

AUPEC 2010 Australasian Universities Power Engineering Conference

Transmission Challenges

06 December 2010

Dr Patrick Strange

Chief Executive, Transpower New Zealand Ltd

TRANSPOWER



AUPEC 2010
Australasian Universities Power Engineering Conference
Power Quality for the 21st Century
5-8 December, Christchurch, New Zealand



EPECentre
The Power Quality Centre



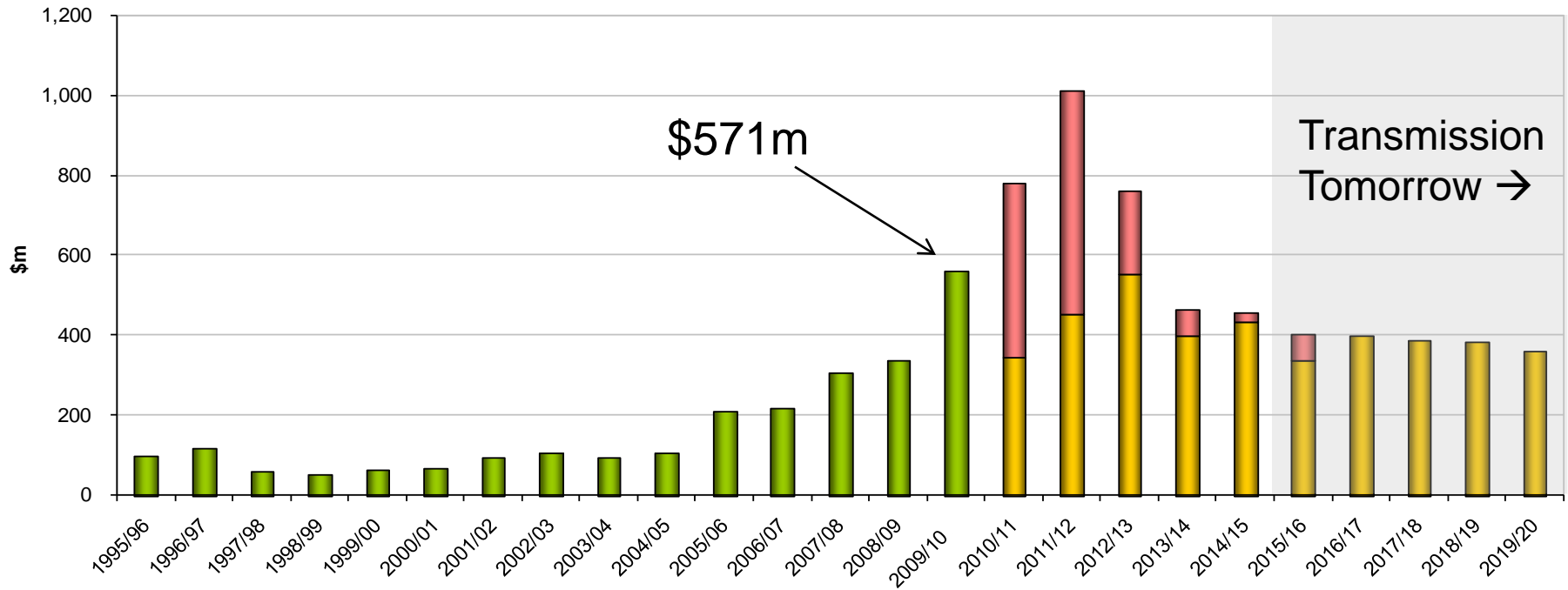
New Zealand's place in the world



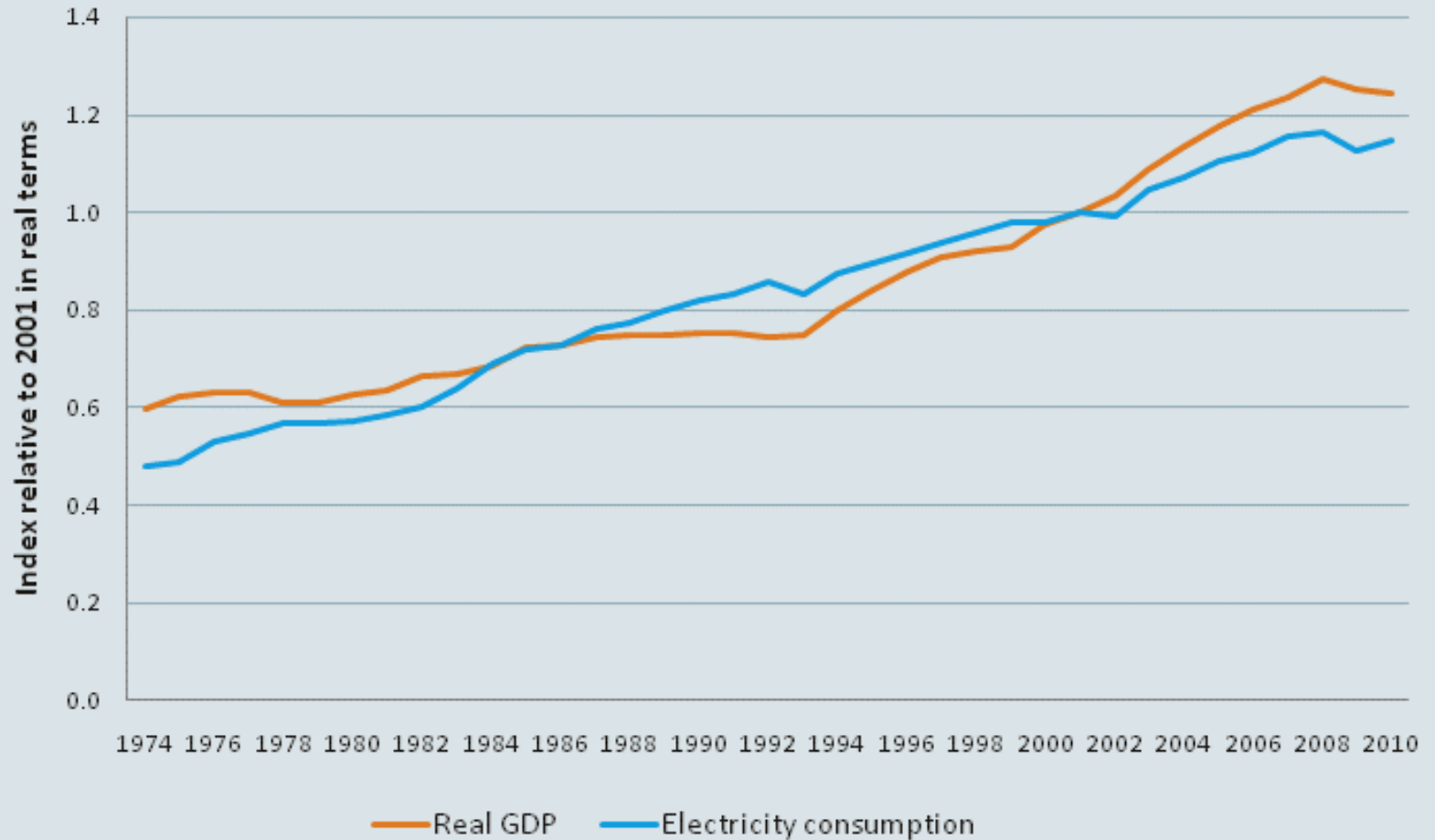
- No opportunity for interconnection
- Have to meet all our own electricity needs

