

# Taking Stock

Adding Sustainability Variables to Asian Sectoral Analysis

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## Oil, Gas & Petrochemicals

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### Sustainability

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of development. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance (ESG) factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

## INTRODUCTION

The major oil, gas, and petrochemical firms of the developed world have long been among the listed companies most closely scrutinized by investors and activists concerned with sustainability and corporate social responsibility. Albeit with varying levels of alacrity, majors such as British Petroleum, ExxonMobil, Royal Dutch/Shell and ChevronTexaco have disclosed extensive operating data, complied with regulation, and responded to a broad set of stakeholder demands. The oft-repeated mantra of good corporate citizenship appears to have been systematically internalized and translated into reasonably consistent operating and investment practices. Extraction, processing, transport and use of the products themselves remain inherently politically sensitive, ecologically disruptive, and subject to the risk of high impact accidents. However, inappropriate conduct, while perhaps more common at smaller or private firms and in the industry at large, is a rare commodity at the major listed firms. The "social license to operate" is too important to risk through carelessness or pursuit of short-term gain.

Not so in the developing markets of Asia. The major listed firms of the region reflect their operating environments, which are characterized by regulatory frameworks and legal contexts which are often inconsistent or under development, legacy assets and practices from the period prior to market liberalization, and pell-mell economic growth which has stretched the ability of firms to engage in long-term planning and to meet burgeoning demand for product. Although major oil, gas, and petrochemical (OG&P) firms such as PetroChina, ONGC, PTT, and CNOOC are appropriately considered to be Asian blue chips, they generally are in the early stages of dealing with issues related to sustainability, governance, and responsiveness to broad stakeholder interests. As highly visible, highly profitable firms, Asian oils are likely to find themselves unwittingly thrust into roles as sustainability pioneers, taking some of the first arrows as sustainability issues inevitably gain greater prominence in the minds of regulators, consumers, investors, and other stakeholders positioned to influence value returned to shareholders.

*Major Asian firms are generally in the early stages of dealing with issues related to sustainability, governance, and responsiveness to broad stakeholder interests*

As this report shall examine, Asian OG&P firms are broadly exposed to significant sustainability-related risks, yet as regionally published equity research reveals, the general community of analysts and investors expends little effort evaluating the impact these risks could have on shareholder value. We contend that investors who consider four key sustainability-related investment themes will be better positioned to manage important categories of risk in their portfolios and capture opportunities presented by an emerging focus on sustainability in the region.

In this report, we assess these issues in the context of Asia's most broadly held large- and mid-capitalization listed OG&P companies. We believe that the most important sustainability themes for investors in Asian OG&P companies will be:

- **Deregulation: a prerequisite** Deregulated markets, characterized by competition and an end to subsidies and price controls, are inherently more efficient and sustainable, but regulatory change will alter competitive dynamics and produce regional winners and losers

- **Rising EHS standards** Environmental, health and safety risks remain unlikely to cross the threshold of materiality near-term, but proactive management of these risks will mitigate future costs
- **Cleaner fuels** Air pollution problems will drive a regulatory push toward cleaner fuels. In an environment of deregulated pricing and chronic refining capacity shortages, firms that invest in advanced fuel technology and global scale infrastructure will lay the foundation for sustainable long-term performance
- **Meeting supply challenges** While concerns about imminent "peak oil" may be debatable, the world faces long-term energy supply challenges which will be felt acutely in Asia, with rapidly rising demand and limited reserves. The increasingly visible push to control overseas "equity oil" highlights this sustainability issue, as firms make large, long-lived investments in often unfamiliar, politically unstable, ecologically sensitive, or strategically contested regions

## COUNTRY AND SECTOR DYNAMICS

### What the sector looks like today

The listed universe of large cap Asian OG&P firms is concentrated in a handful of countries that have engaged in the disaggregation and privatization of formerly state-owned national oil companies (NOCs). South Korea, India, Thailand, and China have moved down this path to varying degrees, dividing various former national monopolies into competing firms with different geographic focus, product mix, and market reach.

**Figure 1** Larger Regional Listed Oil, Gas & Petrochemicals Companies

Market	Company	Market Cap* (US\$m)
China	Petrochina	146,624
	Sinopec	48,712
	CNOOC	27,800
India	ONGC	37,194
	Reliance Industries	27,522
	Indian Oil	14,439
Korea	S Oil	7,939
	SK Corporation	6,696
	LG Chemical	3,668
Taiwan	Nan Ya Plastics	10,183
	Formosa Petrochemical	8,653
	Formosa Chemical and Fibre	8,537
Thailand	PTT	15,457
	PTTEP	7,558
	Thai Oil	3,167

\* As at 30 December 2005, or last official day of trading

Source: Bloomberg, December 2005

Elsewhere in the region, governments have retained full ownership of NOCs; Malaysia, Indonesia, Vietnam, and the Philippines are notable examples. Although NOCs or their successor listed firms have generally dominated oil markets straight through from exploration and production to refining and marketing, the international oil companies (IOCs) have made significant inroads in Asian markets, gaining traction upstream in exploration and production and in refining where local capital and expertise were in short supply, or downstream in marketing, typically where nations were net importers. The IOCs, however, have seldom regained the presence and market share enjoyed prior to past nationalizations of oil assets. Generally speaking, however, national autarky has given way to a patchwork of ownership and market participation, hastened by WTO-driven liberalization, and by rapidly increasing reliance throughout the region on foreign sources of oil, gas, and petrochemical feed stocks.

*National oil companies dominate the sector*

## Cross-cutting issues

As a backdrop to serious consideration of sustainability issues in the Asian OG&P sector, investors should consider three crosscutting issues, which shape the industry today:

- **Rapid demand growth**
- **Government ownership**
- **Limited disclosure**

**Rapid demand growth** Global energy markets were caught flat-footed in 2004 by a surge in demand from developing Asia. The International Energy Agency's 2004 demand growth estimate of 15.6% for China headlined a global "demand shock" which helped to drive oil prices to record nominal levels. While the 2004 China growth is widely seen as an aberration driven by short-term factors, it should be viewed in a context of sustained regional demand growth which has propelled China and India into the ranks of the world's largest energy consumers, and that will continue to exert demand pressure on global oil and gas markets. Investors looking at developed-market oil majors are accustomed to evaluating a torrent of new projects and activity. Yet as a percentage of the total invested capital, the activity of Asian firms is unprecedented in its scale, and the efficiency and productivity of long-lived assets put in place today will affect the sustainability outlook for many years to come.

**Figure 2** Asian Oil Demand Growth & Share of Global Total

Country	Share of Global Demand 1993 (%)	Average Annual Growth 1984-1993 (%)	Share of Global Demand 2003 (%)	Average Annual Growth 1994-2003 (%)	Demand Growth 2003 over 2002 (%)
China	4.6	5.3	8.0	6.5	10.8
India	2.0	4.8	3.1	5.6	1.9
South Korea	2.5	12.9	2.9	2.3	1.0
Taiwan	0.9	5.9	1.1	2.9	4.2
Malaysia	0.5	5.6	0.7	3.4	6.4
Indonesia	1.2	5.1	1.4	3.9	1.5
Thailand	0.8	8.7	1.0	2.8	6.2
Singapore	0.8	8.5	0.9	1.3	-3.9
Japan	8.2	1.7	7.0	-0.5	2.1
Other Asia	1.2	4.4	1.5	3.0	-1.9
<b>Regional Totals</b>					
Asia (excl. Japan)	14.5	6.5	20.7	4.4	4.9
North America	30.9	1.1	30.8	1.3	1.8
Europe & Eurasia	30.8	-0.9	25.3	0.0	0.9
<b>Total World</b>	<b>100.0</b>	<b>1.2</b>	<b>100.0</b>	<b>1.4</b>	<b>1.9</b>

Source: BP Statistical Review of World Energy, 2004

Developed-country OG&P firms typically experience cyclicity that is correlated to global energy pricing, which in turn generally follows broad macroeconomic cycles in the major economies. Although Asian OG&P firms have seen some cyclicity, they have experienced little of the capacity-rationalizing pressure unpleasantly provided by cyclical downturns. As a result, a great deal of uneconomic, inefficient activity occurs behind subsidies and protections in capacity-constrained markets.

*Many Asian governments still exert significant influence on ostensibly private firms*

**Government ownership** Asian nations have yet to take aggressive steps to divest majority stakes in their listed former NOCs, and governments retain controlling interests in nearly all of the major firms in the OG&P sector. Many Asian governments, aware that electoral majorities or other forms of legitimacy depend upon affordable energy and the economic growth it drives, still exert significant influence on ostensibly private firms. This in turn leads to acquiescence to unsustainable regulatory frameworks, or to putting capital at risk in projects that do not always serve the interests of all shareholders equally and which put national policy goals ahead of the interests of financial investors.

