AER benchmarking model - background

Introduction

The Australian Energy Regulator (AER) is required to publish an annual benchmarking report to describe the relative efficiency of each Transmission Network Service Provider (TNSP) in providing prescribed transmission services.

The AER Annual Benchmarking Report is published by 30 November each year. The most recent report, published in November 2018, uses TNSP data from 2005/06 to 2016/17, which is up to the end of Powerlink's last regulatory period.

The AER Annual Benchmarking Report for electricity TNSPs uses two types of 'top-down' benchmarking techniques:

- Productivity Index Numbers (PIN) – indexes of aggregated inputs and aggregated outputs enabling comparison between networks and over time. Examples include Multilateral Total Factor Productivity (MTFP), Capital Partial Factor Productivity (Capital PFP) and Opex Partial Factor Productivity (Opex PFP)
- Partial Performance Indicators (PPIs) – partial efficiency measures that relate one input to one output. Examples include total cost per customer and end user per circuit kilometre (km).

The AER uses benchmarking when assessing network revenue proposals, as information on the historical efficiency of networks can inform decisions on proposed future expenditure. Benchmarking is also intended to provide consumers with accessible information about the relative efficiency of the electricity networks they rely on.

The AER acknowledges there are limitations to the benchmarking of transmission networks. While certain key operating environment factors (OEFs), such as maximum demand and energy throughput are captured, not all OEFs can be accounted for. Top-down benchmarking of electricity transmission network is still relatively new. The small number of TNSPs in the National Electricity Market (five), makes efficiency comparisons at the aggregate expenditure level difficult.

Productivity Index Number (PIN) measures

MTFP measures the ratio of a group of outputs to a group of inputs across all TNSPs across all years. The group of outputs includes maximum demand, energy throughput, customer numbers and circuit length, while the group of inputs includes both operating expenditure as well as the capital deployed in transmission circuits and substations.

MTFP compares each TNSP in each year to a hypothetical average TNSP. Changes in MTFP reflect movements relative to this hypothetical average TNSP. If four out of five businesses improve their productivity by 5% and the fifth business only improves by 2% then the fifth business will show a reduction in relative productivity, as measured by the MTFP, even though its absolute productivity has improved.

Capital and Opex PFPs each use the same group of outputs, but compares this to the relevant subset of inputs, being capital deployed or operating expenditure. Similar to the MTFP measure, these PFP measures compare each TNSP in each year to a hypothetical average TNSP.

Benchmarking model – description of terms

Inputs

Opex Quantity – TNSP Opex in each year ($ nominal) from Economic Benchmarking (EB) Regulatory Information Notice (RIN) data*. This is deflated to $2005/06 real to represent the quantity of Opex in each year.

Opex Price – A weighted average of Electricity, Gas, Water and Waste (EGWW) sector Wages Price Index (WPI) and five ABS Producer Price Indexes (PPIs) with 2005/06 as the base year.

Capital Quantity Proxies – quantify the capacity and size of the network in each year:

- Overhead Lines (MVA.kms) – summation across all overhead line circuits of the circuit thermal rating (MVA) multiplied by the circuit length (kms) from EB RIN data*
- Underground Lines (MVA.kms) – summation across all underground circuits of the circuit thermal rating (MVA) multiplied by the circuit length (kms) from EB RIN data*
- Transformers and other (MVA) – summated capacity of all TNSP owned power transformers, including system spares but excluding generator and interconnection transformers from EB RIN data*.

Capital Proxy Cost (Annual User Cost – AUC) – uses the disaggregated RAB data from EB RIN to derive building block elements – WACC return on capital, regulatory depreciation return of capital, and benchmark tax liability – for each of the capital quantity proxies. A benchmark WACC is derived for each year to apply to all TNSPs based on the prevailing risk free rate, cost of debt etc. in each year.

Capital Proxy Price – for each capital input proxy, for each TNSP, for each year this is the AUC / Capital Quantity Proxy

- Overhead lines - $/(MVA.kms)
- Underground lines - $/(MVA.kms)
- Transformers and other - $/MVA.

Input Index – Summation of each of the input capital and opex quantities multiplied by the corresponding capital and opex price.

**Powerlink can provide more detailed information on EB RIN data on request.*

Outputs

Ratcheted Maximum Demand (MVA) – highest non-coincident delivered maximum demand recorded up to and including the relevant year for each TNSP, including interconnector exports.

Energy Throughput (GWh) – energy delivered by each TNSP in each year.

Transmission Lines (km) – summated total of overhead and underground transmission circuit length for each TNSP in each year.

Customer Numbers – average number of active National Metering Identifiers (reported by Distribution Network Service Providers) for each TNSP in each year.

Unserved Energy (MWh) – energy not supplied by each TNSP due to unplanned transmission network outages in each year.

Adjusted Value of Energy Not Supplied ($) – unserved energy for each TNSP in each year multiplied by the Value of Customer Reliability (VCR) for that jurisdiction in that year, capped at 5.5% of revenue in that year.

Output Cost Weightings – each of the output quantities, excluding energy not supplied, has a pre-determined share of revenue in each year. The current output shares are:

- Ratcheted maximum demand (23.1%);
- Energy throughput (19.4%);
- Transmission lines (37.6%); and
- Customer numbers (19.9%).

Value of Outputs – the revenue for each TNSP in each year is ascribed to each of the output quantities in proportion to the output cost weightings.

Output Prices – for each output quantity, for each TNSP, for each year, this is the value of the output divided by the output quantity:

- Ratcheted maximum demand - $/MVA
- Energy throughput - $/GWh
- Transmission lines - $/km
- Customer numbers - $/customer
- Unserved energy - $/MWh.

Output Index – Summation of each of the output quantities multiplied by the corresponding output price.

Indexes

Details of the calculation of the various indexes is available in *Economic Benchmarking Assessment of Operating Expenditure for NSW and Tasmanian Electricity TNSPs – Appendix B*, Economic Insights, 10 November 2014.