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Embedding an EV car club into targeted neighbourhoods

Newcastle City Council's Net Zero Team and Strategic Transport Team collaborated with Northumbria University and CoWheels, to determine whether it was feasible to deploy an EV car club vehicle into a targeted neighbourhood in the Elswick Ward of Newcastle upon Tyne.

Climate, environment and waste

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Introduction

Newcastle City Council's Net Zero Team and Strategic Transport Team collaborated with Northumbria University and CoWheels, to determine whether it was feasible to deploy an EV car club vehicle into a targeted neighbourhood in the Elswick Ward of Newcastle upon Tyne. The project specifically aimed to test whether a heavily discounted service offer, with a

sustained promotional campaign, could build a stronger sense of community ownership and provide access to a service that would ultimately seek to encourage tenants to forgo their private vehicle ownership. A pre-negotiated, time-limited offer was agreed with CoWheels (who held the car club contract for Newcastle City Council) to enable the project to depart from their more customary business model of deploying vehicles and to test this offer in the targeted community. This allowed the project to de-risk the deployment over two years (after which it would need to become financially sustainable) and to learn from this approach and grow the service across the city (and beyond).

An experienced local social research organisation (Eljay Research Ltd.) with a previous related work in this context was procured to undertake postal and door-to-door surveys of the target households and residents to determine whether there was enough potential demand to justify the vehicle being deployed. The area was selected as part of a wider Low Carbon Neighbourhood approach and was defined by identifying all homes downstream of a secondary substation. The estate was made up of 228 properties of which 156 were council owned; none of the homes have private driveways.

What was your challenge?

The greatest challenge was determining whether there was enough potential demand from residents in this local neighbourhood to justify the EV charging infrastructure and local feeder connections, installation costs, the necessary (mandatory) highway adaptations and the deployment of the (leased) CoWheels EV car club vehicle. Testing the viability of specific locations for EV charging points and public parking reallocation required an accurate indication from a targeted number of households. Identifying micro-locations, negotiate the service offer with the car club provider and recruiting a research company to test the service offer with residents (with all due ethical and diversity & access policies satisfied for the survey) took time to establish and required building consensus across the various stakeholders. Given the targeted nature of the planned service, we needed to undertake door-to-door surveys to reach a high percentage of the target households.

This was a very different approach to traditional socio-demographic modelling used (including by the [EV] car club partner, with their predictive and established business model) to inform site selection and (EV) car club deployment. We were seeking an indication of the potential demand from a very select number of households (228 neighbourhood approach). The project identified a shortlist of micro-sites that were less prevalent to passing traffic (on main roads, which would have been the favoured 'business-as-

usual' deployment approach by the Car Club provider), yet still (potentially) considered viable by the existing community car club operator. Wider issues about vehicle security and avoiding issues such as being parked under trees were also being considered by the car club provider, as ultimately, they would be deploying an expensive asset into a community. The project team were also seeking to find micro-sites that were technically and financially viable from a local grid connection perspective (feeder and sub-station [peak] capacity) and looking to test whether deployment into specific communal parking spaces could create a 'supply-led' transition to electric vehicles.

The sensitivities of removing (at least perceived to be) a communal parking space (and in some cases also [technically incorrectly] perceived as more of a 'household-provision) were also being considered. However, we also had to be careful not to generate demand for the car club by taking patronage away from existing public transport services or negatively impact on existing active travel patterns. Options for deploying 'back to bay' and 'back to zone' were also considered, but 'zone' was discounted given the specific challenge the project team were exploring.

What was your solution?

The solution was to undertake a desktop assessment of options and identify specific issues, and then discuss the options ahead of physically visiting the neighbourhood as a project team and reviewing the pre-identified potential micro-sites. We could then collaboratively discuss the viability of each site amongst the stakeholders within the project including Newcastle City Council, CoWheels and Northumbria University, ahead of developing a community research brief, with a negotiated service offer from the incumbent city-wide car club operator.

What are your top three lessons learned?

Lesson 1 – stronger incentives are required if we are to take car club schemes to a wider audience, particularly if targeting middle-aged populations

Only 31 residents were interested in the service, most of them being young adults. Of the 228 target homes and 160 participants who were engaged (70 per cent of the target area), only 17 per cent expressed an interest in joining the car club (40 per cent of households who owned a car) - a total of only 31 residents. Young adults were the most interested, but few of those surveyed said they would give up their existing cars.