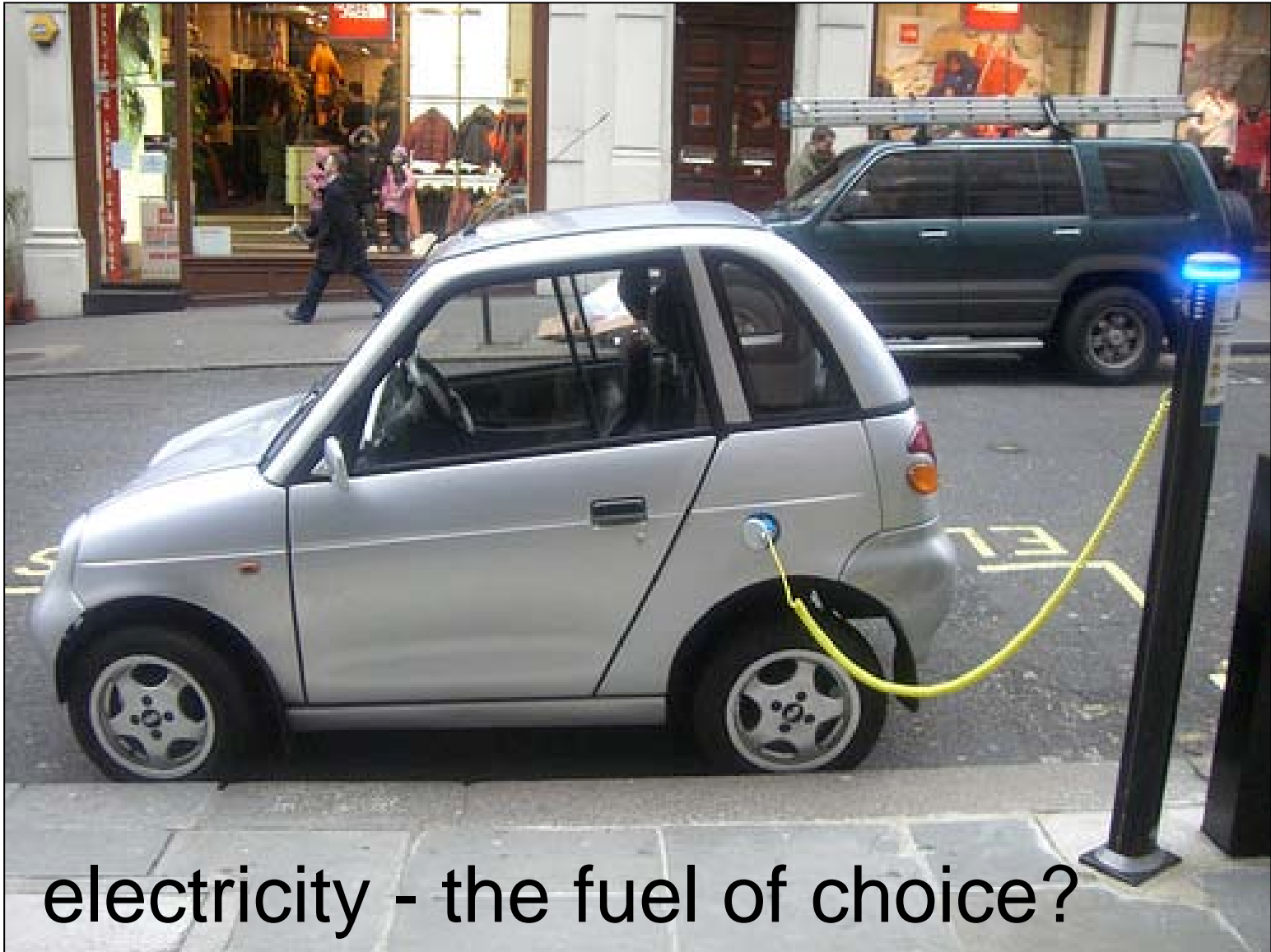


Transpower capex

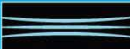


Real GDP/Electricity Consumption comparison



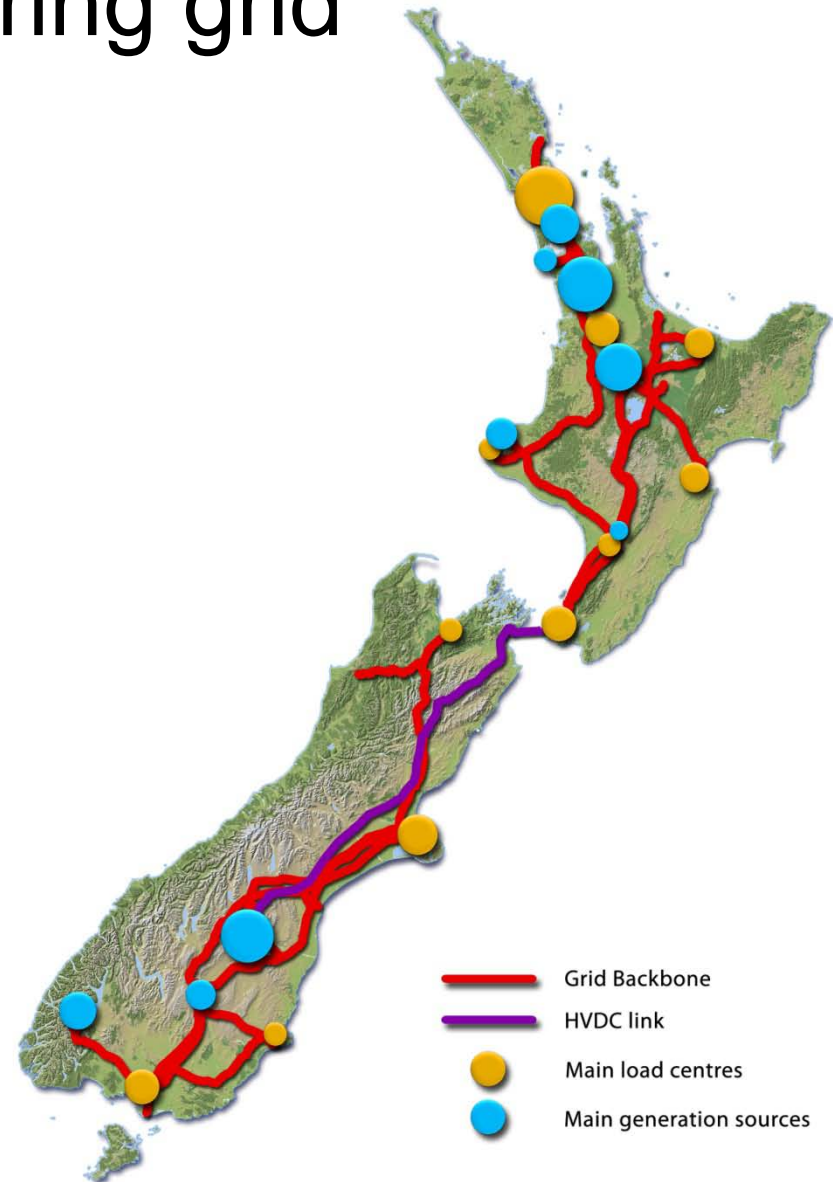


electricity - the fuel of choice?



