

# **North American Energy: A Clear Path Forward?**



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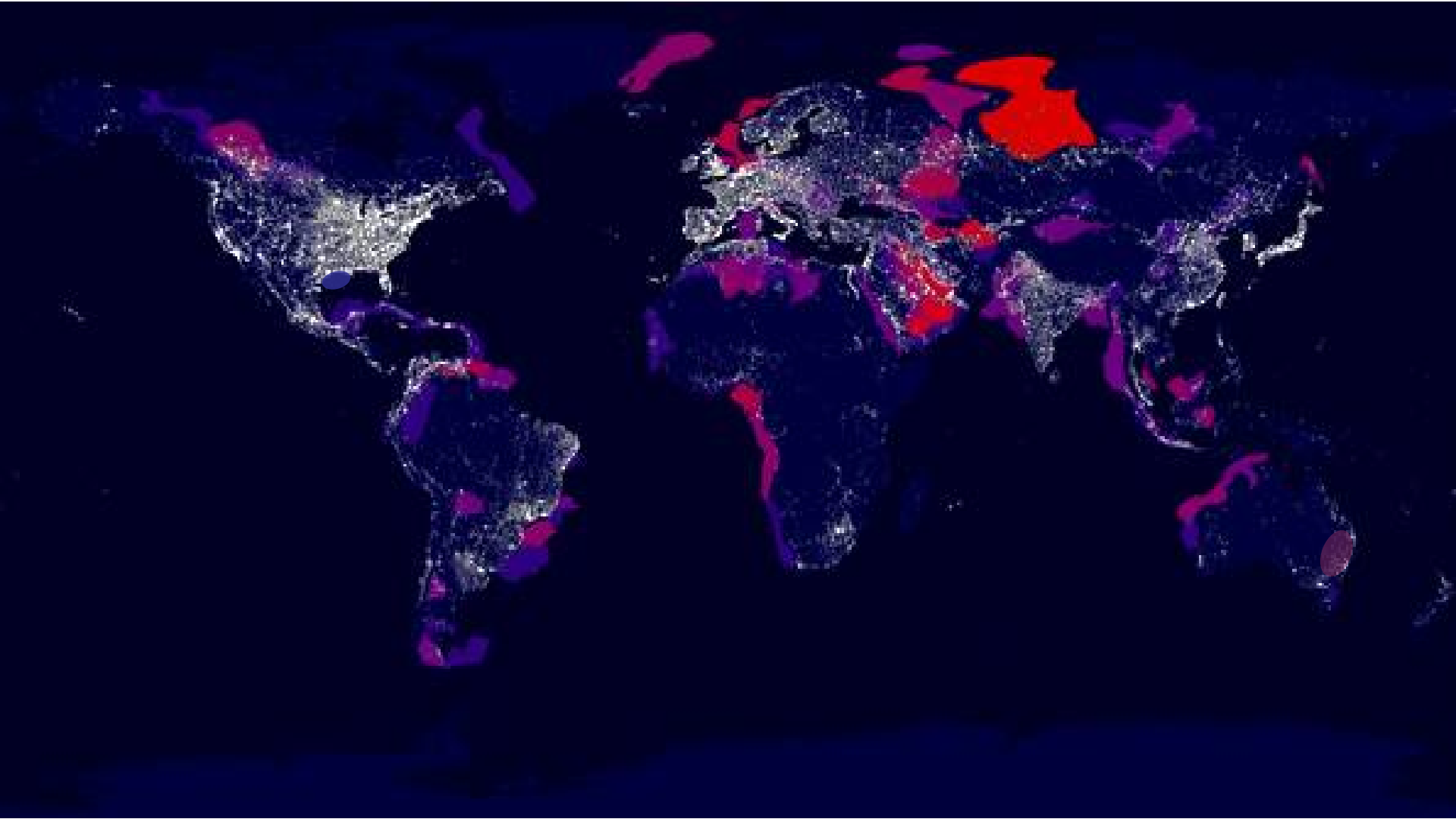
**NAFTA at 20 – Effects on the North American Market**  
**Federal Reserve Bank of Dallas – Houston Branch**

**June 5, 2014**

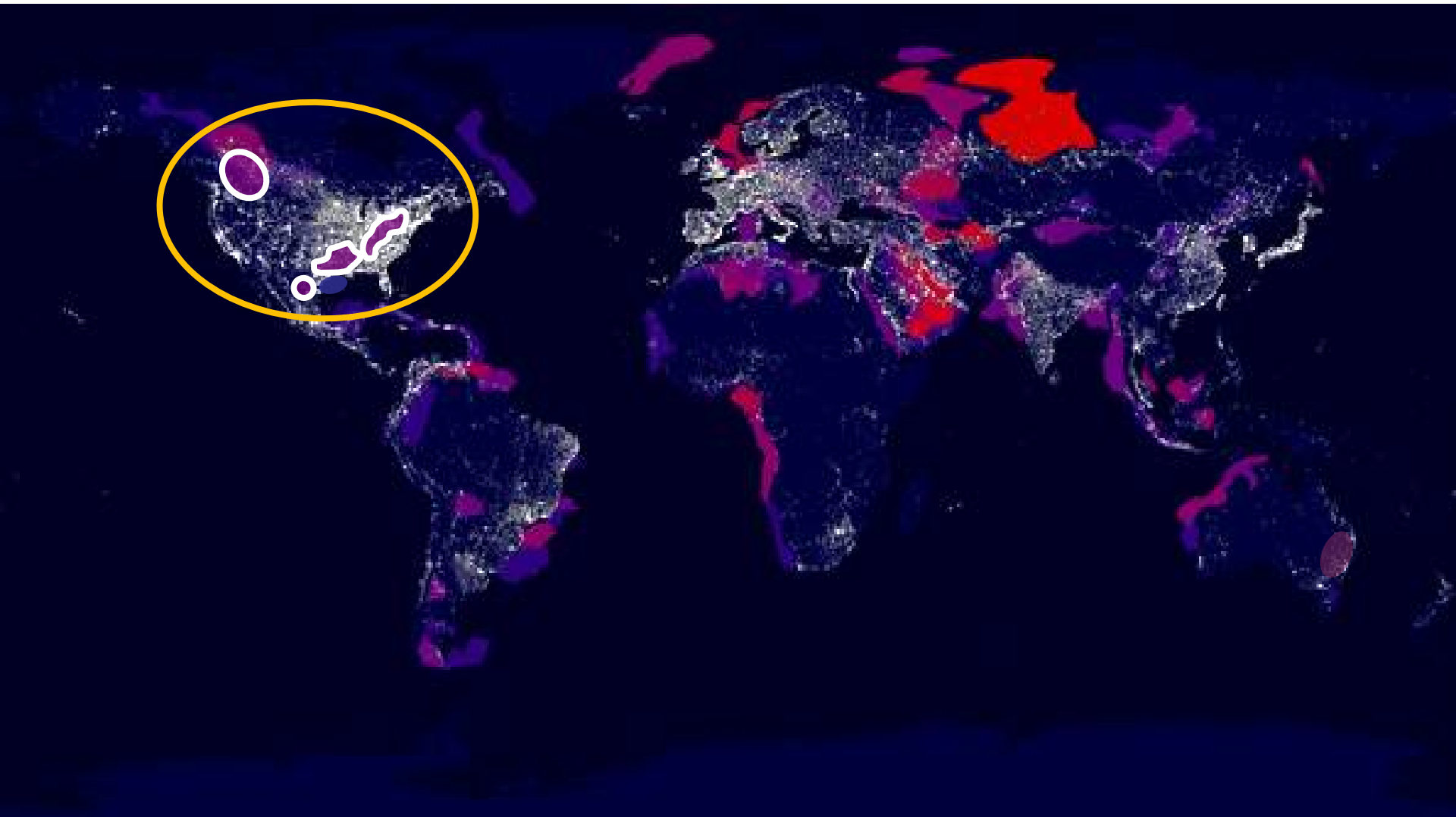
**The last decade has brought significant change in global oil and gas markets, and hence influenced developments in regional energy markets, international energy trade and geopolitics.**

