



DEMAND MANAGEMENT AND NON-NETWORK OPTIONS STRATEGY

Integrated Energy Supply Options

Asset Strategy & Planning

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EXECUTIVE SUMMARY

Endeavour Energy is committed to investigating non-network options and implementing Demand Management (DM) programs as part of our normal planning processes. This includes all projects subject to Regulatory Investment Test – Distribution (RIT-D) as required under the National Electricity Rules and projects that do not meet the RIT-D threshold, known as ‘non RIT-D’ projects. The objective of this strategy is to identify more cost-effective non-network alternatives in order to defer or avoid network expenditure. RIT-D projects include both augmentation and retirement expenditure.

Historically, this has covered a range of initiatives from pay-to-curtailed Demand Response agreements with major customers in constrained areas, through to broader based end-use load management trial programs. The latter have ranged from incentive payment and tariff structure mechanisms to encourage alternate customers’ behaviours, through to technology-oriented programs such as utilising Demand Response Enabled Devices (DRED) such as air conditioning systems.

The changes in customer end-use patterns observed in recent times due to the uptake of solar PV installations and increasingly the emergence of local energy storage facilities are now limiting the range of options available for wide-spread broad based DM programs sponsored by the company. To an extent customers have taken this initiative upon themselves encouraged somewhat by regulatory mechanisms such as the BASIX energy efficiency requirements for new housing, and now on average present less demand per new connection than that planned for 10 years ago. This reduction in energy consumption is built into our demand forecast.

Endeavour Energy has responded to this shift by continuing to work with customers to trial more effective broad-based Demand Response programs, and to call for market-based solutions to identifying non-network options for identified RIT-D projects. This Demand Management Strategy recognises the shift in customer usage patterns and behaviour, and the changing role that the network has to play in meeting customer end-use energy needs. The future focus on Demand Management initiatives will be to be centred on technology-enabled end-use response mechanisms such as that offered by DRED-compliant appliances, as well as financial incentives focused on mechanisms such as time-of-use tariff arrangements.

Five strategic focus areas have been identified to ensure effective demand management programs are developed in the future. These strategic DM focus areas are:

- Network Ability;
- Non-Network Services Market;
- Non-Network Services Engagement;
- Customer Response including tariff reform; and
- Regulatory Support.

Whilst the strategic focus areas overlap and influence each other to an extent, specific action plans are being developed to address each of these initiatives. Central to this is the recognition that customers themselves have been empowered to manage their own demand through energy efficiency initiatives and the increasing penetration of distributed energy resources (DERs) such as rooftop solar PV generation and battery energy storage with a resultant reduction in opportunities for market-based, broad-based non-network solutions. The role of the network in providing the aggregating capability necessary to fully leverage the capacity of DERs in a coordinated manner will become central to the success of future DM programs. Regulatory recognition and support of this changing environment will be central to its future success.

Current DM investment plans are focused on identifying innovations in this field and establishing proof-of-concept of technological innovations prior to the initiatives forming part of our business-as-usual response to managing the impacts of demand growth.

1.0 INTRODUCTION

Electricity Distributors in NSW (DNSPs) operate under the licence requirement (under the NSW Electricity Supply Act 1995) to investigate non-network alternatives to network augmentation for specific capital expenditure projects. The National Electricity Rules (NER) requires distribution network service providers to investigate non-network options as alternatives to proposed network infrastructure investment by utilising a market consultation process to identify potential third-party provided alternatives in the planning of major network upgrades and network asset renewal as part of the Regulatory Investment test for Distribution (RIT-D) detailed in clause 5.17.4 of the NER. This provides an opportunity for all interested stakeholders and the community at large to submit alternative options to network infrastructure investment by the DNSP.

Endeavour Energy recognises and fully supports this aspect of the network planning and investment process as a key feature of our social licence to operate as a distributor in NSW. The Australian Energy Regulator (AER) has the responsibility to ensure compliance with the rules and conducts audits of DNSP expenditure to ensure they are in accordance with the RIT-D procedures. We actively pursue cost-effective non-network options for both RIT-D and non RIT-D projects to defer network expenditure and result in a more efficient network.

The key objective of our Demand Management (DM) and Non-Network Supply strategy is to ensure the investigation of non-network options is integrated into the planning process and evaluated with network supply options in accordance with the RIT-D process and the Electricity Supply Act for all network limitations. We have achieved this in the past through a consultative market-based approach in order to identify and develop a range of integrated network and non-network supply solutions and integrate these into the normal planning process. The Company sees this as one of the mechanisms to minimise the overall cost to the community in the provision of network-enabled energy supply solutions.

Endeavour Energy has developed this strategy to guide the development of market-based non-network energy services and related instruments thereby allowing for the development of cost effective non-network and other demand management support options. This will facilitate non-network service providers to submit proposals for alternate energy supply options and enable Endeavour Energy to evaluate submissions and implement cost-effective initiatives in an efficient manner. This strategy also investigates options that allow Endeavour Energy to implement non-network options itself where it is proven to be more cost effective than the network solutions and after consideration of any third party service provider submissions.

This strategy is multi-dimensional and addresses the following suite of issues:

- The ability of the network to incorporate non-network options;
- Assistance for the non-network services market to develop and offer the appropriate services that meet Endeavour Energy's needs;
- Endeavour Energy's framework to identify and procure non-network options efficiently and effectively;
- Customer's willingness to respond to initiatives to reduce peak demand; and
- The need to appropriately influence regulatory approaches to better incentivise Demand Management Responses from customers and DM programs offered by DNSPs.

2.0 HISTORICAL APPROACH TO DEMAND MANAGEMENT

2.1 RECENT PROGRAMS & DEMAND MANAGEMENT FUNDING

Endeavour Energy has demonstrated its commitment to seeking alternative solutions for non-network energy supply in accordance with the regulatory requirements outlined above through its various DM initiatives. The Company has trialled and/or successfully implemented four different types of demand management programs in order to test the appetite of consumers to embrace demand response initiatives and to defer targeted network infrastructure investment. These are:

- Demand Response;
- Pricing Trials;
- Pay to curtail (major customers only); and
- Assist with major customer infrastructure upgrades to reduce demand

Demand response trials have involved the early development and trial of Demand Response Enabling Devices (DRED - typically domestic air conditioning, but in some case pool pumps). Endeavour Energy was the first DNSP in Australia to run an Air Conditioning cycling program in October 2000. This highlights the level of commitment that this company has shown in identifying effective DM initiatives. Endeavour also trialled a Dynamic Peak Pricing product as part of the Blacktown Solar Cities (BSC) program. This initiative sent a high price signal to customers during peak times to encourage energy reduction. Following on from this, a similar residential program was then developed with but with the different focus, that being the *PeakSaver* program. This program rewarded customers for reducing electricity consumption during peak times rather than penalising them with high prices. This program was also the first of its kind in Australia.

