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RUNNING ON EMPTY? PROSPECTS FOR FUTURE WORLD OIL SUPPLIES

There has been considerable debate in recent years about the determinants of future world oil supply. Some experts point to the declining average size of modern oil discoveries and the rate of depletion in conventional oil fields and conclude that steady growth in oil use could overtake available conventional resources in the coming years. Current high oil prices and the precariously low level of spare oil-production capacity worldwide have intensified these concerns. Others have highlighted advances in oil exploration and drilling technology that are expanding potential frontier resources and greatly reducing the costs of exploiting them. This technology can be used in areas that are newly reopened to the international industry, such as the former Soviet Union, China, and the Persian Gulf, to provide potentially higher supplies from those regions. Political, social, and economic factors also play a critical role. The question is not just whether there will be enough oil under the ground but whether the political, social, and economic environment in oil-producing regions will facilitate or hinder the development of this oil wealth.

The current environment of rising oil prices and worries about near-term supply conditions has made the issue of resources even more timely, although there is a need to distinguish between immediate oil availability, which is determined mainly by past efforts and current resources, and longer-term supply, where future efforts and the potential resource base are the key determinants. Last May, the Baker Institute and PIRINC organized a conference of oil experts and government policy makers to address the critical issues for future oil supplies. This report presents a summary of the highlights of the conference and then a discussion of policy recommendations.

Setting the Stage: Oil Markets in the Year 2000

Ironically, just two years after a historic crash in oil prices, the world has entered an oil-supply situation more precarious than at any other time since the 1973 oil shock. Commercial oil company inventories hover around historic lows, and the Organization of Petroleum Exporting Countries (OPEC) has less immediate spare capacity than it has had for three decades. In a market with so little cushion to cover unexpected events, oil prices become extremely sensitive to perceived supply risks. Such a market increases the potential leverage of an otherwise lesser producer such as Iraq where geopolitical considerations—and conflicts—have previously influenced production decisions.

The details of how the world suddenly became short of oil are complicated, involving both economic

and political factors. A major factor has been the slower pace of exploration and development efforts at a time of low oil prices and the unexpectedly brisk pace of world economic growth in the aftermath of the Asian financial crisis. None have to do with lack of potential resources. Over the past three years, there has not been an appreciable decline in the amount of total world proven oil reserves. Moreover, as discussed at the conference, in its World Petroleum Assessment 2000 report, the U.S. Geological Survey increased its estimate of undiscovered oil outside the U.S. to 649 billion barrels, up 20 percent from its 1997 survey. The U.S., the world's most mature oil province, has seen a significant decline in proven reserves in recent years—from about 26 billion barrels of crude at the end of 1990 to about 20 billion at the end of 1999. But the U.S. still managed to produce a cumulative total of 20 billion barrels over the same period, indicating a still substantial reserve replacement rate. U.S. proven reserves in the lower 48 states remain higher today than the level of those reserves in 1930.

While current resource levels are not a factor in today's tight market, clearly, the recent pace of oil production has not been fast enough to meet demand growth and to preserve stable market conditions. The reasons for this are several-fold. The exceptionally depressed oil prices of 1998 and early 1999 added renewed urgency to the process of industry rationalization and consolidation that had been under way for many years. The renewed pressures showed up most spectacularly in the mergers and acquisitions activity of the world's largest private oil companies but also in cuts in exploration and development budgets. The cutbacks were most severe among the smaller, more financially vulnerable companies. Recovery in exploration and development efforts initially lagged the recovery in prices as companies concentrated on rebuilding their weakened balance sheets and completing their latest consolidations and mergers. The depths of the recent price declines also encouraged a more conservative, long-term view of prices in setting their E&P budgets than today's potentially temporary price signals.

This cyclical industry downturn also came against the backdrop of years of reduced state OPEC investment in its own oil fields. As world oil demand has grown, OPEC's expansion of production capacity has not kept pace, leading to a high utilization rate for the group's fields. The opening of promising areas such as the former Soviet Union to international oil company investment also has been similarly disappointing in terms of new production. While the geological promise remains, internal and external problems have driven up costs, delayed projects, and led to outright withdrawals by investors—all contributing to disappointing production results to date.

U.S. sanctions policy has hindered development of plentiful OPEC resources in Libya and Iran while Iraqi production continues to be held back by the UN sanctions regime, although no longer by any explicit limit on exports. Domestic politics inside OPEC also has played a role. Internal political pressures forced governments in Saudi Arabia, Venezuela, and others to siphon growing shares of depressed revenues from the state oil industry to maintain social programs, reducing still further funds available for capacity maintenance and expansion.

