ENERGEX Limited

ABN 40 078 849 055

DEVELOPMENT OF NETWORK TARIFF STRUCTURES DISCUSSION PAPER

DECEMBER 2007

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1 EXECUTIVE SUMMARY

ENERGEX Limited (ENERGEX) is the electricity distribution entity for South East Queensland. It builds, maintains and operates the network of poles and wires and underground cables that supply electricity to all customers in this area.

As a commercial business, ENERGEX recovers its costs, including an appropriate return on its assets, through the levying of network tariffs. These network tariffs are generally charged to retailers, who pass them on to end use customers. Tariffs are approved by the Queensland Competition Authority (QCA), the economic regulator for electricity distribution entities in Queensland. The QCA also caps the total amount of revenue ENERGEX may earn from these activities.

Under the regulatory arrangements of the QCA, ENERGEX submits a Network Pricing Principles Statement (NPPS) each year, which outlines the basic principles behind the construction of ENERGEX's network tariffs. The QCA subsequently approves a set of network tariffs each year, which are consistent with the revenue cap and the NPPS.

In its 2005 Final Determination, the QCA flagged its desire for Queensland electricity distributors to develop a medium term perspective on the principles that should govern network pricing. The main driver for this was to improve the ability of network tariffs to provide appropriate signals to encourage efficient behaviour by both existing and future users of the network.

From ENERGEX's perspective, getting pricing signals right will assist in ensuring that the utilisation of its network is at its most efficient – an outcome which is of benefit to all customers, as this will reduce the need to spend additional funds on increasing the capacity of the network, thereby minimising price increases.

This paper aims to progress the debate around the merits of the different reform options for ENERGEX's network tariffs. The paper highlights some of the current factors impacting the debate around changing the network tariff structure, assesses how effective the current structure is in meeting the agreed pricing principles, and discusses a number of areas for potential reform, before proposing some specific initiatives for change.

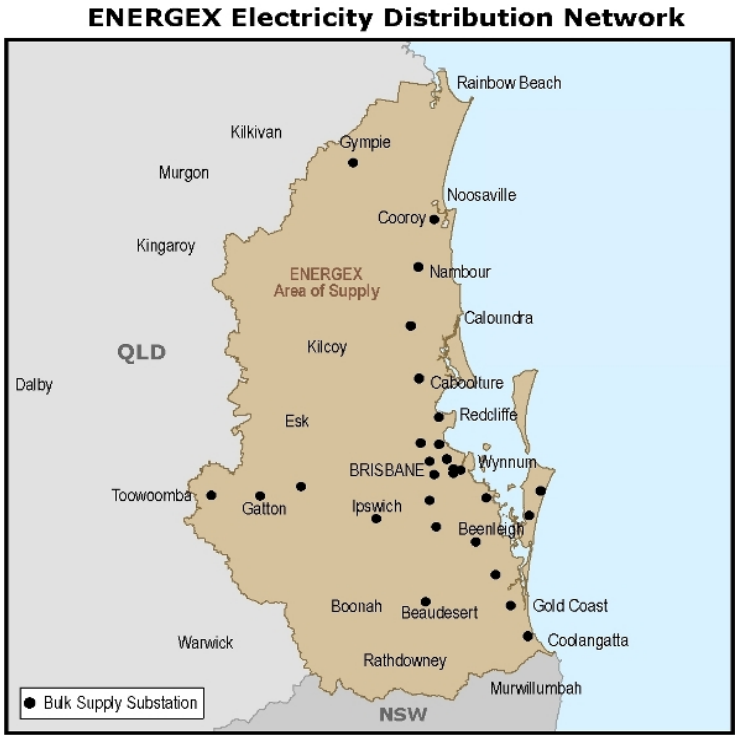
ENERGEX welcomes feedback from all stakeholders, including customers, retailers, policy makers and regulators, on this paper. Submissions are due by 21 December 2007.

2 INTRODUCTION

2.1 ENERGEX'S NETWORK

ENERGEX builds, maintains and operates the electricity distribution network for South East Queensland. The distribution network is the network of poles, wires, underground cables, substations and transformers that transports electricity from the high voltage wires operated by Queensland's electricity transmission company, Powerlink, to all 1.3 million homes and businesses in South East Queensland. ENERGEX's assets include more than 50,000km of underground and overhead electricity lines and cables, over half a million power poles, some 43,000 transformers and more than 290,000 street lights. ENERGEX's distribution network stretches from Gympie in the north to Gatton in the west and Coolangatta in the south (see Figure 1), covering around 25,000 square kilometres.

Figure 1: Map of ENERGEX's electricity distribution network



2.2 ENERGEX'S REGULATORY FRAMEWORK

ENERGEX is regulated by the QCA. The QCA has applied a revenue cap framework, under which the total amount of revenue ENERGEX is permitted to earn for any given year is determined up to five years in advance. In April 2005, the QCA released its *Final Determination - Regulation of Electricity Distribution*[1], which specified ENERGEX's revenue caps for the five year period from 2005/06 to 2009/10.

[1] Queensland Competition Authority (QCA) 2005, *Final Determination. Regulation of Electricity Distribution*, April.

ENERGEX will be regulated by the Australian Energy Regulator (AER) for the next regulatory period. The process for transferring from the QCA to the AER, including the rules that will govern how ENERGEX will be regulated, are currently being finalised. ENERGEX is engaging with both the QCA and the AER in developing its network tariff structures to ensure that any changes will be consistent with the transition from the current regulator to the next regulator.

