Next steps for Evoenergy

Chris Bell
Dennis Stanley
Leylann Hinch

"In many respects we agree with Evoenergy on the key drivers influencing its revenue requirement for 2019–24. However, a few areas remain in which we require further information before we can accept its proposed increases to capex and opex relative to the current period."

- AER, Draft decision Evoenergy 2019 to 24. Overview, p9

Evoenergy will provide the information required by the AER in support of our proposal.

Under Evoenergy's proposal:

- Opex/customer kept constant, despite cost pressures including new vegetation management obligations
- Capex kept within historical levels, despite the need to keep step with changes in technology and accommodate costs of complying with regulatory changes
- Real RAB/customer – reduction of 7.2% over the 5 year period
- Less than one per cent per year impact, excluding inflation, on average bill

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Place holder decisions

Opex – draft decision 4.6% lower than proposal

[AER draft decision opex] rate of change applies a zero productivity growth forecast. This is consistent with Evoenergy's proposal, and has been our standard approach to forecasting the productivity component of our opex the rate of change in past decisions.

- Evoenergy reduced opex by 22% in the current period compared with the previous period – medium to long-term impacts of these cuts on safety and reliability are still unknown
- The AER has not yet canvassed issues in relation to productivity, Evoenergy has had no opportunity to respond
- Draft decision reinstates the Efficiency Benefit Sharing Scheme providing a continuous incentive to find operating efficiencies, which are passed on to consumers

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Capex draft decision

($m 2018/19)	Evoenergy	AER DD	Difference	
Augmentation	47.2	24.8	-22.4	-47.5%
Reliability	6.2	0.0	-6.2	-100.0%
Connections	85.9	85.7	-0.2	-0.2%
Replacement	91.6	83.6	-8.0	-8.7%
Non-Network	58.3	46.0	-12.3	-21.1%
Capitalised overheads	75.6	58.0	-17.6	-23.3%
Gross Capex	365.0	298.0	-67.0	-18.4%
Less Capital Contributions	34.2	35.6	1.4	4.1%
Less Disposals	1.1	1.1	-	0.0%
Net Capex	**329.80**	**261.40**	**68.40**	**-20.7%**

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AUGMENTATION

Canberra's apartment boom biggest since records began

Census 2016: ACT has nation's largest population growth, Gungahlin the driver

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Augmentation Projects

AER's draft decision has rejected a number of augmentation projects required to service the high growth expected in the Canberra metropolitan area.

Major implications for the ACT if development is hindered due to infrastructure mistiming.

- Molonglo Valley Project
    - Relocate Evoenergy's mobile zone substation
    - Associated feeders
- A number of feeders targeted at high growth areas in the ACT:
    - Canberra CBD
    - Canberra North, Lyneham and Dickson
    - Gungahlin
    - Belconnen town centre
    - Pialligo
    - Kingston foreshore

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Augmentation Projects

- The AER has focussed on the value of energy at risk under the “Do Nothing” option.
- Evoenergy’s Project Justification Reports were prepared based on the load forecasts available at December 2017. These included:
    - Organic load growth (resulting from expected population growth etc) and
    - Known point loads.
- Load growth in the ACT is very dynamic
    - Since December 2017 there has been a large number of new point load applications, plus acceleration of the planned residential development of the Molonglo Valley.
- Evoenergy has updated its load forecasts based on latest information.
- In all cases the value of energy at risk is significant under the revised “do nothing” options.

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Changes to Energy at Risk

Project	Energy at Risk 2024 - calculation at December 2017 (kWh)	Energy at Risk 2024 - calculation at October 2018 (kWh)
Molonglo Zone Substation	861,758	24,720,930
Molonglo Valley Feeders	861,758	24,720,930
Supply to CBD	283,749	15,120,430
Supply to Canberra North	537,020	11,646,010
Supply to Belconnen	725,450	2,842,330
Supply to Gungahlin	2,737	1,348,151
Supply to Pialligo	237,964	4,648,192
Supply to Kingston	193,436	611,840

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Molonglo Valley Development

- 21,000 new dwellings plus schools, shopping centre etc to be built over next 20 years, 23 MVA of new load by 2024.
- Maximum capacity of the three existing feeders cannot meet forecast demand beyond mid-2021.
- Most efficient and cost-effective way to provide mid-term supply is to:
    - Acquire mobile zone substation from Angle Crossing
    - Construct network of 11 kV feeders from new zone substation will supply Molonglo Valley.
- Other options considered cannot meet demand and are less cost effective.

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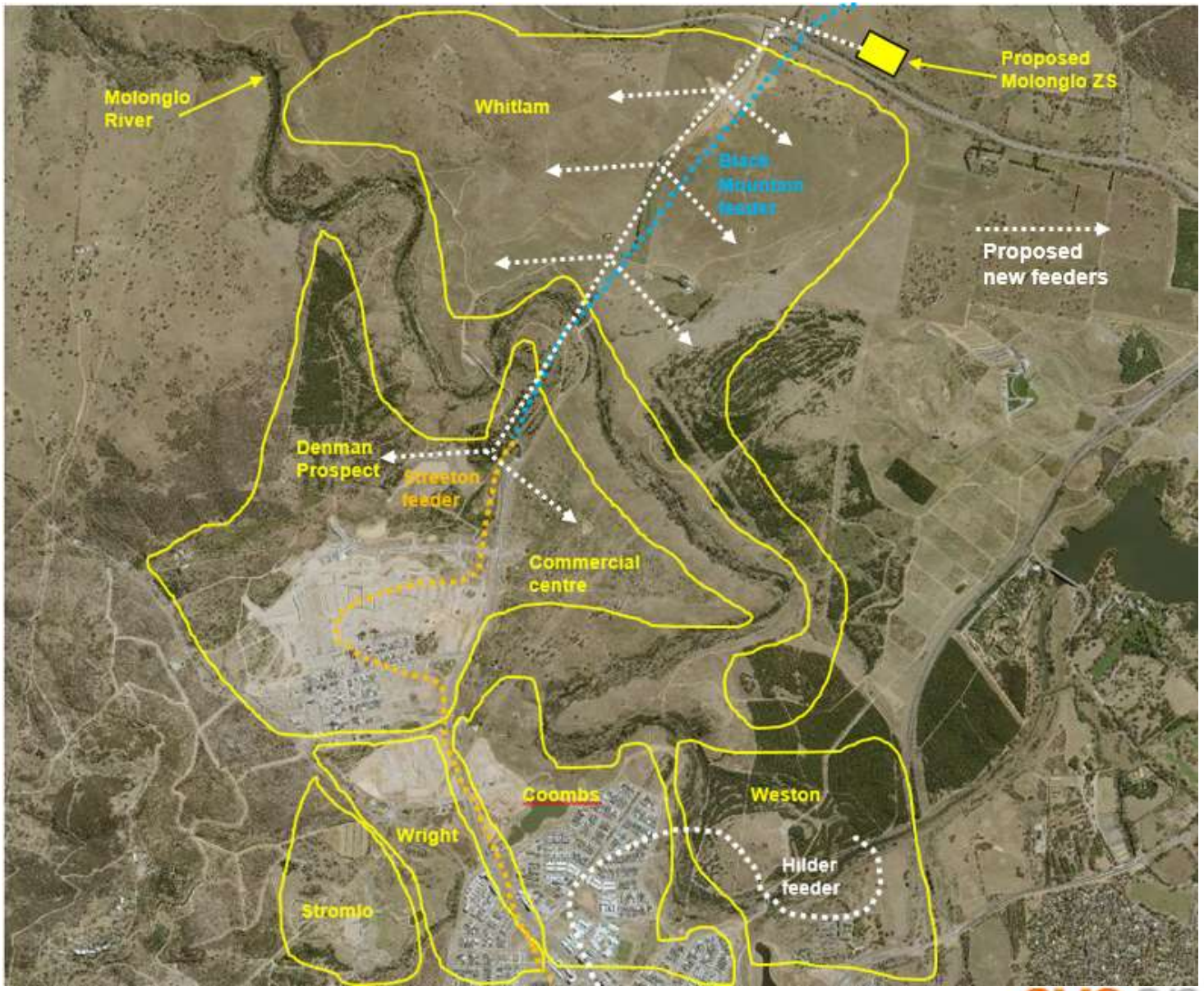
Molonglo River
Whitlam
Proposed Molonglo ZS
Black Mountain feeder
Proposed new feeders
Denman Prospect
Streeton feeder
Commercial centre
Coombs
Weston
Wright
Hilder feeder
Stromlo