**Figure 3** Government Ownership in the Asian OG&P Sector

Country	Company	% Direct Government Ownership	Principal Shareholder
China	Petrochina	90	Chinese Government
	Sinpoec	65	Chinese Government
	CNOOC	71	Chinese Government
	China National Petroleum Corporation	100	Chinese Government
	Zhenhai Refining & Chem	39	Sinopec, 71%
	Shanghai Petrochemical	31	Sinopec, 56%
	Beijing Yanhua Petroleum	39	Sinopec, 70%
	COSL	62	Chinese Government
	Jilin Chemical	60	Petrochina, 67%
	Yizheng Chemical Fibre	23	Sinopec, 42%
India	ONGC	74	Government of India
	Reliance Industries	0	Ambani Family, 46%
	Indian Oil Corporation	82	Government of India
	GAIL	57	Government of India
	HPCL	51	Government of India
	BPCL	66	Government of India
Thailand	PTT	69	Government of Thailand
	PTTEP	44	Government of Thailand
	Thai Oil	34	PTT, 49%
	Aromatics Thailand	32	PTT, 46%
S. Korea	S-Oil	0	Saudi Aramco, 35%
	SK Corporation	0	SK Group Companies, 15%
	LG Chemical	0	LG, 34%
Taiwan	Chinese Petroleum Corporation	100	Government of Taiwan
	Formosa Petrochemical Corporation	0	Formosa Plastics, 32%
Indonesia	Pertamina	100	Government of Indonesia
Vietnam	Petrovietnam	100	Government of Vietnam
Malaysia	Petronus	100	Government of Malaysia
Philippines	PNOC	100	Government of Philippines

N/A - Not applicable

Source: Company disclosures and analyst reports

**Figure 4** Contrasting Views on Government Ownership

"I can tell you that the government does not interfere with our business," Wang says forcefully. "I think people should look at PetroChina's performance. We are truly an independent company."

Wang Guoliang, PetroChina CFO

Quoted in "Do More, Say Less", www.cfo.com, December 29, 2003

"CNPC owns approximately 90% of our share capital. This ownership percentage enables CNPC to elect our entire board of directors without the concurrence of any of our other shareholders. CNPC's interests may sometimes conflict with those of some or all of our minority shareholders. We cannot assure you that CNPC, as controlling shareholder, will always vote its shares in a way that benefits our minority shareholders."

PetroChina, SEC Form 20-F, FY2003

*Remarkably little information is available regarding many areas of key concern for sustainability-oriented investors*

**Limited disclosure** Limited disclosure by firms and incomplete compilation of government statistics severely curtail the ability of investors to assess many key aspects of company performance in Asian OG&P firms, with a particularly large gap in terms of sustainability metrics. While detailed discussion of a variety of backward looking operating performance metrics and forward looking risk factors is common in the reports of developed nation oil majors, Asian investors are left guessing to an extent which would surprise many investors in major non-Asian markets. The issue of disclosure has received greater attention recently and in some areas of note, such as accounting for reserves, progress has been made. Nevertheless, remarkably little information is available regarding key areas of concern for many investors. Concerns are likely to include disclosure of concession terms and payments consistent with "publish what you pay" practices, discussion of environmental practices and potential environmental liabilities, and quantification of greenhouse gas emissions. The lack of disclosure does not mean that managements are not measuring, analyzing and managing the risks involved per se, however the absence of material disclosure can quite justifiably lead investors to worry that significant unacknowledged sustainability risks could threaten shareholder returns.

## Long-term sector outlook

The OG&P sector is currently dominated by large firms due to the manner in which initial privatization was conducted, and we anticipate that large firms will continue to dominate the landscape for the foreseeable future. Scale is a key differentiator, and large firms will enjoy inherent advantages in the pursuit of scale, with preferential access to capital markets a key issue. The immense amounts of capital required to build world-class, large-scale refineries and petrochemical complexes will keep the number of new entrants relatively low. Furthermore, we expect to see increasing pressure on smaller players that are unable to play the scale game, likely ensuring that OG&P will remain a game for giant national champion firms.

Government control will almost certainly continue for the short- and intermediate-term, although gradual divestment should continue. For instance, the Chinese Government will likely sell off large portions of its stakes in major firms as part of efforts to address the non-tradeable A share problem, yet it is unlikely that it would relinquish majority control. Deregulation, on the other hand, will proceed at a more rapid pace, and we believe that downstream markets in all major Asian economies will be fully open to international competition within two years as WTO-induced regulatory change proceeds. Upstream will likely remain the preserve of domestic champions; however, we expect that governments will keep a tight grip on all aspects of OG&P markets that are linked to energy security concerns. Although governments will likely take steps to shield citizens from extreme price volatility, we expect that prices will be fully deregulated in the intermediate-term.

In the long term, we expect that perhaps five to seven Asian firms will join the ranks of the largest global oil firms, serving large domestic markets, entering international markets, and participating in upstream projects globally. Asian majors will be just as dependent as their developed market counterparts on imported feedstocks, sourced primarily from the Middle East. Virtually all of these firms currently have sustainability footprints which differ considerably from the major international oil companies, yet we believe that investors will be able over time to meaningfully identify the more strategically oriented and better managed firms which proactively address sustainability risks and deliver superior shareholder value.

*Virtually all Asian OG&P firms currently have sustainability footprints which differ considerably from that of the major international oil companies*

## DEREGULATION OF MARKETS AND PRICING: A PREREQUISITE FOR SUSTAINABILITY

Efficiency of operations and economically appropriate product pricing are key components of OG&P sustainability, yet Asian firms generally fare poorly in these areas compared to the international oil majors often with severe environmental and social consequences. Access to upstream resources has been exclusively or preferentially granted to domestic firms, and market access both in refining and petrochemicals, as well as downstream marketing activities, has been similarly curtailed. Former public sector firms have in recent years made significant progress in rationalizing various aspects of their businesses, yet price controls, subsidies, legacy business practices, and strict regulation of domestic competition continue to distort markets and diminish the sustainability of growth.

Change has come steadily in the last few years, and there is reason to believe that deregulation will continue to make significant strides in the major Asian OG&P markets. Privatization remains a factor, and governments will likely divest portions of their stakes in major firms, or will continue to sell state assets to private firms. Subsidies have come under fire, since governments can ill afford major outlays necessitated as oil prices have risen, and since increasingly import-reliant nations now see the full price tag for subsidies that were previously

masked by below-market allocation of domestic production. Competition will continue to rise as WTO-induced market deregulation opens the doors to new international competitors, and as increasingly entrepreneurial home markets and improving access to capital yield a crop of new entrants. In all, the prospects are good that deregulatory trends will lead to improved overall industry sustainability.

*OG&P regulation is the most significant single ESG variable for investors to consider as they invest in this largest of all Asian market sectors*

While continued market and price deregulation will be a force for sustainability at the national level, regulatory change will generate very different outcomes for the players in various segments of the various markets in the region. Sustainability-oriented investors, anticipating further deregulation and engaging management with the right questions, may be able to identify firms which can improve financial performance over the longer term. Additionally, investors can track the progress of OG&P deregulation to gain insight into the ability of various regional governments to adopt sustainable, market-based industrial policy, thereby capturing a valuable data point for use in determining overall country asset allocation in broad regional portfolios. In our view, OG&P regulation is the most significant single sustainability variable to consider in this largest of all Asian market sectors.

**Figure 5 Regulatory Status of Asian Nations with Publicly-Traded Oil Sectors**

	China	India	South Korea	Thailand
<b>Overall Regulatory Status</b>	Regulated	Regulated	Deregulated	Regulated
<b>Competition</b>				
Upstream	Low. Limited to major domestics; first new domestic entrant in May	Medium, with new entrants	N/A	Medium, limited gov't licensing
Refining & petrochemicals	Low but increasing; new entrants, rules easing for foreign investment	Medium, with new entrants, foreign and domestic	High, multiple domestic and foreign players	Medium. Market dominated by domestic players
Downstream/marketing	Medium, but increasing; market expected to open to limited foreign competition in 2006	Low, but increasing; foreign competition expected to increase	High, multiple domestic and foreign players	High, multiple domestic and foreign players
<b>Pricing</b>				
Consumer subsidies	Yes	Yes	No	Yes, but soon to be discontinued
Who bears subsidy cost	Refiners-guidance prices limit margins	Both oil marketers and gov't; gov't scheme spreads subsidy burden across oil industry sectors	N/A	Government-direct subsidy
<b>Prospects for Change</b>				
	Good. Indications that price controls may be eased, though still politically sensitive in rural areas. Refining, marketing and petrochem. sectors opening with WTO rules changes	Good. Comprehensive deregulation passed in 2002, but implementation depends on domestic politics. Competition in all segments likely to increase	N/A	Good. Gasoline subsidies ended on Oct. 2004, diesel in June 2005

N/A - Not applicable

Source: ASrIA, 2005

As highlighted earlier in the Sector Dynamics portion of this report, regional governments have maintained a high level of ownership in the industry, maintaining nominally privatized firms as handmaidens to government industrial policy, rather than as independent economic actors. A great deal of political vigor is required to overcome the inertia and vested interests of existing systems, and with the firms themselves either enjoying protection or enjoined from complaining, regulatory change comes only haltingly.

