

The Uncertain Future For ANS LNG Exports

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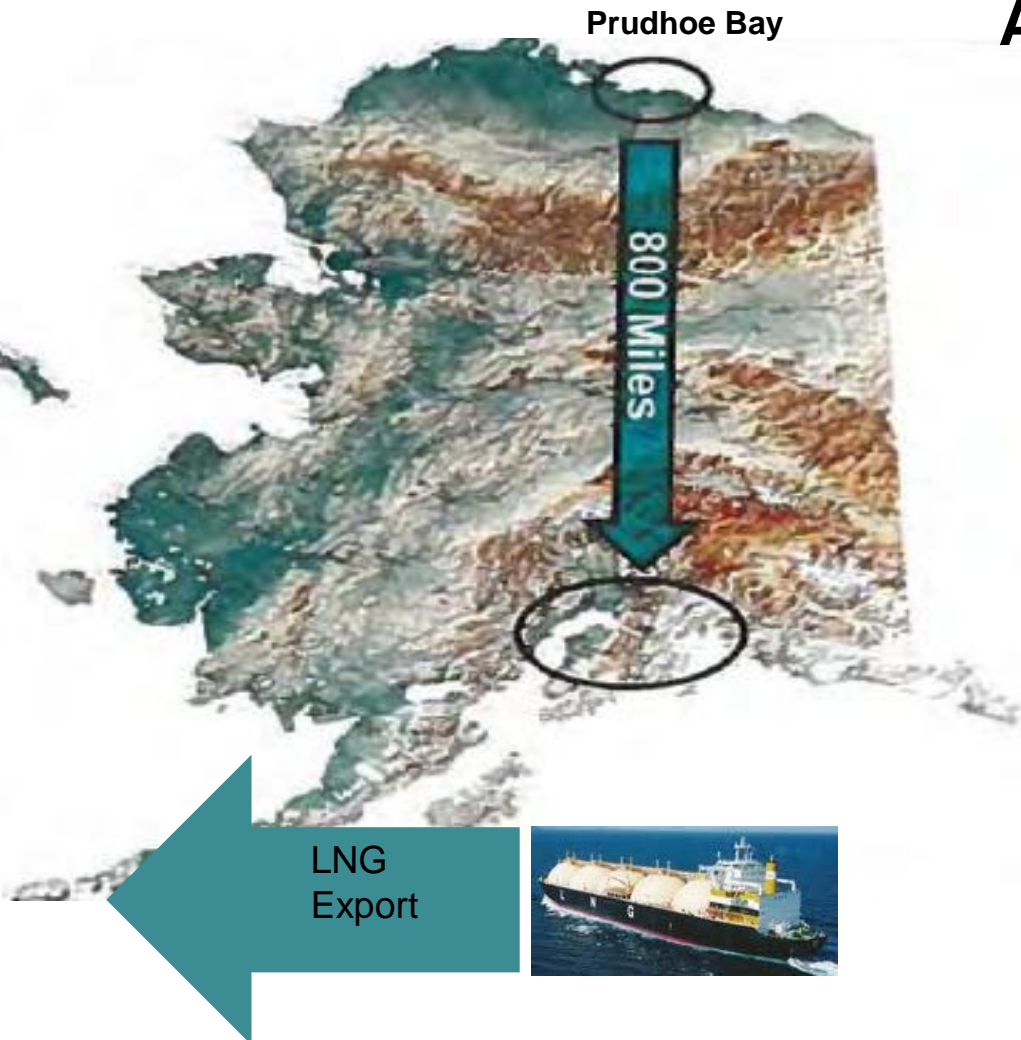
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Overview

- ◆ Last year at this time, at this conference, we spoke about the uncertainty confronting ANS gas exports via pipeline to the lower-48. We discussed:
 - Shale gas: What is the shape of the *long-run* supply curve for natural gas in the lower-48?
 - Demand growth: What will determine whether lower-48 demand growth will support 4-6 Bcf/day of incremental supply and at what future prices?
 - Global gas prices:
 - What are the prospects for global gas price convergence?
 - What is the relationship of the long-run price of oil to that of natural gas?
- ◆ Since then, the Alaskan commercial and political winds have shifted to the promotion of an LNG export project to Asia. Are its prospects any less risky and what uncertainties must be resolved for that project to become a reality?

Overview of the ANS LNG Project



Alaska Pipeline Project

- ◆ Sponsors:
- ExxonMobil ConocoPhillips
bp TransCanada
- ◆ Est. Cost: \$45 - \$65+ Billion
- 800 miles of pipeline (3-3.5 Bcf/d)
 - 1 gas treatment plant
 - 15-18 MTPA liquefaction plant
 - In comparison, current Australian liquefaction capacity ~20 MTPA
 - LNG storage/loading facilities
- ◆ Est. Timeline: ~9 to 12 years
(i.e., post-2020)

