

Natural Gas and Geopolitics

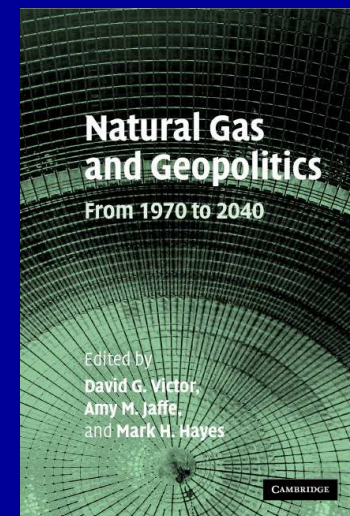
23rd World Gas Conference
9 June 2006

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Program on Energy & Sustainable Development
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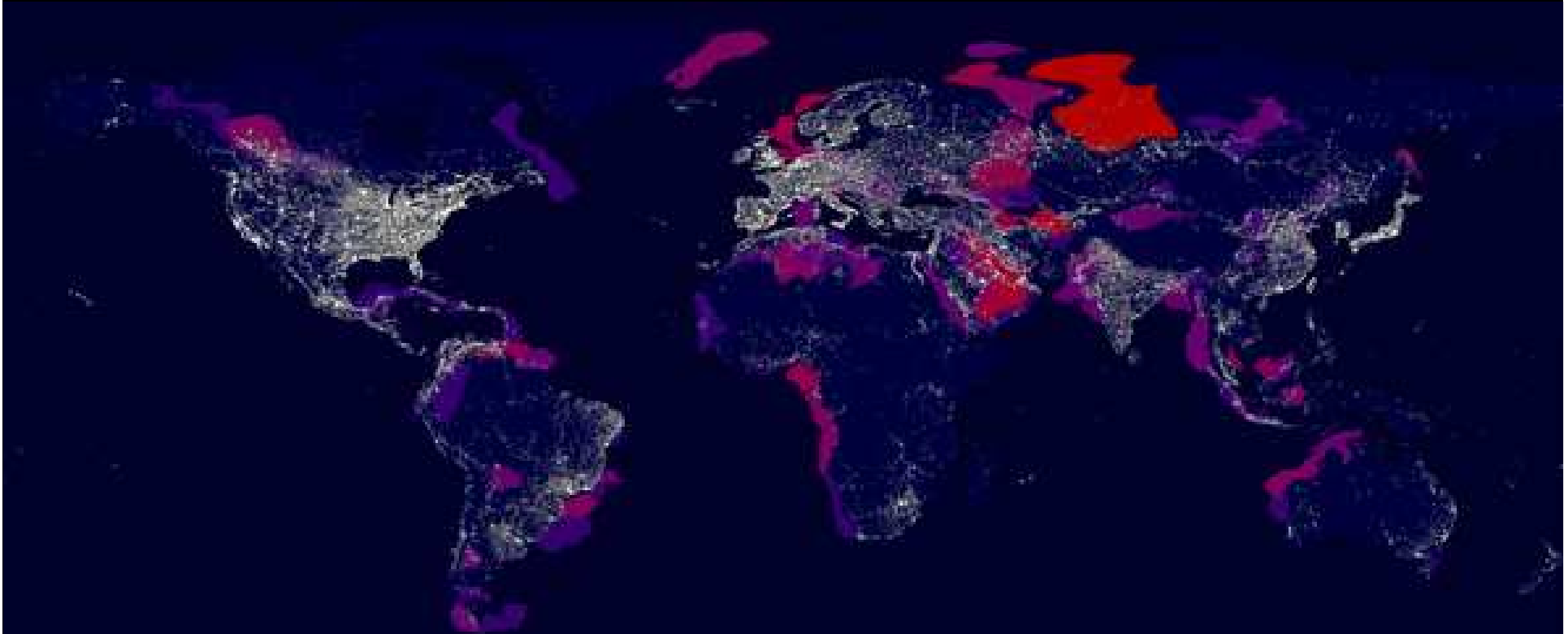
<http://pesd.stanford.edu/>

Overview of the Study

- Collaboration between the James A. Baker III Institute for Public Policy, Rice University and Program on Energy and Sustainable Development, Stanford University
- Research partners conducted seven historical case studies (see supplemental slides)
- New book from Cambridge University Press →



Gas Resources and Potential Demand



White: where the lights are on, satellite imagery

Blue → Red : Gas resources, with increasing size (USGS)

International Gas Trade Projects: Lessons from History



Overview of this Presentation

1. Changing roles for governments

- Winning suppliers are rich in gas and governance

2. Supply security and gas cartels

- Few interruptions
- Gas cartel unlikely

3. Risks to the 'Gas Vision'

1. Changing Roles for Governments

- **“Old World”**

- State-owned enterprises
- Tightly regulated monopolies
- Oil-indexed gas prices

