Energy Networks Innovation Process

Annual Project Progress Report Document

The voice of the networks

Date of Submission: 15/07/2022

Annual Project Progress Report Document

Notes on Completion: Please refer to the NIA Governance Document to assist in the completion of this form. Please use the default font (Calibri font size 10) in your submission. Please ensure all content is contained within the boundaries of the text areas.

Project Title (*This cannot be changed once registered*)	Project Reference
E Tourism	NIA_SSEN_0038
Funding Licensee(s)	**Project Start Date**
Scottish Hydro Electric Power Distribution Southern Electric Power Distribution	July 2019
Project Duration	**Year**
38 months	2022

Nominated Project Contact(s)

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1. Scope

The scope of the project is to carry out traffic flow and network modelling to understand the impact of EV charging. It will also design and develop a trial of specific network and local flexibility solutions to assist with security of electric supply to EV charging hubs to deal with highly seasonal charging peaks in the tourist season.

The geographical scope of the project will be a 'tourist route' suitably representative of the primary tourist routes.

The output will be proven through a modelling tool highlighting geographical areas of improvement calibrated against a real-life trial of a local flexibility solution(s).

The output of both the modelling tool and real-life trial of the flexible solution will feed into a report which captures all learnings and provides system planning with appropriate guidance of areas of focus for investment on the network but also areas of focus for Scottish government, Transport Scotland and Visit Scotland. The method will be transferrable to other parts of the UK where the appropriate data is available.

2. Objective(s)

The project objectives are as below:

1. Understand how increased EV uptake and tourist patterns will impact seasonal peak demand on the network.
2. Identify the scale, location, and duration of any increased charging demand broadly for the North of Scotland followed by an in-depth study of specific locations.
3. Enhance stakeholder engagement for helping local community groups, local authorities, and other organisations to understand impacts of heightened EV tourism on local demand.
4. Identify suitable local flexible solutions to assist in demand management during seasonal peaks but also benefiting residents all year round. These solutions may extend beyond charge points only to options such as valet charging.
5. Inform investment strategies for network development based on expected impacts of EV uptake and tourist patterns.

3. Success Criteria

If the project delivers the anticipated learning to GB stakeholders, then it is deemed successful.

4. Performance compared to the original project aims, objectives and success criteria

Details of how the Project is investigating/solving the issue described in the NIA Project Registration Pro-forma.
Details of how the Project is performing/performed relative to its aims, objectives and success criteria.

The project is progressing satisfactorily against the aims and objectives as presented below.

1. Understand how increased EV uptake and tourist patterns will impact seasonal peak demand on the network.
and
2. Identify the scale, location and duration of any increased charging demand broadly for the North of Scotland followed by an in-depth study of specific locations

The project has worked closely with key stakeholders in Element Energy and Transport Scotland to understand potential EV vehicle flows based on current conventional vehicle movements.

The following 8 use cases were investigated and were chosen with Scottish Government and Transport Scotland to cover journey starting points, tourist hotspots for stopping and overnight accommodation as well as arterial routes:

- Ferry Journey - Uig, Isle of Skye to Tarbet, Isle of Harris
- Tourist hot spot - Fairy Pools, Isle of Skye
- Overnight accommodation / popular hotspot - Portree, Isle of Skye
- Tourist hot spot - Urquhart Castle
- Dundee City Centre
- A9 Perth to Inverness
- A82 Loch Lomond to Inverness
- A87 Inverness to Isle of Skye

The study analysed the scale and duration of charging demand against the relevant primary or secondary substations for each use case. The study identified the location of each constraint that relates to additional tourism demand. The study confirmed that constraints relating specifically to tourist demand are not expected to occur on primary substations, however, will more likely be realised at secondary substations and on the low voltage network.

Although the study focussed on the above use cases, it highlighted that isolated and rural areas with small residential populations are most likely to be a constraint as the electricity grid here often has lower capacity and therefore less ability to accommodate additional demand than more populated towns and cities. Sites such as these will require the provision of flexibility services where feasible, or network capacity upgrades.