Domestic political pressures and financial desperation led in March 1999 to OPEC's unusually robust production sharing agreement, which has deprived oil markets of more than 1 billion barrels of supply since then—more than double the 420 million barrels lost during the entire Gulf crisis. The agreement, however, came at a time of an unexpectedly strong growth in demand, supported particularly by swift recovery in the Asian economies and continued high growth in the United States. Inventories were drawn down to exceptionally low levels. In March of this year, OPEC ended its production cuts and since then has increased production by about 3 million barrels per day with more to come. But so far, the increase has not been sufficient to permit a rebuilding of stocks to normal levels and thereby a return to calmer markets. Nonetheless, strong incentives are in place to increase production from OPEC and non-OPEC sources and to curb demand, both of which act to restore market balance and ease pressure on prices; but this process will take time.

The oil market's current tight supply situation is forcing policy makers to revisit energy security issues in a serious manner. But energy security policies must take into consideration not just short-term concerns but longer-term trends and challenges. Thus, understanding of the long-range trends in the industry is imperative for proper policy formation.

The Geological Backdrop to Our Energy Future: Are We Running Out of Oil?

Warnings that the world will soon exhaust the known base of hydrocarbon resources are not new. As far back as 1914, the U.S. Bureau of Mines forecast only a 10-year supply of oil left for the United States. In the aftermath of the 1970s oil crises, the Club of Rome concluded that the world would shortly run dry of oil. This extreme view, and others like it, failed to allow for the technological advances that have slashed the costs of finding and developing previously hard-to-tap reserves and improved the chances of new discoveries. Similarly, technological advances, conservation policies, and consumer reactions to earlier price shocks have all contributed to slower demand growth, reducing the rate of depletion of the world's resources. But what of the current circumstances? Are we approaching limits to the world's resource base, and, therefore, approaching a foreseeable limit to available supplies?

Support for resource optimism comes from the recently released World Petroleum Assessment 2000 by the U.S. Geological Survey. As described by Thomas Ahlbrandt, Chief of the U.S. Geological Survey World Energy Project, the assessment estimates that in areas exclusive of the U.S., a mean value of 649 billion barrels of oil could be added to reserves through new discoveries in the coming 30 years (1995–2025). This estimate is 20 percent higher than the estimate in their last assessment published in 1994. The new figure is based on reassessments of potential for the Arabian Peninsula, Algeria, the Atlantic offshore of South America and Africa, the North Sea Graben province, and Greenland. Higher assessments for these regions offset a lowering of expectations for new oil discoveries in Mexico, China, Indonesia, and the former Soviet Union, among others. These findings represent a continuation of the long-term upward trend in ultimate reserve estimates. The ratio of world-proven reserves to production currently stands at 42 years, substantially higher than it was in 1972.

The report states that the greatest volumes of undiscovered resources lie in the Middle East, Greenland shelf, West Siberia and the Caspian Basin, and the Niger and Congo deltas of Africa. An additional mean value of 612 billion barrels could be added to already discovered fields through technological gains and additional drilling, according to the report.

Total estimates for the world oil reserves outside the U.S. of 2,659 billion barrels represent a 5 percent increase over previously assessed totals. The assessment also estimates that as of the end of 1995, the world had used 539 billion barrels, or 20 percent, of its currently estimated total oil endowment. Of the remaining estimated oil endowment of about 2,100 billion barrels, about 75 percent, which includes potential additions from reserve growth, has been found, and 25 percent remains undiscovered. Ahlbrandt noted that 75 percent of undiscovered oil resources outside OPEC would be found offshore, lending credence to contentions that much of the "easy" oil has already been found.

This view and its implications were discussed in a presentation by Jack Zagar, an associate of Malkewicz–Hueni Associates of Golden, Colorado, and partner with the noted author and world oil reserve expert, Colin Campbell, who is a co-author of the presentation. Zagar noted that the pace and size of conventional oil discoveries not only peaked in the 1960s but have now stopped exceeding the rate of world oil use. "We find only one out of every four barrels produced," he said in a comprehensive presentation of conventional oil resources. He indicated potential limits to gains from technology and increased effort by

noting that, historically, high technology has not been necessary for giant field discoveries and that in the mature U.S. lower 48, the massive efforts made in the 1970s and early 1980s as well as the technological advances since then have not led to any significant change in the production decline that has been under way since the early 1970s. As he put it in his presentation, "If more oil could have been found, it would have been found."