**While activity in the US has been the driver thus far, North America more generally is set to become a very different actor in global energy markets, with the potential to improve energy security and economic well-being.**

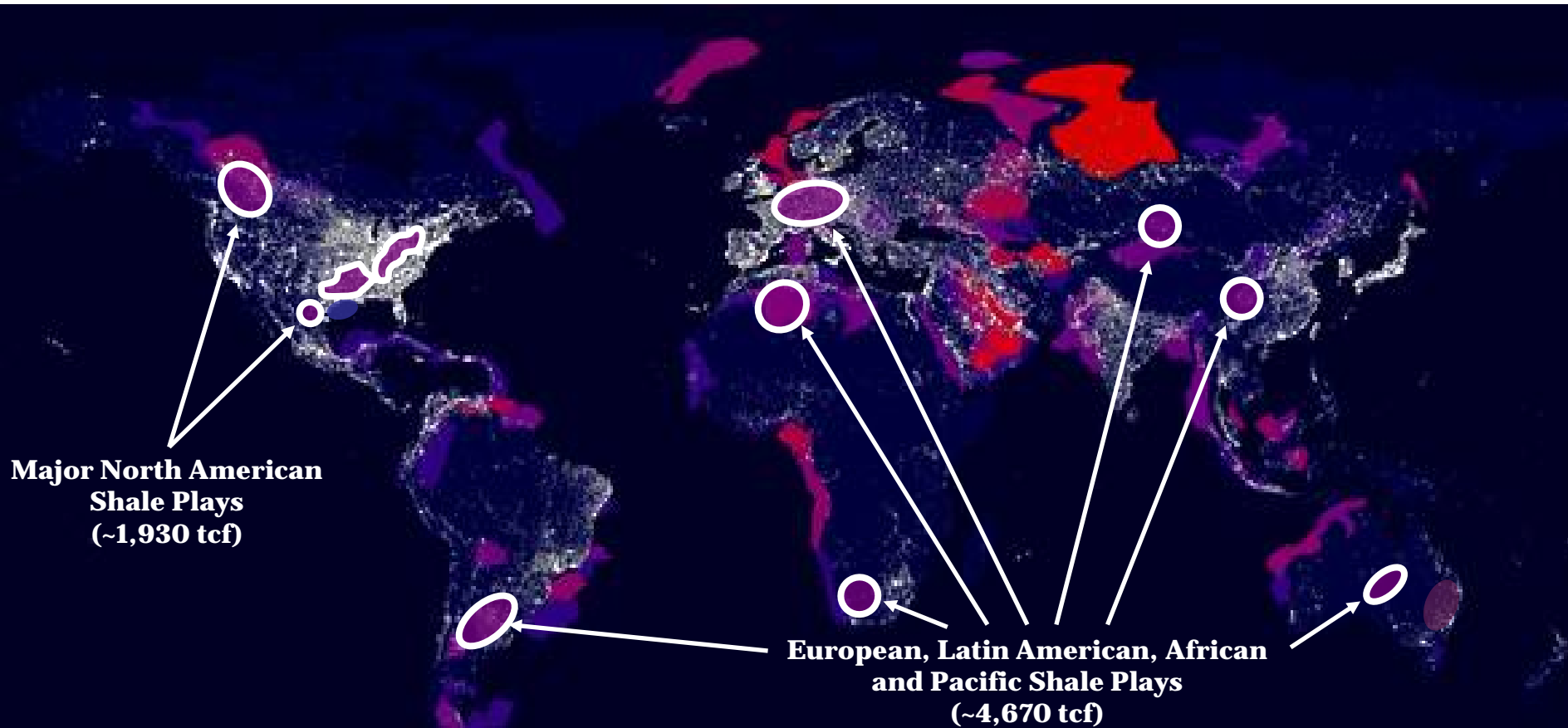
## Rewind to 2003 – LNG is coming to North America



## **Then, shale happened in the US and Canada...**



**... we quickly realized shale resources are everywhere\***



*\*Over 6,600 tcf of shale according to ARI report, 2011*

## **The US as a Microcosm**

**Much success has been realized, but  
some constraints may become binding**



Source: Gallery of World Hydrocarbon Endowment & Shale Gas Resources,  
<http://alfin2300.blogspot.com/2012/03/gallery-of-world-hydrocarbon-endowment.html>

# **Geology *AND* market structure yields the recipe for success... and a massive competitive advantage**

- Geology is a *necessary* condition for vibrant and successful upstream activity...
- ... but it is NOT *sufficient*!
- A host of above ground factors must be aligned for commercial success to be realized.
- Once in play, commercial success builds on itself because it encourages entrepreneurial activity, and creates an environment that is attractive to capital inflows.
- Thus, a variety of regulatory and market institutions must be in place if North America is to reach its full potential in terms of energy security and economic well-being.

