THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS HONG KONG SECTION

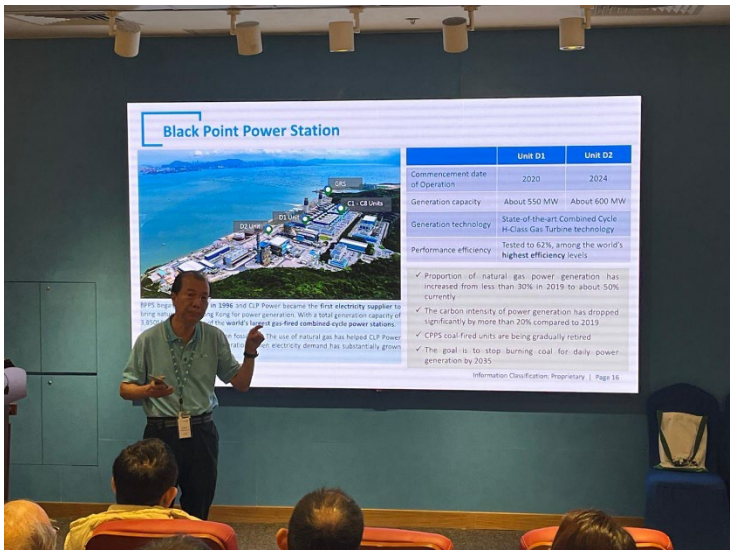
TECHNICAL VISIT TO CLP POWER'S BLACK POINT POWER STATION ON 20/12/2025

CLP Power Hong Kong Limited (CLP Power) has been a cornerstone of Hong Kong's energy infrastructure since its establishment in 1901. As one of the city's primary electricity suppliers, it currently provides reliable power to more than 80% of the population, covering key regions including Kowloon, the New Territories, and several outlying islands. CLP operates as a fully integrated utility, meaning it oversees the entire electricity supply chain — from power generation and transmission to distribution and customer services.

With a longstanding commitment to safety, reliability, and environmental responsibility, CLP Power continues to modernize its systems to meet Hong Kong's growing energy needs while aligning with global sustainability goals. The company plays a central role in supporting the city's transition toward carbon neutrality by 2050 through investments in cleaner energy sources, advanced grid technology, and initiatives to promote energy efficiency among customers.

Honorable guest

It is an honor to invite Mr. Sze Wing Tung, enriched the experience with technical discussions about operational challenges and recent advancements in turbine and plant engineering to all the attendees. Mr. Sze is a seasoned electrical and control engineer who holds the professional qualifications of Registered Professional Engineer in Control, Automation & Instrumentation,



Electrical, and Energy disciplines, as well as a Registered Electrical Worker license for categories C0 and H0. Over the course of his distinguished career, Mr. Sze has developed extensive expertise in the design, installation, and commissioning of large-scale power generation systems.

In the early stages of his career, he was involved in major power station development projects across Hong Kong, where he gained hands-on experience in both engineering design and on-site technical coordination. His strong technical foundation and leadership skills later led to his deployment on overseas assignments, where he took on full engineering management responsibilities for multiple power station projects in Mainland China and Southeast Asia. These roles allowed him to further broaden his international project exposure, overseeing multidisciplinary teams and ensuring high engineering standards and project delivery excellence.

Following his retirement from full-time service, Mr. Sze has continued to contribute his knowledge and experience to the industry. He currently serves as a project advisor for the Unit D1 project, providing strategic guidance and technical support to ensure the successful execution of project objectives.

D1 unit CCGT visit

A visit to Black Point Power Station's Unit D1 offers a close look at how a modern, large-scale gas-fired plant supports Hong Kong's decarbonisation while maintaining grid reliability. Through a higher view at the D1 unit, visitors are able to overview the large Siemens H-class gas turbine. The gas turbine itself is a heavy-duty Siemens H-class machine, weighing hundreds of tonnes and roughly the size of a small two-story building, with a single rotor running at 3,000 rpm on a 50 Hz system.