It is important to recognize that the politics of deregulation can be damaging in the short-run, even if the long run economic benefits appear to be clear. Firms are major employers, providing jobs to many. In 2004, PetroChina employed 424,000 to generate US\$46.9b in revenues, while ExxonMobil employed 86,000 to generate US\$298.0b — a 31x higher ratio of employees to sales. Inexpensive fuel is popular with political constituents, and fuel riots last spring in the Philippines and Indonesia vividly demonstrate the political downside to reducing subsidies. Governments throughout the region, both elected and unelected, are fully aware of the extent to which legitimacy rests upon delivering the economic goods, and are understandably reluctant to change. HSBC analyst Vidyadhar Ginde captured this tension in a February 2005 report: "An upcoming election-free year in India (February 2005 - May 2006) offers the prospect of an overhaul of the domestic regulatory regime. Such an overdue reform would help restore pricing power to the sector and potentially dramatically improve the profitability profiles of Indian downstream oil companies."

## Distorted markets, unintended consequences

Regulated and subsidized hydrocarbon markets have frequently led to distortions and unintended consequences which have harmed the sustainability profile of the industry. Furthermore, it is difficult to discern the degree to which intent has even factored into much policymaking due to the lack of data and understaffing of key oversight bodies. Subsidies have frequently been justified as a commendable redistributive policy with environmental and public health benefits, and yet it is not clear these policy ends are achieved. A jointly sponsored United Nations Development Program (UNDP) and World Bank study, "Access of the Poor to Clean Household Fuels in India" (2003), found that subsidies of LPG and kerosene intended to help the very poor in fact transferred wealth to the non-poor. More than 60% of the value of the kerosene subsidy went to urban households in the top half of the income distribution, with other subsidy value claimed through black market sales of subsidized kerosene to industrial users. Meanwhile 90% of rural households continued to consume agricultural wastes, wood, and other free biomass fuels.

*Studies have found that subsidies of LPG and kerosene, intended to help the very poor, transferred wealth to the non-poor*

Perhaps the most significant distortion comes in terms of efficiency, since consumption patterns have been shaped in the absence of signals indicating the true cost of energy. While consumers in less developed countries typically face higher costs of capital than developed market consumers, necessarily skewing rational economic behavior away from capital investments in efficiency and toward variable cost consumption of fuels, the subsidies prevalent in Asia have heightened the propensity to indulge in over-consumption of inexpensive and often highly polluting fuels. While the table below can be expected to show variability based on the composition of national economies (with developed

nations showing reduced energy intensity due, perhaps, to a higher proportion of low-energy-intensity services), Asian economies clearly are making less efficient use of fuels than their developed country counterparts.

**Figure 6 Energy Intensity of National Economies (2003)**

	Total Energy Use (mm tons of oil equiv.)	Gross Domestic Product (\$US billions)	Kg. of Oil Equiv. per US\$ of GDP
<b>China</b>	1199.3	1573.7	0.76
<b>India</b>	345.3	600.6	0.57
<b>Thailand</b>	74.0	143.0	0.52
<b>Indonesia</b>	107.0	208.3	0.51
<b>Brazil</b>	181.4	492.3	0.37
<b>South Korea</b>	212.0	605.3	0.35
<b>Australia</b>	115.6	522.4	0.22
<b>United States</b>	2297.8	10978.5	0.21
<b>Germany</b>	332.2	2403.2	0.14
<b>United Kingdom</b>	223.2	1794.9	0.12
<b>Japan</b>	504.8	4300.9	0.12

Source: World Bank, BP Statistical Review of Energy, 2004

**Figure 7 Subsidized Consumption in Indonesia: An Unsustainable Addiction to Cheap Oil**

On February 28, 2005, the Indonesian government announced 29% price hikes on transport fuels — 32.6% for gasoline and 27.3% for diesel fuel. Riots ensued, as the prospect of paying US\$0.68 per gallon (2,400 rupiah/liter) for gasoline rocked the country. The value of these subsidies, both as direct outlays and as foregone revenue to Pertamina, the government-owned national oil company, estimated by the World Bank to total nearly 40 trillion Rupiah (US\$3.3B), exceeds 10% of the government budget. A major price hike in 1998 sparked street protests that contributed to unrest in the months prior to the fall of the Suharto regime. Keith Bradsher, writing in the New York Times, reported that "already, the 29 percent increase has provoked large street demonstrations and even fistfights on the floor of Parliament. The political debate in Indonesia now is over whether to roll back the increase or simply form a committee to study whether to roll it back. Further increases in fuel prices are no longer even under public discussion."

Although Indonesia held the rotating OPEC presidency in 2004, it was actually a net importer of oil for the first time in the second half of the year. A decade of under-investment due to a complex range of factors brought exploration activity to a 30-year low and resulted in declining production. However, consumption growth has outstripped economic growth over 1983-2003 period; dollar-denominated GDP growth averaged 4.56%, while the volume of oil consumption grew an average of 4.73%. Subsidies have distorted consumption patterns, leading to a situation that is increasingly unsustainable in economic, environmental, and political terms.

Sources: World Bank; Indonesian Petroleum Association; BP Statistical Review of World Energy; "Oil Wealth Wasting Away in Indonesia," NYTimes, March 19, 2005; "Indonesia Torn by Fuel Price Protests," The Standard (HK), March 2, 2005

## Regulatory change will come, pace uncertain

Although the high level of regulation in the Asian OG&P sector is highlighted in figure 5, it also showed a highly dynamic landscape in which news of major policy changes comes seemingly daily. In addition to the simple reality that sustainable development relies on more accurate economic signals and that these rapidly growing nations are increasingly adopting market-based industrial policies, we believe that three additional factors have hastened the liberalization of the sector:

- **High oil prices** The real costs of subsidies have increased significantly over the last two years, highlighting the distortion caused by generous subsidy regimes
- **WTO** Many nations in Asia, most notably China, are preparing for new foreign market entrants; deregulation of markets has been essential, and nations have taken steps to prepare domestic firms for an increase in competition. In China recently, PetroChina and Sinopec have aggressively expanded marketing networks in advance of expected foreign competition
- **Increasing import reliance** As the mix of domestic consumption shifts rapidly toward market-priced imports, implicit subsidies (unrealized resource rents) become explicit payments due in cash, creating pressure in favor of deregulation. It is interesting to note that the US oil price control system managed by the Texas Railroad Commission with prices managed by allocating production & transport quotas lost its effectiveness around 1970, just as domestic production peaked and import reliance surged upward. In Asia, we may see that similar exogenous factors induce unexpected changes and hasten the pace of reform

A fourth factor which is a key driver for change in many developed countries, will likely have limited impact in the foreseeable future:

- **Global warming** Few long-term issues are as significant as reduction of carbon emissions, yet the prospects for near-term impact in Asia are less apparent given the absence of market price incentives and clear government policies. Future approaches to reducing aggregate carbon emissions will include fuel switching which will increase gas demand, and reduction of growth in oil demand, both of which will impact the Asian OG&P sector. We believe that, aside from the need to increase operational efficiency within the OG&P sector, policies to address global warming will be directed primarily at the power and transport sectors as end users of fuel, with limited direct impact on fuel providers. Approaches such as carbon taxes can have impact, but will have limited efficacy without prior meaningful industry and price deregulation

In our view, deregulation is therefore the most significant issue for sustainability-oriented investors to consider as they make investment decisions regarding individual companies, and as they make asset allocation decisions across the different countries of the region. The discipline of market forces, long absent,

*Ending subsidies is  
a key step toward  
sustainability*

has the potential to do more, more rapidly, than any other factor in increasing the efficiency of the OG&P sector, while an end to subsidies will reduce economic deadweight losses and contribute materially to sustainability by rationalizing energy consumption patterns.

Individual companies stand to lose or gain from deregulation, as protected market positions are eroded or upended, or as price controls and implicit subsidy burdens are reduced or eliminated. One rare example of equity research examining the deregulation issue is a May 2005 report entitled, "High-Octane Growth" by HSBC analyst Henik Fung, which contemplated the potential impact of fuel price liberalization on Chinese refiners. Refiners currently must acquire feedstocks through their own upstream affiliates or via the market, but must sell product within a narrow price band around a government-set national reference price. For example, Sinopec reports indicate that in 2004, 76% of its refinery feedstock was purchased at market prices from third parties, placing significant pressure on profits should reference prices not be reset to account for global crude price fluctuations. Fung considers a number of scenarios for price regulation, ranging from continued controls in a high oil-price environment, in which refiners face a mounting subsidy bill that could dramatically reduce profits, to full liberalization, in which refiner profit margins could improve as much as 50%. The choices made as the Chinese Government manages fuel affordability, long-term supply and demand balances, and competitiveness of domestic oil companies, will directly impact returns for investors.

