

Breaking convention

Malaysia's vast Bintulu complex is now not only the world's largest LNG plant. By changing Asia's marketing rules, it is also setting innovative precedents

Malaysia's Bintulu facility in Sarawak, Borneo, opened two new trains last week, increasing capacity to 23mn t/yr and making the LNG plant the world's largest.

But the unconventional sales terms that Bintulu has embraced to support the \$1.5bn expansion are more significant than the capacity increase. The impact of these arrangements is far reaching. They provide a new and more flexible contract model for the Asian LNG trade as a whole.

Unlike the usual approach to LNG development from the 'seventies to the early 'nineties, the Bintulu consortium — led by Malaysia's state-owned Petronas (60pc) in partnership with Shell (15pc), the Sarawak government (10pc), Nippon Oil (10pc) and Mitsubishi subsidiary Diamond Gas (10pc) — went ahead without a full order book of customers.

Traditionally, the decision to commit to the investment needed to construct liquefaction plants would not be taken unless developers knew they had enough long-term sales contracts to match the planned output.

In Bintulu's case, construction began in late 1999 on the two train expansion — each of 3.4mn t/yr — well ahead of marketing. The company set up to run the trains, Malaysia LNG Tiga, signed its first contract in April 2001. This was for 900,000 t/yr from 2005 for 20 years, with Japan's Tohoku Electric. The same year saw a major setback when US energy utility Enron's Indian subsidiary, Metgas, withdrew from a preliminary agreement to take 2.6mn t/yr on a long-term basis.

Other contracts were signed in February last year with Tokyo Gas, Osaka Gas and Toho Gas for up to 1.6mn t/yr for 20 years from 2004, and in April 2002 a 20-year contract for supply of up to 480,000 t/yr for 20 years to Japan Petroleum Exploration. First shipment under this latter deal

began in March this year. MLNG Tiga also signed a one-year, 540,000t contract with Tokyo Electric in March, starting in April. And last week it signed a 1.5mn t/yr contract with options for another 500,000 t/yr for seven years with South Korea's Kogas, starting this month (*see p7*).

MLNG Tiga has departed from convention to secure these contracts just when competition is rising for Asian LNG markets. Its contracts offer buyers far more flexibility than the usually rigid terms governing the Asian LNG business. For example, the first contract with the three Japanese gas utilities provides for only 680,000 t/yr to be delivered under take-or-pay conditions. The companies have the right to take up to 480,000 t/yr more between them every year. In addition, the buyers have the option of taking another 440,000 t/yr in total during the contract period.

Automatic pilot

As a result, MLNG Tiga can relax a little. It looks like it has covered the first train's output with contracts phasing in as the train ramps up to full capacity. But with the second train scheduled to come on stream in October, there is still a lot to do. Much rests on the yet-to-be-awarded contract by South Korean steelmaker Posco and conglomerate SK for up to 1.1mn t/yr for 20 years. MLNG Tiga is shortlisted with Indonesia's BP-led Tangguh project (*see p7*).

But even if MLNG Tiga wins, Petronas will not be able to relax. Customer decisions to take or decline options will demand complex juggling of production planning. And buyers renewing contracts from the other Bintulu trains will no doubt want similar options. Gone are the days when a full portfolio of rigid 20-year contracts meant production could go on automatic pilot and marketing put aside.

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Argus Asia Gas & Power is published by Argus Media Ltd

Main offices:

London (head office): 93 Shepperton Road, London N1 3DF

Tel: (44 20) 7359 8792 **Fax:** (44 20) 7226 0695

e-mail: agp@argusmediagroup.com

e-mail: sales@argusmediagroup.com

Singapore office: 22 Malacca Street, #10-02 Royal Brothers Building, Singapore 048980

Tel: (65) 6533 3638 **Fax:** (65) 6533 4181

Houston office: 4801 Woodway,

Suite 270W, Houston, Texas 77056

Tel: (1 713) 622 3996 **Fax:** (1 713) 622 2991

New York office: 129 Washington St,

Suite 200, Hoboken, NJ 07030

Tel: (1 201) 659 4400 **Fax:** (1 201) 659 6006

Washington office: 1012 Fourteenth Street NW,

Suite 1500, Washington, DC 20005

Tel: (1 202) 775 0240 **Fax:** (1 202) 872 8045

Moscow office: ul. Prechistenka 40/2, entr 2, Floor 7, 119034 Moscow, Russia

Tel: (7 095) 933 7571 **Fax:** (7 095) 933 7572

Chairman: JA Nasmyth

Publisher: Adrian Binks

CEO Americas: Abudi Zein

Business development: Peter Caddy

Commercial manager: Barbara Kalu

General manager Asia: John Driscoll

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Japan recoils at GHG trade

Many Japanese firms favour meeting greenhouse gas (GHG) reduction targets by their own efforts, rather than purchasing credits from other companies on an emissions trading market.

Companies see the idea of meeting targets through emissions trade as an admission of failure. "Buying credits in trade is just like turning to others for help. We should focus on quickly coming up with our own workable but cost-effective plans for cuts," says battery maker Shin-Kobe Electric Machinery.

But trading GHG emissions credits is — along with moving towards reliance on natural gas rather than fuel oil for heating, and the accumulation of credits by contribution to GHG reduction projects overseas — one of the three means by which Japan can meet its Kyoto commitments. In June, Tokyo ratified the protocol, which requires Japan to cut emissions by 6pc between 2008 and 2012 from 1990 levels. But the treaty needs Russian ratification to become binding (*AGP*, 19 June, p1).

Until recently, the government left it to firms and industries to develop their own reduction strategies, having experienced resistance to institution of an emissions credit trade. Many firms consider it "disgraceful", as one observer puts it, to rely on the efforts of others that have cut their GHG emissions by more than their targets and, as a result, can trade the difference.

This is "to sumo-wrestle in someone else's loincloth", he says.

Where firms cannot meet their own targets, the preference in Japan is to contribute directly to overseas environmental preservation — through forestation projects or by refurbishing aged power plants, for example — rather than purchase credits on a market.

But despite company reticence, the economy ministry (Meti) and the environment ministry hope to launch a GHG emissions trading market in fiscal year 2005-06.

The environment ministry says its initial examination of company prac-

tices indicates that it will be difficult to achieve reductions targets purely through internal company efforts.

Japan's success in capping GHG emissions in recent years is, according to industry analysts, largely due to the country's stagnant economy. In recent government data, the country's industrial carbon dioxide (CO₂) emissions contracted by 0.2pc to 495mn t in 2002-01 on the previous fiscal year. This is only a 0.9pc rise on 1990 levels and compares with more than 20pc rises in CO₂ emissions from the transportation and service sectors.

Nippon Keidanren, Japan's most powerful industrial association, has set a voluntary target to cap fiscal 2010-11 CO₂ emissions at par with 1990 levels. Its 1,540 firm membership produces 40pc of the country's CO₂ emissions. Keidanren says this is the "best compromise" target. But the Japanese industrial sector will nonetheless need a large number of credits, either through emissions trading or other overseas efforts, to achieve the 7pc reduction target requested by the government.

As industrial activity shows signs of recovery, Keidanren warns that its CO₂ emissions could rise by 8.4pc by 2010-11 from 1990 levels and is asking its members for additional efforts.

Another obstacle to the government's GHG scheme is public resistance to the expansion of nuclear power (*AGP*, 12 February, p10). Under Meti's 2001 long-term energy plan, Japan's nuclear capacity is scheduled to rise by nearly 30pc to account for 42pc of the total power generation mix by 2012.

The stagnant economy and flat power demand growth, while reducing the rate of emissions growth, also work against the government's programme, as they prevent power firms from investing in cleaner technology. Coal remains the most cost-efficient fuel, if external environmental impact costs are ignored. The power industry plans to boost coal-fired generation capacity by 30pc in the next 10 years.

Nam Con Son inspires longer-term vision

BP's newly operating Nam Con Son gas supply chain promises to be the foundation for a long-term gas production hub in the offshore south Vietnam basin. Output from the first operating fields in the South China Sea can be reinforced well into the future by already identified fields in the near vicinity, BP and the state-owned PetroVietnam say.

PetroVietnam also wants gas from the joint Commercial Agreement Area (CAA) with Malaysia piped to Vietnam as well as to Malaysia. First gas from the PM3 block in the CAA — operated by Canada's Talisman Energy (41.4pc) in partnership with Malaysia's state-owned Petronas (46.1pc) and PetroVietnam (12.5pc) — is to be piped to Malaysia in October, reaching a plateau rate of 270mn ft³/d (2.8bn m³/yr) after the start of an expansion of oil output to 60,000 b/d in September (*AGP*, 6 November, p2). PetroVietnam also wants a pipeline running north (*see map*).

Available reserves at the block may be bolstered by exploration about to begin on an adjacent block north of PM3, 46/02, awarded last year to Talisman (30pc) with PetroVietnam (40pc) and Petronas (30pc).

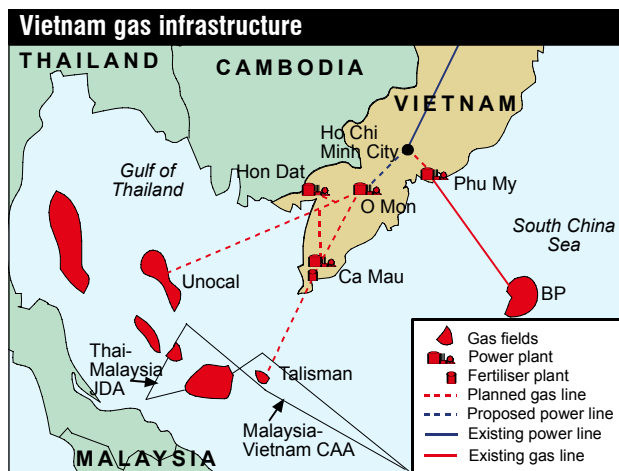
In the longer term, PetroVietnam wants to see gas from fields operated by US firm Unocal in the Malay basin, in the southwest Gulf of Thailand, supplied to domestic markets. But some in the industry say it would be better to sell Vietnam's share of the CAA gas to Malaysia, given the abundance of Nam Con Son basin gas and the existence of transport and processing infrastructure. Others say Vietnam should consider exporting at least part to Thailand.

Start of a supply chain

The Nam Con Son project was commissioned in November, marking the start of Vietnam's first large-scale gas supply chain. Until then, only a small volume of associated gas was produced — from the Bach Ho oil field, the country's largest structure, operated by Vietnamese-Russian joint venture Vietsovpetrov. Gas is badly needed to support expansion of the country's meagre generation capacity of 8.5GW to match an economy that has been growing by 6-7pc a year, the highest level in Asia outside of China (*AGP*, 4 December, p4).

