# CER Transmission and Distribution Price Review

REVIEW OF TRANSMISSION ASSET OWNER OPERATING COSTS 2006 TO 2015

FINAL REPORT

2 June 2010

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## REVIEW OF TRANSMISSION ASSET OWNER COSTS 2006 TO 2015

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# 1. Executive Summary

All prices in this report are expressed as real prices at 2009 price levels, unless otherwise stated.

Conclusions and recommendations are included in the report in bold type and are summarised in Section 8.

## 1.1. Overview of Operating costs.

This report provides an analysis of the TAO's operating costs incurred in the period 2006 to 2010 (PR2) and reviews the TAO's forecast of operating costs for the period 2011 to 2015 ( PR3). The report makes recommendations for costs to be allowed by CER in PR3 and outputs and incentives.

**Table A TAO Operating Costs 2006 to 2015 €m 2009 Prices**

| | CER PR2 Allowed | Var PR2 Outturn Vs CER Allowed | TAO PR2 Projected Outturn | TAO PR3 Forecast | Var PR3 Forecast Vs PR2 Outturn | PR3 Recommended | Var Recommend Vs TAO Forecast |
|---|---|---|---|---|---|---|---|
| Operations | 16.10 | -5.15 | 10.95 | 14.44 | 3.49 | 10.52 | -3.92 |
| Planned maintenance | 62.30 | -9.64 | 52.66 | 87.26 | 34.60 | 68.09 | -19.17 |
| Fault maintenance | 8.33 | -0.05 | 8.28 | 6.19 | -2.09 | 5.62 | -0.57 |
| Professional Services | 25.75 | -0.73 | 25.03 | 24.30 | -0.73 | 19.43 | -4.87 |
| Telecom Fees | 8.12 | -1.68 | 6.44 | 9.00 | 2.56 | 7.60 | -1.40 |
| Asset Management | 5.00 | -1.27 | 3.73 | 8.07 | 4.33 | 5.05 | -3.01 |
| Legal | 1.11 | -0.69 | 0.42 | 2.00 | 1.58 | 1.00 | -1.00 |
| Pension | 0.00 | 0.47 | 0.47 | 1.74 | 1.26 | 0.69 | -1.05 |
| Insurance | 1.55 | 0.00 | 1.55 | 1.38 | -0.17 | 1.38 | 0.00 |
| Company Wide Costs | 2.44 | -0.07 | 2.38 | 2.53 | 0.15 | 2.15 | -0.38 |
| Corporate Charges i& Corp Affair | 11.66 | 1.23 | 12.89 | 11.78 | -1.11 | 11.01 | -0.77 |
| Other | 11.76 | -12.18 | -0.42 | 2.53 | 2.95 | 2.50 | -0.03 |
| **Controllable Costs** | **154.13** | **-29.74** | **124.39** | **171.21** | **46.83** | **135.03** | **-36.19** |
| Rates | 82.61 | 0.00 | 82.61 | 92.86 | 10.25 | 92.86 | 0.00 |
| CER Levy | 5.37 | 0.00 | 5.37 | 4.00 | -1.37 | 4.00 | 0.00 |
| **Non Controllable Costs** | **87.98** | **0.00** | **87.98** | **96.86** | **8.88** | **96.86** | **0.00** |
| **Total Operating Costs** | **242.11** | **-29.74** | **212.37** | **268.07** | **55.71** | **231.89** | **-36.19** |

Table A provides a summary of TAO operating costs, excluding depreciation, from 2006 to 2015, comparing CER allowed costs for PR2, TAO PR2 outturn costs, TAO forecasts for PR3 and our recommendations for allowed costs for PR3.

Allowed non controllable costs are adjusted to outturn as these costs are not under the control of the TAO.

## 1.2. TAO Operating Costs 2006 to 2010

During PR2 the TAO implemented a number of efficiency and service initiatives listed in Appendix A to meet the challenge of cost pressures encountered, which are summarised in Appendix B.

Three major IT systems have been implemented for asset and work management and mobile data by ESB Networks, which provide support for TAO activities.

ESB Networks has also funded severance costs of €135m which have contributed to net staff reductions of 287 from 3758 to 3471 across ESB Networks as a whole.

**Table A TAO Operating Costs by Activities 2006 to 2010 €m 2009 Prices**

| | CER Allowed | PR2 Outturn | Variance |
|---|---|---|---|
| Operations | 16.10 | 10.95 | -5.15 |
| Planned maintenance | 62.30 | 52.66 | -9.64 |
| Fault maintenance | 8.33 | 8.28 | -0.05 |
| Professional Services | 25.75 | 25.03 | -0.73 |
| Telecom Fees | 8.12 | 6.44 | -1.68 |
| Asset Management | 5.00 | 3.73 | -1.27 |
| Legal | 1.11 | 0.42 | -0.69 |
| Pension | 0.00 | 0.47 | 0.47 |
| Insurance | 1.55 | 1.55 | 0.00 |
| Company Wide Costs | 2.44 | 2.38 | -0.07 |
| Corporate Charges & Corp | 11.66 | 12.89 | 1.23 |
| Other | 11.76 | -0.42 | -12.18 |
| **Controllable Costs** | **154.13** | **124.39** | **-29.74** |
| | | | |
| Network Rates | 82.61 | 82.61 | 0.00 |
| CER Levy | 5.37 | 5.37 | 0.00 |
| **Non Controllable Costs** | **87.98** | **87.98** | **0.00** |
| **Total** | **242.11** | **212.37** | **-29.74** |

Table A gives a summary of the TAO's operating costs over the period 2006 to 2010, comparing outturn costs by activity with CER's allowed costs. Allowed costs for non controllable items have been adjusted to outturn.

The TAO's PR2 operating costs of €212.4m are €29.7m lower than the allowed costs of €242.1m. The TUoS tariffs over PR2 are based on the allowed expenditures. We recommend that allowed operating costs for PR2 be reduced by €25.04m, as these savings are windfall gains and not due to efficiency savings.

The under spend is due to an under spend on transmission maintenance of €9.6m which arises due to under achievement of the planned maintenance programme and associated under spend on field operations of €3.2m.

The remainder of the under spend is due to over- provision of allowed Other costs in PR2 of €12.2m. This may have been partly due to the uncertainty at that time over the split of responsibilities and costs between the TAO and TSO, which were later clarified under the Infrastructure Agreement.

### 1.2.1. Operations Expenditure

**(Allowed €16.1m Outturn €11m)**

This cost item includes operational switching, station attendance, fault location, and a range of other services. The under spend on these items is similar to the reduction in costs of area operations for distribution and may be due in part to reduced switching associated with the shortfall in the planned maintenance programme.

### 1.2.2. Planned Maintenance

**(Allowed €62.3m Outturn €52.7m)**

Planned maintenance costs of €52.7m are €9.6m lower than the allowed costs of €62.3m, mainly due to under-achievement of the substation maintenance programme.

The TAO planned maintenance programme is based on TSO maintenance policies agreed between the TSO and TAO, which defines the work tasks required and the inspection and maintenance frequencies. The TAO therefore has little control over the work requirement but has the opportunity to gain incentive rewards by reducing unit costs beyond those used as a basis for allowed costs. Efficiency savings of 1% per annum were included in the CER allowed unit costs for PR2.

The under spend on planned maintenance does not reflect efficiency savings but reflects the shortfall in the achievement of the planned maintenance programme, particularly on substation maintenance, where only 67% of maintenance tasks required by TSO policies were completed in the period 2006 to 2008. Due to restrictions on outage availability and other constraints not all maintenance required by the policies could be programmed. Over 80% of scheduled maintenance was achieved.

### 1.2.3. Fault Maintenance

**(Fault Maintenance Allowed €8.3 Outturn €8.3)**

Fault maintenance costs were allowed at 12% of total maintenance costs and the outturn is close to allowed costs of €8.3m.

### 1.2.4. Professional Services

**(Allowed €25.75m Outturn €25.03m**)

Professional Services are almost wholly ESBI costs associated with provision of technical services such as maintaining records, provision of advice on technical matters, managing overhead line infringements. ESBI also provide support during routine planned maintenance by inspecting equipment before it is returned to service.

In our view these activities are core services that could be provided more effectively and with better control of costs from within ESB Networks.

### 1.2.5. Telecoms

(Allowed €8.1m Outturn €6.4m)

Telecoms costs are lower than forecast.

### 1.2.6. Asset Management

**(Allowed €5m Outturn €3.7m)**

The majority of the asset management costs are associated with mast interference and forestry payments, which are increasing due to pressure from landowners.

### 1.2.7. Corporate Costs

**(Allowed €14.1m Outturn €15.3m)**

Corporate charges and company-wide costs are allocated according to a basket of measures and are overspent by €1.1m.

### 1.2.8. Other Costs

**(Allowed €11.8m Outturn -€0.4m)**

There appears to have been an over-provision of allowed Other costs, due to uncertainties over responsibilities between TAO and TSO at the time the allowed costs were set. These windfall gains of €12.07m are to be disallowed.

### 1.2.9. Non Controllable Costs

Non Controllable Costs of €87.9m are allowed as pass through items and consists mainly of Network Rates (€82.6m), which represent 38.7% of the TAO operating costs.

## 1.3. Assumptions for Operating Costs 2011 to 2015

### 1.3.1. Payroll Costs

The TAO's assumption that internal labour costs will be maintained at CPI is considered to be too conservative in the present economic climate and when compared with pay reductions elsewhere in the Irish economy. Our recommendations are based on a reduction in payroll costs of 5% pa in 2011, which is approximately 1.75% of total controllable operating costs.

### 1.3.2. Productivity

The TAO has assumed a productivity increase of 1% per annum over PR3. The ESRI Medium Term Review 2008[1] forecasts that the average productivity of the Irish economy to be 2.5% per annum over the period 2011 to 2015. The TAO's activities are highly mechanised and are supported by a

[1] Economic and Social Research Institute Medium Term Review 2008 – May 2008

significant level of IT investment. There has also been significant reorganisation and staff reduction in PR2 and potential for more in PR3. Much of these developments have occurred in the latter part of PR2 and the full effect is not reflected in the forecasts.

Overall we have included an efficiency saving of 2% per year on most controllable costs, taking into account the potential for productivity savings, alignment of salaries within the TAO organisation and the reduction in margin of its internal service providers.

Our recommendation for allowed costs is an overall settlement and is not dependent on individual line items and the recommendation is based on what is considered to be efficient overall.

### 1.3.3. Benchmarking

Benchmarking of ESB Networks DSO and 110 kV TAO opex and non network capex indicates that the DSO costs are 7.5% above the Upper Quartile of the GB DNO costs and 16 % above the efficiency frontier. This is consistent with our recommendations for allowed costs.

## 1.4. Operating Costs 2011 to 2015

### Table C Operating Costs 2011 to 2015

| | 2009 Actual | 2011 | 2012 | 2013 | 2014 | 2015 | TAO PR3 Forecast | PR2 Outturn | Variance PR3-PR2 | Variance % |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *TAO Forecast* | | | | | | | | |
| Operations | 2.3 | 2.90 | 2.89 | 2.88 | 2.87 | 2.89 | 14.4 | 11.0 | 3.5 | 31.9% |
| Planned maintenance | 10.3 | 16.36 | 16.62 | 17.26 | 18.11 | 18.92 | 87.3 | 52.7 | 34.6 | 65.7% |
| Fault maintenance | 1.7 | 1.22 | 1.22 | 1.24 | 1.25 | 1.27 | 6.2 | 8.3 | -2.1 | -25.2% |
| Professional Services | 7.0 | 4.20 | 4.40 | 4.80 | 5.30 | 5.60 | 24.3 | 25.0 | -0.7 | -2.9% |
| Telecom Fees | 1.6 | 1.80 | 1.80 | 1.80 | 1.80 | 1.80 | 9.0 | 6.4 | 2.6 | 39.7% |
| Asset Management | 0.8 | 1.60 | 1.60 | 1.61 | 1.62 | 1.63 | 8.1 | 3.7 | 4.3 | 116.2% |
| Legal | 0.2 | 0.41 | 0.40 | 0.40 | 0.40 | 0.39 | 2.0 | 0.4 | 1.6 | 373.3% |
| Pension | 0.0 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 1.7 | 0.5 | 1.3 | 267.5% |
| Insurance | 0.7 | 0.28 | 0.28 | 0.28 | 0.27 | 0.27 | 1.4 | 1.6 | -0.2 | -11.2% |
| Company Wide Costs | 0.5 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 2.5 | 2.4 | 0.2 | 6.5% |
| Corporate Charges i& Corp Affairs | 2.6 | 2.38 | 2.37 | 2.36 | 2.34 | 2.33 | 11.8 | 12.9 | -1.1 | -8.6% |
| Other | 1.1 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 2.5 | -0.4 | 3.0 | -699.7% |
| **Controllable Costs** | **28.8** | **32.5** | **32.9** | **34.0** | **35.3** | **36.5** | **171.2** | **124.4** | **46.8** | 37.6% |
| | **2009 Actual** | **2011** | **2012** | **2013** | **2014** | **2015** | **PR3 Recommended** | **TAO PR3 Forecast** | **Variance Recomend vs TAO Forecast** | **Variance %** |
| | | *Recommended* | | | | | | | | |
| Operations | 2.3 | 2.19 | 2.15 | 2.10 | 2.06 | 2.02 | 10.5 | 14.4 | -3.9 | -27.2% |
| Planned maintenance | 10.3 | 14.17 | 13.89 | 13.61 | 13.34 | 13.07 | 68.1 | 87.3 | -19.2 | -22.0% |
| Fault maintenance | 1.7 | 1.17 | 1.15 | 1.12 | 1.10 | 1.08 | 5.6 | 6.2 | -0.6 | -9.1% |
| Professional Services | 7.0 | 4.04 | 3.96 | 3.88 | 3.81 | 3.73 | 19.4 | 24.3 | -4.9 | -20.1% |
| Telecom Fees | 1.6 | 1.58 | 1.55 | 1.52 | 1.49 | 1.46 | 7.6 | 9.0 | -1.4 | -15.6% |
| Asset Management | 0.8 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 5.1 | 8.1 | -3.0 | -37.4% |
| Legal | 0.2 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 1.0 | 2.0 | -1.0 | -50.1% |
| Pension | 0.0 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.7 | 1.7 | -1.1 | -60.5% |
| Insurance | 0.7 | 0.28 | 0.28 | 0.28 | 0.27 | 0.27 | 1.4 | 1.4 | 0.0 | 0.0% |
| Company Wide Costs | 0.5 | 0.45 | 0.44 | 0.43 | 0.42 | 0.41 | 2.1 | 2.5 | -0.4 | -15.2% |
| Corporate Charges & Corp Affairs | 2.6 | 2.29 | 2.25 | 2.20 | 2.16 | 2.11 | 11.0 | 11.8 | -0.8 | -6.6% |
| Other | 1.1 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 2.5 | 2.5 | 0.0 | -1.2% |
| **TAO Controllable Costs** | **28.8** | **28.0** | **27.5** | **27.0** | **26.5** | **26.0** | **135.0** | **171.2** | **-36.2** | **-21.1%** |
| Variance SKM and TAO Forecast | | -4.5 | -5.4 | -7.0 | -8.8 | -10.5 | -36.2 | | -36.2 | -21.1% |

**Summary of TAO Non Controllable Costs 2011 to 2015 €m 2009 Prices**

| | 2009 Actual | 2011 | 2012 | 2013 | 2014 | 2015 | PR3 Forecast | PR2 Outturn | Variance PR3-PR2 | Variance % |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *TAO Forecast and Recommended* | | | | | | | | |
| Network Rates | 16.6 | 18.21 | 18.21 | 18.21 | 18.21 | 20.03 | 92.9 | 82.6 | 10.3 | 12.4% |
| CER Levy | 0.9 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 4.0 | 5.4 | -1.4 | -25.6% |
| **Non Controllable Costs** | **17.5** | **19.0** | **19.0** | **19.0** | **19.0** | **20.8** | **96.9** | **88.0** | **8.9** | **10.1%** |

The recommendations for allowed operating costs are based on the assumptions in section 1.3. The particular features of each cost heading have been reviewed including the base level of costs appropriate in 2011, growth factors and potential efficiencies available.

The TAO's forecast of operating expenditure in the PR3 period (2011 to 2015) is €268m, which is €56m greater than the equivalent PR outturn of €212.4m.

Our recommendation is for allowed PR3 operating costs of €231.9m, of which €96.9m is non controllable rates and CER Levy. The allowed opex is €36.2m lower than the TAO's PR3 forecast and €19.5m more than the equivalent PR2 outturn, on the basis that the TAO will complete the majority of its maintenance programme in PR3. Any volume shortfall in the maintenance programme will be disallowed.

### 1.4.1. Operations

**(PR2 €11.0m TAO €14.4m Recommended €10.5m)**

We recommend network operations costs of €10.5m based on 2009 costs with the payroll reduction in 2011 and efficiency factor of 2% per annum. This is in line with our recommendations on the capital and maintenance programme. We understand that CER allows a + or – 20% tolerance on these costs due to the variable nature of the work.

### 1.4.2. Planned Maintenance

**(PR2 €52.7 TAO €87.3m Recommended €68.1m)**

In PR3 the allowed costs should be adjusted for changes in volumes of maintenance work completed, either due to shortfall in the maintenance programme or due to changes in volumes of maintenance required. In this way the TAO will be able to retain savings associated with achieving lower than allowed unit costs, but not due to changes in volumes.

For the purpose of our recommendation we have assumed that new assets installed during PR3 will not require significant maintenance during PR3. Existing assets that have been replaced or upgraded are also likely to need less maintenance. We have therefore based our recommendation for planned maintenance expenditure of €68.1m on the requirements identified by the TAO in 2011 and applied payroll reduction in 2011 and an efficiency factor of 2% per year. We also consider that for pricing purpose we need to discount the maintenance costs by 10% which represents our assessment that the TAO will achieve a 90% of the maintenance programme, taking into account constraints and historic levels of performance.

We consider that the TAO may fall short of this target and that CER should monitor the programme annually and make adjustments to allowed revenue on a year by year basis. The review should take account of the revenue from generators for ongoing maintenance charges for connection assets owned by TAO.

In addition we would expect the TSO to review again their maintenance practices and intervals and bring them into line with best international practice as advised by their consultants.

### 1.4.3. Fault Maintenance

**(PR2 €8.28m TAO €6.2m Recommended €5.6m)**

We recommend fault maintenance costs of €5.6m based on the TAO's 2011 forecast with payroll reduction and efficiency factor of 2% per annum.

### 1.4.4. Professional Services

**(PR2 €25.0m TAO €24.3m Recommend €19.4m**

Professional Services have varied significantly over PR2 from €3.6m per year in 2007 to €7.0m per year in 2009. The TAO uses ESBI for many routine activities such as maintaining records and checking equipment before return to service after maintenance. We do not have a complete schedule of activities but accept the reduced level of cost of €4.2m in 2011 and have applied the payroll reduction and efficiency factor of 2% per year for these costs throughout PR3.

### 1.4.5. Telecom Fees

**(PR2 €6.4m TAO €9.0m Recommended €7.8m**

This item cover fees from ESB Telecoms for support of operational IT and telecoms services. These costs rose in PR2 from €0.9m in 2006 to €1.75m in 2009. Our forecast is based on the 2009 level with an efficiency factor applied.

### 1.4.6. Asset Management

**(PR2 €3.7m TAO €8.1m Recommended €5.1m)**

These costs include mast interference and forestry payments, which are increasing. The TAO (and DSO) has asked for these costs to be treated as pass through costs, which we do not recommend, as these costs are subject to some control and negotiation by ESB Networks. The TAO forecast includes an amount for retiring transmission assets which are not included in our recommended costs.

### 1.4.7. Other Controllable Costs

**(PR2 €17.3m TAO €22.0m Recommended €18.7m)**

Other controllable costs include legal, pension administration, insurance, company-wide costs and corporate charges. We accept the reduction proposed for corporate charges for 2011 and maintain other costs at appropriate PR2 levels, all with efficiency savings.

### 1.4.8. Non Controllable Costs

**(PR2 €88.0m TAO €96.9m Recommended €96.9m)**

A review of the global assets valuation was conducted by the Department of the Environment in 2008, which has dictated increased rates charges for the period from 2010 to 2014 inclusive. A further global valuation review is planned for 2015 onwards and we accept the estimated provision of 10% increases in rates charge in 2015 for tariff purposes.

Non Controllable Costs will be adjusted for outturn as the TAO has little control of these costs.

## 1.5. PR2 Network Capital Expenditure

The review of PR2 transmission network investments indicates that due to significant slippage in a number of major projects the PR2 investment profile differs significantly from the original PR2 submission and also CER’s PR2 allowances. This observation is presented in Table D below.

**Table D - Transmission Capital Expenditure 2006 – 2010**

| | Year | 2006 | 2007 | 2008 | 2009 | 2010 | Totals |
|---|---|---|---|---|---|---|---|
| Gross (after allowing for IDC) | CER Allowed | 145.30 | 114.32 | 96.82 | 103.83 | 118.53 | 578.80 |
| | Actual | 71.59 | 86.28 | 106.67 | 141.36 | 144.80 | 550.69 |
| | Interest During Construction (IDC) | -3.86 | -4.27 | -4.58 | -5.05 | -5.80 | -23.56 |
| | Actual (less IDC) | 67.73 | 82.01 | 102.09 | 136.31 | 139.00 | 527.13 |
| | Variance | 77.36 | 32.32 | -5.27 | -32.48 | -20.47 | 50.55 |
| Customer Contributions | CER Assumed | -17.14 | -11.78 | -10.62 | -7.75 | -7.79 | -55.08 |
| | Actual | -10.32 | -14.71 | -11.27 | -38.01 | -6.90 | -81.21 |
| | Variance | -6.83 | 2.93 | 0.65 | 30.26 | -0.89 | 26.13 |
| Net (after Customer Contributions) | CER Allowed | 128.15 | 102.54 | 86.20 | 96.08 | 110.74 | 523.71 |
| | Actual | 57.62 | 67.29 | 90.82 | 98.29 | 132.10 | 446.13 |
| | Variance | 70.53 | 35.24 | -4.62 | -2.22 | -21.36 | 77.58 |

Whilst increased investments towards the end of the PR2 period indicate that the shortfall against the PR2 capex allowances will be limited to just under €80m, i.e. a 17% shortfall, significant project cost overruns are evident due to material and labour cost increases and also due to project slippage and disruptions caused by site access issues. As a consequence it is estimated that only about 50% of the anticipated additional transmission network infrastructure will have been delivered during PR2. However, likely due to some slippage in generation connections and also demand growth there is little evidence of any reduction in customer quality although it is evident that the original PR2 submission was clearly optimistic with respect to network deliverability, particularly with respect to obtaining planning consents and land/site access.

Set against major issues associated with site access, particularly for new overhead line constructions, although additional costs have been incurred we are satisfied that network investments have been made in as efficient a manner as possible, noting the steep learning curve that both the TSO and TAO have been set against the changing economic and social environment. However, we expect that lessons will continue to be learned and that project delivery efficiency will further improve in order to meet the investment requirements of PR3.

## 1.6. PR3 Network Capital Expenditure

The recommended capital expenditure allowance for PR3 is presented in Table E below.

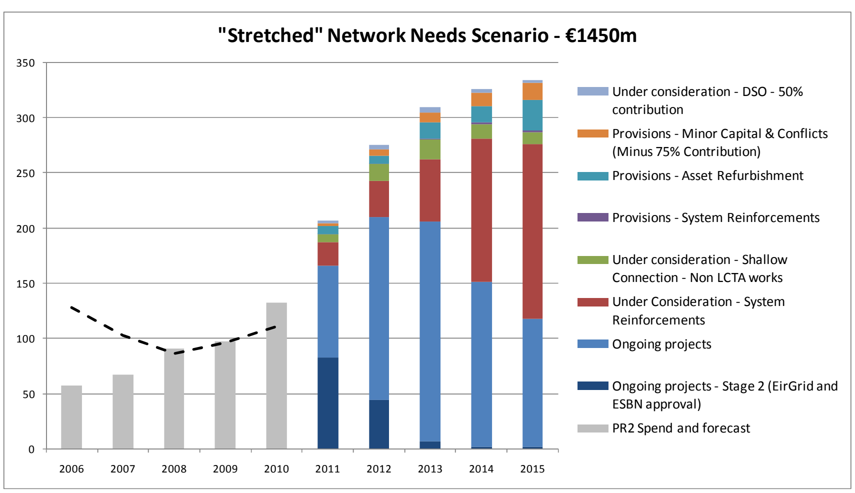
**Table E - Transmission Capital Expenditure 2006 – 2010**

| | Year | 2011 | 2012 | 2013 | 2014 | 2015 | Totals |
|---|---|---|---|---|---|---|---|
| **Proposed PR3 allowances (€m)** | **Load related** | 184.8 | 251.0 | 288.4 | 303.5 | 307.6 | **1335.3** |
| | **Non-Load related** | 32.1 | 30.3 | 29.2 | 30.0 | 27.6 | **149.1** |
| | **Gross Network capex** | 216.9 | 281.3 | 317.6 | 333.5 | 335.2 | **1484.4** |
| | **Customer contributions** | -10.5 | -6.3 | -8.4 | -7.8 | -1.4 | **34.4** |
| | **Net Network Capex** | **206.4** | **275.0** | **309.2** | **325.7** | **333.8** | **1450.0** |
| ***EirGrid submissions (Net network capex)*** | ***Network Needs*** | *296.4* | *431.1* | *508.8* | *488.3* | *384.8* | ***2,109.4*** |
| | ***Deliverability*** | *270.6* | *384.9* | *428.2* | *380.8* | *268.9* | ***1,733.5*** |
| | ***Affordability*** | *249.04* | *333.22* | *339.05* | *265.81* | *142.18* | ***1,329.3*** |

Table E above also lists the Network Capex associated with the three EirGrid scenarios for comparison purposes and the classical "planners droop" is evident post 2013 in all three EirGrid scenarios. These are considered somewhat unreasonable profiles given the longer term GRID25 planning horizon, e.g. 40% renewable by 2020, with its implicit longer term network investment planning objectives.

