

UE and Local Government Strategic Planning Seminar and Workshop

UE Network Planning
28th January 2015

Agenda

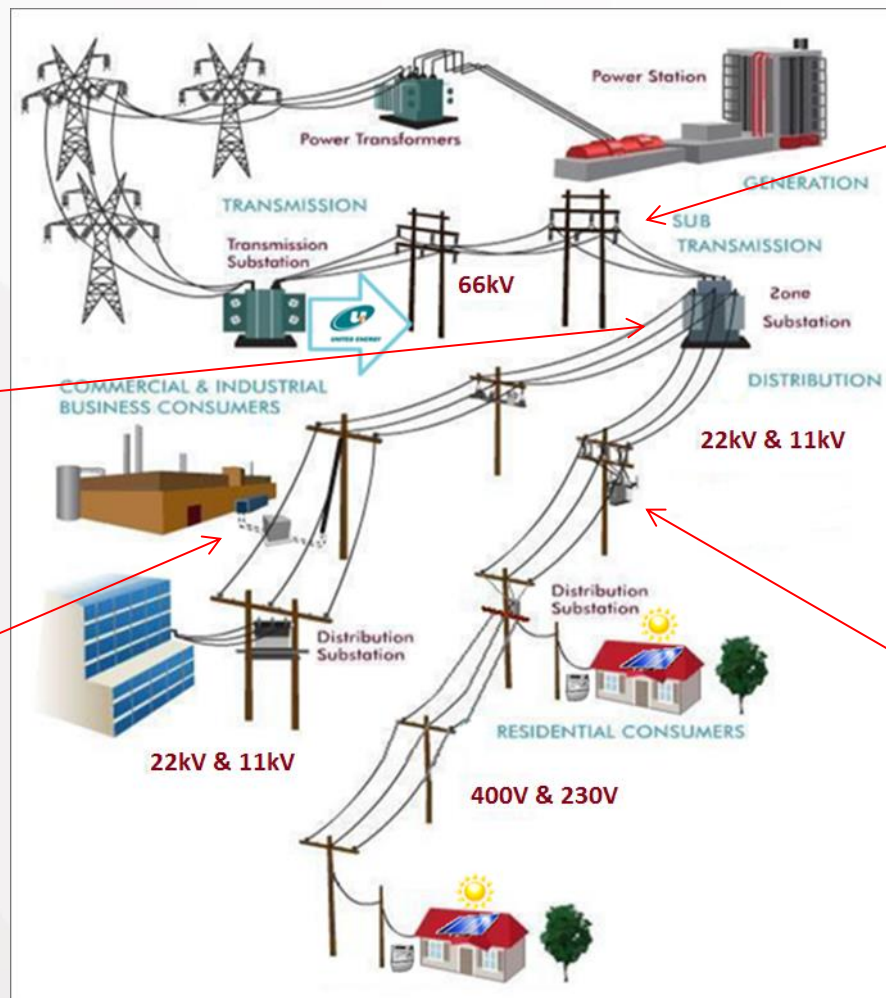
- Overview of UE's electricity distribution network
- Distribution Annual Planning Report
- Electricity peak demand impact and drivers
- Electricity network planning process & the RIT-D
- Our vision for managing peak electricity demand
- Demand management options
- Capital deferral opportunities
- Cross-sector planning opportunities

UE's Distribution Network

Network parameters	Value
Network service area	1472 km ²
Bulk supply points	11
Sub-transmission circuits	78
Zone substations	46
Major power transformers	108
Distribution transformers	12,795
Power poles	214,801
Overhead powerlines	
- Sub-transmission	636 km
- High voltage distribution	3,610 km
- Low voltage distribution	5,898 km
Underground power cables	
- Sub-transmission	12 km
- High voltage distribution	988 km
- Low voltage distribution	1,691 km

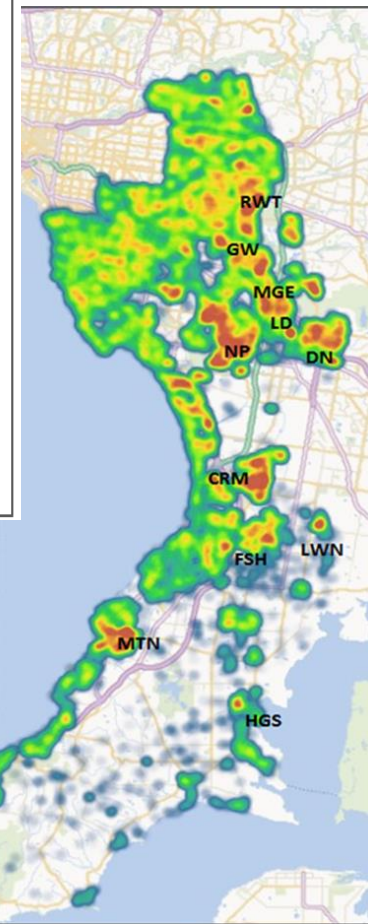
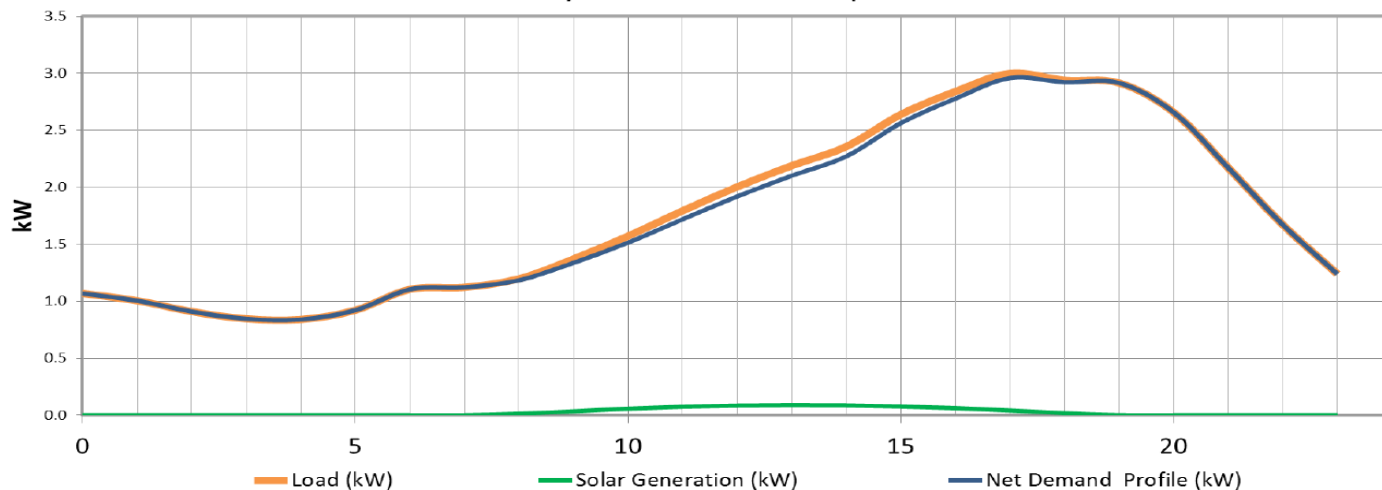


