



# **TransGrid**

## ***Transmission Efficiency Review***

*8 May, 2008*

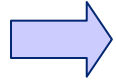


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## Confidentiality



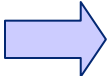
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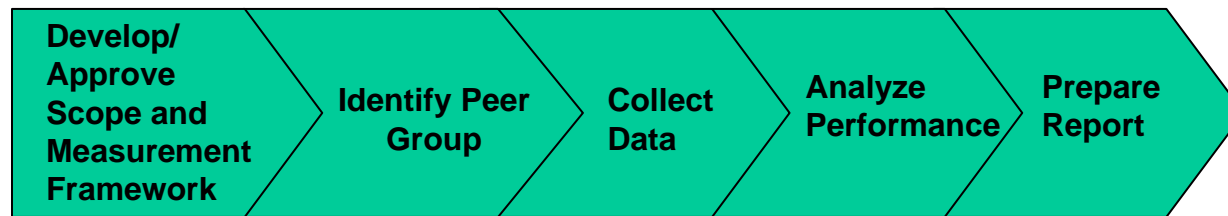
- I. Executive Summary**
- II. Project Approach**
- III. Operating Efficiency Results**
- IV. Productivity and Resourcing**

## **Overall Assessment Of TransGrid's Operating Efficiency – Based on Our Analysis Of TransGrid's Performance, We Believe That:**

- TransGrid 's operational efficiency and service levels are excellent by international standards, measuring better than average against the superior performing Australian market, and global top quartile in many areas benchmarked.
  - Operational efficiency is excellent by international standards, measuring global top quartile against comparable peer companies in half the Operating functions benchmarked.
  - And is better than average among the tough Australian Peer group. (The Australian transmission network companies are clearly superior performers (operators and maintainers) on the world stage, with performance levels that exceed global peers by a considerable margin.)
  - TransGrid's service quality is also superior in many areas of operation, with good availability, few unserved load events each year, equipment failure rates which are in line with industry norms, and good power quality (relatively few supply frequency or voltage variations each year).
- TransGrid 's relatively heavy transmission loading and its operating and business environment impose numerous unique challenges that make these performance results even more impressive on a global basis. But based on our experience with Transmission businesses around the world, maintaining this superior efficiency is likely to be more difficult over the next few years as asset aging will present growing challenges to TransGrid.
- There may be areas within TransGrid 's business in which efficiency or effectiveness can be improved further over time, however, those opportunities would involve tradeoffs of cost vs. service levels. To make those improvements sustainable would mean significant further investment in time and money to drive the required changes in systems, processes, skills and culture.

- I. Executive Summary
-  II. Project Approach
- III. Operating Efficiency Results
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Our approach was designed to give TransGrid an independent assessment of Transmission performance against a global peer group, based upon a repeatable methodology with valid comparisons.



## Context

- As TransGrid indicated a desire to present and discuss the report with various external stakeholders, we chose to gather as much comparison data as possible through public sources, rather than from UMS Group Inc. proprietary databases. Wherever UMS Group's databases were used, company names have been replaced with randomly assigned letters so as to uphold the confidentiality of our clients.
- This also enables our results to be approximately\*\* reproduced by any 3<sup>rd</sup> parties that may have an interest in our findings and conclusions.
- TransGrid required an overall Enterprise efficiency analysis that went well beyond the usual scope of such comparisons.
- Included in this analysis is a combination of operational, financial and productivity analyses in our review. For example, relative cost efficiency is one dimension of this analysis, service quality another, and labor productivity a third.
- We haven't been privy to TransGrid's plans. Our comments in this report are based on industry norms and our opinion of TransGrid's performance is based only on the publicly available information contained within this report.

\*\*UMS firmly believes in normalizing all cost data to ensure accurate comparison. The methodology is spelled out in the report, using UMS Group's database of benchmark jobs.

## Metrics

- We included a combination of operational, financial and productivity metrics in our analysis.
- The proposed measures are designed to provide an accurate and comprehensive view of performance.
- Relative cost efficiency is one dimension, and service quality another. The specific measures we used included:
  - O&M per Replacement Value\*
  - O&M per GWh Delivered
  - O&M per km of line
  - FTE per Replacement Value
  - FTE per GWh Delivered
  - FTE per km of line
  - System Availability
  - Number of Loss Supply Events
  - Minutes off-supply
  - Price to Consumer per kWh
- All charts have been normalized to Australian dollars and are fiscal year 2006/07 unless otherwise stated.

\* Replacement Value data was based on ITOMS data.



## To Get A Strong Peer Group, We Began By Looking At The Industrialized Countries To Identify The Major Transmission Players. . .

In North America the majority of companies are vertically integrated, at least partially, with the exception of a few:

- BPA – Pacific Northwest, United States
- ITC – Upper Midwest, United States

Europe predominately has one large transmission company in each country:

- Red Electrica de Espana – Spain
- National Grid UK – United Kingdom
- Elia – Belgium
- Tennet – Netherlands
- Landsnet – Iceland
- ESB – Ireland
- Rede Eléctrica Nacional, S.A. – Portugal
- Statnett – Norway
- Fingrid – Finland
- E.On-Netz - Germany
- Terna – Italy
- Energinet.dk - Denmark

Australia generally has 1 transmission company per state, with nearby New Zealand having 1 large transmission company for the entire country.

- SP AusNet
- Electranet
- Transend
- Powerlink Queensland
- TransGrid
- Western Power
- Transpower NZ

Other industrialized countries with large transmission companies include:

- ESKOM – South Africa
- Transco – UAE

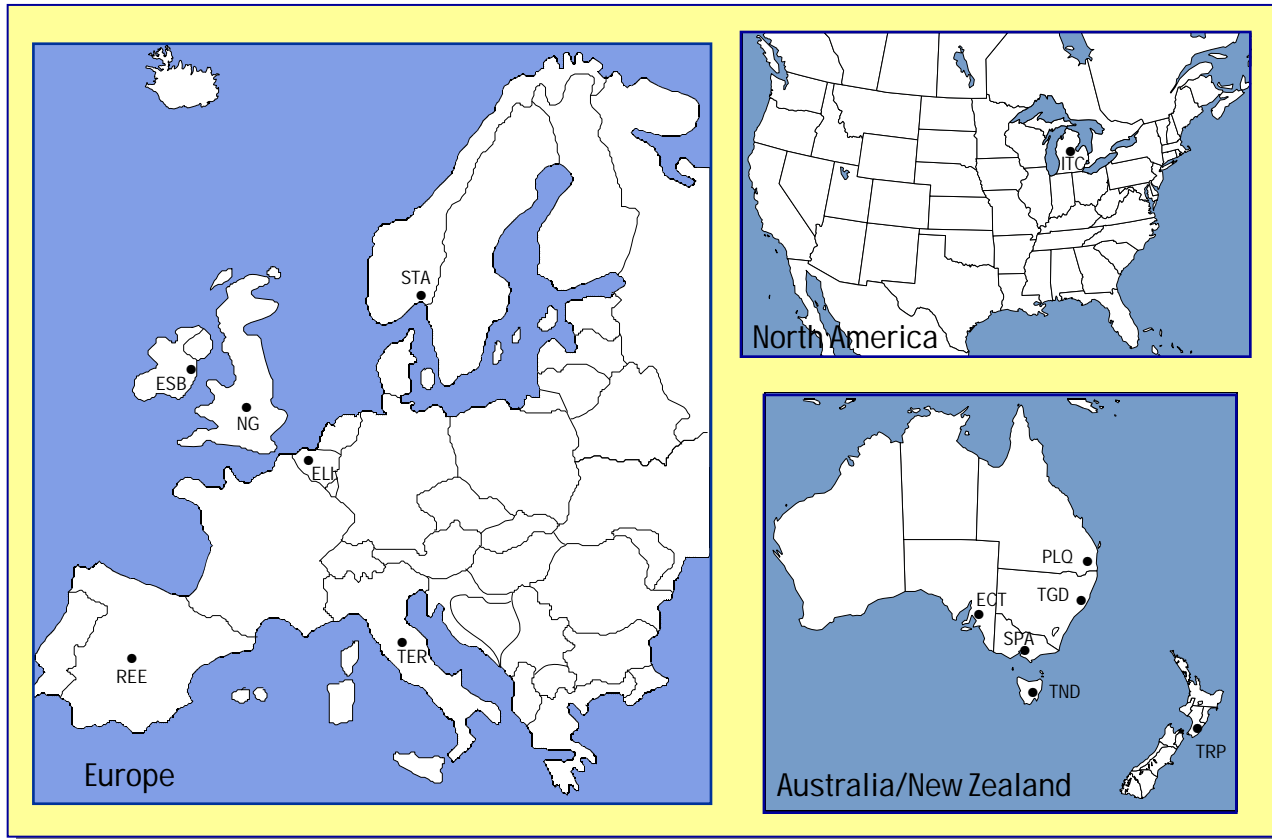
## ...Then Looked At the regulatory and operating environment to assure comparability

	Energy Market	Regulator either sets revenue or rates	Include in Peer Group
BPA – Pacific Northwest, United States	Privatized Generation and Transmission Systems	No	No
ITC – Upper Midwest, United States	Independent System Operator – Energy Market	Yes	Yes
Red Electrica de Espana – Spain	Independent System Operator – Energy Market	Yes	Yes
National Grid UK – United Kingdom	Privatized with Energy Market	Yes	Yes
Elia – Belgium	Independent System Operator – Energy Market	Yes	Yes
Tennet – Netherlands	Independent System Operator – Energy Market	Yes	No
Landsnet – Iceland	Nationalized Generation and Transmission	Yes	No
ESB – Ireland	Independent System Operator – Energy Market	Yes	Yes
Rede Eléctrica Nacional, S.A. – Portugal	State owned, building energy market	Yes	No
Statnett – Norway	TSO Plus Nordic Energy Market	Yes	Yes
Fingrid – Finland	Privatized Generation and Transmission Systems	No	No
E.On-Netz - Germany	Privatized Generation and Transmission Systems	No	No
Terna - Italy	Independent System Operator – Energy Market	Yes	Yes
Energinet.dk - Denmark	Nationalized Grid with Energy Market	Yes	No
SP AusNet	Independent System Operator – Energy Market	Yes	Yes
Electranet	Independent System Operator – Energy Market	Yes	Yes
Transend	Nationalized Grid with Energy Market Pool	Yes	Yes
Powerlink Queensland	Nationalized Grid with Energy Market Pool	Yes	Yes
TransGrid	Independent System Operator – Energy Market	Yes	Yes
Western Power	Nationalized Generation and Transmission	Yes	No
Transpower NZ	Nationalized Grid with Energy Market Pool	Yes	Yes
ESKOM – South Africa	Nationalized Grid with Energy Market Pool	No	No
Transco – UAE	Government owned	No	No