In addition, the study highlighted that the seasonal increases in tourism are often thought to occur in the summer. However, across the use cases investigated large peaks in tourism are noticed in the winter as well, which could provide additional strain to the network especially with the winter demand being higher due to heating.

Individual analysis of each use case can be found in the project report produced by Element Energy which is available here https://ssen-innovation.co.uk/wp-content/uploads/2021/10/20200706_E-tourism_report_V3.pdf

Following this study completed by Element Energy for SSEN in 2020, which investigated the impacts of e-tourism in Scottish tourist hotspots, a new study was agreed to take place which focused on e-tourism on the Isle of Wight. Engagement with local stakeholders was undertaken to understand which tourist sites are particularly popular and where good quality visit and tourist behaviour data could be obtained. Based on this engagement, four use cases were selected, four on the island and one on the mainland. These sites include two ferry terminals and two tourist attractions where visitors are expected to stay overnight. The selected use cases are shown below:

- Southampton ferry terminal
- East Cowes ferry terminal
- Woodland Resort
- Shanklin

Following a similar approach to the previous study for the North of Scotland, the study highlighted that the impact of the charging demand from an increased amount of EVs visiting the Isle of Wight is likely to cause network constraints at tourist resorts and attractions located in rural areas on the island, such as the Woodlands Resort in Yarmouth. These constraints are projected to only

impact on the secondary substations, with the primary substation being mostly unimpacted by the uptake of tourist and residential EVs. Rural secondary substations will be impacted most heavily because, given the small number of customers they serve, their transformer rating is very low and hence cannot cope with the additional load on the network from EV charging points.

Meanwhile, the substations which serve tourist attractions in towns either on the island (East Cowes and Shanklin) and on the mainland (Southampton) are expected to be able to operate in 2030 without any constraints on the substation as a result of tourist or residential EV charging demand. In the case of the ferry terminals, this is because both terminals are served by relatively large secondary substations. The secondary substations in Shanklin are also relatively large compared to the transformer serving the Woodland Resort.

Individual analysis of each use case can be found in the IoW project report produced by Element Energy which is available here: https://ssen-innovation.co.uk/wp-content/uploads/2021/10/20210924_IOW-E-tourism-final-report.pdf

3. Enhance stakeholder engagement for helping local community groups, local authorities and other organisations to understand impacts of heightened EV tourism will have on local demand.

While the ability to engage with stakeholders was disrupted in earlier phases of the project by the emergence of Covid-19, stakeholder engagement has become an important part of the project and a focus of the current work. Relationships have been built with several stakeholders on the Isle of Wight who are well aligned with the project's aim to help tourist destinations and communities manage the energy transition while ensuring this does not adversely impact the electricity distribution network.

Work so far has answered questions on the potential impacts from increases in EV tourism, however the latest phase of the study aims to give an assessment of alternative solutions to grid reinforcement that are available to tourist site managers facing the challenge of increased electricity demand form tourist EV charging. Deliverables from this work will serve as a useful suite of information for stakeholders in the tourism industry as well as local community groups and councils, allowing them to better understand the options available for accommodating increased electricity demand in popular tourist destinations.

4. Identify suitable local flexible solutions to assist in demand management during season
al peaks but also benefiting residents all year round. These solutions may extend beyond charge points only to options such as valet charging.

Following on from the E tourism study completed for the Isle of Wight in 2021, the project scope was expanded to include the assessment of the feasibility of using alternative solutions to avoid the need for reinforcement due to electricity network constraints in locations where high levels of tourist EV charging demand are expected. This work aims to give feasible options that would be suitable for the use cases studied and will help inform SSEN's broader aim of developing a suite of solutions that can be used to mitigate constraints at similar sites across their licence area.

