



Macau SAR



The Macau Special Administrative Region, commonly known as Macau or Macao is one of the two special administrative regions (SARs) of the People's Republic of China (PRC), along with Hong Kong. Macau's economy has remained one of the most open in the world since its reversion to China in 1999. The economic environment of the Macau SAR was remarkably "good" in 2006, the GDP (gross domestic product) is estimated to have grown by 16.6%, the unemployment rate fell to 3.7% and the number of tourists exceeded 21.9 million. However, the economic boom in this tiny city's economic growth was primarily powered by the gaming, tourism, and the construction industry, with gaming taking the lead. Where on one hand, China's decision to ease travel restrictions led to a rapid rise in the number of Mainland visitors, on the other, the opening of Macau's gaming industry to foreign access (in 2001) spurred an increase in public works expenditures.

Gaming earns bucks but spends more power

Not only has the casino boom transformed the docile Chinese backwater of Macau into the Vegas of the Far East but has also put a serious strain on its power supplies. Electricity use in this densely-populated former Portuguese colony leapt 17.6 per cent (to be in line with others) in the first five months of 2007 and the territory is becoming increasingly prone to power outages.

Fifty per cent of Macau's electricity is now being imported from southern China's Mainland power grid compared to just 15 per cent. The surge in electricity consumption in the territory of 525,500 people has been spurred by a boom

in casinos which last year saw Macau overtake Las Vegas in gaming revenue, taking in 7 billion US dollars to 6 billion US dollars in Vegas.

As new casinos continue to open, Macau's electricity consumption is expected to be double of 2005 by 2010 where legislators fear that the city's energy security could be put at risk by reliance on imported power.

Who generates, transmits and distributes power in Macau?

CEM is a public utility company with the sole authority to generate, transmit, distribute, sell, import and export electricity in Macau. CEM signed its 25-year franchise with the former Portuguese administration in 1985 and has been interconnected to the 110kV network of Guangdong Province since 1984.

The second and third interconnection consisting of double 110kV circuits were put into operation in 2006 and 2007 respectively. This increased Macau power reserve and directly improved the reliability and flexibility of electricity supply services.

By the end of 2006, CEM was providing service to over 206,000 customers. The Macau peninsula accounted for 87.1% of the total customer base, Taipa 12.2% and Coloane 0.7%. The highest load recorded in 2006 was on 14 July when demand reached 522MW representing 9% growth when compared to 2005.

Generation

The generating system of CEM consists of three power stations: one located in the Macau Peninsula

PROFILE

Capital	City of Macau	Installed Capacity	472MW
Area	28.6 km ²	Population Electrified	100%
Population	525,500 (August 2007 estv.)	Main Voltages (kV)	110, 66, 11
GDP	\$10 billion	Natural Resources	-
Currency	Macanese pataca (MOP)		

and the other two, on the Coloane Island. Together, these three power stations are equipped with a total installed capacity of 472 MW. Among the various types of power generation methods, as in 2006, the predominant type was the use of the low speed diesel generator. This kind of generating units constituted of almost 49% of the total installed capacity and accounted for as much as 92% of total generation in 2006.

The use of the steam turbines, gas turbines and the medium speed diesel generators, which comprises 22% of the total installed capacity, remained low. However, their output summed up to 4% only. The Combined Cycle, using diesel oil since gas is not yet available in Macau, accounted for 4% of total generation, while its capacity was 29% of the total generating system.

Transmission and Distribution

The Macau transmission network consists of twelve 66/11kV substations, as well as three 110/66kV interconnections with Zhuhai, Nanping and Gongbei substations in Mainland China. There is also a high voltage network of 150km made up of 66kV and 110kV cables. The 11kV medium voltage distribution network is composed of 127 private and 1,027 public customer substations (11kV/440V) connected by cables with a total length of 527 kilometers. The low voltage distribution network is made up of 731 kilometers of cables, while the street lighting system consists of 507 kilometers of cables and 14,833 streetlights. Almost the entire power network under CEM runs underground.

The significant economic growth that Macau SAR is witnessing is obviously largely impacting its power consumption. The forecasts show that the consumption is expected to double in the five years. In order to cope with such demand increase and also keep abreast with the required quality, developments in the major grid have begun being incorporated.

Among those, we could itemise the most important as follow:

- Installation of new substation for additional Interconnections with Mainland China (at 220kV and 110kV voltage levels).
- Extension of some existing HV substations

in order to increase the supply capacity.

- Splitting of the 66kV cable network to contain the fault level.
- Expansion of the 110kV cable grid in order to efficiently transmit the power throughout network.

Electricity Output and Consumption

Year 2006, witnessed the generation of 1,558 GWh of electricity, a decrease of 19% over the figure of 2005. Electricity bought from the Mainland amounted to 965 GWh, which represents 183% growth when comparing with 2005. Electricity purchase from the Macau Central Incineration Centre totaled to 62 GWh. The Company's sales for 2006 were 2,369 GWh.

Tariffs

CEM's tariff scheme consists of three tariff groups which is set according to the voltage level of billing/metering point for the supply:

- Tariff Group A (Residential & small commercial use)
- Tariff Group B (Large commercial & industrial use)
- Tariff Group C (Large commercial & industrial use)

A2- Reduced Tariff – Customers with a subscribed demand up to 6.9kVA and a monthly consumption that does not exceed 120 units (kWh) in six months are entitled to this tariff scheme. This tariff class is applied as an automated procedure of CEM.

A3-Social Assistance Tariff – This tariff plan is for non-profitable public and private institutions that develop and organise relevant social activities. A written request enclosing all relevant documentation issued by the Social Welfare Institute (IAS) is required to be provided to CEM.

A4-Social Assistance Tariff – Customers, with a subscribed demand up to 6.9kVA and whose monthly consumption does not exceed 120 units (kWh) over a time span of six months, are entitled to the public assistance tariff. Customers should apply to the CEM presenting the social assistance card issued by the IAS.

If customers meet the previous consumption requirements and proceed with the first time application, this tariff class will be applied as an automated procedure by the CEM.

Environment

The installation of the Selective Catalytic Reduction (SCR) systems in all low-speed Diesel generators allows a significant reduction in nitrogen oxides (NOX) atmospheric emissions.

The fine-tuning of the system (SCR systems had been coupled with this type of generators for the first time in the world), including the later installation of a low activity catalyst, together with the continued use of lower sulfur content fuel oil, made room for the consolidation in the reduction of the main pollutant atmospheric emissions, while reducing the plume visibility to a minimum.

CEM has also launched Energy Audits and audits the customers' installations and

recommends energy savings. The customers can now save 10 to 13% of their annual electricity bill on an average!

A Clean Chit

Guided by the vision to become one of the best energy suppliers in Asia, CEM has completed the development of its Quality Management System and obtained the international standard ISO 9001 certification in February 2007.

Together with the ISO 14001 Environmental Management System and OHSAS 18001 Occupational Health and Safety Certifications, attained in 2003 and 2006 respectively, CEM has now developed its Integrated Management System, in order to reach a high level of operational quality as per high international bench marks.

Power Plant	Electricity Generated [GWh]	Fuel Used [1]+[2]=103t	
		Heavy fuel oil [1]	Diesel oil [2]
Coloane-B	55.2	-	12.72
Coloane-A	1437.2	277.7	0.06
Macau (CMC)	65.2	15.13	0.28
Auxiliaries	-	0.17	0.13