Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

Network Licensees must publish the required Project Progress information on the Smarter Networks Portal by 31st July 2014 and each year thereafter. The Network Licensee(s) must publish Project Progress information for each NIA Project that has developed new learning in the preceding relevant year.

NIA Project Close Down Report Document

Date of Submission

Jun 2022

Project Reference

NIA_WPD_056

Project Progress

Project Title

Temporary Event Charging

Project Reference

NIA_WPD_056

Funding Licensee(s)

WPD - Western Power Distribution (East Midlands) Plc

Project Start Date

December 2020

Project Duration

0 years and 11 months

Nominated Project Contact(s)

Ryan Huxtable

Scope

The Temporary Event Charging project will develop solutions for charging EVs at scale at temporary events held in areas where there is a need for attendees to travel by car. The project will ensure that these solutions will be possible for use on the distribution network while providing cost benefit to the DNO and its customers, before making a recommendation on if a trial project would be suitable.

Objectives

This project is a feasibility study with the aim to improve knowledge on how to accommodate charging at temporary events, design solutions for charging at a range of events, determine the benefits of using temporary connections to achieve this and determine whether a demonstration project is appropriate.

Success Criteria

- A set of concept designs for providing temporary event charging at festivals for a number of case studies are presented.
- Capital costs are outlined for each design and this feeds into CBA in respect to DNOs and their customers.
- Benefits of making temporary connections over existing methods of connection or on site generation are presented.
- Outline of how solutions will fit within WPD policy and PSD practices is documented.
- A conclusion is given on whether a trial is suitable for temporary connection solutions.

Performance Compared to the Original Project Aims, Objectives and Success Criteria

The project has successfully completed all of its aims, objectives and success criteria:

Objectives:

- Improve knowledge on how to accommodate charging at temporary events – complete

o Knowledge improved on how to accommodate charging at temporary events by the development of a range of solutions for use at multiple events.
o This includes knowledge on how solutions can be connected to the distribution network, how solutions can make use of battery storage solutions, and what the charging infrastructure should look like for temporary solutions.
o This knowledge applies to DNOs, events, and charge point operators.

- Design solutions for charging at a range of events – complete

o Multiple solutions designed for the three events identified as case studies during the course of the project. This includes portable battery storage options and network connection options. The project selected three events as case studies, and this included a range of timescales and event types.

- Determine the benefits of using temporary connections to achieve EV charging at events – complete

o Multiple options considered for accommodating EV charging at events including timed connections, temporary connections and traditional network connections, with cost benefits found for DNOs, but costs still prohibitively high for event organisers.

- Determine whether a demonstration project is appropriate – complete

o The project found that a project to demonstrate network connections for accommodating EV charging was not appropriate as the battery storage solutions identified would be more commercially appealing to event organisers, therefore the methods trialled would be unlikely to be used following the trial.

Success Criteria:

- A set of concept designs for providing temporary event charging at festivals for a number of case studies are presented – complete

o Four concept designs presented for each of the three case studies selected within the project.

- Capital costs are outlined for each design and this feeds into CBA in respect to DNOs and their customers – complete

o Costs for each solution outlined, and a CBA carried out for each event to demonstrate the value for event organisers, DNOs and their customers.

- Benefits of making temporary connections over existing methods of connection or on site generation are presented – complete

o Temporary and timed connections assessed against other existing practices with benefits and limitations identified and presented.

- Outline of how solutions will fit within WPD policy and PSD practices is documented – complete

o Workshops used to identify how solutions fit within policy and design practices. Outcomes of this documented within the projects WP2 report and used to influence designs.

- A conclusion is given on whether a trial is suitable for temporary connection solutions – complete

o The project found that a project to trial temporary network connection solutions was not suitable as alternative solutions identified would be more commercially appealing to event organisers and have fewer limitations, therefore the methods trialled would be unlikely to be used.

Required Modifications to the Planned Approach During the Course of the Project

There were no required modification to the planned approach during the course of this project.

Lessons Learnt for Future Projects

The key points of learning from the project have been summarised below. Further details can be found within the temporary event charging closedown report published on www.westernpower.co.uk/projects/temporary-event-charging

- On average 70% of festivalgoers travel by car. They travel between 70 and 140 miles - most travelling in an EV would need at least one charge to complete this round trip. Unlike internal combustion engine vehicles refuelling there is a need for EV charging at events due to timescales for charging and lack of availability of local charging infrastructure.
- During COVID19 pandemic receiving engagement from events was challenging due to furloughed workers and cancelled events, where engagement did not provide all necessary data engagement with local councils and parking management companies was able to provide information.
- Audience demographic is an important factor when considering the need for EV charging - some music festivals approached had a large number of young attendees leading to them being dropped off by parents or using public transport even if this would take a long time.
- Distance travelled to events and ranges of EVs demonstrate that not all will need charging at the event.
- Difficulties with insurance and logistics mean that event organisers are not willing to have fast charging with vehicles charged in

stages - preference to have more slower charging points.

