

Background Notes

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Strategies for Greater Energy Security and Resource Security

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These notes are background for remarks to Finance Deputies of the G20 countries' Energy and Resources Seminar in Banff, Alberta June 16 – 18th, 2006. The organizers of the seminar posed several questions or propositions related to the role of markets and the role of governments in developing strategies aimed at strengthening energy security and resource security. To provide a context for addressing these propositions, some relevant current and historical developments in oil and gas markets, industry and policies are reviewed as well as aspects specifically germane to the subject of “energy security”. The questions posed by the organizers are then addressed specifically as a point of departure for discussion at the seminar.

The Context—Current oil prices

Oil prices have increased from \$22 in June 2003 to over \$70 today (early June, 2006). Much has been written about the set of economic, technical and political factors that converged to cause this rise¹. While a surge in global, but US/China-led, economic growth in 2003 prompted many analysts to label this ‘price shock’, demand-driven, history will probably record that the key factor was the disappearance of spare capacity along the supply, transport and transformation/refining chain. Oil is not alone. The prices of many other commodities’ have increased for much the same reasons: accelerated demand while capacity remains tight or the threat of interruption keeps markets on edge.

The distinction between a largely demand- versus a supply-driven price surge is important to defining the set of strategies that would have as their objective (the hope of) easing the tightness in the market. Indeed, demand growth and importantly from the market’s perspective, *expected* demand growth, has fallen off yet prices remain high; and there is no shortage of crude oil—inventories are at a 20 year high. The market therefore perceives upside risk on supply and assigns little downside to demand, notwithstanding macroeconomic signals (higher interest rates in the largest oil consumer, the U.S.). This should not be construed to imply that demand-side policies are not important in the current circumstances—indeed they are—but apart from mandatory lower speed limits, and vehicle use restrictions, most interventions would take years to bite. Supply-side interventions are another matter; complex, rife with many technical and geopolitical questions and relatively slow to show results. Meanwhile, expectations that non-OPEC supply will ‘come to the rescue’ in the short term (12 to 18 months) do not seem warranted.

¹ For a summary and review of comparison with post-1973, see “**World Energy Trends: Recent Developments and their Implications for Arab Countries**”, R. Skinner, 2006, prepared for the 8th Arab Energy Conference, Amman, Jordan, <http://www.oxfordenergy.org/pdfs/SP19.pdf>, also at www.oapec.org and in press, OPEC Bulletin, summer 2006.

Governments, international financial bodies and politicians in consuming countries are reacting, and are wanting to be seen to be reacting, to the surge in oil and gas (and other commodity) prices. It should be recalled that their concern regarding oil prices tends to be asymmetrical: in 1998 when prices bottomed out, the IMF for instance worried whether the sorry state of commodity markets and decreased financial flows would delay developing countries' progress with 'structural adjustment'. The history of 'dialogue' and the asymmetry of interests at the table has been discussed at length in the literature. This asymmetry does pose problems regarding the credibility of one side or the other depending on when in the price cycle dialogue is promoted. The question before policy makers today is, can and *should* governments do anything, and if so, what?

Historical context for future energy policies

The global energy supply system is a vast, inertia-ridden complex of large, fixed capital assets that take years to plan, sanction and construct, and they tend to be in place for decades. This long-term business must operate within a political context manifestly driven by short-term concerns and developments. Government policies affect energy supply and demand, but not as quickly as politicians might like. Given the energy system's inertia we must look several years if not decades back to find the hand-print, or lack of, of government intervention². We need to bear this in mind today when looking for policy responses to high energy prices as we are merely responding to the outcomes of previous policies or the lack of.

There is pressure on politicians from certain consumer groups "to do something" about current prices. Governments should think very carefully before 'doing something' or even implying they might do something. Part of the problem we confront today stems from governments having sent confused and conflicting policy signals to industry over the last two decades of surplus energy supply capacity. These 'signals' reflected a passive view about energy. For example,

- "The market will deliver security of supply"
- "Energy is not special: we don't have a Ministry of Orange Juice, so why have a Ministry of Energy?"
- "Responses to Climate change will largely determine our energy policy";
- "We favour the use of economic instruments to secure a low or no carbon energy future" (yet even with a tripling of oil prices promoters of low/non-carbon fuels/resources continue to seek subsidies and governments continue to signal they may grant such support, thereby compounding uncertainty);
- "We defer to local levels of government the planning and approval process" (for energy supply installations and infrastructure that serve the whole nation/region).