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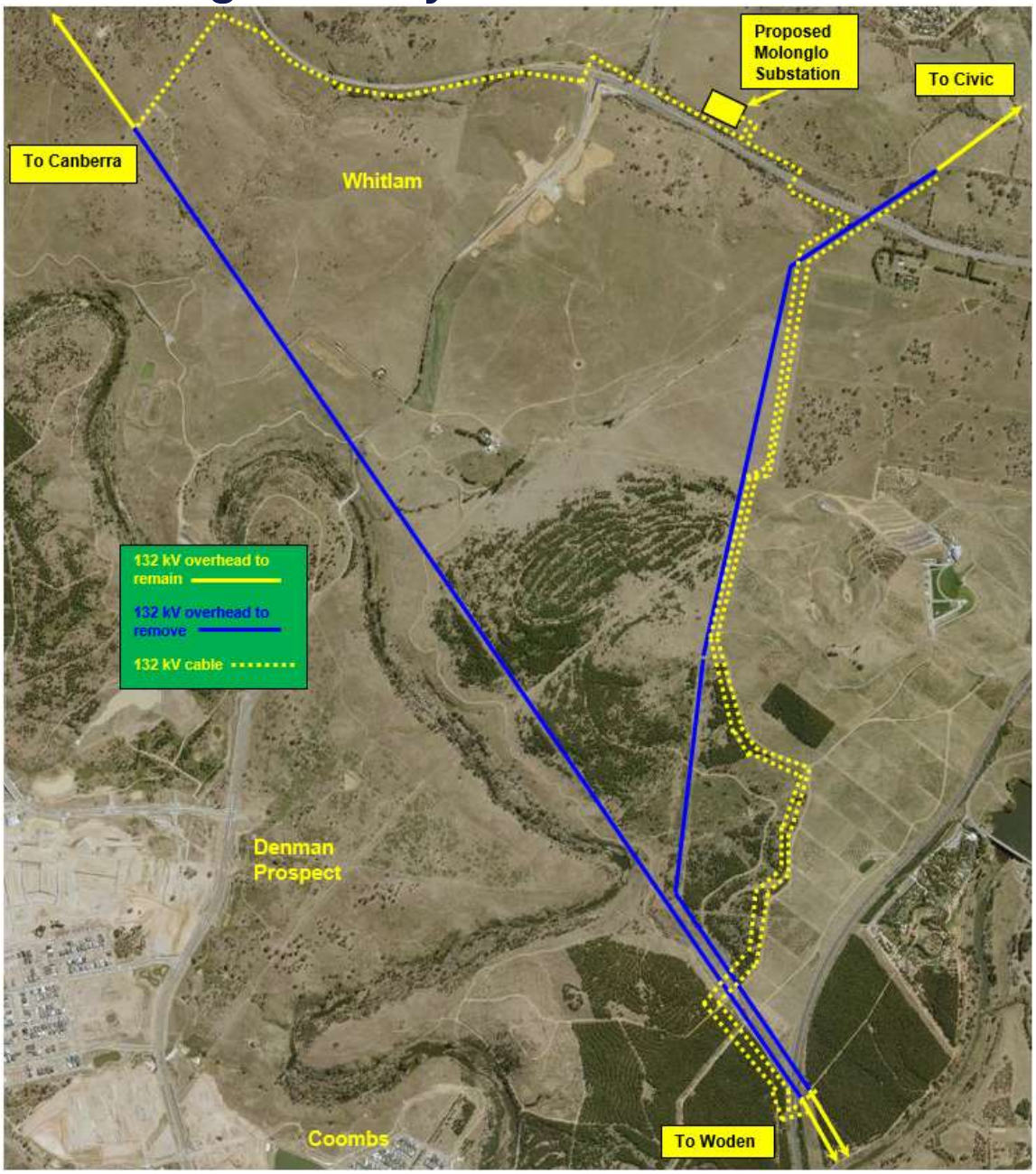
Molonglo Valley 132 kV Relocation



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Molonglo Valley Development

Consequences of “Do Nothing”

- No capacity to meet forecast demand beyond mid-2021.
- Development of North Weston, Wright, Coombs, Denman Prospect and Whitlam cannot continue beyond 2021.
    - Even under the regulatory proposal forecasts, firm capacity is breached and energy at risk becomes unacceptable soon after 2024, the AER draft decision leaves little room for error.
- Power supply would be unavailable to:
    - ❖ Proposed residential dwellings including several multi-unit apartment buildings.
    - ❖ Proposed commercial centre at Denman Prospect.
    - ❖ Proposed schools at North Wright, Denman Prospect and Whitlam.
    - ❖ Proposed hotel and restaurants at North Wright.
    - ❖ Proposed Aquatic Centre and motels at Stromlo Forest Park

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High Growth Feeder Augmentation Projects

- Canberra CBD – feeder to London Circuit.
  - ❖ Numerous high-rise commercial and residential buildings, Canberra Metro Stage 2, City to the Lake project, National War Memorial expansion.
- Canberra North – feeders to Donaldson St and Dooring St.
  - ❖ Major expansion of Canberra centre, numerous high-rise commercial and residential buildings in Braddon, Lyneham and Dickson areas.
- Belconnen Town Centre – feeders to Cooinda St and Lathlain St.
  - ❖ Expansion of Calvary Hospital, University of Canberra Hospital, UoC residential buildings, Belconnen Trades Centre, and major high-rise commercial and residential buildings in town centre.