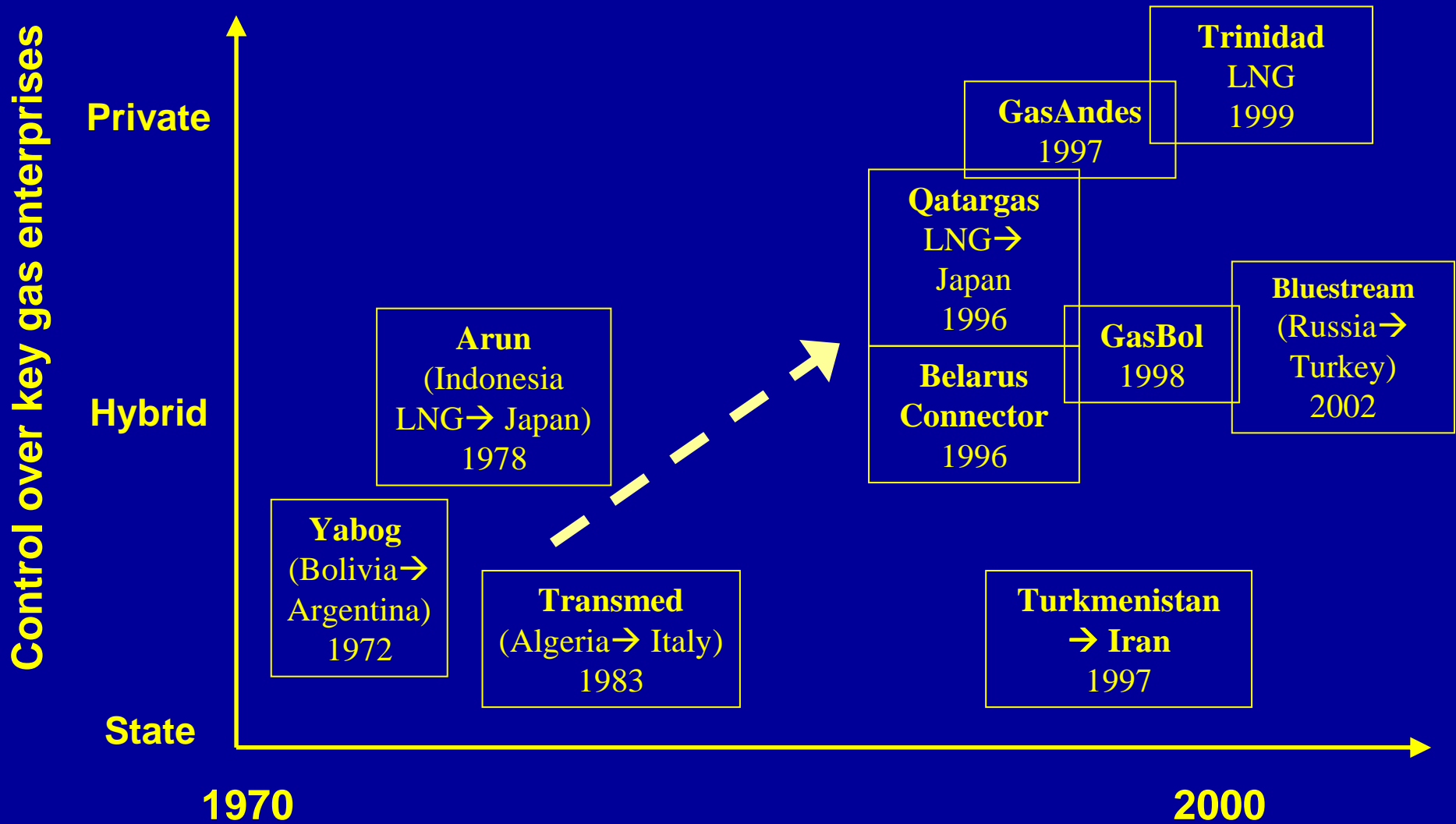
- **“New World”**

- Private operators, financing, and contracting
- Contestable, multiple markets
- Gas-on-gas competition

