

COMPANY

CLP Power Hong Kong Limited

PROJECT

Smart Sustainable Substation

LOCATION

Hong Kong Boundary Crossing Facilities (HKBCF), Chek Lap Kok, New Territories

TYPE

Hong Kong-Zhuhai-Macao Bridge Substation

SCHEDULED TIME OF COMPLETION

2019

Smart BIM - Smart Sustainable Substation

“BIM helped us to solve the challenges in adopting a systematic and innovative approach to developing green practices for the Hong Kong-Zhuhai-Macao Bridge Substation.”

—Yeung, Arras Yuk Yin

Acting Senior Project Architect -
Civil Design,
CLP Power Hong Kong Limited

AUTODESK PRODUCTS USED

A360

Autodesk 3ds Max

Navisworks Freedom

Revit



BIM is a smart technology that facilitates the development of the Smart Sustainable Substation
Image courtesy of CLP Power Hong Kong Limited

The Hong Kong-Zhuhai-Macao Bridge Substation is built on an artificial island adjacent to the Hong Kong International Airport. The substation is a strategic facility, critical for the long-term reliability and integrity of the electricity supply system. CLP Power has incorporated the concept of sustainability into the development and operation of this smart sustainable green transmission substation building. With its distinctive features of efficient use of natural resources and less impact on the environment, the substation received a Provisional Platinum Rating in the BEAM Plus by the Hong Kong Green Building Council.

Substation with low carbon initiatives

A systematic and innovative approach has been adopted to developing green practices for the substation. The development of this substation addresses various aspects of environmental protection throughout the entire project life cycle.

With more than 30% of the area covered by greenery – including a vertical green wall – the substation appears welcoming, and blends in with the surroundings of the new transportation hub. A rainwater recycling



BIM model is an effective tool for helping stakeholders understand the building design and surrounding development
Image courtesy of CLP Power Hong Kong Limited

system and automatic dripping irrigation system will save more than 70% of the water required for irrigation, compared with the conventional irrigation system. Photovoltaic (PV) panels with solar tracking devices will maximise the harvest of solar energy, to further reduce the substation's power consumption. A solar tube will be provided to enhance the use of clean natural energy for the interior space. The green substation not only marks the standard for CLP Power's future substation design, but also acts as a milestone of the company in continuously striving for environmental excellence.

BIM helps to solve the challenges by the use of an information rich model, facilitating information exchanges between project team members, supporting the different phases of the lifecycle of the substation project.



Simulated visual impact of the substation on the surrounding environment
Image courtesy of CLP Power Hong Kong Limited

By using BIM, PV solar tracking devices can simulate and evaluate the substation's overall energy efficiency and consumption.

Smart and innovative use of BIM

The BIM process enables collaboration among various stakeholders during different project phases. For example, the building operators can state their detailed requirements regarding future

cable installation during the planning and design stage. The designer can also provide detailed plans and information regarding the future cable installations by using the virtual 3D model during the design stage, to assist in the subsequent construction and operation phases.

By using the BIM model, users can easily understand and interpret information that is actively linked to the relevant 3D object. Misinterpretation of the information by users in the other project phases can be avoided.

Moreover, BIM reduces the time for retrieval of information that is passed from one project phase to another. All project data is defined at a level of granularity that allows for flexible tracking and retrieval of information across the lifecycle of the project, without the need to regenerate the information.

The BIM process promotes the work safety, collaborative working culture and environmental conservation / management through the presentation of 3D visualisation of the building and work procedures, which help with facilitating project management, engaging staff, fostering cooperation and commitment to improving safety, achieving consistency and driving continuous improvement through periodic reviews with stakeholders.