As we also argued at the beginning of this section, successful implementation of OG&P sector reforms is a good indicator of the sustainability trajectory of the nations of the region. Energy inputs are a significant cost factor across the entire economy, and efficient delivery of fuels and reduced subsidy bills and deadweight losses will improve national competitiveness.

## **EH&S : A PROXY FOR MANAGEMENT QUALITY**

The prevailing view in the investment community in Asia is that environmental, health, and safety (EH&S) risk is largely immaterial to investment returns. This has been borne out in experience as few major problems have come to light, and as those that do are quickly resolved, typically settled in an extra-legal context, often not warranting a footnote. This view prevails in developed markets as well but for different reasons: mature firms have learned to manage risks that have yet to be systematically addressed in Asia. ExxonMobil, for example, chastened and recovered from the Valdez disaster, now discloses oil spill figures in terms of teaspoons per million barrels shipped. Research on environmental and social impacts of the energy sector by Goldman Sachs suggests that even major high impact events, such as spills and refinery explosions, have no discernable extended impact on share price performance if markets regard them as a one-off occurrence. Nevertheless, developed market examples of major industrial liabilities in oil and other industries are not difficult to find, whether involving PCBs, asbestos, or MTBE fuel additives.

While we believe that EH&S risks are being systematically underestimated in Asia, we are not certain that awareness of this aspect of the sustainability agenda will help investors identify issues with the potential to have a material impact on returns over the medium-term. Although the liabilities have the potential to be very large, the materiality threshold is also quite high for these large firms. Ultimately, in the absence of meaningful disclosure, these risks remain unknowable at present.

*EH&S risks are being systematically underestimated in Asia*

However, sustainability-oriented investors have come to understand that a firm's "social license to operate" and reputation can have important bearing on a firm's ability to prosper. We also are of the opinion that EH&S performance is a good indicator of general management competence, a view that has gained currency with developed market sustainability investors. The ability to control processes and prevent incidents, rather than to simply pay off aggrieved parties in the aftermath of sloppy operation, demonstrates a level of ability to manage difficult issues which will have intangible but significant benefits elsewhere in the business.

## Running hard to meet demand increases risk

Demand for virtually all oil, gas, and petrochemical products has consistently outstripped supply in global markets over the last two years, and the industry is racing to address chronic under capacity. The situation is particularly acute in Asia, where many analysts are forecasting refinery utilization rates in the high 90% range for at least another 2-3 years, despite massive expected capacity additions. As a result, many individual refineries are operating over their rated capacity levels, achieving greater than 100% capacity factors. In petrochemicals, the domestic Chinese industry can only meet an estimated 45% of China's current annual demand, and some analysts estimate that existing plants are running at as much as 110% of rated capacity, running equipment extremely hard and postponing scheduled maintenance to capture high margin additional revenues. Even many grossly inefficient and potentially dangerous legacy plants are kept running, since subsidized feed stocks, protected markets, and fully depreciated asset bases enable them to put up nominally profitable numbers while providing employment, despite high levels of EH&S risk. Pollution remediation equipment can be expensive to operate, and can incur high parasitic losses, so managers have been known to simply shut off the equipment to increase output, knowing that any environmental citation or fine from local authorities will have an inconsequential impact.

*High capacity utilization raises EH&S risks*

Employees and societies already bear risks and external social costs associated with poor EH&S practices. It is therefore not unreasonable to conclude that over time, regulatory and legal changes, along with rising social pressure, will lead companies to bear a greater portion of the total costs, whether through preventive investment or remedial compensation. While some nations in the region have relatively advanced legal systems and open public discourse and media coverage, others will seek to keep a lid on disclosure of EH&S impacts. Even so, riots in April 2005 in Huaxi, Zhejiang Province over excessive chemical pollution show that public reaction to abusive practices cannot be suppressed indefinitely. An additional cost consideration arises from the over utilization of

*Over time, regulatory and legal changes, and rising social pressure, will raise costs for companies*

assets, since plants running over capacity for extended periods will experience more significant wear and tear, shortening their productive lives, and increasing the likelihood of disruptive failures that could take a plant offline for an extended period of time. Although shareholders are clearly pleased by high profits today, it is not clear that optimal long-term outcomes are being achieved.

### Figure 8 Industrial Accidents in China —The Kaixian Gas Leak

On the night of December 23, 2003, a uncontrolled leak at a gas well released methane with high concentrations of toxic hydrogen sulfide gas in Kaixian County near Chongqing, killing 243 and injuring more than 4,000 others. It was determined that negligence was the cause of the accident. Wu Yaowen, Deputy General Manager of CNPC, PetroChina's parent company, was fired as a result. Ma Fucai, PetroChina's President & Chairman, resigned under pressure and six PetroChina employees were sentenced to jail terms from three to six years for their roles in the incident. In January 2004, in response to the PetroChina disaster, Beijing stepped up an industrial safety initiative begun in October 2002 to try to reduce the number of workplace deaths (2003 official numbers: 4,200 coal mine deaths, 14,675 from all industrial accidents).

Although the intense media outcry and public attention on the case catalyzed an encouraging response on the part of the authorities, certain aspects of the Kaixian incident highlight stark ongoing differences between developing Asia and the developed world. PetroChina settled with victims out of court, providing a total of US\$3.6mn in compensation, an amount equivalent to US\$15,000 per fatality, excluding the fact that a large portion of the settlement went to compensate the injured. In an environment such as the US, where the actuarial value of a life is generally considered to exceed several million dollars, a settlement of this sort would simply not be an option.

## EH&S visibility and costs will rise over time

*EH&S variables could shape international opportunities*

It is unclear that EH & S issues in and of themselves are going to have a material impact on investor returns, despite the tremendous social significance of the issue. Investors looking to achieve superior near-term and intermediate-term returns by identifying firms which outperform on EH&S criteria may find themselves disappointed. For fund managers employing screens to eliminate offenders from "clean hands"-type SRI portfolios, EH&S-based screening will likely eliminate all China holdings, while the impact on Thai and Indian holdings will be moderate, and on South Korean firms limited.

Taking a longer term view, EH&S issues may be material for investors in two ways. First, these issues are complex and difficult to manage, and leadership in this area may be indicative of management strength in other areas. We believe that firms that are progressive enough to take a proactive EH&S stance are more likely to adopt forward-looking approaches in a variety of areas, rather than simply continuing with a business-as-usual approach. Secondly,

as we shall discuss at greater length later in this report, Asian firms are moving rapidly to expand operations into international markets, particularly with a focus on acquiring reserves. EH&S performance, while somewhat intangible compared to the monetary value of bids for resources, may become a factor for firms and nations entertaining offers from Asian firms. Therefore more is at stake than just financial returns, and good EH&S performers may gain an edge in the race for resources.

## CLEANER FUELS: A CHALLENGE & OPPORTUNITY FOR ASIA

Air pollution statistics compiled by the World Health Organization and the Asian Development Bank consistently rank major Asian cities among the most polluted in the world, with Beijing, New Delhi, Mumbai, Bangkok, and Shanghai among those receiving dubious honors. While major stationary emissions sources such as coal-fired power plants may accurately be singled out as the largest contributors to air pollution, the transportation sector is the leading source of ground-level nitrogen oxides (NO<sub>x</sub>), respirable suspended particulates (RSP), carbon monoxide (CO), sulphur dioxide (SO<sub>2</sub>), and various volatile organic compounds (VOC), all of which have significant negative effects on public health and quality of life. Any solution to the air quality problem will require change on many fronts, most notably in terms of power sector emissions regulation, adoption of improved combustion technologies in both power and transport, and more stringent standards for vehicular and diesel generator exhaust. Primary responsibility will rest with government and market regulators and with the end users of fuels, as they adopt new equipment and technologies to increase efficiency and reduce emissions.

Nevertheless, the OG&P sector will be effected and investors will find several major criteria on which to differentiate firms. First, while coal and oil have played a significant role in the Asian power sector, firms are seeking to achieve greater diversification of fuel supply and are attempting to introduce natural gas-fired generation into the power mix. OG&P firms will need to make significant infrastructure investments to produce, transport, and distribute the liquefied natural gas (LNG) necessary to make this transition. Secondly, firms will need to upgrade refining capacity to produce fuels which meet higher standards of cleanliness, most particularly in terms of sulphur content. Many of the most efficient and low-emitting engine technologies cannot function on insufficiently refined high-sulphur fuels. Finally, OG&P firms will eventually need to invest in development or acquisition of technologies for alternative fuels, such as gas-to-liquids (GTL) and will even need to consider options such as biofuels (biodiesel, ethanol, etc.), once ecologically appropriate, non-subsidy-dependent options emerge.

*The emissions problem will primarily be addressed by regulators and by fuel consumers; nevertheless, the OG&P sector must necessarily play an important role*

The capital investment necessary to build natural gas infrastructure, clean fuel refining capacity, and to eventually adopt alternative fuel technology will be immense, and investors will be challenged to determine where best to deploy capital. Nevertheless, we believe that the trend towards adoption of

cleaner fuels will benefit from an unusually strong tailwind as governments across the region move to address air pollution issues which are taking a significant public health and quality of life toll on increasingly affluent populations.