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High Growth Feeder Augmentation Projects

- Gungahlin Town Centre – feeder to Valley Ave.
  - ❖ Numerous high-rise commercial and residential buildings in Gungahlin Town centre East area, Throsby Estate, Canberra Metro TPS, Kenny Estate.
- Pialligo – feeder to Brindabella Park.
  - ❖ Commercial and light industrial developments at Brindabella Park, Fairbairn Park, Majura Defence facility and Canberra Airport.
- Kingston – feeder to Kingston Foreshore.
  - ❖ Numerous high-rise commercial and residential buildings, Kingston Arts Precinct, and proposed school.

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High Growth Feeder Augmentation Projects

Consequences of "Do Nothing"

- No capacity to meet forecast demand.
- Development of load centres as described could not continue beyond 2021-22.
- Power supply would be unavailable to proposed residential dwellings, commercial and retail developments including several multi-unit apartment buildings.
- Major slow-down in growth and redevelopment of the ACT.
- Large amounts of energy at risk in the event of a feeder contingency.

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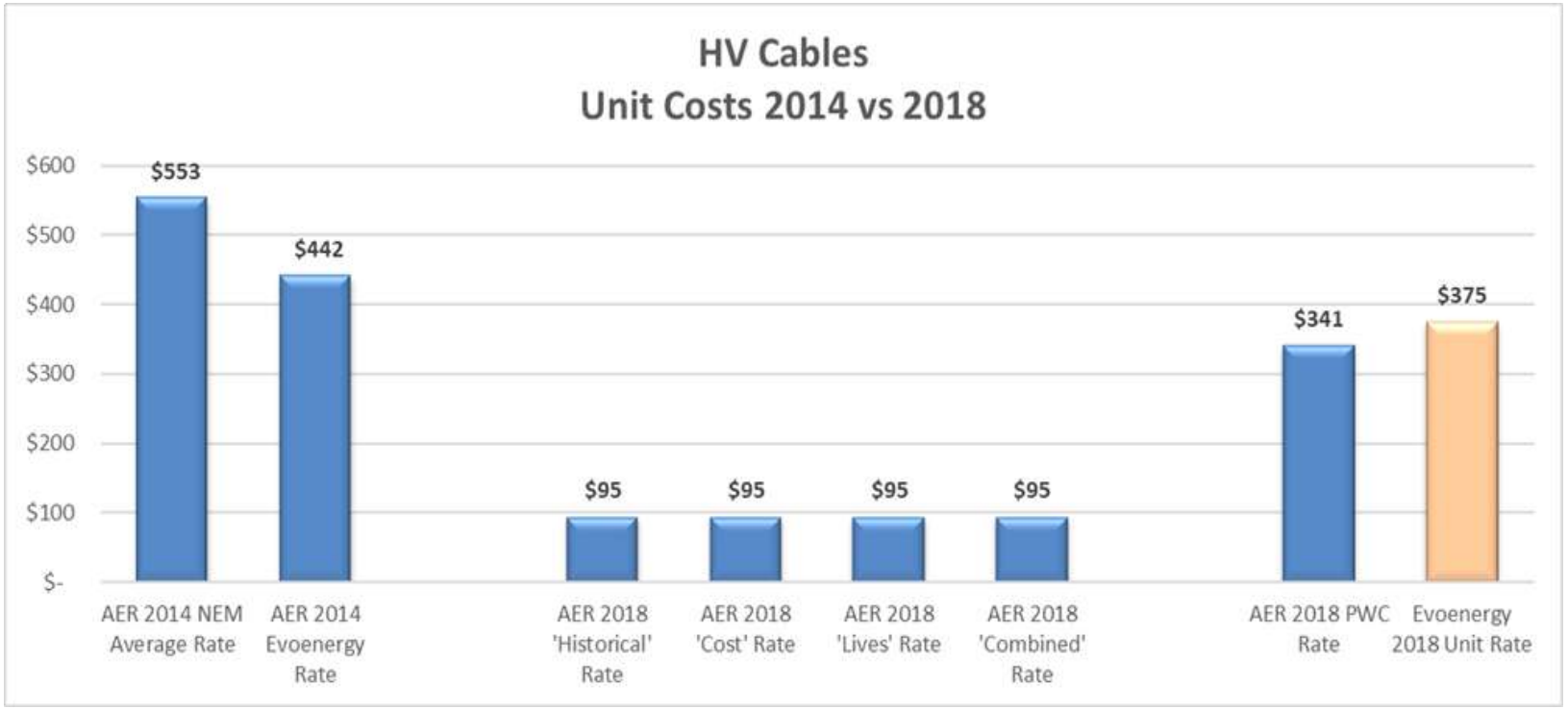
HV CABLES

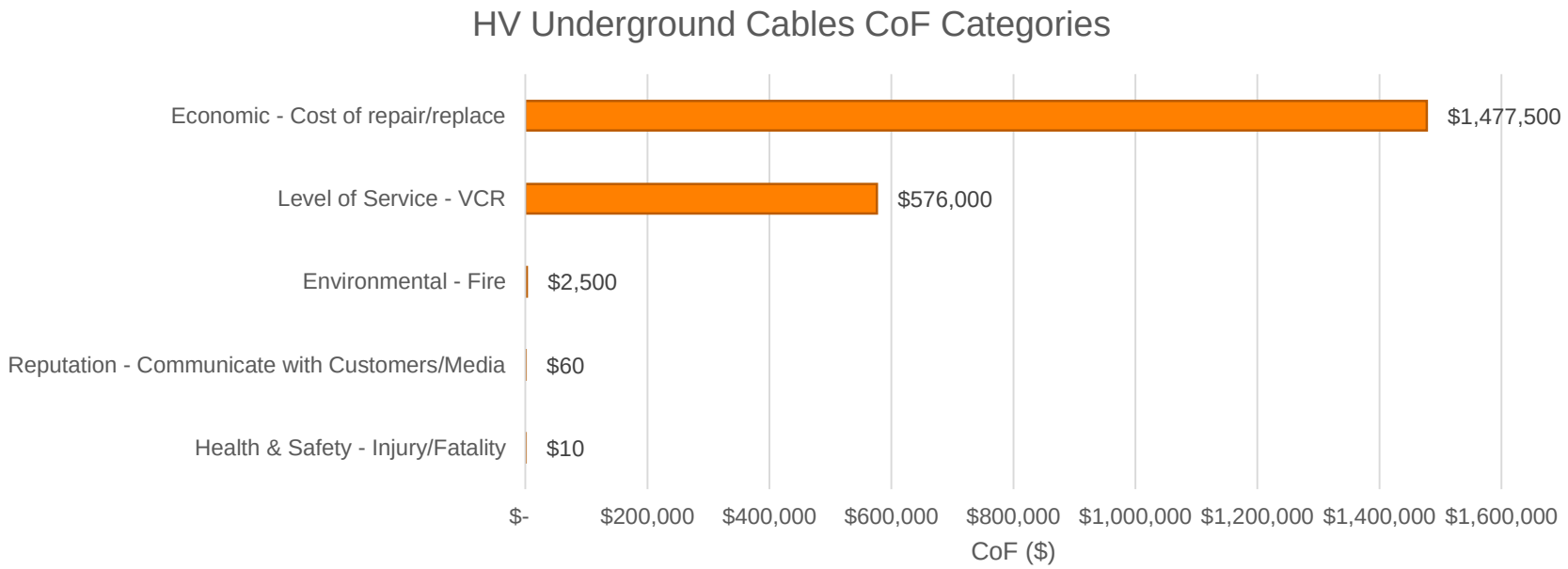
HV Cable REPEX model

- AER assessment of Evoenergy forecast REPEX was found to be above the “Repex Model Threshold“
- However there appears to be a potential issue with the HV Cable unit cost used by the AER in its repex model.
- The unit rate is materially lower than what would be considered reasonable for HV Cable replacements.



