

A black and white photograph of a hand holding a white marker, writing on a whiteboard. The word 'TERRA' is partially visible on the board. The background is blurred, showing other people in a meeting.

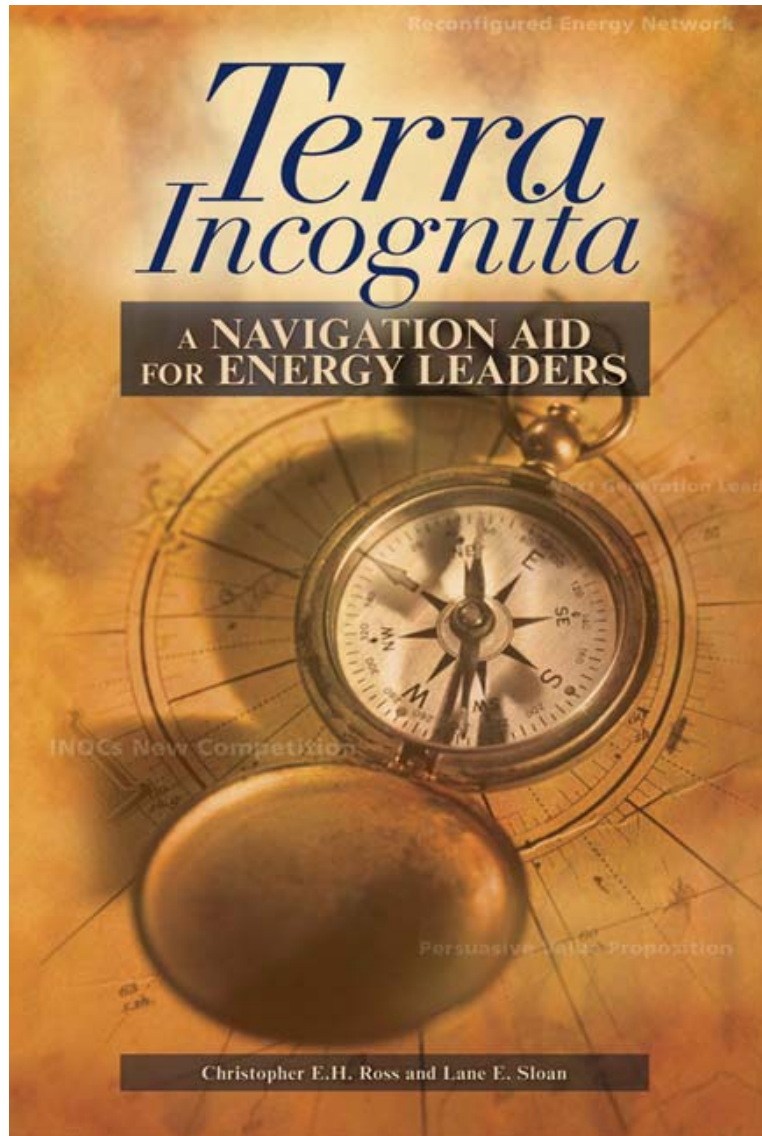
Terra Incognita: A Navigation Aid for Energy Leaders



INTERNATIONAL

Marine Technology Society
April 24, 2007

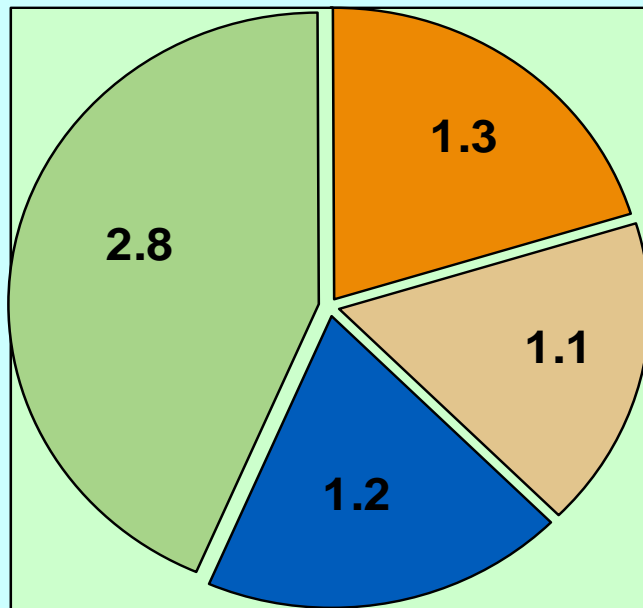
The energy world is changing – a leadership challenge



