The Cost of Information

Industrial Decarbonisation via Electrification

Nathan Miller
The RETA Project

EECA
TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

Electrical & Civil Consulting Engineers

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Who is EECA?

The Energy Efficiency & Conservation Authority:

- Build a sustainable energy network for NZ

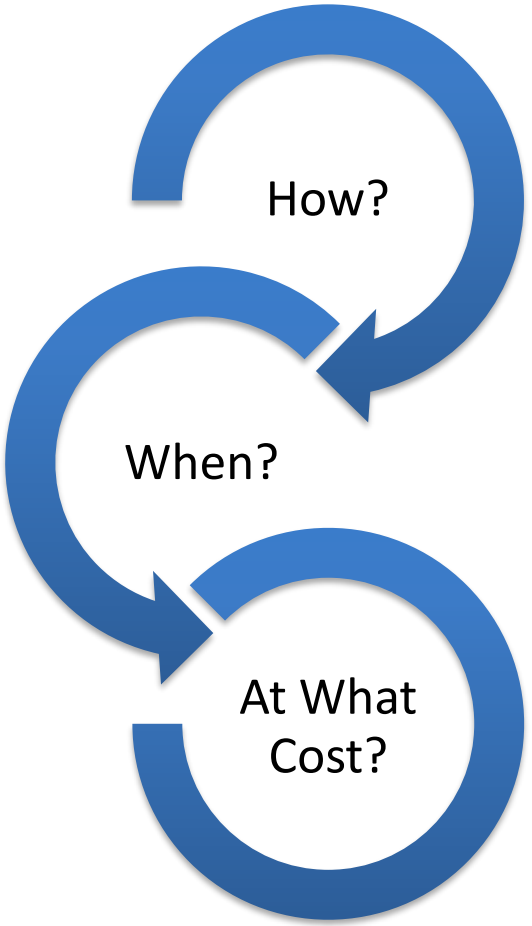
How do they do it?

1. Regulation
2. Information and motivation
3. Targeted investment

The Current Problem

Constraints surrounding conversion:

- Confidence in supply
- **Infrastructure cost & timing**
- Information gaps
- Optimal transition time

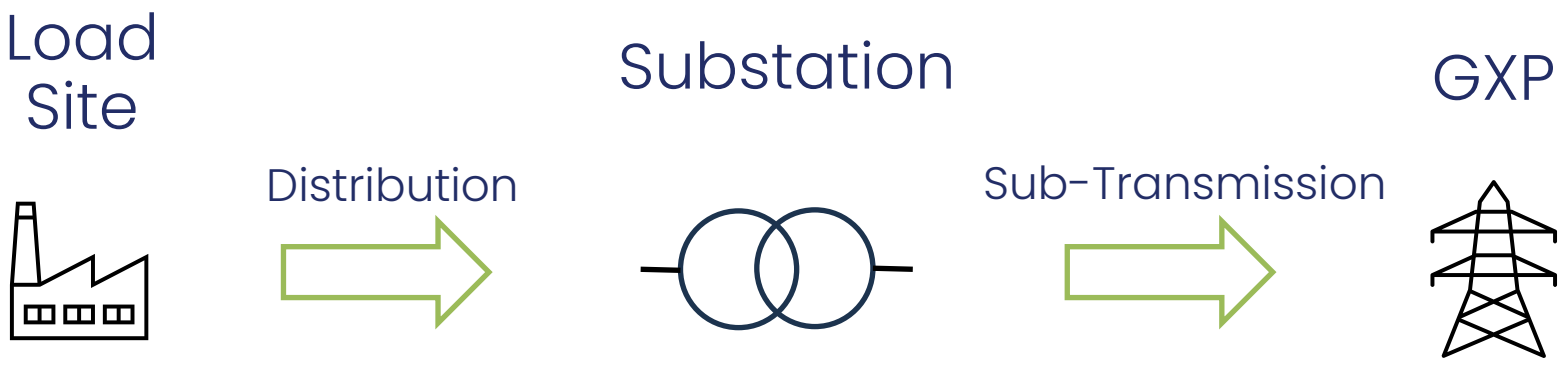


Regional Energy Transition Accelerator

Heat Processes makes up ≈28% of NZ's energy related fossil fuel emissions.