The electricity supply chain



Solar PV & Peak Electricity Demand

Impact of Residential 2.4kW Solar PV on an Average 3kW UE Residential Customer
Summer Peak Day Demand with 6% solar PV penetration across network



Network parameters	Value
Total customers	656,516
Solar PV customers	38,400
Peak coincident demand (2014)	2066 MW
Record peak coincident demand	2084 MW
Solar PV installed capacity	95 MW
Solar PV contribution to peak demand	-20 MW

Distribution Annual Planning Report



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Welcome to United Energy and Multinet Gas

Electricity Current Demand 1113 (MW)

LOW MODERATE HIGH EXTREME

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Search

Network planning reports

Distribution Annual Planning Report

The Distribution Annual Planning Report (DAPR) is prepared in accordance with clause 5.13 of the National Electricity Rules (NER). This DAPR also discharges our obligations under clause 3.5 of the Victorian Electricity Distribution Code (Code) regarding the publication of an annual Distribution System Planning Report (DSPR).

The purpose of this report is to provide an overview of how UE will manage and develop the electricity distribution network over the next five years from 2014-15 to 2018-19.

The DAPR is structured to provide information on:

- Obligations under the distribution planning and expansion framework
- Distribution network, the operating environment, and the number and type of distribution assets
- Asset management approach and annual planning process, methods and assumptions
- Forecasts, including capacity and maximum demand at the sub-transmission, zone substation and high-voltage distribution feeder level
- Present and emerging network limitations including identified preferred network solutions to address those limitations
- Likely network augmentations likely within the planning period are flagged to give interested parties the opportunity to offer alternative proposal to alleviate the limitations. These proposals may include non-network options such as demand management or embedded generation solutions
- Regulatory Investment Test for Distribution (RIT-D) assessments that has been completed or currently underway
- Upcoming RIT-D assessments
- Joint planning and demand management activities
- Recent network performance and improvement initiatives
- Asset replacement/rehabilitation, metering and information technology plans.

To read the 2014 Distribution Annual Planning Report, please [click here](#).

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"Do you want to monitor and assess your electricity consumption?" [CLICK HERE >](#)



Strategy



6.3.1.17 East Malvern zone substation

East Malvern (EM) zone substation consists of two 20/27 MVA 66/11 KV transformers and supplies the suburbs of Alamein, Carnegie, Chadstone and East Malvern.

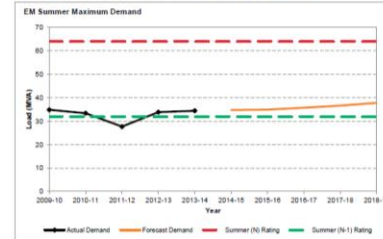
Being a designated Principal Activities Centre, the demand around the Chadstone area is expected to continue to grow steadily over the coming years.

Magnitude, probability and impact of loss of load

EM is a summer-critical zone substation. The actual maximum demand at EM for summer 2013-14 was 34.4 MVA which occurred on 16th January 2014 at approximately 6:15 pm.

The figure below depicts the historical actual maximum demands, 10% PoE summer maximum demand forecast together with the station's summer (N) and (N-1) ratings.

Figure 42 - Forecast maximum demand against station ratings for EM zone substation



The figure above shows that with the exception of 2011-12, the actual maximum demand at EM zone substation has been above its summer (N-1) rating. Given a steady demand growth over the next five years, there would be significant amount of energy-at-risk should a forced transformer outage occur during maximum demand periods.

The bar chart below depicts the expected unserved energy with one transformer out of service for the 10% PoE demand forecast and the hours per year that the 10% PoE demand is expected to exceed the station's summer (N-1) rating. The line graph shows the expected value of unserved energy in each year, for the 10% PoE demand forecast.

Strategy - Distribution Annual Planning Report (DAPR)

Review by: 12/2015

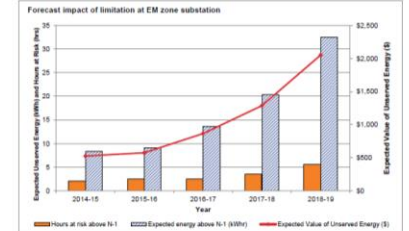
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Strategy



Figure 43 - Annual hours at risk, expected unserved energy and expected value of unserved energy



As shown above, if there is a forced transformer outage during summer maximum demand periods, there will be insufficient capacity at EM zone substation to supply all demand in 2014-15 for about 2 hours.

