

# ELECTRICAL GRID AND PROJECT RISK ASSESSMENT CONSULTANCY SUPPORT

## 1. CAN YOU ACHIEVE YOU NET ZERO CARBON AMBITIONS?

The starting point is to ask this question:

Do you know how much additional demand and export capacity is required in your region for:

- electrification of transport and the volume of EVs;
- the electrification of heat;
- residential and business growth; and
- export capacity as a result of new renewable generation and storage.

If the answer is no, there is every likelihood that your next zero carbon ambitions will be unachievable. This because much of the local electrical grid is already constrained with a lack of capacity resulting in unaffordable grid connections.

Example 1: Cambridge City Council have ambitions for six grid connections for electrification of their bus services. Instead of the grid connections being circa £300,000, quotations were received for £1.3 m. For the project to proceed, an overspend of £1m is required.

Unless you know today what you can and cannot 'affordably' connect to the grid, your net zero carbon plans may well be undeliverable. Furthermore, a financially unviable grid offer would typically cost the council £5,000-£6,000 in fees (DNO and consultants) dependent upon size of required connection, plus around 4-5 months in wasted time.

Future demand for electricity depends on several variables and National Grid's has forecast electric vehicle growth of around 9m plug-in cars and vans by 2030. Without smart charging it is estimated that could mean between 5pm and 6pm, peak demand could be as much as 8GW higher in 2030.

Example 2: A grid analysis for future electrical demand for the Greater Cambridge Partnership (GCP). By 2030 demand in the region would have to increase by nearly 300% for a network that was already constrained with almost no available capacity. The analysis set out options for alleviating capacity constraints on the network to achieve growth and development targets.

## 2. ELECTRICAL GRID CAPACITY CONSTRAINTS

Whilst DNO/DSOs are working collaboratively with partners including local authorities to balance demand and capacity in the system through for instance developing Local Energy Markets (LEMs) to support flexible, smart energy solutions, this is far from being a total integrated solution for the wider energy system.

So, it is vitally important that local authorities have a good and detailed knowledge of the capacity constraints of the local electricity network and where additional capacity is either available or can be created, otherwise this will become a barrier to their own plans for decarbonising the energy system.

## 3. IDENTIFYING THE SOLUTIONS

There are essentially **six stages** to a local network analysis, which should be undertaken as a matter of priority if a local authority is going to be able to develop its own road map to net zero carbon. The stages are as follows:

### STAGE 1: DEVELOPING A DEMAND AND GENERATION PROFILE

The first stage is to develop a comprehensive demand and generation profile of all known and potential developments (public and private sector), which either increase demand for electricity or increase generation. These could include residential, commercial, electrification of transport and heat and renewable energy technologies.

This profile is then built up over a timeline (say 10 years to 2030) which shows the annual and cumulative demand and generation profile for an area.

### STAGE 2: IDENTIFYING KEY LOCAL AUTHORITY PROJECTS

The second stage is to identify all possible projects that the local authority will require grid connections for over the next 5 years. The key is to take into consideration all projects that could form part of the carbon action plan so that their grid connectivity can be tested.

## OUTPUTS

The following outputs will be produced :

- A register of possible projects will be created together with assumed levels of import and export capacity for the anticipated renewable technologies
- Summary of the budget applications to be made to test the financial viability of each connection - to be completed as part of STAGE %

## **STAGE 3: DNO/DSO GRID ASSESSMENT**

The second stage is a detailed engagement with the local DNO/DSO to understand where there is current capacity in the network, where the planned future upgrades will take place over what timescales and which of the proposed developments can proceed in a planned way without creating a 'bottleneck' in the network or without significant and costly upgrades.

This works commences with an assessment of the 132kV network to understand the available headroom (capacity still available) that exists within the DNO's network.

A secondary acid test is then conducted on the 33kV network by identify the level of capacity (import and export) at each 33kV substation. The purpose of this exercise is to then create a geographical risk register of areas where there is:

- Available capacity and therefore no immediate grid connection applications are required
- Limited capacity and local authority should consider making early connections to secure financially viable grid connections (whilst capacity exists)
- No or restricted capacity and any applications would involve reinforcement works

Discussion with DNO/DSO will include the following:

- Ongoing works to the network that will release further capacity (import and/or export)
- Scheduled (future) works that will release further capacity (import and/or export)
- Required works where there is no '1st comer' and as such the infrastructure works are unfunded

A risk register would then be completed to summarise the connection possibilities and also network restrictions. This would be based on both import and export capacity now and following and scheduled works/infrastructure upgrades.

## **OUTPUT**

The following outputs will be produced from Stage 3:

- Risk register that summarises the headroom for import and export capacity.
- Risk register that identifies the issues (or not) utilising a traffic light system (green, amber and red) for the available of connection capacity.
- A timeline of present and planned works by the DNO that will influence the availability for additional capacity in the grid

## **STAGE 4: MAKING BUDGET APPLICATIONS TO TEST CONNECTIVITY AND CONNECTION AFFORDABILITY**

Identified in Stage 2 were possible renewable energy projects, their renewable technology requirement and assumed levels of import and/or export capacity requirements that would require a grid connection.