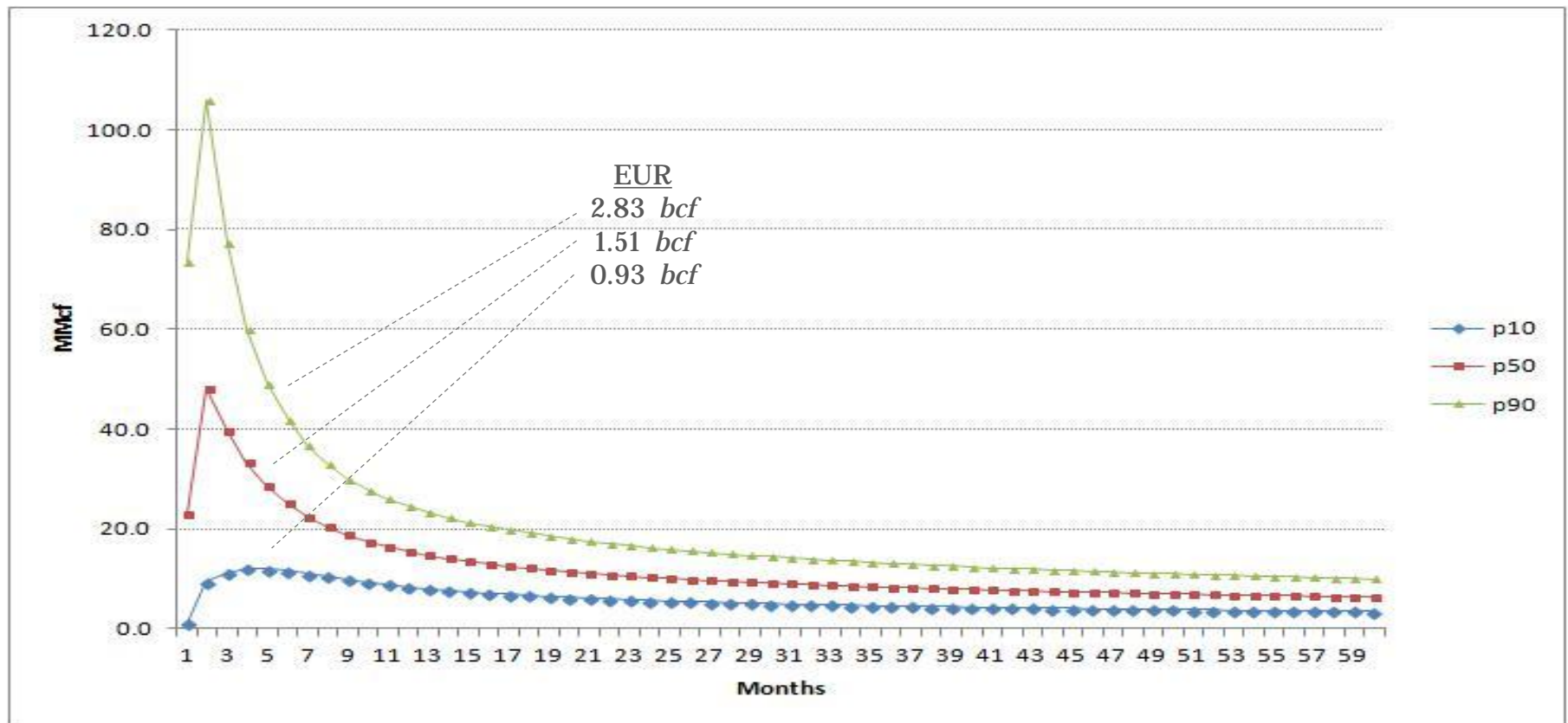


## **The *sufficient* conditions...**

- Upstream firms negotiate directly with landowners for access to mineral rights.
- A market in which liquid pricing locations, or hubs, exist and are easily accessed due to liberalized transportation services being unbundled from pipeline ownership.
- A well-developed pipeline network that can accommodate new production volumes.
- A market in which interstate pipeline development is relatively seamless due to a well-established governing body – the Federal Energy Regulatory Commission (FERC) – and a comparatively straightforward regulatory approval process.
- A market in which demand pull is sufficient, and can materialize with minimal regulatory impediment thus allowing new supplies to compete for market share.
- A market where a well-developed service sector exists that can facilitate fast-paced drilling activity and provide rapid response to demands in the field.
- A competitive service sector that strives to lower costs and advance technologies in order to gain a commercial advantage.
- A rig fleet that is capable of responding to upstream demands without constraint.
- A deep set of upstream actors – the independent producer – that can behave as the “entrepreneur” thereby facilitating a flow of capital into the field toward smaller scale, riskier ventures than those typically engaged by vertically integrated majors.

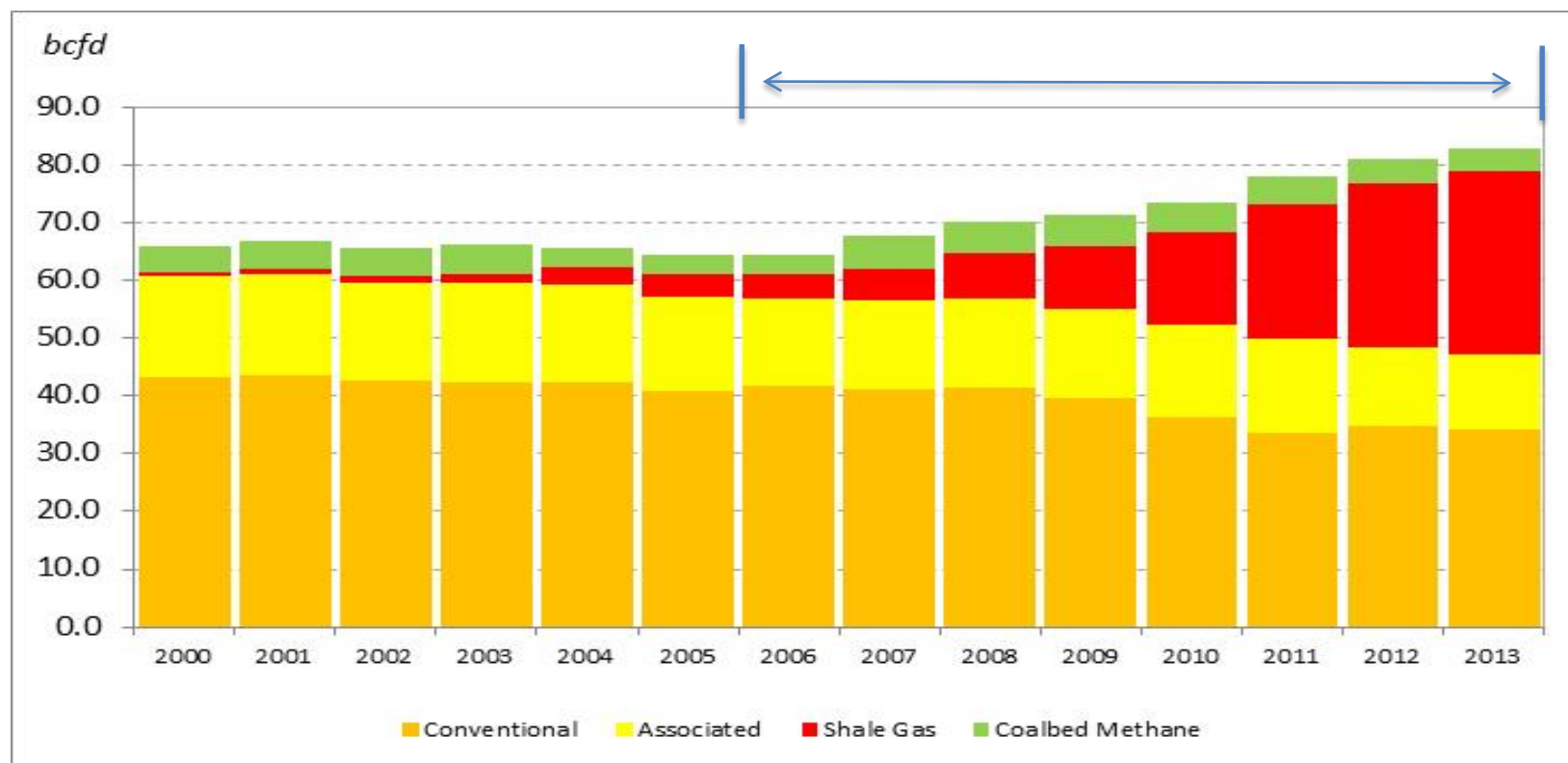
# Will it Last? Shale Well Performance

- Well-specific EURs can vary within a shale play substantially
  - Ultimately, profitability matters, as there is little debate about resource scale
  - Some wells are profitable at \$2.65/mcf, others need \$8.10... median is \$4.85.