2.3 HOW ENERGEX'S NETWORK CHARGES ARE DETERMINED

As a commercial business, ENERGEX recovers its costs, including an appropriate return on its assets, through the application of network tariffs. These tariffs are generally charged to retailers, who pass them on to end use customers.

These network tariffs are derived through a three step process.

- First, the total amount of revenue ENERGEX can earn is established by an independent regulatory body, currently the QCA. This is done through a regulatory Determination which sets revenue up to five years in advance, although various amendments may be made to the revenue cap in the course of the regulatory period, e.g. to allow for previous over or under recoveries.

- Second, on an annual basis, ENERGEX puts forward a set of principles in regard to how this revenue will be recovered from end users of the network (the Network Pricing Principles Statement or NPPS). This document is available on both the QCA's website (www.qca.org.au) and ENERGEX's web site (www.energex.com.au). These principles need to be consistent with the requirements of the QCA's current Determination.

- Third, ENERGEX then annually submits its network tariffs to the QCA for approval, consistent with the agreed NPPS and the required revenue cap. Network tariffs are published by 31 May each year, and are also available on ENERGEX's web site.

2.4 THE NEED FOR CHANGE

In the 2005 Final Determination, the QCA flagged its desire for Queensland electricity distributors to develop a medium term perspective on the principles and structure for network pricing. The main driver for this was to improve the ability of network tariffs to provide appropriate signals to encourage efficient behaviour by both existing and future users of the network.

A subsequent report commissioned by the QCA on these issues, *Network Pricing: Where To From Here?*[2], discussed a number of different issues in greater detail, including achieving greater signalling to customers of the impact of their use of the network in the price they pay. In particular, this report canvassed the notion of moving away from a backward looking approach where prices are based on previous capital investment, to a more forward looking method which focuses on future network costs. This report also flagged the use of time-based and location-based pricing as worthy of further investigation.

From ENERGEX's perspective, getting pricing signals right will assist in ensuring that the utilisation of its network is at its most efficient – an outcome which is of benefit to all customers, as this will reduce the need to spend additional funds on increasing the capacity of the network, thereby minimising price increases. Reform of network tariff structures is also important in light of the changing circumstances in which ENERGEX is operating – including community expectations, statutory requirements, demand growth and the introduction of competition in the broader retail market.

[2] Alan Tregilgas, Network Pricing: *Where to from Here?*, April 2006.

With this incentive in mind, ENERGEX published its first discussion paper on pricing in December 2006. This paper canvassed a range of pricing issues which ENERGEX intends to investigate over the next few years, and flagged that further papers would be published on this subject, with a view to developing a phased approach to changing the structure of network tariffs over the medium term.

Since this time, ENERGEX has engaged in discussions with a number of its major customers and bodies such as the Energy Users Association of Australia (EUAA) in regard to tariff structures. A forum was also held on 20 September 2007 with large customers to progress understanding of tariff issues and impacts.

2.5 PURPOSE OF THIS PAPER

This paper aims to progress the debate around the merits of the different reform options for ENERGEX's network tariffs, as input to the process of changing its NPPS and the structure of its network tariffs for the coming year, and beyond. This paper highlights some of the current factors impacting the debate around changing the network tariff structure, assesses how effective the current structure is in meeting the agreed pricing principles, and discusses a number of areas for potential reform, before proposing some specific initiatives for change.

To raise awareness of its existence, major stakeholders will be formally advised of the release of this paper and it will be placed on the ENERGEX web site. ENERGEX welcomes feedback from all stakeholders, including customers, retailers, policy makers and regulators, on this paper.

Written submissions should be provided to:

LNSP@energex.com.au

or posted to:

Network Commercial Management
ENERGEX Limited
PO Box 1461
BRISBANE 4001

Responses should be received by no later than **Friday 21 December 2007**.

ENERGEX is also offering meetings with interested parties seeking to provide input to its tariff development process. For further details please contact Carl Olivero on (07) 3407 4531.

3 CURRENT ENVIRONMENT

ENERGEX's network tariffs reflect the cost of operating its distribution business. ENERGEX's costs have expanded significantly as a result of:

- A need to improve the overall operation of the distribution network, consistent with statutory targets and community expectations, including:
    - ❖ Building the security of the electricity sub-transmission network (and the electricity high voltage network) towards the N-1 standard, whereby any major equipment failure will be largely mitigated by an alternative source of supply;
    - ❖ Raising reliability levels to improve the competitiveness of Queensland industries and in line with community expectations;
    - ❖ Matching electricity network infrastructure with customer preferences, including health, safety and amenity;
- Requirements to keep pace with demand for electricity, including increasing the capacity of the electricity network to meet the strong growth in economic activity in South East Queensland, including demand for air conditioning load; and
- The introduction of Full Retail Competition (FRC) and the sale of ENERGEX's retail business, which required significant systems and process changes for the network business.

In translating this increased capital program into network tariffs, a number of issues require consideration:

- What is the impact of increasing peak demand on the network, and what can be done to improve the effectiveness of network tariffs in managing this increase; and
- How can costs be contained to a level consistent with the level of services expected by our customers.