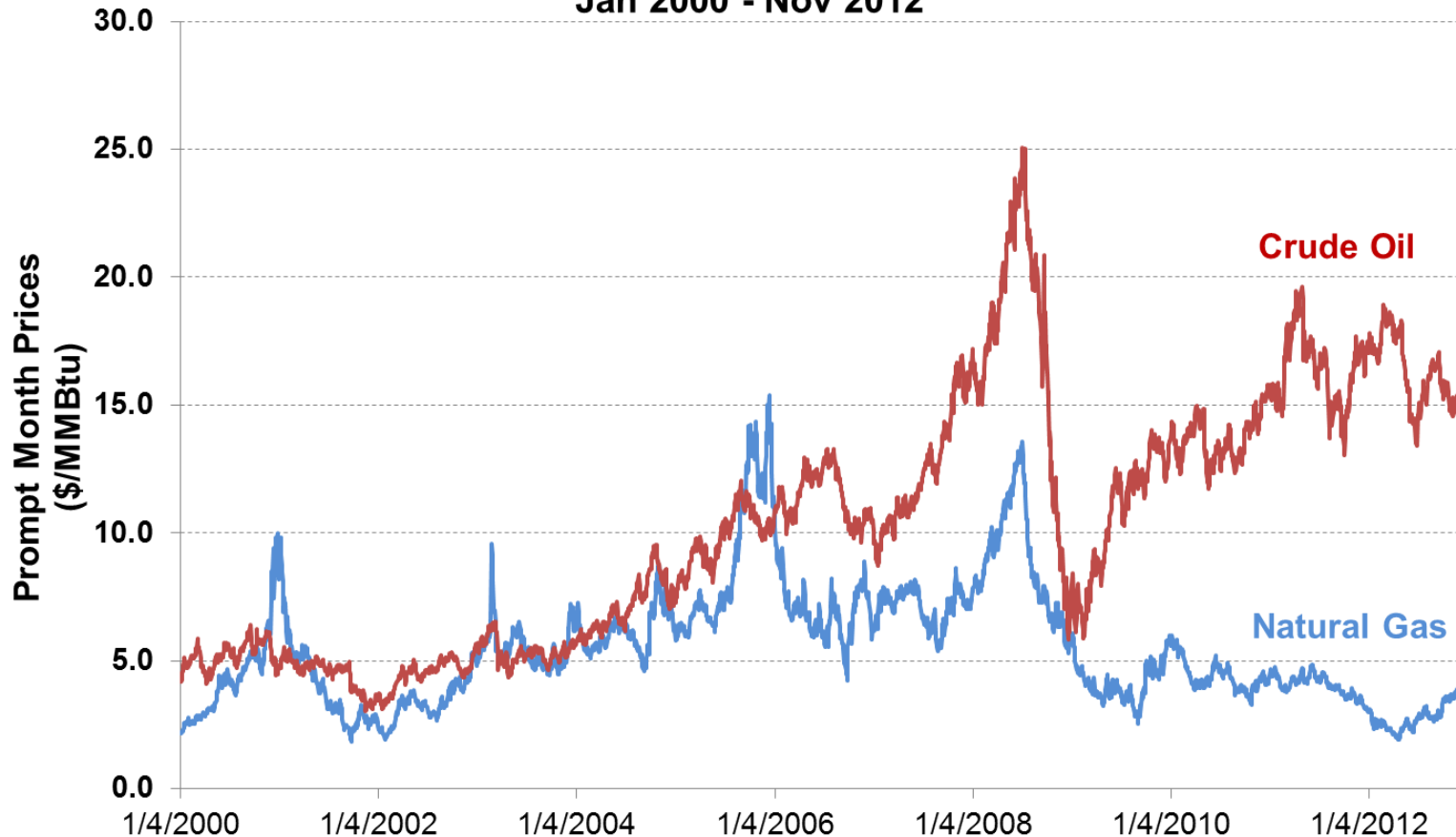
What is different about export as LNG instead of via pipeline to lower-48?

- ♦ ***Different market*** – Asia -- where LNG prices have historically been linked to oil and unlinked to lower-48 or European prices. Will oil prices continue to dictate the price of LNG in Asia?
- ♦ ***Different competition*** – Australian, Middle-eastern, Russian, BC and Gulf Coast LNG development projects have a head start. Is it already too late for an Alaskan project?
- ♦ ***Different project*** – shorter pipeline but expensive liquefaction facility. Is it less costly than the competition? Is “stranded” ANS gas a competitive advantage for Alaskan LNG exports?

Each of these differences carries a different set of risks/uncertainties for the project.

Large Oil/Gas Price Differential Makes Oil Price-linked LNG Exports Potentially Attractive

NYMEX Prompt Month Prices
Crude Oil vs. Natural Gas
Jan 2000 - Nov 2012



Sources/Notes: NYMEX data downloaded from EIA. The crude oil prices are for WTI Cushing, OK Crude Oil Future Contracts.

World Energy Outlook Unconventional Scenarios: Golden Rules Case & Low Unconventional Case

International Energy Agency's 2012 World Energy Outlook Special Report on Unconventional Gas evaluated two scenarios:

