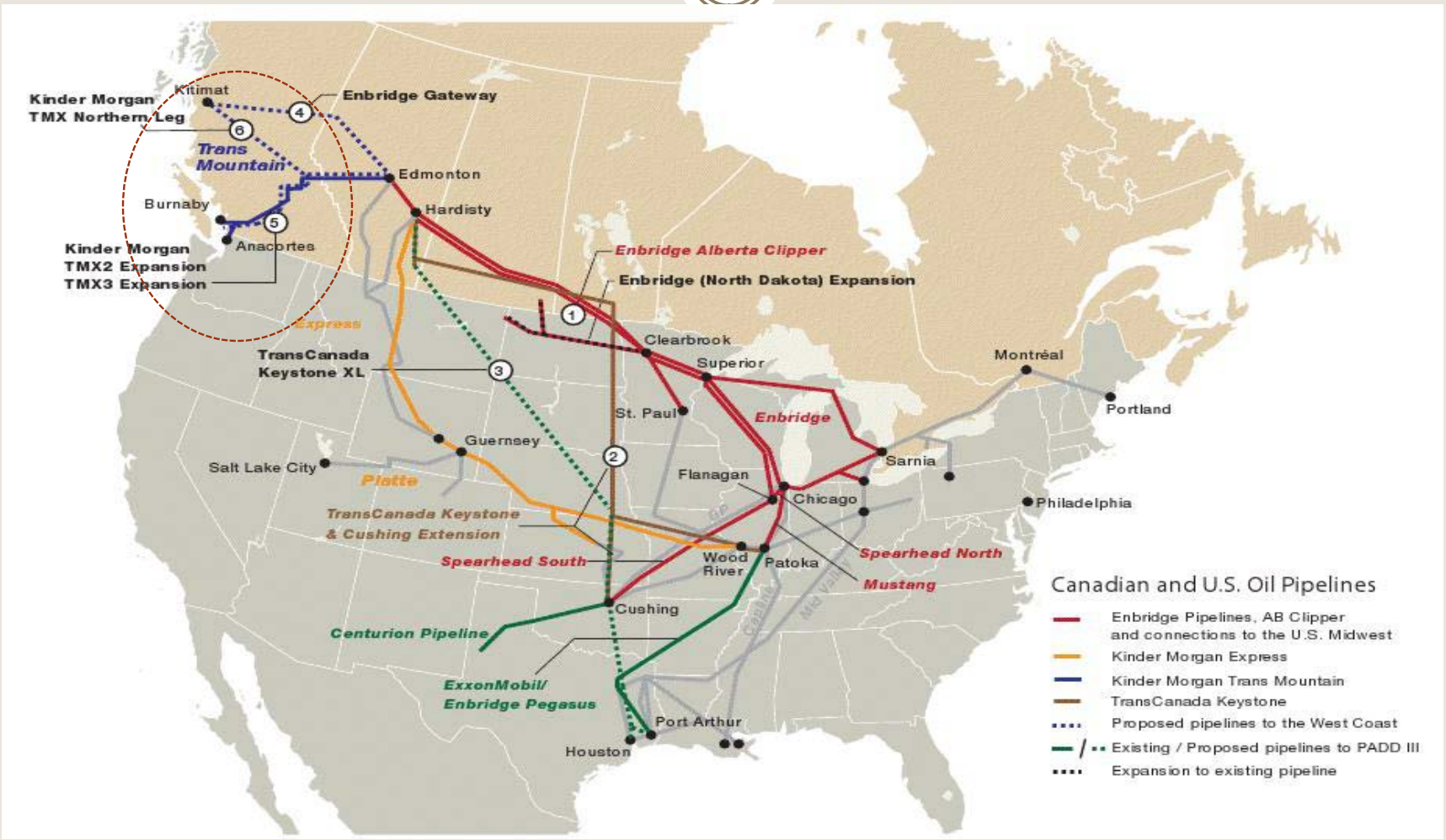


Sources: Nexant (2011), Platts (13 Apr 2011), WGI Various Issues (2011), Petroleum Association of Japan (2011) ,in PECC (2011)

Oil Pipelines and Refineries in North America



Go West to Go East



Proposed Northern Gateway and Trans-Mountain Pipelines

Proposed LNG export projects in North America

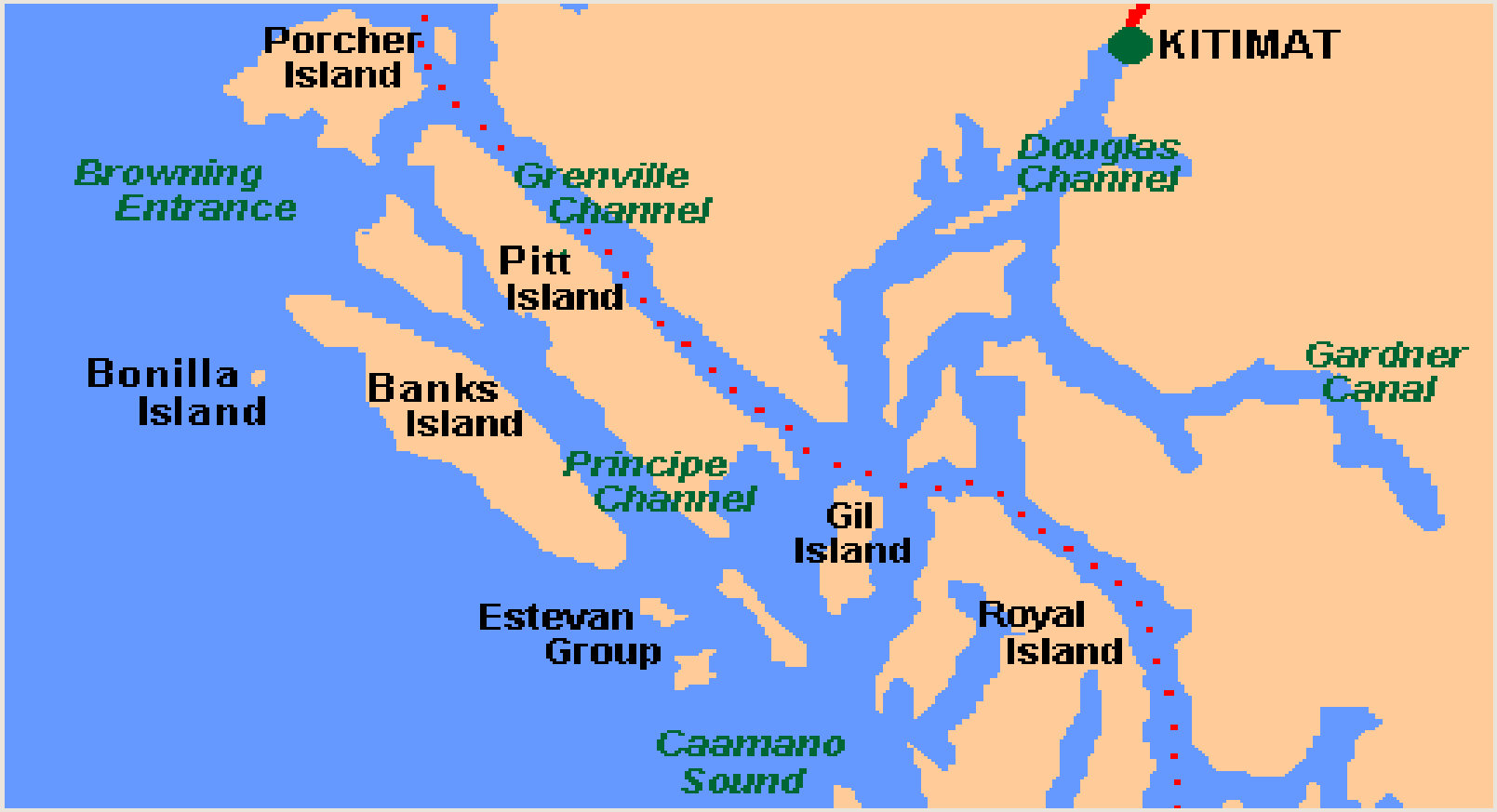
Project	Country	Location	Export capacity (in million tons per year)	Expected starting date
Kitimat LNG	Canada	West Coast	10.0	2015
BC LNG	Canada	West Coast	15.0	2015
Petronas/Progress	Canada	West Coast	-	2016-18
Douglas Chanel LNG	Canada	West Coast	1.8	2014
Sabine Pass LNG (Cheniere)	USA	Gulf Coast	16.0	2015
Shell/Mitsubishi/CNPC/KOGAS	Canada	West Coast	-	-
British Gas	Canada	West Coast	-	-
Freeport LNG	USA	Gulf Coast	15.0	> 2015
Lake Charles (BG)	USA	Gulf Coast	17.6	-
Cove Point LNG (Dominion)	USA	East Coast	-	-
North Slope, Alaska (BP/ConocoPhillips)	USA	West Coast	-	-
Jordan Cove LNG, Oregon	USA	West Coast	-	-

Recent Investments by Asian oil & gas companies in North American oil and gas industry

Date	Category	Investing country	Investing company	Recipient country	Project/ company	Valuation (in billion US$)
May-05	Oil sands	China	CNOOC	Canada	MEG	0.2
Aug-06	Oil sands	S Korea	KNOC	Canada	Black Gold	1.7
Apr-10	Oil sands	China	Sinopec	Canada	Syncrude	4.6
Nov-10	Oil sands	Thailand	PTTEP	Canada	Kai Kos Dehseh	2.3
Jan-11	Shale gas & oil	China	CNOOC	USA	Chesapeake	0.6
Jan-11	Pipeline	China	Sinopec	Canada	Northern Gateway Pipeline	2.3
Feb-11	Shale gas	India	Reliance	USA	Atlas, Chevron	3.2
Mar-11	Shale gas & oil	S Korea	KNOC	USA	Anadarko	1.6
Jul-11	Oil sands	China	CNOOC	Canada	OPTI Canada	2.1
Oct-11	Conventional Oil	China	SINOPEC	Canada	Daylight	2.2
Nov-11	Shale Gas	Japan	Inpex	Canada	Nexen	0.7
Feb-12	Shale gas	Japan	Petrochina	Canada	Encana	2.9

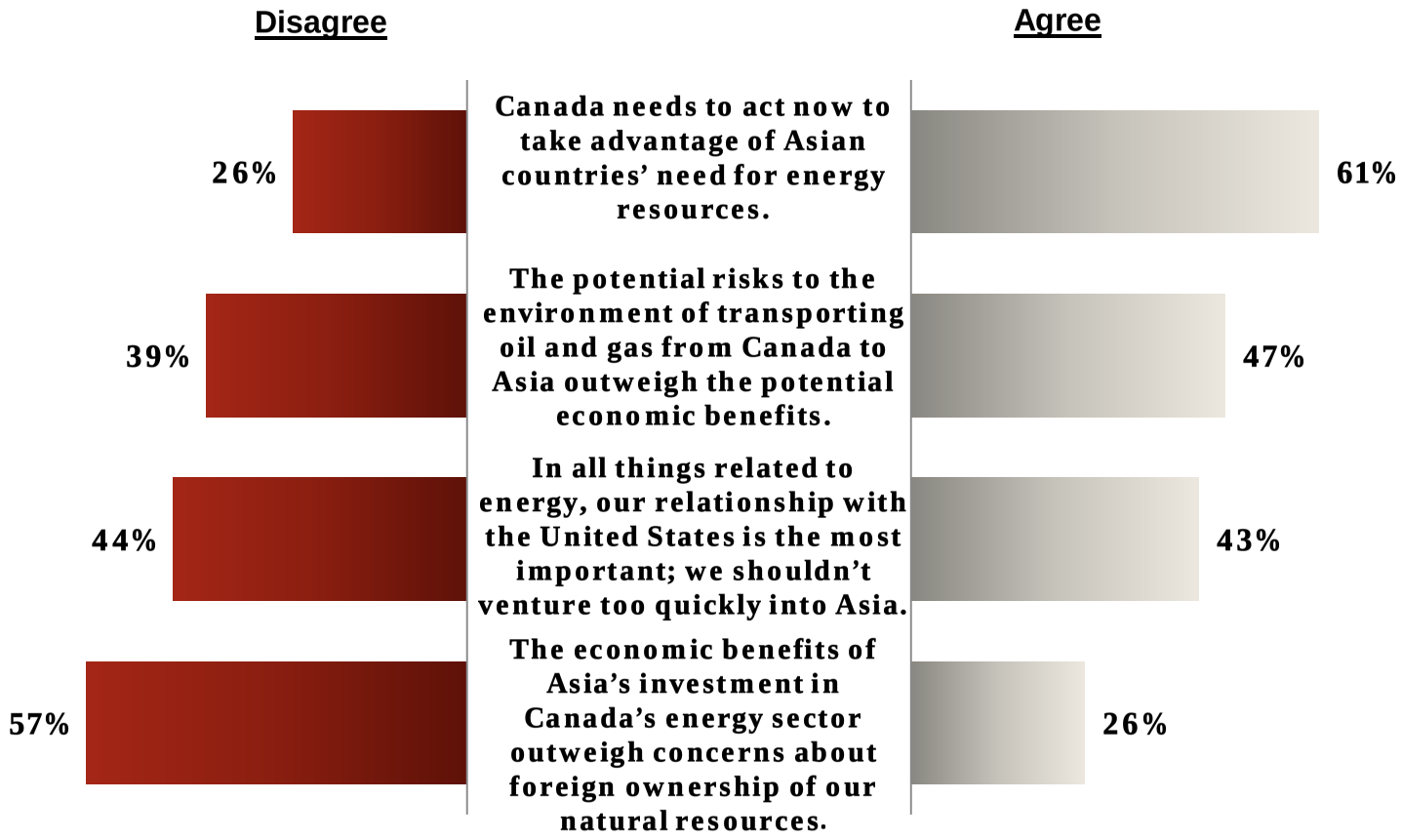
Kitimat, BC

Navigating the Douglas Channel



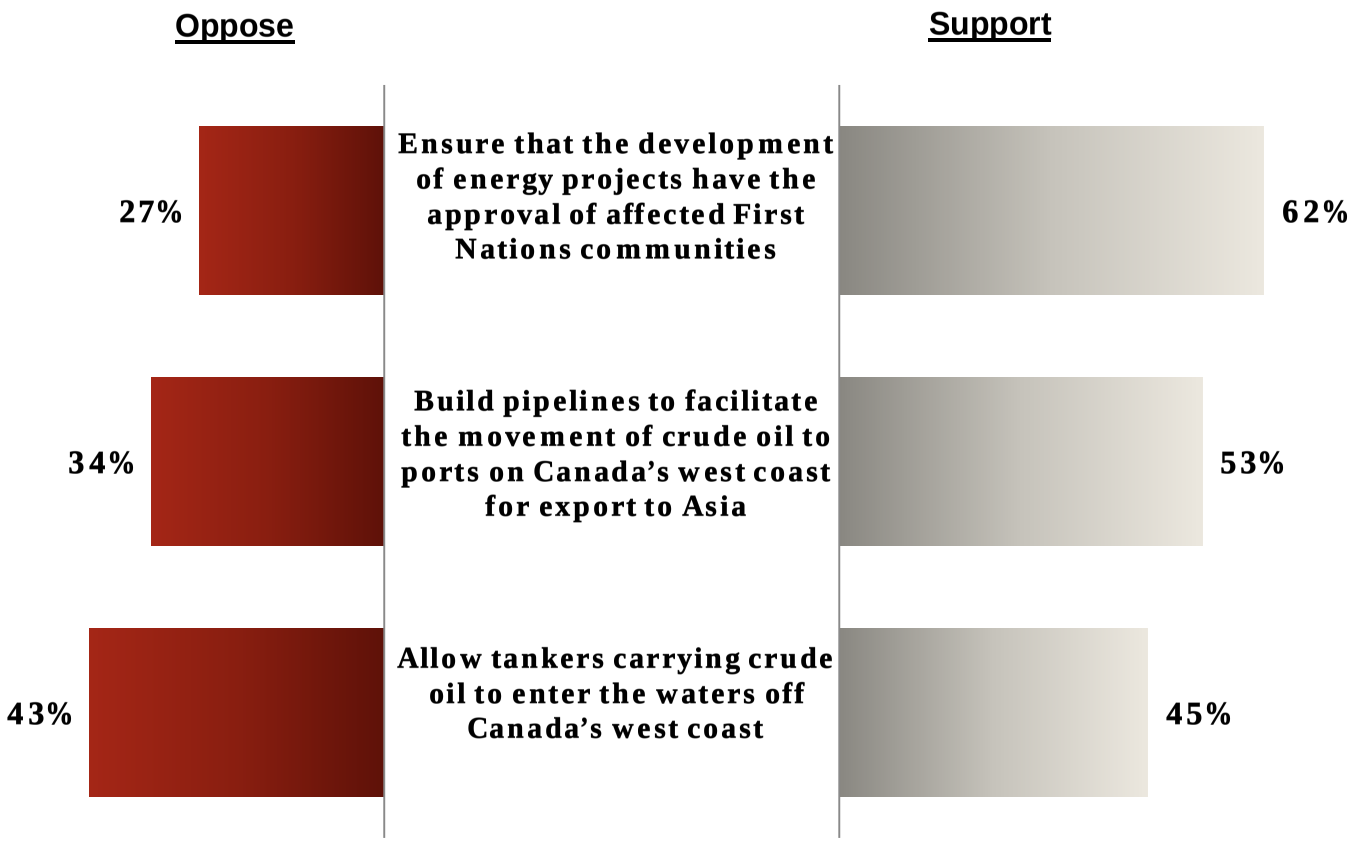
Opposition to Pipelines and Tankers

Canadians Willing to Look to Asian Markets to Export Energy Resources, but are cautious about Foreign Ownership and Environmental Concerns



Source: Asia Pacific Foundation of Canada 2012 National Opinion Poll

Canadians Are Split about Facilitating the Transport of Oil and Gas Exports Asia



Source: Asia Pacific Foundation of Canada 2012 National Opinion Poll

Canada-US-Japan Energy Interdependence?