However, the most successful demand management programs have involved direct engagement with industrial and large-scale commercial customers to implement pay-to-curtail arrangements, triggered by expected peak demands impacting constrained parts of the network. The DM payments for these initiatives were funded from the regulatory D-Factor cost recovery mechanisms, which no longer operates.

The AER has signalled that future DM programs are likely to be funded through a mixture of DM regulatory funding allowances (supporting actual programs and trial innovation schemes alike) and from the Opex savings accumulated from the deferral of network capital expenditure. This funding approach and the use of DM and non-network solutions forms an integral part of business decisions pertaining to network capital investment and the potential deferral of this through the application of DM programs.

Endeavour Energy has also pursued commercial arrangements with some customers that have standby generation available. This has been of limited success with only a limited number of customers exhibiting a willingness to run their generation as a commercial demand response initiative at Endeavour Energy's request. Endeavour Energy also has installed a generation facility to provide a "non-network" capacity increase to a remote load that features a high seasonal variability and "peaky" characteristics. The operating costs of this installation were partially funded from the D-factor allowances for a period of time.

In general, Endeavour Energy's targeted approach to identifying load-curtailment or "pay-to-generate" demand response initiatives have included the following features:

- Supply areas with emerging network capacity constraints are identified in advance;
- Demand response load arrangements creating economic benefit through investment deferral with payments to involved customers funded partially through deferral and partially from D-factor allowances;
- The agreements are contracted for the period of the network investment deferral, terminating at the time that the investment was deferred to;

- Major customer load curtailment arrangements were typically implemented at production facilities where processes could be scaled back at a day's notice with little overall business impact. Typically this was targeted engineering fabrication industries and non-critical production line industries.
- "Pay-to-run" generation contracts typically involved commercial sites with back-up generators featuring the ability to be easily operated combined with non-critical operational flexibility, such as registered clubs.
- Partially funding demand reducing initiatives which included equipment upgrades. Customer participation in these initiatives generally required that the customer's investment was returned in less than two years.

Endeavour Energy's DM program outcomes for Industrial & Commercial customers are provided in Table 1 below. It is noteworthy that whilst the domestic pricing signal and DRED trials provided some degree of insight into customer behaviours, the schemes proved complex and cumbersome to implement. The absence of a broad-based aggregator (a market-based energy services provider) and the relatively low-level of financial reward showed that it was challenging for these initiatives to be commercially viable in targeted areas.

Table 1 - Demand Management Program Statistics - Industrial/Commercial

Program Name	Program Type	Year Implemented	Year Completed	Total Customer Demands (MVA)	Number of Customers approached	Number of Customers Engaged	Demand reduction identified (MVA)	Demand reduction Implemented (MVA)	Number of initiatives identified	Number of initiatives implemented	Program types and Quantities	Percentage demand reduction to peak demand
Campbelltown	Commercial	1-Jan-06	31-Mar-09	14	36	12	5.9	4	140	20	Lights – 4 PFC- 14 DSR – 2	28.6%
Liverpool	Commercial	1-Aug-06	31-Dec-11	30.6	40	27	9	6	259	102	Lights – 26 PFC- 18 DSR – 2 HVAC – 12 Monitors – 24 Hot Water – 8 Motor – 1 Other - 11	19.6%
Unanderra	Industrial / Commercial	20-Sep-06	31-Mar-09	15.23	35	9	6.5	2.8	169	16	Lights – 7 PFC- 7 DSR – 2	18.4%
Minto	Industrial / Commercial	1-Sep-07	31-Dec-09	29.30	36	21	5.9	4.2	98	29	Lights – 2 PFC- 18 DSR – 2 Compress. – 5 Hot Water – 2	14.3%
Chipping Norton	Industrial	1-Jul-08	31-Dec-10	16.50	34	23	6.4	2.7	92	17	Lights – 5 PFC- 12 DSR – 1	16.4%
Windsor / Richmond	Industrial / Commercial	20-Feb-09	30-Jun-11	5.60	20	13	3.2	0.84	79	11	Lights – 15 PFC- 7 DSR – 1 PV - 1	15.0%
Rooty Hill	Industrial / Commercial	7-Sep-09	31-Dec-13	14.9	38	24	8.1	4.2	85	26	Lights – 3 PFC- 15 DSR – 4 HVAC – 1 Cooking – 1 PV – 1 Other – 1	28.2%
Granville	Industrial / Commercial	31-Mar-10	31-Mar-12	5.87	23	16	2.6	0.84	65	12	Lights – 2 PFC- 9 HVAC – 1	14.3%
Arndell Park	Industrial	1-Apr-11	31-Mar-14	21.3	35	17	5.04	2.44	88	36	Lights – 21 PFC- 12 DSR – 2 Other – 1	11.5%

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Mamre	Industrial	11-Apr-12	31-Mar-15	13.4	29	14	5.7	1.6	85	7	Lights – 1 PFC- 3 DSR – 3	11.9%
Eschol Park	Industrial / Commercial	1-Jun-12	31-Mar-15	15.7	19	6	5.6	3.7	55	10	Lights – 1 PFC- 6 DSR – 3	23.6%
Total									1,215	286		18.3%

Since 2012 no demand management projects have been implemented. This is due to all network limitations and expenditure being limited to greenfield development areas. Endeavour has issued Non-Network Options Reports requesting submission for non-network options but has to date received no submissions. This is due to the difficulty in reducing demand in basically rural areas and where land is subdivided into of residential lots, industrial areas or commercial centres.

3.0 CHANGES IN CUSTOMER BEHAVIOUR

3.1 TECHNOLOGY DEVELOPMENTS AND FUTURE DM POTENTIAL

There are technology advancements occurring in both the energy consumption and energy production fields. New dwellings include efficient appliances and the majority have PV installed are being constructed to meet increasingly stringent energy efficiency standards.

Endeavour Energy's own experience and that of the broader energy services market place has affirmed the viability of various technologies which, if deployed on a sufficient scale and with appropriate incentives are likely to underpin the deployment of successful targeted and broad-based demand management programs.

Endeavour Energy is taking this into account by adopting a lower ADMD figure for new residential release areas which will result in lower demand of new release areas and a reduced level of network assets required to service the demand. Endeavour has considered all these demand reducing options and incorporated them into the demand forecast and network planning. Endeavour Energy does not offer financial incentives for these initiatives to be implemented as they will occur naturally in new development sites.

Further, a residential battery storage trial is currently being undertaken by the Company to determine how best to use this technology to reduce peak demand. Important outcomes of the trial include:

- determining how to best work with potentially competing interests from all parties involved;
- the level of potential and reliable demand reduction; and
- the financial incentive required to secure customer participation.

The success of this technology will require the involvement of energy services aggregators to work with Endeavour Energy to assist in developing the viability of this technology as a market-based DM solution. Aggregators will also need to manage the potential conflicting interests of retailers and network service providers by developing and deploying dispatch algorithms that offer market-based access to the stored energy based on pricing or other market-based signals.