It is emphasised that the probability of a major outage of a transformer occurring during summer maximum demand periods is very low - about 0.5% per transformer per year with the expected unavailability per transformer per year is about 0.25%. When the energy-at-risk is weighted by this low probability, the expected unserved energy is estimated to be 9 kWh in 2014-15. If no action is taken, this figure is expected to rise to 33 kWh in 2018-19, with the expected value of unserved energy of around \$2,100 (based on a VCR of \$63,000 per MWh).

Presently, there are no 66 kV sub-transmission line circuit breakers at EM zone substation. Therefore, a forced outage of one of the sub-transmission line into EM zone substation would also lead to an outage of one of the EM zone substation transformers. However, the probability of such outage is low and the restoration time is expected to be shorter compared to a transformer outage. Therefore, the magnitude of expected unserved energy would be marginally higher than the values presented in the figure above.

Feasible options for alleviation of limitations

The following options are technically feasible and potentially economic to mitigate the risk of supply interruption and/or to alleviate the emerging limitation.

- Maintain contingency plans to transfer load to adjacent zone substations.

Strategy - Distribution Annual Planning Report (DAPR)

Review by: 12/2015

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- <http://uemg.com.au/about-us/regulatory-framework/electricity-regulation.aspx>

Peak demand impact & drivers

Economy



Population



(Prices)



(Storage)



Electric Vehicles



(Energy Efficiency)



(Solar / Generation)

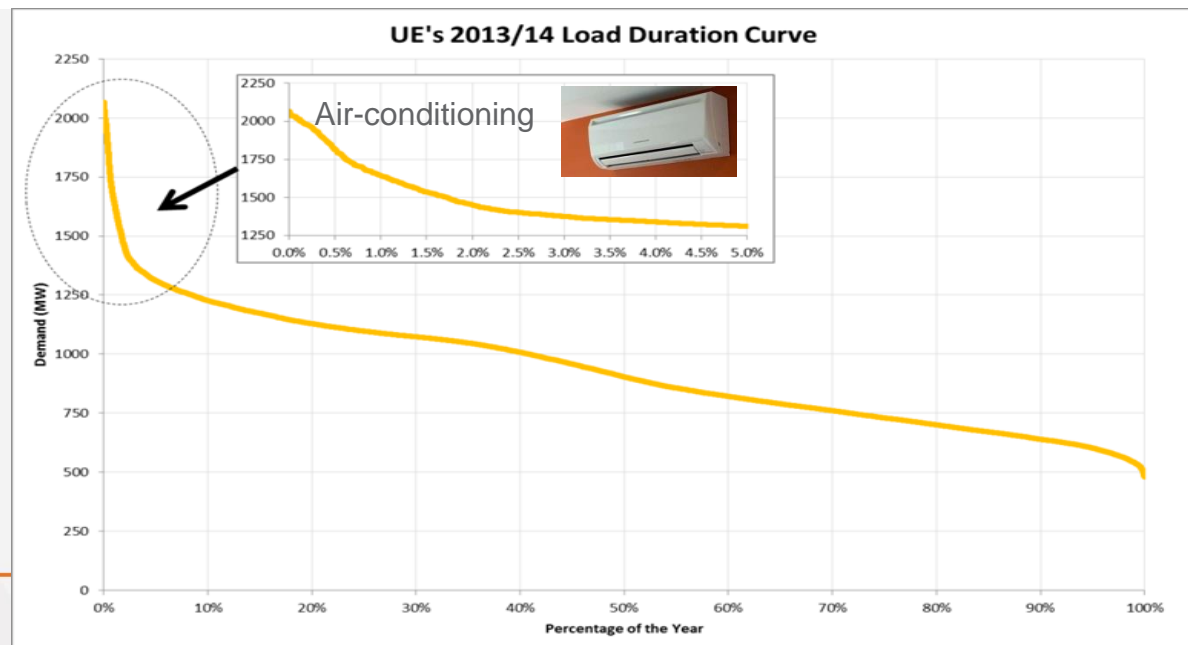
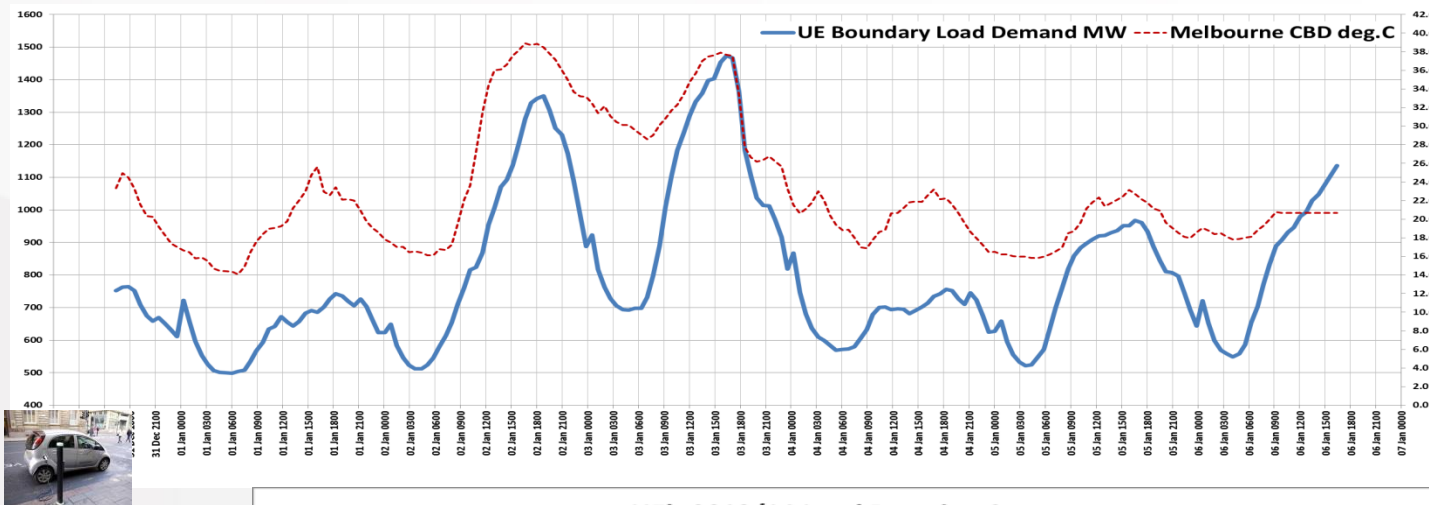


