COMPANY
CLP Power Hong Kong Limited

PROJECT
Queen's Hill 132kV Substation

LOCATION
Lung Ma Road, Queen's Hill, Fanling

TYPE
Transmission Substation

SCHEDULED TIME OF COMPLETION
2020

Smart BIM, Smart Team

"Smart BIM, Smart Team"

—**Yeung, Arras Yuk Yin**

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

AUTODESK PRODUCTS USED

3DS Max

A360

Navisworks Freedom

Revit

BIM model is an effective tool to help stakeholders understanding the building design and surrounding development
Image Courtesy of CLP Power Hong Kong Limited

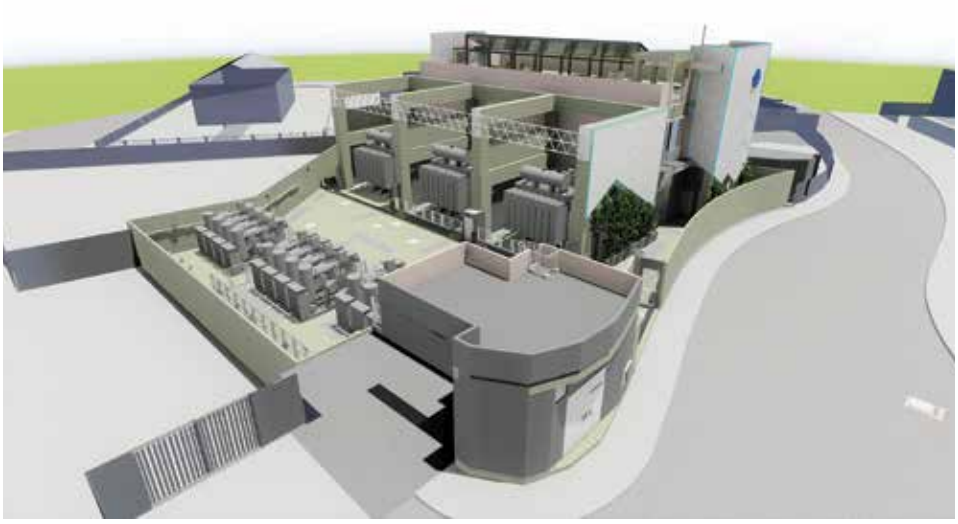
CLP Queen's Hill Substation

The new Queen's Hill substation (QUH) of CLP Power Hong Kong Limited (CLP Power) located at Lung Ma Road, Fanling is scheduled to be commissioning in the first quarter of 2020. Queen's Hill substation is a 132kV transmission substation providing electricity to support the development of the new residential areas and public infrastructure facilities in the northeast New Territories. The substation is designed to blend in with the surroundings in a sustainable way by enhancing its energy efficiency through the use of natural ventilation and light, environmentally-friendly building materials, and green coverage. Building Information Modeling (BIM) technology was also deployed to improve the safety, project management and overall cost effectiveness of the substation.

Low Carbon Substation – A Holistic Approach

Apart from our architectural concept and the cutting-edge digital technology

BIM enhances the multidiscliplinary design collaboration and effectiveness of photovoltaics operations
Image Courtesy of CLP Power Hong Kong Limited



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

we applied for this substation, a set of sustainable design and green construction practice echoing today's demand for low carbon building was adopted for this substation. With high achievement in aspect ranging from site design, materials, water and energy use, indoor environmental quality and innovative design and construction methods, a low carbon substation prototype at Queen's Hill substation was established.