Encourages **electrification** or biomass conversion.

Considers the entire country, one step at a time.



Electrification – The Idea

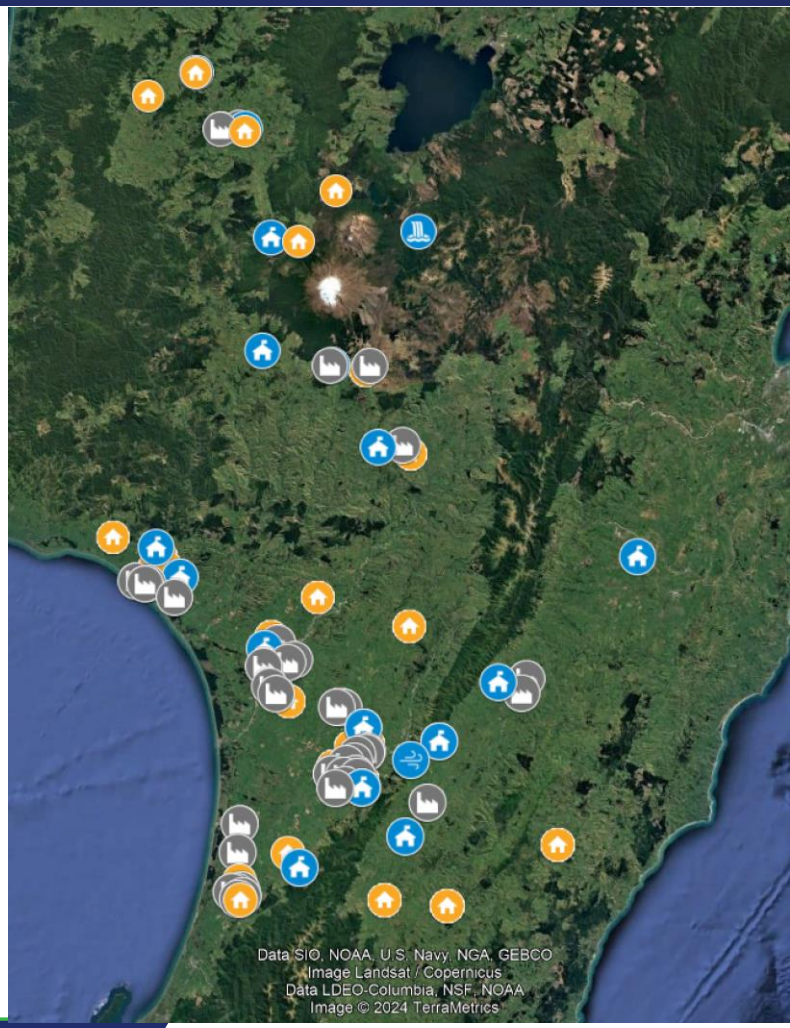
- Provide a system wide, regional view:
  - Network Capacity
  - Network Constraints
- Analyse each electrical substation & GXP:
  - (N) and (N-1) capacity
- Consider Load Conversion Opportunities:
  - Per Site
  - Per Substation
  - Per GXP