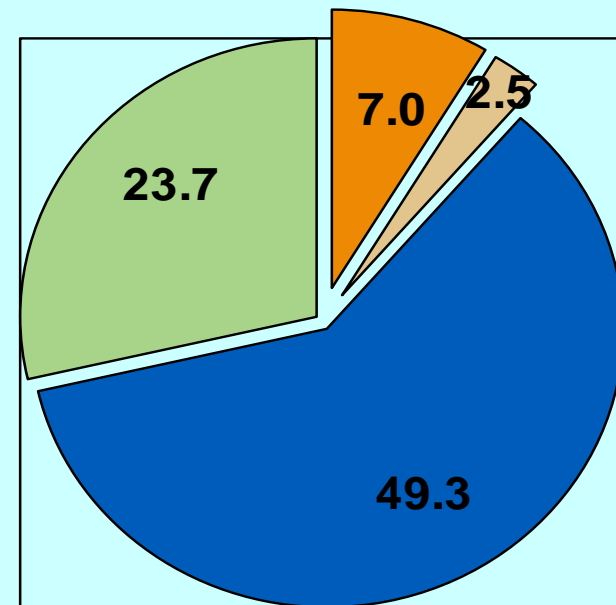
1. **Global energy complex is entering its third phase change**
2. **IOCs are losing competitive position in conventional resources**
3. **Demand trends are not sustainable - China and India rise to materiality requires a “Phase Change” in the global energy complex**
4. **Society’s ascent of the Maslow hierarchy increases expectations of energy companies – security and climate must both be addressed**
5. **Previous shareholder value propositions are becoming unpersuasive**
6. **Old strategies are threatened - the “phase change” demands a different approach to strategy development**
7. **The industry must revitalize its portfolio and refine its parenting advantage**
8. **Execution increasingly requires driving down the cost of high cost resources**
9. **Leadership has never been more important**

China and India rise to materiality changes everything

World Population (Billion in 2005)

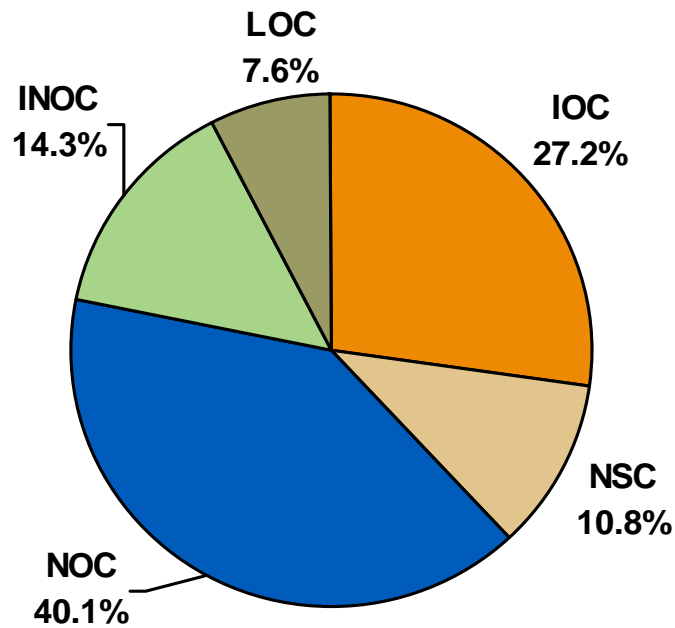


Oil Consumption (MMBD in 2005)



