

ASSET MANAGEMENT

Growth Strategy

Asset Management Division

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1.0 OVERVIEW

1.1 BACKGROUND

Endeavour Energy services some of the fastest growing communities in NSW. NSW Government's priority growth areas within our service area are projected to accommodate 950,000 new residents over the next 30 years as part of the largest coordinated release of greenfield land for residential, commercial and industrial development in the State's history. Our growth areas include the North-West, South-West, Greater Macarthur and West Lake Illawarra Growth Areas and the development of the Western Sydney Priority Growth Area which includes the Western Sydney Airport at Badgerys Creek and surrounding commercial and industrial lands envisaged to form a 'third city' for Sydney. The North West and South West Priority Growth Areas alone are expected to accommodate 500,000 new residents over 30 years.

The above developments, combined with such infrastructure projects as the WestConnex motorway, South West and North West rail links and the associated greenfield and redevelopment growth of the region will continue to require the extension and augmentation of substantial parts of Endeavour Energy's network. This will be required to connect new customers in new areas, support the urbanisation of previously semi-rural areas, the new economic activity of these developing areas, and ensure that we continue to meet customer's requirements for network-connected energy services.

Australia's electricity landscape is changing, and is expected to change further in the coming decades with the increasing use of embedded generation, development and uptake of economically efficient energy storage solution. As an example, today, approximately 12% of Endeavour Energy's customers have solar roof-top installations. The emergence and adoption of electric vehicles as a means of urban transport is also expected to result in transformational change to customer end-use patterns.

As a consequence, the role of the network is expected to change significantly with the increasing prevalence of the 'two-way' energy flow. The role of the traditional grid is evolving to enable customer-driven take up of new services, such as renewable generation, battery storage, electric vehicles and home automation. Notwithstanding these changes, new network connections requires new additional supply infrastructure in areas previously devoid of it, or increases in the capacity and capability of existing infrastructure in older areas that are transforming through urban densification and re-development.

These changes, combined with price signal impacts and energy efficiency improvements mean that customer usage patterns are changing and will continue to change. The energy supply service provided by the network transitioning from a traditional "bulk supply to customer" model to a "connection sharing" model, similar to the way the internet functions.

Nevertheless, medium and long-term forecasts for our supply area continue to indicate stable growth in energy consumption and peak demand, largely fuelled by greenfield development (where limited network currently exists) and organic growth due to infill and old area redevelopment. The widespread use of embedded generation and the emergence of cost-competitive battery storage solutions mitigates some of this growth but not at the rate that new connections occur.

Endeavour Energy has recognised these changes in our network investment planning through using lower per-customer average demand values for future network design, enhanced levels of automation to provide a more agile network, and adopting a higher risk-based approach to identifying the needs for new upstream network investments.

1.2 PURPOSE

Endeavour Energy's purpose is captured in the statement:

“To be of service to our communities by efficiently providing energy supply services to our customers in a way that is safe, reliable and sustainable.”

The Company's corporate strategy is to meet the long-term interests of our customers, shareholders, people and communities by delivering on three key strategic goals:

- Safety – We will deliver safe outcomes for our employees, contractors, our customers and the community;
- Reliability – We will provide an energy supply network and associated services upon which customers can rely, that meets their evolving long-term energy supply needs; and
- Affordability and Sustainability – We will build a thriving, adaptable business by growing long-term value for customers and shareholders through creating and operating an affordable, efficient, adaptive electricity network, and providing related services.

The corporate strategy is enacted through a series of supporting strategies and prioritised areas of focus.

Specifically it provides the direction for the Network Strategy and the achievement of the objectives of this strategy, which are aimed at delivering the desired network outcomes using efficient, “fit-for-purpose” approaches.

The key strategic focus areas of the Network Strategy, enacted through our asset management strategy and plans are:

1. Preparing the network for future grid requirements through the commercially efficient provision of network-connected energy services.
2. Asset management effectiveness, which aims to deliver the required network performance at least cost to customers (i.e. commercial network management); and
3. Efficiency and service delivery, which aims to deliver workforce optimisation productivity improvements.

