

Evolving Structures of the Global Oil and Gas Industry

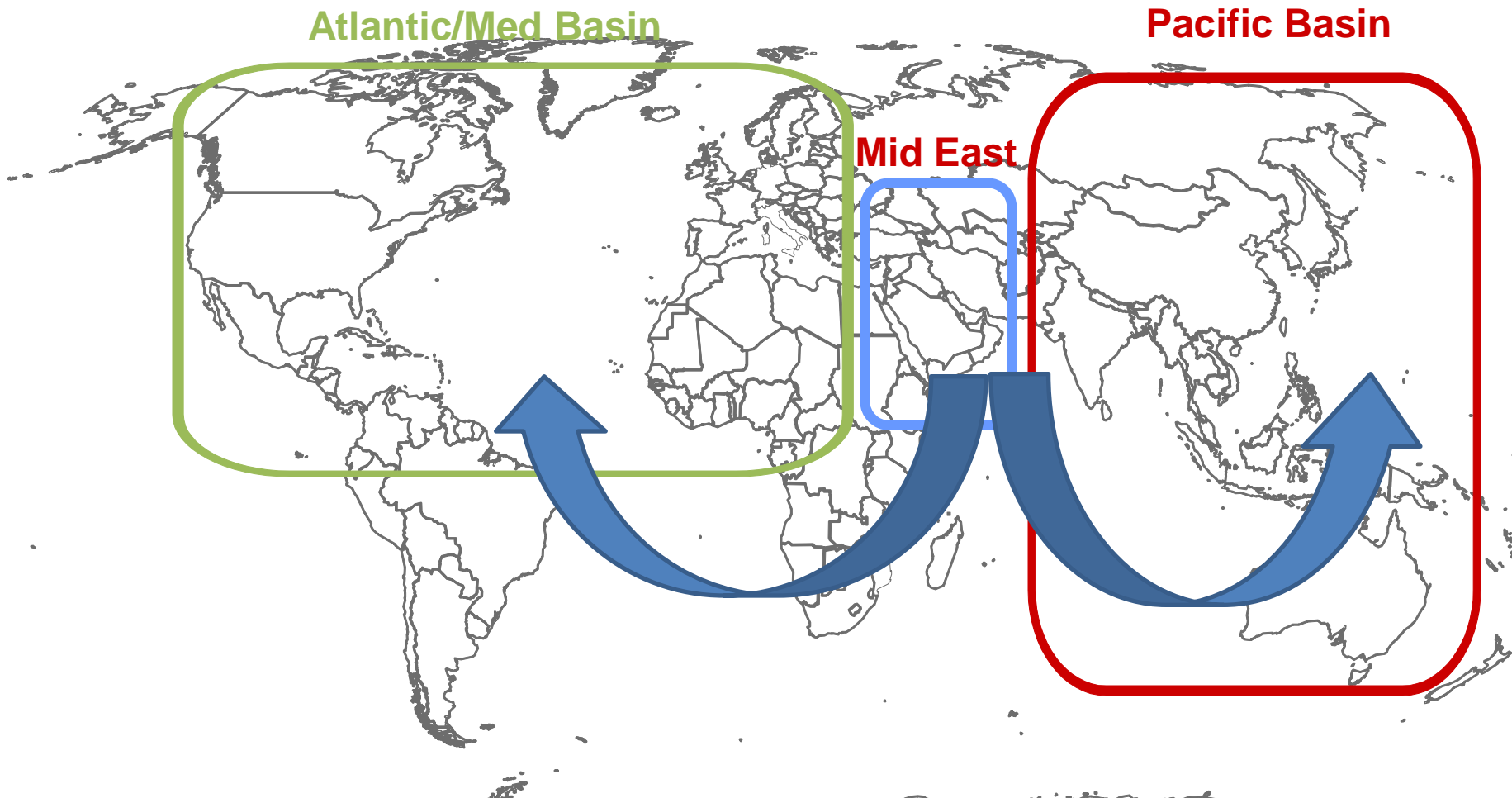
Prepared for New America

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The Oil Trading System



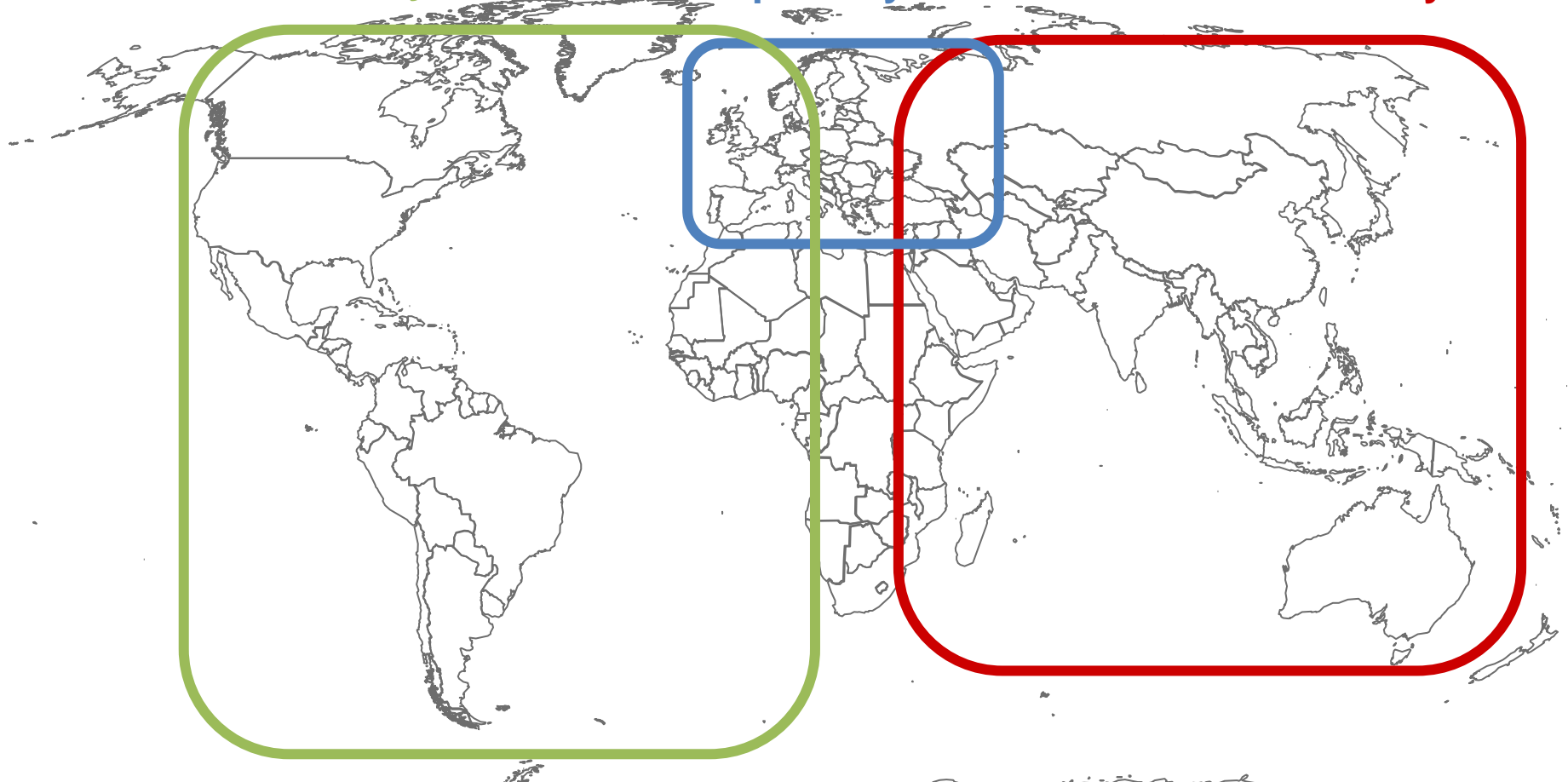
The Middle East swung between the Atlantic Basin and the Pac Basin
– If their net import requirements were rising price went up