The Region - Manawatū-Whanganui

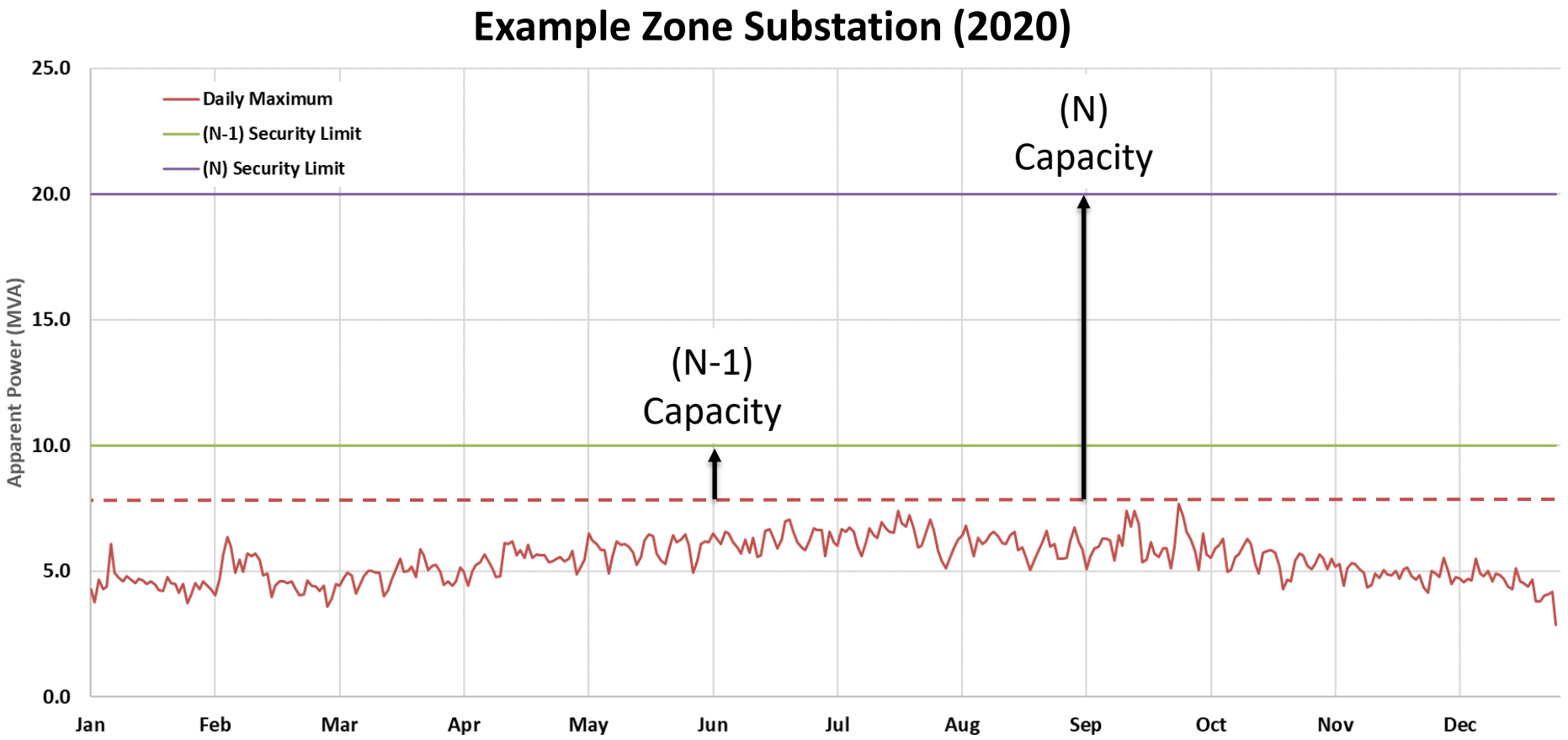
This Region includes:

- 15 Grid Exit Points (GXP)
- 42 Electrical Substations
- 40 Load Sites

Lots of data points to consider!



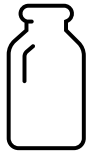
N vs N-1 Capacity



Worked Example

A Dairy Process Facility wants to add 38 MW to the network.

38 MW?

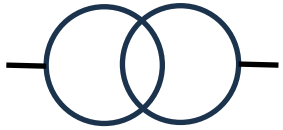


Load Site

(N)

Cable
~3 MVA
Spare

(N) = 13 MVA
(N-1) = 0 MVA

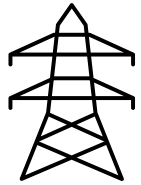


Substation

(N-1)

