Industry Outlook Report

The Energy Industry at the Start of the New Millennium

Christopher E.H. Ross

Each year, my colleagues and I take time to reflect deeply about the future of energy markets and the industry. This year's conversations were particularly challenging given the turbulent environment, which we metaphorically compare to „riding the rapids."[1] These rapids, or trends, include abrupt U-turns in oil prices, a squeeze on margins throughout the industry supply chain, mind-boggling megamergers, and growing evidence that traditional vertically integrated structures are misaligned with the direction of change. Then there is an ongoing technology revolution to reckon with, and a climate-change debate that threatens the very future of the fossil fuels industry.

In a previous issue of *Prism*[2] we explored three scenarios that were inspired by the World Business Council on Sustainable Development's descriptions of how the energy industry might evolve in different ways in the future. These scenarios are valuable to companies wishing to open their minds to different possible futures in order to conceptualize radically innovative strategies. However, most planners will still try to predict what will *really* happen and what will be the implications of this „baseline" scenario. So in this article, I will outline our conclusions on the most probable outlook for energy markets, the strategies that energy companies are likely to pursue, and the resulting competitive landscape.

Energy Market Outlook

Our thinking is predicated on two important assumptions. First, we have assumed that the current trends of relatively open markets and rapid technological advance will continue well into the next century, resulting in a rapid economic growth (particularly in the emerging economies) coupled with intense downward price pressure. Second, we have presupposed that a more prosperous world will demand that technology be harnessed to improve environmental and social performance.

Our analysis has led us to conclude that over the next 20 years we will observe the following three trends:

• A long-term structural decline in oil prices, with fluctuations caused by investment cycles

• A shift in oil demand toward emerging economies

• A shift in fuel mix toward natural gas

Oil Prices in Decline. We like to think about the history of the oil industry in terms of three eras: the so-called „Seven Sisters" period, the Organization of Petroleum Exporting Countries (OPEC) years, and the new era of sustainable development (Exhibit 1). This new era suggests a scenario for oil prices over the next 20 years that is lower than we were forecasting last year, and much lower than we projected 10 years ago. There are three key structural reasons for continuing low oil prices:

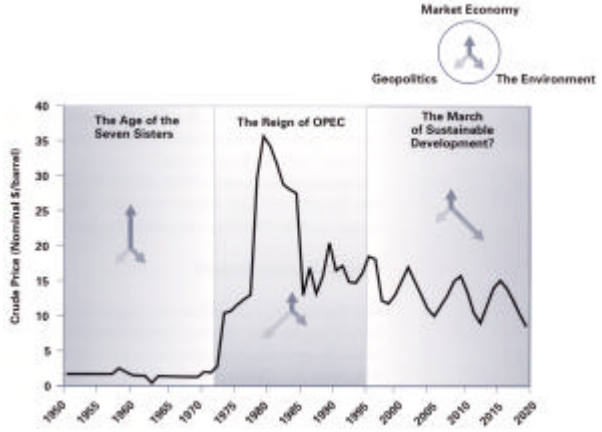
• Major new supply sources have emerged due to technological advances and geopolitical changes.

• New technologies and business practices are driving down exploration and production costs.

• Oil supplies are now too dispersed for a producer cartel to work, and it is not in major producers' interests to let oil prices rise too far.

Exhibit 1

Key Forces Shaping the Oil Industry Through 2020



Major New Supply Sources. New technologies in drilling, marine production facility design, and subsurface imaging have dramatically increased potential oil supply. They have extended the economic life of old fields, increased total recovery, uncovered new horizons in existing provinces, and opened up the previously inaccessible enormous resources lying under deep water (for example, in Brazil, the Gulf of Mexico, and \Vest Africa). Improved production and conversion technologies have made the vast Orinoco heavy oil belt reserves economic at prices comparable to the production costs of mature U.S. fields. At slightly higher prices, Canadian heavy oil and gas-to-liquid technologies may become commercially viable. The broad application of the new technologies is being helped by the more flexible fiscal policies of many governments, which are aimed at encouraging marginal field development by moderating tax and royalty regimes.