3.1 PEAK DEMAND

Over the summer of 2006/07, the ENERGEX network experienced an increase in maximum demand of 5.5 per cent relative to 2005/06 (on a temperature corrected basis). This was below forecast maximum demand mainly due to the mild temperatures across South East Queensland. The average daily maximum temperature for December to February was 28.9 degrees compared with the average of 29.8 degrees since 1999/00.

While last year's growth in electricity peak demand was only 5.5 percent, recent summers have seen annual growth 7.4 percent. Much of this high growth is attributed to the increasing use of air conditioning in summer months.

The traditional response of electricity distribution companies to demand growth has been to augment the capacity of the network to ensure that higher levels of demand can be met. However, in recent times, there has been an increasing focus on alternative strategies, such as demand side management, to manage this issue. Such strategies have included curtailable load and use of embedded generation.

At a national level, consideration of the roll out of smart meters has also been strongly linked to management of peak demand. Smart meter is a generic term which refers to a meter with more advanced functionality than a standard accumulation meter, including half hour consumption measurement and recording, secure two way communication and remote reading capability. This extra functionality supports time of use and/or demand based pricing and billing not available with older style accumulation meters. Smart meters could therefore provide opportunities to support a range of new tariff structures including more time-based price signalling.

From a pricing perspective, significant costs have been incurred as a result of the increase in demand. These costs are currently smeared across all users of the network. Ideally, the pricing structure should ensure that such costs, to the extent practicable, are borne by those causing the need to increase network capacity. Smart meters, because of their increased functionality, support pricing structures that take into account customers' impact on the network.

3.2 RETAIL BUNDLED PRICE (NETWORK PRICE DILUTION)

While ENERGEX has responsibility for the construction of network tariffs, it does not have control over how these network tariffs are passed through to smaller end use customers with the retail tariff generally being a bundled price. As a result, network tariff changes introduced by ENERGEX may not have the predicted impact, as retailers may potentially distort the pricing signal by the way in which they pass through these costs. This can dilute the ability of distribution companies such as ENERGEX to achieve the right pricing signals in the wider market.

3.3 SUSTAINABILITY

The wider community is becoming increasingly aware of environmental issues. In so far as it can, ENERGEX will promote the efficient use of electricity and encourage customer practices which will minimise impacts on the environment. This may include prices and strategies which promote the efficient use of the network, such as moving demand away from peak periods and encouraging wise use of energy through energy efficient devices and appliances.

4 CURRENT NETWORK PRICING PRINCIPLES AND NETWORK TARIFFS

4.1 CURRENT PRICING PRINCIPLES

ENERGEX's network tariffs are currently developed in accordance with the following principles:

- **Regulatory compliance** – network tariffs must comply with the requirements and controls set by the QCA, including achieving the annual revenue target;
- **Free from cross-subsidy** – this requires that the network tariff for a network user, or group of users, recovers costs which are between the incremental cost of supply and the stand-alone cost of supply;
- **Efficient use of the network** – there should be appropriate signalling to network users of their impact on existing and future network capacity and costs;
- **Equity** – network tariffs should be equitable for network users and should reflect the users' utilisation of the existing network and the use of specific dedicated assets;
- **Cost-reflectivity** – network tariffs should reflect the actual cost of service provision to customers;
- **Price stability** – network tariffs should remain stable over time to permit customers to make informed investment decisions; and
- **Simplicity** – network tariffs should be simple and straightforward to apply and readily understood by network users.

Some of these principles may conflict from time to time. For example, a uniform, flat tariff across all customers would be very simple. However, this would be unlikely to promote efficient use of the network and would result in cross-subsidies between customer classes. Accordingly, a balanced approach is required when applying these principles.

4.2 CURRENT PRICING STRUCTURE (2007/08)

For the recovery of ENERGEX's annual revenue requirement, current network tariffs are structured under three customer classes, namely:

- Individually Calculated Customers (ICCs), with energy consumption greater that 40GWh/year;
- Connection Asset Customers (CACs), with energy consumption greater than 4 GWh/year but less than 40 GWh/year; and
- Standard Asset Customers (SACs), with less than 4 GWh/year. These are generally divided into two groups, those above and below 100MWh/year.

A further subclass of CAC customers is embedded generators, which are small generators connected directly to the distribution network.

The network tariffs applied to each of these customer classes are designed to recover Transmission Use of System (TUoS) revenue, as well as Distribution Use of System (DUoS) revenue. DUoS tariffs may be separated into connection asset charges and charges for the use of the shared network, as shown in the following table.

Customer Group	TUoS	Shared Network	Connection Assets
ICCs	Individually calculated based on demand and energy at connection point	Individually calculated based on use of network shared with others based on anytime demand	Individually calculated based on the actual assets used
CACs	Allocated on an average of kW.h basis	Average shared network costs for group of customers	Individually calculated based on the actual assets used
SACs	Allocated on an average of kW.h basis	Average shared network costs for group of customers	Averaged based on standard connector assets for the Customer Group
Embedded Generators	Allocated on an average of kW.h basis	Average shared network costs for group of customers	Individually calculated based on actual assets used

ICC prices are individually calculated for all price components.

CAC prices also separate connection and shared network charges, but the latter are based on averaged transmission and distribution network charges. Averaging is undertaken on the basis of the practical difficulties of calculating individual shared network charges for each customer. Network tariffs for a CAC customer comprise:

- A fixed charge ($ per month);
- A capacity charge ($ per kW per month);
- An actual demand charge ($ per kW per month); and
- A volume charge (cents per kW.h).

