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Welcome to another issue of *CRA Insights*, a newsletter for our clients that profiles interesting developments occurring within the oil and gas industry.

Our current issue describes the many challenges facing the energy industry in the 21st century and suggests that a phase change in energy is emerging that will have a major impact on established energy firms. This topic was explored in detail in a recent book sponsored by CRA, *Terra Incognita: A Navigation Aid for Energy Leaders*. We are profiling this thought provoking topic and many of the authors' compelling conclusions in this edition of our newsletter.

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Discovering shareholder value in terra incognita

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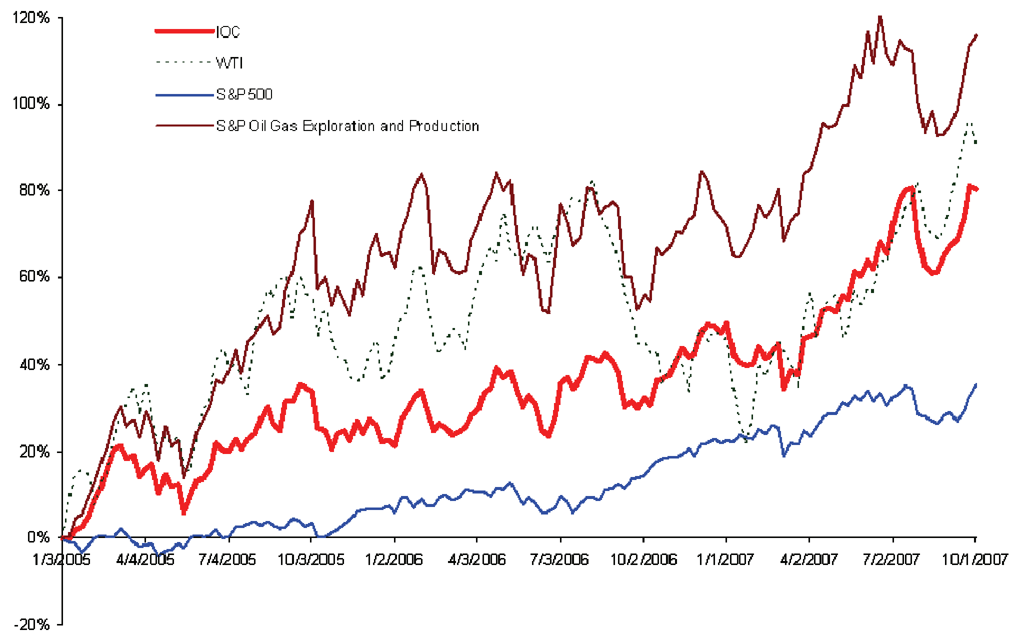
On the face of it, large IOCs[1] seem to be doing quite well in creating shareholder value. From the beginning of 2005 through the third quarter of 2007, their shareholder returns (including dividends) were 79 percent, handily outpacing the S&P 500's 34 percent (Figure 1). But more focused companies in the S&P Oil Gas Exploration & Production Industry Index earned returns (including dividends) of 113 percent. The IOCs have emphasized their capital discipline during this period of record operating cash flows. As evidence, they point to the fact that they only invested about half of their operating cash flow in new projects. Instead, they used excess cash to buy back stock to the tune of a cumulative $110.3 billion in 2005 and 2006.

The current IOC leaders were surely basing their decisions to return large amounts of cash to their shareholders at least in part on their memories of the market reaction to the excesses of their predecessors in the 1980s. At that time, corporate raiders accused them of squandering value on uneconomic projects and building excessive cost structures created on false expectations of ever rising prices. Today's leaders are keen to avoid the same mistake.