Endeavour Energy's asset management purpose statement is summarised as “commercial network management”, which captures the organisational goal of sustainable renewal and development of the network balanced with continually increasing efficiency. Endeavour Energy drives its sustainability objective through a strategic approach to asset investment, which integrates and pro-actively coordinates investments driven by growth or renewal. This embodies “needs-based” network investment targeting the development of a network that meets the needs of the future in a commercially efficient way. This philosophy has underpinned its investment programs for several regulatory control periods.

Endeavour Energy's “needs based” investment approach includes, but is not limited to:

- Ensuring electricity infrastructure is developed in line with the whole-of-government approach to coordinated infrastructure planning (roads, rail, water and sewage) for rezoning of new release areas to ensure development in new precincts can proceed in accordance with market requirements;
- Growth investment to meet future electricity demand is enacted on an “in time” rather than “ahead of time” approach;
- Planning standards at the sub-transmission level that employ probabilistic methods to determine when incremental increase in capacity is economically justified and/or required to facilitate network connection of greenfield developments; and
- Asset renewal based on asset need integrated with network growth requirements in order to meet future network needs as these change over time.

In this context, the Company identifies the required asset investments necessary to support key objectives of meeting customer’s network-connected energy services needs. A critical element of this function is investments to support growth in the network.

This strategy has been developed to direct our approach to facilitating growth within our network franchise area and provides the high-level guidance for planning and investment decision making consistent with overall network objectives and, therefore, corporate objectives.

This strategy provides the overall principles and features of our growth planning requirements in order to facilitate the development of planning systems and to guide various implementation plans for servicing growth within our franchise area. It is one of the enabling strategies supporting the asset management capability of the Company.

1.3 SCOPE

1.3.1 Application and Timeframe

This Growth Strategy sets out the strategic objectives, processes and outcomes used to develop plans for servicing growth in Endeavour Energy’s network. It underpins Endeavour Energy’s investment plans to service greenfield and infill development areas across Endeavour Energy’s franchise area. It influences and shapes Endeavour Energy’s proposals to the Australian Energy Regulator’s (AER) regulatory determination process and is required to operate within the bounds set by the determination.

This strategy has been developed to direct the formulation of plans to service growth within the Endeavour Energy franchise area to effectively and efficiently meet customers’ needs and to achieve the strategic objectives of the business as outlined in the Network Strategy.

In this respect, it is applicable to short and long term plans for investments related to shortfalls in network capacity or network capability. Such investments may be manifested in traditional network augmentation works or may take the shape and form of non-network options or investments in new and emerging technology.

It is applicable to the current regulatory control period and the next to FY2024, in line with the Network Strategy. This strategy drives the following plans:

- Area Plans for defined strategic areas;
- Growth Servicing Plan;
- Transmission Network Planning Review (TNPR);

- Distribution Works Program; and
- Demand Management Plan.