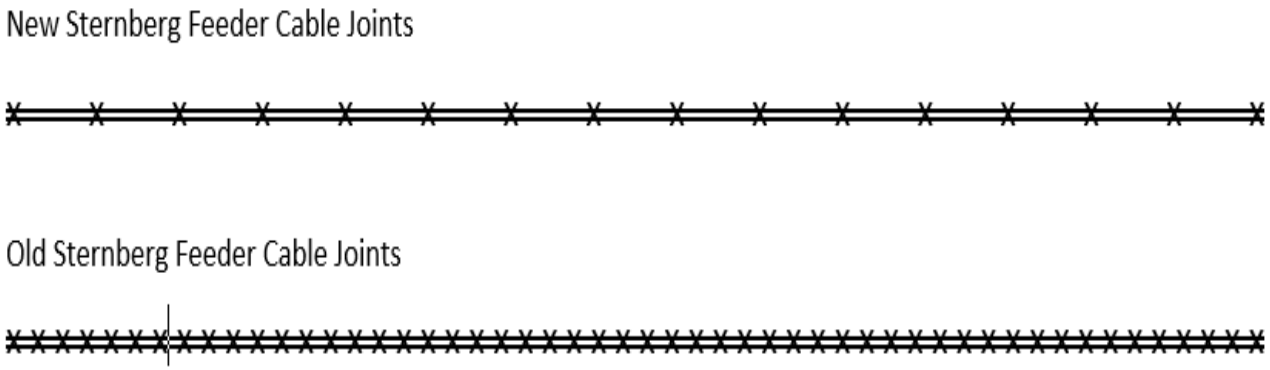
HV Cable replacement strategy

- AER assessment of Evoenergy HV cable strategy determined that Evoenergy underlying cost–benefit analysis includes conservative assumptions
- AER stated that Evoenergy used a value for fatality per FTE that is much higher than values used by other distributors in the NEM.
- Evoenergy have assessed safety risk of HV Cable failure to be an rare event and is not driving the replacement program



HV Cable replacement case study

- Sternberg 11kV HV Cable
  - Priority one feeder – high reliability required above 99.94% for Tuggeranong Town Centre and national Dept of Social Services
  - 6.5km Length
  - Oldest sections 36 years old
  - 52 joints which are a common failure point – Replacement cable has 16 joints.

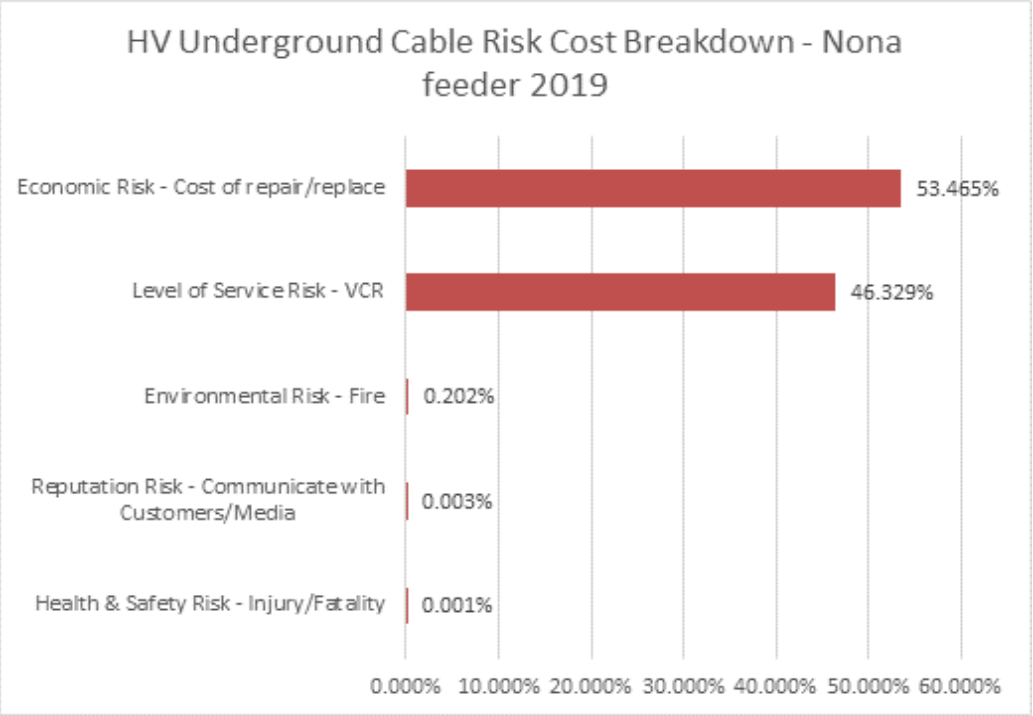


  - 8 faults since 1991 – 3 in 2016
  - Cable testing carried out in 2016 finding poor condition. The cable had to be cut into 4 sections for testing due to the cable length.
  - A capacity upgrade included in project to defer a near term future feeder to town centre

HV Cable refurbishment (partial replacement) case study

- Nona 11kV HV Cable partial replacement
  Priority two feeder – high reliability required above 99.94% for 2800 customers and Franklin Public School

- 7 faults since 2009 – 2 in 2017, 2 in 2018.
- Cable section rerouted rather repaired due to a failure under new light rail track in July 2018
- Below budget Unit Rate achieved in project
- Further condition testing in 2018-19
- Consumer comments on most recent fault in August 2018



Community Engagement for the Nona Feeder
7 August 2018

User: Gungahlin Community Council

I wonder if the current blackout being experienced in parts of Gungahlin is advertising for tomorrow night's presentation from Evoenergy?
6:30pm at Gungahlin Club - everyone is welcome.
The presentation is on their program of works and discussing their focus for 2018/19 as it relates to the Gungahlin region, but I'm sure someone will mention the timing of this blackout ;)

@StumpedByADoor

Customer message: Hey @EvoenergyACT, if any of my appliances or devices blow because of the constant blackouts, counting 4 so far, will you replace them? Just curious is all. I'm in Franklin by the way.