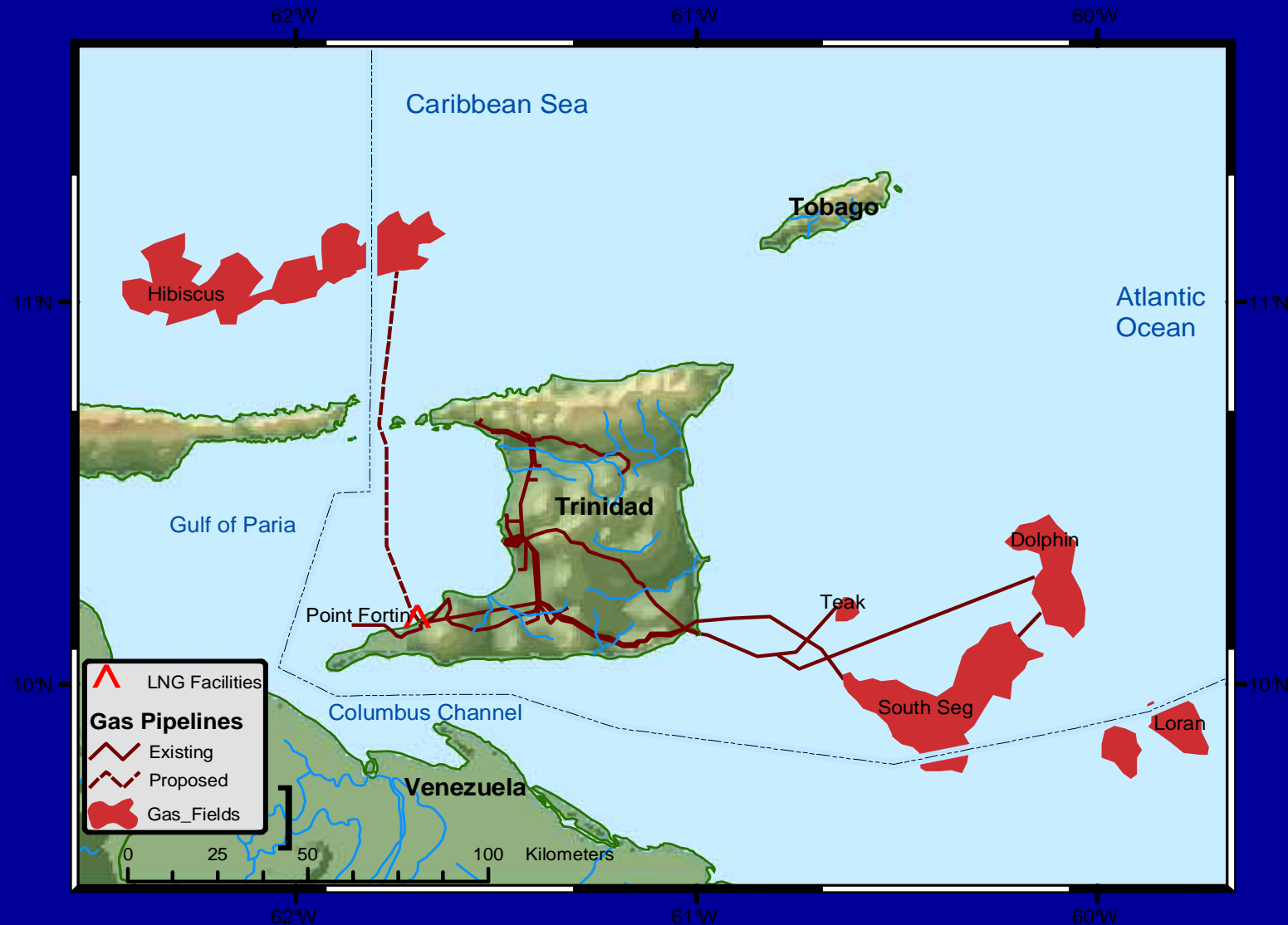
- **The “Real” Hybrid World**

- National champion energy companies
- Managed markets
- Mixed pricing regimes

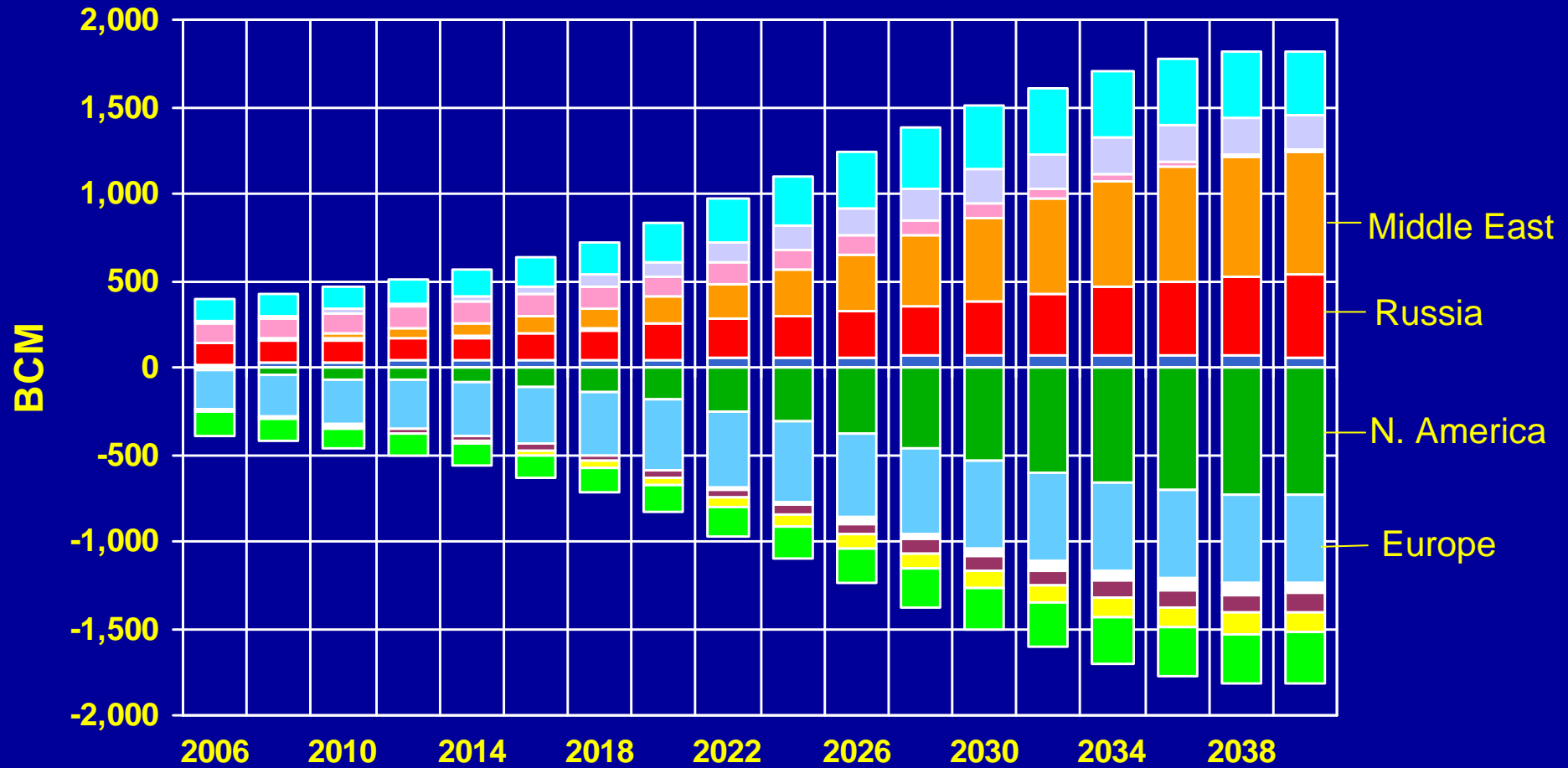
From States to Markets