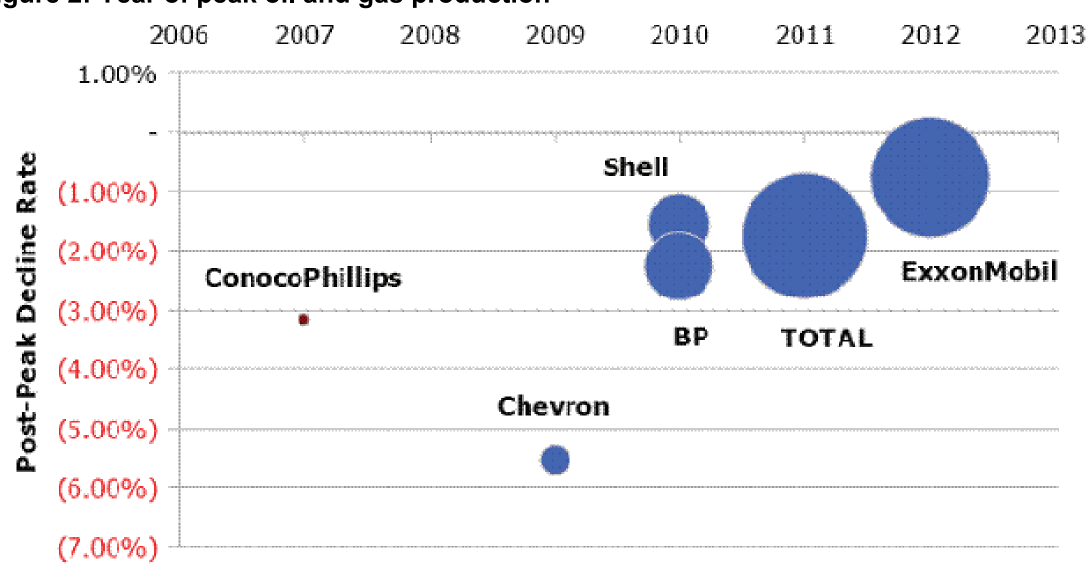
[1] In this article, aggregate data is presented for the largest super-major international oil companies (IOCs): ExxonMobil, BP, Shell, Chevron, Total, and ConocoPhillips. We also refer to internationalizing national oil companies (e.g., Statoil, Petrobras, Petronas, ONGC, OIL, CNPC, Sinopec, and CNOOC) as INOCs, and national oil companies (e.g., Saudi Aramco, QP, KPC, ADNOC, NNPC, PDVSA, Sonangol, Sonatrach, etc.) as NOCs.

Figure 1: Total returns: IOCs vs. WTI and S&P indices (January 2005 to September 2007)



Yet, the present increases in oil prices—WTI oil prices increased by 71 percent from January 2005 to September 2007—are much more likely to be permanent, and the consequences of the current low rate of investment, according to JS Herold, is that the large IOCs will hit peak production from 2008 to 2012 and decline at rates of up to 5 percent per annum after the peak (Figure 2).

Figure 2: Year of peak oil and gas production



Bubble size indicates 3-year ahead average production growth rate

Source: JS Herold

A recent book sponsored by CRA, *Terra Incognita: A Navigation Aid for Energy Leaders*, argues that shareholder value propositions and strategies that worked well in the past may not work as well in the future. In this paper, we examine that proposition in more detail.

Barriers to growth

The large IOCs present their low reinvestment rate as evidence of capital discipline. They are not going to fall into the agency trap of making uneconomic investments. Capital discipline is achieved by selectivity as one senior exploration executive told us: "never drill the bottom half of your portfolio." But a larger portfolio of options will allow more investments while respecting this maxim. The problem cited by IOC leaders is that too many of the world's resources are inaccessible, and this makes it hard to expand the portfolio of opportunities.

Learn more about *Terra Incognita* . . .

In *Terra Incognita: A Navigation Aid for Energy Leaders*, authors Chris Ross and Lane Sloan explore the daunting challenges that face the energy business in the 21st century. They declare that the world will soon face a phase change in energy, which will have a major impact on deeply established energy firms. A new paradigm will emerge that does not just involve new fuels and technologies but includes a different set of expectations from consumers and a changing competitive market.

The book is being received quite favorably in the business community:

- *Petroleum Intelligence Weekly* recently profiled *Terra Incognita* offering a detailed synopsis and a comment from Energy Intelligence president Tom Wallin remarking that Ross and Sloan arrive "at some provocative conclusions."
- A large independent oil and gas company has adopted the book as part of its management development program, and the senior leadership team intends to debate the key issues arising from the book over the course of 2008.
- The technology development unit of one major oil company and an internal advisory group in another major provided copies of the book to their leadership teams to provide a broad context for their 2008 planning.
- Several leadership teams and boards of directors of large oil and gas companies have invited Chris Ross to present the main findings and open a discussion on the key implications for their companies.