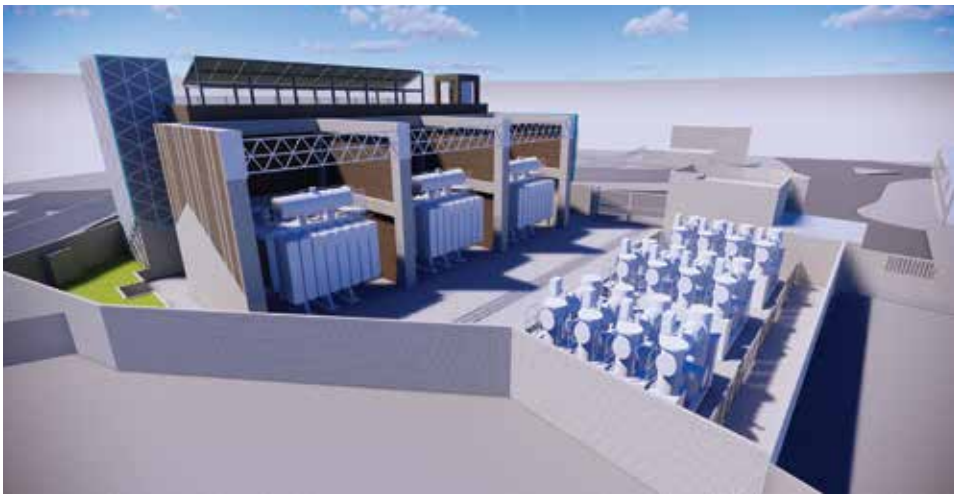
Green and Smart Use of BIM

Due to the congested site area, the substation adopts a compact yet effective design approach. BIM was deployed to improve the efficiency in design, project delivery and asset management of QUH. Numerical simulation technology was applied to determine the best shape of QUH for mitigating impacts on wind amplification, daylight factor and sun shading to neighbours. In addition, its innovative building management system (BMS) by BIM facilitates the future substation maintenance and operation by clearly showing the status and energy consumptions of individual services installations. The emerging BIM applications and numerical simulation technologies greatly improve the performance and the overall cost effectiveness of the modern substation development.

QUH is a low rise building with an open design that fully exploits the natural ventilation and daylight. The major building façade is utilised for installation of photovoltaic (PV) panels and vertical greening. PV panels in white and vivid colours are installed on the upper part of the façade, generating electricity equivalent to over 10% of annual energy consumption of the building. To avoid nuisance to the neighbours caused by reflected glare, white PV panels with textured glass surface have been used for creating a matte appearance. Each wall-mounted PV panel is 200mm away from the external wall of QUH, this gap allows ambient air circulation to cool down the PV panel system.

Moreover, green plantations are provided on the ground floor and lower portion of the building façade. The coloured PV installation over the building facade and the 315m^2 greenery area in QUH echoed with the "urban-rural-nature integration" design theme of the surrounding new town development. The extensive greening and paver area at QUH also improve the microclimate in the area.

The BIM process enables the collaboration of various stakeholders of the project during different project phases. For example, the plant equipment and power cable installation can be incorporated in the BIM model for ease of communication with different stakeholders during the planning and



BIM enhances the multidisciplinary design collaboration and optimisation for high voltage plant equipment installation
Image Courtesy of CLP Power Hong Kong Limited

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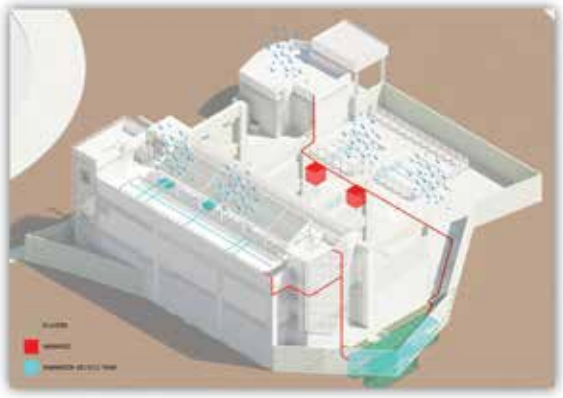
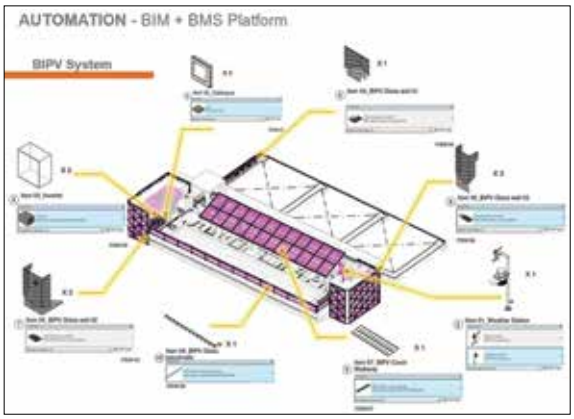


BIM enhances the multidisciplinary design collaboration and intelligent and effective operations of BMS
Image Courtesy of CLP Power Hong Kong Limited