Zagar defines conventional oil as including only onshore and offshore oil production at traditional industry depths and fields requiring water flooding. His estimates of conventional oil do not include deep-water fields, heavy oil, extra heavy oil, tar sands, oil shale, reserves requiring enhanced recovery techniques, polar resources and other assets such as hydrates and coal bed methane. Under this definition of conventional reserves, Zagar estimates that some 1,637 billion barrels of oil has been discovered, of which 822 billion barrels has been produced and 151 billion barrels are yet to be discovered. Pointing to a declining discovery rate of only roughly 6 billion barrels a year, Zagar estimates that the world will deplete these resources at a rate of 2.2 percent per annum. He also predicts that world production of conventional oil will peak between 2005 and 2010 at between 60 to 70 million barrels a day (b/d), having seen its peak discoveries in 1965. On unconventional resources, Zagar says he expects deep-water finds to extend the oil reserve base by only five years.

Matt Simmons, president of Simmons & Company, adds an investment perspective to the issue of future oil supplies, noting that exploration spending has taken a "backseat" to development drilling. "There is a big difference between how many reserves we have and what we can produce at any given moment," he points out. Simmons suggests that even additions to capacity in OPEC, where reserves are prolific, will be expensive and time consuming and that giant finds outside of OPEC are becoming scarce. Outside of OPEC, Simmons notes that many fields have reached peak production, including some fields discovered in the 1980s that have already been depleted. He asserts that the majority of spending today by the international oil companies is being targeted toward "fighting" the natural production decline in existing fields as opposed to identifying new oil fields through exploration activities. "About 70 percent of current oil production is from fields [more than] 30 years old," observed Simmons, who also believes the largest oil fields may have already been discovered. "Fighting the decline curve is taking up 80 to 90 percent of the upstream spending budgets for many companies."

A key question addressed by Mike Lynch of WEFA is just how firm estimates of approaching limits on production really are. He points out that consistently over time such estimates have proven to be too pessimistic. Non-OPEC production was expected to decline by 3.6 million b/d or about 13 percent over the last two decades based on predictions that North Sea production would decline rapidly. Instead, non-OPEC output rose by more than 4 million b/d over the period despite a 50 percent drop in production rates inside the former Soviet Union. He emphasized that non-OPEC oil output data has shown a relatively consistent upward trend despite other data sets covering other indicators, such as depletion statistics and drilling rig counts, and added that students of oil resources should be wary of recurring errors and biases in oil forecasting. Both the International Energy Agency and the U.S. Department of Energy repeatedly have had to revise predictions of when non-OPEC production rates would peak. Historically, projections of oil forecasting models have proved too pessimistic in considering the role of technological advances in improving recoverability as well as expanding access to unconventional sources. "The state of what amount of reserves is recoverable is a dynamic reality," he told the conference.

Lynch added that the time line to peak production in many oil provinces could be more a function of policy than geology. Are prolific areas open to exploration? What kind of tax and royalty and tendering system does an oil-producing country maintain? What kinds of incentives are extended for the exploitation of unconventional resources? These considerations can play a key role in extending existing resources and stretching out the time frame for a production peak in any given province, Lynch observed. The history of

tax and production policy in the North Sea is a key example of a prolific oil province where a lowering of government taxes and royalties stimulated additional drilling and staved off any peaking in output rates. Even U.S. production saw a flattening out of its decline in the 1980s, Lynch noted.

The Role of Technology in Stretching the Resource Base

There is no question that technology has played an increasingly important role in the exploration and production business over the past two decades. There have been over a half dozen revolutionary changes made that have shortened the time it takes to find and develop an oil field as well as to lower the cost. Dramatic advances in underground imaging technologies, deep-water drilling platform design, drilling methods, enhanced recovery techniques and data processing and communications have radically changed the practices and capabilities of the oil industry and its success rates. The recent willingness of the U.S. government to share previously classified satellite data has opened areas for exploration that weren't even considered only a few years ago. Technological advances impact the issue of future oil supplies in several ways. They expand recovery potential from existing discovered reserves and can also speed up depletion rates. The advances can also improve discovery rates and drive down costs of exploiting frontier and "unconventional" sources of oil.

