

# Grid Projects

## Outage Protocol Forums

Auckland 22<sup>nd</sup> March, Wellington 23<sup>rd</sup> March, and  
Christchurch 24<sup>th</sup> March 2017

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# Where we are today



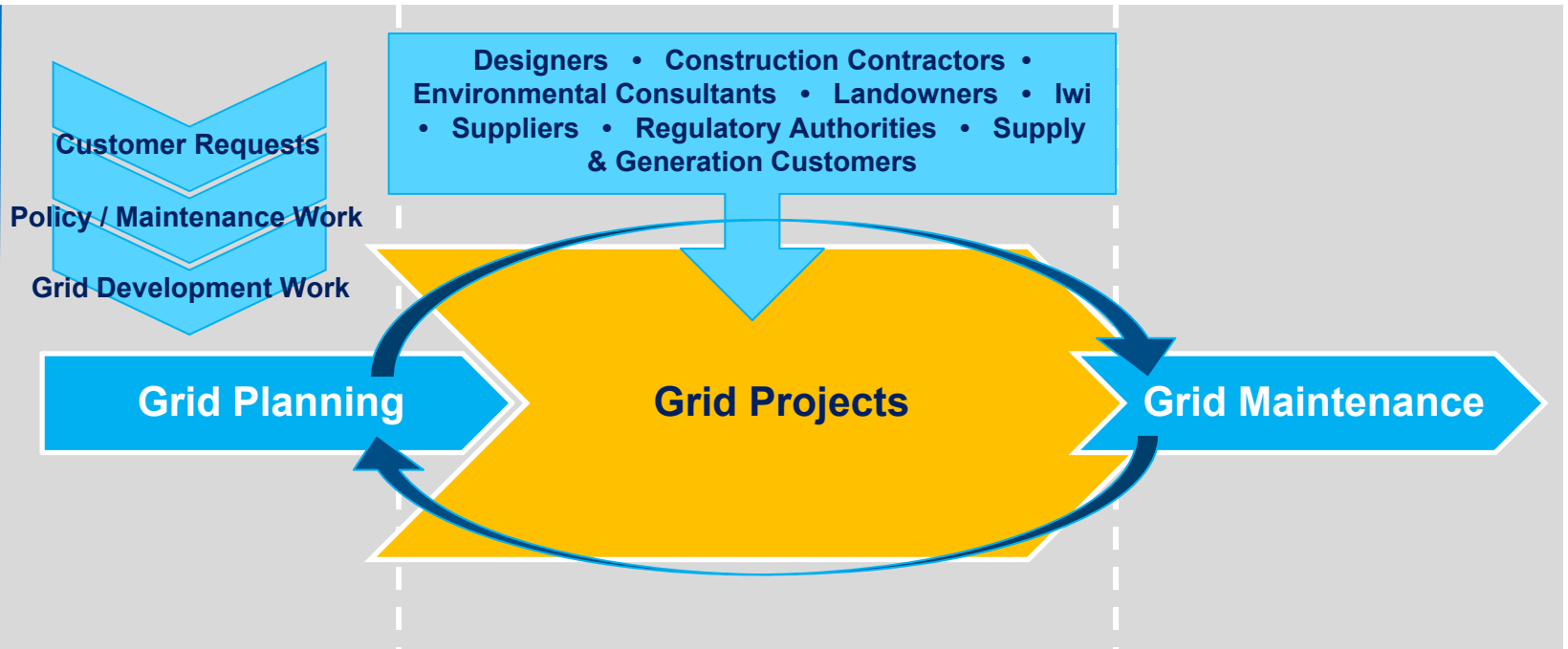
# Grid Projects

- Capital Works Programme is responsible for delivering transmission capability upgrade projects
- Projects cover installation, replacement and upgrade of:
  - Substations
  - Lines
  - Cables
  - and Transformers
- Three major project types undertaken:
  - Customer
  - Network
  - Policy