Future Crude Oil Systems

Atlantic System

European System

Pan-Asian Grid System

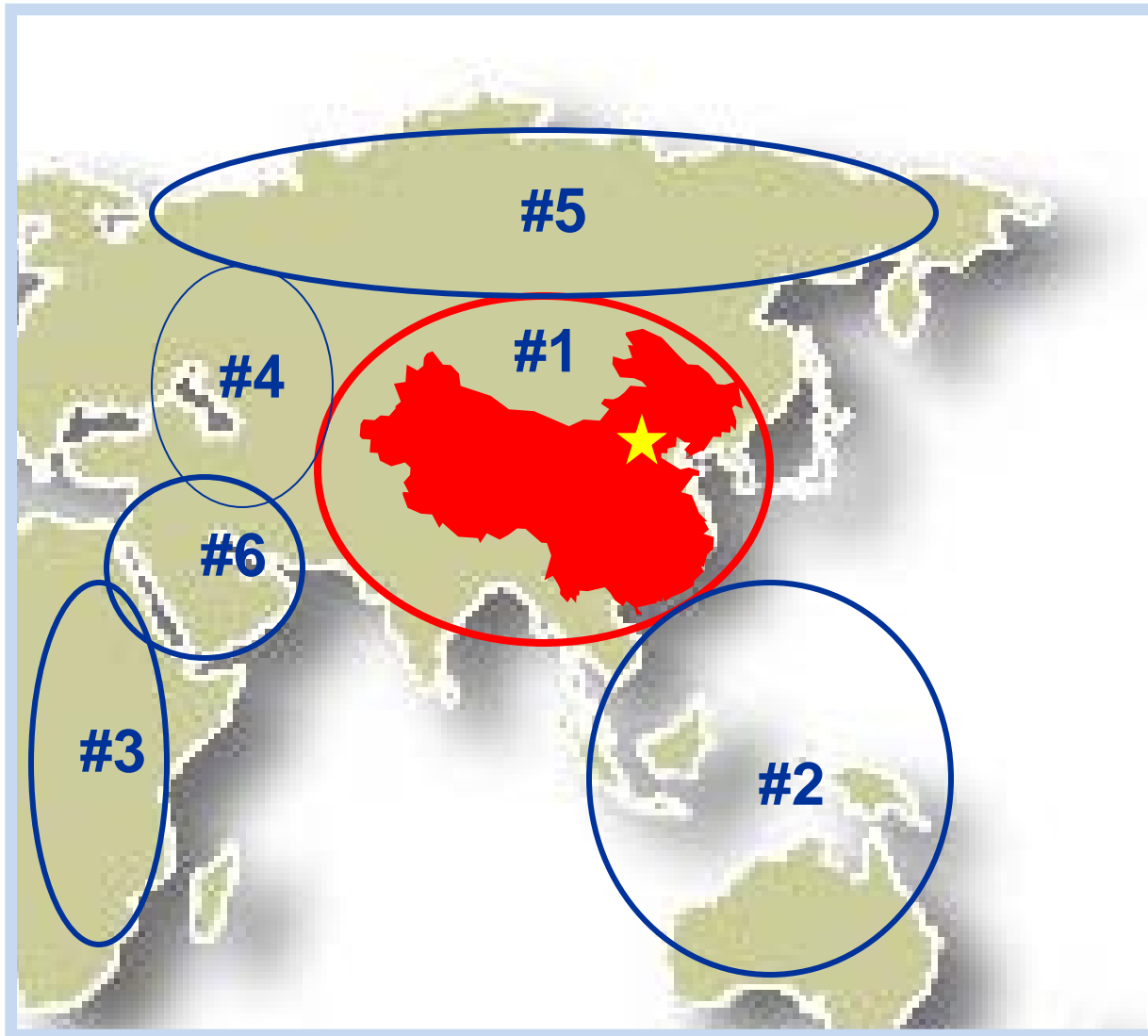


The bulk of the crude oil trade will take place within these regional systems, however, some leakage is likely