Having 'liberalized' energy markets over the past 20 years, many governments felt they could move on to other social/economic/environmental priorities. Governments have always been important agents in energy markets, but the style, focus and magnitude of intervention have changed. After privatisation and liberalization of the energy supply industries, governments needed to ensure independent regulation to achieve competition, health, safety and environmental goals. Yet governments continued to be important players in the market when

² North American natural gas supply offers a good example of the lag effects of government policy. Wellhead price controls implemented in the late sixties led to a fall-off in gas supply in the early seventies as industry reduced drilling. In turn the U.S. introduced legislation that forbade the use of natural gas in power generation. The Canadian government meanwhile applied strict surplus tests in licensing gas exports and regulated gas prices. In 1978, the U.S. began deregulating the gas supply sector while providing special price incentives for certain new gas supply; Canada followed in the mid-eighties by liberalizing its market. The result was a large gas supply surplus (the famous 'gas bubble'). With the resulting low prices through the late eighties and the difficulty of building any other kind of generating units, gas turbines became the technology of choice—over 200 GWs between 1998 and 2003. These came on line just as deliverability failed to meet demand, around 1997/98.

they signalled they might intervene to assist one fuel versus another to achieve their new environmental and social goals. In ratifying the Kyoto Protocol, they implicitly took long-term inter-generational decisions; some now seem uneasy with addressing the fiscal and financial fall-out from that decision when it comes to assuring energy supply, specifically baseload electricity capacity. This merely reminds us that governments tend to be slaves to the 'urgent' rather than to the important, where urgency is largely determined by special elites and interests.

The IEA's World Energy Outlooks since the early nineties repeatedly flagged most of the important energy issues that seem to come as surprises to many of today's policy makers. These include,

- Surging energy demand of China,
- Preponderance of global energy demand growth in non-OECD countries,
- Dominance of fossil fuels, not only in the global energy mix but in its growth,
- Enormous investment requirement,
- Tightening North American natural gas supply,
- Industrialized countries' growing dependence on imported oil and gas

But we have to look even further back to the seventies and eighties for the developments that led to the conditions—supply surplus—that made energy sector reform politically saleable. Surplus capacity in oil, gas and power virtually assured governments that prices would not rise in the short-term. In this environment liberalizing energy supply industries and markets, particularly the grid-based energy sectors, gas and electricity, was politically safe. This is not to imply there were not sensible, compelling reasons behind this reform. There were over 30 million unemployed in the OECD region in 1990. Structural reform of the grid-based energy industries was necessary to shake out inefficiencies hopefully to supply lower cost energy to firms (increasingly dependent on grid-based energy, in particular electricity), to improve their competitiveness in global markets. Governments then turned their attention to the threat of climate change, embracing selective, politically safe policies (renewables and energy efficiency) that pleased environmental NGOs, who in effect have been the de-facto regulators of fuel and technology choice in the power sector. This 15 to 20-year holiday in policy-making aimed at energy security is now over and the room to manoeuvre is limited.

Through this period as oil prices bounced off a floor of \$16/bbl, the oil industry was busy cost cutting and re-structuring in an attempt to meet shareholders' expectations of return on capital employed and growth targets. They eventually exhausted this source of 'returns' and then turned to mergers and acquisitions to build or replace reserves. In their new 'super-sized' mode, some face challenges to replace reserves. Although they were invited into many countries during the nineties, induced and attracted by generous fiscal regimes (Venezuela, for example), with the surge in oil revenues many host countries have changed the terms, believing they can develop their resources without the foreign companies. Local politics in some countries have encouraged this change of attitude to foreign investment in oil and gas.

While some OPEC countries, notably Saudi Arabia, have a policy of maintaining spare capacity, they do not want to risk over-investing and thereby repeat incurring the costs of the massive 10 mb/d capacity surplus in OPEC in 1986, which despite revisionist thinking to the contrary was purely accidental. But accidental or not, it serves as a central reference point for OPEC; the subject of spare capacity, who benefits and who should pay, is a recurring theme in the Producer – Consumer Dialogue, addressed below.

