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## Taiwan

*Located across the Taiwan Strait from mainland China (80 miles at the closest point), Taiwan is a leading economic and trading center, with one of the busiest ports in the world (Kaohsiung). As Taiwan lacks sufficient domestic energy sources, it is almost totally dependent on energy imports.*

*Note: The information contained in this report is the best available as of July 2004 and can change.*



### GENERAL BACKGROUND

Taiwan's economy in 2004 is experiencing strong growth, building upon a robust year in 2003. The 3.2% real GDP growth recorded in 2003 reflects the second-quarter dip caused by the outbreak of SARS, but export-led growth and swelling consumer demand are contributing to an expected rate of 5.3% real GDP growth in 2004. Taiwan's economy is heavily oriented toward the manufacturing of consumer electronics products. Growing worldwide demand, bolstered by economic recovery in the United States, as well as growing demand in mainland China for industrial goods pushed the value of Taiwanese exports up around 22% year-on-year in April 2004.

Oil is by far the dominant fuel in Taiwan's energy mix, accounting for 48% of total primary energy consumption. Coal also plays an important role (34% of total energy consumption), followed by nuclear power (9%), natural gas (8%), and hydroelectric power (less than 2%). Taiwan has very limited domestic energy resources and relies on imports for most of its energy requirements. The country's industrial sector accounts for about 42% of total energy demand, but this share is expected to decline slightly, since Taiwan's economy is moving toward newer, less energy-intensive industries. The transportation sector accounts for one-third of total energy demand.

Taiwan was admitted to membership in the World Trade Organization (WTO) in November 2001, concurrently with China's admission. Unlike China, Taiwan has been admitted to the WTO as a "developed country," which imposes more stringent requirements for reducing barriers to foreign competition. Taiwan recently has lifted some restrictions on direct trade with and investment in

mainland China, which is expected to increase cross-strait commercial ties.

## **OIL**

Chinese Petroleum Corporation (CPC), Taiwan's national oil company, is the dominant player in all sectors of the country's petroleum industry, including exploration, refining, storage, transportation, and marketing. However, significant competition began in July 2000 with the opening of a refinery at Mailiao owned by Formosa Petrochemical Company (FPC), a subsidiary of the private Taiwanese petrochemical firm Formosa Plastics Group. The first phase of production from FPC's Mailiao refinery began in mid-2000 at 150,000 barrels per day (bbl/d), reaching full capacity of 450,000 bbl/d in 2002.

Prior to the construction of the FPC Mailiao refinery, Taiwan imported a significant quantity of refined petroleum products. Now the country's refining capacity exceeds its domestic consumption of petroleum products, making Taiwan a net exporter. Responding to growing fuel demands in the region, as well as a domestic shift away from oil-fired power generation, Taiwan is seeking to export more of its fuel refining production. Taiwan's refining capacity has increased by about 69% during the past 10 years. Tuntex Group, one of the largest developers in Taiwan, plans to construct a refinery at Tainan, in the southwest region of Taiwan, with a capacity of 150,000 bbl/d. Three refineries, Ta-Lin, Kaohsiung and Tao yuan, are all owned by CPC. Together, they have a total capacity of 770,000 bbl/d, according to the Taiwan Ministry of Economic Affairs.

Taiwan's current crude oil production is under 1,000 bbl/d, compared to crude oil consumption of 876,000 bbl/d. Most of Taiwan's crude oil imports come from the Persian Gulf, though West African countries also are important suppliers. To ensure against a supply disruption, Taiwan's refiners are under a regulatory requirement to maintain stocks of no less than 60 days of consumption. Refiner-held strategic petroleum stocks are the norm in Asia, and Taiwan's policy is similar to those of Japan and South Korea.

Taiwan's government has announced plans to further liberalize the petroleum sector. Taiwan's legislature passed the Petroleum Administration Law in October 2001, which removed CPC's quasi-governmental policy implementation functions, and which will permit the eventual sale of a majority stake in the firm. In January 2003, the Taiwanese government announced that it would accelerate the timetable for the sale, with the process to be completed in 2004, but this timetable has slipped as well. When privatization eventually moves forward, foreign firms will be allowed to acquire stakes in CPC on an equal basis with domestic investors.