Broadly grouped into two categories, the recent technologies are:

Currently proven:

- DRED to Australian Standard AS4755.3.1;
- Domestic solar PV installations;
- Energy efficient appliances; and
- Remote area power systems for combined peak-demand reduction and reliability improvement

Emerging or in need of further development:

- Domestic battery storage;
- Large-scale battery storage;
- Thermal energy storage;
- Large-scale “commercial” solar PV (factories, industrial plants, car-parks);
- Electric vehicle charging/discharging capability;
- Aggregated demand response and control of domestic appliances and energy storage; and
- Time-of-Use demand tariff signals coupled with a smart meter rollout.

The identification, implementation and management of Endeavour Energy’s Demand Management programs have been resource intensive, particularly regarding the recruitment of potential participants. Further, it has required detailed operational coordination and manual intervention to trigger the demand responses when required. In particular, the initiation of demand response in accordance with network need, either by observation of weather conditions and network conditions, or by the sending of pricing signals, has not been automatic, remotely controllable or naturally integrated with network operational systems.

Further, the financial incentives required to elicit desired responses from domestic customers has not been sufficiently strong, in some areas, to enable the broad uptake required to gain any real benefit in managing network constraints. The most successful outcomes have been achieved with the targeted commercial and industrial pay-to-curtailed or pay-to-run programs.

As can be seen from Table 1 however, the degree of uptake is still well short of the potential opportunity available. Importantly, these opportunities have been limited to a small range of customers that Endeavour Energy directly investigated, established strong relationships with, and supported through the DM engagement process. It is interesting to note that as prices increased customers became more interested in participating but still not to the point of commitment to the program. This highlights the short-term focus and pay-back requirements of the majority of customers, and how present DM incentive arrangements are inadequate.

It is the inability to engage with customers en-masse, and to provide integration and response systems that are unobtrusive that has limited DM program uptake in the past. The emergence of potential DM opportunities through changes in customer energy supply technologies further exacerbates this limitation. The ability to find market-based energy service providers with the capability to offer short-term demand response/demand mitigation options is limited. This is due primarily to the aggregation market being immature, albeit it does appear to be developing in-line with solar PV and battery storage integration.

3.2 END-USE LOAD TRENDS

There is a widely-held view that future demand growth on the network will be curtailed substantially by the uptake of end-use supply technologies such as embedded solar PV generation supported by

energy storage technologies. Endeavour Energy has identified and recognised this trend in its reductions in end-use customer After Diversity Maximum Demand values (ADMD) used for network planning and design. The current residential ADMD figures used for forecasting and planning purposes are 3.2kVA for dwellings and 2.4kVA for apartments. This is down from 5.2kVA used four years ago and 6 to 7 kVA eight years ago. The figures quoted are for the summer forecast while the ADMD figures are further diversified by 80% for winter. In addition, the forecast demands are reduced by adopting post-model adjustments to incorporate energy efficiency government policy measures.

These ADMD figures incorporate the demand reduction occurring in the marketplace through changes in customer behavior, supported by changes in technology and regulatory requirements. This includes the fact that the majority of dwellings have to meet the BASIX certificate energy efficiency criteria with regards to efficient housing construction and the installation of energy efficient appliances. As noted previously, Endeavour Energy does not need to support these initiatives as they will be implemented naturally in new development sites through government policy.

It is noted however that the level of demand reduction that has been included in peak demand forecasts reflects the fact that network peak demand typically occurs between 4pm to 8pm where the solar PV energy production is approaching minimum output levels around 5pm. The Company is of the view that peak demand in the residential sector will only marginally decrease until there is a widespread uptake of embedded energy storage capability which will then have an impact on peak demand.

4.0 EMERGING NETWORK NEEDS

4.1 CHANGING ROLE OF THE NETWORK

At present, the configuration of distribution networks is based on the traditional bulk supply to end-use connection topology, which is still recognised as being the predominant feature in the foreseeable future. Notwithstanding this, network functionality is changing to become a neural-network of interconnected supply sources (including bulk supply) and embedded generation (primarily end-use solar PV installations).

The Energy Network Association's (ENA) recent Electricity Networks Transformation Roadmap (2017) has identified this as a key strategic issue facing the electricity supply sector. Endeavour Energy's current Network Strategy has recognised these emerging needs as identified in the ENA report and through our own observations of consumers trends. In light of this we note that ongoing redevelopment of the network will need to be more oriented to modern technology power supply equipment that natively embraces automation and two-way communication.

As customers are added to our network in the manner in which we are experiencing in the North West and South West growth areas of Sydney, new network connections are required. These in turn are required to be supported and integrated to the rest of the network through up-stream network investments, such as the provision of zone substations and associated sub-transmission network. These connections are required simply to facilitate the provision of network-connected energy supply services, which Endeavour Energy sees as its core function. In other words, new customers mean new network, with many distributed energy resources connected to the network providing valuable services to the electricity market.

Further, as noted by the ENA, the investment profile in the new 'future' network will require greater levels of technological enhancement than what has been previously provided. This will require higher levels of investment and greater sophisticated two-way communication with end-use

customers, the provision of facilities to allow customers to interact with each other, and the need to automatically and remotely control the distributed sources of generation and energy storage. Endeavour Energy's Future Grid strategy addresses these changing needs.

Network topology and equipment capacities will need to evolve as part of the ongoing reinvestment in the network to recognise the changing role of the network. This will potentially result in a network design that features higher-capacity at lower levels of the network than what has traditionally been designed. This change reflects the different flow patterns and control requirements necessary to support greater levels of generation and energy supply in the distributed parts of the network. The higher-order levels of the network are expected to increasingly perform a dual role of providing system stability and supply security services as well as shared bulk-supply from the high-level interconnected transmission and sub-transmission systems.

The network configuration and its operations will need to be adaptive to the installation of increased levels of embedded generation, energy storage, and the possible interconnection of micro-grids. This will require enhanced levels of control, network automation and end-to-end two way real-time communications between network control facilities and the end-use customer (whether they be a net generator or net consumer). It is arguable that the real benefits from distributed generation and energy storage can only be economically realised through the aggregating capability of the network.

It is not presently economic for customers with existing solar PV installations to retrofit energy storage mechanisms of sufficient capacity to maximise the benefit of their installations (based on current technology and cost structures). It may be economic however, for bulk energy storage solutions to be implemented at aggregating points in the network, which Endeavour Energy has trialled as an alternative for network investment as a means to efficiently manage demand on the network.

The realisation of the full potential of this technology is dependent on the role of the network at the local level: connecting customers and generators together. It is only through the provision of a robust interconnected distribution network that the overall benefits of local distributed generation and energy storage will be realised. Furthermore, the aggregation of sources of energy supply and energy storage is essential to ensure supply stability and supply security.

In light of this, it is necessary for regulatory regimes to support the implementation of alternate end-use and customer connection technologies as part of the NER requirement to support the uptake of community-based non-network solutions.