Confidence for Investors: The Success of Trinidad and Failure of Venezuela

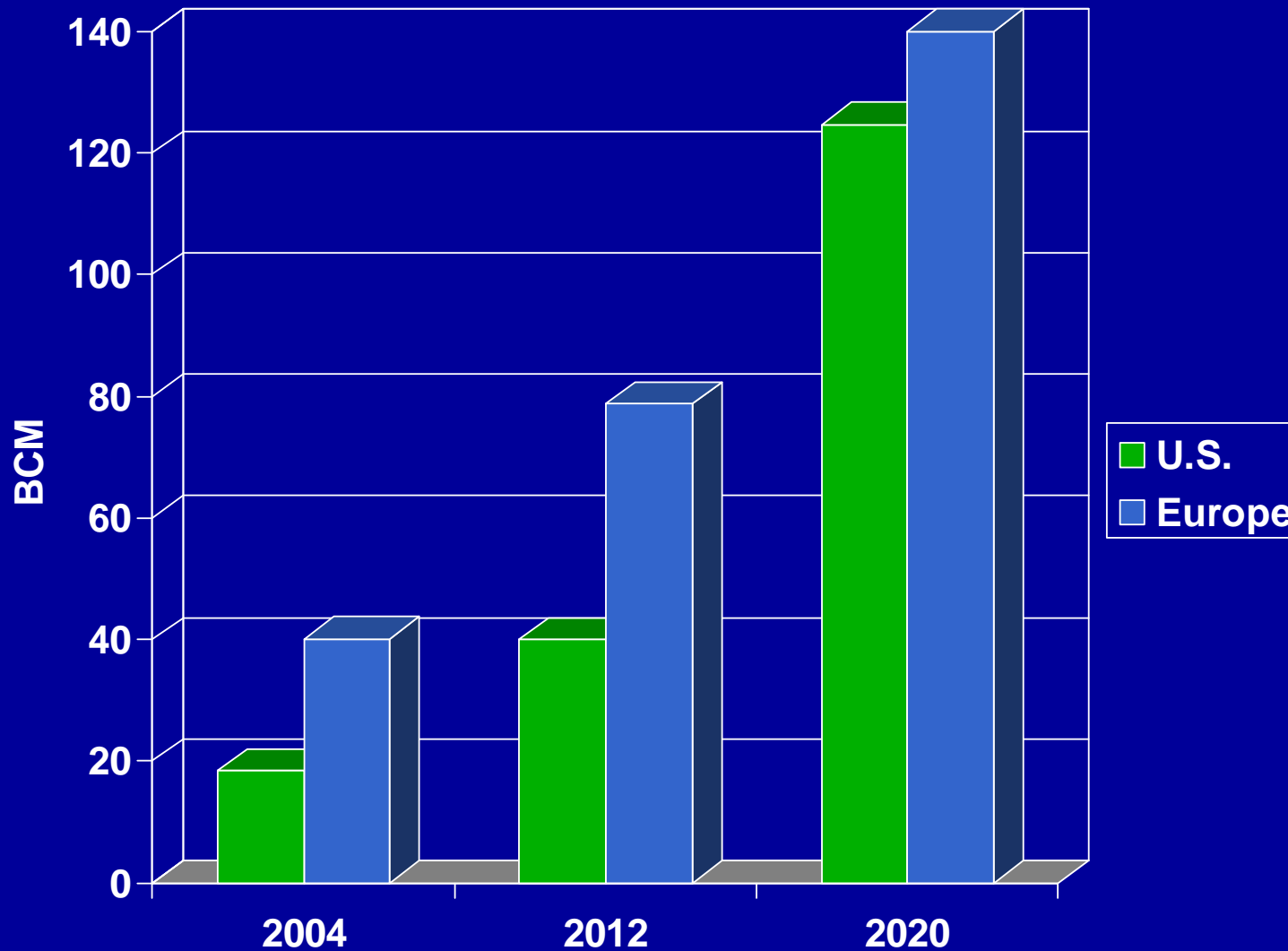


Projected Gas Trade Between Regions



Source: Baker Institute World Gas Trade Model (BIWGTM)