♦ **Golden Rules Case**

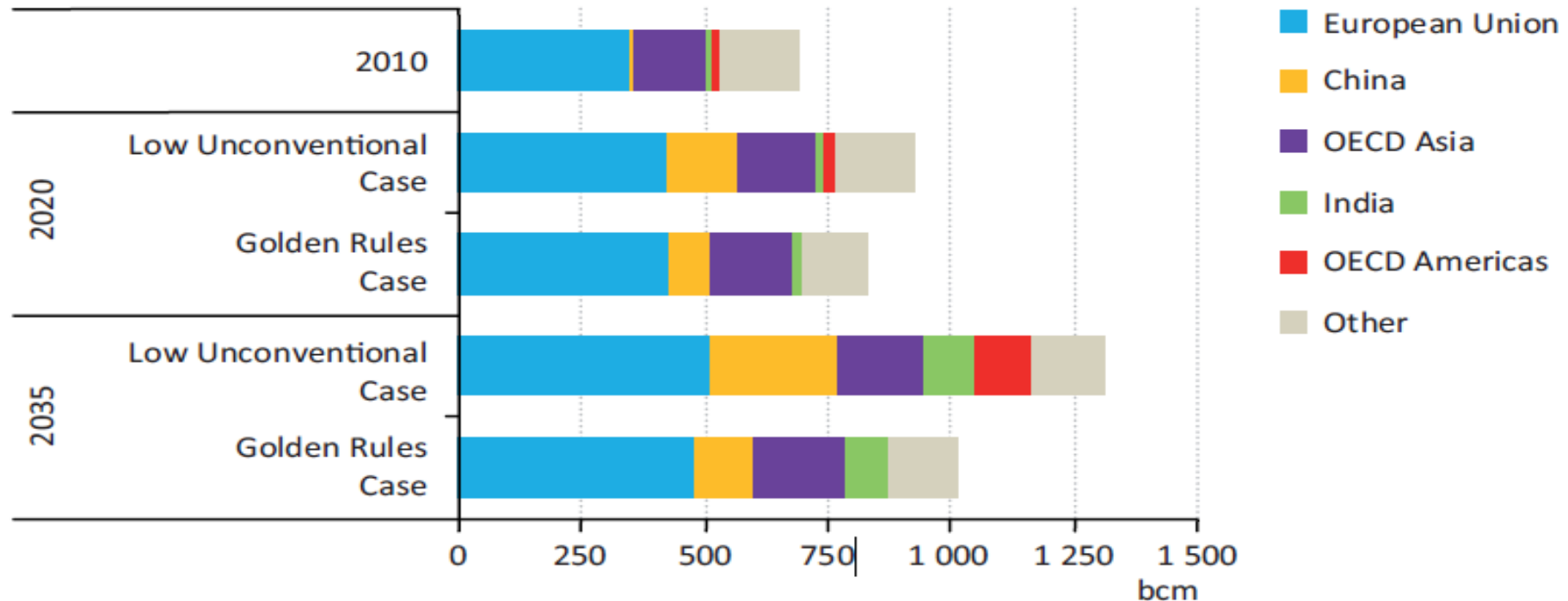
- Significant unconventional development globally (~1 million+ new unconventional wells drilled before 2035)
- Diverse mix of sources of gas in most markets, suggesting an environment of growing confidence in the adequacy, reliability and affordability of natural gas supplies
- An increased volume of gas, particularly LNG, looking for markets in the period after 2020 stimulates more liquid and competitive international markets

♦ **Low Unconventional Case**

- Lack of public acceptance leads to only a small share of unconventional gas resources being accessible for development (unconventional gas production rises only slightly above 2010 levels by 2035)
- The competitive position of gas in the global fuel mix deteriorates as a result of lower availability and higher prices
- The requirement for imported gas is higher and some patterns of trade are reversed, with North America needing significant quantities of imported LNG, and the preeminent position in global supply of the main conventional gas resource-holders is reinforced

