

Emerging Trends in the Gas Industry

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a word on GAS

Setting the context



- ❑ Global gas demand - **the fastest growing** demand for fossil fuel
- ❑ The **mismatch** between demand and supply centers result in inter/intra- regional gas trade via **pipeline** and **LNG**.
 - Global pipeline and LNG trades are **unevenly distributed** across regions
- ❑ Investments in gas **infrastructure** are continuously made to meet increasing demand
- ❑ The global gas market is **fragmented** and **regionalised**.



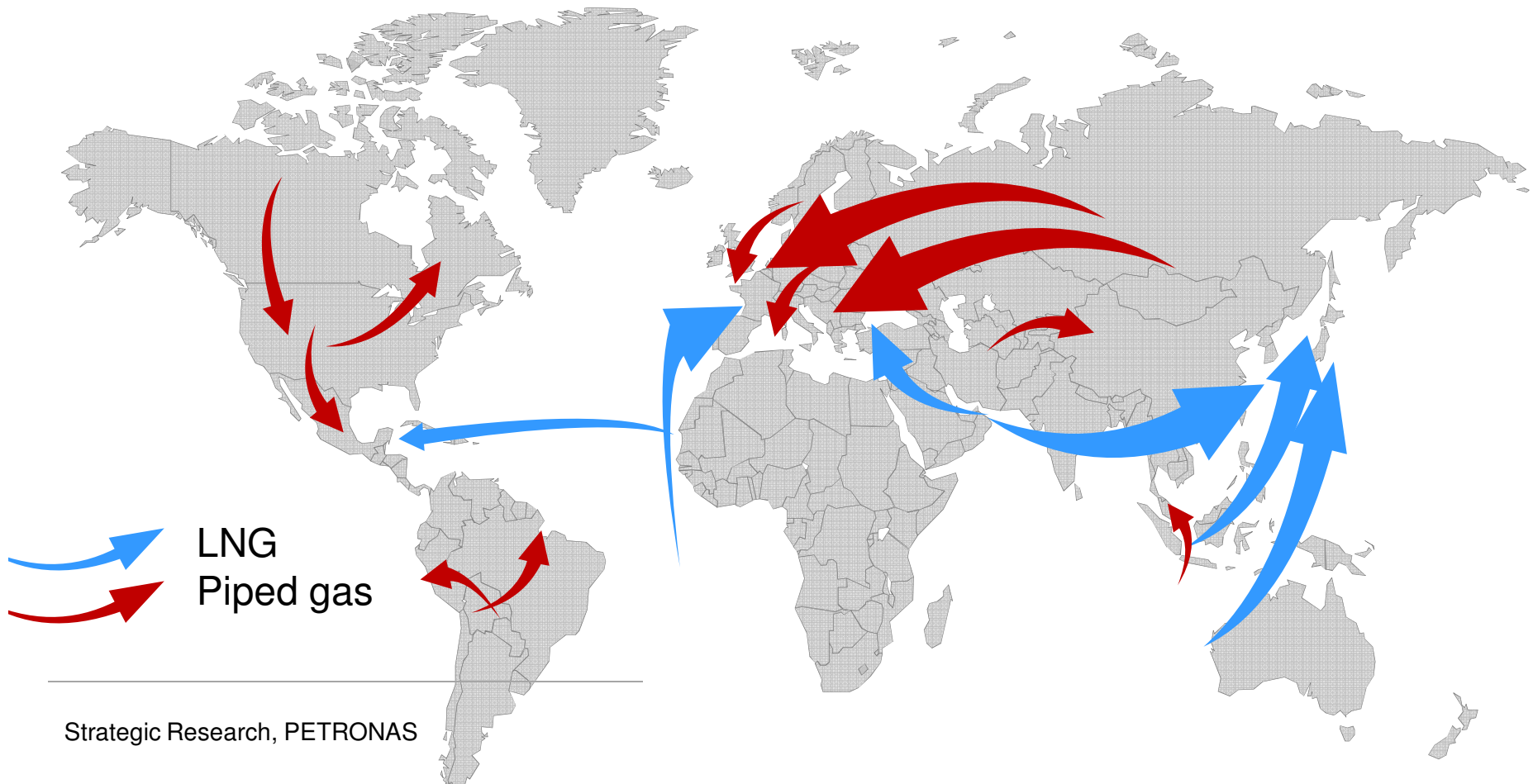
Gas trades are driven by mismatch between supply and demand centres

Atlantic Markets

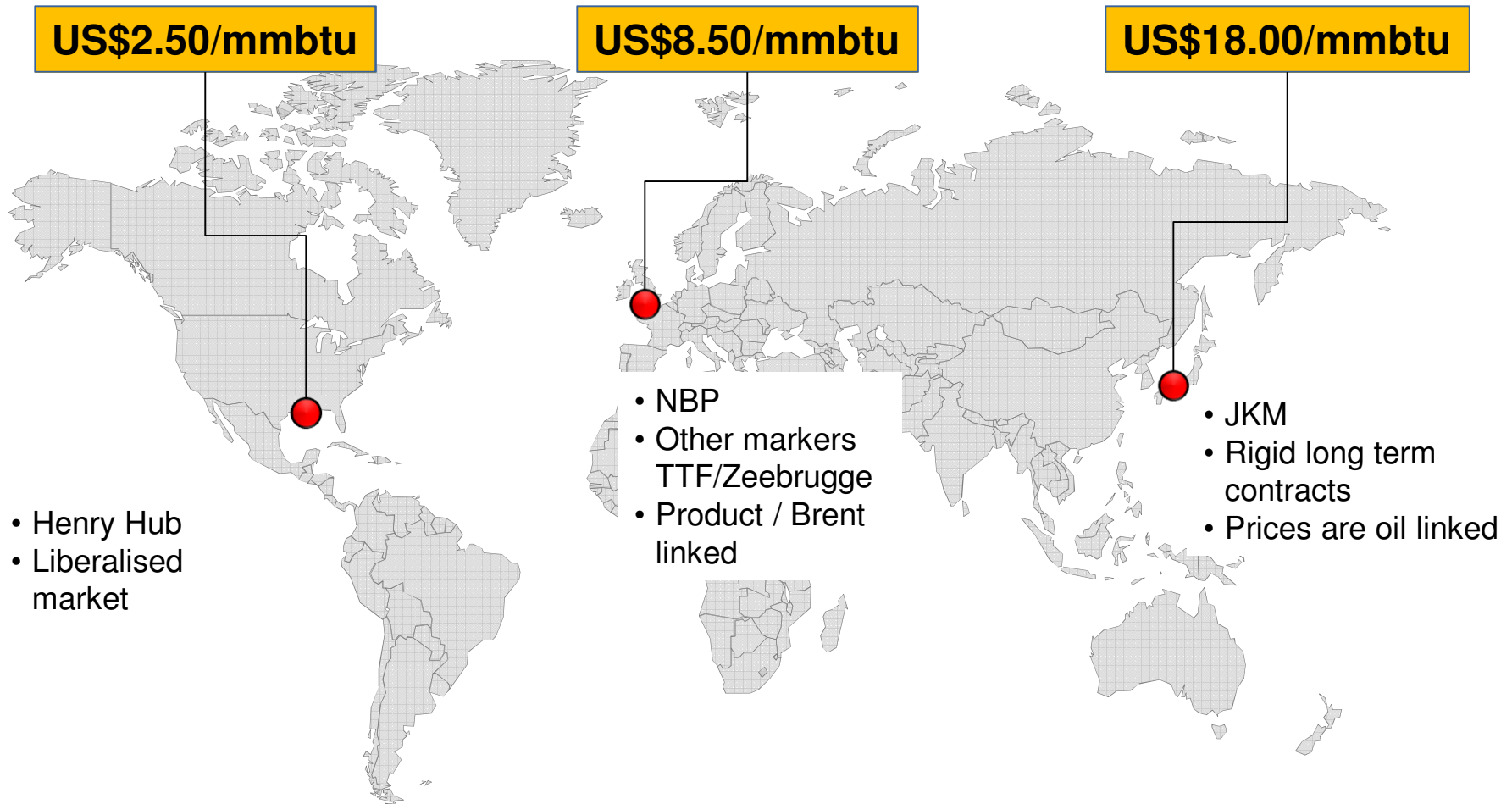
~90% of total global pipeline gas trade is in Europe and North America