Stage 4 uses multiple budget applications to test the amount of capacity available for each project. This is important because:

### **Example 3:**

- a project is assumed to require 3 MW of capacity
- but only 2.5 MW is available
- the grid quotation will include reinforcement costs (for the additional 0.5 MW)
- Which may make the project financial unviable and is therefore cancelled

On the other hand, if the grid is tested and an acceptable grid quotation was obtained for 2.5 MW, the project would be permitted to proceed.

## **OUTPUTS**

The following outputs will be produced from Stage 4:

- Results from multiple budget applications for each identified project
- A report that summarises the financial viability for each potential project

A summary report would be produced for each of the 'outputs' from Stages 2 - 4 to create :

- A register of an authority's possible projects requiring a grid connection with assumed levels of import and export capacity for anticipated renewable technologies
- Risk register that summarises the headroom for import and export capacity at each 132kV substation
- Risk register that identifies the issues (or not) utilising a traffic light system (green, amber and red) for the available of connection capacity at each 33kV substation
- A timeline of present and planned works by the DNO that will influence the availability for additional capacity in the grid
- Results from multiple budget applications for each identified project
- A summary of the financial viability for each potential project

The report can then influence and define the delivery of renewable technologies to support the local authority's carbon action plan.

## STAGE 5: CREATING A RISK REGISTER

From work completed in Stage 1 identifying the demand and generation profile of all known and potential developments and then discussions with the DNO/DSO, a **risk register** is then created to identify those developments and projects which are 'at risk' and unlikely to proceed based on current and future capacity constraints of the network.

This is subject to further detailed discussion with the DNO with a view to setting out potential solutions and influencing the future network plans of the DNO.

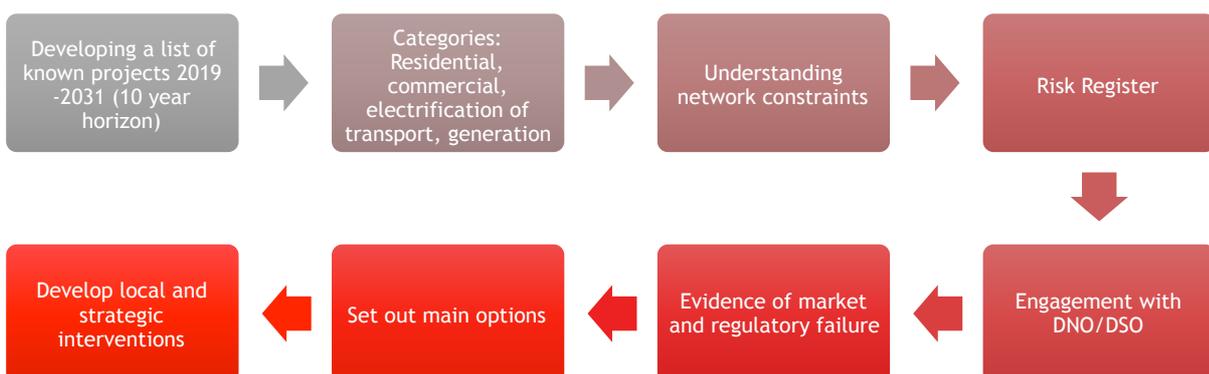
## STAGE 6: STRATEGIC SOLUTIONS

From detailed work completed on the risk register, the final stage is to develop a series of potential strategic interventions which will meet the local authority's demand and generation requirements over the projected timescales.

This will include an initial options appraisal of the proposed solutions in order to develop a ranking structure to determine the most cost effective and timely solutions.

Some of the options may require policy or regulatory change and that would be part of a wider lobbying strategy for the local authority and its partners.

The diagram below illustrates the process involved in the local network analysis:



#### 4. OUTPUT REPORTS

The local authority has two options.

Option 1 is the grid analysis only as summarised in STAGES 2 - 4 to test the connectivity of the grid and assess the financial viability of local authority projects. The output report will be as defined at the end of Stage 4.

Option 2 is to instruct all STAGES 1 - 6 and the output report will be as per Stage 2 plus the following elements :

- a demand and generation profile over a 10-year horizon (or defined period agreed with the client) based on source data and plans;
- a summary of discussions with the DNO/DSO including developments and projects which fall within their development/investment plans and timescales;
- a risk register of all known developments/projects which cannot proceed due to current capacity constraints including when and if there will be any future increases in network capacity that will facilitate implementation;
- a short review of policy and regulatory constraints impacting on developments/projects;
- a summary of the potential interventions and strategic solutions that could unlock capacity in the network including traditional grid reinforcement and more innovative Smart energy solutions; and
- an appraisal of the potential options together with recommendations for future progress.

#### 5. COST AND TIMESCALES

Asset Utilities supported by Municipia can undertake this work for local authorities on a consultancy basis. This is a cost-effective approach which will prevent future abortive work by the local authority in terms of its plans to deliver carbon neutrality to its locality.

**OPTION 1** : The STAGE 2 - 4 work will take approximately 4 - 6 weeks and consultancy fee based on the remit within this proposal will be £4,750 plus vat. This fee also includes an unlimited number of budget quotations for ten projects (normally costing £3,000), two meetings with the council, DNO/DSO and all travelling expenses.

**OPTION 2** : The STAGES 1 - 6 work will take approximately 2 months from start to completion and consultancy fee will depend upon the agreed remit with the local authority and will be in the region of £8,500 to £11,000 plus VAT.

The above fees include a **15% discount for members of Zero Carbon Places.**