Roger Anderson, currently director of the Energy Research Center at Columbia University, sees new advances on the horizon that will sustain the rapid pace of technological change in the industry. In his presentation, he pointed to a number of new management technologies that will improve efficiency as well as the amount of oil that can be recovered. Improved portfolio management, 4D seismic, E/P work flow optimization, and other new techniques that allow operators to merge design, construction, operational, and maintenance and repair phases will lower costs and boost efficiency in the future, enhancing how much can be recovered, according to Anderson. But debate remains over whether this improved technology is really extending the resource base or whether it is simply allowing depletion to happen at a faster rate.

In Anderson's opinion, technology is not just helping oil companies drain fields faster but is providing the tools to recover more oil for a longer period of time. He says statistical evidence does not justify perceptions that deep-water fields will deplete faster than their predecessors and that experience with water-injection-enhanced recovery in new fields is showing better results than in aged reservoirs. Rather, he expects to see a slower rate of decline overall as technology is applied to a wider number of fields. Still, he concedes that technology has been used on the most promising fields to date, and therefore, future returns might not be as strong.

Arthur Green, chief geoscientist with ExxonMobil Exploration Company, noted that advances in geoscience and subsurface technology have advanced rapidly in the last decade, facilitating "smarter" exploration for world resources. These technological advancements have occurred within a revolution of changes in world politics, economic growth, and reorganization within the oil and gas business. Green contends that the energy industry is emerging as a truly global, high-tech, efficient, information-based industry.

The race to meet the energy and chemical needs in a world with a high population growth and increasing economic development and thrust for energy has been affected by a number of factors, according to Green. The most significant is the advancement of subsurface imaging tools and a better understanding of the basic concepts of the subsurface atmosphere. Green says earth-sensing satellites and other imaging tools combined with massive, global, digital data sets are bringing about nonlinear increases in the transfer of geoscience data, allowing the industry to drill and produce oil and gas with increasing accuracy and at a

fraction of the cost of just 10 years ago.

“Downstream improvements in gas-to-liquid technology, pipeline construction materials, and refining have enabled the global industry to meet the energy needs of a world without walls, even though we are adding more than 250,000 additional natural resource consumers every day on our planet,” Green told the conference. He added that meeting future needs will require a “mature cooperation between industry, universities, and governments” in making sure that enough highly trained people will be available to serve in the energy industry.

Manik Talwani of Rice University says the story for heavy oil is similarly optimistic. He predicts that recovery factors for very heavy oil will rise from 2 percent currently to more than 20 percent in the coming decades as new steam injection and other technologies are applied to vast resources in Canada, Venezuela, China, and Turkey. Talwani notes that technology exists today that could mean 80 percent recovery might be possible in such fields.

But B. N. Murali, vice president for technology at Halliburton, interjects some sobering barriers to technology’s positive impact on oil and gas exploration. Intermittently low oil prices and more complex drilling requirements for smaller fields and fields at great depths will make it more difficult to operate profitably unless costs can be brought down. Moreover, environmental regulations will add to this burden. But most importantly, the industry has seen a huge decline in its manpower, given consolidations and lay offs in recent years.

Murali notes, however, that technological progress has a significant track record, providing about 55 percent of the cost reduction seen in the industry in the last 20 years and as much as 85 percent of the cost reduction for offshore operations. Further progress can be expected in information processing, telecommunications, 3D visualization, extension reach drilling, smart wells, magnetic resonance, and rotary steering operations. Elaborating on technology’s boost to capabilities, Pete Fontana from Deep Vision notes that many new technologies are being added to the oil scene that will boost the industry’s ability to recover more oil, lower costs, and ensure better finding rates. He notes that the industry now has the capability to drill in water depths below 10,000 feet but cautions that it may be five years before this technology is fully applied.

Later, Peter Davies, chief economist of BP, offered a “balanced assessment” on the issues. He started his assessment by noting that all estimates of world oil reserves are subjective and unreliable, but he emphasized that there are no economic signs of an impending structural oil shortage. He indicated that BP’s latest Annual Statistical Review would show a continuation in the underlying upward trend of proven reserves, which has been apparent since 1965. The industry’s ability to replace its working inventory of reserves at declining real cost is clear evidence that supply constraints are not binding. The vast Middle East discoveries of the 1950s and 1960s provide a reserve buffer for the immediate future and beyond. On the other hand, some regions will deplete and decline, and there is no assurance that costs will always decline. From a policy standpoint, he saw no reason to panic and good reason to focus on technology support and the removal of barriers to investment.

