Global trends in enerqv

Energy and materiais companies face a demanding future. They must start preparing for it now.

Ivo J. H. Bozon, Warren J. Campbell, and Mats Lindstrand

The world's providers of energy and energy-intensive commodities face a decade of unprecedented change and uncertainty as a combination of six macroeconomic, social, and business trends reshapes the competitive landscape. These trends include booming demand for energy and basic-materials resources, particularly in developing economies;.the shift of supplies of oil, natural gás, and basic materiais to ever more remote (and often geopolitically unstable) locations; heightened scrutiny of the environmental effects of the production and consumption of energy and materiais; and increasingly large capital investments needed at a time of regulatory uncertainty.

To understand the nature of the forces affecting global energy and materiais markets, executives in these sectors will have to confront difficult strategic, organizational, operational, and technological choices. In an environment of growing competition, ever-higher resource costs, and significant price uncertainty, for instance, how should energy and materiais companies manage their performance in order to improve productivity constantly? How can big corporations expand their global footprint while maintaining a local presence in the markets they serve? Dealing with such questions will prove increasingly important.

Article at a glance

Global providers of energy and energy-intensive commodities face a decade of unprecedented change and uncertainty.

The competitive landscape is being reshaped by six macroeconomic, social, and business trends—notably, booming demand for energy, a shift in the sources of oil and basic materials to remote (and often geopolitically unstable) locations, and heightened scrutiny of the environmental effects of the production and consumption of energy and materials.

Executives of companies in the energy and materials sectors must strengthen the existing capabilities of these companies and help them develop new ones. Improving operational productivity will be essential, and companies must learn to be "locals" wherever they do business.

Related articles on mckinseyquarterly.com

"What's next for Big Oil?"
2005 Number 2

"Preparing for a low-carbon future,"
2004 Number 4

"How global organizations develop local talent,"
2006 Number 3

Given the essential role of energy resources in the global economy, executives in ali sectors—particularly energy- and materials-intensive ones—must come to terms with changing circumstances and the implications for business (see sidebar, "Building capabilities for success).

The shape of things to come

Recently, McKinsey sought to identify the trends that will make the world of 2015 a very different place to do business from the world of today. In ali, we identified ten of them: macroeconomic trends that will transform the global economy, social and environmental trends that will change the way people live and work, and business and industry trends that will generate new management approaches and business models.[1] Ali ten will affect the energy and materiais sectors to a certain extent, but we believe that six will shape their future and therefore deserve special attention.

Shifting centers of economic activity

The world is undergoing a massive realignment of economic activity, whose outlines are clearly visible in the changes occurring in the energy and materiais sectors. Growth in demand for energy and basic materiais (such as steel and copper) is moving from developed countries to developing ones, predominantly in Ásia. Demand for oil in China and índia, for example, will nearly double from 2.003 to 2.020, to 15.4 million barreis a day. Asia's oil consumption will approach that of the United States—the world's largest consumer—by the end of that period.

On the supply side, Asia's strong demand environment for energy and basic materiais, coupled with its low labor costs, means that the region will

[1] For an in-dcpth discussion of these trends, see lan Davis and Elizabeth Stephenson, "Ten trends to watch in 1006," *The McKinsey Quarterly,* Web exclusive, January 2006.

increasingly become a global producer of aluminum, chemicals, paper, and steel. China, for instance, is adding steelmaking capacity só rapidly that its production will rise from 5 percent of the worldwide total in 1995 to more than 30 percent by 2015. In the process, it will become a leading exporter.

Over the next decade, resources (gás, minerais, steel, and pulp and paper, among others) will generally be developed and produced farther away from the points of consumption than ever before; Brazilian fiber, for instance, will be converted into paper products in China. In natural gás, the amount of indigenous production consumed within countries will continue to decline, replaced by cross-border flows delivered by long-distance pipelines and by ships carrying liquefied natural gás (LNG). Oil production too will increasingly switch to regions that are more and more remote (and often geopolitically unstable) as developed countries with dwindling reserves seek new supplies.

Important macroeconomic shifts are also occurring within regions. States in the Middle East are expanding their reach beyond oil, into new industries such as chemicals and metais. Dubai, for example, hás emerged as a leading producer of aluminum, as a result of access to cheap energy (notably natural gás) and a proximity to markets in Ásia and Europe. Qatar, in addition to being a major LNG player, is converting its cheap gás directly into high-quality diesel fuel and hopes to become a world leader in the emerging gas-to-liquids industry by 2010. Such activities could provide much-needed employment for the region's young and rapidly growing workforce (see "Beyond oil: Reappraising the Gulf States," in the current issue).