The recent gas 'crisis' in North America provides an object lesson in how surpluses can lead to complacency and how government/industry 'dialogue' and oversight of the latter by the former can break down. It also reminds us that information by itself is not enough. In the most transparent energy industry in the world, where data on virtually every gas well is in the public

domain, successive U.S. administrations entrusted the industry³ for advice on the state of natural gas supply and demand. To its credit, surely only exceeded by its embarrassment, the National Petroleum Council (NPC) did a 180° turn between its 1999 and 2003 reports. Within that extremely short period of time (well within the planning cycle of all commercial oil and gas producers), the collective industry's projection of Lower 48 gas production for 2005 was reduced by more than 20%, an amount nearly equal to the total World LNG production at the time—even though between reports the NPC *doubled* its price assumption. The principal sedimentary basins serving the continent were performing seriously short of expectations. The Council in its latest report (actually triggered by concerns expressed by the Chairman of the U.S. Federal Reserve testifying before legislators in April, 2003), pressed government for a suite of actions generally aimed at expediting access to resources and faster approvals of gas infrastructure projects.

While the NPC reports (2003 in particular) pointed to serious deficiencies in energy governance—lack of clear, expedited rules governing access to resources and markets and the associated planning and approval processes—this example reflects poorly on both the industry and governments: the NPC abused its half-century old, privileged status by ignoring the data pointing to tightening gas supply in favour of special pleading. Meanwhile governments at national and state level abdicated their role to critically monitor and report on fundamental developments in the gas sector. It was not the Energy department, but the Chairman of the Fed, who raised the alarm regarding gas supply. In over thirty years of energy policy experience, this author has never before witnessed a central banker leading on energy policy.

Notwithstanding the shock of North American gas supply and the problems of access to resources, the current situation in the US Gulf coast region underscores the importance of unfettered markets. Gas supply is being restored; high prices and an exceptionally warm winter drove down demand and left storage levels high. While this is a 'rough and tumble' process where the caprice of weather tended to cut both ways (in taking out supply and reducing demand), the important lesson is that government did not step in to 'save' or 'protect' the gas-intensive industries. The government's role with respect to infrastructure maintenance and emergency response is another question, however.

Environment policies of the nineties may not necessarily offer the best point of departure for energy policy for security of supply for the 21st C.

As noted above, during the energy surplus period, concerns about climate change preoccupied governments. Climate change is a serious issue and requires serious action by all countries. Unfortunately, 'free' markets fall short of addressing climate change in a politically acceptable way, which is where we are today—higher energy prices are directionally beneficial in reducing Greenhouse Gases (GHGs) and other polluting behaviour.

While the OECD promoted economic instruments to reduce GHGs, few countries have introduced large and effective carbon taxes. The preferred, fall-back (easy, politically-correct) policies in the context of Kyoto have tended to be the promotion of energy efficiency and renewable energy technologies, mostly wind power, with reluctant acknowledgement that natural gas could be a bridge to replace the 'bad' energy sources. However, relying on wind and energy efficiency to meet growth in electricity demand amounts to a triple hope—hope that wind turbines will be approved and installed, hope that the wind will blow when needed, and hope that consumers will invest in reducing their energy consumption (permanently). The empirical evidence does not vindicate these hopes. Besides, these are largely irrelevant to addressing the problem at hand—expanding or replacing capacity to generate baseload power. Governments signalled to the power sector that rather than relying on fuels and technologies that manifestly *did* deliver in the past, they prefer to rely on sources that *might* deliver in the future if conditions are right.

³ See the National Petroleum Council's reports on natural gas, 1990, 1999 and 2003; the last two reports are available on its website, www.npc.com

As there is no serious contender to replace oil in the transport sector, nor any on the horizon, little can be done to reduce carbon emissions from oil consumption in the short term. Its growth could be reduced through mandatory efficiency standards and intermodal shifts (implying major infrastructure expenditures by governments) but few governments have embraced these approaches. With developing countries (not subject to Kyoto) accounting for most of the recent and projected growth in oil demand, we can conclude that as far as oil is concerned, Kyoto and other policies would seem a theoretical threat at best.

Security of Energy Supply—Political context is everything

The strategic nature of 'security of supply' is reflected by what might be called, the Market / Resource Mismatch, an acute asymmetry that defines resource geopolitics in the twenty-first century.

To put some dimensions to the mismatch, the world consumes a little more than 10 Billion tonnes of oil equivalent a year. Oil and gas (hydrocarbons) account for 6 of these 10. The two largest 'entries' in the globe's energy account are US oil consumption and China's coal consumption; about equal and together just under 2 Billion tonnes of oil equivalent—together they underscore the world's energy security and climate challenges.

Of oil, 66% is consumed by the 'Consumer Five', or the 'C5' (who accounted for 83% of the world's GDP in 2003 of \$36.3Trillion)

	<u>Share of Oil Demand ('04)</u>	<u>GDP(2003)</u>
• NAFTA	30%	\$12.4 Trillion
• European Economic Area (EEA)	18%	\$11.3T
• China	8.2%	\$1.4T
• Japan	6.4%	\$4.3T
• India	3.1%	\$0.6T.