Lesson 2 – targeting the service to a specific community, with a time-limited discounted membership offer was unlikely to be financially sustainable after the discounted membership period ends

In addition to the low level of interest, we were trying to tackle the challenge that the (EV) vehicle deployment was to be targeted into very specific areas. This represented a change to the more traditional (EV) car club sites that would tend to be on busier roads (helping to increase awareness of the scheme and potentially create increased demand through passing traffic). It also meant our trial was seeking to grow new demand from a specific community which was not able to bring forward demand from wider stakeholders who currently use car clubs, such as employees of SMEs.

Determining a target audience from the outset would be more beneficial in the future. The Elswick Low Carbon Neighbourhood may not be viable for this project now as the area is close to city centre, with well-serviced bus routes and lower than average private vehicle ownership. Therefore, it is relatively easy for residents to walk or use a bus to reach the city centre. We found that our target cohort wouldn't be commuters and use would involve sporadic journeys for shopping or visiting friends and families that couldn't be serviced by existing public transport (serving more radial routes). Young adults would use electric car clubs. This niche use case suggests that the pool of potential customers needs to be drawn from a bigger target area.

Potentially, we had two interested social housing partners semi-engaged (whose property footprint we had identified locally), but this would have meant planning for alternative sites, either east or west of the original neighbourhood. The Car Club Provider suggested that a 5-10 mins walk between deployed car club vehicles helps take-up of usage and hence viability, but this approach would fundamentally change the project beyond our original and viable scope.

Improving electric vehicle infrastructure in Newcastle must be a top priority if we would like to establish more EV car club vehicles within the city. We also faced the additional problem that the council did not have a contracted EV charging post installation contract in place, as this was under procurement at the time of the project. This risked installing a stranded asset, procured to a different specification (with ongoing maintenance regimes) and being out of kilter with the longer-term citywide roll out of EV network charging specifications.

Lesson 3 – wide market segmentation is critical for (EV) car club patronage along with sequencing and deployment scheduling

Our research found that putting an EV car club vehicle into an isolated, particularly targeted neighbourhood is risky in terms of potential underutilisation (and is likely to be the case for other similar settings).

A lack of visibility from a busier road means that the customer base is not grown through ‘passing traffic’ and potential market penetration is diminished. Security concerns were also raised. Understanding minimum (commercially) viable usage from the outset would reduce this risk, and also help design deployment planning and engagement approaches. Having clarity on this ‘black box’ required vehicle utilisation from the outset is important step and one that was not really shared by the Car Club within this project. The Council or project partners were not able to access the propensity modelling developed (in-house) by the Car Club.

Also, obtaining evidence of locally operating minicab drivers from a community-location would make sense, as this appears to be a way for neighbourhood residents to meet some of their (infrequent) mobility needs beyond walking/cycling and public transport, and mutual economic support in a neighbourhood. Understanding the needs and occasional car (or perhaps small van) mobility needs profiles of local neighbourhood businesses may also help with assessing deployment.

The time of year to deploy such a vehicle was also critical, as new customers were unlikely to change behaviour during winter months. We had anticipated a spring deployment driven largely by the long lead-in times for both leased EV deployment (partly a Covid supply chain legacy issues) and the sequence of works required for the charging infrastructure, local grid connections and the mandatory highway adaptations.

Project impact

1.a. What have the outcomes of the project been so far (e.g. development of a mapping tool to understand emissions per area)?

We now have an improved understanding of the target market for (EV) car clubs, as those interested appear to be generally young adults (and potentially middle-aged adults), who do not need to act as ‘volunteer-drivers’ for their children.

We now have a stronger evidence base of the mobility needs and trends within the Low Carbon Neighbourhood area. This can be used to develop

other service offers in the community and replicated in similar neighbourhoods.

The project has opened communication and created stronger links between Newcastle City Council (NCC) and Northumbria University. This involves various departments and skillsets in the University and has led to numerous spin-off projects now under development, many involving Newcastle City Council.

1.b. How will these outcomes be sustained?

Outcomes will be sustained through clarification of the role that the Council plays in supporting the deployment of more car club schemes.

The outcomes can be considered in the next tendering exercise for future car clubs across Newcastle in terms of tendering and providing future contracts for city-wide car clubs.

2. What is the anticipated longer-term impact on progress towards Net Zero (e.g. greenhouse gas emissions savings)?

We anticipate that the lessons and pathways mapped out by this project to address the challenges in promote low carbon neighbourhoods in suburban communities, will have a major impact in the medium-term and will support achieving the longer-term Net Zero goal. Collective learning to develop a strategic approach to supporting social housing tenants with the transition to electric vehicles (EVs), particularly in circumstances where the housing does not have private driveways, represents an ongoing logistical challenge. It remains unclear whether tenants feel they can make the transition without embedded EV charging posts in their communities, as opposed to wider access to rapid charging networks at strategic locations. This may mean adapting the public (adopted) highway in specific neighbourhoods that don't have off-street parking facilities. Whilst the electric vehicle car club offer (initially incentivised for 2 years) in this case did not have enough latent demand, there is still a need to define how to devise EV charging infrastructure deployment. It is possible that the allocation of EV charging infrastructure is required ahead of subsequent trials for EV car club deployment.