Asia-Pacific Markets

~60% of total global LNG trade is in the Asia-Pacific



Despite increasing trades, global gas market is still regionalised

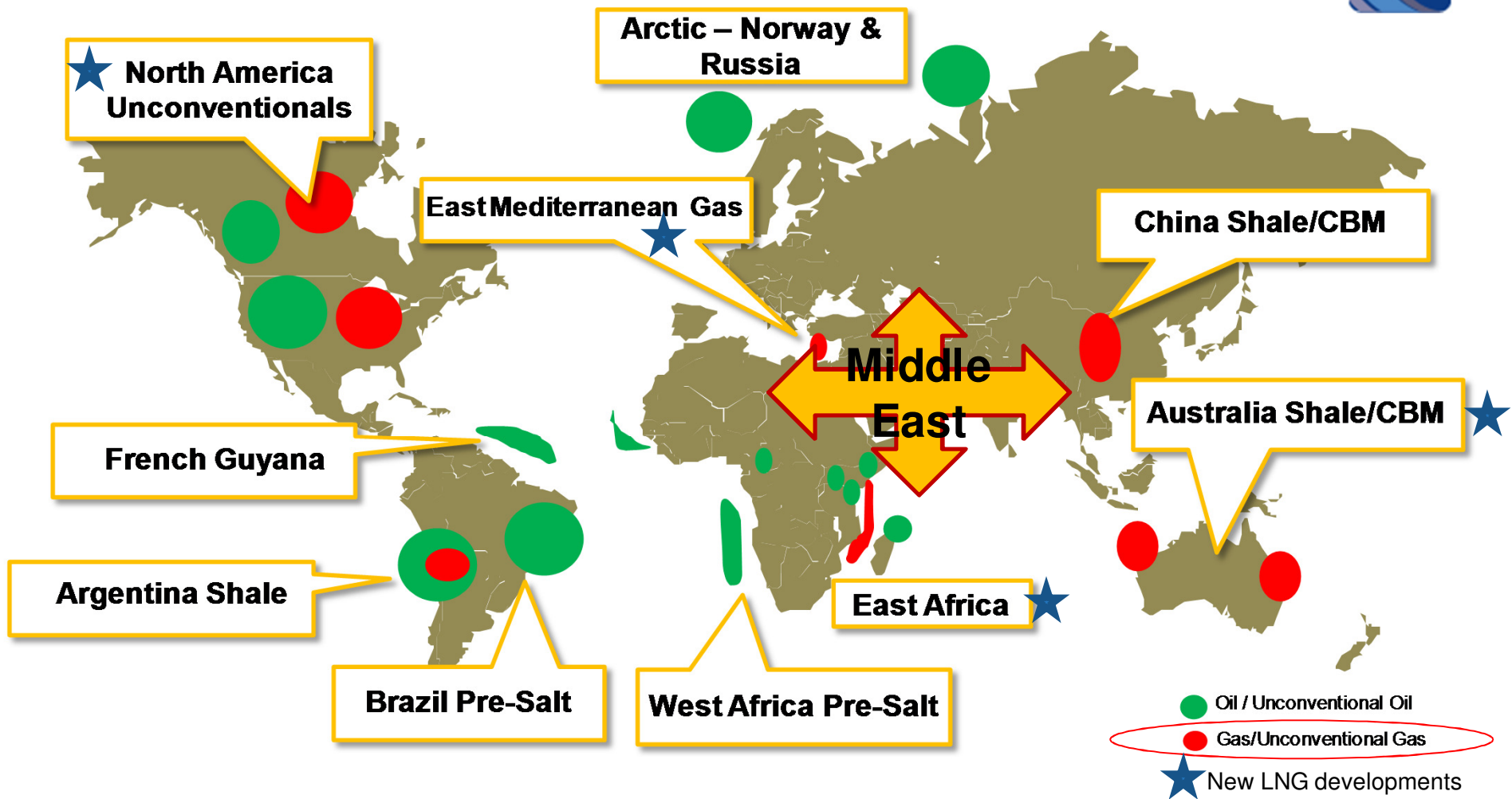


Emerging trends in the global gas industry



- The centre of gravity is slowly shifting from the **Old World** (Middle East) to the **New World**.
- Increasing production from **unconventional gas** will strengthen security of supplies in especially key consuming regions.
- New **extraction and monetisation technologies** will continue to transform the landscape of the gas (& energy) industry and enhance security of supply.

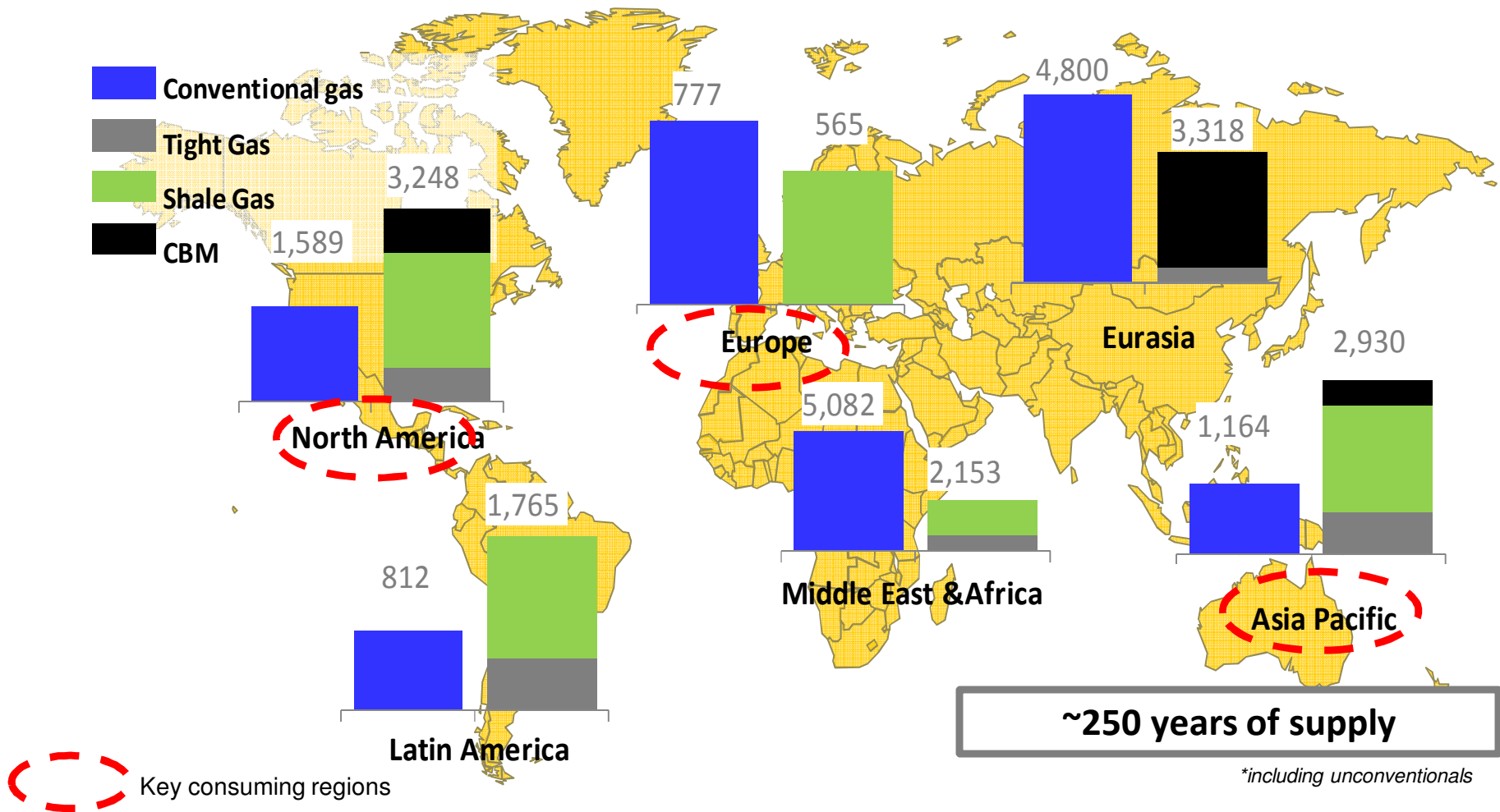
Centre of gravity is slowly shifting from the 'Old World' (Middle East) to the 'New World'



