# 5. Location

1. The Project is based in the North East of England in order to utilise its diverse mix of urban and rural geographies (and therefore distribution network topologies), demographics and socio economic groups. This ensures we will be able to gain statistically significant results from the trials that will be applicable to at least 80% of electricity networks in GB. Furthermore, the North East's position as an early adopter of low carbon technologies (in particular in the installation of heat pumps, PV and EV') means that we shall have access to a wide range of households with low carbon technologies (LCTs) installed or scheduled to be installed.

## *5.1 North East and Yorkshire Regions*

2. The North East economy has become one of the most dynamic in the UK and Europe, helped by massive investment in a new generation of advanced technologies. Its companies now serve expanding markets around the world with products exploiting those technologies.

3. There are extensive and highly innovative collaborations taking place between the North East's companies and world-renowned Universities, such as Durham, to develop their technologies and nurture their success, with more than £200 million being invested in leading edge technology in the past six years alone.

4. Two of the key priority sectors within the North East, viewed as offering huge economic potential are new and renewable energy and low carbon vehicles.

5. The new and renewable energy industry is estimated by One North East to be worth around £2 billion worth of economic growth in North East England over 20 years. The region has ground breaking activities taking place in offshore wind power, bio-fuels, PV solar cell technology, hydrogen fuel cells and wave and tidal power.

6. A formidable partnership between the regions universities, businesses, regional development agencies and the public sector is creating a unique low carbon industrial infrastructure across the entire sector.

7. The North East is also at the centre of electric vehicle development in the UK and its vision is to become a world leader in research and development for the industry. It is envisaged by One North East that the automotive sector and its related supply chain could soon be worth close to £1 billion in the North East, with access to further opportunities across the UK.

8. It is the UK's first Low Carbon Economic Area for Low Carbon Vehicles, with the North East being the first area in the UK to have a world class network of electric vehicle points. This will involve up to 1,300 electric vehicle charging points being created as part of the Plugged in Places initiative, and tested in practice by the deployment of 35 vehicles in the Newcastle area including the first all electric Nissan Leaf cars to hit the roads in the UK. A variety of supporting technologies

are also under development, ranging from smart meters at charging points to software that will enable the collection of payments at charging points – these have the potential to integrate with the smart grid technology which will be needed to manage the distribution network to support the charging network.

9. The region has also been selected by Nissan as the location for its £200 million European electric car battery mother plant, to add to the Low carbon Vehicle Development and Demonstration Centre currently located at the Nissan plant in Sunderland.

10. A core strength of the Project lies in the North East's position as an early adopter in the installation of low carbon technology (air source heat pumps - 700 in situ, PV) and electric vehicles. This means we are well placed to trial the benefits to networks from customers adopting new technologies and their willingness to change their electricity usage patterns, either dispersed or in local clusters. The early adoption of these disruptive technologies in clusters have already led to voltage rise issues with solar PV and power quality issues with heat pumps.

11. Examples of the local clusters to be included in the Project, which illustrate the varying network topologies, are:

- 50 properties in Cockfield, County Durham, where Community Energy Solutions is installing air source heat pumps;
- 240 domestic electric vehicle charging points being installed in Newcastle-Upon-Tyne in the next year as part of the Plugged in Places initiative; and,
- 42 properties in Huddersfield where Kirklees Council are installing PV
- 20 properties with heat pumps and 20 with PV in Sunderland

12. As we are not constrained by the networks, we are not generally constrained in location. We are instead free to follow the customers.

13. Some of the trials in the Project require clustering (see Section 8 for further details), while others work well with dispersed customers. This gives us even greater latitude in location. Specifically, we can test the commercial propositions associated with demand profiling and demand responsiveness because we will, across the region and within the timeframe of this project, find a statistically significant number of customers prepared to participate. We can also test the engineering solutions associated with direct control, although closing the loop to generate a measurable network response does require clusters of participating customers.