(Demand Management)



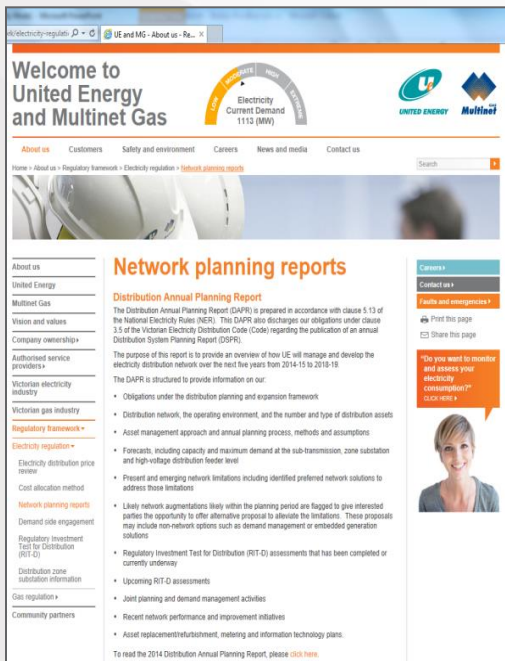
Temperature !!!!

- Extreme heat
- Cooling appliances



Annual network planning process

Peak Demand Forecast & Constraints



Welcome to United Energy and Multinet Gas

Electricity Current Demand 1113 (MW)

Network planning reports

Distribution Annual Planning Report

The Distribution Annual Planning Report (DAPR) is prepared in accordance with clause 5.13 of the National Electricity Rules (NER). This DAPR also discharges our obligations under clause 5.6 of the Victorian Electricity Distribution Code (Code) regarding the publication of an annual Distribution System Planning Report (DSPR).

The purpose of this report is to provide an overview of how UE will manage and develop the electricity distribution network over the next five years from 2014-15 to 2019-18.


The DAPR is structured to provide information on our:

- Obligations under the distribution planning and expansion framework
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To read the 2014 Distribution Annual Planning Report, please [click here](#).

Publish Distribution Planning Report

Identify Network and Non-Network Options



Welcome to United Energy and Multinet Gas

Electricity Current Demand 1142 (MW)

Demand side engagement

As part of encouraging timely and meaningful engagement between United Energy (UE), customers and other stakeholders, we have developed a demand side engagement strategy document. This document will be reviewed and revised at least every three years. The strategy will set out our processes and procedures for assessing non-network options as alternatives to network investment and interacting with non-network providers. We have also established a regular forum for parties interested in being notified of developments relating to distribution network planning and expansion.

Demand side engagement strategy

The Demand Side Engagement document is prepared in accordance with the requirements of clause 5.13.1(a) – (g) of the National Electricity Rules (NER). The purpose of the document is to present our demand side engagement strategy that sets out the process, methodology and procedures for engaging with non-network providers and assessing non-network options as alternatives to network investment. The objectives is to encourage and facilitate the engagement of non-network service providers in our planning process.

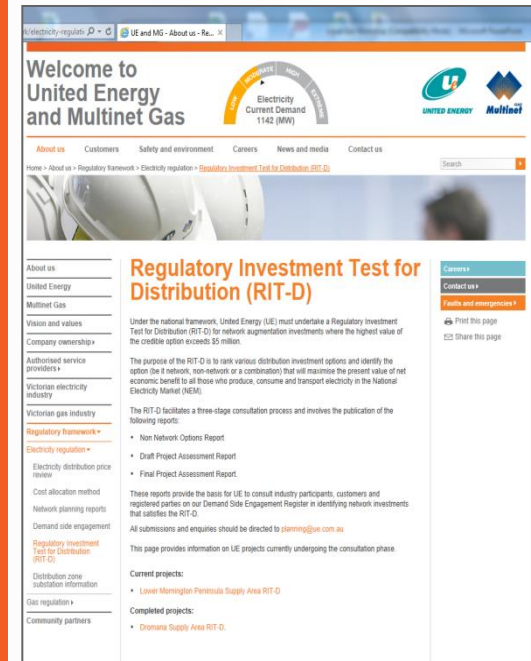
The information included in this document is in accordance with Schedule 5.9 of the NER. More specifically:

- Provides an overview of UE's planning framework and approach to engage non-network service providers for addressing network capacity limitations identified in UE's Distribution Annual Planning Report (DAPR)
- Describes how UE will maintain a Demand Side Engagement Register for parties wishing to be advised of relevant publications and events relating to UE's planning activities
- Provides an outline of technical data requirements expected from non-network service providers when responding to a Regulatory Investment Test for Distribution (RIT-D) consultation, and minimum criteria that non-network options should meet
- Describes the method adopted by UE to assess non-network options and negotiate services proposed by non-network service providers
- Describes the method used to determine the applicable non-network incentive payments.

To read the demand side engagement strategy, please [click here](#).

Public Forum & Joint Planning Activities

Determine Preferred Option (or do nothing)



Welcome to United Energy and Multinet Gas

Electricity Current Demand 1142 (MW)

Regulatory Investment Test for Distribution (RIT-D)

Under the national framework, United Energy (UE) must undertake a Regulatory Investment Test for Distribution (RIT-D) for network augmentation investments where the highest value of the credible option exceeds \$5 million.