(India's inclusion could be debated as its oil consumption is less than that of France and only slightly more than South Korea's, but it *will* become important and it certainly sees itself as important).

However, the C5 have only 8% of the world's oil reserves; The Middle East and North Africa on the other hand have two thirds of the world's reserves.

Of natural gas, the C5 consume 50% of the world's supply, but have only 9% of its reserves; the Middle East and Russia have 2/3rds.

This picture of resources, markets and geopolitics is not the product of an econometric projection for the 21st century—it is the starting point; it is the context for examining security of energy supply in the twenty first century. Moreover, the mismatch of '*markets here—resources over there*' will increase. Moreover, as the IEA pointed out in its WEO 2004, the mismatch means that more oil and gas will pass through the well-known choke points and potential disruption points.

What is the product of an econometric projection is the increase in shares of Primary Energy for 2020. That hydrocarbons will still provide 60% of primary energy in 2020 tells us less than that 63% of final energy consumed outside transport will be delivered to consumers on *grids* (electricity and gas) by 2020. The politics and policies governing grid-based energy are different than those of transport—both are certainly politically charged domains of energy consumption. But grid-based energy is costly. It therefore implies inter-jurisdictional agreements to underpin the necessary capital costs in regional or international pipes and wires. It implies the necessary sector reform to attract investment. It implies improved equity of access to electricity in particular and improved capacity of consumers to pay for the services. With the lion's share of new power-generation assumed based on natural gas, a different world is implied by this scenario than the world currently painted by the media and some politicians in which suppliers 'score own-goals' by cutting off grid-based energy supplies to their customers.

'Fear of the Foreigner' is the old boogiemane of much bad policy and needs critical examination. When it comes to oil's security of supply, the empirical evidence is mixed. Most supply interruptions originate within consumer countries, mostly due to technical breakdowns, labour disputes or consumer blockades in protest of high prices. The much-discussed 'oil weapon' has been used more often by consumers against producers through the application of economic sanctions than by producers against consumers. Paradoxically, while the Middle East has the appearance and a history of fragility, and oil supplies in the region have certainly been disrupted frequently and by major amounts, the world has been supplied with oil mostly from elsewhere in the region, principally from Saudi Arabia. But the sanguinity that might be derived from this record is misplaced as it depended on the existence of spare capacity—a spare capacity that was accidental and not entirely the product of prudent planning. Saudi Arabia in particular is actively restoring some of this spare capacity.

Noteworthy about the resource/market mismatch is the asymmetry of *control* over oil and gas resources and their markets: over 75% of the hydrocarbon resources are under state ownership; their development and export are controlled by government officials or state oil companies subject to direct political oversight and influence. The OECD markets, on the other hand, are in countries where governments have largely liberalized market entry and have devolved the market functions of supply, distribution and marketing to private agents, subject of course to regulations protecting health and safety and promoting competition.

Some countries of the producer side of this mismatch increasingly tend to see the trade in political terms, or at least through a state-to-state lens often with linkages not found in normal commercial arrangements. They are increasingly receiving a receptive audience from Asian consuming countries, the latter through their National Oil Companies (NOCs), anxious to secure positions in oil supply. For example, Angola accepted loans from China while the latter's NOC secured offshore exploration licenses; Nigeria granted exploration licenses to Chinese firms while the latter undertook to build roads and infrastructure. Euro-American private firms (International Oil Companies, IOCs) are seriously disadvantaged in this business environment; as the traditional 'private agents' of the Euro-American consumer states, they face serious challenges in accessing and replacing oil and gas reserves.

The phrase, 'security of supply' embraces a hard and a soft concept: the economic fact of a *quantity* of a *good* or *service* delivered at a *price* and the psychological notion of security, which is a *feeling*. The literature offers many attempts to define 'security of supply'. Most tend to embrace soft, subjective descriptors such as 'adequate', 'reasonable', 'sufficient', etc. One country can be entirely dependent on imports yet feel secure. Another can rely only partly on imports yet feel this constitutes a major vulnerability. Supply quantity and the degree of dependence can remain unchanged, yet the feeling of insecurity can increase or decrease with time. It becomes clear that the particular political relationship between the trading parties defines the sense of security of that trade. In this respect the current political relationship between Europe and Russia seems to have shifted from what it was during the Cold War, at least when it comes to the feeling of security of supply of natural gas. It might be concluded based on recent developments that one of the sources of insecurity is the rhetoric and signals from political leaders and how the media portrays these.