4.2 GREENFIELD DEVELOPMENTS

Endeavor Energy's supply area includes two of the most rapidly developing greenfield growth centres in Australia – the North West sector and the South West Sector, as shown in Figure 1. The South West Sector, when complete, will contain 110,000 dwelling with a population of 300,000 people while the North West Sector will have 70,000 dwellings and a population of 200,000. In addition to new dwellings, associated social infrastructure has to be supplied such as new shopping centres, employment precincts, schools, health, rail, water infrastructure and sewage pumping stations.

Figure 1. North West and South West Sectors



Endeavour Energy appreciates the need to investigate and implement DM where appropriate. However, these development sites currently have low levels of demand and rural standard electricity infrastructure. They will grow rapidly over a ten year period and develop into new suburbs that require electricity supply reticulation. Shown below in Figure 2 is a greenfield 'rural' site that was re-developed into residential housing.

Figure 2: Greenfield Residential Re-Development of semi-rural land in the north-west sector



These areas have historically been rural and semi-rural in nature and as such have had little or very low-capacity electricity supply infrastructure. It is not possible for the existing network to supply the scale of development that is occurring. Substantial new urban infrastructure is required which is installed as the development grows. Also, the state government is investing heavily in infrastructure to service these developments which needs to be supported by the electricity supply infrastructure.

Demand Management programs are ineffective in limiting this growth in infrastructure, which is required simply for the number of customer connections required irrespective of the loading presented by each customer. The option of installing micro-grid supply arrangements has been pursued and discussed with developers utilising alternative generation supplies and incorporating demand limiting strategies. At this stage, developers have not been willing to further investigate these opportunities.

As noted above the current regulatory approach to DM incentives is limited to operational responses which have little impact on long-term loading levels and the infrastructure required to be provided to supply this load. However, a more strategic approach to DM that locks in sustained lower levels of

demand per customer will have an impact on the planning and design considerations in deploying the new network.

4.3 BROWNFIELD REDEVELOPMENTS

With the NSW government push for an increase in new housing, there has been an upsurge in in-fill redevelopment close to transport hubs and commercial centers in addition to greenfield development. Endeavour Energy has observed that this usually takes the form of land-use recycling, removing two to three older houses and developing the released land into medium density housing units or high-density apartments. Redevelopment of commercial and disused industrial land into high-density apartment dwellings is also a significant feature of the redevelopment of “old” areas.

This raises several issues affecting network demand and network capacity. The primary driver of growth in network demand is from new network connections. The remaining connected customers in brownfield areas have been experiencing little growth or a decline in demand due to government policy in promoting energy efficiency and micro-embedded generation, and in response to the increasing costs of electricity supply. Every new connection added through redevelopment adds new load to the network at its point of connection (and in the local upstream network) which Endeavour Energy is required to have sufficient capacity network to supply.

Further, the “densification” of older areas adds substantial numbers of new connections, but also removes many opportunities for offsetting the additional load through the uptake of distributed energy resources. Combined solar PV and battery installations may be affected due to the lower equivalent roof area per dwelling and higher-density residential developments having less available space for potential energy storage opportunities.

Given this, demand management programs for these older, redeveloping areas need to be targeted towards demand-response initiatives. This will require more sophisticated levels of automation and integration of customer end-uses with network operational systems. This requires a level of sophistication in the network that is yet to be fully developed, let alone deployed, and requires strong financial incentives to customers to assure participation.

Similarly for greenfield developments, with the regulatory approach to incentivising demand management limited to just the deferral value of the of the network option, the same issues regarding operational and capital expenditure treatment and financial incentives for both the DNSP and the customer apply, as previously noted.

As demand growth in brownfield sites tends to be slower than greenfield sites, demand management is more feasible as opportunities generally exist within the existing customer base and the load growth on the network is more manageable in terms of the time to implement initiatives and recruit participants. In such cases, Endeavour Energy approaches the market for all RIT-D projects in brownfield development areas as part of the evaluation process for supply augmentation to brownfield development areas.

4.4 SOCIAL AND ENVIRONMENTAL ISSUES

Sustainable reductions in the maximum demand drawn from each customer is occurring organically through changes in customer behavior and technology change, encouraged by government policy initiatives, leading to a reduction in the per-unit scale of the infrastructure to supply new land-release developments, as noted above. Therefore, the only other way to further reduce the amount of network infrastructure required to supply new greenfield development is through more extensive

deployment of local energy supply such as embedded generation and/or energy storage as well as time-of-use demand tariff structures which provide appropriate signals to manage demand.

As part of a DM program at Eschol Park in the south-western Sydney growth precinct, Endeavour Energy negotiated and entered into an agreement with an embedded generator proponent for the establishment of a natural gas fired power plant. The plant was located beside the main eastern natural gas pipeline, a railway line and within an industrial area. Large embedded generation power plants such as this would normally contain rotating equipment powered by the burning of fuel. The main areas of concern for the local councils are therefore exhaust emissions and the generation of noise that may affect nearby residential premises.

The financial incentive provided by Endeavour Energy was sufficient to enable the proponent to establish the plant with the provision of peak lopping generation for a five year period. The plant was to operate in the energy market all other times. This proponent was responsible for the development of the plant and all environmental approvals. The local council ultimately rejected the project on environmental grounds due to its proximity to residential housing and the project did not proceed.

Large renewable power plants, such as PV and wind, require a large amount of land to accommodate the equipment as do bulk energy storage plants. All types of large power plants require environmental assessments and approvals, which is the responsibility of the plant proponents. As is evident in the Eschol Park case, obtaining these can prove particularly challenging particularly in greenfield residential development sites if in fact sustainable land can be identified and set aside to accommodate such facilities. With land in Sydney in short supply, it is unlikely that sufficiently large portions can be set aside for such non-network energy supply developments.

5.0 DEMAND MANAGEMENT AND NON-NETWORK SOLUTIONS

5.1 DEFINITION AND RECOGNITION OF DM INITIATIVES

Historically the terms “Demand Management” and “Non-Network” options have been variously interpreted to mean either the same thing or different things, depending on the point of reference from which they are viewed. The National Electricity Rules require that a DNSP investigate non-network options as an alternative to network capital investment to address network capacity or capability limitations, and that these be sought through open consultation processes with the community and non-network energy service providers.

Typically, however, a network service provider will see a solution that does not entail the construction of “poles and wires” in order to meet energy supply requirements or to curtail demand as a “non-network” solution. This means that DNSP’s may view the use of local embedded generation, for example, as a legitimate “non-network” option. If this service is provided by a third party, the Regulator would agree. However, if it is provided by the DNSP itself (as indeed Endeavour Energy has done in some cases), the regulator typically views this as a Standard Control Service of the network.

In other words, the defining feature of whether an alternative energy supply solution or demand management solution is to be classed as “non-network” is whether the investment is made by anyone other than the DNSP.