This work is currently ongoing and the proposed list of alternative solutions to be reviewed is provided below:

- Smart charging – shifting demand
- Smart charging – dynamic charging rates
- Local generation
- Energy storage
- Combined generation and storage
- Novel EV charging options (e.g. valet charging, ticketed charging, overnight charging)
- Flexible connections (seasonal and time of day connections)
- Network based solutions

5. Inform investment strategies for network development based on expected impacts of EV uptake and tourist patterns.

Not started.

5. Required modifications to the planned approach during the course of the project

The Network Licensee should state any changes to its planned methodology and describe why the planned approach proved to be inappropriate. Please confirm if no changes are required.

Tourism has been significantly affected by Covid-19. This has hindered stakeholder engagement and workshops, which has caused a programme delay, however no time extension has been required. The project has completed its first objective in Scotland.

A change request was submitted in May 2021to expand the project to include our southern region. SSEN are working with an already formed consortium on the Isle of Wight. We are replicating the approach used in Scotland to understand the differences in available data between Scotland and England to develop a UK replicable methodology for realising seasonal charging impacts. Working with the Isle of Wight consortium has highlighted opportunities to complete the remaining objectives to test suitable local solutions to support the seasonal increase in network demand which was not available in Scotland after the study As can be seen in this report issued in July

2020.

6. Lessons learnt for future projects

Recommendations on how the learning from the Project could be exploited further. This may include recommendations on what form of trialling will be required to move the Method to the next TRL. The Network Licensee should also state if the Project discovered significant problems with the trialled Methods. The Network Licensee should comment on the likelihood that the Method will be deployed on a large scale in future. The Network Licensee should discuss the effectiveness of any Research, Development or Demonstration undertaken.

Understanding Covid-19 impacts on Tourism

Very little is understood about the long-term impacts of Covid-19 on tourism. Particularly the increase in 'staycations' and potential higher volumes of EV Tourism. The methodology which was developed as part of stage 1 is being exploited further to analyse the Isle of Wight. There will be consideration made for uncertainty around Covid-19 long term impacts.

Whole System Planning

Whole system planning combines electricity, gas, transport, tourism, a local and national government, regulated networks, and community stakeholders to provide a better understanding of infrastructure requirements. Alongside this, Local Energy Plans are being developed by the local authorities. The data and methodology around seasonality obtained in the first part associated with EV Tourism are being incorporated into the Regional Energy System Optimisation Planning (RESOP) tool which is part of the NIA_SSEN_0043 Whole System Growth Scenario Modelling Phase 2 project.

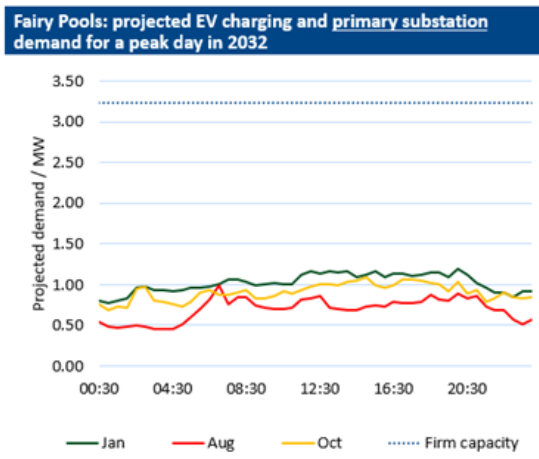
This will allow DNOs to assess specific geographical challenges and risks to the demand capacity and identify specific solutions for flexibility around EVs. For example, Dundee is close to St Andrews and when large golfing events take place in St Andrews, large numbers of visitors choose accommodation in Dundee and travel to the event. This has the potential to increase the number of EVs in the surrounding area which will produce a temporary increase in electrical demand for a few days only. Studying this influx of visitors on Dundee and the resultant energy demands will help to plan for temporary infrastructure or travel hubs for instance.