# The Recent US Natural Gas Supply Surge

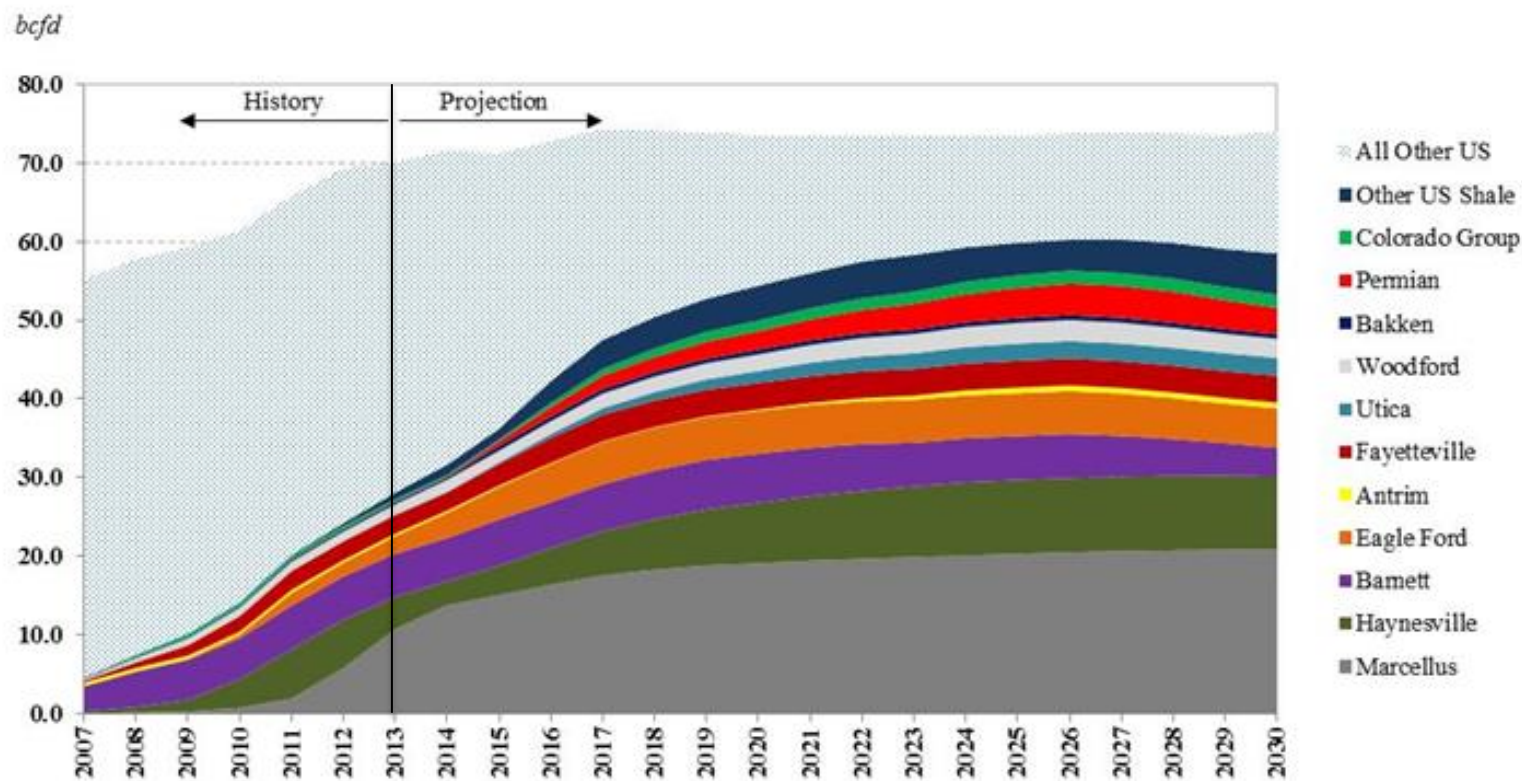
- The last 7 years have seen tremendous growth in US natural gas production, largely driven by shale gas resource development.



Source: EIA

# Longer Term Shale Production in the US

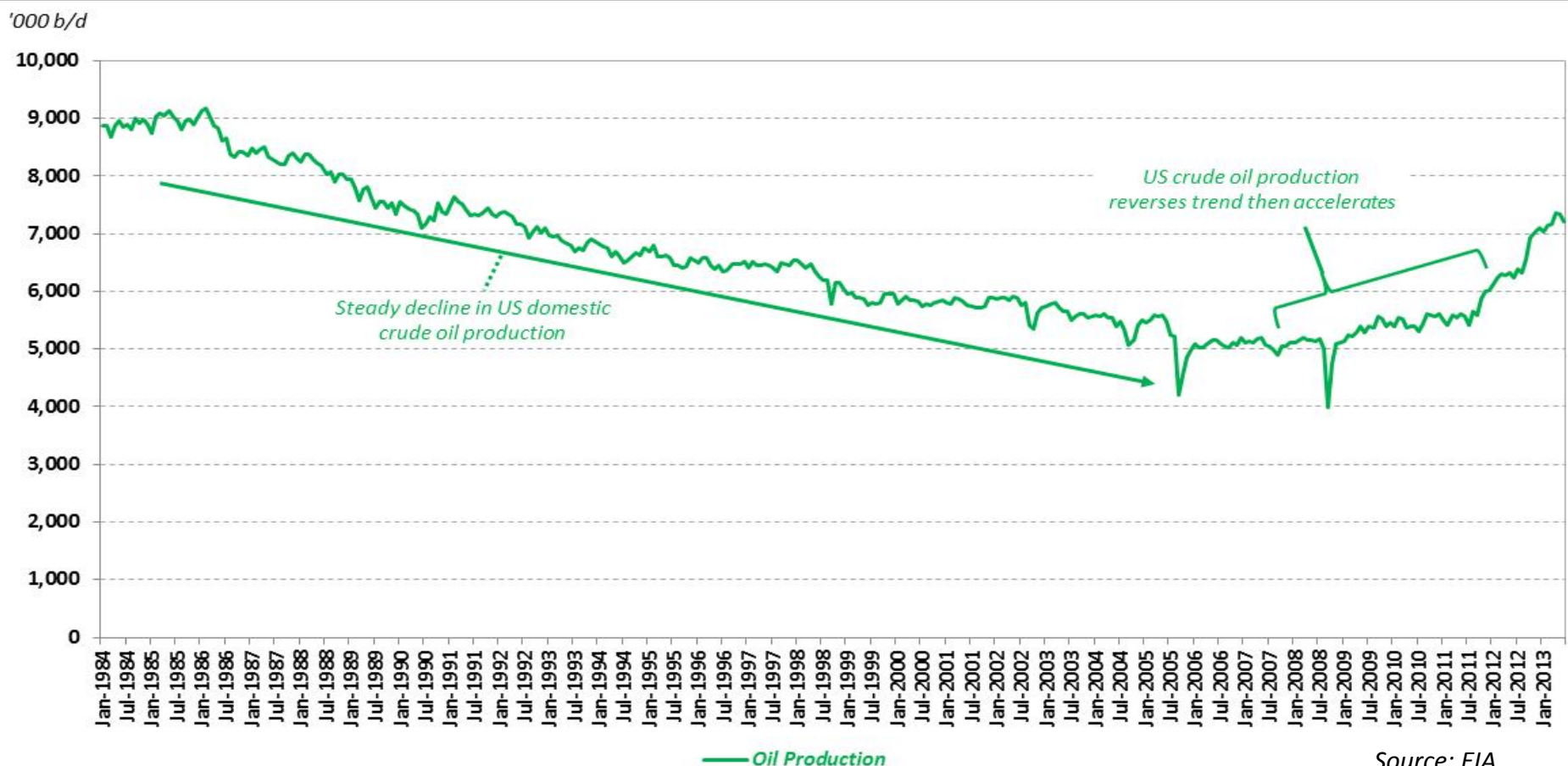
- Strong growth of dry gas production through 2020 then stabilization.