Then there is the contribution of geopolitical change. It was less than 10 years ago that the Berlin Wall fell and all our mental models began to change. They are still changing. Moving from a bi-polar world, with farther subdivisions between North and South, to the current multidimensional international scene has stretched all our minds. Add the impact of global media, telecommunications, the Internet, and public-interest groups, and all previous concepts of the relationships among peoples, governments, nongovernmental organizations, and supranational organizations become obsolete.

This is the context in which the opening of previously closed economies and resources should be viewed. Central Asia and the Russian Far East have enormous latent hydrocarbons that are on the verge of development. Venezuela's and Brazil's growth prospects are much higher now, with the entry of a disparate group of new companies, each with its own geological and operating theory, bringing fresh ideas, technologies, and finances. Opening of other hydrocarbon-rich countries (for example in the Middle East) is inevitable in the current competitive environment; the only questions are timing, speed, and geographic reach.

Decreasing Exploration and Production Cost.

Ultimately, the reason oil prices will be lower than we had expected is that lower prices create new economic opportunities. Recently, every oil company has proudly described in its annual report how its finding costs have declined, how it has engineered costs out of new development projects, and how it has managed to economize on lifting costs and to extend the life of reservoirs. Low prices have forced companies to innovate in their deployment of new technologies and in their business practices. Lower costs expand the range of economic opportunities. Realization of these opportunities increases supplies and puts renewed pressure on prices. This lowers investment levels, which brings supply back into balance with demand, but also increases the need to innovate.

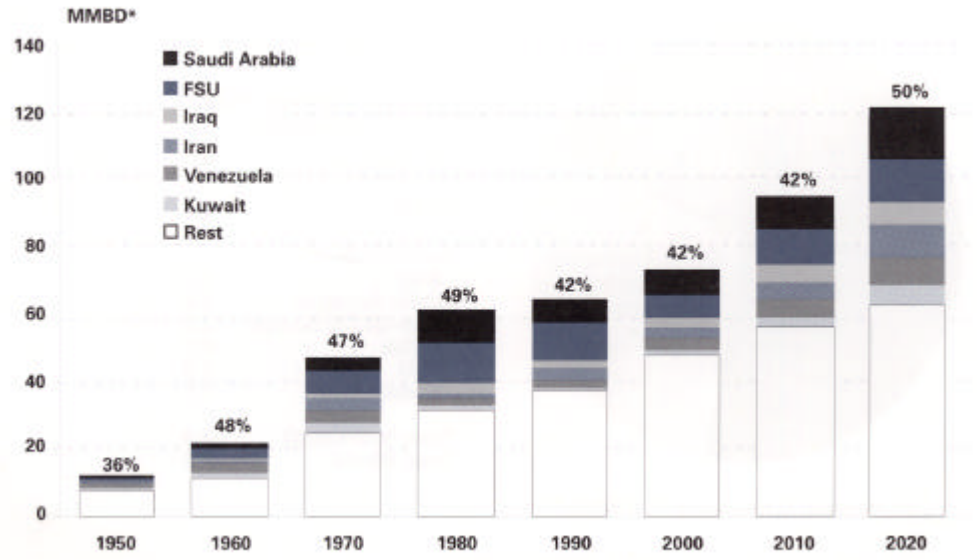
In fact, price is the signal that regulates investment, and the upstream oil industry is beginning to experience a cyclical price pattern similar to those we have historically observed in the downstream oil and petrochemical industries. We can expect shorter upstream price cycles around a declining price trend because the exploration and production industry is more efficient than it was, supplies are by and large less concentrated, and investment cycle times have decreased.

Oil Supply Dispersion. In 1960, OPEC was formed at a time when the big six exporters – Iran, Iraq, Kuwait, Saudi Arabia, Venezuela, and the Soviet Union (not an OPEC member) – accounted for 48 percent of world oil production (Exhibit 2). In 1972, OPEC countries were beginning to make their moves to increase government take, participate in the production of domestic resources, and eventually regulate supply and demand. At that time, the top six producers still provided nearly half of world production, and they retained that share until 1980. However, by 1997, the big six producers' share of global production had slipped to 42 percent.