- Canada and the US already have an intimate and longstanding energy relationship. It is in the interest of both countries to also forge a trans-Pacific energy relationship, separately or together. Apart from commercial benefits, there are other important factors to consider:
  - Strengthening Japan's energy security, which in turn enhances the overall strategic relationship
  - Reducing the trade imbalance
  - Japan has expertise in clean technology and energy efficiency to share with Canada and the US
  - Reducing Canada's dependence on the US market
  - Providing a basis for broader and deeper trans-Pacific ties, in the context of growing Asian regionalism

Summary

- The discovery of massive unconventional oil and gas deposits in North America, together with slowing energy demand in the US have made possible the prospect of energy exports to Asia
- Canada has a range of energy assets that are exportable, IF the physical and institutional infrastructure is put in place
- There is growing Asian interest and investment in Canadian energy assets
- The economic case for oil and gas exports to Asia is compelling, but the window of opportunity is not indefinite.
- Environmental and First Nations (aboriginal) concerns are major domestic challenges
- A national consensus on the role of oil and gas exports in the Canadian economy and the need for diversification of markets must be forged in order to build the infrastructure that is needed for shipping energy across the Pacific
- Creation of a Trans-Pacific Energy Market would increase economic welfare, have positive environmental impacts, contribute to reducing trade imbalances, and improve energy security in Asia.
- It is in the interest of US, Japan, and Canada to advance the idea of trans-Pacific energy trade as a way of strengthening Asia-Pacific relations.
- Energy trade has strategic significance in virtually every region of the world. The same is likely to be the case for trans-Pacific energy trade – more work is needed to understand and anticipate the implications of any such development.

The 3rd Meeting of the Japan-Canada-US Conference Series on Trilateral Cooperation

Panel I: Emerging Energy Issues

Two Challenges for Energy Security in the North Pacific Region

May 8, 2012, 9:00-10:30 am.
Rome Auditorium, SAIS, Washington, D.C.

Shoichi ITOH
Senior Researcher,
Institute of Energy Economics, Japan (IEEJ)

<shoichi.itoh@tky.ieej.or.jp>

MENU

I. The Future of Asian Natural Gas Markets

- Lessons from the 3.11 Fukushima nuclear accident.
- China-led expansion of natural gas consumption
- Implications of the ‘shale gas revolution’

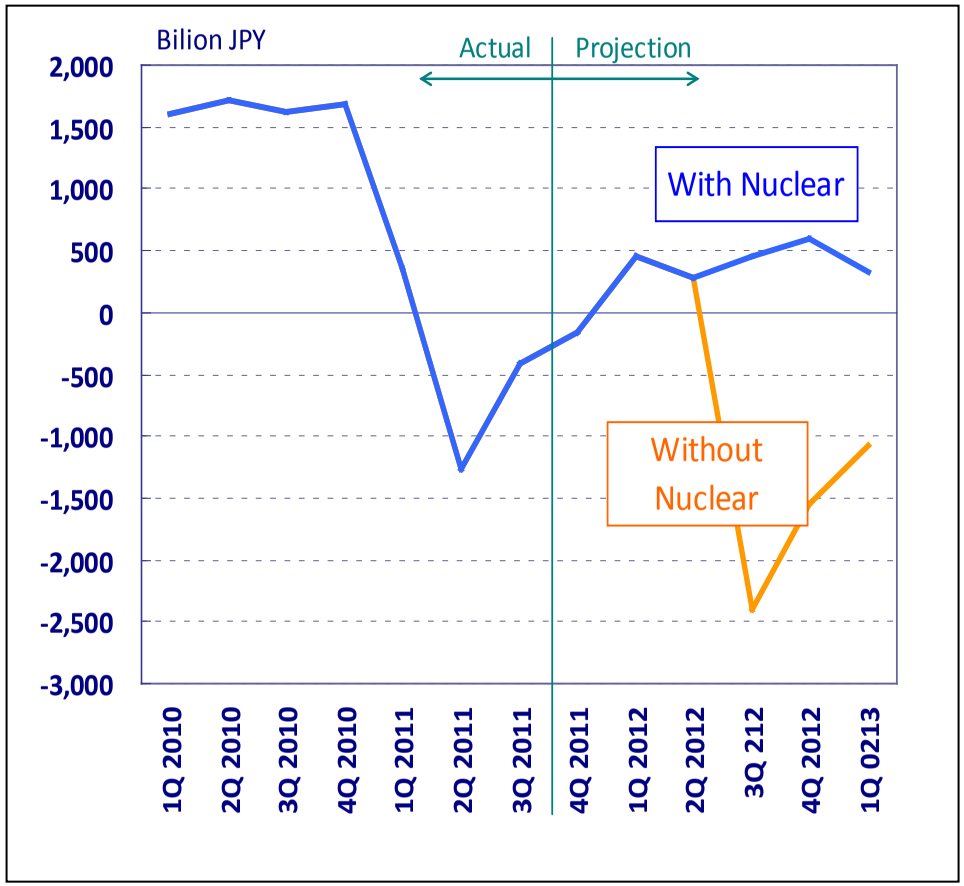
II. Russia’s Asia-Pacific Pivot

- New frontiers of offshore hydrocarbon development
- Convergence of energy and security issues.

The Future of Asian Natural Gas Markets

I-1. Estimated Impact of Nuclear Power Plant Shutdown

Trade Balance of Japan



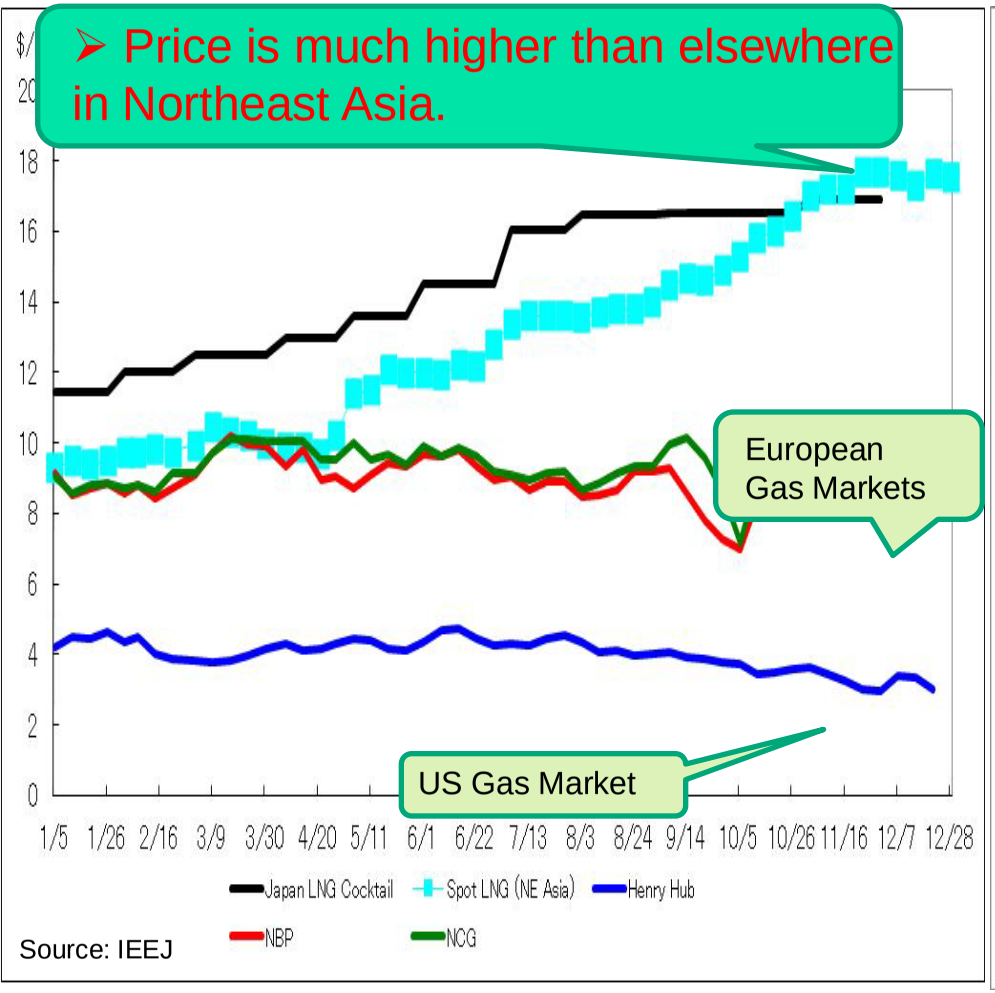
Source: IEEJ

- Increase in fuel imports in FY2012 compared to FY2010:
  - With Nuclear
    - Coal : −5.0 Mt
    - Crude oil : −150 kb/d
    - LNG : +7.0 Mt
    - +JPY 2.6 trillion
      (= $32.5 bllion; $1=\80)
  - Without Nuclear
    - Coal : +6.3 Mt
    - Crude oil : +280 kb/d
    - LNG : +20.0 Mt
    - +JPY 4.6 trillion
      (= $ 57.5 billion)

Nuclear shutdowns have led to a big loss of national wealth due to increases in import prices of LNG ・・・ Japan had its first trade deficit (= $35 billion) in more than the past three decades.

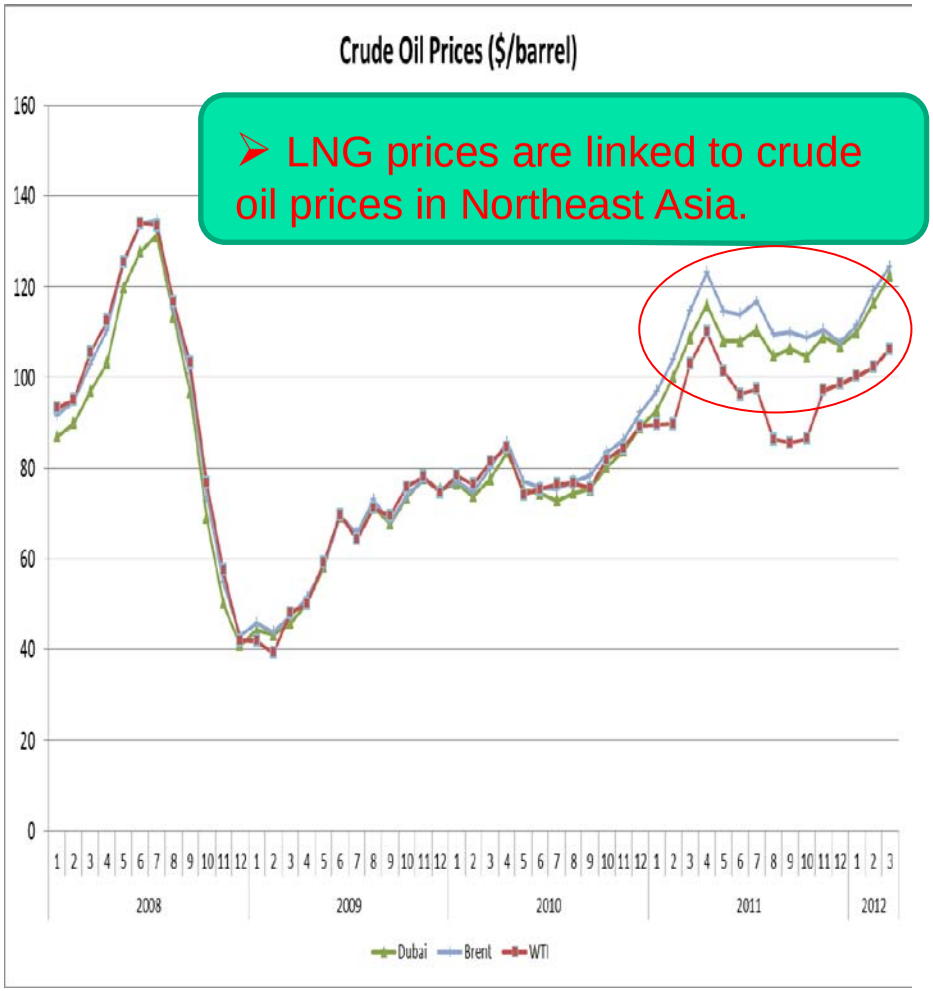
I-2. Oil-Linked Natural Gas Prices in Northeast Asia

Natural Gas Prices (2011)



Source: IEEJ

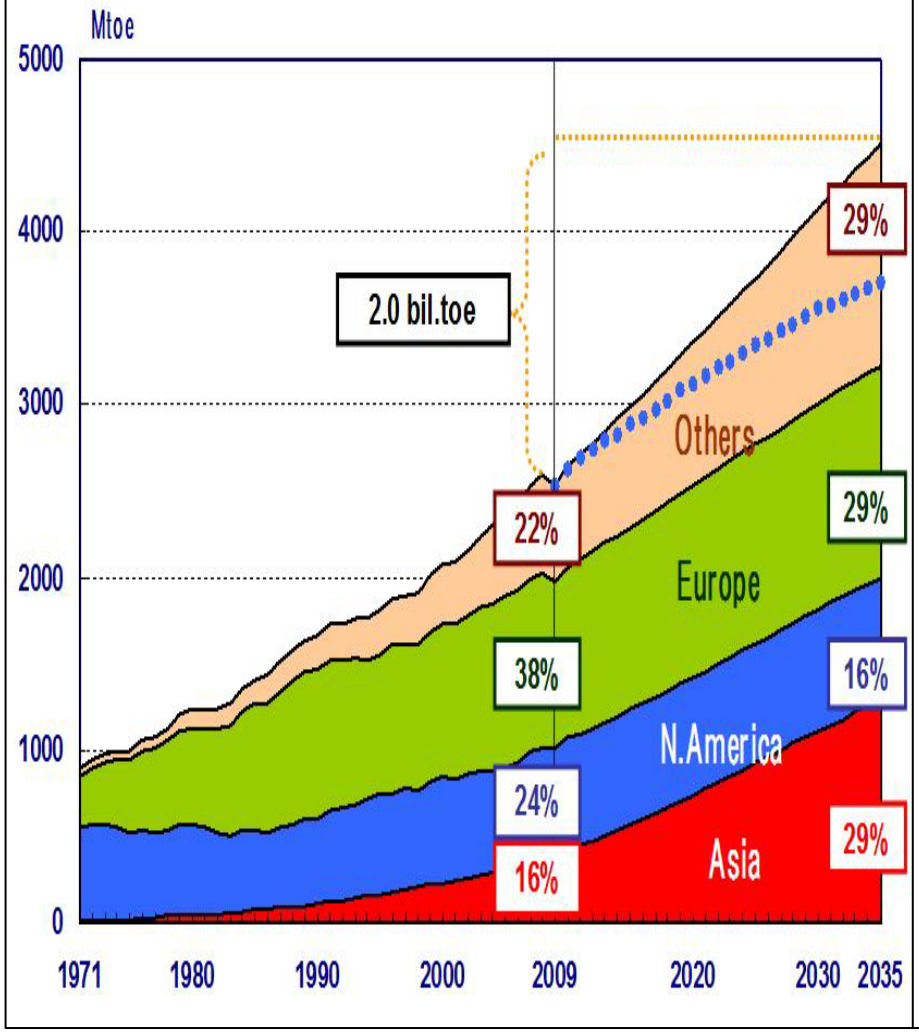
Crude Oil Prices (2008-11)