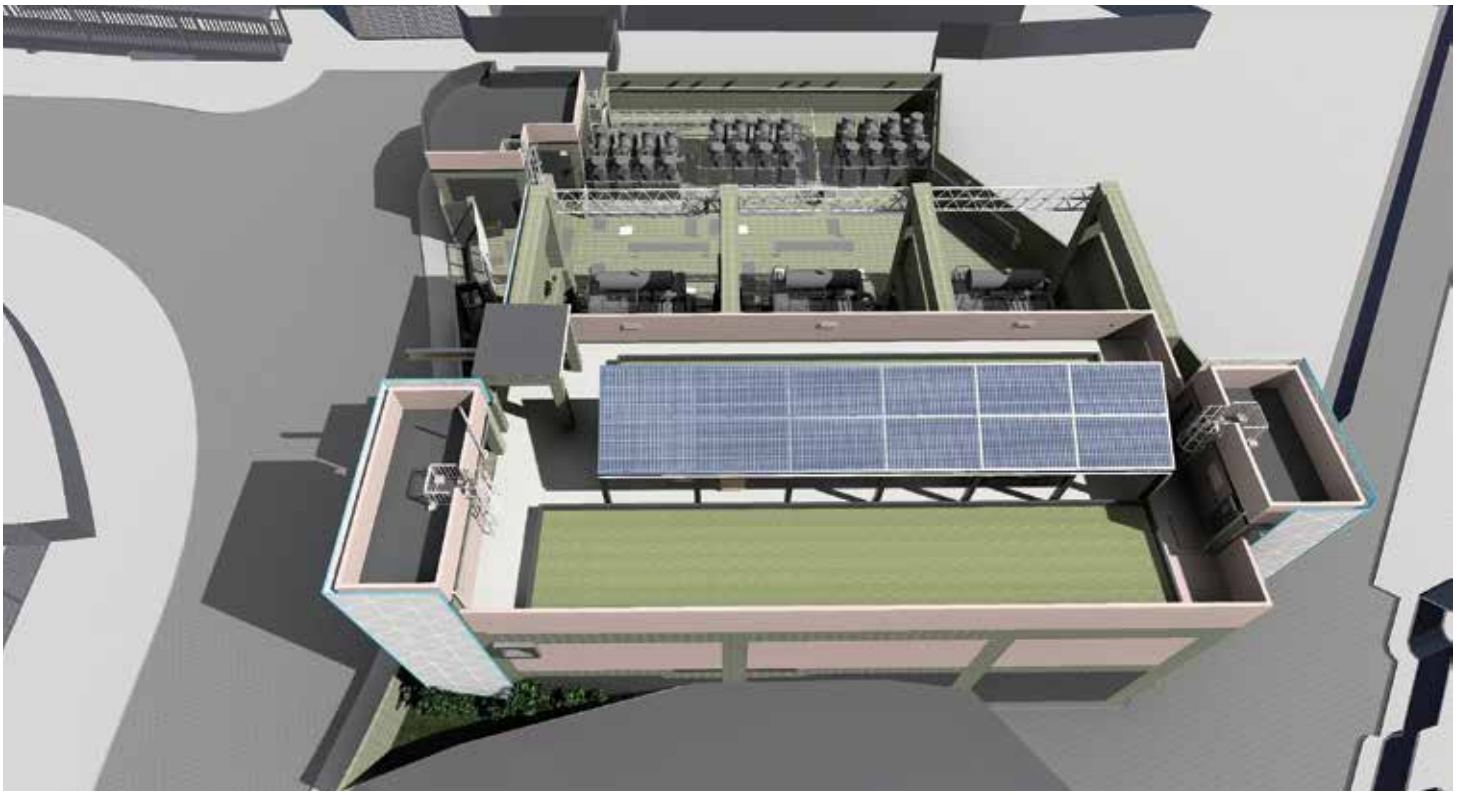
BIM enhances the multidisciplinary design collaboration intelligent and effective operations of BMS
Image Courtesy of CLP Power Hong Kong Limited

design stage. The detailed plan and information shown at the virtual 3D model can also be used for the subsequent construction work and safety planning and operational review.

In the BIM models, users can easily understand and interpret the information which is actively linked to the relevant 3D object. Mis-interpretation 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 other phases. 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 for regeneration of the information.