An enduring grid

- Auckland will continue to use more electricity than can be supplied locally
- Long term investment in large-scale, remote generation
- Requires a grid backbone for northwards transfer



Going forward

- The grid will always be long and stringy, and moving electrons a long distance
- We will probably have to transport more electrons!
- Increased variability is a given, due to hydro and wind

We need to create solutions to address these issues, and many of these are about technology



How do we do this?

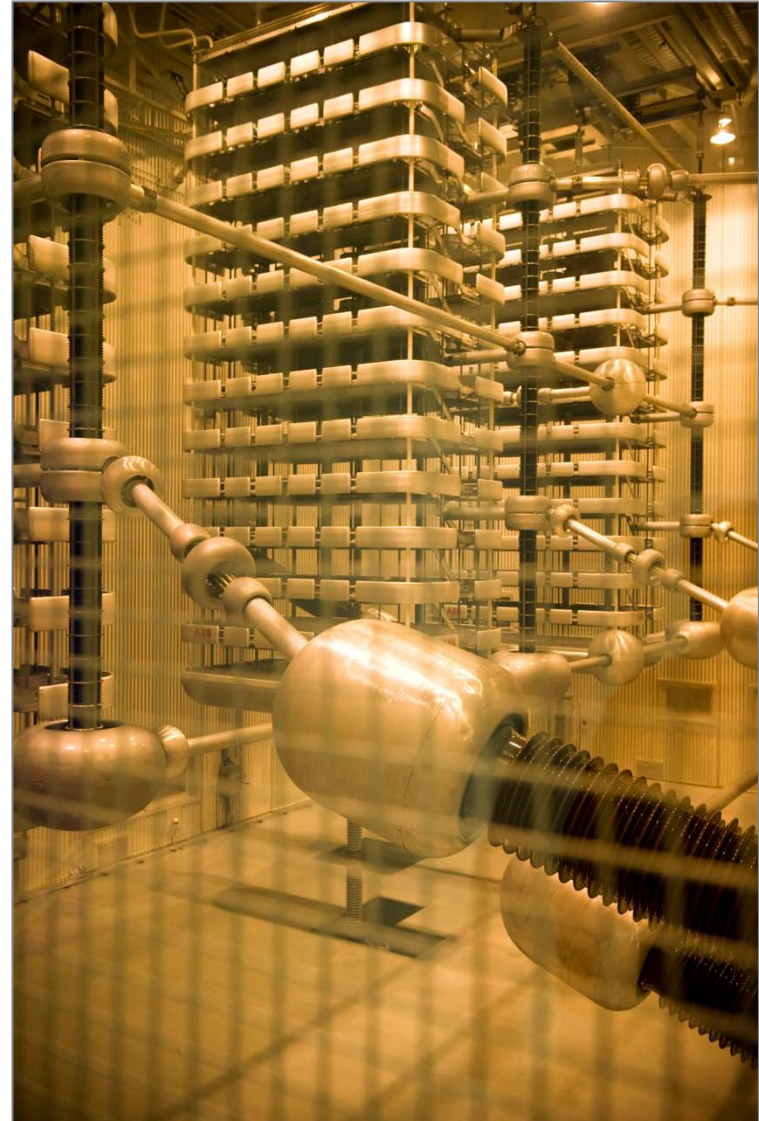
- Grid technology
- More active integration of grid and generation
- Demand side – the Smart Grid...?



Voltage support and voltage stability – SVCs, STATCOMs, regional power controllers