Terra Incognita is published by PennWell Books and can be ordered from online distributors including pennwell.com, amazon.com, and barnesandnoble.com.

Implicit in this judgment is that large IOCs should "stick to their knitting" and focus on traditional investment targets and practices. This implies beliefs that:

- Long-established value propositions to resource owners should govern access discussions.
- Energy prices will not reward capital investments in unconventional resources.
- Classic valuation methodologies are appropriate for novel investment ideas.

We believe all these assumptions are open to challenge.

The problem with sticking to their knitting is that the IOC investment sweet spots (i.e., deep water, heavy oil, stranded gas) are unlikely to provide sufficient space to economically reinvest all operating cash flow (Figure 3), and the opportunities outside those sweet spots present competitive problems. Conventional oil and gas in the Organisation for Economic Co-operation and Development (OECD) countries has become violently competitive, and IOC strengths of scale, financial strength, and technology are less important than fleetness of foot and the willingness to bear risk. In fact, some mature IOC assets may be worth more to others than under the IOC corporate umbrella. Further, IOCs are not yet as effective in developing unconventional gas resources as are smaller, more specialized companies that have built tailored, decentralized business processes to drive down the costs of "gas factories."

Outside the OECD, IOCs face intense competition from INOCs with broader value propositions. For example, in West Africa, Chinese and Korean companies have offered broad packages of infrastructure development programs as part of broad ranging deals that include access to resources. IOCs have not yet developed a persuasive response to this competitive threat. And there are areas that are inaccessible to IOCs either because of a national oil company monopoly or a political embargo.

IOCs have disfavored refining for decades, investing mainly in mandated product quality improvement, and are just now beginning to reinvest discretionary capital in equipping refineries to process heavy syncrude. There are still opportunities in emerging economies, though these will require alignment with the interests of NOCs. Finally, IOCs are still uncomfortable with investments in the power sector.

Figure 3: IOC investment sweet spots cannot absorb cash flow

	Conven-tional Oil	Conven-tional Gas	Tight Gas/ CBM	Deep Water	Heavy Oil	Stranded Gas	Refining	Power/ CTL/ BTL
OECD	Competition from MLPs & private capital driving down returns		Specialist Gas Factories; decentralized business model	Current IOC focal areas for investment and growth, leveraging financial, technological and market strength Need crisp, well-designed business strategy Different competitors in each segment: majors & independents (deep water), Canadians (oil sands), INOCs and regional power & gas "gatekeepers" for LNG			Relinquished market share; opportunity in syncrude integration	IOCs have compet-encies and capital but fear of regulated businesses
Non OECD	Rejuvenate value proposition		Not yet material				Opportunity in growth and upgrading; coopetition with NOCs	Capacity markets may present new interest

Returns threatened by intense competition

Requires non-traditional competencies or higher risk

IOC focal point

IOCs are left with a narrow spectrum of opportunities in mega-projects covering oil sands and extra-heavy oil, stranded gas monetization (LNG and possibly GTL), and exploration in hostile environments such as the Arctic and ultra-deep water. It is unlikely that these opportunities will be sufficient to sustain production, let alone create growth, and will cause the IOCs to be left returning large amounts of cash to investors even as rivals raise capital to pursue their new projects.