Projected US and European LNG Imports



Source: BIWGTM, Base Case Results

2. Supply Security

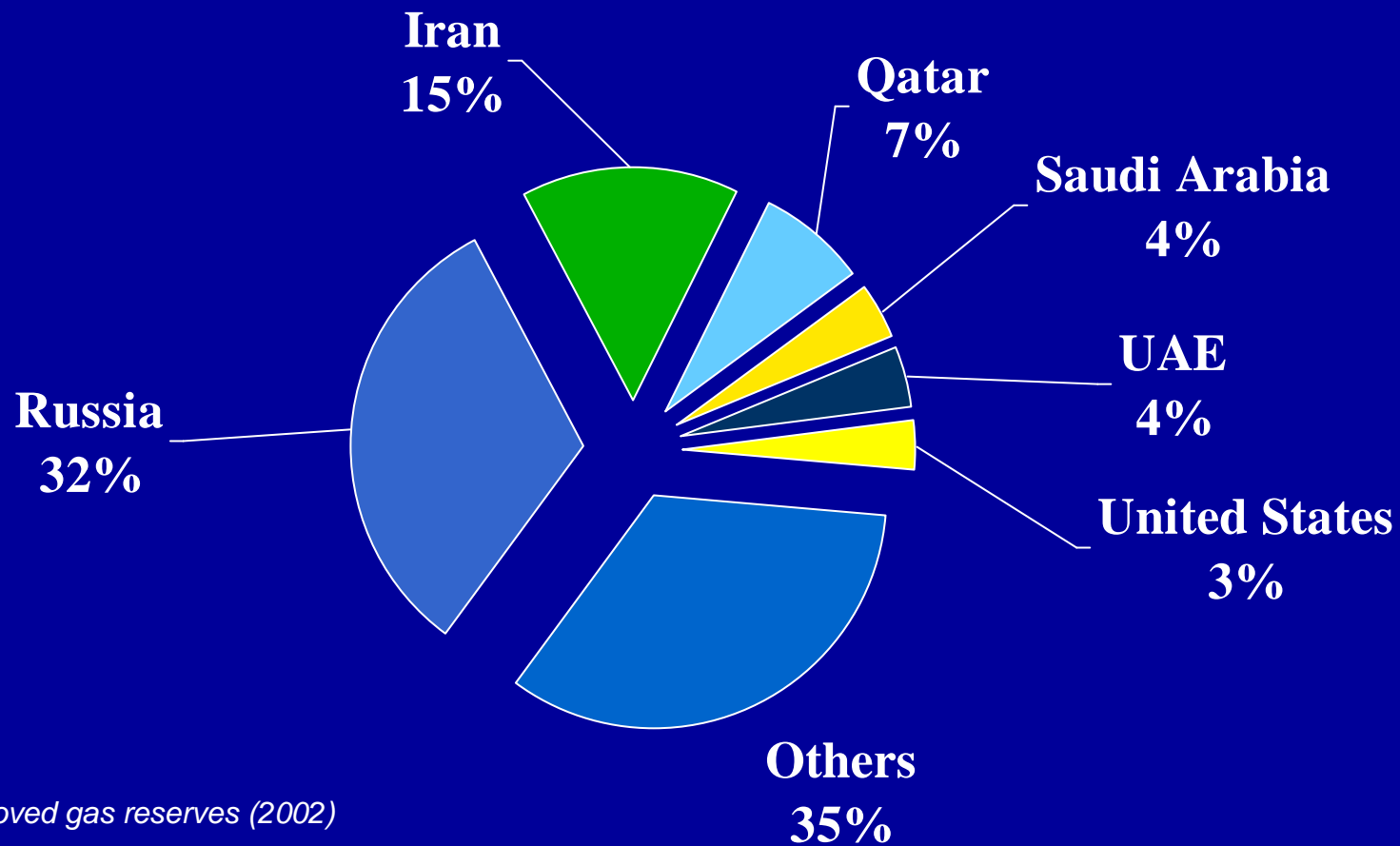
- Rising attention to “gas security”
- How many interruptions? And by whom?
- Could a gas cartel form?

Gas Trade Interruptions

Initiating Party	Examples from 7 Case Studies
Supplier	<ol style="list-style-type: none"> 1. Algeria (1981 to 1983). “Gas Battle” with Italy, the United States and others. 2. Arun (2001). Civil unrest in Aceh disrupts shipments. 3. GasAndes (2004). Argentine government curtails shipments to Chile.
Transit Country	<ol style="list-style-type: none"> 1. Russia (1997-1998). Gazprom refuses to transport Turkmen gas to Europe. 2. Ukraine (mid-1990s) disputes with Gazprom over volumes and payments for gas shipments. 3. Gazprom (2004) cuts supplies to Belarus (and to Europe via Belarus Connector) in pricing dispute with Belarus. 4. Gazprom (2005-2006) cuts supplies to Ukraine during a pricing dispute but tries to keep supplies flowing to Europe through cross-Ukraine pipelines.
User	<ol style="list-style-type: none"> 1. U.S. Govt. (1981) disallows Algerian shipments in retaliation to price demands. 2. YABOG (1987). Argentina refuses to take or pay for full Bolivian shipments. 3. GasBol (2001). Brazil refuses full volumes contracted from Bolivia 4. Qatargas (1998). Japan demands price reductions. 5. Bluestream (2002). Turkey demands price and volume reductions for Russian gas.