Network tariffs for the SAC class are averaged for all types of charges. For SAC customers above the 100MWh threshold, network tariffs comprise:

- A fixed charge ($ per month);
- A demand charge ($ per kW per month); and
- A volume charge (cents per kW.h).

For SAC customers below the 100MW.h threshold, network tariffs comprise:

- A fixed charge ($ per day); and
- A volume charge (cents per kW.h).

5 ASSESSMENT OF CURRENT PRICING PRINCIPLES

The following analysis assesses the extent to which ENERGEX is achieving its pricing principles.

5.1 REGULATORY COMPLIANCE

ENERGEX's network tariffs are designed to recover the approved revenue cap each year, while staying within required side constraints. The QCA approves that these compliance requirements have been met as part of its annual approval process. To the extent that actual revenue collected is above the approved amount, the unders and overs process applies, requiring ENERGEX to refund this amount to consumers.

5.2 FREE FROM CROSS-SUBSIDY

ENERGEX is required to demonstrate annually that its network tariffs recover costs which are between the incremental cost of supply and the stand alone cost of supply for each customer. ENERGEX and the QCA specifically monitor this requirement as part of the annual network tariff approval process.

5.3 EQUITY

The equity test examines issues around customers paying for the assets they use, including similar customers paying similar tariffs. ENERGEX's pricing process customises tariffs for very large customers based specifically on the proportion of shared assets they use, and all of the dedicated assets they use. Beyond this, prices are averaged such that customers with similar consumption patterns and levels pay similar amounts. ENERGEX also assesses the boundary issues between customer classes on an annual basis, to ensure that there are no inappropriate incentives for customers to switch between tariff classes.

In summary, this test is met as dedicated assets are paid for by the relevant customer, similar customers generally pay similar network tariffs, and boundary issues between tariff classes provide for a smooth transition between classes without anomaly.

A more particular issue in the equity category is the treatment of capital contributions. ENERGEX's current policy requires that customers make a cash contribution towards the cost of a connection in the case of an uneconomic connection. An uneconomic connection is defined as one where the average distribution prices for the relevant network price category would not be sufficient to recover the full cost of the connection. This policy means that no customer is worse off as a result of a new customer connecting to the network.

5.4 COST REFLECTIVITY

As noted above, there is a considerable amount of averaging of costs in the construction of network tariffs. However, the nature of the network is such that joint costs are a significant proportion of total costs. As a result, as long as network tariffs are between incremental and stand alone costs (ie. the free from cross-subsidy test is met), this test can also generally be said to be met.

However, even where the general cost reflectivity can be considered a spectrum, and accordingly there may still be opportunities to improve the cost reflectivity of prices.

In summary, while this test is broadly met, its application could be improved through network tariff reform.

5.5 EFFICIENT USE OF THE NETWORK

The efficiency test requires that network tariffs send appropriate signals to network users of their impact on existing and future network capacity.

The nature of ENERGEX's current network tariff structure is that there is a significant degree of averaging. While this meets the basic tests of being free from cross-subsidy and generally equitable, this does inherently limit the efficiency of the pricing signals sent.

As a consequence, there is considerably more work that could be done in terms of tariff reform to improve the efficiency of ENERGEX's network pricing. These issues are discussed in Section 6.

5.6 PRICE STABILITY

In establishing ENERGEX's revenue caps, the QCA applied a smoothing process to ensure that price increases between regulatory periods, as well as from year to year, are relatively consistent. This exercise, along with publishing revenue caps and side constraints up to five years in advance, provides for price stability to end users.

As a result, ENERGEX is of the view that there is strong evidence that network prices have been reasonably stable over an extended period of time. However, as with all principles, this will need to be balanced against the need to achieve other objectives.

5.7 SIMPLICITY

ENERGEX's network tariffs are relatively straightforward in terms of the process to develop them, the number of customer classes they apply to, and the different components within each customer class.

ENERGEX holds the view that this test is met reasonably well at present, but this will need to be kept in mind as new network tariff structures are developed to improve performance against some of the other pricing principles, to ensure that the solutions proposed are not unnecessarily complex.

5.8 ASSESSMENT AGAINST OTHER REGULATORY REGIMES

A high level scan of pricing principles adopted by other electricity distributors and a range of other utilities in Australia indicates a great deal of consistency with the principles that have been applied by ENERGEX.

Some which are not covered explicitly in ENERGEX's pricing principles include the following:

- Responsive to the needs of network users;
- Minimise compliance costs; and
- Promote sustainable investment.

At this stage, ENERGEX is of the view that its suite of pricing principles is appropriate to the needs of its customers, and does not propose to modify or expand these principles. However, going forward, ENERGEX will continue to assess the need to include additional principles, particularly in regard to promoting sustainable investment. Such a principle would support the introduction of tariffs in support of air-conditioning load control, for example.

5.9 CONCLUSION

ENERGEX's current network tariff structure is broadly compliant with all current principles. However, a number of improvement opportunities have been identified. Efficiency, and to a lesser degree cost reflectivity, are the main areas for short term improvement. In analysing how this might be achieved, it will be important to keep in mind that some of the other principles are not eroded, in particular simplicity and price stability.

ENERGEX invites comment on its views on the achievement of its pricing principles.

