

THAILAND

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Thailand covers some 514,000 km², slightly smaller in size than Spain. It is located in southeast Asia and bordered by Cambodia and Laos to the east, by Myanmar to the west, and by Malaysia in the far south. The southeastern part of the country borders the Gulf of Thailand. The population totals 63 million and agriculture is the principal occupation, providing employment for 46% of the workforce.

Agriculture contributes little more than 10% to GDP, however, compared with 37% contributed by the manufacturing sector. In 2003, GDP grew by 6.2% to Bht5,868 billion (baht 41 = US\$1.00). Exports rose by some US\$8 billion, worth US\$75 billion (compared with imports of US\$71.3 billion) and benefited from gains in higher prices for farm products (including rubber) and an improvement in the technology sector. More than half of the country's exports now go to China and ASEAN countries. However, Thailand has one of the stronger Asian currencies, and the price competitiveness of Thai goods could present a challenge in the future.

Consumer confidence also grew last year and domestic consumption increased by 4.7%. Encouragingly, the level of private investment climbed by an estimated 16% and the forecast is for similar growth in 2004.

Thailand operates a free-enterprise economy and foreign investment is welcomed. An UNCTAD report sees regional integration as the key to attracting more foreign direct investment in the country. In the first ten months of 2003, some 826 projects attracted more than Bht270 billion in FDI, according to Thailand's Board of Investment. Japan tops the list of foreign investors, most of its investment commitments being directed towards the automobile and electronics sectors.

Thailand has plentiful resources of a variety of industrial minerals, ranking amongst the leading world producers of feldspar and gypsum. It is also a significant producer of gemstones. Resources of metals and fuel minerals are more modest, however. Tin, tungsten and zinc are all produced and a gold mine has operated since 2001. There are known resources of copper and efforts are being made to develop a copper mine. Oil and gas are produced but known reserves are limited

Metallic minerals

Padaeng Industry plc is the only private company in southeast Asia engaged in zinc mining and smelting. The Padaeng mine is located in northern Thailand at Mae Sot in Tak Province and commenced operations in 1982, based on a large deposit of zinc silicate.

As at December 31, 2003, the total mineral resource amounted to 4.6 Mt averaging 12.3% Zn containing 565,000 t of metal. The mining resource amounts to about 4.1 Mt, sufficient to sustain an expanded mining operation of over 0.4 Mt/y of ore over ten years.

The company also operates a smelter located 96 km from the mine. When it began operation in 1982 the smelter had the capacity to produce 60,000 t/y of special high-grade zinc ingot. This was increased to 72,000 t/y in 1987 and in 1988 a die-casting alloy unit was added. Current capacity is around 105,000 t/y. To conserve the ore resource at Mae Sot, the company began importing zinc sulphide concentrates in 1995 to provide part of the feedstock. The sulphide requires calcining to form zinc oxide prior to extracting the zinc and, accordingly, Padaeng invested in a roaster and acid plant. Today, Padaeng is one of the few companies in the world capable of using both zinc silicate and zinc sulphide in the same production process. During 2003, the company initiated a cost-reduction programme, including the construction of a 60,000 t/y capacity flotation plant at the Mae Sot concentrator, the aim being to utilise a larger proportion of the silicate ore in the smelting process and thereby reduce the volume of sulphide concentrates that have to be imported. This year it is expected that 50% of the smelter feed will be zinc silicate, up from 45% in 2003.

Total sales last year increased by 7.5% to 113,941 t, worth Bht4.38 billion, with 80% of sales going to the domestic market and 20% exported. The total production capacity share for zinc alloy was increased from 31% to 39%. The higher domestic consumption and higher zinc prices helped Padaeng to report a modest profit of Bht2.8 million after recording a Bht29.1 million loss in 2002.

Padaeng has an active exploration programme and on its existing mining leases at Mae Sot, reverse-circulation drilling intersected high-grade secondary zinc (24.6% Zn) in 30 drill-holes. It also employed diamond drilling to test deep zinc sulphide targets.

Padaeng's affiliate, Puthep Co Ltd is an incorporated joint venture with Pan Australian Resources NL, with the objective to develop the Puthep copper project in northeast Thailand. Pan Australian has the right to earn a 51% flow-through interest in Puthep Co, the owner of the property, by completing a feasibility study to a bankable standard. In addition, there are options for Pan Australian to acquire a further 19%.