The purpose of the RIT-D is to rank various distribution investment options and identify the option (if network, non-network or a combination) that will maximise the present value of net economic benefit to all those who produce, consume and transport electricity in the National Electricity Market (NEM).

The RIT-D facilitates a three-stage consultation process and involves the publication of the following reports:

- Non Network Options Report
- Draft Project Assessment Report
- Final Project Assessment Report

These reports provide the basis for UE to consult industry participants, customers and registered parties on our Demand Side Engagement Register in identifying network investments that satisfies the RIT-D.

All submissions and enquiries should be directed to planning@ue.com.au.

This page provides information on UE projects currently undergoing the consultation phase.

Current projects:

- Lower Warrington Peninsula Supply Area RIT-D

Completed projects:

- Chromeh Supply Area RIT-D

RIT-D Assessment & Consultation




Our vision for managing peak demand

- Develop new demand management capabilities to provide additional / enhanced options for managing peak demand in a sustainable way
- Incorporate non-network options (eg. solar, storage, demand-side management etc.) into our “business-as-usual” network planning process
- Identify economically favourable non-network options compared with more traditional network augmentations
- Demonstrate that our demand management initiatives and non-network options are capable of deferring network augmentation

UE's demand management options

Level	UE Demand Management Capability	Current	Emerging	Future
Customer / Precinct Level	Smarter Tariffs	UE BAU CAPEX / OPEX FUNDING	DMIS FUNDING OPPORTUNITIES	OTHER FUNDING SOURCES
	Direct Load Control			
	Customer Demand Response			
	Distributed Generation (eg Solar) / Storage			
	Smart Appliances			
	Supply Capacity Limiting (via smart-meter)			
Network Level	Network Solar / Storage	✓	✓	✓
	LV Conservation Voltage Reduction			
	Network Support by Generators & Demand Aggregators			
	Reactive Power Compensation			
	Probabilistic Planned Network Augmentations			
Traditional	Remote Controlled Switching	✓		
	HV Voltage Reduction			
	Voluntary Customer Load Reductions			
	Spare Equipment Stock			
	Standby Emergency Generation			
	Load Shedding			

Example Initiative – Summer Saver Trial



Keep your cool and earn rewards this summer...

Join United Energy's Summer Saver Trial

Help to ease the pressure on the energy network when we experience extreme temperatures.

Play your part
This year United Energy is trialling a new program called the Summer Saver Trial to help ease the pressure on the network.
Customers who sign up to the Summer Saver Trial will be rewarded with \$25 for each 'event day' where they have reduced consumption.

Beat the heat
Reducing your electricity consumption could be as easy as:
- Setting the temperature on your air conditioner a few degrees higher or reducing the fan speed
- Turning off pool pumps
- Limiting television use
- Limiting the opening of external doors and fridges
- Not using clothes dryers, washing machines or dishwashers

On days hotter than 35° power usage increases by 60%

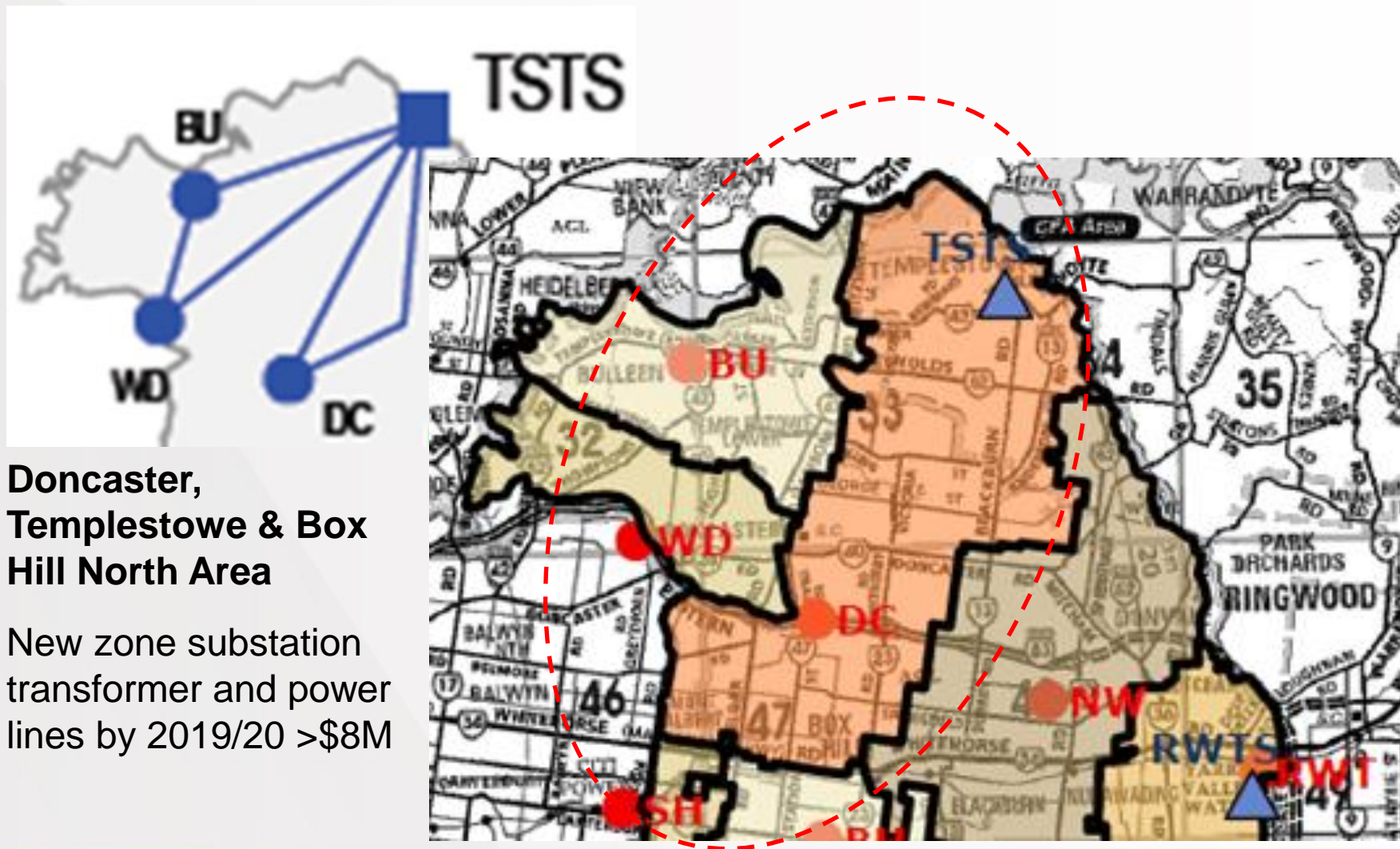
For full details and to sign up please visit ue.com.au/summersavertrial
Or for further information call 1300 131 689 (8am – 6pm Mon to Fri)