China: Regional Preferences For Sourcing Oil

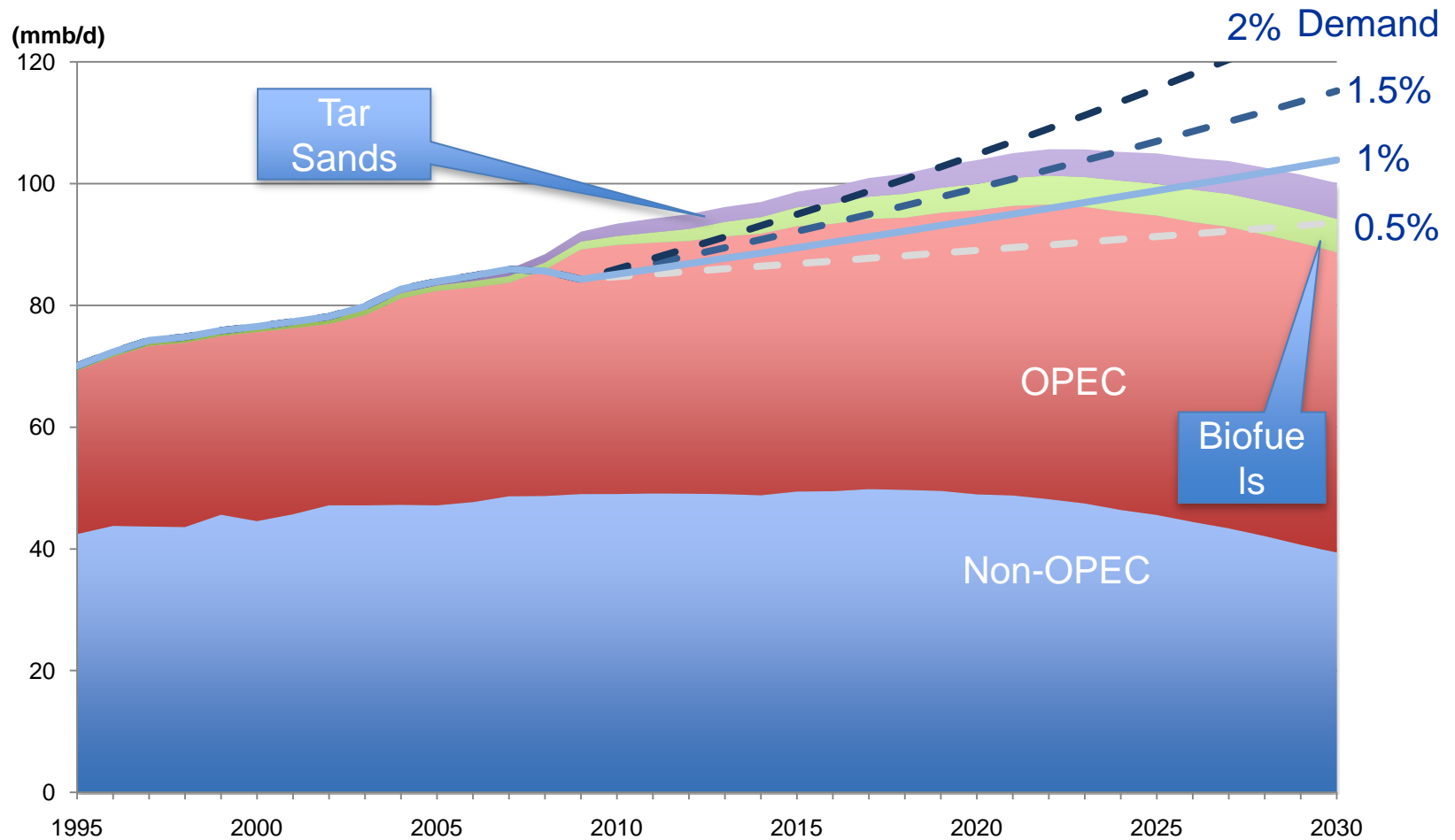


**Dragon
Zone
(Local)**

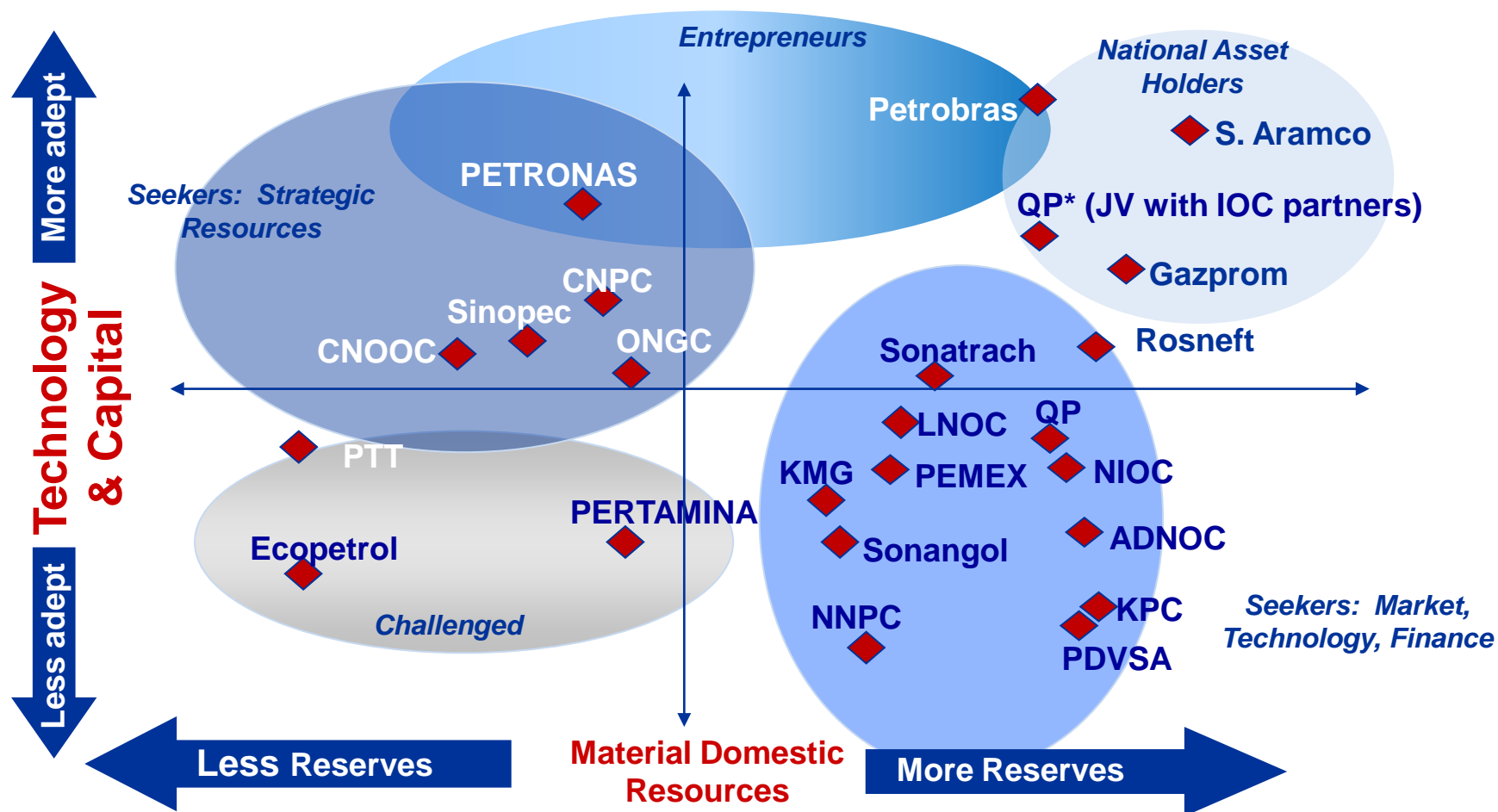


**Panda
Zone
(Global)**

Global Supply of Liquids Sufficient for Now



The NOC Landscape is Changing



Note: Positions of NOCs in graph are indicative only and not to scale.

Broad Conclusions on Energy Transitions

- **Taken together, current trends suggest that a major energy transition is unlikely before 2020. It is only after that date that trends such as the exhaustion of cheap oil or China's conversion to a consumer society might raise prices enough to trigger long-term changes.**
 - When oil prices appear to be permanently headed toward a significantly higher band, the switch to new energy resources may be much more rapid and comprehensive than many would expect.
 - The cyclical interaction of oil prices and unconventional gas development will kick in.
 - A series of alternative energy technologies that already exist but are not commercially viable will suddenly become profitable.
 - Some of the local smart grids built during the 2010s will start to illustrate their synergistic effects and such grids will be expanded to the national level as rapidly as possible.
 - Electric vehicles will sell as quickly as the grids can be built to sustain them.
- **These changes will obviously occur more quickly in some societies than others. In the “Neuro” countries of Old (Northern) Europe, plus Japan and its satellites, they will already have been underway. The conversion of the US to the new technologies will begin the moment prices stabilize at a higher level. China will follow shortly thereafter.**
- **The bulk of the industrial world, therefore, may have completed the transition as early as 2025-2030.**



- In 2008, many analysts hoped/feared that the world was on the verge of an “energy transition” away from hydrocarbons.
- Crude prices rose to almost \$150 per barrel and worries about peak oil seemed real.
- UN-sponsored negotiations about preventing climate change seemed poised for success.
- The new American president promised to lay the foundations for a “21st-Century” economy including renewable energy, clean tech, and a smart grid.



- By 2010 analysts painted a completely different picture, in which an energy transition was extremely unlikely.
- Oil prices had fallen, and when they began to rise again analysts blamed commodity cycles rather than peak oil.
- International climate talks had collapsed at Copenhagen and the Kyoto process looked unlikely to be extended.
- The new American president was not able to pass any of his energy agenda before voter concerns about debt obstructed further action.

What Happened?