6 OPTIONS TO IMPROVE NETWORK TARIFFS

ENERGEX has considered the current Pricing Principles in Section 5 where it identified that the largest opportunity for potential gain in network tariff reform is in efficiency and cost reflectivity. To improve these, ENERGEX is considering a range of options which are discussed in more detail. The options considered are:

- More customised tariffs and connection agreements for large customers;
- Creation of new customer classes;
- Locational pricing signals;
- Congestion pricing signals;
- Improved demand signals;
- kW vs. kV.A pricing;
- Time of use pricing (demand and/or energy);
- Block tariff structures;
- Energy efficiency measures;
- Controlled load; and
- Changing the mix of fixed versus variable tariff components.

A summary table of proposed options to be adopted over the short to medium term is in Section 6.11.

6.1 GREATER CUSTOMISATION FOR LARGE CUSTOMERS

The requirements of large customers may need special attention to provide the best customer service possible. For example, these customers may have “beyond the norm” connection requirements, possibly requesting different levels of reliability of supply. A negotiated connection agreement is already available to customers who may require specific connection assets. Going forward, the scope and nature of such agreements could change, increasing the number of these agreements, to accommodate more specific needs and/or price structures. This approach, although requiring a greater investment of resources on ENERGEX’s part, could potentially assist in achieving a higher level of cost reflectivity in pricing.

6.2 MORE CUSTOMER CLASSES

In principle, more cost reflective pricing can be achieved by allocating costs across more customer classes as it allows clearer delineation between customer demand and consumption characteristics, provided suitable data is available. However as granularity is increased (i.e. more customer classes, which if taken to the extreme would result in a different price for every customer), administrative and transaction costs increase. Finding the correct balance between detail and averaging across customer classes is necessary for economically efficient pricing. The customer classes currently used by ENERGEX are intended to reflect this balance between detailed individual prices (e.g. ICC pricing) and averaged prices (e.g. SAC).

However, individual customer requirements and expectations are rapidly changing. For example consider the change in domestic use which is being driven by the requirements of sophisticated electronic equipment now found in many households, or the increasing number of pool pumps and air conditioners. These are increasing network demand and a requirement for high quality and reliable electricity supply. At the other extreme, large industrial installations have their own unique connection requirements. Increased flexibility in pricing and special connection agreements may be necessary to accommodate differing customer requirements.

At a minimum, new customer classes will be necessary to support environmental and sustainability initiatives such as photovoltaic installations and other alternate embedded generation and demand side management strategies. Further analysis needs to be carried out on the impact or benefit of embedded generation. It could be expected that this would result in new prices for this type of connection and further development of customer specific connection agreements and specific class prices.

Preliminary analysis carried out by ENERGEX, of the costs to provide streetlights, night watchman lighting and unmetered supplies indicates there are significant differences in the cost to provide and maintain these types of services. Different costs arise from capital funding arrangements, ownership and maintenance requirements. Maintenance costs can vary according to location with the likes of traffic control requirements on major roads, or the difficulties of physically getting safe working platforms in very inaccessible laneways. A number of discussions are underway to improve cost reflectivity with a more detailed breakdown of unmetered supply categories.

ENERGEX will continue to explore the possibility of improved pricing signals either using more customer classes or prices which are derived to differentiate customers' behaviour and their impact on the network.

6.3 LOCATIONAL SIGNALS

Location based prices can be used to indicate the actual cost of supply at different geographical locations in the network. For example, more remote parts of the network, which cost more to construct and maintain, could be separated into a different zone, which could be charged a price more reflective of these costs.

ENERGEX is developing models and options to test the viability of such approaches to network pricing.

6.4 CONGESTION PRICING SIGNALS

Congestion Pricing Overview

Congestion pricing is designed to signal the cost of supplying the next incremental unit of demand as the network reaches its capacity limit. This can be either at a specific time and place or at a specific time when the network system as a whole is stressed (i.e. maximum system demand on a fully meshed distribution network). These prices are usually a real time price such that as the congestion increases so does the price, thereby providing a signal to customers to reduce their consumption. It tends to be a forward looking price calculation to reflect future investment which can provide a clear and effective signal to the impact individual consumption is having on the network.

In contrast, with a fully distributed cost model, prices will decline as utilisation increases. It can be argued that this encourages efficient utilisation of the network, as a fully loaded network will deliver the lowest price. However it does not provide a forward looking price signal for when the capacity limit is reached. Under these circumstances it can produce a perverse price signal.

The disadvantage with some forms of congestion pricing is that it requires substantial investment in communication infrastructure and can impose significant transaction costs on the customer. It is anticipated that as the cost of improved metering and communications equipment reduces, the feasibility of implementing congestion pricing will increase. Accordingly, at this stage congestion pricing is a longer term possibility.

Congestion Pricing and TUoS

In the case of transmission, increases in capacity can cause significant step changes in TUoS charges, especially to existing ICCs whose consumption may not have changed. ENERGEX's network pricing methodology allocates Powerlink's TUoS costs directly to ICCs based on their physical connection to the network. All remaining customers have an averaged TUoS allocation of costs.

Changes in TUoS charges can be imposed on an ICC due to factors completely beyond their control such as changes to system load flows resulting from a reconfiguration of the network and therefore connection to a different Transmission Connection Point (TNCP). Changes may also be caused by system augmentation necessary because of other customers' increased consumption.