- A customer demand response initiative
- Bulleen and Templestowe are targeted as well as a number of critical local street locations throughout our whole network
- <http://uemg.com.au/summer-saver-trial-eligible-areas.aspx>

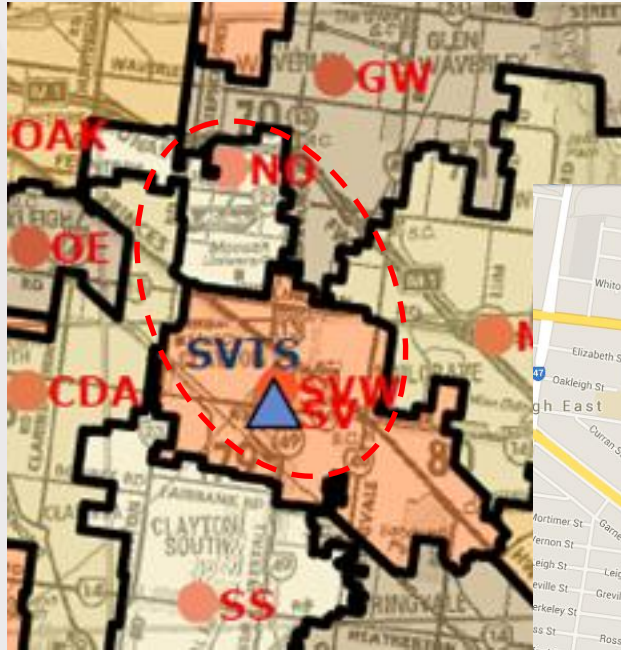
Network augmentation deferral opportunities

- 4 major network constraints over the next 5 years:
 - *Doncaster, Templestowe & Box Hill North Area*
 - *Notting Hill & Clayton North Area*
 - *Carrum Downs & Skye Area*
 - *Lower Mornington Peninsula Area*
- Many more localised (street-level) constraints
- All of these will trigger a network augmentation
- Looking to explore non-network alternatives (different options are likely for different constraints)

Network deferral opportunities (Far North)

