

Powerline Bushfire Safety Committee

September 2018

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Agenda



▶ REFCL

1. Tranche 1A commissioning
2. Technical issues update
3. Harmonics are a challenge
4. Program status
5. Tranche 1 roadmap
6. Tranche 1 exemption applications
7. Tranche 2 roadmap
8. Tranche 2 exemption application
9. REFCLs in service for the 2018/19 summer
10. Operating modes policy
11. ESC Review of voltage standards

▶ Other bushfire mitigation programs

12. ACR Program
13. Powerline Replacement

1. Tranche 1A commissioning

Woori Yallock, Barnawartha and Rubicon A



› **Woori Yallock (WYK)**

- Network capacitive balancing was completed in June 2018
- Following the release of new software in early July 2018 to address the technical issues identified in late May/early June 2018, offline and online testing was performed in preparation for compliance testing during the last two weeks of August 2018
- Due to the identification of new technical issues (refer to the following slide), no compliance testing was undertaken at WYK in August 2018 with the allocated two weeks being spent investigating the issues with Swedish Neutral resources on site. This included trials of alternate current transformers (CTs)
- The presence of harmonics on the WYK network has been found to be a significant impediment to achieving compliance (refer to later slide)
- Compliance testing at WYK is now scheduled for February 2019

› **Barnawartha (BWA)**

- Customer isolation substation works are progressing at Woolworths and Uncle Toby's
- Both sites are scheduled to be ready for compliance testing to commence in mid-November 2018

› **Rubicon A (RUBA)**

- Compliance testing was attempted during the first two weeks of August 2018
- Results overall were encouraging for achieving the required capacity, with voltage collapse, fault detection sensitivity and I_{2t} values being met for variety of tests including both high and low impedance examples
- GFN software and CT issues prevented compliance being achieved (more details are on the following slide)
- Compliance testing is now planned for March 2019 after HV customer works are complete

› **Myrtleford (MYT) and Kinglake (KLK) are scheduled to be compliant ahead of WYK and RUBA**

Key Point: Ongoing technical issues have prevented achievement of compliance at any substation to date. The overall schedule has lost 6 weeks since the June 2018 PBSC meeting.

2. Technical issues update



- ▶ **During primary earth fault testing at Woori Yallock (WYK) and Rubicon A (RUBA) during August 2018, the following issues have arisen:**
 - › Arc Suppression Coil tuning was inconsistent in some circumstances at RUBA
 - › Unreliable identification of faulty feeder at WYK, believed to be due to limitations of existing current transformers (CTs)
 - › Harmonics preventing achievement of required capacity at Woori Yallock (refer to following slide)
 - › GFN software issues and lack of detailed instructions relating to the latest firmware upgrade, resulted in the inverter tripping and hence failed tests
- ▶ **Some of the issues will be challenging to resolve in the time available**
 - › AusNet Services will be making exemption applications related to harmonics and measurement device performance issues as it may not be possible to address these issues in the time between now and the Tranche 1 compliance date.
 - These are anticipated to be a time-bound exemption i.e. temporary technical exemptions to allow further R&D in parallel with operating REFCL's at a lower sensitivity.

