WESTERN POWER DISTRIBUTION

Serving the South West and Wales

Report on 2004/05 work undertaken under Ofgem Innovation Funding Incentive

Western Power Distribution (South West) plc

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1.0 INTRODUCTION

1.1 Western Power Distribution (South Wales) plc and Western Power Distribution (South West) plc hold electricity distribution licences issued by Ofgem under the Electricity Act (as amended). For brevity, "WPD" is used to refer to both licenced areas in this report.

2.0 OFGEM INNOVATION FUNDING INCENTIVE

During 2004, Ofgem consulted upon and introduced an "Innovation Funding Incentive" (IFI) to encourage the DNOs to apply innovation in the way they pursue the technical development of their networks Ofgem recognised that innovation has a different risk/reward balance compared with a DNO's core business. The incentives provided by the IFI mechanism were designed to create a risk/reward balance that is consistent with research, development and innovation. (Similarly "Registered Power Zones" (RPZs) were introduced, though WPD is not currently pursuing any RPZ registrations). IFI came fully into effect in April 2005 but "early start" projects running during the preceding 6 months were also encompassed.

2.1 Having introduced IFI, previous funding of research activity was removed and only projects which met criteria set out in the Ofgem IFI Regulatory Instructions and Guidance (RIG) and an Ofgem agreed Good Practice Guide would be partially funded, on a reducing sliding scale. DNOs who wished to undertake work under IFI were required to prepare and submit a Good Practice Guide (GPG) to Ofgem for agreement. That GPG had to meet Ofgem requirements, in particular relating to project eligibility and also in respect of net present value. Whilst DNOs could submit their own individual GPGs, there has been collaboration between DNOs in consultation with Ofgem, and a common GPG produced, as Energy Networks Association Engineering Recommendation G85. This has received Ofgem agreement.

2.2 The RIGs published by Ofgem provide the following definition of an Eligible IFI Project:

A project will qualify as an eligible IFI project provided that it is designed to enhance the technical development of distribution networks (up to and including 132kV). Eligible IFI projects will embrace all aspects of distribution system asset management from design through to construction, commissioning, operation, maintenance and decommissioning.

2.3 The definition of technical development, contained in the GPG, was the subject of considerable discussion with Ofgem before it was agreed and is as follows –

" In this context:

- "Technical" means "Being of a scientific and/or engineering nature and benefiting the design, construction, commissioning, operation, maintenance and decommissioning of the Primary plant and equipment employed in the distribution of electrical energy and/or of the secondary plant and equipment employed to control, protect and maintain such Primary plant and equipment"

- "Primary" means "heavy current equipment that carries power currents at voltages from LV up to and including 132kV"

2.4 The Ofgem website contains both a brief description of the IFI and RPZ processes and the June 2004 DPCR consultation which includes further detail.

2.5 This report on WPD IFI activity for the 6 months "early start" projects ending 31st March 2005, has been prepared in accordance with the RIGs and GPG.

3.0 WPD's APPROACH TO RESEARCH AND DEVELOPMENT

3.1 WPD seeks, where reasonably practicable, to undertake targeted research through collaborative projects or programmes to gain added value and gearing. Having regard to the need for prudent investment, the focus is on a range of short to medium term projects addressing specific areas, rather than on longer-term blue sky or speculative research. Consequently research has centred on specific projects or programmes of topic related projects spanning up to three years and not having a high cost / high risk profile.

3.2 WPD has, in common with other DNOs, a long association of collaborative research working with EA Technology, Capenhurst, arising from the former Electricity Council Research Centre and the establishment of areas of UK expertise in specific and pertinent spheres of electricity distribution which are of relevance to WPD. Collaborative working has been undertaken with other UK DNOs and overseas partners in Strategic Technology Programme (STP) modules on substation, overhead line and underground cable subject areas. WPD submitted collaborative EATL STP Modules 2,3,4 as "early start" projects. The costs of these are well below the de-minimis £40k per licenced DNO set in the GPG (para 3.4) for reporting at individual project level; programme level reporting is required.

3.3 In addition to work with EATL, WPD has previously engaged ERA Leatherhead and a wide range of other providers including Universities to undertake specific research work. Since April 2005, WPD has committed to supporting a large research proposal to EPSCR on Enhanced Management and Performance for a Sustainable UK Energy Infrastructure (Supergen V), which would be heavily geared and involve collaboration with six leading UK Universities, together with Industrial partners and possibly other UK DNOs and transmission companies. That proposal is awaiting EPSCR decision. (It was not included in WPD's "early start" project list due to this and because it was not committed by 1st April 2005.)