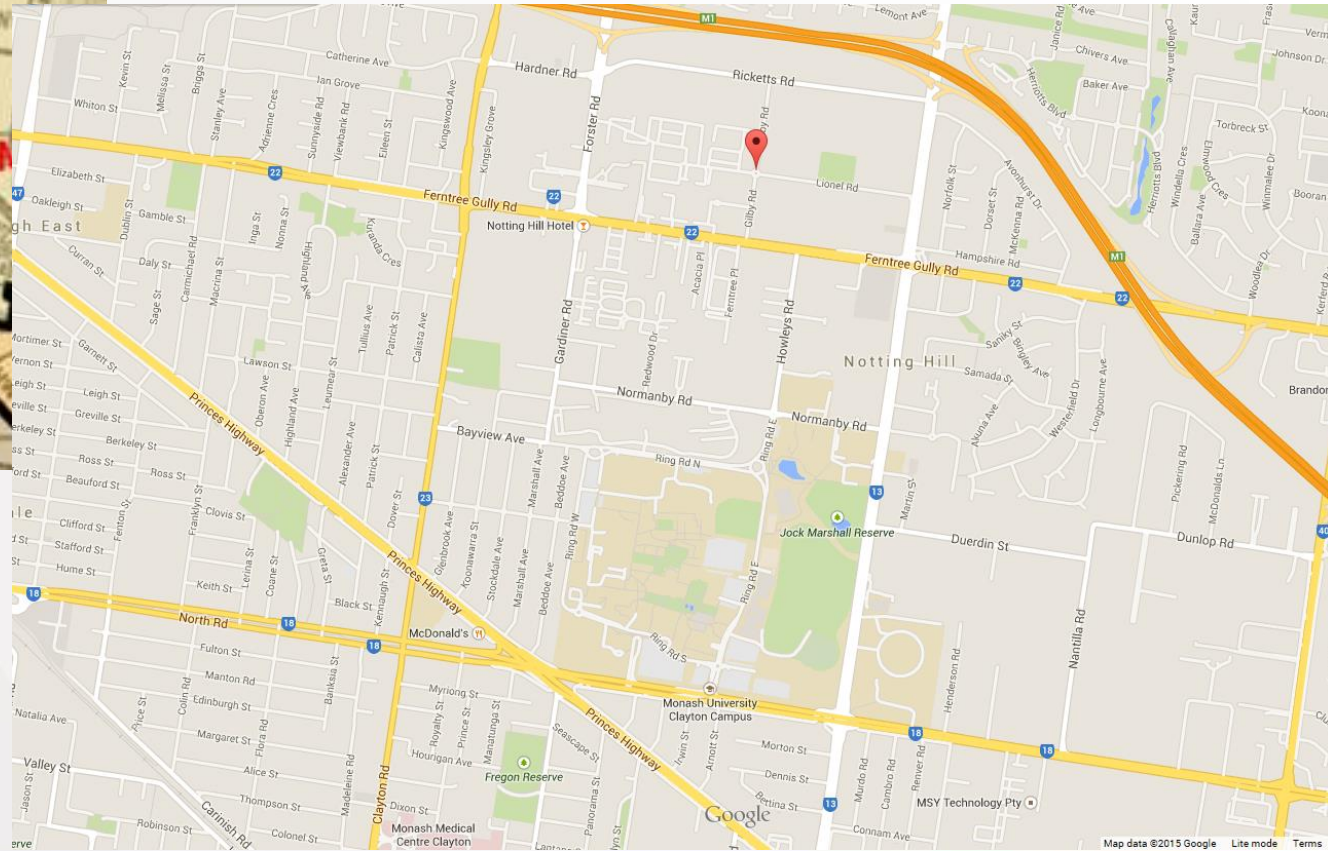


Network deferral opportunities (North)

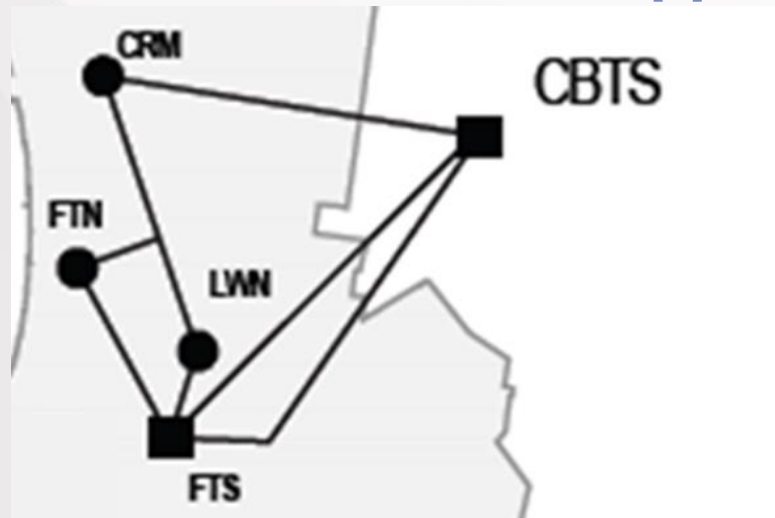


Notting Hill, Clayton North Area

New zone substation
transformer by 2017/18
~\$6M

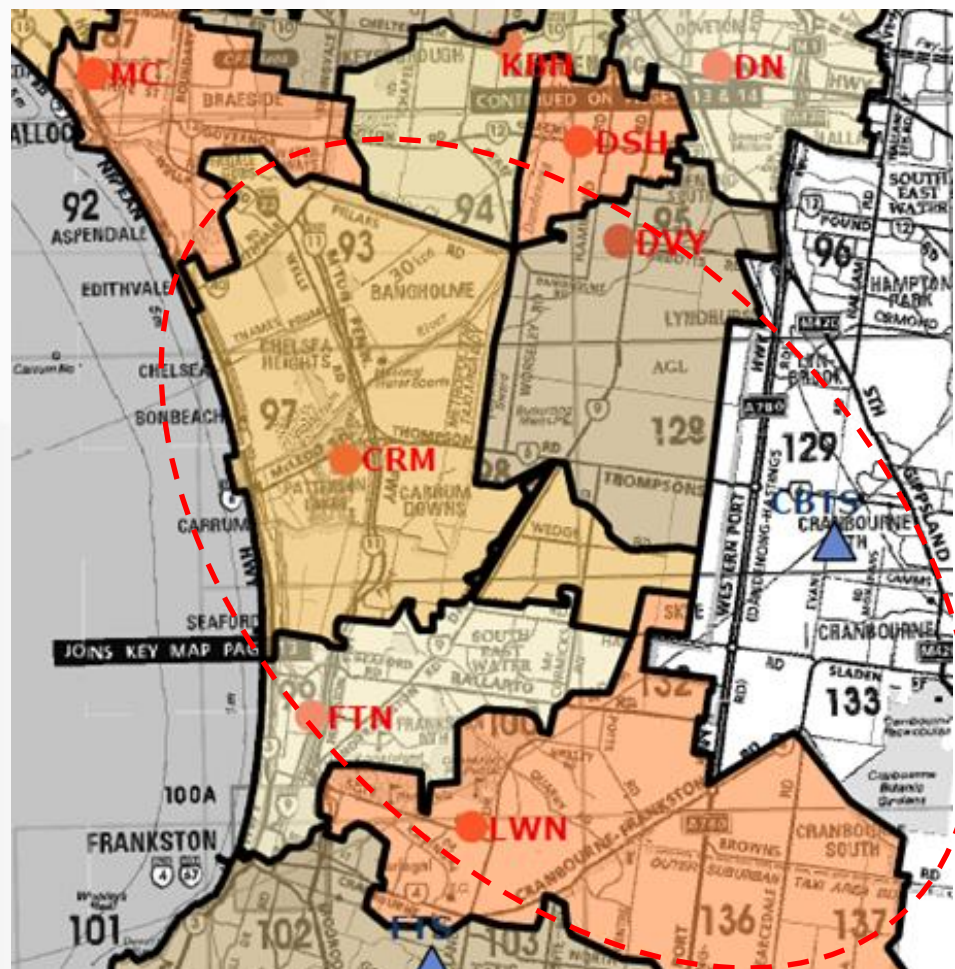


Network deferral opportunities (Central)

