Environmental Performance Improvements

InnoAsia
Hong Kong
6 December 2013
Over a Century of Asian Experience

- Established in 1901, 75 kW power station in Hong Kong in 1903
- Largest private investor in Asia Pacific
- Largest foreign investor in China and India
- 2nd largest energy business in Australia’s deregulated market
- CLP operates 8 different technologies
  - Gas, coal, nuclear, hydro, wind, solar, oil and biomass

燃點生活力量
Energy for Life
CLP’s Climate Vision 2050

- **2004**: 0.84 kg CO₂/kWh
- **2007**: 0.8 kg CO₂/kWh
- **2010**: ~5%
- **2020**: >30%
- **2035**: >45%
- **2050**: >75%

**Non-carbon Emitting**
- **2012**: Reached 20.2% renewable energy generation
- **2020**: 30% (non-carbon) including 20% renewables
- **Ongoing Review of Target**

**CO₂ Emissions Intensity**

- **CLP** 中 中 电

燃點生活力量
Energy for Life
Hong Kong Generation Supply
CLP Power Hong Kong – Power Generation

Castle Peak Power Station

- 4,108MW Coal Fired
  (4 x 350MW + 4 x 677.5MW)
CLP Power Hong Kong – Power Generation

- Total capacity 2,500MW
  (8 x 312.5MW)
Daya Bay Nuclear Power Station

- 1,968MW (2 x 984MW)
CLP Power Hong Kong – Power Generation

Pumped Storage Power Station

- 2,400MW (8 x 300MW)
CLP Power Hong Kong – Power Generation

Penny’s Bay Power Station

- Total capacity 300MW
  (3 x 100MW)
Emissions Control Process
Hong Kong Emissions

- Electrostatic Precipitators at CPPS
- Low NOx burners at CPPS
- Nuclear at Daya Bay
- Natural Gas at BPPS
- Increasing use of Ultra Low Sulphur Coal
- Emissions Control Project

**Demand increased >80%**

**Emissions reduced by >80%**

0.94 kg CO2 per KWH

Energy for Life
Continuous Tightening on Emission Caps

- **1997 (Base Year)**
  - RSP: 57%
  - SO2: -48%
  - NOx: -32%

- **2010**
  - RSP: 33%
  - SO2: -64%
  - NOx: -34%

- **2015**
  - RSP: -6%
  - SO2: -9%
  - NOx: -6%

- **2017**
  - Total emissions (KT)

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燃點生活力量
Energy for Life

CLP 中電
Fuel Mix
Fuel Mix Adjustments

- Coal
- Gas
- Nuclear

Increased Gas means higher costs

Year: 2015 Projected Fuel Mix

Generation (GWh)


CLP 中電

燃點生活力量
Energy for Life
Trilemma
Energy Trilemma

Care for the Environment

Reliable and Safe Supply

Reasonable Tariff

High reliability
Unplanned customer minutes lost per year

CLP Power
New York
Sydney (CBD)
London

Note: CLP: 2010-2012 average
Others: 2009-2011 average

2013 Residential Tariff Comparison

Residential Tariff HK cents / kWh
(As of January 2013)

Source: Web search
Understanding The Trilemma
### CASTLE PEAK

**HONG KONG**

**FACILITY PERFORMANCE STATISTICS**

- Coal-fired power station
- 4,108MW (4 x 350MW, 4 x 677MW)
- Plant commissioned between 1982 and 1990
- Shareholding of 40% with operational control by CLP

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>2012</th>
<th>2011</th>
<th>2010</th>
<th>2009</th>
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<tbody>
<tr>
<td>1. OPERATION</td>
<td></td>
<td></td>
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<tr>
<td>Electricity sent out</td>
<td>GWh</td>
<td>17,310</td>
<td>17,644</td>
<td>14,004</td>
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<td>Coal consumed</td>
<td>Tj</td>
<td>182,651</td>
<td>188,407</td>
<td>148,229</td>
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<td>Oil consumed (1)</td>
<td>Tj</td>
<td>4,195</td>
<td>995</td>
<td>826</td>
<td>893</td>
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<td>Gas consumed</td>
<td>Tj</td>
<td>12</td>
<td>26</td>
<td>36</td>
<td>102</td>
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<tr>
<td>Thermal efficiency</td>
<td>%</td>
<td>33.4</td>
<td>33.5</td>
<td>33.8</td>
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<tr>
<td>Equivalent availability factor (EAF)</td>
<td>%</td>
<td>81.3</td>
<td>85.1</td>
<td>72.0</td>
<td>78.4</td>
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<td>2. AIR EMISSIONS</td>
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<td>CO₂ (Scope 1) (2)</td>
<td>KT</td>
<td>16,645</td>
<td>16,921</td>
<td>13,357</td>
<td>15,258</td>
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<tr>
<td>CO₂ (Scope 1) (2)</td>
<td>KT</td>
<td>16,538</td>
<td>16,821</td>
<td>13,279</td>
<td>15,164</td>
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<td>SO₂</td>
<td>KT</td>
<td>11.3</td>
<td>9.7</td>
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<td>NOₓ</td>
<td>KT</td>
<td>20.8</td>
<td>19.6</td>
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<td>Particulates (Total)</td>
<td>KT</td>
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<tr>
<td>Particulates (Respirable)</td>
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<td>0.7</td>
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<td>3. WATER</td>
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<td>Water Withdrawal</td>
<td>Mm³</td>
<td>2,887.6</td>
<td>2,807.6</td>
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</tbody>
</table>

**CLP Group Website – CLPP Annual Emissions**

- By plant
Sustainable Energy Solutions

People of Hong Kong’s Requirements

Open Information

Operational Experience
Everyone goes home safely!