Lines
~32 MVA
Spare

(N) = 35 MVA
(N-1) = 15 MVA



GXP

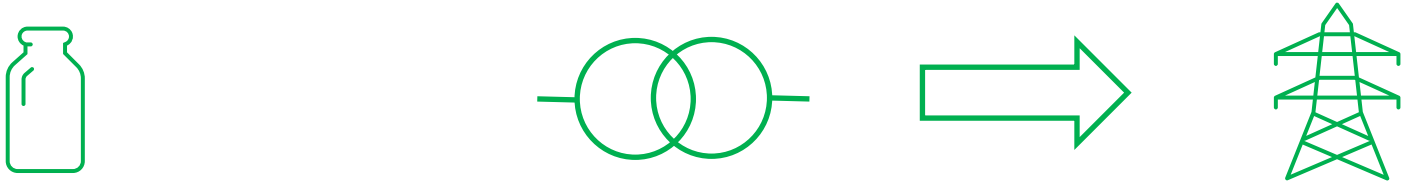
Worked Example - Staging

38 MW is too large to add in one go!

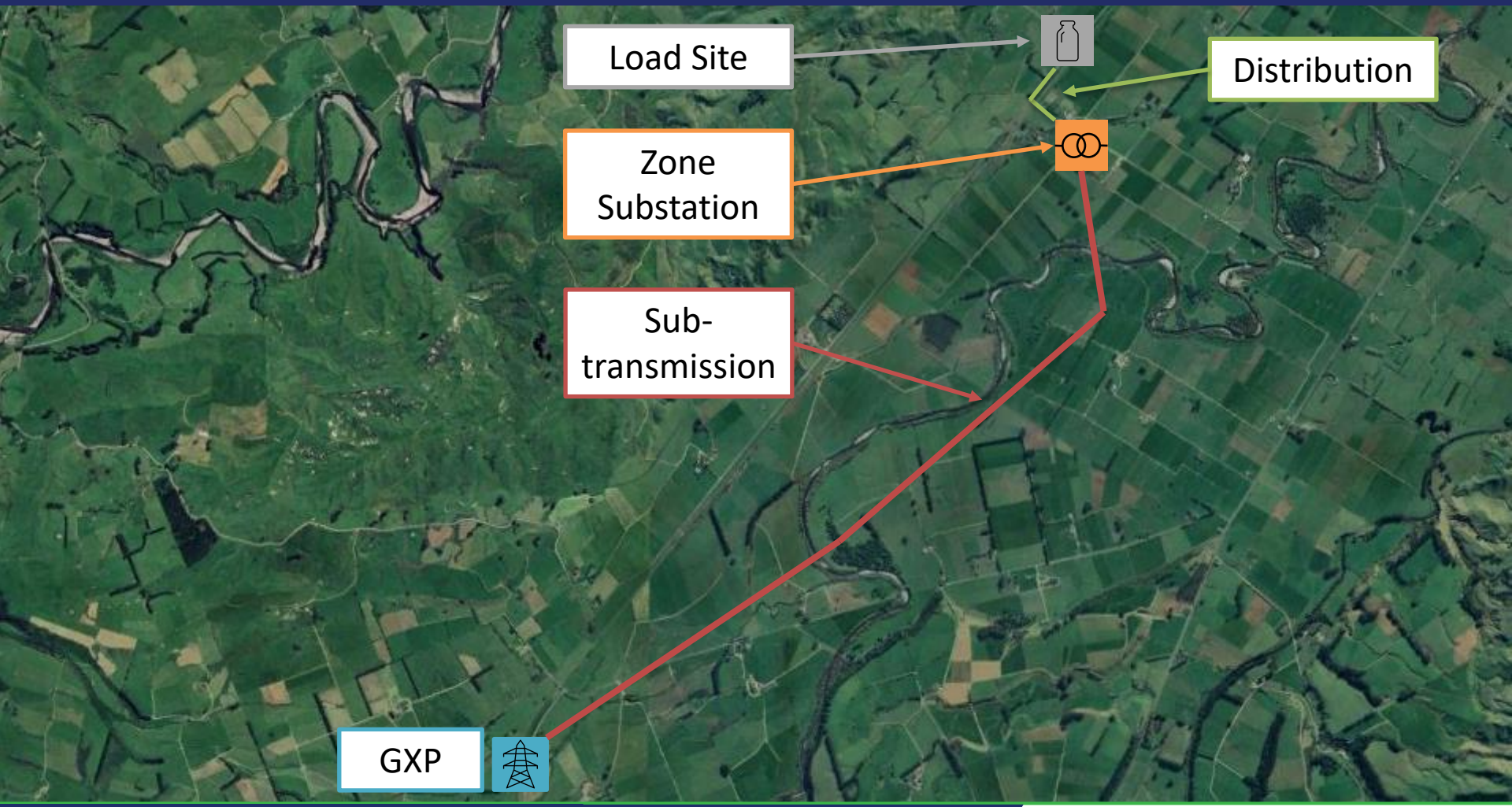
Break into 2 stages:

1. +13 MVA – Upgrade the substation & distribution path

2. +25 MVA – Upgrade the load Site, substation, sub-transmission path & GXP!