A Gas Cartel Is Unlikely

Distribution of Proved Gas Reserves Implies Concentration

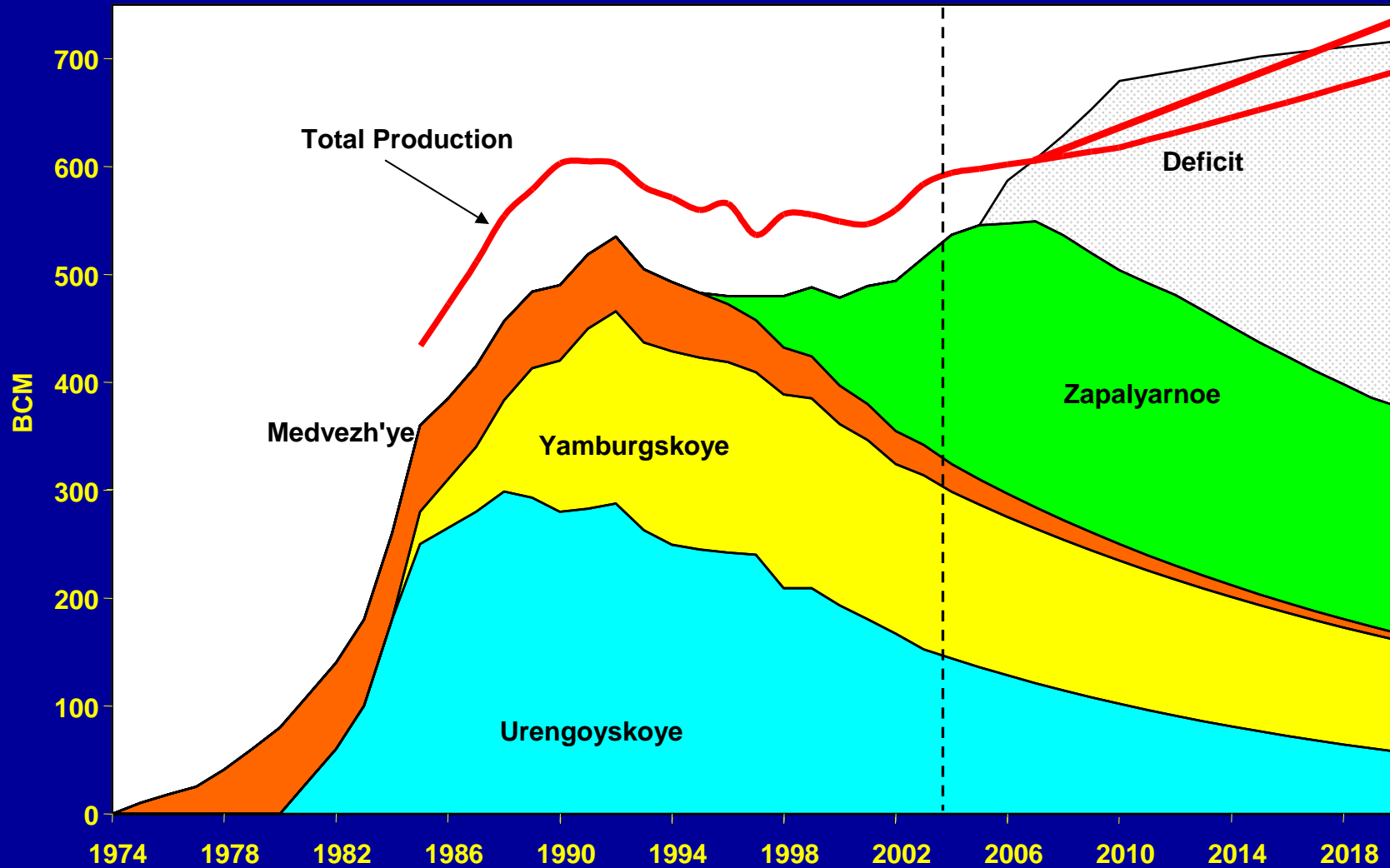


US EIA; Proved gas reserves (2002)

3. Risks to the 'Gas Vision'

- Will supplies materialize?
 - Incredible governments, politicized resources
- Will demand materialize?
 - Competition from coal and nuclear for electric power
 - Emerging gas markets in China and India

Russian Natural Gas Production: Historical & Projections



Source: IEA 2002, Stern, J.P. 2005

Credibility: The 'Commitment Problem'

1. State supplies credibility

- “Old World” : state provides capital, enforcer, guarantor (e.g. Transmed)
- “New World”: credibility through transparency, reputation
- “Real” World: one-off deals, erratic credibility