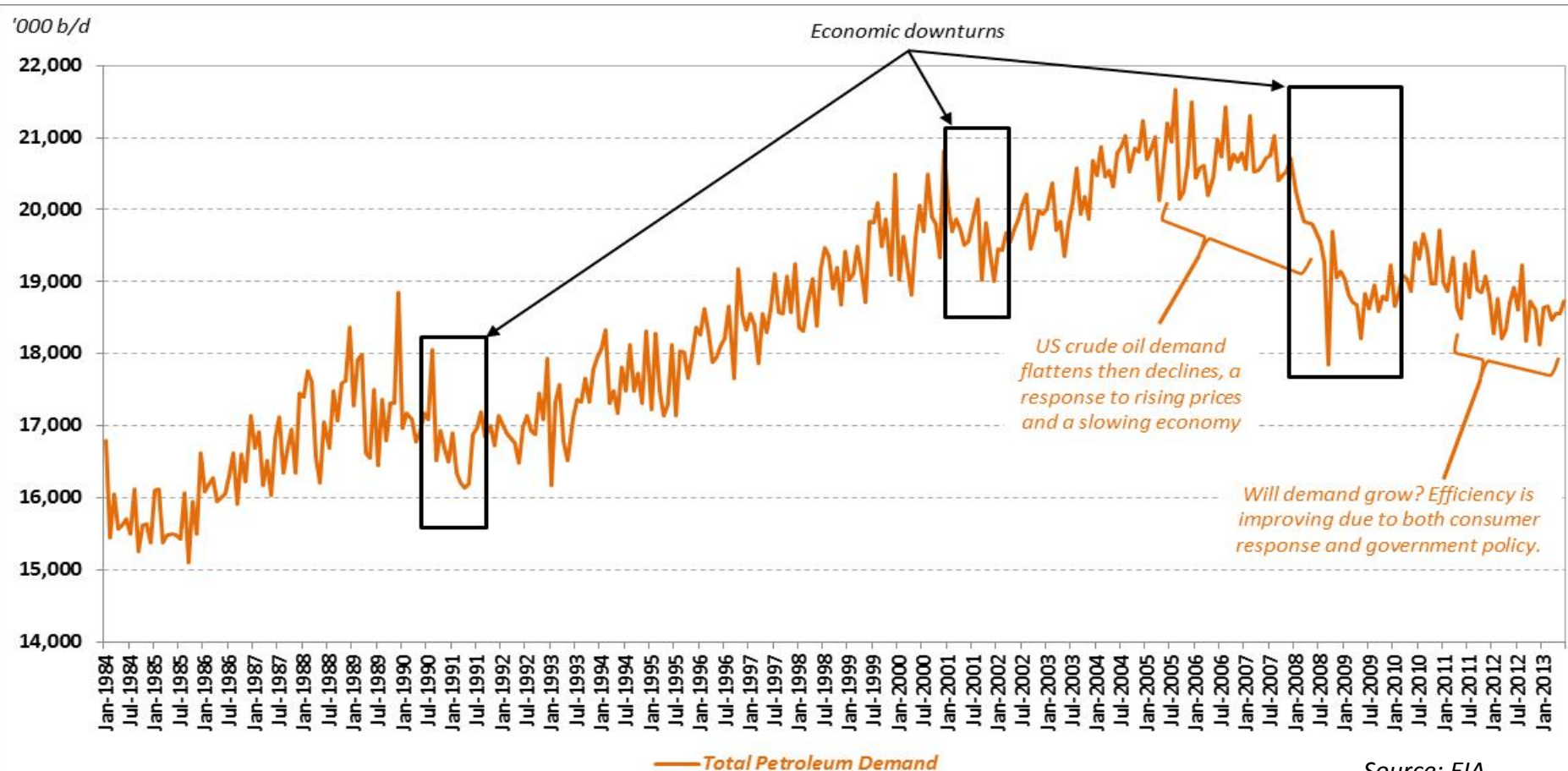
# US Oil Production Surge

- The last 5 years higher price has lead to a resurgence in US oil production, from both unconventional reservoirs *and* old fields.



# US Oil Demand: A New Paradigm?

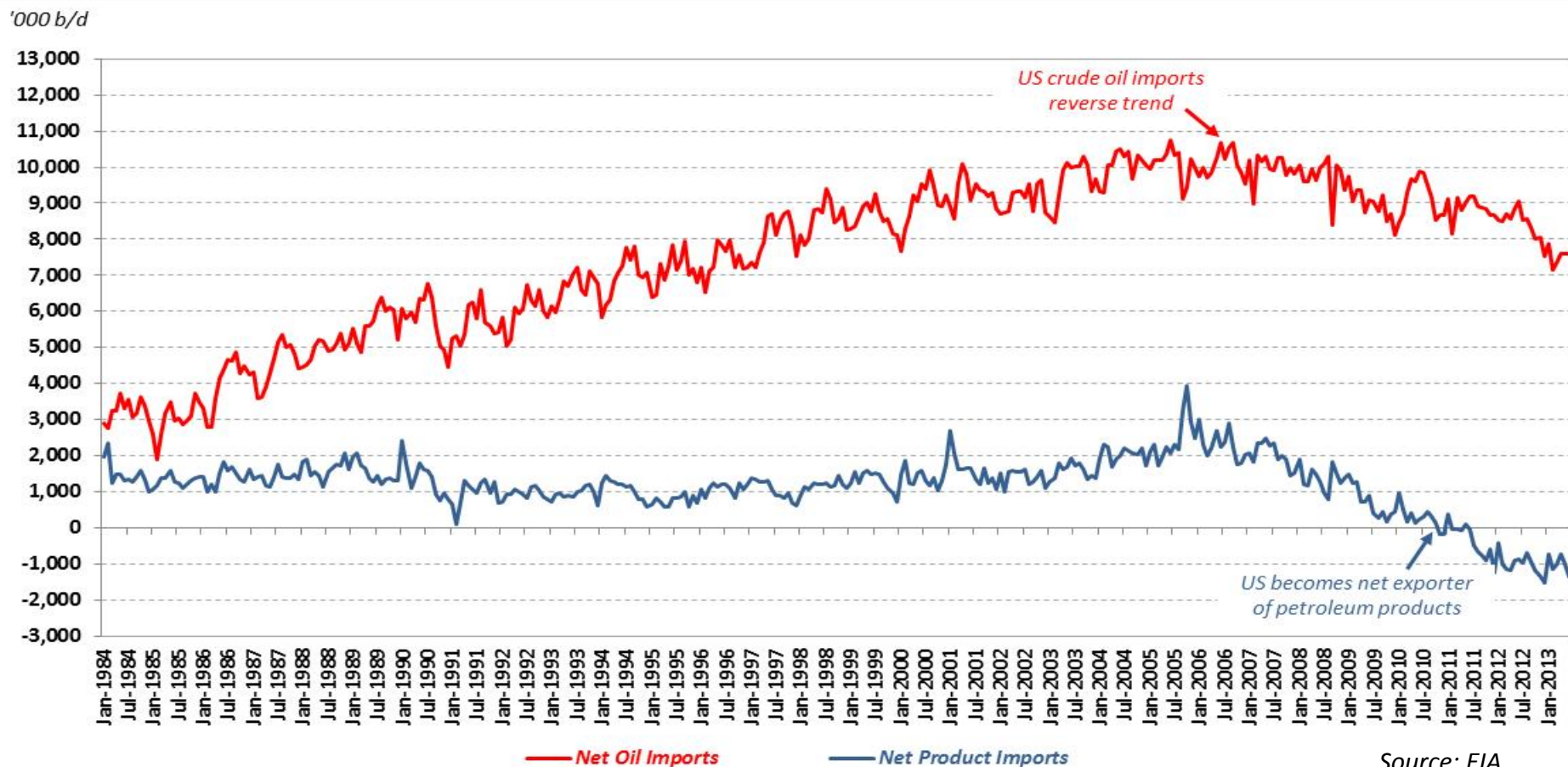
- Recent demand trends are indicative of high prices and the economy. But, there is more going on that may signal longer term demand destruction.