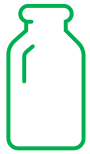
Worked Example – Lay of the Land



Worked Example - Result

A successful upgrade requires changes at every level!

Tx Upgrade

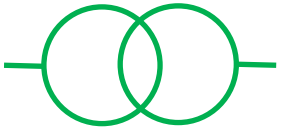


Load Site

(N)

2x 33kV Feeders

Switchboard Upgrade

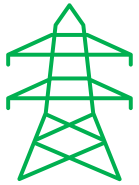


Substation

(N-1)

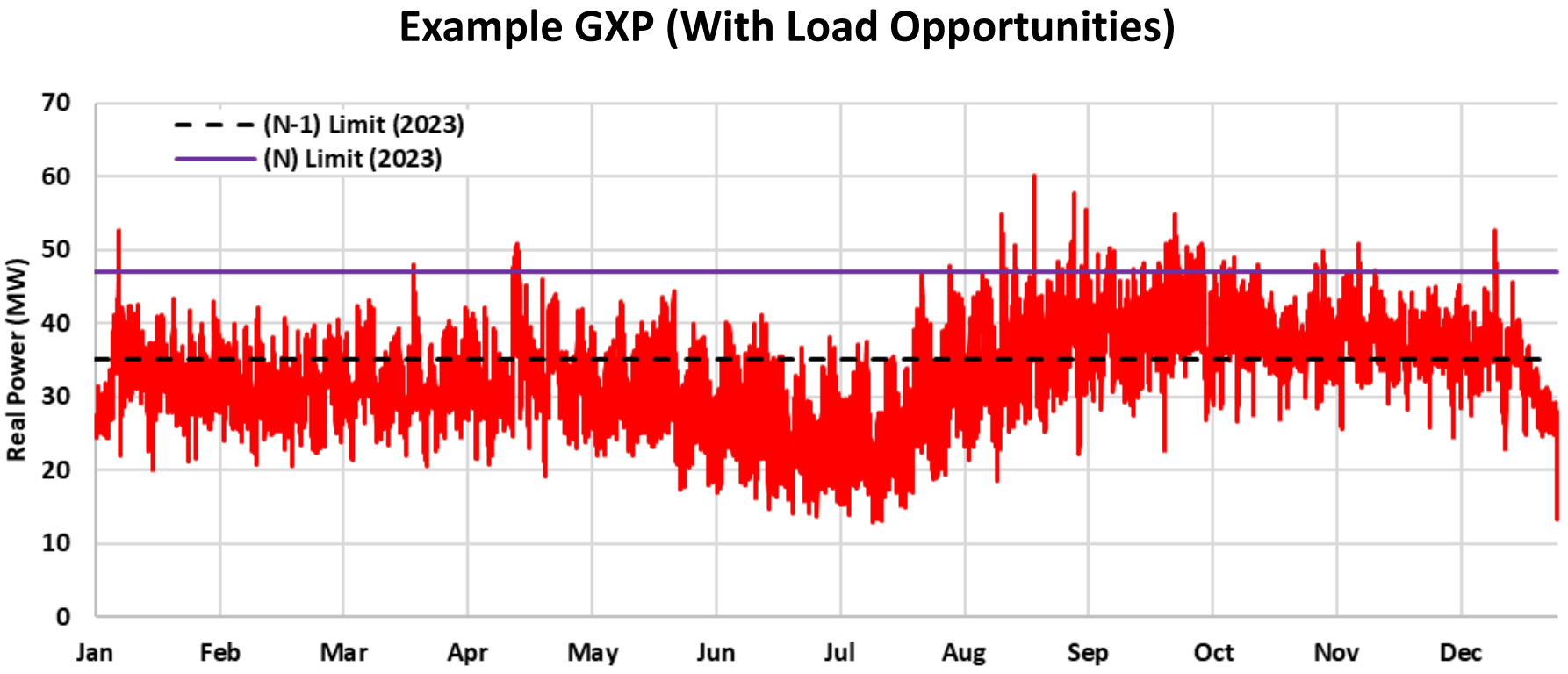
New Sub. Trans Cable

Tx Upgrade



GXP

Impact on GXPs (Usually)