Parenting advantage = Enterprise value/Asset value

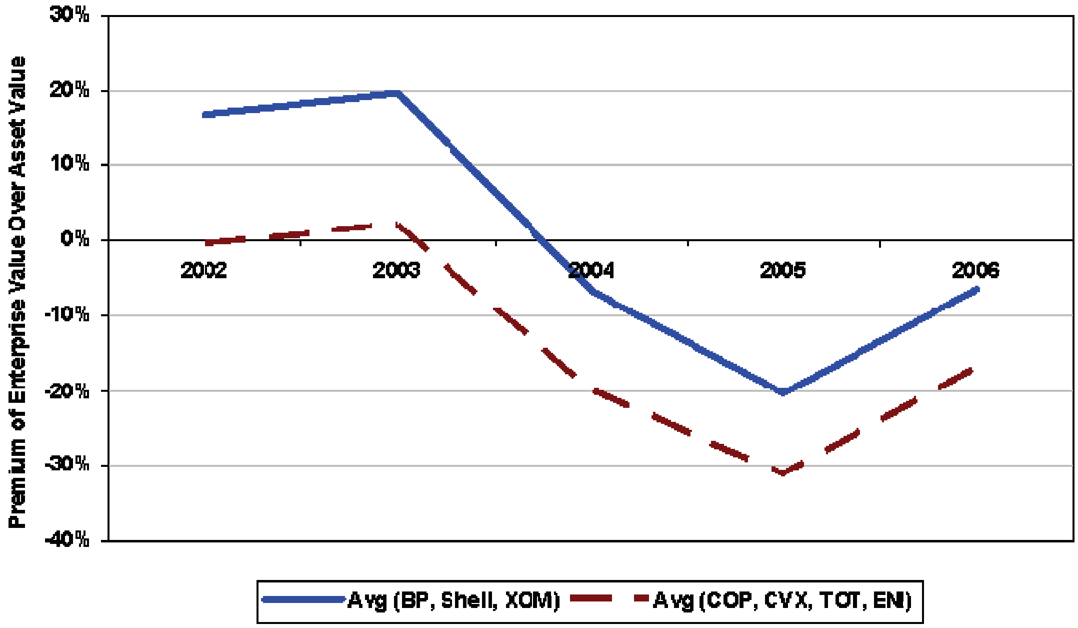
One way of keeping track of the value added by corporate leadership is to calculate the "parenting advantage" that they have created by comparing the market value of their assets to their enterprise value. Each year, JS Herold analysts appraise the market value of the assets of the companies they track and also document the enterprise values. The parenting advantage for the large IOCs has shifted from positive in 2002 and 2003 to negative in recent years (Figure 4), with the smaller super-majors lagging the largest super-majors. The implication is that (before considering tax implications) these companies, absent a change in approach, are worth more broken up than they are worth as going concerns.

Maximizing value of existing assets

There are various reasons why some of the smaller IOC assets may be worth more to third parties. One often cited reason is that their cost structures may be higher than their more focused competitors, especially for more mature assets. Some independents assert that they not only operate assets acquired from IOCs with lower operating costs, but they are also able to extract more oil from the reservoirs due to their greater attention to detail and business models that tie compensation closely to value creation in smaller assets.

In addition, there may be diseconomies of scope in several classes of assets that offset the IOC advantages of scale; for example, the business model that seems most effective for unconventional gas production is quite different from that of mega-project development. IOC leadership's need for process consistency may be designed for effectiveness in one type of business to the detriment of another. But there are ways to mitigate these problems through more tailored organizations, which will be discussed in a future newsletter.

Figure 4: Premium of enterprise value over asset value



Source: CRA International based on data from J.S. Herold

Further, there may be companies with lower costs of capital that can justifiably pay more for assets than they are worth to the large IOCs; for example, tax advantaged vehicles such as master limited partnerships (MLPs) and royalty trusts may be able to distribute free cash flow to investors more efficiently than can conventional stock companies. This allows the MLPs to discount the value of future cash flows at lower rates than the IOCs typically use.