## Final Peer Group Characteristics

Company	GWh Delivered	Peak System Load (MW)	Service Area (km <sup>2</sup> )	Number of Line Km.	Number of Substations	Include Energy Dispatch and Field Operations in Transmission Business Unit
<b>TransGrid</b>	<b>78,226</b>	<b>13,458</b>	<b>803,698</b>	<b>12,489</b>	<b>82</b>	<b>No</b>
Powerlink Queensland	46,025	8,589	313,000	12,132	102	No
SP AusNet	51,815	9,062	227,600	6,553	46	No
Transend	11,565	2,415	64,100	3,645	47	No
ElectraNet	13,381	2,934	150,000	5,676	76	No
Transpower New Zealand	39,128	No Data	266,171	11,787	173	No
International Transmission Co	No Data	12,087	69,376	13,036	235	No
ESB	24,873	5,035	67,600	5,800	No Data	No
National Grid Company UK	303,721	52,100	151,189	15,160	337	Yes
Elia	88,800	13,443	30,527	8,406	No Data	Yes
Red Electrica de Espana	260,838	44,876	506,000	33,503	2,905	No
Statnett	127,000	18,539	323,802	10,000	No Data	No
Terna SpA	339,800	56,822	318,998	39,446	366	Yes

# Final Peer Group



### Europe

ELI	Elia
ESB	ESB National Grid
NG	National Grid
REE	Red Eléctrica de España
STA	Statnett
TER	Terna SpA

### North America

ITC	International Transmission Company
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### Australia/New Zealand

ECT	Electranet
PLQ	Powerlink Queensland
SPA	SP Ausnet
TND	Transend
TGD	TransGrid
TRP	Transpower New Zealand

## Data Collection Was Primarily Through Public Sources

- Five main sources of information were used for the purposes of collecting comparison data:  
Annual Reports; Financial Reports; Regulator Reports; Reliability Reports; ITOMS data (limited use)
- Annual Reports  
Annual reports provided the backbone of the data collection process. These reports provided the majority of financial information as well as provided some reliability figures, such as system availability, although this data was not always present in the annual report.
- Financial Reports  
The available financial reports were used mostly to confirm the values located in annual reports but in some cases these reports provided financial information that could not be found in the annual report or provided the same data but in a more detailed manner allowing for more accurate comparisons between companies.
- Regulator Reports  
The majority of use for regulator reports were used in conjunction with the Australian companies. These reports provided a background of information which could be used to compare / verify the data collected via the use of annual reports. These regulator reports also provided the majority of reliability information for the Australian companies that is used throughout the report.
- Reliability Reports  
The reliability reports that were available were used to collect useful data such as system availability and number of outages. These reports were used to verify annuals report figures and in some cases used to fill in information pertaining to reliability that was unable to be located within particular annual reports.
- ITOMS Data  
The ITOMS data (blinded charts), was used to further highlight service level performance, which is typically not consistently reported in public sources. Further, to get a comparable definition of replacement value, we used ITOMS submitted data for which participants reported using the same definition.

## Non-labor and Labor Cost Normalization Methodology

- The international FOREX exchange rate was used to adjust non-labor costs. For this, we used the annual average exchange rate for the study year in question.
- However, the FOREX rate is not a valid normalizer for labor costs, because : 1) Exchange rates fluctuate significantly over time without moving salaries 2) Exchange rates are influenced by international monetary developments, governmental policies and debt levels, and do not directly affect costs of living.
  - To ensure the consistency and accuracy of reported labor cost data across multiple geographic regions, UMS employs a labor cost normalization process. The purpose of this normalization is to determine what peer companies spend for the same standard units of labor. This allows a company to accurately determine where it stands against its peers in terms of real production and costs.
  - The labor cost normalization process begins with the collection of client labor cost data that adheres to strict definitional terms for the various types of labor and costs. This raw data is then normalized for each company using a **labor adjuster** that reflects the core labor cost differences across countries.
  - The **labor adjustment** formula is based on the pricing of a market basket of standard transmission industry jobs that UMS collects throughout its projects.
    - *Dividing each country's market basket salary average by the average country's market basket salary average produces the labor conversion factor. This factor can be applied to any job within any country to calculate what the equivalent salary would be for the same job in any comparison country.*

$$\text{UMS Labor Adjuster to US\$} = \frac{\text{US average salary (US\$)}}{\text{Country average salary (own curr.)}}$$

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## Non-labor and Labor Cost Normalization Details

- To apply the cost adjuster, we assumed 60% of capital costs were labor, and 80% of O&M costs were labor. We applied this percentage to all peers.
- We then applied the labor adjuster to that percentage of reported cost, applied the forex adjuster to the remaining percentage, then added the labor and non-labor costs back together to get a total adjusted cost.
- For measures that were shown as a percentage (cost / cost), we did not normalize the costs
- Below is an example of National Grid in the United Kingdom, adjusting for Labor and Non-Labor costs at 2007 rates:

Reported O&M = £1,209.0 M

Assume 80% labor =  $(1,209.0 \times 80\%) = \text{£ } 967.20\text{M}$

Using GBP to AUS adjuster =  $\text{£ } 967.20\text{M} \times 2.129 = \underline{\text{\$AUD}2059.05\text{M Labor}}$

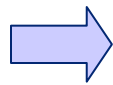
20% non-labor =  $(1,209.0 \times 20\%) = \text{£ } 241.8\text{M}$

Using GBP to AUS adjuster =  $\text{£ } 241.8\text{M} \times 2.444 = \underline{\text{\$AUD}591.00\text{M Non-labor}}$

Total Adjusted O&M =  $\text{\$AUD}2059.05\text{M Labor} + \text{\$AUD}591.00\text{M Non-labor} = \text{\$AUD}2,650.05\text{M}$

**I. Executive Summary**

**II. Project Approach**

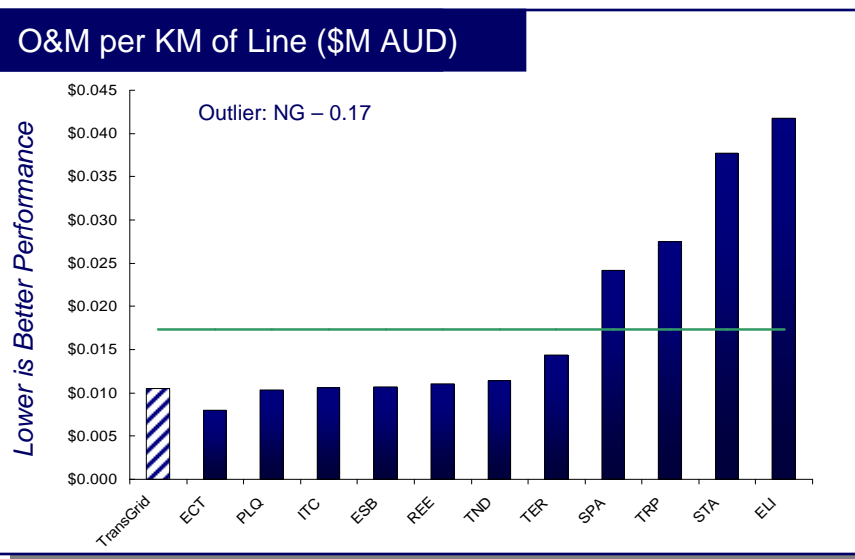
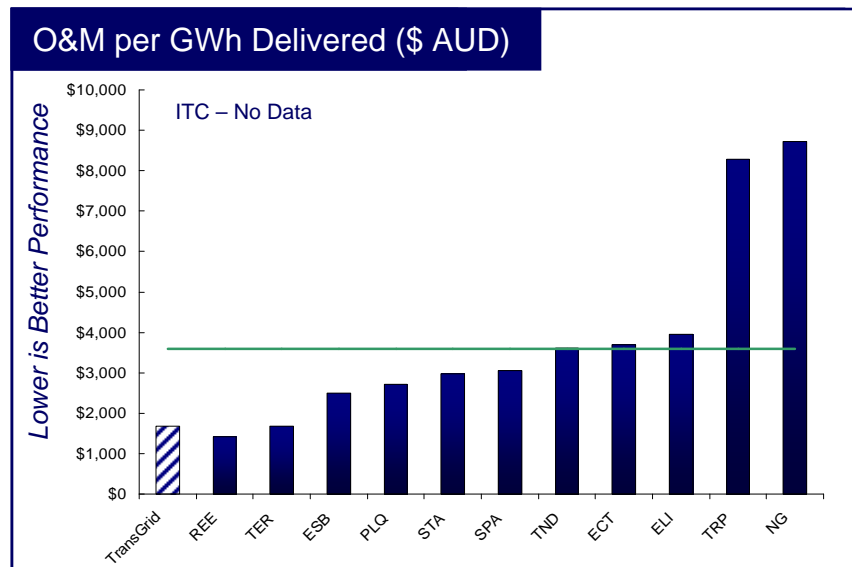
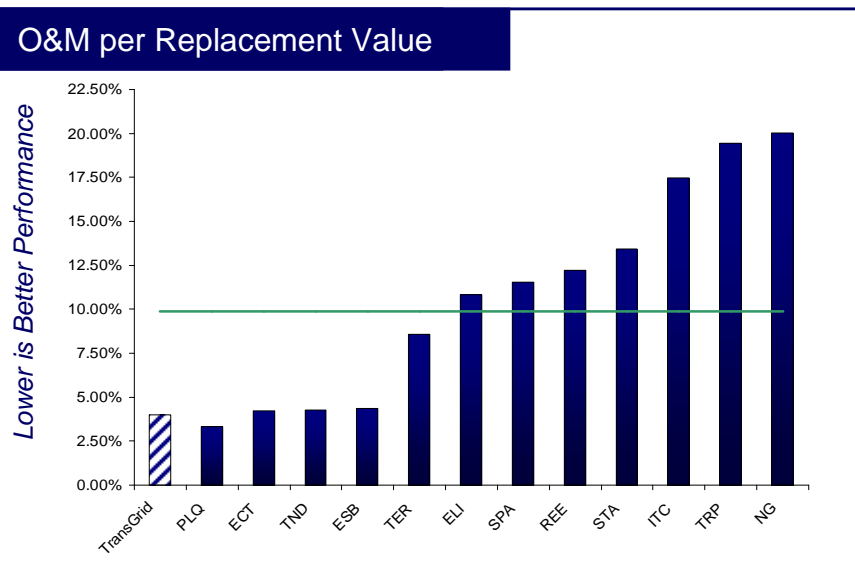