It should be noted that the capital expenditure allowances outlined above are based upon releasing significant additional transmission capacity from the existing network infrastructure by the adoption of somewhat modified transmission planning criteria, which basically accepts the risk of a small level of constraint (1-2%) on predominately renewable generation, and also the use of dynamic line rating techniques and also advanced protection/control schemes.

The investment requirements and associated profile for PR3 are presented below in a graphical format which is consistent with EirGrid submission format.




One of the key observations from this figure is the relatively low proportion of the proposed PR3 investment that is currently fully "in hand", i.e. in Stage 2 status. It is therefore imperative, even with this reduced and adapted investment profile that EirGrid progresses projects into and through the Stage 1 status and that the TAO are in a position to expedite the projects promptly.

### 1.7. Incentives for Capital Investment Delivery

We recommend an incentive linked to MW of connected generation based on overall lead times approved by CER. This approach avoids sub-optimisation over the various stages and encourages catch up where there is slippage in any one stage.

This incentive scheme should also be applied to the TAO, based on standard lead times from the point that the project is handed over to the TAO from TSO. The incentive should apply to all network capital works that deliver additional usable network capacity including the implementation of capacity enhancement measures such as Dynamic Line Rating and Advanced Protection Systems, noting that ownership and stewardship of these assets reside with the TAO.

The Capex Monitoring Report has been a very useful diagnostic tool during the course of this review. We understand that this was prepared at the request of CER however we are of the view that this is indicative of the sort of management information that should also be in place within the TSO and TAO. Accordingly, it is our suggestion that the Capex Monitoring Report should become a fully functional (i.e. formula based) tool that is shared document between the three main stakeholders, albeit with some improved clarity and quality control of inputs. As such it will act to highlight project issues and if updated regularly (at least monthly) by the responsible project managers it will allow additional management focus on problematic issues. The information contained within such report may also form a basis for appropriate incentivisation of individuals and also the licensed businesses

# 2. Introduction and Assumptions

## 2.1. Introduction

Conclusions and recommendations are included in the report in bold type and are summarised in Section 8.

This report reviews the Transmission Asset Owner (TAO) efficiency and operating costs, excluding network depreciation, over the PR2 period (2006 to 2010) and forecasts for the PR3 period (2011 to 2015). The review considers the costs, systems processes, and initiatives of the TAO over PR2 and identifies key issues to be considered in PR3. The report then reviews the TAOs proposals for expenditure in PR3 and makes recommendations on the level of expenditure to be allowed by CER and outputs and incentives.

## 2.2. Objectives

The objective of the review is to assess the TAO's performance in achieving the outputs required by CER during PR2 within CER's allowed costs. The review identifies any changes in circumstances put forward by the TAO and CER to explain any variances in outputs and costs and makes recommendations for adjustments to allowed costs. A further objective is to appraise the TAO forecast of operating costs for PR3. The report makes recommendations on the programme of works and expenditure to be allowed by CER.

The objective in setting allowed operating costs is to ensure that efficiency improvements continue to be made, to the benefit of customers. This should result in setting the TAO challenging but realistic and achievable targets and incentives, all the while moving closer to international best practice. Before proposing an appropriate level of opex, the review of both historic and forward looking opex needs to assess a number of issues:

- Historic trends in opex
- Comparison of actual opex against allowed opex
- Benchmark TAO opex against international comparators
- Evaluation of future required opex
- Impact of capex programme on opex requirements

## 2.3. Data Sources and Assumptions

All prices in this report are expressed as real prices at 2009 price levels, unless otherwise stated, based on the following inflation factors.

| | **2006** | **2007** | **2008** | **2009** | **2010-2015** |
|---|---|---|---|---|---|
| CPI Inflation factor | 4.0% | 4.9% | 4.1% | -4.5% | 0% |

CER allowed costs are as set out in the CER PR2 transmission decision paper[2] with annual adjustments made during the price control period by CER, for example due to higher than forecast number of connections and pass through items such as network rates.

The review has been informed by the TAO's response to the questionnaire on historic and forecast operating costs and associated information papers, together with further data provided by the TAO at meetings and from supplementary questions raised by CER and consultants. The review takes into account provisional outturn costs and performance for 2009. CER has also provided a significant amount of background information on previous price reviews and updated information during the period 2006 to 2010.

[2] CER Paper 05/143 2006 - 2010 Price Review Decision on Transmission Asset Owner and Transmission System Operator Revenues September 2005.

# 3. Review of Operating Costs

This section provides an analysis of the TAO's operating costs incurred in the period 2006 to 2010 (PR2) and reviews the TAO's forecast of operating costs for the period 2011 to 2015 ( PR3). The report makes recommendations for costs to be allowed by CER in PR3 and outputs and incentives.

- **Table 1 -** TAO Operating Costs 2006 to 2015 €m 2009 Prices

| | CER PR2 Allowed | Var PR2 Outturn Vs CER Allowed | TAO PR2 Projected Outturn | TAO PR3 Forecast | Var PR3 Forecast Vs PR2 Outturn | PR3 Recommended | Var Recommend Vs TAO Forecast |
|---|---|---|---|---|---|---|---|
| Operations | 16.10 | -5.15 | 10.95 | 14.44 | 3.49 | 10.52 | -3.92 |
| Planned maintenance | 62.30 | -9.64 | 52.66 | 87.26 | 34.60 | 68.09 | -19.17 |
| Fault maintenance | 8.33 | -0.05 | 8.28 | 6.19 | -2.09 | 5.62 | -0.57 |
| Professional Services | 25.75 | -0.73 | 25.03 | 24.30 | -0.73 | 19.43 | -4.87 |
| Telecom Fees | 8.12 | -1.68 | 6.44 | 9.00 | 2.56 | 7.60 | -1.40 |
| Asset Management | 5.00 | -1.27 | 3.73 | 8.07 | 4.33 | 5.05 | -3.01 |
| Legal | 1.11 | -0.69 | 0.42 | 2.00 | 1.58 | 1.00 | -1.00 |
| Pension | 0.00 | 0.47 | 0.47 | 1.74 | 1.26 | 0.69 | -1.05 |
| Insurance | 1.55 | 0.00 | 1.55 | 1.38 | -0.17 | 1.38 | 0.00 |
| Company Wide Costs | 2.44 | -0.07 | 2.38 | 2.53 | 0.15 | 2.15 | -0.38 |
| Corporate Charges i& Corp Affair | 11.66 | 1.23 | 12.89 | 11.78 | -1.11 | 11.01 | -0.77 |
| Other | 11.76 | -12.18 | -0.42 | 2.53 | 2.95 | 2.50 | -0.03 |
| **Controllable Costs** | **154.13** | **-29.74** | **124.39** | **171.21** | **46.83** | **135.03** | **-36.19** |
| Rates | 82.61 | 0.00 | 82.61 | 92.86 | 10.25 | 92.86 | 0.00 |
| CER Levy | 5.37 | 0.00 | 5.37 | 4.00 | -1.37 | 4.00 | 0.00 |
| **Non Controllable Costs** | **87.98** | **0.00** | **87.98** | **96.86** | **8.88** | **96.86** | **0.00** |
| **Total Operating Costs** | **242.11** | **-29.74** | **212.37** | **268.07** | **55.71** | **231.89** | **-36.19** |

Table 1 provides a summary of TAO operating costs, excluding depreciation, from 2006 to 2015, comparing CER allowed costs for PR2, TAO PR2 outturn costs, TAO forecasts for PR3 and our recommendations for allowed costs for PR3.

Allowed non controllable costs are adjusted to outturn as these costs are not under the control of the TAO.

## 3.1. Overview of Operating Costs 2006 – 2010

This section looks at the TAO's historical operating expenditure to determine whether the TAO's actual and proposed expenditure is prudent and offers value for money to customers.

The CER PR2 decision paper set out the TAO's allowed operating expenditure period 2006-2010. Certain items of this expenditure are classed as pass through costs which are adjusted year on year in line with outturn, for example network rates.

The following table summarises actual operating expenditures made by the TAO against the CER's allowed operating expenditure, taking account of all adjustments that were allowed in the annual revenue calculations over the control period.

- **Table 2 -** CER Allowed Opex Vs TAO Actual Opex by Activity 2006 – 2010 €m 2009 Prices

| | CER Allowed | PR2 Outturn | Variance |
|---|---|---|---|
| Operations | 16.10 | 10.95 | -5.15 |
| Planned maintenance | 62.30 | 52.66 | -9.64 |
| Fault maintenance | 8.33 | 8.28 | -0.05 |
| Professional Services | 25.75 | 25.03 | -0.73 |
| Telecom Fees | 8.12 | 6.44 | -1.68 |
| Asset Management | 5.00 | 3.73 | -1.27 |
| Legal | 1.11 | 0.42 | -0.69 |
| Pension | 0.00 | 0.47 | 0.47 |
| Insurance | 1.55 | 1.55 | 0.00 |
| Company Wide Costs | 2.44 | 2.38 | -0.07 |
| Corporate Charges & Corp | 11.66 | 12.89 | 1.23 |
| Other | 11.76 | -0.42 | -12.18 |
| **Controllable Costs** | **154.13** | **124.39** | **-29.74** |
| | | | |
| Network Rates | 82.61 | 82.61 | 0.00 |
| CER Levy | 5.37 | 5.37 | 0.00 |
| **Non Controllable Costs** | **87.98** | **87.98** | **0.00** |
| **Total** | **242.11** | **212.37** | **-29.74** |

Table 2 excludes network depreciation, and exceptional costs.

In addition to the expenditure in Table 2 ESB Networks has also funded from its own resources severance costs of €135m which have contributed to net staff reductions of 287 from 3758 to 3471 across ESB Networks as a whole, covering DSO and TAO activities.

Pension deficit costs of €201m have also been incurred for ESB Networks as a whole and CER is considering separately whether these costs should be borne by customers through DUoS and TUoS.

- **Table 3 -** CER Allowed Opex Vs TAO Actual Opex by Source 2006 – 2010 €m 2009 Prices

**Summary of TAO Operating Costs by Cost Source €m 2009 Prices**

| | CER Allowed | PR2 Outturn | Variance |
|---|---|---|---|
| Payroll costs | 38.45 | 37.37 | -1.08 |
| Materials and Goods for Resale | 18.56 | 7.25 | -11.31 |
| Contractors | 4.76 | 8.67 | 3.91 |
| Transport and Communications | 2.49 | 0.01 | -2.48 |
| Premises | 0.03 | 0.48 | 0.45 |
| IT Costs | 0.86 | 0.21 | -0.65 |
| Professional Services | 25.77 | 29.46 | 3.70 |
| Business Insurance and Legal | 2.99 | 0.00 | -2.99 |
| Other | 22.98 | 16.49 | -6.48 |
| Inter BU - Shared Services | 7.18 | 0.03 | -7.14 |
| Inter BU - Corporate Centre | 11.22 | 15.28 | 4.06 |
| Inter Business Unit - Other | 17.29 | 7.54 | -9.76 |
| **Controllable Costs** | **152.58** | **122.80** | -29.77 |
| Network Rates | 82.61 | 82.61 | 0.00 |
| Insurance | 1.55 | 1.55 | 0.00 |
| CER Levy | 5.37 | 5.37 | 0.00 |
| **Non Controllable Costs** | **89.53** | **89.53** | **0.00** |
| **Total Opex** | **242.11** | **212.34** | **-29.77** |

Table 3 provides an alternative analysis of the TAO's operating costs by source of costs and is a break out of the activity costs into cost source categories.

**The TAO's PR2 operating costs of €212.4m are €29.7m lower than the allowed costs of €242.1m. The TUoS tariffs over PR2 are based on the allowed expenditures and we recommend that allowed operating costs for PR2 be reduced by €25.04m, as these savings are due to windfall gains and not efficiency savings.**

**The under spend is partly due to an under spend on transmission maintenance of €9.6m which arises due to under achievement of the planned maintenance programme and associated under spend on field operations of €3.2m.**

**The remainder of the under spend is due to the over- provision of allowed Other costs in PR2 of €12.2m, which may have been partly due to the uncertainty at that time of the split of responsibilities and costs between the TAO and TSO, which were later clarified under the Infrastructure Agreement[3].**

The TAO has accepted that there were some windfall gains in PR2 for the reasons stated above and that much of the under spend is not due to efficiency savings.

[3] Infrastructure Agreement ESB Networks and EirGrid 14 March 2006.

The allowed costs were set at the time the TAO and EirGrid were separating out TAO and TSO activities and before the detailed arrangements had been concluded in the Infrastructure Agreement. The allowed costs may therefore have included some inaccuracies.

There appears to be a mismatch in the alternative presentation of costs by activity Table 2 and by cost source, Table 3 e.g. allowed materials of €18.6m compared with the TAO PR2 forecast of €11m.

The under spend on overheads of €19.3m on Inter – Business Unit charges and Other expenditure (Table 3) is also considered to include an over – provision of allowed costs.

The allowed Other costs (Table 3) of €4.3m in 2006 reducing at 2% per year thereafter (2004 prices) is understood to include Telecom costs. The CER PR2 decision paper (page 9 – 15) made particular reference to the need to review telecom costs to ensure that there was no duplication of costs between TAO and TSO. It is understood that SCADA costs were allowed in the TAO costs but the TSO was allocated these assets under the Infrastructure Agreement. Operational telecom facilities (Optel) were retained by the TAO and not transferred to the TSO. In the event the allowed costs of €22.9m (2009 prices) have been under spent by €6.5m.

PR2 allowed costs (Table 3) included a provision for “Inter Business Unit Other” costs of €17.29m (2009 prices) which has been under spent by €9.76m. The outturn costs are mainly ESB Telecoms costs and this allocation appears to have been duplicated and also allowed under the “Other” (Table 3) category.

It is understandable how these allowed costs were established at the time, but the situation should now be rectified by disallowing allowed costs not expended during PR2.

### 3.2. Assessment of Operating Costs 2006 to 2010

The TAO faced a number of pressures during PR2, including an unprecedented increase in new connections and pressure on input prices caused by overheating of the World economy during 2006 and 2007.

The cost pressures encountered by the TAO during PR2 are summarised in Appendix B. We have reviewed the evidence provided on cost increases and have noted a significant increase in material prices during PR2, in particular metal prices and electrical equipment, which have a greater impact on capex than opex.

The TAO implemented a number of efficiency and service initiatives listed in Appendix A.

Three major IT systems have been implemented for asset and work management, and mobile data. The DSO has gained PAS 55 accreditation for asset management for its distribution activities and follows similar processes for transmission. However PAS 55 accreditation was not sought for transmission activities due to the complex interface between the TAO and TSO.

ESB Networks has undertaken significant re-organisation in PR2, reducing the number of directors from 9 – 7 directors, the number of divisions from 7 – 5 divisions and depot rationalisation from 81 to 60 depots.

### 3.2.1. Operations and Maintenance Costs

#### 3.2.1.1. Operations Expenditure

**(Allowed €16.1m Outturn €11m)**

This cost item includes operational switching, station attendance, fault location, and a range of other services. The under spend on these items is similar to the reduction in costs of area operations in distribution and may be due to reorganisation of activities and reduced switching due to the shortfall in the planned maintenance programme. We understand that CER allows a + or – 20% tolerance on these costs due to the variable nature of the work.

#### 3.2.1.2. Planned Maintenance

**(Planned Maintenance Allowed €62.3m Outturn €52.7m)**

A breakdown of planned and fault maintenance costs is shown in Table 4 .

- **Table 4 -** Planned and Fault Maintenance Costs

| | 2006 | 2007 | 2008 | 2009 | 2010 | Total PR2 |
|---|---|---|---|---|---|---|
| *Planned Maintenance* | | | | | | |
| Overhead Lines | 4.19 | 4.53 | 5.27 | 5.35 | 5.73 | 25.06 |
| Underground Cables | 0.72 | 0.35 | 0.17 | 0.05 | 0.05 | 1.33 |
| Switchgear | 0.98 | 0.99 | 0.84 | 1.04 | 1.12 | 4.97 |
| Transformers | 0.28 | 0.63 | 0.48 | 0.10 | 0.10 | 1.59 |
| Substations | 2.64 | 3.38 | 3.16 | 3.44 | 3.68 | 16.30 |
| Other | 1.57 | 0.43 | 0.71 | 0.31 | 0.33 | 3.34 |
| Total | **10.37** | **10.31** | **10.62** | **10.27** | **11.01** | **52.66** |
| *Fault Maintenance* | | | | | | |
| Overhead Lines | 0.10 | 0.12 | 0.14 | 0.19 | 0.14 | 0.68 |
| Underground Cables | 0.19 | 0.95 | 0.68 | 0.71 | 0.52 | 3.04 |
| Substations | 0.82 | 1.25 | 1.07 | 0.79 | 0.58 | 4.51 |
| Total | **1.11** | **2.31** | **1.88** | **1.69** | **1.23** | **8.28** |

2010 Estimated Pro Rata

Planned maintenance costs of €62.3m are €9.6m lower than the allowed costs of €52.7m, mainly due to under-achievement of the substation maintenance programme.

The TAO planned maintenance programme is based on TSO policies agreed between the TSO and TAO, which defines the work tasks required and the inspection and maintenance frequencies. The TAO therefore has little control over the work requirement but has the opportunity to gain incentive rewards by reducing unit costs beyond those used as a basis for allowed costs. Efficiency savings of 1% per annum were included in the CER allowed unit costs for PR2.

**However, the under spend on planned maintenance does not reflect efficiency savings but reflects the shortfall in the achievement of the planned maintenance programme, particularly on substation maintenance, where only 67% of maintenance tasks required by TSO policies were completed in the period 2006 to 2008. Due to restrictions on outage availability and other**

**constraints not all maintenance required by the policies could be programmed. Over 80% of scheduled maintenance was achieved. See Tables 5 and 6 below.**

- **Table 5 -** Maintenance Tasks Completed Compared with Tasks Programmed.

| YEAR | STATIONS % COMPLETED | LINES % COMPLETED | CABLES % COMPLETED | OVERALL % COMPLETED |
|---|---|---|---|---|
| 2005 | 89 | 90 | 82 | 89 |
| 2006 | 79 | 94 | 83 | 86 |
| 2007 | 74 | 98 | 90 | 84 |
| 2008 | 89 | 93 | 88 | 91 |
| 2009 (part) | 89 | 78 | 86 | |

Table 5 shows the number of tasks completed compared with the number of tasks programmed. However, not all maintenance was programmed and Table 6 compares tasks completed with the number required from the maintenance standard.

- **Table 6 -** Sub Station Tasks Completed Compared with Maintenance Standard Requirements

| Year | NUMBER TO BE MAINTAINED FROM COMPANY STANDARD | NUMBER PROGRAMMED (% of Standard) | NUMBER COMPLETED (% of Standard) |
|---|---|---|---|
| 2005 | 1508 | 1413 (94%) | 1048 (69%) |
| 2006 | 1869 | 1741 (93%) | 1178 (63%) |
| 2007 | 1806 | 1806 (100%) | 1224 (68%) |
| 2008 | 1507 | 1317 (87%) | 996 (66%) |
| 2009 | 1541 | 1179 | 878 |

- It should also be noted be noted that there is no evidence that any overdue items are included in the following year.
- For individual items of equipment the % completed can be as low as 18% - Ordinary Service on all cubicles containing GIS switchgear 2008.
- Of particular concern is the under achievement of maintenance on Ordinary Service on 110kV cubicles containing Air Blast or Minimum Oil switchgear 32% only completed in 2007 with only 19% of Ordinary Service on 220 or 400kV cubicles containing SF6 switchgear completed in that year.
- It is not clear what impact the new maintenance policy revised in 2008 has had on the numbers of units programmed for 2009 and 2010. The numbers of items in Stations programmed for 2009 and 2010 are very similar to those of 2005.
- There is no evidence of the level of maintenance work being reduced by the refurbishment/replacement programmes that have been carried out and in progress on CAPEX between 2006 and 2010.

- The Maintenance Costs in the Unit Cost schedule seem to be higher than expected.

### 3.2.2 Efficiency of Planned Maintenance

- **Table 7 -** Efficiency of Substation Maintenance

| | | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|
| Standard Cost for Completed Units (€) | | €8,481,828 | €8,938,468 | €9,100,949 | €9,195,093 |
| Outturn Costs (€) | | €10,000,000 | €10,400,000 | €11,100,000 | €10,300,000 |
| Variance | (€) | €1,518,172 | €1,461,532 | €1,999,051 | €1,104,907 |
| | (%) | 18% | 16% | 22% | 12% |

Table 7 shows the actual planned maintenance costs compared with costs based on standard unit costs provided by the TAO for the 4 years for which actual completed unit numbers are available. This indicates that the expenditure on maintenance exceeds the calculated figure in every year.

We do not have a detailed breakdown of maintenance costs for overheads lines but note that the completion of overhead line task tree cutting costs averages 94% for the complete years of 2006 to 2008.

Overhead line maintenance includes tree cutting and ESB Networks tree cutting costs increased during PR2 due to health and safety requirements. However tree cutting cost per km compares favourably with those of GB DNOs. The TAO forecasts of tree cutting for PR3 include a 7% reduction in contract prices.

### 3.2.2. Review of Maintenance Practices

We have reviewed some aspects of maintenance practices of TSO/ TAO, which is included as Appendix C.

In 2008 a review of maintenance intervals was undertaken by a joint committee of TAO and EirGrid. An international expert was brought in to advise the committee. The recommendations were finalised during 2009 and are now being applied to the maintenance programme. However, the changes made did not go as far as the consultant recommended resulting in more extensive maintenance being applied than is considered appropriate, based on best industry practice.

The schedules within the policy are described as “minimum maintenance activities and the frequencies at which they shall be performed”, this assume that all equipment of a given type and technology requires the same degree and frequency of maintenance. Many utilities have recognised that maintenance should be established for each type of equipment based on specific design features and operational experience. [e.g. CIGRE Paper B3-106 2008].

For example the policy recommends that the major maintenance intervals for circuit breakers should be 8 years for critical switchgear and 10 years for non-critical switchgear. These intervals not taking into account the differences between equipment designs and the lower maintenance needs of more modern equipment which require shorter maintenance intervals.

Manufacturers typically specify 12 years for major maintenance intervals or suggest that maintenance is only required based on diagnostic checks. This applies not only to recent equipment but also to equipment where manufacturers initially suggested more frequent intervals. As described in CIGRE Paper B3-103 2006, SF6 breaker maintenance intervals of 12 years are also common from a utility perspective.

SF6 filled equipment are required according to have Dew points checked in all compartments.  Such a requirement is seen as unnecessary.

#### 3.2.2.1. Fault Maintenance

**(Fault Maintenance Allowed €8.3 Outturn €8.3)**

Fault maintenance costs were allowed at 12 % of total maintenance costs and the outturn is close to allowed costs of €8.3m.

### 3.2.3. Professional Services

**(Allowed €25.8m Outturn €25.03m**)

Professional Services are almost wholly ESBI costs associated with provision of technical services such as maintaining records, provision of advice on technical matters, managing overhead line infringements.  ESBI also provide support during routine planned maintenance by inspecting equipment before it is returned to service.

In our view these core activities could be provided more effectively and with better control of costs from within ESB Networks.

### 3.2.4. Telecoms

**(Allowed €8.1m Outturn €6.4m)**

Telecoms costs appear are lower than forecast

### 3.2.5. Asset Management

**(Allowed €5m Outturn €3.7m)**

The majority of the asset management costs are associated with mast interferences and forestry payments and are increasing due to pressure from landowners.

### 3.2.6. Corporate Costs

**(Allowed €14.1m Outturn €15.3m)**

Corporate charges and company-wide costs are allocated according to a basket of measures and are overspent by €1.1m.

### 3.2.7. Other Costs

**(Allowed €11.8m Outturn -€0.4m)**

As discussed in Section 3.1 there appears to have been an over-provision of allowed Other costs.

### 3.2.8. Non Controllable Costs

Non Controllable Costs of €88.0m are allowed as pass through items and consists mainly of Network Rates (€82.6m), which represent 38.7% of the TAO operating costs.

## 3.3. Operating Costs 2011 to 2015

This section considers the operating costs proposed by the TAO for the period 2011 to 2015 and makes recommendations for allowed operating costs taking into account efficiencies that we consider to be achievable in PR3.

### 3.3.1. Aims and Assumptions for Operating Costs 2011 to 2015

ESB Networks has indicated that it has responded to the current economic climate and believes that the DSO and TAO submission is in keeping with the times and has provided details of the underlying assumptions behind its PR3 forecast.