Finally, the growing disparity of incomes and wealth is the starkest asymmetry and is the single greatest threat to peace and stability, nationally and internationally. It exists in virtually every nation of the world. We ignore it at our peril. When overlain on the global market/resource mismatch, particularly for oil and gas, it more than anything else gives meaning to '*insecurity* of energy supply'.

The roles of markets and government

Both markets and governments have a role in strengthening security of energy supply. When governments liberalized markets they made a serious error when they assumed that *strengthening* their role in compelling the gathering of energy end-use and other statistics

somehow constituted 'intervention' and therefore inconsistent with the doctrine of 'free markets'. Energy statistics have been greatly improved in many countries since the mid-nineties, but much work remains to be done. While markets are efficient, they may not necessarily be fully transparent, or deliver a clean environment and (the perception of) security of supply satisfactory to governments and publics. Often government intervention is required.

Role of markets

"Can Markets ensure sufficient investment in new sources of supply?" 'Markets' refer to the willing exchange of goods and services at prices determined by supply and demand. Prices signal whether more or less supply is required or demand wanted. But the response tends not to be smooth for many reasons. Price volatility is a consequence. The energy sector's inertia and lumpiness of its supply installations is relevant in influencing price volatility. This lumpiness is increasing as new increments of oil supply are coming from large offshore structures (west Africa, Brazil, Gulf of Mexico), major unconventional oil supply plants (oil sands plants, GTL plants), or through large pipelines from distant sources (Russia, Caspian). Lumpiness in the supply chain becomes particularly important when markets are tight or perceived to be threatened by political tensions.

There has been much discussion about the role of futures markets and whether 'speculators' have led the market. This subject was briefly reviewed by the International Energy Agency in its June, '06 Oil Market Report. Suffice it to say here that there are some important fundamentals, principally tight or perceived potentially tight supply that seem to be motivating buyers to stay long in the futures market. For example, Airlines, transport companies and the like have hedged their oil requirements. Since 2Q 2004, pension funds and other long-term investors have considered it prudent to allocate some of their portfolios to commodities. In view of the surge in demand and lack of investment in new capacity, this would seem warranted.

Meanwhile there is a lot of crude oil available in inventories and floating at sea, accounting for the contango in the forward curve. But buyers evidently discount this 'fundamental' when pricing their forward positions at the back end of the curve, implicitly believing that demand will stay robust, that non-OPEC supply will not surge and that OPEC will likely defend an unofficial floor price around \$55/bbl.

Development of new capacity is central to enhancing security of supply. Firms will invest in new supply projects provided they have confidence they can build them on time within budgets and that the rules will remain sufficiently stable over the economic life of the project and of course whether the average price of oil over the period will meet their planning assumptions. Governments through their fiscal, monetary and other policies, as well as their likely longevity, play an important role in informing the set of assumptions that firms use to develop their project economics. So, in markets where commercial players have a licence to operate, sufficient investment in new sources of supply can be reasonably ensured but it will take time and prices may not necessarily be at a level to suit everyone in the interim. The message then for government, while not very satisfactory, might be to be patient.

"Long term supply contracts: What is their role?" Implicit in this question is that long term contracts somehow guarantee supply and remove the 'worry' of disruption, and can therefore reduce price volatility. While, for example, gas supply from Russia to Europe was steady and uninterrupted during the Cold War and prior to liberalization, this was not necessarily due to the long-term nature of the contracts. Also, during the period of 'surplus capacity' of hydrocarbons, governments declared long-term contracts as anti-competitive, and implicitly assumed competition assure security of supply. There is a long history of tensions between governments and industry regarding the latter's supply contracts.

- During the seventies in the United States as gas supply withered under wellhead price controls, pipeline companies and Local Distribution Companies (LDCs) entered into long-term take-or-pay supply contracts. With tightening of prices, many buyers were left paying for gas they could not sell on to customers. In 1984 the U.S. Federal Energy

Regulatory Commission issued its Order 380 to release the LDCs from their obligations to pay pipeline companies for minimum volumes ('Minimum Bills' or 'Take-or-Pay'). While a spot market for gas emerged, it took a decade of hearings, court cases and subsequent FERC Orders to sort out the conflicts. For the last fifteen years, Public Utility Commissions overseeing local distribution companies have tended to rule long term contracts as being "imprudent" and have not allowed all of their costs to be passed through to consumers.