For at least the next decade, we expect steady demand growth to be met from widely distributed supply sources. Thus, we expect the lower concentration of supply to continue through the next decade, and not inch up toward 50 percent again until 2020. With the current dispersion of global oil production, major producers will be at least as concerned with sustaining market share as with elevating prices. Nor, given the availability of resources that can be commercially developed under $20/barrel, is it in the interests of the major producers to try to sustain higher prices. They should not wish to accelerate the development of novel oil sources, such as gas-to-liquids plants for example. Even more important, they should be careful in opening up the oil-security issue to the adversaries of fossil fuels. These adversaries are already beginning to influence government policy on emissions, and their influence would be greatly strengthened if they could raise fears of energy security.

Exhibit 2

Long-Term Oil Production Estimates

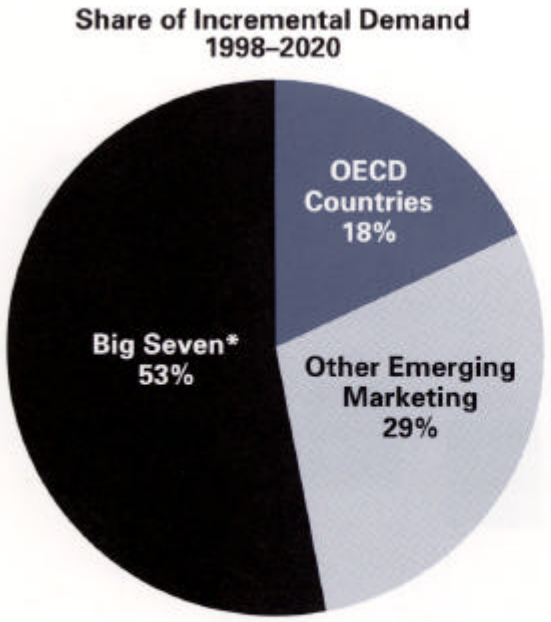


*Million barrels per year

A Shift in Oil Demand Toward Emerging Economies. We estimate that over 80 percent of global oil demand growth over the next 20 years will come from outside the Organization for Economic Cooperation and Development (OECD) countries (Exhibit 3).

Exhibit 3

Oil Demand Growth, 1998-2020



Annual Growth Rate 1998–2020	
Per Annum	*%*
OECD	0.9
Non-OECD	
Asia	5.2
Latin America	3.2
Non-OECD Europe	3.5
Africa	2.7
FSU	2.9
Middle East	1.5
Total Non-OECD	3.9
Total World	2.5

*Brazil, China, India, Indonesia, Korea, Mexico, Russia

**Million barrels per year

It has long been axiomatic that energy and oil demand grow as economies grow. The rate of growth slows as the economy matures and the economy tilts away from basic industries and toward service and technology sectors. Periods of shrinking demand have generally been associated with supply constraints or high prices. More recently, however, concerns over possible climate change resulting from accumulation of greenhouse gases have raised the possibility of lower consumption for reasons other than supply constraint or high prices.