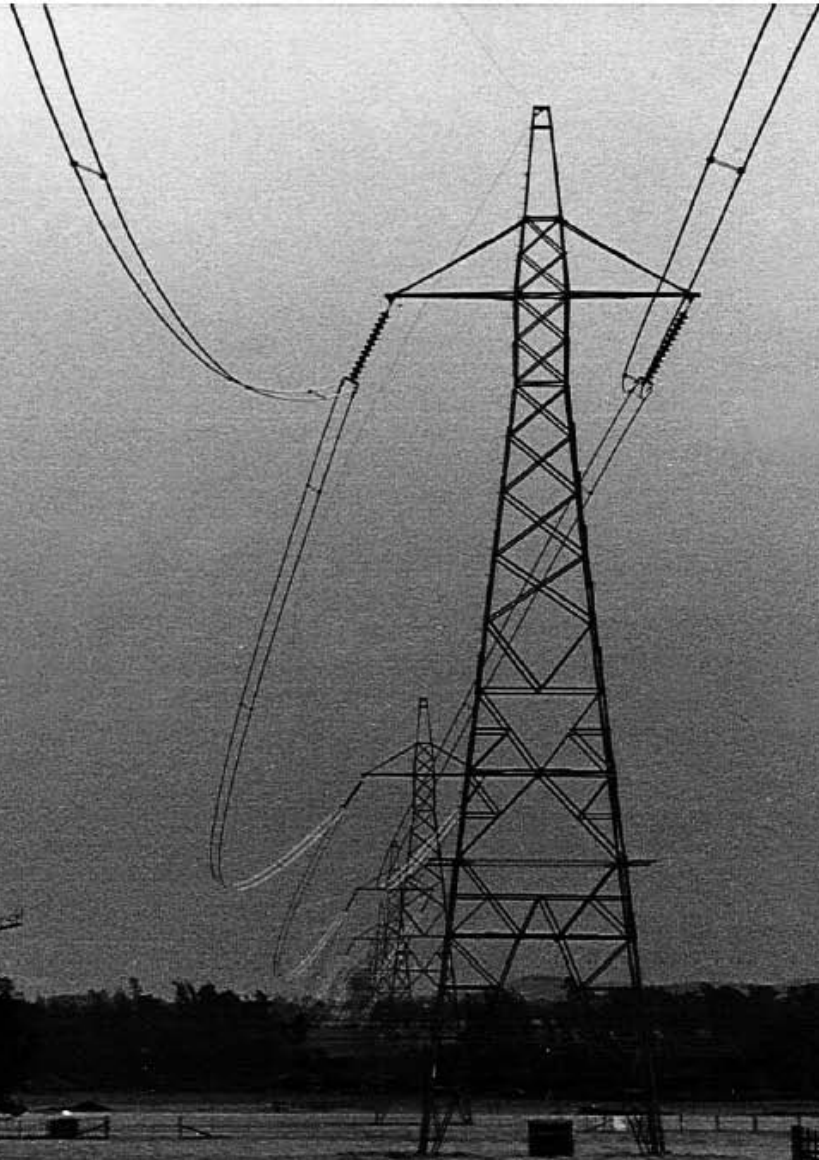
- The Pole 2/3 Control System



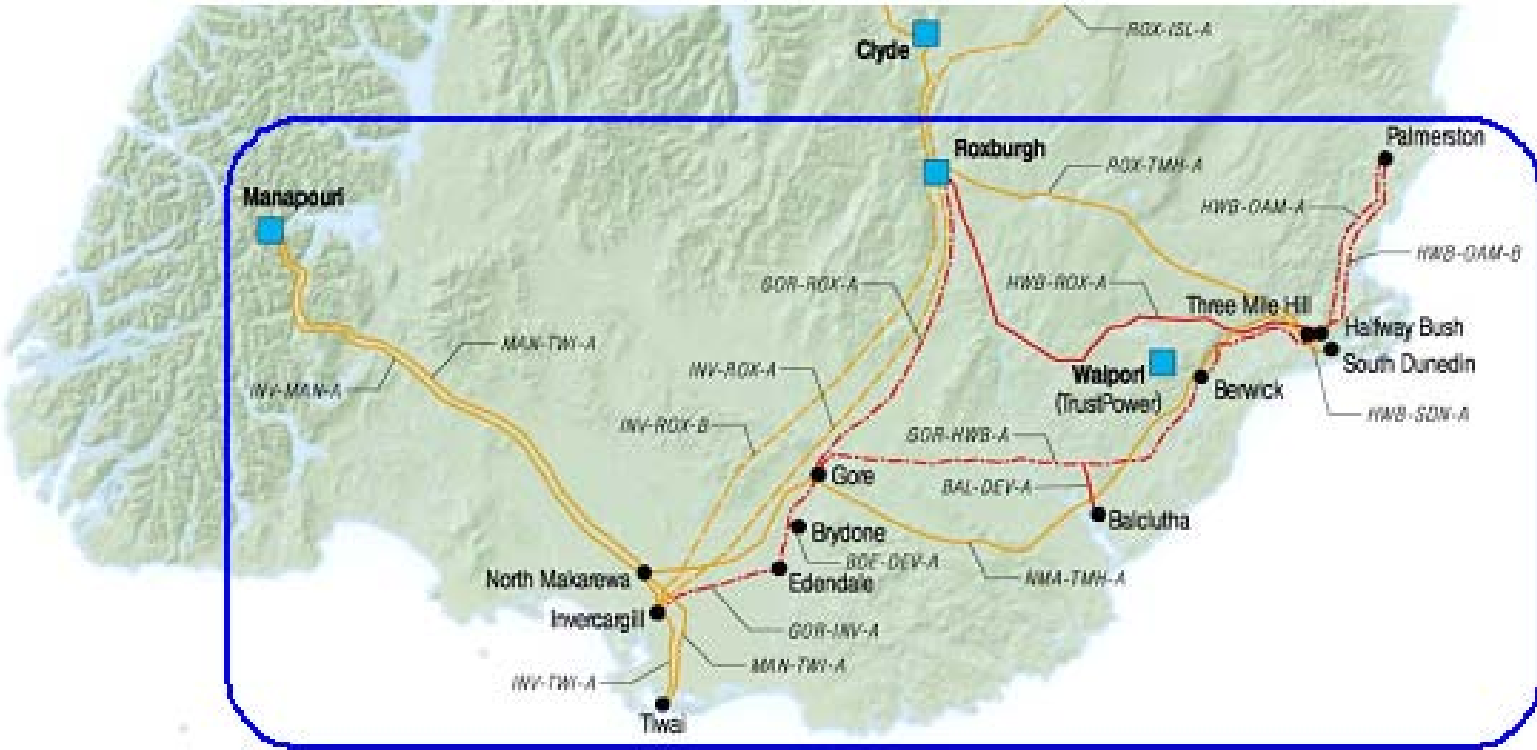
HVDC tower in high winds,
just before it collapsed.