To be sure, the rising leveis of global connectivity required to meet the world's energy needs in the coming years will have positive economic effects, such as greater market liquidity and more globally priced commodities. At the same time, longer and more complex supply chains, combined with the mounting possibility that geopolitical events could curtail supply, will make prices more volatile.

Rising demand, rising environmental concerns

As economic growth accelerates, particularly in developing economies, the world is consuming natural resources at an unprecedented rate. In China, for example, oil consumption nearly doubled from 1995 to 2004, and demand for aluminum, nickel, and steel more than tripled. Likewise, China, índia, the Middle East, and Rússia are struggling to build power generation capacity and grids fast enough to meet growth in demand; China, for instance, is expected to add another 500 gigawatts of generating

Building capabilities for success

The ability of energy and materiais company executives to read and interpret the global forces buffeting their sector is becoming ever more important, yet executives need more than good radar for emerging trends. They must also strengthen the existing capabilities of their companies and, in some cases, develop new ones. There are a number of áreas of focus.

The first is operational productivity. Upstream mining companies that are developing new capacity at the high end of the cost curve, for example, must focus on lowering costs in order to ensure the profitability of projects throughout ali phases of the economic cycle. Managing costs will be even more criticai for midstream materiais players (such as steel companies and manufacturers of paper and packaging), as they are likely to be squeezed by new entrants that can benefit from the cost advantages of novel technologies and massive scale. In addition to a fervent focus on operational excellence, today's midstream players will also need disciplined capacity management and a proactive approach to M&A.

Companies must also learn to be locais in the markets where they do business. Oil and mining companies have long hired local employees, of course; Nigéria, for instance, requires energy companies to hire a certain percentage of local employees and to use local contractors to build and maintain facilities. The challenge for companies, especially midstream ones looking to participate in the expected growth in Asian markets, will be to go further still—for instance, by adapting their traditional capital-intensive business models in manufacturing, distribution, and marketing in order to take better advantage of the low labor costs characteristic of developing countries.

Energy and materiais companies must also improve their ability to make decisions under uncertainty, which will be plentiful around prices, investments, growth in specific regions, and government policy. The fuel-mix decisions that power generators make to reduce their carbon emissions, for example, will have economic life spans extending decades beyond the horizon of today's regulations. Better decisions under uncertainty require, for example, learning to track the economic value at risk in projects in real time and to tie this knowledge to processes that would help them escalate decisions to the proper leveis quickly. These capabilities wiil present a challenge for many energy and materiais companies, since their project managers tend to have technical rather than financial backgrounds.

Finally, growth for most energy and materiais companies will depend on the ability to execute massive investment projects at unprecedented scale, often using new technologies in harsh climates. One key determinam of success will be superior project execution skills—for example, a willingness to make design trade-offs between the besttechnical solutions and more practical, standardized, and slightly suboptimal ones that may well make it possible to predict project delivery times with great reliability. Even more important will be the ability to attract, retain, and develop top-class project managers capable of balancing the complex technical, commercial, and political factors inherent in the megaprojects of today and tomorrow. Here, in particular, talent will remain a vital concern for energy and materiais CEOs throughout the coming decade.

Jurriaan H. Ruijs, Olivier F. Scheele, and Níels van Buuren

Jurriaan Ruijs is a principal and **Olivier Scheele** is a consultam in McKinsey's Amsterdam office, where **Niels van Buuren** is an alumnus.

capacity by 202.0, on top of the 400 gigawatts added over the past two decades. Rising demand for energy and materiais is spurring a massive need for investment: according to the International Energy Agency, the oil industry alone must invest $4.3 trillion (in 2005 dollars) from 2005 to 2030 to keep pace.