- When Canada liberalized its gas markets, the governments of Alberta and Canada essentially forced payout by producers of the carrying costs from the Take or Pay obligations incurred by the major gas buyer.
- As long as deliverability exceeded demand (the so-called 'gas bubble') the spot market generated prices that made consumers and governments happy. But in the late nineties the market reversed: rather than producers competing for buyers, major consumers competed for gas producers. Prices more than tripled. The prospects improved for importing LNG, a business historically underpinned by long-term contracts. This is now changing as the size and structure of the LNG industry changes. Increasingly both sellers and buyers of LNG want more flexibility in the contract. Given that LNG contracts tend to be more onerous, buyers need flexibility in the remainder of their portfolio. On the other hand, in order to finance new pipelines to move gas out of unconnected basins producers are prepared to enter into long-term (>10 years) contracts for capacity in order to avoid shutting in gas. LDCs continue to sign at most 3 to 5 year supply contracts.
- In Europe, the Commission (DG Comp) ruled long-term gas supply contracts as anti-competitive. This changed the context of this trade relationship especially when the Commission applied the ruling retroactively and without consultation with the LNG producers (principally Algeria). This constituted a major irritant to producers prompting them to establish a 'Gas Exporting Countries Forum', which in turn is sometimes pointed to as a potential threat to security of supply. But there are reasons why this concern might not be justified.⁴
- Long term, 'evergreen' contracts for crude oil supply exist, but not all crude is sold on such terms. The price is basis-determined; that is, with respect to a reference crude or crudes. In the case of gas, prices are based off a reference hub, real or notional.
- Some producing countries apply destination restrictions in supply contracts even though these can be considered as anti-competitive. Force majeure clauses are standard.
- It should be recalled that in the price run-up of 1978 and 1979 many consuming countries entered into State-to-State oil deals or counter-trade arrangements. The Japanese trading houses led in this activity joined by state-directed firms from Europe and Canada. In the frenzy, the illusion of 'long term supply security' trumped short-term prices. The results were obvious—prices were bid up. Maximum security of supply at the lowest price proved to be an oxymoron. State to state oil deals, rather than guaranteeing supply for consuming states during tight market conditions provided security of demand for producing countries during slack market periods, at least until the buyers could get out of them. In this sense, producer countries would tend to favour state-to-state oil sales with take-or-pay provisions. Asian state oil companies are increasingly engaging in state-to-state arrangements in order to gain entry to the upstream in producing countries but these new arrangements do not much resemble the deals of the seventies and eighties—yet⁵.
- There is nothing stopping parties from entering into some form of long-term off-take arrangement for crude oil. Such arrangements could allow for parking volumes, minimum

⁴ See, Hadi Hallouche, 2006, "**The Gas Exporting Countries Forum: Is it really a Gas OPEC in the Making?**" at <http://www.oxfordenergy.org/pdfs/NG13.pdf>

⁵ John Mitchell of Chatham House has pointed to the two 'regional oil markets', the East Asia-Pacific and the Atlantic-Mediterranean, in which the dominant players are governments and private parties respectively. See J. Mitchell, 2005, "**Producer – Consumer Dialogue: What can energy ministers say to one another?**" available at www.chathamhouse.org.uk/eedp

takes, under- and over-nominations, etc. Parties might view these services and benefits as providing some flexibility and security, but they would of course have a price. In general, they tend to decrease flexibility in the broader market as they could be a barrier to entry by third parties.

The role of governments

“How can governments foster well-functioning markets?” Markets for oil and gas are functioning but the issue is that certain publics and politicians do not like the consequences when prices increase. Liberalized markets do not mean low prices always. What prompted Alan Greenspan in April of 2003 to bring to legislators’ attention the surge in gas prices was the relative inelasticity of gas supply in North America. As noted above, new supply is increasingly slow and difficult to bring to market. Even new, conventional oil from OPEC takes time. Gas, increasingly based on LNG, and in North America, unconventional gas (coal bed methane, shale gas and tight gas), takes far longer from first cost to first gas at the burner-tip.

Governments have a role in regulation (competition, health, safety, environment, trade and commerce, legal systems to protect contracts) and obviously have a fiscal function. They should review their systems for approving energy and resource infrastructure. Such reviews can be politically fraught as environmental groups tend to interpret them as simply code for ‘Fast Tracking’ and dilution of environmental standards, rigour, public participation and due process.

“How can governments encourage appropriate conservation of energy?”

Governments certainly face communication challenges in assuring consumers that higher prices are a necessary result of liberalized markets (and can be good for the environment). Higher prices are a signal to consumers to change behaviour. They are changing and will continue to change their consumption patterns but it will take time.