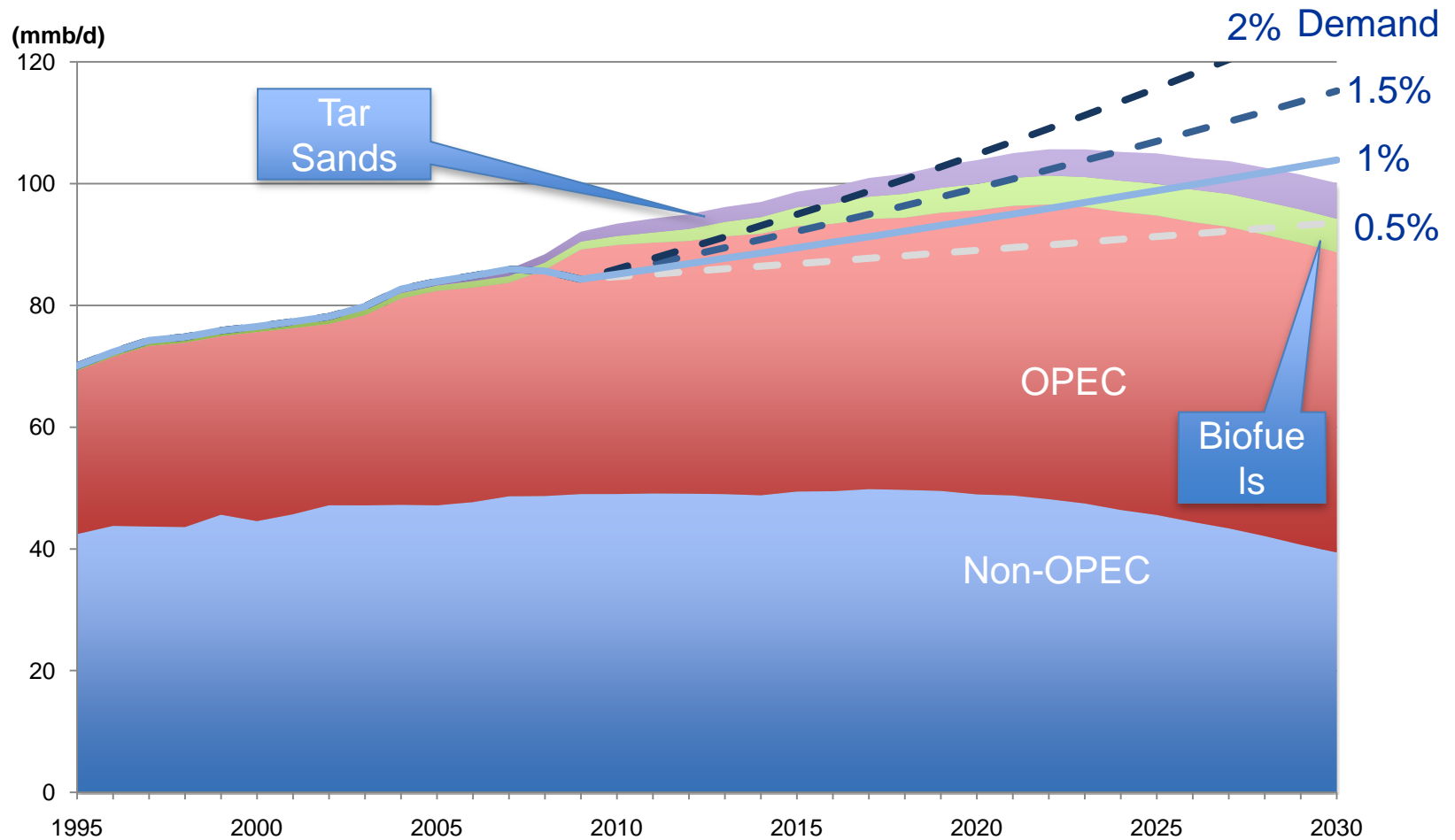


- In the long-term the world faces very real problems in terms of the exhaustion of cheap oil and the growing prospect of climate change.
- But in the short-term, the international financial crisis in late 2008 transformed the priorities of citizens and leaders alike.
- Dealing with a massive burden of bad debts, which threatened to hobble the industrial economies, slowing their growth and fueling unemployment, became the highest priority.
- Investment in clean tech and smart grids retained some allure (although fears of climate change evaporated). Yet since their benefits would only be manifest over the long term, demand for new energy technologies was postponed indefinitely.