Increasing production from unconventional gas will strengthen security of supply

Global Unconventional Gas Resources vs. Conventional Resources

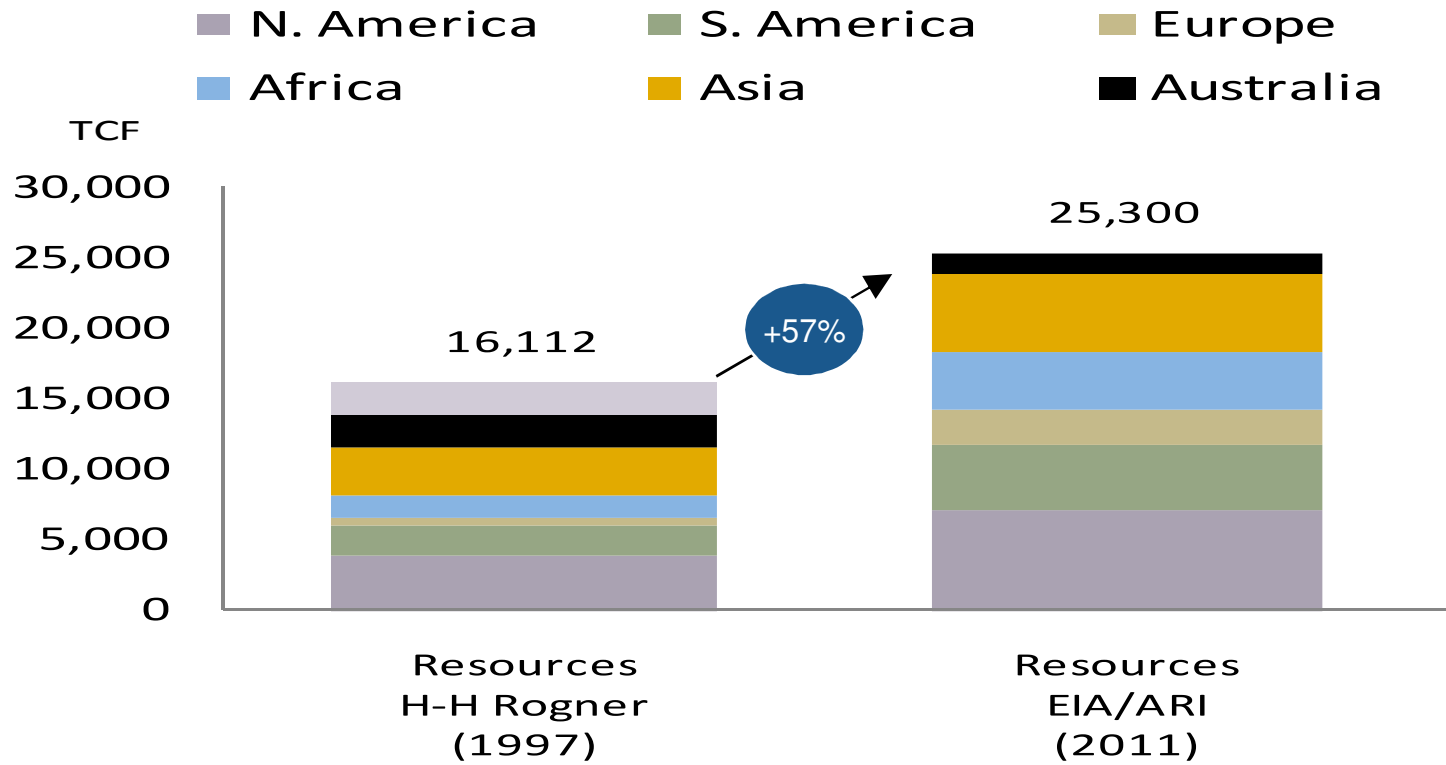
In TCM



Shale gas resources have been revised upwards



Global Shale Gas Resources





Role of technology



Extraction and monetisation technologies

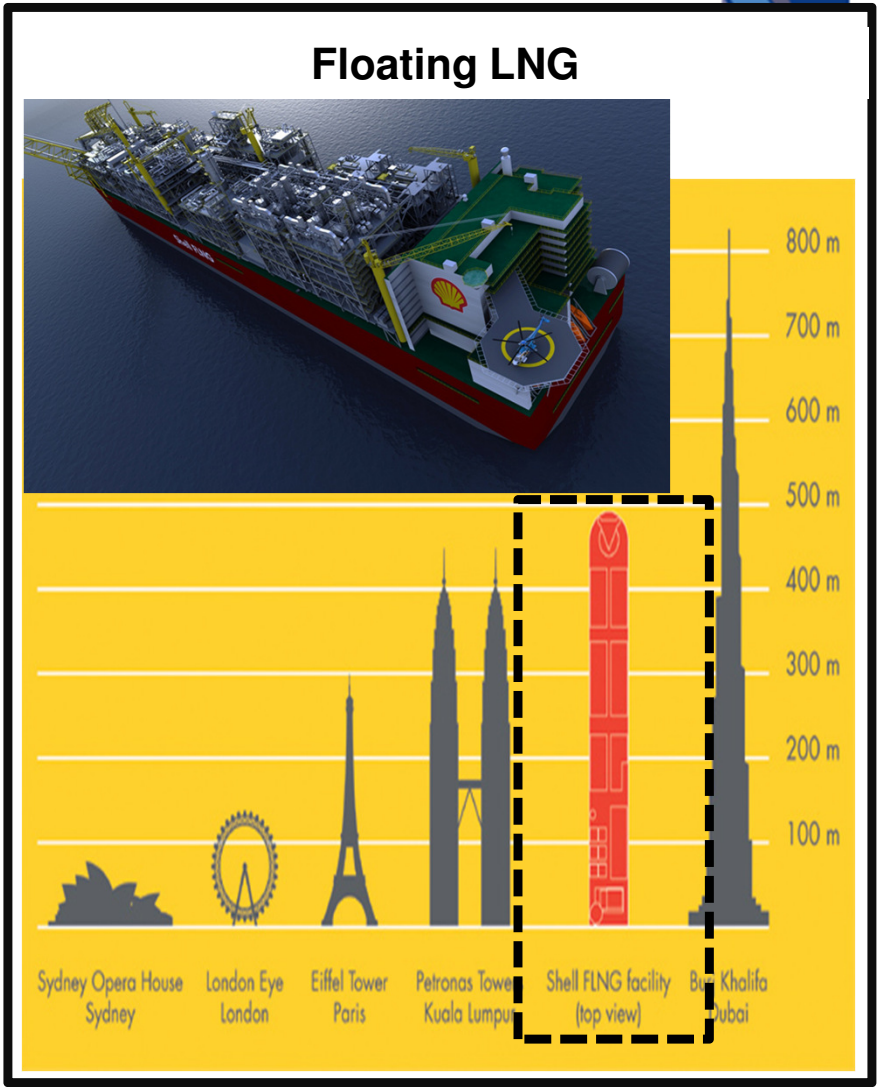
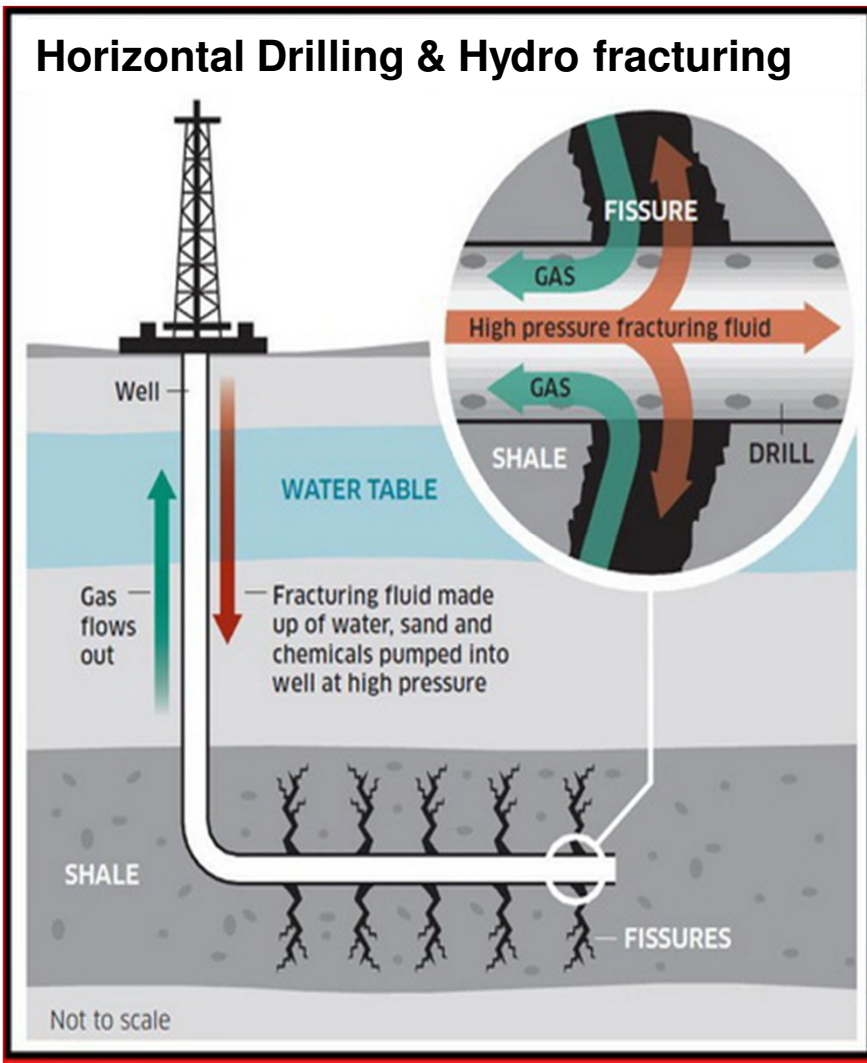
- Horizontal drilling & Hydro fracking
- FLNG
- Methane hydrates
- Gas and LNG for transportation (LNG bunkering, trucks, CNG)
- Ultra-deep water drilling
- ...

Competing technologies

- Clean coal technologies
- CCS
- Renewable (solar, wind, geothermal etc)
- End use efficiency
-