1.3.2 Limitations

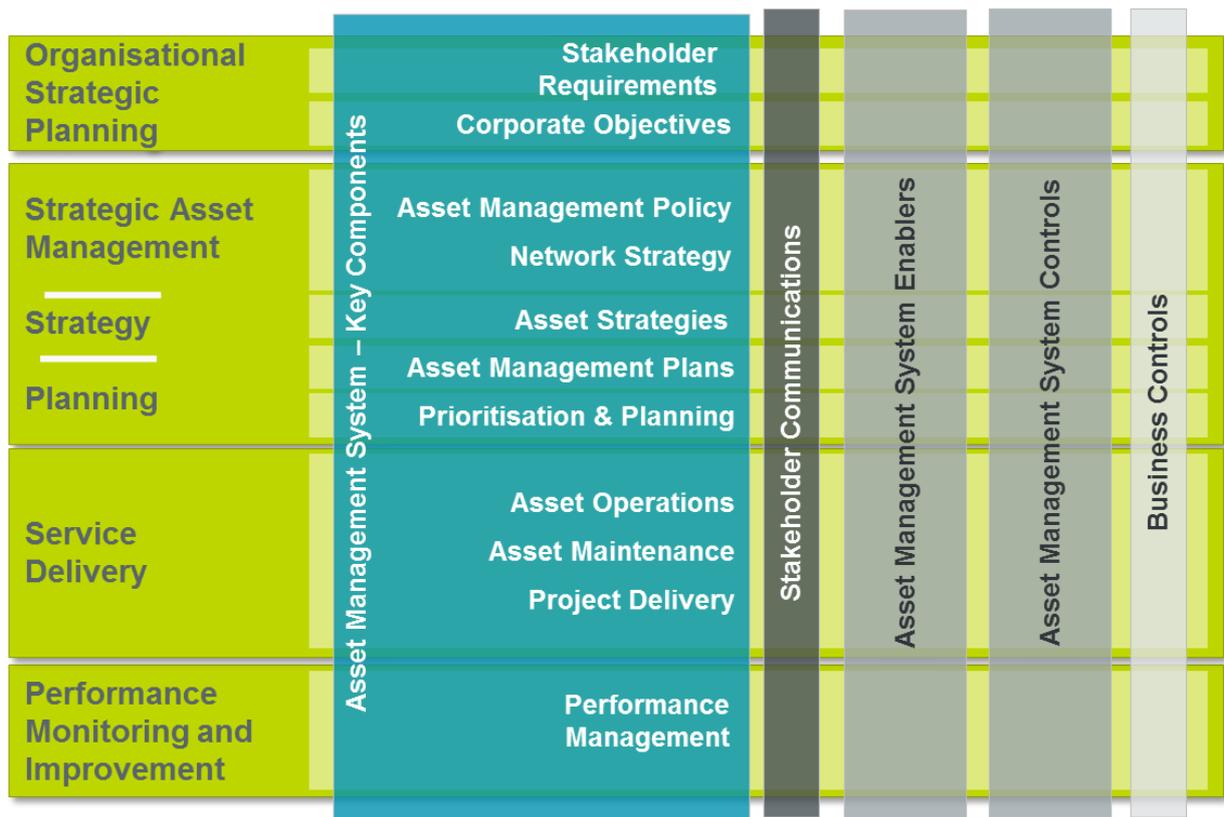
This strategy is not intended to direct the technological solutions that may be required to fulfil the objectives of the strategy – this is left to specific implementation and technology development strategies and plans. It is outcomes focussed, specifically to address network limitations in accordance with the Network Strategy.

In this regard, this strategy is expected to transcend technological evolution in servicing the network and demand growth needs of the business as they may evolve over time.

1.4 STRATEGIC PLANNING CONTEXT

An overview of Endeavour Energy’s asset management framework aligned with the requirements of ISO 55001, which underpins the delivery of our Network Strategy and corporate plans, is given in Figure 1 below.

Figure 1. Endeavour Energy Asset Management System Framework



This strategy serves to link the outcomes of Organisational Strategic Planning with our Network Strategy and strategic asset management requirements for as much as these address the future needs of the network.

2.0 DRIVERS OF GROWTH

2.1 UNDERLYING CHARACTERISTICS OF GROWTH

In spite of the uptake of solar PV installations and improvements in end-use energy efficiency, Endeavour Energy continues to experience the demand impact of relatively high-levels of customer number growth in many parts of its network.

Our network's greenfield development areas includes the North West and South West priority growth areas in Greater Western Sydney which are projected to accommodate 500,000 new residents, the equivalent to two cities the size of Canberra and Wollongong, over the next 30 years. These priority growth areas are the result of the biggest coordinated greenfield land release in the state's history. Additionally, demand growth is created by the development of the Western Sydney Airport at Badgerys Creek and the large surrounding residential, commercial and industrial areas planned to support the Greater Sydney Commission's vision of a 'third city' for Sydney with a potential 100,000 dwellings and 100,000 jobs. There is also growth occurring as part of the Western Sydney Employment Area, Greater Macarthur Priority Growth Area and the West Lake Illawarra Growth Area.

The identified growth has the following features:

- Demand growth in existing established areas is being driven by general economic activity and changes in customer end-use patterns and appliance uptake. This is termed 'organic growth';
- Growth in connections in older areas is due to redevelopment, increased housing density and land re-use due to re-zoning (urbanisation of older industrial and commercial lands);
- There is substantial growth in new connections as new residential precincts are developed. This includes the development of new commercial centres, development of "employment lands" and the provision of supporting social infrastructure all of which adds to growth impacts and demand on network infrastructure; and
- Uptake of new technologies, increased appliance and end-use efficiency and 'demand shapers' such as rooftop solar PV installations and batteries is evident in lower per-unit demand for new connections, both in established areas as well as new greenfield areas, but this is not necessarily offset by the growth in the number of connections.