GFN Technical Issues Update

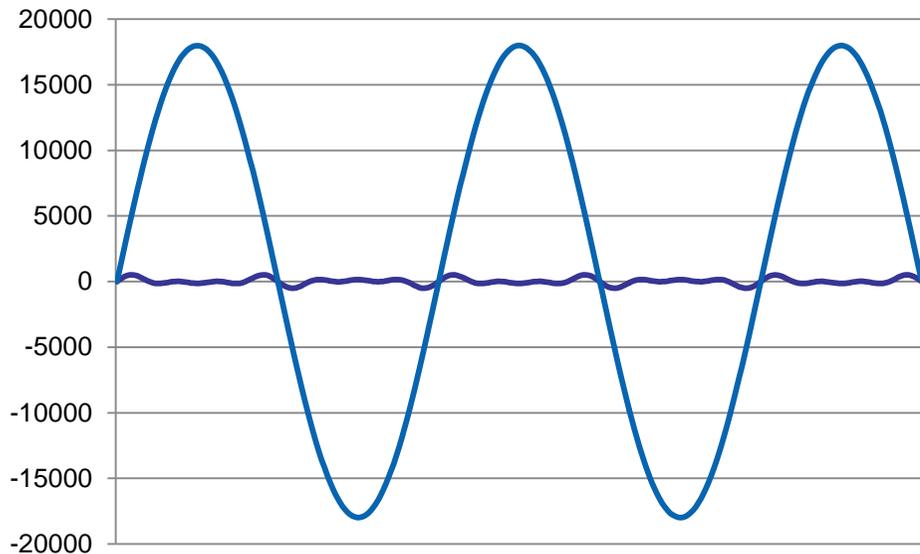
- › **Majority of technical issues identified in May/June 2018 are resolved:**
 - **No more hardware failures**
 - **Software bugs:**
 - A number of previously identified issues have been resolved or have acceptable work-arounds
 - Some new issues have been identified and being worked on jointly with Swedish Neutral
 - **GFN Human Machine Interface bugs**
 - Whilst a number of issues have been resolved, there are still issues to outstanding

Key Points:

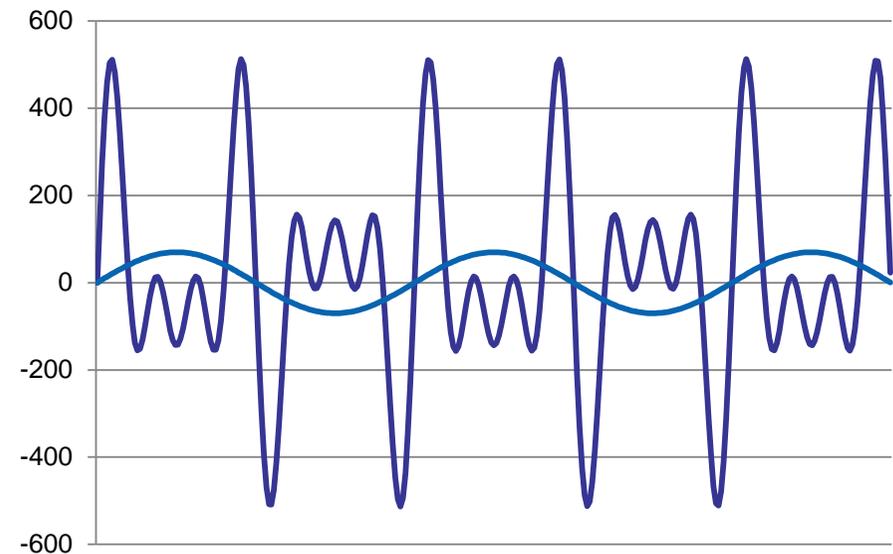
- GFN technical issues are being progressively resolved however several issues remain
- Strict compliance to the Regulations is going to be challenging at some sites due to harmonics and current transformer limitations

