BEC Net-zero Carbon Charter

Power Up Coalition

Guideline for Project Proponents for Temporary Electricity Application *Version 1 2022 (DRAFT v4)*

1. BACKGROUND

The Power Up Coalition

The Power Up Coalition (PUC) is an initiative under the Business Environment Council Net-zero Carbon Charter to promote decarbonisation of construction sites. The PUC aims to encourage and facilitate timely electrification of construction sites for non-public works projects in Hong Kong, reduce use of diesel generators and diesel-powered equipment, and promote zero-emission construction sites in the long term.

Purpose of the Guideline

This guideline is intended to assist project proponents and their teams with the simple forecasting of power demand and early application of temporary electricity from the power company before a contractor starts work on site.

Project Applicability

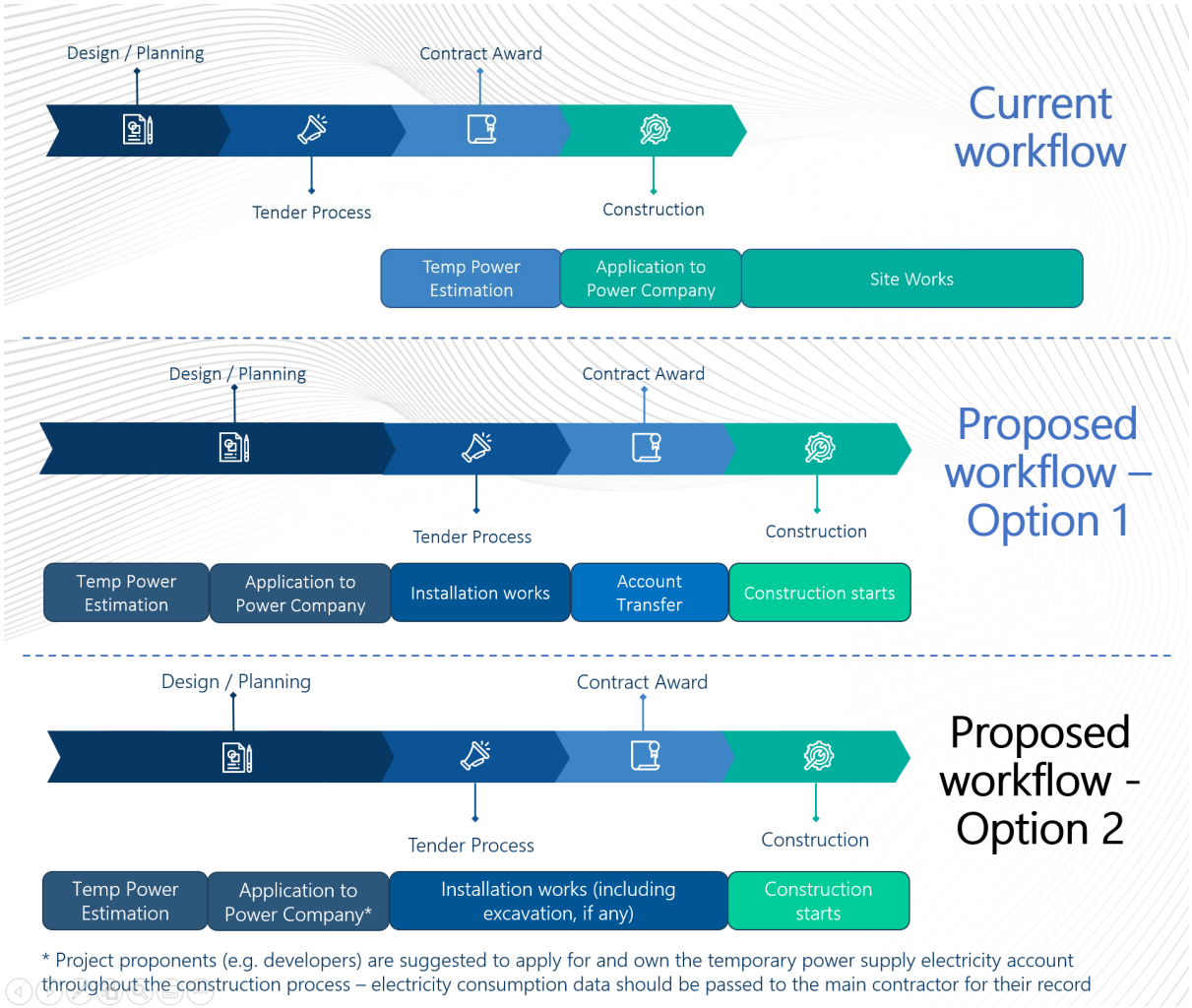
This guideline is intended for use on all non-public works projects and is specifically aimed at ensuring there is sufficient temporary electricity supply for the **superstructure phase** of construction which currently offers the greatest potential to avoid the use of diesel generators, plant and equipment. (In reality, the guideline can be used for any type of construction, especially for buildings.) Ideally, however, temporary electricity should also be made available during the **foundations and substructure works** phases to avoid the need for generators to power standard electric equipment such as pumps, office air conditioners and equipment, hand tools, lighting and welding equipment etc. It will also reduce barriers for the use of new electric plant (replacing diesel engines) as it becomes available in Hong Kong.

2. APPLICATION PROCESS

Timing

Under the PUC approach, early electrification is achieved by the project proponent applying for sufficient electricity during the planning or design phase. This should be a minimum of nine months before superstructure contract award, or ideally nine months before foundation works start. This would be a significant improvement on the main contractor applying upon site mobilisation. The current workflow and proposed approach options are shown in the figures below. If it is a large project site, a high-voltage cable connection may be a better solution and a minimum of 12 months is normally required for application and installation.