The above features are factored into the assessments of the impact that this growth is expected to have on the network.

2.2 AFTER DIVERSITY MAXIMUM DEMAND

A key input into demand forecasting is the After Diversity Maximum Demand (ADMD). In particular for greenfield locations the ADMD for new homes applied to the forecast number of new connections is used to develop demand forecasts.

Endeavour Energy has identified and recognised changing consumption trends in its reductions in ADMD values used for network planning and design. The current residential ADMD figures used for zone substation level 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 behaviour, 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.

2.3 DEMAND FORECAST AND NETWORK IMPACT

Overall, the demand growth in greenfield areas and redevelopment areas is forecast to remain strong for the foreseeable future. Recent analysis has shown that greenfield area zone substations show an average annual growth rate of 9% compared with an average 1.5% growth per annum for zone substations in established areas that are experiencing pockets of brownfield development.

Current forecasts of expected summer maximum demands for the forthcoming ten-year period have identified that:

- approximately 1/3rd of Endeavour Energy's zone substations are expected to experience growth rates of greater than 1.5% per annum;
- 1/3rd are expected to experience growth rates of between 0% and 1.5%, per annum; and
- the remaining third expected to experience no growth in demand from present levels.

For those substations forecast to experience no growth in demand, we note that this is more as a result of post model adjustments (PMA) utilised as part of Endeavour Energy's forecasting methodology. These PMAs cater for the anticipated potential impact of rooftop photovoltaic (PV) and other energy efficiency and demand-reducing measures rather than actual recent observations of demand trends. In fact, analysis of this declining group reveals that the majority have shown positive growth in recorded demand in the previous five years, and any actual measured decline has occurred through load transfers or due to a downturn in industrial load.

Given all these factors, we have identified a number of network substation assets that will approach their firm capacity within the next ten years. This includes 10% of our zone substations that are all in greenfield development areas, all of which have high forecast growth rates noted above. Further, some of our major transmission substations and sub-transmission lines that form the backbone of the network are also forecast to reach rating limitations within the 10 year planning horizon, as identified in our annual planning reviews and detailed planning studies.

3.0 GROWTH PLANNING STRATEGIC OBJECTIVES

Elements of Endeavour Energy's asset management plans address the need to provide timely electricity supply to meet development within Sydney's growth areas. However, these plans need to be balanced against community expectations with regard to price and other stakeholder expectations in relation to economic efficiency.

3.1 STRATEGIC OBJECTIVES

This Growth Strategy will govern and direct the formulation of relevant asset management plans to support the AM processes in delivery of the AM objectives of the business. Given

this, the following suite of overarching principles associated will guide the Company's approach to facilitating and addressing growth in new connections and the capability of the network to deal with growth.

- Objective 1:** Ensure the network continues to be affordable for the whole customer base whilst servicing expected growth.
- Objective 2:** Facilitate connections for customers in a timely manner
- Objective 3:** Manage growth in a reliable sustainable manner so that customers receive an acceptable level of reliability and power quality.
- Objective 4:** Leverage the capability of existing network assets including the use of third-party non-network solutions
- Objective 5:** Understand the impact of technological advances on the load and operation of the network. Leverage current and potential future technological advances.
- Objective 6:** Optimise economic net present value taking into account the market benefits of investment. Consider non-network solutions and comply with the Regulatory Investment Tests.

To achieve the above objectives, Endeavour Energy develops plans to enhance and expand its network in accordance with the drivers of the demand on its network. Area Plans are developed for areas that are expected to require significant investment in the future. The purpose of these area plans is to outline an overarching view of the network infrastructure that will be required to service the identified growth area.