The Hurdle - Information

- Quality of information at every step is vital

- Three main types of information
  - Loading data
  - Cable / lines ampacity
  - Upgrade costs

- Three main stages
  - Distribution
  - Sub-transmission
  - Transmission (GXP)

Data – The Good

Bless you Powerco

Bless you Transpower

EMI ELECTRICITY AUTHORITY TE MANA HIKO

HOME RETAIL WHOLESALE FORWARD MARKETS ENVIRONMENT

Wholesale category / Datasets ▸ Transmission ▸ Power systems analysis ▸ DIgSILENT Powerfactory case files

Wholesale datasets

DIgSILENT Powerfactory case files

Transpower uses the Powerfactory power systems software from DIgSILENT. Representative Powerfactory case files, one for the North Island and one for th
available by Transpower at the end of each year.

See the readme file for more details about the various case files.

Name	Date modified
202311 EMI Powerfactory Cases Summary (updated Sep 2024).pdf	25 Sep 2024
202311 EMI Powerfactory Cases Summary.pdf	12 Dec 2023
202311NorthIsland (updated Sep 2024).pfd	25 Sep 2024
202311NorthIsland.pfd	12 Dec 2023
202311SouthIsland.pfd	12 Dec 2023
202210 EMI Powerfactory case file summary.pdf	03 Nov 2022

Data – The "Could Be Better"

1. Spreadsheets are great organised and labelled
   - Hard when labels do not match network diagrams

2. Cable data matches archaic cable systems
   - Metrification of New Zealand completed in 1976

3. Files like this break my computer…

Microsoft Excel Comma Separated Values File 809,402 KB

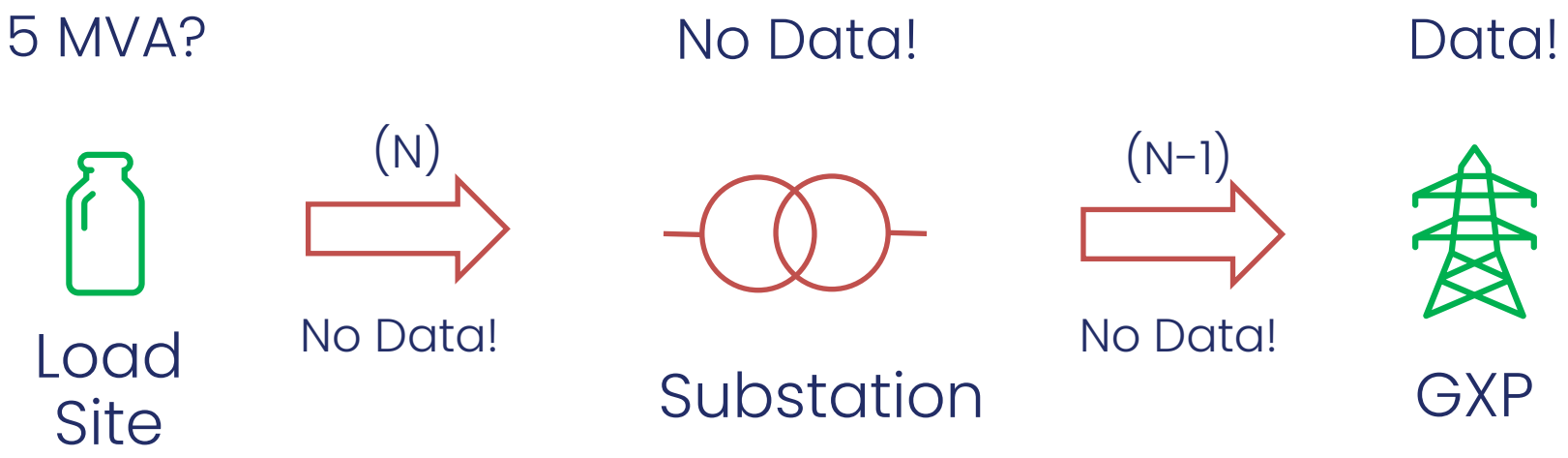
Data – The Missing

?