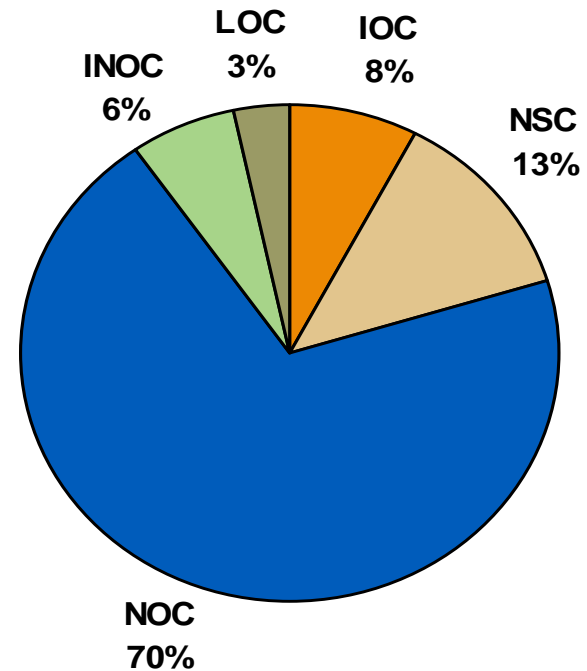
Industry structure is not sustainable

Liquids Output



Top 50 Share of Global Total = 79%

Liquids Reserves