Some segments of society such as old age pensioners and the poor have little scope to change consumption. Governments can use the fiscal system to address such fuel poverty (but this can be a slippery slope, attracting other supplicants for subsidies and once started, difficult to terminate when prices ameliorate). The IEA has provided a list of initiatives that industrialized governments can take (WEO 2004, p. 395). Increased efficiency standards, some biofuels, Compressed Natural Gas Vehicles, bonus/malice taxing of vehicles depending on efficiency, road pricing and inter-modal shifts have been demonstrated as reliable means of reducing oil demand over time. For industrializing countries the most important, but manifestly most difficult, step is to pass on as much of the fuel costs as possible.

Governments have a role in Education. The industry desperately needs skilled and semi-skilled labour to build the necessary supply infrastructure. This is one of the most pressing issues currently confronting the supply industry (including the Engineering, Procurement and Construction sector). Here again the industry confronts a legacy—a legacy of past surpluses and attitudes born by them⁶. New oil and gas supply and infrastructure projects in Alberta will require a tripling in manpower over the next 5 years. Costs are escalating. Correction of the manpower deficit cannot be done overnight. It will be especially challenging if governments and industry alike signal to students that the oil and gas industry is a cyclical, boom/bust dinosaur industry. Accounting for 60% of the world’s primary energy supply, such a prognosis for hydrocarbons is premature.

“Do governments have a role in encouraging new technologies?”

This is an old chestnut and tends to degenerate into debates about subsidies and the perils of picking winners. For example, it is often argued that because nuclear was subsidized, it would be ‘fair’ for governments to subsidize wind power and other forms of power generation that are

⁶ In the UK, enrolment in chemical engineering has declined for the last 7 years; enrolment in all engineering and physical sciences has been flat since early 90s. Recent measurement of US: high school graduates’ performance in science tests has recorded poorer scores than in 1996.

currently uneconomic. Virtually every technology has some vestige of government subsidy, direct or indirect, current or historic. For example, gas-fired turbines came out of the aviation sector and the years of military subsidies to develop long-distance airborne submarine surveillance capability. Governments can help create the market for new, promising technologies and fuels but there are examples where these evolve into gaming for subsidies and have little to do with encouraging diversity of energy supply. Ethanol from corn (maize) and biodiesel in Europe based on food crops are relevant examples.

There are many good and bad examples of governments' encouraging new technologies. But governments, because of inertia and politically determined 'flavours of the month', often pick the wrong winner. In the eighties the IEA's intergovernmental Fossil Fuel Technology committee expected Pressurized Fluidised Bed Combustion (PFBC) would be the power generation technology of the future; Combined Cycle Gas Turbines (CCGTs) were hardly mentioned. Within five years, CCGTs were the technology of choice for power generation where natural gas supply was available. Few PFBC units have been constructed.

The story of the Alberta oil sands is a good example of successful research and development partnerships between industry and government. Governments have conducted oil sands research since the early 20th Century and in the eighties matched funding in pilot plants to demonstrate new technologies to extract and upgrade the bitumen. The governments of Alberta and Canada have more than recouped their contributions to this effort. It is fair to say that over the many years these programmes ran, government's share of contributions to the R&D&D did not enjoy constant political support!

A case can be made for industry/government partnerships in demonstrating low or no carbon technologies for generating electricity and carbon capture and sequestration. Governments can facilitate the rapid penetration of efficient end-use technologies, for example through the application of performance standards. The International Energy Agency's Technology Implementation Agreements are examples of international collaboration to bring industry and governments together to share knowledge and experience with new energy technologies.

Concrete steps for the G20

When searching for solutions, it is important to recall what the problem is—absence of spare capacity. While geopolitics dominate most analyses of energy, it is fundamentally an engineered technical system. Like all technical systems, in order to be reliable, it needs spare capacity and redundancy. Governments need to examine critically any government barriers impeding expansion of spare capacity, surge capacity and strategic stocks—for they constitute the essence of redundancy. Therefore the core recommendation to governments is that strategic stocks should be increased.

The following are related or additional areas that governments might address:

1. The number of countries carrying strategic stocks should be increased—Brazil, China and India—and they should be at the table with the IEA countries and with OPEC in coordinating the filling and use of those stocks.
2. All governments need to examine the processes and regulations regarding public review and approval of major infrastructure projects. New approaches are needed to ensure that local impacts are minimized and innovative mechanisms designed to compensate local communities for hosting infrastructure.
3. Ensure that markets are functioning; implement the structural reforms nationally and regionally that governments have already agreed to.
4. Improve the availability and quality of energy statistics; the Joint Oil Data Initiative under the International Energy Forum (IEF) is an important step, but collecting and releasing data is not enough; attention must be paid to its quality, timeliness, analysis and interpretation.