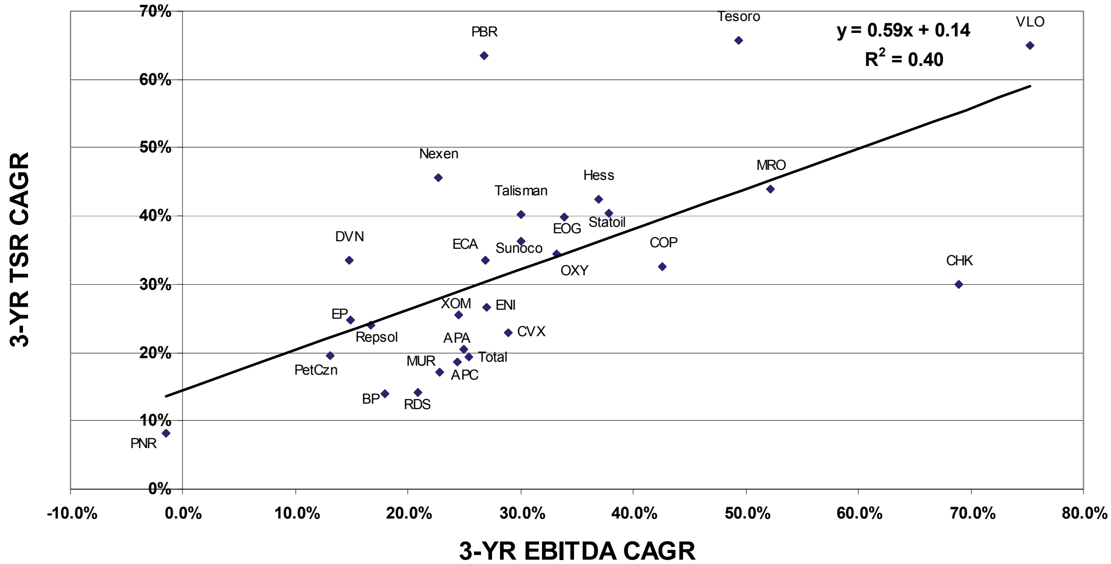
Large IOCs must certainly look critically at those elements of their portfolios that seem worth more to others. They should consider whether some could be spun out to existing shareholders in tax-advantaged structures, much as several downstream companies have put their infrastructure assets into MLPs; whether asset swaps of mature producing properties for more complex, risky projects may be possible; or whether outright sale may be advised.

Reinforcing the IOC growth portfolio

In addition to maximizing the value of current assets, IOCs must develop an attractive portfolio of growth opportunities for the medium term and options that can be called to create long-term growth. This requires companies to originate, capture, and execute well a series of capital projects.
Shareholder value is created by exceeding expectations for growth in net cash flow. We like to look at a company's track record in producing growth in their operating cash flow (EBITDA as a surrogate), and also review the proportion of their operating cash flow that they reinvest through capital expenditures in organic growth projects. Not surprisingly, there is a relationship between total shareholder returns (TSR)[2] and growth in EDITDA for a group of energy companies with a considerable range of business portfolios (Figure 5). Growth matters.

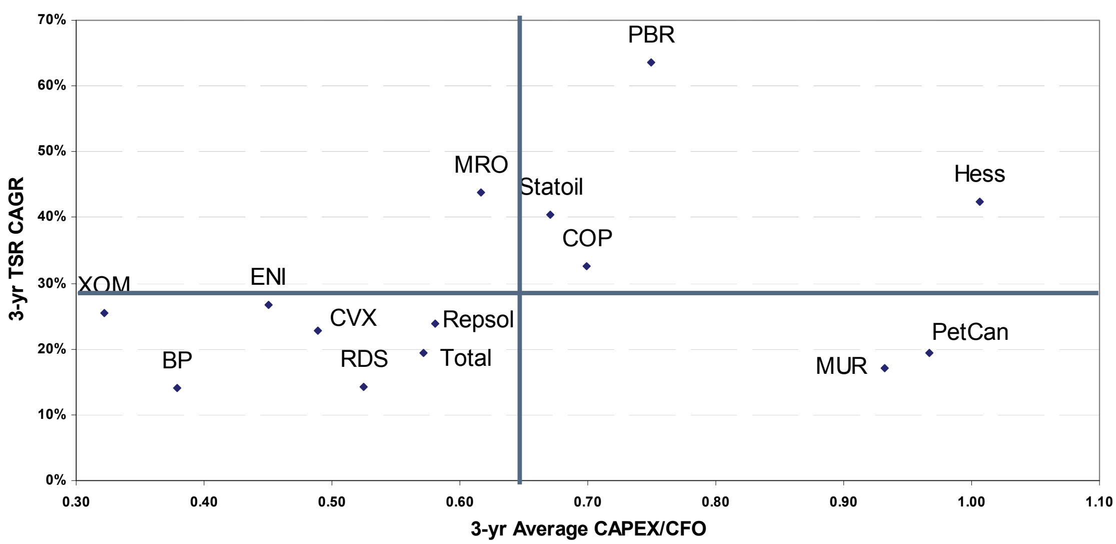
[2]TSR is the total shareholder return from stock price appreciation and dividends.

