

Nisha Doshi
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Dear Nisha,

Consultation on the Successful Delivery Reward Applications for Low Carbon Networks Fund: *Customer Led Network Revolution*

This project very successfully trialled alternative customer propositions and network technologies with the underlying premise that additional capacity in the network can be released. In addition to network monitoring, the solutions being demonstrated include enhanced automatic voltage control, demand-side response, electrical energy storage and real-time thermal rating. Data collection on a grand scale enabled updating of historical models and informing the development of new standards. The high quality of the project outcomes has gained very significant recognition at both national and international level and has generated good value to consumers.

One of the major and unique contributions of CLNR is a comprehensive analysis of the combined quantitative data from the monitoring and intervention trials, that were fully integrated with social science analysis from interview and survey with individuals, families and organisations, providing unique insights in customers' energy use behaviour and their responsiveness to interventions.

CLNR studied, for the first time, the evolution and impact of domestic heating and hot water provision following the installation of air source heat pumps in households providing new insights regarding the interplay between technological interventions and everyday practices and socio-cultural norms. Furthermore, the project generated critical evidence regarding the impact of the uptake of electric vehicles on electricity distribution networks. Spatial and temporal diversity of vehicles charging demand has been demonstrated, suggesting that distribution network operators could collaborate with new market players, such as charging infrastructure operators, to support the roll out of an extensive charging infrastructure in a way that makes the network more robust. Moreover, the CLNR project demonstrated that the aligning use of domestic PV generation with the smart grid objectives, will require modification of domestic

practices, like laundry, dish washing, showering etc., to make best use of PV power onsite.

Furthermore, CLNR successfully tested application of real time thermal ratings showing that it can increase the static rating of critical circuits to a generally higher dynamic rating, and thereby decrease the likelihood of customer disconnection, in particular at peak periods.

Novel insights were provided from trialling electrical energy storage technologies in managing distribution network flow and voltage constraints. Novel models were developed to evaluate the impact that energy storage could have on the design and operation of future distribution networks.

The project also successfully trialled a new concept of autonomic voltage control that do not require direct access to remote voltage references in order to adequately control voltage. A key benefit of demonstrated setpoint control is that existing functionality of the automatic voltage control is not interfered with, and hence many of the existing modern voltage relays in operation would require minimal modification to enable setpoint control.

Overall, CLNR has been a very ambitious and all embracing project that examined the whole system rather than individual components in isolation, including pioneering involvement of customers and provided strong evidence that GB system can evolve to lower carbon future in the coming decades.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Goran Strbac', written in a cursive style.

Prof Goran Strbac