Top 50 Share of Global Total = 84%

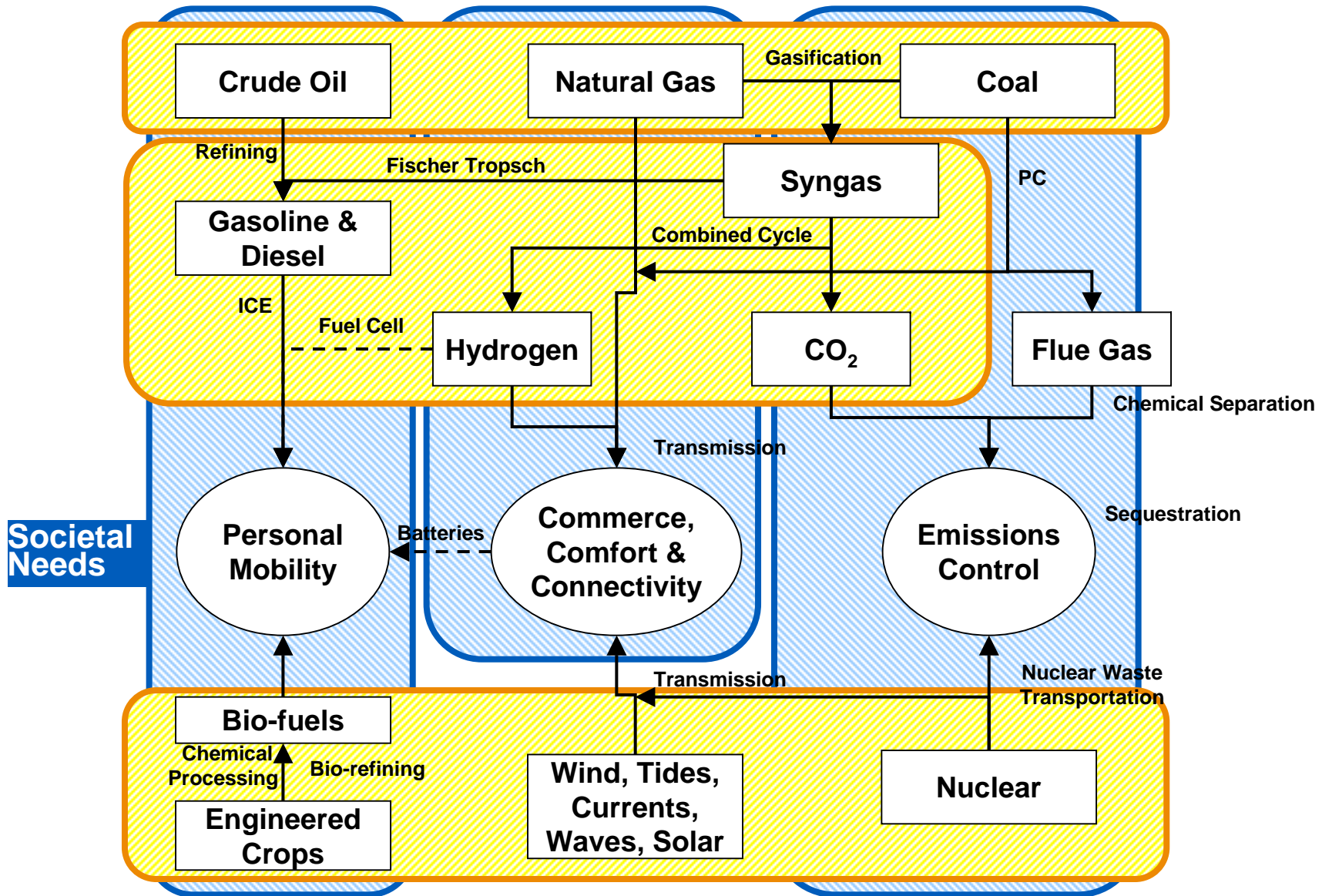
Source: PIW's Top 50: How the Firms Stack Up (www.energyintel.com)