**III. Operating Efficiency Results**

**IV. Productivity and Resourcing**



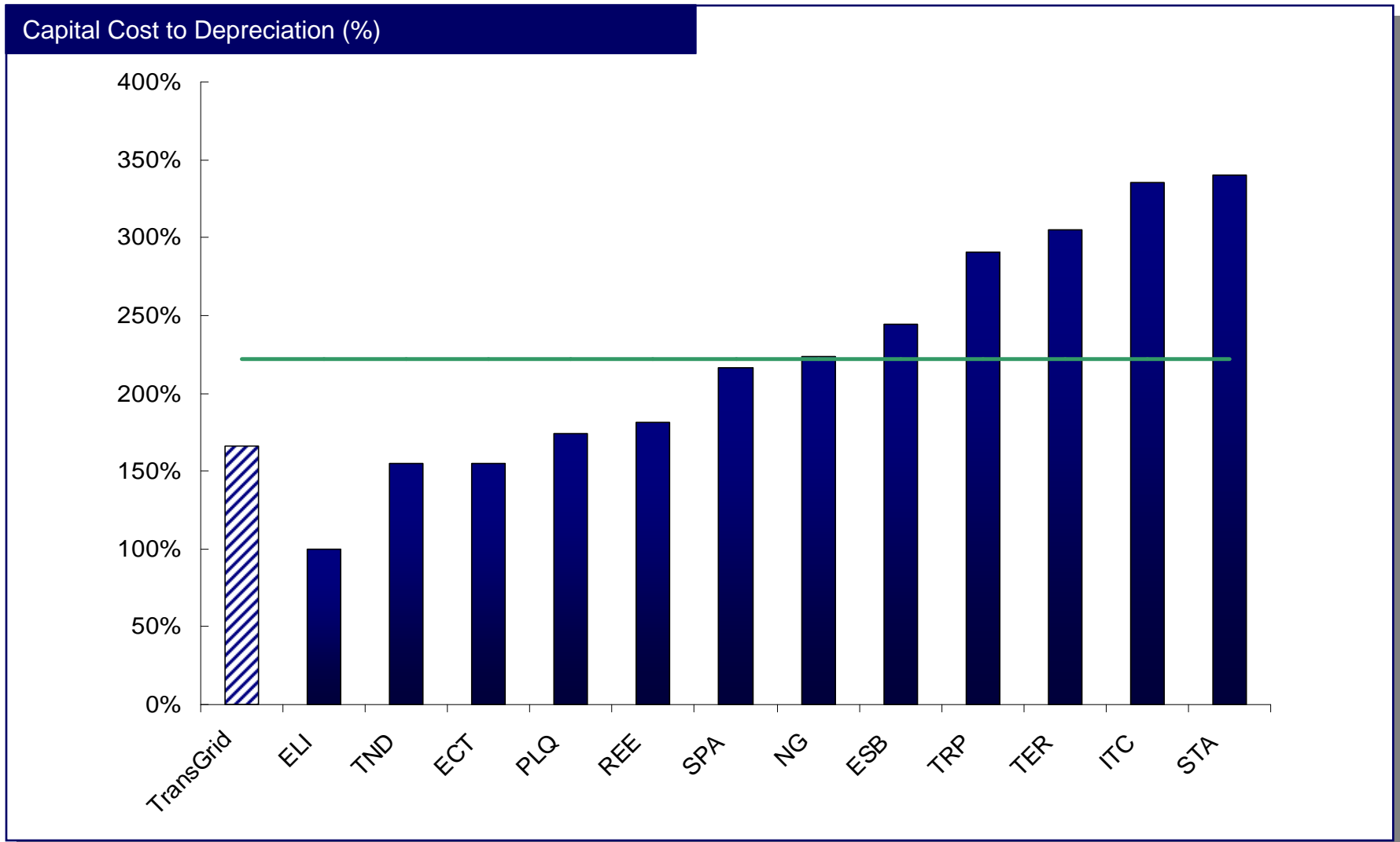
**Total Transmission O&M Comparisons – By any of the generally accepted measures, TransGrid’s Operating costs are very low, ranking in the top (best) quartile globally.**



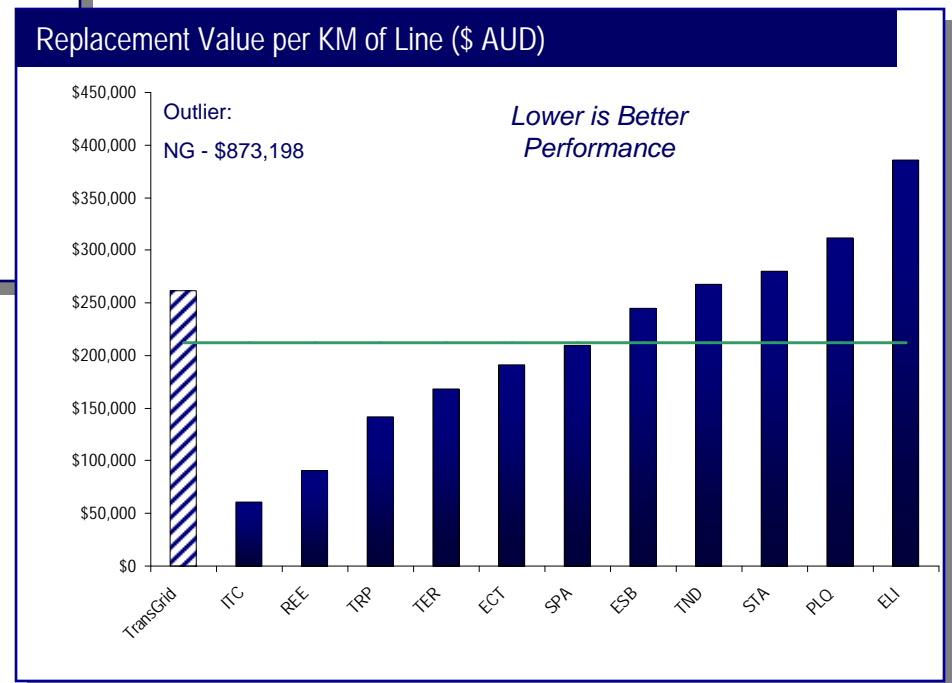
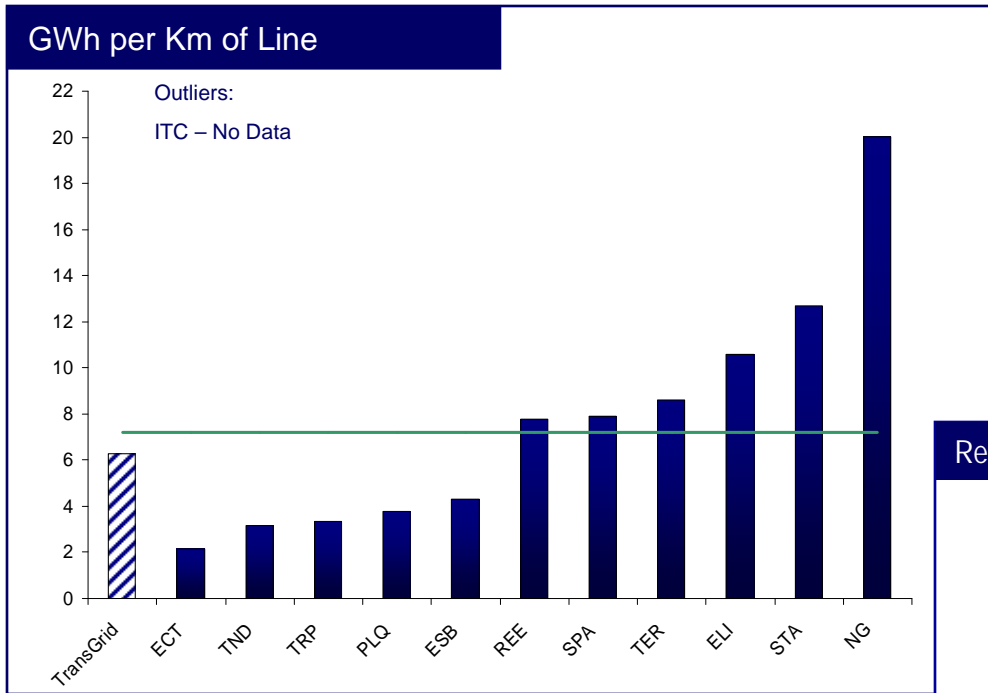
### Legend for Report

- Peer
- TransGrid
- Average

Capital spending at TransGrid also appears to be relatively efficient, with two thirds of peers spending more as a multiple of depreciation.

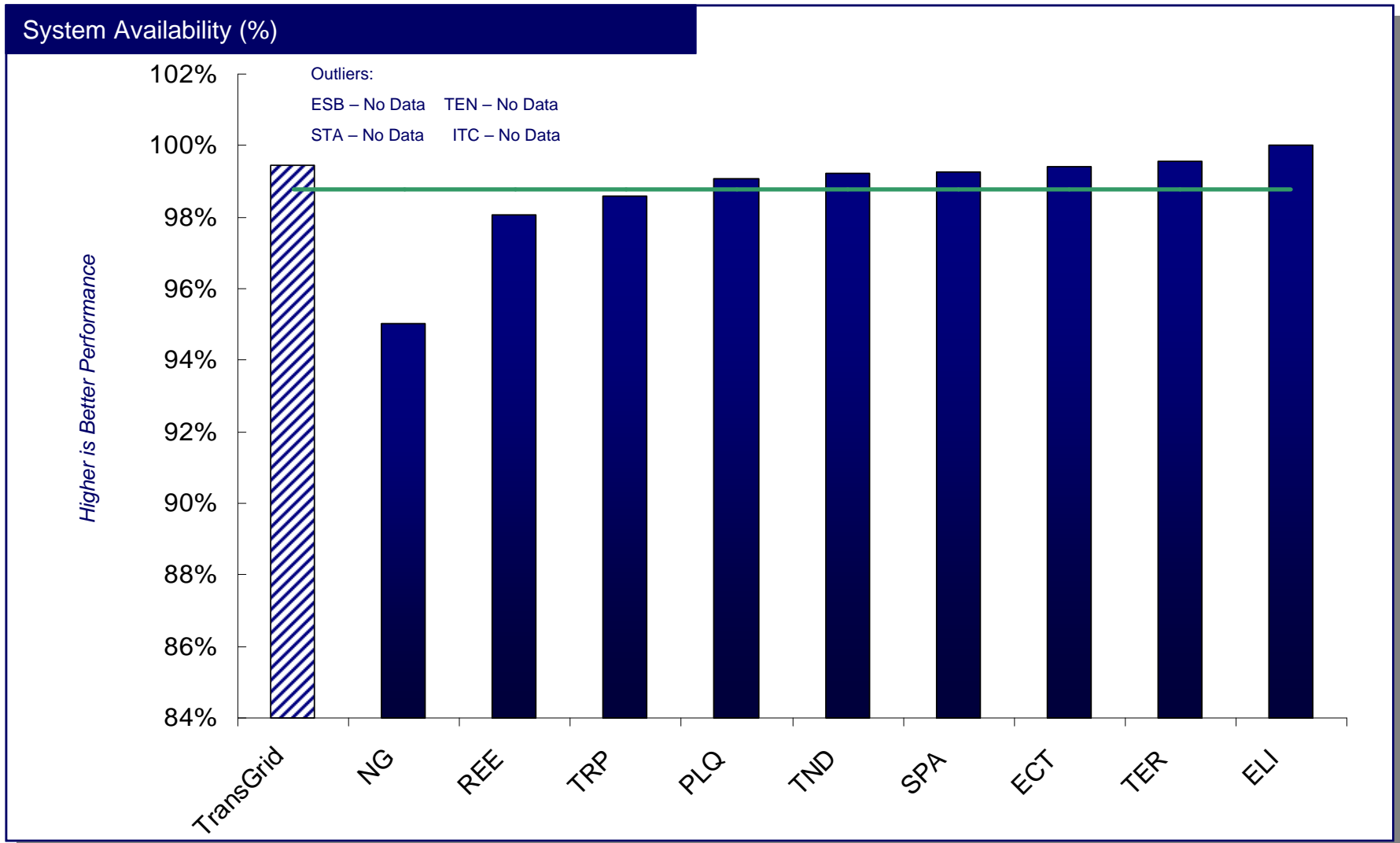


## TransGrid's Network Has Greater Load Density (GWh Delivered/Km of Line) And Capital Intensity Than Many Other Peer Transmission Systems Around the World.