New extraction and monetisation technologies will continue to transform the energy industry landscape

Examples



- Will the gas future be more **diversified**?
- What are the **factors that influence** further development of gas / LNG demands; and supplies?
 - What are roles of **technology**?
- How will the **share of LNG** in the global gas trade evolve in the long term?
- How have the **developments in unconventional** gas affected the global gas industry?
 - What will be the impact to the global gas industry if US **success is replicated elsewhere**?
 - **Who** would develop unconventional gas?
 - Are we **short or long** on supplies?
- Any other questions?



Say yes



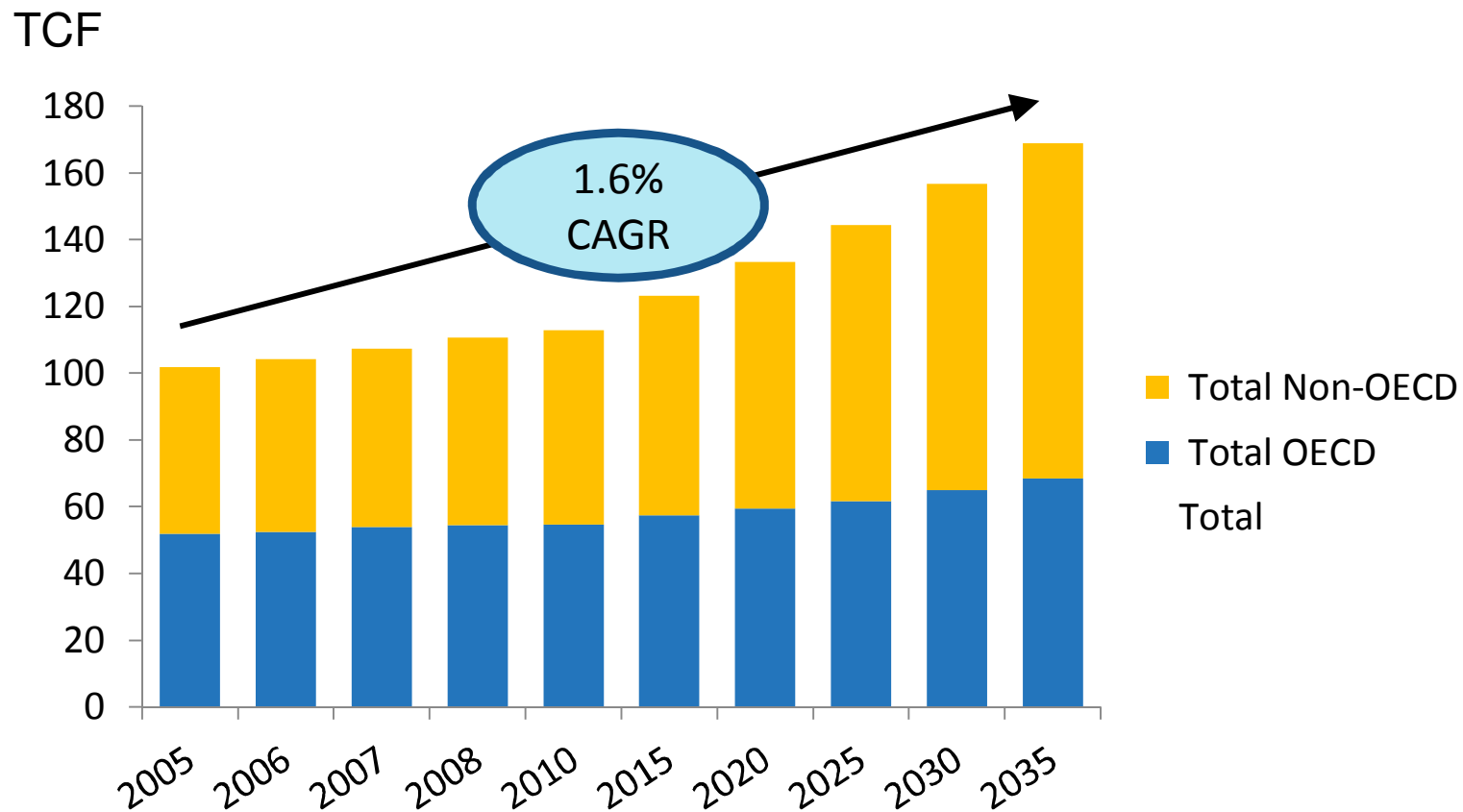
...to **GAS** !!!