Western society's ascent of the Maslow hierarchy increases expectations of energy companies

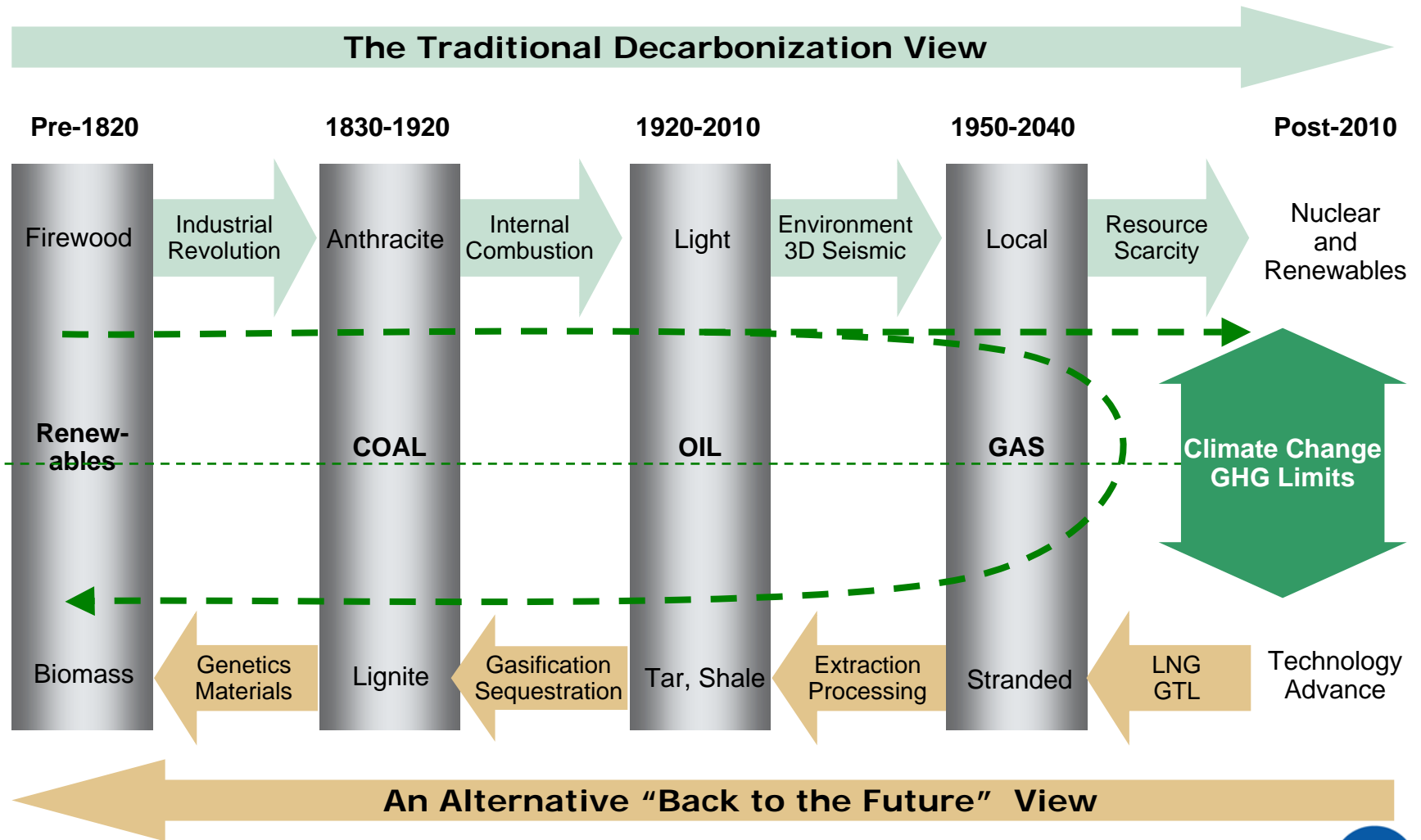
TIME FRAME	MASLOW'S NEED LEVEL	ENERGY IMPACT
21st Century?	Self-Actualization	<ul style="list-style-type: none"> • Sustainable World • Freedom of Personal Choice
2nd Half of 20th Century	Ego	<ul style="list-style-type: none"> • Consumer choice • Communities of Interest
1st Half of 20th Century	Socialization	<ul style="list-style-type: none"> • Work Conditions • Emergent Leisure • Personal Mobility
19th Century	Safety & Security	<ul style="list-style-type: none"> • Reduced Toil • Economic Livelihood • Light & Mass Mobility
Pre-Industrial Revolution	Survival	<ul style="list-style-type: none"> • Warmth & Cooking