#### 3.3.1.1. Assumptions on growth of assets

The TAO's activities are mainly associated with operation and maintenance of the transmission assets. Any change in the volume of activity is largely driven by the increase in the asset base arising from the TSO's capital programme.

The TSO's capital and operating cost forecasts are based on a recovery of the Irish economy. ESRI, in its most recent medium term publication, *Recovery Scenarios for Ireland*, is predicting that if the world economy recovers significant momentum by 2011, which is widely anticipated, then the Irish economy can be expected to grow quite rapidly in the 2011-2015 period, averaging over 5 per cent per year to 2015. This growth will be both intensive and extensive. EirGrid forecast of electricity demand is based upon underlying macroeconomic projections and taking into account sectoral shifts, energy intensity and household formation. EirGrid is predicting steady energy demand growth in the second half of the 2011-15 control period with an average annual growth in units of 2.3% per year over the period. This is consistent with the assumptions made by ESB Networks.

The TAO's assumption of an increase in units of 2.85% is considered to be high in view of the economic circumstances and we agree with the TAO that there is likely to be no increase in peak demand throughout PR3.

The reinforcement element of the TSO's capital programme is not driven by increase in units. The TSO's capital programme is dominated by renewable generation connections and associated transmission system reinforcement.

The TAO forecasts are based on assumptions of the growth of assets arising from the "Network Needs" capital programme of €2bn put forward by the TSO. Our recommendations for TAO operating costs are consistent with our recommendations for a transmission capital programme of €1.45bn, details of which are contained in our report on Transmission Operator Costs. However, the maintenance requirements of new assets are not significant in the short term and the programme has been reduced accordingly.

#### 3.3.1.2. Modelling Assumptions

The TAO has provided a summary of modelling inflation and productivity assumptions as set out in Table 8 below:

- **Table 8 -** TAO Modelling Assumptions

| Assumptions/Notes | | | | | | |
|---|---|---|---|---|---|---|
| Latest ESRI Data | 2011 | 2012 | 2013 | 2014 | 2015 | |
| CPI | 2.6% | 2.6% | 2.6% | 2.6% | 2.6% | avg 2.6% over 11-15 from ESRI based on "Pathway to Recovery" ESRI publication |
| | | | | | | |
| | 2011 | 2012 | 2013 | 2014 | 2015 | |
| **Contractor Rates** | | | | | | |
| OverHead Line Work | | | | | | |
| LVR | +3.5% | +3.5% | +3.5% | +3.5% | +3.5% | |
| MV | +3.4% | +3.4% | +3.4% | +3.4% | +3.4% | |
| 38kV | +2.7% | +2.7% | +2.7% | +2.7% | +2.7% | |
| 110kV | +2.7% | +2.7% | +2.7% | +2.7% | +2.7% | |
| Stations Electrical Work | | | | | | |
| 38kV & 110kV | +2.1% | +2.1% | +2.1% | +2.1% | +2.1% | |
| Civils Work | +2% | +2% | +2% | +2% | +2% | |
| **Material Rates** | CPI | CPI | CPI | CPI | CPI | |
| **Wage Rates** | CPI | CPI | CPI | CPI | CPI | |

Overall the forecasts of input prices are 1% higher than CPI for Low voltage and Medium voltage line work and CPI or less in other areas.

The TAO has assumed a productivity improvement of 1% per annum.

This compares with Ofgem GB forecasts of RPI plus 1.4% per annum increase in input prices and 1% productivity improvement. However GB has not seen the level of deflation seen in Ireland in 2009.

**Efficiency Stretch**

ESBN has also indicated that after modelling to these assumptions it has included €60m efficiency stretch applied across the cost base, ie savings which have not yet been identified to specific initiatives. ESBN has also identified €15m additional revenue from commercial activities.

The TAO has not indicated that any additional efficiency stretch has been applied to its forecast operating costs and this has been taken into account in our assessment.

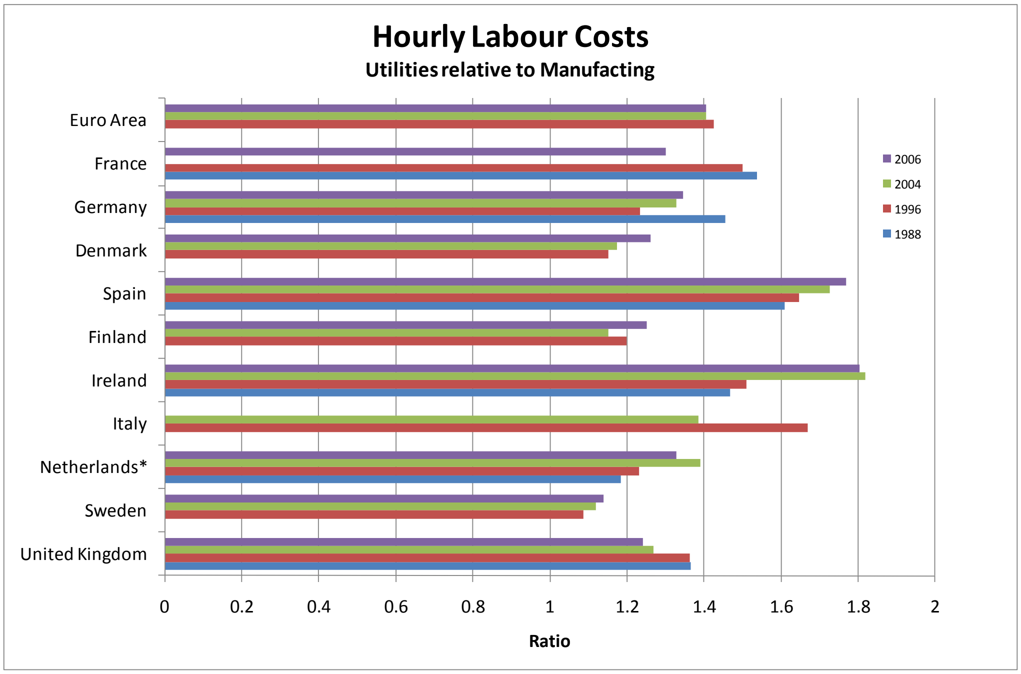
#### 3.3.1.3. SKM Assumptions

**Payroll Costs**

**The TAO's assumption that internal labour costs will be maintained at CPI is considered to be too conservative in the present economic climate and when compared with pay reductions elsewhere in the Irish economy. Our recommendations are based on a reduction in payroll costs of 5% pa in 2011, which is approximately equivalent to a reduction of 1.75% in controllable costs.**

We have also considered relative payroll costs of the TAO. Figure 1 shows the hourly payroll costs for the Utilities sector in Ireland compared with manufacturing for a number of European countries and EU area average[4]. This shows that the ratio of Utilities to Manufacturing hourly payroll costs in Ireland is 1.8 compared with an EU Area average of 1.4. The gap is becoming wider in Ireland, whereas in many other countries exposure of Utilities to competition (or regulation) has reduced the gap over the last 20 years.

- **Figure 1 -** Utility Labour Costs Relative to National Industry [5]




**Services Provided from ESB Corporate and Other ESB Entities**

The assumptions on input prices do not include the whole of the TAO cost base. 22% of TAO operating costs derive from other parts of ESB Group, including ESB Corporate, ESB ITS, ESB Telecoms and ESBI.

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[4] Eurostat statistics

[5] Data for 2004 and 2006 from Eurostat http://ec.europa.eu/eurostat/. Data for 1988 and 1996 Economic and Social Research Institute Ireland.

The TAO has explained that it has made economies in its own costs during PR2; however, there is no evidence of the same level of efficiency improvement in these internal services. These services are provided at cost, or in many cases at market rates, and the TAO considers that it is not necessary to provide extensive details of the margin on these services.

ESBI's own benchmarking indicates reasonable day rates but longer times to deliver services. In any event commercial day rates do not appear to be appropriate for enduring contracts for services that could equally be provided in-house with no added margin.

In addition, much of the costs from other parts of ESB Group consist of payroll costs which are now out of line with the Irish economy in the same way as the TAO business.

**In making recommendations for allowed costs we have taken excess margin and payroll costs into account when assessing those costs from other parts of ESB Group.**

**Productivity**

**The TAO has assumed a productivity increase of 1% per annum over PR3. The ESRI Medium Term Review 2008[6] forecasts that the average productivity of the Irish economy to be 2.5% per annum over the period 2011 to 2015. The TAO's activities are highly mechanised and are supported by a significant level of IT investment. There has also been significant reorganisation and staff reduction in PR2 and potential for more in PR3. Much of these developments have occurred in the latter part of PR2 and the full effect is not reflected in costs.**

ESB Networks is operating a voluntary selective severance scheme in 2009 and 2010 and will lose 287 staff (net) over the whole of PR2, while further staff reductions of 329 are forecast for PR3, which is equivalent to a saving of around €45m per year by 2015.

**Overall we have included an efficiency saving of 2% per year on most controllable costs taking into account the potential for productivity savings, alignment of salaries in the TAO organisation and the reduction in margin of its internal service providers.**

**Our recommendation for allowed costs is an overall settlement and is not dependent on individual line items and the recommendation is based on what is considered to be efficient overall.**

**Benchmarking**

Benchmarking has been carried out by both TAO and SKM and is considered in more detail in Section 4.

**Benchmarking of ESB Networks DSO and 110 kV TAO opex and non network capex for indicates that the DSO costs are 7.5% above the Upper Quartile of the GB DNO costs and 16 % above the efficiency frontier. This is consistent with our recommendations for allowed costs.**

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[6] Economic and Social Research Institute Medium Term Review 2008 – May 2008

**The DSO appears to be closing the efficiency gap with the GB DNOs and has implemented a number of measures adopted by the GB DNOs in the last 15 years. However there is insufficient evidence to conclude that the DSO is at the efficiency frontier and much evidence to indicate that significant further efficiency improvements are available.**

**It is evident that benchmarking becomes more difficult as the DSO approaches GB efficiency levels. Whereas it was easy to identify a large efficiency gap in PR1 and PR2 by benchmarking, this is now more difficult as the gap narrows.**

### 3.3.2. Summary of Operating Costs 2011 to 2015

Table 9 summarises the proposals of the TAO's for operating costs in PR3 and our recommendation for allowed costs.

- **Table 9 -** Summary of TAO Forecast and Recommended Allowed Operating Costs 2011 to 2015

| | CER PR2 Allowed | Var PR2 Outturn Vs CER Allowed | TAO PR2 Projected Outturn | TAO PR3 Forecast | Var PR3 Forecast Vs PR2 Outturn | PR3 Recommended | Var Recommend Vs TAO Forecast |
|---|---|---|---|---|---|---|---|
| Operations | 16.10 | -5.15 | 10.95 | 14.44 | 3.49 | 10.52 | -3.92 |
| Planned maintenance | 62.30 | -9.64 | 52.66 | 87.26 | 34.60 | 68.09 | -19.17 |
| Fault maintenance | 8.33 | -0.05 | 8.28 | 6.19 | -2.09 | 5.62 | -0.57 |
| Professional Services | 25.75 | -0.73 | 25.03 | 24.30 | -0.73 | 19.43 | -4.87 |
| Telecom Fees | 8.12 | -1.68 | 6.44 | 9.00 | 2.56 | 7.60 | -1.40 |
| Asset Management | 5.00 | -1.27 | 3.73 | 8.07 | 4.33 | 5.05 | -3.01 |
| Legal | 1.11 | -0.69 | 0.42 | 2.00 | 1.58 | 1.00 | -1.00 |
| Pension | 0.00 | 0.47 | 0.47 | 1.74 | 1.26 | 0.69 | -1.05 |
| Insurance | 1.55 | 0.00 | 1.55 | 1.38 | -0.17 | 1.38 | 0.00 |
| Company Wide Costs | 2.44 | -0.07 | 2.38 | 2.53 | 0.15 | 2.15 | -0.38 |
| Corporate Charges i& Corp Affair | 11.66 | 1.23 | 12.89 | 11.78 | -1.11 | 11.01 | -0.77 |
| Other | 11.76 | -12.18 | -0.42 | 2.53 | 2.95 | 2.50 | -0.03 |
| **Controllable Costs** | **154.13** | **-29.74** | **124.39** | **171.21** | **46.83** | **135.03** | **-36.19** |
| Rates | 82.61 | 0.00 | 82.61 | 92.86 | 10.25 | 92.86 | 0.00 |
| CER Levy | 5.37 | 0.00 | 5.37 | 4.00 | -1.37 | 4.00 | 0.00 |
| **Non Controllable Costs** | **87.98** | **0.00** | **87.98** | **98.24** | **8.88** | **96.86** | **0.00** |
| **Total Operating Costs** | **242.11** | **-29.74** | **212.37** | **269.45** | **55.71** | **231.89** | **-36.19** |

**The TAO's forecast of operating expenditure in the PR3 period (2010 to 2015) is €269m, which is €56m greater than the equivalent PR outturn of €212m.**

**The additional costs forecast by the TAO of €56m include an additional €35m for planned maintenance associated with the increase in the asset base from an assumed capital programme of €2bn.**

**Our recommendation is for allowed PR3 operating costs of €231.9m, which is €36.2m lower than the TAO's PR3 forecast and €19.5m more than the equivalent PR2 outturn, on the basis that the TAO will complete the majority of its maintenance programme in PR3. It is recommended that any volume shortfall in the maintenance programme should be disallowed.**

Details of the derivation of our recommendations are set out below:

- **Table 10 -** Summary of TAO Forecast and Recommended Operating Costs 2011 to 2015

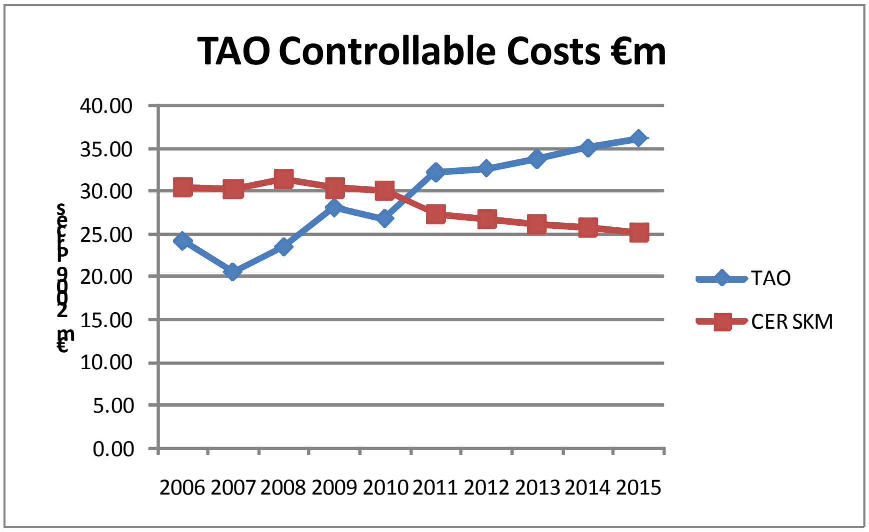
| | 2009 Actual | 2011 | 2012 | 2013 | 2014 | 2015 | TAO PR3 Forecast | PR2 Outturn | Variance PR3-PR2 | Variance % |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *TAO Forecast* | | | | | | | | |
| Operations | 2.3 | 2.90 | 2.89 | 2.88 | 2.87 | 2.89 | 14.4 | 11.0 | 3.5 | 31.9% |
| Planned maintenance | 10.3 | 16.36 | 16.62 | 17.26 | 18.11 | 18.92 | 87.3 | 52.7 | 34.6 | 65.7% |
| Fault maintenance | 1.7 | 1.22 | 1.22 | 1.24 | 1.25 | 1.27 | 6.2 | 8.3 | -2.1 | -25.2% |
| Professional Services | 7.0 | 4.20 | 4.40 | 4.80 | 5.30 | 5.60 | 24.3 | 25.0 | -0.7 | -2.9% |
| Telecom Fees | 1.6 | 1.80 | 1.80 | 1.80 | 1.80 | 1.80 | 9.0 | 6.4 | 2.6 | 39.7% |
| Asset Management | 0.8 | 1.60 | 1.60 | 1.61 | 1.62 | 1.63 | 8.1 | 3.7 | 4.3 | 116.2% |
| Legal | 0.2 | 0.41 | 0.40 | 0.40 | 0.40 | 0.39 | 2.0 | 0.4 | 1.6 | 373.3% |
| Pension | 0.0 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 1.7 | 0.5 | 1.3 | 267.5% |
| Insurance | 0.7 | 0.28 | 0.28 | 0.28 | 0.27 | 0.27 | 1.4 | 1.6 | -0.2 | -11.2% |
| Company Wide Costs | 0.5 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 2.5 | 2.4 | 0.2 | 6.5% |
| Corporate Charges i& Corp Affairs | 2.6 | 2.38 | 2.37 | 2.36 | 2.34 | 2.33 | 11.8 | 12.9 | -1.1 | -8.6% |
| Other | 1.1 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 2.5 | -0.4 | 3.0 | -699.7% |
| **Controllable Costs** | **28.8** | **32.5** | **32.9** | **34.0** | **35.3** | **36.5** | **171.2** | **124.4** | **46.8** | 37.6% |
| | **2009 Actual** | **2011** | **2012** | **2013** | **2014** | **2015** | **PR3 Recommended** | **TAO PR3 Forecast** | **Variance Recomend vs TAO Forecast** | **Variance %** |
| | | *Recommended* | | | | | | | | |
| Operations | 2.3 | 2.19 | 2.15 | 2.10 | 2.06 | 2.02 | 10.5 | 14.4 | -3.9 | -27.2% |
| Planned maintenance | 10.3 | 14.17 | 13.89 | 13.61 | 13.34 | 13.07 | 68.1 | 87.3 | -19.2 | -22.0% |
| Fault maintenance | 1.7 | 1.17 | 1.15 | 1.12 | 1.10 | 1.08 | 5.6 | 6.2 | -0.6 | -9.1% |
| Professional Services | 7.0 | 4.04 | 3.96 | 3.88 | 3.81 | 3.73 | 19.4 | 24.3 | -4.9 | -20.1% |
| Telecom Fees | 1.6 | 1.58 | 1.55 | 1.52 | 1.49 | 1.46 | 7.6 | 9.0 | -1.4 | -15.6% |
| Asset Management | 0.8 | 1.01 | 1.01 | 1.01 | 1.01 | 1.01 | 5.1 | 8.1 | -3.0 | -37.4% |
| Legal | 0.2 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 1.0 | 2.0 | -1.0 | -50.1% |
| Pension | 0.0 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.7 | 1.7 | -1.1 | -60.5% |
| Insurance | 0.7 | 0.28 | 0.28 | 0.28 | 0.27 | 0.27 | 1.4 | 1.4 | 0.0 | 0.0% |
| Company Wide Costs | 0.5 | 0.45 | 0.44 | 0.43 | 0.42 | 0.41 | 2.1 | 2.5 | -0.4 | -15.2% |
| Corporate Charges & Corp Affairs | 2.6 | 2.29 | 2.25 | 2.20 | 2.16 | 2.11 | 11.0 | 11.8 | -0.8 | -6.6% |
| Other | 1.1 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 2.5 | 2.5 | 0.0 | -1.2% |
| **TAO Controllable Costs** | **28.8** | **28.0** | **27.5** | **27.0** | **26.5** | **26.0** | **135.0** | **171.2** | **-36.2** | **-21.1%** |
| Variance SKM and TAO Forecast | | -4.5 | -5.4 | -7.0 | -8.8 | -10.5 | -36.2 | | -36.2 | -21.1% |

**Summary of TAO Non Controllable Costs 2011 to 2015 €m 2009 Prices**

| | 2009 Actual | 2011 | 2012 | 2013 | 2014 | 2015 | PR3 Forecast | PR2 Outturn | Variance PR3-PR2 | Variance % |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *TAO Forecast and Recommended* | | | | | | | | |
| Network Rates | 16.6 | 18.21 | 18.21 | 18.21 | 18.21 | 20.03 | 92.9 | 82.6 | 10.3 | 12.4% |
| CER Levy | 0.9 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 4.0 | 5.4 | -1.4 | -25.6% |
| **Non Controllable Costs** | **17.5** | **19.0** | **19.0** | **19.0** | **19.0** | **20.8** | **96.9** | **88.0** | **8.9** | **10.1%** |

In developing recommendations for allowed costs consideration has been given to the assumptions in Section 3.3.1. However the particular features of each cost heading have also been reviewed including the base level of costs appropriate in 2011, growth factors and potential efficiencies available. Non controllable costs are allowed as pass through costs in line with the TAO proposal but will be adjusted ex post to outturn costs.

- **Figure 2 -** TAO Controllable Operating Costs 2006 to 2015




### 3.3.3. Operations

**(PR2 €11.0m TAO €14.4m Allowed €10.5m)**

We recommend network operations costs of €10.5m based on 2009 costs with payroll reduction of 5% in 2011 and efficiency factor of 2% per annum. This is in line with our recommendations on the capital and maintenance programme. We understand that CER allows a + or – 20% tolerance on these costs due to the variable nature of the work.

### 3.3.4. Planned Maintenance

**(PR2 €52.7 TAO €87.3m Allowed €68.1m)**

TSO standards determine maintenance requirements and intervals and this defines programme of work. We have expressed concerns on maintenance policies being too conservative in section 3.2.2.

**In PR3 the allowed costs should be adjusted for changes in volumes of maintenance work completed, either due to shortfall in the maintenance programme or due to changes in volumes of maintenance required. In this way the TAO will be able to retain savings associated with achieving lower than allowed unit costs, but not due to changes in volumes.**

The TAO has provided a spreadsheet showing all maintenance requirements through PR3, based on the maintenance TSO maintenance policy. The increased requirements reflect the increase in asset volumes associated with the TSO "Network Needs" capital programme of €2.1bn. Our recommendations are for a reduction in the transmission capital programme and the transmission maintenance will require modification to reflect the lower level of expenditure.

We also have concerns about the derivation of the TAO's maintenance programme, which is based on TSO policy. The programme appears to be based on the population of assets installed at any one time divided by the maintenance interval. This does not take into account the fact that newly installed assets and replacement assets will not require a first maintenance for up to 12 years. Newly installed or upgraded overhead lines will not require significant maintenance for 10 years. Further it is usual for new and upgraded lines to be cleared of trees as part of the capital programme, for constructional convenience, and therefore tree cutting is not required for a period on such lines.

In assessing allowed costs the TAO should press the TSO to revise its policy so that the maintenance programme for each year takes account of the actual due date for maintenance taking account of the date of commissioning of newly installed assets rather than a programme based on a theoretical model. The programme should also take account of work that is not required on the due date because it has been overtaken by other work such as tree cutting carried out as part of the capital programme.

We are also concerned about the unit costs used for maintenance and consider that these are high compared with a GB DNO. Examples of a circuit breaker ordinary circuit service are given below.

| | 110/132 kV Air Blast Circuit Breaker | 110/132 kV SF6 Circuit Breaker |
|---|---|---|
| GB DNO Frequency | 8 Years | 12 Years |
| TAO Frequency | 4 or 5 years | 4 or 5 Years |
| GB DNO | €7125 | £1140 |
| TAO | €10300 | €7050 |

GB Costs are based on 2004 prime costs uplifted for overheads, inflation and exchange rate.

In addition the TSO specifies a detailed service on SF6 switchgear every 16 years at the cost of €75,000 and on non SF6 switchgear every 12 years at the cost of €27,250. These maintenance activities are not required as a routine and should only be necessary as follows: on specific evidence of incipient faults from condition monitoring; very heavy duty such as generator circuit breakers; and near the end of life to ascertain life extension strategy.

There are other examples of items such as transformer oil bund routine maintenance on a 3 year cycle costing €10,600, which would only be necessary on need not as a routine.

**For the purpose of our recommendation we have assumed that new assets installed during PR3 will not require significant maintenance during PR3. Existing assets that have been replaced or upgraded are also likely to need less maintenance. We have therefore based our recommendation for planned maintenance expenditure of €68.1m on the requirements identified by the TAO in 2011 and applied a payroll reduction of 5%and efficiency factor of 2% per year. We also consider that for pricing purpose we need to discount the maintenance costs by 10% which represents our assessment that the TAO will achieve a 90% of the maintenance programme, taking into account constraints and historic levels of performance.**

**We consider that the TAO may fall short of this target and that CER should monitor the programme and make adjustments to allowed revenue on a year by year basis, for volumes actually maintained above the TAO/TSO 2011 base figure. The review should take account of the revenue from generators for ongoing maintenance charges for connection assets owned by TAO.**

**In addition we would expect the TAO should press the TSO to review again their maintenance practices and intervals and bring them into line with best international practice as advised by their consultants**.