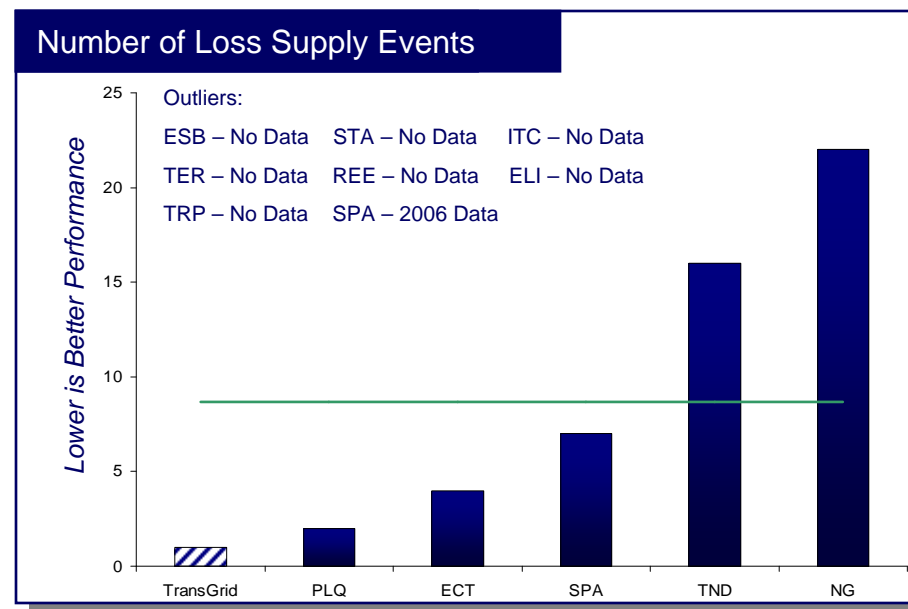
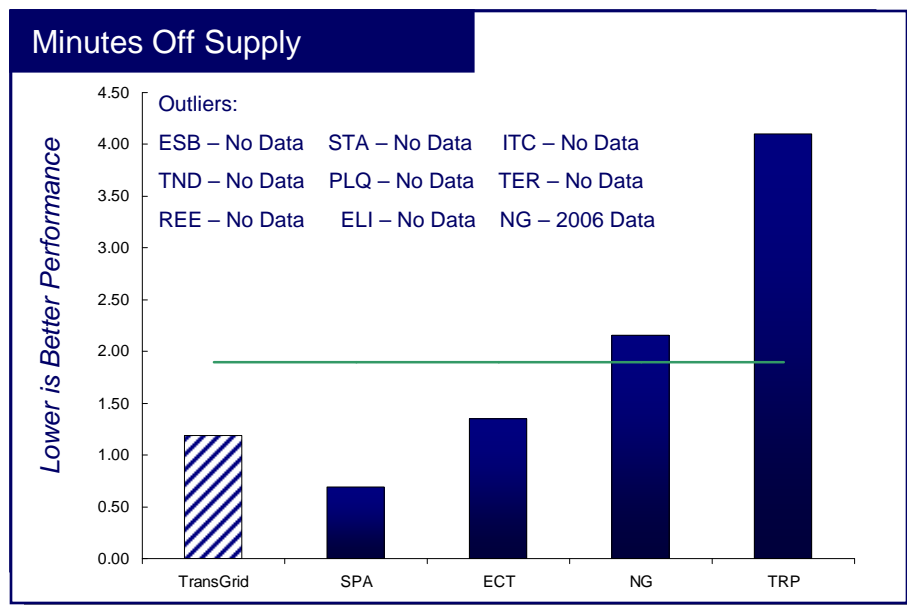


This intensity would be expected to place greater pressure on reliability and to make outage planning and management more challenging for TransGrid as the Transmission Network Manager.

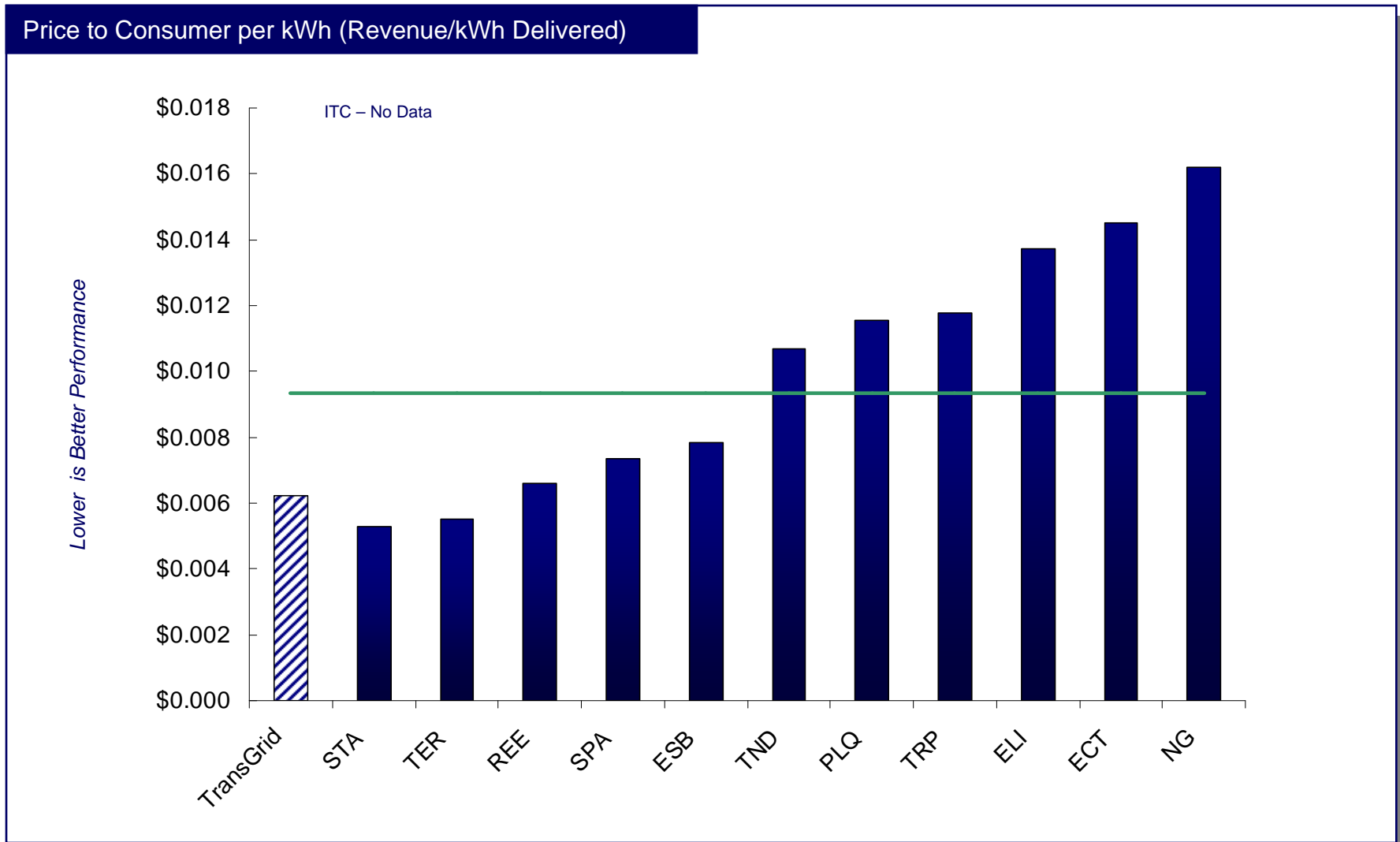
**Service Levels – TransGrid’s System Availability is among the industry best, ranking top quartile against global peers.**



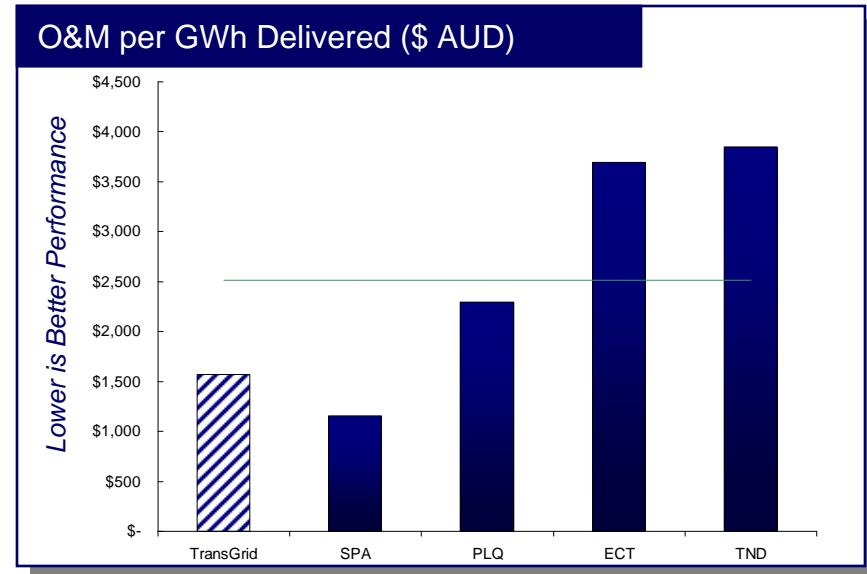
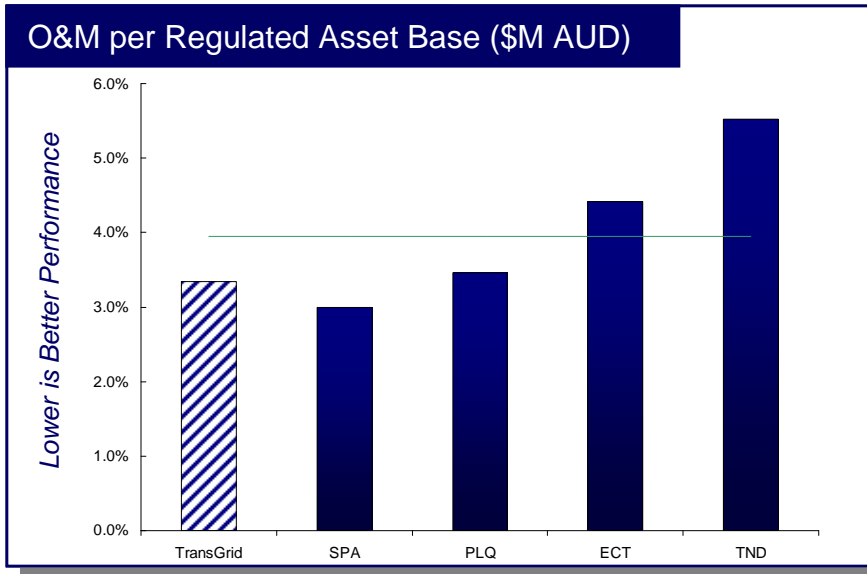
TransGrid’s service levels also rank highly in outage frequency (number of loss of supply events) and duration (minutes off supply).