In doing so, these area plans:

- Identify anticipated network constraints;
- Identify likely prudent network infrastructure investments need and potential opportunities for non-network options;
- Ensure that investments are made in an orderly manner, timed and linked to the staging of the development being serviced, or the expected reaching of capacity limits in existing infrastructure;
- Ensure that network augmentation and expansion along a pathway that sustainably leads to the ultimate long-term network configuration as outlined;
- ensure that overall objectives of the network strategy are satisfied; and
- minimises the risk of rework investment and the potential stranding of assets

The identification of growth focus areas covered by area plans is based on the following triggers:

- Priority Growth Areas are identified by the NSW Government that require a level of analysis, rendering these growth focus areas in need of network development area plans
- Annual planning reviews of the capacity of the network and its ability to meet forecast demand for electricity and the growth in new customer connections
- Endeavour Energy's ongoing interactions with urban planning bodies and developers, which serve to identify future development needs and development areas.

In NSW, the Electricity Supply Act (1995, as amended) requires that customers fund their own connections to a licenced distribution service provider's network, with the connection

works themselves being contestable. This requires a clear definition of a customer connection asset as opposed to a shared network service asset. Consequently, the cost borne by customers in establishing new housing in greenfield areas can be adversely impacted by this definition, particularly if it is not reflective of actual network usage trends.

Endeavour Energy has recently reviewed its approach to funding the installation of electricity supply connection infrastructure for new housing developments. We have recently worked to

- remove inequities, complexities and inconsistencies associated with the funding and development of the high-voltage underground reticulation in rapidly developing residential areas; and
- remove ambiguities associated with the categorisation of shared network assets and the costs of funding their provision.

This latter issue recognises the changing role of the network in connecting customer to customer to facilitate the sharing of embedded renewable energy supplies such as that from rooftop solar PV installations in new residential subdivisions.

3.2 PLANNING APPROACH

As noted above, Endeavour Energy undertakes ongoing reviews of the capacity of its network and its ability to supply the forecast demand for electricity supply. These reviews identify options where the existing network can be utilised for as much as possible to supply increasing numbers of new connections. Once existing capacity is exhausted a staged approach is taken to servicing growth where it is economic to do so.

Should network enhancement or expansion be required, comprehensive planning processes are initiated to identify the most economically efficient stages of investment in accordance with customer growth, connection requirements and emerging network constraints. Non-network solutions are considered at each stage of investment and implemented if economically viable. The strategic objectives in meeting the growth needs of our network underpin or approach to identifying solutions. If these solutions require network enhancement, this is identified and coordinated through our various growth plans, as noted in the graphic below



Figure 2. Strategic Approach to Growth Planning

Based on the approach outlined above a range of solutions are considered for the treatment of identified emerging capacity constraints, viz;

- **Utilisation of the existing network and minor network extensions**
 - The capacity of the existing infrastructure is optimised through operational changes and minor investments to defer the constraint for as long as is practicable provide initial capacity;
 - Operational plans are developed and implemented in areas with emerging capacity constraints. This is done to pre-condition the network through strategic

reconfiguration to mitigate potential supply risks in forthcoming peak demand periods, typically in preparation for summer periods.

- Capex investment to mitigate supply capacity risks are timed to be implemented when these operational risk-management opportunities are exhausted, thus deferring the capex for as long as is practicable
 - Capacity from adjacent zone substations is utilised wherever possible through the provision of new distribution feeders or the extension of existing ones, assuming it is technically feasible to do so. Whilst this can come at a cost it is generally a low-cost start to the establishment of supplies in new developing areas. Combined, these approaches generally only provide short-term capacity improvements for greenfield areas, but can result in medium term deferral of capacity-related capex requirements in redeveloping areas.
- **Non-network solutions**
 - Endeavour Energy's Demand Management strategy guides our pursuit of non-network options for major augmentation or renewal of the network;
 - Demand Management and non-network solutions are primarily funded cost savings achieved from capex deferral (avoided distribution cost). The AER will introduce a demand management incentive scheme which will provide a financial incentive for successfully implemented demand management programs ;
 - Demand Management initiatives are pursued in accordance with National Electricity Rules to address capacity constraints. Opportunities from the market for the provision of non-network options are sought in accordance with regulatory requirements including applying the full RIT-D process for projects exceeding \$5m. Demand management initiatives are also investigated for non RIT-D projects ;
 - Endeavour Energy is actively pursuing new technological developments such as battery storage, and other options to provide broad-based demand management solutions. For example we are currently investing in battery storage trials at West Dapto (greenfield growth) and Parklea (brownfield growth) to investigate peak lopping potential.
 - **Network augmentation**
 - In higher growth areas or where it is warranted based on the scale of the development, new zone substations and supporting subtransmission network infrastructure may be required once non-network options have been exhausted;
 - Where growth forecasts are lower, temporary substation installations (using relocatable infrastructure) may be deployed to appropriately stage the deployment of upstream supply infrastructure in alignment with the staging of the land development and its uptake.