## Natural gas — the clean fuel of the future

Natural gas has come to comprise a steadily increasing proportion of total energy consumption in developed country markets in recent decades. In North America and Europe, demand generally has been satisfied by regional production and via extensive pipeline networks extending into such major reserve areas as Canada and Russia. Natural gas-fired power plants are less expensive to build and operate, enjoy greater thermal efficiency than oil or coal-fired plants, are significantly less carbon-intensive than other fossil fuel options, and have very low emissions profiles.

*Major Asian emerging markets have had limited access to natural gas*

The major energy markets of emerging Asia, however, have not had ready access to natural gas. China and India both have unusually low consumption levels due to a lack of indigenous resources, although Thailand, Malaysia, and Indonesia have had significant domestic production giving rise to meaningful local gas markets.

**Figure 9** Developing Asia Has Lagged in Adoption of Natural Gas — Total Energy Consumption By Fuel Type

	Oil	Natural Gas	Coal	Nuclear Energy	Hydro electric
China	23%	3%	68%	1%	5%
India	33%	8%	54%	1%	5%
Indonesia	50%	30%	18%	0%	2%
Malaysia	44%	47%	6%	0%	3%
Thailand	52%	32%	13%	0%	2%
Asia Pacific	36%	11%	45%	4%	5%
North America	40%	25%	22%	7%	5%
South & Central America	47%	21%	4%	1%	27%
Europe & Eurasia	32%	33%	18%	10%	6%
Middle East	50%	47%	2%	0%	1%
Africa	40%	20%	32%	1%	6%
World Total Mix	37%	24%	26%	6%	6%

Source: BP Statistical Review of Energy 2004, US Department of Energy, EIA, 2005

*The prospects are extremely good for rapidly increasing natural gas consumption in both India and China*

The prospects are extremely good, however, for rapidly increasing natural gas consumption in both India and China, as numerous proposed pipelines and LNG terminals will enable gas to reach end-users from distant gas producing regions. Asian firms are moving aggressively to develop gas infrastructure, even in advance of the development of end user markets. CNOOC, for example, is developing a series of LNG terminals along the Chinese coast even though these terminals do not have industry standard gas offtake agreements in

place. PetroChina and its parent company, the unlisted Chinese National Petroleum Corporation (CNPC), are developing pipelines to bring gas from Kazakhstan and from western gas fields within China. In the Indian market, ONGC and GAIL are developing pipelines to bring gas from Burma, Bangladesh, and potentially from Iran. LNG terminals are also in development. Although current spot pricing for gas has risen strongly, giving coal a more significant price advantage in power markets at present, pricing in long-term purchase agreements remains competitive. We do not expect short- and intermediate-term price rises in gas to interrupt the long-term shift toward gas in the Asian fuel mix.

## Improving fuel standards — a crucial driver

While Asian refiners will need to make significant investments to meet increasingly stringent fuel cleanliness standards, right now they are struggling simply to put enough capacity in place to process crude into saleable product. As Indian and Chinese imports have surged, domestic refiners have increasingly been forced to rely upon sour (high sulphur) Middle Eastern crude oils versus the sweeter domestically produced crudes. As a result, significant additional desulphurization capacity must be brought online in order to produce high-quality distillates.

*Asian refiners will need to make significant investments to meet increasingly stringent fuel cleanliness standards*

In the absence of sufficient capacity, many small "teapot" refiners, estimated to supply as much as 15% of China's diesel fuel, have sold poorly refined, high-sulphur products which have contributed to air quality problems. Similar small-scale refineries (<60,000bpd) are common across Asia. Ironically, high international demand for sweet crudes has led to record sweet/sour price spreads, and China actually exported high-priced sweet Daqing crude equivalent to 5% of national consumption in 2004. These exports were offset by sour crudes which were presumably subsequently improperly refined. A final affront is the residual fuel market, in which low-end diesel and heavy bunkers with sulphur contents exceeding 2-3% versus unrefined Daqing crude at 0.1% are sold directly to transport and industry, with these fuels contributing disproportionately to the air pollution problem.

Fuel standards will improve but medium-term capacity is limited, and government standards will need to be enforced in order to ensure uptake of more costly fuel. Only coherent and enforceable government policy will reward refiners for producing cleaner, more sustainable fuels. From March 2005, India, where enforcement of standards appears to be more systematic, was importing approximately 80,000 barrels per day of clean Euro II standard refined diesel to meet fuel standards in major cities, despite sufficient domestic lower-standard diesel refining capacity. Responding to government calls to reduce air pollution in Beijing, PetroChina has introduced Euro III standard (mandatory European Union 1999 standard) gasoline at Beijing-area service stations, although it appears that the company does not have the capacity to extend this quality fuel beyond the capital at this time. Over time, adoption of Euro IV (2005) and Euro V (2008) standards will enable use of the advanced particle traps, catalytic converters, and other vehicular emission control devices which may be required in the future.

### Figure 10 Low Cost Vehicles or High Impact Polluters?

Although seen by some as a triumph of socially "appropriate technology," the three-wheeled agricultural vehicles ubiquitous in rural areas of China actually present a significant sustainability challenge. Twenty-two million CRVs (Chinese Rural Vehicles), most of which cost less than US\$300, serve as diesel-powered "mules" in the Chinese agricultural sector, and are a critical component of the rural economy. A recent analysis of fuel consumption patterns in China, however, revealed that CRVs consume more than twenty percent of all diesel fuel, far more than previously recognized. The typical CRV uses 1960's era, single cylinder engine technology — remarkably simple and easy to maintain, but a disaster from an efficiency and emissions standpoint. Sperling, an academic expert, argues that some basic technology transfer could nearly double CRV fuel efficiency and dramatically reduce emissions. Although more expensive, increased efficiency would provide an attractive return on investment, even more so if diesel prices are deregulated. Although much can be done by major OG&P firms to increase energy sector sustainability on the production side, some of the lowest hanging fruit, and much of the most fertile ground for policy solutions, will come on the consumption side through the introduction of truly appropriate technology in the transport sector.

Source: Sperling, Lin, & Hamilton, "Rural Vehicles in China: Appropriate Policy for Appropriate Technology," Transport Policy, January 2005

## Asian firms are technology laggards

*Asian oils are absent from the high end of fuels technology*

At present, Asian oils are absent from the high end of fuels technology. The international oil majors are pioneering new technologies such as gas-to-liquids (GTL), producing zero-sulphur diesel from plentiful natural gas in distant markets. As Asian firms increasingly look further afield for reserves in locations where the scale required for LNG may be unachievable, GTL may be an important alternative. Biofuels are another example of clean fuel technology receiving little attention in Asia, even as progress is made elsewhere on products such as sugarcane ethanol in Brazil and emerging cellulosic ethanol technologies in the US. Finally, Asian oil companies make little pretense about developing renewable energy technologies. We believe that it will be some time, perhaps more than a decade, before investors will be able to meaningfully differentiate between Asian OG&P firms on the basis of commitment to clean energy technology.

*Asian firms which proactively move to make investments in advanced refining and clean fuel technologies will be more attractive to SRI investors*

Developed market traditional SRI investors frequently apply simple screens to select firms with higher-than-average gas/oil reserve mixes, but we believe that this approach, while desirable from the standpoint of favoring gas as a cleaner-burning, less carbon-intensive fuel, is ill-suited to the analysis of Asian oil firms, which with few exceptions generally have extremely limited gas reserves. We believe, instead, that Asian firms, in fact, will be better judged in the medium-term based on how successfully they take the more basic step of moving toward production of the low-sulphur, consistently high-quality petroleum-based fuels which are a crucial component of a vehicular pollution solution. We believe that fuel quality standards will be tightened in Asia, and that firms which proactively move to make investments in advanced refining and clean fuel technologies may well produce better returns in the medium term.

The success of this portion of the sustainability thesis, however, hinges on the progress of deregulation, as discussed previously. In environments where refiners

are compelled to internalize a significant portion of the overall subsidy burden via price controls, firms could perversely suffer from making such investments. However, in a deregulated environment, highly refined fuels, likely to remain in short supply globally for some time, will command a premium which may translate into significant income gains for major supplier companies.

## LONGER TERM SUPPLY: THE RACE FOR RESOURCES

"Simply put, the era of easy access to energy is over. In part, this is because we are experiencing the convergence of geological difficulty with geopolitical instability...although political turmoil and social unrest are less likely to affect long-term supplies, the psychological effect of those factors can clearly have an impact on world oil markets, which are already running at razor-thin margins of capacity...with the growth in Asian demand, China, Japan and Southeast Asia as a region are by far the largest importers of oil and gas and are particularly dependent on the Mideast. And as a result, we are seeing the beginnings of a bidding war for Mideast supplies between East and West."