- A review of existing policies has showed information relating to existing temporary connection methods for use under fault conditions including the use of a temporary 11kV substation (see standard technique SP1O for further details)
- Requirements in P2:7 would typically suggest that anything over 1MW would require a firm supply - therefore potential need for two 11kV supplies
- If the earthing system for a temporary substation is to be left in place, a way of ensuring that this is not stolen will need to be developed - holding within a substation building may lead to problems with redundant equipment - HSE have demonstrated safety issues in the past with this.
- Existing HV metering units at an 11kV primary substation supply could be used for battery recharging solutions.
- Depending on the number of charging points required multiple options are available for a battery storage solution. This includes trailer mounted 90kWh units and containerised 610kWh solutions.
- Temporary concrete footings for use on connection design and EVCP installations are possible without the need for significant civil works on site. It is expected that the unit cost for these reusable footings is around £450.
- The further away a temporary event is to the nearest 33/11kV primary substation, the higher the base case cost of traditional reinforcement i.e. to install and commission a new 11kV feeder to the event site. As the base case is a higher cost, the benefits of employing a BESS solution are greater.
- Offering non-firm connections to events with controllable EVCP allows utilisation of the diversity in local network demand.
- Timed connections provide significant savings in the selected case studies, but further savings can be made using battery storage and primary substation connection
- Low power EV chargers (up to 7kW) are the most suitable solutions at temporary events given that EVs tend to have a long dwell time over the temporary event duration. These types of chargers can be installed and configured relatively quickly and with little disruption in a suitable parking location in proximity to the temporary event.
- EV chargers should ideally be located for best access for the power source, either based on optimal cable connection to a substation or easiest access for the vehicles delivering the BESS. Another key consideration for the installation location is ensuring access for disabled drivers is not restricted or compromised by the roll-out of on-site EV charging infrastructure.

Note: The following sections are only required for those projects which have been completed since 1st April 2013, or since the previous Project Progress information was reported.

The Outcomes of the Project

Work Package one of the Temporary Event Charging project demonstrated the need for facilitating EV charging at temporary events, and confirmed that historically this has only been carried out at a few events on a very small scale.
Following the case study selection process in Work Package one, and using feedback from event organisers and stakeholders, Work Package two then carried out the solution designs for each case study and analysed its costs. This led to the following main conclusions:

- Our research and CBA has led us to the conclusion that portable BESS are the optimal power solution to supply forecast EV charging demand at temporary events.
- The BESS solution was beneficial both technically and financially when compared to the other solutions namely temporary and permanent network connections to the local 11kV network.
- New network connections to supply the forecast EV demand were found to be significantly more expensive even when a temporary event is located in close proximity to an existing primary or secondary distribution substation. The new network connection designs required the installation of secondary distribution substations and associated 11kV overhead lines (OHL) and/or cabling that was deemed cost-prohibitive for the very short duration the assets are utilised for over the year.
- Our investigation has shown low power EV chargers (up to 7kW) are the most suitable solutions at temporary events given that EVs tend to have a long dwell time over the temporary event duration. These types of chargers can be installed and configured relatively quickly and with little disruption in a suitable parking location in proximity to the temporary event. Charging infrastructure is most easily deployed where it is surface mounted, self-weighted and interconnected with concrete and rubber cable tracks to hold the equipment safely and securely in place.
- The location of the chargers should ideally be located for best access for the power source, either based on optimal cable connection to a substation or easiest access for the vehicles delivering the BESS. A key consideration for the installation location is ensuring access for disabled drivers is not restricted or compromised by the roll-out of on-site EV charging infrastructure.

One of the overall aims of this feasibility study was to provide recommendations on whether a future trial should be carried out. The project found that a leased BESS solution would be the most cost-effective solution for the Distribution Network Operator (DNO) as this option does not require the installation of additional network infrastructure, and event organisers who would benefit from the lowest capital and operating costs. This would likely be carried out by a third party that has the experience of installing and configuring BESS solutions. Therefore, the DNO will not have any role in the provision of the EV charging infrastructure at the event site. It has therefore

been found that there is no scope for a future NIA funded trial as any future work would need to be funded directly by the events industry in coordination with their EV charging delivery partners.
Full learning and outputs from the project have been disseminated via the WPD innovation webpage reporting, allowing other DNOs to benefit from the learning generated without the need for duplication of any work. Reports produced by the project were the WP1 Case Study Selection report, WP2 Case Study Analysis and Designs report, and the closedown report.
www.westernpower.co.uk/projects/temporary-event-charging

Data Access

The detailed report on the completion of Temporary Event Charging can be found on the project page on the WPD Innovation website: www.westernpower.co.uk/projects/temporary-event-charging
No new data about the network or consumption has been gathered in the course of this Project, but rather use has been made of existing data within WPD's systems.
Detailed network plans used are available via our Data Portal which can be found here:
https://www.westernpower.co.uk/our-network/network-plans-and-information

Foreground IPR

No foreground IPR has been developed as part of this project.

Planned Implementation

As detailed in section 7, the project found that continuing this feasibility study with a trial project would not be suitable, as the most effective solutions for providing charging at festivals sit outside of the DNO. Therefore, there is no plan for the outcomes of this project to be implemented by the DNO, but the learning and solutions will be useful to event organisers, and can held the DNO in ensuring they inform potential customers of the limitations with making connections to accommodate charging infrastructure.

Other Comments

N/A

Standards Documents

N/A