- **Table 11 -** Planned Maintenance and Fault Maintenance Costs 2011 to 2015

| | 2011 | 2012 | 2013 | 2014 | 2015 | TAO PR3 Forecast | PR2 Outturn | Variance |
|---|---|---|---|---|---|---|---|---|
| **TAO Forecast** | | | | | | | | |
| *Planned Maintenance* | | | | | | | | |
| Substations | 8.21 | 8.46 | 9.00 | 9.79 | 10.48 | 45.94 | 26.20 | 19.74 |
| Overhead Lines | 7.27 | 7.26 | 7.36 | 7.39 | 7.43 | 36.70 | 25.06 | 11.64 |
| Cables | 0.89 | 0.90 | 0.90 | 0.94 | 1.01 | 4.63 | 1.33 | 3.30 |
| **Total** | **16.36** | **16.62** | **17.26** | **18.11** | **18.92** | **87.27** | **52.59** | **34.68** |
| *Fault Maintenance* | | | | | | | | |
| **Total** | **1.22** | **1.22** | **1.24** | **1.25** | **1.27** | **6.19** | **8.28** | **-2.09** |
| | **2011** | **2012** | **2013** | **2014** | **2015** | **PR3 SKM Recommend** | **TAO PR3 Forecast** | **Variance** |
| **SKM Recommended** | | | | | | | | |
| *Planned Maintenance* | | | | | | | | |
| Substations | 7.11 | 6.97 | 6.83 | 6.69 | 6.56 | 34.16 | 45.94 | -11.78 |
| Overhead Lines | 6.30 | 6.17 | 6.05 | 5.93 | 5.81 | 30.24 | 36.70 | -6.46 |
| Cables | 0.77 | 0.76 | 0.74 | 0.73 | 0.71 | 3.71 | 4.63 | -0.92 |
| **Total** | **14.18** | **13.89** | **13.62** | **13.34** | **13.08** | **68.11** | **87.27** | **-19.16** |
| *Fault Maintenance* | | | | | | | | |
| **Total** | **1.17** | **1.15** | **1.12** | **1.10** | **1.08** | **5.62** | **6.19** | **-0.57** |

### 3.3.5. Fault Maintenance

**(PR2 €8.28m TAO €6.2m Recommended €5.6m)**

We recommend network operations costs of €5.6m based on the TAO's 2011 forecast with a payroll reduction of 5% in 2011 and efficiency factor of 2% per annum.

### 3.3.6. Professional Services

**(PR2 €25.0m TAO €24.3m Recommend €19.4m**

Professional Services have varied significantly over PR2 from €3.6m per year in 2007 to €7.0m per year in 2009. The TAO uses ESBI for many routine activities such as maintaining records and checking equipment before return to service after maintenance. We do not have a complete schedule of activities but accept the reduced level of cost of €4.2m in 2011 and have applied a payroll reduction of 5% and efficiency factor of 2% per year for these costs throughout PR3.

### 3.3.7. Telecom Fees

**(PR2 €6.4m TAO €9.0m Recommended €7.6m**

This item cover fees from ESB Telecoms for support of operational IT and telecoms services. These costs rose in PR2 from €0.9m in 2006 to €1.75m in 2009. Our forecast is based on the 2009 level with payroll reduction and efficiency factor applied.

### 3.3.8. Asset Management

**(PR2 €3.7m TAO €8.1m Recommended €5.1m)**

These costs include mast interference and foreshore payments, which are increasing. The TAO (and DSO) has asked for these costs to be treated as pass through costs, which we do not recommend as these costs are subject to some control and negotiation by ESB Networks. The TAO forecast includes an amount for retiring transmission assets which have been excluded from our recommended costs.

### 3.3.9. Other Controllable Costs

**(PR2 €17.3m TAO €22m Recommended €18.7m)**

Other controllable costs include legal, pension administration, insurance company-wide costs and corporate charges. We accept the reduction proposed for corporate charges for 2011 and maintain other costs at appropriate PR2 levels, all with payroll reduction and efficiency savings.

### 3.3.10. Non Controllable Costs

**(PR2 €88m TAO €86.9m Recommended €96.9m)**

A review of the global assets valuation was conducted by the Department of the Environment in 2008 which has dictated increased rates charges for the period from 2010 to 2014 inclusive. A further global valuation review is planned for 2015 onwards and we accept the estimated provision of 10% increases in rates charge in 2015 for tariff purposes.

Non Controllable Costs will be adjusted for outturn as the TAO has little control of these costs.

# 4. Benchmarking TAO Costs

## 4.1. Introduction and Summary

This section summarises benchmarking studies we have undertaken for CER, which are set out in a report in Appendix D of the SKM Report on DSO Operating Costs. Top down benchmarking covers ESB Networks DSO costs and TAO 110 kV costs against GB DNO costs, excluding Scottish DNOs, which are not responsible for 132 kV assets.

Our findings are as follows:

**Benchmarking of ESB Networks DSO and 110 kV TAO opex and non network capex for indicates that the DSO costs are 7.5% above the Upper Quartile of the GB DNO costs and 16 % above the efficiency frontier. This is consistent with our recommendations for allowed costs.**

Our benchmarking shows a smaller efficiency gap when benchmarking opex costs alone, and are similar to the results of the ESBN studies. However we consider that it is necessary to include all inputs and note that in the recent DPCR5 price review Ofgem benchmarked GB DNOs opex plus non network capex costs.

Tree cutting costs have been benchmarked and the DSO’s costs of €107 per km are lower than the DNO costs of €251 per km. This may be partly due the relative tree cover and the temporary increase in tree cutting in GB due to new safety regulations.

**We compared IT and Telecoms costs and System Control support costs and found them to be relatively high. This corresponds with the findings of one of the DSO’s benchmarking studies, which indicates that some technical costs such as fault and maintenance (cost per km) are considered to be best in class or low, whereas support costs leave room for improvement.**

## 4.2. Top Down Benchmarking

The studies include top down benchmarking using various regression analysis methods adopted by Ofgem in the price reviews of DNOs. Our studies compare operating costs plus non network capex, as these latter costs are in support of operations. Omitting these cost can lead to errors. For example DNO leased transport charges show in operating costs, whereas ESBN purchase transport at €7.5m per year and costs are reflected as depreciation so are not included in benchmarking on opex alone.

ESBN networks are very different from those of GB DNOs. GB network is 64% cable and network length is 27m per customer, whereas the DSO’s network is only 13% cable and has a network length of 75m per customer. Much of the ESBN MV and LV overhead networks are simple single phase networks. ESBN’s unit costs (opex plus non network capex) are €96 per customer and €1274 per km, whereas the average DNO unit costs are €60 per customer and €2139 per km. Comparison on a per km basis favours companies with a higher relative network length.

For this reason top down benchmarking is carried out against a Composite Scale Variable (CSV) which is a composite index based on, customer numbers; length of network; and unit distributed. CSVs adopted by Ofgem in the DPCR3 and DPCR4 price reviews have been used for comparison.

The differences in the CSVs have a small impact on the relative positions of GB DNOs, but have a significant impact on the relative position of ESBN because it is an outlier in network characteristics.

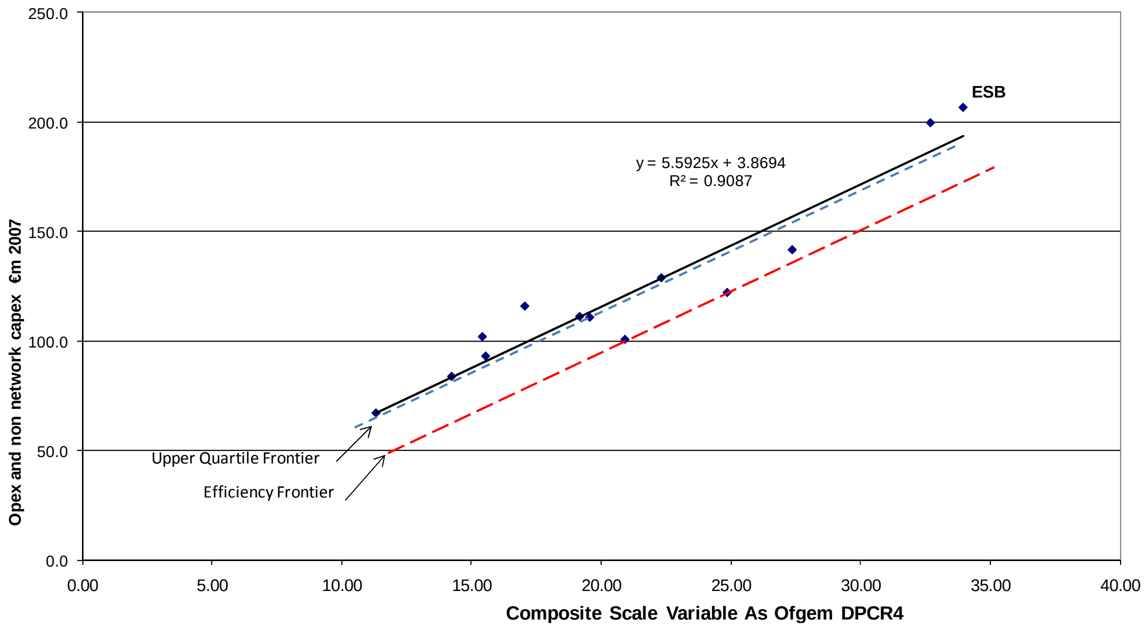
As ESBN move closer to the efficiency frontier it becomes more important to have all the information required to ensure that only comparable activities are included and that costs are correctly normalised. Ofgem has instituted a cost reporting regime for DNOs which gives considerable insight into their costs. No such equivalent information is available outside GB. GB DNOs are also considered to be efficient by worldwide standards. Despite the difference in network characteristics, GB is considered to be the only benchmark that provides reliable results, within the limits of precision now required. We consider benchmarking against other companies to be of limited value.

- **Table 12 -** Results of Benchmarking

| Regression | Costs | Ofgem CSV | €m from Efficiency Frontier | €m from Upper Quartile Frontier | Correlation $R^2$ |
|---|---|---|---|---|---|
| Regression 1 | Opex + Non Network Capex | DPCR 3 | €63m | €46m | 0.83 |
| Regression 2 | Opex + Non Network Capex | DPCR 4 | €33m | €15m | 0.91 |
| Regression 3 | Opex | DPCR 3 | €40m | €26m | 0.90 |
| Regression 4 | Opex | DPCR 4 | €16m | €5m | 0.94 |

The most representative study is considered to be Regression 2 as shown in Figure 3 below. This indicates that ESB Distribution and TAO 110 kV opex plus non network capex is around €33m from the efficiency frontier and €15m from the upper quartile frontier. The upper quartile is commonly used benchmark, recognising that there may be inaccuracies in a methodology that create outliers.

- **Figure 3 -** Benchmarking ESBN and GB DNO Opex plus Non Network Capex – DPCR4 CSV




A €207m sample of the ESBN's opex and non network capex is therefore €33m (16%) from the efficiency frontier and €15.5m (7.5%) from the upper quartile efficiency frontier.

Our recommendations indicate reductions in controllable opex of €4m from the CER allowed costs of €30m in 2010 to €26m in 2015, a reduction in allowed costs of 13%.

## 4.3. IT, Telecoms and System Control Costs

Other costs have characteristics that allow direct comparison for companies of the same customer base and demand. A comparison of the GB average annual IT and Telecom costs and System Control costs against DSO costs indicates that the DSO is less efficient in these areas.

| | GB Average | DSO Costs |
|---|---|---|
| System Control* | €9m p.a. | €18.6m p.a. |
| IT Costs/Telecoms | €12.2m p.a. | €26.2m p.a. |

* Note EirGrid is responsible for 110 kV system control and these costs are not included.

## 4.4. ESBN Benchmarking

ESBN has provided summary details of three benchmarking studies carried out by their consultants, which are summarised below with our comments:

### 4.4.1. Benchmarking of ESBN opex costs against GB DNO for 2007/08

This study is based on the Ofgem DPCR 4 methodology and gives results that are €5m more favourable than our equivalent study, showing the DSO close to the efficiency frontier

- Adjustment for Purchasing Power Parity is not a significant factor in 2007/08. In any event it obscures the difference due to high payroll costs in Ireland and a more absolute benchmark is required.
- We consider that insufficient costs may have been included for Market Systems and the110 kV adjustments may have been insufficient.

### 4.4.2. Benchmarking of DSO opex costs GB DNO costs for 2005 to 2009

This study uses Ofgem DPCR 5 price review data for five years, using the Ofgem DPCR 4 benchmarking methodology.

The results show ESBN as being within 1% of the Upper Quartile Frontier.

- Our results for the study based on 2007 data show ESBN as €5m above the upper quartile and the results are very similar, within the accuracies of such studies.
- It is noted that the Scottish Companies are included and it is not known whether the costs have been adjusted for 132 kV. Our studies exclude Scottish Companies.
- 110kV adjustments may have been insufficient.
- Benchmarking over 5 years and adjusting for Purchasing Power Parity in a climate of fluctuating exchange rates and deflation is questionable but does not appear to have produced significantly different results.

### 4.4.3. Benchmarking of DSO opex costs with 17 European regional and national DSOs based on 2008 data

The participants were not selected on the basis of comparability or efficiency and small urban companies were excluded from some of the comparisons with the DSO.

- Adjustments for activities and costs appears to have been restricted , as the study was based on limited data and limited interaction with the companies.

The consultant reports with our observations are set out below:

The data suggest that ESBN has best-in- class performance with regard to technical activities costs in its regional/nationwide peer group. ESBN`s fault & maintenance costs amount to €340/km compared to the average fault & maintenance costs in the regional/nationwide peer group of €1,649/km.

- We have commented above that the cost of ESBN's network may be low due to inherent difference in proportion of overhead line and the relatively simple nature of much of the MV and LV single phase networks.

ESBN customer activities and operational metering costs are at a low level, though a more detailed examination of the scope of activities compared to other participants in both of these areas would be required to support these findings.

Support activities costs and the percentage of grid losses show potential room for improvement based on the survey data. ESBN also displays an average continuity of supply value in the regional/nationwide peer group. ESBN‘s support activities costs of €4.4/MWh are somewhat greater than the average support activities costs of €3.8/MWh.

- This is an area where we have also noted that ESB Networks is high costs and where costs are not falling. This may be due to the lack of direct control of services provided from other parts of ESB Group.

#### 4.4.4. Benchmarking of Transmission Activities

The combined TSO and TAO activities in Ireland is comparable to the TSO Transpower in New Zealand both own and operate down to the 110 kV level and serve a population of 4.4 million and neither is involved as TSO in market operations.

Operating costs are similar but not necessarily comparable due to different capitalisation polices and overheads. For example 30% of the TAO costs are for local authority rates.

Transpower has 520 staff which is similar to current TSO and TAO staff in Ireland of 495. However due to the large capital programme the combined TSO TAO staff is forecast to peak at 685 in 2013 before dropping back to 554 in 2015.

However, these companies are likely to have different outsourcing policies which impacts staff levels. For example TAO depends heavily on ESBI and in 2009 charged €25.9m to the TAO, €7.1m to operating costs and €18.8m to capital projects. This amounts to the equivalent of around 300 staff.

# 5. Review of PR2 Capital Expenditure

## 5.1. Introduction and Objectives

The objective of this review of historic capital expenditure is to assess the TAOs performance in achieving the outputs required by CER during the PR2 period within the CER allowed costs. The review includes an appraisal of the issues that have affected performance in PR2 and those issues which will require further consideration when reviewing the proposals of the TAO for PR3**.**

## 5.2. Data Sources and Assumptions

The review has been informed by the TAO's and also the TSO's response to the questionnaire on historic and forecast capital expenditure and associated information papers, together with further data provided at meetings and from subsidiary questions raised by CER and consultants. CER has also provided a significant amount of background information on previous price reviews and updated information during the period 2006 to 2010.

## 5.3. Overview of Capital Expenditure

A high level summary of the PR2 capital expenditure, allowed and actual is presented in Table 13

- **Table 13 - Transmission Capital Expenditure 2006 – 2010**

| | Year | 2006 | 2007 | 2008 | 2009 | 2010 | Totals |
|---|---|---|---|---|---|---|---|
| Gross (after allowing for IDC) | CER Allowed | 145.30 | 114.32 | 96.82 | 103.83 | 118.53 | 578.80 |
| | Actual | 71.79 | 86.28 | 106.67 | 141.36 | 144.80 | 550.90 |
| | Interest During Construction (IDC) | -3.86 | -4.27 | -4.58 | -5.05 | -5.80 | -23.56 |
| | Actual (less IDC) | 67.94 | 82.01 | 102.09 | 136.31 | 139.00 | 527.34 |
| | Variance | -77.36 | -32.32 | 5.27 | 32.48 | 20.47 | -51.45 |
| Customer Contributions | CER Assumed | -17.14 | -11.78 | -10.62 | -7.75 | -7.79 | -55.08 |
| | Actual | -10.32 | -14.71 | -11.27 | -38.01 | -6.90 | -81.21 |
| | Variance | 6.83 | -2.93 | -0.65 | -30.26 | 0.89 | -26.13 |
| Net (after Customer Contributions) | CER Allowed | 128.15 | 102.54 | 86.20 | 96.08 | 110.74 | 523.71 |
| | Actual | 57.62 | 67.29 | 90.82 | 98.29 | 132.10 | 446.13 |
| | Variance | -70.53 | -35.24 | 4.62 | 2.22 | 21.36 | **-77.58** |

It can be seen from Table 13 that there is an overall variance (underspend) of €78m between the Actual/forecast (2010) outturns and the CER allowance which was itself set somewhat below the transmission businesses PR2 submissions.

## 5.4. Load Related and Customer Contributions

Gross Load Related Expenditure of €397.5m was €51m lower than the CER allowed costs of €448.5m. Net Load Related Expenditure of €316.3 was €77m lower than the allowed costs of €393.4m. As discussed later, a number of Load Related projects which required the construction of new overhead lines were significantly delayed due to problems with obtaining permission for access to the land which partly explains the shortfall against forecast.

- **Table 14 - Load Related Expenditure (€m 2009 prices)**

| | Year | 2006 | 2007 | 2008 | 2009 | 2010 | Totals |
|---|---|---|---|---|---|---|---|
| Gross | CER Allowed | 108.88 | 79.09 | 70.94 | 85.57 | 104.04 | 448.51 |
| | Actual | 38.97 | 61.03 | 66.18 | 108.15 | 123.20 | 397.53 |
| | Variance | -69.91 | -18.06 | -4.75 | 22.58 | 19.16 | -50.98 |
| Customer Contributions | CER Assumed | -17.14 | -11.78 | -10.62 | -7.75 | -7.79 | -55.08 |
| | Actual | -10.32 | -14.71 | -11.27 | -38.01 | -6.90 | -81.21 |
| | Variance | 6.83 | -2.93 | -0.65 | -30.26 | 0.89 | -26.13 |
| Net (after Customer Contributions) | CER Allowed | 91.74 | 67.31 | 60.32 | 77.82 | 96.25 | 393.43 |
| | Actual | 28.66 | 46.32 | 54.91 | 70.13 | 116.30 | 316.32 |
| | Variance | -63.08 | -20.99 | -5.41 | -7.69 | 20.05 | **-77.11** |

*Note: The figures above do not include Interest During Construction (IDC) which has been taken into account in the overall capital expenditure (Table 13).*

The original submission for PR2 was reduced by €113m at the total level. There was no list of specific projects which were assumed would not be undertaken. Additionally, in response to changes in customer demand and generation requirements as referenced later, only about 50% of the projects included in the original PR2 submission, both in numbers and values proceeded and a further 50% of new projects were identified and put in hand. This has resulted in the evident lack of correlation between Gross and Net spend.

The difference between the gross and net position Load Related Expenditure is also in part due to the fact that mix of projects that were undertaken during the period were significantly different from those included in the forecast, with a higher level of customer contributions arising in practice. It should be noted that there is a very high figure for Capital Contributions in 2009 is due to two large projects to connect new generators in the Cork area.

## 5.5. Non Load Related Expenditure

Non-load related expenditure during PR2 is presented in Table 15 and it can be seen that Non Load Related Expenditure €152.6m exceeded the CER allowed costs of €129.2m by €23.4m. Increases in the costs of materials and labour have contributed to this overspend and the percentage overspend is reasonably consistent with the analysis presented in Section 5.8.1. As with Load Related Expenditure the reduction in the original submission did not relate to specific projects so no clear targets were identified.

- **Table 15 - Non-Load Related Expenditure (€m 2009 prices)**

| Year | 2006 | 2007 | 2008 | 2009 | 2010 | Totals |
|---|---|---|---|---|---|---|
| **CER Allowed** | 35.31 | 35.23 | 25.89 | 18.26 | 14.49 | 129.17 |
| **Actual** | 32.61 | 25.05 | 40.11 | 33.21 | 21.60 | 152.58 |
| **Variance** | -2.69 | -10.18 | 14.22 | 14.95 | 7.11 | **23.41** |

*Note: The figures above do not include Interest During Construction (IDC) which has been taken into account in the overall capital expenditure (Table 13).*

A total of 943km of overhead transmission line have been refurbished as have 12 transmission stations in the period based on detailed figures available for 2006-08.

## 5.6. Impact of the change in responsibilities

During the PR2 period, responsibility for some aspects of Transmission activity was transferred to the newly created EirGrid organisation which became the Transmission System Operator. This was initiated in 2006. In order clarify the relationships and responsibilities an Infrastructure Agreement was introduced and fully implemented in 2008[7].

Under the Infrastructure Agreement the responsibilities can be briefly summarised as follows:-

| ACTIVITY | TSO | TAO |
|---|---|---|
| Identification of Need | X | |
| Provision of Standard Costs | | X |
| Selection of Optimal Solution | X | |
| Obtaining Planning Permission | X | |
| Obtaining Wayleaves | X | |
| Outage Planning | X | |
| Detailed Design | | X |
| Procurement of Materials | | X |
| Procurement of Resources | | X |
| Management of Site Works | | X |
| Commissioning | | X |

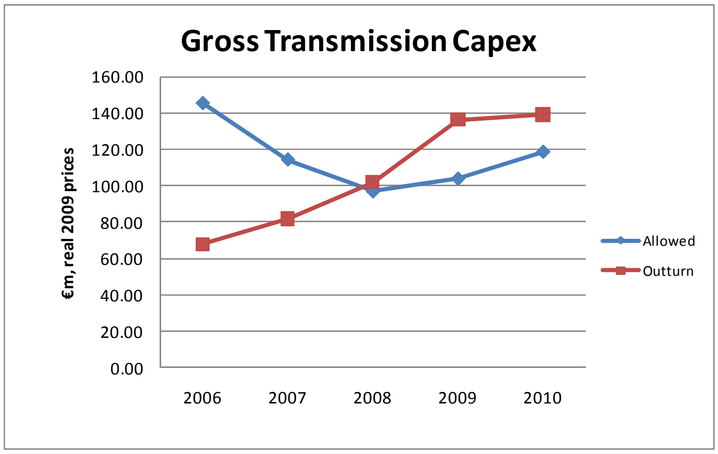
Initially the responsibilities identified above tended to make the process overly sequential, however arrangements have been improved following discussions and projects are now progressing more quickly with respect to inter-business responsibilities and early purchase of materials, etc.

As can be seen from Figure 4, the rate of expenditure on Capital projects was below the forecast value during the years 2006 and 2007. Following the full implementation of the Infrastructure Agreement there appears to have been an improvement in the number of projects achieved such that the 2008 expenditure closely aligned with the CER Allowed amount although this may be purely coincidental,

[7] It should be noted that prior to these formal changes, very similar practices were being exercised by the individuals and groups that were responsible for transmission planning and network development at that time and which are now part of EirGrid.

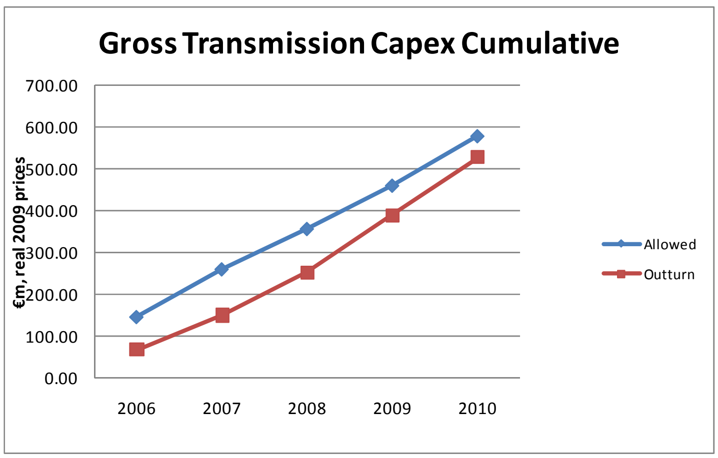
noting the changed mix in projects referenced earlier. Expenditure in 2009 and forecast for 2010 is also shown to exceed the CER Allowed values.

- **Figure 4 – PR2 Outturn Network Capex – year on year**




The increased rate of expenditure will result in the outturn for the PR2 period being more closely aligned with the CER Allowed figure than would have appeared likely at the time of the mid point review as can be seen in Figure 5 although, given the changed mix of projects and also project cost overruns and slippages discussed in some detail later, this may be considered largely coincidental.

- **Figure 5 - PR2 Outturn Network Capex – cumulative**




## 5.7. Revenue Adjustments

It should be noted that the allowed revenue impact of the cumulative capital expenditure underspend in the years 2006-2008 has been reflected in adjustments against regulated revenue in 2009 and 2010.

## 5.8. Cost increases and land access issues.

Both the TSO and TAO have identified a number of cost pressures over the PR2 period which impact on project outturn costs. These include increases in basic material and equipment costs as well as increases in labour rates.

In the case of a number of the major transmission projects costs pressures are also attributable to increases in wayleaving costs and the continuing delays in project completion due to landowner objections to the construction of new lines and substations. As well as introducing delays in project completion, these latter problems can also result in the need to mobilise and demobilise contractors several times on the same project at significant additional costs.