David O'Reilly, Chairman & CEO, ChevronTexaco Corporation,  
Keynote Address at CERAWEEK Conference, February 15, 2005

China, India, and other regional economies have emerged as major net importers of oil, gas, and petrochemical feed stocks and products, and it is probable that they will continue for many years to increase both their total quantity of imports, as well as their share of aggregate world demand. The demand shock that has hit the global oil market over the last two years has highlighted the impact that Asian economies could have on worldwide energy demand in coming decades, and the industry is scrambling to make large new investments in production capacity.

To meet rising demand, major Asian oil firms are adopting a resource seeking strategy. While they dominate, or even monopolize, domestic production, they are increasingly stepping up efforts to obtain international upstream resources to help ensure availability of supply in domestic markets. The pace of upstream investment has increased substantially in the last two years, and major moves into distant oil provinces, particularly those made by China and India, have received extensive attention in the global financial and political press.

Investors will recognize that the move beyond protected home markets is fraught with risk for Asian oil firms, as companies that have comfortably operated as protected domestic NOCs must learn a new set of skills to compete abroad against experienced IOCs that are at the top of their game. We believe that firms will encounter the greatest difficulty in areas most familiar to SRI investors. Anticipation of risks associated with local politics and stakeholder groups, EH&S impacts and enforcement, and geopolitical dynamics will yield an edge in

*The move beyond protected home markets is fraught with risk for Asian oil firms*

evaluating the prospects of these major firms as they venture into unfamiliar territory.

### Figure 11 Environmental and Social OG&P Performance Indicators

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Sustainable Asset Management, in its corporate sustainability assessments, reviews the following criteria to assess OG&P companies' performance and policies:

#### Environmental Dimension

- Advanced Environmental Management System
- Biodiversity
- Climate Strategy
- Refining/Cleaner Fuels
- Releases to the Environment
- Renewable Energy

#### Social Dimension

- Occupational Health & Safety
- Social Impacts on Communities

Source: Sustainable Asset Management (SAM)

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## The supply challenge is real

Developing Asia possesses limited oil and gas reserves. Although domestic reserves can support Asian production at current levels for longer periods than will likely be seen in North America, rapid demand growth will place increasing pressure on the relatively mature oilfields of China and India. In 2004, China passed Japan to become the world's second largest oil importer, and Indian demand is experiencing similar rates of growth.

Figure 12 Asian Energy Reserve Levels

OIL RESERVES					
Proven reserves at yearend (billions of barrels):				2003 Share of World Total (%)	Res. To Prod. Ratio.
	1983	1993	2003		
China	18.2	29.5	23.7	2.1	19.1
Indonesia	10.1	5.2	4.4	0.4	10.3
India	3.6	5.9	5.6	0.5	19.3
Thailand	-	0.2	0.7	0.1	8.7
Brunei	1.5	1.3	1.1	0.1	14.1
Vietnam	-	0.6	2.5	0.2	18.4
Malaysia	2.6	5.0	4.0	0.3	12.5
Other Asia	1.1	1.2	1.3	0.1	15.4
<b>Total Asia</b>	<b>37.1</b>	<b>48.8</b>	<b>43.3</b>	<b>3.7</b>	<b>16.4</b>
North America	95.2	91.0	63.6	5.5	12.2
Europe and Eurasia	100.1	80.4	105.9	9.2	17.1
Middle East	396.9	660.1	726.6	63.3	88.1
Africa	58.2	60.9	101.8	8.9	33.2
S&C America	33.7	79.1	102.2	8.9	41.5
<b>Total World</b>	<b>723.0</b>	<b>1,023.6</b>	<b>1,147.7</b>	<b>100.0</b>	<b>41.0</b>

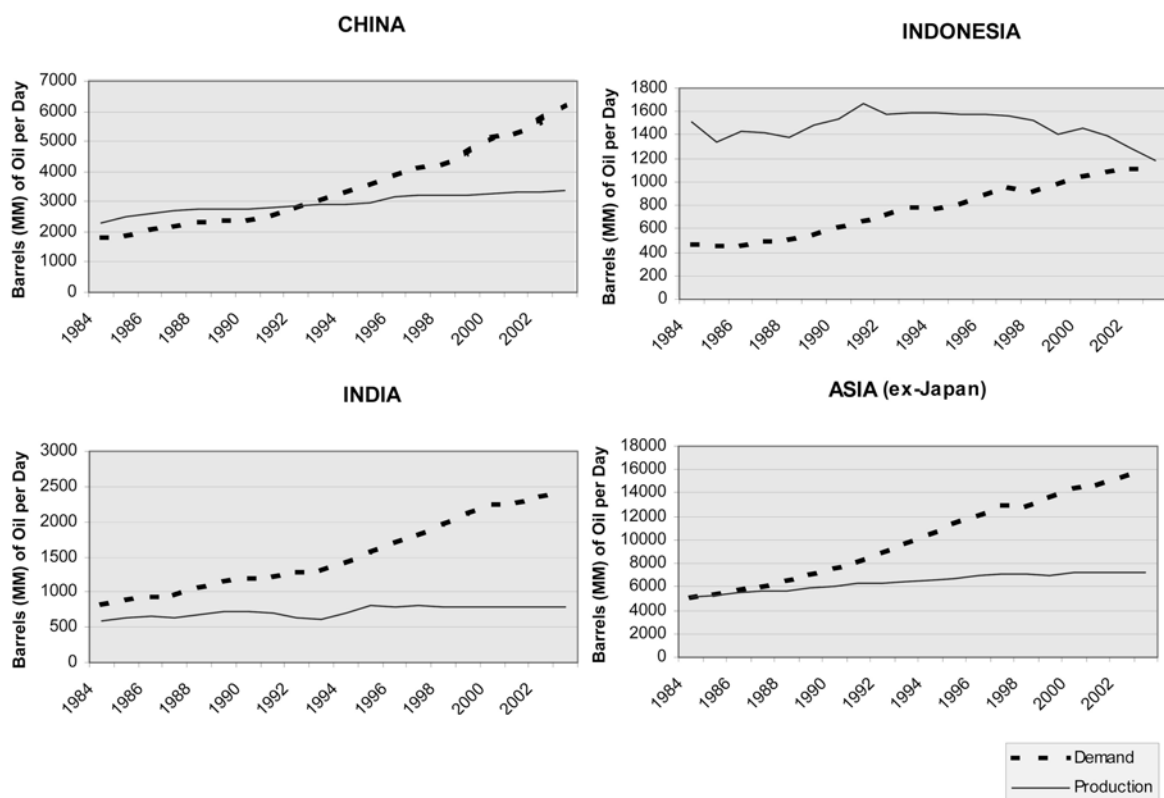
  

GAS RESERVES					
Proven reserves at yearend (billions of barrels):				2003 Share of World Total (%)	Res. To Prod. Ratio.
	1983	1993	2003		
China	0.8	1.0	1.8	1.0	53.4
Indonesia	1.2	1.8	2.6	1.5	35.2
India	0.5	0.7	0.9	0.5	28.4
Thailand	0.1	0.2	0.4	0.2	22.3
Brunei	0.2	0.4	0.4	0.2	28.3
Vietnam	-	0.1	0.2	0.1	76.7
Malaysia	1.4	1.8	2.4	1.4	45.0
Other Asia	1.1	1.8	1.9	1.2	32.9
<b>Total Asia</b>	<b>5.5</b>	<b>8.2</b>	<b>10.9</b>	<b>6.1</b>	<b>43.4</b>
North America	10.4	8.8	7.3	4.2	9.5
Europe and Eurasia	40.5	63.6	62.3	35.4	60.8
Middle East	26.4	44.4	71.7	40.8	>100
Africa	6.3	10.0	13.8	7.8	97.5
S&C America	3.2	5.5	7.2	4.1	60.6
<b>Total World</b>	<b>92.7</b>	<b>141.1</b>	<b>175.8</b>	<b>100.0</b>	<b>67.1</b>

Source: BP Statistical Review of Energy, 2004

In China and India, and now even in Indonesia, demand is rapidly outstripping domestic production, and the trends look set to continue indefinitely. As a result, developing Asia will almost unavoidably find itself increasingly dependent upon imports from other regions, most particularly from the Middle East. Although the global supply/demand balance will continue to ebb and flow and with it pricing, the sudden arrival of two energy-hungry economic powerhouses portends an extended period of strong demand growth.

**Figure 13 Asian Energy Production & Consumption Trends**



Source: BP Statistical Review of Energy, 2004

## Energy security: driving the push overseas

Growing import dependence is leading Asian governments to take energy security issues increasingly seriously, and government-controlled firms are inevitably among the instruments of policy. Recent oil price hysteria has fueled the fears of Asian governments, as concerns over potential oil price "superspikes," particularly painful to oil intensive economies, or the possible peaking global production, have given energy Cassandras the upper hand. With the legitimacy of governments inextricably linked to delivering economic prosperity, aggressive steps are being taken to ensure that the oil keeps flowing. China now imports more than 50% of its oil, and India more than 70%, and it is reasonable to

expect that these nations would undertake to develop measures to cushion supply interruptions, to protect those sources in place, and to develop more diverse sources of supply.

