BURNS McDONNELL

CASE STUDY / **ELECTRICAL NETWORK REINFORCEMENT**

PREPARING THE GRID FOR A NET ZERO TRANSITION

Meeting the U.K.'s net zero targets will require significant infrastructure changes and investments. The Zero2050 initiative is designed to identify obstacles and find decarbonisation pathways, including analysing what electrical network reinforcement measures will be necessary.

STUDYING SCENARIOS FOR SHIFTING ELECTRICITY DEMAND

A detailed model of the South Wales grid was developed to examine a variety of ways in which decarbonisation could impact the network.

CHALLENGE

To meet net zero targets set by the U.K. government, a consortium of companies came together to find a pathway to decarbonisation in South Wales. National Grid is leading Zero2050, a coordinated cross-sector initiative looking at cities, industry, renewables and transport. The initiative aims to speed up progress towards those targets and prepare the grid for a range of decarbonisation scenarios.

Zero2050 South Wales consists of 11 work packages designed to resolve uncertainties around assumptions, explore interdependencies, and perform initial reviews of emerging results. National Grid selected Burns & McDonnell to lead Work Package 3, covering network reinforcement requirements.

SOLUTION

The project took a whole systems approach to assess the impacts of change on multiple energy sectors.

Given the innovative nature of the project, we began by developing the methodology and setting out the required inputs and outputs. We set out to determine electrical distribution and transmission network reinforcement costs based on scenario data provided from the other work package assessments. We modelled the network, processing the data provided and running load flows before analysing the results.

We also assessed the sensitivity of electric network reinforcement costs by shifting demand from being connected to the distribution network to the transmission network. We developed a custom Python tool to perform the analysis.

We worked with energy utilities, academia and the South Wales Industrial Cluster, as well as other engineering and consultancy companies, to reach our conclusions.

RESULTS

The final report concluded that with continued investment in renewables — and enablers such as electric vehicles, energy efficiency and heat pumps — net zero targets for 2050 are achievable. Hydrogen from electrolysis was considered as part of the mix in all scenarios, but uncertainty remains around the proportion it could contribute, compared to electrification.

In all scenarios, we found that reinforcement of the electrical network would be required. The report also made note of its limitations, based on available input data, making its conclusions better utilised for order of magnitude approximation. We offered recommendations for what should be studied to obtain more accurate results if desired.

The results of this innovative project were reported to the Welsh government and will be used to inform future change.

PROJECT STATS

CLIENT
National Grid Electricity Transmission

LOCATION
South Wales

25916-ENR-1121