In order to obtain a better understanding of the impact of the latter factors on TAO capital expenditure, a high level assessment has been undertaken to quantify the underlying effects of material and labour costs, in part based upon detailed analysis undertaken as part of the TAO PR2 capital expenditure review.

### 5.8.1. Cost Increases.

For the period 2004 to 2008 there was a significant increase in civil engineering contract prices due to increases in both labour and material and also a less competitive market situation. Based on the analysis of a number of projects the following year on year increases are indicated:

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Change (%) | 8.26 | 3.38 | 7.07 | 2.97 | 1.27 |

ESBN have also carried out a study of installation contract price increases for overhead line and substation work over the period 2007 to 2009 and the average price increase was 3.0% per year for overhead line work and 2% for substation work. In part this follows the national trend for labour costs and also cost increases attributable to enhanced safety (legally binding) requirements in the case of electrical work.

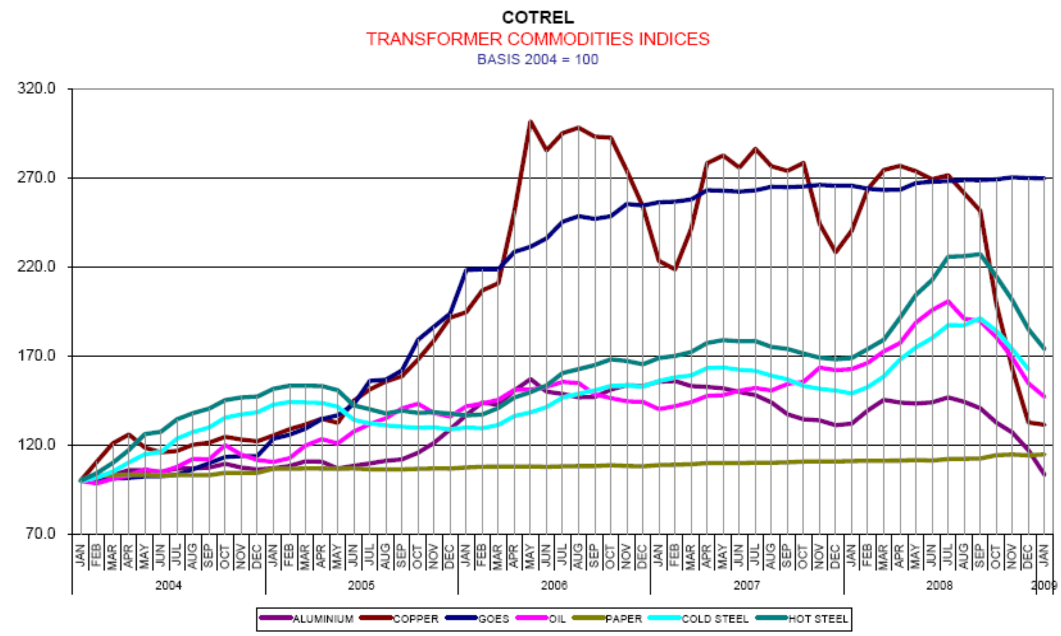
The inflationary impact of materials used in electrical works. These cost pressures can be significant as indicated by the movement in raw material costs, over the period 2004 to 2009, SKM investigations (London Metal Exchange cash prices) show that aluminium rose in price by of the order of 50% and copper by 100% during PR2. Prices then fell back in the recession and began to rise again in 2009 although they have been reasonable stable thereafter.

The impact of the above on ESBN material costs was analysed for the period 2006 -2008. Over 1,100 material codes were analysed. When the actual prices of materials used in new connections are compared to 2004 prices, the rate of material inflation for the period was 22% which, whilst indicative of the impact of raw material prices also reflect the generally longer term buying practices of manufacturers and supplier and also the more modest increases in the manufacturing labour costs which can be a significant component.

Increase in costs of electrical equipment such as transformers and switchgear. ESBN provide information which indicates that transformer costs doubled in the period 2004 to 2008 which reflects the significant use of copper in such equipment, and also that the cost of cables (mixed use of aluminium and copper) and overhead line conductors (mainly aluminium) also increased by 30% to 40%.

However, transformers appear to be an exceptional item due partly to the rise on copper prices but more particularly to the limited production capacity for the special steels used for the transformer cores (Grain Oriented Electrical Steel or GOES) which have been shown a significant and persistent price rise due to the significant increase in worldwide demand for transformers, refer to Figure 6.

- **Figure 6 – Transformer commodities indices**




BEAMA STATISTICS

It can be seen from Figure 6 that movements in the indices for other commodities also important to transmission project costs, in particular steel, have been somewhat less dramatic, albeit that significant cost increases are evident. These observations about the increasing costs of electrical power equipment are also supported by information sourced from the UK Office of National Statistics as part of the UK Energy Regulators DPCR5 process[8] and are presented in Figure 7 below. This shows year on year changes in Input (materials and labour) and Output (equipment) costs of between 2 and 8% from mid 2004 to mid 2009 and indicate some moderating, smoothing effects on output prices, presumably due to drawing down stock holdings and also some forward buying of commodities. The indicated **year-on-year** changes in prices are therefore somewhat more modest and indicate an overall change of only about 20% between 2004 and 2009.

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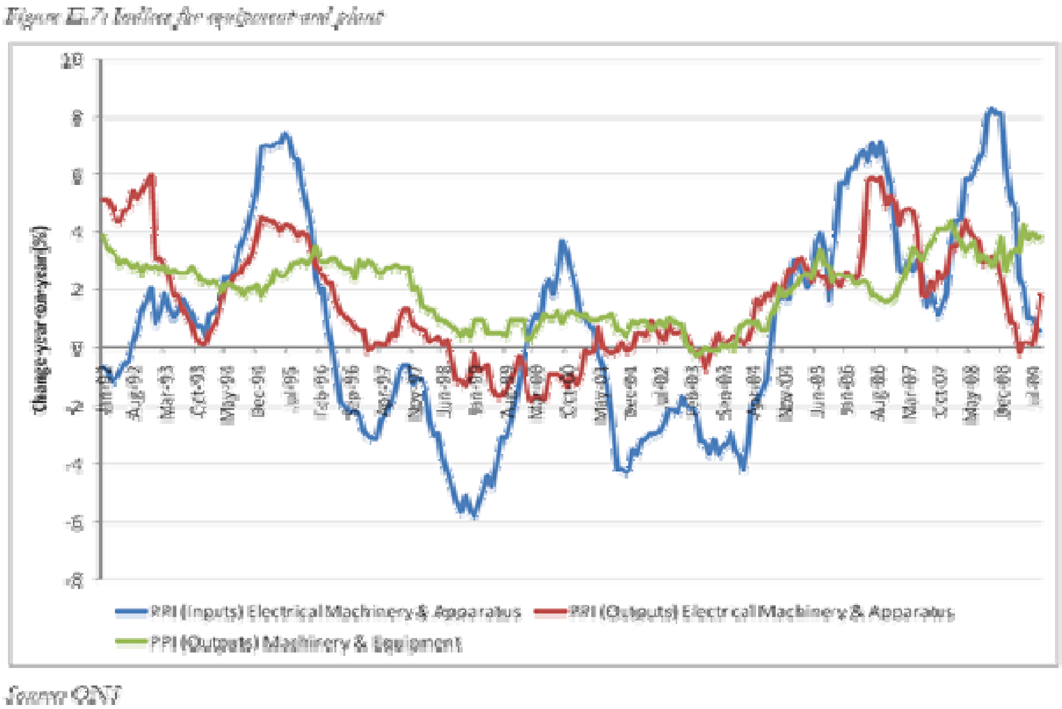
[8] Cambridge Economics Policy Associates Ltd, Ofgem, Update of Input Price Inflation Forecasts for DPCR5, 6th November 2009, Figure E.7

- **Figure 7 – UK Indices for electrical machinery and apparatus**




We have examined the evidence provided by ESBN with respect to material costs and concluded that these cost pressures are a significant factor to be taken into account in assessing capital spend efficiency. However, in order to assess the likely impact on outturn composite project costs we have undertaken a high level assessment based upon "weighting" the various cost pressure outlined above.

This analysis, which takes into account the differential rates of inflation associated with typical "input costs" into a project, is presented in Table 16[9].

[9] The information for the years 2005 to 2008 are taken from ESBN reported cost changes with the 2009 and 2010 values being estimated by SKM on the basis of forecast changes in CPI indices and the implicit impact on the specific cost categories.

- **Table 16 – High level assessment of input costs on project outturn costs**

| | Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|
| Input cost changes (%) | Civil works | (PR2) Reference year | 3.38 | 7.07 | 2.97 | 1.27 | -2.03 | 0.0 |
| | Labour | | 2.5 | 2.5 | 2.5 | 2.5 | -2.0 | 0.0 |
| | Main power equipments | | 19.0 | 19 | 19 | 19 | -10 | 0.0 |
| | Other materials | | 5.1 | 5.1 | 5.1 | 5.1 | -10 | 0.0 |
| Project cost impacts (%) | Civil costs (20% of project) | | 0.68 | 1.41 | 0.59 | 0.25 | -0.41 | 0.0 |
| | Labour (30% of project) | | 0.75 | 0.75 | 0.75 | 0.75 | -0.60 | 0.0 |
| | Main power equipment (35%.) | | 6.62 | 6.62 | 6.62 | 6.62 | -3.5 | 0.0 |
| | Other materials (15%..) | | 0.77 | 0.77 | 0.77 | 0.77 | -1.5 | 0.0 |
| Overall - year on year (%) | | | 8.8 | 9.6. | 8.7 | 8.4 | -6.0 | 0.0 |
| **Overall cumulative impact (%)** | | **100** | **109** | **119** | **130** | **141** | **132** | **132** |

### 5.8.2. Land access issues

A further cause of increased project costs has been the opposition from landowners to new construction, particularly of overhead lines. In a number of projects this has resulted in the contractors being forced to stop work. The subsequent delays during the resolution of access problems have lead to contractors withdrawing completely and moving on to other work which may be overseas.

The additional costs of closing the work site, transport and storage of materials and security together with the costs of re-establishing the project can be considerable. Contractors will have normally assumed continuous working in their tenders and will seek to recover the extra costs which result from the interruption.

Significant legal costs have also been incurred by EirGrid in pursuing land access issues.

## 5.9. Transmission Capex Monitoring Report.

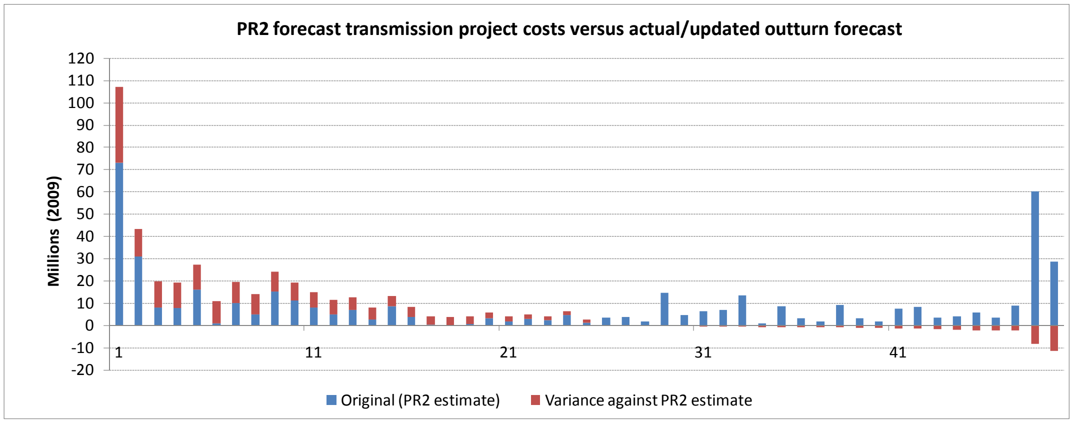
In line with the requirements of CER, a transmission CAPEX Monitoring Report has been prepared jointly by the TSO and TAO, covering all of the projects undertaken during PR2.

### 5.9.1. Project delivery and outturn costs.

Examination of the Transmission Capex Monitoring Report highlights the number and the extent to which projects have been delayed and also the extent to which outturn costs are not aligned with the forecasts. The most recent version of this report (February 2010) shows a total of about 30 projects for which final expenditure is, or is forecast to be over 20% above the original PR2 submission values, refer to Figure 8. Figure 8 also includes a number of projects where outturn costs are below the PR2 submission estimates, possibly due to project delivery efficiency or revised project scopes.

In this respect we have reviewed the underlying equipment supply and installation costs and we are satisfied that these are consistent with historical outturns, other than due to project delivery problems associated with planning and land access issues, and are also consistent with outturn transmission project costs in similar operational regimes, e.g. Great Britain, Australia and New Zealand, and other international market places, e.g. Abu Dhabi and Oman.

- **Figure 8 – Transmission Capex Monitoring Report - Project Outturns v PR2 Estimates**

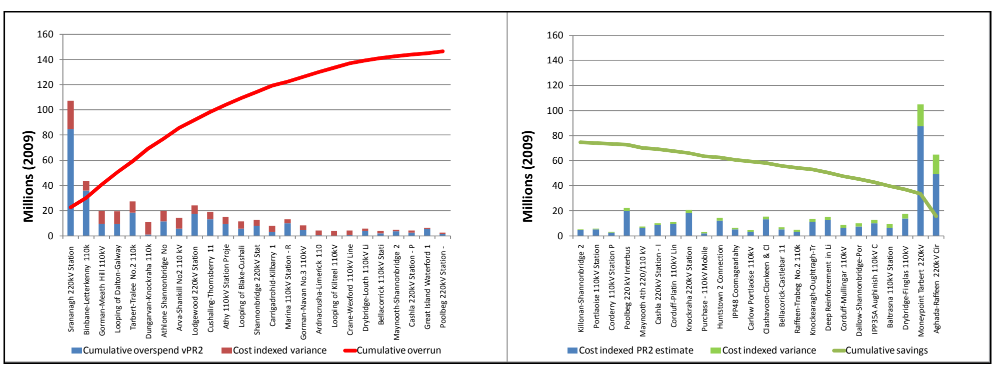



It can be seen from Figure 8 that almost half of the projects monitored are indicating quite significant cost overruns.

## 5.10. Project delivery efficiency

In order to estimate the cost implications associated with the reported project delays and attendant cost overruns, the PR2 projects included within the Capex Monitoring Report have been further analysed by "factoring out" likely increases in project costs attributable to the Cost Pressures identified in Section 5.8 above[10]. The result of this analysis is presented in graphical format in Figure 9 with the cumulative cost overruns being indicated by a red line on the left hand graph and cost underruns by an equivalent green line on the graph on the right.

- **Figure 9 – PR2 project outturn costs after adjustment for input cost pressures.**




It can be seen from Figure 9 that a somewhat more favourable presentation results, with cost overruns appearing somewhat reduced and cost savings enhanced when the likely impact of input prices (materials and labour) on outturn project costs are taken into account. However, the net effect is still

[10] These have been calculated on the basis of the aggregated spend basis and applied equally to all projects.

a significant overall increase on the PR2 submission estimates, with adjusted project cost overruns totalling €150m to set against cost savings of only about €70m, i.e. a net overspend (after input cost adjustments) of about €80m. When expressed in terms of the original (PR2 submission) cost estimates for the seriously overrunning projects, totalling about €445m, the cost increases of €150m attributed to projects delays due to land access issues equate to the equivalent of a 30 percent increase in project costs, or alternatively, reduction in project delivery efficiency.

To better understand the causes for the indicated cost overruns and also programme slippage associated with these projects, the TSO was asked to provide a presentation and an expanded commentary both on cost and projects timescale variances for the most significant projects worked on during PR2. This enquiry focussed on the 32 highest cost projects, which between them represent almost €400m estimated outturn capital expenditure and represent the greater part of the PR2 reported expenditure. At face value the positive cost variances on these projects equate to about 75% and the programme slippage is equivalent to just over 28 months on a weighted average basis[11].

The questionnaire response is included as Appendix D to this report and also summarised below.

a) If restricted to projects actually under construction, PR2 estimated costs totalling €130m, the forecast overruns total almost €80m, i.e. a cost variance of 60%.

b) The programme delays for these same projects equate to over 3 years on a weighted basis.

c) The main reasons for the above cost overruns and programme slippage is stated to be due to difficulties in obtaining wayleaves and easements, presumably site access issues and to a lesser extent scope changes and also underestimated project costs at the time of the PR2 submission.

d) In the case of projects currently “under consideration” or “in planning”, the main reason for forecast variances between the PR2 submission for these projects and the presently forecast outturn costs is given as “underestimation at PR2 submission” or else “un-scoped estimate in PR2”. Planning and wayleaving difficulties are also cited for indicated programme slippage, noting however that the majority of these projects are still within the TSO project development phase.

It should be noted that after correction for factual errors in the Capex Monitoring Report, as advised by EirGrid in the above referenced responses, the weighted programme slippage corresponded to about 25 months. This implies that the related project spend profiles will have been stretched by this amount; although any implicit reduction in year on year spend will have been largely masked by the cost overruns referenced above.

After modifying the project list in the light of the discussions with EirGrid, a modified Project Overrun assessment resulted and is presented in Figure 10.

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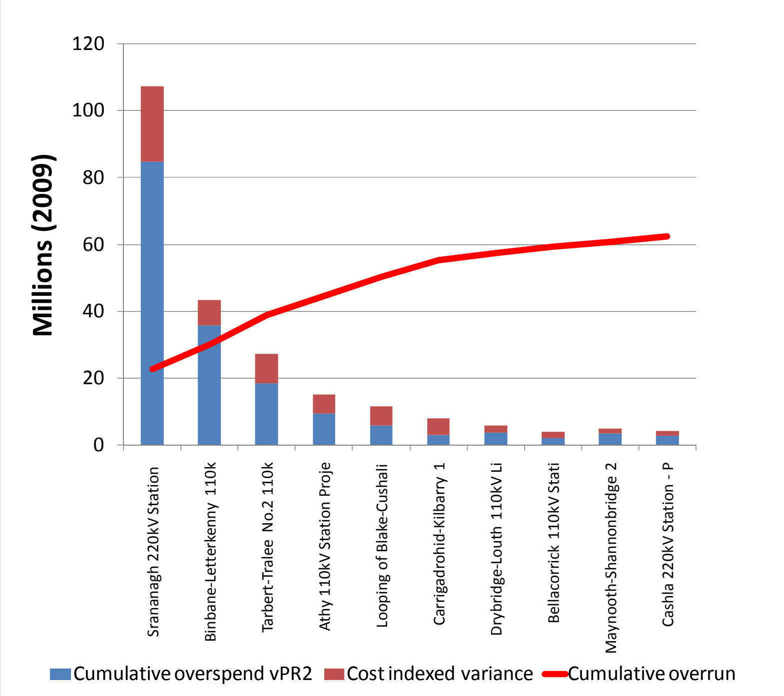
[11] Weighted in accordance to the PR2 project cost estimate.

- **Figure 10 - Adjusted Project Overrun analysis**




It can be seen from Figure 10 that the cumulative overrun has reduced to about €60m. However, when expressed on the overall PR2 estimate applicable to this reduced group of projects, now totalling about €170m, the indicated cost variances attributable to wayleave/consenting and land access issues approximates to about 37%, i.e. somewhat higher than was estimated on the larger grouping of projects[12]. However, if expressed on the original PR2 estimate for the 32 highest cost projects, which between them represent almost €400m of estimated outturn capital expenditure and represent the greater part of the PR2 reported expenditure, a cost overrun attributable to project delays due to land access issues may therefore be considered to be equivalent to a 15 percent increase in project costs, or alternatively, reduction in project delivery efficiency.

## 5.11. Implications of Project Delays and Cost Overruns.

The combination of higher input costs, estimated to be equivalent to about 30% above the PR2 price basis during 2007, 2008, 2009 and 2010, when the greater part of the PR2 capex has been expended (Section 5.8.1), coupled with an apparent circa 15 % drop in project delivery efficiency (Section 5.10) implies that in terms of delivered infrastructure volumes only about 2/3$^{rd}$ of the originally forecast infrastructure will be delivered for each €100m of expenditure. When taken together with a forecast significant shortfall against the PR2 forecasts, **Net Load Related** capex €77m below CER PR2 allowance of €393m[13] (and €156m below the PR2 submission of €476m) implies that only about 50% of the estimated PR2 infrastructure requirements will have been delivered during this period.

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[12] Whilst Figure 10 is clearly dominated by the Srananagh 220 kV project, if this is excluded the overrun factor increases to almost 50%, indicating that the Srananagh project is not exceptional

[13] Refer to Table 14, Page 13

In considering allowances for the PR3 period it is important that lessons are learnt from the PR2 capex performance, particularly with respect to the rate at which projects can be defined, approved and progressed from the planning to the project delivery stage.

### 5.12. Project Progress

The procedures in place for developing projects within EirGrid and then progressing them to agreed projects with ESB Networks are determined by the Infrastructure Agreement (IA) and have been described by EirGrid in connection with the PR3 submission. These descriptions are also relevant to PR2 and are paraphrased below.

### 5.13. Process for Advancing Projects

The network projects underpinning the capital expenditure in a revenue control period are invariably at various stages in their development. Those described as **Ongoing** have obtained internal approval to proceed at the appropriate level within EirGrid. These projects are listed in EirGrid's annual Transmission Development Plans which have been approved by the Commission. These projects pass through a defined **Pre-Stage 1** internal approval process.

Following internal approval, there is a two stage process to bring projects through to completion. The first stage**, Stage 1**, covers the work from start-up to project agreement with ESB Networks as the Transmission Asset Owner. This stage involves preliminary design work, consultation on the proposed scheme, preparation of the appropriate environmental statements and reports, lodging of planning applications with an Bord Pleanála, public hearings, and where planning permission is granted, preparation of Committed Project Parameters(CPP) to ESBN.

Once Planning has been obtained, EirGrid provides ESBN with its outline designs and functional specifications through issue of its **Committed Project Parameters (CPP)**. ESB Networks then provides EirGrid with its proposals for implementing the project via its **Project Implementation Plan (PIP)**. Only when these have been agreed can a **Project Agreement** be signed and construction work commence. In the case of overhead line projects, EirGrid has the additional responsibility of arranging land access for ESBN construction crews.

Table 17 presents a breakdown of the status of the projects detailed in the Transmission Capex Monitoring Report. Whilst the nature of a number of the project status tranches are consistent with the categories detailed above and some others are relatively obvious, i.e. Cancelled, Finished or On Hold, a number of the dominant categories relevant to the forecast 2010 expenditure and beyond require some interpretation.

The Pre CA category covers those projects inherited from the pre TSO/TAO regime and essentially committed or under construction. The TSO Proposed category, although not identified above represents a significant number of smaller projects primarily concerned with asset replacement and equipment upratings that have been identified by the Transmission Asset Owner (TAO) and are currently either Under Consideration or identified as New Provisions by EirGrid but not yet agreed.

## Table 17 - Project Status and Cost breakdown

| Status | Number of projects | PR1 expenditure | PR2 expenditure (to date) | *Forecast 2010 expenditure* | Total projects cost | Expenditure beyond 2010 (PR3?) |
|---|---|---|---|---|---|---|
| Cancelled | 16 | - | €3.3m | - | €3.3m | - |
| Pre-CA[14] | N/A (lumped) | €2.9 | €26.4 | - | €29.3m | - |
| Finished | 49 | €314.5 | €154.7m | *€2.3m* | €472m | - |
| Project agreement in place | 60 | €64.9m | €188.3m | *€67.7m* | €413m | €92m |
| PIP Issued | 12 | - | €19.0m | *€13.1m* | €39.8m | €8m |
| CPP Issued | 22 | €2.7m | €3.9m | *€49.4m* | €176m | €120m |
| On Hold | 14 | €0.3 | €0.7m | *€0.2m* | €1.2m | - |
| TAO Proposed | 22 | - | €3.4m | *€6.1m* | €26.5m | €17m |
| Indicative | 14 | - | €15.4m | *€6.0m* | €312m | €262m |
| TDP/Concept | 21 | - | €13.9m | *€12.8m* | €538m | €512m |
| **Totals** | **260+** | **€385.3m** | **€428.9** | ***€157.5m*** | €2011m | **€1099m** |

The categories Indicative and TDP/Concept are predominately projects that are very much in the planning stage not having incurred any Stage 2 expenditure[15] although the forecast spend for 2010 implies a number of these projects moving towards Stage 2. They will therefore fall into a Stage 1 or Pre-Stage 1 status with the expenditure to date (circa €17m[16]) approved internally by EirGrid.

An examination of the Table 17 indicates that the forecast spend for 2010 is in line with the historic/longer term forecast spends for each of the categories and, given the updated outturns for 2009 of about €142m, the forecast spend of €145m for 2010 appears reasonable[17]. However, the indicated spend beyond 2010, totalling over €1bn is dominated by the Indicative and TDP/Concept categories which are as yet only at an early stage of definition. If expensed over the anticipated 5 year PR3 period, this spend would equate to about €200m/year, and there is a clear need to provide greater definition for these latter categories and progress them into Stage 2 if a similar fall in outturn expenditure to that experienced between 2005 and 2006 is to be avoided. This observation is supported by the visual representation of these spend levels (on a simplified annual basis) in Figure 11 which highlights the proportion of Indicative and TDP/Concept projects that will be expected to make up a significant proportion of the post 2010 expenditure.