3. Harmonics are a challenge

Normal Operations



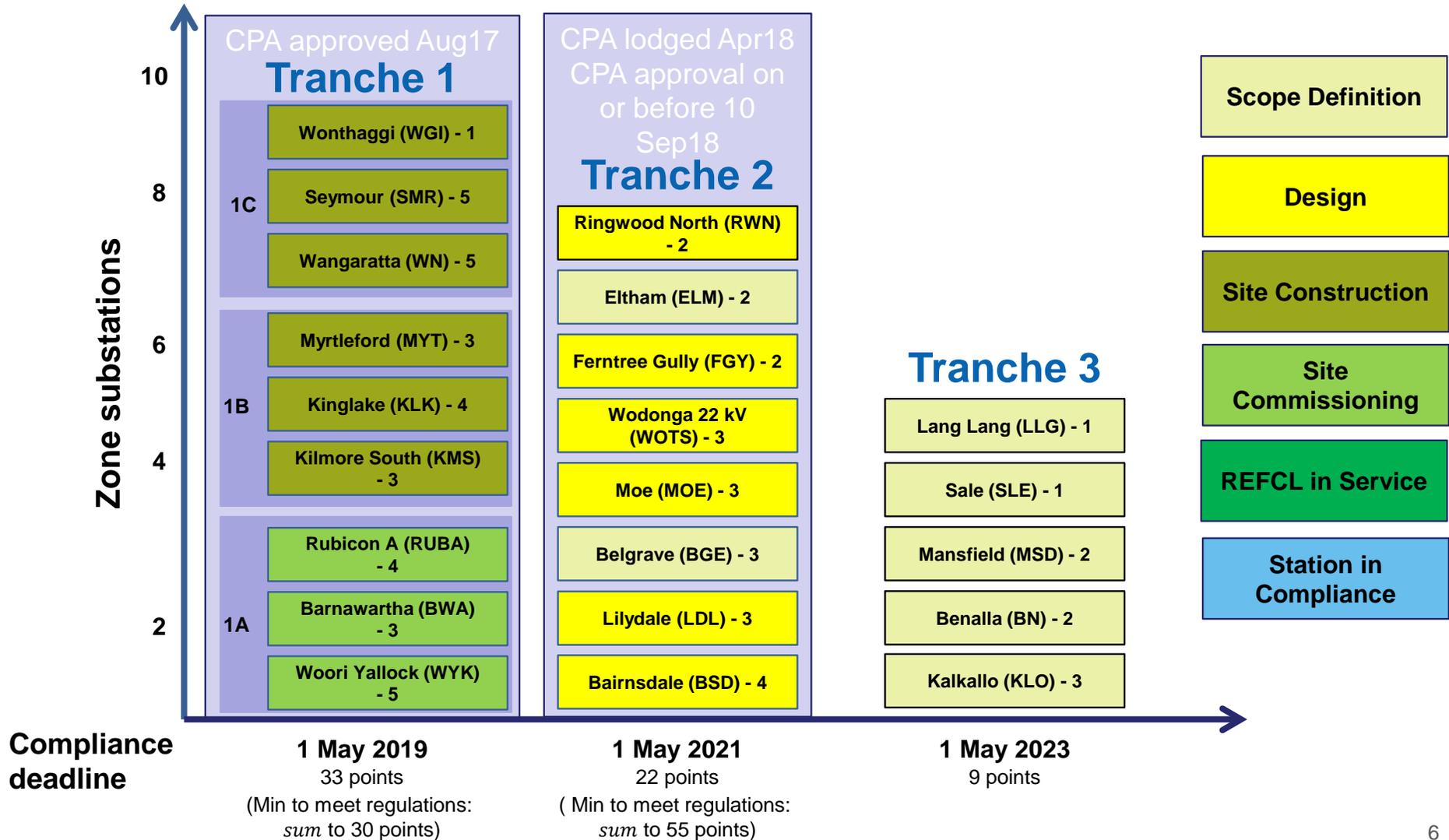
REFCL Compensating



- › Harmonics on our networks are typically 1.5% to 2%
- › In the example, Total Harmonic Distortion (THD) = 1.8%
- › In the example, total RMS voltage is 270V versus target of 250V
- › Electricity Distribution Code has THD limit of 3% which equates to 380V RMS – whereas voltage target in Regulations is 250V!
- › Harmonics at KMS during trials were only 0.2% THD

Key Point: Harmonics will prevent compliance being achieved at some sites and will require an exemption

4. Program status



6. Tranche 1 exemption applications



- ▶ Six exemptions are currently with the Department who are preparing a recommendation to the Energy Minister for approval of the exemptions
- ▶ Puckapunyal exemption re-submitted following feedback from ESV:
 - › Defence has indicated willingness to treat remaining bare-wire assets on customer side of isolating transformer
- ▶ Exemptions for harmonics and current transformer performance issues to be submitted on site by site basis with the first for WYK to be submitted by end September 2018