Based on this, many historical demand management initiatives undertaken within the NSW industry are not deemed to be “Non-Network” programs as they have been treated as part of the Standard Control Services provided by a DNSP. Off-peak hot water load control facilities are a

prime example of this, although this system meets the definition of a demand management program.

The corollary of this is that the Regulator views capital investments to manage demand or provide an alternative to traditional “poles and wires” supply configurations as “network”, and therefore they do not attract regulatory incentive for Demand Management. As the network increasingly becomes a provider of interconnected network services (as opposed to traditional network supply services) this regulatory interpretation may limit the opportunities demand management DM programs to be developed.

The past approach to providing demand management incentives to encourage market or community based non-network solutions has not yielded significant third-party interest. The barriers to entry such as dispersity of the customer base, the need for aggregation, and the need to integrate these with conventional network operations are significant for third-party DM service providers or demand response aggregators. The lack of recognition of the challenges faced by the DNSP in implementing non-network solutions further frustrate these opportunities, arguably to the detriment of providing lowest-cost energy supply services to the community.

The most successful Demand Management programs that Endeavour Energy has implemented have been when the Company itself has directly interacted with customers, as it is in the best position to do this across its broad customer base. This however has only been supported by the regulatory incentive regimes where the costs are not capital but operational, such as in tariff mechanisms, pay-to-reduce demand schemes (load curtailment of demand response initiatives). This includes other financial incentive mechanisms or demand intervention mechanism such as Demand Response Enabled Device (DRED) programs.

To address this, it is proposed in this strategy that network-embedded demand management instruments (such as network automaton initiatives, load control devices, and even network-embedded energy supply technologies) be treated as valid non-network options, and incentivised accordingly. Under current regulatory arrangements, the recovery of the costs associated with such initiatives would be achieved through the capital investment being included in the Regulatory Asset Base, and therefore ultimately funded through Standard Control Service revenue allowances. Endeavour Energy supports this treatment of non-network option Capex but the AER would need to recognise this expenditure as a valid non-network option in terms of the RIT-D evaluation process.

If it can be demonstrated that significant deferral of network supply investments can be achieved through other DNSP-based demand management approaches, benefits sharing schemes should exist to encourage these. Other Opex-based demand management initiatives would also be sought through the regulatory cost recovery mechanisms. This approach will need to be supported by regulatory approval to ensure non-network options can be evaluated equally against network options.

5.2 AGGREGATION AND INCENTIVES

At present, initiatives aimed at identifying and facilitating customer end-use responses are funded from the savings from deferring the capital expenditure of the network investment option. This current approach, whilst allowing the identification of potential technological or financial DM instruments, does not support the development and implementation of broad-based DM programs as these are typically best provided by a DNSP who has natural aggregation capability. As noted above, such initiatives are not necessarily considered as valid DM programs for the purpose of satisfying regulatory requirements even though they have the material benefit of

minimising the amount of network investment required, which is a primary goal of DM. Indeed, current indications are that there is the potential to exclude DNSPs from pursuing such programs. The historical “identify-spend-recover” approach, whilst offering some degree of success with large single customers, only provides limited incentive for programs that require mass participation or broad-based DM programs.

There is a need to support broad-based DM programs to provide more aggregated and “natural” demand responses to pricing signals and to facilitate economies of scale, particularly from solar PV and distribute energy storage. The technology required to enable this needs to be cost effective in its own right in order to make the programs economically self-sufficient and obviate the risk of hidden cross-subsidisation. Endeavour Energy is of the view that real opportunities to reduce long term demand must occur over time and cannot be implemented within 12 to 18 months of the network limitation requiring attention, as currently occurs. This can only be achieved through a broad based program approach, before the limitation actually arises and before the network option is known and costed.

To take full advantage of the DM and non-network supply opportunities being presented by developments in end-use technologies, the network is required to adapt to facilitate a higher degree of technical integration, automation, and sophistication. There is a need to develop new aggregated approaches using present and emerging technologies to directly interface with the consumers equipment that is either driving demand (such as domestic air conditioning) or can be controllable with little end-use impact in order to limit demand (such as pool pumps and other non-critical low-level appliances).

Further, financial incentives to customers need to be sufficient to send the appropriate signals to elicit the necessary demand response, or at least be sufficient to cover the costs of the technology required to automate and integrate the end-use energy supply technology with network operational systems. Under the current regulatory regime however, this expenditure would not be viewed as prudent if deferral investment is not uniquely identified as being attributed to a specific DM program. In other words, historical approaches to incentivising DM have been tactical, whereas future approaches will need to be more strategic, targeting long-term customer energy use trends. Having said this, the challenge is to ensure financial incentives for broad based programs are cost effective to the community and in their long-term interest.

For example, Endeavour Energy is currently implementing a battery storage trial which is expected to run for two years. The information obtained from this trial will hopefully assist in the development of an effective long-term battery storage DM initiative. Whilst the Company has assisted with the cost of installation for the trial (funded from the DM Innovation Allowance), it is unlikely to be in a position to fund widespread programs to install battery storage systems in end-use customer installations without the assistance of significant regulatory incentives. This is partly because the current regulatory framework for Demand Management and non-network solutions prevents us from making a financial offer when the level of demand reduction is unknown, as this most likely would not be viewed as prudent if a clear network investment deferral cannot be identified.

This is an issue that future Demand Management incentive schemes need to address. Financial incentives need to be sufficient to engage participants in the short term for immediate DM responses, and sustained to encourage network service providers to establish longer-term demand response mechanism without fear of having the associated expenditure disallowed by the regulator. The expenditure classification is also an issue to that needs to be addressed in order to appropriately incentivise the distribution company to undertake broad-based DNSP provided DM programs as discussed above.

6.0 STRATEGIC OBJECTIVES

Endeavour Energy's Demand Management and Non-Network Options Strategy is aimed at

- Facilitating the development of integrated energy supply solutions deployed throughout different layers of the network to maximise opportunities for customer generation and demand management;
- Providing a framework to explore the full-range of options from customer demand response through to embedded generation and storage, and grid connected storage and load management technologies; and
- Facilitating broad-based DM programs as a “standard control service” to provide network security and peak-response capability whilst limiting network infrastructure investment requirements.

To be successful, Endeavour Energy is of the view that the following is required:

1. The network needs to be capable of connecting multiple embedded generators and facilitate the communications between these and energy storage and/or aggregation services. The energy services market also needs to be capable of responding to non-network services with a full range of demand management options, and in the absence of a higher level aggregated solution being provided by the market, such as a bulk energy storage facility, Endeavour Energy should be able to attract the same incentives.
2. Endeavour Energy requires the agility to approach the “non-network” energy services market, to obtain and evaluate submissions and have the ability to engage the successful proponent efficiently within the RIT-D process. This requires a more pro-active approach prior to the firm requirement for investment being clearly identified, and will also require the ability to proactively work with developers when establishing new housing estates and be recognised for implementing demand management technology at an early stage. In this regard, present and future customers will need to have the understanding of DM opportunities available to them and be incentivised to participate in demand management programs and be rewarded for doing so with certainty.
3. Recognition that regulatory incentives for DM are limited by being focussed on immediate “operational” (Opex) responses rather than capital investment responses or broader Opex investment initiatives. This is currently an impediment to strategies being developed for more aggregated and network-integrated solutions in recognition of changing future network role and customer interactions. The regulatory incentive framework should therefore provide greater commercial incentives for these services whether they be provided by a third-party energy service provider (such as an energy storage technology provider or aggregator), or whether they be provided by Endeavour Energy itself, and whether or not the DM solution is funded out of Opex or Capex.