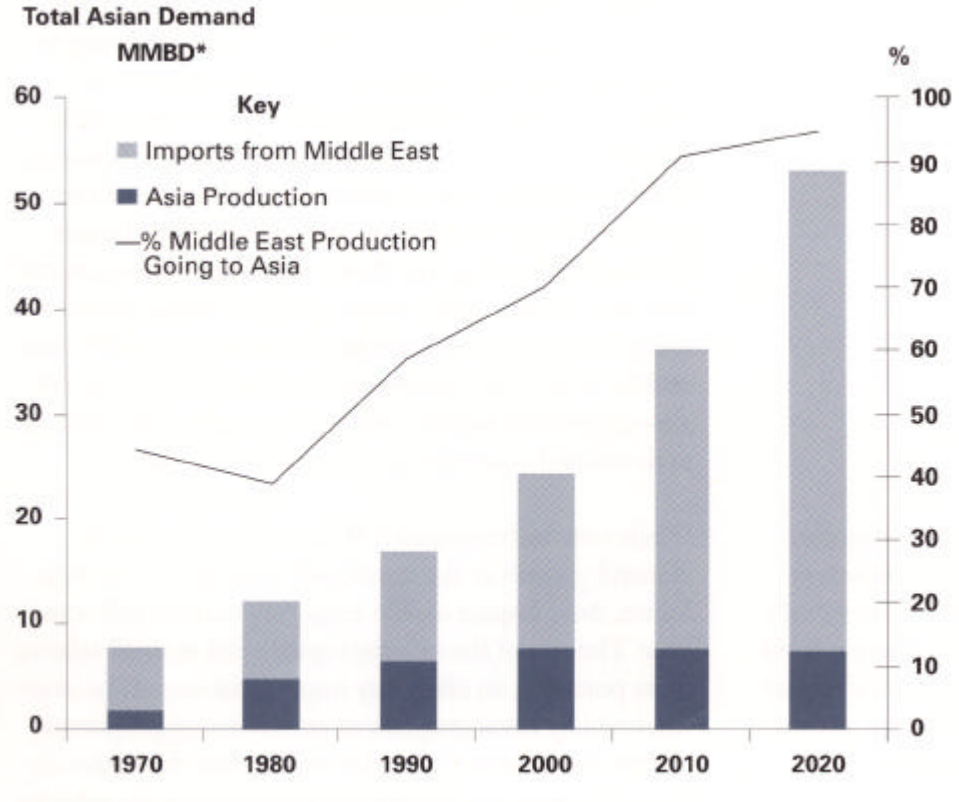
Moreover, this concern has been the impetus for research into new technologies that could potentially provide consumers with more power, at lower installed cost, with greater efficiency and lower emissions. An example of this is the application of combined-cycle technologies to power generation. Fuel cells powered by hydrogen from an on-board hydrogen processor, such as that designed by Arthur D. Little, could provide similar advances in the transportation sector. In addition, oil companies, notably BP and Shell, are now investing in businesses focused on the development of renewable energy sources. These energy sources are designed to complement oil – but we never know when technology, like Frankenstein, will surprise us. Realization of the promise of the more radical technologies may be one or two decades away, but that is still within the economic horizon of major hydrocarbon projects being planned today. Less radical technologies, such as the hybrid automobile, will bring improvements in efficiency that will almost certainly begin to have an impact on oil demand in developed countries early in the next decade.

While new technologies will have an impact on oil demand growth in the developed countries in the near future, their impact on the emerging nations will come later. The size of the existing capital stock is small relative to its potential, so efficiency improvements will be overwhelmed by demographics as an increasing proportion of emerging nations' populations demand fuel. Also, in the transport sector the need is for simple robust vehicles that are easy to maintain. The complexity of some of the fuel-efficient vehicles will be ill adapted to many of the emerging markets, at least initially.

One consequence of the shift in demand growth will be increasing interdependence of die Middle East with emerging markets in Asia-Pacific (Exhibit 4). Within 10 years, it seems likely that over 90 percent of Middle East oil will be destined for Asian markets. This suggests a series of geopolitical and commercial issues. Specifically, western companies wishing to be intermediaries in this trade flow will need to be sensitive to the concerns of the supplying and the consuming countries, and seek to devise and communicate constructive win-win propositions.

Exhibit 4

Growing Oil Interdependence Between the Middle East and Asia, 1970-2020



*Million barrels per year

A Shift in Fuel Mix Toward Natural Gas. The strongest advocates of sustainable development are committed to the rapid introduction of renewable power sources. However, current geopolitical reality links global environmental and social improvement to increasing prosperity in the emerging economies, and fueling that prosperity will require increasing quantities of fossil fuels, at least for the first part of the next century. While there are scenarios in which renewables will start to make a major contribution sooner rather than later, none that we are aware of postulates a significant dis placement of fossil fuels over the next 20 years.