Boris @Darthboris84
It's ridiculous how often we lose power in Franklin

Boris @Darthboris84
That's what, 5 times now in 30 mins....sort your **** out. Good thing I splashed for decent surge protection once I realised how often we lose power here.

@ResonanceRPG
THIS CERTAINLY ISN'T THE RESULT OF FLAGRANT INCOMPETENCE.

So when do we find out which idiot is responsible for these constant problems and why you haven't already fired them?

Squidbunny @squidbunny87

Customer message: Hey guys, so thanks to the wonderful electricity grid in my suburb I am experiencing maybe the 6th complete blackout this year and the second within a month. Thanks @EvoenergyACT. Guess the stream is off for tonight. Sorry guys.

Community Engagement for the Nona Feeder
7 August 2018

Adam Zorzi @Lorenz0_7

Customer message: This is absolutely ridiculous! Are your workers ******* ammatures!??? Power has been cut 4 times in 30mins! If any of my appliances short or blow, I'm billing you *******! Sort it out

Adam Zorzi @Lorenz0_7
Dude, its a ******* joke! Its gone out 5 times now since 8.30pm. It can't be healthy for my heater, fridge, tv or computer to keep having power cut off and on

@Andrewwhiteau

.@ActewAGLAssist @EvoenergyACT We've lost power 3 times tonight. Can you send somebody sober out?

@nutmeg_jane

Customer message: 45mins later and still no details about what's going on…

Ok, so why even bother with an outages page that has no info. That I have to use data to access because I have no WiFi because I have no power. Now that power is back on, will you tell us why it went out and why it keeps going out?!

Tom Foley @tomf72
Yep @EvoenergyACT sucks. This is becoming a regular event. Check their timeline.

Tom Foley @tomf72
Minutes left before router goes down. So still got the internet for now.

DISTRIBUTION SUBSTATION MONITORING

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Distribution Substation Monitoring Program

Program Context

- Power quality issues are an emerging issue with the increasing penetration of embedded generation in the Evoenergy network. In 2017-18, 39% of surveyed customer sites showed power quality issues.
- The Evoenergy network currently has high penetration of embedded generation and this is expected to increase significantly over the coming regulatory period.
- The increasing penetration of embedded generation in the Evoenergy network is forecast to exceed technical limits of the existing network.

The increase in PV solar connections to the Evoenergy Network has seen considerable rise in PQ complaints.

Distribution Substation Monitoring Program

Program Overview

Evoenergy's 2019-24 regulatory proposal included projects for the installation of *Distribution Substation Monitoring* in 1000 (20%) of distribution substations over period to 2024

- The project provides a clever way to deal with power quality problems and to avoid additional investment in asset replacements
- The project will provide visibility of the low voltage network enabling Evoenergy to proactively manage power quality at the customer connection

The project provides the intelligence to the ADMS permitting upstream high voltage network control in a real-time response to feedback from distribution substation monitoring

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Distribution Substation Monitoring Program

Consumer Benefits

Avoid unnecessary network replacements and augmentation

- A number of Evoenergy distribution substations do not have the tapping adjustment required to maintain LV voltage compliance.
- Without the program these distribution substations will need to be replaced at an estimated cost of $3.8M over the period to 2024.

Enabler for new estate development with 100% PV solar at the lowest cost

- New estates such as Denman Prospect and Ginninderry have mandated that homes must have PV rooftop solar installed. We have already detected reverse power flows in feeders at Denman Prospect and this is causing power quality voltage issues.
- Either we over-engineer the network at additional cost or build an intelligent grid with *distribution substation monitoring* combined with other solutions such as embedded storage and on-line tap changer (OLTC) distribution transformers.

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Distribution Substation Monitoring Program

Consumer Benefits

Ensure existing customers are not impacted

- Poor power quality might mean that lights flicker or dim, and in the worst case customers could face damage to appliances due to over voltage.

Support customers' future energy ambitions

- Permit the connection of new generation, storage and electric vehicle chargers to the existing network at the lowest cost to serve
- Intelligent real-time network management will avoid the additional costs of network planning studies that may otherwise need to be imposed as part of customer connection applications
- Ensure customers have the full use of their investments in renewable energy and storage system; avoid curtailment of excess generation due to network constraints and overvoltage

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ADMS

ADMS

Historical, real-time and forecasted views of the network → Improved system planning → Delivering service with fewer assets

Single system for operators, dispatchers, planners and analysts → Operating efficiencies → Lower bills over time

Common situational Awareness → Coordinated response to industry shifts → Unlock customer investment potential

Greater network reliability, efficiency, safety and security → Safe & reliable electricity supply → Customer satisfaction

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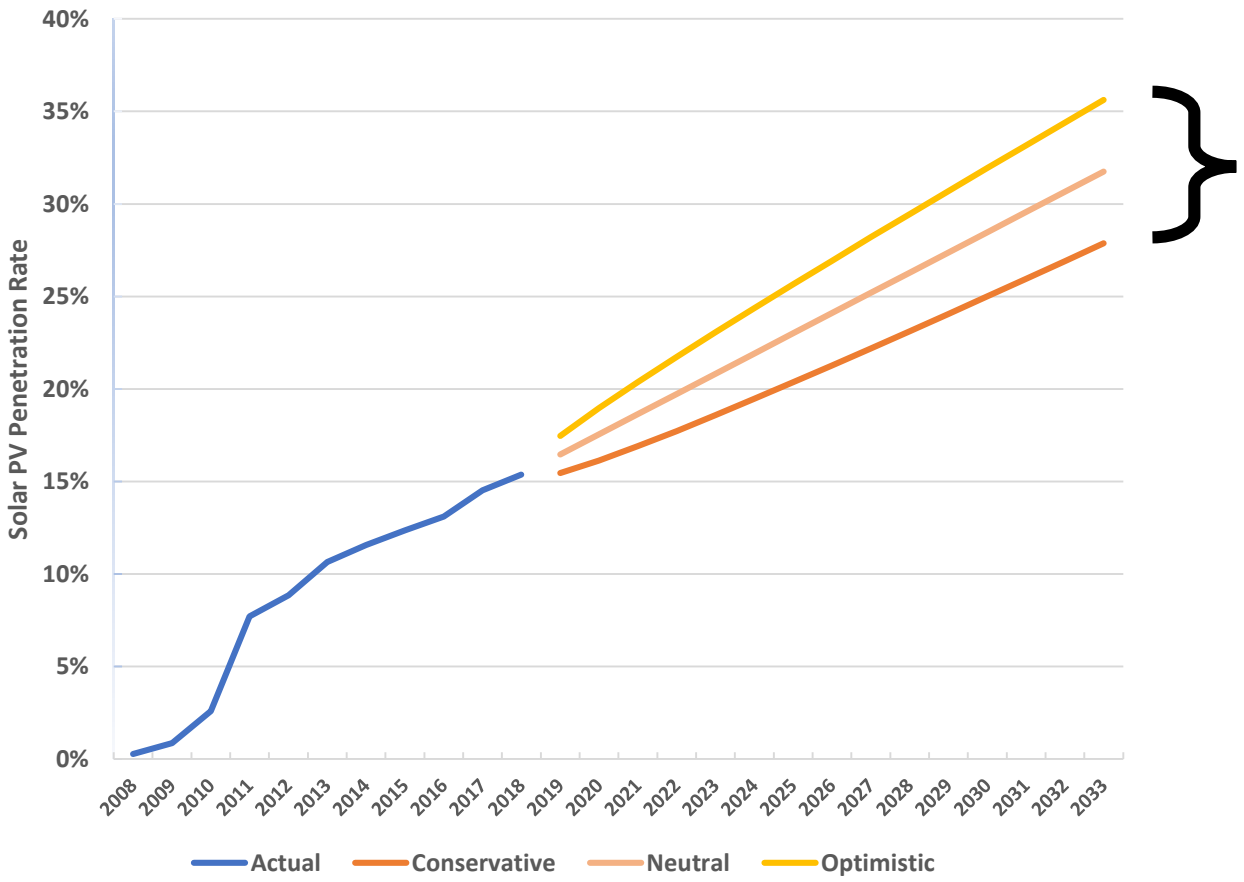
Solar PV Penetration