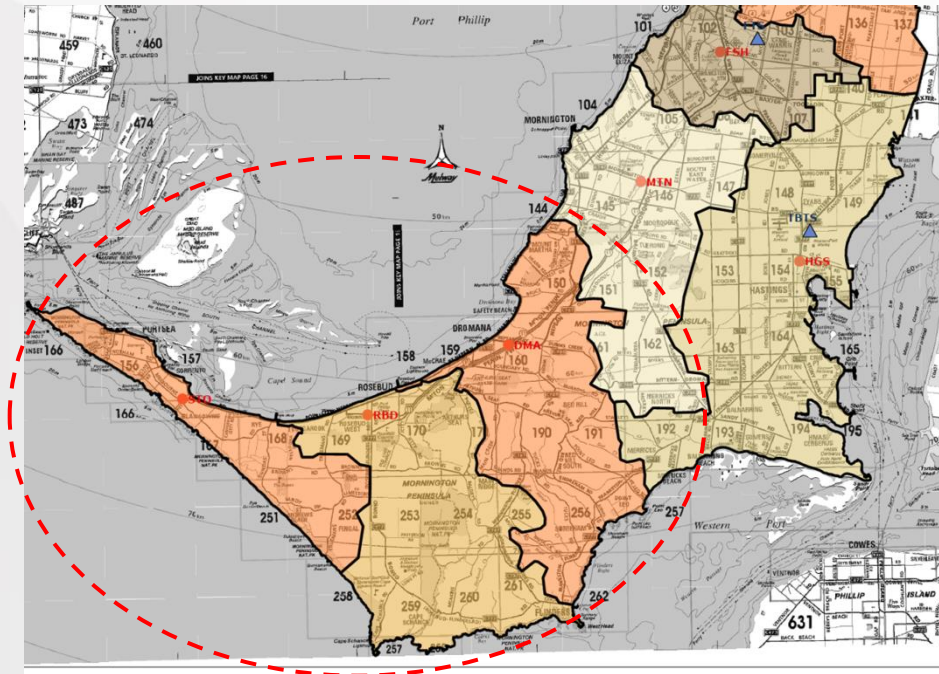


Carrum Downs, Skye Area

New zone substation site,
transformer and power lines
by 2020/21 ~\$26M

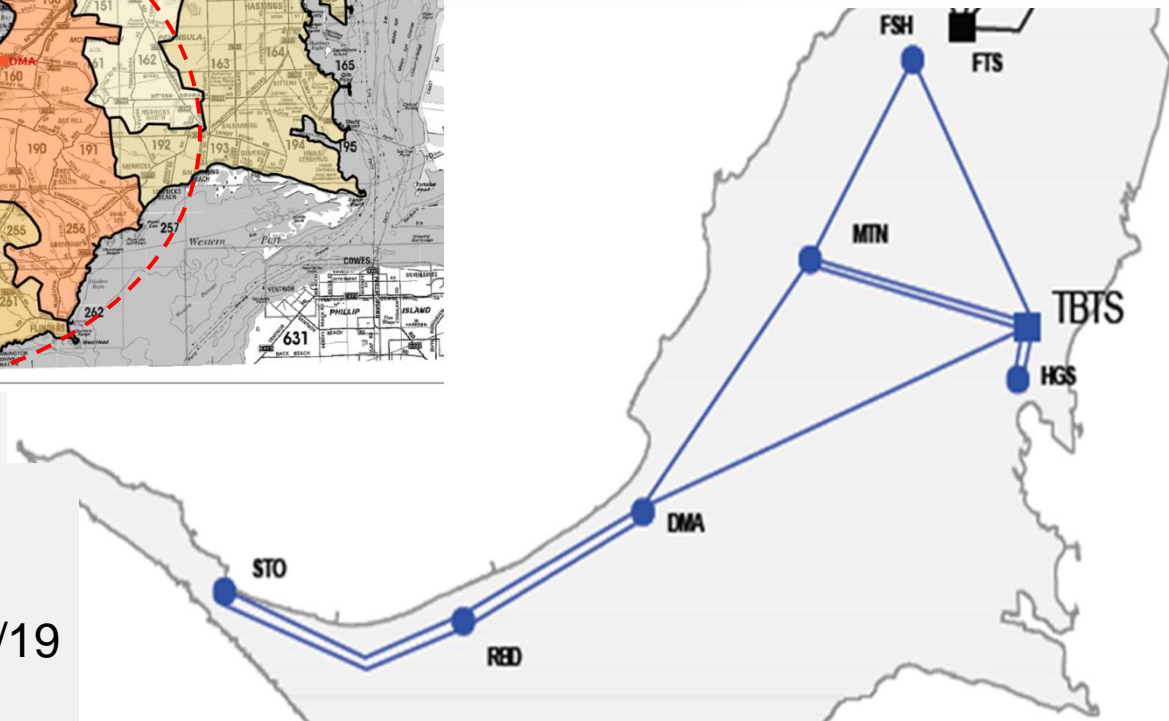


Network deferral opportunities (South)



Lower Mornington Peninsula Area

New power line by 2018/19
~ \$25M



Cross-sector planning opportunities

- Identify areas of development with timing to improve accuracy of demand forecasting (activity session to follow)
- Facilitate promotion of our '*Summer Saver*' customer demand response initiative and align with local government sustainability programmes
- Joint planning to develop up a council-driven non-network solution (eg. District Energy Services Scheme) with DMIS funding from UE
- Facilitate planning approvals and identifying suitable land for both network and non-network solutions (e.g. distributed embedded generation)

Cross-sector planning opportunities

- Facilitate non-network initiatives when approached by third-party organisations specialising in demand aggregation and community generation schemes
- UE currently has joint planning MoUs with the following organisations (and seeking more!!)



GREENSYNC



RepositPower



MANNINGHAM



aggreko



Jemena



AusNet
services



CITIPOWER



Powercor
AUSTRALIA



AEMO
AUSTRALIAN ENERGY MARKET OPERATOR