Source: EIA

# Effects of Supply & Demand Trends

- Import trends shifted with demand beginning in 2006.
- Production growth since 2008 is exacerbating the trends in imports.





# Oil Market Developments (US)

- Resource potential is distributed widely.
  - LTO production is the driver of trends in the US. North Dakota (Bakken), Texas (Permian, Eagleford), Ohio (Utica), Pennsylvania (Marcellus), Colorado (Niobrara), Louisiana (Tuscaloosa Marine), Oklahoma (Mississippi Lime), California (Monterrey).
    - Not all shales are created equal. Each faces different geology, different environmental factors (such as water availability), and different economics.
    - Bakken and Eagleford currently accounts for most US LTO production.
    - Strong activity emerging in Permian.
    - LTO production is challenging the current legal frameworks on US oil exports.
    - Oil imports are down.
    - The US now is a net exporter of petroleum products, aided by cheap natural gas and lower domestic demand.
    - **The export ban may present a demand constraint, especially with uncertainty looming on the law. Policy certainty is key.**

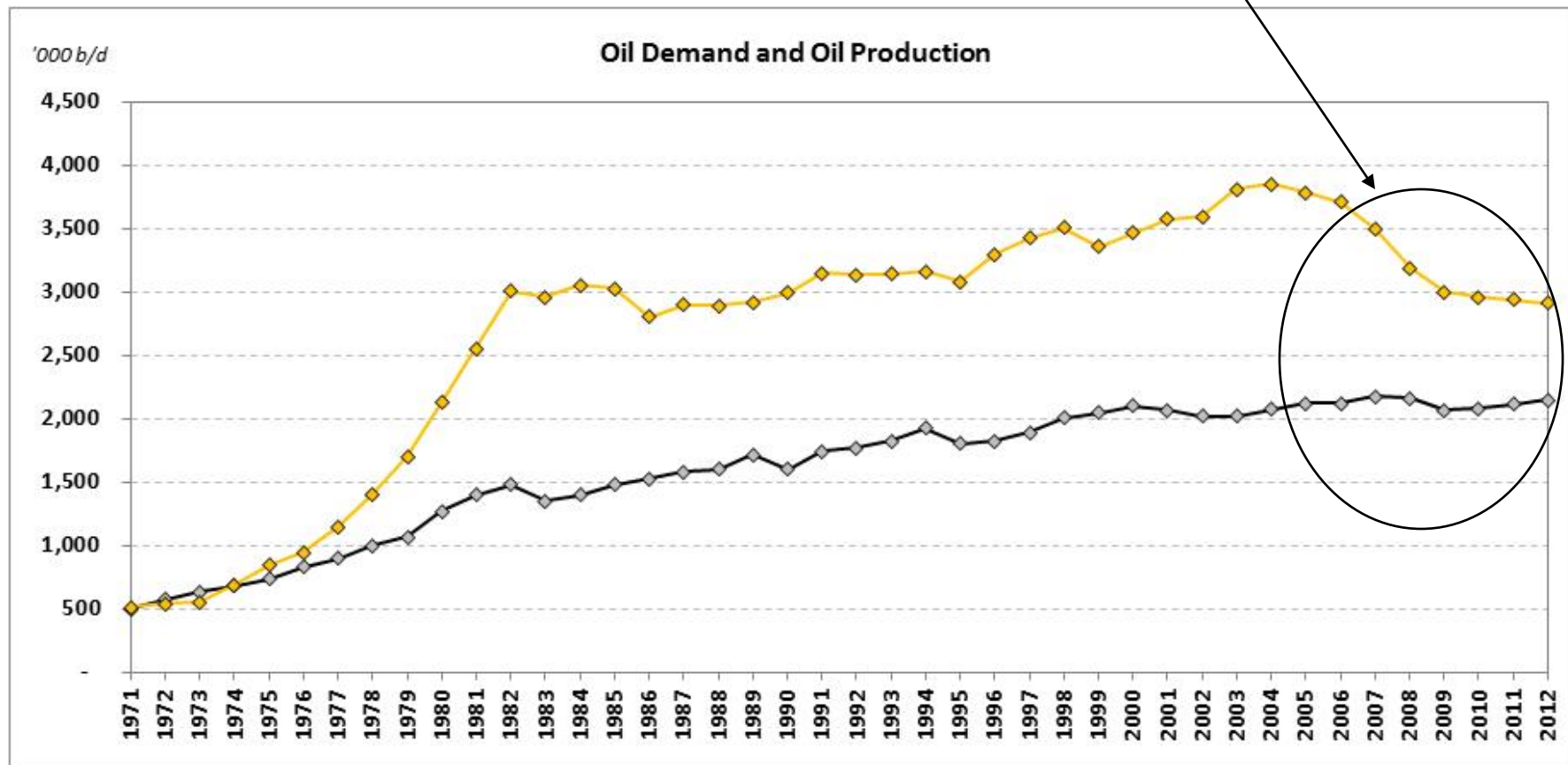
## **Comment on Mexico**

**The potential role of energy reform is significant, but much remains to be determined for a full realization of the possible benefits... high on the list of potential impediments:**