Growth in Global Net Imports Also Makes LNG Exports Attractive

Figure 2.12 ▶ Major natural gas net importers by case

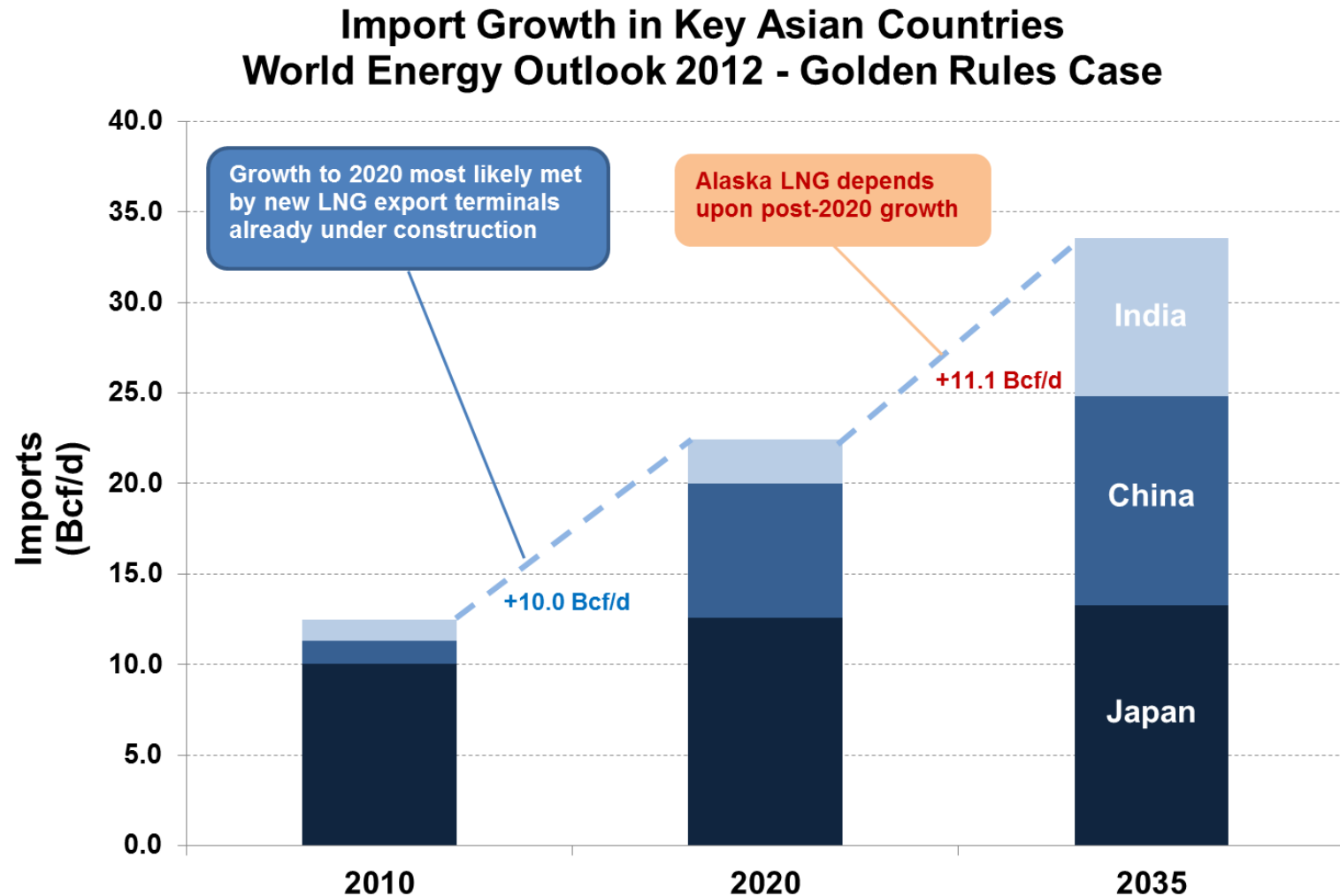


Source: Golden Rules for a Golden Age of Gas, World Energy Outlook Special Report on Unconventional Gas, IEA, 2012, p.97

◆ Demand growth expected in non-OECD countries, particularly China

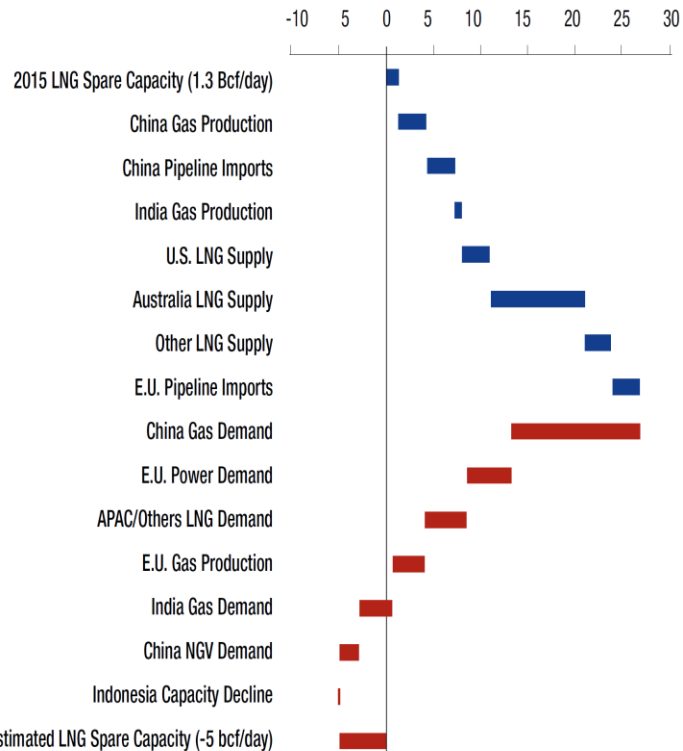
- China's net gas imports only 14 bcm (~1.4 Bcf/d) in 2010
- IEA - China's net imports could reach 77 bcm to 143 bcm (~7 Bcf/d to 14 Bcf/d) by 2020 and 119 bcm to 262 bcm (~ 12 Bcf/d to 25 Bcf/d) by 2035

Potential Import Growth in Key Asian Countries



Note: Imports calculated as demand less indigenous production.

Significant Uncertainty in Unmet Gas Demand Post-2020



Source: Brookings analysis of Morgan Stanley research and data; IEA, EIA, ClearView Energy Partners

Source: "Liquid Markets: Assessing the Case for U.S. Exports of Liquefied Natural Gas," Brookings Energy Security Initiative, May 2012