5. Governments need to give serious attention to developing and agreeing on rules governing transit of oil and gas pipelines. This is not just a Europe/Russia issue in the context of the Energy Charter Treaty—it applies to the Indian sub-continent, the Middle East, Latin America and East and Southeast Asia.
6. International development assistance programmes should emphasize transfer of good energy practices that improve the efficiency and quality of energy access and use in developing countries.
7. Cities are where energy is consumed; it is estimated that by 2050, 80% of the world's energy will be consumed in cities: do national policies adequately and specifically address urban energy challenges, particularly in transport?
8. Governments have a role in technology development and research and development, stopping short of reverting to seventies policies of picking winners.
9. Tax the 'bad' and reward the 'good'—not easy, particularly in geographically large confederations with diverse energy resource endowments among sub-states.

Producer – Consumer Dialogue

'Producer – Consumer Dialogue', encouraged by Summit leaders at Rambouillet in 1976, now formalized under the IEF Secretariat in Riyadh, confronts a long list⁷ of problems, irritants and issues⁸. OPEC and its leaders repeatedly call for "stability and predictability" and cooperation from consumers and other producers to stabilize the market and to share the burden of spare capacity. Is this merely code for international agreement on prices and mechanisms to manage supply?

The parties at the 'dialogue' table exchange information and views. Some are seeking something more concrete. OPEC, as noted above, would appear to be such a party.

OPEC's recent Long-Term Strategy document focuses on (the need for) "stability of the world oil market with fair prices, the mutually dependent security of supply and security of demand issues, and the long-term petroleum revenues of Member Countries"⁹. The document identifies the key uncertainties affecting the demand for OPEC oil (economic growth, non-OPEC supply, consuming countries' energy and environmental policies, and technology development). The secretariat derived three scenarios to underscore the uncertainty of future world oil demand (ranging some 12 mb/d for 2020 across the three scenarios). They embrace a spread of 10 mb/d in the call on OPEC oil depending on world demand and non-OPEC performance. This is OPEC's concern: with this degree of uncertainty and lack of predictability, how can they plan their investments? How can they have "security of demand"? How can they "avoid unnecessary investment"? The investment required would range between \$230 and \$470 billion dollars according to these scenarios¹⁰.

Although unpredictability and uncertainty are permanent features of oil markets¹¹, it is a major preoccupation of OPEC. The secretariat seeks some form of international cooperation to "support fair and stable prices (and) sustainability of supply and security of demand". Thus, "various industry participants—OPEC, non-OPEC, producers and consumers, as well as the IOCs and other intermediaries—(need to) make every effort to collaborate and together reduce

⁷ See **Energy Security of Supply and Producer—Consumer Dialogue: Avoiding a Maginot Mentality**, R. Skinner, <http://www.oxfordenergy.org/presentations/SecurityOfSupply.pdf>

⁸ The Communiqué of OPEC in September, 2005 insisted that "*Dialogue must address all the issues of interest to all parties*".

⁹ See OPEC website and "**OPEC's Long-Term Strategy**", by Adnan Shihab-Eldin, in *Geopolitics of Energy*, Vol 28, Numbers 4&5, April-May, 2006.

¹⁰ Five outlooks prepared by the IEA, EIA and OPEC over the last two years ranged by 6 mb/d demand for 2020 and by 16 mb/d for non-OPEC supply.

¹¹ For a review of this uncertainty and un-predictability, see "**World Energy Trends: Recent Developments and their Implications for Arab Countries**", R. Skinner, 2006, *ibid*.

uncertainties and share the risks"¹². It has even been suggested that investment in new capacity be coordinated¹³.

Leaving such propositions unchallenged raises expectations that are simply unrealistic in an open or liberal, pluralist market-based system of trade and investment. Dialogue should lead to Ministers committing their governments to supplying better information (such as under JODI) to enable better analysis of demand and supply. Governments should commit to develop a comprehensive, current and public catalogue of new supply projects under development. Above all, they should agree to expanding strategic oil stocks whose filling and release should be coordinated in close consultation with key producers. Dialogue should address the important and doable; it should be pragmatic. But it should be frank.

¹² *ibid*

¹³ Discussed in Skinner, *ibid*.