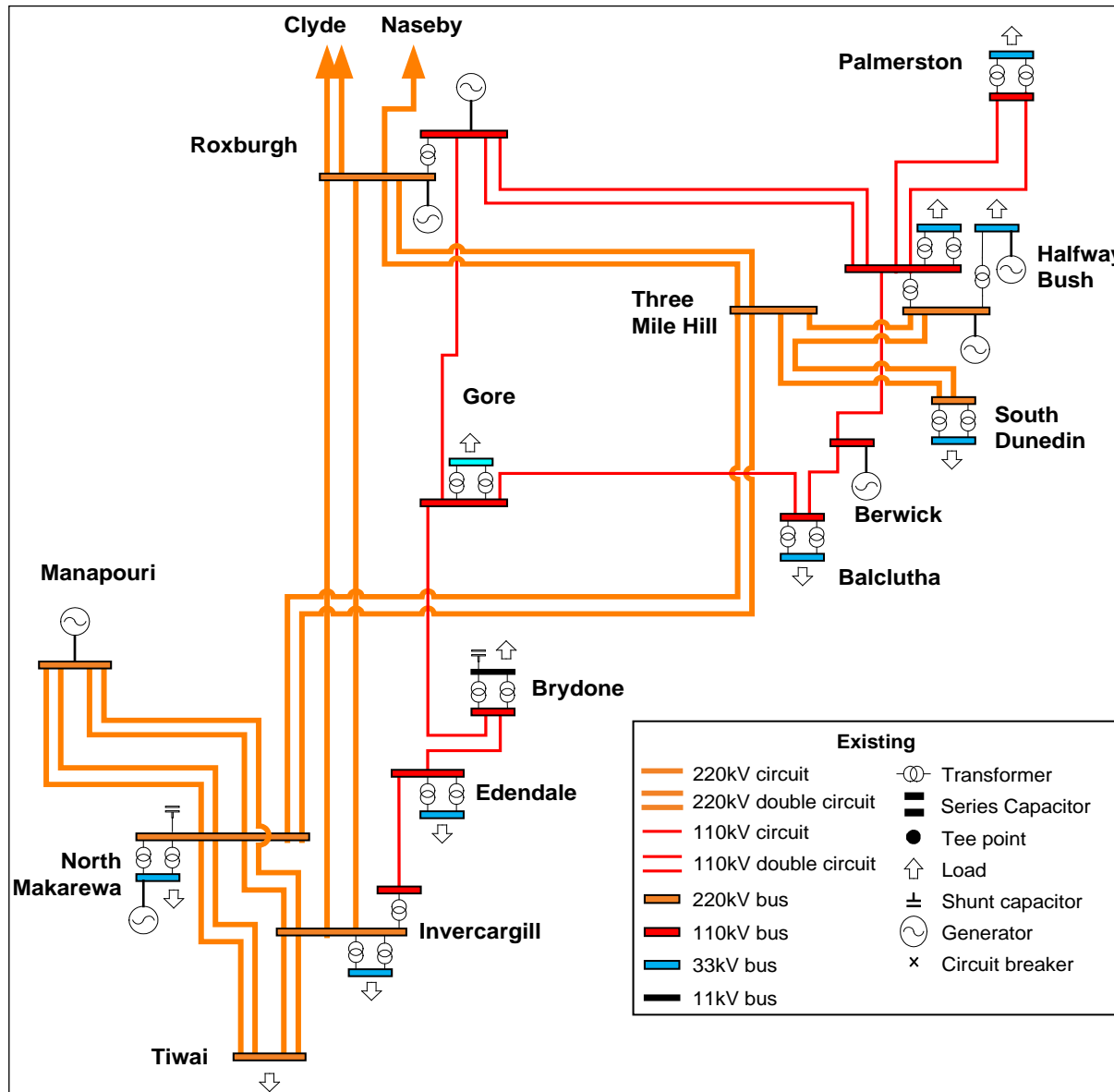
EARLE NUNN August 1975

- Variable ratings



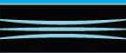
- Series capacitors





Integrating generation and the grid

- Coordinated operation of renewable generation and the grid
- New HVDC controls designed for integrated operation with AC network
- Future - AGC + , to manage generation and transmission events

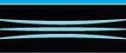


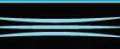
The two way grid - consumer response

- Interruptible load initiative - defer timing of grid build in Auckland
- Utilising the consumer technologies currently being installed
- *The future, fully interactive system?*



The two way grid – “fly by wire”