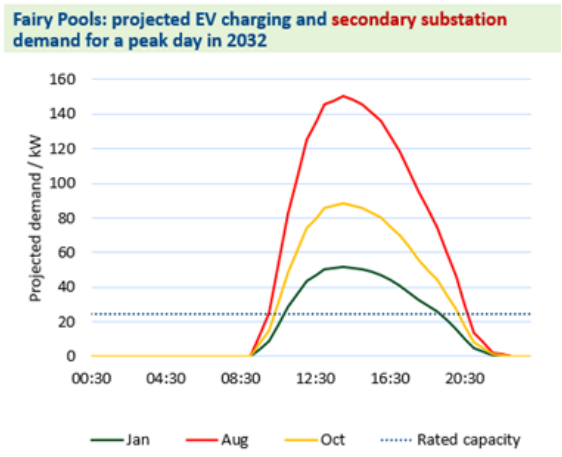
7. The outcomes of the project

When available, comprehensive details of the Project's outcomes are to be reported. Where quantitative data is available to describe these outcomes it should be included in the report. Wherever possible, the performance improvement attributable to the Project should be described. If the TRL of the Method has changed as a result of the Project this should be reported. The Network Licensee should highlight any opportunities for future Projects to develop learning further.

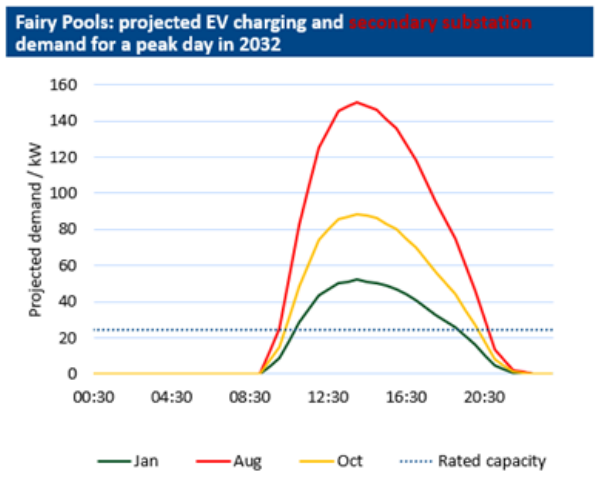
Key outcomes to date for the North of Scotland study:

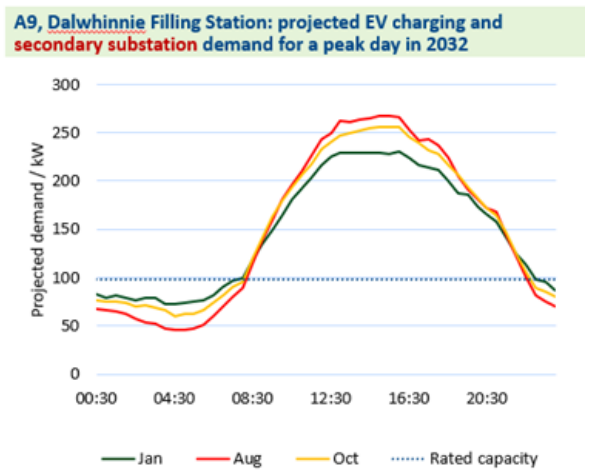
Constraints are not expected at primary substation level; however, some secondary substations are expected to incur network constraints.