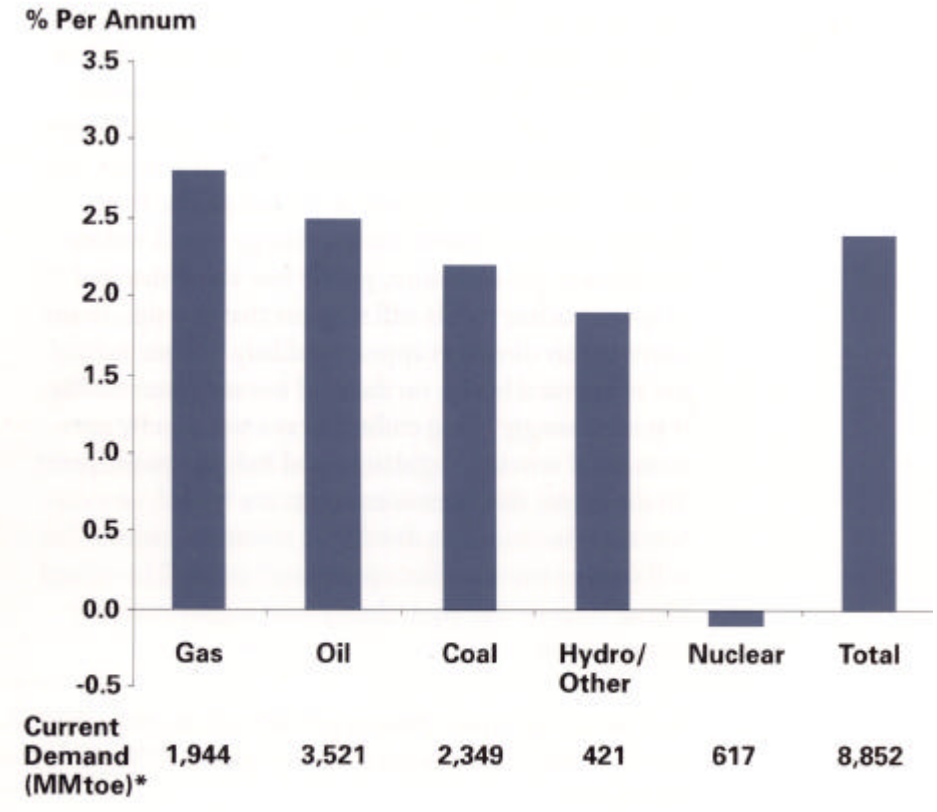
Still, there will be plenty of opportunities for mitigating emissions. In the industrialized economies, there is an enormous potential for improving energy efficiency, and this conservation will result in lower-energy-demand-growth relative to GDP in OECD countries. A shift in the fuel mix can also make an important contribution to the task of reducing emissions. It seems unlikely that nuclear energy can recover public acceptance in the projected environment of lower fossil fuel prices. Even though increased use of nuclear energy would reduce greenhouse gas emissions, public fear about disposal of spent nuclear fuel is still so great that any significant move in this direction appears unlikely. We see natural gas as a natural bridge on the road toward sustainability. It is increasingly being embraced as a solution by environmental activists, regulators, and industry participants. To the extent that emissions rights are traded, or a carbon tax is instituted in developed countries, natural gas will start to enjoy a „form premium“ and will be valued higher than its Btu equivalency with higher-carbon-content fuels.

As a result, we expect natural gas demand to grow the fastest of the conventional fuels over the next 20 years (Exhibit 5).

This fuel shift will be reinforced by further advances in power-generation technology and by the increasing pace of liberalization of electricity and natural gas markets. Recent advances in combined-cycle power generation have already driven efficiency levels above 60 percent. Developments in microturbines have opened up the possibility of extensive distributed power generation based on natural gas. Fuel-cell technology is developing rapidly, and natural gas is an attractive source of hydrogen for stationary fuel cells. These technologies are all likely to increase natural gas demand in the next two decades.

Exhibit 5

Growth Rates in Primary Energy Supply, 1999-2020



Source: IEA, EIA, ADL Analysis

*Million tons of oil equivalent

Liberalization of electricity markets will lead to intense competition among power-generating companies. They will favor the lowest-cost option for new capacity, and natural gas in combined-cycle turbines has clear advantages in construction cost and time, as well as in life-cycle economics. Liberalization of natural gas markets will further reinforce this shift toward natural gas, as increased competition will reduce costs along the entire natural gas supply chain.