Perceptions Versus Structural Changes

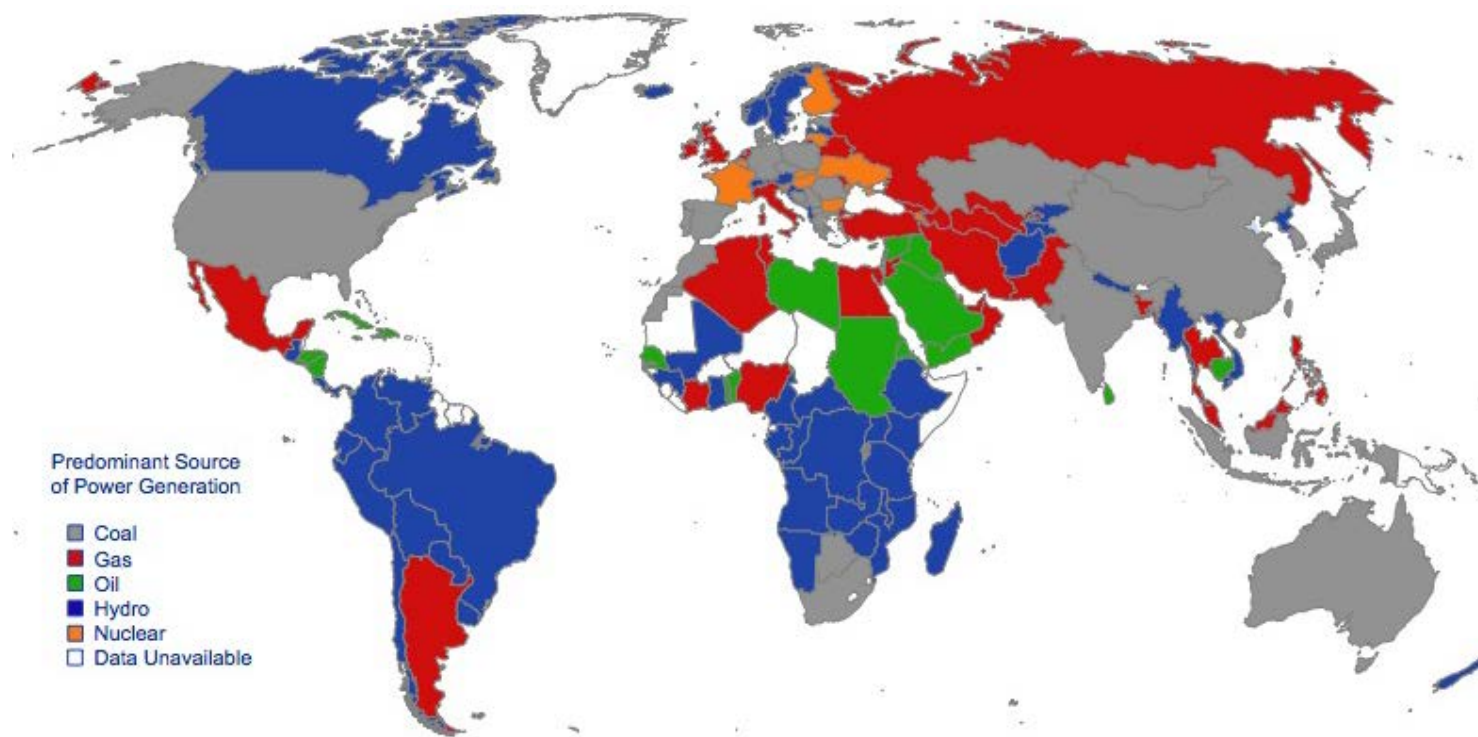
- **The volatility of this change in public perceptions warns us that the picture might reverse again, quite rapidly.**
- **But what sort of events might bring about such an inversion and restore demand for new energy technologies.**
- **There are some unpredictable events that might trigger the change:**
 - A major disaster that convinced the public that dealing with climate change was urgent (a meltdown of Greenland's ice cap or a series of hurricanes hitting England)
 - A technological breakthrough that made some energy vastly cheaper than hydrocarbons (cold fusion)
 - An unforeseen turnaround of the global economy, restoring jobs and rapid economic growth
- **But there are also other, structural forces that will more slowly (but more certainly) restore demand for new energy technologies.**

Global Supply of Liquids Sufficient for Now



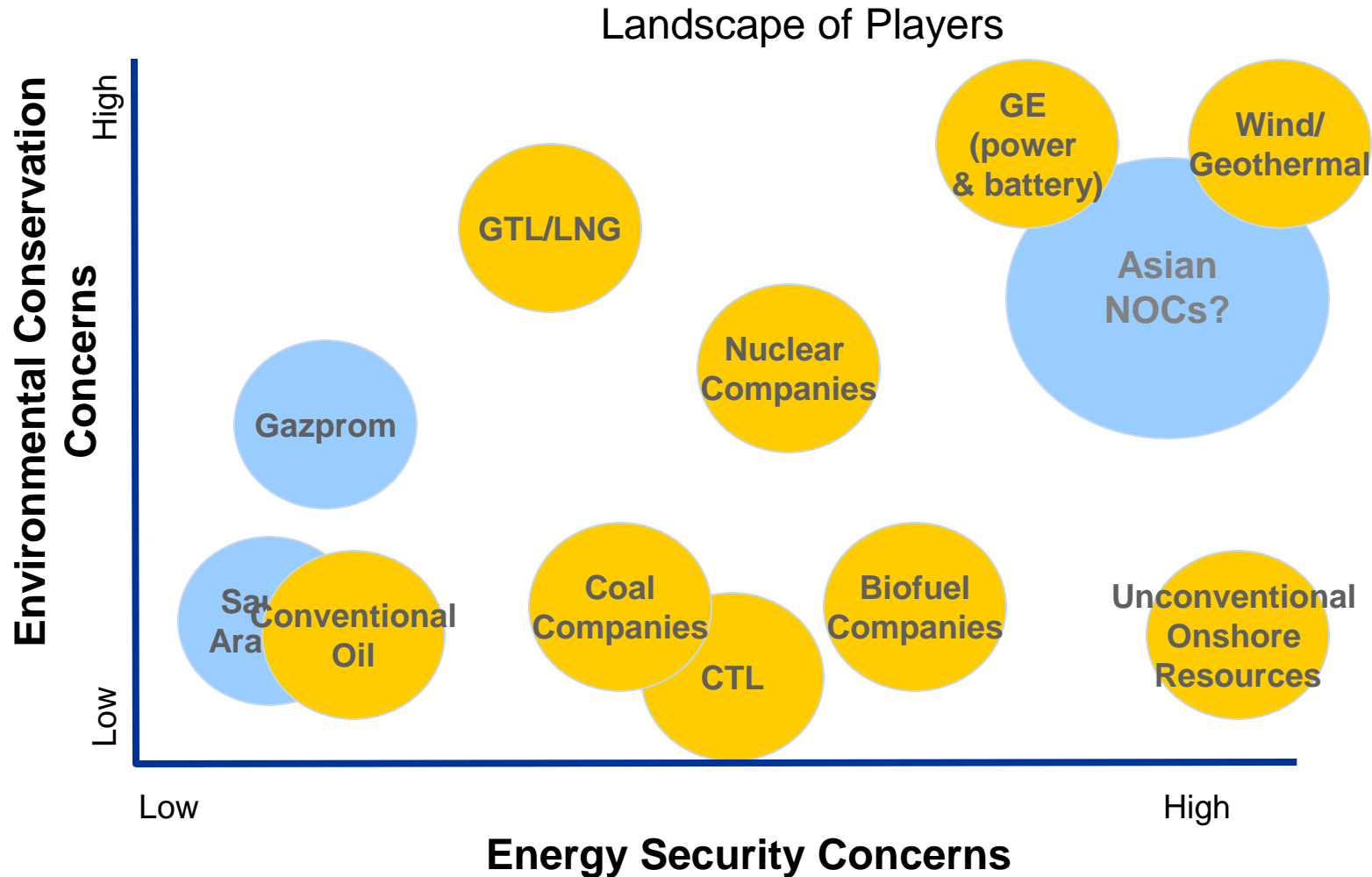
- China's 12th Five-year-plan mandates a shift from Beijing's traditional export-led strategy to a new formula aimed at raising incomes within China and re-orienting production toward the domestic market.
- This will begin to assuage the problem of global macroeconomic imbalances by 2015. China cannot end the imbalances by itself, of course: the US will still have to learn to live within its means.
- Chinese consumers will already have emerged as a major market by 2015, although the Middle Kingdom will not be a true consumer society before 2020.
- Although Chinese firms will be the primary beneficiaries of this transition, Western firms that learn to meet demands for which Chinese have fallen short, will have enormous opportunities.
- Chinese demand, especially for cars, will increase global demand for oil and drive up prices. This too might foster an interest in new energy sources.
- The Chinese government is aware of this trend and is already working hard to diversify its energy resources by pioneering new technologies. For example, the government hopes to pioneer the development of electric vehicles—to ease demand for petroleum, to reduce domestic pollution, and to dominate an important 21st-century technology market.