Gas from the Lan Tay offshore field in block 6.1 is piped 370km to onshore processing at Din Co and then 30km to the Phu My industrial estate, southeast of Ho Chi Minh City for existing and planned power stations and industrial use. The initial 20-year supply contract to PetroVietnam, which sells on to final customers, is 260mn ft³/d.

BP operates the block with a 35pc stake, in partnership with India's state-owned ONGC (45pc) and PetroVietnam (20pc). Adding the block's Lan Do field, total proven reserves are 2 trillion ft³. BP (32.6pc) operates the pipeline and processing plant in partnership with PetroVietnam (51pc) and ConocoPhillips (16.3pc). PetroVietnam is to take over the midstream operation in 2006-07.



Expansion of flow well beyond the initial contract is possible with the pipeline, and processing facilities have a capacity of 650mn ft³/d. Additional compression could raise pipeline capacity even further. BP estimates that there could be more than 4 trillion ft³ of gas as well as significant condensate reserves in the Hai Thach and Moc Tinh fields, in the adjacent BP-operated blocks 5.2 and 5.3. BP is negotiating a \$650mn development of 5.2 with PetroVietnam. New gas could be fed into the transmission line through short links and the extension of the onshore Nam Con Son pipeline northwest to Ho Chi Minh City for further power plant and industrial consumption. BP wants to have the field on stream by 2006.

South Korea's KNOC wants to flow gas from its nearby Rong Doi field in block 11.1 to the Nam Con Son pipeline. The field has recoverable reserves of 1.3trillion ft³. KNOC's development plans — submitted to PetroVietnam — propose that 150mn ft³/d be piped into the system through a 60km link.

Gas aplenty

There is another major offshore gas area southwest Vietnam, where Unocal has had major finds. Reserves are estimated at 3.6 trillion-3.8 trillion ft³ with potential for as much as 8 trillion ft³, Unocal says. Anchor customers for the gas will be the key to development, the firm adds.

"We can build everything — the pipelines, the facilities — in two years. But what is needed is the onshore infrastructure and we need to negotiate the sales agreement with [state-owned power firm Electricity Vietnam] EVN. The power firm says they will be ready by 2008," says Peter Longerich, Unocal Vietnam finance and administration manager.

Longerich believes Vietnam will be the market for the gas. "Thailand has enough gas. Everything will go to Vietnam." Do Dinh Luyen, PetroVietnam's general gas and power manager, says: "We have no plans to export gas even in the long term [*AGP*, 3 July, p3]. The reserves are set for our long-term development."

Kabul's gas master plan

International exports will begin work this month on a 10-year master plan for exploitation of Afghanistan's gas resources and development of infrastructure for the domestic market. The work coincides with efforts to promote a gas line from Turkmenistan through the country to Pakistan and India.

Afghanistan's gas production peaked at 385mn ft³/d (3.9bn m³/yr) around the time of the 1979 coup that ushered in the military occupation by the former Soviet Union and the subsequent civil war. Up to 90pc of the gas was supplied to the Soviet Union by a pipeline through Uzbekistan. But those exports halted a long time ago.

The years of strife have wrecked much of Afghanistan's infrastructure or left it in a dangerous state of neglect, with leaks posing a major safety hazard. The only significant production is at three northern fields in the Sheberghan area — Djarquduk, Khowaja Gogarak and Yatimtaq — that produce around 19mn ft³/d.

The fields are connected by pipeline to the city of Mazar-i-Sharif, with small spur lines to a power plant operating at less than 30MW and a fertiliser factory. The Manila-based Asian Development Bank (ADB), which is funding the work with a \$1mn grant, says that only 300,000 Afghans, out of 25mn, have access to gas.

Just 6pc of the population has access to electricity. Most domestically produced power comes from a handful of small hydroelectric dams — although hydropower is considered to be a promising source of larger-scale generation. And some border areas receive their power from neighbouring countries, including Iran, Uzbekistan and Turkmenistan.

Low demand

Afghanistan is one of the lowest per-capita energy consumers in the world. The burning of firewood accounts for around three-quarters of all energy supplies — with serious environmental consequences. Gas is the most abundant domestic fossil fuel and the country has estimated coal reserves of 125mn t. But crude reserves are insignificant.

There has been virtually no upstream petroleum exploration for many years. Known gas reserves are estimated to be as much as 5 trillion ft³, with potentially 10 times that amount thought to be available deeper underground.

The development plan — to be completed in February — will examine extending Afghanistan's gas transmission system to reach the capital, Kabul, and other population centres. Given the extreme winter conditions in the country, potential demand for household heating is substantial, the ADB says.

The project will also help the government develop a policy on inter-regional gas trade. Although a proposal to revive exports to Uzbekistan has not made headway, the ADB is supporting reinvigoration of an idea to pipe gas from Turkmenistan through Afghanistan.

A proposed \$2.5bn, 1,600km pipeline would take up to

1 trillion ft³/yr of gas from the Dauletabad fields in south-east Turkmenistan across Afghanistan and on into Pakistan — and possibly India, if political tensions were to ease (*AGP*, 26 February, p12). "It has significant potential to improve stability and raise living standards in south and central Asia," the ADB says.

The proposal revives efforts led by US firm Unocal in the late 'nineties. The firm abandoned the scheme after the US conducted missile strikes against Afghanistan in 1998 during the rule of the former Taliban regime.

Turkmenistan, Afghanistan and Pakistan formed a ministerial steering committee in May last year to resurrect the concept. The committee has met five times, and the heads of the three governments have met twice to discuss the pipeline. The ADB provided a \$1mn grant in December to pay for a feasibility study.

The three nations signed a joint letter on 9 April inviting New Delhi to join the project, which economists say would need to be based on the Indian market if it were to go ahead.

The prospects of extending the pipeline to India have been enhanced by moves by India and Pakistan to resume diplomatic and trade relations.

Pakistani prime minister Zafarullah Khan Jamali has invited Indian prime minister Shri Atal Bihari Vajpayee to visit Pakistan in response to the Indian government's demand for talks. India has reappointed a high commissioner in Pakistan and has agreed to restore civil aviation links on a reciprocal basis.

But political uncertainty in Afghanistan may still be the stumbling block as the US-backed government of Hamid Karzai has only a tenuous grip on the country in the wake of the US-led destruction of the Taliban regime.

Afghanistan economic outlook

Afghanistan's energy demand is likely to jump sharply in the next few years as the country's economic activities return to a more normal course after the turmoil of recent years. The Manila-based Asian Development Bank (ADB) says the economy is likely to "surge ahead" in 2003 and 2004, provided the security situation improves, international support for reconstruction is maintained and economic management is sound.

"Annual economic growth in 2003-04 could be well above 10pc with inflation kept in reasonable check," it says. Supporting strong growth are an expected economic rebound accompanied by new inward investment; an influx of skills and entrepreneurship as large numbers of Afghans return to the country; and a substantial boost to economic demand and increase in business opportunities as a result of reconstruction activities. The ADB estimates 2002 GDP at \$4.4mn and annual per-capita GDP at \$170 for Afghanistan's 25mn population.

Delhi dallies with power reform

Reform of India's ailing power sector was boosted on 6 May by the passage of an overarching electricity law through the national parliament.

Although India's new electricity law remains subject to further government amendments, the legislation is hailed as an important advance. "It's a new paradigm, it's a new structure, it's fairly liberal," says the joint secretary of the Ministry of Power, Ajay Shankar. "It facilitates multiplicity of purchase for development of the power sector, private-sector participation in public-sector generation and transmission, and in distribution at a micro level."

The legislation, which has been in parliament for three years, consolidates several existing laws and provides various reforms. It aims to facilitate a more coherent approach to India's power development (*AGP*, 26 February, p5). The bill passed finally through the Rajya Sabha, the upper house of parliament, but is still subject to three amendments — relating to open access in distribution, theft and the central appellate — a newly appointed body to resolve disputes between the state electricity regulatory commissions, the state electricity boards (Sebs), and others. All three will be introduced in the next parliamentary session.

The law should encourage new generation projects by removing the hurdle of obtaining licences, removing the restriction of having to buy and sell power through the local Sebs, and imposing instruments of reform such as state regulatory commissions. The idea of future power trading is endorsed.

Reform of the power sector is one of the most urgent tasks facing Delhi if it is to reach its targeted annual GDP growth rate of 8pc over the 10th Economic Plan period from 2002 to 2007. Insufficient power is a key economic constraint. Power expansion has been crippled by the largely insolvent Sebs, which provide most of India's power at highly subsidised rates, especially to the agriculture sector.

Not only have the Sebs been unable to match demand growth, but their inability to pay full-cost power generation has made it difficult to establish independent power plants (IPPs) — as the failure of Enron's Dabhol power project illustrates (*AGP*, 30 April, p5). This, in turn, is why many plans to import LNG into India — which must be anchored largely by power generation — are floundering.

Theft and the failure of customers to pay bills are compounding the Sebs revenue shortfalls. Under the new law, metering — largely absent in India — will now become compulsory. The other joint secretary in the ministry of power, AK Kutty, explains why Sebs have often failed to provide meters to customers that should be billed. "My agri-

cultural connections are unmetered. Why? Because these are out in a farm, I put out a meter, my meter gets spoiled and no one reads these meters — who will wade through water to go and read a meter? So once my farm meter is unmetered, I think why should my residential connections be metered? I don't see any sanctity of the meter, so I start bypassing the meter."

As a means of arriving at revenues, cross-subsidisation is employed, but not successfully. Many industrial customers have turned to their own "captive" power generation.

The new law provides for the phasing out of non-transparent cross-subsidies and their replacement with tariffs decided and overseen by state electricity regulatory commissions. Subsidies apportioned to consumers to allow lower tariffs must be openly declared.

Theft is penalised under the law, although one of the amendments to be put to parliament reduces the proposed

penalties. The distribution segment of the power supply industry is a particular focus of reformers' efforts. Under the law, distribution networks will be free to provide open access to suppliers. Large users will be free to choose their supplier, and power generators can choose their distributor.

The amendment seeks to provide more clarity for the implementation of this measure. "Clause 42 says there shall be open access in distribution and that the regulatory commissions must within one year come up with the road map for it," the ministry of power's Shankar says. "So some people felt that since this is a very major reform issue, we should provide in the law itself some time-frame for introduction of open access for consumers above 1MW."

Associations and co-operatives may now be allowed to set up their own captive generation facilities. All captive facilities may wheel excess power on to the grid.

Cumbersome regulatory approvals are reduced for generation projects apart from hydro schemes. Clearance from environment and forestry commissions remains necessary.

"Generation will not need a licence, but simultaneously a station cannot be set up through the MoU [memorandum of understanding] route," says the chairman of the Central Electricity Regulatory Commission (Cerc) AK Basu. "You can't just sign with the government and set up. Bidding has to be tariff based; it will be competitive bidding."