Success Factors

In this emerging environment, the successful companies will be those that create and sustain a low-cost culture while capitalizing on changing industry boundaries and raising the bar on environmental and social performance. In a speech to the World Energy Congress last year, Sir John Browne, Group Chief Executive of BP Amoco, focused on four success factors: cost, reach, quality (environmental issues), and organizational learning. Amplifying that list, we believe that successful companies will:

• Create and sustain a low-cost culture

• Create and manage a dynamic portfolio „funnel," allowing them to choose the most attractive project opportunities and build new areas of focus

• Continuously learn and innovate in project design, construction, operation, and maintenance

• Find new ways to add value downstream: by offering multiple energy forms and energy management services to stationary users and by offering multiple convenience items to the mobile customer

• Become adept at sharing risks among suppliers, partners, financiers, and customers

• Proactively reduce their environmental footprints and manage interactions with external stakeholders to earn good reputations and preferential treatment while avoiding the costs of adversarial relations

• Find new ways of organizing to best leverage competencies

In the global oil market that we project, the larger companies will compete aggressively for access to the low-cost reserves in Central Asia, the Middle East, Russia, and Venezuela. The national oil companies there will not necessarily be accommodating, so only those companies that understand and can navigate the complex relationships of influence in these countries will be successful. The larger companies will also invest in the rapidly growing downstream sectors in emerging markets. All upstream companies will be highly focused on ways to commercialize natural gas reserves located in areas remote from current major markets.

Smaller companies will bring their low-cost cultures to bear on opportunities that fall outside the majors' radar screens because of scale, economics, or risk. Some companies will be successful at growing rapidly in sectors, such as retail marketing or mid-stream, in which shareholder value propositions based on earnings growth and sustainability can attract new capital. This will accelerate the movement of the industry from vertical to horizontal integration, particularly in the developed markets.

The Competitive Landscape

Needless to say, the low oil prices in 1998/early 1999 were a disappointment to all industry players. Low prices put extreme stress on many companies, some of which have merged (or plan to merge) as a way to survive and prosper. Whereas over most of the past five years companies have been able to reduce debt levels and buy back stock, recent cash flows for many companies have been inadequate to meet capital commitments. Oil companies will need new sources of money, but neither equity nor debt markets may be welcoming. The problem is exacerbated by the fact that downstream and petrochemical margins have also been depressed by excess capacity, primarily caused by the Asian economic crisis.

Oil companies will need to come up with a powerful „story" to attract new funds and retain existing investors. BP Amoco plus Arco and Exxon Mobil clearly offer powerful stories that no one else can match. Shell is fighting hard to come up with its own story. These three emerging super-majors will have many advantages:

• Benefits from reach, scale, and access

• A complete portfolio in exploration, production, refining, marketing, basic ethane and refinery-based petrochemicals, and renewables

• A focus on megaprojects, large markets, and key technologies

• Lower costs through scale, as well as development costs spread over large programs rather than individual projects

• True global scope with global branding, staff capabilities, and learning networks

• Access to selected key opportunities (particularly the megaprojects) as preferred, exemplary partners of their

key stakeholders

Beyond the three emerging super-majors, there are some real questions about the structure of the rest of the oil industry. Of course, in many ways this is a continuation of a 15-year process of industry consolidation. In 1983, the *Oil and Gas Journal* began its financial and operating summary with data for 400 companies. It took eight years for the OGJ 400 to shrink to the OGJ 300, and five years to go from the OGJ 300 to the OGJ 200. How long will it take to lose the next 100 companies? And what sort of smaller companies will emerge?

It seems clear that smaller companies will have to have a very tight focus. A story that says „we're like a super-major but one-tenth the size" doesn't hold much appeal.

Yet that's where many of the midsize oil companies are now positioned.