2. Realign incentives

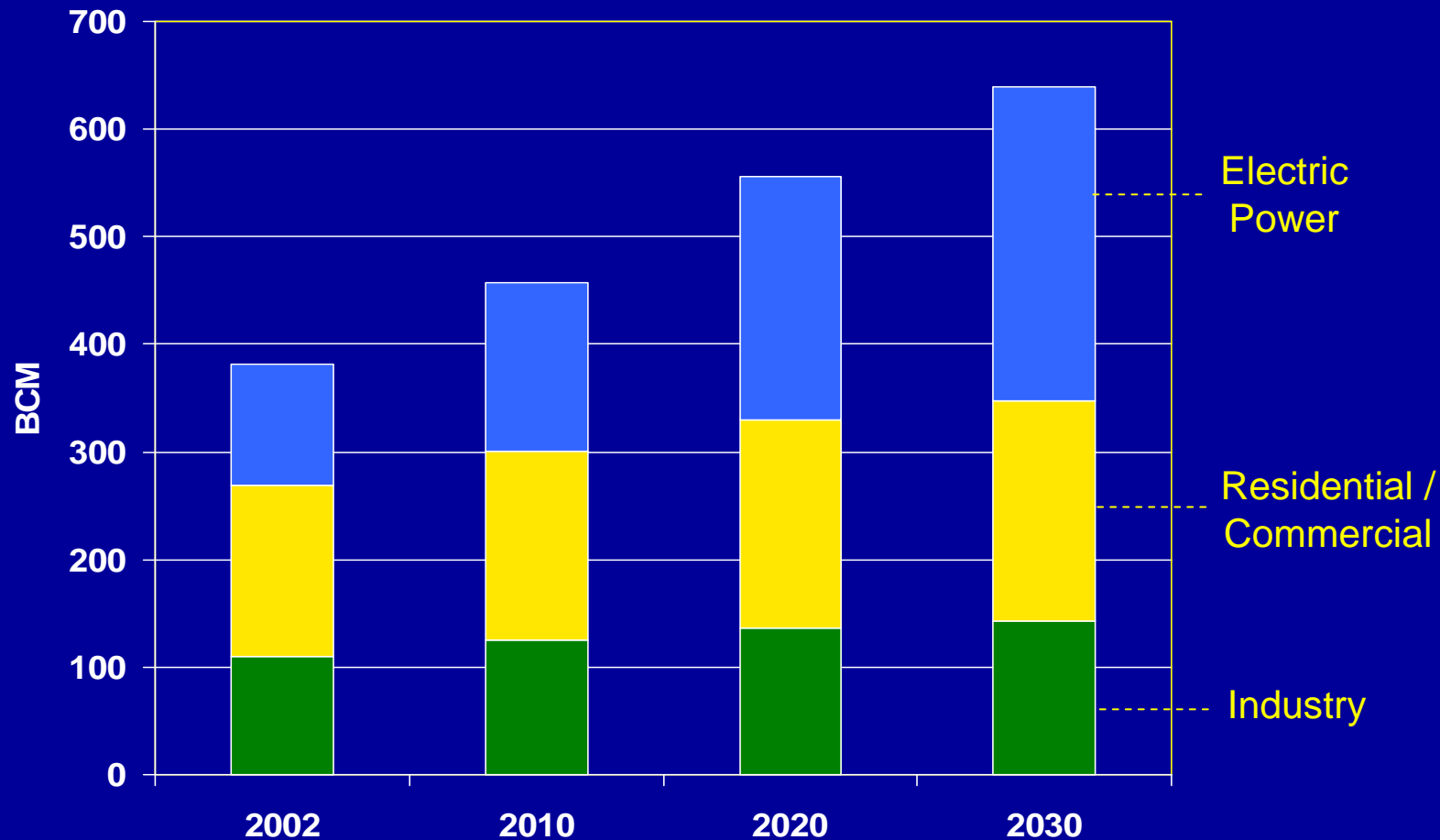
- Partner with locals → political leverage AND exposure

3. Engage international institutions?

- Provide capital and leverage broader relationship (e.g. GasBol)
- External accounts

Will Demand Materialize?