State electricity regulatory commissions (SerCs) are mostly in place already and operating, but their powers will now be mandatory. One of the amendments to the bill is to curtail the power of the central appellate — the new body designed to resolve disputes. Basu says: "Everyone felt the SerCs should be independent. The appellate body should hear only appeals."

'Generation will not need a licence, but simultaneously a station cannot be set up through the MoU route'

Japanese demand rebounds

Japan's LNG demand is set to rebound this year against 2002, supported by serious nuclear power shortages boosting demand for thermal power. In 2002, Japanese LNG imports fell from 53.0mn t to 50.3mn t, mostly dragged down by weak industrial activity capping electricity demand.

"Early last year, power companies were taking only close to minimum volumes of LNG allowed under long-term contracts as electricity demand remained weak. But the nuclear crisis has changed the whole scene," says Takeo Suzuki, an analyst with the Institute of Energy Economics, Japan (IEEJ).

In September, Tokyo Electric Power (Tepeco) admitted that it had covered up data showing cracks and minor structural damages in a number of its reactors. By mid-April, Tepeco — the country's largest nuclear power operator — had shut all of its 17 reactors for examination, causing power shortages in Tokyo and the surrounding area.

To compensate, the utilities have increased their burning of fuel oil, coal and gas. Suzuki says this year's LNG demand should rebound, with the nuclear power crisis extended into the second quarter. In the first quarter, Japan increased LNG imports by 8.2pc on the year to 15mn t.

Tepeco last week restarted its first reactor since April. Although this adds 1.36GW to its operating capacity, the firm — also Japan's largest electricity supplier and largest importer of LNG, taking 16mn t/yr — is still 8GW of capac-

ity short of meeting the peak electricity summer demand forecast of 64.5GW. Tepeco expects that a few more reactors will be ready to restart before the summer.

The especially cold winter last year resulted in a late pickup in demand for LNG, offsetting a drop earlier in 2002. "It will now solely depend on the course of the nuclear crisis to see how much more Japan will import LNG this year," Suzuki says. "Because of the problem, power utilities are now buying maximum quantities in addition to occasional spot cargoes, like those from Oman."

But offsetting the affect of a possibly temporary retreat from nuclear generation, Japan's bleak economic outlook is not encouraging for LNG demand. The economy showed a slight recovery in late 2002, supported by strong export demand. But it may now be falling back for the first time in five months, with the forward-looking index of economic activity for March falling below the crucial 50-point mark, regarded as the dividing line between growth and contraction.

● Russia's Shell-led Sakhalin Energy LNG project this week signed an initial agreement for supply of 1.1mn t/yr for 24 years to Tokyo Gas. The deal is the most advanced negotiation for the planned 9.6mn t/yr LNG plant on Russia's Sakhalin island, north of Japan. A final sales and purchase agreement is expected to be signed in 2004 with first deliveries in 2007 (*AGP*, 12 February, p8).

LNG imports in the Asia-Pacific region

| Japan | 1996 | 2000 | 2001 | Jan 02 | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec | 02 total | Jan 03 | Feb | Mar |
|----------------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|--------------|-----|
| Volume* | 46,513 | 54,500 | 52,963 | 4,314 | 4,263 | 4,047 | 3,781 | 3,422 | 3,696 | 4,617 | 4,757 | 4,263 | 4,591 | 3,982 | 4,603 | 50,336 | 4,853 | 4,484 | |
| Average cost† | 197.88 | 250.74 | 229.61 | 216.92 | 212.81 | 206.15 | 206.04 | 208.69 | 211.12 | 215.59 | 225.94 | 231.95 | 235.92 | 236.95 | 237.19 | - | 244.14 | 249.55 | |
| South Korea | | | | | | | | | | | | | | | | | | | |
| Volume* | 9,595 | 14,578 | 16,164 | 2,078 | 1,795 | 1,844 | 1,496 | 962 | 729 | 910 | 803 | 1,117 | 1,739 | 1,855 | 2,499 | 17,827 | 2,319 | 1,988 | |
| Average cost† | 196.65 | 258.31 | 250.69 | 206.95 | 219.60 | 209.87 | 204.55 | 207.40 | 204.56 | 210.52 | 221.15 | 231.8 | 243 | 247.98 | 245.47 | 223.77 | 252.73 | 257.8 | |
| Taiwan | | | | | | | | | | | | | | | | | | | |
| Import volume* | 3,054 | 4,593 | 5,016 | 420 | 240 | 420 | 540 | 480 | 480 | 540 | 540 | 540 | 420 | 420 | 360 | 5,400 | 420 | 300 | 420 |
| Total volume* | 59,162 | 73,671 | 74,143 | 6,812 | 6,298 | 6,311 | 5,817 | 4,864 | 4,905 | 6,067 | 6,100 | 5,920 | 6,750 | 6,257 | 7,462 | 73,563 | 7,592 | 6,772 | |

*'000t †\$/t

— Government, industry and Argus estimates

Tokyo tries to please everyone

Tokyo's efforts to promote the more clean burning gas over coal appear to be somewhat contradictory. While the upper house of the Japanese diet, or parliament, approved proposals in early May to levy coal consumption in support of government efforts to meet greenhouse gas (GHG) cuts, it also raised taxes on LNG and liquefied petroleum gas (LPG), starting on 1 October. This follows approval by the lower house in late March.

The changes to the tax scheme were proposed by the economy ministry in

order to balance the tax burden on all fossil fuels and raise funds to support Tokyo's stance against global warming. Currently, both import and consumption of coal are free from any levy, because of the government's policy supporting industrial activity.

Coal used for generation will be taxed at ¥230/t (\$1.97/t) from 1 October. The tax will rise to ¥460/t from 1 April 2005 and to ¥700/t from 1 April 2007.

But coal used for producing steel, coke and cement will be exempt from the

tax until 31 March 2005 as a grace period for these sectors striving to cut competition costs against overseas producers.

Under the new scheme, the levy on LNG and LPG will be raised on 1 October to ¥840/t and ¥800/t respectively from ¥720/t and ¥670/t. The rates will then be increased to ¥960/t for LNG and ¥940/t for LPG from 1 April 2005. As of 1 April 2007, both LNG and LPG use will be taxed at ¥1,080/t. The tax on crude and fuel oil burning remains unchanged at ¥324/bl.

South Korea postpones privatisation

LNG exporters are unlikely to see any acceleration in long-term contract negotiations with South Korea's state-owned import and transmission company, Korea Gas (Kogas), as a result of the government's decision to halt plans for its privatisation.

The government late last month said it will no longer force the division of Kogas' wholesale and importing business into three competing entities — two of which would be privatised — as proposed by the previous government. Instead, it will study alternative means of introducing competition into the gas supply industry.

But the new position is unlikely to result in Kogas rushing to conclude negotiations for the long-term supply contracts that the country needs to meet forecast demand growth from 16mn t in 2002 to 26mn/yr by 2010 (see table).

Kogas says the company still cannot engage in negotiations to enter new long-term gas supply contracts, or renew an existing 2.3mn t/yr contract due to expire in 2007 for Indonesian LNG supplies from ExxonMobil's Arun plant. "We have to wait until after the government decides on an alternative plan for the gas industry," Kogas says.

Caution

President Roh Moo-hyun, who was sworn into office in February, last month reiterated to the energy ministry that the privatisation of state-owned energy and related "network infrastructure" firms must proceed in a cautious manner. Although Kogas was not singled out for mention, industry sources interpret this to mean that the firm will not be privatised during the presidency of Roh, who advocates a more gradualist approach to the reform of state-owned enterprises than his predecessor Kim Dae-jung.

"At the moment there is no concrete decision regarding privatising and reforming Kogas," the director of gas in the Ministry of Commerce, Industry and Energy (Mocie), Yun Soo Young, says.

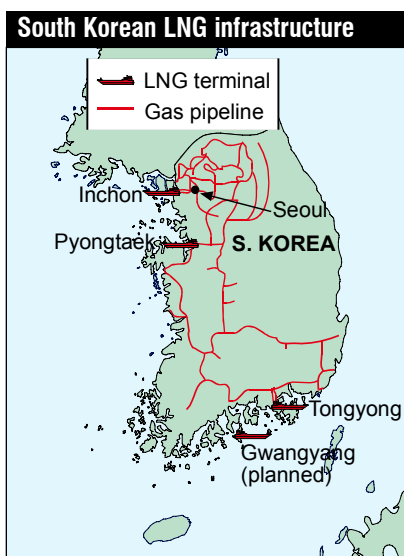
The government's decision may not be permanent and Mocie remains committed to the restructuring and ultimate privatisation of Kogas, Yun says. While Roh's government has indicated that network infrastructure businesses should not be privatised directly, it also acknowledges that they will be transformed first into public companies before being privatised eventually.

If the government is now rethinking its policy towards Kogas, it does want to see other companies importing LNG as is already possible under law. The joint import tender by steel maker Posco and conglomerate SK has not been affected by the decision to stall Kogas' privatisation.

The two new importers have already short-listed two preferred suppliers — Malaysia and the BP-led Tangguh project in Indonesia — for a base quantity of 950,000 t/yr for 20 years — with the option of an additional 150,000 t/yr — to be delivered into Posco's new 1.7mn t/yr Gwangyang terminal. When completed in 2005, the terminal will be the country's first private LNG import facility. It has spare capacity to allow Posco to enter the wholesale business when the market eventually deregulates.

The energy ministry says it may consider barring Kogas from entering new long-term gas supply contracts, instead granting this right to new players. To address immediate shortfalls in gas imports, the government has allowed Kogas to enter new mid-term contracts.

Kogas last week sealed its second seven-year supply contract with Malaysia, following a similar agreement with Australia early in the year (*AGP*, 18 December, p6). This involves a base quantity of 1.5mn t/yr from the Malaysia LNG Tiga project at Bintulu in Sarawak — and the option of an additional 500,000 t/yr — with 80pc of the volume to be supplied in the winter months from October to March (*AGP*, 12 March, p6). The first shipment will arrive this month.



| Forecast LNG demand in Asia 2002-15 | | | | | | | | | mn t | |
|-------------------------------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--|
| | 2005 | | | 2010 | | | 2015 | | | |
| | Low | Base | High | Low | Base | High | Low | Base | High | |
| Japan | 56.2 | 58.6 | 59.2 | 61.1 | 64.2 | 68.2 | 62.2 | 69.3 | 72.9 | |
| South Korea | 19.4 | 20.7 | 22.9 | 24.2 | 26.0 | 29.0 | 25.7 | 30.1 | 34.8 | |
| Taiwan | 5.9 | 7.1 | 8.2 | 9.7 | 10.6 | 13.2 | 12.4 | 13.5 | 14.9 | |
| India | 1.6 | 3.2 | 3.8 | 4.2 | 7.0 | 8.5 | 8.3 | 11.5 | 12.5 | |
| China | | | | 5.2 | 6.7 | 7.7 | 9.9 | 12.4 | 14.4 | |
| Total | 83.1 | 89.6 | 94.1 | 104.4 | 114.5 | 126.8 | 118.5 | 135.0 | 149.5 | |

— Facts Inc

Alkatiri: 'Stability is very important'

The future of the tiny, now impoverished nation of East Timor should be bright from the flow of its petroleum revenues from the Timor Sea — notably \$3bn over the 17-year life of ConocoPhillips' Bayu-Undan condensate liquids and LNG project. To manage the income, the government is creating an offshore fund (AGP, 9 April, p8).