CHINA'S PIPELINE GAS IMPORT OPTIONS



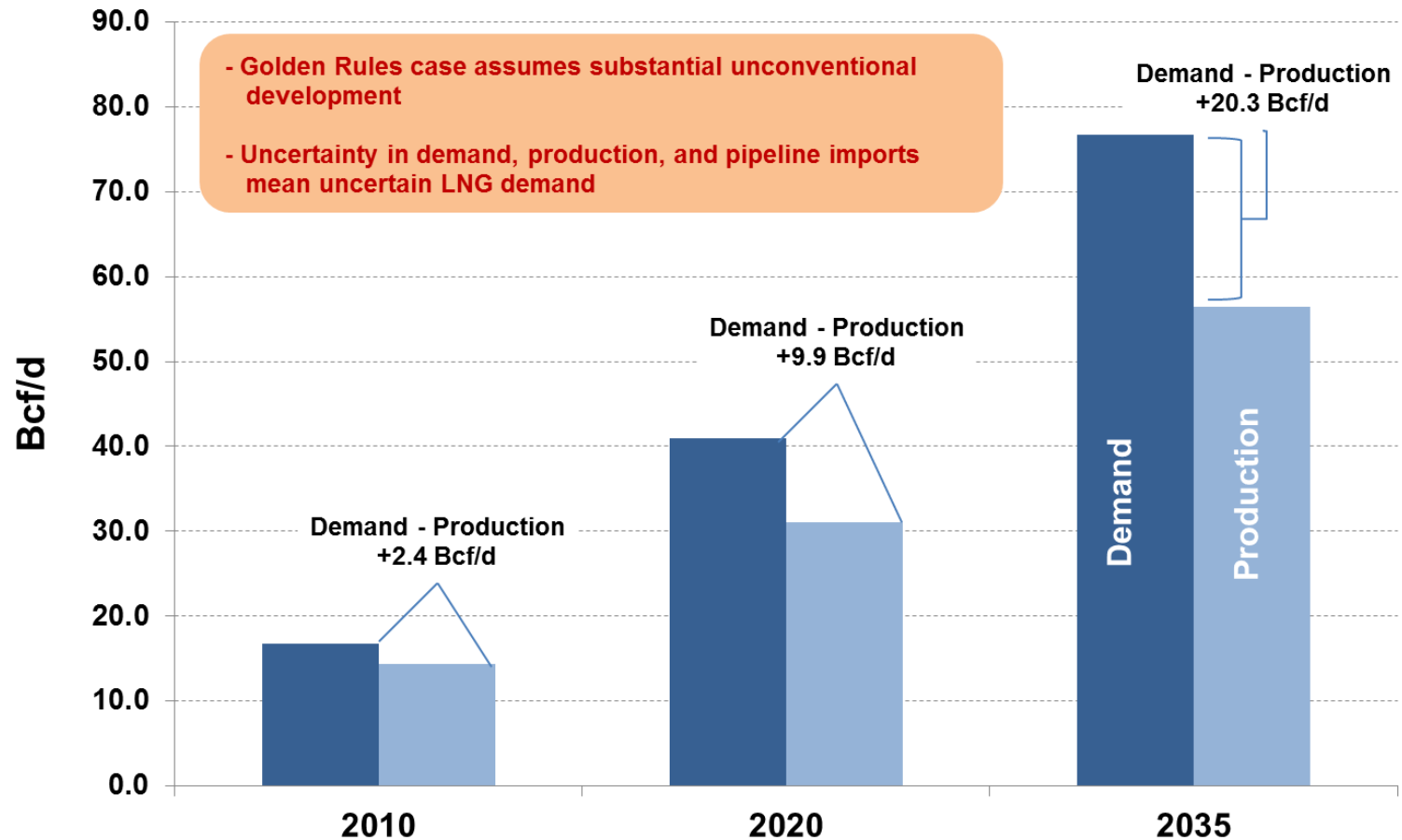
Source: Gazprom, CNPC, Energy Intelligence

Source: "China Keeps Import Options Wide Open," World Gas Intelligence, July 25, 2012

- ◆ Brookings: In China, LNG shortfall of ~5 Bcf/d expected by 2020 (i.e., LNG supply < LNG demand)
- ◆ Global LNG outlook depends in part on supply-demand dynamics in China
 - China potentially has competitive alternatives for gas supply
 - Some estimates suggest China has 886 Tcf of shale gas reserves (~10x the size of Marcellus)
 - China is exploring several import options apart from LNG (e.g., pipeline imports from Russia)

Uncertainty in LNG Demand Driven by Uncertainty in Natural Gas Demand and Indigenous Production Growth

Demand and Production Growth in India and China World Energy Outlook 2012 - Golden Rules Case



Alaskan LNG Success Will Depend On the Success of Projects Ahead of It In Line

New LNG Projects

- ♦ In Australia, 9 Bcf/d already under construction = 3 “Alaskas”
- ♦ Others proposed for development before Alaska could be online = 10 “Alaskas”
 - ~33.6 Bcf/d in North America (27.5 Bcf/d Lower-48 + 6.1 Bcf/d Canada) with at least 25 Bcf/d pre-Alaska
 - ~4.5 Bcf/d in Australia

As discussed, LNG will also compete with indigenous production in the import countries as well as other import options

Timing of this competition does not favor Alaska

- ♦ Wood Mackenzie: the “sweet spot” for LNG export projects to come online is between 2016-18

What will be the effect on LNG prices? Very difficult to predict.

- ♦ A supply glut by 2020 could lead to a decline in Asian prices
- ♦ Indigenous unconventional development in import market could also dampen prices in Asia
- ♦ But high costs of these projects may continue to support high Asian prices

Irony that shift of ANS focus to LNG export to avoid direct competition with US shale gas may be thwarted by the effects of shale gas on Asian prices via other US/Canadian exports or indigenous shale development.

