COPPER

Copper Development Centre • Australia Ltd

10th April 2012

Electricity Network Regulation
Productivity Commission
GPO Box 1428
Canberra City ACT 2601

Submission: Electricity Network Regulation

Dear Sir,

Thank you for the opportunity to provide this contribution on the regulation of the electricity network.

Benchmarking can provide considerable assistance setting values and targets for organizations under review. For instance the measurement of electrical power into a network and from such a network is recorded and can provide a reliable measure of the efficiency of the network and therefore its losses. It is becoming more important to identify such losses and minimize them at least to an economic limit.

This submission extends the definition of the components of the National Electricity Market provided in the Issues Paper. It identifies three separate networks, an assembly network for clusters of small renewable generators feeding the transmission network, the transmission network itself and the exchange network which replaces the previous distribution network. Suitable regulatory supervision is provided for the two latter networks and no regulation is presently in place for assembly networks although they have the greatest potential for higher losses in operation. The necessity to properly account for the increasing cost of losses incurred as the networks transform is illustrated in the paper "The cost of losses for future network investment in the new networks regime" by Harry Colebourn (ESAA 2010 conference best paper).

In every network there are physical components which can effectively benchmarked against other similar organizations. The question of benchmarking the rules under which they operate is however considerably more difficult.

This submission is made as part of the Copper Development Centre contribution to the industry which utilizes copper components as an integral part of efficient performance in supplying electrical power to the community.

Our experts are available to help clarify any issues this submission raises.

John J Fennell
Chief Executive Officer
Copper Development Centre • Australia Ltd

AUSTRALIAN GOVERNMENT
PRODUCTIVITY COMMISSION
ELECTRICITY NETWORK REGULATION
SUBMISSION

It is understood that this inquiry is primarily concerned with aspects of benchmarking and its possible application for regulatory purposes.

In general it is considered that benchmarking has a place in identifying physical assets such as length of supply line and value such as kWh output. On the other hand benchmarking is seen as less appropriate in comparing the set of rules under which an organization may be required to operate. Thus benchmarking should be utilized as a tool to assist in making a determination rather than being the sole measure.

Benchmarking is also inappropriate for factors over which the organization being reviewed has little or no control.

Specific comments on the Issues Paper are set out below:

TERMS OF REFERENCE

It is noted that the Deputy Prime Minister and Treasurer Wayne Swan specifically uses the word "effectiveness" of the application by network businesses of the current regulatory regime. In other places throughout the document and elsewhere the word efficiency tends to be used.

Effectiveness is seen as describing the purpose of regulation in a far more appropriate manner. It is commended that effectiveness be used generally rather than efficiency which has a rather more technical meaning. This difference will become more pronounced as the technological efficiency of the network and its losses become more important.

1 SCOPE OF THE INQUIRY

As a matter of course, as part of maximizing the long run benefits to the community, the Productivity Commission reviews the social and environmental dimensions of any inquiry. A critical environmental component of any electrical network is the losses resulting from supplying power from a generator to a customer via the network.

Losses arise in every network between the generator terminals and the customer delivery point. Such losses arise in the clusters of renewable generators, in the transmission network and in the distribution of power to the customer. Within Australia these losses are presently typically 5-10% for the clusters of small renewable generators, ~3% for the transmission network and ~5% for the distribution of power to the customer.

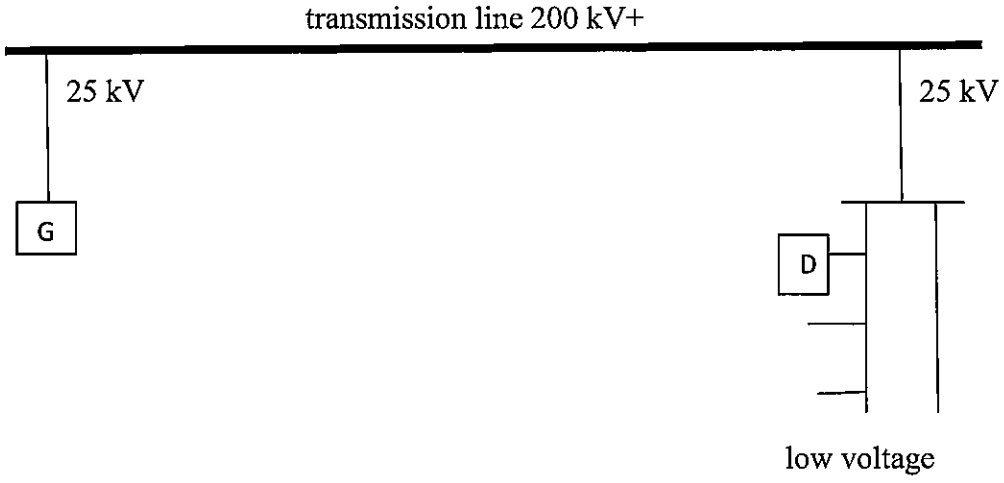
These losses must be provided by further generation, whether from existing fossil fired generation or from rather more expensive renewable generation. There is a strong case to minimize these at least to an economic level and if coal fired generation is the source for supplying losses to go beyond this level.