Figure 5: TSR vs. EBITDA growth



Empirical analysis of a broad array of firms from different industries shows that companies starting with high returns on capital employed achieve higher returns to shareholders if they are able to increase their growth rates than if they increase still further their returns. Since the increases in oil prices, gas prices, and refining margins, most oil and gas companies are currently earning high returns. Therefore, we would expect investors today to favor companies that are “putting their money to work” by reinvesting a substantial proportion of their operating cash flow in capital projects that will generate future growth in cash flow. And broadly, this seems to be the case for international oil companies (Figure 6). With one exception, all the companies with below average reinvestment rates achieved below average total shareholder returns, and companies that were putting more of their cash flow to work in good projects achieved stronger total shareholder returns.

Figure 6: TSR vs. Reinvestment rate



IOCs are finding growth in traditional areas to be difficult. But IOCs have great advantages in financial strength, technological know-how, and project management. Their robust cash flows allow them to take greater risk today than they could support a decade ago in an environment of lower prices. For example, they can now afford to accelerate large, complex projects such as LNG trains without full contractual certitude on shipping, markets, and buyers.

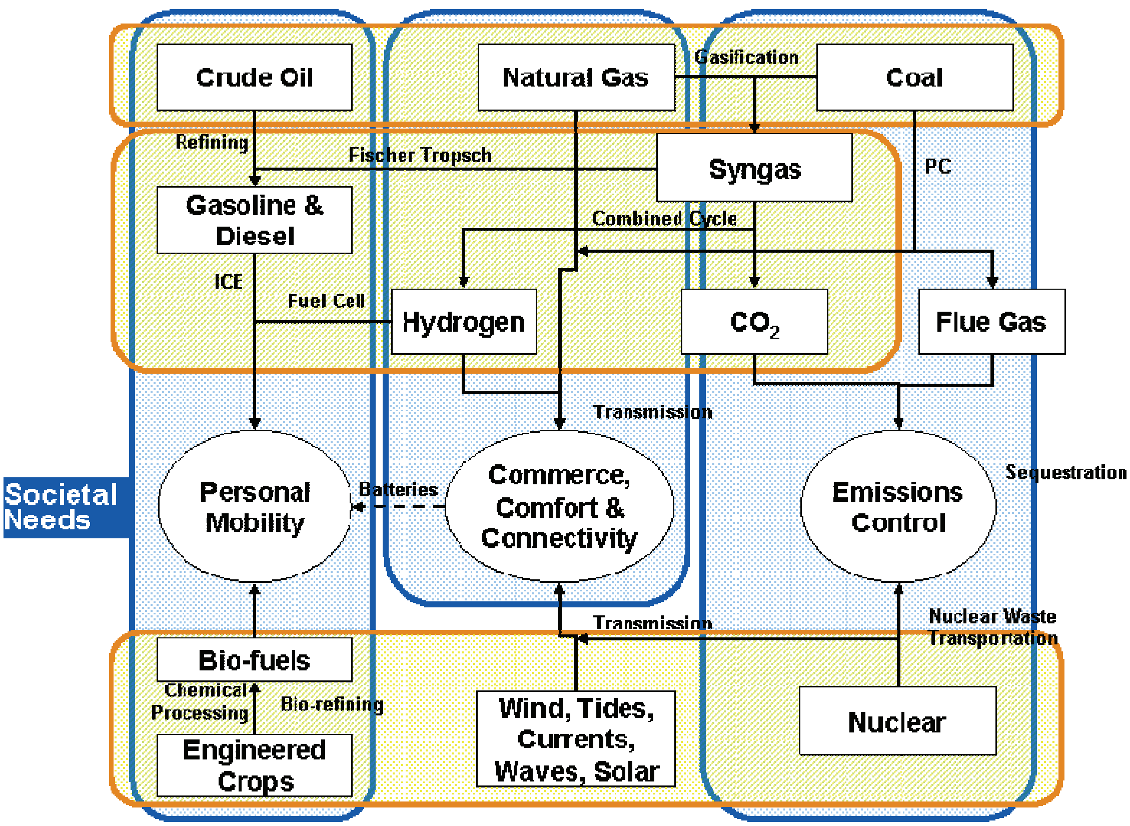
They also can offer host governments deeper and broader education and training than smaller companies and INOCs can. And IOCs can assist local firms in resource rich countries to capture a greater proportion of the project spend than they have had in the past. Finally, IOCs could leverage their project development and management skills to help resource-rich countries with their economic and industrial development by playing a proactive role in attracting resource-related investments to form economic development “clusters.” So far, IOCs have not allocated the resources necessary to capitalize on their latent strengths and play important roles in job creation and development in the host countries. This opportunity, with the potential for preference in resource access, is yet to be fully explored.