At the same time, it is pursuing a favourable final settlement of maritime boundaries with Australia and Indonesia that would give it sovereignty over a larger share of the mostly gas rich Timor Sea, such as the yet to be developed Sunrise gas fields and the operating Laminaria oil field. The country sees the boundaries set by the Timor Sea treaty — which came into force on 2 April, defining a joint petroleum development area (JPDA) between the two countries — as only temporary. East Timor's prime minister, Mari Alkatiri, outlined his government's goals in an exclusive interview with *Argus* last week.

What is the philosophy behind the petroleum fund?

It's a very simple thing. What we are looking for is to ensure that all revenues coming from the Timor Sea will be managed properly, and transparently. Not only for the current generation, but for future generations too. We have been consulting many countries, and institutions such as the IMF [International Monetary Fund], to try to set up a whole policy on this matter.

It will be close to the Norwegian model, but we are trying to be even better — what we call "Norway plus". We think that we need to manage the fund in an even better way. We are sure that the Norwegian model is the best existing one up until now, but we are looking to have an even better one.

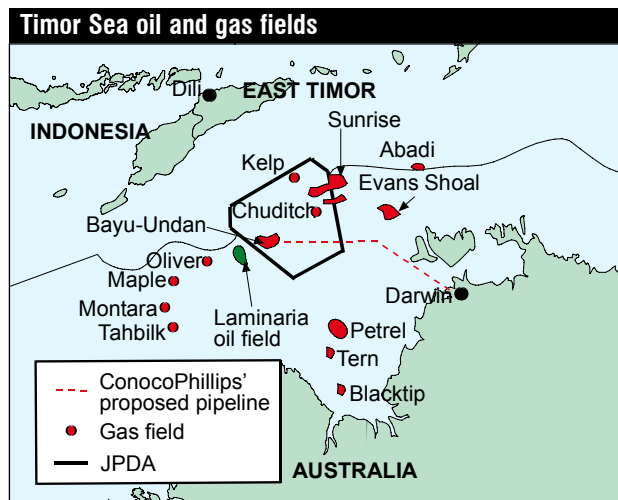
What risk would you be running by not setting up an oil fund?

There are many, many oil producing countries — some of them with even more potential than Timor Leste [East Timor]. But because they didn't really manage their resources in a proper and transparent way, their people now are still very poor. The oil development plan here has the objective to reduce poverty in our country, or to eradicate poverty even.

How do you convince your people to forego immediate access to oil and gas wealth?

What we are trying to show the people is that we should use the revenues coming in from oil and gas to invest in education, to invest in health, to invest in infrastructure. Holding back the money is not our policy.

But these are not renewable resources, and spending everything is not always the best way to manage the resources, because you need to spend only what you can



really afford to spend in a proper way. You have to develop your capacity to manage the money, and invest it gradually in order to develop the country in an integrated way.

Can you prevent a future government from dismantling the petroleum fund?

The type of oil fund we are establishing is one that is transparent and sensible. I cannot promise that future governments and parliaments will not make bad decisions. I cannot do it. However, we already have total transparency in Timor Leste with oil money. That's why I think the people will understand the importance of having this kind of policy, and will try everything possible to stop future governments spending the money in an improper way.

How are the petroleum fund issues being decided?

Our task in the past year — the first year of an independent government in Timor Leste — was to set up the structures and institutions, as well as the decision-making process. We have to involve the parliament in the main important decisions related to this money. We may have to have a national commission — a consultative body for the president and the government. These are the kinds of things you have to establish in creating an institutional culture for this country, in order to be transparent and responsible.

When will the final decisions about the petroleum fund be made?

I will do everything possible to do it this year. I will table it very soon as a recommendation for the council of ministers [the cabinet], and then send it to parliament, which will make the final decisions.

Are you including potential revenues from the Sunrise gas and condensate field, part of which falls within the JPDA with Australia (see map) in your planning? ⇒ p9

We are working on the basis of just Bayu-Undan, and two other small [oil producing] fields within the JPDA — Elang-Kakatua and Kudi-Tasi. But when we are talking about the oil fund, we are talking about all of the other oil revenues that we will get later on. For now, though, we are being realistic.

How are you going to get Australia and Indonesia to negotiate a final settlement of your mutual maritime boundaries?

I have already written letters to the Australian prime minister and the Indonesian president, urging them to begin maritime boundary talks. We have a strong preference for negotiation rather than litigation, and we expect those talks to talk place on a bilateral basis.

We certainly believe that they have an obligation to negotiate with us, because boundaries are part of our right to self-determination. No other country, anywhere else in the world, can deny the people of Timor Leste their right to self-determination.

I have already made it clear many times that it was a clearly unfriendly act [for Australia to withdraw from the international maritime tribunal (*AGP 9 April p9*)]. It is a moral and legal question for both countries. But I'm not

only looking for morality, also for legality.

We are not considering a trilateral negotiation. We think that the best approach is bilateral.

What is a realistic schedule for settling the maritime boundary issue?

Stability is very important for investors — stability both for the Timor Sea and for the region. For the investor it is very, very important. That's why we expect that the boundary issue to be agreed within a three-five year timeframe.

Is there any risk that the LNG phase of Bayu-Undan will not go ahead?

We agreed to the [Timor Sea Treaty] based on the whole package. If the LNG plant is not going to be considered, for sure we are not interested in the whole project [under the treaty's terms]. But for Bayu-Undan, there is a stable regime already. Although not for Sunrise, of course.

One thing is very clear. The treaty, and a related agreement for the Sunrise field signed last month, are not enough. They may reduce poverty in the short term, but they will not satisfy Timor Leste's right to self-determination. Why not? Precisely because they do not identify permanent boundaries. We still do not know where our natural resources lie.

Advance of Bayu-Undan LNG encounters contract revisions

ConocoPhillips' final investment commitment for the \$3bn LNG phase of the Bayu-Undan project has been held up, mainly by revisions to its production-sharing contract (PSC). But a decision to advance the project is still likely soon.

The new PSC had to be issued after the start to the Timor Sea Treaty between East Timor and Australia on 2 April (*AGP, 9 April, p8*). The treaty eliminated the body that issued of the old PSC, the bilateral Joint Authority, and created the new bilateral institution, the Designated Authority, to administer the JPDA.

The new PSC issued by the Designated Authority includes an annex covering gas export issues that were not dealt with in the previous contract.

"It's complicated because you're talking about a cross-jurisdictional issue. That's the big complex item," says the body's Andrew Caddy.

The Designated Authority is in talks on the annex with Australia and East Timor, as well as ConocoPhillips and its partners. Participating as an observer is Australia's Northern Territory (NT),

where ConocoPhillips plans to build a 3mn t/yr LNG plant to supply Tokyo Electric and Tokyo Gas from 2006. Preliminary agreements have been signed for the LNG, but no final sales deal. The first condensate and liquefied petroleum gas phase of development will start in mid-2004, with 110,000 b/d peak output.

ConocoPhillips chief Jim Mulva visited the Wickham Point site on 13 April, but construction is so far in the form of roadworks undertaken by the NT. Also under discussion is the Designated Authority's gas development plan.

The head of ConocoPhillips' Darwin office, Blair Murphy, says the major hurdles have been overcome. Japanese LNG customers understand that the approval process is in the final stages, he says.

"It was the Timor Sea Treaty that was the big hurdle, and we got that within our timeframe," Murphy says. "So now it's just checking the boxes for these other items, so [the Japanese] are comfortable."

Murphy says the final commitment will be made "as soon as possible", but will not be drawn on a timeframe.

The talks have so far managed to avoid the issue of the disputed maritime boundary, officials say. This prolonged the discussion of the Timor Sea Treaty beyond Canberra's expectations because of the need for agreement on the sharing of the Woodside-operated 7.7 trillion ft³ (218bn m³) Greater Sunrise field.

"Everyone is focused on the same thing, which is important. That was one of the things that held up treaty negotiation, because they weren't all aiming at the same thing," Caddy says. "Now everyone wants to get to the same place, and it's just a matter of putting the words together so they are comfortable enough to get there."

Another source of delay is legislation covering double-taxation and taxation stability — only introduced into the East Timor parliament this week. Concerns were raised about some aspects of the Portuguese translation of the draft law, but those issues have now been resolved and the cabinet has given its approval.

"We believe those are the outstanding issues that will trigger the final investment decision," a NT official says.

Reforming PetroBangla

The key to a fuller and more efficient harnessing of Bangladesh's abundant natural gas reserves may be the reform now under way at state-owned PetroBangla.

An all-encompassing petroleum and minerals company, PetroBangla — also known as Bangladesh Mineral Oil and Gas — monopolises mid and down-stream gas supply and is the country's predominant gas producer. Only since the early 'nineties have foreign companies been able to return to play a larger upstream role as production-sharing contractors, after the government abandoned its emphasis on self-reliance.

Reform promoted by development assistance agencies the World Bank and the Manila-based Asian Development Bank (ADB) will see nine of PetroBangla's 11 subsidiaries restructured. They are to be given operational and financial autonomy as a step towards introduction of competition in gas supply and other energy industries.

The restructuring will include reorganisation of the firms' boards of directors and management to include representatives from the private and civil sector.

"The aim of the present round of restructuring is to introduce competition in the Bangladesh gas production, transmission and distribution sectors, by eliminating monopolies and introducing private-sector participation," says S Chander from the ADB.

"Competition should help raise the operating efficiencies of the sector, attract more skilled manpower and capital into the firms, allowing them to expand their business and activities to meet the country's growing demand for gas," he says.

Born out of independence

PetroBangla is the second-largest state-owned industrial group in Bangladesh, after the Bangladesh Power Development Board, which is responsible for generation and transmission. PetroBangla was established in 1972, only a few months after the end of the independence war between Bangladesh, or East Pakistan, as it then was, and West Pakistan.

The restructuring of PetroBangla has been discussed since 1999, but the then Awami League government had reservations. But the new Bangladesh Nationalist Party led government of prime minister Khaleda Zia, elected in 2001, appears a more enthusiastic supporter of economic reform.

Of the nine subsidiaries earmarked for restructuring, three began the process about two months ago — Gas Transmission, Rupantarita Prakritik Gas, and Titas Gas Transmission and Distribution. Restructuring of the other six subsidiaries is expected by September or October.