THANK YOU



- BACK UPS

Global gas demand will grow by 1.6% annually

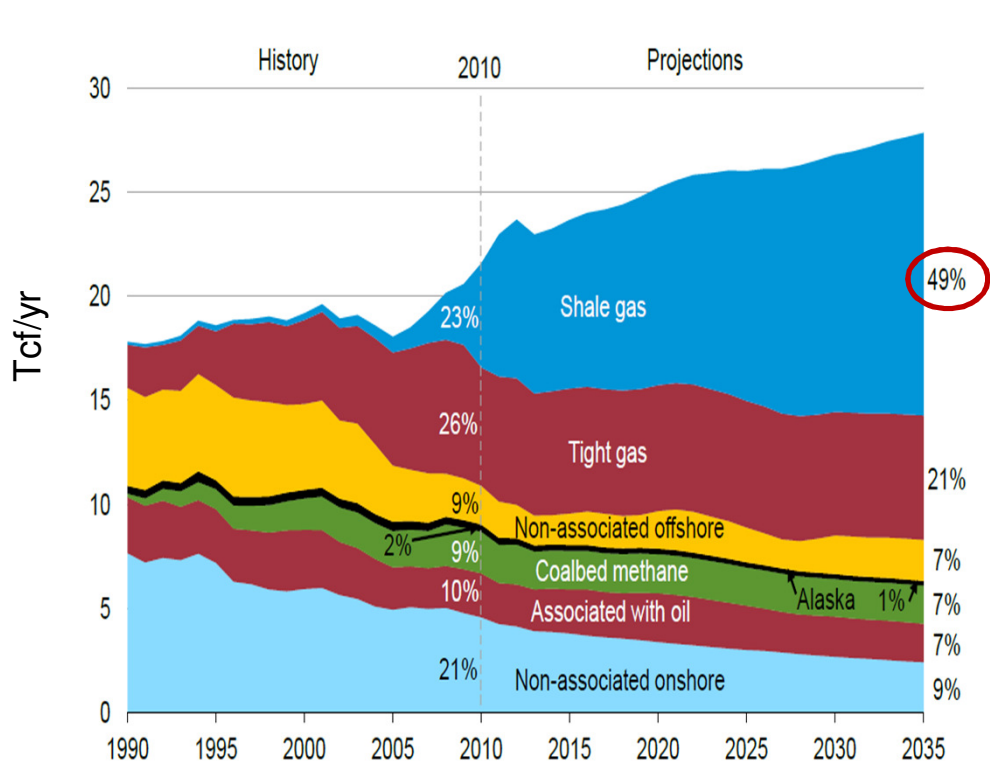


*CAGR: Compounded Annual Growth Rate

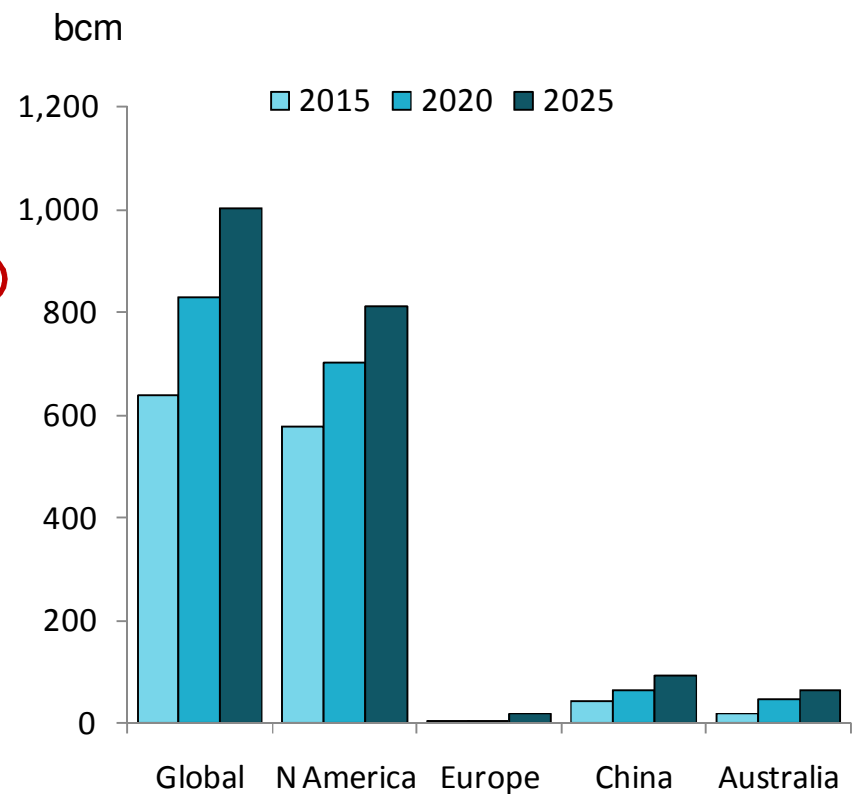
North America (particularly the US) is expected to drive the growth of unconventional gas production

Unconventional gas production (particularly shale production) will become more prominent in the US, but various production forecasts for the rest of the world are less than optimistic

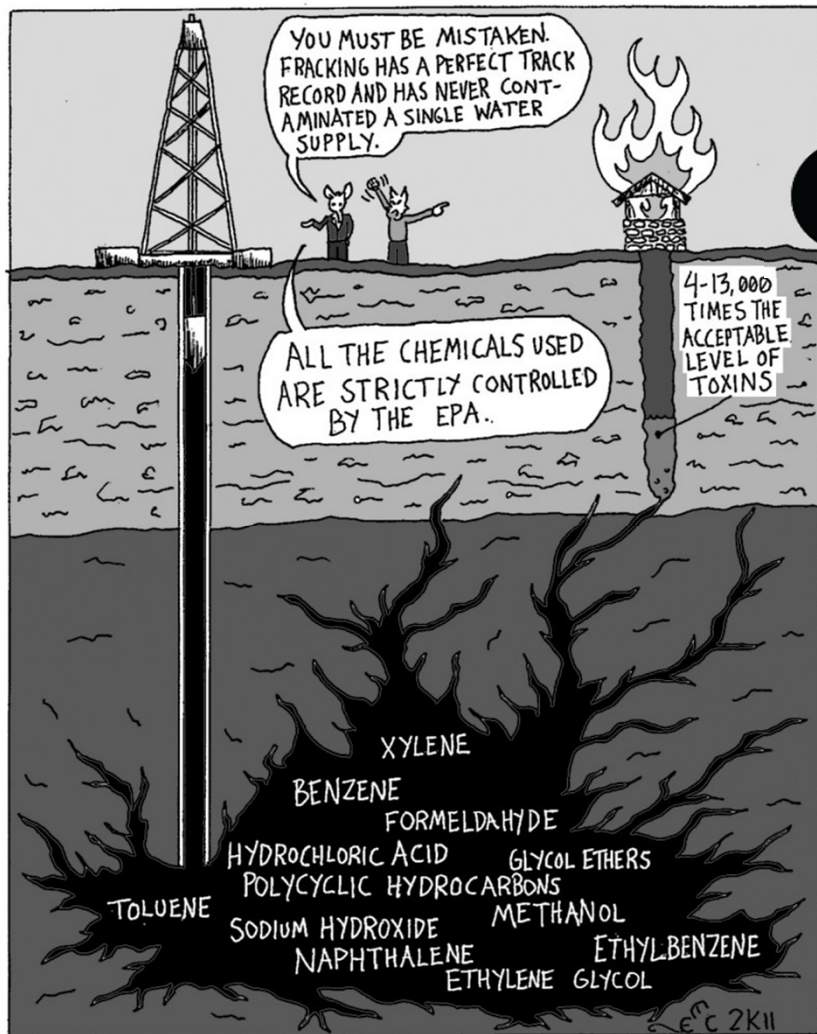
US Dry Gas Production



Global Unconventional Gas production



Environmental concerns has led to divergent approaches in development of shale gas in addition to other above ground risks which are applicable throughout Europe



France
Norway
Sweden
Germany
Lithuania
Bulgaria



Poland
UK
Ukraine
Hungary
Romania?



