To minimise the volatility in TUoS charges, virtual transmission node (or zone) pricing could be established solely for pricing purposes. These virtual TUoS pricing zones would not apply to transmission loss factors (TLF) or for market settlement purposes. While in principle it reduces the cost reflectivity of ICC prices, and to some extent may reduce locational signals in prices, the benefit of stability may outweigh this. This issue is being further developed.

6.5 DEMAND SIGNALS

Demand is the single most dominant driver of network augmentation. Consequently, price reflectivity can be improved by using a network price structure which differentiates customer classes by their demand and their impact on the network at times when it is most stressed.

Establishment of network prices which reflect the true cost of network development can encourage a more efficient use of the network. Accordingly network prices should provide a clear and accurate indication of the impact a customer is having on the network. Ultimately, reductions in demand can defer the need for network expansion. It is ENERGEX's strategy to transition toward a pricing structure which has a clearer and stronger demand signal.

Options to achieve this include:

- increasing the bias to demand and capacity charges by reducing the volume charge component (reducing the volume charge needs to be carefully balanced against the benefits of a stronger Time of Use Energy price signal, as discussed below);

- increasing demand charges for demand occurring during times of maximum utilisation of the electricity network for example at times of system coincident peak demand (e.g. a Time of Use Demand charge or Critical Peak Prices); and

- improving the efficiency of the demand pricing by adopting kV.A as the demand measure as opposed to the kW currently used (kV.A vs. kW is discussed below).

ENERGEX has considered these options in the context of the Pricing Principles, and concluded that kV.A and Time of Use (ToU) should be considered part of the short to medium term pricing strategy.

kV.A vs. kW for Demand

The two methods of measuring demand are kW or kV.A. kV.A is a more accurate measure of a customers impact on the network. As shown in the table below customers may have the same kW reading, but with different power factors (power factor is an indication of the relationship between real and apparent power) have very different impacts on the network. Ideally power factor should be as close to unity as possible, therefore the further it moves away from one the more network capacity is needed.

Typical customer	kW average max demand for charge to customer	power factor	kVA impact on network
Customer 1	1,600	0.7	2,286
Customer 2	1,600	0.8	2,000
Customer 3	1,600	0.9	1,778
Customer 4	1,600	1	1,600

Current price structures used by ENERGEX use kWs as the measure of demand in calculating demand and capacity based charges. Improved cost reflectivity and price signalling can be achieved by using kV.A rather than kW for network prices.

It is proposed to commence using kV.A price structures from 1 July 2008. The new network price structures would replace existing kW charges with kV.A charges and be available to all ICCs and CACs, as well as SACs on a Demand tariff. For a transition period, both kW and kV.A prices structures will be offered to allow time for customers to adapt and respond to the new network tariffs. ENERGEX will also provide guidance on technical issues associated with installing power factor correction equipment, as part of the introduction of kV.A tariffs.

Time of Use Pricing

The purpose of a ToU network tariff is to provide a signal to customers to encourage usage during periods of low demand on the network and discourage use during periods of high demand i.e. when the network is highly utilised. ToU pricing encourages more efficient use of the network as customers switch non-essential electricity use to off-peak periods, reducing peak demand and ultimately benefiting all customers.

ToU pricing also allows customers the flexibility to optimise their own electricity costs by either manually switching appliances off or fitting plug-in timers. This alleviates the need for hard wired switching as is necessary for controlled tariffs.

ToU tariffs can be based on either demand or volume. ToU Volume is widely used by other jurisdictions and internationally. Variants of ToU pricing include Critical Period Pricing (CPP) which is similar to Dynamic Peak Pricing (DPP) and Real Time Pricing (RTP). CPP and RTP have been trialled globally, mostly by retail (or vertically integrated) entities. Further analysis of the benefits and costs of CPP or RTP would be required before a position is formalised on these specific price structures.

Application of ToU Volume

With the introduction of FRC a new Business ToU Network price was offered to small and medium businesses effective 1 July 2007. ENERGEX has considered a range of options to extend the application of this type of tariff.

For small customers, a major restriction on the application of ToU Volume pricing is having suitable interval metering installed for all customers. While a mass rollout of interval metering will not occur in the short term it is being promoted nationally by COAG (subject to a cost benefit analysis) as part of the Smart Meter initiative. Accordingly ENERGEX is undertaking preparatory work to ensure it is well placed to embrace opportunities to trial ToU prices and explore customer behaviour and response to price signals.

Unlike domestic customers larger market customers generally have suitable meters. Prices for these customers have a balance of different elements making up the price signal. These include fixed, demand, capacity and volume (energy) charges. The opportunity now, is to reconstruct the existing non-ToU volume charge to a peak / off-peak charge. This provides a small but tangible signal of their impact on the network. It is proposed that all volume based charges be modified to a peak / off-peak price structure.

It is proposed that ToU Energy charges for large customers be expanded from 1 July 2008.

ToU Demand

As discussed previously, demand is the single most dominant driver for network investment. Therefore a price signal, which captures demand and also the time aspect of when that demand occurs, provides a sharper more cost reflective price signal.

The success of a ToU Demand price hinges around how closely the times chosen in the tariff structure reflect the requirement of, or the demand on the network. For example, one question that arises is should the peak period be defined as when the system as a whole is at maximum stress, or when a particular zone substation is most utilised? The respective peaks could occur at different times, and hence require different price signals.

Further analysis will be undertaken before a final position on ToU demand is settled on by ENERGEX. It is anticipated that ToU Demand will form part of ENERGEX's medium term pricing strategy.