Regulatory support in terms of incentives for all of these activities must be available for non-network options to be competitive and cost-effective. This strategy focuses on addressing these issues in order to ensure the adoption and implementation of non-network options. However, the regulatory aspect is considered the most crucial as the financial stream and cost effectiveness of non-network option is heavily dependent on the appropriate regulatory incentives being in place.

6.1 KEY STRATEGIES

The overarching goal of Endeavour Energy's Demand Management and Non-network options strategy is to minimise peak demand that drives network investment, through incentivising customer

behaviour and widespread adoption of alternate energy supply and usage technologies and energy efficient equipment. This will require a multi-dimensional approach that addresses key focus areas concurrently. The key focus areas are:

- The ability of the network to incorporate non-network options;
- Assist the non-network services market to develop and offer the appropriate services that meets Endeavour Energy's needs;
- Endeavour Energy's framework to identify and procure non-network options efficiently and effectively;
- Customer's willingness to respond to initiatives to reduce peak demand including time-of-use tariff demand signals; and
- Influence regulatory approaches to better incentivise Demand Management Responses from customers, and demand management programs offered by DNSPs.

6.1.1 FOCUS AREA 1 – NETWORK ABILITY

As previously discussed, the network configuration and its operations will need to be adaptive to the installation of increased levels of embedded generation, energy storage, and the possible interconnection of micro-grids. This will require enhanced levels of control, network automation and end-to-end two way real-time communications between network control facilities and the end-use customer (whether they be a net generator or net consumer).

The Energy Network Association's (ENA) recent Electricity Networks Transformation Roadmap (2017) has identified this as a key strategic issue facing the electricity supply sector. This is detailed in Figure 3 below. All areas nominated are relevant to this strategy, although some more than others.

Figure 3. Energy Network Association - Transformation Roadmap

Overview of the Electricity Network Transformation Roadmap

	FOUNDATION						IMPLEMENTATION					
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2027+
 CUSTOMER ORIENTED ELECTRICITY	Improve Trust with Customers <ul style="list-style-type: none"> » Enhanced customer engagement and collaboration » Customised choices, better information on services and new connection and advisory services » Demonstrate investment reflects customer value while improving service performance and response times » Review of Consumer Protection and concessions 						Networks provide a service platform <ul style="list-style-type: none"> » Open network platforms embrace diverse customer needs and aspirations » Collaborate with customers and market actors to create new value with streamlined connections » Leverage network information and digital services for personalised innovation in a dynamic market 					
 POWER SYSTEM SECURITY	New systems to support diverse generation <ul style="list-style-type: none"> » Update Transmission Interconnection test » Review frameworks for protection systems, efficient capacity and balancing services » New market frameworks for ancillary services » Develop new power system forecasting and planning approaches to anticipate system constraints » Enhanced intelligence and decision making tools » Close focus on physical & cyber security 						Harmonised System Operations at all levels <ul style="list-style-type: none"> » Transmission networks support system stability with new services. » Distribution networks provide visibility of DER and potentially Frequency Control Ancillary Services (FCAS) and delegated balancing services. » Real-time communication and controls 					
 CARBON ABATEMENT	A stable Carbon Policy for higher targets <ul style="list-style-type: none"> » Develop nationally integrated carbon policy framework » Implement emissions Baseline & Credit Scheme » Set Light Vehicle emissions standard policy to provide incentives for electric vehicle uptake, supporting climate goals » Review Australia's emissions reduction target » Agile network connections and integration of large and small scale renewable technologies 						Reviewing scope for greater efficiency <ul style="list-style-type: none"> » Review technology specific incentive schemes to focus on least cost abatement » Review scope for more efficient economy wide carbon pricing where consensus » Review Australia's emissions reduction target (2027) 					
 INCENTIVES & NETWORK REGULATION	Incentivising efficiency and innovation <ul style="list-style-type: none"> » Ensure extensive smart meter penetration » Assign customers to new range of fairer demand-based network tariffs, with a choice to Opt Out » Enable standalone systems and micro-grids as a substitute for traditional delivery models » New innovation incentives in Regulation and Competition frameworks 						Unlocking value of distributed energy resource orchestration <ul style="list-style-type: none"> » Networks pay for distributed energy resource orchestration to provide system support in the 'right place at right time' » New network tariffs that provide beneficial incentives for standalone systems and micro-grids to stay connected to the grid » New and more adaptive regulatory approaches that are customer focused 					
 INTELLIGENT NETWORKS & MARKETS	Essential information for an integrated grid <ul style="list-style-type: none"> » Establish open standards and protocols to enable secure system operation, management and exchange of information and interoperability with distributed energy resources » Networks enhance current system monitoring and models to inform advanced system planning » Build distributed energy resource maps and feeder hosting analysis to support locational valuation of distributed energy based services 						Networks optimised with distributed energy resources <ul style="list-style-type: none"> » Active network management for technical stability, enabling distributed energy resource markets and efficient optimisation. » Networks provide a suite of grid intelligence and control architectures to animate distributed energy resource markets, as well as providing system security. » Establish a new network optimisation market to procure DER services for network support. » A flexible and agile workforce to support the new optimised energy system. 					

Reference: Electricity Network Transformation Roadmap: Key concepts report, December 2016

The focus of Endeavour's Corporate and Network Strategies is to develop a network that is capable of enabling the above categories to be successfully addressed. Listed below are the main issues in each category.

Customer Orientated Electricity

This category focuses on engaging the customer to participate by informing them of the choices available. The DNSPs obligation in this area is to ensure that the network has the technical capability to facilitate all available and future technologies to be connected and accessible by all market players.

Power System Security

This category focuses on the stability and security of both the high-level subtransmission system and the lower-level distribution network. The DNSP's obligation in this area is to enable market services to be accessible with real-time communications and control capability. The issue of network security (in addition to supply security) is one that will need a particular focus as the network will be accessible to multiple parties.

Carbon Abatement

This category is not addressed as part of this strategy.

Incentives and Network Regulation

This category focuses on ensuring the correct incentives are in place for Endeavour Energy to implement cost-effective non-network strategies and the programs required to ensure future non-network initiatives can be easily implemented. A proactive posture will be adopted to influence the various industry and regulatory bodies regarding the impediments to effective and commercially efficient demand management programs.