Energy Security and Politics

In studying both the short-term strained condition of the oil market and the prospects for the future, it is clear that political issues will loom large, possibly playing a more important role than even geological factors in determining the pace of resource development for at least the next 10 years. While there is a broad range of political issues that influence this question, three have played a pivotal role over the past decade or two and will continue to affect the timely development of oil resources to meet rising demand. They are: U.S. and international oil sanctions policy, the political stability of the Middle East, and the

elimination of bureaucratic, logistical, and political obstacles to investment in Russia and Caspian Basin energy sectors.

The importance of these three issues on oil resource development cannot be underestimated. Persian Gulf crude oil currently makes up about 25 percent of current world oil supply but could rise to 30–40 percent over the next decade as the region's key producers pursue higher investments to capture expanding demand for oil in Asia and the developing world. If political factors were to block the development of new oil fields in the Persian Gulf, the ramifications for world oil markets could be quite severe.

Moreover, the deterioration of the Russian oil industry has been a prominent feature of international oil markets in recent years. While Russia holds the world's eighth largest oil reserves, Russia's political and economic problems have discouraged investment by both domestic and international oil companies. As a result, Russian oil production has fallen to about 6 million b/d in 1999, down from 12 million b/d in the late 1980s. Both Russia and the Caspian Basin countries show promise as key future suppliers of hydrocarbons. The former Soviet Union holds about 27 percent of the world's undiscovered oil resources. Bureaucratic, logistical, and political obstacles remain a hindrance to both the timely development of currently exploitable reserves and new discoveries.

Finally, U.S. and international oil sanctions policy has discouraged oil resource investment in a number of key domains including Iraq, Iran, and Libya. U.S. sanctions policy has constrained capacity expansion to a certain extent in Iran and Libya, although the unilateral aspect of the U.S. action limited its impact. In the case of Iraq, UN sanctions imposed as a result of the Iraqi invasion of Kuwait have had a severe effect on Iraqi production, although the relaxation of explicit limits on exports has resulted in a significant recovery. Investment in oil field maintenance and expansion continues to be impacted. The fate of sanctions policy will have a significant influence on oil markets in the coming years, particularly in determining the amount of Iraqi oil that will be available in the future. The country has a widely acknowledged oil resource base, second only to Saudi Arabia. An eventual normalization of relations would lead to a significant expansion in production.

The role of sanctions in constraining investment in several key OPEC countries has meant less diversification of productive capacity, as well as less total capacity, among a number of large producers, contributing to high prices. Most of today's spare production capacity is located in Saudi Arabia. And Saudi Arabia's high, and growing, level of production and lack of significant spare unutilized capacity outside the kingdom has spotlighted that country's critical role in determining the state of current and future oil markets, in turn creating unique political pressures. These conditions have put a spotlight on Saudi policy and the kingdom's close relations with the West and complicated relations with other key producers. Iran and Iraq accuse Saudi Arabia of seeking higher production rates to accommodate Western economic interests at the expense of the needs of local populations, creating internal pressures in the Arabian Gulf against a moderate price stance.

Bruce Riedel, special assistant to the president and senior director of Near East and South Asian Affairs at the National Security Council, made it clear that this administration sees sanctions as an important, and successful, policy tool. He argued for the necessity of United States' policies on oil sanctions during a luncheon address, saying, "The Middle East is an area of absolute strategic importance to the United States . . . it is absolutely vital to the future of our country." Riedel explained, "Sanctions are a part of a broader policy focus that includes intense diplomatic engagement and forward presence of American military forces." He also noted that "denial of access to the American economy in a meaningful way relegates economies to a lesser status in the world," and he further explained that multilateral sanctions had cost Iraq more than \$130 billion dollars since 1990, severely constraining its ability to threaten our interests. "In this part of the world [the Middle East], sanctions means going after oil," since oil is the essence of economies in the region, Riedel continued. He conceded that sanctions policies might result in

higher energy prices and can be detrimental to the global competitiveness of American energy companies in certain markets. Riedel noted that the price was a “small one” when considering the larger picture of national security and effective foreign policy toward states that sponsor terrorism abroad.

Riedel cited the sanctions against Libya as the “poster child” for effective sanctions policy implementation, noting that Libya had lost more than \$33.6 billion since the imposition of sanctions in 1985, causing it to turn over the Pan Am 103 suspects, and that Libya no longer serves as a state sponsor and training ground for international terrorism. Riedel said that the present oil embargo against Iraq was essential to demonstrating the U.S. resolve to support international law and peace, warning that as long as Saddam Hussein was in power, relations with Iraq would never improve. However, according to Riedel, the improving political conditions in Libya and Iran offer hope that “we might see improved relations with them in the future.”