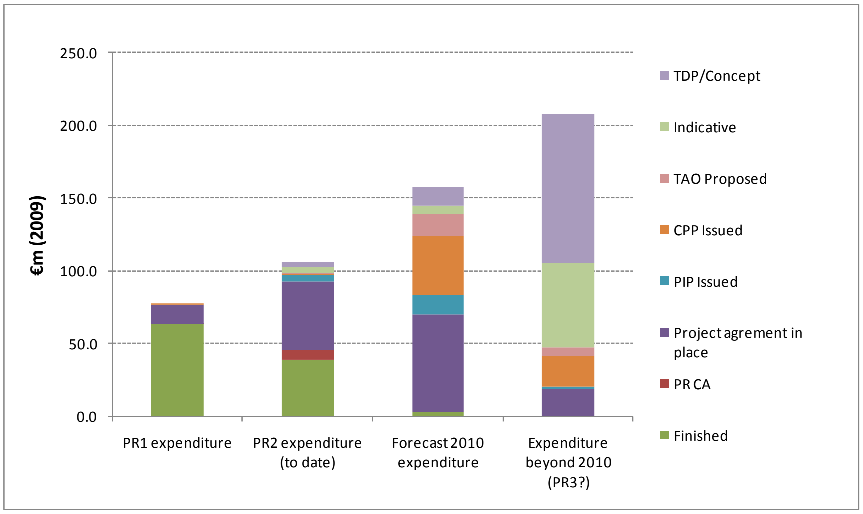
[14] Includes otherwise un-classified Cork Harbour Projects - €1m

[15] One of the projects is likely wrongly categorised, Balgriffin 220kV Station Project has a Stage 2 spend totalling €12.4m in the period up to 2009

[16] Excluding Balgriffin 220kV station

[17] Noting, once again that the values presented in Table 17 include a component of Stage 1 spend that will eventually be consolidated into specific project costs.

- **Figure 11 - Annualised network capex**




## 5.14. Project delivery

We have examined the 25 worst performing projects with respect to cost overruns. By their nature, new transmission circuits in particular tend to be characterised by cost over-runs and project delays. We recommend that EirGrid consider how to enhance the focus on each problematic project, noting that on the basis of the analysis presented earlier, the costs of such delays approximates to about €60m which will largely fall upon the electricity customer.

In the case of ESB Networks there seems to have been a loss of focus on problematic projects with project managers moving from a stalled project onto an ongoing project as appropriate. Again, a situation where an individual has ongoing responsibility for particular projects and is incentivised to deliver against programme and budget is clearly desirable. Reference to Appendix D indicates that this aspect has been addressed going forwards as individual Contract managers are now on bonus which includes project performance on their range of projects.

### 5.14.1. Lessons learned

From discussions with both entities it is evident that procedures and practices are being put in place to minimise project delivery issues and cost overruns. In the case of EirGrid there is an increasing focus on using the full power of the law to ensure access to site and allow construction to proceed.

In the case of ESB Networks, lessons seem to have been learnt with respect to construction contracts such that demobilisation, remobilisation and downtime rates are now more fully covered, furthermore they are also more adept at moving construction teams from one project to another if work is halted at any time.

More generous arrangements have also been put in place with farming organisations which, in tandem with the depressed economy and housing market, appears to be overcoming many of the wayleave and land access issues. These arrangements include a three stage payment process, i.e. Stage 1 – Access, Stage 2 – Build and Stage 3 Energisation, all of which should encourage landowners to allow completion of projects.

At this stage we also wish to draw attention to the Capex Monitoring Report which has been a very useful diagnostic tool during the course of this review. We understand that this was prepared at the request of CER however we are of the view that this is indicative of the sort of management information that should also be in place within the TSO and TAO. Accordingly, it is our suggestion that the Capex Monitoring Report should become a fully functional (i.e. formula based) tool that is shared document between the three main stakeholders albeit with some improved clarity and quality control of inputs. As such it will act to highlight project issues and if updated regularly (at least monthly) by the responsible project managers it will allow additional management focus on problematic issues.

### 5.14.2. PR2 capex efficiency.

As indicated above, a detailed review has been undertaken of the capital expenditure information provided by EirGrid in response to the PR3 questionnaire, both the historic and forecast submissions and additional information and presentation provided both by EirGrid and also ESB Networks. The progression of individual projects and the build up of their costs has also been investigated, including the issues of significant programme delays and cost overruns. During PR2 there have also been significant changes in electrical transmission equipment and labour costs and these have all impacted on the PR2 capital expenditure.

In comparing the PR2 actual and forecast (2010) outturns against the original PR2 submission it should be noted that transmission network investments, particularly in the dynamic environment that existed in Ireland during the early years of PR2, needs to be aligned with changing network needs, initially rapid demand growth followed by a collapse in demand at the same time as new generation projects are connecting and older generation is retired. Against this background it should be noted that only about half of the projects identified in the PR2 submission have actually progressed whilst an equivalent amount of new projects have been identified and largely implemented.

Given that transmission network development is in many cases reactive, it follows that other when constrained by financial allowances the extent to which actual transmission network investment during PR2 matches the original submission or indeed CER allowances may be largely coincidental. Nevertheless, in terms of capital expenditure, after a slow start with only about 50% of the allowed expenditure being delivered during 2006 and 2007, the level of investment thereafter has matched and is forecast to exceed allowances for 2009 and 2010 and overall about 80% of allowed investments will be delivered. However, when account is taken of increased material and labour costs, coupled with significant additional costs associated with project delays and land access issues it is our assessment that only about 50% of the originally intended network assets will be installed by the end of PR2. However, likely due to some slippage in generation connections and also demand growth there is little evidence of any reduction in customer quality although it is evident that the original PR2 submission was clearly optimistic with respect to network deliverability, particularly with respect to obtaining planning consents and land/site access.

Set against major issues associated with site access, particularly for new overhead line constructions, although additional costs have been incurred we are satisfied that network investments have been made in as efficient a manner as possible, noting the steep learning curve that has been set against the changing economic and social environment. However, we expect that lessons will continue to be learned and that project delivery efficiency will further improve in order to meet the investment requirements of PR3.

# 6. Review of PR3 Capital Expenditure

In response to the Price Review Questionnaire, EirGrid submitted three capital expenditure projections in spreadsheet format, each set against somewhat different development scenarios respectively referenced as "Network Needs", "Deliverability" and "Affordability". The capital expenditures associated with each of these scenarios are presented in tabular format below

- **Table 18 - TSO three Network Capex scenarios**

| Network Needs Scenario - €2109 Million | | PR3 Period | | | | | Total in the PR3 period |
|---|---|---|---|---|---|---|---|
| **€ million** | | **2011** | **2012** | **2013** | **2014** | **2015** | |
| **Ongoing projects** | EirGrid | €22.1 | €9.2 | €3.9 | €3.5 | €0.7 | |
| | ESB | €210.4 | €290.3 | €223.4 | €145.5 | €28.6 | |
| | **Total** | **€232.5** | **€299.5** | **€227.4** | **€149.0** | **€29.3** | €937.6 |
| **Under Consideration - System Reinforcements** | EirGrid | €1.1 | €7.2 | €57.2 | €38.4 | €22.1 | |
| | ESB | €16.9 | €48.1 | €130.9 | €216.5 | €250.3 | |
| | **Total** | **€18.0** | **€55.3** | **€188.0** | **€255.0** | **€272.4** | €788.7 |
| **Under consideration - Shallow Connection - Non LCTA works** | EirGrid | €2.1 | €2.3 | €4.9 | €2.3 | €0.4 | |
| | ESB | €2.3 | €9.4 | €11.7 | €12.4 | €16.4 | |
| | **Total** | **€4.4** | **€11.7** | **€16.7** | **€14.7** | **€16.8** | €64.3 |
| **Provisions - System Reinforcements** | EirGrid | €0.0 | €0.0 | €0.0 | €0.8 | €0.8 | |
| | ESB | €5.2 | €3.4 | €3.4 | €0.0 | €7.2 | |
| | **Total** | **€5.2** | **€3.4** | **€3.4** | **€0.8** | **€8.0** | €20.8 |
| **Provisions - Asset Refurbishment** | EirGrid | €0.6 | €0.7 | €0.4 | €0.6 | €0.1 | |
| | ESB | €23.0 | €49.0 | €61.0 | €55.0 | €46.0 | |
| | **Total** | **€23.6** | **€49.7** | **€61.4** | **€55.6** | **€46.1** | €236.3 |
| **Provisions - Minor Capital & Conflicts (Minus 75% Contribution)** | EirGrid | €0.1 | €0.1 | €0.1 | €0.1 | €0.1 | |
| | ESB | €7.8 | €8.9 | €9.0 | €9.6 | €10.3 | |
| | **Total** | **€7.9** | **€9.0** | **€9.1** | **€9.8** | **€10.4** | €46.1 |
| **Under consideration - DSO - 50% contribution** | EirGrid | €1.5 | €0.4 | €0.0 | €0.0 | €0.0 | |
| | ESB | €3.3 | €2.3 | €2.8 | €3.6 | €1.8 | |
| | **Total** | **€4.8** | **€2.6** | **€2.8** | **€3.6** | **€1.8** | €15.6 |
| **Total** | EirGrid | €27.5 | €19.8 | €66.5 | €45.6 | €24.2 | |
| | ESB | €268.9 | €411.3 | €442.3 | €442.7 | €360.6 | |
| | **Total** | **€296.4** | **€431.1** | **€508.8** | **€488.3** | **€384.8** | €2,109.4 |
| | | | PR3 Total | | €2,109 | Million | |

| Deliverability Scenario - €1733 Million | | PR3 Period | | | | | Total in the PR3 period |
|---|---|---|---|---|---|---|---|
| € million | | 2011 | 2012 | 2013 | 2014 | 2015 | |
| Ongoing projects | EirGrid | €21.0 | €8.7 | €3.7 | €3.3 | €0.6 | |
| | ESB | €199.9 | €275.8 | €212.3 | €138.2 | €27.2 | |
| | **Total** | **€220.8** | **€284.5** | **€216.0** | **€141.5** | **€27.8** | €890.7 |
| Under Consideration - System Reinforcements | EirGrid | €1.0 | €6.8 | €54.3 | €36.5 | €21.0 | |
| | ESB | €10.1 | €28.9 | €78.5 | €129.9 | €150.2 | |
| | **Total** | **€11.1** | **€35.7** | **€132.8** | **€166.4** | **€171.2** | €517.3 |
| Under consideration - Shallow Connection - Non LCTA works | EirGrid | €2.1 | €2.3 | €4.9 | €2.3 | €0.4 | |
| | ESB | €2.3 | €9.4 | €11.7 | €12.4 | €16.4 | |
| | **Total** | **€4.4** | **€11.7** | **€16.7** | **€14.7** | **€16.8** | €64.3 |
| Provisions - System Reinforcements | EirGrid | €0.0 | €0.0 | €0.0 | €0.4 | €0.4 | |
| | ESB | €2.6 | €1.7 | €1.7 | €0.0 | €3.6 | |
| | **Total** | **€2.6** | **€1.7** | **€1.7** | **€0.4** | **€4.0** | €10.4 |
| Provisions - Asset Refurbishment | EirGrid | €0.5 | €0.5 | €0.3 | €0.4 | €0.0 | |
| | ESB | €18.4 | €39.2 | €48.8 | €44.0 | €36.8 | |
| | **Total** | **€18.9** | **€39.7** | **€49.1** | **€44.4** | **€36.8** | €189.0 |
| Provisions - Minor Capital & Conflicts (Minus 75% Contribution) | EirGrid | €0.1 | €0.1 | €0.1 | €0.1 | €0.1 | |
| | ESB | €7.8 | €8.9 | €9.0 | €9.6 | €10.3 | |
| | **Total** | **€7.9** | **€9.0** | **€9.1** | **€9.8** | **€10.4** | €46.1 |
| Under consideration - DSO - 50% contribution | EirGrid | €1.5 | €0.4 | €0.0 | €0.0 | €0.0 | |
| | ESB | €3.3 | €2.3 | €2.8 | €3.6 | €1.8 | |
| | **Total** | **€4.8** | **€2.6** | **€2.8** | **€3.6** | **€1.8** | €15.6 |
| Total | EirGrid | €26.2 | €18.9 | €63.4 | €43.0 | €22.6 | |
| | ESB | €244.4 | €366.0 | €364.9 | €337.8 | €246.2 | |
| | **Total** | **€270.6** | **€384.9** | **€428.2** | **€380.8** | **€268.9** | €1,733.5 |
| | | | PR3 Total | | €1,733 | Million | |

| Affordability Scenario - €1329 Million | | PR3 Period | | | | | Total in the PR3 period |
|---|---|---|---|---|---|---|---|
| € million | | 2011 | 2012 | 2013 | 2014 | 2015 | |
| Ongoing projects | EirGrid | €21.0 | €8.7 | €3.7 | €3.3 | €0.6 | |
| | ESB | €199.9 | €275.8 | €212.3 | €138.2 | €27.2 | |
| | **Total** | **€220.8** | **€284.5** | **€216.0** | **€141.5** | **€27.8** | **€890.7** |
| Under Consideration - System Reinforcements | EirGrid | €1.0 | €6.8 | €54.3 | €36.5 | €21.0 | |
| | ESB | €4.2 | €12.0 | €32.7 | €54.1 | €62.6 | |
| | **Total** | **€5.2** | **€18.9** | **€87.0** | **€90.7** | **€83.6** | **€285.4** |
| Under consideration - Shallow Connection - Non LCTA works | EirGrid | €2.0 | €2.2 | €4.7 | €2.2 | €0.4 | |
| | ESB | €0.6 | €2.3 | €2.9 | €3.1 | €4.1 | |
| | **Total** | **€2.6** | **€4.5** | **€7.6** | **€5.3** | **€4.5** | **€24.5** |
| Provisions - System Reinforcements | EirGrid | €0.0 | €0.0 | €0.0 | €0.8 | €0.8 | |
| | ESB | €1.3 | €0.8 | €0.8 | €0.0 | €1.8 | |
| | **Total** | **€1.3** | **€0.8** | **€0.8** | **€0.8** | **€2.6** | **€6.3** |
| Provisions - Asset Refurbishment | EirGrid | €0.6 | €0.6 | €0.4 | €0.5 | €0.1 | |
| | ESB | €5.8 | €12.3 | €15.3 | €13.8 | €11.5 | |
| | **Total** | **€6.4** | **€12.9** | **€15.6** | **€14.3** | **€11.6** | **€60.7** |
| Provisions - Minor Capital & Conflicts (Minus 75% Contribution) | EirGrid | €0.1 | €0.1 | €0.1 | €0.1 | €0.1 | |
| | ESB | €7.8 | €8.9 | €9.0 | €9.6 | €10.3 | |
| | **Total** | **€7.9** | **€9.0** | **€9.1** | **€9.8** | **€10.4** | **€46.1** |
| Under consideration - DSO - 50% contribution | EirGrid | €1.5 | €0.4 | €0.0 | €0.0 | €0.0 | |
| | ESB | €3.3 | €2.3 | €2.8 | €3.6 | €1.8 | |
| | **Total** | **€4.8** | **€2.6** | **€2.8** | **€3.6** | **€1.8** | **€15.6** |
| Total | EirGrid | €26.2 | €18.8 | €63.2 | €43.4 | €23.0 | |
| | ESB | €222.8 | €314.4 | €275.9 | €222.4 | €119.2 | |
| | **Total** | **€249.04** | **€333.22** | **€339.05** | **€265.81** | **€142.18** | **€1,329.3** |
| | | | PR3 Total | | €1,329 | Million | |

The three network development scenarios are described in EirGrid's Forecast Submission Document 5.1 – Approach to Network Capital Expenditure 2011-15. EirGrid advise that if all Grid25 new build projects were commenced over the next 18-24 months network uprates scheduled according to their deliverability then the CAPEX spend in PR3 would have required about €3.5bn.

In order to establish the Network Needs for PR3, the above programme of €3.5bn was adjusted to take account of the current, lower demand projections, the more limited number of new thermal generation plants which will be provided under Gate 3 and, the advancement in the first instance of only one major [transmission] project where two or more largely parallel projects were identified. EirGrid states that it is continuing to optimise the solutions while monitoring the uncertainties that could change the planning environment. However, while individual solutions may change as a result of optimisation, EirGrid is confident that the estimate of capital expenditure in the period to 2015 [€2.1bn] is broadly correct.

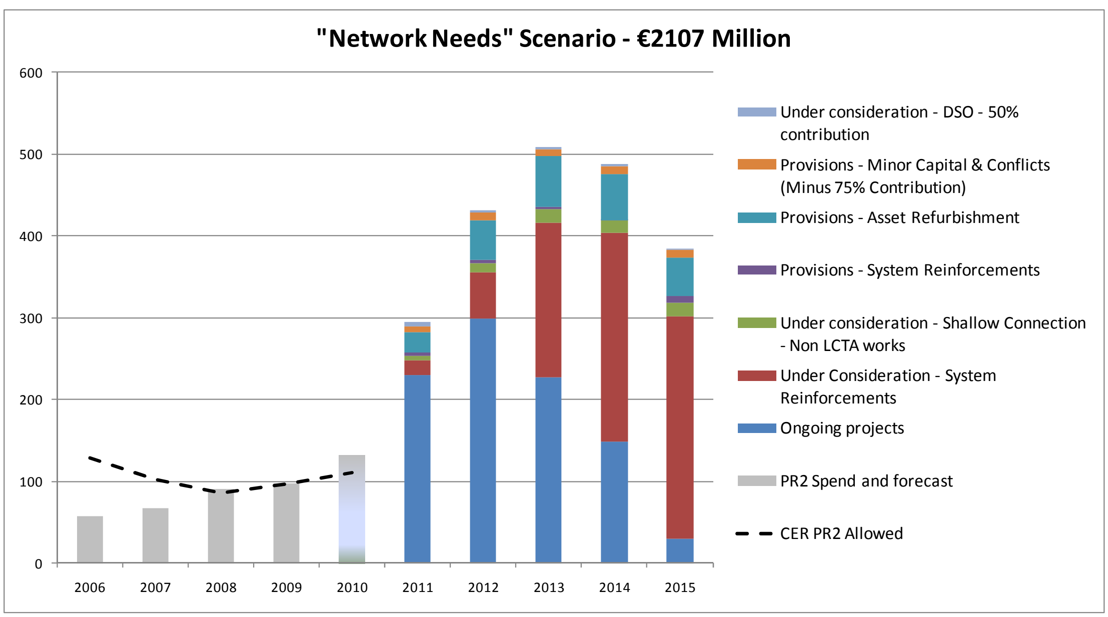
In this latter respect we have reviewed the underlying equipment supply and installation costs and we are satisfied that these are consistent with historical outturns, other than due to project delivery problems associated with planning and land access issues, and are also consistent with outturn transmission project costs in similar operational regimes, e.g. Great Britain, Australia and New Zealand, and other international market places, e.g. Abu Dhabi and Oman.

In response to the Commission's request that consideration be given to both alternative scenarios and flexibility as part of the approach to forecasting for the forthcoming period, two further scenarios were adopted namely, Deliverability and Tariff Impact/Affordability. The Deliverability scenario is described as EirGrid's best assessment of what proportion of the Network Needs scenario will actually be delivered in 2011-15 and equates to €1.7bn. EirGrid states that the Tariff Impact/Affordability scenario is essentially based upon delaying capital expenditure to minimise any early impact on tariffs, albeit inevitably resulting in higher overall costs in terms of constraints, losses and in the extreme load shedding. This scenario equates to a 2011-15 spend of €1.3bn, in part constrained by the fact that almost €900m of transmission projects are already underway with EirGrid indicating that these could only be reversed at considerable cost and stranding [of assets].

In reviewing these three scenarios we have looked at the three differentiators', namely Network Needs against GRID25 objectives, Deliverability against past and likely future performance and also Affordability, or more precisely the extent to which planned expenditure is committed and penalties/asset stranding may occur should the project be suspended or abandoned.

To better put the scenarios into perspective, the Network Needs scenario is presented Figure 12 in a historical context set against the PR2 CER Allowed and Outturn/2010 forecast network capital investments.

- **Figure 12 – Network Needs scenario**




It is evident that undertaking a capital expenditure programme of the magnitude of €2.1bn will represent a significant change from recent/ongoing practice both within EirGrid and also ESB Networks. To better understand the requirements and likely capital expenditure outcomes during PR3 it is necessary to firstly understand the drivers behind the Network Needs scenario and potential ways in which some savings in network capacity may be realised.

### 6.1. Available network capacity

This work, which included consideration of somewhat changed application of the network planning standards, the use of Dynamic Line Rating (DLR) and also increased utilisation of opportunistic network capacity through the use of Advanced Protection Systems (APS) all associated with the use of automatic controls to manage the output from largely wind based renewable generation indicates that upwards of 50% additional network capacity can be released with only minimum (1-2%) constraint on generation output. It should be noted that the additional, albeit marginally constrained network capacity identified were not considered as additive but rather as somewhat complementary approaches.

Taken together, the work referenced above indicates that there may be significant existing and/or potential new network capacity that can be made available in a cost effective and timely manner to network users, particular wind based renewable generation, both in the existing radial feed networks and also the main power corridors.

In conclusion, on the basis that the scope for releasing network capacity by means other than traditional network reinforcements is fully adopted, the extent of network reinforcements focussed on allowing the connection of renewable and used in the ITC program can be reduced to only about 40% of the original program whilst still allowing the 2020 targets to be met. Additionally, this assessment indicates that by the use of DLR and encouragement of non-firm connections, to remain on target only minimal renewable capacity investments need be undertaken during PR3 and only a small degree of catch-up would then be necessary during PR4, noting that in total only about 40% of the original renewable capacity investments may need to be undertaken through to 2020.

It must also be recognised that the use of DLR and also increased utilisation of opportunistic network capacity through the use of APS on other main transmission circuits, not necessarily associated with the connection of renewable generation, may also deliver significant and useful enhancements to existing capacity and/or reduction in network constraints and hence facilitate the avoidance/delay of certain major reinforcement expenditure.

#### 6.1.1. Reduction in PR3 Network Needs investment requirements.

The above observations have been investigated and the associated savings identified. It should be noted that where uprating of substation equipments and the provision of additional capacitive compensation necessary to allow for increased power flows across the existing network infrastructure has been fully recognised. Adopting the same approach other proposed main network reinforcements have been reassessed, as well as certain demand growth related developments.

Additionally, given the high level nature of this assessment, a 20% provision has been included against all identified savings such that any instances where it is found that uprating of certain sections of overhead line are necessary, or that for other reasons some line uprating works are required, then appropriate provisions are available. Asset refurbishment provisions have also been reduced such that after recognising significant asset condition driven work included under "ongoing projects" the overall asset condition related spend aligns with that reported for PR2.

### 6.2. Adjusted Network Needs scenario

The adjusted network investment profile resulting from the above assessments are presented in Table 19 below in what is described as a "Stretched Network Needs" scenario. This totals about €1.45bn and sits somewhere between EirGrid's Deliverability" and "Affordability" scenarios. However, the basis of the Stretched Network Needs scenario is considered to be aligned with the cost effective delivery of the network capacity required to allow the 40% renewable energy target to be met by 2020 and to also be aligned with the GRID25 strategy for the development of Ireland's Electricity Grid for a sustainable and competitive future.