Despite the lack of formal ties between Taipei and Beijing, Taiwan and mainland China have developed a cooperative relationship in the field of energy. CPC and Beijing's state-owned China National Offshore Oil Corporation (CNOOC) signed a deal in 1996 to jointly explore a 5,939-square-mile area in the Tainan Basin of the Taiwan Strait. Taipei officially ratified the deal in March 1998, and the first round of seismic surveys by the two companies was completed in October 1999. A joint venture agreement was signed between the two companies in May 2002, and CPC received approval in March 2004 to open representative offices in Shanghai and Beijing.

## **NATURAL GAS**

Besides oil, CPC also is responsible for Taiwan's natural gas exploration, production and imports. Taiwan had net imports of 257 billion cubic feet (Bcf) of liquefied natural gas (LNG) in 2002 -- up almost 8% over the figure for 2001. Indonesia and Malaysia are Taiwan's two LNG suppliers. Total natural gas consumption in 2002 was 287 Bcf.

CPC operates Taiwan's only LNG receiving terminal -- at Yungan, Kaohsiung. CPC anticipates an increase in natural gas demand due to the construction of additional power plants. The government plans to triple LNG consumption by 2010 for environmental reasons, as natural gas is the cleanest burning fossil fuel.

Meanwhile, Taiwan's energy sector market liberalization program has made possible the construction of competing LNG import terminals. Several private Taiwanese and Japanese firms have formed a consortium, Tung Ting Gas, to pursue an LNG regasification project in Tao-Yuan county. Construction of the terminal was started in mid-2001 by Japan's Chiyoda and Taiwan's CTCI, and it is scheduled for completion in 2006. A preliminary agreement has been signed with Qatar's RasGas for LNG supplies. Most of the natural gas from the terminal is slated to be used for electric power generation. CPC announced that the construction of its second LNG import terminal in Tatan will be completed around 2009 and will increase Taiwan's LNG importing capacity from 4.5 to 7.5 million tons.

### **COAL**

In Taiwan, coal is used for electric power generation as well as for the steel, cement and petrochemical industries. Taiwan ceased producing coal in 2000, and its 55.8 million short ton (Mmst) demand is met with imports, with Australia and China as major suppliers.

### **ELECTRIC POWER**

Taiwan Power Company (Taipower), the state-owned electric power utility, currently dominates Taiwan's electric power sector. However, Taipower's monopoly status technically ended after a 1994 measure which allowed independent power producers (IPP's) to provide up to 20% of Taiwan's electricity. IPPs are required to sign power purchase agreements with Taipower, which distributes the power to consumers. Regulations issued by the government in July 1998 allow foreign investors to play a greater role in Taiwan's electric transmission and distribution sector. After joining the WTO in 2001-2002, foreign firms were permitted 100% ownership of firms in the sector.

A new electricity law has been under consideration in Taiwan's parliament, the major feature of which is expected to be the privatization of Taipower. Progress, though, has been slow, and the legislation is being reworked by the new Democratic Progressive Party (DPP) government, which was reelected in April 2004. Under the basic framework envisioned, Taipower would retain a monopoly on transmission and distribution networks, but Taipower's generation assets would be split into several firms. The planned privatization is to an extent the result of rapidly rising power demand in Taiwan, and Taipower's inability to build sufficient capacity to keep pace with demand, which led to a power crisis during the summer peak-demand months in 1999. The expected date for completion of Taipower's privatization was originally 2001, but several issues, most notably the controversy over nuclear power, have pushed the expected date back to 2006. In June 2004, the Taiwan legislature opposed a measure that would have allowed revenues achieved by the sale of the stake to be used for the privatization project.

At the end of 2002, Taipower controlled a total installed capacity of 31,915 MW, of which 69% was thermal, 16% was nuclear, and 14% was hydropower, according to Taipower's published figures. Taipower retains exclusive control over nuclear and hydropower plants. The government will continue to own these assets after Taipower is privatized. Taipower currently has 4,884 MW of nuclear generating capacity at 3 plants (Kuosheng and Chinshan stations in the north and Maanshan station in the south).

Taiwan's first major IPP, the coal-fired Mailiao plant owned by the Formosa Plastics Group, began

operation in 1999. It currently has an installed capacity of 2,400 megawatts (MW) in four 600-MW generating units, and sells about three-quarters of its output to Taipower. A new coal-fired IPP plant, Ho Ping Power Station, began commercial operation of its two 660-MW units in 2002. Ho Ping is a joint venture including Taiwan Cement Corporation and Hong Kong's China Power and Light Corporation. Several other IPP projects have been approved.