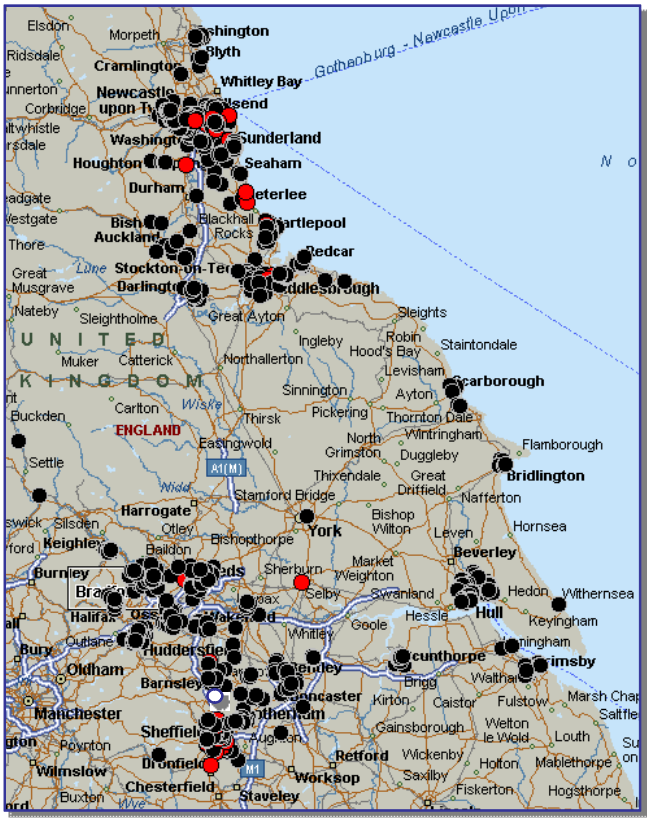
14. We will continue to work with low carbon technology installers, whose projects tend to create clusters. We will build on this to work with registered social landlords and regional regeneration projects, which again tend to create clusters of customers that could usefully be included in the scope of the Project over its lifecycle.

15. A core objective of the Project is for British Gas to leverage its position as the UK's largest energy supplier and the UK's leader in the roll out of smart meters, to target the deployment of both smart metering and its CESP resources in CE

Electric's territory. This provides a unique opportunity to engage both individual customers and communities through leveraging the British Gas CESP programme

16. Figure 1 below shows the areas within the North East and Yorkshire which will be covered by British Gas's CESP activity.

**Figure 1 – CESP Areas North East and Yorkshire Regions**




## Key

- Cesp Area – Early stage engagement with British Gas
- Cesp Area – Discussions currently ongoing with British Gas
- Cesp Area – Advanced work underway with British Gas

### Further Information

- 482,000 householders in this area that qualify for CESP
- These are split into 696 communities
- 2 of the top 10 poorest communities nationally fall within Yorkshire and the North East area
- British Gas are currently working with Barnsley where they are working on a scheme involving 250 homes which will reduce emissions by 48,000 tonnes of CO2
- They are in discussions with a further 35 areas across the region

### *5.2 Durham*

17. As Durham Energy Institute is a Strategic Partner on the Project, and Durham University is a major customer on CE Electric's network, it was clear from the outset that the University estate should play a key role within the overall Project.

18. The University's Estates and Buildings includes 18 half hourly metered sites (each with a demand of over 100kW) and around 200 non half hourly sites, which together give around 8MW of load in Durham. The core of the load is on and around the science campus, specifically:

- The science campus site, generally fed from the 20kV bulk supply point (Durham St Mary's substation) includes the library, the gateway building and the biological sciences building (fed from CE's High Technology general network substation);
- Grey and Collingwood colleges are fed from the 20kV bulk supply point;

- St Mary's, St Aiden's, Trevelyan and Van Mildert colleges are fed from Durham University 11kV substation.

19. The load curve of the University is fairly typical of a large commercial customer.

20. The Durham University site contains a broad range of key resources that will be utilised within the Project, namely;

- Multiple HV connections to CE Electric's distribution network at both 20kV and 11kV
- Private networks within the University estate
- Voltage optimisers (one installed in the biological sciences building)
- Smart meters
- Electric vehicles (in conjunction with the University's green transport plan)
- A mix of industrial, commercial and residential load types
- Micro-generation – PV, Wind, CHP
- Standby generation
- Wide range of building stock
- Micro-generation laboratory with real time link to simulation environment connected to private network.

21. These key resources, both individually and in combination, offer the potential to develop and explore a wide range of initiatives relating to managing the variety of supply and demand which will in turn deliver significant learning in both the technical and commercial aspects of the Project. An example being, Durham University campus and neighbouring colleges, where customer choice techniques together with appropriate technical solutions will be used to optimise electricity use and reduce cost.

22. Further detail about the integration of Durham University resources into the overall trials can be found in Appendix 4.

### *5.3 National*

23. A key requirement of the Customer Led Network Revolution Project, as with all LCNF projects, is to generate learning from our Regional study that can be replicated at scale on the vast majority of distribution networks in GB.

24. A central principle of our strategy to achieve this is to use the roll out of the British Gas Smart Metering Programme, currently extending to 110,000 meters and set to rise to 2 million by the end of 2012, to develop a statistically robust baseline profile of energy use across GB. This will be achieved by combining consumption patterns with demographic profiling information (see Appendix 2 for further details) to create a unique set of baseline data.

25. This large and geographically spread baseline data set will be used to verify and extend our findings from the North East throughout the remainder of GB, thereby providing DNOs with a validated set of generic tools that can be deployed with confidence on the vast majority of network topologies.