#### Figure 14 Peak Oil: The Ultimate Sustainability Challenge for the OG&P Sector

Many sustainability investors have taken note of the ongoing debate between "Hubbertians" and "Cornucopians," opposing camps in a discussion of the long-term outlook for energy supply. The Cornucopian view has long been supported by a reality in which regular discoveries of new oil and gas reserves, coupled with technological innovation, has increased global production steadily. Much faith has been put in markets and the belief that high oil prices would spur the innovation and justify the capital investment necessary to raise production for the foreseeable future.

Hubbertians hold that only a finite amount of oil can be squeezed from a stone, infinite capital and innovation notwithstanding. Many in the industry, including many notable petroleum geologists, believe the world is approaching a peak in total oil production. M. King Hubbert, longtime chief geologist for Shell Oil, first advanced the "Peak Oil" thesis in the late 1950s, when he predicted, based on patterns of oil discovery, economics of extraction, and an assumption that oil resources were finite, that oil production in the lower 48 US states would peak in the early 1970s and decline thereafter, following a bell-shaped curve. Hubbert's predictions proved remarkably prescient, and present-day adherents to the theory of "Hubbert's Peak" have extended his methodology globally, asserting that production, peaking this decade, will never rise much beyond current levels. This view contradicts mainstream projections from the US Department of Energy and the International Energy Agency, which predict that oil production will continue to rise from current levels of roughly 80 million barrels per day, toward 120 million barrels per day by 2025.

The jury will not be back anytime soon, and the world will likely continue to experience broad swings in oil prices, driven by normal macroeconomic cycles, which will appear, at times, to vindicate each side. The recent surge in investment will likely yield production increases, but it is unclear if this will offset dwindling production at mature fields. The world has seen no major "supergiant" discoveries since the early 1990s, and although "proved" reserves continue to rise (partly as a function of accounting rules), new finds have fallen steadily. The global economy depends on fossil fuels, and emerging Asia will demand its share. The prospect of "peak oil" amplifies many challenges regarding energy availability and affordability, the geopolitics of supply and energy security, and the need for investments in efficiency and alternative energy sources. It may be the most fundamental sustainability issue facing the both the oil industry and the world economy today.

Source: ASrIA, 2005

This is exactly what has transpired in recent years. Both China and India are developing energy stockpiles modeled loosely after the US Strategic Petroleum Reserve, which holds crude oil stocks equivalent to roughly five weeks of US domestic consumption. China is currently building tanks in Zhejiang province with capacity to hold 31 million barrels of gasoline (equivalent to approximately one week of domestic consumption), and plans are under development for a stockpile that can hold supplies equaling three months of national consumption. India has also proposed a stockpile that would hold 37 million barrels of crude

(two weeks of consumption). The desire to protect energy supply lines has also become a more visible component of national policy, and this has likely been a major factor in the expansion of military forces. More than 40% of China's oil imports travel from the Middle East, through the notoriously insecure Straits of Malacca, and energy concerns are among the reasons why China is making moves to develop a deepwater navy capable of projecting power far from home. The national security significance of energy has heightened tensions between Asian neighbors as well as interest in offshore resources has breathed life into territorial spats over various uninhabited atolls, rocks, and islands, heightening potential military issues.

*Diversity = Security*

The most meaningful form of energy security, however, is diversity of supply, and it is in developing new sources of energy that Chinese and Indian firms have been most notably active to make up for a major shortcoming. The contrast is at times quite striking: at the start of 2004, ExxonMobil had 35 billion barrels of reserves outside the U.S., TOTAL had 22 billion barrels outside of France, and PetroChina had just 1 billion barrels outside of China. To make up for the gap, Chinese firms are estimated to have made overseas oil investments totaling between US\$15 billion to \$40 billion since 2000, while Indian firms invested between US\$4 billion and \$10 billion during the same period.

**Figure 15** Energy Policy Meets Foreign Policy

"Wenran Jiang, an expert in Chinese foreign policy at the University of Alberta, said 'many in the West viewed the Unocal offer [by CNOOC] as part of China's coordinated assault on foreign markets, a sign of economic vigor'. In China, he said, 'the energy quest is seen as a belated, disorganized, even desperate rush to meet basic security needs. They feel threatened, with their back in a corner, forced to pay high prices to Western companies', Mr. Jiang said. 'For them, this is a matter of the survival of the regime.'"

Joseph Kahn, "China's Costly Quest for Energy Control"

Source: New York Times, June 27, 2005

The effort to lock in supply diversity has led Chinese and Indian firms to pursue "equity oil" in a manner which does not always appear to be economically rational. Although global energy and futures markets have evolved such that oil is a truly fungible commodity, the push for equity oil harkens back to the old days of dedicated, bilateral product flows. While major IOCs typically are willing to pay between \$25-33/barrel for proven reserves, anecdotal market evidence indicates that Asian firms appear to be paying significant premiums in exchange for guaranteed product flows. Nevertheless, Chinese and Indian firms continue to make aggressive moves into a long list of nations, including Kazakhstan, Russia, Sudan, Myanmar, Vietnam, Iran, Angola, Syria, Libya, and Ivory Coast.

## Overseas engagement presents new sustainability challenges

As the list of nations below makes evident, overseas engagement can be a politically sensitive affair. Oil firms are finding themselves on the front lines, dealing with issues of geopolitical significance, while juggling new human rights and environmental challenges. As discussed in the environmental, health, and safety section of this report, the imperfect track record of Asian firms can exacerbate tensions involved in operating in new overseas locales. Most challenging in the long-term, however, is the significant engagement that Chinese and Indian firms have in nations where regimes face serious legitimacy issues. Although oil revenues may help regimes maintain control, domestic political turmoil or international sanctions could threaten the ability of firms to obtain energy supplies. Furthermore, firms viewed as enablers of oppressive regimes could find themselves in a difficult position if regime change does eventually occur.

*Oil firms are on the front lines, dealing with issues of geopolitical significance, while juggling new human rights and environmental challenges*

**Figure 16** Sustainability Challenges in Engagement with Oppressive Regimes

Location	Issue	Players Involved
<b>Myanmar</b>	Military usurpation; slave labor and other human rights abuses	India developing plans for US\$1B gas pipeline; Thailand gets 20% of gas from Myanmar
<b>Uzbekistan</b>	Unelected government; recent massacre of democracy protesters	China signed US\$600M joint exploration deal weeks after Andijan massacre
<b>Iran</b>	State sponsor of terrorism under international sanction	Sinopec in \$100B, 25-year deal for gas; GAIL in \$50B, 30-year deal for gas
<b>Sudan</b>	Civil conflict exacerbated by struggle to control oil resources; genocide in Darfur	ONGC and CNPC (40% stake) are main shareholders in Sudanese national oil company

Source: ASRIA, 2005

China's decision to abstain from the recent UN vote on Resolution 1593 to refer Sudanese war crimes in Darfur to the International Criminal Court highlights how oil-related interests can trump human rights considerations. Sustainability investors can do little but choose not to invest in such firms. Harvard University, not known to adhere to sustainability practices in the management of its US\$22 billion endowment, divested its ownership stake in PetroChina following the vote, despite having never divested from South Africa during Apartheid, nor having taken an activist stance on other investment issues.

The engagement of major Asian OG&P firms with such countries as Sudan, Iran, Myanmar, and Uzbekistan may make them inherently unsuitable or ineligible for a majority of sustainability-oriented portfolios. For sustainability oriented investors, however, where firms are responding to trends for improved disclosure it is possible to differentiate between firms, and to choose firms which appear to be on a path toward greater sustainability.

The involvement of China and CNPC in Angola is a troubling example of oil firms acting in a manner damaging to sustainable development. The Eximbank of China last March provided a US\$2 billion development loan to the government of Angola in order to pave the way for greater CNPC involvement in the African nation; repayment was guaranteed in part by oil. The loan, much of which will be spent on projects involving Chinese firms, was accepted by the Angolan government over a package on offer from the International Monetary Fund. The IMF package reportedly had been hung up because of disclosure and anti-corruption provisions, while the Chinese made no such demands. Chinese oil firms continue to resist participation in the Extractive Industries Transparency Initiative (EITI), and sustainability investors have little information with which to determine if firms are supporting unsustainable practices in their pursuit of resources. However, EITI is not the only source of information. CNOOC, Petrochina and Sinopec have overseas listings and filings which will exert some pressure on them to be more transparent and responsive on these issues.

### Figure 17 A Pakistani-India Pipe Line May Help Reduce Traditional Rivalries

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GAIL's plan to transport Iranian gas via a pipeline through Pakistan presents a difficult but somewhat more hopeful example. Although the plans violate the US Iran-Libya Sanctions Act (ILSA) and could be scuttled due to pressure from the US on Pakistan, the pipeline project would serve to create new economic interdependence between Pakistan and India, two nuclear-armed rivals who until recently appeared to be at the brink of military conflict. In this instance, a questionable gas project could serve to reduce military and political tensions, potentially dramatically improving the investment and sustainability climate of the entire region.