Communication and collaboration

Adopting BIM throughout the design and construction process enables collaboration and effective communication among stakeholders including company's executives, architects, engineers, project managers



Simulated visual impact of the substation on the surrounding environment
Image courtesy of CLP Power Hong Kong Limited



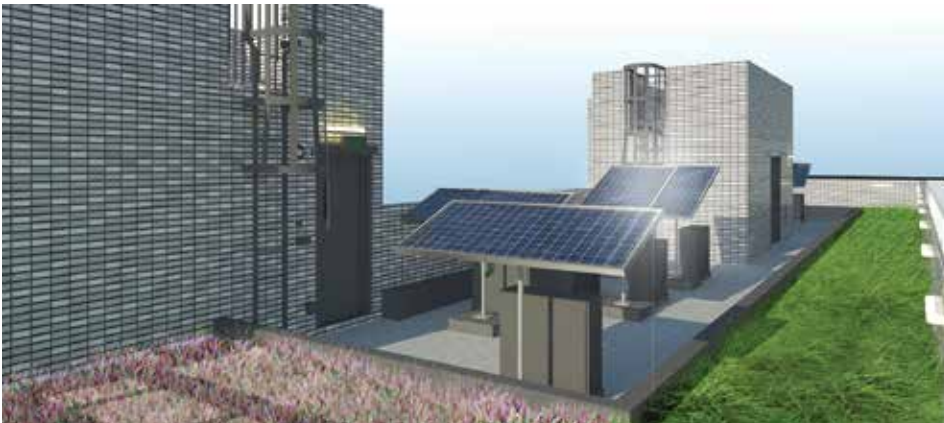
BIM enhances the multidisciplinary collaboration. The configuration is optimised for installation of high voltage plant equipment
Image courtesy of CLP Power Hong Kong Limited



Visualisation of the aerial view of the substation
Image courtesy of CLP Power Hong Kong Limited



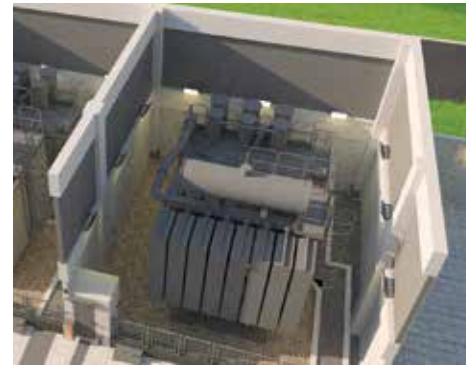
Visualisation of the aerial view of the substation
Image courtesy of CLP Power Hong Kong Limited



Virtual model showing sun screening effect of the PV panel installation above the outdoor air conditioning units
Image courtesy of CLP Power Hong Kong Limited



Simulated view from people on the upper roof of the substation
Image courtesy of CLP Power Hong Kong Limited



Virtual model of the high voltage transformer bay facilitates the planning for future operation and maintenance activities
Image courtesy of CLP Power Hong Kong Limited

and front-line workers to identify and control risks.

Advanced BIM tools are adopted in the substation project, formulating the delivery routes and arrangement of plant equipment and transformers. It also aids communication with both internal and external stakeholders for the delivery of plant equipment. The collaborative process within BIM implementation is essential for exchanging project information and professional knowledge among the stakeholders.

Green vision

Care for the Environment is always one of the core values of CLP Power, and has been fully demonstrated in the substation project. A holistic approach has been adopted for the design, construction, operation and maintenance for the substation – and this will serve as a strategic blueprint for reengineering the future substation projects.



BIM Model provides an accurate sense of presence of building structure that is yet to be built. Improvement to the design can be identified easily prior to the construction
Image courtesy of CLP Power Hong Kong Limited

About CLP Power Hong Kong Limited

CLP Power Hong Kong Limited (“CLP Power”) is a Hong Kong utility subsidiary wholly owned by CLP Holdings Limited, a company listed on the Hong Kong Stock Exchange and one of the largest investor owned power businesses in Asia. CLP Power operates a vertically integrated electricity supply business in Hong Kong, and provides a highly reliable supply of electricity and excellent customer services to 6 million people in its supply area.