3.4 The type of work historically undertaken has naturally had a distribution company focus, not only to enhance efficiency, improve reliability, safety or environmental performance. The work has also encompassed issues which are not directly related to an item of primary or secondary plant and equipment such as network design, connections, charging methodologies, climate change impact, risk management etc

3.5 WPD has expressed concern that the current IFI eligibility criteria act as an inhibitor rather than an enabler of a range of projects. These are –

- those which are not directly related to the primary plant / equipment and related secondary plant /equipment.

- those which do not show a real financial benefit rather than an " equivalent financial benefit" (RIG para. 3.2 and GPG para. 3.2.3). This would encompass some projects which are otherwise eligible but also those relating for example to safety, reliability, resilience, environmental performance, or security. (There is currently a recognised disparity between the RIG requirement that a project should have an expectation of a positive present value (PV), whilst the GPG expects that the primary driver of more than 50% of projects should be financial benefits and that the overall programme should show a positive PV.)

3.6 The requirement for the programme to show a positive net present value also raises a fundamental question relating to the duration of the benefits from a successful project. When considering real financial benefits, over what period are these to be taken, having regard to efficiency savings having historically been removed from DNO income streams at five yearly Ofgem Distribution Price Control Reviews? If all DNOs were to co-operate in some worthwhile project such that all were able to make some reduction eg in opex costs, the "regression line" approach taken at DPCR would remove from the DNO the ongoing financial benefit. This raises the dilemma that projects which may be justifiable when rightly viewed from the perspective of costs to the Customer, are not justified when viewed from a DNO NPV perspective. This aspect of IFI requires further discussion with Ofgem.

3.7 The future of WPD engagement in research will be influenced by the manner in which IFI develops, in particular the following –

- project eligibility criteria
- approach to NPVs
- administrative overhead burden

4.0 EARLY START PROJECTS

4.1 These have been STP Modules 2 – Overhead Networks, 3 – Cable Networks and 4 – Substations. The range of projects encompassed within each is described below –

Module 2 - Overhead Networks
Corrosion protection of tower foundations
Life of copper conductors
Bird flight diverters
Surge arrester failure
Ice accretion modelling
Conductor rating
Performance of polymeric insulators
Testing of aluminium and aluminium alloy conductors
Improved RFI detection

Module 3 Cable Networks
Improvement in earthing design
Cable ratings
Detection of lead fatigue
Cable oil sniffer
Intelligent fuses
New jointing compound
Condition monitoring

Module 4 Substations
Calormetric discharge indicator
Headspace gas testing in oil filled switchgear
Modelling plant degradation
Reduction of life cycle environmental impact of electromechanical plant
Refurbishment viability of large power transformers
Switchgear fault ratings
Earth mat mapping at pole mounted substations
Tapchanger monitor
Power line carrier "state aware" network
Switchless tapchangers

5.0 NET PRESENT VALUE OF EARLY START IFI PROJECTS

5.1 There are several approaches to net present value assessments of research type work. One approach is to scale up test discount rates to reflect the "riskiness" of a project whilst another is to employ a standard test discount rate and employ a success probability factor, for example 25, 50 75%. The latter was described in a report commissioned by Ofgem on Innovation in Electricity Distribution Networks and prepared by Mott MacDonald/BPI in March 2004, and is the approach employed by WPD.

5.2 Experience of the typical payback of successful projects undertaken within an STP Module is typically in the range of 6 – 8 X investment, which success probabilities of the programme projects tends to be at the 25% band. Timescales of individual projects within an STP Module are of the order of 3 years, with break milestones built in. The test discount rate employed is the WPD cost of capital from DPCR4, i.e. 6.9%. The average duration of benefit once a successful project has been achieved has been assessed as 10 years.

5.3 The RIG and GPG required aggregate and programme reports follow overleaf.

WPD South West Summary report of "Early Start" IFI Project activities October 2004 to March 2005

Number of active IFI projects	5 – all collaborative. Of those notified as early start projects in August 2004, one (connection of mobile phone base stations) had not incurred significant cost to WPD up to March 2005, and another (Fault level monitor) had not been initiated by that time.
NPV of costs and anticipated benefits from committed IFI projects	NPV of costs - £94,500 NPV of benefits - £110,600 Positive NPV - £16,000 (rounded from information on following sheets)
Summary of other benefits anticipated from active IFI projects	Reductions in CMLs through improved reliability and resilience. Maintaining or improving safety to the public and staff. Reduction of environmental risk of oil loss from plant and cables.
Total expenditure to date on IFI projects	£33,600 up to end March 2005
Benefits actually achieved from IFI projects to date	De-minimis to date