The power fed into the network and the power received by the customer are reliable figures which allow accurate benchmarking of losses and comparison of losses with standards and with other similar networks.

2 THE NATIONAL ELECTRICITY MARKET

While figure 3 "The transmission and distribution network" in the body of the report is reasonably indicative of the present network there are major changes developing and these should be taken into account in any serious consideration of benchmarking aspects of the national electricity network.

Generation has traditionally been made up of a small number of large units, 300 to 700 MW capacity, supplying the transmission network at about 25 kV. The transmission network supplies power to many distant distribution networks at about 25 kV. This voltage is reduced to supply customers at agreed voltages. Power is essentially transmitted one way from the generator to the customer and safety can be assured by isolation of the supply at a transformer. The network losses in transmission are about 3% and in distribution about 5%.



Power network 2012
G large generator
D customer demand

DIAGRAM OF 2012 POWER SYSTEM

This has been supplemented by many thousands of small renewable wind and solar generators of about 2 MW capacity feeding power at about 600 V to the network. A proportion of these are located where the natural resource is greatest which may be far from customer demand.

Assembly network
These small units are clustered into groups with relatively wide spacing, their output cabled at low or intermediate voltage and finally the voltage stepped up to about 25 kV for connection to the transmission network. This "assembly network" has a significant power loss associated with it because of the low generation voltage and the necessary wide

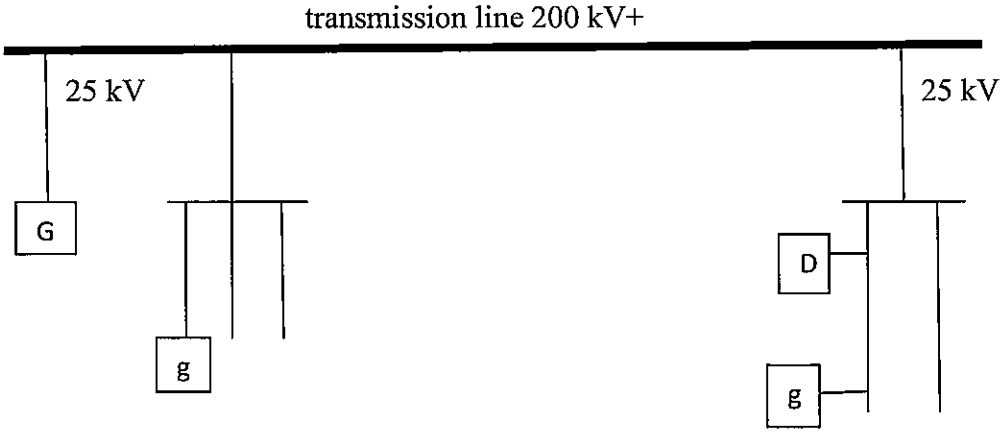
separation of generator to take best advantage of the resources, such as wind. These losses may be 5 to 10% of the generated output and are unregulated at present.

Both of these types of generator are linked to the transmission network at about 25 kV. The transmission network operates above 200 KV and supplies many what were distribution networks to the customer at about 25-35 kV. The level of voltage transfer from transmission network to lower networks varies throughout the power system ranging from 132 kV to 22 kV based mainly on previous historical arrangements.

Exchange network

The remainder of the renewable wind and solar generators feed what was the distribution network but which has now become an "exchange network". The previous distribution network essentially supplied power from a single point transformer through cables of decreasing cross section to reach the customer required voltage. It was essentially a one way network with isolation at the high voltage connection rendering the network safe to carry out maintenance.

This has been replaced by an exchange network with local small generators being connected directly at various points to the exchange network. As a consequence of this, power may flow in both directions, depending on local generation and customer demand at any instant. For safe maintenance all local generators must be locked out of service. This requirement will make maintenance much more difficult, time consuming and expensive.



Power network 2031+
G large generator
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D customer demand

DIAGRAM OF 2031+ POWER SYSTEM

The prime regulatory problem with this new network lies in the likelihood of serious congestion from local generation as the cable and equipment sizes are designed for one way flow to the customer. This mitigates against local generators which depend upon line voltage to enable their generator to feed the local demand. Voting customers may have purchased their own solar generator and hope to recoup their investment by feeding their local exchange

network. Some new form of organization will be required to manage this situation as the number of local generators increases.

This word picture provides a more specific description of the networks which are the coming subject of this inquiry. In particular it will assist in enabling benchmarking of losses in the three networks, assembly, transmission and exchange from measured generation and demand over time.