Intelligent Network Markets

This category focuses on ensuring the appropriate information is available to prospective participants and customers on the availability of Distributed Energy Resources (DER) and control mechanisms. Information will need to be gathered on the location of DER connections to allow the procurement of market and aggregation services.

This strategic focus area encompasses the changing needs of the network from a one-way flow to a neural-network of interconnected supply sources. A future network will need to adopt a range of solutions that allow for flexibility and changes in customer end-use behaviours including uptake of solar PV, battery storage, and emerging local generation technologies. This strategy identifies the actions required to develop a network that is capable of providing the above services, including the accommodation of micro-grids with supply-side network support.

6.1.2 FOCUS AREA 2 – NON-NETWORK SERVICES MARKET

The non-network services market is still immature. Endeavour Energy's own experience is that it continues to require guidance and information to assist in responding to requests for non-network services. There exist multiple types of DM initiatives and service providers who require different information to formulate their response to a tender. Endeavour Energy has conducted a number of trials evaluating different technologies and equipment to determine the value provided to the network in terms of demand reduction and reliability. This information is provided back to the market to assist any prospective service provider with knowledge on how to develop and tailor their service to provide maximum benefit to the network.

These trials and pilots have been conducted under the Demand Management Innovation Allowance (DMIA). The AER will continue this incentive scheme into the 2019-2024 regulatory control period to encourage innovation and to ensure that learnings from new technologies and innovative services are shared amongst the community.

Where no service providers exist in the provision of the appropriate services Endeavour should be allowed to implement the non-network option itself and have this recognised as a valid non-network option and be appropriately incentivised to do so.

6.1.3 FOCUS AREA 3 – NON-NETWORK SERVICES ENGAGEMENT

The Regulatory Investment Test for Distribution (RIT-D) requires that non-network options be investigated through the issue of a Non-Network Options Report (NNOR) for all RIT-D projects. This investigation is required for all growth related projects and, under a recent Rule change, is also required for all asset replacement projects above the expenditure threshold from September 2017.

The current demand management procurement process is designed to approach the market for a specific product or service. A non-network option may take many forms and contain a diverse range of initiatives. To enable the procurement of a non-network service under the current framework it is

often necessary to approaching the market twice, one with a Request for Information and then for a Request for Proposal. A new process is required to enable the engagement of a successful proponent to a request for non-network services in one step.

The National Electricity Rules (NER) also requires a Demand Side Engagement Register be maintained for all interested parties and that the all parties on the register be informed when a NNOR is release for non-network service. It is intended that the new procurement process allow all registered parties and other interested parties to make a submission with sufficient detail to enable the engagement of the preferred proponent if the non-network option if found to be the preferred option.

The implementation of potential broad-based programs requires a different procurement approach. Dependent on the technology, alliances may be required to roll out technology or equipment to be ready for demand reduction when required or it may involve incentivising the take-up of particular technologies. This will need to be investigated to determine the best approach.

6.1.4 FOCUS AREA 4 – CUSTOMER RESPONSE

Endeavour Energy has been implementing demand management programs since 1998 and has implemented many industrial/commercial area programs. One of the challenges in achieving the target demand reduction is securing sufficient customer participation. Through many customer discussions and negotiations, we have consistently received feedback from potential participants that a payback period of less than two years is required for companies to allocate funding towards a demand reduction or energy efficiency initiatives.

Not surprisingly, the programs that offered higher customer financial incentives for verified demand reduction achieved better results in terms of overall demand reduction. Another observation has been that as electricity prices increased customers become more interested in participating in demand management programs and identifying demand reduction opportunities, particularly load curtailment.

Altering the financial incentive payment for a particular demand management program is not possible as the current regulatory rules stipulate that a network option must be investigated to determine the preferred network option and associated costs in order to determine the avoided distribution cost (ADC). The ADC in turn dictates the customer financial incentive payments.

Industrial and/or commercial demand management programs involve the retention of between 20 and 30 customers onto a program to achieve the required target demand reduction. Residential demand management programs requires the retention of many hundreds, if not thousands, of customers to achieve the same result. This requires a concerted effort and expense, particularly if performed in-house.

Determining the appropriate level of financial incentive or the number of participants is different when investigating a targeted or a broad-based demand management program. Targeted programs are totally based on the ADC for determining the overall budget and the demand reduction target to determine the financial incentive payment. Financial incentive payments for broad-based program are more subjective and require regulatory agreement and acceptance of the methodology.

Another issue is the development of time-of-use tariffs that are acceptable to customers that results in a change of behaviour and a reduction in peak demand. This requires the roll out of smart metering and a tariff structure that enables the customer to reduce costs when energy consumption is shifted from peak periods.

To address these issues, the areas that need to be developed include:

- obtaining regulatory approval for the implementation of broad-based demand management programs;
- obtaining regulatory approval for an acceptable methodology for financing broad-based demand management programs;
- a method of acquiring a large number of participants to a residential demand management program;
- a standardised marketing engagement approach and material for demand management programs; and
- time-of-use demand tariff structures that are acceptable to customers and are willing to adopt and modify behaviour.

6.1.5 FOCUS AREA 5 – REGULATORY SUPPORT

In order to implement components of this strategy regulatory approval and support is required. The areas that require particular attention include;

- Support (in terms of approved Capex) to develop a network capable of delivering the required services to permit two way flow of electricity and third party access to DER's.
- Increased support for conducting trials and pilots to test new technologies to determine the network benefits that services provider may deliver to the network;
- Allow Endeavour to implement non-network services where no service providers can offer the appropriate service and have the expenditure appropriately recognised;
- Have broad-based DM programs recognised and an approved method of determining the appropriate level of expenditure and customer financial incentive levels; and
- Ensure appropriate financial incentive and support is available to Endeavour Energy in order to equally compare non-network and network options.

6.2 COMPANY GOVERNANCE AND RECOGNITION

The approval process for all RIT-D projects involves following the NER requirement for issuing the Draft Project Assessment Report (DPAR) and the Final Project Assessment Report (FPAR) as well internal Gate 2 and 3 approvals. Endeavour must ensure all document include an evaluation of the non-network option investigation that was conducted and its outcomes.

To ensure the appropriate level of investigation is conducted sufficient time needs to be allowed to conduct non-network option reviews and if necessary approach the market for submissions via a Non-Network Options Report representing a Request for Proposal (RFP). All other approval documents need to appropriately reference the outcome of investigation.

6.3 BROAD-BASED DEMAND MANAGEMENT PROGRAMS

There has been much discussion on broad-based DM programs as opposed to targeted area demand management programs within this strategy. It is important to draw the distinction between the two program types to fully appreciate the differences.

All demand management programs implemented by Endeavour Energy to date have been targeted at a specific area, generally a zone substation supply area, to reduce peak demand by a known quantity to remove a known network limitation. The level of expenditure for the preferred network option was known and a financial incentive payment level in terms of \$/kVA or c/kWh was able to be determined based on a fixed deferment period. These are targeted DM programs and are driven by the NER and the RIT-D methodology requirement of first developing feasible network options for an identified network limitation. This approach limits the possibility of feasible non-network and DM

options being developed as the time required to implement program is insufficient (12 to 18 months as noted above).