~36 Bcf/d of Proposed LNG Export Capacity in North America

Proposed North American LNG Export Terminals (As of Oct 16, 2012)

Project		Capacity (Bcf/d)	Status FTA	Status non-FTA	Announced Online Date
[1]		[2]	[3]	[4]	[5]
<u>United States:</u>					
Sabine Pass Liquefaction, LLC	[a]	2.2	Approved	Approved	2016/2018
Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC	[b]	2.8	Approved	Under DOE Review	2017
Lake Charles Exports, LLC	[c]	2.0	Approved	Under DOE Review	2016
Carib Energy (USA) LLC	[d]	0.0	Approved	Under DOE Review	
Dominion Cove Point LNG, LP	[e]	1.0	Approved	Under DOE Review	2018
Jordan Cove Energy Project, L.P.	[f]	1.2	Approved	Under DOE Review	2017
Cameron LNG, LLC	[g]	1.7	Approved	Under DOE Review	2016/2017
Gulf Coast LNG Export, LLC	[h]	2.8	Pending Approval	Under DOE Review	
Gulf LNG Liquefaction Company, LLC	[i]	1.5	Approved	Under DOE Review	
LNG Development Company, LLC (d/b/a Oregon LNG)	[j]	1.3	Approved	Under DOE Review	2020
Southern LNG Company, L.L.C.	[k]	0.5	Approved	Under DOE Review	
Excelerate Liquefaction Solutions I, LLC	[l]	1.4	Approved	Under DOE Review	2017
Golden Pass Products LLC	[m]	2.6	Approved	n/a	
Cheniere Marketing, LLC	[n]	2.1	Pending Approval	Under DOE Review	2017
Main Pass Energy Hub, LLC	[o]	3.2	Pending Approval	n/a	2017
CE FLNG	[p]	1.1	Pending Approval	Under DOE Review	2017
Waller LNG Services, LLC	[q]	0.2	Pending Approval	n/a	
Subtotal (Lower 48)	[r]	27.5			
Alaska	[s]	2.5			2021/2024
Total United States	[t]	30.0			
<u>Canada:</u>					
Kitimat	[u]	2.0	Approved	Approved	2016/2017
BC LNG Co-op	[v]	0.3	Approved	Approved	2014
Penn West	[w]	0.5			2017
Progress Energy	[x]	1.0			2018/2019
Shell	[y]	1.8			2020
BG LNG	[z]	0.6			
Total Canada	[aa]	6.1			
Grand Total	[ab]	36.1			

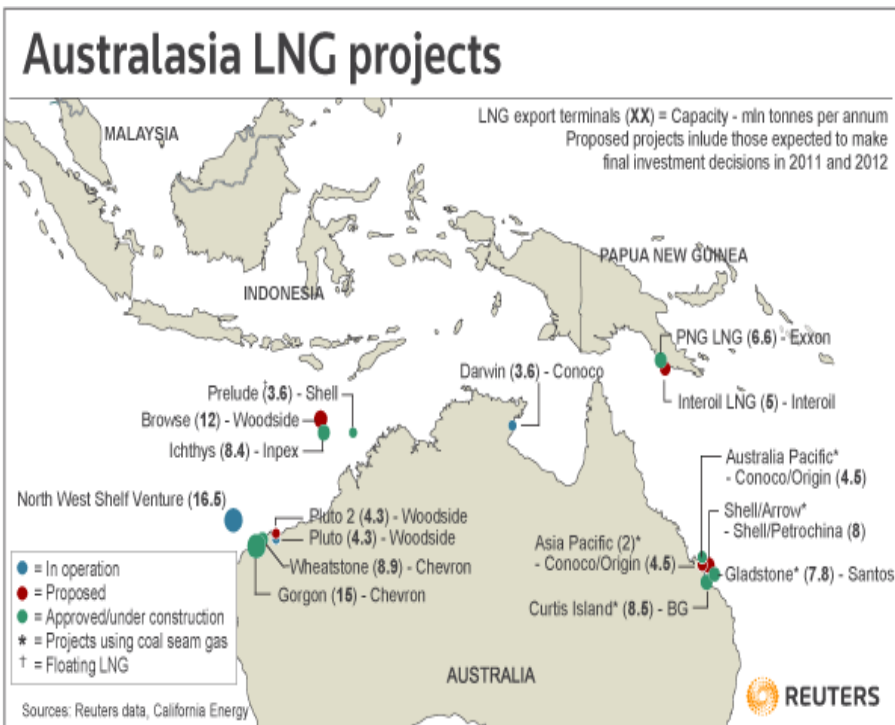
Sources/Notes:

[a]-[r]: <http://www.lngglobal.com/latest/applications-received-by-the-doe-to-export-domestically-produced-lng.html> (accessed Nov 28, 2012)

[s]: Alaska Gas Port Authority Application to Export LNG (Docket No. 12-75-LNG) filed on July 12, 2012 before the Dept. of Energy.

[s]-[z]: EVA

Australia Ahead of the Pack with ~9 Bcf/d Under Construction



Australian LNG Projects

Project	Status	Owner	Capacity (Bcf/day)	Cost	Online
[1]	[2]	[3]	[4]	[5]	[6]
North West Shelf Venture	[a] Operational		2.20		1989
Darwin	[b] Operational	Conoco	0.48		Early 2006
Subtotal			2.68		
Gorgon	[c] Approved/Under Construction	Chevron	2.00	\$57 Billion	2014
Wheatstone	[d] Approved/Under Construction	Chevron	1.19	\$35 Billion	2016
Curtis Island	[e] Approved/Under Construction	BG	1.13	\$34 Billion	2014
Ichthys	[f] Approved/Under Construction	Inpex	1.12	\$43 Billion	Q4 2016
Gladstone	[g] Approved/Under Construction	Santos	1.04	\$30 Billion	2015
PNG LNG	[h] Approved/Under Construction	Exxon	0.88		2014
Australia Pacific	[i] Approved/Under Construction	Conoco/Origin	0.60	\$37 Billion	2015
Pluto	[j] Approved/Under Construction	Woodside	0.57		
Prelude	[k] Approved/Under Construction	Shell	0.48		
Subtotal			9.02		
Browse	[l] Proposed	Woodside	1.60		
Shell/Arrow	[m] Proposed	Shell/Petrochina	1.07		
Interoil LNG	[n] Proposed	Interoil	0.67		2015
Asia Pacific	[o] Proposed	Conoco/Origin	0.60		
Pluto 2	[p] Proposed	Woodside	0.57		
Subtotal			4.51		
Grand Total			16.21		

Sources:
Reuters and CNN Money.