Range of possible scenarios is 100% of conservative – accurate forecasts are necessary to plan the network for the future

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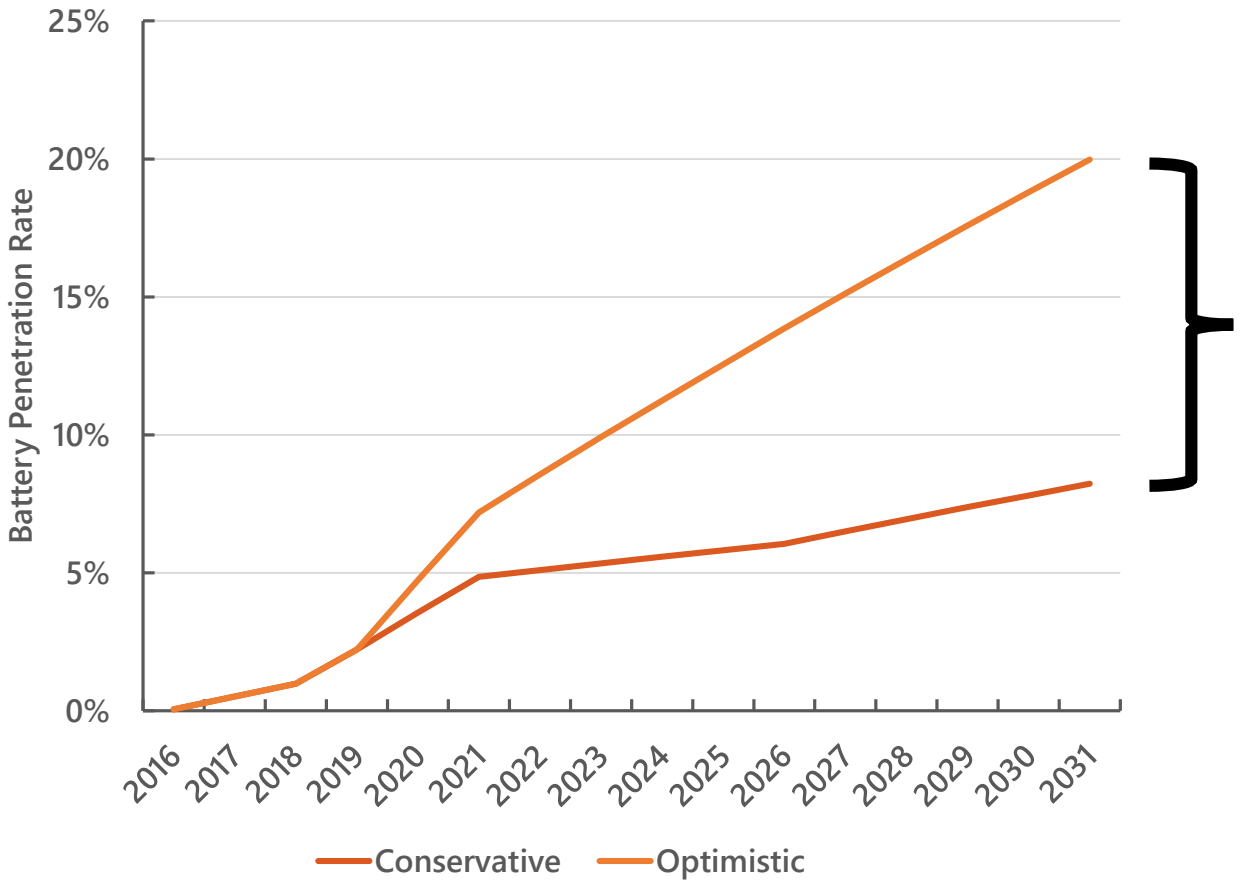
Battery Penetration



Range of scenarios is even greater than for solar.

Relatively low existing take up and the recent introduction of the technology causes additional uncertainty.

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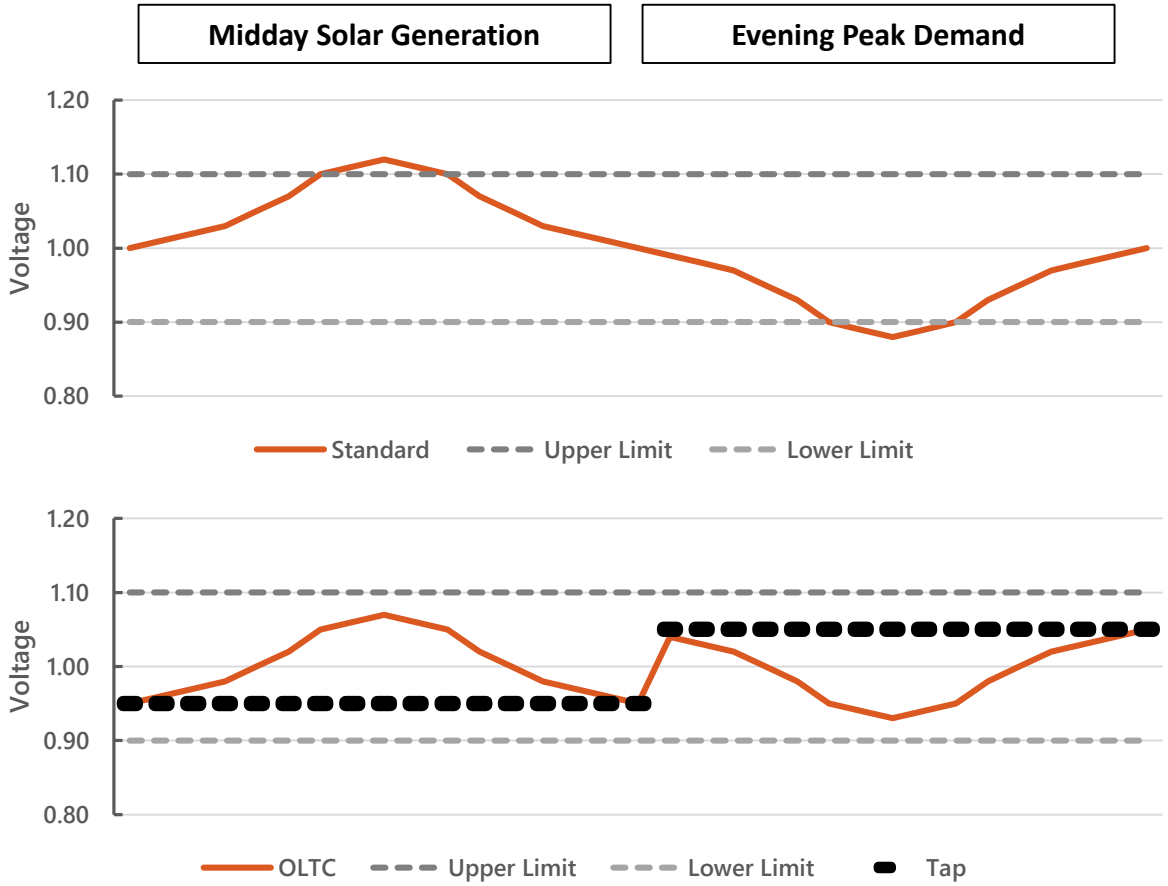
Enabling generation access for customers