“If a problem cannot be solved, enlarge it.”
Dwight D. Eisenhower

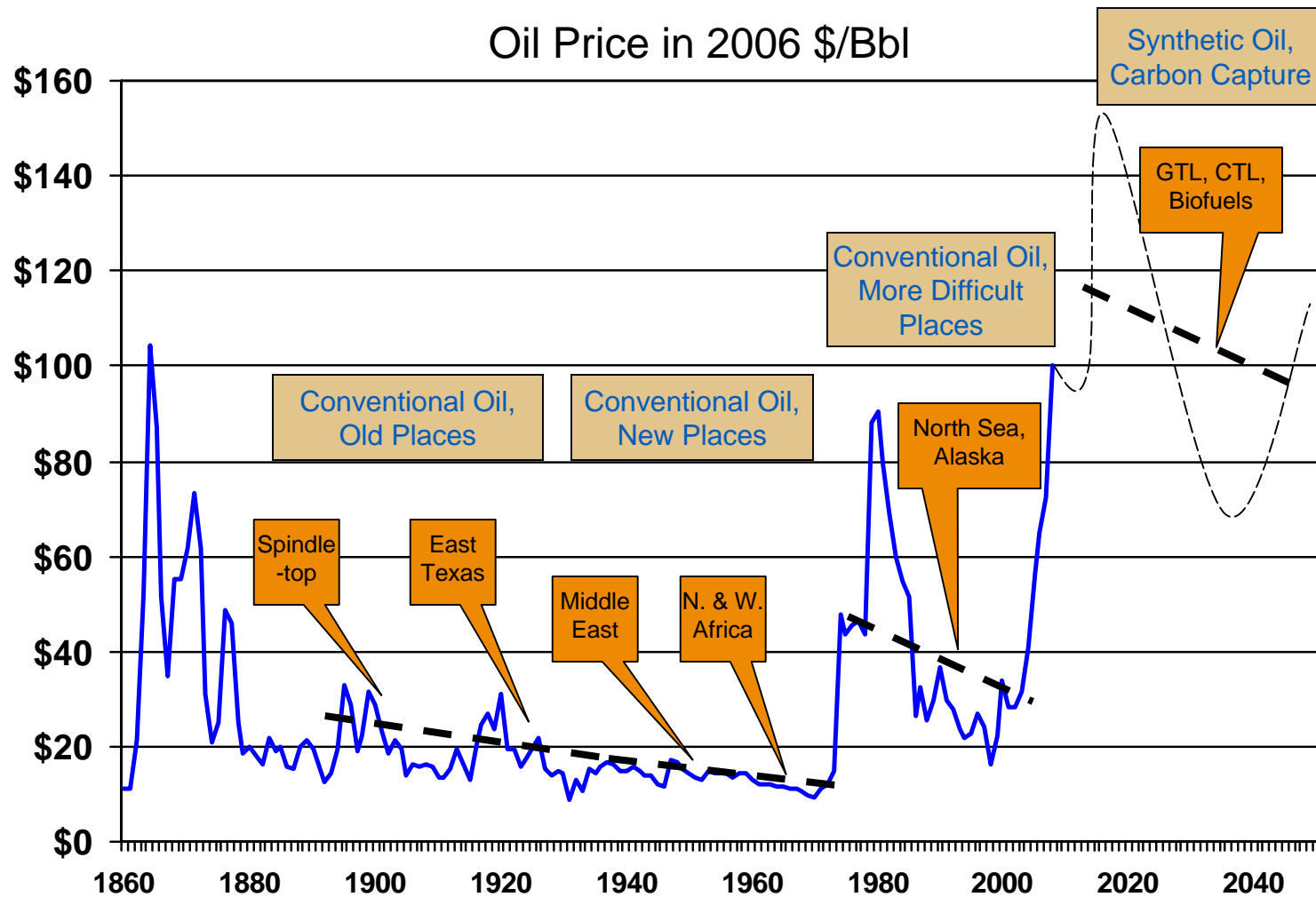
The Phase Change opens up new business models ...