# Projects Life Cycle

Departmental Flow



Grid Project Processes



# Selection of recently completed and projects currently under construction

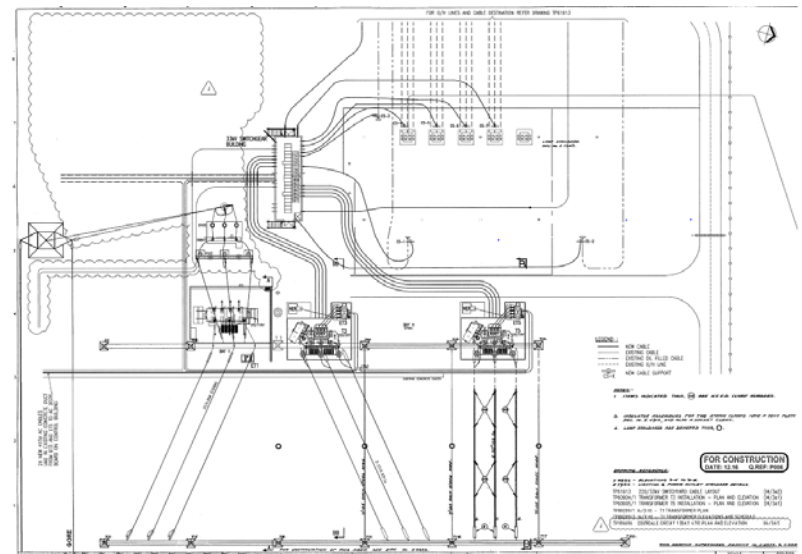
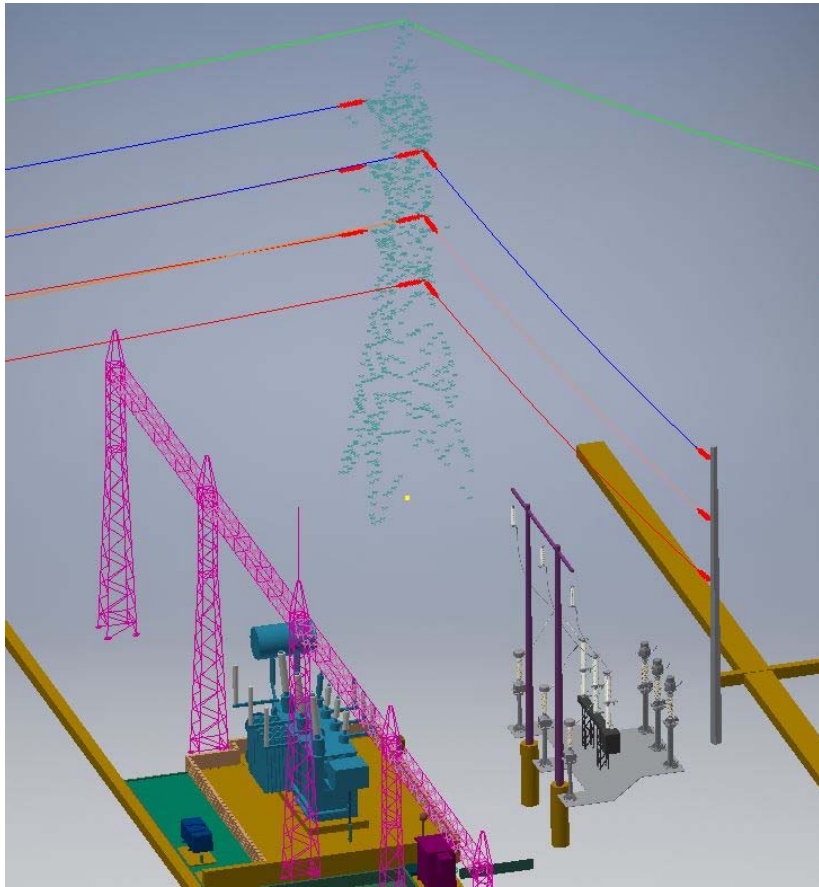
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# Invercargill 110kV Site Rationalisation

