Background

EA Technology is one of the UK's leading power asset management companies. Its origins date back to the mid-1960s, when it was established as the UK Electricity Industry's Research and Development arm. The business has since evolved and developed to its present status of an independent limited company, working on behalf of clients in the electricity, energy, infra-structural and associated sectors. We were a project partner in the Northern Powergrid's (NPg's) Customer-Led Network Revolution (CLNR).

Our contribution was proportionately greater at the beginning and end of the project than in the middle of the project. Our role was essentially one of "client engineer" in the early stages of the project – identifying where on the network innovative technologies could be deployed, briefing NPg Business As Usual (BAU) staff on the functionality and use cases for innovative technologies and specifying technology requirements which NPg used in their procurement process. Towards the end of the project we reviewed the output of the academic work and produced outputs which will be used in the transfer of the CLNR learning into BAU for NPg, including network planning and design tools. It is from this viewpoint that we feel we are best suited to comment on the value of the outputs from the CLNR project.

In the middle of the project, where network technology was procured, installed and the trials were undertaken, our role was one of relatively low-level advice and support. We were therefore essentially outside these activities looking in. It is from this viewpoint that we feel we are best suited to pass comment on NPg's project strategy and management of the project.

Outputs

Statistical significance and validity. A major strength of the CLNR is the volume of activity that was undertaken. This increases the confidence level of decision makers in its outputs, compared to smaller trial and demonstration projects, which should ultimately lead to appropriate (not over-) investment. For example the CLNR recommendations to update ACE49 are based on smart meter data from approximately 8000 customers over a two year period, so the results have an exceptionally high confidence level. We are not aware of other UK studies that approach this level of confidence. ACE49 information underpins network design and CLNR outputs have challenged the pre-CLNR view, leading to less conservative design assumptions, which will save customers money.

Another strength is the independent peer review of the academic output, verifying its quality. This output, together with outputs that are perhaps more accessible for non-experts, have been made widely available via the CLNR library and web-access to the project. This information, together with the rich data sets that have been published by the project, has been regularly accessed since publication. More than 7,000 visitors from 18 countries have accessed the CLNR website since 1st July 2014. Most of these have had multiple visits.

Useful learning converted to practical guidance. The project outputs collectively form a "how to" guide, which describes under what circumstances to implement Enhanced Automatic Voltage Control, Real-Time Thermal Ratings, Electrical Energy Storage and Demand-Side Response, either singly or in combinations. This could so easily have been presented solely as an academic piece with some great mathematical analysis but leaving power system engineering practitioners and policy creators little better off. Instead, in keeping with the ethos of the project, the academic research has been shaped to answer the questions that the power industry have been asking, in order to inform

policy and new ways of working. In this sense the project output is exceptional. The Optimum Solutions Document provides both an overview and a map of the outputs. It includes a "merit order" of solutions…in essence it is a road map to smart grid implementation that is applicable to all GB DNOs.

Strategic Direction and Project Management by NPg

Resourcing via NPg's conventional delivery. In our opinion NPg took some brave decisions when formulating the project. One of these was resourcing for delivery. When delivering a significant sized innovative project, it is normal for an organisation to form a specialised innovation team, which runs the project largely outside of "business as usual" activities. NPg chose to involve normal business functions in the delivery of the project, rather than setting up a specialist innovation group . On the one hand, this made it harder for external organisations to navigate the project. It also made resourcing more challenging for the project, because CLNR was competing with normal business pressures to obtain scarce resources (skilled NPg people). There are strong pressures for people that are not directly accountable for the successful delivery of an innovation project to focus on their "day job". On the other hand, it meant that hundreds of people in NPg had some involvement in doing, deciding, shaping or managing CLNR activities.

The consequence of this positive decision is that many people in NPg's business have already been trained "on the job" so to speak, which will make realisation of benefits so much easier than if these staff only started to learn to accept or engage with the outputs and recommendations of the project after it had finished….or worse, when a recommendation of the project is selected to address a specific business need in the future! There is also the cultural benefit of exposure to innovation over an extended period, which tends to reduce barriers to innovation going forward.

Testing the supply chain. Another brave decision was to go to the market for technology that would be used in the project. Typically, in projects which aim to trial innovative technology and practices, end user organisations partner with the technology providers. As such, these projects do not actually test the market readiness of the technology and so they can provide a false view of the true state of the market. NPg should be commended for not taking this typical approach. Instead NPg went to the market to source technology. This approach demonstrated the gap between what some technology providers said they had available and what they actually could provide when invited to supply under contract – this is valuable learning for the industry. NPg demonstrated good change management by identifying alternative means to satisfy requirements (which had been produced following engagement with technology providers at bid stage), where the market proved unable to meet those requirements.

Dealing with the unexpected. NPg also demonstrated good change management in the face of worse than predicted market conditions leading to take-up of LCTs, particularly heat pumps, not being as great as expected, also when faced with the spectre of insolvency of the company which had been contracted to supply Electrical Energy Storage technology.

NPg did not accept the market constraint on the number of heat pumps available to the project, rather it engaged with others interested in heat pump trials and achieved a significant number of heat pump installations for the project, which we believe to be the largest number of heat pumps monitored in a single trial in the UK.

NPg dealt sensitively with the potential insolvency of the company which had been contracted to supply Electrical Energy Storage technology. It would have been understandable if NPg had assessed that the risk was too great and placed the contract on hold until matters were resolved, which would probably have led to the failure of the company and consequent de-scoping of Electrical Energy Storage from the CLNR project. Instead NPg engaged positively, which resulted in the delivery, installation and successful operation of the technology, both stand-alone and in combination with other technologies under the control of the Grand Unified Control system, albeit with some time delays against the original plan.

The interface with BG was also managed well. The cultural differences between an Energy Supply business and a DNO should not be underestimated. Alignment of interest between different people working in these very different businesses does not happen by accident. It would have been all too easy for NPg management to press issues strongly from a DNO point of view, without understanding the pressures and constraints on a supply business, and not get the positive outcome that was achieved. NPg should be commended in the way it sensitively managed that interaction.

NPg invested in Prince 2 training for selected people in all partner organisations in order to introduce common parlance and a common method of working across partners, including use of product based planning. This was helpful for project management.

In Summary

Overall, we feel that the project has significantly advanced the knowledge of Smart Grids and has significantly reduced the barriers to further deployment.

It was managed well by NPg in the face of a number of unexpected and significant external events. It has trialled combinations of technologies, both customer-side and network-side, at a scale which has not been done in the UK before. It has engaged with more customers than any previous network innovation project, increasing the clarity and confidence level of its outputs, compared to smaller trial and demonstration projects.

The academic output has been independently verified by peer review and has been converted into outputs which are suitable for use by DNO staff and others. These outputs have been made publically available and summarised in a form that is, in essence, a road map to smart grid implementation including a “merit order” of solutions, both “smart” and conventional. The outputs have also been made available in the form of solution templates for the Transform model, which should assist other DNOs to assess the cost / benefit ratio of the recommendations of the project in their specific circumstances.