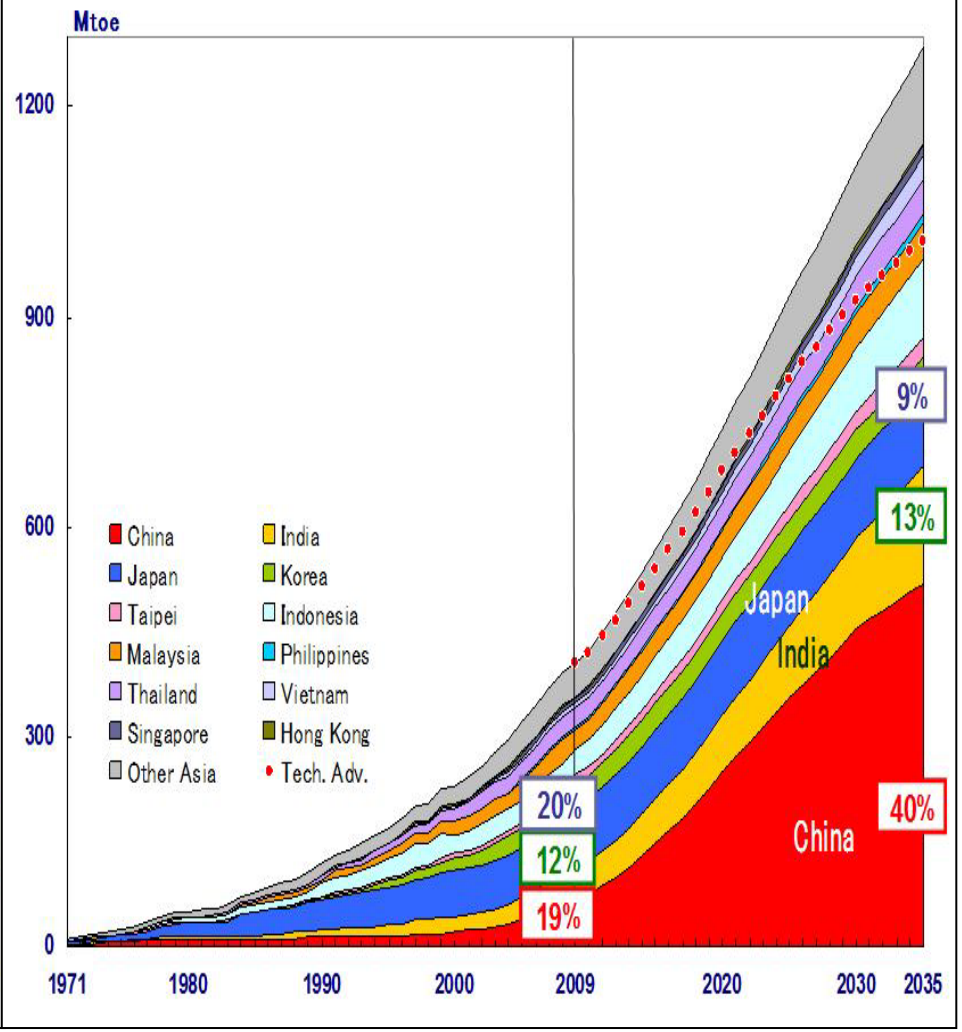
Source: IEEJ

I-3. Estimated Natural Gas Demand

World by Region



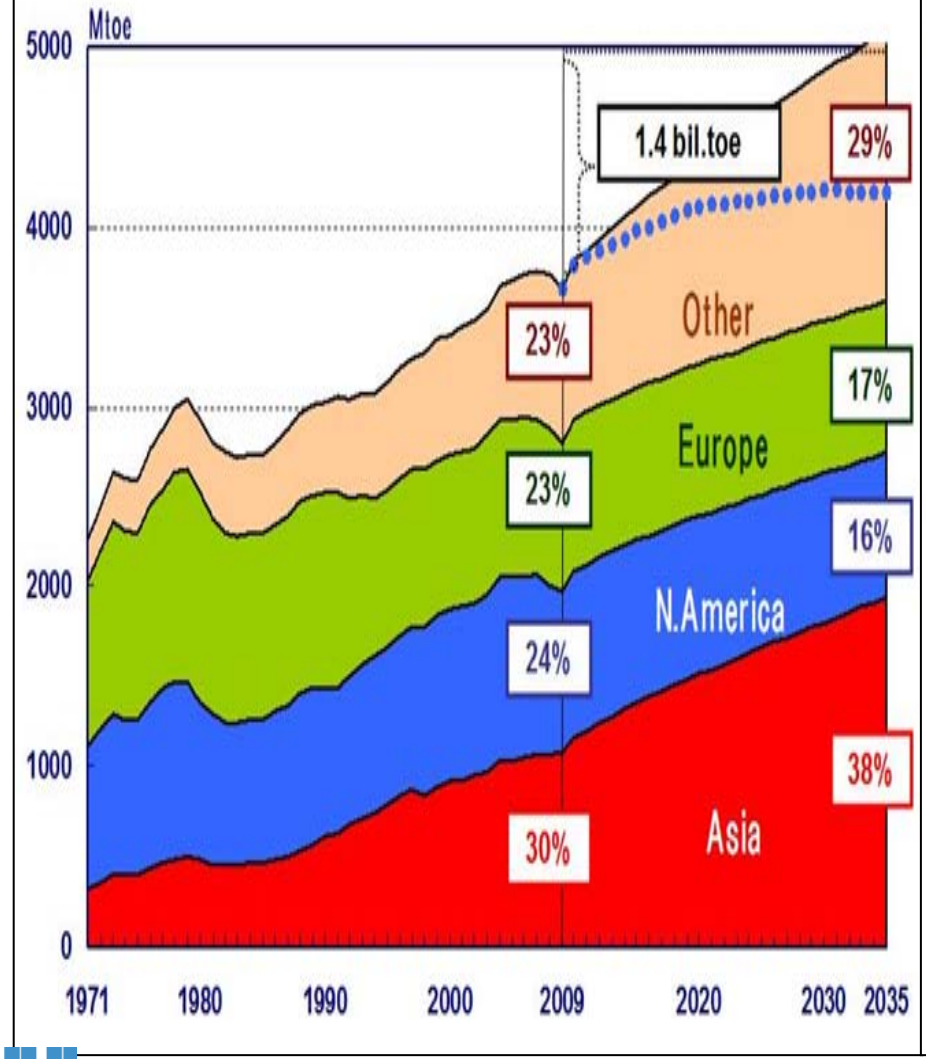
Asia by Region



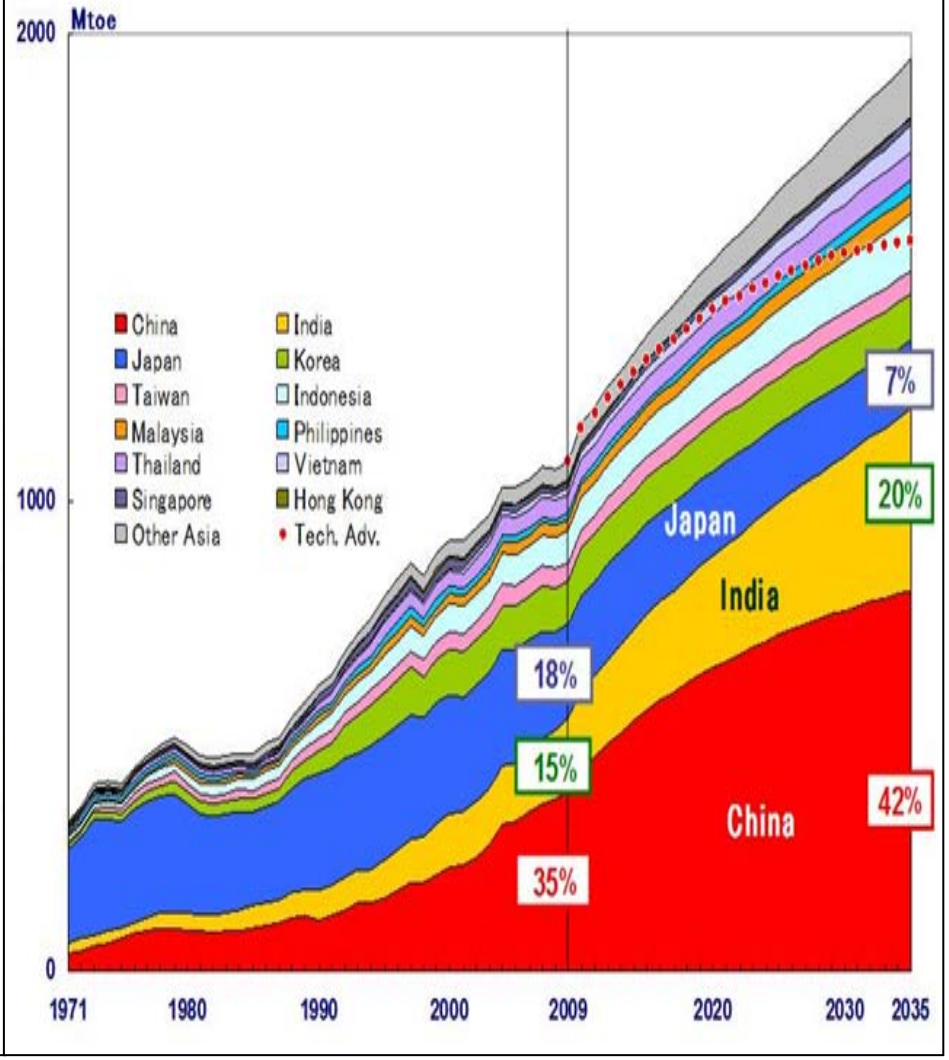
Source: Asia / World Energy Outlook 2011, IEEJ.

I-4. Estimated Oil Demand

World by Region

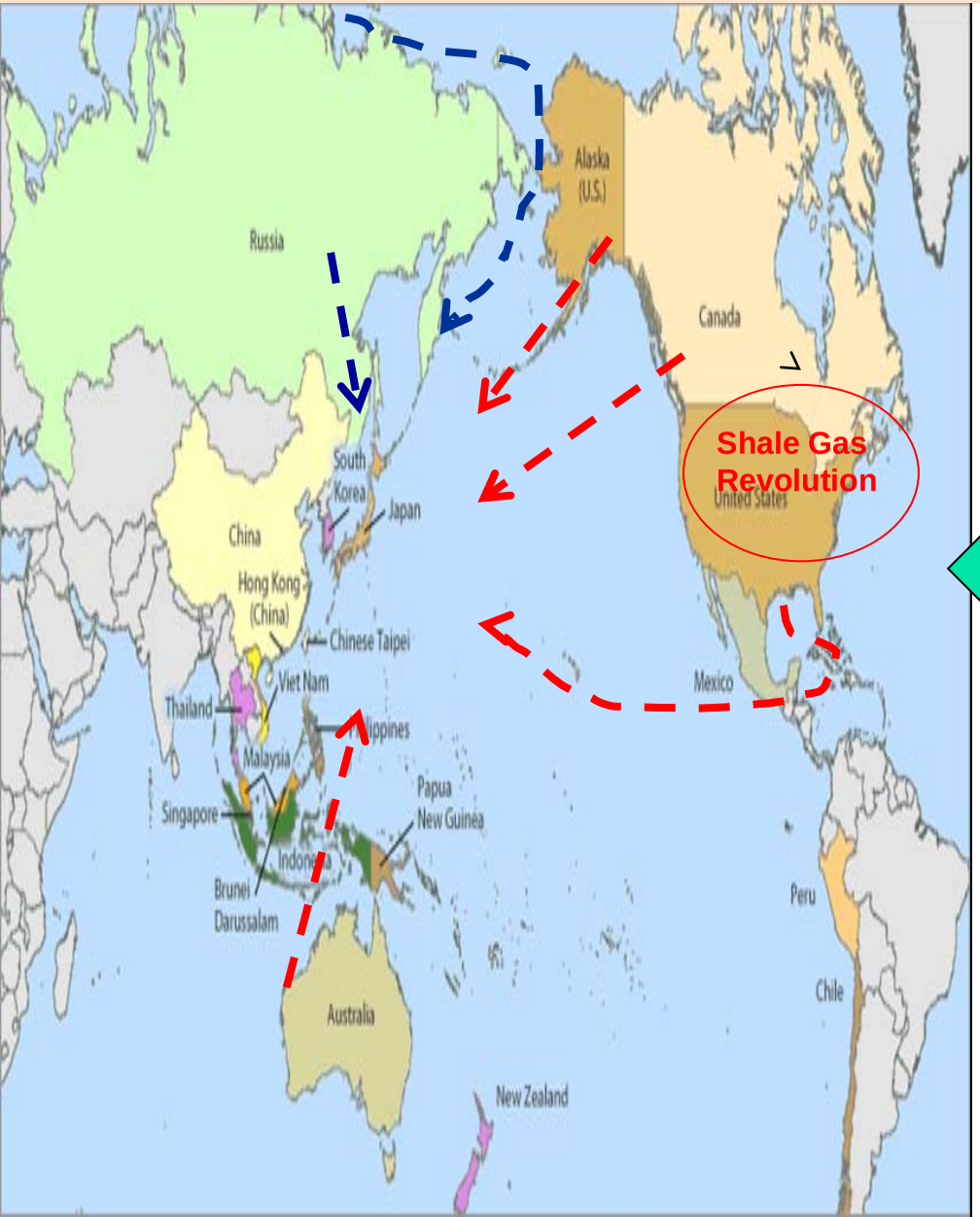


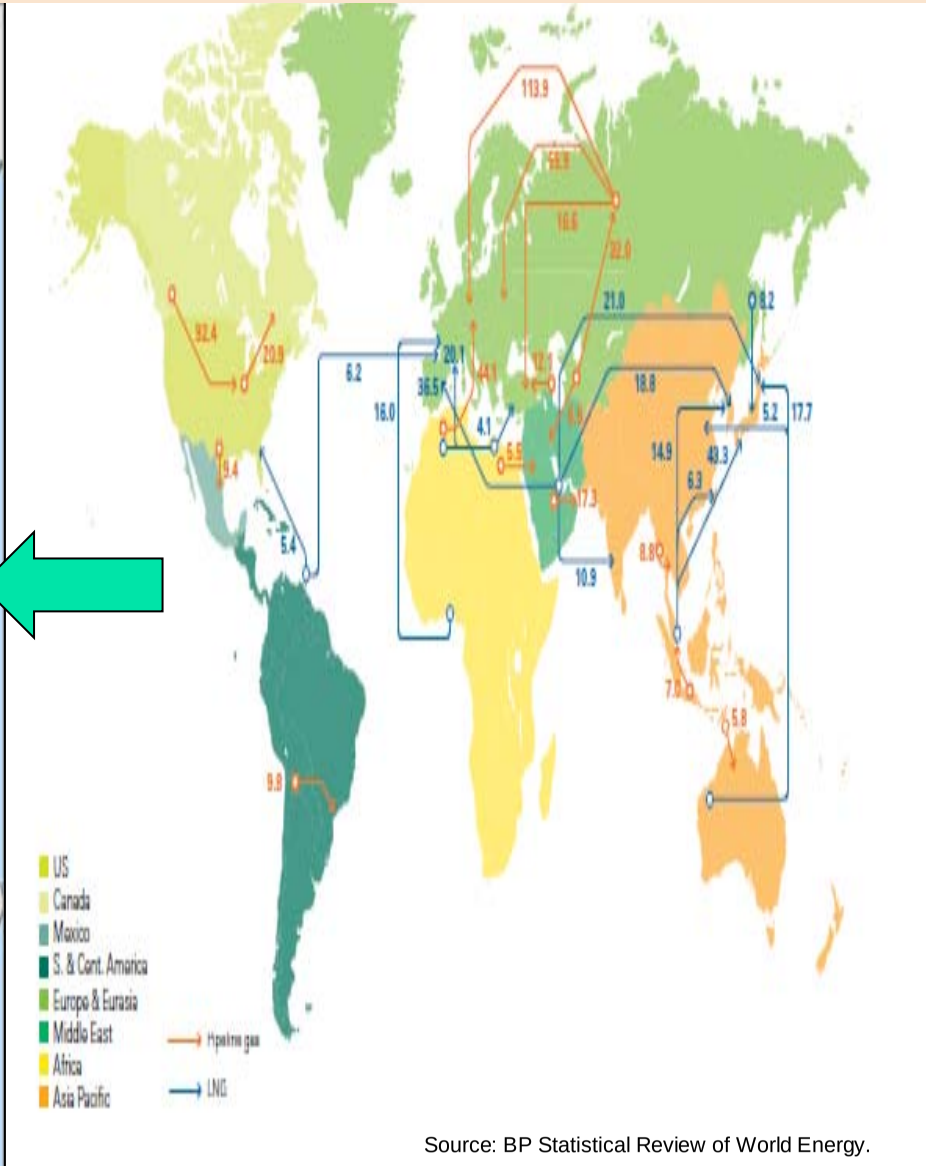
Asia by Region



Source: Asia / World Energy Outlook 2011, IEEJ.