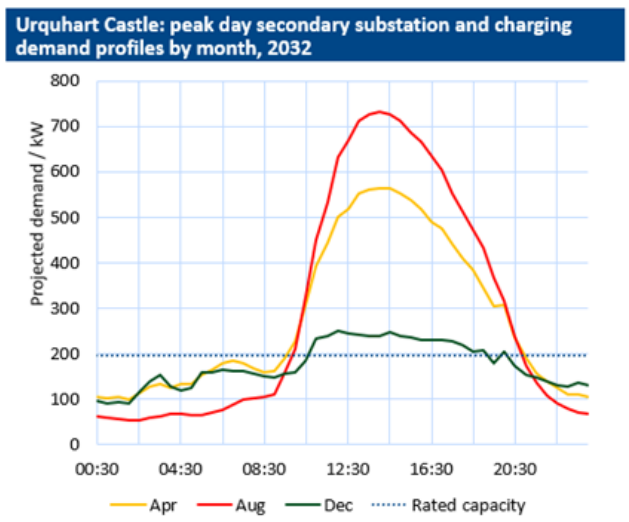


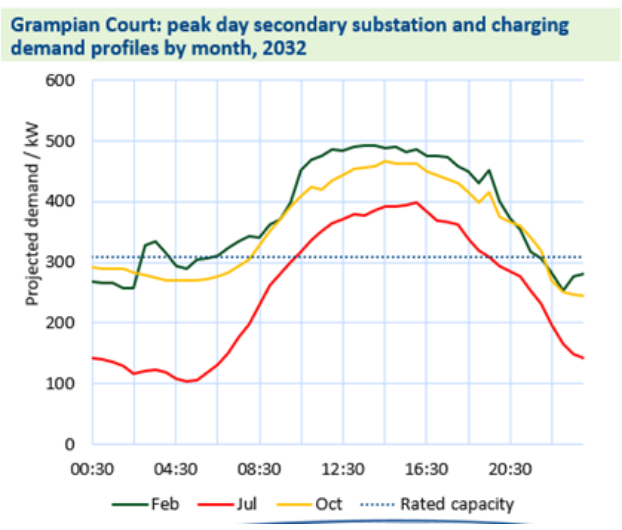


Isolated tourist sites and popular routes are predicted to be the worst affected. This highlights the need for a just and fair transition to ensure those in rural communities are not left behind.









The season when highest network demand is predicted depends on the balance between existing network demand and predicted charging demand. This needs to be explored further however this could be a significant challenge for the electricity as transport and heat converge. For full details on the findings of each use case see the final report available here: https://ssen-innovation.co.uk/wp-content/uploads/2021/10/20200706_E-tourism_report_V3.pdf

Key outcomes to date for the IoW study:

The table below provides a summary of the findings from the network analysis of secondary substations. Green: no demand constraints expected; amber: demand constraints expected; however, capacity breaches are small and short; red: large, long duration demand constraints expected, network upgrade required to mitigate. Note generation constraints are not considered in this table.

Case study	Secondary substation	Current network status	Days of constraint expected in 2030	Days of constraint expected in 2030 with smart charging
Southampton Ferry Terminal	French Quarter		0	0
East Cowes Ferry Terminal	Waitrose		0	0
Woodland Resort	Lucketts		161	52
Shanklin[1]	Regent Street		0	0

Both ferry terminals are served by secondary substations with a high level of spare capacity, so are expected to be able to accommodate increased electricity demand from EV charging. The combination of high residential and EV charging demand on secondary substations in Shanklin is expected to cause peak demand to approach transformer ratings, but no thermal constraints are predicted in 2030. Of the sites analysed, only the Woodland Resort is expected to experience large capacity breaches, due to the small secondary substation currently installed here. The Woodland Resort is currently still in development, due to open to the public in 2023. Therefore, their connection to the grid is a new request on a substation (Lucketts) that currently has very little demand. Hence, the capacity of the small secondary substation is quickly exceeded when the addition of EV charging is accounted for.

For full details on the findings of each use case see the final report available here: https://ssen-innovation.co.uk/wp-content/uploads/2021/10/20210924_IOW-E-tourism-final-report.pdf

8. Data Access & Quality Details

A description of how any network or consumption data (anonymised where necessary) gathered in the course of the Project can be requested by interested parties. This requirement may be met by including a link to the publicly available data sharing policy.

See Network Innovation Competition (NIC) and Network Innovation Allowance (NIA) Data Sharing Procedure at https://ssen-innovation.co.uk/innovation-strategy/

9. Foreground IPR

A description of any foreground IPR that have been developed by the project and how this will be owned.

N/A