Many New Long Term Contracts Signed in 2011 Related to Australian LNG Projects

Long & Medium Term LNG Sales Contracts Concluded in 2011

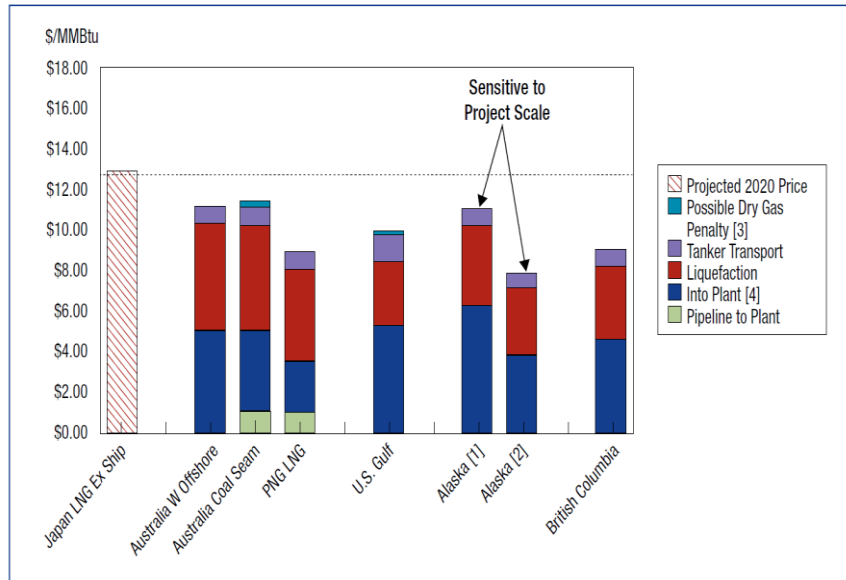
Export Country/Exporter	Purchaser	Import Country	Amount (Bcf/d)	Duration	Extra Years	Start
[1]	[2]	[3]	[4]	[5]	[6]	[7]
Australia & BG Portfolio	[a] CHUBU ELECTRIC	Japan	0.05	21		2014
Australia (QCLNG/BG)	[b] TOKYO GAS	Japan	0.16	20		2015
Australia (Gorgon)	[c] KYUSHU ELECTRIC	Japan	0.04	15		2015
Australia (APLNG)	[d] KANSAI ELECTRIC	Japan	0.13	20		2016
Australia (Wheatstone)	[e] The Tokyo Electric Power Co.	Japan	0.40	20		2017
Australia (Wheatstone)	[f] KYUSHU ELECTRIC	Japan	0.09	20		2017
Australia (IchtyS)	[g] The Tokyo Electric Power Co.	Japan	0.14	15		2017
Australia (IchtyS)	[h] TOKYO GAS	Japan	0.14	15		2017
Australia (IchtyS)	[i] KANSAI ELECTRIC	Japan	0.10	15		2017
Australia (IchtyS)	[j] KYUSHU ELECTRIC	Japan	0.04	15		2017
Australia (IchtyS)	[k] OSAKA GAS	Japan	0.10	15		2017
Australia (IchtyS)	[l] TOTAL		0.12	15		2017
Australian LNG	[m] = sum([a]-[l])		1.51			
Australian LNG % of Total	[n] = [m]/[y]		40%			
Qatar (QATARGAS)	[o] CHUBU ELECTRIC/SHIZUOKA	Japan	0.03	6		2014
Indonesia	[p] KOGAS	South Korea	0.09	13		2015
TOTAL Portfolio	[q] KOGAS	South Korea	0.26	18		2014
IBERDOLA Portfolio	[r] BP	Spain	0.05	10	January 2012	
USA (CHENIERE)	[s] BG GROUP		0.46	20		2015
USA (CHENIERE)	[t] GASNATURAL FENOSA		0.46	20	12	2015
USA (CHENIERE)	[u] GAIL		0.46	20		2017
USA (CHENIERE)	[v] KOGAS		0.46	20	up to 10	2017
Other LNG	[w] = sum([o]-[v])		2.25			
Other LNG % of Total	[x] = [w]/[y]		60%			
Total LNG	[y] = sum([m],[w])		3.77			
Total LNG %	[z] = [n]+[x]		100%			

Source:

The LNG Industry in 2011, GIIGNL, Page 6.