Invariably a combination of the above approaches are adopted in order to achieve the strategic objectives outlined above. As an example, in recent times the Company has implemented two remote area generation schemes at Colo Heights, north-west of Sydney, and at Bawley Point, south of Ulladulla. These schemes have been successful in effectively reducing the demand on the local network in order to defer the need for augmentation until it is more economically efficient to invest in the local distribution network, and to improve supply reliability for the local areas. Whilst both of these programs are now approaching the economic cross-over point, they have been effective in trading off the need for capex at the expense of opex.

The various coordinated approaches to addressing growth needs are formulated and implemented through the various Growth Servicing Plans that implement this strategy, as outlined in the Section 5.0.

4.0 GROWTH FOCUS AREAS

Collectively, Western Sydney is Australia's third largest economy (behind Sydney CBD and Melbourne). Parramatta itself is the nation's 6th largest CBD with dense urban areas, industrial load as well as significant critical loads such as Westmead Hospital.

In this context, network development Area Plans are developed for areas that the NSW Department of Planning and Environment has identified as Priority Growth Areas in order to ensure supply infrastructure development priorities are strategically with the urban growth plans. These plans provide an overarching view of the ultimate network topology required to service the defined area, with each area typically covering anticipated network development requirements for 30 years or more.

The growth areas identified for which Endeavour Energy has long-term development Area Plans are as follows:

- North West Priority Growth Area;
- South West Priority Growth Area;
- Western Sydney Priority Growth Area;
- Sydney Metro North West Urban Renewal Corridor;
- Greater Macarthur Priority Growth Area;
- Glenfield to Macarthur Urban Renewal Corridor (subset of Macarthur Priority Area); and
- West Lake Illawarra Growth Area

In addition to these strategic growth areas, existing large urban centres within Endeavour Energy's franchise area such as Liverpool, Parramatta and Penrith are experiencing significant brownfield re-development and increases in density, which in themselves attract special planning consideration. Area Plans for these centres are formulated as required when significant investment requirements are foreseen, driven by firm redevelopment plans or observed significant growth trends. Triggers are typically driven changes in planning limits to increase density or building heights, increases in applications for supply connections to new higher-density developments, etc.

An overview of the features of our largest greenfield release areas is provided in the following sections.

4.1 NORTH WEST PRIORITY GROWTH AREA

The North West Priority Growth Area within Endeavour Energy's Northern region is approximately 10,000 hectares of mostly rural land that is progressively being urbanised with greenfield development. It is within the boundaries of three local government areas of The Hills, Blacktown and Hawkesbury, which will ultimately have 90,000 homes and over 500 hectares of commercial and industrial development.

This growth area features existing dense urban areas, new greenfield developments, increased customer density through brownfield redevelopment, as well as a rural fringe which is rapidly experiencing growth and urbanisation. The rural fringe of this supply area contains network that is at risk of poor performance, which can be exacerbated by pockets of new development connected to the existing rural network during development transition periods. Furthermore, the majority of Endeavour's 22kV feeders are located within this supply area, supplying more customers per feeder than 11kV feeders.

4.2 SOUTH WEST PRIORITY GROWTH AREA

The South West Priority Growth Area is approximately 10,000 hectares of mostly rural land that is progressively being urbanised with greenfield development similar to the North West Priority Growth Area. This area is within Endeavour Energy's Central region.

The area is located within the boundaries of the Liverpool, Camden and Campbelltown local government areas. It will ultimately have 132,000 homes and over 450 hectares of employment lands including the new Leppington and Edmondson Park Town Centres.

Whilst it contains established urban and industrial centres of Campbelltown and Liverpool, there are large semi-rural or rural areas undergoing rapid greenfield urbanisation supplied by predominantly new reliable underground network.