- Voltage is too high, and too low, at different times of day
- Change transformer voltage → keep voltage within limits along the feeder
- Automatically change voltage setting in response to load/solar PV
- Less solar PV “tripping off” = less damage to customer appliances

OLTC = on load tap change. Voltage regulation

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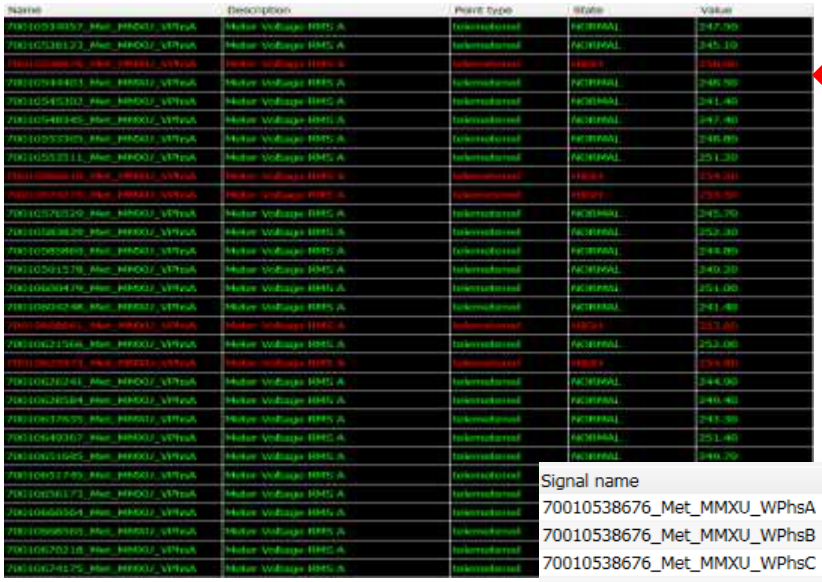
PVs and Battery Storages monitoring via ADMS

- There are about 21,307 PV installations in ACT.
- ADMS is getting real time data from 339 sites. Every month the number of sites with real time monitoring is being increased with about 50 sites.
- On 09.10.2018 at 13:38, there were 25 customers with over voltage out of the 339, which are being monitored in real time. (Voltage > 253V)



Signal name	Signal type	Value	Measurement type
70010538676_Met_MMXU_WPhsA	Custom (Analogue)	-3.89 kW	Active Power
70010538676_Met_MMXU_WPhsB	Custom (Analogue)	0.19 kW	Active Power
70010538676_Met_MMXU_WPhsC	Custom (Analogue)	0.13 kW	Active Power
70010538676_Sol_MMXU_WPhsA	Custom (Analogue)	-4.03 kW	Active Power
70010538676_Bat_MMXU_WTot	Custom (Analogue)	2.52 kW	Active Power
70010538676_Met_MMXU_VArPhsA	Custom (Analogue)	0 kVAr	Reactive Power
70010538676_Met_MMXU_VArPhsB	Custom (Analogue)	0.35 kVAr	Reactive Power
70010538676_Met_MMXU_VArPhsC	Custom (Analogue)	0 kVAr	Reactive Power
70010538676_Met_MMXU_VPhsA	Custom (Analogue)	258 V	Voltage
70010538676_Met_MMXU_VPhsB	Custom (Analogue)	250.4 V	Voltage
70010538676_Met_MMXU_VPhsC	Custom (Analogue)	249.4 V	Voltage
70010538676_Bat_MMXU_WhTot	Custom (Analogue)	6.4 kWh	Active Energy