- ❑ Little upstream service industry focused on unconventional gas
- ❑ The benefits of the subsurface rights belong to the government leaving **no incentives to landowners**

International and domestic shale gas investments will help China with its shale gas production target

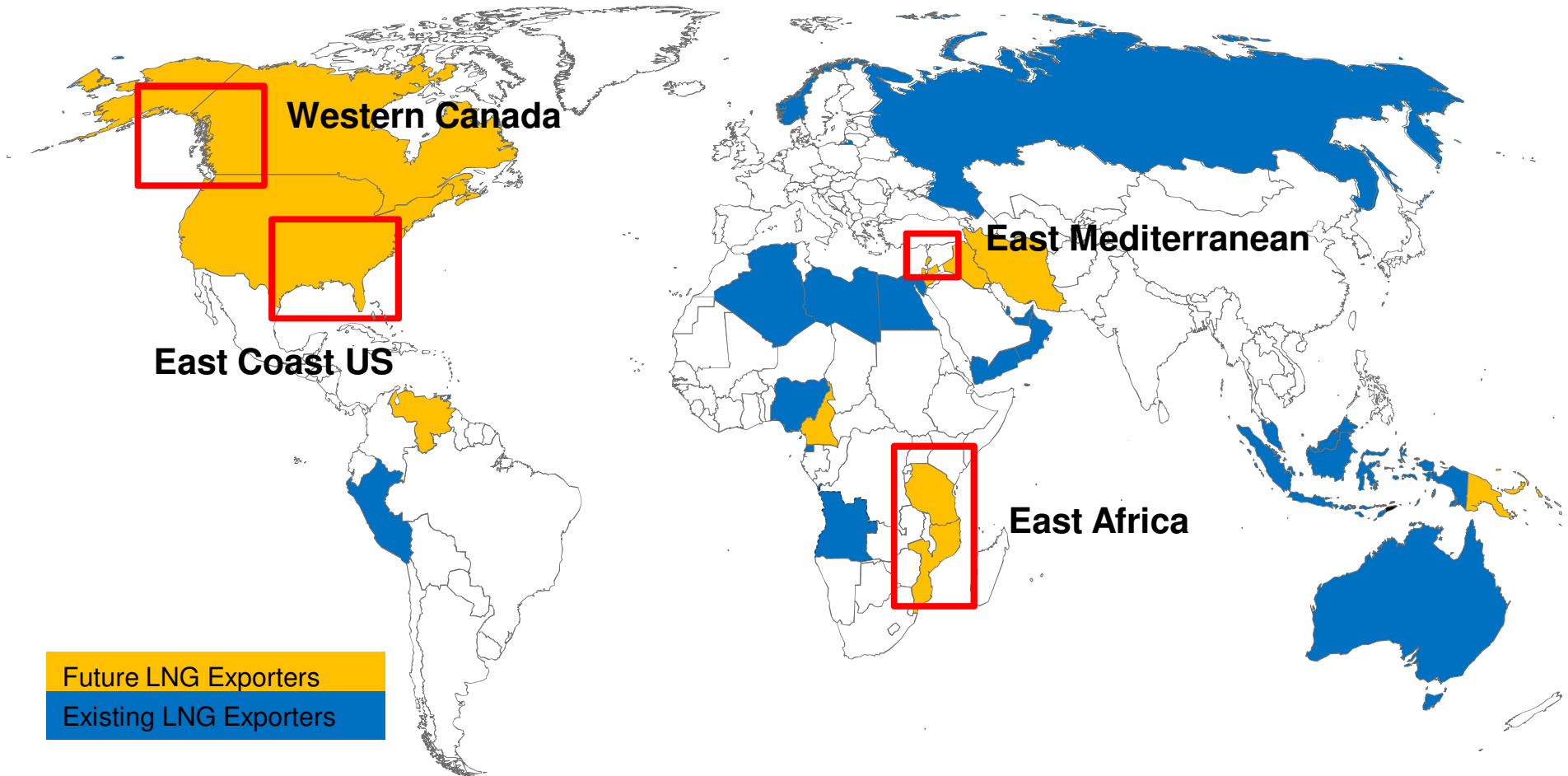


China's acquisition in shale gas plays in the US, foreign interests in China will facilitate the country with its shale gas production target of 6.5 bcm by 2015

- **CNOOC** acquires a 33.3% interest in Chesapeake's **Eagle Ford** acreage for US\$2.16 billion (2010)
- **Sinopec** acquires **Daylight Energy** for US\$2.8 billion (2011)
- **Sinopec** invest US\$2.2b in exchange for 1/3 of Devon's interest in **five new venture plays** (2012)
- ❑ **Chinese NOCs spent >\$7 bil on shale gas assets in North America**