<b>Budget</b>	\$0.9m	<b>Commissioned</b>	June 2017
<b>Overview</b>	<p>The two 110kV bulk oil circuit breakers at Invercargill (INV) substation; CB452 (Edenvale circuit) and CB472 (T1 220/110kV interconnector transformer) are 50 years old and have reached the end of their useful life.</p> <p>The most efficient way to replace these is to remove the entire Invercargill 110kV bus gantry structure and install one new circuit breaker and current transformer in a new 110kV bay located beside the T1 220/110kV interconnecting transformer and route the Edendale circuit onto a new strain monopole structure in this new bay.</p>		





# Penrose 33kV Outdoor to Indoor Conversion

<b>Budget</b>	\$19m	<b>Commissioned</b>	April 2016
<b>Overview</b>	<ul style="list-style-type: none"><li>Conversion of outdoor 33 kV bus structure to a double bus indoor switchboard. Feeder cut overs are complete with 33kV structure demolition planned in 2017.</li></ul>		



# Hepburn Road Outdoor To Indoor Conversion

<b>Budget</b>	\$9.2m	<b>Commissioned</b>	April 2016
<b>Overview</b>	• Conversion of Triple bus outdoor 33 kV structure to an indoor switchboard.		





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# Henderson 33kV Outdoor to Indoor Conversion

<b>Budget</b>	\$7.5m	<b>Commissioned</b>	December 2016
<b>Overview</b>	<ul style="list-style-type: none"><li>Conversion of single bus outdoor 33 kV structure to an indoor switchboard, cutting down on maintenance and switchgear footprint.</li></ul>		



# Tangiwai 11 kV Switchgear Replacement

<b>Budget</b>	\$5.1m	<b>Commissioned</b>	June 2017
<b>Overview</b>	<ul style="list-style-type: none"><li>Existing 11kV indoor switchgear to be replaced with new Schneider PIX-H switchgear to be located within a new 11kV fire rated switchroom</li></ul>		



# BPE-HAY AB Reconductoring

**Budget**

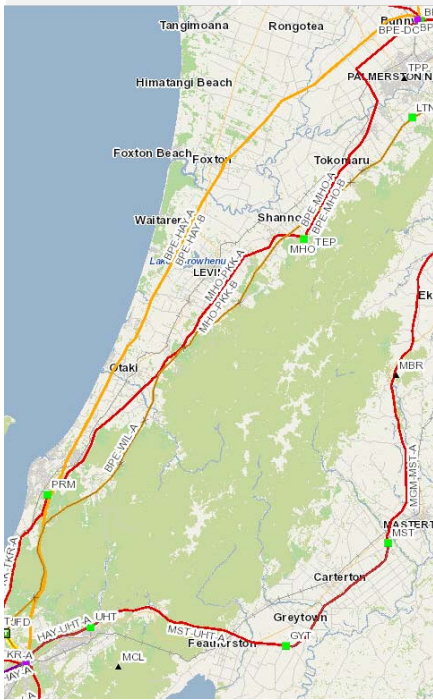
\$ 149m

**Commissioned**

June 2019

**Overview**

- Replace existing Goat conductor on both circuits with Zebra to remove risk of degrading conductor and ensure transmission security
- Some tower raising and earthworks for clearance purposes



# Hawera Substation Upgrade

<b>Budget</b>	\$13.9m	<b>Commissioned</b>	July 2017
<b>Overview</b>	<ul style="list-style-type: none"><li>Replacement of Hawera substation 110 kV lattice steel gantry structure due to corrosion and limited remaining life. Project to upgrade the 110 kV bus bar and connected primary circuit protection schemes to provide increased security and mitigate existing maintenance and operational constraints.</li></ul>		



# Penrose NAaN Stage 3

<b>Budget</b>	\$2.8m	<b>Commissioned</b>	January 2016
<b>Overview</b>	<ul style="list-style-type: none"><li>• The NAaN Project provides for redundancy of supplies to Auckland City, the North Shore and Northland and was approved by the Electricity Commission (EC) in May 2009.</li><li>• The 220 kV bus at Penrose has been extended to provide bus connections for new 220 kV cable circuits from Pakuranga and Hobson Street. A new Bus D with a bus section CB has been installed for the new circuits and an additional future transformer bay. The PEN-OTA5 circuit connection has been converted to double circuit breaker.</li></ul>		