- 1. Security**
- 2. Local Content Requirements**
- 3. Contract Terms**

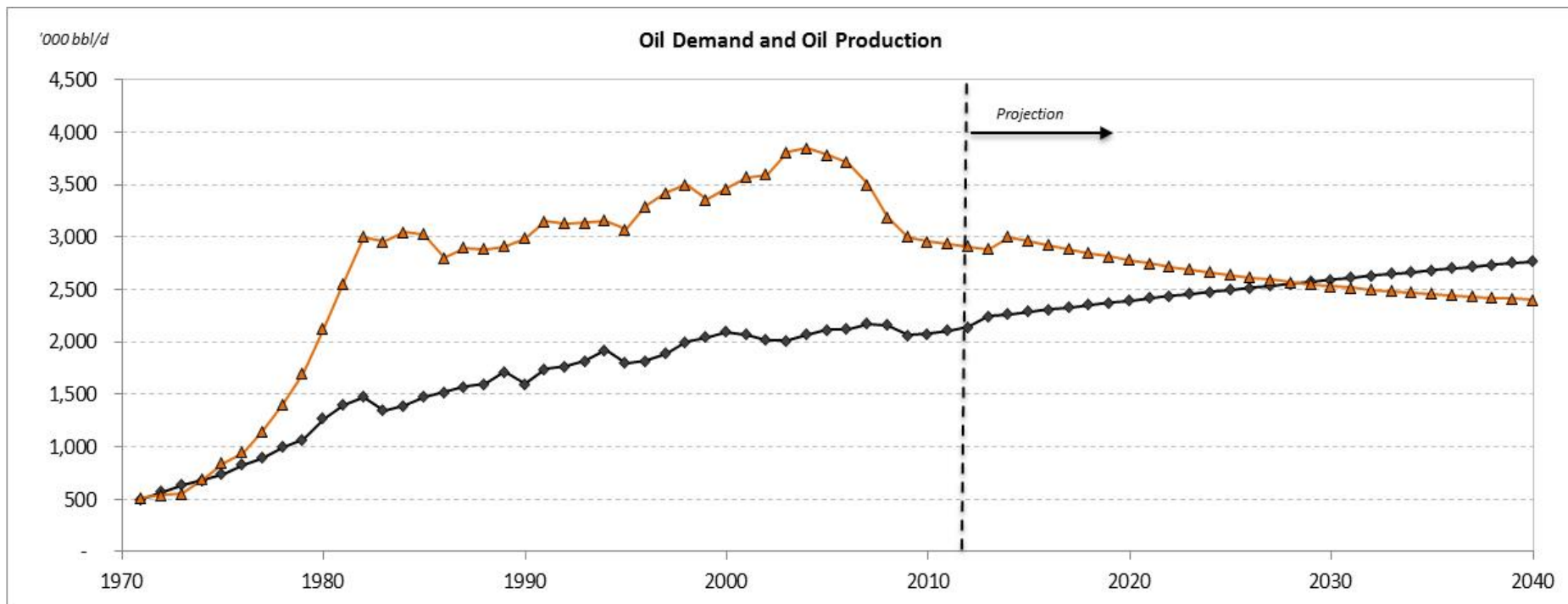
# History (1971-2012)

**Lack of successful upstream investment in new resources triggers decline... absent this, there is no “crisis”.**



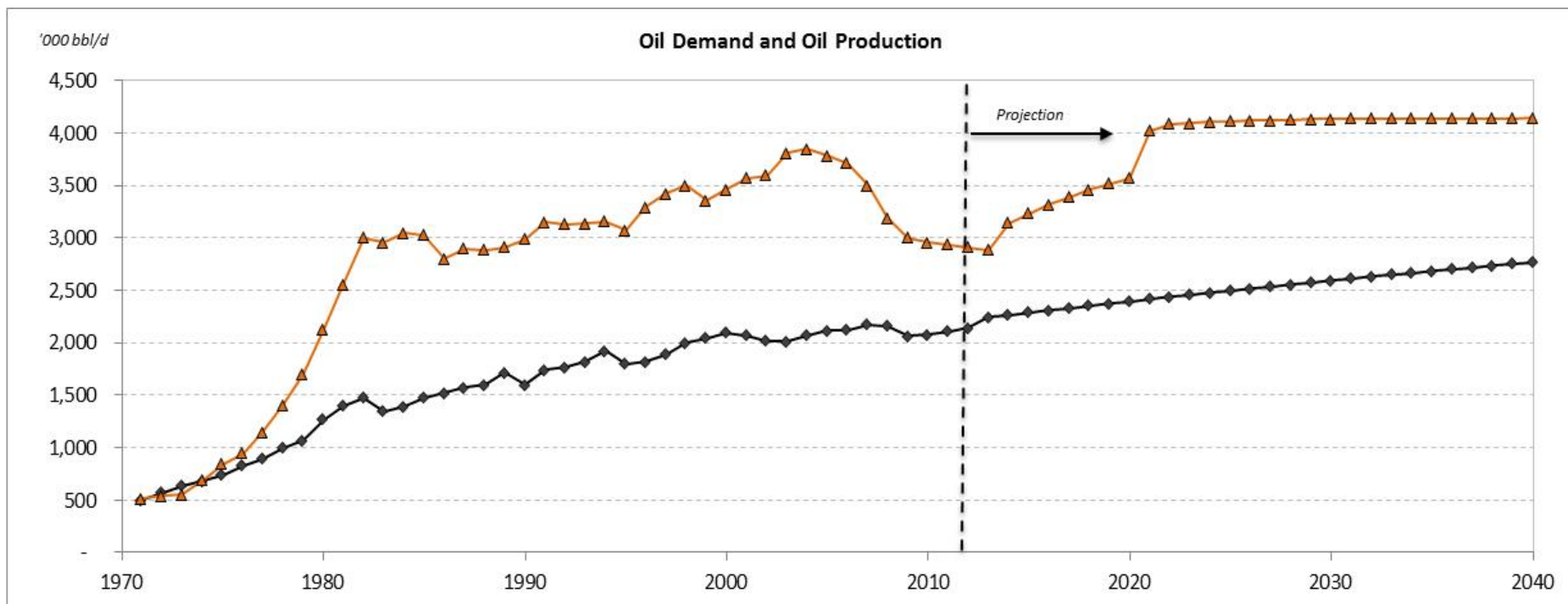
# Projection Under the Status Quo

- Business-as-usual
  - $GDP_{gr} = 1.44\%$ ;  $POP_{gr} = 0.44\%$ ;  $P_{oil,2040} = \$90/bl$
  - Resource = 29.83 billion bls; Reserve replacement = 0.83 billion bls/y
- Mexico becomes net oil importer in 2027.