If oil peaks, it seems likely that there will be a need to reconsider the coal value chain as well as biomass



It is unlikely that we will revert to the 1990s price trend



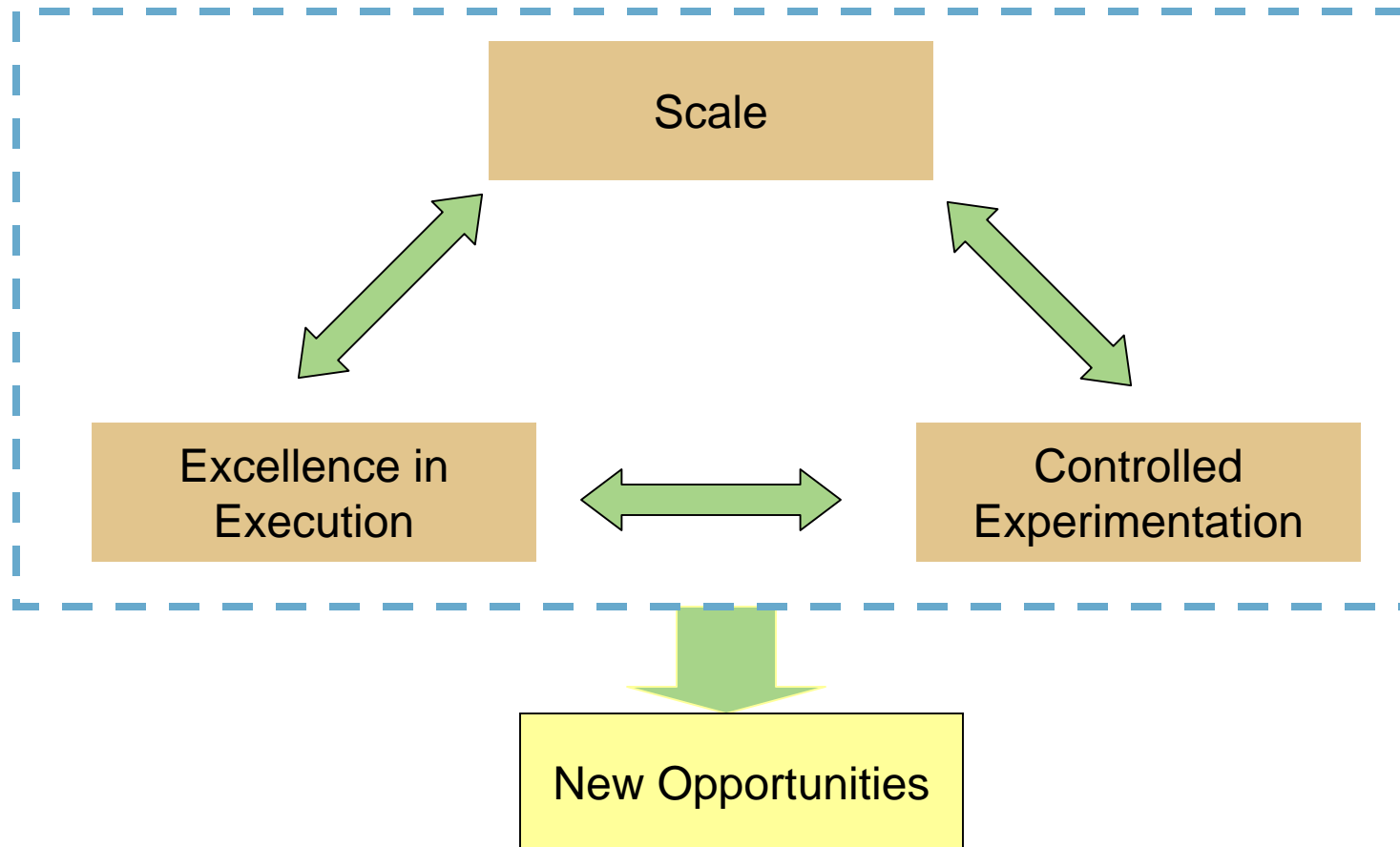
So, what are the downwind opportunities?

- **Become the low cost producer of high cost resources**
 - EOR; key competency = reservoir
 - Building factory-like production systems for tight gas and coal bed methane; key competency = SCM
 - Developing integrated oil sands/ refining systems to transform bitumen into transportation fuels; key competency = conversion
 - Monetize stranded gas; key competency = major projects
 - *Deep water and Arctic exploration; key competency = production systems*
- **Broaden the scope of the value proposition offered to resource rich countries to access conventional resources:**
 - Assess real needs of government, NOC and communities
 - Be prepared to address these needs with human, institutional and industrial development, jobs and engagement of local partners
- **Create options in unconventional sources of transportation fuels and work to enhance the technology:**
 - Biological or chemical cellulosic biofuels manufacture
 - Improving on gasification and synthesis for synthetic liquids (CTL, GTL, BTL) and perfecting carbon capture and storage systems
- **Reconsider position on participation in power generation**
 - Leverage competencies in low cost project management and plant operations