PetroBangla also encompasses two production firms — Bangladesh Gas Fields and Sylhet Gas Fields — and three distribution and transmission firms — Bakhrabad Gas Systems and Distribution, Western Gas Supply and Jalalabad

Gas Transmission and Distribution. The firm also includes one oil and gas exploration subsidiary — Bangladesh Petroleum Exploration. Two coal and mining firms, which are under PetroBangla, will not be involved.

The state-owned firm's future role will be mainly as a holding company. It will still operate as an aggregator for gas exports to India if this long-standing and contentious proposal is approved by the government (*AGP*, 9 April, p4).

Restructuring should encourage much-needed new investment. There is great potential for expansion. PetroBangla's proven and probable reserves are 12 trillion-15 trillion ft³ (340bn-425bn m³) with possibly undiscovered resources of 20 trillion-40 trillion ft³, according to Shell and other estimates. Gas to support power generation expansion is the highest priority as total installed capacity is just 4.5GW. Only 30pc of Bangladesh's 135mn citizens have access to electricity. Power generation takes up 50pc of gas consumption, with

25pc going on urea fertiliser production, also important as two-thirds of the population is employed in agriculture.

Infrastructure is confined to the east, where there are 1,800km of transmission pipelines and 1,600km distribution lines.

To the west of the Brahmaputra river,

which divides the country, there is no supply. But completion in 1998 of the massive multi-purpose Jamuna bridge, the first span across the river, has enabled gas to flow west.

Fuller use of gas would help improve the economic conditions in what is one of the world's poorest and most overpopulated countries. Gas consumption in Bangladesh, currently 1.2bn ft³/d (12.4bn m³/yr), is set to rise by 6-7 pc/yr, reaching 1.5bn ft³/d by 2007. But PetroBangla's capacity to invest upstream and downstream is severely constrained by financial losses. Subsidies to consumers mean it gets a significantly lower price for the gas than it otherwise might. This is underlined when PetroBangla buys gas linked to international oil price movements from foreign contractors.

"We pay about \$2.90/000 ft³ for gas from foreign producers, but we sell it at about \$1.40/000 ft³ because of domestic price controls. That is why PetroBangla is making losses," the firm explains.

PetroBangla produces about 80pc of the country's gas supply, with the rest from the offshore Sangu field in the southeast, operated by Shell in partnership with Cairn Energy, and the Jalalabad gas field, operated by US firm Unocal in the northeast. PetroBangla already owes Shell and Unocal over \$100mn for gas it buys from them.

The state-owned firm says it is investing 5.5bn taka (\$95mn) in its upstream over the next five years to add 200mn ft³/d of output, in order to offset production decline. This will maintain current gas production to 2007. An additional Tk18bn is needed for transmission expansion, it says.

| PetroBangla results | | bn Tk* | |
|--|--------|--------|--|
| | 2002 | 2001 | |
| Revenues | 41,199 | 36,958 | |
| Net loss (after tax) | 3,469 | 1,005 | |
| *Does not include income from coal and minerals operations | | | |

China

Partners block CNOOC's Kazakh bid

Chinese offshore producer CNOOC announced that its plan to buy UK firm BG's stake in the North Caspian Sea production-sharing agreement in Kazakhstan has been blocked by other existing partners in the project. Consortium partners led by operator Italy's Eni have exercised their pre-emptive rights, and will instead buy BG's stake. Eni, ExxonMobil, Shell and Total each holds a 16.67pc stake. ConocoPhillips and Japan's Inpex have 8.33pc each. CNOOC had entered a preliminary agreement with BG on 7 March to buy an 8.33pc stake at \$615mn. Completion of the deal is subject to approval from the Kazakh government and other North Caspian Sea partners waiving their pre-emptive rights. The North Caspian Sea PSA boasts the Kashagan field, which has estimated reserves of 13bn bl of oil equivalent. BG had also agreed to sell its remaining 8.33pc stake in the North Caspian project at \$615mn to China's state-owned Sinopec Group. The North Caspian Sea partners are expected to block this deal as well.

Indonesia

Aceh peace hopes recede

Hopes of a sustainable peace between Jakarta and separatists in Aceh, northern Sumatra, are receding, threatening ExxonMobil's natural gas production in the region. The Free Aceh Movement (GAM) is resisting the 12 May deadline set by Jakarta for GAM to lay down arms and accept special autonomy instead of independence looms close. Jakarta has sent 3,000 marines to Aceh in preparation for a possible attack if the deadline is missed. Any attack on GAM would effectively end a peace settlement signed in December aimed at halting the decades-long conflict. ExxonMobil says gas production is at normal levels of 1.5bn ft³/d (15.5bn m³/yr). It has no plans to move its employees out of Aceh. In 2001, fears

for the safety of its workforce led ExxonMobil to halt gas production between March and July (*AGP*, 4 December, p12), resulting in the shut-down of its four-train LNG plant. ConocoPhillips and Italy's Eni also hold exploration blocks in Aceh.

Japan

Hokkaido announces wind winners

Japan's largest wind power user, Hokkaido Electric, has selected the winners of a tender for a total of 100MW of wind-based electricity for 17 years, beginning in the next two years. To comply with the government's new renewables portfolio standard (RPS) policy, Hokkaido sought 80MW from private firms and 20MW from public bodies at ¥3,300/MWh (\$28/MWh). Hokkaido already has 150MW of wind power capacity of its own. Japan implemented the RPS regulations on the 1 April start of the current fiscal year. The policy requires power retailers to procure a certain amount of electricity generated from renewable sources, such as solar, wind and biomass, or from hydroelectric generators of up to 1MW capacity. For fiscal 2003-04, the government has set the RPS requirement at 7.32mn MWh. Hokkaido's tender attracted a strong response from the private sector. Some 70 private firms made offers totalling more than 650MW combined, while four public bodies offered only 3.6MW. Of the four private firms now finalising contracts with Hokkaido, Eurus Energy Japan is seen as the biggest winner. It offered a total of 80kW from facilities planned in Hokkaido's Wakkanai and Hamatonbetsu. Eurus Energy Japan is a subsidiary of Eurus Energy Holdings, a 50-50 joint venture between Japan's largest power utility Tokyo Electric Power and trading house Tomen. Eurus is the leading wind power producer in Japan, with 58.4MW in operation and an additional 126MW under development. The three other private firms offered total capacity of 2.3MW. Hokkaido also accepted the offers from

all four public bodies, which totalled 3.6MW, well short of the 20MW target. Contracts will be finalised by the end of July. Hokkaido plans to seek more wind power from public bodies in a new tender. In the long term, Hokkaido will cap its wind power procurement at 250MW due to difficulties in absorbing the volatility in electrical frequency associated with wind generation.

Osaka Gas profit falls 25pc

Japan's second-largest gas utility, Osaka Gas, has posted a 25pc year-on-year drop in its fiscal 2002-03 (April-March) group profit to ¥30bn (\$250mn), mainly due to reduced sales turnover caused by low gas prices. For fiscal 2002-03, Osaka Gas supplied a total of 7.7bn m³ of retail and wholesale gas, up by 2.8pc on the previous year. But the company twice reduced gas sales prices during the fiscal year, leading to a 2.6pc year-on-year fall in its sales turnover to ¥948bn. The company also attributed the profit drop to extraordinary losses caused by payments under the early retirement programme as part of cost-cutting measures. Osaka Gas posted a 32.5pc year-on-year drop in its company profit to ¥25.5bn for fiscal 2002-03 on a sales turnover of ¥722bn, also down by 3.8pc. For fiscal 2003-04, the company forecasts a group profit of ¥42.5bn and a company profit of ¥36.5bn, based on expectations of higher gas sales. Osaka Gas is the regional supplier of city gas — mostly LNG — for about 6.6mn household and industrial customers in Osaka and its surrounding area.

New Zealand

Wellington pushes exploration

New Zealand put 17 more exploration permits out for bidding, as it accelerates the search for oil and gas resources to replace declining fields. The latest round by the government offers nine blocks offshore north Taranaki, and eight onshore blocks in Taranaki in the northwest of the North Island. The region contains the country's richest

petroleum reserves, including the mainstay Maui offshore gas field that has been the backbone of the country's energy industry for 25 years. A re-determination of its reserves earlier this year showed Maui would run out of gas in 2007, two years earlier than originally planned. Maui's decline has prompted the need for further exploration and has also added to concerns over the power industry at a time when hydropower shortages are looming. Lack of rain has left many reservoirs low, reducing the capacity of hydroelectric plants that normally provide 75pc of the country's power (*AGP*, 30 April, p11). There are 86 exploration and mining permits on issue with eight applications pending — compared with just 58 permits issued two years ago. Bids for the latest 17 blocks must be received by 31 October. Last October, New Zealand offered five blocks covering 42,000km² in the previously unexplored Deepwater Taranaki basin, with bidding to close in September. It has also offered five offshore blocks in the South Island's Canterbury basin, with bidding closing on 30 May.

Philippines

Meralco faces regulatory meltdown

The Philippines' largest private power distributor, Meralco, made a net loss of 2.015bn pesos (\$38.6mn) last year, compared with a profit of 1.481bn pesos in 2001. The loss was due mainly to "a one-time provision for regulatory decisions", the company says. The country's Energy Regulatory Commission (ERC) has ruled that Meralco can only recover 5.8bn pesos of its 9.3bn-pesos claim for deferred purchased power adjustment (PPA) charges. The PPA is a mechanism for recovering stranded power costs arising from highly priced long-term take-or-pay volumes signed with independent power producers during the power crisis in the early 'nineties. The ERC also disallowed recovery of cost associated with system losses and transmission line fees. As a result of

the adverse rulings, the company had written off 878mn pesos in "disallowed receivables", and made provisions totalling 1.639bn pesos for probable losses arising from the non-recoverable receivables. Adding to Meralco's woes is the supreme court's rejection of its appeal to reconsider a ruling that it must refund unauthorised price hikes since 1994 to customers (*AGP*, 29 January, p12). The refunds, as of April, are estimated to total a hefty 30.4bn pesos, based on the court's decision that it had overcharged 0.167 pesos/kWh. The magnitude of the refund has raised concerns about Meralco's financial viability, with the government stepping in to find ways of preventing it from going under. The government has a 25pc stake in the company.