Regulatory report for DG incentive, RPZs and IFI **Reporting year 2004/05** **Western Power Distribution – South West**	
Innovation Funding Incentive	**£m**
IFI carry forward (£m)	**0**
Eligible IFI expenditure (£m) *	**0.0336**
Eligible IFI internal expenditure (£m)	**0.00399**
Combined distribution network revenue (£m)	**184**
* includes internal expenditure	

In addition to the above costs, internal expenditure of £2,000 has been incurred up to 31/3/05 on national work on IFI, and the development of the GPG

WPD South Wales Summary report of "Early Start" IFI Project activities October 2004 to March 2005

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WPD S West and WPD S Wales *
IFI Project report for "Early Start" Project October 2004 to March 2005

Description of project	EATL STP Module 2 - Overhead Line Module, Forum and Tower Paint research and development relating to overhead lines.				
Expenditure for financial year	Internal - £ 1,850 External - £10,800 Total Cost - £12,650		Expenditure in previous financial years	N/A	
Technological area and / or issue addressed by project	Rating, design and specification of overhead lines. The STP overhead network programme for 2004/5 aimed to reduce costs and improve performance of overhead networks by increasing understanding of issues that have a negative impact on costs and performance. The programme is expected to also have a positive impact on safety and environmental performance. The projects all address real problems that have been identified by the module steering group members as significant and which require technical investigation and development.				
Type(s) of innovation involved	Incremental and radical				
Expected Benefits of Project	Financial project benefits are expected to be approximately 8 times the cost of successful projects. The benefits will be across a range of areas including construction, maintenance, refurbishment and operation.				
Expected Timescale to adoption	3 years (average)		Duration of benefit once achieved	10 Years (average)	
Estimated Success probability (at start of project)	25%				
PV of Project Costs	£35,400	PV of Project Benefits	£39,800	NPV of Project Costs	£4,400
Commentary on project progress and potential for achieving expected benefits	Projects currently on target.				

***The above figures are the same for each licence area. Ofgem have agreed (meeting 09-08-05) that both may be shown together**

WPD S West and WPD S Wales *
IFI Project report for "Early Start" Project October 2004 to March 2005

Description of project	EATL STP Module 3 – Underground Cables and Forum.				
Expenditure for financial year	Internal - £ 1,070 External - £8,850 Total Cost - £9,920		Expenditure in previous financial years	N/A	
Technological area and / or issue addressed by project	Rating, specification, operation and network management of underground cables. The programme for the year 2004/5 aimed to reduce costs and improve performance of cable networks by increasing understanding of issues that have a negative impact on costs and performance. The programme is expected to also have a positive impact on safety and environmental performance. The projects all address real problems that have been identified by the module steering group members as significant and which require technical investigation and development.				
Type(s) of innovation involved	Technological substitution and radical				
Expected Benefits of Project	Financial project benefits are expected to be approximately 6 times the cost of successful projects. The benefits will be across a range of areas including construction, maintenance, refurbishment and operation.				
Expected Timescale to adoption	3 years (average)		Duration of benefit once achieved	10 Years (average)	
Estimated Success probability (at start of project)	25%				
PV of Project Costs	£27,850	PV of Project Benefits	£35,000	NPV of Project Costs	£7,150
Commentary on project progress and potential for achieving expected benefits	Projects currently on target.				

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WPD S West and WPD S Wales*
IFI Project report for "Early Start" Project October 2004 to March 2005

Description of project	EATL STP Module 4 – Plant and Forum.				
Expenditure for financial year	Internal - £ 1,070 External - £8,850 Total Cost - £9,920		Expenditure in previous financial years	N/A	
Technological area and / or issue addressed by project	The programme of projects in the 2004-5 STP substations module budget encompass both developing new innovative asset management processes and practices and developing innovative diagnostic techniques. The aim is to develop already well established themes such as life extension of aged assets within legal and health and safety constraints, examination of new technologies, developing an understanding of, and innovative solutions for the impact on substation assets of increasing levels of distributed generation on networks and condition monitoring techniques.				
Type(s) of innovation involved	Incremental / Significant / Technological Substitution / Radical				
Expected Benefits of Project	Financial project benefits are expected to be approximately 6 times the cost of successful projects. The benefits will be across a range of areas including construction, maintenance, refurbishment and operation.				
Expected Timescale to adoption	3 years (average)		Duration of benefit once achieved	10 Years (average)	
Estimated Success probability (at start of project)	25%				
PV of Project Costs	£31,300	PV of Project Benefits	£35,700	NPV of Project Costs	£4,400
Commentary on project progress and potential for achieving expected benefits	Projects currently on target.				

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