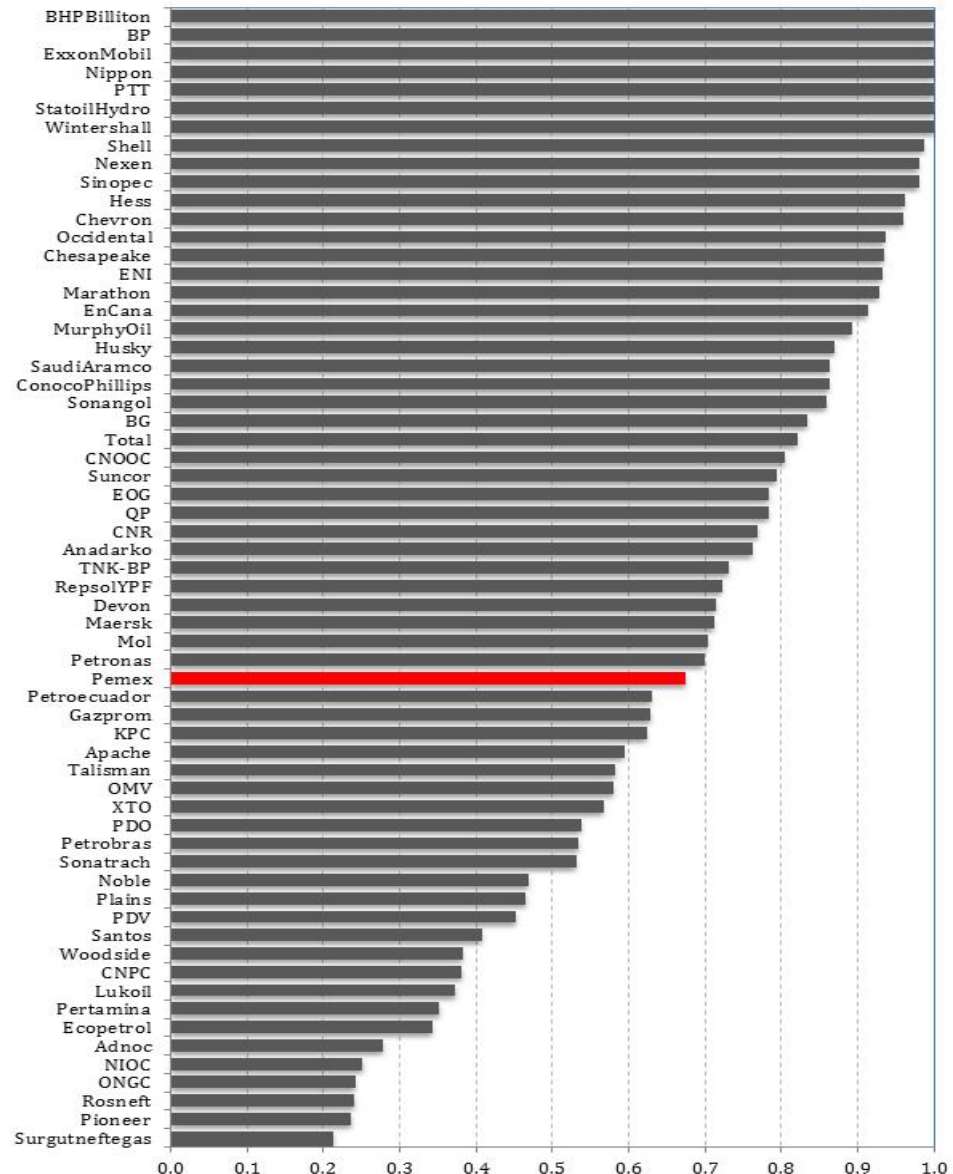
# Projection Under Alternate Assumptions

- The result, however, is highly contingent on
  - Reserve replacement (+); New discoveries, such as deep water (+)
  - Domestic demand growth (-)
- Pictured: US-type reserve replacement with GoM Activity



# Upstream Firm Efficiency: A Function of Operating Conditions and Regulatory Overburden

- Average revenue efficiency (pictured) for 2000-2009, sourced from Hartley and Medlock, 2012.
- Absent change, PEMEX is not likely to move to the frontier.
- With reform, increased PEMEX may be forced to compete with players that are active in international capital markets...





## Shale in Mexico

- A potential oil *and* gas, as TM mapping indicates there are both oil and gas windows.
  - Assessments indicate the resource native to the Eagle Ford extends well into Northern Mexico
    - Resource endowments are highly uncertain, so drilling activity is needed to fully characterize the resource
- While access through market structure is a *necessary* condition to attract capital, it is not *sufficient*. There are other concerns that pervade the onshore and offshore.
  - These include **infrastructure** and **safety**, both of which are equally important to realization of the resource potential.



## **Comment on Canada**

# **The All Important Role of Policy-related Demand Constraints**

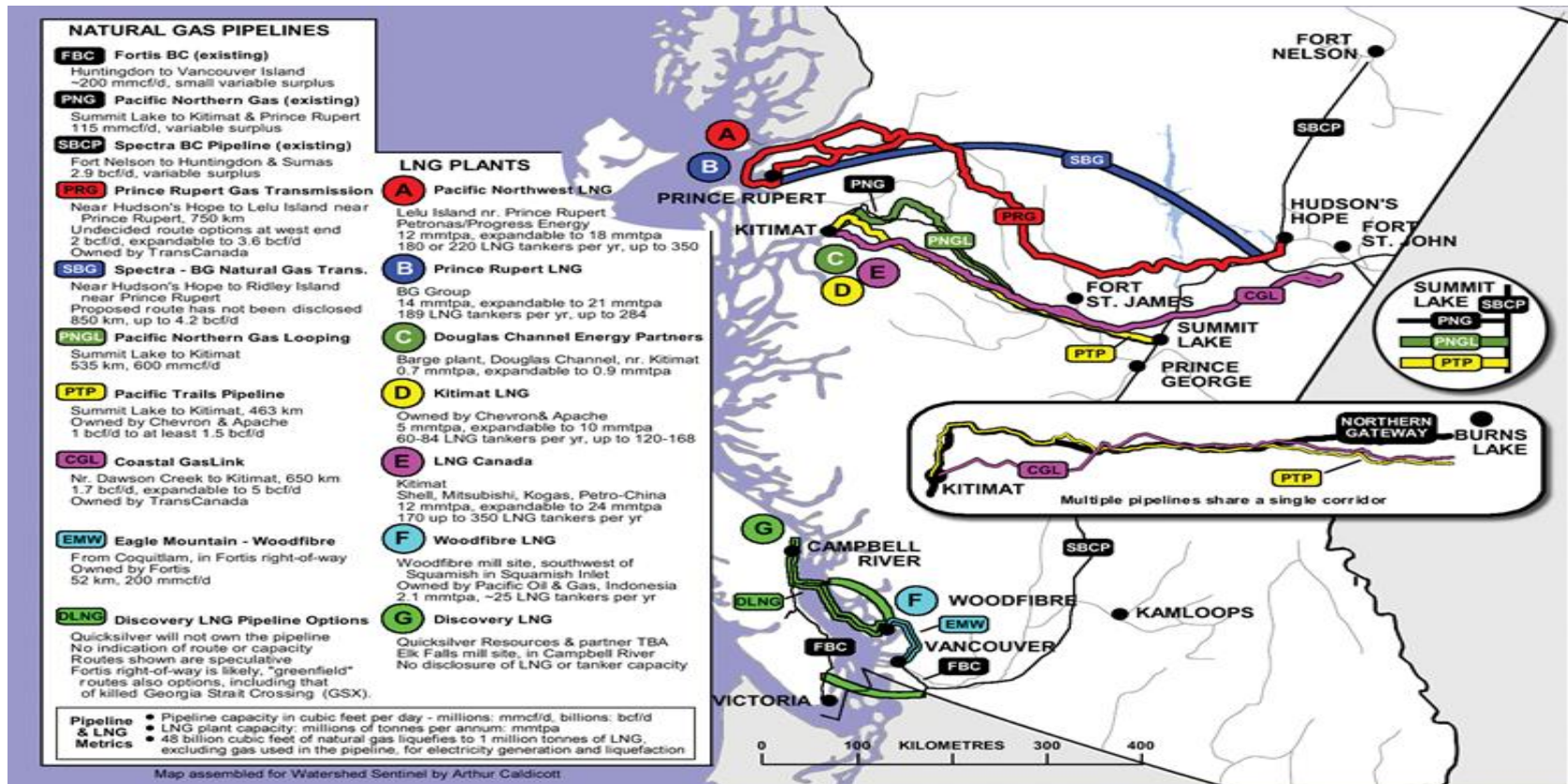
# Canadian Heavy Oil

- Keystone XL: a *de facto* export control through policy external to Canada.
- But, it is only temporary.



# Canadian Natural Gas

- Upstream constraints are not the issue. Rather, a lack of demand outlet presents a real commercial barrier to investment.



Source: Watershed Sentinel, <http://www.watershedsentinel.ca/files/documents/BC-outline-LNG-pipelinesRGB.jpg>

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