What's more, local resource owners (such as those in the Middle East and Rússia) with cheaply extracted reserves are increasingly exerting control to seek a greater share of the profits. The security of energy supplies ís a matter of growing concern—particularly in countries and regions (such as China, Europe, and the United States) that consume more energy than they produce; for instance, Europe's energy markets were roiled by Russia's move, in January 2006, to cut its natural-gas supplies to Ukraine and by more recent signals that it could do the same to Belarus and Geórgia. Such issues, which will remain high on the policy agendas of governments in Ásia, Europe, and North America for some time, will force many countries to take a more concerted approach to energy partnerships.[2]

Meanwhile, the environment is becoming more important to business. Growing pressure to reduce greenhouse gás emissions (especially carbon dioxide) may have a far-reaching impact, starting with Europe but extending globally as well (see "A cost curve for greenhouse gás reduction," in the current issue). In the power generation industry—the biggest emitter of greenhouse gases—uncertain carbon dioxide regulation in Europe is stymieing investment in new generating capacity. One effect is a redoubled interest in renewable sources of energy, such as wind and solar power. Indeed, renewables have become a substantial business, accounting for 30 percent of power generation investments globally in 2005, for example. By 2020, renewables could provide more than 10 percent of ali electricity generated, and technologies such as wind, solar, and biomass could be economical even without subsidies.

In addition to supply-side measures, we expect a change in emphasis toward demand-side management by companies, consumers, and governments. The promise is substantial. The McKinsey Global Institute finds that the growth rate of worldwide energy consumption could be reduced up to 25 percent by 2020 if existing policy distortions are removed and households and businesses are given incentives to use energy more efficiently (see "Making the most of the world's energy resources," in the current issue).

[2] lvo J. H. Bozon, Warren J. Campbell, and Thomas Vahlenkamp, "Europe and Rússia: Charting an energy alliance," *The McKinsey Quarterly,* 2.006 Number 4, pp. 94-7.

A changing consumer landscape

Economic growth in the developing world will usher nearly a billion new consumers into the global marketplace over the next decade, as household incomes reach the levei (around $5,000) associated with discretionary spending. Although these consumers will have less spending power than do their counterparts in the developed world, they will have similar demands as well as access to global brands. Many industries therefore face polarized markets where premium and no-frills offerings are squeezing middle-of-the-road ones.[3]

This polarization will become a fact of life throughout the materiais sector as well. Consider the automotive industry, which is largely concentrated around two kinds of vehicles: high-volume, low-cost models and premium luxury ones. Materials providers will benefit if they can offer automakers differentiated products—say, for lighter bodies with improved fuel efficiency. Likewise, specialty providers of high-strength steel and aluminum are harnessing technology to create captive markets among luxury carmakers. Similarly, paper manufacturers have profitable niche opportunities to design innovative packaging for makers of consumer products such as ice cream or potato chips.

In fact, premium niches represent important opportunities for producers of aluminum, paper, and steel as they find themselves squeezed by high input prices, the substitution of materiais when customers attempt to slash costs, excess capacity, and tough competition. Winners will increasingly need to play the role of productivity-improvement partner to their customers—by offering services, for example, or helping in áreas such as product design.

The battlefield for talent

In the coming decade, a global strategy for talent will be as important to many companies as a global strategy for sourcing or manufacturing is today. Two themes stand out. First, the growth of knowledge-intensive industries underscores the importance and scarcity of well-trained employees. Second,

[3]Trond Riiber Knudsen, Andreas Randel, and J0rgen Rugholm, "The vanishing middle market," *The McKinsey Quarterly,* 2.005 Number 4, pp. 6-9.

the integration of global labor markets is opening up vast new sources of talent. Indeed, more than twice as many university-educated young professionals—33 million—are available in developing countries as in developed ones.

The energy and materiais sectors occupy the crossroads of these trends. The investment boom anticipated throughout most resource industries, for instance, will drive a huge demand for engineers and other technical employees. Although the number of Western students enrolling in technical programs is increasing and the suitability of engineers from developing countries is improving, gaps in quality and experience will persist. Some equipment manufacturers in the metais and power generation industries, for example, report that they cannot fulfill new orders, because of a shortage of engineers.

In the oil industry, the demand for petroleum engineers and development engineers could almost double over the next decade, and the hunt for scarce reserves will place commercial deal makers in high demand. It is a matter of concern that a shortage of experienced project managers who can handle complex capital projects (such as oil platforms or pipelines) may create bottlenecks that will determine whether multibillion-dollar projects are finished on time and on budget. Language difficulties and inadequate management skills could limit the suitability of large numbers of Chinese and, to a lesser extent, Indian engineers for employment by Western companies.[4]

The challenge for energy and materiais companies will be to seed the next generation of engineers while finding clever ways to make up for today's shortages. Some oil companies are already recruiting students from petroleum-engineering universities and finding more and more talent abroad. Meanwhile, some oil companies are offering experienced employees lucrative terms to defer their retirement and even hiring and retraining talented technical staff from the US automotive industry, which hás shed large numbers of workers in recent years.