Singapore

Power market continues deregulation

Singapore is entering a further phase of electricity market deregulation that will allow more users to shop for their preferred suppliers. From 1 June, customers consuming more than 240 MWh/yr will become contestable — free to choose their electricity supplier from among six registered retailers. This is slightly later than an original schedule of three months after the 1 January launch of a revamped power pool market (*AGP*, 15 January, p3). The retailers are Tuas Power Supply, Senoko Energy Supply, Seraya Energy, SembCorp Power, Kepple Electric and SP Services — most of which are affiliated to a generating company. SP Services is the default supplier for non-contestable customers at regulated tariffs. Contestable customers can opt to stay with SP Services but will be billed based on wholesale pool prices. The new deregulation phase will add about 5,000 users, including small factories and shopping centres, to the contestable group, currently comprising around 200 large consumers of 2MW and above. The new contestable users will enter the market in three batches, with the

first 440 on 1 June, and the remaining two tranches in August and September. Some have raised the issue that the different times of market entry for the new contestable customers, likely due to logistical reasons, could make an unfair impact on power costs for rival users, such as those in computer fabrication. But the impact is expected to be small, since most large-scale wafer fabrication companies have already become contestable under the earlier 2MW threshold. Future liberalisation will see consumers of at least 120 MWh/yr becoming contestable, followed by full liberalisation in 2004.

SembUtilities enters UK gas and power

Singapore domestic firm SembUtilities has moved into the UK gas and power markets with the acquisition of the former Enron-owned 133MW combined heat and power (CHP) business Enron Teesside Operations (Etol) in a deal worth up to £87.2mn (\$140.2mn). "This expansion to Europe is a major milestone for SembCorp Industries. With this acquisition, our utilities business is now a global leader in centralised utilities," says Wong Kok Siew, chief executive of SembUtilities. The cogeneration facility in Teesside provides steam and power to nearby petrochemical sites. The business also operates a water treatment plant. SembUtilities acquired Etol from administrators Deloitte and Touche, which took over the operations of Enron's UK businesses following the collapse of the US giant in autumn 2001. It will be renamed SembCorp Utilities Teesside (SUTL). The much larger former Enron-owned 1.88GW Teesside combined cycle gas turbine (CCGT) plant will not be affected.

South Korea

Power pool timetable pushed back

South Korea's schedule for launching a new two-way bidding (with demand side bidding) electricity pool market will be pushed back from the original target of April next year, says the

energy ministry (Mocie). But Mocie has yet to decide on a new timetable. South Korea currently operates a cost-based pool market with participation from Kepco's five thermal and one nuclear generating companies. The unbundling of the retail and distribution arms from the generation business of state-owned Korea Electric Power (Kepco) will also be delayed from the target of next year. But they will eventually be unbundled, Mocie reiterates. Full retail competition is scheduled in 2009. The delays follow the unsuccessful attempt at privatising the 5.57GW Korea Southeast Power (Kosep), a wholly owned subsidiary of Kepco. Citing poor international economic conditions and local regulatory uncertainties, potential investors have said they will not bid for the proffered 34-51pc stake in Kosep (*AGP*, 9 April,

p1). Kepco has now decided to sell 10-15pc of Kosep through a domestic initial public offering, and await better market conditions before having another go at privatising Kosep.

Thailand

Unrest clouds pipeline project

Civil unrest in the largely Malay provinces of southern Thailand at the bottom of the Kra Isthmus continues to concern Bangkok. The area where the Thai and Malaysian governments want to route a 360km, 750mn ft³/d (7.7bn m³/yr) capacity pipeline — from the offshore joint development area (JDA) between the two countries in the lower Gulf of Thailand across the Isthmus to northwest Malaysia — has been beset by vandalism and

attacks on government offices. On 28 April, armed militants attacked the Thai military in Yala's Than To district. The Yala police say that attack is believed to have been carried out by Muslim separatists. The attackers robbed the unit of M-16 rifles. The government says development plans focusing on infrastructure, public health and economic development for the south will be improved to help bring about lasting stability. The JDA project, which has been delayed because of environmental protests by villagers at the planned processing plant site at Songkhla in the east, aims to be in operation by mid-2005. An initial 350mn ft³/d of processed gas would be sold to Malaysia. Producers are US firm Amerada Hess in equal partnership with Malaysia's state-owned Petronas (*AGP*, 30 April, p1).

Sars dampens east Asian economic growth, says ADB

The Manila-based Asian Development Bank (ADB) says Sars could significantly dampen economic growth in east Asia if it is prolonged.

Fear of the disease has resulted in business travellers and tourists cancelling travel within and to the region. The high-risk areas are mainland China, Hong Kong and Taiwan. Singapore, an earlier high-risk area, appears to be gaining control of the disease* (*AGP*, 30 April, p2).

The ADB says that Sars could reduce GDP growth in northeast Asia this year to 5.3pc and to 3.4pc in southeast Asia if it extends over the second quarter of 2003. Under a second scenario, if SARS extends into the third quarter of 2003, East Asia's GDP growth could fall to 4.7pc, while southeast Asia's growth might decline to 2.5pc (*see table*).

The reduction in GDP growth will translate into huge falls in income and production. Estimated losses range from \$12bn to \$27.7bn for east and southeast Asia should Sars extend into the third quarter of 2003, says the ADB.

The impact of Sars is felt disproportionately by small and medium enterprises (SMEs) and their workers. In many

countries, SMEs are an important source of employment for the poor. The agriculture sector could also be severely affected by Sars. It would be considerably more difficult to control, since rural health systems are inadequately equipped for surveillance, prevention and treatment of Sars. The economic impact on the rural population could be significant.

While the northeast and southeast Asian regions have been the most affected, the impact of Sars has spread outside the region. It has caused a reduction in import demand from Asian economies, especially for tourism-related services; and it has weakened consumer and investor sentiment because of increased uncertainty.

The ADB says that one bright spot is the possibility of a rebound in private spending once Sars is brought under control. Consumers may compensate for their reduction in consumption by increasing their spending. While domestic consumption could quickly change once confidence resumes, it may take a longer period for foreign travellers and investors to return.

The Sars fear is adversely affecting

one of the international gas industry's premier events, its biennial World Gas Conference (WGC) which is to be held in Tokyo on 1-5 June. The organisers are asking delegates from affected areas to "voluntarily withdraw" their registrations to the conference and are declining new applicants to attend from these areas. It has asked 200 people from Sars-infected areas to cancel.

But the organisers still anticipate a large gathering. The WGC has received registration from 4,200 people and over 200 exhibiting companies and organisations from 72 countries.

*WHO. www.who.int/csr/sars/en

Impact of Sars on GDP growth %

| 2003 | Earlier forecast | Sars fear to end Jun | Sars fear to end Sep |
|-----------------------|------------------|----------------------|----------------------|
| | Growth | Growth | Growth |
| Northeast Asia | | | |
| China | 7.3 | 7.3 | 7.0 |
| Hong Kong, China | 2.0 | 0.8 | -1.4 |
| South Korea | 4.0 | 3.8 | 3.5 |
| Taiwan | 3.7 | 2.8 | 1.8 |
| Region | 5.6 | 5.3 | 4.7 |
| Southeast Asia | | | |
| Indonesia | 3.4 | 3.2 | 2.3 |
| Malaysia | 4.3 | 3.8 | 2.9 |
| Philippines | 4.0 | 3.7 | 3.2 |
| Singapore | 2.3 | 1.9 | 0.7 |
| Thailand | 5.0 | 4.3 | 3.4 |
| Region | 4.0 | 3.4 | 2.5 |

— Asian Development Bank

| Natural gas production in Asia-Pacific region | | | | | | | | | | | | | | | | mn ft ³ /d | | |
|---|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--------|-------|-------|-------|-------|-----------------------|-------|-------|
| | Proven reserves end 2000 (trillion ft ³) | 1996 | 2000 | 2001 Sep | Oct | Nov | Dec | 2001 avg | 2002 Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct |
| | | | | | | | | | | | | | | | | | | |
| China | 48.3 | 1,925 | 2,679 | 2,998 | 2,904 | 3,131 | 3,252 | 2,935 | 3,536 | 3,585 | 3,167 | 2,995 | 3,040 | 2,941 | 3,006 | 3,006 | 3,036 | 3,007 |
| Taiwan | 0.5 | 87 | 72 | 72 | 76 | 88 | 103 | 82 | 115 | 100 | 106 | 90 | 72 | 61 | 70 | 75 | 75 | 93 |
| Southeast Asia | | | | | | | | | | | | | | | | | | |
| Brunei | 13.8 | 1,131 | 1,122 | 1,147 | 1,186 | 1,238 | 1,257 | 1,133 | 1,178 | 1,237 | 1,227 | 904 | 806 | | | | | |
| Burma | 12 | 151 | 284 | 670 | 670 | 670 | 670 | 637 | 670 | 670 | 670 | | | | | | | |
| Indonesia | 92.5 | 8,669 | 7,949 | 7,003 | 7,720 | 8,073 | 8,000 | 7,690 | 8,545 | 8,653 | 8,630 | 8,326 | 7,747 | 7,675 | 7,698 | | | |
| Malaysia | 75 | 3,366 | 4,951 | 5,476 | 5,500 | 5,822 | 6,037 | 5,534 | 5,567 | 5,562 | 5,207 | 5,014 | 4,400 | 4,848 | 5,167 | 5,600 | 5,661 | 6,169 |
| Philippines | 3 | 1 | <1 | <1 | 11 | 70 | 76 | 13 | 110 | 92 | 114.00 | 94 | 166 | 184 | 188 | 192 | 140 | 236 |
| Thailand | 12.7 | 1,267 | 1,948 | 1,891 | 1,887 | 1,827 | 1,703 | 1,900 | 1,765 | 1,917 | 2,068 | 2,040 | 2,046 | 2,069 | 2,096 | 2,117 | 2,077 | 1,991 |
| Vietnam | 6.8 | 32 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | | | | | | | | |
| South Asia | | | | | | | | | | | | | | | | | | |
| Bangladesh | 10.6 | 735 | 996 | 1,050 | 934 | 915 | 892 | 1,017 | 890 | 890 | | | | | | | | |
| India | 22.9 | 1,972 | 2,524 | 2,765 | 2,864 | 2,925 | 2,930 | 2,858 | 2,936 | 2,930 | 2,867 | 2,654 | 2,999 | 3,025 | 3,029 | 3,016 | 3,040 | 2,995 |
| Pakistan | 25.1 | 1,701 | 1,998 | 2,349 | 2,400 | 2,365 | 2,365 | 2,413 | 2,365 | 2,365 | | | | | | | | |
| Pacific | | | | | | | | | | | | | | | | | | |
| Australia | 90 | 2,960 | 3,008 | 3,196 | 3,225 | 3,117 | 3,021 | 3,141 | 3,100 | 3,100 | 2,766 | 2,771 | 2,914 | 4,126 | | | | |
| New Zealand | 3 | 515 | 595 | 835 | 788 | 706 | 611 | 763 | 605 | 640 | 722 | 719 | 719 | 719 | 650 | 650 | 650 | |
| PNG | 12.2 | 193 | 322 | 327 | 363 | 339 | 305 | 319 | 405 | 407 | 405 | 442 | 418 | 443 | 422 | 434 | 408 | 433 |
| Total | 428.4 | 24,705 | 28,593 | 29,924 | 30,673 | 31,431 | 31,367 | 30,580 | 31,932 | 32,293 | | | | | | | | |