I-5. An Expected New Dimension of Natural Gas Flows in the Asia-Pacific Region

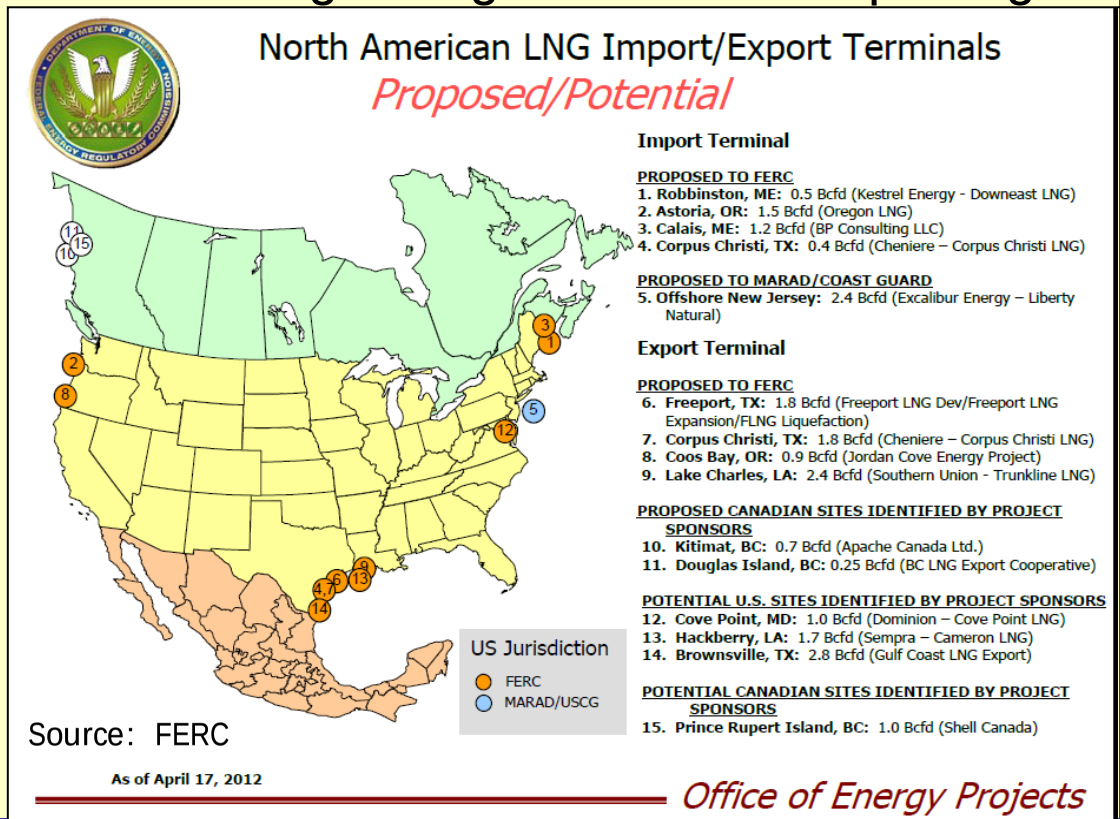




Source: BP Statistical Review of World Energy.

I-6. LNG Imports from North America in negotiation

- Dec. 2011- **Gail** (India) signed an agreement of 3.5 million tons/y from Sabine Pass (LA).
- Jan. 2012- **Kogas** signed an agreement of 3.5 million tons/y from Sabine Pass (LA).
- April 2012- **Mitsubishi** and **Mitsui** began negotiation over importing a total 8 million tons of LNG from Hackberry (LA).
- April 2012- **Tokyo Gas** and **Sumitomo** began negotiation over importing a total 2.3 million tons of LNG from Cove Point (MD).
- **Mitsubishi**, **Shell**, **CNPC**, **Kogas** are reportedly in negotiation over joint production of LNG (12 million tons/y) in British Columbia.



I-7. Key Questions for the Future

(1) The volume of LNG exports from North America.

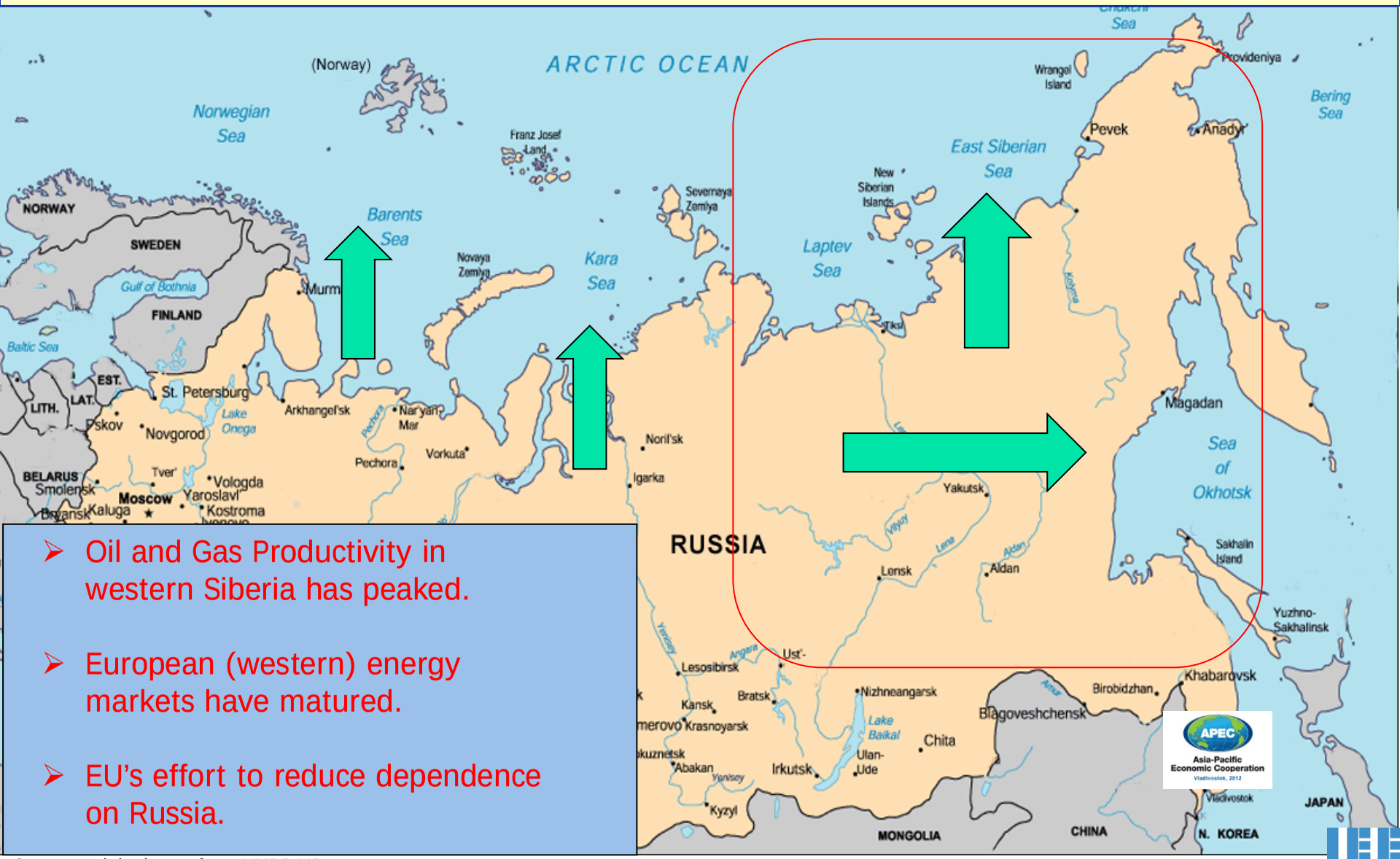
(2) Expansion of China's share in the regional gas market.

(3) Possibility of changing gas pricing formula in Asia.

Russia's Asia-Pacific Pivot

II-1. Russia Looks East and North

New Frontiers of Oil and Gas Development – high costs, long lead time.

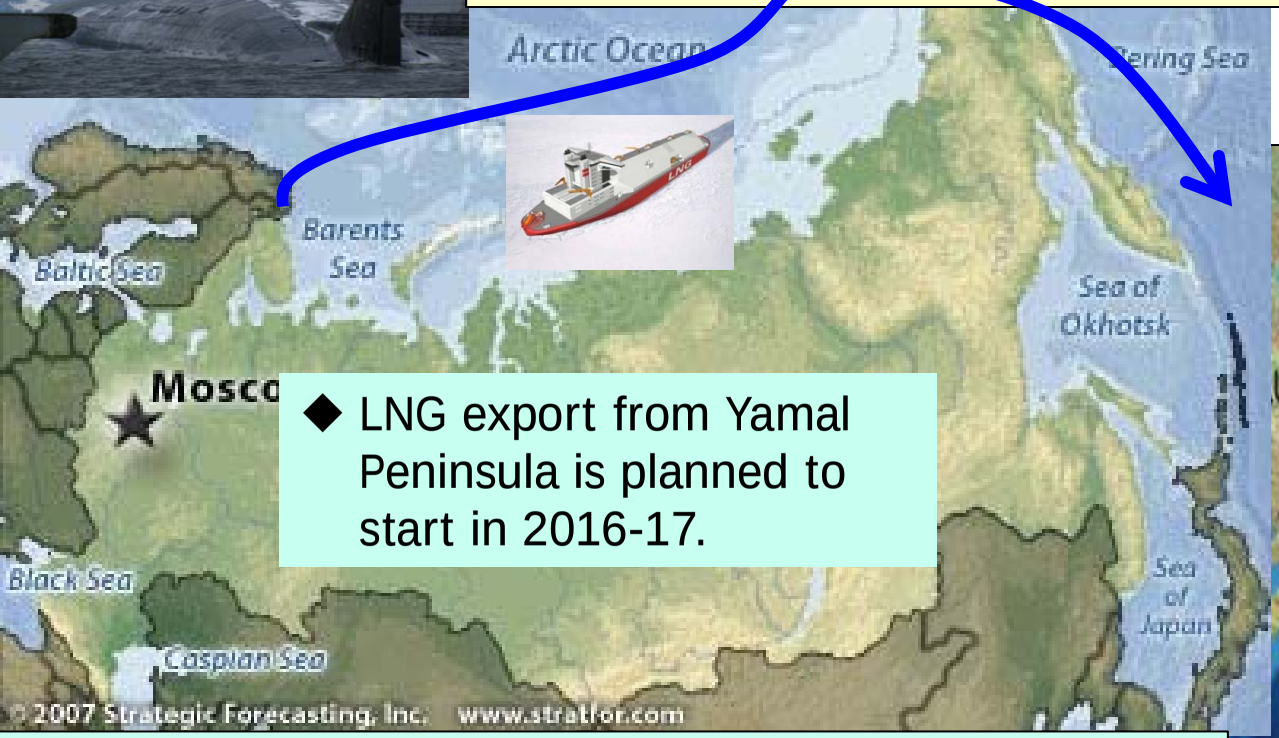


- Oil and Gas Productivity in western Siberia has peaked.
- European (western) energy markets have matured.
- EU's effort to reduce dependence on Russia.

Source: original map from UNDP HP.

II-2. Russia's Development of the Northern Sea route toward the Pacific Ocean across the Bering Strait

- Energy and military security are intertwined.
  - Northern Fleet's access to the Pacific Ocean; commercial interests; territorial claims, etc.



- LNG export from Yamal Peninsula is planned to start in 2016-17.

- Enhancement of a confidence-building mechanism for the new route is a matter of urgency.

Ⅱ-3. Key Questions for the Future

(1) Participation of foreign capital and realization of offshore development in the Arctic Sea.

(2) How much LNG will Russia be able to ship to Asian market via the northern route?

(3) Engagement in constructing a new regional architecture with Russia and China.

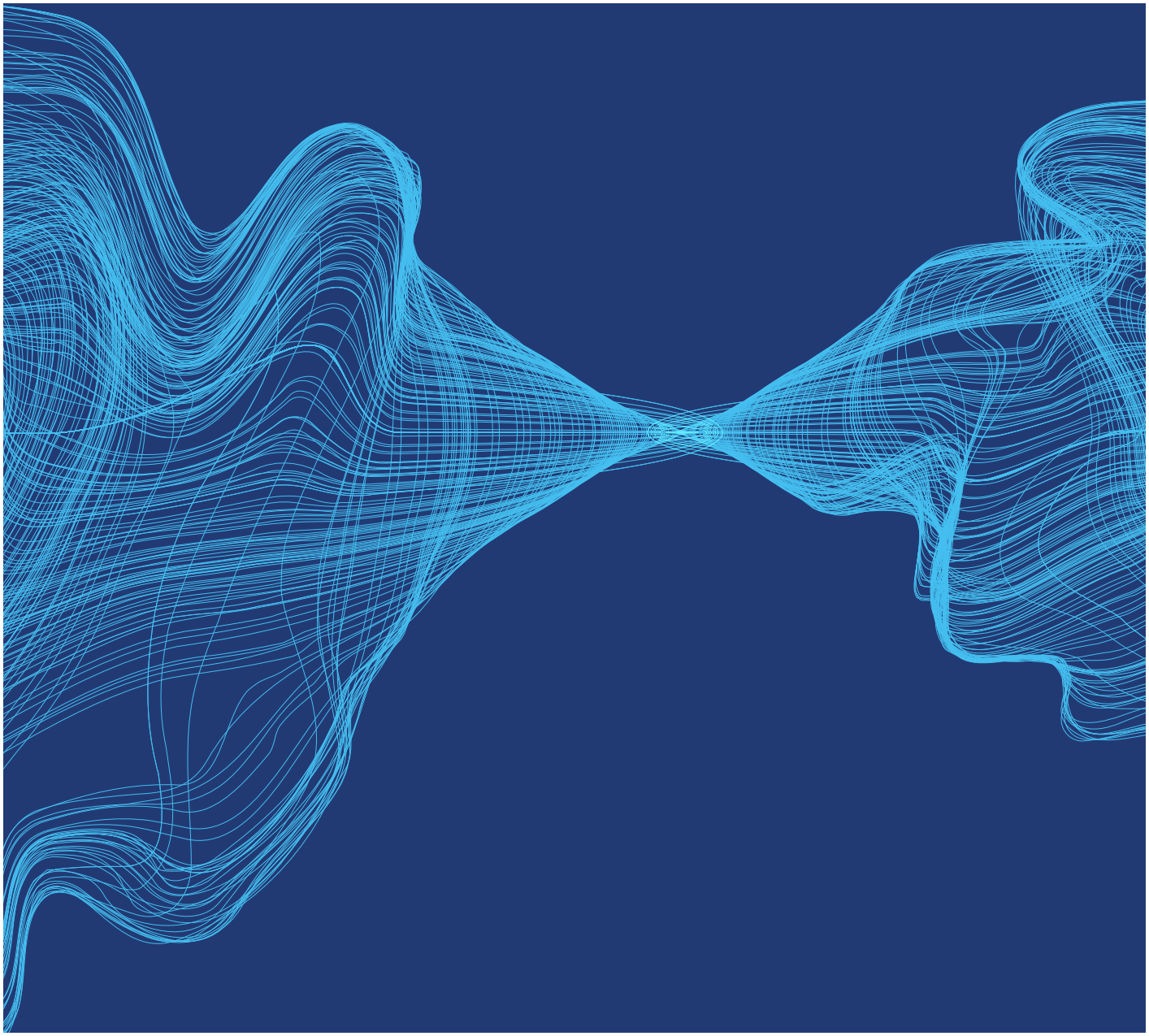
Thank You Very Much

for Your Attention!

Pacific Economic Cooperation Council

Supplement to the State Of The Region 2011-2012

PROSPECTS FOR TRANSPACIFIC ENERGY TRADE



EXECUTIVE SUMMARY

Even though oil and gas is the most traded product in the Asia-Pacific region, there is virtually no energy trade across the Pacific. The major energy importing economies of Northeast Asia source their oil and gas largely from the Middle East, Southeast Asia and Australia, while the United States imports energy from the Americas, West Africa, and the Middle East. Indeed, transpacific trade in energy products (oil, gas, and coal) accounts for only 1.4 percent of global trade in those products. The segmentation of energy markets between Asia and the Americas is seen in the sharp price differential for natural gas between the two regions, and – more recently – in a price differential for crude oil as well.

A number of developments in recent years have raised the possibility of transpacific trade in oil and gas, and the emergence of a more integrated and competitive market in energy products in the Asia-Pacific region. These include:

A) The discovery of massive unconventional (shale) gas deposits in the United States and Canada which are creating a gas glut in North America;

B) Increased demand in Asian countries for less carbon-intensive energy sources, in particular a shift away from coal to natural gas;

C) Concerns about nuclear power following the Fukushima Daiichi disaster and the resulting search for clean alternatives to nuclear energy;

D) The changing energy balance in Southeast Asia, particularly Indonesia and Malaysia, which are expected to become importers of LNG due to rapid increases in domestic demand; and

E) Rapidly growing investment by Asian national oil and gas companies in North American energy assets, especially in the Canadian oil sands, which has the third largest proven reserves of crude oil in the world.

Even taking into account the higher cost of shale gas production, the substantial investments required to build pipelines and liquefaction plants, and the transportation cost of shipping LNG across the Pacific, North American gas could be competitive in Asia against existing suppliers, or at the very least serve as an secondary source of supply for Northeast Asian economies looking to diversify their energy imports or seeking more secure sources. Likewise, the prospect of North American crude oil exports to Asia is increasingly attractive given the gas glut in the United States and a widening price differential between benchmark West Texas Intermediate and Brent crude oil prices.

Favorable economics, however, do not guarantee that transpacific energy trade will become a reality, since there are political, regulatory, and environmental risks to be overcome, as well as a need for substantial capital investment. Nevertheless, the prospect of transpacific energy trade would be good news for Asia-Pacific regional integration, since it would lead to a more competitive energy market and more transparent pricing of energy products, likely resulting in a reduction in price differentials between Asia and North America. In addition, transpacific energy trade would allow both exporters and importers in the region to diversify their markets, and hence support energy security objectives.