# CUWLP Aviemore-Livingstone A 220kV Duplex

<b>Budget</b>	\$24m	<b>Commissioned</b>	May 2016
<b>Overview</b>	<ul style="list-style-type: none"><li>• Doubling capacity by reconductoring with a double bundle of 42km of single circuit flat top towers from Livingstone to Aviemore including the tee into Waitaki.</li><li>• Project included foundation grillage encasement of 100 towers and tower strengthening work on 107 towers. 3 towers permanently guyed as a strengthening solution. 2 replacement towers were installed.</li><li>• Constraints included weather conditions, outage availability (and times) due to dairy irrigation load, customers (Network Waitaki, Alpine Energy, North Otago irrigation).</li><li>• Wiring completed over 2 summers because of resource and system constraints.</li></ul>		





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# Timaru 110 kV Bus Bar Rationalisation and Local Back Up Protection Upgrade

**Budget**

\$5.2m

**Commissioned**

August 2016

**Overview**

- Timaru 11kV bus bar rationalization, removing the top bus. Installation of full local back up protection. This project will follow on after the installation of the new supply transformers.



# Bunnythorpe T1/T2/T3 Replacement

<b>Budget</b>	\$8.7m	<b>Commissioned</b>	July 2017
<b>Overview</b>	<ul style="list-style-type: none"><li>This project is to replace T1 ,2 and 3 Interconnectors (single phase units) at BPE with two 150MVA three phase units, as part of the network replacement programme (existing units below)</li></ul>		



# Linton T2 Transformer Replacement

<b>Budget</b>	\$6.1m	<b>Commissioned</b>	March 2016
<b>Overview</b>	<ul style="list-style-type: none"><li>Replace strategic spare (installed when existing transformer failed) with new 120MVA unit.</li></ul>		



# Wilton 110 kV Bus Rationalisation

<b>Budget</b>	\$8.7m	<b>Commissioned</b>	March 2017
<b>Overview</b>	<ul style="list-style-type: none"><li>Wilton 110 kV Bus Rationalisation will remove the two split bus and replace it with a single level, three split bus largely within the existing structure. This will improve supply security at CPK and eliminates the two level bus maintenance issues. All primary equipment (CBs and Disconnectors) will be replaced with DCBs and new CTs.</li></ul>		



**Some projects in progress /  
coming up .....**



## Upcoming \ **underway** projects – RCP 2

Portfolio	Spend	Locations
Power Transformers	\$150 Million	STK, ROS, <b>KAW</b> , STK, OWH, <b>MCH</b> , KIN, HWB, HAY, GOR, <b>BRY</b> , <b>BPE</b> , <b>ABY</b> , TIM, BOB
ACS Outdoor to Indoor Conv	\$80 Million	MNG, WIR, MHO, LTN, HTI, GOR, FHL, WHU, TAK, <b>ROS</b> , HWA, <b>UHT</b> , <b>TAK</b> , <b>ALB</b>
Transmission Reconductoring /Duplexing	\$120 Million	<ul style="list-style-type: none"> <li>• BPE-HAY Reconductor A &amp; B Section 2</li> <li>• <b>BPE-HAY Reconductor A &amp; B Section 3 (virtually complete)</b></li> <li>• BPE-HAY Reconductor A &amp; B Section 4</li> <li>• <b>BPE-HAY Reconductor A &amp; B Section 5 (underway, ~ 60% to go)</b></li> <li>• CPK-WIL-B Reconductoring</li> <li>• <b>Gore Hard Tee</b></li> </ul>
Primary and Secondary equipment replacement (CB, CT, DIS, PROT)	\$110 Million	<b>National</b>
Transmission Lines (Foundation, Grillage, Insulators, Poles, structure ) replacements	\$135 Million	<b>National</b>
Transmission Lines – Paint	\$123 Million	<b>National</b>



Thank you .....