— Government, industry and Argus estimates

| Natural gas consumption in Asia-Pacific region* | | | | | | | | | | | | | | | | mn ft ³ /d |
|---|-------|-------|-------|-------------|-------|-------|-------|-------|-------|-------------|-------|-------|-------|-------|-----------------------|-----------------------|
| | | 1996 | 2000 | 2001 Jul | Aug | Sep | Oct | Nov | Dec | 2002 Jan | Feb | Mar | Apr | May | | |
| | | | | | | | | | | | | | | | Northeast Asia | |
| China | total | 1,876 | 2,640 | 2,825 | 2,892 | 2,998 | 2,904 | 3,131 | 3,252 | | | | | | | |
| | power | 225 | 343 | 396 | 405 | 420 | 407 | 438 | 455 | | | | | | | |
| | other | 1,651 | 2,297 | 2,429 | 2,487 | 2,578 | 2,497 | 2,693 | 2,797 | | | | | | | |
| Japan | total | 6,206 | 7,272 | 8,417 | 8,120 | 6,889 | 6,931 | 6,535 | 6,809 | 6,776 | 7,413 | 6,356 | 6,136 | 5,374 | | |
| | power | 4,300 | 5,049 | 5,932 | 5,941 | 5,023 | 4,755 | 4,555 | 4,735 | | | | | | | |
| | other | 1,906 | 2,223 | 2,485 | 2,179 | 1,866 | 2,176 | 1,980 | 2,074 | | | | | | | |
| South Korea | total | 1,256 | 1,916 | 1,232 | 1,192 | 1,234 | 1,585 | 2,498 | 3,459 | 3,617 | 3,229 | 2,783 | 1,920 | 1,648 | | |
| | power | 617 | 599 | 578 | 569 | 562 | 564 | 693 | 913 | 994 | 847 | 837 | 667 | 654 | | |
| | other | 639 | 1,317 | 654 | 623 | 672 | 1,021 | 1,805 | 2,546 | 2,623 | 2,382 | 1,946 | 1,253 | 994 | | |
| Taiwan | total | 405 | 608 | 705 | 751 | 588 | 632 | 613 | 687 | 657 | 566 | 685 | 828 | 784 | | |
| | power | 142 | 369 | 506 | 547 | 376 | 414 | 370 | 429 | 392 | 334 | 442 | 582 | 559 | | |
| | other | 263 | 239 | 199 | 204 | 213 | 218 | 243 | 259 | 265 | 232 | 243 | 246 | 225 | | |
| Southeast Asia | | | | | | | | | | | | | | | | |
| Brunei | total | 200 | 211 | 210 | 210 | 210 | 210 | 210 | 210 | | | | | | | |
| Burma | total | 151 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | | | | | | | |
| Indonesia | total | 3,037 | 2,689 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | | | | | | | |
| | power | | | 600 | 600 | 600 | 600 | 600 | 600 | | | | | | | |
| | other | | | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | | | | | | | |
| Malaysia | total | 1,538 | 2,099 | 2,100 | 2,100 | 2,100 | 2,100 | 2,100 | 2,100 | | | | | | | |
| | power | | 1,511 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | | | | | | | |
| | other | | 588 | 600 | 600 | 600 | 600 | 600 | 600 | | | | | | | |
| Singapore | total | 145 | 145 | 345 | 345 | 345 | 345 | 345 | 345 | | | | | | | |
| Thailand | total | 1,277 | 2,085 | 2,505 | 2,440 | 2,446 | 2,415 | 2,279 | 2,152 | | | | | | | |
| | power | 929 | 1,297 | 1,543 | 1,542 | 1,412 | 1,458 | 1,203 | 1,103 | | | | | | | |
| | other | 348 | 788 | 962 | 898 | 1,034 | 957 | 1,076 | 1,049 | | | | | | | |
| Vietnam | total | 32 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | | | | | | | |
| | power | | 145 | 145 | 145 | 145 | 145 | 145 | 145 | | | | | | | |
| | other | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | |
| South Asia | | | | | | | | | | | | | | | | |
| Bangladesh | total | 735 | 996 | 1,050 | 1,050 | 891 | 850 | 841 | 817 | | | | | | | |
| | power | | 433 | 500 | 500 | 474 | 440 | 435 | 400 | | | | | | | |
| | other | | 563 | 550 | 550 | 393 | 420 | 406 | 417 | | | | | | | |
| India | total | 1,992 | 2,524 | 2,863 | 2,888 | 2,765 | 2,864 | 2,925 | 2,930 | | | | | | | |
| | power | | 934 | 1,088 | 1,097 | 1,051 | 1,088 | 1,112 | 1,113 | | | | | | | |
| | other | | 1,590 | 1,775 | 1,791 | 1,714 | 1,776 | 1,813 | 1,817 | | | | | | | |
| Pakistan | total | 1,701 | 1,998 | 2,367 | 2,354 | 2,349 | 2,400 | 2,365 | 2,365 | | | | | | | |
| | power | | 679 | 805 | 800 | 799 | 816 | 804 | 804 | | | | | | | |
| | other | | 1,319 | 1,562 | 1,554 | 1,550 | 1,584 | 1,561 | 1,561 | | | | | | | |
| Pacific | | | | | | | | | | | | | | | | |
| Australia | total | 1,924 | 2,060 | 2,332 | 2,204 | 2,109 | 2,129 | 2,057 | 1,994 | | | | | | | |
| | power | 288 | 350 | 396 | 375 | 358 | 362 | 350 | 339 | | | | | | | |
| | other | 1,636 | 1,710 | 1,936 | 1,829 | 1,751 | 1,767 | 1,707 | 1,655 | | | | | | | |
| New Zealand | total | 455 | 522 | 859 | 874 | 831 | 676 | 703 | 700 | | | | | | | |
| | power | | 214 | 361 | 367 | 349 | 284 | 295 | 294 | | | | | | | |
| | other | | 308 | 498 | 507 | 482 | 392 | 408 | 406 | | | | | | | |

*excludes consumption for production of LNG for export in Australia, Brunei, Indonesia and Malaysia

— Government, industry and Argus estimates

| Selected companies in gas and power on Asia-Pacific stock markets | | | | | | |
|---|----------------------------|----------------------|------------------------------|----------------------|--------|-------|
| Exchange and company | Business | Market cap (\$mn) | Share price 9 May Baht | Share price 2 May | EPS* | P/E* |
| Bangkok | | | | | | |
| Banpu Pub. | Diversified minerals | 245.07 | 39.25 | 39.5 | 6.86 | 5.72 |
| Cogeneration | Electricity — integrated | na | na | na | 1.42 | na |
| Elec Generating | Electricity generation | 556.58 | 45 | 43.75 | 5.63 | 8.00 |
| PTT | Oil and gas downstream | 3,105.13 | 47.25 | 47.75 | 8.76 | 5.39 |
| PTT Expl. & Prod. | Oil company upstream | 1,884.08 | 123 | 123 | 19.31 | 6.37 |
| Ratchaburi Elec. | Electricity generation | 810.76 | 23.8 | 23.9 | 3.27 | 7.29 |
| Bombay | | | | | | |
| Rupee | | | | | | |
| Gas Authority | Gas distribution | 1,431.97 | 79.90 | 80.95 | 19.00 | 4.21 |
| Gujarat Gas | Electricity distribution | 102.31 | 376.40 | 385.75 | 46.05 | 8.98 |
| Oil & Natural Gas | Oil company upstream | 11,040.90 | 365.35 | 353.85 | 43.47 | 8.41 |
| Hong Kong | | | | | | |
| \$ | | | | | | |
| Hong Kong China Gas | Gas distribution | 6,949.59 | 9.55 | 9.30 | 0.54 | 17.62 |
| CLP Holdings | Electricity — integrated | 10,097.01 | 32.70 | 32.20 | 2.94 | 11.12 |
| CNOOC Ltd | Oil company upstream | 10,847.89 | 10.30 | 10.30 | 1.12 | 9.76 |
| China Petroleum | Oil company — integrated | 34,630.36 | 1.45 | 1.51 | 0.19 | 8.10 |
| PetroChina | Oil company — integrated | 40,353.02 | 1.79 | 1.82 | 0.27 | 7.04 |
| Beijing Datang-H | Electricity generation | 1,936.24 | 2.93 | 2.95 | 0.27 | 11.41 |
| Huaneng Power-H | Electricity generation | 9,634.99 | 7.10 | 7.30 | 0.65 | 11.59 |
| Shandong International-H | Electricity generation | 1,186.09 | 1.76 | 1.68 | 0.23 | 8.30 |
| Jakarta | | | | | | |
| Rupiah | | | | | | |
| Medco Energy | Oil company upstream | 545.66 | 1400 | 1350 | 0.027 | 6.11 |
| Karachi | | | | | | |
| Rupee | | | | | | |
| Mari Gas | Oil company upstream | 38.63 | 60.75 | 59 | 10.74 | 5.66 |
| Sui Northern | Gas distribution | | 29.5 | 28 | 3.40 | 8.69 |
| Sui Southern | Oil refining and marketing | | 19.25 | 17.45 | 2.14 | 9.00 |
| Kuala Lumpur | | | | | | |
| Ringgit | | | | | | |
| Malakoff | Electricity generation | 996.83 | 4.38 | 4.3 | 0.46 | 10.53 |
| Petronas Gas | Gas distribution | 3,645.03 | 7 | 7 | 0.30 | 29.05 |
| Powertek | Electricity distribution | na | na | na | 1.01 | na |
| Tenaga Nasional | Electricity — integrated | 7,042.55 | 8.6 | 8.65 | 0.40 | 19.07 |
| YTL Power | Independent power producer | 1,740.60 | 2.89 | 2.81 | 0.25 | 13.38 |
| Manila | | | | | | |
| Peso | | | | | | |
| Manila Elect. | Electricity distribution | 153.68 | 6.7 | na | 1.4 | 4.79 |
| Seoul | | | | | | |
| Won | | | | | | |
| Daehan City Gas | Gas distribution | 107.89 | 13,350 | 13,350 | 2,312 | 5.77 |
| Korea Gas | Gas distribution | 1,751.34 | 27,200 | 27,000 | 4,224 | 6.44 |
| Korea Electric Power | Electricity — integrated | 10,692.35 | 20,050 | 20,350 | 4,770 | 4.20 |
| Kukdong City Gas | Gas distribution | 59.99 | 12,000 | 11,600 | 2,239 | 5.36 |
| Kyungdong City Gas | Gas distribution | 37.35 | 14,150 | 14,150 | 4,697 | 3.01 |
| Kyung Nam Energy | Gas distribution | 26.44 | 1,065 | 1,050 | 238 | 4.67 |
| Samchully | Gas distribution | 132.77 | 39,300 | 38,000 | 7,447 | 5.28 |
| Seoul City Gas | Gas distribution | 68.94 | 16,550 | 16,500 | 2,529 | 6.54 |
| Sydney | | | | | | |
| A\$ | | | | | | |
| Australia Gas Light | Gas distribution | 3,235.59 | 11.13 | 11.51 | 0.52 | 21.57 |
| BHP Billiton | Diversified minerals | 20,658.25 | 8.56 | 8.79 | 0.27 | 20.20 |
| Energy Equity | Oil company upstream | 10.79 | 0.02 | 0.024 | 0.01 | 1.54 |
| Oil Search | Oil company upstream | 449.86 | 0.64 | 0.64 | 0.05 | 9.16 |
| Santos | Oil company upstream | 2,123.55 | 5.64 | 5.55 | 0.51 | 11.02 |
| Woodside Petroleum | Oil company upstream | 4,942.52 | 11.48 | 11.18 | -0.14 | na |
| Tokyo | | | | | | |
| ¥ | | | | | | |
| Chubu Electric Power | Electricity — integrated | 14,812.46 | 2,360 | 2,390 | 139.17 | 13.93 |
| Chugoku Electric Power | Electricity — integrated | 6,039.92 | 1,911 | 1,932 | 65.95 | 18.31 |
| Hokkaido Gas | Gas distribution | 152.82 | 290 | 286 | 5.5 | 60.61 |
| Kansai Electric Power | Electricity — integrated | 16,392.12 | 1,999 | 1,998 | 140.39 | 15.79 |
| Osaka Gas | Gas distribution | 6,860.85 | 340 | 333 | 10.77 | 31.33 |
| Saibu Gas | Gas distribution | 627.18 | 198 | 196 | 5.44 | 36.73 |
| Toho Gas | Gas distribution | 1,639.12 | 323 | 322 | 17.67 | 17.84 |
| Tohoku Electric Power | Electricity — integrated | 8,220.03 | 1,919 | 1,903 | 123.91 | 14.91 |
| Tokyo Electric Power | Electricity — integrated | 28,175.15 | 2,445 | 2,430 | 137.68 | 18.38 |
| Tokyo Gas | Gas distribution | 9,167.77 | 383.00 | 378.00 | 19.19 | 20.06 |
| Wellington | | | | | | |
| NZ\$ | | | | | | |
| Natural Gas | Gas distribution | na | na | na | 0 | na |
| Contact Energy | Electricity — integrated | 1,494.68 | 4.49 | 4.28 | 0.19 | 24.27 |