6.6 BLOCK TARIFF STRUCTURES

Most of ENERGEX's small customers (less than 100MW.h) currently have accumulation meters (i.e. no ability to record demand or time of use energy consumption). These small customers (SAC – non-demand metered) account for approximately 56% of energy and 67% of the total anytime maximum demand on the network. This means that they contribute significantly to the network peak demand, and as previously articulated, demand is the key driver to transmission and distribution network augmentation.

One method that has been applied in an attempt to reduce the impact of small customers on peak demand is the use of Inclining Block Tariffs (IBT), sometimes referred to as Inverted Tier Tariffs.

The current network price structure for non-interval and non-demand metered customers consists of a fixed daily charge and a flat energy (volume) charge. However with an IBT, the price increases in steps as energy consumption increases. Because of cost averaging across the customer group, this would usually result in a price which is lower than actual cost for the first block and a price higher than cost for subsequent blocks. Accordingly, higher use customers would pay proportionally higher charges.

Such higher charges can be considered reasonable as it could be argued that as a general rule, high energy consumers will probably be running air-conditioners during the peak period and should therefore contribute proportionally more to the cost of the network. Air-conditioners are a major contributor to increasing system peak demand. Effectively IBT could be used as a surrogate for a time of use demand price.

In summary ENERGEX will continue to explore the option of using IBT as a surrogate for demand and/or time of use metering until such time as suitable metering is available to all customers. Any adoption of IBT will be implemented after careful consideration and modelling of possible impacts on various customer groups.

6.7 GENERAL ENERGY EFFICIENCY MEASURES

An alternative to network augmentation is to encourage demand side participation. This is not necessarily a pricing issue but alternative schemes to encourage customers to use the network efficiently. This may involve shifting load to periods when there is lower utilisation on the network by the use of controlled load (as discussed below) or with energy efficient devices which can provide benefit at all times.

A broader question is how much should a distribution company be involved in promoting energy efficiency as the implications can be far reaching? As an example, it is recognised that air-conditioning is a source of increased load on the network. Should a network business be promoting more efficient building practices such as window shading or better thermal insulation? If so, should this be a passive support or actively pursued with financial incentives? In line with both government and customer expectations for a sustainable environment, ENERGEX will explore and test strategies for improved customer demand side participation.

6.8 CONTROLLED LOAD

ENERGEX has approximately 600 MW of interruptible hot water load installed throughout its distribution area. At any point in time ENERGEX has approximately 350 MW of controlled load which can be switched off. Controlled load is generally switched off during periods of network capacity constraints, providing a means to manage network demand during times of maximum network utilisation. This reduces the capacity requirement of the network.

Accordingly the challenge is to not only maintain the existing controllable load but to increase it. Prices need to provide appropriate signals to customers of the value controllable load provides to the network. While controllable load is predominately hot water, there is the risk that its impact will reduce with the increasing market penetration of solar, gas and heat pump hot water systems. Therefore alternative controllable loads need to be found. This could include air conditioners, refrigeration and other curtailable commercial / industrial loads which can be interrupted by agreement with the customer. Controllable load encourages efficient and responsible use of the network by removing load that can be shifted to times of lower network usage. An extension to reducing load is to have agreement with customers who have standby generation which on request can be run specifically to provide network support when the network is under stress.

Controllable load can also provide direct benefit to customers and retailers as it is likely that periods of high system use are also periods of high energy market prices.

ENERGEX intends to explore the possibilities of expanding product offerings for controlled loads and envisages that with the right incentives customers will be encouraged to install controllable loads.

6.9 FIXED VERSUS VARIABLE COMPONENTS

The majority of ENERGEX's network assets are long-lived, with asset lives between 25 and 60 years. They are also generally immovable once installed, and require investment in large increments. These network assets have few if any alternative uses, and once in place, the cost of these assets cannot be avoided by any future strategy.

This combination of factors means that many of the costs ENERGEX is seeking to recover from its customers are fixed. These fixed costs could be recovered by "selling" a specific capacity to a customer at a fixed rate. This is a similar concept to the existing capacity charge built into ICC and CAC network prices except, rather than being based on a nominated or historical demand they would be on an agreed capacity basis.

ENERGEX will continue to consider the most appropriate balance between fixed and variable network price structures.

6.10 SUMMARY OF PRICING OPTIONS FOR 2008/09

Increasing demand on the network is the primary driver of present and future network requirements. Accordingly, pricing strategies which encourage efficient use of the network and accurately signal to consumers their impact on the network should be addressed first. The price structures which provide the most opportunity to meet these goals in the short term are kV.A and ToU for larger customers. It is anticipated that these changes could be offered from 1 July 2008.

OPTIONS CHOSEN AS WORTHY OF CONSIDERATION AND DEVELOPMENT

Option	Strategy Term
kV.A	Short
ToU Volume	Short
ToU Demand	Medium
TUoS - TNI virtual zones	Medium
Wider application of Load Control prices	Medium
Zonal pricing	Medium

kV.A Network Price Structure

The proposed change to kV.A will impact ICC, CAC and SAC demand customers. The table below demonstrates what the new network price structures would look like if kW pricing was transitioned to kV.A pricing.