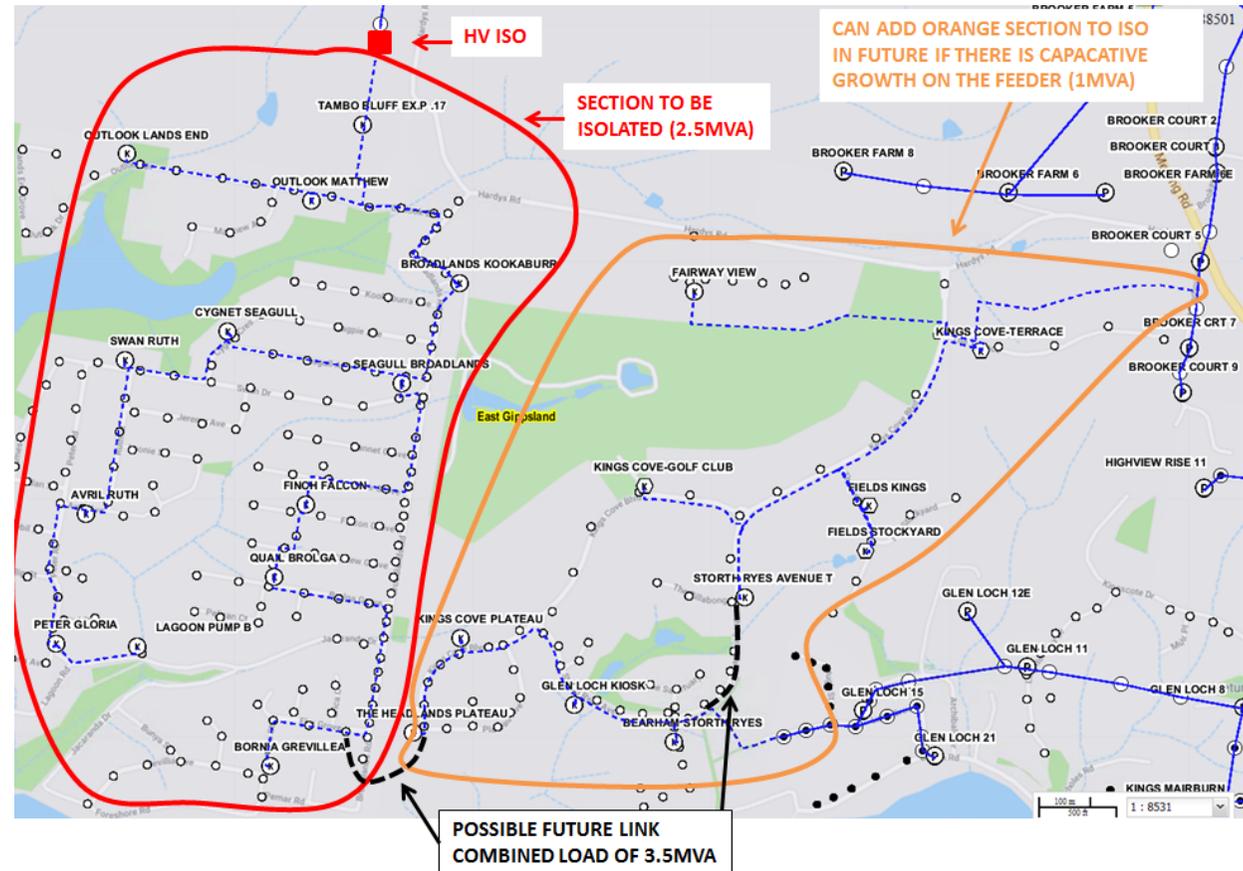


ZSS	HV Customer	Date submitted / re-submitted to ESV	Approval status
BWA	Woolworths	29 May 2018	Application with DELWP
BWA	Uncle Tobys	29 May 2018	Application with DELWP
RUBA	Pacific Hydro, Eildon Pondage	29 May 2018	Application with DELWP
WN	Pacific Hydro, William Hovell	29 May 2018	Application with DELWP
WN	Australian Textiles Mills	29 May 2018	Application with DELWP
SMR	Australian Defence Force, Puckapunyal	2 August 2018	Application with ESV
WGI	Wonthaggi Wind Farm	29 May 2018	Application with DELWP