From the visit, one can learn how a combined-cycle configuration extracts more useful energy from the same fuel by using the gas turbine exhaust heat to produce steam for a secondary steam turbine, lifting overall thermal efficiency to around 60% and reducing emissions compared with older coal or gas units. The visit also highlights how D1 fits into Hong Kong's fuel-mix strategy, increasing the share of natural gas in CLP's portfolio and helping cut carbon intensity by roughly one million tonnes of CO_2 per year while supplying power to hundreds of thousands of households. In the control room, visitors can observe how operators monitor combustion conditions, HRSG temperatures, steam parameters, and grid conditions in real time,

demonstrating the importance of automation, protection systems, and cyber-secure controls for safe and reliable operation.

Advanced technologies are a key feature of Unit D1, starting with the H-class gas turbine, which operates at ultra-high firing temperatures and uses a triple-pressure HRSG to recover as much heat as possible from the exhaust gas. The unit incorporates a shaft clutch arrangement so the gas turbine and generator can start and synchronise quickly while the steam turbines warm up more slowly, giving the plant fast-start flexibility suited to a modern system with variable demand and increasing renewable penetration. Digitalisation is also prominent: Building Information Modelling was used throughout design and construction to avoid clashes and plan sequences, while enhanced cybersecurity measures such as data diodes protect the control network from external threats.

Behind the clean design, there are several technical challenges that engineers had to solve for D1. One major challenge was constructing the new unit in a live station where eight existing CCGT units already supplied up to about 60% of CLP's electricity demand, meaning any outage or damage to shared utilities such as gas, water, or power cables would carry huge system risk. Another difficulty was providing an efficient seawater cooling system without large-scale marine works; this was addressed by adopting deep shafts, tunnelling, and pipe-jacking for underground cooling water tunnels, which reduced environmental impact but required complex geotechnical design, safety control, and close monitoring of excavation conditions. In addition, lifting and installing heavy components such as the roughly 450-tonne turbine and generator required specialised floating cranes and meticulous planning to manage lifting, alignment, and safety constraints in a tight site.

BPPS Gallery

During a visit to the Black Point Power Station Gallery, visitors are first introduced to the wider energy landscape of Hong Kong through visual panels, scale models, and multimedia displays that explain how gas-fired generation supports a cleaner and more reliable electricity supply for the city. The gallery helps make the otherwise invisible power system visible by illustrating how fuel is delivered, how electricity is generated, and how it is transmitted across Hong Kong before

finally reaching homes and businesses. This creates a clear storyline from “fuel to socket”, which is especially useful for visitors without a technical background.

One of the key highlights is the model of the Hong Kong Offshore Liquefied Natural Gas (LNG) Terminal, which shows how LNG carriers berth at the floating storage and regasification unit (FSRU), and how regasified natural gas is transported via subsea pipelines to power stations such as Black Point. Beside the model, information boards typically explain why offshore LNG is important for Hong Kong’s fuel security and diversification, including its role in supporting a higher gas share in the fuel mix and reducing emissions compared with coal. Visitors can therefore understand not only the physical infrastructure, but also the strategic value of the terminal in strengthening supply reliability and flexibility.

Another focal point in the gallery is the model of Unit D1, the latest combined-cycle gas-fired unit at Black Point, which showcases its main components such as the gas turbine, heat recovery steam generator, steam turbine, and generator within a compact layout. During the visit, the speaker typically explains how D1’s high-efficiency combined-cycle design reduces fuel consumption and emissions, and how advanced technology like H-class gas turbines helps CLP support Hong Kong’s decarbonisation targets. The speaker may also highlight key challenges encountered in developing D1, such as building a new high-capacity unit inside an operating station, integrating new systems with existing infrastructure, and managing complex construction and lifting works within tight space and time constraints.

The gallery also includes content that explains the overall power system from power station to customers, often using diagrams and interactive displays showing each stage of the journey. Visitors can see how electricity generated at Black Point is stepped up in voltage at the switchyard, transmitted through high-voltage transmission lines and substations, then stepped down and distributed through the medium- and low-voltage networks to residential, commercial, and industrial users. Through these exhibits, visitors gain a clearer understanding of why system reliability, grid planning, and demand management are essential, and how investments in cleaner generation like D1 and LNG infrastructure support both supply security and environmental performance for Hong Kong.

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