Alaska LNG is Competitive But Stranded Gas Advantage Offset by Infrastructure Requirements

Competition to Serve Asian LNG Markets



Note: Gulf exports to Asia assume tankers travel through an expanded Panama Canal

[1]: Assumes 1 bcf/day from Valdez, Alaska

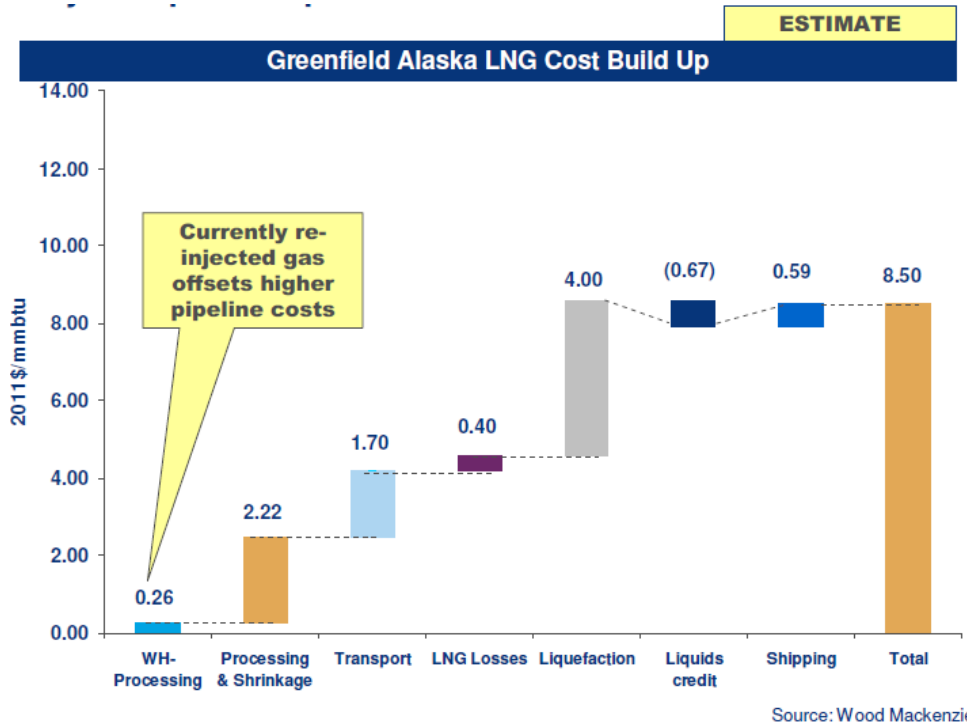
[2]: Assumes 3.1 bcf/day from Valdez, Alaska

[3]: Dry gas penalty is assumed at 2 percent

[4]: For Alaska and British Columbia, "Into Plant" refers to the opportunity cost relative to projections of Henry Hub price

Source: From a client presentation by James Jensen, Jensen Associates

Source: "Liquid Markets: Assessing the Case for U.S. Exports of Liquefied Natural Gas," Brookings Energy Security Initiative, May 2012



Source: "Alaska LNG Exports Competitiveness Study," Wood Mackenzie, July 27, 2011

- ◆ Brookings & Wood Mackenzie: Alaskan LNG competitive with other LNG suppliers
- ◆ But, significant uncertainty in project costs and timing
 - Wood Mackenzie 2011 estimate ~\$45 - \$50 Billion project costs (21 million ton capacity)
 - But, updated costs ~\$45 - \$65+ Billion (15-18 million ton capacity)
 - Hence, delivered price might be higher than the \$8.50/MMBtu due to updated project cost and scope

Contract Pricing Uncertainty

Historically, LNG has served Asia priced under oil-linked contracts

Asian buyers now looking for gas price-linked contracts

- ◆ Possibly Henry Hub-linked, or other Asian market index
- ◆ “Linkage”, of course, does not necessarily mean parity

But North American project developers want continuation of oil-linked contracts

- ◆ Even Gulf Coast projects might require premium to Henry Hub
- ◆ Link to Henry Hub creates price volatility risk

Pricing uncertainty is creating project uncertainty since contractual support is key to project success

Summary of Uncertainties Facing Alaskan LNG Export Project

Demand Uncertainty

- ◆ Need for LNG post-2020 is very uncertain (e.g., China's needs will depend upon its natural gas demand growth as well as growth in its indigenous production)

Competition Uncertainty

- ◆ Australia, British Columbia, Gulf Coast and other LNG and indigenous gas projects

Pricing/ Project Economics Uncertainty

- ◆ Oil-linked or gas-linked
- ◆ Panama Canal toll uncertainty may affect Gulf Coast competitors

Upstream Infrastructure Development Uncertainty

- ◆ Alaskan LNG exports contingent upon large pipeline build-out
 - But, environmental and cost growth challenges seen in big pipeline projects
- ◆ Possible siting advantage in U.S. Gulf Coast due to existing infrastructure

Level of Government Support

- ◆ Large “stranded gas” advantage in British Columbia and Alaska, but pipeline infrastructure disadvantage
- ◆ Uncertainty in U.S. export permit process

Alaskan Project Evaluation Difficulty

- ◆ This set of risks creates a challenging project-evaluation problem for the project developers and potential buyers deciding whether to commit to long-term contracts.
- ◆ For private commercial parties, there is option value in waiting for uncertainties to resolve.
- ◆ For the State, waiting for uncertainties to resolve may foreclose future options and/or concede the market to competitors.

Key Indicators of How Uncertainties Might Resolve

What should we be watching for over the next 12 months?

- ◆ DOE study release and US export permit process
 - Politics of US LNG exports may get intense – will Alaska benefit?
- ◆ Cost “blowouts” in Australian projects
 - Project delays and high costs may cause buyers to think Alaska
- ◆ Asian equity positions in competing projects and upstream assets
 - Canadian government opposition may affect BC projects
 - Possible for Alaska?
- ◆ Economic growth and indigenous gas supply (shales) and infrastructure development in China.
 - May take much longer to resolve
- ◆ US gas price rebound?
 - Will we be talking again about the reemergence of the pipeline to the lower-48?

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Renewables

Risk Management

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