In contract, a broad-based DM program seeks to commence implementing certain demand reducing technologies and equipment early, before the constrained is within the timeframe that action needs to be taken, specifically, the 5 year regulatory period. The challenge with a broad-based program is the network option is not certain and the cost of the network option is unknown. Also, regulation stipulates that a limitation is identified and any feasible option must be cost effective in terms of maximising the net benefits to all market participants.

For Endeavour Energy to pursue the implementation of broad-based programs they must be cost effective in the long run to customers and the regulator must recognise expenditure and allow the appropriate returns to Endeavour. There is no guarantee that the regulator will allow cost recovery as the AER has rejected broad-base program proposals in the past, in which case, Endeavour will not pursue their implementation.

7.0 STRATEGIC INITIATIVES AND ACTIONS

A number of initiatives and actions need to be developed and applied in order to implement the strategic objectives detailed in section 5.0. Each item is categorised in terms of their implementation being, short term (12 to 18 months), medium term (18 to 36 months) and longer term (36 months onwards). These initiatives are shown in Table 2.

Table 2. Demand Management Strategic Initiatives

Focus Area	Short Term	Medium Term	Longer Term
Network Ability	Identify network upgrades to facilitate DER connections	Investigate network automation requirements	Promote to customers the options for DER's
	Investigate network security enhancements to enable access by multiple parties	Develop system to capture the connections of DER's and other new technologies	Educate customers on the market services available for financial return
	technological enhancement two-way communication with end-use customers		
	Data acquisition and tracking of DER connections to the network		
Non-Network Services Market	Conduct new technology trials to test their ability to support the network	Work with developers to identify central bulk storage opportunities	Investigate opportunities for community based micro grid developments
	Provide the results of the trial to the market.	Enable network access for market services	
Non-Network Services Engagement	Streamline the procurement process for non-network services	Investigate options to procure & roll out broad-based programs or technologies	Work with developers to incorporate broad-based initiatives
Customer Response	Investigate options of engaging customers in residential DM programs	Enable customer access to market services	
	Develop standardised DM program marketing material		
	Develop time-of-use tariff structures and roll out with an opt-out strategy	Seek opportunities to partner with Retailers for price and non-price based localised DM programs	Full market penetration for customers with smart meters.
Regulatory Support	Appropriate incentives required for non-network options	Endeavour's ability to implement DM	
	Network driven DM and its recognition as a valid non-network option	Acceptability of broad-based non-network options	

	Approved Capex for network capability development	Financial incentive for broad-based non-network options	
	Increased support for conducting trials and pilots		

7.1 IMPLEMENTATION, ISSUES AND IMPEDIMENTS

A demand management implementation plan is to be developed to implement the initiatives identified in Table 2. This will be implemented in stages and will remain flexible to change as the need arises. There will be several branches associated with the strategic focus areas listed in Table 2 which will be separately identified in the plan.

There are some potential issues and impediments to the successful implementation of the strategic initiatives identified above, some of which have already been outlined, but are repeated here. Those identified thus far are outlined below, but may not be limited to those listed here.

Regulatory

- The main regulatory environment impediment to cost-effective demand management programs is that expenditure on non-network options is not appropriately recognised in order to equally evaluate and compare network and non-network options. The current rules do not appropriately recognise the long-term nature of network cost avoidance, and favours short-term network expenditure deferral. This tends to lock-out long-term demand response initiatives.

This has been recognised in part in the most recent review of the demand management incentive scheme by the AER. The proposed Demand Management Incentive Scheme allows for a 50% up-lift on the cost of implementing a demand management program, but with a two year lag on cost recovery. The AER believe this will address some of the imbalance between network and non-network options. Endeavour Energy will continue to work with the AER on improving methods regulatory frameworks to address the imbalance.

- Endeavour Energy is of the view that a DNSP should be allowed, if not incentivised, to implement DM programs where no other DM service provider is able or willing to do so, especially following a market-based consultation to identify opportunities has proven unsuccessful. This will require the recognition of investment as satisfying the DM requirements of the RIT-D test, even though it may become a standard Control Service investment.

The proposed Demand Management Scheme does sufficiently recognise that in certain situations the distributor may implement a demand management program in-house but not before approaching the market for non-network services. Endeavour Energy will need to clarify if in-house demand managements program are allowed when identified as being potentially more cost-effective than that provided by external service providers.

Technical

- The low voltage network has generally not been designed for two way flow of electricity and may represent a block to the connection of DER's. There will need to be investment in this level of the network to ensure appropriate connectivity of DER's and other technologies so that the market can fully realise the potential of this technology as market services. This will need to occur over time and funded by the distribution company, which will require recognition as a legitimate driver of investment.
- Associated with this point above are quality-of-supply issues that are already impacting as a result of the increasing penetration of DERs. Issues such as voltage fluctuations,

harmonics from inverters, and the impact on existing power system protection and control facilities may also drive the need for significant re-engineering of the network at the lower levels.

- The need for ongoing coordinated control of DER's embedded deep in the network will require far more sophisticated telecommunications and control systems to effectively manage supply security and reliability of supply. The issue of physical network security also emerges as greater numbers of actors have access to the power system. Security measures will need to be enhanced to maintain system integrity and mitigate the potential risk of malicious disruption of the operation of the energy supply network.

Social and Community Issues

- As a DNSP, Endeavour Energy carries responsibility that the energy supply network in its franchise area meets standards of safety and minimum technical requirements for the benefits of the consumers and society at large. The encouragement of greater uptake of DERs in order to extract DM outcomes raises issues surrounding the maintenance and control of these minimum standards. This is likely to emerge as a risk issue that will need to be addressed. Factors that should be considered are likely to be, but not limited to:
 - Failsafe management of long-term community or private assets;
 - Public safety, risk management, authorisations, and policing;
 - Ensuring that uneconomic cross-subsidies between participants are avoided or minimised;
 - Data acquisition and tracking of DER connection onto the network; and
 - That power quality does not deteriorate as a result of a high penetration of DER installations, as noted above.

Whilst the strategic focus areas overlap and influence each other to an extent, specific action plans are being developed to address each of these initiatives. Central to this is the recognition that the customers themselves have been empowered to manage their own demand through energy efficiency initiatives and the increasing penetration of distributed energy resources (DERs) such as rooftop solar PV generation and battery energy storage. In this context, the opportunities for market-based broad-based non-network solutions are reducing. The role of the network in providing the aggregating capability necessary to fully leverage the capacity of DERs in a coordinated manner will become central to the success of future DM programs. Regulatory recognition and support of this changing environment is central to this future success.

In this context, DM investment plans will be focussed on identifying innovations in this field and establishing proof-of-concept of technological innovations prior to the initiatives forming part of our business-as-usual response to managing the impacts of demand growth.