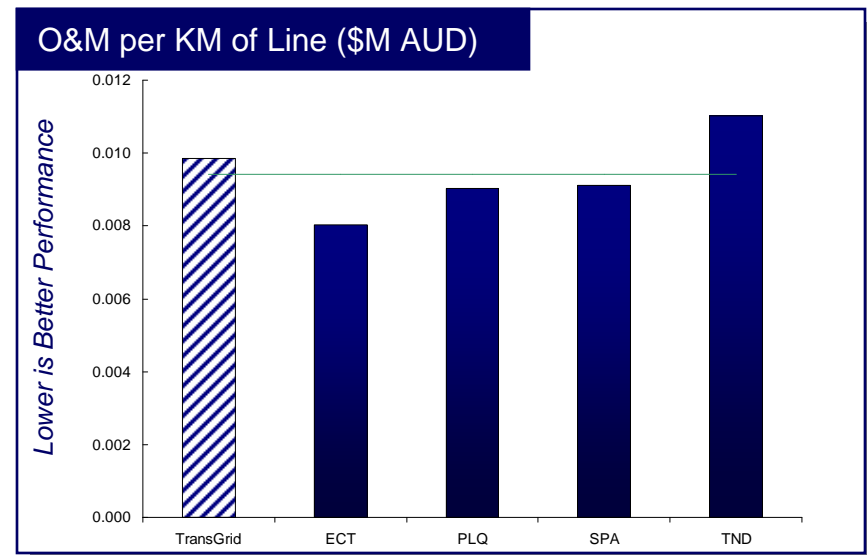
In addition to reliability, price is important to customers. We've looked at rates around the world, TransGrid is well below average...



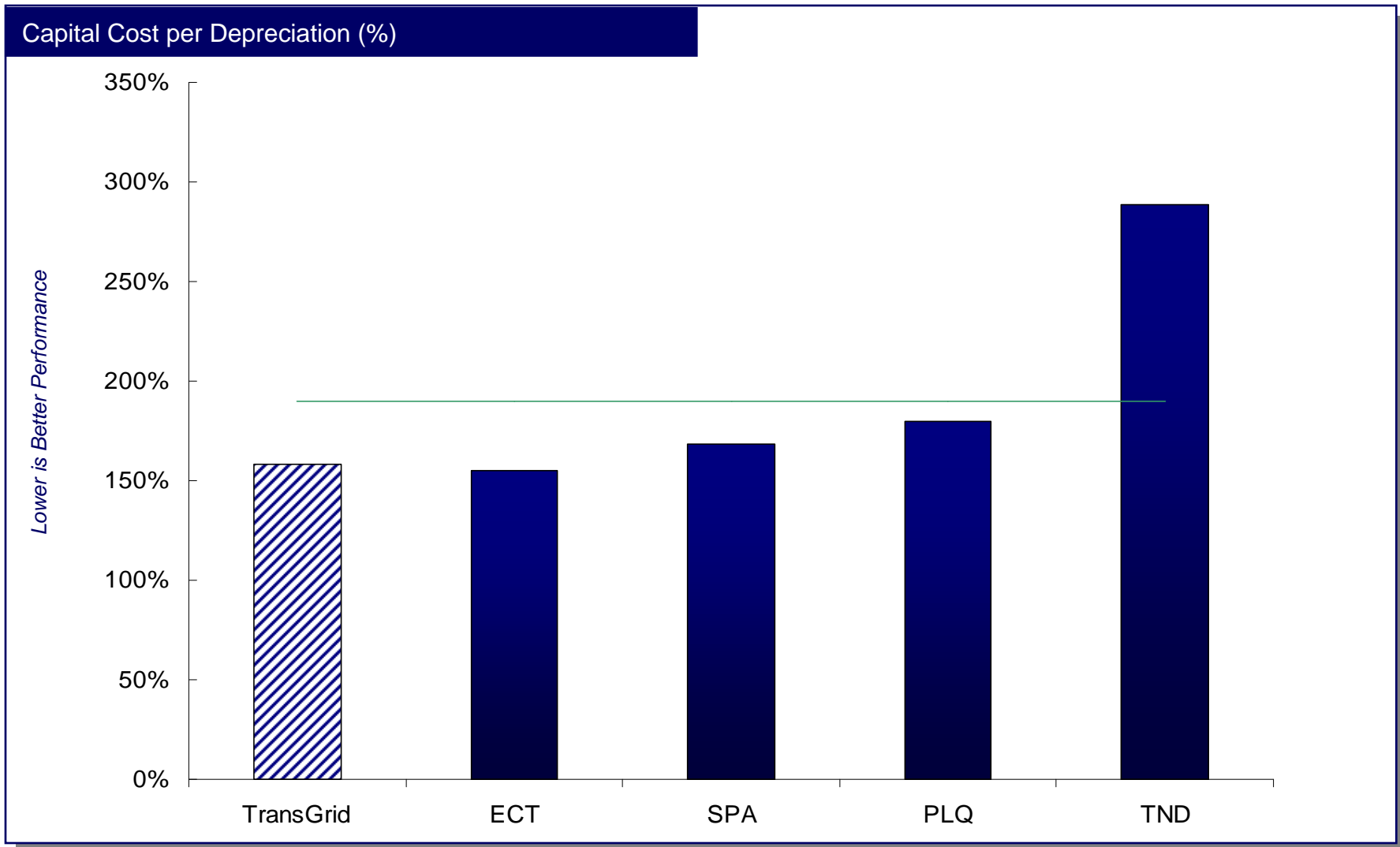
**Because of Differences In Reported Values, We’ve Also Provided Analysis Using The TNSP Electricity Regulatory Report for 2006/07 (April 2008) published by AER.**



TransGrid’s operating costs, which appear very low against global peers, are on a par with the low cost Australian peer group.

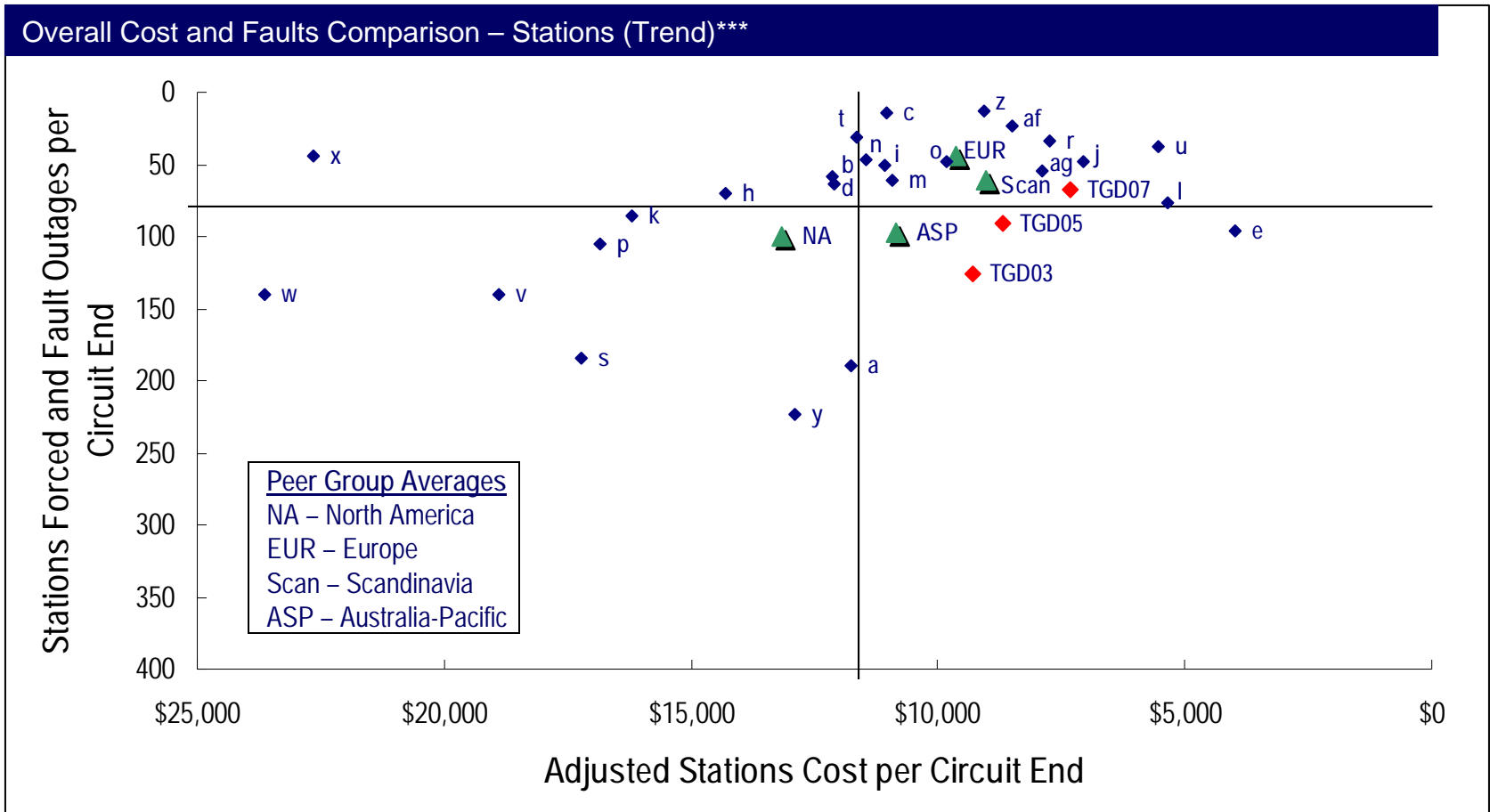


**But even among the low cost Australian peers, TransGrid’s CAPEX spend is relatively low. This is unlikely to be sustainable over the long term and increases in Capex should be planned for the years ahead...**