We must have better information on the dynamic response of the grid

Scada

X-rays show the bone structure

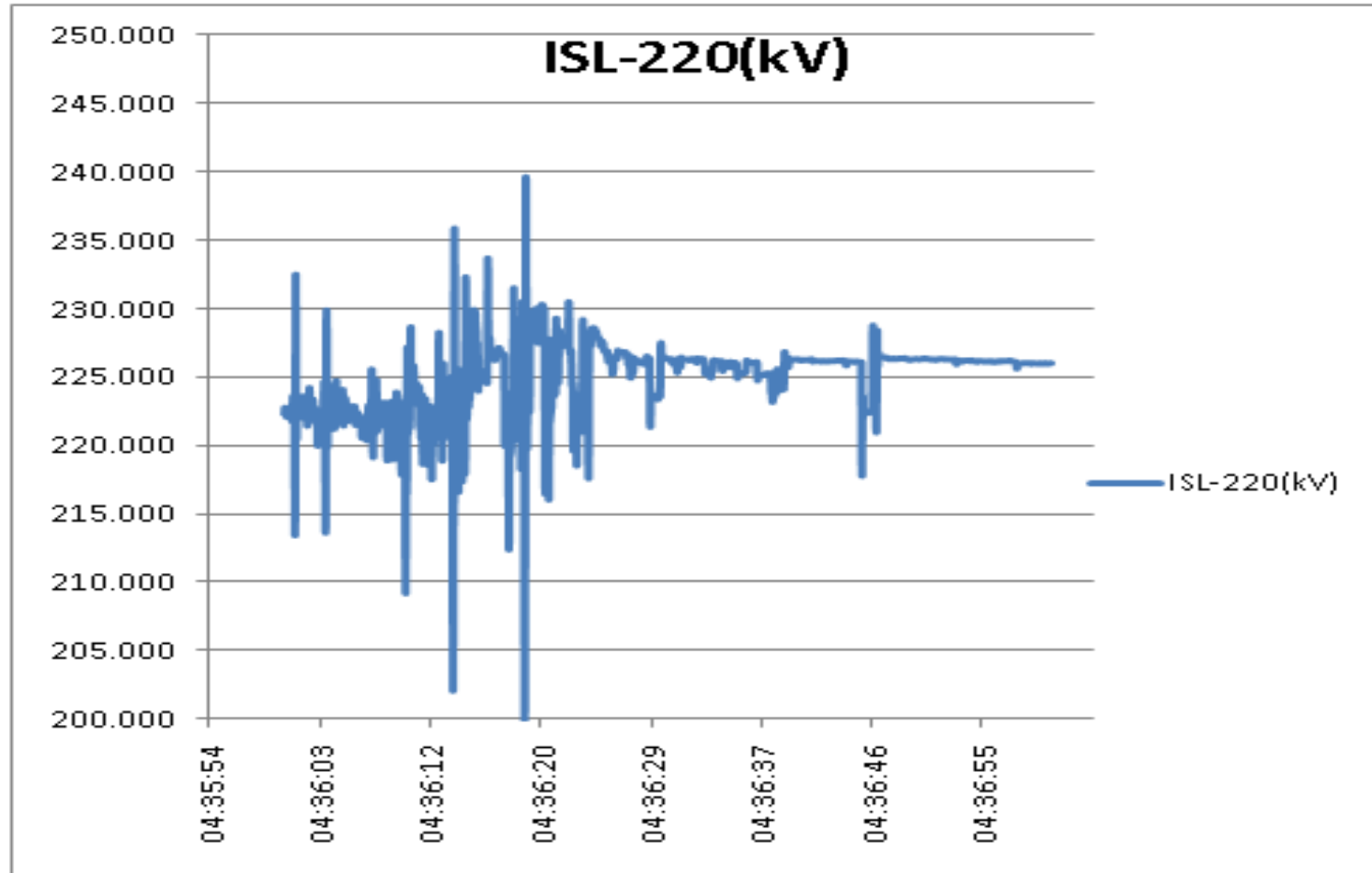


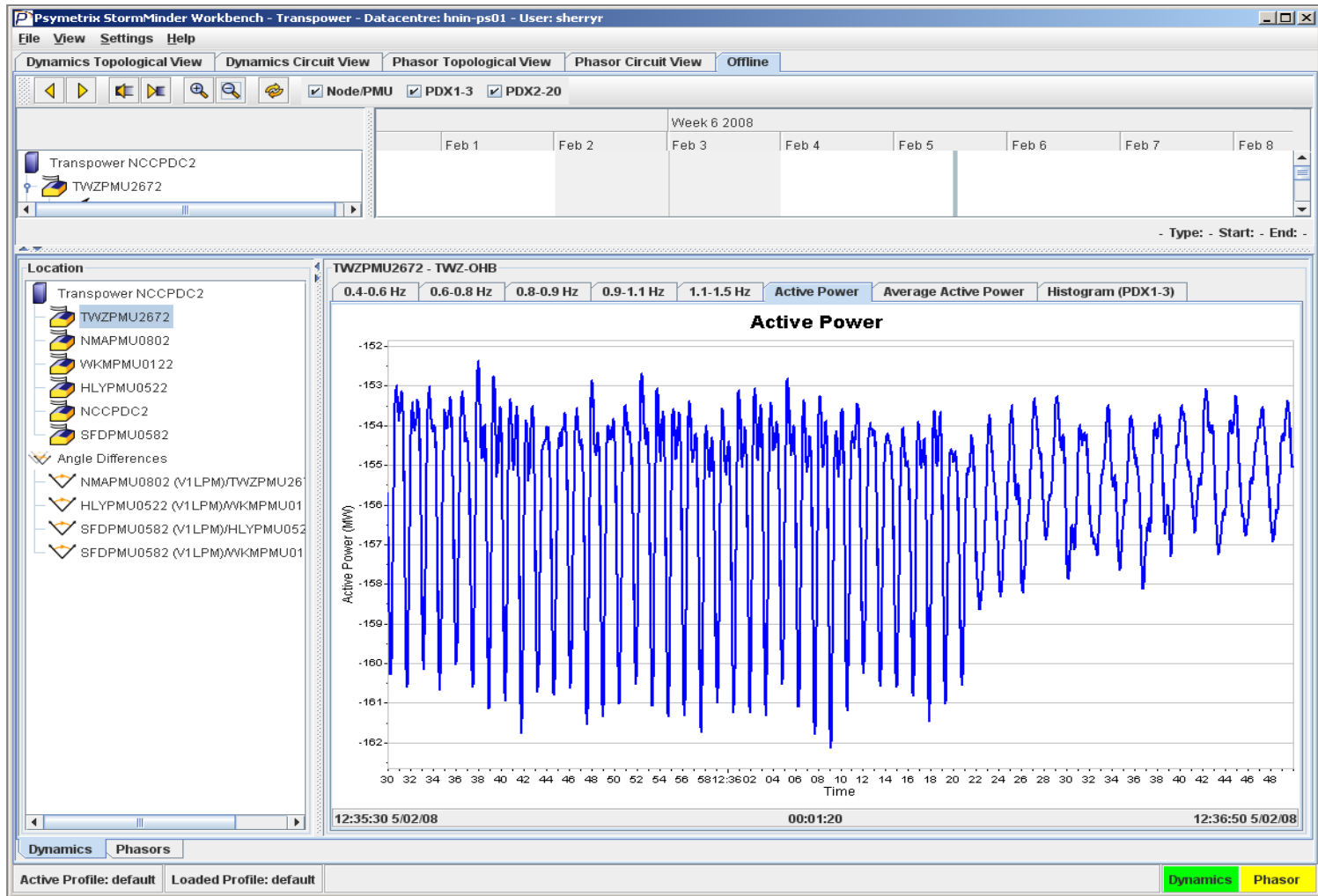
Phasor

CT scans show the soft structures as well



post-earthquake





- We will have, over time, vast information on the dynamic situation of the grid



To use it, we must develop tools to visualise all this for the operator