Caring for the environment is one of the core values of CLP Power. We are committed to integrate environmental protection concepts and innovative technologies into our newly developed substations to provide customers with a greener and smarter electricity supply. The award recoginsed CLP Power's commitment to promote green building design and new technology application. This project also sets as the prototype for CLP Power's future green substation.



BIM enhances the multidiscliplinary design collaboration and effectiveness of photovoltaics operations
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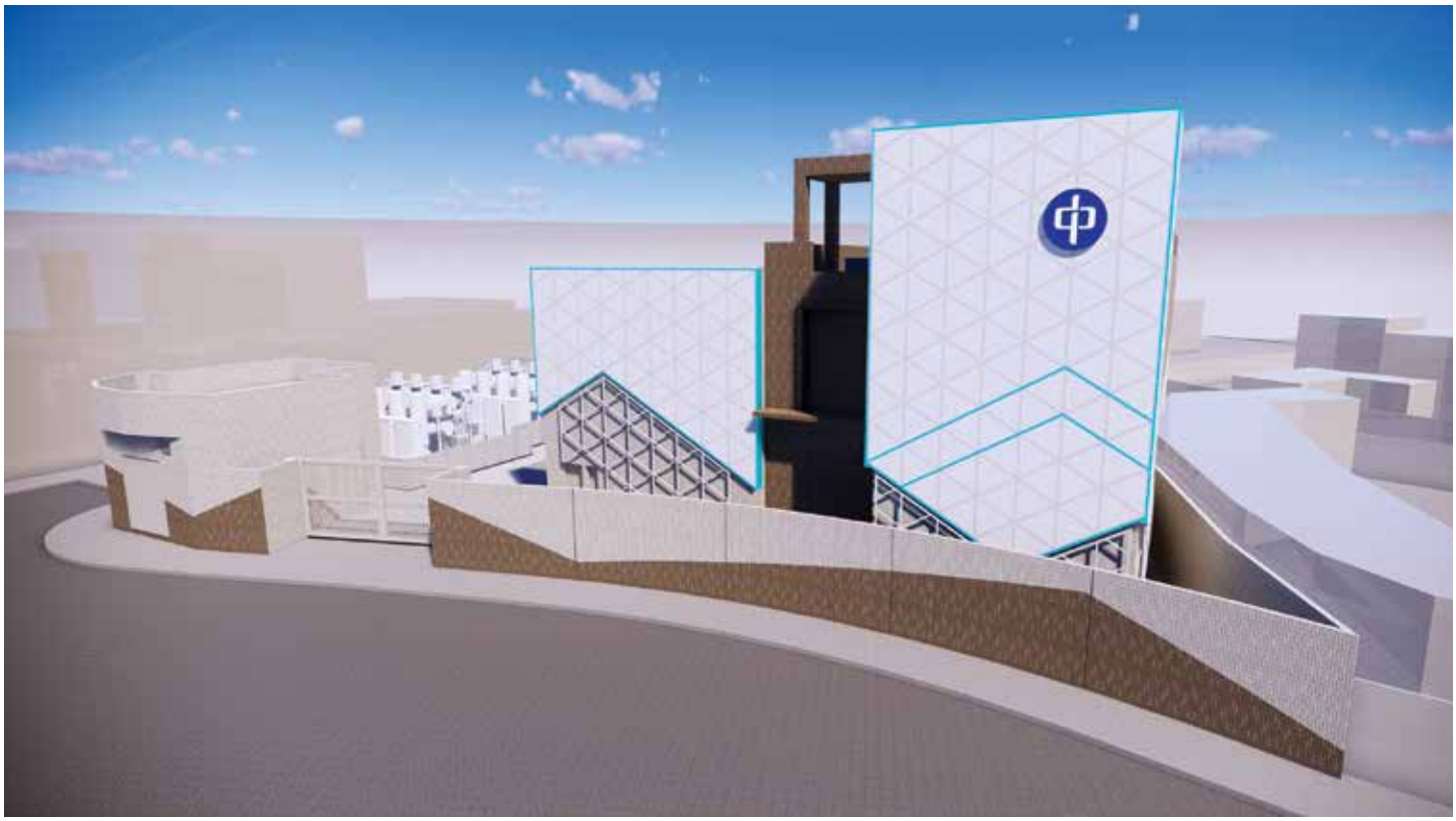

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About CLP Power Hong Kong Limited

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.