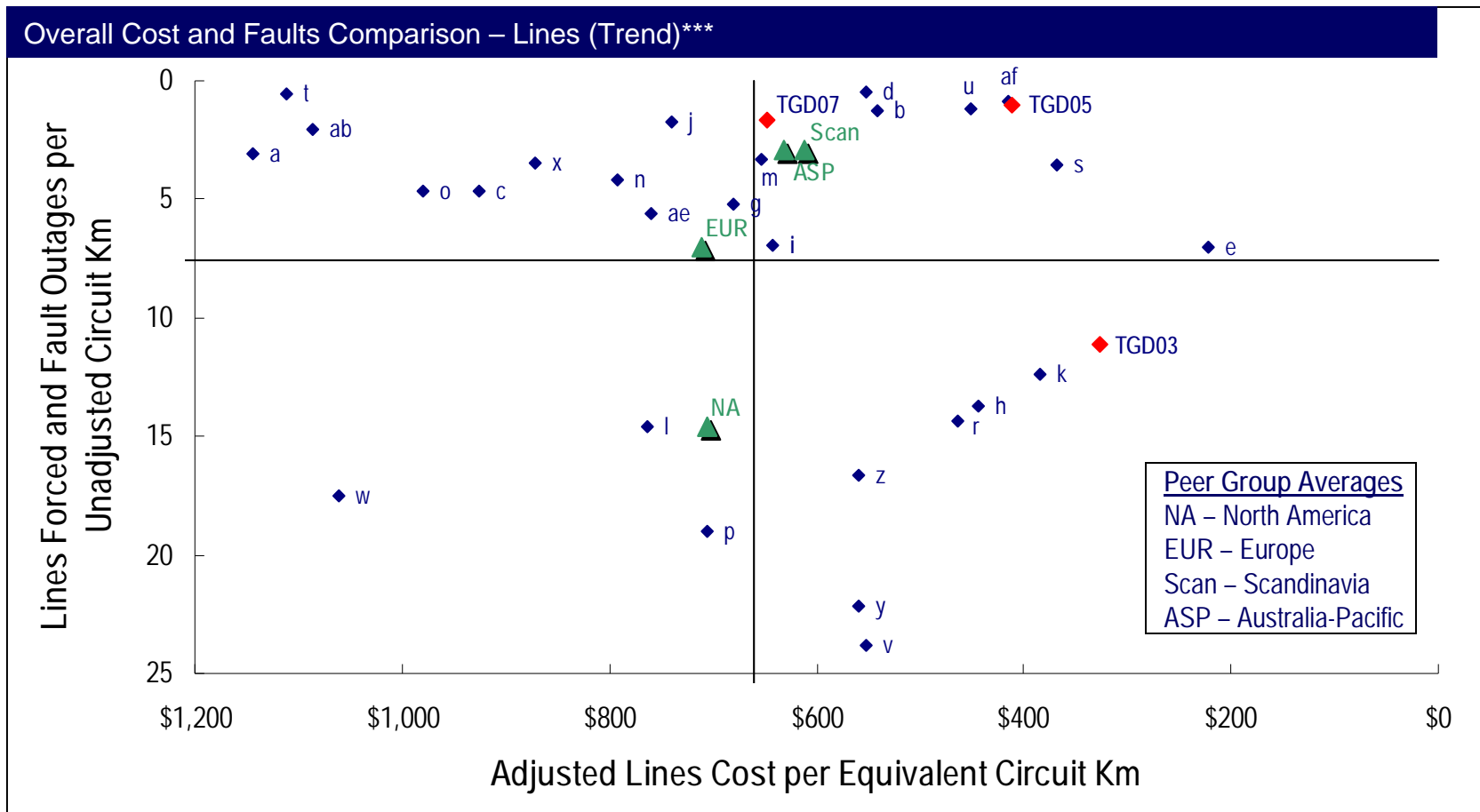




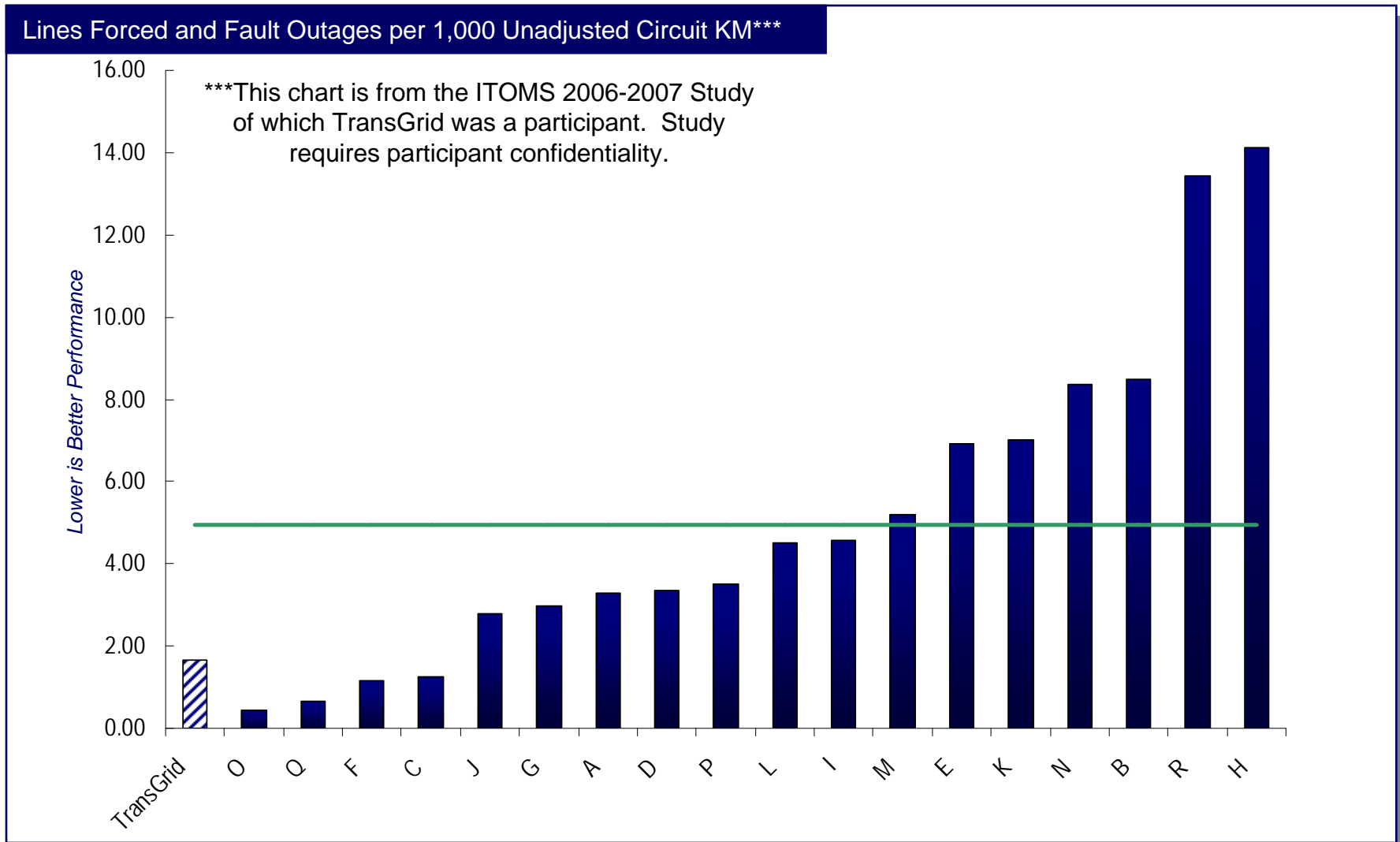
**Comparing TransGrid's Overall Substation Spending to Substation Outages over the period 2003 – 2007, Performance has been exceptional and the trend is ideal. TransGrid has positioned itself as a Global Best Performer.**



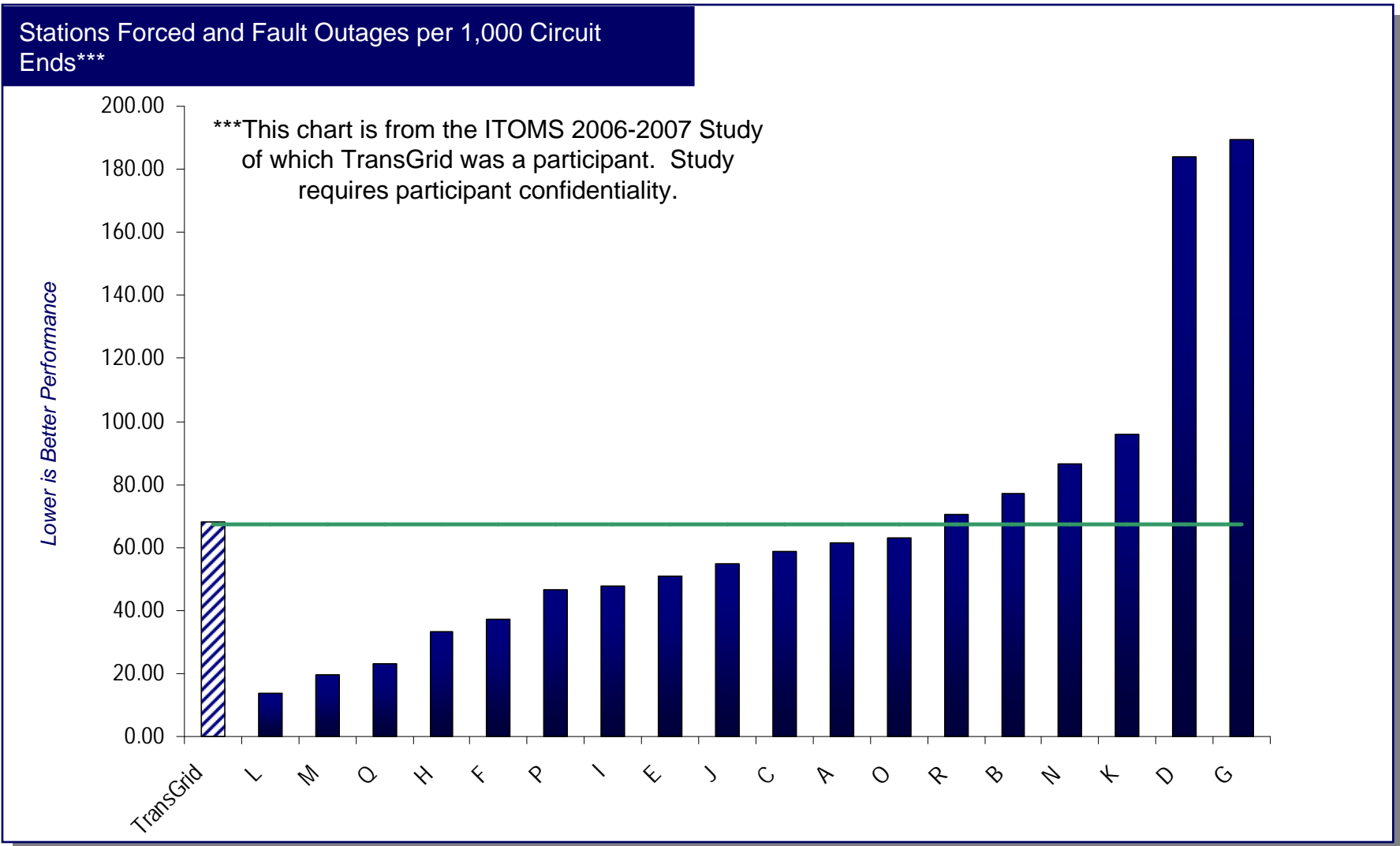
Comparing TransGrid's Overall Transmission Line Spending to Line Outages over the period 2003 – 2007, the company has performed well. Costs have increased, though still below average. TransGrid remains a Global Best Performer.