Beyond opportunity origination and capture, some IOCs may not be delivering on their promises due to poor execution. Flawed execution strikes at the heart of the super-major shareholder value proposition and proposed parenting advantage, and it is logical that it should be punished by the market. But it is also a capability that companies can improve; it will always be essential for value creation, and companies must increase their capacity to undertake large, complex projects. This will require massive investment in human capital throughout the major project supply chain.

Creating options for new value chain investments

In our book, we noted that the most successful companies positioned themselves downwind of major trends and then responded quickly to the opportunities they found. In the high price environment that we see enduring, there should be attractive growth opportunities in redesigning the global energy system so it is scalable beyond the OECD countries. This will involve expanding the problem statement and considering investments in a variety of new value chains (Figure 7), mobilizing a broader set of resources to meet global energy demand and thereby creating interesting and profitable growth opportunities.

Figure 7: The phase change opens up new business models



As companies review the new value chains that may be created in terra incognita, they should consider how to express (and value) the opportunities as a series of options designed to expand the information available and propel the company on a pathway that results in a steep learning curve and progressively lower costs. Currently, investments in most novel value chains appear risky when viewed as single projects. Costs have escalated for all major capital projects, and investments in coal, gas, or biomass to liquids projects are barely feasible at today's prices with today's technology. Yet, these new value chains will be necessary to meet future demand. Those companies that move fastest along the learning curves will reap the greatest benefits.

Rebalancing the IOC portfolio

In this paper, we are concerned with the highest level of corporate strategy—what companies do to strengthen shareholder value creation through organic and inorganic portfolio moves and by clarifying the basis for parenting advantage. We recommend that IOCs should:

- Investigate whether organizational standardization is impeding operational effectiveness across the range of their assets and whether organizational structures, processes, and metrics should be tailored to the business models that fit best for each asset class
- Aggressively review their portfolios of mature assets and seek the most tax effective mechanisms to divest or spin out those assets that may benefit from different corporate structures such as MLPs
- Consider taking more risk by accelerating LNG and other complex projects in advance of full contractual certitude on destinations and customers
- Contemplate expanding their value propositions to resource rich countries by leveraging their strengths to proactively assist these countries develop their economies through new industries and jobs, gaining preference in access to conventional hydrocarbons
- Expand their capacity to execute multiple large complex projects simultaneously safely and effectively by investing heavily in human capital development and measures to radically improve capital project productivity
- Consider how to embark on new pathways by opening a series of options to develop new value chains in coal, gas, and biomass to liquids projects

We acknowledge the problem that the IOC shareholder value proposition has for a decade-and-a-half been centered on predictable returns with modest organic growth supplemented by bottom-of-cycle acquisitions. But that value proposition is just not repeatable in the future. IOCs are going to have to educate their shareholders into accepting a new proposition. The choices are rather limited:

1. Increase reinvestment and growth as we describe above albeit with less predictable returns
2. Merge with an internationalizing national oil company
3. Be bought out by private capital
4. Gradually liquidate with cash being returned through stock buy-backs

For most companies, we believe the first option will be preferable . . .

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CRA's Oil & Gas Practice has extraordinary capacity to comprehend and meet the business, financial, and litigation challenges faced by the oil and gas industry. We use our deep experience and expertise to help our clients make the most of their assets, enhance operational efficiency, drive down costs, become more competitive and profitable, and expand their thinking on possibilities for future growth.

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