4.3 WESTERN SYDNEY PRIORITY GROWTH AREA

The new Western Sydney Priority Growth Area is approximately 10,300 hectares of rural land that encompasses the proposed airport, the Sydney Science Park and Western Sydney Employment Lands extending from Eastern Creek to Austral, Leppington and Bringelly. This area is within Endeavour Energy's Northern region.

4.4 GREATER MACARTHUR PRIORITY GROWTH AREA

Located within Endeavour Energy's Central region is the Greater Macarthur Study area. It consists of approximately 17,600 hectares of mostly rural lands across Campbelltown and Wollondilly local government areas.

Of this area, the NSW Government has identified approximately 7700 hectares of land that can be developed in the short-term and that will become priority growth precincts. Developments at Menangle Park, Mount Gilead, Wilton New Town and the West Appin precincts are expected to establish over 60,000 new homes and 700 hectares of employment lands.

There has also been more recent interest in developing areas south of Mt Gilead that will result in the construction of additional new homes. Collectively this will ultimately create an increase in network demand in excess of 300MVA, or nearly 10% of our current overall peak demand.

4.5 WEST LAKE ILLAWARRA GROWTH AREA

The Illawarra region is a geographically large supply area which contains the major residential and industrial load centre of Wollongong and Port Kembla and the regional residential and holiday towns of Kiama, Culburra Beach, Nowra, Berry and Ulladulla. The northern part of the South Coast is densely populated whereas the southern part is typically a mix of small towns, rural areas and national parks. This area is within Endeavour Energy's Southern region.

The West Lake Illawarra growth area is approximately 5,500 hectares of mostly rural land across Wollongong and Shellharbour local government areas. It will ultimately accommodate an estimated 26,000 residential dwellings and comprise 3.1km² of employment lands. Based on the total number of dwellings and employment lands, the ultimate imposed additional network demand from this development is estimated at approximately 130MVA.

5.0 GROWTH SERVICING PLANS

Area Plans for strategically defined areas are developed to provide an overarching view of the ultimate network topology required to service the defined area. Area Plans would typically cover development of the network for 30 years or more. Large growth areas that require significant investment will generally require a dedicated area plan. Ten-year network development plans across the entire network are documented in the Transmission Network Planning Review which highlights the main development features for precincts covered by Area Plans, and provides an overview of network needs for precincts which do not have a discrete area plan.

The Growth Servicing Plan typically covers a 5-year period encompassing the regulatory determination period and summarises the investment plans for augmentation by geographic area.

Whereas broad based planning is driven by Department of Planning and Environment forecasts, actual infrastructure investments, in particular timing of these are driven largely by applications for connection. Endeavour Energy considers this process necessary to minimise the risk of investing in assets that might become stranded as a result of developments not proceeding.

As a first step Endeavour considers the capability and feasibility of existing nearby assets for supplying initial development in growth areas. This is followed by firming up the timing of any additional major infrastructure required. The trigger for firming up the timing of infrastructure development is confirmed applications for supply from developers.

To minimise risks associated with stranded assets Endeavour Energy generally prefers to undertake development for major network investments concurrently with development as they proceed. This is especially so where some capacity may be available in the adjacent electricity network. Where investments are required before development commences, risk mitigation measures to minimise the risks of stranded investments are undertaken, such as the provision of temporary infrastructure like mobile substations.

Supporting the investment processes, and to ensure that the strategic principles outlined above are adhered to, Endeavour Energy's undertakes regular reviews the capability of its existing network infrastructure and its potential to meet future needs. Through these reviews, future network constraints and supply needs are identified, thereby triggering subsequent aspects of the planning process to identify:

- potential network capacity or network serviceability constraints;
- network and non-network options to address these constraints;
- opportunities to coordinate growth needs with asset renewal needs; and;
- the identification of sound economic future investment requirements.

Key aspects of this planning process are outlined below.

5.1 TRANSMISSION NETWORK PLANNING REVIEW

The Transmission Network Planning Review (TNPR) is produced annually and identifies capacity constraints on Endeavour Energy's 132kV, 66kV and 33kV sub-transmission network. It documents possible future network developments based on the outcomes of annual planning reviews and the identification of forecast network constraints.