3. How has this project evolved your approach to net zero (e.g. approach to stakeholders/ways of working)?

The project partners initially set out to develop a stronger empirical (data-driven) evidence base to support wider approaches to Net Zero, but subsequently decided (after being nudged quite strongly in this direction by LGA & UCL Net Zero Innovation programme colleagues) to focus into a more

tangible real-world study. The project enabled the time and space to collaborate in a much more meaningful way and has allowed the project team to coalesce around a case study of a systemic city-wide challenge. The teams met both in person and online, and shared respective (and complementary) expertise and insights as to how various organisations and service areas operate (and develop a 'business case' and planning for this). This allowed the project team to develop a deeper appreciation of the various drivers and challenges faced by the different stakeholders.

Wider partners were engaged by visiting their offices, including CoWheels. The Inception meeting for the community research was held in the CoWheels' offices and through online meetings, they demonstrated some of their data visualisations for analysis. They also joined in, together with Newcastle City Council staff from two different Departments, as well as Northumbria University project members from two different departments, the local site assessment visit ('walk and talk')

We shared the lessons of the project surrounding charging infrastructure with registered providers of social housing stock as the estates to the East and West are provided by Registered Housing providers which should inform their future projects.

Numerous projects are likely to be initiated by Northumbria University into electric vehicle charging optimization that can benefit from the strong collaboration with Newcastle City Council. One recently funded is a European Commission (MSCA) funded project on "Electric Vehicles Point Location Optimisation via Vehicular Communications"

4. Who will benefit from your project (please consider benefits to other parts of your organisations and your community)?

Our strategic partners and registered housing providers will benefit by having detailed information into transport needs of the estate. Our contracted (including EV) car club provider has been able to gain detailed insights of a specific communities' mobility needs and was nudged to 'think outside their box' away from 'business-as-usual' modelling (although given the financial de-risking, this may not be replicable). Their contract comes up in 2023 and they (and other competitors) may better understand what the Council is looking for going forward from their services.

Newcastle City Council will have a stronger understanding of the challenges into rolling out electric vehicle charge points to areas with social housing. A wider set of stakeholders have learnt how to use Northern Powergrid's AutoDesign tool to help identify potential EV charging sites.

Partnership development

The partnership between Newcastle City Council and Northumbria University has been strengthened and we have better understandings of the skillsets of the different respective departments and service providers. We also have insight into the challenges and the drivers that our organisations must address when collaborating or developing new initiatives and projects. This project provided a typical scenario and case study to an EPSRC research project led by the Northumbria team. The EPSRC research project investigated how the information technology and optimization methods can be adopted to improve utilisation of on-site renewable energy resources to charging EVs, so that the usage cost of EVs can be reduced and make the EV car club more viable.

The timeframe set by the LGA/UCL Net Zero Innovation Programme cohort drove us to collaborate in a more intensive and condensed timescale. It was difficult to stay focused on the core project given the wider opportunities and initiatives that were being explored by the partnership.

How will the partnership be sustained in the medium and longer term?

Various projects are still being explored between Newcastle City Council and Northumbria University. Collaborative PhD proposals are being developed, collaborative policy & research programmes are being targeted and we have developed much closer working relations across multiple departments, specifically knowing our mutual interests and merits.

We will retain our communicative links with various departments and have their contact details.

Further information

Email contacts from both partner organisations

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Find out more:

- [EU funded EVOLVE project](#) which also came out of NZIP
- [EFORES project](#) (which Adrian McLoughlin at NCC, amongst industry partners, fed in - and which came out of NZIP)

Publications which have drawn on NZIP in part:

[Modelling and Uncertainty Analysis of On-site Renewable Sources for Optimal EV Charging](#)

[Data-Driven EV Charging Load Forecasting and Smart Charging](#)

[A Simulation Environment of a Solar-Wind Powered Electric Vehicle Car Park for Reinforcement Learning and Optimization](#)

[EFORES: Electric Fleets with On-site Renewable Energy Sources](#)

[Framing Electric Mobility for Urban Sustainability in a Circular Economy Context: An Overview of the Literature](#)