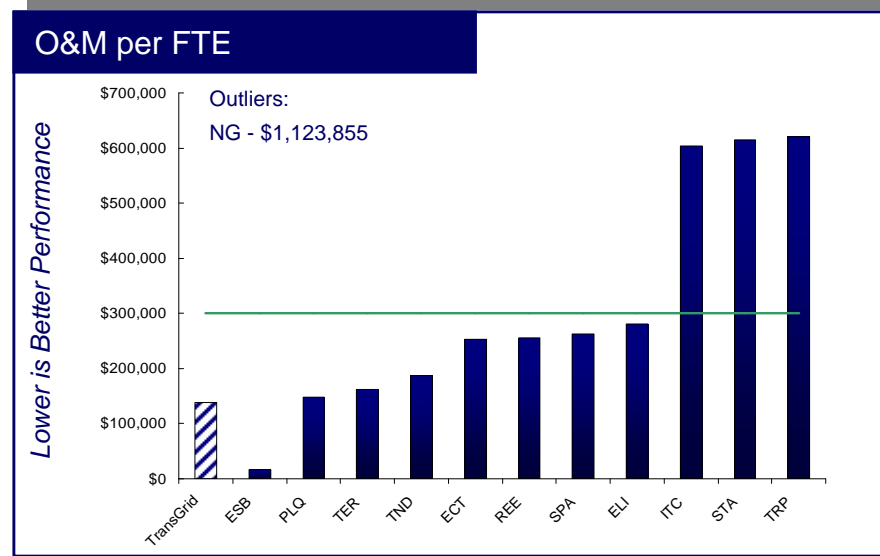
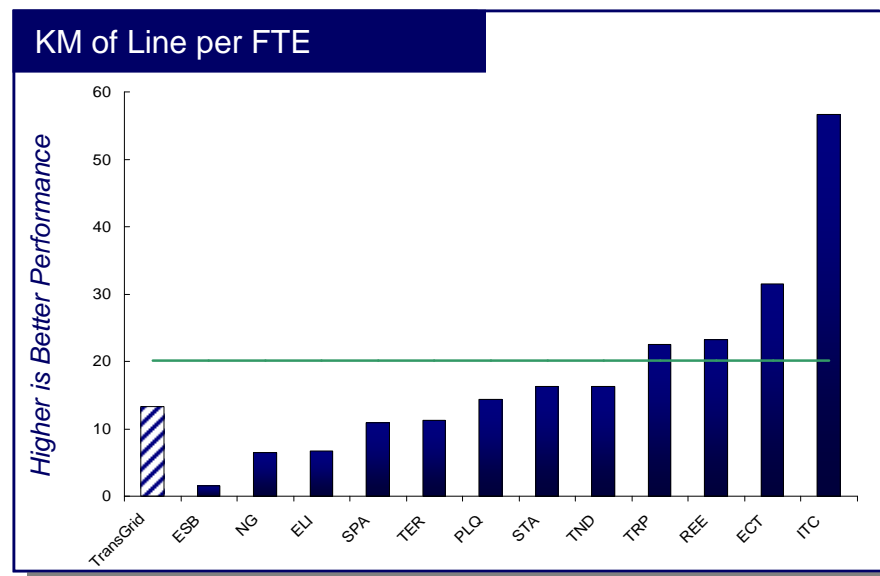
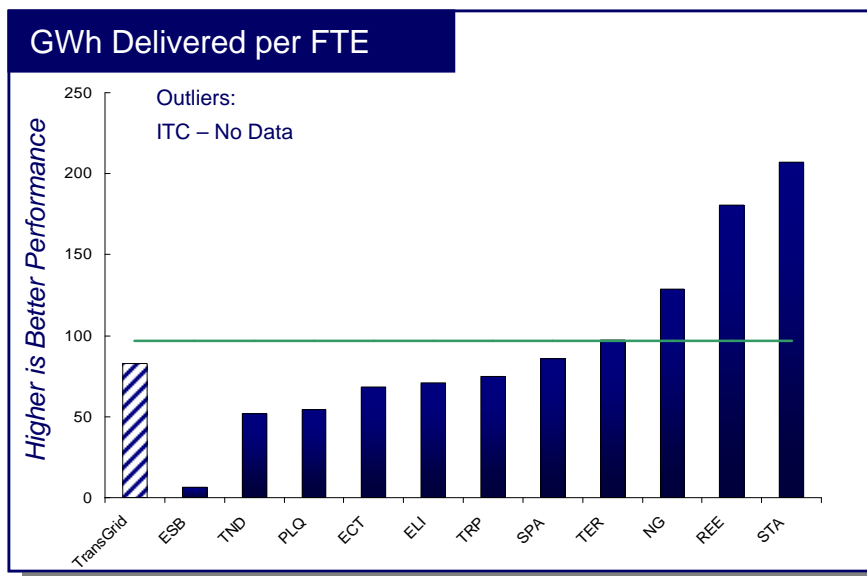
TransGrid is among the best in the world in line equipment reliability...



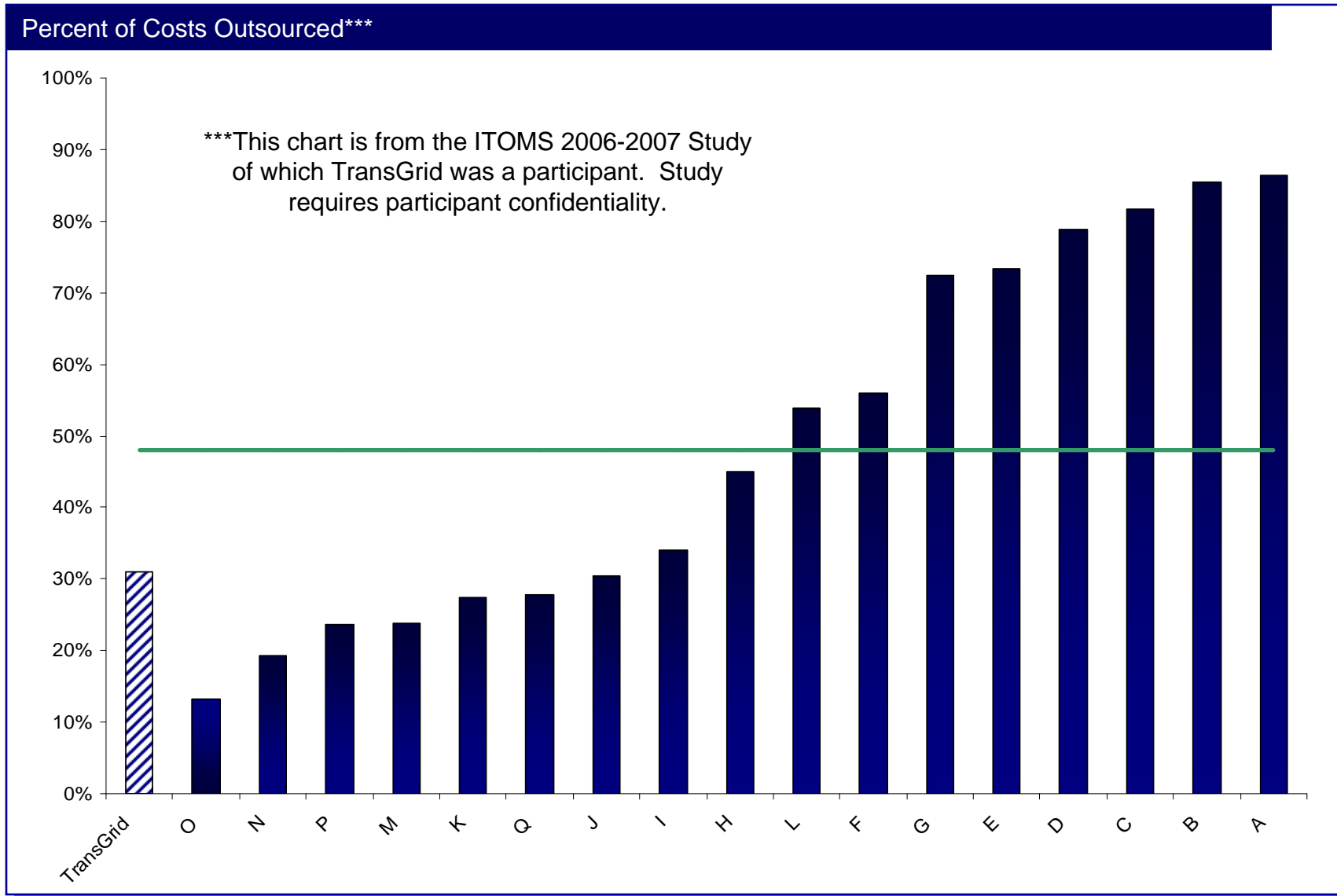
And in the Substation arena, despite greater load density than most peers, TransGrid’s reliability is still at industry norm.



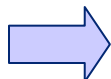
TransGrid’s staffing levels appear to be average, but low overall cost suggests relatively low levels of contracting or outsourcing of work compared to peers.



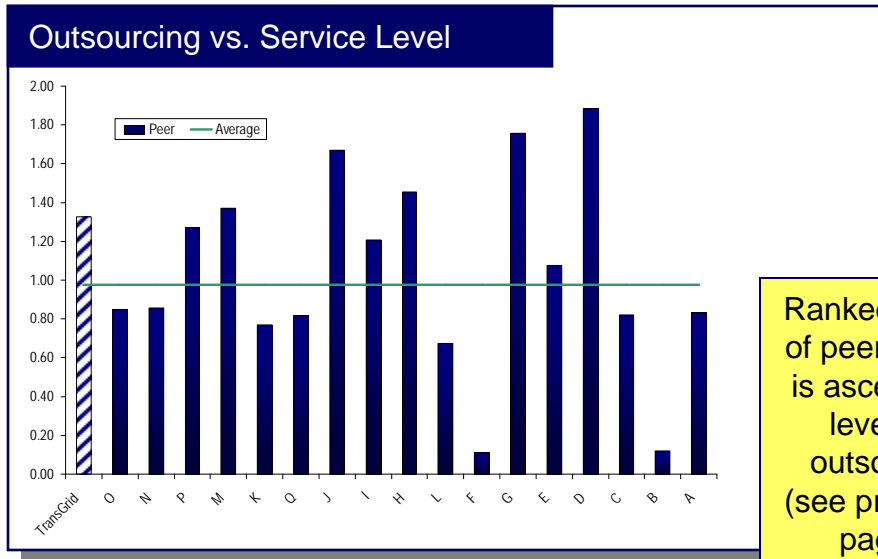
TransGrid outsources relatively little of its operating activities.



