

APPENDIX H - INNOVATION FOR RP5

NIE T&D's proposals for RP5 innovation expenditure

NIE T&D has developed a set of objectives and proposals for innovation expenditure in RP5. These are based on the learning outcomes from the Sustainable Network Programme.

NIE T&D proposes more effective and efficient deployment of developed technologies, and the development of a better understanding of strategic communication infrastructure requirements. This will be based on available learning adapted for NIE T&D's network characteristics and systems. The company also proposes a series of smart technology trials and pilots that will focus on:

- greater utilisation of the existing network assets; and
- more active distribution network management.

NIE T&D has structured its proposals around a 'technology readiness model'. This represents the different stages of product readiness and risk, as well as the associated funding requirements.

NIE T&D plans to adopt the 'fast follower' principle that was established in RP4. The principle involves spotting relevant ideas of others, rapidly replicate these, and improving on them where possible. This would appear entirely appropriate if the objectives, issues and characteristics of Northern Ireland were the same as elsewhere.

Much of the reference to trials and pilots for RP5 continue to focus on the apparent sole objective of facilitating the cost-effective connection of renewable distributed generation – particularly wind generation. There is the potential for intermittent forms of generation, and changes to loading characteristics, to have an impact on transformer asset life. The consequences of this should be considered in the development of such networks.

NIE T&D believes investment in research and development is still necessary for the following reasons.

- The smart technology solution that is most appropriate for NIE T&D will depend on local system characteristics, in particular the current and future generation mix, and legacy network design. It will not always be possible to incorporate smart technology design that has worked elsewhere. Effort will be

required to determine the solution's feasibility, make modifications to suit the network in Northern Ireland and pilot the technology before it is put into use.

- The uncertain future of emerging technologies (such as electric vehicles, micro generation and clusters of heat pumps) makes it difficult to factor in these technologies when planning of the network's future capacity. However, it is necessary to keep up with recent developments and feed into current smart grid activity. Otherwise, without any consideration, the uptake rate of these technologies may overtake the pace of network reinforcement that is required, especially if additional transmission network assets are required.
- Provide the resource to continually assess emerging technologies and participate with collaborative research to leverage funding.

This is summarised in table 1.

Estimate of costs for research and development projects

Table 1 – Estimate of costs for research and development projects

| Research area | Cost |
|---|--------------|
| Participation in collaborative research and development | £1.0M |
| Individual R&D projects (see Appendix 2 for detail on potential projects) | £1.5M |
| Total cost | £2.5M |

Source: NIE T&D

NIE T&D also wishes to trial smart technology that has never been implemented before within the network but may help to:

- deliver reduction in network investment;
- increase the level of renewable or embedded generation that is connected to the system; or
- offer a better quality supply to customers.

NIE T&D has stated that it is difficult to predict the potential gains ahead of actual implementation. The company is seeking funding of £6 million to support these projects. It believes that the learning from the trials and pilot projects will be invaluable in determining the value of the technology and will help determine its suitability for use in other parts of the network.

The projects identified are shown in table 2

Table 2– Projects identified for trials and pilot projects

| Project title | Objective | Cost |
|--|---|--------------|
| Active network management of Armagh | Reduce load-related investment | £2.0m |
| Voltage control solution at Enniskillen – Aghyoule | Manage reactive power support for wind farms | £0.7m |
| Dynamic transformer ratings and active network management of Omagh | Facilitate further connection of renewable and distributed generation | £1.2m |
| Dynamic line rating trial | | £0.4m |
| SGL smartzone trials | Smartgrid/active distribution management trials | £0.5m |
| Projects to be developed within RP5 | | £1.2m |
| Total cost | | £6.0m |

Source: NIE T&D

NIE T&D also stated the need for trialling advanced/proven technology. Projects in this category involve trialling equipment or systems that are available off the shelf and in some instances have already been trialled and proven by other utilities. If successful, NIE T&D believes these technologies have the potential to reduce investment in asset replacement.

NIE T&D states that it is fairly confident that the technology will lead to some level of reduced network investment. This expenditure for deploying the advanced/proven smart technology is factored into NIE T&D's proposed programme for asset replacement. The expenditure will be offset by reductions in asset replacement expenditure that have been taken into account in developing the RP5 capex plan.

Table 3 – Projects and estimate of costs for projects to trial proven technology

| Project title | Cost |
|---|---------------|
| Smart approaches to the management of system transformers | £3.00M |
| Smart approaches to the management of cables | £0.35M |
| Total cost | £3.35M |

Source: NIE T&D

NIE T&D has proposed incentivisation arrangements for the pilots and trials based on:

- reductions in load related investment; and
- providing additional capacity to connect renewable and distributed generation.

In establishing this incentive mechanism, it would of course be appropriate to determine the capability and likelihood of addressing network capacity by traditional network extension, and the other short- medium-term solutions that NIE T&D refer to.

The company has indicated that such incentivisation should include an allowance for retaining any deferred pre-construction spend, and additional mechanisms to meet generation connection in excess of 750MW.

NIE T&D also proposes control and communication trials to address the requirement for greater data volumes and resilience to support distributed control nodes on the network.

The company considers that the incentive arrangements associated with Ofgem's Low Carbon Networks Fund are unsuitable for Northern Ireland. The reason for this is because they rely on competitive elements between the DNOs in GB that do not apply in Northern Ireland. Instead, NIE T&D proposes two different incentives for pilots and trials based on the following criteria/principles:

- **Delivering a reduction in load-related investment**

An incentive mechanism could be developed to reward NIE T&D for deploying smart technology schemes efficiently in order to reduce load-related investment.

NIE T&D proposed that it is allowed to retain the benefit of the deferral of pre-construction work through the capex efficiency mechanism if the scheme proves successful. This will encourage NIE T&D, in this instance and for other projects of a similar nature, to focus smart technology in areas where the company considers that a reduction in load-related investment can realistically be delivered. The benefit to customers would be by ensuring that expenditure on smart technology is used to deliver real savings in capital investment.

- **Releasing additional capacity on the existing network to connect renewable and distributed generation**

NIE T&D faces planning challenges to address additional network investment and meet the government's target of 1,000MW of renewable generation by 2015. The company forecasts a shortfall in its ability to meet this target by around 250MW, despite a range of short and medium term measures to extend network capacity. NIE T&D believes that additional capacity could be provided through innovative use of smart technologies. This suggests that an

appropriate incentive mechanism could be provided for NIE T&D to facilitate increased generation above the identified 750MW.