SECTION 01

STATUS OF ASIA-PACIFIC ENERGY USE AND ENERGY TRADE

ENERGY USE IN ASIA-PACIFIC ECONOMIES

Figure 1: *Energy mix of selected economies in 2010* **Source:** *BP Statistical Review of World Energy 2011*

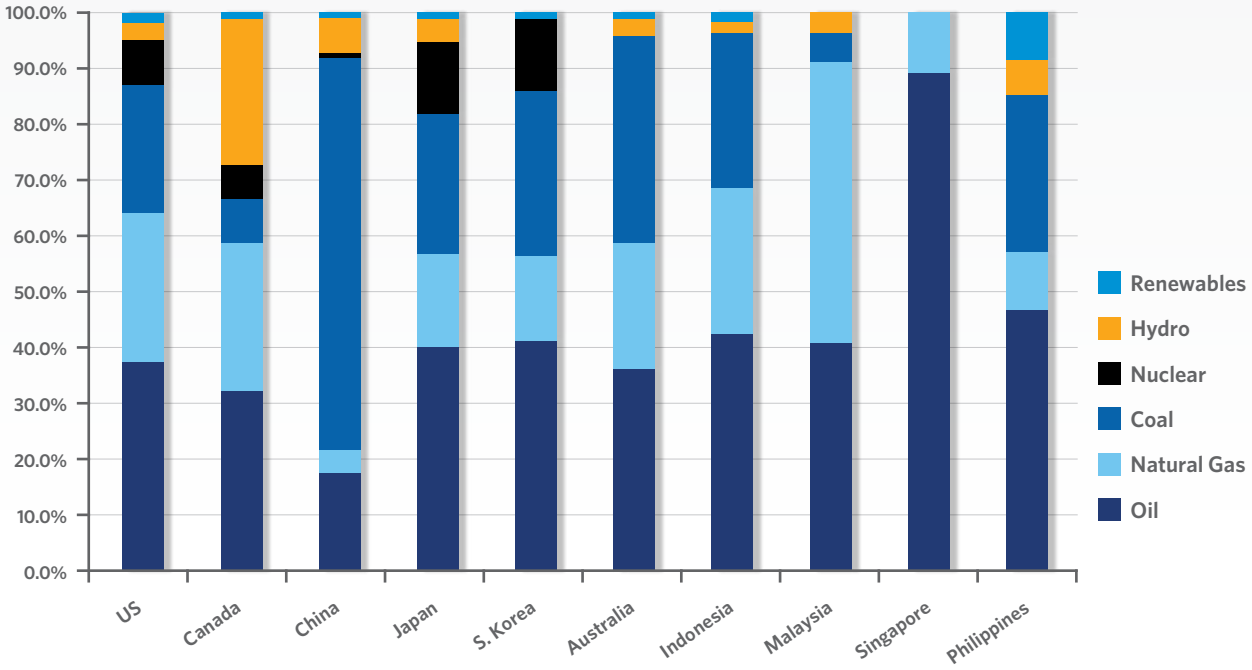
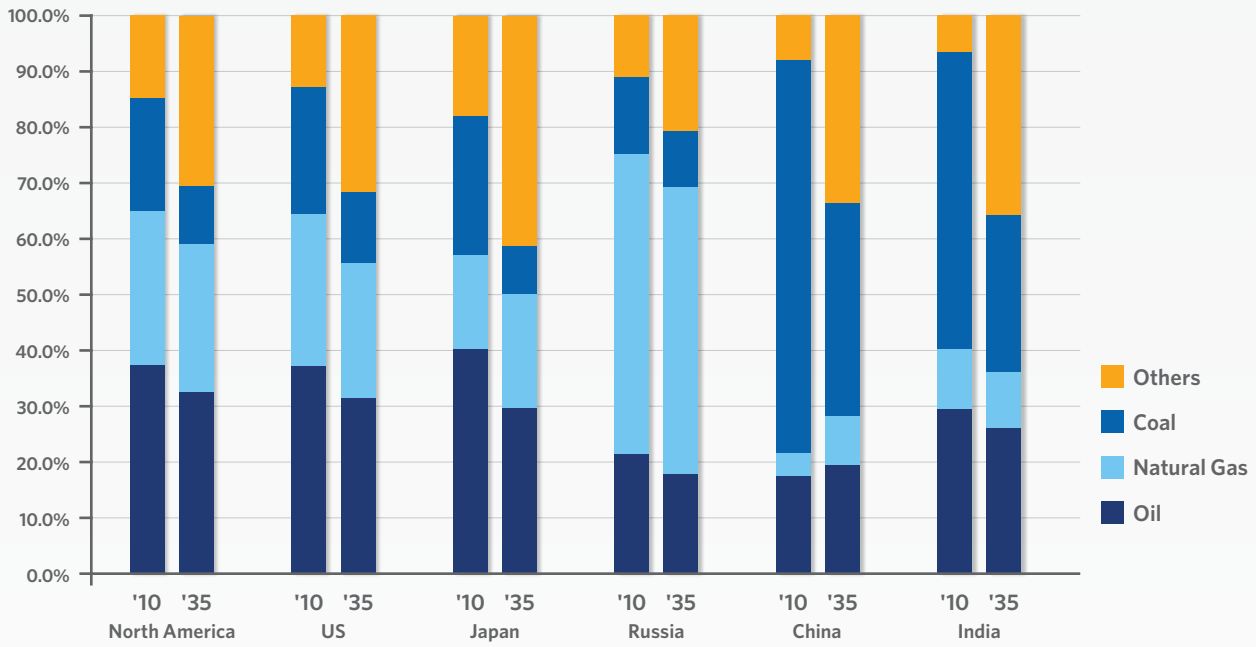


Figure 1 illustrates the mix of energy use in some of the major economies in the Asia-Pacific region. The use of fossil fuels is predominant in the Asia-Pacific region, with hydro-electricity, renewables and nuclear energy typically accounting for less than 20% of overall energy use. Oil is the fuel of choice in most Asia-Pacific economies (the key exception is China which relies heavily on coal), accounting for 30-40% or more of energy needs in most economies. Coal constitutes more than 20% of overall energy use in the majority of Asia-Pacific economies, while natural gas typically accounts for 10-20% of the energy mix (China is again the exception, with only 4% of its energy needs met by natural gas).

Figure 2: *Energy mix of selected economies in 2010 and 2035* **Source:** *BP Statistical Review of World Energy 2011*



The basic patterns of energy use in the Asia-Pacific region are unlikely to change materially in the foreseeable future. **Figure 2** illustrates how the energy mix in Asia-Pacific economies (including Russia) can be expected to change between now and 2035, under IEA's New Policies Scenario. In this scenario, the use of non-fossil fuel sources of energy (nuclear, hydro-electricity and renewables) increases appreciably in each of the major economies. Nevertheless, fossil fuels continue to dominate the energy mix, accounting for 60-80% of the energy mix in most economies. The share of coal, in particular, as well as oil decreases in almost all countries- particularly dramatic is the reduction in the share of coal in China's energy mix from around 70% in 2010 to 38% in 2035. By contrast, natural gas shares remain relatively stable, reflecting its status as a cleaner fuel relative to oil and coal.

The significance of energy trade to the Asia-Pacific economies is underscored by the fact that much of the fossil fuel needs of Asia are met by imports[1]. In particular, 94.3% of the region's oil needs are met by imports. Natural gas imports are fairly significant, accounting for 37.2% of total natural gas use, while coal imports are comparatively less significant, only accounting for 14.9% of total coal use. Aggregating across all 3 fuels, 41.2% of fossil fuel needs of the Asian economies are met from imports.[2]

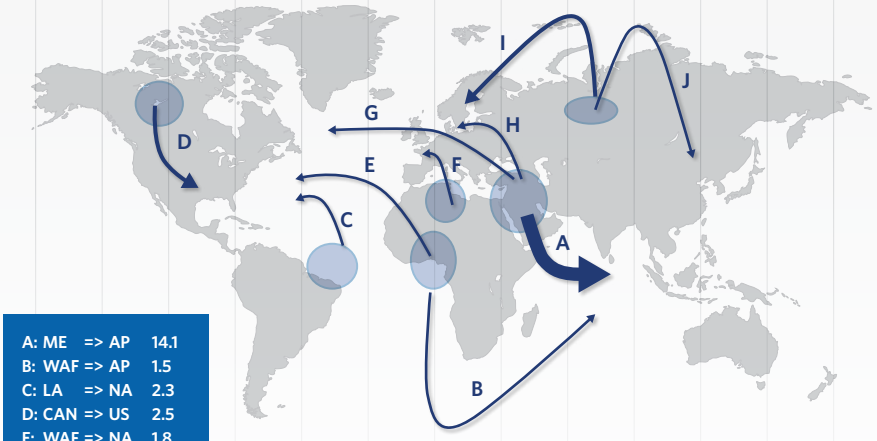
[1] *In the analysis that follows, Asia is defined so as to include Brunei, Cambodia, China, China Hong Kong SAR, Indonesia, Japan, Laos, Malaysia, Mongolia, North Korea, Philippines, Singapore, South Asia (Afghanistan, Bangladesh, India, Myanmar, Nepal, Pakistan and Sri Lanka), South Korea, Chinese Taipei, Thailand, Vietnam, Australia, New Zealand, Papua New Guinea and Oceania.*

[2] *The calculation is carried out by converting import and consumption figures for each of the 3 fuels into a common unit, millions of tones equivalent (Mtoe), before summing import and consumption figures across each fuel.*

STATUS OF ASIA-PACIFIC ENERGY TRADE

To place Asia-Pacific energy trade (specifically, fossil fuel energy imports of Asian economies) in context, it is useful to begin by looking at patterns of global energy trade. **Figure 3** demonstrates the major inter-regional oil flows in the global economy in 2010. By far the largest single flow of crude oil trade is from the Middle East (ME) to Asia (AS), of around 14.1 million MMBD; this reflects both the large base of demand in Asia and its limited domestic crudes. The only other significant inter-regional flows of crude into Asia are from West Africa (WAF) and from the Former Soviet Union (FSU), approximating 1.5 MMBD each. The North American market not only produces significant proportions of its own crude requirements, but also has access to short haul and long haul crudes from Latin and Central America (LA, 2.3 MMBD), Europe (EUR, 1.0 MMBD, not shown on the map), West Africa (1.8 MMBD) as well as the Middle East (1.8 MMBD). Europe is a recipient of FSU crude (5.9 MMBD), North African crude (1.9 MMBD) and ME crude (2.3 MMBD), apart from being an exporter of crude to other regions.

Figure 3: *Pattern of global oil trade in 2010*



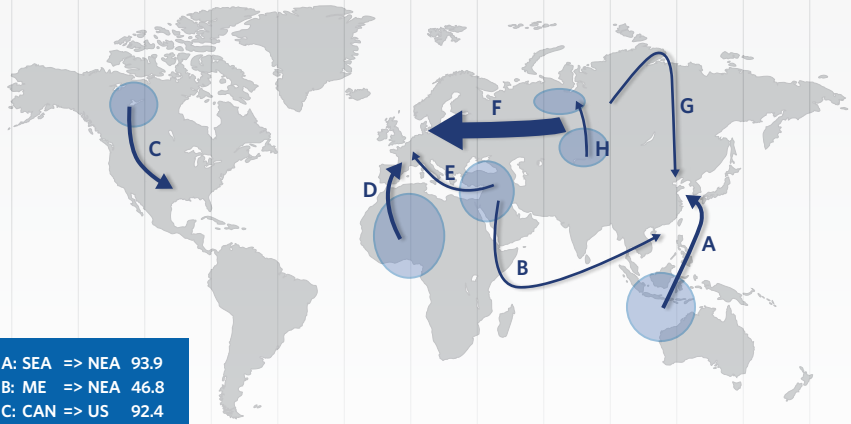
A: ME	=> AP	14.1
B: WAF	=> AP	1.5
C: LA	=> NA	2.3
D: CAN	=> US	2.5
E: WAF	=> NA	1.8
F: NAF	=> EUR	1.9
G: ME	=> NA	1.8
H: ME	=> EUR	2.3
I: FSU	=> EUR	5.9
J: FSU	=> AS	1.5

ME = Middle East **AS** = Asia **WAF** = West Africa
NAF = North Africa **NA** = North America **CAN** = Canada
EUR =Europe **LA** = Central & S America **FSU** = Former Soviet Union

All figures are in MMBD

Source: *BP Statistical Review of World Energy 2011*

Figure 4: *Pattern of global gas trade in 2010*



A: SEA	=> NEA	93.9
B: ME	=> NEA	46.8
C: CAN	=> US	92.4
D: AF	=> EUR	84.3
E: ME	=> EUR	45.0
F: FSU	=> EUR	185.7
G: FSU	=> NEA	16.0
H: CA	=> RUS	31.9

ME = Middle East **NEA** = Northeast Asia **SEA** = ASEAN+Australia **AF** = North and West Africa
CAN = Canada **EUR** =Europe **FSU** = Former Soviet Union **CA** = Central Asian FSU members

All figures are in Bcm (Billions of cubic metres)

Source: *BP Statistical Review of World Energy 2011*

Figure 4 illustrates the major flows of natural gas (both pipeline and LNG) in the world in 2010. In contrast to oil, the global gas market is regionally segmented to a significant degree, and intra-regional flows of gas are important, with gas flows from Canada to US (92.4 Bcm), from Southeast Asia and Australia (SEA) to Northeast Asia (93.9 Bcm) and from Central Asia to Russia (31.9 Bcm). The largest flow of gas is from Russia and the Central Asian FSU countries to Europe (185.7 Bcm), though Europe also receives significant gas imports from Africa (84.3 Bcm) and the Middle East (45.0 Bcm). In addition to gas imports from SEA, Northeast Asia receives imports from the Middle East (46.8 Bcm) and, increasingly, from the Former Soviet Union as well (16.0 Bcm). Note that North and South America are effectively 'gas islands' isolated from the rest of the world, with few significant transpacific or transatlantic gas flows.

Figure 5: *Oil trading pattern in the Asian region in 2010*

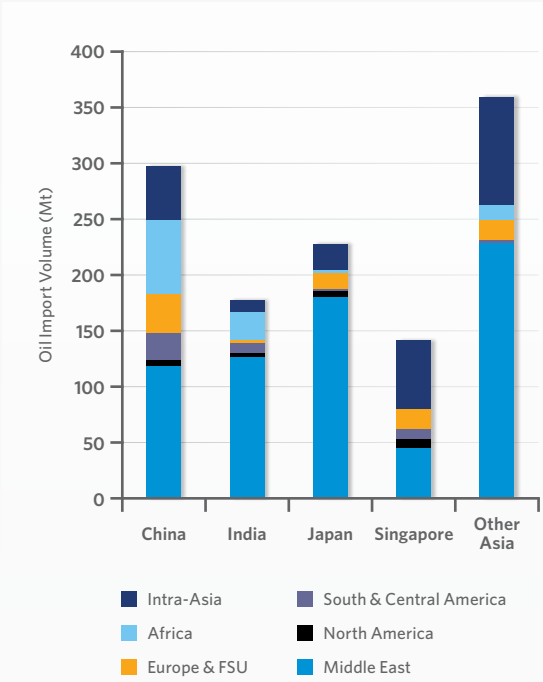


Figure 5 shows the areas from which major Asian oil importers obtain their product. The Middle East is by far the biggest source of oil imports, but there are also significant intra-regional flows, while China and India import some of their oil from Africa and China also imports oil from South and Central America.

Figure 6: *Gas trading pattern in the Asian region in 2010*

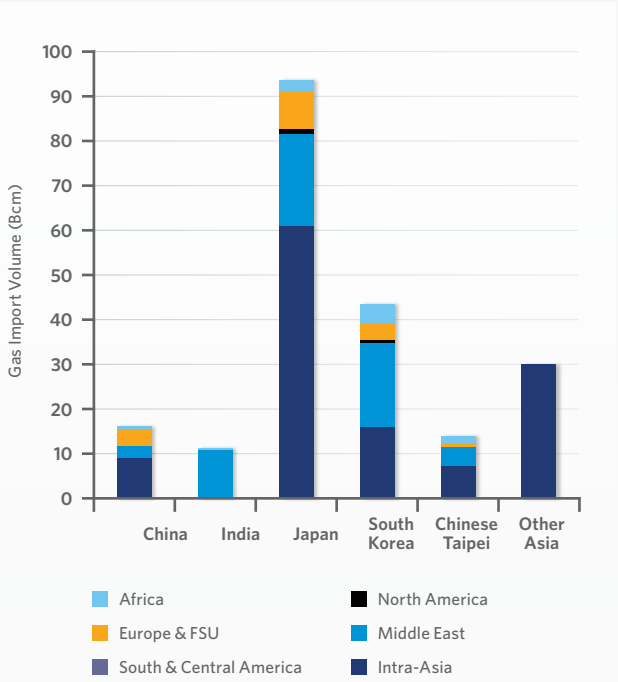


Figure 6 illustrates where Asian economies source their gas imports. Intra-regional gas flows are the most important, with gas flowing from the Southeast Asia belt (Indonesia, Malaysia, Brunei, and Australia) to Northeast Asia (China, Japan, South Korea). The Middle East is the only other significant exporter into Asia, accounting for almost all of India's gas imports and a significant proportion of the gas imports of South Korea and, to a lesser extent, Japan.

Source: *BP Statistical Review of World Energy 2011*

The above figures demonstrate that transpacific energy trade (i.e. trade between North America and the Asian economies) is comparatively insignificant relative to both global energy trade and energy imports into the Asian region. Transpacific oil and natural gas trade are particularly limited in their scale, respectively accounting for only 1.2% of global oil trade and 0.3% of global natural gas trade in 2010 *(BP Statistical review of World Energy, June 2011)*. Transpacific coal trade is relatively more significant in global coal trade, but even so, accounts for only 4.6% of overall trade in coal. Aggregating across all 3 fuels, transpacific energy trade only accounts for 1.4% of global energy trade, more than two-thirds of which is from North America to Asia.