The timing for the application, however, might present a challenge as the proponent and their team may not be confident in determining the power demand needed during construction. Two simple approaches have therefore been developed with the support of a working group of contractors and the two power companies (see Section 3 below).



Application to power companies

Once the power demand has been estimated, project proponents should follow the application procedures as specified by one of the two power companies, depending on the site's location, to arrange for the installation of cabling and enclosures. Applications can be made through:

CLP Power: www.clp.com.hk/en/business/business-insights/construction-site.html

HK Electric: Smart Power for Construction Site www.hkelectric.com/SPCS-en

When a contractor takes over the site, the electricity account can be transferred to them (Option 1) or retained by the project proponent (Option 2, shown above).

3. FORECASTING TEMPORARY ELECTRICITY DEMAND

Approach 1 – Typical site

This approach is the simplest and consists of an application for an 800-amp supply for each site (via two 400-amp low-voltage cables) which should be more than enough for single tower construction. With the advances in battery energy storage systems (BESS) to support potential peak demands, 800 amps should, in fact, be sufficient for most sites.

Approach 2 – Large site

For larger projects (e.g. multiple residential towers, MTR station or depot site, major institutional building etc.), a high-voltage power cable connection and temporary transformer pillar or room or even a permanent transformer room may be more cost and carbon efficient.

A simple calculation tool has been developed to provide an estimate of a project's expected electricity demand. Only two inputs are required – the main construction method and the number of tower cranes – and the resultant demand can then be used to decide whether a high-voltage power cable connection is needed. While the only plant input is the number of tower cranes required, the calculation already makes allowance for other typical equipment that would be needed for high rise construction such as material and passenger hoists, welders, site offices and miscellaneous items such as pumps, lighting, hand tools, etc.

4. UPDATES TO THIS GUIDELINE

It is anticipated this guideline should be updated as technology improves, and more electric or other lower carbon plant becomes available. It is likely there will be higher electricity demands in the future as electric versions of some of the heavier plant and equipment become available in Hong Kong and greater charging capacities are needed. Proponents may even need to install plant charging facilities before construction starts or allow sufficient space for more BESS. There could also be other low carbon and non-electric plant used (e.g. hydrogen) in the future that might require early actions from project proponents to facilitate uptake. Regardless of the changes, it is recommended this document is reviewed for applicability every 2-3 years.

FREQUENTLY ASKED QUESTIONS

Qu. 1: How early should the owner begin applying for temporary supply before awarding the construction contracts?

Currently superstructure works provide the best opportunity for electrification, and all diesel generators could feasibly be avoided. The project proponent should apply for sufficient electricity during the planning or design phase. For smaller sites (served by one or two 400-amp low-voltage cables) this should be a minimum of nine months before superstructure contract award, or ideally nine months before foundation works start. If it is a large project site, a high-voltage cable connection may be a better solution and a minimum of 12 months is normally required for application and installation.

Qu. 2: In addition to the tower cranes, how is the power demand for other equipment estimated? Will the tool cover those?

The calculation already includes an approximate allowance for all typical equipment that would be needed, based on a range of previous project examples for power demand forecasts. Nominal power demands for tower cranes, passenger hoists / lifts, material hoists, welders, site offices and miscellaneous items such as pumps, lighting, hand tools, ventilation fans, etc. have already been included.

Qu. 3: The estimation relies on the project design team, but the design team may not have professional construction experience. How would they determine the numbers of tower cranes needed?

Typically, most discrete towers will require a tower crane each. When towers are directly adjacent or connected, it may be possible for cranes to cover more than one tower. Guidance is included in the tool for the radius of typical tower cranes i.e. 40-50m. This can be used to approximately position

tower cranes so that all parts of the development can be reached and the number of tower cranes can be estimated.

Qu. 4: If the power demand is underestimated during the design stage, how should the proponent avoid the risk of potential claims or variation order by the future contractor once the contract is awarded?

It is recommended that a statement is included in the contract clauses defining how much power would be made available by the proponent and who would be responsible for payment of the electricity bills. The contractor should be instructed to consider and be responsible for their own temporary power planning based on this assumption, and avoid the use of diesel generators by supplementing with the use of BESS. If this responsibility and power availability is clearly stated in the terms of the contract, the risk of any claim could likely be avoided.

Qu. 5: If the proponent maintains the electricity account rather than transferring it to the contractor (Option 2), how is the contractor incentivised to be energy efficient and minimise energy consumption?

It is recommended that while the proponent continues to hold the electricity account, the electricity consumption information and cost is transferred to the main contractor for their information and payment. As many contractors are or will be required to disclose their carbon emissions annually, making electricity consumption information available to contractors will also be essential for completeness of disclosure.

Qu. 6: Is it possible to provide two 400-amp low-voltage cables to all construction sites?

In general, temporary supply via two 400-amp low-voltage cables can be made available to construction site located in developed urban areas. However, the availability shall be assessed on a case-by-case basis with due consideration of network loading conditions in the construction site neighboring areas. Where necessary, ample capacity of site supply can be provided through high-voltage cables.

Qu. 7: Before temporary electricity is connected, would it be possible for the electricity companies to provide recharging of BESS daily e.g. by battery truck or replacement BESS?

From a cost and carbon perspective it would be preferable that the temporary electricity is provided in advance as suggested in approaches 1 and 2, rather than relying on daily supply through recharged batteries. For a very remote site with insufficient / or incomplete electricity supply network in place, a 12-month lead time is likely needed for new cable laying. If that is not possible, perhaps a battery supply might be one solution, or perhaps a hydrogen generator in future.