- I. Executive Summary**
- II. Peer Group Selection for Comparisons**
- III. Operating Efficiency Results**
- IV. Productivity and Resourcing**



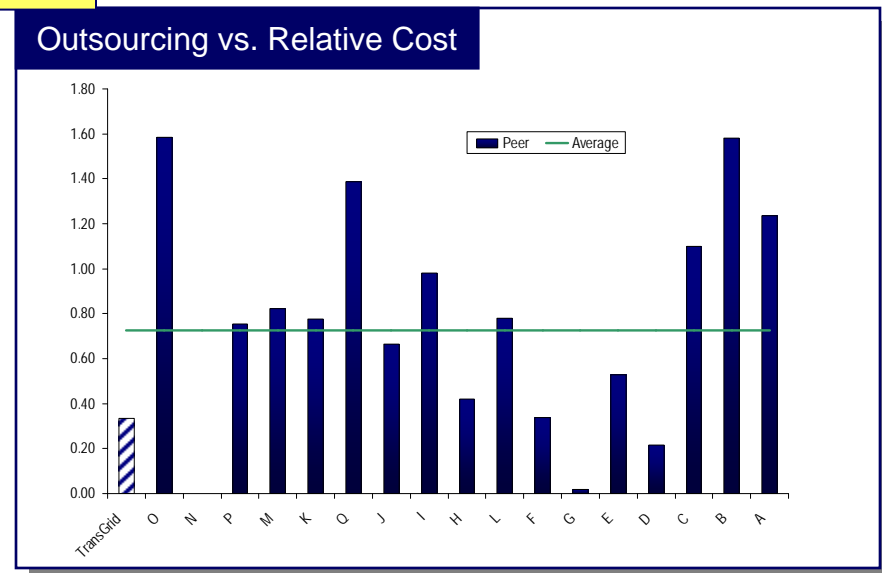
Reviewing service level and relative cost, we find no correlation between the degree of outsourcing and the effectiveness or cost of operations for a company.



Ranked order of peer group is ascending level of outsource (see previous page)

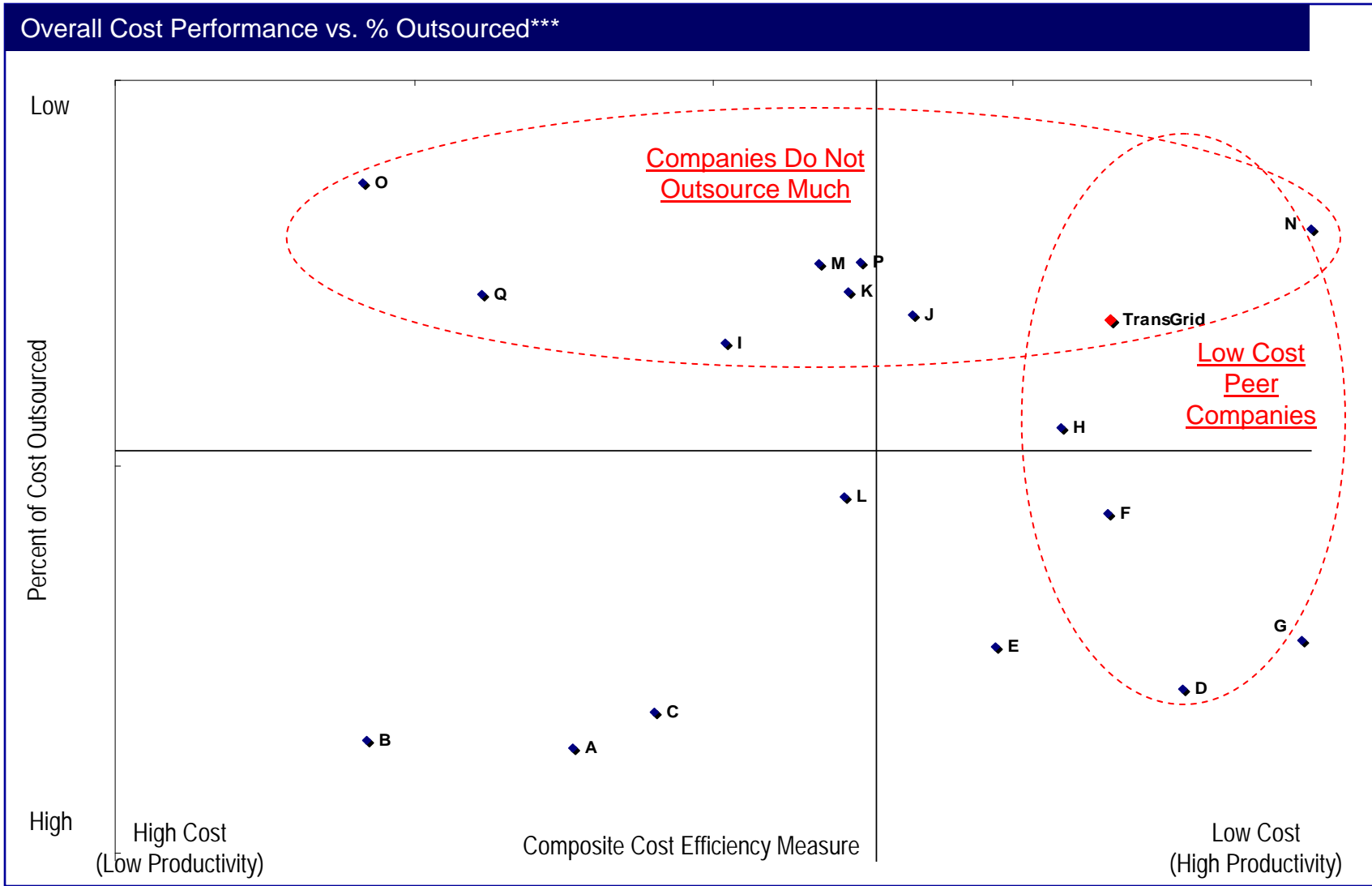
- Outsourcing strategies vary widely across the global Transmission business.
- Some companies seek to outsource wherever they can, while others are committed to providing as much work with internal staff as possible.
- UMS Group has studied various strategies across the world and the impact they have on efficiency and performance of the business.

- The evidence suggests that when appropriately applied, outsourcing can improve performance and efficiency of parts of the transmission business.
- This is almost universally true in selected areas such as tree trimming.
- But caution is indicated because there are many areas (such as asset management) in which outsourcing can increase costs.
- And if done poorly, outsourcing can result in loss of management control and reduced effectiveness in the business.



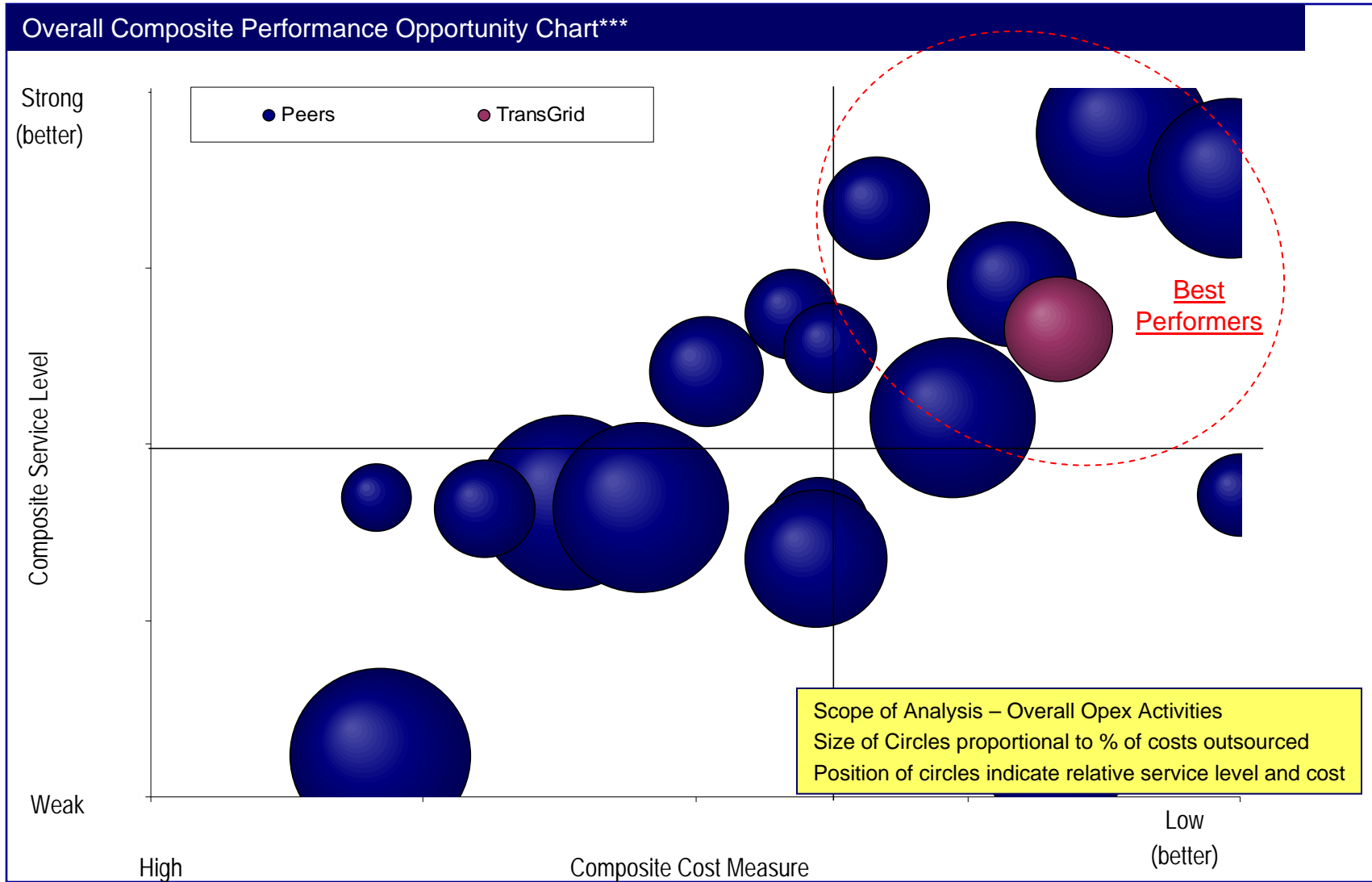


**ITOMS Overall Composite Benchmark – TransGrid has very low cost among its peers, and outsources relatively little compared to others.**



\*\*\*This chart is from the ITOMS 2006-2007 Study of which TransGrid was a participant. Study requires participant confidentiality.

## Looking At Overall Performance (Cost & Service Level), Degree of Outsourcing Has No Apparent Relationship To Performance Of the Utility



\*\*\*This chart is from the ITOMS 2006-2007 Study of which TransGrid was a participant. Study requires participant confidentiality.

## How To Read This Scatter Chart

- Two dimensional scatter charts of composite benchmark comparisons display a company's overall service level and cost performance versus other companies in its peer group. These charts display company relative performance concurrently in both service level and cost to give an accurate picture of its overall standing.
- The y-axis represents a relative service level score. The y-axis is indexed with zero representing a low relative composite service score and two representing a high relative composite service score.
- The x-axis represents an individual cost or productivity metric, usually in terms of normalized cost per asset.
- Average lines for both composite service and cost performance are determined by the overall average of the peer group in each. These lines visually define whether a particular company on the scatter is above or below the average of its peer group in either or both service and cost performance. Outliers are noted and removed from the scatter in order to prevent unnecessary skewing of the average lines.
- Each circle on the scatter chart represents a different peer company and is differentiated by the diameter of the circle: The size of the circles represent the relative degree of outsourcing by each individual peer-group company.