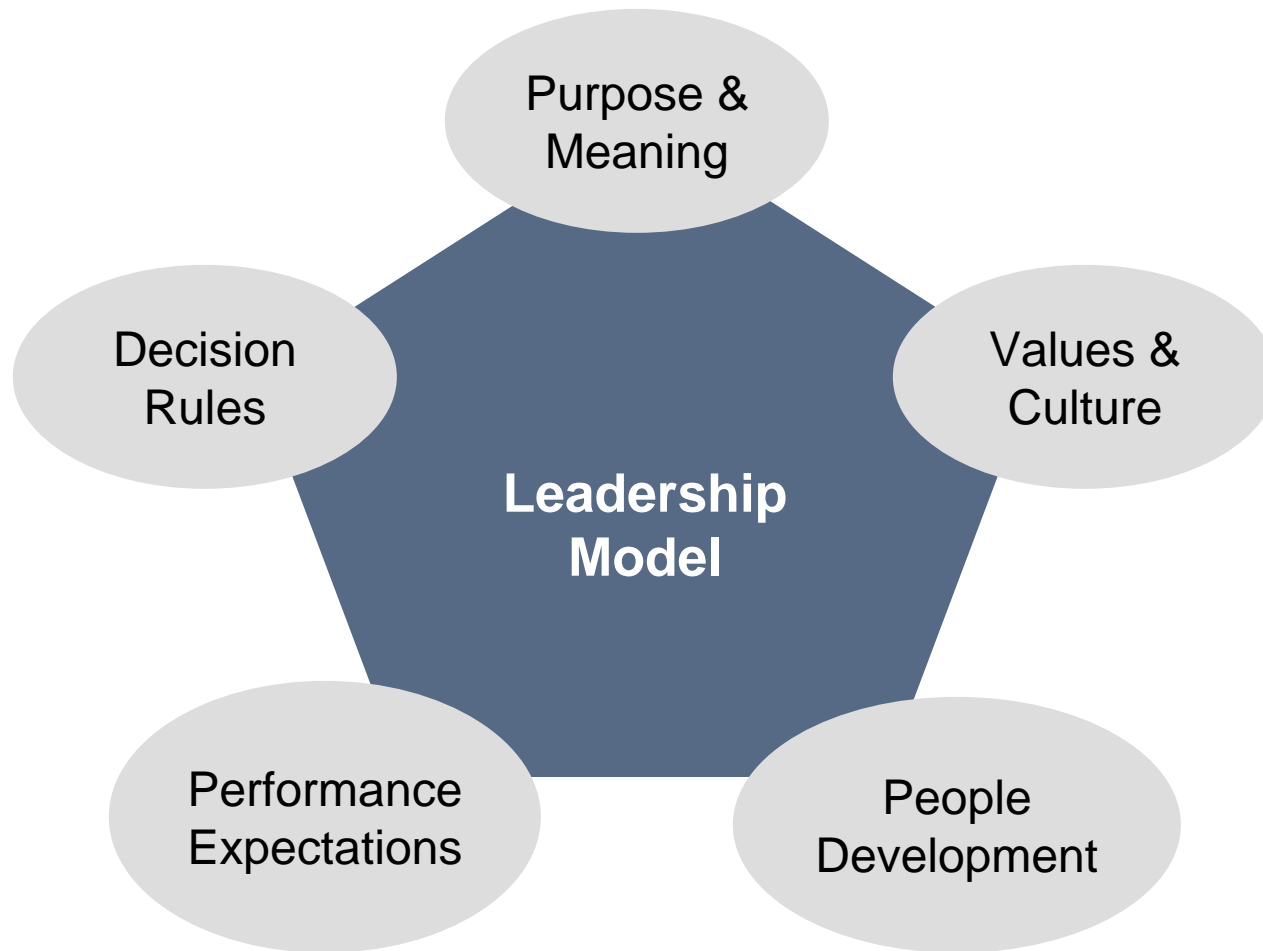
... and what are the main risks to be managed?

- **Resource nationalism**
 - Stiffer fiscal terms
 - Retroactive changes
- **Greater competition from INOCs and private capital**
 - Inflated bids
 - Broader value propositions
- **Proliferation of projects to meet India/ China growth**
 - **Cost inflation**
 - Longer cycle times
- **Aging/ turnover in work force**
 - **Higher costs**
 - Execution problems
- **Societal expectations**
 - Uncertain cost of carbon emissions
 - NIMBY project delays
- **Accelerating technology change**
 - Reduced demand in OECD
 - Supply innovations
- **Business model innovation**
 - Offshoring and bundling services
 - Industry restructuring

Toward Low Costs for High Cost Resources



The foundation is a robust leadership model



See also *Systems Thinking – Managing Chaos and Complexity: A Platform for Designing Business Architecture* p58 by Jamshid Gharajedaghi for a similar leadership model, derived from manufacturing plants

“The winds and waves are always on the side of the ablest navigators.”

Edward Gibbon, Decline and Fall of the Roman Empire