SECTION 02

PROSPECTS FOR TRANSPACIFIC NATURAL GAS TRADE

ENERGY USE IN ASIA-PACIFIC ECONOMIES

Table 7: *Primary Natural Gas Demand by Region (bcm)*

				CAGR		SHARE	
	1980	2008	2035	1980-2008	2008-2035	2008	2035
OECD	**958**	**1,541**	**1,758**	**1.7%**	**0.5%**	**48.9%**	**38.8%**
North America	659	815	913	0.8%	0.4%	25.9%	20.1%
United States	581	662	664	0.5%	0.0%	21.0%	14.6%
Europe	264	555	628	2.7%	0.5%	17.6%	13.8%
Asia	35	170	216	5.8%	0.9%	5.4%	4.8%
Japan	25	100	117	5.1%	0.6%	3.2%	2.6%
Non-OECD	**559**	**1,608**	**2,777**	**3.8%**	**2.0%**	**51.1%**	**61.2%**
Asia	36	341	934	8.4%	3.8%	10.8%	20.6%
China	14	85	395	6.7%	5.9%	2.7%	8.7%
India	1	42	177	14.3%	5.5%	1.3%	3.9%
Middle East	36	335	608	8.3%	2.2%	10.6%	13.4%
World	**1,517**	**3,149**	**4,535**	**2.6%**	**1.4%**	**-**	**-**

Source: *IEA World Energy Outlook 2010 (New Policies Scenario)*

Compared to the markets in oil and coal, the natural gas market has traditionally been the least integrated, with the global market effectively segmented into three regions (Asia, Europe and North America) and trade largely occurring within these regions[3]. The scale of transpacific natural gas trade is particularly small in relation to global gas trade (0.3%), as opposed to 1.2% for oil and 4.6% for coal. Moreover, existing gas flows from North America to Asia were largely from the Kenai LNG export terminal in Alaska, which is scheduled to shut down later this year.

Recent developments in both gas demand and supply have led to a scenario where significant growth in LNG exports from North America to Asia has become a distinct possibility. On the demand side, natural gas demand in Asian economies is projected to grow substantially in the next 25 years, as **Table 7** above illustrates. One reason is simply the strong economic growth forecast for Asia's developing economies, in particular China and India, which consequently are expected to experience a higher than average CAGR (Compound Annual Growth Rate) in gas demand of over 5%. Indeed, recent estimates of China's future natural gas demand by the Institute for International Oil Politics are even more bullish, with demand projected to reach 450 bcm by 2020, compared to IEA's estimate of 395 bcm by 2035. Moreover, the implementation of greenhouse gas policies, even at a modest level (as in IEA's New Policies scenario), favors natural gas over other fossil fuels, which explains why the share of natural gas in Asia's energy mix is expected to nearly double by 2035.

[3] *This can be visually illustrated by comparing Figures 3 and 4.*

Two other factors could further boost Asia's future demand for LNG imports. First, Indonesia and Malaysia, two of the largest gas exporters in the region, are both experiencing dwindling supply from aging fields. Coupled with increasing domestic natural gas demand, both countries appear set to be transformed into LNG importers. Indeed, Indonesia's first import terminal is expected to begin operating in 2012, and private firms have already been given permission to import LNG. Malaysia has planned the construction of 3 LNG receiving terminals, and expects to begin importing LNG from 2014. As such, other Asian/Oceania economies that currently import gas from Indonesia and Malaysia may well have to scout for new import sources in the future.

Second is the impact of the earthquake in March this year on Japan's LNG demand. The earthquake not only resulted in the shutdown of much of Japan's nuclear generating capacity, in the aftermath of the Fukushima disaster, but also damaged oil and coal-fired thermal power stations. As Japan seeks to replace its lost thermal and nuclear capacity by running all its gas-fired units, Japan's LNG demand has increased and may be expected to continue to do so in the short-run. Whether Japan's LNG demand will grow even further beyond the next 5 years is less clear- while Wood Mackenzie forecasts relatively flat LNG demand for Japan in the next decade, Ziff Energy expects strong growth in demand.

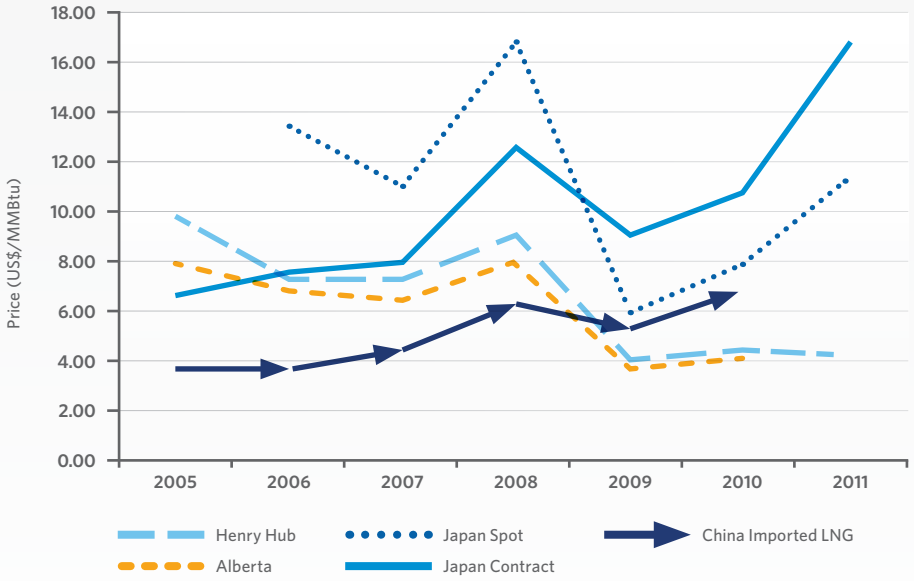
Growing demand in Asia for natural gas is also set to be accompanied by a large increase in North American gas production, driven by the shale gas revolution which has made feasible the extraction of vast reserves of unconventional gas in the US and Canada. An indication of the 'game-changing' nature of shale gas is provided by **Table 8** below, which presents the proved reserves of natural gas at the end of 2010. While proved dry-gas reserves of the US only amount to 273 tcf (4% of the world's total), the addition of potential gas reserves (as estimated by the Colorado School of Mines) inflates that figure to 2170 tcf (22% of the world's total); shale gas accounts for 687 Tcf of that figure. Similarly, Canada's recoverable gas reserves jump from 61 tcf to 1338-1407 tcf (14% of the world's total) if unconventional gas reserves are included. Thus, whereas the US was once expected to be a major LNG importer, the EIA now expects US LNG imports to decline progressively as gas demand is increasingly met by domestic production.

Table 8: *Natural Gas Proved Reserves, end 2010 (US & Canada unconventional gas included)*

	Tcf	Share of Total	R/P Ratio (yrs)
North America	**351**	**5.3%**	**12.0**
North America (incl. potential reserves)	**3525-3594**	**36-36.5%**	
US	272.5	4.1%	12.6
US (incl. potential reserves)	2170	22.0-22.2%	
Canada	61.0	0.9%	10.8
Canada (incl. potential reserves)	1,338-1,407	13.7-14.3%	
S. & Cent. America	**262**	**4.0%**	**45.9**
Europe & Eurásia	**2,228**	**33.7%**	**60.5**
Russian Federation	1,581	23.9%	76.0
Middle East	**2,677**	**40.5%**	**>100**
Iran	1,046	15.8%	>100
Qatar	894	13.5%	>100
Africa	**520**	**7.9%**	**70.5**
Asia / Oceania	**574**	**8.7%**	**37**
Australia	103	1.6%	58.0
Indonesia	108	1.6%	37.4
Malaysia	85	1.3%	36.1
World	**6,609**		**58.6**
World (incl. NA potential reserves)	**9,784-9,853**		

Sources: *BP Statistical Review of World Energy 2011, Colorado School of Mines (2011) as cited in WGI (World Gas Intelligence), 4 May 2011; Energy Futures Network and Canadian Society of Unconventional Gas (2011) as cited in WGI, 9 Mar 2011.*

Figure 9: *Natural gas prices in North America and Asia*



Sources: *Nexant (2011), WGI (various issues, 2010-2011), Petroleum Association of Japan (2011)*

Notes: *The Henry Hub and Japan spot prices for 2011 are the averages for the first six months of 2011. The Japan contract price for 2011 is calculated using the assumed formula: Contract price = 0.1485* Average JCC crude price for 1st 6 months of 2011 + 1.0. The formula is derived from Gary Eng (www.med.govt.nz/upload/65505/Formula_for_LNG_Pricing.pdf, 2008), and is consistent with recent estimates of the oil slope amounting to 0.14-0.1485 (WGI, 17 Aug 2011).*

Table 10: *Proposed LNG export projects in North America*

Project	Country	Location	Export Capacity (In million tons per year)	Expected Starting Date
Kitimat LNG	Canada	West Coast	10.0	2015
BC LNG	Canada	West Coast	15.0	2015
Petronas/Progress	Canada	West Coast	-	2016-18
Douglas Chanel LNG	Canada	West Coast	1.8	2014
Sabine Pass LNG (Cheniere)	USA	Gulf Coast	16.0	2015
Freeport LNG	USA	Gulf Coast	15.0	> 2015
Lake Charles (BG)	USA	Gulf Coast	17.6	-
Cove Point LNG (Dominion)	USA	East Coast	-	-
Jordan Cove LNG, Oregon	USA	West Coast	-	-

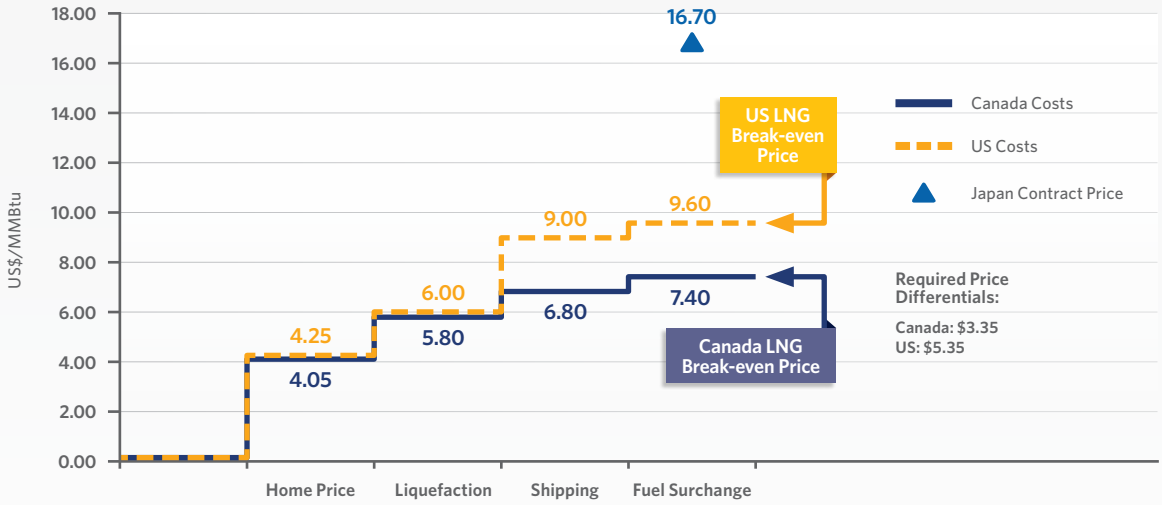
Sources: *WGI (24 Nov 2010), WGI (02 Feb 2011), WGI (23 Mar 2011), WGI (20 Apr 2011), WGI (11 May 2011), Nexant (May 2011), Oregon Live (16 Jul 2011), WGI (17 Aug 2011)*

The effect of the North American gas glut coupled with the Asian demand surge has been to widen natural gas price differentials between North America and Asia. Historically, natural gas in the Asia-Pacific region has been priced at a premium relative to North American natural gas **(see Figure 9)**. Several factors have contributed to the Asian premium- the absence of multiple import sources, the fact that gas is purchased under long-term contracts and finally the use of oil-indexed formulas to determine the prices of natural gas contracts. As **Figure 9** illustrates, however, in the last few years the price differentials have widened considerably. The difference between the Japan contract price and the Henry Hub price in 2010 was approximately $6.40, and is estimated to have increased even further in 2011 to around $12.50 due to the oil price hike as well as the increase in Japan's LNG demand following the Fukushima disaster.

With such large price differentials, gas exports from North America to Asia are increasingly attractive to investors, resulting in a number of export projects in both the US and Canada **(Table 10)**. All of the projects proposed in Canada are new terminals to be located on the West Coast in British Columbia, with access to the vast reserves of mostly unconventional gas in the Western Canadian Sedimentary Basin (WCSB) that span over the provinces of Alberta and British Columbia. In contrast, the US export projects largely involve re-purposing existing import terminals on the Gulf and East Coast into bi-directional terminals that can both export and import LNG.

OUTLOOK FOR NORTH AMERICAN LNG EXPORTS TO ASIA

Figure 11: *Cost buildup for breakeven prices for US and Canada LNG exports to Japan, 2011*



In evaluating the outlook for North American LNG export projects, a key question is whether exports from the USA or Canada to Asia are economically viable. The step-chart in **Figure 11** illustrates the estimated prices at which LNG exported by US and Canada break even, and compares it to the actual price that LNG exporters can hope to obtain if they sell LNG to Japan under long-term contracts. At current prices, the break-even export price is approximately $9.60/MMBtu for US Gulf Coast terminals and $7.40/MMBtu for Canadian export terminals, both of which are considerably less than the estimated Japanese contract price of $16.70. Thus, at current prices it makes economic sense for gas producers in North America to export LNG to Asia as opposed to selling the gas domestically, with estimated profit margins of $9.35/MMBtu for Canadian exporters and $7.15/MMBtu for US exporters.

Independent of the price of natural gas in North America and Asia, it is estimated that US terminals will require a minimum price differential of US$5.35/MMBtu (between Henry Hub prices and Asian LNG prices) for US LNG exports to be economically feasible[4], while the corresponding price differential required for Canadian terminals (i.e. the difference between Alberta prices and Asian LNG prices) is US$3.35/MMBtu. Canadian terminals (and any terminals on the US West Coast) thus have a substantial cost advantage over terminals on the US Gulf Coast due to the difference in shipping distances to Asia -- transportation costs for West Coast export terminals are only $1/MMBtu versus $3/MMBtu for the Gulf Coast terminals. The impetus for Canada to export gas is also greater than for the US due to the presence of domestic push factors. Most of the gas demand in North America is in the U.S., and with US gas production increasing Canada's gas exports to the US have been steadily declining.

In view of the large reserves of unconventional gas in both Canada and the US **(Table 8)**, there are unlikely to be any physical constraints on gas production. Liquefaction capacity, however, is the key capacity constraint. Projected liquefaction capacities of Canada and the US are presented in **Table 12** together with those of Qatar, Australia and Russia (which are likely to be the other key competitors in the Asia-Pacific LNG market).

Sources:
Nexant (May 2011), Platts (13 Apr 2011), WGI (various issues, 2011), Petroleum Association of Japan (2011)

Notes:
The Japan contract price and the Henry Hub price (i.e. home price for the US) refer to 2011 and are calculated as described in the notes to Figure 9. The home price for Canada refers to the Alberta average spot price for 2010 (Nexant, 2011). The costs of liquefaction, shipping and fuel surcharge are estimated by Barclays (Platts, 13 Apr 2011). The fuel surcharge is a fee paid to the hauler to cover the fuel costs incurred while shipping and is calculated as a fixed percentage of fuel prices so as to cushion the hauler from changes in fuel prices.

[4] *Note that this is consistent with the $5.40/MMBtu that Cheniere Energy (operator of Sabine Pass LNG) estimates will be added to Henry Hub prices when gas is exported to Asia (WGI, 20 Apr 2011).*

Despite the wide variability in the estimates, it is clear that the liquefaction capacity of Qatar and Australia will exceed that of North America in the medium-term (i.e. up to 2016) and quite likely in the long-run as well. Nevertheless, even conservative estimates of North America's liquefaction capacity represent a sizeable chunk of the total liquefaction capacity that is to be used to direct LNG exports to Asia[5]. Thus, the possibility of profitable exports to Asia, coupled with growing liquefaction capacity, underscores the significant *potential* for large volumes of transpacific gas trade.

The actual volume of transpacific LNG trade in the medium-term may be constrained by the cost advantage of existing LNG suppliers such as Qatar (and to a lesser extent, Australia), who have the luxury of reducing their prices to aggressively compete against North American exporters as well as the "first mover" advantage of existing suppliers to enter into long-term contracts for the rapidly growing demand for LNG, especially for Japan, in the wake of the Fukushima disaster. However, a desire for energy security on the part of Asian buyers might lead to significant North American LNG exports despite higher prices compared to existing supplies. Buying North American gas would allow Asian buyers possibilities for diversification by including multiple indices in their gas portfolio, and might further reduce risks for buyers given that North American gas prices (e.g. Henry Hub prices) are less volatile than the JCC crude price.