Some early steps taken by midsize companies to clarify and distinguish their value propositions include identifying low-performance assets and merging them to create scale and synergistic cost-reduction opportunities or selling them outright. Marathon and Texaco (mostly) have put their downstream operations into joint ventures, and Unocal has sold its downstream operations and is now a focused upstream company. Unocal and Arco have put their U.S. upstream assets into quasi-independent companies. We should see considerable regional consolidation in the next few years, as well as the emergence of some viable smaller companies with clear regional strengths.

The problem with mergers in this segment is scale. It would take a combination of Chevron, Conoco, Marathon, Phillips, and Texaco to match the scale of the smallest of the super-majors. Putting two midsize companies together only creates a larger midsize company. So midsize companies must be crystal clear in their value propositions, which will necessarily be different from those of the super-majors. They may, for example, be based on preferential access to opportunities, rapid technological deployment, a tight regional focus, or some other distinctive competence. But they must be supported by an aligned business model and proven through consistent financial results.

There will also be some mergers across traditional segment lines, perhaps between oil companies and infrastructure companies, to create new and interesting combinations. Also, the move toward horizontal integration will produce some spin-offs from the oil companies focused on global horizontal businesses, such as midstream, back-office services, and retail marketing, that may surprise the current occupants of those competitive territories.

We also see opportunities for the continued growth of an entrepreneurial sector we call „pilot fish." These firms use a Virtual Oil Company™ model to leverage the strong infrastructure of the global service companies to pick up the smaller opportunities that fall below the size threshold requirements of the super-majors. In this way, the global service companies, and some strong local ones, could continue to capture a growing share of the capital and of operating budget in the oil business.

National oil companies have solid local franchises that can be sustained if they can get the capital from their governments to reinvest. But privatization will become an increasingly attractive option for governments in need of funds and with a declining global ideological support for government ownership of industries. The privatized companies will not necessarily remain independent – witness Repsol's takeover of YPF, for example. Nevertheless, the billions of dollars of value created by YPF during the 1990s is a strong testament to what can be achieved through privatization.

And, since we are fundamentally optimistic about the global economy in this era of explosive technological advances and relatively free trade, we believe there will be a growing role for global infrastructure companies, such as ABB, British Gas, El Paso, Enron, TransCanada, Williams, and others. These companies are likely to:

• Dominate gas and power infrastructures that were previously government-owned or regulated, which have large growth potential

• Eventually include water, telecommunications, and other transportation infrastructures in their scope

• Operate or even own some „core" upstream/downstream assets (refineries, power generation, or producing facilities)

• Have a fuzzy overlap with the super-majors in the natural gas midstream segment

Conclusions

To summarize, our planning assumptions for the first two decades of the next millennium are as follows:

• Oil prices will oscillate with the capital expenditure cycles around a declining trend.

• Oil demand growth will be concentrated in the emerging markets.

• Natural gas will be the top-growth fuel.

• Service companies will get an increasing share of total industry expenditures.

• The super-majors will provide high returns and modest growth.

• Global infrastructure companies will grow strongly.

• Midsize companies will find ways to differentiate themselves, shrink, focus, „virtualize," and combine to form different types of companies – or will be acquired.

• „Pilot fish" entrepreneurs will present high-return opportunities for risk-tolerant investors.

• More national oil companies will be privatized.

As always in the energy industry, the future will be interesting, challenging, and different from the past. Nevertheless, we are persuaded that this is a time for bold advances, not for retreat into corporate navel-gazing:

• There will be huge opportunities for growth in the resource-rich areas, though returns may be modest.

• There will be opportunities for companies that focus on areas outside the majors' radar screens and in horizontal integration plays.

• There will be opportunities to participate profitably in emerging market energy demand growth.

• There will be large rewards for the companies that can commercialize remote natural gas reserves.

• Sustainable development concepts will continue to evolve and will increasingly influence society and governments. Companies will need to realign their business models to constructively address society's concerns.

[1] *For information on ADL's multiclient studies of the oil industry environment, see our „Petroleum Industry Perspectives" at http://www.arthurdlittle.com/multiclient.html.*

[2] *See „Different Oil Industries for Different Futures" in the fourth quarter 1998 issue of* Prism.

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