The Puthep project is located 20 km from Loei a major centre within a region with excellent power, water, road and associated infrastructure. The project is based on shallow, disseminated mineralisation at the PUT 1 and PUT 2 deposits, which have a combined copper oxide-supergene mineral resource of 121 Mt averaging 0.43% Cu, making Puthep Thailand's largest known copper deposit. A pre-feasibility study completed by Pan Australian in 1999 has been revised to incorporate new data collected over the subsequent three years. This indicates that Puthep has the potential to become a viable heap-leach and solvent extraction-electrowinning (SX-EW) copper mine. It would

be based initially on the PUT 1 deposit where there is a potential open-pit mineral resource of 44 Mt at 0.5% Cu. The study has also confirmed the potential of Puthep to produce over 25,000 t/y of LME grade copper cathode over a minimum seven-year period.

A major hurdle for the advancement of the Puthep Copper Project was passed in June 2004 when the Thai Government approved a proposal for a full feasibility study on the PUT 1 deposit and gave in-principle approval for mining. Prior to this event work, at PUT 1 had been in abeyance because of the government's watershed zoning over the deposit (PUT 2 does not have such zoning).

As a consequence of Government support, Pan Australian has shifted focus back to PUT 1, where it plans to commence a full feasibility study, to commence in 2005, following a review of previous work. In addition, there appears to be the possibility of a high-grade zone at both PUT 1 and PUT 2. Australian-listed Kingsgate Consolidated Ltd officially opened its Chatree open-pit gold mine in Pichit Province, central Thailand, in 2001. The mine, located 280 km north of Bangkok, is owned by Kingsgate's wholly-owned Thai subsidiary Akara Mining Ltd and is the country's only modern gold mine. As at June 30, 2003, total proven and probable reserves amounted to 14.6 Mt at 2.1 g/t Au and 14 g/t Ag, sufficient for a mine life of eight years.

Commercial production commenced on November 27, 2001, and for the seven months to June 30, 2002, throughput significantly exceeded the nameplate capacity of 1 Mt/y. Metal output amounted to 91,185 oz of gold and 353,146 oz of silver at a cash cost of US\$61/oz, ranking the mine as one of the lowest- cost producers in the world. The ore has a high metallurgical recovery and the gold and silver is extraction using standard Carbon in Leach (CIL) processing.

For the year ended June 30, 2003, output was 154,484 oz of gold and 484,170 oz of silver at a total cash cost of US\$94/oz and a total production cost of US\$143/oz. The production represents a 69% increase on the previous year, when the plant operated for only seven months following commissioning.

An expansion at the Chatree plant was approved during 2003. Ore grades are forecast to decline and the increase in ore throughput, by approximately 50% to 1.8 Mt/y, should sustain production at current levels.

Oxiana Ltd is exploring for gold in joint venture with Thai Goldfields NL Oxiana through the Thai Goldfields joint venture (Oxiana 50%, earning 75%). Oxiana is sole funding a detailed surface exploration and drilling programme on several prospective high grade, low sulphidation epithermal gold prospects in the Loei and Phetchabun gold belts near the Chatree gold mine. In 2004 drilling commenced at the LD and Wang Yai project areas to test various geochemical and geophysical anomalies associated with epithermal vein systems identified in surface exploration.

Thailand produced an estimated 1,000 t of tin in concentrate in 2003 compared with 1,700 t in 2002. Tongkah Harbour's tin ore sales totalled Bht20.83 million (US\$532,960) for the full year 2003, down 51% from Bht42.13 million in 2002. Tongkah uses contractors, operating their own dredges, to conduct offshore mining operations. However, the number of dredges in operation dropped from three in 2002 to one in 2003. In addition, mining operations were conducted for only eight months, from May to December, compared with 10 months in 2002. Despite higher tin prices, Tongkah's gross margin from tin remained at around 8% in 2003, much the same as 2002, as the company had to absorb an increased royalty fee as prices increased.

Tin metal production from the Thaisarco smelter fell by about 13% to 15,400 t for 2003, down from 17,800 t in the previous year, and against an installed capacity of 36,000 t/y. Primary tin output is under pressure and likely to fall again in 2004 because of a shortage of concentrates as feed from Peru and Indonesia is now being smelted domestically.