There are also regulatory risks in Canada and the United States related to environmental concerns around the hydraulic fracking process that is used in the recovery of shale gas, and opposition from large buyers of natural gas in the US, including Dow Chemical and American Public Gas Association, which have opposed LNG export plans on the grounds that they would lead to higher domestic prices and expose the domestic gas market to the potentially unstable global crude oil market.

[5] *Note that Australia exports LNG almost exclusively to Asia / Oceania (BP, 2011); Asia / Oceania remains the most attractive market for Qatar while Russia's Northeast Asian LNG export terminals are very likely to cater only to Asia and Oceania.*

Table 12: *Liquefaction capacities of potential exporters to Asia (million tons per year)*

Country	Capacity in 2011	Projected Capacity (2015-16)	Projected Capacity (2020+)
Qatar	77	77	77
Australia	20	60-70	60-160
North America	2	12-34	26-113
Canada	0	5-27	10-50
US	2	7	16-63
Russia (Northeast Asia)	10	10-15	10-25

Sources: *Capacity estimates for Qatar were compiled from Petroleum Economist (Feb 2011) and Nexant (2011); for Australia from Nexant (2011), Petroleum Economist (Jul 2011), APPEA and Deutsche Bank (both cited in Business Times, 12 Apr 2011); for Russia from Nexant (2011) and WGI (30 Mar 2011) and for North America from Nexant (2011), WGI (17 Aug 2011) and Table 10 in this paper.*

For the lower bounds of the 2015 and 2020 estimates, we assume that Kitimat LNG in Canada and Sabine Pass LNG are partially operational by 2015 and fully operational by 2020. For the upper bounds, we assume that all proposed projects are completed on schedule.

IMPACT ON GAS AND OIL PRICE DIFFERENTIALS

Regardless of actual export volumes, the prospect of significant North American LNG exports is likely to have an impact on gas price differentials and oil-gas price differentials in the region.

Asian LNG importers currently do not have access to a competitive market. Japan and South Korea source their LNG imports from a limited number of countries which hold significant market power. This market power is further enhanced by the pricing formulas of most long-term LNG contracts, which tie natural gas prices to the price of crude oil. While oil indexing was logical in the 1960s when natural gas used to be a substitute for home heating oil, natural gas today tends not to be a substitute for oil and the earlier logic behind indexation no longer holds. Instead, oil-indexed prices allow suppliers to assert their market power by charging high prices, partly because of high crude prices but also because such formulas can serve to aggregate the market power of a number of producers by providing an implicit collusive mechanism -- if all suppliers utilize oil-indexation (and crude oil prices are high enough), LNG prices will be maintained at high levels, to the benefit of all LNG exporters and LNG exporting countries.

Given the oligopolistic nature of the Asian LNG market and the high Asian gas price, the entry of North American producers into the Asian LNG market will challenge the market power of existing producers and threaten to capture some of their market share. At the same time, though, the break-even prices for North American producers are higher than those for producers from countries such as Qatar. In such a scenario, a rational response by existing producers will be to reduce the price they charge Asian buyers, so as to price North American producers out of the market while continuing to maintain their share of the market (albeit with lower prices and therefore lower profits). There are already indications that Qatari gas producers behave in the manner described above. In response to the growing threat of Australian competition, Qatar has recently reduced its price demands towards Japan even in spite of the post-Fukushima surge in Japan's LNG demand.

One way Asian prices might decrease, in response to the entry of North American producers, is through adjustments to oil-indexation formulas (e.g. a decrease in the slope in a typical formula). What is unique about the North American gas supply push, however, is that it may eventually challenge the very basis of Asian LNG pricing- the use of oil-indexed formulas. North American gas prices are not oil-indexed and thus provide their own alternative benchmarks for pricing (e.g. Henry Hub pricing). Given the large differential between oil and gas prices in North America, prices of North American LNG based on gas-hub indices are likely to be much lower than prices determined using traditional oil-indexed formulas, which could lead buyers to increasingly explore alternative pricing mechanisms for contract LNG. Although oil-indexation formulas are likely to stay, if pricing based on North American gas-hub prices is adopted at some point in the future due to the influx of North American exports, Asian prices (and therefore price differentials between Asia and North America) are likely to fall, independently of whether sellers pursue a strategy of lowering prices in order to maintain market share.

Furthermore, price differentials can be expected to decline because of a potential shift in the balance between contract and spot LNG prices used by Asian buyers. While contracted LNG has been the traditional mainstay, a number of economies have recently demonstrated an increased openness to purchasing spot LNG. For instance, in the aftermath of the March earthquake, Japanese buyers have tended not to rush into new long-term contracts, relying instead on spot LNG and LNG from short-term contracts to cover up for lost nuclear and thermal capacity. North America's entry into the Asian LNG market, by providing Asian buyers with an additional source of LNG supplies, might persuade them to buy a greater proportion of their LNG from spot markets. The fact that Henry Hub spot prices are far lower than contract LNG prices would mean that the *average* price paid by Asian buyers for their LNG would decline (even if contract prices remained the same).

SECTION 03

PROSPECTS FOR TRANSPACIFIC OIL AND COAL TRADE

In general, prospects for transpacific oil and coal trade are relatively muted in comparison to natural gas trade. According to IEA's projections, the share of coal in the energy mix of all the major Asian economies will decline substantially, as we saw in ***Figure 2***. On the other hand, in absolute terms, Asia's coal consumption is projected to increase substantially (from 2601 Mtce in 2008 to 4081 Mtce in 2035), driven by increases in coal consumption in China, India and Indonesia. While consumers of coal have not been as reliant on imports as oil and natural gas consumers (recall that only 14.9% of the Asia's coal needs are met by imports), the importance of imports to coal has been rising in this region, with China becoming a net coal importer in 2009 for the first time. By contrast, OECD countries such as the USA and Japan will reduce their coal demand over the next 25 years (*World Energy Outlook 2010*, International Energy Agency), thus increasing the supply of coal available for exports in such countries. The combination of the growth in demand in Asia (largely China and India) and the increased net supply in North America (largely USA) raises the possibility of transpacific coal trade, with the USA potentially selling coal on a major basis to China.

However, the Energy Information Administration (2010) points out a number of reasons why a significant rise in US coal exports to China is unlikely. The main reason is that the US produces coal at a relatively high cost, and is thus a "swing" supplier in the international coal trade market, only exporting to other countries when the price increases. Geographical factors also come into play- the global coal market is effectively segmented into the Atlantic and the Pacific regions, and the US is only a marginal player in the former whilst rarely participating in the latter. Exporting coal from the West Coast, an attractive idea in theory since it would result in reduced transportation costs, is rendered unlikely by the absence of a large dedicated coal terminal on the West Coast. As for China's new status as an importer, it is likely to import its coal requirements from Australia, Russia, Mongolia and Mozambique, rather than from the US.

Prospects for transpacific oil trade are somewhat more upbeat, in particular for Canada which has plentiful oil sands deposits in the state of Alberta. In fact, according to IEA, even the US has the potential to become an oil exporter, with an additional production of 500,000 barrels a day from oil shale fields in Texas and North Dakota (*New York Times*, 16 Jun 2011). However, given that the US continues to import significant quantities of oil from the Middle East, Africa and Latin America ***(see Figure 3)***, increased US oil production is more likely to be substituted for imports rather than exported.

Canada seems the more likely candidate to export oil to Asia. Canada can increase its oil production by 1.3 million barrels a day according to IEA, so supply is certainly not an issue. The key choice for Canadian oil producers is between exporting oil south to the US and west to Asia. Currently Canada is almost entirely reliant on a single market- the US - for selling its oil, with exports to US accounting for close to 98% of its overall oil exports (*BP Statistical Review of World Energy*, June 2011). Exporting oil to Asia would provide Canada with the benefits of diversification and reduce its reliance on a single market for oil.

There are also purely economic reasons favoring export of oil from Canada to Asia. Firstly, the costs of transporting oil to China, Japan, S Korea and Chinese Taipei (via pipeline and tanker) are lower than the costs of transporting oil to US (via pipeline). Secondly, while crude market prices generally tend to match each other quite closely, in the past year or so a differential has opened up between WTI prices and crude oil prices in the rest of the world. Starting from 2010, the JCC crude price has inched ahead of the WTI price. The new oil price differential (a result of the relative oil supply glut in North America and in particular Canada), though small in relative terms, also favors Canadian oil exports to Asia. The economic advantages of Canadian oil exports to Asia, however, must be balanced against the fact that oil produced from oil sands is less fungible than sweeter grades from traditional sources.

The biggest obstacles to Canadian oil exports to Asia, however, have to do with environmental and regulatory issues. There is domestic and international opposition to the oil sands in general due to the environmental impacts, even though these concerns are highly unlikely to bring further development of the oil sands to a complete standstill. The more immediate roadblock is opposition to the proposed Northern Gateway Pipeline that would transport oil from the Athabasca oil-sands in Alberta to Kitimat, British Columbia on the Pacific coast, for onward shipment to Asia.

If North American crude oil exporting capacity can be achieved, it is likely that there will be a narrowing of the differential in WTI and Brent/JCC crude prices, similar to the reduction in natural gas price differentials between North America and Asia. The price spread in crude oil is a relatively recent phenomenon, but it is a function of the same fundamental causes that affect gas price differentials, namely surplus energy supply in North America coupled with the very limited ability (especially for Canada) to export oil to destinations outside the continent. In recent months, the spread between Brent and WTI prices has widened to as much as US$25 a barrel.

SECTION 04

ASIAN INVESTMENTS IN NORTH AMERICAN OIL AND GAS INDUSTRY

In addition to growing interest in transpacific energy exports from North America to Asia, the past few years have also featured a trend of increasing capital and equity investments by Asian state-owned oil & gas companies in the North American oil and gas industry. ***Table 13*** below summarizes some of the key recent investments that have been made. Almost all of the investments have been in unconventional oil and gas resources.

Most of these investments are likely motivated by straightforward profit-maximizing interests that take into account the growth prospects of shale gas and oil, as well as oil sands. In the case of oil sands, rising crude oil prices imply greater profits from those investments. Investments in shale gas are harder to defend from a profit-maximizing perspective, given the low price of natural gas in North America, if there is no intention of exporting the gas to higher paying markets.

It is likely, therefore, that some of the Asian investments in unconventional gas are motivated by broader objectives. One source of motivation could be the desire to acquire experience and technical know-how to develop similar unconventional gas fields in home economies. China, for example, is known to have substantial shale gas reserves, even though these are in remote areas that do not have access to the vast amounts of water that are needed for hydraulic fracking.

Furthermore, some of the investments appear to be tailored towards securing Asian oil and gas imports. Sinopec's investment in the Northern Gateway Pipeline (which, if completed, would allow the transport of heavy oil to the west cost for onward shipment to Asia) appears to be motivated by a desire to secure a new import source for oil. In the same way, the recent initiative by Petronas to set up an LNG export terminal in Canada ***(see Table 10 above)*** is likely motivated by a similar desire to for access to a secure long-term energy source.

Hence there are important synergies between the North American drive to export LNG to Asia, and the Asian drive to invest in the North American oil and gas industry. Both these trends point to an important conclusion - North America and Asia are becoming increasingly interdependent in energy terms, with each having a stake in the other's energy sector. North American LNG exports to Asia could mean that the Asian and North American gas markets will no longer be disconnected, with prices in one market affecting prices in the other. By the same token, Asian investments in North American unconventional oil and gas industry will mean that both Asia and North America will have a stake in how the unconventional gas boom in North America plays out.

Table 13: *Investments by Asian oil & gas companies in North American oil and gas industry*

Date	Category	Investing country	Investing company	Recipient country	Project/ company	Valuation (in billion US$)
May-05	Oil sands	China	CNOOC	Canada	MEG	0.2
Aug-06	Oil sands	S Korea	KNOC	Canada	Black Gold	1.7
Apr-10	Oil sands	China	Sinopec	Canada	Syncrude	4.6
Nov-10	Oil sands	Thailand	PTT	Canada	Kai Kos Dehseh	2.3
Jan-11	Shale gas & oil	China	CNOOC	USA	Chesapeake	0.6
Jan-11	Pipeline	China	Sinopec	Canada	Northern Gateway Pipeline	2.3
Feb-11	Shale gas	China	Petrochina	Canada	Encana	6.9
Feb-11	Shale gas	India	Reliance	USA	Atlas, Chevron	3.2
Mar-11	Shale gas & oil	S Korea	KNOC	USA	Anadarko	1.6
Jul-11	Oil sands	China	CNOOC	Canada	OPTI Canada	2.1

Source: *Wall Street Journal (31 Jan 2011), Business Times (11 Feb 2011), Financial Times (22 Mar 2011), Financial Times (13 Apr 2011), and Wall Street Journal (20 Jul 2011)*

THE EMERGING TRANS-PACIFIC ENERGY ECONOMY: IMPLICATIONS FOR POLICY AND ECONOMIC PARTNERSHIP

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THE EMERGING TRANS-PACIFIC ENERGY ECONOMY: IMPLICATIONS FOR POLICY AND ECONOMIC PARTNERSHIP

By

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Energy was at once a strategically crucial and a conflicted agenda for the twentieth century, serving as a major catalyst for global military conflict, and for two major Oil Shocks to the industrialized world as well. So it promises to be, albeit in hopefully more pacific fashion, across the twenty-first century as well. Energy supply and price remain among the most important parameters of global economic life, for producers and consumers alike.

Few major democratic, capitalist nations are more central in the political economy of global energy than the United States, Japan, and Canada. The United States and Japan are two of the three largest oil importers and consumers on earth.[1] Simultaneously, the United States and Canada are also two of the world's largest oil and natural-gas producers. Their productive roles are being enhanced by rapidly rising shale-gas production in both countries, and the future prospect of substantial exports. Meanwhile Japan's role as the largest liquefied natural gas (LNG) importer on earth is being further magnified by the need for alternative energy sources in the wake of the Fukushima nuclear accident, creating important new complementarities with the Canadian and American roles as major energy exporters.

[1] The U.S. is the largest oil consumer in the world in 2010 (21.1 percent of the global total), followed by China (10.6 percent) and Japan (5.0 percent). The three countries are also the world's largest oil importers, with 21.8 percent, 11.1 percent, and 8.5 percent of world oil imports respectively. See BP. Statistical Review of World Energy, June, 2011 edition, p. 9 and p. 18.

The Trans-Pacific Energy Economy in Historical Context

For the first four decades of the twentieth century, the United States was an important supplier of energy to Japan, particularly in the form of oil. The end of that interdependence on the eve of World War II arguably accelerated the onset of military conflict.[2] After World War II, American majors such as Standard Oil of New Jersey, Mobil, and Texaco held a central role as distributors of petroleum products in Japan for over three decades, but the actual flow of energy imports into Japan was mainly from Southeast Asia and the Middle East, rather than the United States. Even when oil and gas were discovered in large quantities on the North Slope of Alaska in the 1970s**,** domestic interest-group pressures within the U.S. made the economically rational export of oil to Japan politically impossible.[3]

Both the U.S. and Canada have of course exported substantial amounts of coal to Japan for years, and Canada has exported significant amounts of uranium as well. Indeed, Canada has recently been Japan's largest source of uranium supply. Yet hydrocarbon exports from North America to Japan have been limited, and, in the case of the United States, non-existent.

For more than seventy years—since the U.S. oil embargo of 1941, on the eve of World War II—the United States has not engaged in significant hydro-carbon exports to Japan. More generally, oil and natural-gas trade across the Pacific has been virtually non-existent—trans-Pacific gas trade in 2010, for example, accounted for only 0.3 percent of the worldwide total, while trans-Pacific oil trade only constituted 1.2 percent of global totals.[4] Yet that un-integrated pattern, in the wake of historic developments on the two shores of the Pacific—the shale-gas

[2] See, for example, Daniel Yergin. The Prize**:**The Epic Quest for Oil, Money, & Power. New York: Touchstone Books, 1991, pp. 305-327.
[3] See DOE/NETL. Alaska North Slope Oil and Gas—A Promising Future or an Area in Decline? at: http://www.netl.doe.gov/technologies/oil-gas/publications/EPreports/ANSSummaryReportFinalAugust2007.pdf.
[4] BP. Statistical Review of World Energy, June 2011 edition, p. 18.

revolution and the post-Fukushima energy transformation in Japan—appears to be changing in dramatic fashion. Suddenly, the prospects for an era of true trans-Pacific energy interdependence, fraught with important geostrategic implications, appears to be emerging.

To fully understand the new profile of trans-Pacific energy interdependence and its historic policy and geopolitical implications, it is important to review the embedded patterns of energy supply and demand prevailing in the United States, Japan, and Canada. Following that survey, this paper then considers economic prospects for the new era of deepening trans-Pacific energy interdependence. In conclusion, it enumerates the strategic benefits of the emerging trans-Pacific energy relationship, and reviews policy issues which the new trans-Pacific energy economy evokes.

North America and Japan in the Global Energy Economy Today

To fully appreciate emerging policy issues in U.S.-Japan-Canada energy relations, it is important first to grasp concretely the role of these three nations in the broader global energy economy. As noted previously, and in Figure I, the US and Canada are major energy producers, while the US and Japan are major energy consumers and importers. The US and Canada both have substantial untapped coal and shale gas reserves, while Canada also has substantial un-utilized export capacity with respect to non-conventional oil and uranium.