In June 2004, Taiwan's Council for Economic Planning and Development (CEPD) approved plans for a 800-MW coal-fired power plant at Changhua in central Taiwan. The plant will be built by Taipower for around US\$1.4 billion and will come online in two stages during 2011. Additionally, Taipower is building a 4,000-MW LNG-fired complex, the Tatan Power Plant, expected to be completed in 2007. However, the facility is likely to be completed before the adjacent LNG terminal becomes operational in 2009, requiring that the plant be run on coal until then.

One major controversy which has affected Taiwan's electric power over the past two years concerns the future role of nuclear power. Taiwan's Democratic Progressive Party government came into office in early 2000 promising to approve only LNG-fired power projects in the future, and to increase LNG's share of Taiwan's power generation to roughly one-third by 2010. This raised the question of what to do about the 2,700-MW Kungliao nuclear power plant, which is currently under construction. The DPP government attempted to terminate the project in October 2000, but action by the legislature and courts forced a resumption of construction in February 2001. The plant currently is scheduled to begin operation in July 2006. After that, the current government does not plan to support additional nuclear generating capacity. Some officials have reportedly started to question the designation of LNG as the "fuel of choice" for electricity generation, due to cost, which might mean the approval of additional coal-fired capacity for incremental demand after the completion of the Kungliao and Tatan projects in 2006.

## **ENVIRONMENT**

Taiwan currently is grappling with the environmental ramifications of building one of Asia's richest economies through a decades-long commitment to economic growth. Environmental issues include: the pollution of air and water in urban areas, stores of nuclear and toxic wastes, loss of fisheries and coastal ecosystems, and an overall degradation of the country's natural landscape.

Per capita energy use in Taiwan is on par with several of its neighboring countries in Asia. However, energy intensity levels in Taiwan compared to other developed countries tend to be relatively high. This is due primarily to the country's heavy concentration of energy-intensive manufacturing industries.

Taiwan's per capita carbon dioxide emissions have been increasing, and in 2002 represented almost four times the amount of per capita carbon dioxide emissions in China (10.21 compared to 2.57 metric tons). Compared to Taiwan's neighbors, carbon dioxide intensity (the amount of carbon consumed per dollar of GDP) in Taiwan has experienced very little growth since 1980.

Air pollution in Taiwan is most obvious in Taipei -- the country's capital and largest city. The primary cause of urban air pollution in Taipei is the large number of motorbikes and scooters which are the main source of transportation for millions of the city's residents. Nuclear power plays an important role in Taiwan's energy sector, making up 22% of Taipower's electric generation in 2002.

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*Sources for this report include: Asian Wall Street Journal; CIA World Factbook 2002; Dow Jones News Wire service; Economist Intelligence Unit; Global Insight Asia Economic Outlook; Oil & Gas Journal; Petroleum Intelligence Weekly; Platt's Oilgram News; Reuters News Wire; U.S. Energy*