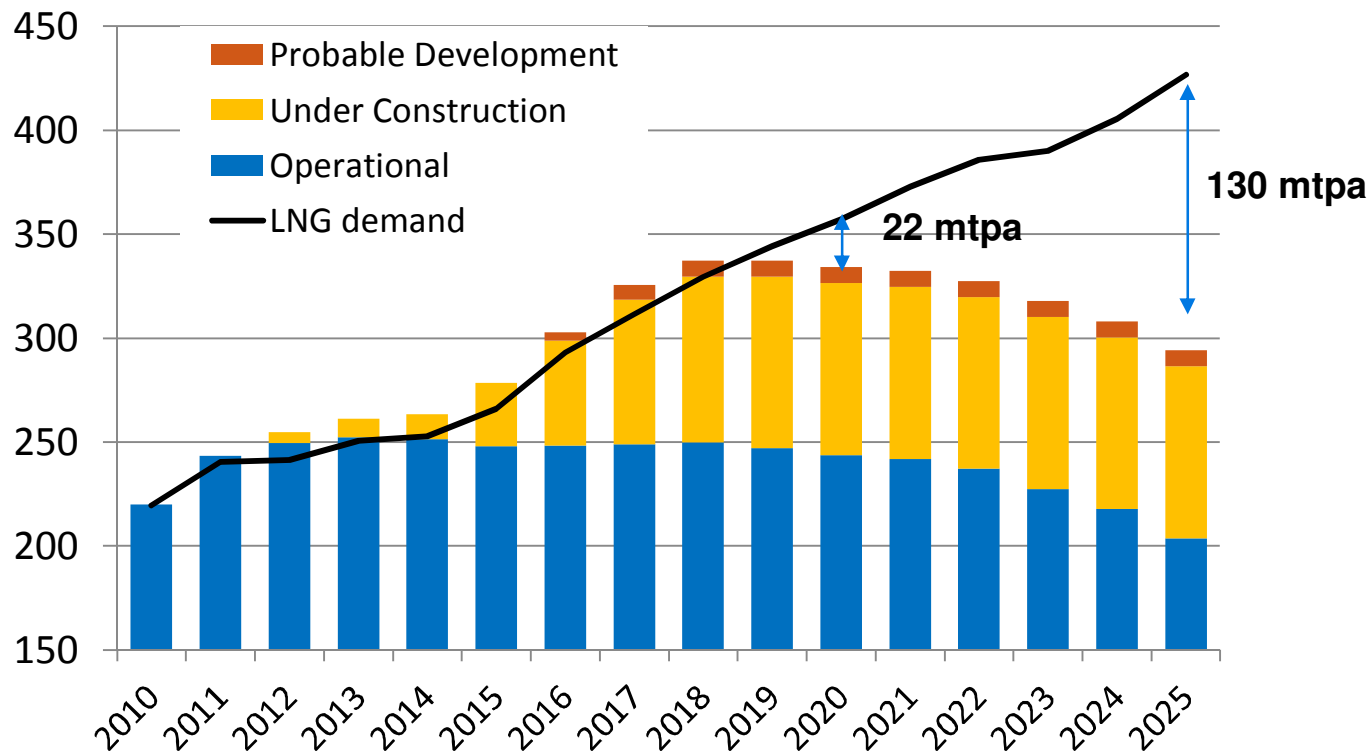
Date	Company	NOC	Shale basins
Oct 2007	 NEWFIELD	 CNPC	Weiyuan Block, Sichuan
Nov 2009	 Shell	 CNPC	Fushun-Yuangchuan Block, Sichuan
Jan 2010	 bp	 SINOPEC	Kaili Block, Guizhou, Huangqiao Block, Jiangsu
May 2009	 Statoil	 SINOPEC	Sichuan
Q3 2010	 ConocoPhillips	 CNPC	Sichuan
Q4 2010	 Chevron	 SINOPEC	Longli County, Guizhou
2010	 Shell	 CNPC	Jinqiu Block, Sichuan
July 2011	 ExxonMobil	 SINOPEC	Wuzhishan-Meigu Block, Sichuan
July 2011	 Eni	 SINOPEC	N/A

IMMENSE NEW LNG SUPPLY PROSPECTS



New supplies are timely to fill in the potential supply gap post 2020

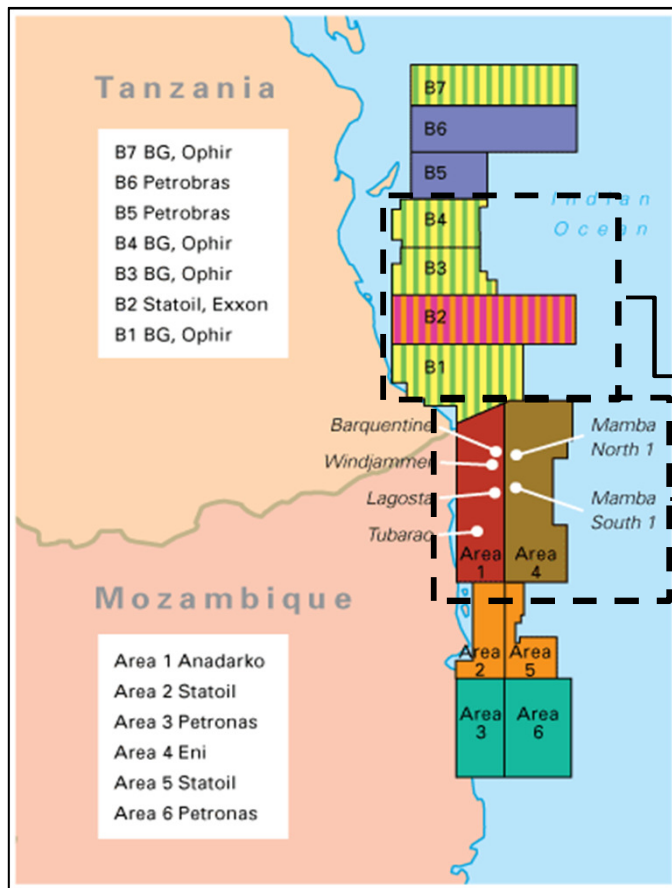
- Prospects of supply shortage post 2020 – around 22 mtpa of projected shortage by 2020. Timing of project sanctions is key.



Tanzania and Mozambique gas finds could support 20-30 mtpa LNG project by 2020

Gas finds could support minimum of 10 mtpa LNG project by 2020, but regional instability could deter investors

East African Gas Hotspot



- 2 separate plans by BG and Statoil
- FID are expected by 2015

- ~20 mtpa planned from 2 projects by Anadarko and Eni.
- FID are expected by 2013

East Mediterranean Gas Finds



Gas Fields Maritime Boundaries

*still requires Lebanese ratification

Source: Menas Borders, Noble

WIDE PRICE DIFFERENTIAL BETWEEN REGIONS PROMOTE LNG EXPORT PROJECT FROM THE US

Although over 100 mtpa of project being planned, LNG exports from the US will have a limit of around 45 mtpa

US LNG Export Projects



US LNG Export Economics

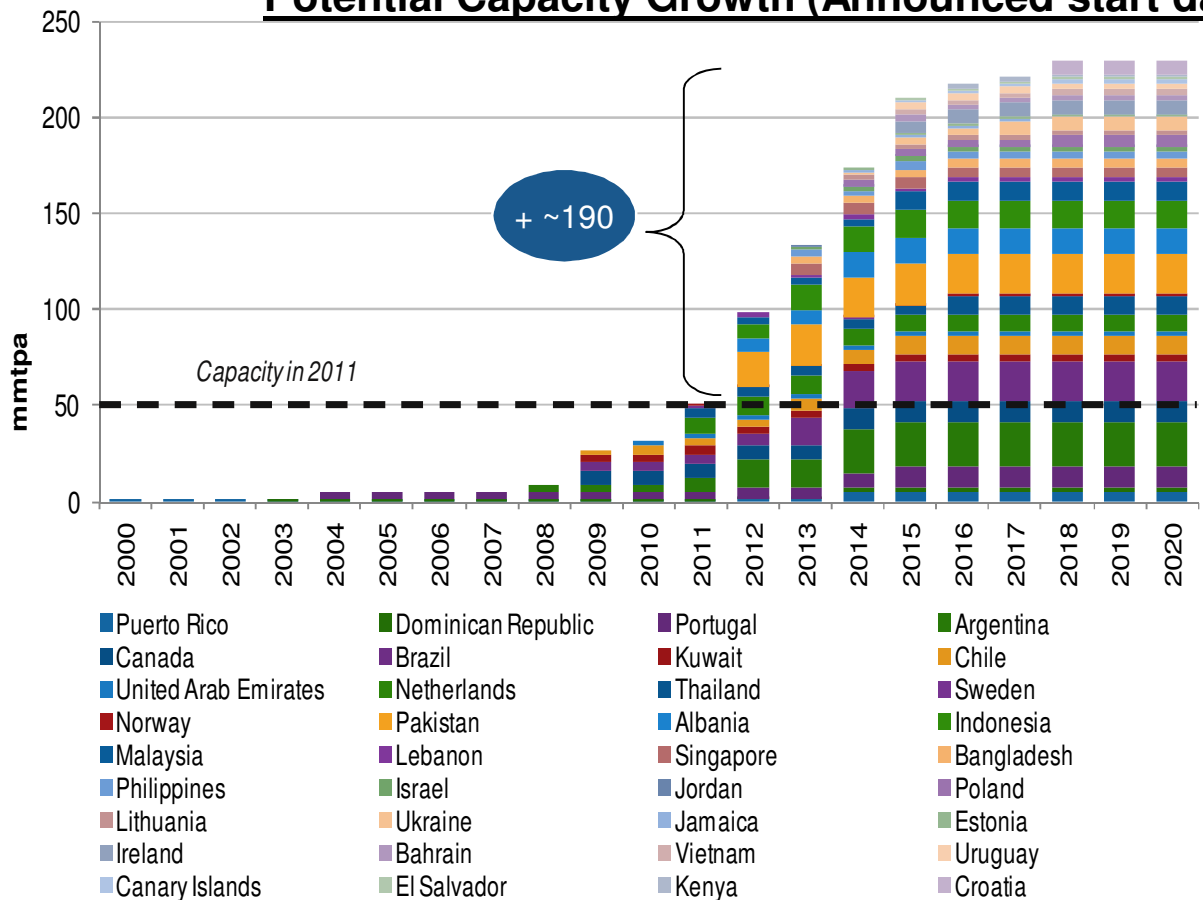
	US\$/mmbtu	
Gas cost*	\$4.89	
Fuel and gas sourcing charge (15% of Henry Hub)	\$0.73	
Capacity charge**	\$2.25	
FOB cost	\$7.87	
Shipping	Europe	Asia
	\$1.21	\$2.70
Ex-ship cost	\$9.08	\$10.57
Brent (\$105)	@12%	@15%
	12.6	15.75
Margins	\$3.52	\$5.18