The International Tungsten Industry Association estimates that Thailand produced about 100 t of tungsten in 2003, in the form of both wolframite and scheelite. It reports that future production plans in the country continue to be addressed.

Industrial minerals

Thailand originally developed its gypsum deposits as a source of raw material for domestic use, but it is increasingly becoming an important producer of wallboard, both for its own use and for export. Within the region, Thailand is now second only to China as a producer, its production in 2003 amounting to 6.5 Mt compared with 6.3 Mt in the preceding year.

The country is a modest kaolin producer and the Ranong kaolin operation produces 50,000 t/y mainly for use in sanitaryware as the clays shows good casting properties. The French kaolin producer Imerys acquired a 70% interest in Ranong in 2002, when it acquired Mineral Resources Development (MRD). It also increased its stake in the MRD-ECC joint venture (ball clays in Lampang) from 49% to 57.19%.

Thailand is now a significant producer of ground calcium carbonate (used mainly by the paper, plastics and paint industries) and in 2003 it produced 1.21 Mt. The best quality is from the Khoktum area, 10-30 km east of Lopburi. The main plants are all located there and use marble from the extensive Khoktum deposits.

Asia Pacific Resources Ltd (APR) has identified two large potash deposits at Somboon in the Udon Thani region of northeastern Thailand, Udon North and Udon South, and has a direct and indirect 90% beneficial interest in Asia Pacific Potash Corp, the company that holds the concession. The other 10% is held by the government. Udon South averages 24% sylvinitic and lies at a

depth of about 350 m. Measured and indicated resources amount to 225 Mt of sylvinite.

In November 2003, APR signed a memorandum of agreement, with China State-Owned Enterprise Investment Co in respect of co-operation between the two to develop the project. APR believes that production could begin at Udon South at an initial production rate of 1.0 Mt/y, with a subsequent expansion to 2.0 Mt/y, dependent on the share of the market that it secures. The first phase would require a capital investment of over US\$300 million, and the expansion cost of US\$220 million, could be funded from cash flow. The company has applied for mining leases covering Udon South under the terms of its concession agreement. Securing both product offtake agreements and the necessary financing for the project will be needed in order to develop Udon South. The company indicates that the mine will be brought into production in 2008. The adjacent Udon North tract remains under exploration.

Fuel minerals

Thailand is a significant producer of brown coal, which is used almost exclusively for power generation. The 2,400 MW lignite-fired Mae Moh power plant is the largest source of electricity generation in the country and also one of the largest point sources of atmospheric pollution in Southeast Asia, generating around 13% of Thailand's electric power production. The Mae Moh mine produces around 18.3 Mt/y, feeding directly to the power plant. Other producers include Banpu plc, Thailand's largest private coal company, which produced 2.5 Mt of lignite in 2003, with sales to the cement industry and power generation utilities. Its open-pit operations are in northern Thailand in the provinces of Lampang and Payao, where there are reserves of 12 Mt.

Total national lignite production is around 21 Mt/y. The country currently also imports some 5 – 6 Mt/y of bituminous coal and some coke for industrial use.

Banpu has invested in a new 1,434 MW coal-fired power plant in eastern Thailand. It has a 50% share in the project with CLP Power Ltd as its 50% equity partner. The total cost of the project has been estimated at US\$1,300 million and US\$1,100 million has been received in debt financing from a consortium of financing institutions. Construction began during 2003 and is scheduled for completion in 2006. The project will rely on imported coal. The company is rapidly expanding its coal operations to become a regional coal supplier based on operations in Indonesia. Its mines in Thailand and Indonesia currently have a combined annual capacity to produce 14.5 Mt/y, with a reserve base of 170 Mt and resources of 139 Mt.

According to the BP *Statistical Review of World Energy*, Thailand produced 19.6 billion m³ of natural gas in 2003, a 3.7% increase over 2002 but representing only 0.7% of world production. Proven reserves are sufficient to last 22 years at the current rate of production. Oil production jumped by almost 16% to 9.0 Mt. This was equivalent to only 0.2% of world output, and Thailand's proven reserves of oil are sufficient for only another nine years at current production levels. Oil consumption in 2003 rose by 6%, to 39 Mt. By

comparison, coal production amounted to 5.6 Mt of oil equivalent, and proven reserves of lignite and sub-bituminous coal amounted to 1,268 Mt, sufficient for 68 year's at the current production level.