While sustainability investors should make efforts to differentiate between various international energy projects, they should also consider the inherent difficulty of managing international projects and the challenges associated with entering foreign markets. A lack of focus can be particularly difficult. For example, Chinese firms are currently pursuing projects in more than 40 different countries. Not only does this create challenges for analysts and investors, but it signals a separate set of questions about the ability of Asian OG&P companies to develop the resources necessary to manage sustainability issues across a range of geographies and cultures. As we have seen time and again, this requires a robust combination of top level commitment and the patient development of internal skills and external partnerships.

## INVESTOR QUESTIONS FOR COMPANIES

### Compliance, standards and disclosure

- Does your company's senior management participate in a regular policy dialogue with the government?
- In what timeframe do you expect your firm to join international standards bodies and conventions, such as the Extractive Industries Transparency Initiative?
- What is the timeframe on which you expect to begin to disclose key sustainability data, such as emissions, spills, and safety performance?

### External risk assessment

- What government approvals are necessary to shut down legacy assets, and do you expect management autonomy to increase?
- What impact would complete deregulation of fuel pricing have on profitability of the different portions of your business?
- When acquiring reserves and foreign assets, what are your firm's assumptions about long-term energy pricing?
- How does your firm assess political risk as it enters production agreements overseas?

### Management and internal investment

- What internal disciplinary policies are in place to prevent environmental and safety violations?
- When your company undertakes a new exploration or production project, what policies do you follow on environmental impact assessments and community engagement?
- What impact does over-utilization of assets have on plant longevity?
- What are your company's plans regarding continued operation of non-"global scale" refining and petrochemical facilities?
- What is your firm's ability to adapt quickly to cleaner fuel standards, and what capital investments would be required?
- What plans are in place to increase natural gas production and distribution?
- What clean fuels R&D projects are underway, and what are the budgets?

## RESOURCES

### Company websites

- Bharat Petroleum Corp. Limited [www.bharatpetroleum.com](http://www.bharatpetroleum.com)
- China National Offshore Oil Corporation [www.cnooc.com.cn/defaulten.asp](http://www.cnooc.com.cn/defaulten.asp)
- Chinese Petroleum Corporation (Taiwan) [eng.cpc.com/tw](http://eng.cpc.com/tw)
- Formosa Petrochemical Corporation [www.fpcc.com.tw](http://www.fpcc.com.tw)
- Formosa Chemicals & Fibre [www.fcfc.com.tw](http://www.fcfc.com.tw)
- Gas Authority of India Limited [www.gailonline.com](http://www.gailonline.com)
- Hindustan Petroleum Corp. Limited [www.hindustanpetroleum.com](http://www.hindustanpetroleum.com)
- Hyundai Oil Refinery Corporation [www.oilbank.co.kr/english/index.jsp](http://www.oilbank.co.kr/english/index.jsp)
- Indian Oil Corporation [www.iocl.com](http://www.iocl.com)
- Korean National Oil Corporation [www.knoc.co.kr/stat/eng/index.htm](http://www.knoc.co.kr/stat/eng/index.htm)
- Oil & Natural Gas Corporation [www.ongcindia.com](http://www.ongcindia.com)
- Nan Ya Plastics [www.npc.com.tw](http://www.npc.com.tw)
- PetroChina [www.petrochina.com.cn/english](http://www.petrochina.com.cn/english)
- Petronas [www.petronas.com.my](http://www.petronas.com.my)
- Pertamina [www.pertamina.com](http://www.pertamina.com)
- Philippines National Oil Company [www.pnoc.com.ph](http://www.pnoc.com.ph)
- PTT [www.pttplc.com/en/default.asp](http://www.pttplc.com/en/default.asp)
- PTT Exploration & Production [www.pttep.com/en/index.asp](http://www.pttep.com/en/index.asp)
- Reliance Industries [www.ril.com](http://www.ril.com)
- Sinopec [www.sinopec.com](http://www.sinopec.com)
- SK Corporation [eng.skcorp.com](http://eng.skcorp.com)
- S-Oil [www.s-oil.com/eng/index.html](http://www.s-oil.com/eng/index.html)
- Thai Oil [www.thaioil.co.th/index\\_eng.php](http://www.thaioil.co.th/index_eng.php)

### Examples of sustainability reporting

- Amerada Hess [www.hess.com/downloads/reports/ehs/us/2003/home.htm](http://www.hess.com/downloads/reports/ehs/us/2003/home.htm)
- British Petroleum [www.bp.com](http://www.bp.com)
- ChevronTexaco [www.chevrontexaco.com/cr\\_report/2003](http://www.chevrontexaco.com/cr_report/2003)
- ExxonMobil [www.exxonmobil.com/corporate/Citizenship/Corp\\_citizenship\\_home.asp](http://www.exxonmobil.com/corporate/Citizenship/Corp_citizenship_home.asp)
- ONGC [www.ongcindia.com/hse.asp](http://www.ongcindia.com/hse.asp)
- Pertamina [www.pertamina.com/englishversion/ourcommunity/social.html](http://www.pertamina.com/englishversion/ourcommunity/social.html)
- PetroChina  
(2002 report) [www.petrochina.com.cn/english/jkaqhhj/pdf2002/jkaq2002.pdf](http://www.petrochina.com.cn/english/jkaqhhj/pdf2002/jkaq2002.pdf)
- PTT [www.pttplc.com/en/ptt\\_core.asp?page=cr](http://www.pttplc.com/en/ptt_core.asp?page=cr)
- PTTEP [www.pttep.com/files/PTTEP\\_HSE2002.pdf](http://www.pttep.com/files/PTTEP_HSE2002.pdf)
- Shell [www.shell.com/home/Framework?siteId=shellreport2003-en](http://www.shell.com/home/Framework?siteId=shellreport2003-en)
- Sinopec [english.sinopec.com/en-business/956.shtml](http://english.sinopec.com/en-business/956.shtml)

## Useful web-based resources

- Azure International [www.azure-international.com](http://www.azure-international.com)
- BP Statistical Review of World Energy [www.bp.com](http://www.bp.com)
- Chinese Petroleum and Chemical Industry Association [www.cpcia.org.cn/english/english.htm](http://www.cpcia.org.cn/english/english.htm)
- Energy Foundation: China Sustainable Energy Program [www.efchina.org](http://www.efchina.org)
- Energy Research Institute, Chinese National Development & Reform Commission [www.eri.org.cn/e\\_ab.htm](http://www.eri.org.cn/e_ab.htm)
- ENI World Oil & Gas Review [www.eni.it](http://www.eni.it)
- Extractive Industries Transparency Initiative [www.eitransparency.org](http://www.eitransparency.org)
- International Finance Corporation [www.ifc.org/sustainability](http://www.ifc.org/sustainability)
- International Petroleum Industry Environmental Conservation Association [www.iecea.org](http://www.iecea.org)
- KNOC Petronet News Service [www.petronet.co.kr/htm/eng/index.jsp](http://www.petronet.co.kr/htm/eng/index.jsp)
- Responsible Care (United States) [www.responsiblecare-us.com](http://www.responsiblecare-us.com)
- The Energy & Resources Institute, India [www.teriin.org](http://www.teriin.org)
- UN Framework Convention on Climate Change (Clean Development Mechanism) [cdm.unfccc.int](http://cdm.unfccc.int)
- US Department of Energy EIA [www.eia.doe.gov](http://www.eia.doe.gov)
- World Business Council for Sustainable Development [www.wbcsd.ch](http://www.wbcsd.ch)

## Papers & further reading

- Asian Development Bank, 2001. *"Asian Environment Outlook 2001"*
- British Petroleum, June 2004. *"Energy in Focus; BP Statistical Review of Energy"*
- Energy Research Institute, National Development & Reform Commission, October 2003. *"China's Sustainable Energy Future: Scenarios of Energy and Carbon Emissions"*
- Goldman Sachs, February 2004. *"Global Energy: Introducing the Goldman Sachs Energy Environmental and Social Index"*
- HSBC Global Research, May 2005. *"High-Octane Growth"*
- HSBC Global Research, February 2005. *"Keeping the Lid on Asian Oil Price"*
- International Finance Corporation, SustainAbility, & Ethos Institute, 2002. *"Developing Value: The Business Case for Sustainability in Emerging Markets"*
- Deffeyes K, Hill & Wang, 2005. *"Beyond Oil: The View from Hubbert's Peak"*, McKinsey Quarterly, April 2005. *"Securing Asia's Energy Future"*
- Sperling, Lin, & Hamilton, Transport Policy, January 2005. *"Rural Vehicles in China: Appropriate Policy for Appropriate Technology"*
- World Bank Group, September 2004. *"Striking a Better Balance — The World Bank Group and Extractive Industries: Final Report of the Extractive Industries Review, Management Response"*
- World Resources Institute, July 2002. *"Changing Oil: Emerging Environmental Risks and Shareholder Value in Oil & Gas Industry"*



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