The annual Summer and Winter Demand Forecasts provide the basis for the transmission analysis. Specifically, the intent of the TNPR is to identify system constraints that will occur under "System Normal" and "Single Contingency" situations within the ten-year forecast period, and the year in which the constraints are likely to occur. Endeavour Energy has developed processes to apply probabilistic planning when assessing supply security constraints. Deterministic (N-1) criteria are used only as a trigger for investigation.

5.2 DISTRIBUTION WORKS PROGRAM

The Distribution Works Program (DWP) targets the network risks associated with the high voltage distribution network assets and infrastructure.

The high voltage distribution network comprises of 11kV, 12.7kV and 22kV assets and forms the link between zone substations and distribution substations feeding the majority of Endeavour Energy's customers. The distribution network provides a means of connecting customers as well as allowing for flexible switching options for the transfer of load under contingent situations between adjacent high voltage feeders.

The targeted network risk areas are mainly associated with the safety, capacity and capability of the distribution network.

5.3 DEMAND MANAGEMENT STRATEGY

Endeavour Energy is committed to identifying and implementing Demand Management programs for all projects subject to Regulatory Investment Test – Distribution (RIT-D) as required under the National Electricity Rules. Endeavour Energy also investigates non-network options for non RIT-D projects. Historically, this has covered a range of initiatives from pay-to-curtail agreements with major customers in constrained areas, through to the trialling of broader based end-use load management programs. The latter have ranged from incentive payment and tariff structure mechanisms to encourage alternate customer 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 will in future provide more opportunities for cost-effective demand management programs through aggregations services. Customers have taken this initiative upon themselves encourage 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.

Endeavour Energy has responded to this shift by continuing to work with customers to trial more effective Demand Response programs, and to call for market-based solutions, through aggregation services, to identify non-network options for identified RIT-D projects. We have recently revised our Demand Management Strategy in order to recognise the shift in customer usage patterns and behaviours, and to recognise the changing role that the network has to play in meeting customer end-use energy needs. Our future focus on

Demand Management initiatives are likely to be centred on technology-enabled end-use response mechanisms such as that offered by DRED-compliant appliances, as well as financial incentives focussed on mechanism such as time-of-use tariff arrangements.

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

5.4 DISTRIBUTION ANNUAL PLANNING REPORT

The Distribution Annual Planning Report is a requirement of the National Electricity Rules and summarises the above reports into a single report that is made available to the public. It takes into account analysis carried out for the Transmission Network Planning Review, the Distribution Works Program and Demand Management activities. Presented in this report are demand growth forecasts, network performance, identified network constraints, major projects completed, and future projects.

6.0 STRATEGY IMPLEMENTATION

Implementation of this strategy is achieved through the annual network development planning process. The growth servicing plans outlined previously, incorporating non-network and demand management solutions, are reviewed annually to identify specific network investment needs required to service the growth in customer connections. These plans also identify the associated impacts on the various elements of the network because of this customer connection and organic growth. They also serve to identify preferred network investments, optimised and coordinated with other network investment requirements that impact requirement, including asset renewal requirements.

Once a network constraint has been identified as requiring mitigation the required expenditure is allocated with the 10-year investment portfolio plan. Application of the Regulatory Investment Test – Distribution (RIT-D) is central to this should an identified investment be required within the timeframe necessary to mitigate the emerging constraint. This includes the identification and implementation of any non-network options that may serve to defer to the potential investment.

Once a network investment need has been identified as being required at or within its delivery lead-time in order to mitigate the associated constraint or to meet customer connection requirements, specific project implementation plans are developed. The flow from strategy to overview strategic planning, through to the identification of specific needs, and ultimately to the incorporation of any required network investment is a central pillar of this strategic planning framework. Endeavour Energy's investment planning and governance processes ensure that a perpetual planning cycle is undertaken every year in order to effect just-in-time commitment to new network investments in line with the achievement of strategic corporate objectives.

Apart from ensuring that growth driven investments are strategically optimised with renewal driven investment needs, this process results in the development of:

- Annual capital investment plans aligned to long-term plans and the network strategy,
- The 10 year capital investment portfolio, which is revised and updated annually;
- Integration of the investment portfolio with other business requirements