*for most recent annual reporting period

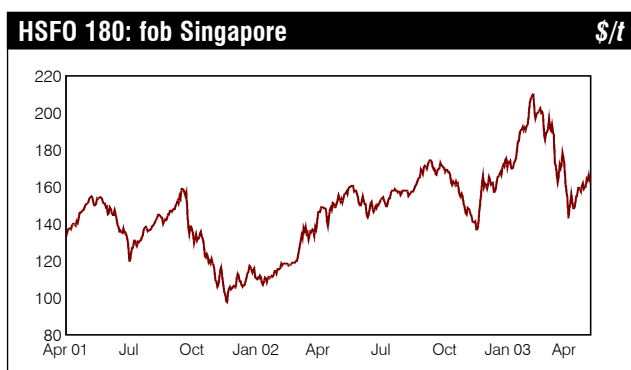
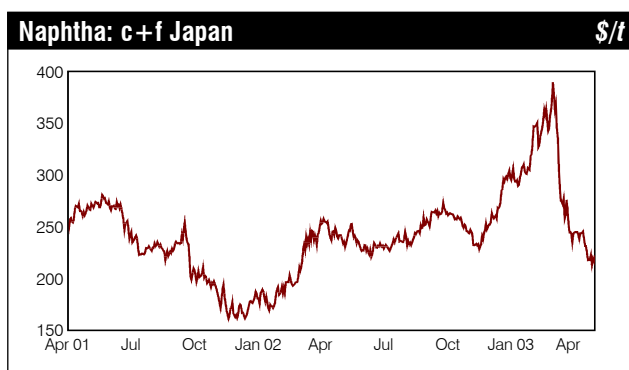
— Bloomberg

| Generation costs | | | | 12 May | | | | |
|----------------------------------|--------|---------------|--------------------------------------|--|--------|--------|--------|--------|
| Fuel type | Price | Fuel (\$/MWh) | Electricity wholesale price (\$/MWh) | Spreads at varying conversion rates (\$/MWh) | | | | |
| | | | | 30pc | 34pc | 38pc | 50pc | 55pc |
| Australia | | | | | | | | |
| Natural gas (\$/GJ) | 1.84 | 6.61 | 10.89 | -11.13 | -8.56 | -6.51 | -2.34 | -1.13 |
| Coal, fob Newcastle (\$/t) | 23.50 | 3.37 | 10.89 | -0.32 | 0.99 | 2.03 | 4.16 | 4.77 |
| HSFO 180, fob Spore (\$/t) | 161.00 | 13.45 | 10.89 | -33.89 | -28.66 | -24.50 | -16.00 | -13.56 |
| Japan | | | | | | | | |
| LNG, cif Japan (\$/t) | 244.14 | 16.04 | 128.19 | 74.78 | 81.02 | 85.98 | 96.11 | 99.02 |
| Coal, cif Japan (\$/t) | 31.40 | 4.50 | 128.19 | 113.20 | 114.95 | 116.34 | 119.19 | 120.00 |
| HSFO 180, cif Japan (\$/t) | 172.75 | 14.43 | 128.19 | 80.14 | 85.75 | 90.21 | 99.33 | 101.95 |
| South Korea | | | | | | | | |
| LNG, cif Korea (\$/t) | 249.55 | 16.39 | 47.89 | -6.70 | -0.32 | 4.75 | 15.10 | 18.08 |
| Coal, cif Korea (\$/t) | 29.50 | 4.23 | 47.89 | 33.81 | 35.46 | 36.76 | 39.43 | 40.20 |
| HSFO 180, fob Korea (\$/t) | 174.00 | 14.53 | 47.89 | -0.51 | 5.15 | 9.64 | 18.82 | 21.46 |
| Taiwan | | | | | | | | |
| Natural gas (\$/m ³) | 21.10 | 21.10 | 57.61 | -12.66 | -4.45 | 2.08 | 15.41 | 19.24 |
| Coal, cif Taiwan (\$/t) | 29.50 | 4.23 | 57.61 | 43.53 | 45.17 | 46.48 | 49.15 | 49.92 |
| HSFO 180 fob S'pore (\$/t) | 161.00 | 13.45 | 57.61 | 12.82 | 18.06 | 22.22 | 30.71 | 33.15 |
| Indonesia | | | | | | | | |
| Natural gas (\$/MWh) | 9.10 | 9.10 | 48.00 | 17.70 | 21.24 | 24.05 | 29.80 | 31.45 |
| Coal, fob Indonesia (\$/t) | 23.80 | 3.41 | 48.00 | 36.64 | 37.97 | 39.02 | 41.18 | 41.80 |
| HSFO 180 fob S'pore (\$/t) | 161.00 | 13.45 | 48.00 | 3.22 | 8.45 | 12.61 | 21.10 | 23.55 |

Spark spreads compare the cost of generating power at various heating efficiencies with the cost of buying power from the grid. A positive spread indicates it is economical to buy fuel, while a negative spread indicates it is economical to buy power off the grid. Fuel and electricity prices are taken from the Argus Asia-Pacific Products Report, Argus Coal Daily International Report, Australia's Nemmo, the IEA, company sources and national statistical bodies. The model does not take account of local taxes or transport costs

| Key prices | | | | | | | | | | |
|------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | Jul 02 | Aug | Sep | Oct | Nov | Dec | Jan 03 | Feb | Mar | Apr |
| Crude, Tapis fob Malaysia (\$/bbl) | 26.39 | 27.23 | 28.38 | 27.83 | 26.97 | 30.09 | 31.89 | 34.05 | 31.33 | 27.56 |
| HSFO 180 fob S'pore (\$/t) | 155.37 | 161.26 | 170.94 | 159.78 | 149.36 | 165.84 | 182.35 | 200.50 | 181.08 | 156.00 |
| Naphtha, c+f Japan (\$/t) | 234.98 | 243.94 | 262.61 | 255.59 | 240.15 | 279.51 | 303.64 | 341.16 | 319.74 | 239.08 |
| Steam coal, cif Japan (\$/t) | 29.78 | 29.00 | 29.00 | 29.55 | 29.75 | 29.94 | 30.28 | 26.62 | 31.16 | 31.15 |
| Propane, Far East Index (\$/t) | 247.59 | 274.64 | 309.24 | 343.76 | 346.75 | 355.31 | 393.08 | 399.54 | 362.86 | 265.76 |
| LNG, cif Japan (\$/t) | 215.59 | 225.94 | 231.95 | 235.92 | 236.95 | 237.19 | 244.14 | 249.55 | | |
| LNG, cif Korea (\$/t) | 210.52 | 221.15 | 231.76 | 243.06 | 247.98 | 245.47 | 252.73 | 257.80 | | |

Prices taken from the daily Argus Crude Report, Argus Asia-Pacific Products Report, Argus Coal Daily International Report and Argus International LPG Report. LNG prices taken from national statistics sources



| Conversion factors (left-hand column units are multiplied by the factor shown to convert to units in the top row) | | | | | | | | |
|---|---------|--------|--------|---------|-----------------|----------------|----------|-----------|
| | kWh | GJ | Therm | mn Btu | ft ³ | m ³ | t LNG | t oe |
| 1 kWh | — | 0.0036 | 0.0342 | 0.00342 | 3.3367 | 0.094515 | 0.000066 | 0.0000855 |
| 1 GJ | 277.8 | — | 9.478 | 0.95 | 950 | 26.25 | 0.018 | 0.022 |
| 1 therm | 29.3071 | 0.1055 | — | 0.10 | 96.59 | 2.766 | 0.0019 | 0.0024 |
| 1mn Btu | 293.1 | 1.055 | 10 | — | 965.9 | 27.66 | 0.019 | 0.024 |
| 1 ft ³ | 0.2997 | 0.0011 | 0.0102 | 0.001 | — | 0.0283 | 0.000019 | 0.000024 |
| 1 m ³ | 10.58 | 0.0381 | 0.362 | 0.0362 | 35.3023 | — | 0.00072 | 0.00083 |
| 1t LNG | 15,000 | 52 | 520 | 52 | 48,690 | 1,379 | — | 1.2 |
| 1t oil equivalent | 11,700 | 42.2 | 400 | 40 | 39,220 | 1,110 | 0.77 | — |