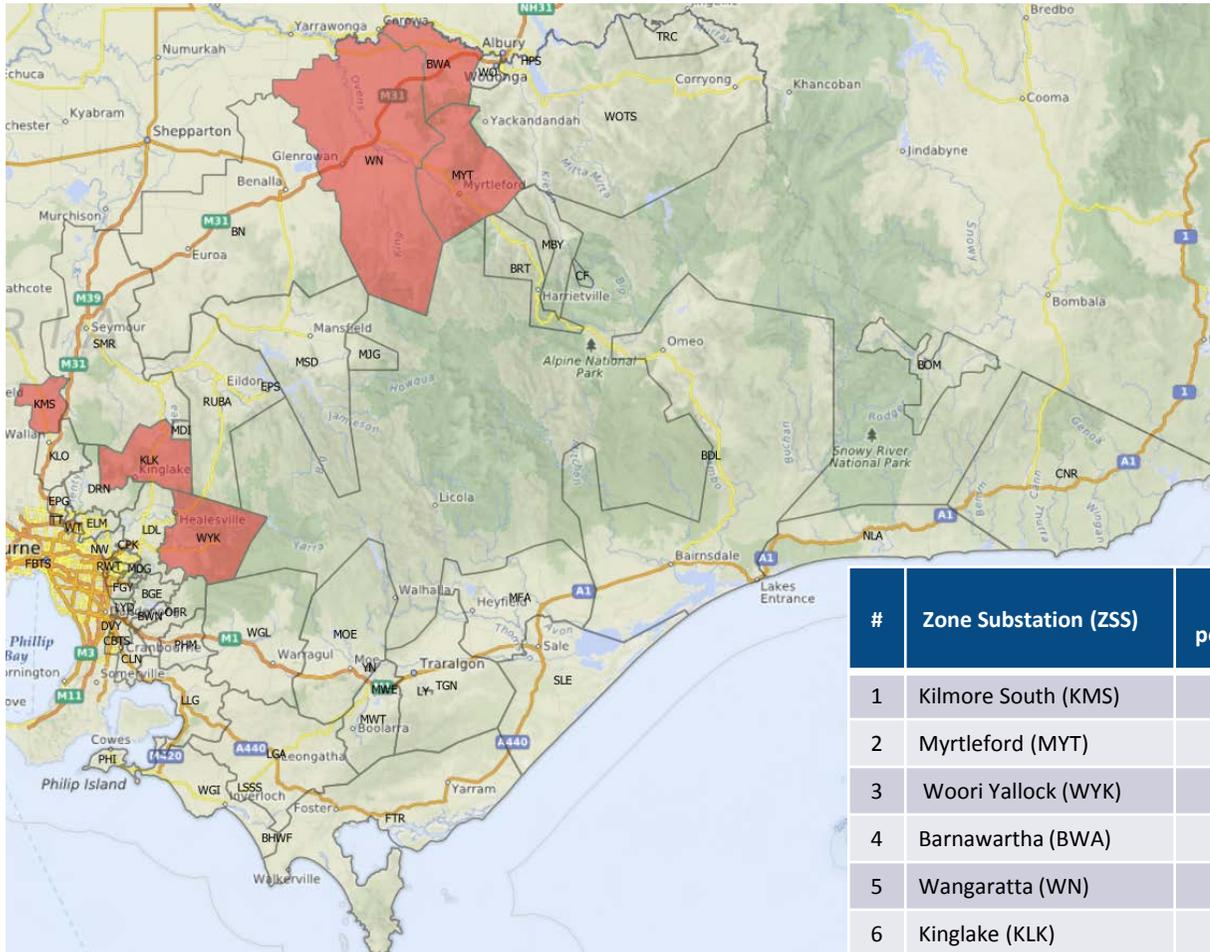
8. Tranche 2 exemption application

Bairnsdale Exemption Application

- ▶ Objective is to seek approval to isolate a large, entirely underground reticulation system at Metung to reduce the network capacitance
- ▶ Avoids the installation of a third REFCL and associated works at Bairnsdale, saving ~\$5m
- ▶ To be submitted to ESV during September 2018



9. REFCLs in service for the 2018/19 summer



- ▶ **Required capacity**
 - › WYK sensitivity likely restricted to >1 Amp due to measurement device issues
- ▶ **Critical dependencies:**
 - › WYK, WN – resolution of dual GFN interaction issues
 - › BWA, WN – completion of HV customer isolation works
 - › KLK – installation of a new supply transformer