Proposed Price Structure kV.A				
DUoS Charge	Fixed Charge (Service Availability)	Capacity Charge	Demand Charge (Variable)	Volume Charge (Note: the volume charge will change to a ToU volume if ToU charging is also adopted.)
Charge unit	$ per mth	$ per **kV.A** per mth	$ per **kV.A** per mth	Cents per kW.h
ICC	Yes – no change	Yes	Yes	Yes – no change
CAC	Yes – no change	Yes	Yes	Yes – no change
SAC Demand	Yes – no change	N/A	Yes	Yes – no change

ToU Pricing

ToU pricing offers the opportunity for prices to provide strong correlation between the impact a customer has on the network and the price paid by the customer. ToU pricing for large customers will form part of the ENERGEX short term and medium term strategy.

ToU prices can be applied in two ways, either based on demand or volume. For large customers with demand metering ToU demand is the preferred option. However, to implement ToU demand will require a longer transition period to allow more time for customers to familiarise themselves with the impact of ToU Demand prices. Accordingly ENERGEX proposes that ToU for larger customers will be implemented in two steps. Firstly ToU volume will be offered in the short term and ToU Demand adopted in the medium term.

The table below shows how new network tariff would look with a time of use volume charge.

Proposed Price Structure Time of Use (ToU) Volume					
DUoS Charge	Fixed Charge (Service Availability)	Capacity Charge (Note: if kV.A is adopted the basis of charging will change from kW.)	Demand Charge (Variable) (Note: if kV.A is adopted the basis of charging will change from kW.)	**Volume** Charge **Peak**	**Volume** Charge **Off-Peak**
Charge unit	$ per mth (or $ per day)	$ per kW per mth	$ per kW per mth	Cents per kW.h	Cents per kW.h
ICC	Yes	Yes	Yes	Yes - **New**	Yes - **New**
CAC	Yes	Yes	Yes	Yes - **New**	Yes - **New**
SAC Demand	Yes	N/A	Yes	Yes - **New**	Yes - **New**
SAC Business (Note: Subject to suitable metering)	Yes	N/A	N/A	Yes – existing ToU (Phase-out existing non-ToU prices as metering allows)	Yes - existing ToU (Phase-out existing non-ToU prices as metering allows)
SAC Domestic (Note: Subject to suitable metering in the future)	Yes	N/A	N/A	No	No

6.11 SUMMARY OF PRICING OPTIONS FOR BEYOND 2008/09

Pricing options which will be further developed for possible implementation in the medium term include:

- ToU Demand;
- Analysis of TUoS pricing options;
- Increased customer driven connection agreements;
- Special pricing structures for energy efficiency incentives; and
- Analysis of the cost and benefits of embedded generation pricing and incentives.

7 GLOSSARY

AER	Australian Energy Regulator, expected to take over as the regulator of ENERGEX's distribution network prior to the commencement of the next regulatory period on 1 July 2010.
CAC	Connection Asset Customer, which is a customer that consumes between 4 and 40 GW.h per annum of electricity.
CPI	Consumer Price Index, which is a measure of the relative changes in prices for consumer products over time, as measured and reported by the Australian Bureau of Statistics.
DUoS	Distribution Use of System, which refers to the network charges for the use of the distribution network.
ECC	Energy Competition Committee, which is an independent panel appointed by the Minister for Energy to oversee the implementation of Queensland's Full Retail Competition program for electricity and gas.
FRC	Full Retail Competition, which means that all customers (irrespective of their level of consumption) may purchase electricity from their electricity retailer of choice. From 1 July 2007, all electricity customers in Queensland have this option.
HV	High Voltage, which refers to the 11kV or above network.
ICC	Individually Calculated Customer, which is a customer that consumes more than 40 GW.h per annum of electricity.
kV.A	Kilovolt Amperes, which is a measure of the apparent power flowing and is used to measure demand. One kV.A equals 1,000 Volt Amperes.
kW	Kilowatt, a measure of capacity demand.
LV	Low Voltage, which refers to the sub-11 kV network.
MW	Megawatt, which is equivalent to 1,000 kW.
MW.h	Megawatt-hour, a measure of volume demand. It equals 1,000 kW.h (kilowatt hours), which is the standard 'unit' of electricity. One kW.h represents the consumption of electrical energy at the rate of one kilowatt over a period of one hour.
NEM	National Electricity Market, which is the interconnected electricity grid covering Queensland, New South Wales, Victoria, Tasmania and the Australian Capital Territory.
NEMMCO	National Electricity Market Management Company, which is the operator of the NEM and operator of the power system that underpins NEM operation.
NMI	National Metering Identifier, which is a unique number assigned to each metering installation.
Power Factor	Power factor, is the ratio of kW to kV.A, and is a useful measure of the efficiency in the use of the network infrastructure. The closer to one the power factor, the more efficient the network assets are utilised. $$\text{Power Factor} = \frac{\text{kW}}{\text{kV.A}}$$
QCA	Queensland Competition Authority, the jurisdictional economic regulator for ENERGEX. The QCA determines ENERGEX's aggregate annual revenue requirement (AARR) and approves ENERGEX's network tariffs.
SAC	Standard Asset Customer, which is a customer that consumes less than 4 GW.h per annum of electricity.
TNCP	Transmission Network Connection point, which is a connection point between Powerlink's transmission network and ENERGEX's distribution network.

ToU	Time of Use, which refers to tariffs that vary according to the time of day at which the electricity is consumed.
TUoS	Transmission Use of System, which refers to the charges incurred for use of the transmission network.