Still, the Gulf Arab states remain concerned with the power of Iran and Iraq to destabilize the region. And about 20–25 percent of the world’s supply of crude oil transits through the Strait of Hormuz in the Persian Gulf. Saudi Arabia and the United Arab Emirates also house 90 percent of the world’s spare capacity that could be called upon instantly in an oil supply crisis caused by weather or other unpredictable factors. A good portion of this incremental supply must move through the Strait of Hormuz, though Saudi Arabia has some capacity to ship oil by pipeline to the Red Sea. The Persian Gulf also holds two-thirds of global oil reserves, with sanctioned Iraq alone sitting on 110 billion barrels. These realities make security considerations paramount to oil market stability.

Leaders of the Gulf Cooperation Council said that a successful U.S. effort in the Middle East peace process could do more to isolate Iraq than any other initiative. Some Gulf leaders, frustrated by the inertia in the U.S.’s Iraq policy, would like to see U.S. policy toward Iraq take a firmer and more innovative direction. But they concede that the U.S. military remains the “security backbone” for the region until it can develop its own effective deterrence to the threat from the northern Gulf.

James Bodner, principal deputy undersecretary for defense for policy, noted that the U.S. is better prepared today than ever before to prevent disruptions of energy supplies, whether at their source or in their transportation to market. He noted that in 1980, the U.S. needed three months to get a division into the Persian Gulf where it had only three ships in the region, none of which were aircraft carriers and could tap war reservists only in Europe and Asia. By 1990, Bodner noted, “as many people are aware,” that the U.S. military could, in three weeks, amass two combat divisions, three carrier battle groups, and 14 tactical fighter squadrons. “But,” Bodner continued, “perhaps less people are aware that since then we have continued to make dramatic improvements in our strategic position. In October 1994 when Saddam Hussein built up troops in southern Iraq, it took the U.S. only three days to move the first combat units into action in Kuwait,” Bodner said.

The U.S. also has new bilateral agreements that give the U.S. military access to facilities in all the countries of the Gulf Cooperation Council (GCC), supplementing prior agreements with Bahrain and Oman. And the Pentagon is “working to deepen and institutionalize the relationships and facilities put in place as a result of these new agreements,” according to Bodner. It also is working to foster multilateral exercises, command and control coordination for the GCC, a defense initiative against chemical and biological weapons, and a multilateral missile launch warning system.

The U.S. now keeps on average about 25,000 military personnel in the Persian Gulf region and about 30 ships. One to two aircraft carriers remain in the Persian Gulf and 175 tactical aircraft now have access to facilities and prepositioned equipment in all six GCC countries.

Bodner also stressed that the U.S. military had learned several important lessons from its recent Kosovo operations beyond the improvements in pinpoint bombing, including that strike missions can be conducted from the continental U.S. even if access has been denied to bases in the region. The U.S. military

also is experimenting with telecommunications improvements that allow more planning and intelligence operations to be kept out of the war theatre, limiting the number of personnel that have to be moved during an operation.

In a parallel development to the buildup of equipment in the Persian Gulf, the U.S. military also has enhanced its capacity to prevent the closure of sea-lanes in Asia and is building up its multilateral relationships in Southeast Asia. A new pier in Singapore will allow U.S. aircraft carriers to fuel and operate. The U.S. also is working closely with Japan to operate “side by side” to ensure its security.

Bodner stressed that these new deepening relationships and infrastructure would allow the U.S. to benefit from a coalition of allies that “make us better prepared to shape the security environment.”

Despite these improvements in U.S. security positioning in the Persian Gulf and Southeast Asia, problems remain. While the U.S. military has demonstrated clearly its prowess at isolating external threats to the free flow of energy resources in the Persian Gulf and Southeast Asia, the challenge of internal threats may be harder to manage. Internally organized sabotage of a country’s own oil installations is a different kind of challenge than those solved in the past through foreign military assistance. Nor can the U.S. easily prevent oil supply disruptions or disruptions to investment in resources that might stem from a violent or unexpected regime change in the Persian Gulf. A clear lesson from the ill-fated rule of the shah of Iran was that pouring arms into the region did little to address the emerging problems of social discontent and economic modernization.

Nawaf Obaid noted that inside Saudi Arabia there has been widespread “disappointment with how the economy has been managed.” The Saudi government continues to owe money to public organizations and welfare institutions and remains short of cash despite this year’s boost in oil prices. Obaid noted that \$6 to 7 billion in investments will be needed in the Saudi energy sector in the first year alone, forcing the kingdom to consider opening up to foreign participation. It is hoped that investments by Western firms in the Saudi energy sector can help create jobs that will satisfy an increasingly young and restive population.