#	Zone Substation (ZSS)	# points	# of GFNs	# of feeders	# of HV connection points	Available to be placed in service
1	Kilmore South (KMS)	3	1	2	0	Mid October 2018
2	Myrtleford (MYT)	3	1	4	0	End October 2018
3	Woori Yallock (WYK)	5	2	4	1	End November 2018
4	Barnawartha (BWA)	3	1	4	2	End November 2018
5	Wangaratta (WN)	5	2	7	2	Mid December 2018
6	Kinglake (KLK)	4	1	3	0	End December 2018

AusNet Services is planning to have REFCLs in service at six ZSSs for the 2018/19 summer subject to:

- resolution of key technical issues
- AusNet Services operational readiness being sufficiently advanced

10. Operating Modes Policy

► AusNet Services Policy

Operating Mode	When Modes Applied as per BFM Plan	Rationale/Priorities
1. Fire Risk (Required Capacity i.e. 0.5 amps)	Total Fire Ban & Code Red Days Exceptions include; <ul style="list-style-type: none"> Switching associated with fault & emergency works 'Standard' may be applied if FDI below 30 (same process as ACR settings) 	<ol style="list-style-type: none"> Limit the risk of bushfire ignition Keep the power on
2. Standard (target range >0.5amps & <2.5amps)	Fire Danger Period - Non TFB/Code Red Days Application typically applied during declared fire danger period or for fire danger ratings between 'Very high' and 'Extreme' REFCL-NER mode can be applied for fire danger ratings 'Low' to 'High'	<ol style="list-style-type: none"> Keep the power on Minimise impact on customers from maintenance and replacement activities Limit the risk of bushfire ignition
3. REFCL-NER (>2.5amps)	Non-Fire Danger Period (Winter) Application typically applied during winter period or for fire danger ratings up to and including 'high'	<ol style="list-style-type: none"> Keep the power on Minimise impact on customers from maintenance and replacement activities Use REFCL to minimise outages (transient faults)



“... the adverse impact on the community by deliberately turning off powerlines on a temporary basis generally outweighs the risk of powerlines starting bushfires.”

Powerline Bushfire Safety Taskforce

11. ESC Review of Voltage Standards

Final decision



- ▶ **The final Electricity Distribution Code (EDC) decision was released by the Essential Services Commission (ESC) on 14 August 2018**
 - › The final decision confirmed the revised EDC removes the conflict between the Bushfire Mitigation Regulation obligations and the EDC obligations with respect to voltages on the 22kV electricity distribution network
 - › Responsibility for being compliant with REFCL voltage levels now with HV customers
- ▶ **High Voltage Customer Assistance Program (HCAP) Scheme**
 - › The Energy Minister has announced a HCAP scheme of 50% contribution up to a cap of ~\$250k per customer connection
 - › Typical customer cost to establish an isolating transformer ~\$750k
 - › HCAP Scheme is only available to non-government owned businesses
- ▶ **Key issues**
 - › Distribution Businesses reliant upon action of HV Customers to be ready for Tranches 2 and 3 of the REFCL Program
 - › Some HV customers are claiming hardship
- ▶ **AusNet Services response**
 - › We have written to all tranche 2 and 3 HV Customers setting out their obligations and dates by when they need to be REFCL compliant
 - › The letter sets our support structure to assist them in becoming compliant
 - › We are continuing pro-active engagement with our HV customers to minimise risk of delays

Key Point: There is a risk of potential delays to operating REFCLs should Tranche 2 & 3 HV customers not carry out their obligations on a timely basis

12. ACR Program



➤ **Completed December 2015**

Fire Consequence Level	# Devices Highest Risk Areas	# Devices Remaining Risk Areas
TFB/Code Red	165	900

13. Powerline Replacement

Powerline Replacement Fund

- 1,680km in 'codified' areas
- 126km replaced; cost \$67.8M
- 50km in progress; cost \$14.6M
- Scheduled completion Nov 2019

AusNet Services' Program

- Conductor condition good
- Risk Based Modelling
 - Vegetation
 - Reliability
- No contingent projects identified
- Approx \$500-600M investment