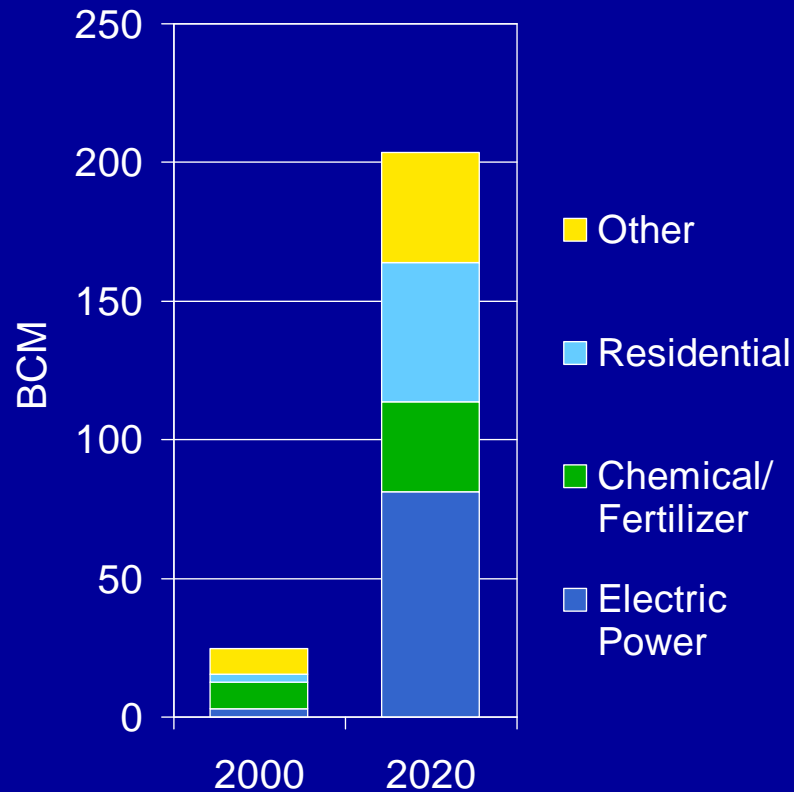
Projected European Gas Consumption



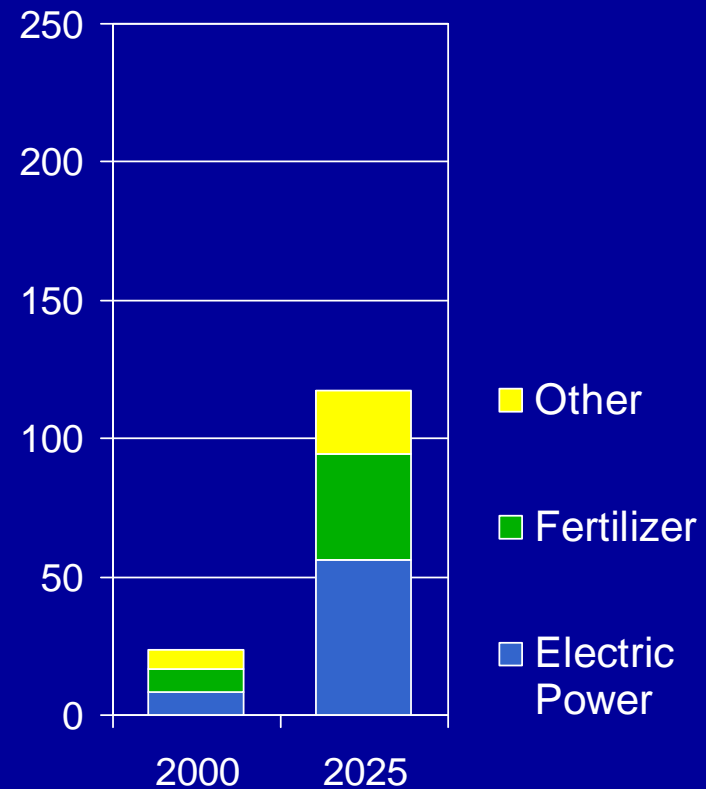
Source: IEA-WEO 2004

Gas Growth in Major Developing Countries

China



India



Sources: China: IEA; India: Hydrocarbon Vision 2025

Conclusions:

- Governance drives investment
- “Real” world is a hybrid market
- A fungible, global market delivers security?
- Where governments aren't credible, gas is left in the ground
- Gas-to-power highly uncertain



Natural Gas and Geopolitics

From 1970 to 2040

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CAMBRIDGE

Supplemental Slides

Seven Historical Case Studies

Built Projects	Author
1. Indonesia LNG to Japan	Lewis & von der Mehden
2. Algeria to Italy	Hayes
3. Russia to Poland and Germany	Victor & Victor
4. Turkmenistan (to Iran, to Russia, to Pakistan & India)	Olcott
5. Qatar to Japan	Hashimoto
6. Trinidad LNG to U.S.	Shepherd & Ball
7. Southern Cone (Bolivia to Argentina; Argentina to Chile; Bolivia to Brazil)	Mares

The Importance of Governance: Why many gas resources don't get monetized

		Reserves and Resources*		General Investment Risk Index	Gas Production (Bcm)**	Total Exports (Bcm)**	Export Rank
		(Tcm)	% world				
1	Russia	83.0	24.0%	5.5	578.6	131.8	1
2	Iran	33.6	9.7%	5.8	79.0	3.5	23
3	Saudi Arabia	32.4	9.4%	7.2	61.0	--	NA
4	United States	30.0	8.7%	8.7	549.9	18.5	9
5	UAE	15.5	4.5%	7.5	44.4	7.1	17
6	Turkmenistan	9.4	2.7%	NA	55.1	4.9	20
7	Norway	8.9	2.6%	9.2	73.4	68.4	3
8	Iraq	8.7	2.5%	NA	2.4	--	NA
9	Algeria	8.1	2.3%	4.7	82.8	61.1	4
10	Venezuela	8.1	2.3%	4.3	29.4	--	NA
11	Indonesia	8.1	2.3%	4.3	72.6	39.4	6
12	Australia	7.9	2.3%	8.8	33.2	10.5	13
13	Qatar	6.4	1.8%	7.5	30.8	19.2	8
14	Nigeria	6.3	1.8%	2.8	19.2	11.8	12
15	Brazil	5.9	1.7%	5.5	10.1	--	NA

*Reserves and resources data from USGS (2000); **Production and exports from BP (2004).