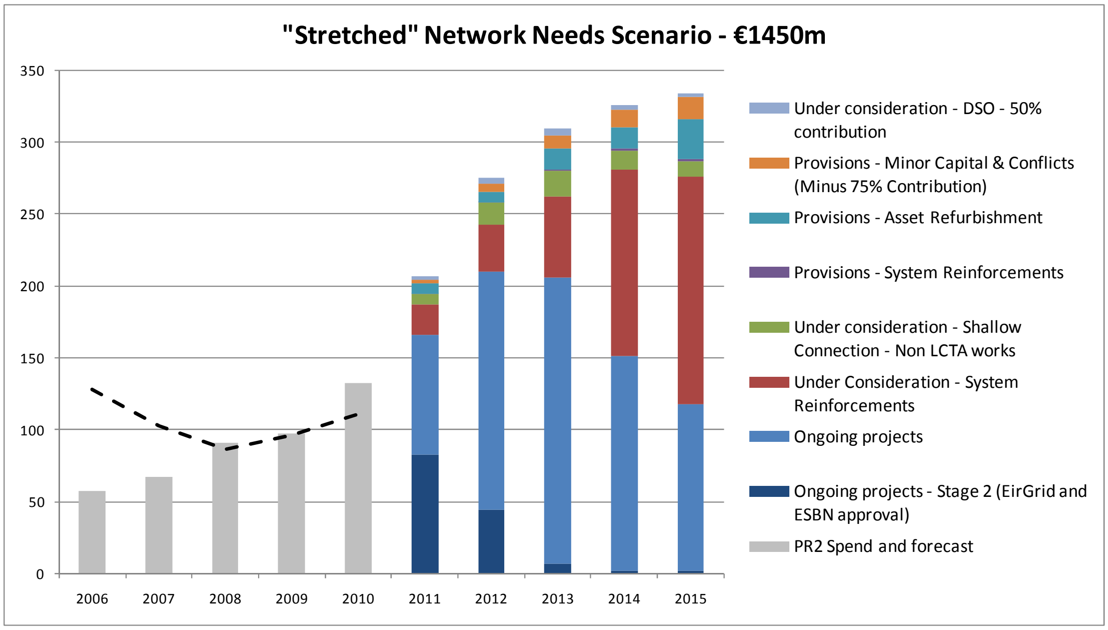
- **Table 19 – Adjusted Network Needs scenario**

| Stretched Network Needs Scenario | | PR3 Period | | | | |
|---|---|---|---|---|---|---|
| | | 2011 | 2012 | 2013 | 2014 | 2015 |
| Ongoing projects | EirGrid | 7.1 | 9.1 | 8.9 | 6.5 | 5.1 |
| | ESB | 158.9 | 201.3 | 197.3 | 144.5 | 112.7 |
| | **Total** | **166.1** | **210.3** | **206.1** | **151.0** | **117.8** |
| Under Consideration - System Reinforcements | EirGrid | 9.1 | 9.1 | 9.1 | 12.7 | 18.2 |
| | ESB | 11.7 | 23.4 | 46.8 | 117.0 | 140.3 |
| | **Total** | **20.8** | **32.5** | **55.9** | **129.7** | **158.5** |
| Under consideration - Shallow Connection - Non LCTA works | EirGrid | 1.4 | 2.8 | 3.4 | 2.5 | 2.0 |
| | ESB | 6.1 | 12.1 | 14.6 | 10.9 | 8.5 |
| | **Total** | **7.5** | **14.9** | **17.9** | **13.5** | **10.5** |
| Provisions - System Reinforcements | EirGrid | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 |
| | ESB | 0.3 | 0.5 | 0.8 | 1.1 | 1.4 |
| | **Total** | **0.3** | **0.6** | **0.9** | **1.2** | **1.5** |
| Provisions - Asset Refurbishment | EirGrid | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 |
| | ESB | 6.8 | 6.8 | 14.6 | 14.6 | 27.3 |
| | **Total** | **6.9** | **6.9** | **14.8** | **14.8** | **27.6** |
| Provisions - Minor Capital & Conflicts (Minus 75% Contribution) | EirGrid | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 |
| | ESB | 3.0 | 6.1 | 9.1 | 12.1 | 15.2 |
| | **Total** | **3.1** | **6.2** | **9.2** | **12.3** | **15.4** |
| Under consideration - DSO - 50% contribution | EirGrid | 0.2 | 0.4 | 0.5 | 0.4 | 0.3 |
| | ESB | 1.6 | 3.2 | 3.8 | 2.9 | 2.2 |
| | **Total** | **1.8** | **3.6** | **4.4** | **3.3** | **2.5** |
| Total | EirGrid | 18.0 | 21.6 | 22.2 | 22.5 | 26.1 |
| | ESB | 188.4 | 253.5 | 287.0 | 303.1 | 307.7 |
| | **Total** | **206.4** | **275.0** | **309.2** | **325.7** | **333.8** |
| | | PR3 Total | | | 1450.0 Million | |

Additional to the determination of the total PR3 investment requirements, the expenditure profile has also been adjusted to better reflect likely sustainable outcomes, noting the project delivery issues that have been encountered in the past and also the clear linkage with further expenditure during PR4 that will be needed to deliver the GRID25 objectives. It can be seen that a longer term investment level of about €330m/year is indicated by the 2014 and 2015 levels. This may be contrasted with the PR2 annual expenditure rate of between €70m and €145m.

The resulting expenditure profile is presented in Figure 13. This profile also indicates the PR3 work included under "Ongoing Projects" which has progressed to Stage 2 status, i.e. now projects being undertaken by ESB Networks, rather than developing projects within EirGrid. The significant shortfall between ongoing Stage 2 works and envisaged overall investment requirements is clearly evident and indicates the need for caution when sanctioning initial PR3 investment proposals.

- **Figure 13 – "Stretched" Network Needs scenario**



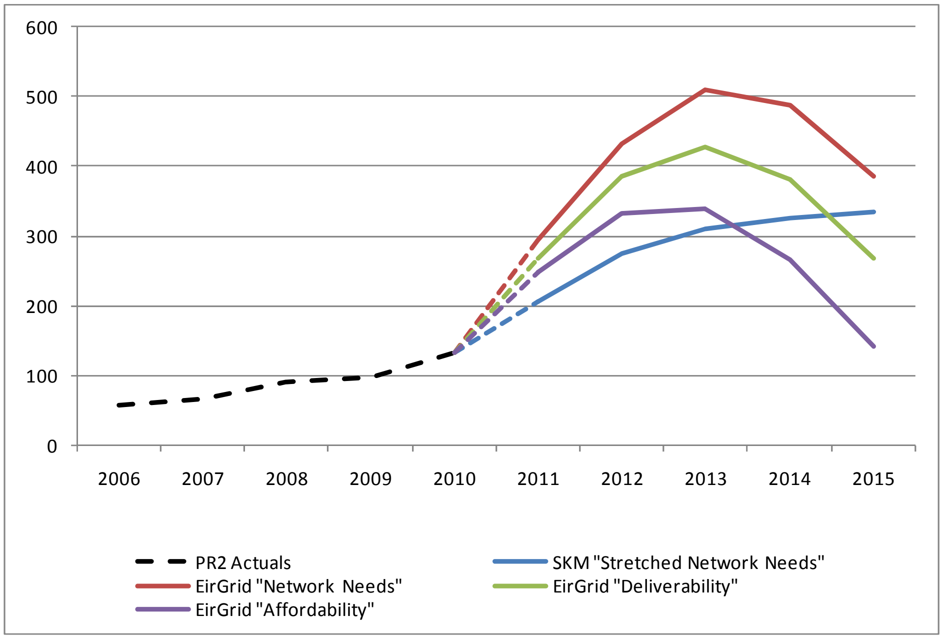

Based upon the assessment presented above and also the information contained in EirGrid's submissions relating to the three scenarios that they outlined, the underlying split between load and non-load related capital expenditures lines and also customer contributions have been identified and the associated build up of the Net Network Capex is presented in a more conventional format in Table 20. Table 20 also lists the Network Capex associated with the three EirGrid scenarios for comparison purposes.

- **Table 20 – Proposed PR3 allowed capital expenditure (€m 2009 prices)**

| | **Year** | **2011** | **2012** | **2013** | **2014** | **2015** | **Totals** |
|---|---|---|---|---|---|---|---|
| **Proposed PR3 allowances (€m)** | **Load related** | 184.8 | 251.0 | 288.4 | 303.5 | 307.6 | **1335.3** |
| | **Non-Load related** | 32.1 | 30.3 | 29.2 | 30.0 | 27.6 | **149.1** |
| | **Gross Network capex** | 216.9 | 281.3 | 317.6 | 333.5 | 335.2 | **1484.4** |
| | **Customer contributions** | -10.5 | -6.3 | -8.4 | -7.8 | -1.4 | **34.4** |
| | **Net Network Capex** | **206.4** | **275.0** | **309.2** | **325.7** | **333.8** | **1450.0** |
| ***EirGrid submissions (Net network capex)*** | ***Network Needs*** | *296.4* | *431.1* | *508.8* | *488.3* | *384.8* | ***2,109.4*** |
| | ***Deliverability*** | *270.6* | *384.9* | *428.2* | *380.8* | *268.9* | ***1,733.5*** |
| | ***Affordability*** | *249.04* | *333.22* | *339.05* | *265.81* | *142.18* | ***1,329.3*** |

The capital expenditure profiles detailed above are presented in graphical format in Figure 14 and the classical "planners droop" is evident "post 2013" in all three EirGrid scenarios. These are considered somewhat unreasonable profiles given the longer term GRID25 planning horizon, e.g. 40% renewable by 2020, with its implicit longer term network investment planning objectives. The more consistent profile associated with the "Stretched Network Needs" scenario is therefore considered being better matched and more likely deliverable and sustainable profile.

- **Figure 14 – PR2 and proposed PR3 expenditure profiles (€m 2009 prices)**




It should be noted that the capital expenditure allowances outlined above are based upon releasing significant additional transmission capacity from the existing network infrastructure by the adoption of somewhat modified transmission planning criteria, which basically accepts the risk of a small level of constraint (1-2%) on predominately renewable generation, and also the use of dynamic line rating techniques and also advanced protection/control schemes. Implicit within this scenario is the assumption that all network developments will be subject to critical cost ~ benefit analysis to ensure that the most cost effective and also deliverable alternatives will be taken forward consistent with both the present planning/consenting and also the Irish and international economic environments.

Commensurate with the increase in the level of network investment, an assessment of TSO and TAO manpower and Contractor based resource requirements have also been undertaken and are presented in Appendix D. Whilst the resource requirements increase significantly from those applying at present, we are satisfied that the necessary resources are available to support the increased investment requirements.

# 7. TAO Incentives

Hitherto no incentive payments have been available to the TAO, other than the incentive available from outperforming allowed costs. This section considers suitable incentive for delivering the capital programme, particularly for renewable generation connections.

## 7.1. Incentives for Capital Investment Delivery

The TAO has proposed incentives for connecting generators to the network based on achievements in relation to each of three milestones - planning stage, detailed design stage and construction stage. The TAO proposes adjustments to target dates due to matters considered to be outside the TAO's control. **We recommend an incentive linked to MW of connected generation based on overall lead times approved by CER. This approach avoids sub-optimisation over the various stages and encourages catch up where there is slippage in any one stage.**

**This incentive scheme should also be applied to the TAO, based on standard lead times from the point that the project is handed over to the TAO from TSO. The incentive should apply to all network capital works that deliver additional usable network capacity including the implementation of capacity enhancement measures such as DLR and APS, noting that ownership and stewardship of these assets reside with the TAO.**

**The Capex Monitoring Report has been a very useful diagnostic tool during the course of this review. We understand that this was prepared at the request of CER however we are of the view that this is indicative of the sort of management information that should also be in place within the TSO and TAO. Accordingly, it is our suggestion that the Capex Monitoring Report should become a fully functional (i.e. formula based) tool that is shared document between the three main stakeholders, albeit with some improved clarity and quality control of inputs. As such it will act to highlight project issues and if updated regularly (at least monthly) by the responsible project managers it will allow additional management focus on problematic issues. The information contained within such report may also form a basis for appropriate incentivisation of individuals and also the licensed businesses**.

# 8. Conclusions

## 8.1. PR 2 Operating Costs

The TAO's PR2 operating costs of €212.4m are €29.77m lower than the allowed costs of €242.1m. The TUoS tariffs over PR2 are based on the allowed expenditures and we recommend that allowed operating costs for PR2 be reduced by €25.04m, as these savings are due to windfall gains and not due to efficiency savings.

The under spend is partly due to an under spend on transmission maintenance of €9.6m which arises due to under achievement of the planned maintenance programme.

The remainder of the under spend is due to the over- provision of allowed Other costs in PR2 of €12.2m due to the uncertainty at that time of the split of responsibilities and costs between the TAO and TSO, which were later clarified under the Infrastructure Agreement.

The under spend on planned maintenance does not reflect efficiency savings but reflects the shortfall in the achievement of the planned maintenance programme, particularly on substation maintenance, where only 67% of maintenance tasks required by TSO policies were completed in the period 2006 to 2008. Due to restrictions on outage availability and other constraints not all maintenance required by the policies could be programmed. Over 80% of scheduled maintenance was achieved.

## 8.2. PR3 Assumptions

**Payroll Costs**

The TAO's assumption that internal labour costs will be maintained at CPI is considered to be too conservative in the present economic climate and when compared with pay reductions elsewhere in the Irish economy. Our recommendations are based on a reduction in payroll costs of 5% pa in 2011, which is approximately equivalent to a reduction in controllable costs of 1.75%.

In making recommendations for allowed costs we have taken excess margin and payroll costs into account when assessing those costs which have a component of costs from other parts of ESB Group.

**Productivity**

The TAO has assumed a productivity increase of 1% per annum over PR3. The ESRI Medium Term Review 2008[18] forecasts that the average productivity of the Irish economy to be 2.5% per annum over the period 2011 to 2015. The TAO's activities are highly mechanised and are supported by a significant level of IT investment. There has also been significant reorganisation and staff reduction in PR2 and potential for more in PR3. Much of these developments have occurred in the latter part of PR2 and the full effect is not reflected in costs.

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[18] Economic and Social Research Institute Medium Term Review 2008 – May 2008

Overall we have included an efficiency saving of 2% per year on most controllable costs taking into account the potential for productivity savings, alignment of salaries in the TAO organisation and the reduction in margin of its internal service providers.

We have chosen to apply reductions over the PR3 period to minimise the impact on the TAO's operations, including the ability to resource its activities. A more aggressive approach would have led to a step reduction in allowed costs in 2011.

Our recommendation for allowed costs is an overall settlement and is not dependent on individual line items and the recommendation is based on what is considered to be efficient overall.

**Benchmarking**

Benchmarking has been carried out by both TAO and SKM and is considered in more detail in Section 4.

Benchmarking of ESB Networks DSO and 110 kV TAO opex and non network capex for indicates that the DSO costs are 7.5% above the Upper Quartile of the GB DNO costs and 16 % above the efficiency frontier. This is consistent with our recommendations for allowed costs.

## 8.3. PR3 Operating Costs

The recommendations for allowed operating costs are based on the assumptions in section 1.3. The particular features of each cost heading have been reviewed including the base level of costs appropriate in 2011, growth factors and potential efficiencies available. Efficiency factors have not been applied for example to all non controllable pass through cost.

The TAO's forecast of operating expenditure in the PR3 period (2011 to 2015) is €268m, which is €56m greater than the equivalent PR2 outturn of €212m.

The additional costs of €56m include an additional €35m for planned maintenance associated with the increase in the asset base from an assumed capital programme of €2bn.

Our recommendation is for allowed PR3 operating costs of €231.9m, which is €36.2m lower than the TAO's PR3 forecast and €19.5m more than the equivalent PR2 outturn, on the basis that the TAO will complete the majority of its maintenance programme.

### 8.3.1. Operations

**(PR2 €11.0m TAO €14.4m Recommended €10.5m)**

We recommend network operations costs of €10.5m based on 2009 costs with a payroll reduction of 5% in 2011 and efficiency factor of 2% per annum. This is in line with our recommendations on the capital and maintenance programme.

### 8.3.2. Planned Maintenance

**(PR2 €52.7 TAO €87.3m Recommended €68.1m)**

In PR3 the allowed costs should be adjusted for changes in volumes of maintenance work completed, either due to shortfall in the maintenance programme or due to changes in volumes of maintenance required. In this way the TAO will be able to retain savings associated with achieving lower than allowed unit costs, but not due to changes in volumes.

For the purpose of our recommendation we have assumed that new assets installed during PR3 will not require significant maintenance during PR3. Existing assets that have been replaced or upgraded are also likely to need less maintenance. We have therefore based our recommendation for planned maintenance expenditure of €69.3m on the requirements identified by the TAO in 2011 and applied a payroll reduction of 5% in 2011 and an efficiency factor of 2% per year. We also consider that for pricing purpose we need to discount the maintenance costs by 10% which represents our assessment that the TAO will achieve a 90% of the maintenance programme, taking into account constraints and historic levels of performance.

We consider that the TAO may fall short of this target and that CER should monitor the programme and make adjustments to allowed revenue on a year by year basis. The review should take account of the revenue from generators for ongoing maintenance charges for connection assets owned by TAO.

In addition we would expect the TAO to press the TSO to review again their maintenance practices and intervals and bring them into line with best international practice as advised by their consultants.

### 8.3.3. Fault Maintenance

**(PR2 €8.28m TAO €6.2m Recommended €5.6m)**

We recommend network operations costs of €5.8m based on the TAO's 2011 forecast with a payroll reduction of 5% and efficiency factor of 2% per annum.

### 8.3.4. Professional Services

**(PR2 €25.0m TAO €24.3m Recommend €19.4m**

Professional Services have varied significantly over PR2 from €3.6m per year in 2007 to €7.0m per year in 2009. The TAO uses ESBI for many routine activities such as maintaining records and checking equipment before return to service after maintenance. We do not have a complete schedule of activities but accept the reduced level of cost of €4.2m in 2011 and have applied a payroll reduction and efficiency factor of 2% per year for these costs throughout PR3. Some of these activities may be more efficiently provided in-house.

### 8.3.5. Telecom Fees

**(PR2 €6.4m TAO €9.0m Recommended €7.6m**

This item cover fees from ESB Telecoms for support of operational IT and telecoms services. These costs rose in PR2 from 0.9m in 2006 to €1.75m in 2009. Our forecast is based on the 2009 level with payroll and efficiency factors applied.

### 8.3.6. Asset Management

**(PR2 €3.7m TAO €8.1m Recommended €5.1m)**

These costs include mast interference and forestry payments, which are increasing. The TAO (and DSO) has asked for these costs to be treated as pass through costs, which we do not recommend as these costs are subject to some control and negotiation by ESB Networks. The TAO forecast includes an amount for retiring transmission assets which have been excluded from our recommended costs.

### 8.3.7. Other Controllable Costs

**(PR2 €17.3m TAO €22m Recommended €18.7m)**

Other controllable costs include legal, pension administration, insurance, company-wide costs and corporate charges. We accept the reduction proposed for corporate charges for 2011 and maintain other costs at appropriate PR2 levels, all with payroll reduction and efficiency savings.

### 8.3.8. Non Controllable Costs

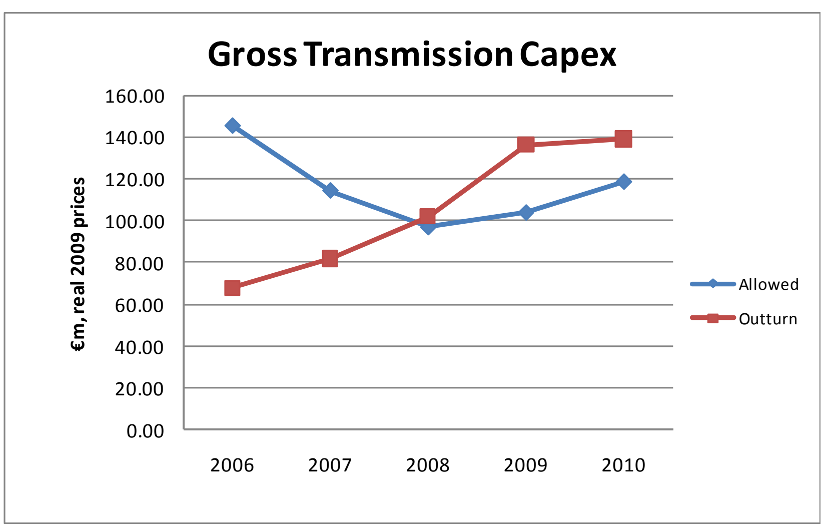
**(PR2 €88.0m TAO €96.9m Recommended €96.9m)**

A review of the global assets valuation was conducted by the Department of the Environment in 2008 which has dictated increased rates charges for the period from 2010 to 2014 inclusive. A further global valuation review is planned for 2015 onwards and we accept the estimated provision of 10% increases in rates charge in 2015 for tariff purposes.

Non Controllable Costs will be adjusted for outturn as the TAO has little control of these costs.

## 8.4. PR2 Network Capital Expenditure

The review of PR2 transmission network investments indicates that due to significant slippage in a number of major projects the PR2 investment profile differs significantly from the original PR2 submission and also CER's PR2 allowances. This observation is presented in graphical format below.



Whilst increased investments towards the end of the PR2 period indicate that the shortfall against the PR2 capex allowances will be limited to just under €80m, i.e. a 17% shortfall, significant project cost overruns are evident due to material and labour cost increases and also due to project slippage and disruptions caused by site access issues. As a consequence it is estimated that only about 50% of the anticipated additional transmission network infrastructure will have been delivered during PR2. However, likely due to some slippage in generation connections and also demand growth there is little evidence of any reduction in customer quality although it is evident that the original PR2 submission was clearly optimistic with respect to network deliverability, particularly with respect to obtaining planning consents and land/site access.

Set against major issues associated with site access, particularly for new overhead line constructions, although additional costs have been incurred we are satisfied that network investments have been made in as efficient a manner as possible, noting the steep learning curve that both the TSO and TAO have been set against the changing economic and social environment. However, we expect that lessons will continue to be learned and that project delivery efficiency will further improve in order to meet the investment requirements of PR3.

## 8.5. PR3 Network Capital Expenditure

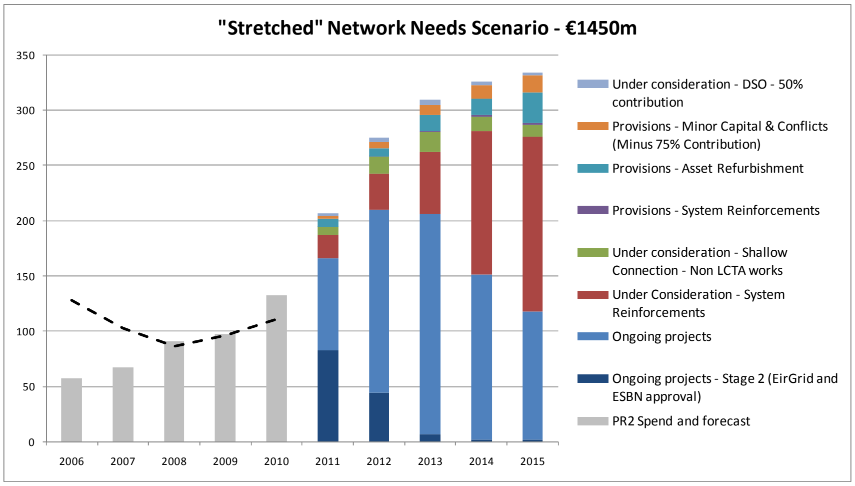
**The recommended capital expenditure allowance for PR3 is presented in tabular format below.**

| | **Year** | **2011** | **2012** | **2013** | **2014** | **2015** | **Totals** |
|---|---|---|---|---|---|---|---|
| **Proposed PR3 allowances (€m)** | **Load related** | 184.8 | 251.0 | 288.4 | 303.5 | 307.6 | **1335.3** |
| | **Non-Load related** | 32.1 | 30.3 | 29.2 | 30.0 | 27.6 | **149.1** |
| | **Gross Network capex** | 216.9 | 281.3 | 317.6 | 333.5 | 335.2 | **1484.4** |
| | **Customer contributions** | -10.5 | -6.3 | -8.4 | -7.8 | -1.4 | **34.4** |
| | **Net Network Capex** | **206.4** | **275.0** | **309.2** | **325.7** | **333.8** | **1450.0** |
| ***EirGrid submissions (Net network capex)*** | ***Network Needs*** | *296.4* | *431.1* | *508.8* | *488.3* | *384.8* | ***2,109.4*** |
| | ***Deliverability*** | *270.6* | *384.9* | *428.2* | *380.8* | *268.9* | ***1,733.5*** |
| | ***Affordability*** | *249.04* | *333.22* | *339.05* | *265.81* | *142.18* | ***1,329.3*** |

**It should be noted that the capital expenditure allowances outlined above are based upon releasing significant additional transmission capacity from the existing network infrastructure by the adoption of somewhat modified transmission planning criteria, which basically accepts the risk of a small level of constraint (1-2%) on predominately renewable generation, and also the use of dynamic line rating techniques and also advanced protection/control schemes.**

The table above also lists the Network Capex associated with the three EirGrid scenarios for comparison purposes and the classical "planners droop" is evident post 2013 in all three EirGrid scenarios. These are considered somewhat unreasonable profiles given the longer term GRID25 planning horizon, e.g. 40% renewable by 2020, with its implicit longer term network investment planning objectives.

The investment requirements and associated profile for PR3 are presented below in a graphical format which is consistent with EirGrid submission format.




**One of the key observations from this figure is the relatively low proportion of the proposed PR3 investment that is currently fully "in hand", i.e. in Stage 2 status. It is therefore imperative, even with this reduced and adapted investment profile that EirGrid progresses projects into and through the Stage 1 status and that the TAO are in a position to expedite the projects promptly.**

### 8.6. Incentives for Capital Investment Delivery

The TAO has proposed incentives for connecting generators to the network based on achievements in relation to each of three milestones - planning stage, detailed design stage and construction stage. The TAO proposes adjustments to target dates due to matters considered to be outside the TAO's control. **We recommend an incentive linked to MW of connected generation based on overall lead times approved by CER. This approach avoids sub-optimisation over the various stages and encourages catch up where there is slippage in any one stage.**

**This incentive scheme should also be applied to the TAO, based on standard lead times from the point that the project is handed over to the TAO from TSO. The incentive should apply to all network capital works that deliver additional usable network capacity including the implementation of capacity enhancement measures such as DLR and APS, noting that ownership and stewardship of these assets reside with the TAO.**

# Appendix A Efficiency and Service Initiatives PR2

ESB Networks has undertaken a number of initiatives to improve efficiency and performance during PR2 which can be expected to decrease costs during the remainder of PR2 and in PR3.