Stephen Grummon, director for the Near East and South Asia at the Office of Intelligence and Research of the U.S. Department of State, added that another key threat to both the Persian Gulf as well as the Caspian Basin energy-producing states could be the “Talibanization” phenomenon that is already impacting Pakistani society and potentially threatens to play back into the Persian Gulf. Grummon warned that Pakistan’s situation bears “careful watching.” He also emphasized that it remains to be seen whether the Taliban is a national movement that would settle down and focus on governing should it win in Afghanistan or whether the Taliban sees itself as an ecumenical religious movement that is not bound by state borders.

Addressing the post-1990 war period in the Persian Gulf, Grummon noted that the prominent divide that now exists between the northern and southern littoral states of the Persian Gulf is out of sync with the region’s history and unlikely to be maintained. Grummon expects a new transition period for balance of power politics in the region and added that the current evolution inside Iran would have enormous implications for the region. “The question will be: Can Katami manage the transition in Iran in a soft landing or is it going to take a civil war?” noted Grummon, who believes Iran will become a major regional force once it sorts out its internal situation.

Many of the speakers noted the energy potential of Russia and the states of the Caspian Basin but added that these resources are unlikely to substitute for the massive reserves of the Persian Gulf. Martha Olcott, fellow at the Carnegie Endowment for International Peace, told the conference that it might be 10 years or more before there will be an environment conducive to large investment in the energy sector inside Russia. “President Putin has made it clear that Russia is not at the stage to influence world oil prices or to break up and reform its state energy monopolies.” Olcott believes that the next two years will be critical in determining Russia’s future direction. “Will security concerns or renewed cooperation dominate U.S.–Russian relations?” she asked. “The two countries must work out a redefinition of geopolitical interests.”

Olcott noted that the development of energy resources in the Caspian Basin has been slowed by the uncertainty in the U.S.–Russia relationship.

Still, Bodner pointed out that under President Putin, there seems to be more possibility of a cooperative stance toward the Caspian Basin energy-producing countries. He noted that after taking the reins of power, Putin called Russian energy leaders to the Russian security committee to discuss their role in foreign policy. Putin urged the industry not only to become more involved in the Caspian energy development but also to take a more cooperative stance toward investment from other countries in that region to help promote a higher level of total development. Indications are that Moscow would like to move away from the idea, promoted by former Russian premier Yevgeny Primakov, to “contain” U.S. expansion in the Caspian region in favor of “constructive engagement,” with the end goal being to move Russia toward better integration into the international economy.

Whatever the promise of the Caspian’s geology, it remains one of the most difficult oil-prospecting terrains in the world: No solution is in sight to the crippling dearth of drilling rigs and other necessary equipment. The region is increasingly unstable and transport routes increasingly insecure due to ethnic conflict and a proliferation of armed, non-state actors, Olcott noted.

It is hoped that Russia will be able to deliver on its promise to support a new export system from Kazakhstan that will extend from the large Western-run Tengiz oil field through Russia to the port of Novorossiysk. Initially, that pipeline, run by the Caspian Pipeline Consortium (CPC) that involves U.S., Kazakh, and Russian oil company shareholders, will carry 28 million tons of oil per year from Kazakhstan and Russia. The pipeline is expected to be in operation by late 2001.

Some commentators believe Russia’s newfound neighborliness stems from a realization that it must work together with the Central Asian countries to protect its own southern flank from Islamic militancy and the ill effects of splinter groups running drugs and arms across the region. Moscow’s problems in Chechnya may indeed have driven home the point that lawlessness in the Caucasus and Central Asia has serious repercussions for Russia itself. For their part, Central Asian leaders might now be more realistic about the kinds of concrete assistance that can be forthcoming from distant Washington and about the strings that might be attached. U.S. concerns about human rights and economic transparency are annoying, if not costly, to the local regimes, and Russia’s more accommodating approach is said to be gaining in appeal.

Still, the question remains whether Moscow itself has the capability to fill the vacuum of power that has prompted the rise in non-state actors and the slide to instability that now plagues parts of the region, according to Olcott. BP’s experience with an oil export route, called the Northern Route, out of Russia provides an instructive glimpse of the problem. The line, which extended from Baku through Grozny and Tikhoretsk to the Russian Black Sea port of Novorossiysk, was supposed to carry 120,000 b/d of newly produced oil from Azerbaijan. Ultimately, however, safety for the line could not be secured. It wasn’t just Russia’s conflict with Chechnya; routine pilfering from the line by local residents living along its extended routing meant the company couldn’t maintain pumping pressure needed to keep commercial flows going, regardless of the state of war or peace along the route.