*Information Administration; U.S. Department of State.*

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## **COUNTRY OVERVIEW**

**President:** Chen Shui-bian (since May 2000)

**Population (2003E):** 22.5 million, heavily concentrated along the west coast

**Area:** 14,000 square miles (slightly larger than Maryland and Delaware combined)

**Major Cities:** Taipei (Capital), Kaohsiung, Taichung, Tainan

**Major Religions:** Mixture of Buddhist, Confucian, and Taoist 93%, Christian 4.5%, other 2.5%

**Languages:** Mandarin (official), Taiwanese (Min), Hakka Chinese dialects

**Ethnic Groups:** Taiwanese, 84%; mainland Chinese, 14%; aborigine, 2%

## **ECONOMIC OVERVIEW**

**Currency:** Taiwan Dollar (TW\$)

**Exchange Rate (07/06/04):** US\$1 = TW\$33.73

**Gross Domestic Product (2003E):** \$287 billion

**Real GDP Growth Rate (2003E):** 3.2% **(2004F):** 5.3%

**Inflation Rate (consumer prices, 2003E):** -0.3% **(2004F):** 1.0%

**Unemployment Rate (2003E):** 5.0%

**Total Reserves, Non-Gold (2003E):** \$206.6 billion

**Current Account Balance (2003E):** \$28.6 billion

**Merchandise Exports (2003E):** \$144.2 billion

**Merchandise Imports (2003E):** \$127.3 billion

**Merchandise Trade Surplus (2003E):** \$16.9 billion

**Major Exports:** Consumer electronics, machinery, chemicals & allied products, iron & steel, plastics

**Major Imports:** Crude oil, capital goods, consumer goods, agricultural and industrial raw materials

**Major Trading Partners:** United States, Japan, Europe, Hong Kong (China)

## **ENERGY OVERVIEW**

**Minister of Economic Affairs:** Yi-Fu Lin

**Proven Oil Reserves (1/1/04E):** 4 million barrels

**Oil Production (2003E):** 3,806 barrels per day (bbl/d), of which 800 bbl/d is crude oil

**Oil Consumption (2003E):** 896,000 bbl/d

**Net Oil Imports (2003E):** 892,200 bbl/d

**Crude Oil Refining Capacity (1/1/04E):** 920,000 bbl/d

**Natural Gas Reserves (1/1/04E):** 2.7 trillion cubic feet (Tcf)

**Natural Gas Production (2002E):** 30 Billion cubic feet (Bcf)

**Natural Gas Consumption (2002E):** 287 Bcf

**Net Natural Gas Imports (2002E):** 257 Bcf (all LNG)

**Coal Reserves (12/31/96):** 1.1 million short tons (Mmst) (active coal production ceased in 2000)

**Coal Consumption (2002E):** 55.8 Mmst

**Net Coal Imports (2002E):** 54.7 Mmst

**Electric Generating Capacity (1/1/02E):** 30.1 gigawatts

**Electricity Generation (2002E):** 159 billion kilowatthours

## **ENVIRONMENTAL OVERVIEW**

**Total Energy Consumption (2002E):** 4.1 quadrillion Btu\* (1.0% of world total energy consumption)

**Energy-Related Carbon Dioxide Emissions (2002E):** 230.0 million metric tons (0.9% of world

total carbon dioxide emissions)

**Per Capita Energy Consumption (2002E):** 182.1 million Btu (vs. U.S. value of 341.8 million Btu)\*\*

**Per Capita Carbon Dioxide Emissions (2002E):** 10.2 metric tons (vs. U.S. value of 19.9 metric tons)

**Energy Intensity (2002E):** 8,972 Btu/ \$ nominal-PPP (vs. U.S. value of 9,344 Btu/\$ nominal-PPP)\*\*

**Carbon Dioxide Intensity (2002E):** 0.50 metric tons/ \$ nominal-PPP (vs. U.S. value of 0.55 metric tons /\$ nominal-PPP)\*\*

**Fuel Share of Energy Consumption (2002E):** Oil (47.9%), Coal (33.7%), Nuclear (9.1%), Natural Gas (7.8%), Hydro (1.5%)

**Fuel Share of Carbon Dioxide Emissions (2002E):** Oil (36.6%), Coal (56.1%), Natural Gas (7.2%)

**Major Environmental Issues:** Air pollution; water pollution from industrial emissions, raw sewage; contamination of drinking water supplies; trade in endangered species; low-level radioactive waste disposal.

**Major International Environmental Agreements:** Taiwan is not a party to any of the selected agreements.

\* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar and wind electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

\*\*GDP based on CIA World Factbook estimates based on purchasing power parity (PPP) exchange rates

## ENERGY INDUSTRY

**State Energy Companies:** Chinese Petroleum Company (CPC), Taiwan Power (Taipower)

**Oil Refineries (1/1/04 capacity):** Kaohsiung (270,000 bbl/d), Ta-Lin (300,000 bbl/d), Tao-Yuan (200,000 bbl/d); Mailiao (150,000 bbl/d)

**Major Ports:** Kaohsiung, Keelung, Hwalien, Taichung, Suao

**LNG Terminal:** Yungan

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## LINKS

For more information from EIA on Taiwan, please see:

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Links to other U.S. federal and state government sites:

[CIA World Factbook - Taiwan](#)

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Contact: Lowell Feld  
[lfeld@eia.doe.gov](mailto:lfeld@eia.doe.gov)  
Phone: (202)586-9502  
Fax: (202)586-9753

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