- Implementation of significant re-organisation 9 – 7 directors and 7 – 5 divisions and Depot Rationalisation – 81 to 60 depots
- Implementation of a significant voluntary severance (VS) programme, costs of which are not funded through regulatory allowances. Loss of 287 staff in networks; target for network technicians of 1700 to 1800 from 2250.
- Flexible resource model and use of contractors; single portfolio for networks overheads, performance pay, pressure on expenses.
- Implementation of Performance Improvement Programmes for Overtime etc.
- Focus on cost efficiencies through technical innovations and effective KPI reporting
- Leveraging maximum efficiencies from IT systems
    - Asset Register and Maintenance Management (ARM)
    - Work Management System
    - Operation Management System – to promote centralisation of System Control
    - Mobile data Management (MDMS) – for metering
- Reduce inter business unit charges since 2006. Market Pricing Board to market test all IT services and brings charges in line with delivery of comparable services to the Irish market.
- Manage and control directly, Legal Services and Training by integrating both functions into the ESB Networks Organisation, services that were previously bought in.
- Strategic procurement
- DSO achieved PAS 55 accreditation for its asset management practices in 2009
- Customer service improvement plan to ensure virtually all targets will be achieved in PR2.

# Appendix B Transmission Cost Pressures PR2

- Historically significant economic growth up to 2008 and its impact on activity levels and ESB Networks' cost base.

- Costs of land access/wayleaving, outage planning in particular in cities (weekday restrictions) and stringent environmental legislation.

- Significant creep in 3rd Party fees and charges (eg local authority development fees, path opening fees and water charges etc.)

- Access problems and work practice requirements around environmentally sensitive areas (Protected woodlands, bogs, marshes and waterways)

- Substantial increases in worldwide commodity prices for key materials until the current year.

- Acceleration in wind generation connections and enhanced service to generators called for by regulatory decisions.

- Landowner insistence on Tree surgeon as opposed to timber contractor in some circumstances.

- Road safety requirements.

- Local authority and Garda compliance in road closure planning, Signage plan and equipment needed to deploy road works + associated fees. Increased spend in disposable equipment / losses in equipment associated with road works.

- Full lane reinstatement (Can be very expensive in Fault clearance/repair circumstances)

- Charge culture - TAO now has to pay or compensate 3rd parties where previously some services/help was given free.

- Customers more demanding and aware of their rights, can result in refusal of access been 1st position rather than acceptance, causes significant delays and downtime.

- On-going and emerging Health, Safety and Environmental Regulations.

# Appendix C Review of Maintenance Practices

### EirGrid TAO Review of Substation Maintenance Practice

In 2008 a review of maintenance intervals was undertaken by a joint committee of TAO and EirGrid. An international expert was brought in to advise the committee. The recommendations were finalised during 2009 and are now being applied to the maintenance programme.

However the changes made were very conservative and did not go as far as the consultant recommended resulting in maintenance intervals still being out of line with international best practice.

EirGrid Asset Maintenance Policy document TAM-AMP-2008-101 demonstrates a level of detail and structure as would be expected. However there are some aspects of the policy that suggest that perhaps more extensive maintenance is being applied than is considered appropriate based on best industry practice.

### EirGrid/TAO General Approach

The TAO has a range of equipment types and the policy differentiates between different technologies of equipment e.g. circuit breaker with SF6 or oil technologies.

The schedules within the policy are described as “minimum maintenance activities and the frequencies at which they shall be performed”, this assume that all equipment of a given type and technology requires the same degree and frequency of maintenance.

Many utilities have recognised that maintenance activities and Maintenance frequencies should be established for each type of equipment based on specific design features and operational experience. [e.g. CIGRE Paper B3-106 2008].

By recognising that each equipment type may require specific maintenance activities it will be more likely that the optimum maintenance is achieved rather than over maintaining some equipment and under maintaining others. It is considered that the schedules within the AMP are based on the most frequent and extensive maintenance that is likely to be required, hence the tendency to over maintain. This conclusion is also supported when some examples are taken of specific maintenance activities and frequencies.

### Circuit Breaker Maintenance Intervals

Section BAY CA1: AIS, BAY CA2 GIS and BAY CA3 MTS suggest that the major maintenance intervals for circuit breakers should be 8 years for critical switchgear and 10 years for non-critical switchgear.

These intervals not taking into account the differences between equipment designs and the lower maintenance needs of more modern equipment the basic intervals themselves are shorter than normally expected.

Manufacturers typically specify 12 years for major maintenance intervals or suggest that maintenance is only required based on diagnostic checks. This applies not only to recent equipment but also to equipment where manufacturers initially suggested more frequent intervals.

As described in paper B3-103 2006 SF6 breaker maintenance intervals of 12 years are also common from a utility perspective.

### Dew Points of SF6 Equipment

SF6 filled equipment are required according to Table 3 to have Dew points checked of all compartments. Such a requirement is seen as excessive and unnecessary.

Equipment dew points are established upon commissioning and ensured to be within acceptable limits based on the type of equipment and any specific requirements of the manufacturer.

It is then considered good practice to check these measurements within the first 12 months in service to determine whether any deterioration has taken place. Deterioration in dew point would suggest that moisture trapped with the internal components of the equipment is reaching equilibrium within the equipment. In the exceptional circumstance of the dew point being found outside limits then corrective action would be required.

Once after 12 months a stable dew point is reached then it is extremely unlikely that the dew point will change, hence testing every 12 months is unnecessary and some manufacturers specify checks at intervals of 6 years, other 10 or 12 years.

A further reason not to over check SF6 gas compartments is in order to minimise SF6 handling and potential losses due to the high greenhouse potential of SF6. CIGRE documents and IEC standards have been produced in recent years to give guidance on the recommended handling measures for SF6 gas, although it must also be stated that these guidelines do not give guidance on minimum dew point checking intervals.

### General Maintenance Trends

Generally there is a trend for reduced maintenance of equipment based on various techniques such as Reliability Centred Maintenance. In example B3 -105 2004 service intervals on equipment were usually extended for example on SF6 circuit breakers where service intervals were increased from 2 years to 8 years.

Direct comparisons between utilities in terms of hours per equipment type can be made but generally need to be assessed in terms of the age profile, specific equipment design, past maintenance policies and operating conditions and duties.

# Appendix D Capex Staff Benchmarking Report

### D.1 Benchmarking TSO/TAO Capital Programme Resource Requirements

Based on considerable in-house experience associated with undertaking transmission renewable projects worldwide, SKM has built up a bank of confidential costs and resources for managing such projects.

Project development and management costs have been collated and analysed, based on work carried out in the UK to provide a model of resource required to manage large renewable energy connection/transmission programme such as that to be undertaken by TSO and TAO in PR3. The data has been derived from project management and programme delivery projects throughout the UK.

The analysis summarised in Table 21 shows the resource requirements for delivering a large renewable transmission infrastructure programme, circa €2bn of capital investment, initially on a five year programme basis.

The resources are based on the following assumptions;

- Designed to deliver a high value programme through contractor delivery.
- This excludes all contractor and site construction costs.
- It includes commissioning and contract project management.
- It includes all back office support.
- It excludes the client engineering role assumed by TSO in Ireland.

The resource requirement for capital works has been allocated between TSO and TAO according to roles under the infrastructure agreement[19] with the TSO carrying out all Stage 1 functions, which are all included in the resource model.

The TAO is responsible for detailed design, project management, construction, and commissioning and the resource model only includes project management and commissioning functions of the Stage 2 activities.

### D.2 TSO Resources for the Capital Programme

TSO has indicated that the majority of resource for Stage 1 work will be carried out in house by TSO's own staff which will increase from 32 in 2009 to 85 throughout PR3.

However we have assumed that the TSO will employ external specialist consultants for 90% of work required for environmental studies.

Based on the SKM cost model the TSO "Network Needs" programme of €2bn over PR3 would require Stage 1 payroll resource of €6.19m per year. This is virtually the same as the €6.2m included

[19] Infrastructure Agreement ESB and EirGrid 14 March 2006

by TSO for annual capitalised payroll costs in PR3 corresponding to the 85 capitalised staff included in the TSO's PR2 forecast.

However the TSO has an existing organisation to provide support services (for a lower programme), which represents around 8% of the resource model costs – equivalent to 7 staff. It is assumed that 3.5 existing opex staff support the capital programme. The TSO has also indicated that a further 8 staff will be required throughout the organisation to support the increased capital programme and other increasing operational functions. It is assumed that 3.5 of these staff will support the capital programme. The requirement for capex staff to support a capital programme of €2bn is therefore 78 staff, plus 7 opex support staff.

There is some uncertainty about the size and duration of the capital programme and the level of capitalised staff allowed should be flexed according to the allowed capital works. For example a €2bn programme delivered over 7 years (i.e. circa €1.43bn in five years) would require 61 staff, i.e. 5 opex staff and 56 capex staff and this is the basis of our benchmark for allowed staff.

## D.3 TSO Client Engineering Role

The resource matrix does not include any costs for the TSO Stage 2 client engineering role which the TSO incurs to provide reassurance on the integrity of new assets and are additional to what would be required in the UK.

TSO has made provision for an increase in client engineering staff from 9 in PR2 to 20 in PR3 and these have been included in their operating costs submission.

The TSO payroll forecasts include a premium for skilled staff such as those required for the client engineering role. The Infrastructure agreement was established in different times when the level of capital investment was much lower than is now forecast with correspondingly lower client engineering costs. There would appear to be opportunities to reduce the level of client engineering activity and costs for the sake of efficiency and utilisation of scarce resources. This will be particularly necessary as the UK is also embarking on an increased programme for renewable generation connections and reinforcement. Ofgem has also recently approved capital expenditure for the GB DNOs which is 40% higher than in the previous five year period.

The client engineering role could be made more efficient by carrying out more work on a generic and audit basis, if required, and reduce the amount of on-site inspections and works visits.

TSO should be involved only at critical stages of work as follows

- Outline specification stage which is provided by EirGrid under Stage 1 capex costs
- Procurement and letting of contracts which are mainly on a framework basis to international specifications and to agreed TSO/TAO requirements and can be generically assessed and require little individual assessment.
- There appears to be no value added by site and works visits and it could be argued that these cloud responsibilities.

- At the commissioning stage the TSO could examine test results rather than witness tests. TSO would attend pre commissioning and commissioning meetings to ensure satisfactory handover for operation but this is probably a separate operations function already in place.

ESBN and EirGrid should review the arrangements between TSO and TAO in the UK to identify any learning points for improving efficiency.

This approach would mean that TSO would not require the additional resource for client engineering in PR2. The TSO has asked for client engineering costs to be capitalised but this is not recommended as these costs are not considered essential to the capital investment but fulfil a TSO operational function. As operating costs they are more conspicuous to scrutiny by CER.

- **Table 21 -** Transmission Resource Required for €2bn Renewable Programme

| | Total Resource Costs (€,000) | TSO Internal (€,000) | TSO Contract (€,000) | TAO (€,000) |
|---|---|---|---|---|
| Total for €2bn programme | 96565 | 30944 | 18464 | 47248 |
| Average per five years | 19313 | 6189 | 3693 | 9450 |
| Average staff numbers | 265 | 85 | 51 | 130 |
| Average staff for 7 year programme | 189 | 61 | 36 | 93 |

It should be noted that the above staffing levels are based on supporting a near continuous spend over the indicated period. In practice both the TSO and TAO resources will need to be matched to the envisaged capex programme during any significant ramp-up in capex, i.e. somewhat less than the indicated average in the early years and somewhat more in the latter period. The differing time scales between TSO and TAO levels of input also need to be recognised.

# Appendix E Project Cost and Programme Overruns.

### TAO clarifications and responses

### CONTRACT TERMS & CONDITIONS

- No turnkey (too expensive) or supply and erect contracts.
- For projects ESBN buy material, free issue to contractors so erection only contracts.
- There are term contracts for all regularly used materials including switchgear, transformers conductors and towers/masts and poles typically 3 or 5 years.
- These contracts have material price index clauses.
- For 220kV + specific tenders are let as volume is too low for term contracts.
- Term contracts for labour for regular tasks like refurbs. Typically 2 years with fixed price.
- Specific erection contracts are let for individual jobs with prices fixed for the job. If job overruns for whatever reason CPI indexing used
- ESBI produce and maintain Standard Specifications for Transmission materials.
- ESBI do all detailed design, layouts etc
- Tenders are issued with a programme proposed by ESBN with their time estimate knowing local situation i.e. seasons, harvesting and wayleave/ landowner’s problems. Contractors price on this and ESBN will not accept bids with shorter timescales.
- If there are expectations that there will be wayleave/access problems, the tender package now seeks mobilisation, demobilisation and downtime rates as part of the tender. (This is something learned from experience on the Srananagh project).
- Contracts do not have penalties or incentives. They prefer partnership approach.
- There is a system of VO approval
- Estimates include 10% contingency. Approval is required for use of the contingency.
- If work is stopped on one job they have moved contractors to others.
- Costs incurred in renting depots/storage and security if work is cannot be done on line wit programme. Seems that ESBN pick up cost.

### LANDOWNERS/WAYLEAVE ISSUES

- There is reluctance to contact landowners too early as they fear that opposition will have time to mobilise. Some landowners have withdrawn permissions following pressure from the local community. This gives problems with mobilisation as contractors can be on site and delayed whilst negotiations are completed.
- They only have to give 2 days’ notice of site work start.
- EirGrid are responsible if Court orders are required but there is cooperation as it is necessary to actually have contractors on site to work when permission is granted. Have to start work on specific date irrespective of work programme.
- There have been examples of sabotage after erection with tower legs being cut done with angle grinders during construction.

- Very little recent experience of major line schemes using towers/masts except for Srananagh. Most 400/220kV was done before the Tiger economy and before farmers wanted to build houses at every available opportunity. Things may be better now that economy is weak and no new houses are being built.
- ESBN do not insist on 100% agreement with landowners before letting contracts and starting work. They will accept 60% in order to get on with the job.
- The new IFA deal has 3 payments
  - Stage 1 Access
  - Stage 2 Build
  - Stage 3 Energisation

Should help to encourage landowners to allow completion of the project.

### PROJECT PROCESS

- EirGrid do functional design and project optioneering as a desk top activity. Only use standard costs. No site investigation
- All wayleaves/planning permissions/landowners' negotiations are done by EIRGRID before route is finalised also before soil tests are done.
- Planning permission is granted with a 40m radius of proposed location so poles/masts can be moved.
- Process in line with IA
- ESBN don't seem to think that EirGrid produce 5 year plan so the first they hear is when EirGrid identify a need. ESBN can and do put forward projects for asset replacement when they are aware of need.
- EirGrid price on standard costs which are produced by ESBN. The updating is supposed to be every year but there was no guarantee of that. There is no system to feed the latest prices from other contracts.
- IA is working better now with more information being provided across the 2 organisations.
- ESB Networks have appointed an individual to be responsible for project liaison to ensure that all documents are managed correctly (version control) and that all parties provide input to new projects before agreed cut off date.

### FUTURE PERFORMANCE

- PR3 Forecasts are believed to include Wayleave /compensation costs in line with Srananagh
- PR3 forecasts are basic estimates without site/soil investigation or detailed route selection.
- See PR3 Capex with ESBN updates spreadsheet for details of proposed projects.
- Personal Contract managers are on bonus which includes project performance on their range of projects.

### SPECIFIC PROJECTS

**SRANANAGH**

- Started 2003. Included as Transition project during transfer from ESB NG to EirGrid and ESBN.

- Additional expenditure
  - Landowners costs incl. wayleaves €15m (wayleaves €12m)
  - Contractor costs €7.5m
  - Additional costs e.g. renting depots security etc €3.75m (paid by ESBN)
  - Other costs Project management €3.2m
  - EirGrid additional costs €5.3m
- There are still 40 tower/mast locations to be completed.
- There have been physical attacks on personnel. Tower stubs have been cut with angle grinders.
- Forecast outturn assumes no additional Landowners costs.

**SHANNONBRIDGE**

- Started 2001
- New switching station being built following closure of existing generator station. Original scheme did not include all the work required. Several additional projects created to deal with fault levels, protection etc.
- To be completed April 2010.

**GREAT ISLAND 1 & 2**

- Line uprating scheme. Scheme did not include uprating of circuit breakers and busbars at each end. So additional scheme created within the original project.

**NORTH WALL**

- Similar to Shannonbridge. New substation to be built following closure of existing generating station. Original scheme did not include protection work to move out of gen station etc.

**KILBARRY**

- Started 2001
- Refurb of outdoor AIS substation.
- Major oil leak required clean up. €3.5m of extra work required above original scheme.

**CRANE WEXFORD LINE**

- Refurb and uprate line
- Finished ahead of target date. Not included in PR2 plan originally. No record of where original costs came from.

## TSO Questionnaire and responses

**Note: Project costs and outturn variances presented in 2004 prices, i.e. as per original PR2 submissions.**

| Description | Original PR2 estimates | Variance against PR2 estimate | Status | Slippage PR2 date v Present date (months) | Clarification of reason for outturn cost variance | Clarification re programm |
|---|---|---|---|---|---|---|
| Srananagh 220kV Station Project | 65,816,801 | 30,878,947 | Under Construction | 46 | For Details please refer to recent presentation | Difficulty in obtaining wayleaves / e lead to delays in project. Discussio refers. |
| Binbane-Letterkenny 110kV Line Project | 27,891,288 | 8,403,350 | Due for construction Start 2010 | - | Significant change in project delivery including different routes, scope change in design, increase in wayleave and construction costs in particular taking into account the difficult terrain the route will now cross and the significant number of wayleaves involved. - (Underestimated in PR2 Submission) | Due to various route alterations, si consultation, full oral hearing unde legislation and 8 month processing Bord Pleanala on the final decision planning will result in slippage from |
| Tarbert-Tralee No.2 110kV Line Project | 14,426,809 | 10,148,544 | Under Construction | 16 | Difficulties in obtaining wayleaves / easements has lead to delay and increase in project costs. Unit build costs have also increased. Project scope has also changed (higher line rating) | Difficulty in obtaining wayleaves / e lead to delays in project |
| Lodgewood 220kV Station Project (including connection to IPP111 Castledockill) | 13,740,636 | 8,005,706 | Under Construction | 24 | Scope of project altered and some ongoing wayleave issues | Scope of project altered |
| Cushaling-Thornsberry 110kV Line Project | 10,149,097 | 7,131,008 | In Public Planning | 6 | Underestimated in PR2 Submission | |
| Athlone Shannonbridge No.2 110kV Line (new) | 9,058,495 | 8,669,047 | Under Consideration | - | Underestimated in PR2 Submission | Project now on hold due to new IP the area altering the requirement f |
| Marina 110kV Station - Rebuild | 7,797,383 | 3,092,709 | Under Consideration | 71 | Requirement to alter GIS building to avoid flood risk. Complexity of transferring HV circuits from old AIS compound to GIS. | Date Error in price review submis have been 2007. The subsequent programme slippage due to requir design building and re-apply for Pl Permission due to flood risk. |
| Gorman-Meath Hill 110kV Line Project | 7,355,373 | 11,189,316 | Due for construction Start 2010 | 24 | Underestimated in PR2 Submission and change in construction and wayleave costs | Delay in construction start due to i projects in the area and associated issues |
| Athy 110kV Station Project | 7,262,362 | 6,290,230 | In Public Planning | 39 | Difficulties in obtaining wayleaves / easements has lead to delay and increase in project costs. Unit build costs have also increased. | Difficulty in obtaining wayleaves / e lead to delays in project |
| Looping of Dalton-Galway 110kV Station into Cashla 220kV Station Project | 7,178,145 | 10,523,269 | Under Construction | 30 | Change in scope and increase in wayleave and construction costs since PR2 | Judicial review - delay in receiving permission and change in scope f 430's conductor |

| Description | Original PR2 estimates | Variance against PR2 estimate | Status | Slippage PR2 date v Present date (months) | Clarification of reason for outturn cost variance | Clarification re program |
|---|---|---|---|---|---|---|
| Kilbarry 110kV Station - Refurbishment | 6,574,863 | 631,471 | Under Construction | 52 | Original scope comprised replacement of vintage switchgear (except circuit breakers), instrument trafos and installation of protection upgrades. Increased costs due to new requirements (tubular busbar, additional protection), soil contamination etc. In addition, costs of working in live station slowed work and increased costs. | Project effectively completed in D (ambiguity in monitoring report). programme slippage to Dec 2006 outage difficulties arising from oth Cork area, working in live station requirements (busbar etc.). Comi Busbar protection only item outst Discussion on 7 April refers. |
| Shannonbridge 220kV Station - Refurbishment | 6,243,962 | 5,154,230 | Under Construction | 55 | Scope of project altered due to new Power Plant. Complexity of project due to live station work and separate compounds | Works undertaken by Power Stat progress slow. Requirement for a associated with new power statio outage restrictions. Discussion o |
| Banoge 110kV Station Project | 5,155,097 | 576,536 | Under Construction | 61 | Difficulties in obtaining wayleaves / easements has lead to delay and increase in project costs. Unit build costs have also increased. | Difficulty in obtaining wayleaves lead to delays in project |
| Looping of Blake-Cushaling-Maynooth 110kV Line into Newbridge 110kV Station Project | 4,568,850 | 5,783,935 | In Public Planning | 20 | Difficulties in obtaining wayleaves / easements has lead to delay and increase in project costs. Unit build costs have also increased, likely underestimated in PR2 | Difficulty in obtaining wayleaves lead to delays in project |
| Arva-Shankill No2 110 kV Line | 4,416,812 | 8,922,878 | Due for construction start 2010 | 11 | Underestimated in PR2 Submission | Planning permission required Ora results in a significant delay to th planning, in addition to some sco Shankill substation requiring furth alterations |
| Great Island Waterford 1&2 110kV Line - Uprate [Suir River Crossing] | 4,218,293 | 1,689,966 | Under Construction | 10 | Underestimated in PR2 Submission. Project cost were greater due to busbar uprate which was required and was not initially included. | Project was delayed until agreem with Irish Rail regarding Transmi vicinity of rail lines. Discussion or |
| Gorman-Navan No.3 110kV Line Project | 3,460,544 | 4,137,810 | Under Consideration | 6 | Underestimated in PR2 Submission and change in construction and wayleave costs | Delay in construction start due to projects in the area and associat issues |
| Drybridge-Louth 110kV Line - Uprate | 2,913,967 | 2,032,339 | Under Consideration | 24 | PR2 assumption based on refurb only. Uprate required due to additional requirements in the area additional cost and time line as a result | Increased scope of works |
| Maynooth-Shannonbridge 220kV Line - Refurbishment | 2,671,350 | 1,738,452 | Under Consideration | 39 | Unscoped estimate in PR2 | Error in PR2 completion date. Sh 2008. |
| Carrigadrohid-Kilbarry 110kV Line - Uprate | 2,338,828 | 4,879,894 | Under Consideration | - | Scope change. PR2 estimate was for a refurbishment project. Final project scope was for line uprate to 430s | |
| Cashla 220kV Station - Protection Upgrade | 2,132,230 | 1,476,341 | Under Construction | 3 | Unscoped estimate in PR2 | - |
| Killonan-Knockraha 220kV Line - Refurbishment | 1,986,122 | 444,518 | Under Consideration | 26 | Unscoped estimate in PR2 | Error in PR2 completion date. Sh 2007. |
| IPP52 Tynagh 220kV Connection | 1,663,812 | 1,082,735 | Under Construction | 3 | Scope change at IPP request | - |
| Bellacorrick 110kV Station - Refurbishment | 1,584,991 | 2,459,716 | Under Construction | 43 | Scope of project altered to include removal of C+P from PG Control Room following closure of Generation Station | Scope of project altered. Demolit Station. Outage difficulties to con |

| Description | Original PR2 estimates | Variance against PR2 estimate | Status | Slippage PR2 date v Present date (months) | Clarification of reason for outturn cost variance | Clarification re progran |
|---|---|---|---|---|---|---|
| Cahir 110kV Station - Refurbishment | 1,578,210 | 1,495,989 | Under Construction | 33 | Scope of project altered to include switchgear and busbar replacement. | Project effectively Completed e minor outstanding commissioni full closure of project |
| Ballydine-Doon 110kV Line - Uprate | 1,463,264 | 1,227,806 | Under Consideration | - | Unscoped estimate in PR2 | - |
| Poolbeg 220kV Station - Protection Upgrade | 1,025,364 | 1,320,688 | Under Consideration | 0 | Unscoped estimate in PR2 | - |
| Dungarvan-Knockraha 110kV Line - Uprate | 870,711 | 10,219,977 | Under Consideration | 49 | Original PR2 project was refurb. changed to uprate/rebuild 200ACSR to 430ACSR - Scope of project altered | The uprate project was part of t the Cork CCGT. Delay was due requirements and subsequent s |
| North Wall 220kV Station - Protection Upgrade | 843,404 | 339,817 | Under Construction | 0 | Underestimated in PR2 Submission. PU necessitated an extension of control building that was not foreseen at PR2 stage. Discussion on 7 April refers. | |
| Crane-Wexford 110kV Line - Uprate | 688,104 | 3,319,445 | Under Consideration | 5 | Scope change. PR2 estimate was for a refurbishment project. Final project scope was for line uprate to 300s | |
| Ardnacrusha-Limerick 110kV Line - Uprate | 389,105 | 4,112,480 | Under Consideration | 24 | Scope change. PR2 estimate was for a refurbishment project. Final project scope was for line uprate to 430s | Scope change and outage restr |
| Looping of Kilteel 110kV Station Project | 95,275 | 3,401,825 | Complete | 30 | Suspected error in forecast cost for PR2 | Delay due to requirement of oth carried out prior to the looping c |