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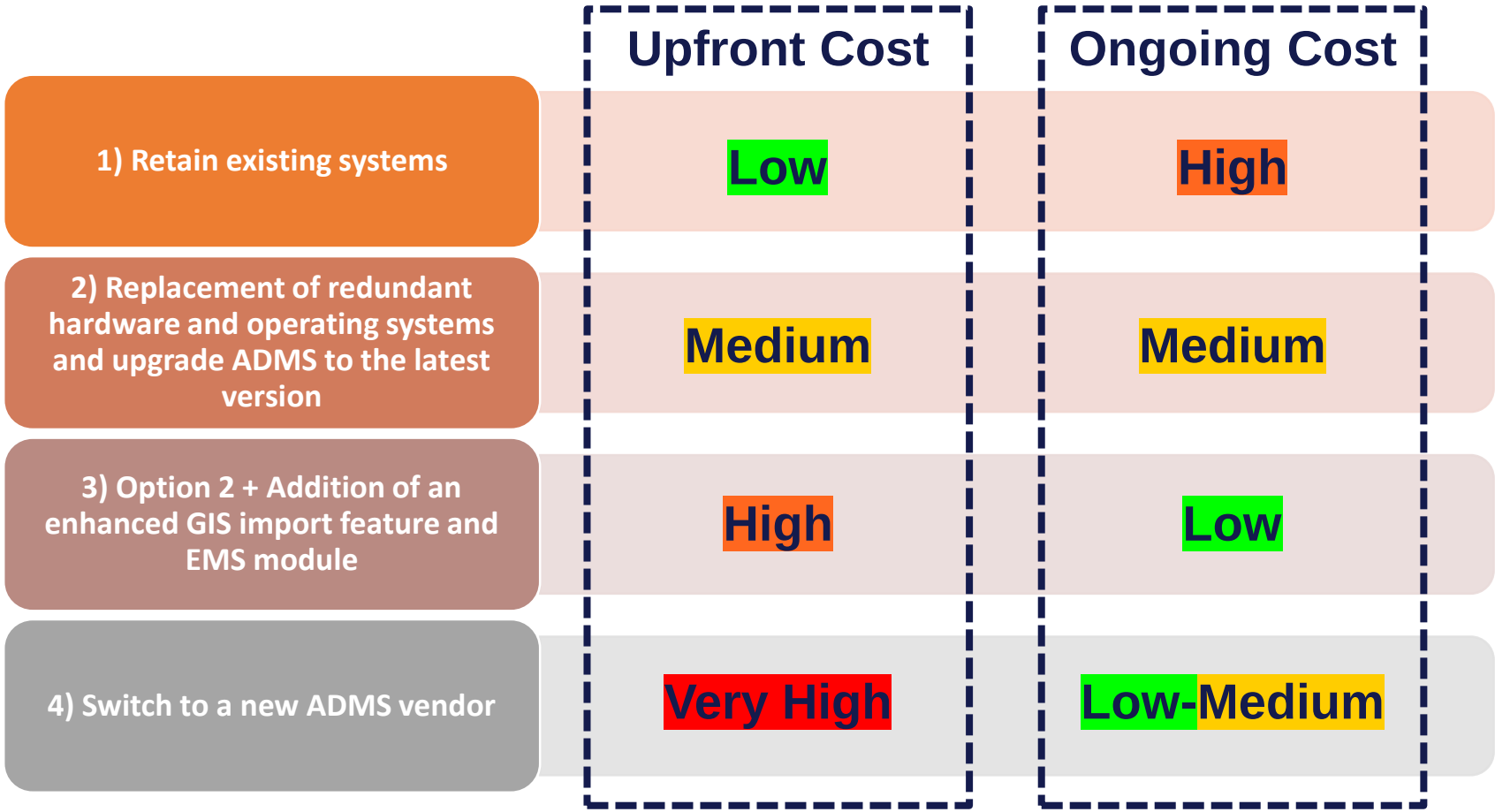
Exploring options



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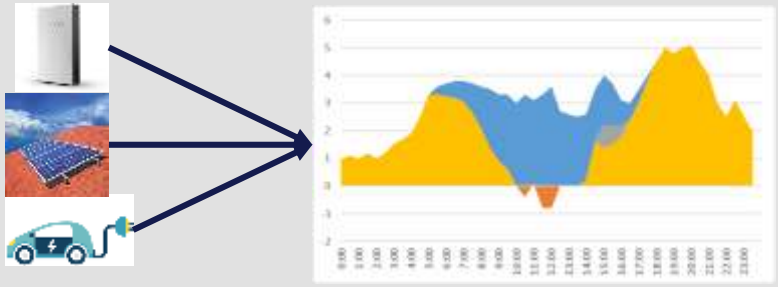
ADMS 3.8 features

Module	Feature	
DERMS module	This reduces customer network costs by increasing asset utilisation, leveraging DERs and allowing an increased penetration of DER. Increases customer access to new energy (storage) services and two-way network power flows. Increases modelling granularity to each customer connection point.	
EMS Module	Single network model for the transmission and distribution networks. Improving network management from planned and unplanned outages point of view.	
Enhanced GIS Importer	Improved data alignment and accuracy. 50% overall reduction in effort required to make operational updates.	
SCADA	Provides a security enhancement in the communication between the master station and the remote terminal units from the field.	

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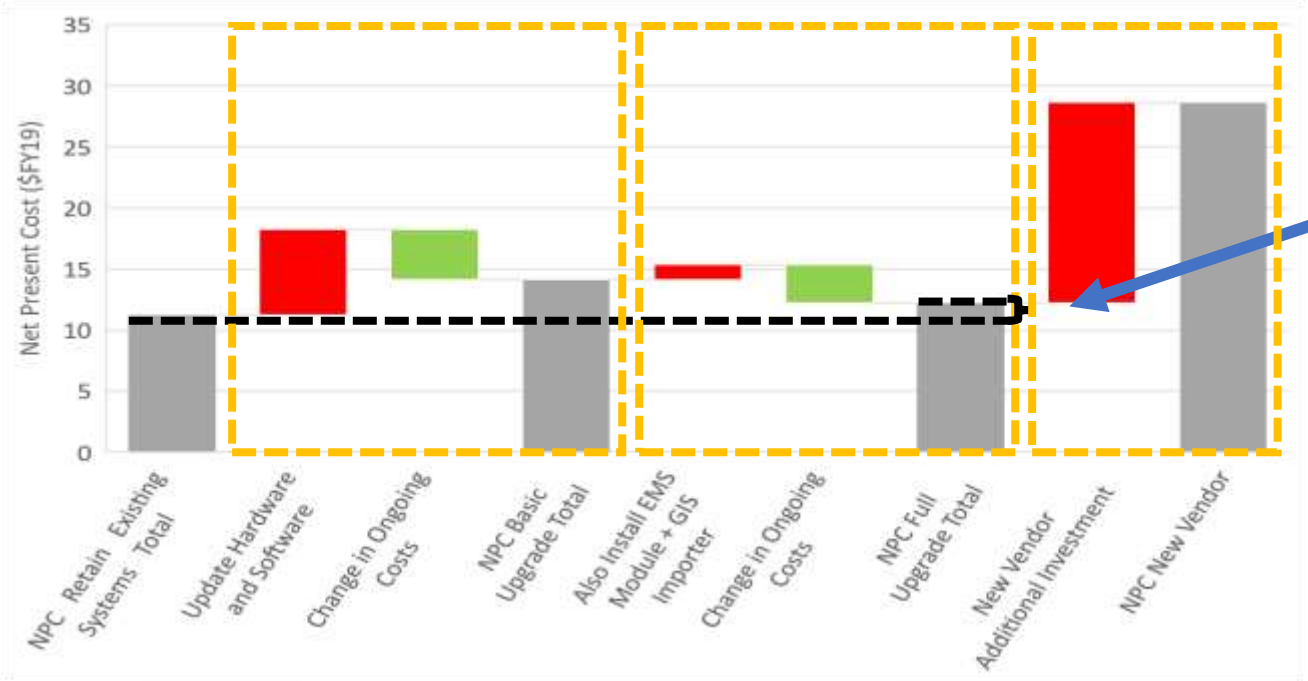
ADMS – Options and Benefits



Upgrade to modern systems with additional features and improved security for < $1m

Rising licence costs will require $11m of funding over the next 10 years to retain the existing systems

Investment in ADMS upgrades will result in operating cost savings that will partially offset the upfront cost

Additional investment in feature enhancing modules will drive operating cost reductions that cover the investment

Or use the upgrade timing as an opportunity to purchase an ADMS from a new vendor

Tangible and unquantifiable benefits likely to be greater than the incremental cost

- Lower failure risk
- Cyber security
- Option to add more features…

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