A Multi-fuel Energy Transition



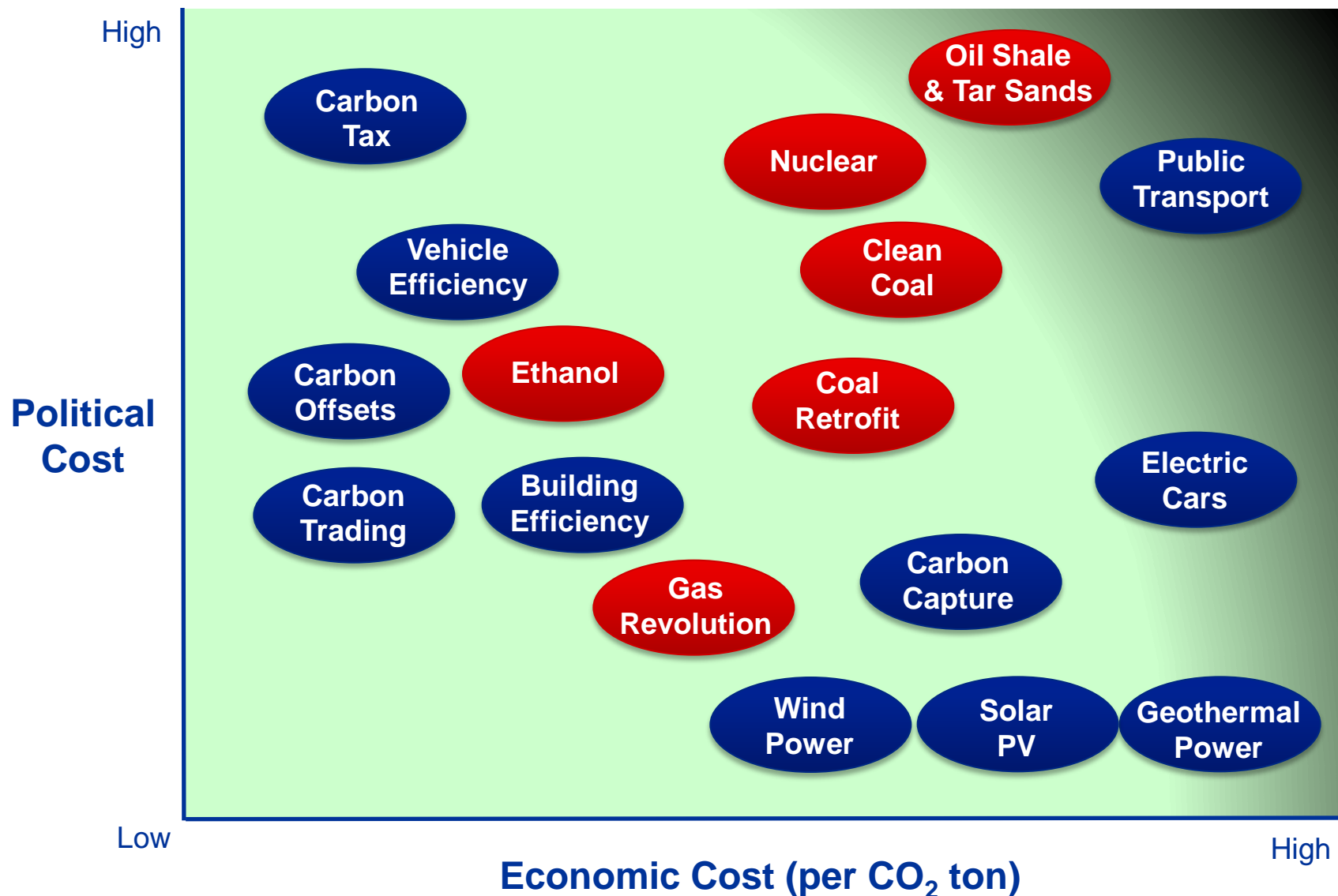
- **Vaclav Smil has written some excellent studies of earlier “energy transitions,” such as the one from biomass (wood) to coal, or from coal to petroleum. He notes that these transitions typically occur only under extreme pressure and can take as much as 50 years to accomplish.**
- **But the next energy transition may not be like that. There is no single energy source on the horizon that can by itself replace petroleum. Rather, a gap is emerging between the global energy demand and the availability of relatively cheap, relatively clean hydrocarbons.**
- **That gap will be covered not by a single new fuel, but by many different technologies.**