Source: IHS CERA.
 1. IHS CERA's average Henry Hub price for 2015-35.
 2. \$1.91 (85%) of the capacity charge is fixed, with the remainder adjusting with inflation.

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

Emerging markets are expected to grow in the coming decade, when a few years ago they were not considered to be future LNG importers

Potential Capacity Growth (Announced start dates)



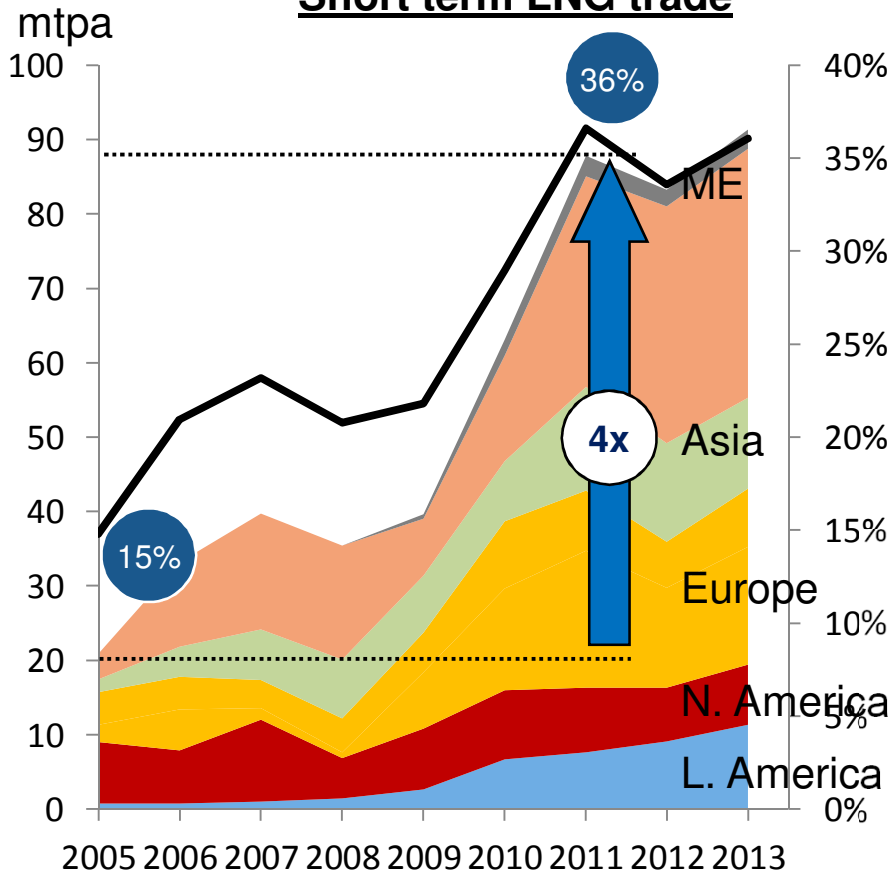
- Growth of emerging LNG market:
 - Mismatch between supply and demand centers
 - Dwindling of domestic gas supplies
 - Diversification of supplies
 - Enhancing security of supplies

- Ability to pay differs from market to market

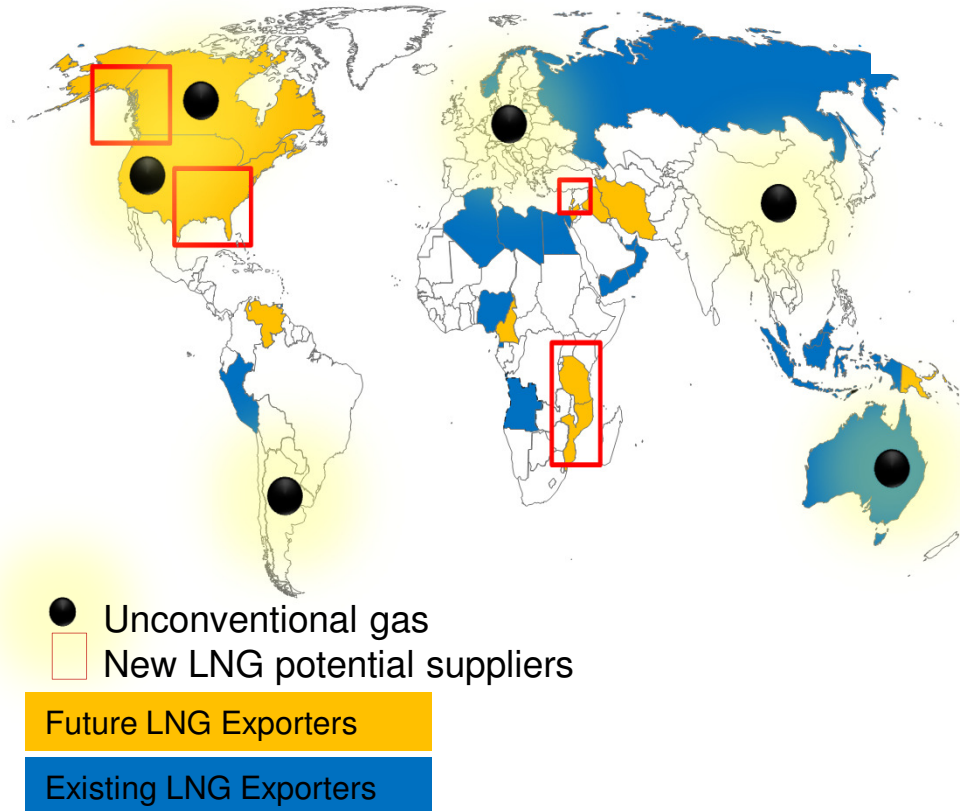
Volume of short term trades has increased 4x since 2005 and is expected to remain elevated

Immense prospects for new supplies particularly in the longer term

Short term LNG trade



New gas and LNG supplies





Many factors will encourage further evolution of spot market in Asia



The growth of spot market is a key step towards establishment of transparent and efficient LNG price discovery especially for Asia Pacific

- ❑ Need for relevant pricing signals
- ❑ Oil prices dependencies & uncertainties
- ❑ Entry of non gas players into LNG trading
- ❑ Realisation of US LNG Exports
- ❑ Unconventional gas revolution outside North America



Shanghai Petroleum Exchange (SPEX)



PTT & SLNG planning to on becoming the regional hub