FIGURE I: U.S., JAPANESE, AND CANADIAN ENERGY TRADE IN COMPARATIVE PERSPECTIVE (2010)

Country	Oil [tb/d]	Natural Gas [bcm]	Coal	Uranium
United States	Ex: 2,154 Im: 11,689 **Net: - 9,535**	Ex: 31.98 Im: 105.48 **Net: -73.50**	Exporter	Little Trade
Canada	Ex: 2,599 Im: 846 **Net: +1,743**	Ex: 92.40 Im: 22.91 **Net: +69.49**	Exporter	Exporter
Japan	Ex: 302 Im: 4,567 **Net: -4,265**	Ex: [0] Im: 93.48 **Net: -93.48**	Importer	Importer
World total	Ex: 53,510 Im: 53,510 **Net: 0**	Ex: 975.22 Im: 975.22 **Net: 0**		

Source: BP, Statistical Review of World Energy, June 2011 edition.

Notes:

(1) tb/d = thousand barrels per day, bcm = billion cubic meters per year, Ex = Export, Im = Import
(2) Japan's natural gas exports assumed to be 0.
(3) '+ (plus)' indicates exports and '-(minus)' indicates imports.

Japan's Energy "Angst"

As the data above suggest, Japan and its North American partners stand in radically contrasting, and yet complementary, relations to the global energy economy. Japan is a massive importer of all variety of energy inputs—Canada and the United States are largely exporters, although the US also does import substantial amounts of oil. To compound Japan's energy vulnerabilities, its economy is highly energy intensive, and it is radically dependent for hydro-carbon supplies on

the Middle East. Indeed, close to 80 percent of its oil imports come from the Persian Gulf, compared to only around 15 percent for the United States.[5]

This radical Japanese dependence on the Middle East is driven by both geography and energy economics. The Persian Gulf is directly accessible to Japan, via the Strait of Malacca and the Indian Ocean, while both supply and price of Gulf oil are relatively predictable. Despite the past predictability, Japanese are nervous about two aspects of the Middle East situation: rising competition from other East Asian demandeurs, including China and South Korea; as well as the apparently waning geopolitical role of the United States in the region. Especially in the wake of the Fukushima accident, which is forcing them to seek alternatives to nuclear power, and to procure more and more LNG, over-reliance on the Persian Gulf is making them increasingly nervous.

Three forms of energy have historically assuaged Japanese misgivings about heavy energy dependence on the Persian Gulf: coal, nuclear power, and natural gas. The first of these, however, has become more problematic in recent years, due to increasing concerns about global climate change. The second is at least temporarily impractical, in the wake of Fukushima. That leaves the third: natural gas.

Natural gas, felicitously, is suddenly available from a new, non-Middle Eastern source—North America—thanks to the emergence of shale gas. And it is available precisely as the need for it is intensified by the Fukushima accident. Almost unbelievably, it is also available at potentially very reasonable prices, with the spot price of LNG in North America, excluding

[5] Japan obtained 79.7 percent of its total oil imports from the Middle East in 2010, while the United States obtained only 14.9 percent from that region. See BP. Statistical Review of World Energy, June, 2011 edition, p. 18.

transportation costs, hovering around one fourth of contract price levels prevailing in Japan that included those costs.[6]

Prospects for Future Trans-Pacific Energy Interdependence

Given trans-Pacific LNG price trends of the past two years, driven by the shale-gas revolution in North America and the Fukushima accident in Japan, natural gas trade across the Pacific is now economically feasible. The infrastructural obstacles, of course, are not inconsequential: (1) greater gasification capacity in Japan, (2) green-field liquefaction facilities along Canada's West Coast to process natural gas exports; and (3) significant technical modifications on LNG import terminals along the U.S. East and Gulf coasts, to make them suitable instead for LNG exports across the Pacific. Yet the long-term economic logic makes trans-Pacific trade in natural gas at last economically feasible.

In April 2012, the U.S. Federal Energy Regulatory Commission (FERC) authorized the construction and operation of up to four modular LNG trains for the liquefaction of domestically produced natural gas at the Sabine Pass LNG terminal in Cameron Parish, Louisiana[7], following Department of Energy authorization to export LNG to FTA countries in September 2010, and to non-FTA countries in May 2011.[8] The Sabine Pass facility is expected to begin exporting natural gas in 2015, with an export capacity of 8 million tons per year[9], and with all capacity already

[6] See Tilak K. Doshi and Nahim Bin Zahur. Prospects for Trans-Pacific Energy Trade. Singapore: Pacific Economic Cooperation Council, 2012.
[7] "Cheniere gets FERC approval for Sabine Pass LNG export facility", at: http://www.marinelog/com/index.php?option=com_content&view=article&id-2277:cheni...
[8] See http://www.chenierеenergypartners.com/liquefaction_project/DOE_filings.shtml.
[9] The first two trains will commence operation in 2015-2016, and another two trains will commence in 2017-2018. 16 mtpa will be available once four trains are completed. Full operating capacity will thus be 16 million tons, available in 2017-2018. See http://phx.corporate-ir-net/phoenex.zhtml?c=207560&p=irol-newsArticle&ID=1683623&highlight=.

committed.[10] As indicated in Table II, Sabine Pass is only one of ten major LNG export projects currently planned in the United States, which are directed largely toward supplying the East Asian market.

TABLE II: PROPOSED LNG EXPORT PROJECTS IN THE U.S.

Applications Received by DoE/FE to Export Domestically Produced LNG from the Lower-48 States (as of March 23, 2012)

Company	Location / Quantity	FTA Applications	Non-FTA Applications
Sabine Pass Liquefaction, LLC	Gulf Coast 2.2 Bcf/d	Approved Sep. 2010	Approved May 2011
Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC	Gulf Coast 1.4 Bcf/d	Approved Feb. 2011	Under DoE Review
Lake Charles Exports, LLC	Gulf Coast 2.0 Bcf/d	Approved Jul. 2011	Under DoE Review
Carib Energy (USA) LLC	South-Eastern 0.03 Bcf/d: FTA 0.01 Bcf/d: non-FTA	Approved Jul. 2011	Under DoE Review
Dominion Cove Point LNG, LP	East Coast 1.0 Bcf/d	Approved Oct. 2011	Under DoE Review
Jordan Cove Energy Project, L.P.	West Coast 1.2 Bcf/d	Approved Dec 2011	Under DoE Review
Cameron LNG, LLC	Gulf Coast 1.7Bcf/d	Approved Jan. 2012	Under DoE Review
Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC	Gulf Coast 1.4 Bcf/d	Approved Feb. 2012	Under DoE Review
Gulf Coast LNG Export, LLC	Gulf Coast 2.8 Bcf/d	Under DoE Review	
Cambridge Energy, LLC	Southeast, Gulf Coast 0.27 Bcf/d	Pending Approval	N.A.
Total of all Applications Received		14.00 Bcf/d	13.71 Bcf/d

Source: Office of Oil and Gas Global Security and Supply, Office of Fossil Energy, U.S. Department of Energy

Note: Bcf/d = billion cubic feet per day.

[10] Some of this capacity is committed to non-Pacific buyers, suggesting that it may well be delivered partially to non-Pacific destinations, although that of course still remains uncertain. See http://phx.corporate-ir.net/phoenix.zhtml?c=207560&p=irol-newsArticle&ID=1653972&highlight=

Japan has also, it should be noted, historically purchased some LNG from Alaska, and will likely continue to do so in future, although those amounts so far have been relatively modest compared to Japan's other supplies.

Apart from large and rapidly expanding LNG trade, substantial trans-Pacific investment in the Canadian oil sands is also in progress that may lead to future trans-Pacific oil exports, together with major infrastructure projects, such as the $2.3 billion Northern Gateway Pipeline in Canada. This pipeline will carry oil from the oil sands district of northern Alberta to Canada's Pacific coast, for export across the Pacific. Asian investment in Canadian oil sands projects and related infrastructure now totals well over $12 billion.

A decade ago most trans-Pacific investment in North American energy was from Japan, but there has been a significant shift in recent years. Energy demand has surged in China, together with rising affluence, and an increasing share of investment is from China. Korea has also become a significant investor, facing fewer regulatory obstacles to its investments and exports from the United States than Japan, due to provisions of the US Natural Gas Act of 1938 as amended by the Energy Policy Act of 1992, stipulates preferential treatment, through a Department of Energy approval process, for nations concluding free-trade agreements with the United States.[11] Coal is historically an important part of trans-Pacific energy trade and investment, and cannot be neglected in future. It is particularly salient in Japan-Canada economic relations. Coal (mainly metallurgical, to fuel Japan's massive steel industry), is Canada's largest export to Japan, totaling $2.3 billion in 2009, or over 19 percent of Canadian exports.[12] In 2011 coal also surged into prominence in US-Japan relations, following the reduction in Japanese

[11] On these regulatory details, see http://fossil.energy.gov/programs/gasregulation/How to Obtain Authorization to Import an.html.
[12] Japanese trade data, at: http://www.mofa.go.jp.

nuclear capacity in the wake of the Fukushima disaster, with American exports increasing 119 percent, to almost 7 million tons.[13]

Civilian nuclear power has traditionally been the energy sector where trans-Pacific interdependence has been the deepest. The Eisenhower Atoms for Peace program inspired the original siting of nuclear plants in Japan, and most of the early equipment—including the Fukushima nuclear plant itself—was supplied by American manufacturers. General Electric, for example, provided substantial capital equipment for nuclear plants to Tokyo Electric Power, both independently, and cooperatively with Toshiba. for many years was the largest American exporter to Japan and Tokyo Electric Power was the largest corporate importer from the United States, with the bulk of their mutual trade in the nuclear power area. Japan also has traditionally imported substantial amounts of nuclear fuel from the US—Y84.7 billion in 2010.[14] Seven percent of Japan's uranium supplies, in total, come from the U.S., which is Japan's fifth largest supplier.[15]The nuclear industries of the U.S. and Japan are also intimately intertwined, with Toshiba owning Westinghouse as a subsidiary, and Hitachi and General Electric enjoying a longstanding joint-venture relationship.

Many parts of the United States are natural energy partners for Japan, but among the most promising is Alaska. Geographically, it is the closest part of the U.S. to Japan, and it is notably well endowed with energy resources. In 2011 Alaska exported nearly $388 million in energy resources to Japan, including LNG, refined petroleum products, and coal. Over half of this total,

[13] Bill Chappell, "U.S. Coal Exports Soar to 1991 Heights", at: http://www.npr.org/blogs/thetwo-way/2012/04/10/150360355/u-s-coal-exports-soar-to-199.
[14] See Ministry of Finance statistical database, at: http://www.customs.go.jp/toukei/srch/index.htm?M=13&P=1,2.....4.1,2010,0,0,0,3,50105....1.....50.
[15] The other largest suppliers are Canada, Australia, Namibia, and Niger. See http://www.enecho.meti.go.jp/topics/energy-in-japan/energy2006html/gragh/gfa.html.

or $198 million, consisted of LNG exports, and those will likely increase substantially in future.[16]

Canada has also been an important participant in trans-Pacific energy trade[17], including the nuclear dimension. Canada continues, for example, to serve as Japan's largest supplier of uranium ore, supplying well over a quarter of Japan's total imports.[18] Total Japan-Canada trade in radioactive elements, including uranium, totaled 2.6 billion yen in 2010[19].

Over the past year since the Fukushima accident, nuclear regulators of the United States and Japan have been in intense communication with one another as never before on safety issues, but their dialogue will inevitably broaden. Looking to the future, it is hard to see how Japan will be economically able to radically phase out its existing nuclear plants, despite continuing public opposition in the wake of the Fukushima accident. If and when Japanese nuclear plants resume operation on a larger scale, North America will no doubt once again play a significant role in providing both raw materials and services to Japan. And U.S. and Japanese firms will in any case continue to cooperate in garnering nuclear contracts in third countries, capitalizing on their advanced technology.

The Fukushima accident, and the aging of existing Japanese nuclear plants, may in fact also open a new and quite dynamic area for U.S.-Japan energy cooperation. The United States, as a pioneer in the nuclear industry, has by definition many older nuclear plants, and substantial experience in the decommissioning of nuclear facilities. This experience will be valuable in

[16] See "Alaska Exports Reach Record Highs", at: http://gov.alaska.gov.
[17] Canada has, for example, exported CANDU reactors to South Korea, although not to Japan.
[18] See METI data, from: http://www.enecho.meti.go.jp.
[19] These figures are for Statistical Code 2488 (Radioactive chemical elements and radioactive isotopes, etc.) See Trade Statistics of Japan database, at: thhp://www.customs.go.jp/English/tariff/2012_4data/i201204e_28.htm.

helping Japan deal with its current problems, and could be an area for deepened trans-Pacific partnership**.**

The Emerging Trans-Pacific Energy Policy Agenda in an Era of Interdependence

In a nation like Japan that imports nearly 99 percent of its oil and gas, adequate energy supply is naturally seen, almost instinctively, as a core element of national security. That instinctive dimension is arguably lacking in the United States and Canada, which perceive national security—especially in the U.S.—in more narrowly political-military terms. Conceptions of energy security on the two shores of the Pacific are complementary to one another, especially when the United States provides military security for Japan's energy sea lanes to the Persian Gulf, and for the political stability of key nations in the Gulf as well. Yet U.S. and Japanese conceptions of energy security, in particular, differ substantially in subtle, subjective dimensions.

Japan and its North American partners have, however, developed a considerable level of trust with one another, including broad Japanese confidence in the transparency and stability of North American institutions, as well as the U.S.-Japan alliance. This confidence makes Japanese energy interdependence with North America attractive, especially given Tokyo's high current levels of dependence on the Persian Gulf for vitally needed hydro-carbons. The attractiveness is compounded by both the new availability of shale-gas supply, and the new Japanese domestic requirements for gas in the wake of Fukushima.

Energy issues, of course, are embedded in larger parameters of political economy. To assure optimal cooperation on energy, including shale gas, more explicit Japanese support of the TPP framework would be helpful. The United States and Canada, for their part, should affirm

their commitment to free trade in energy, including shale gas, as potential for LNG exports begins to rise.

It is important to keep in mind the tangible benefits to Japan, especially important in that strategic nation's fragile post-tsunami circumstances, that would flow from expanded access, under free-trade provisions, to North American natural gas supplies. Access to U.S. and Canadian natural gas, much of it no doubt derived from rapidly expanding shale-gas supplies on the continent, would afford Japanese distributors powerful leverage with Middle Eastern and other suppliers, forcing them to drop or revise traditional oil-linked pricing formulas that severely disadvantage Japan and impede its economic recovery. The availability of lower-cost North American gas under a free-trade regime would thus help reduce the burden of high energy prices that is impeding Japan's recovery.

Flexible provision of expanded North American natural-gas supplies to Japan would also likely have tangible diplomatic benefits to the United States and Canada that would help strengthen trans-Pacific alliance relations. Expanded gas supplies would, for example, help reward Japan for its economically costly cooperation with Iran sanctions, help insure longer-term cooperation with those sanctions, and reduce resentment at special U.S. efforts to encourage China and South Korea to cut Iran procurements by compensatory benefits in the Arab Gulf, predominantly a traditional energy supplier for Japan. Expanded North American gas supplies for Japan could also slow the deepening of political-economic relations with Russia, a potentially important alternate energy partner for Tokyo.

With the first authorizations for North American gas exports to Asia, including Japan, just now in progress, and with memories of the Fukushima tragedy still fresh, it is an excellent

time to deepen the trans-Pacific energy dialogue at the policy as well as the economic level. Such dialogue no doubt needs both bilateral and trilateral dimensions. To deepen and broaden their strategically important but politically delicate bilateral relationship, the United States and Japan need a forum for deliberating diverse issues of mutual energy security and efficiency in an ongoing fashion. Such a dialogue, potentially patterned after the SII talks of the early 1990s with their multiple policy baskets, could cover such diverse topics as nuclear safety, nuclear decommissioning, renewable energy, and smart grids and improved energy infrastructure, as well as energy efficiency. Involving multiple government agencies of both the United States and Japan, the Dialogue could also provide a role for working-level communication between embassies and local specialists in both nations.

Canada, Japan, and the United States together also need more intense trilateral energy discussion. The three countries, after all, have substantial shared interests and concerns, as trans-Pacific energy interdependence continues to rise. These shared interests center on maintaining free trade and transparent investment practices in the energy sector, while also assuring that trans-Pacific energy trade and investment does not undermine shared national-security concerns.

IN CONCLUSION

The trans-Pacific world is approaching a true critical juncture in the energy sphere. The Japanese and the North American shores of the Pacific share important core values of democracy and respect for free enterprise that make them natural partners. Until recently, however, they have engaged in remarkably little energy trade and investment, apart from coal and uranium, despite their intense interaction in other spheres.

A new, much broader era of trans-Pacific energy interdependence is dawning. Both Canada and the United States are rapidly emerging as potentially substantial suppliers of LNG to Japan, just when Japan itself, in the wake of Fukushima, most needs those supplies. For both symbolic and substantive reasons, Canada, Japan, and the United States must grasp this historic opportunity to re-affirm the importance of free trade in energy, as it begins to accelerate across the Pacific; and to engage in a broadened energy dialogue that will examine in a far-sighted way avenues of cooperation that may steadily broaden in future.

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