Oil Era: Post-Oil Era 20??+ (Consumer Driven)



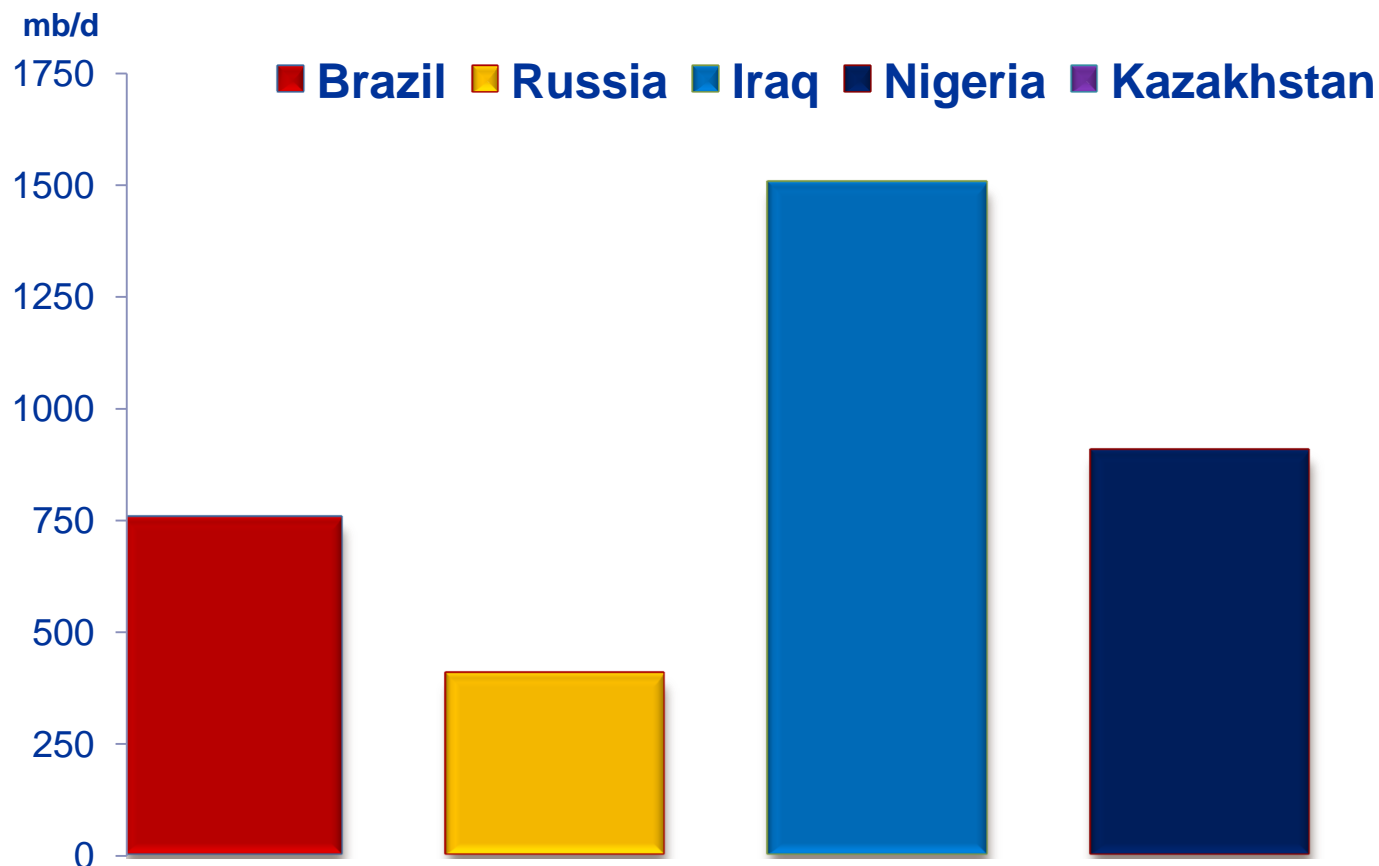
No one in control, but successful actors will be those who become “energy providers”

Energy Policy: Political & Economic Tradeoffs



Meet The BRINKs: OPEC's Coming Challenge

Incremental Production 2010-15



The BRINK countries will add around 4.2 million b/d of new crude oil capacity by 2015