Emerging industry structures

In response to changing market regulation and the advent of new technologies, new industry structures are emerging in the energy and materiais sectors. At the upstream end—for instance, the extraction of materiais and oil exploration and production—large economíes of scale predominate; in iron ore, for instance, the top three players control around 70 percent

[4]Diana Farrell, Martha A. Laboissière, and Jaeson Rosenfeld, "Sizing the emerging global labor market," *The McKinsey Quarterly*, 2005 Number 3, pp. 92-103.

of globally traded volumes. The picture is similar in coal and other minerais; in oil, international companies have Consolidated to a significam" extent during the past few years.

However, in the midstream part of the materiais sector, where inputs are transformed into outputs distributed and sold downstream, the benefits of size are less clear. In the paper industry, for example, the consolidation efforts of companies such as Stora Enso have disappointed their shareholders. The globalization of trade, together with the rapid buildup of new low-cost capacity in emerging markets, hás overwhelmed the benefits of consolidation.

Meanwhile, small niche companies across the value chains of the energy and materiais sectors are setting the pace of global innovation by developing key technologies in petroleum, biotechnology, and clean fuel generation such as biomass and coal-to-liquids technologies. As these technologies mature, giant companies will be tempted to acquire or ally with such innovators in portfolio arrangements; for instance, logen, a biotechnology company, is cooperating with Royal Dutch/Shell and Volkswagen to study the economic feasibility of producing cellulose ethanol on an industrial scale.

In energy and materiais, as in nearly ali other sectors, the combination of industry-restructuring opportunities, attractive growth, and cheap capital hás attracted keen interest among private-equity investors: from 2000 to zoo5 the value of the top 25 private-equity deals in the energy and materiais sectors tripled, to $64 billion. Even large listed companies are not immune. The upshot of this trend is that the capital markets are increasingly dismantling, restructuring, and repositioning undervalued conglomerates. Often, the result is increasingly professional management and a renewed emphasis on performance.

Business in the spotlight

During the next decade, businesses everywhere will face increased societal scrutiny as they expand their size and reach and as the economy's demands on the environment intensify. Energy and materiais players are squarely in the spotlight on these issues. These companies are magnets for controversy because of their size, the sometimes corrupt governments in the often unstable regions where they operate, and, in the case of natural monopolies (such as electricity production), their high profiles in local markets. Likewise, the fact that major oil and electric power companies are enjoying record profits at a time of high prices does not endear them to consumers.

Moreover, the activities of energy and materiais companies necessarily have a big impact, both direct and indirect, on the environment—for example, when they lay pipelines through nature reserves in Alaska or affect the climate through greenhouse gás emissions. Such companies also face the constant risk of mishaps that can have major environmental consequences.

In the years to come, regulators will increasingly intervene in and monitor the operations of companies in the energy and materiais sectors. In Europe, for instance, antitrust authorities are scrutinizing mergers in electric power, natural gás, and petroleum more closely. Governments too are going to demand more of a say and will probably cater to nationalistic sentiment on cross-border trade issues, as happened in 2005 when opposition in the US Congress helped to sink the efforts of the China National Offshore Oil Corporation (CNOOC) to acquire Unocal.

In response, energy and materiais players must continue to improve their health, safety, and environmental performance, a challenge given the dispersed and technically demanding nature of their operations. It will no longer be enough to deploy skillful public relations and to have robust internai control over these issues. Companies in the energy and materiais sectors will need to take the lead in engaging with governments, local communities, and nongovernmental organizations to develop new codes of conduct. Companies that do só effectively can transform themselves from victims—or worse, villains—into role models.

The years ahead will be demanding ones for companies in the energy and materiais sectors as the forces of change shift the fundamental circumstances of competition. Executives who wish to exploit these trends must keep a watchful eye on them and be ready to respond swiftly to their implications. Q

Ivo Bozon is a director in McKinsey's Amsterdam office; **Warren Campbell** is an associate principal and **Mats Lindstrand** is a director in the Stockholm office.

Fonte: The Mckinsey Quarterly, n. 1, p. 47-55, 2007.