Indeed, most of the routes out of the Caspian suffer from a variety of almost overwhelming security issues, Olcott noted. These range from ethnic disturbances to strong political separatist movements to even outright war between states as in the case of Armenia and Azerbaijan. Security arrangements remain relatively undefined in many areas of the former Soviet Union, she added. Local security concerns also have plagued otherwise viable export routes. The armed conflict between Azerbaijan and Armenia over the fate of the dual-claimed territory of Nagorno–Karabakh renders an Armenian route unattractive, and exports via Georgia would still be susceptible to Russian-backed Armenian militia attacks. Georgia faces domestic political problems as well, given a wide number of local separatist movements and Russian interference in its internal affairs. A possible eastward pipeline through Afghanistan suffers under the interminable strain of

civil war.

As these political, security, and logistical barriers to speedy exploitation of oil resources imply, future oil wealth to the Caspian region might be more limited than expected in the region. Early visions of Central Asia and the Caucasus as independent states working steadily toward democracy and liberal economic reform while buoyed by newfound oil wealth might give way to a much harsher reality. Ethnic and religious conflicts, declining living standards and public services, and fragile borders are increasing the volatility of the region. As additional energy income flows unevenly into the increasingly unstable region, it remains unclear what conditions will be fostered.

While U.S. officials attending the conference said Washington would like to see construction of the oil line from Baku to Ceyhan and looks to Turkey to pull the countries of the region together in a cooperative framework, Olcott said that the U.S. has not selected its priorities properly. “We’d like to isolate Iran, make the states of the region independent of Moscow, and see the development of resources,” she said. “But we haven’t made a clear enough choice as to which one is most important.”

Conclusion

The world has entered an oil supply situation that is more precarious than at any other time since the 1973 oil shock. But the oil market’s current tight supply situation stems mainly from transitory political and other factors and does not reflect evidence that we are “running out of oil.” However, there is consensus that in some of the most mature oil provinces in the world, such as the U.S. and North Sea, the easiest to reach resources are being depleted.

Advances in oil-drilling technology have meant that this depletion is still not yet cause for alarm. Technological progress has allowed frontier resources to be exploited almost as cheaply as conventional reserves. In addition, an opening to international capital and technology in countries formerly held off limits to Western methods and investment—including prolific areas of the former Soviet Union, the Middle East, Brazil, and elsewhere in Latin America—could usher in a renaissance of supply from yet untapped and unchartered reservoirs. Up until recent years, exploration in these oil-rich regions was limited to state monopolies that, in many cases, were inefficient and lacked sufficient capital to enhance productive capacity.

Still, a number of political obstacles have already come into play to block investment in several prolific areas. A critical aspect to our energy future will be whether the political, social, and economic environment in oil-producing regions will facilitate or hinder the development of this oil wealth. UN sanctions hinder timely development in Iraq while U.S. unilateral sanctions hinder development in Iran and to a lesser extent Libya, holding OPEC capacity at just over 29 million b/d instead of the 33 million b/d previously projected for the year 2000. Domestic political considerations also have slowed development of new fields or capacity expansion in Kuwait, Saudi Arabia, Venezuela, and Indonesia. In key non-OPEC areas, political barriers also threaten development of resources in Russia, China, and the Caspian Basin.

Energy security policy must take into account both short-term concerns and the longer-term trends and challenges of timely resource development. Policy makers must focus on the political dimension to the timely development of resources instead of assuming that market forces will always bring these resources to bear in an efficient, timely manner. Political considerations have contributed to a slowing in resource development in recent years and have, in several cases throughout the history of the oil patch, brought about market failure. There is no question that political factors could still thwart the full development of oil-production capability needed to meet rapidly growing demand in the years to come.

The Baker Institute and PIRINC recommend that resource development policy be addressed in a more

comprehensive and less piecemeal and reactive fashion. A comprehensive policy must take into consideration long-term issues, strategic challenges, and emerging political trends in oil-producing regions. Policy makers need not fear that we are running out of oil, but constructive policies are required to promote supply diversity and timely development of the world's resource base. Such policies should take into consideration both the economic issues related to energy security and strategic considerations. Both strategic components and economic protection are important considerations when devising a meaningful energy security policy.

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