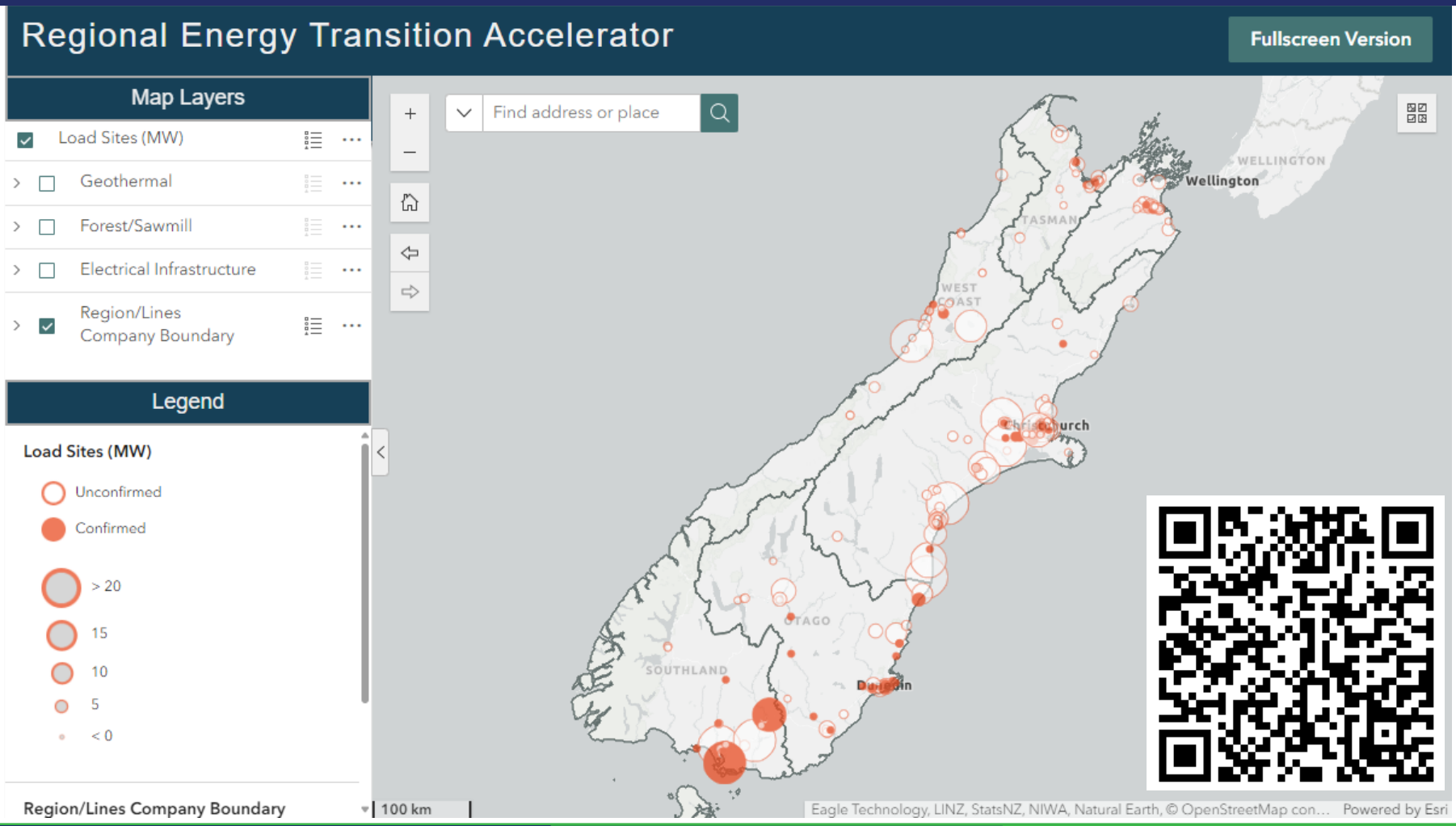
Impact on Findings

Less information = More assumptions

More assumptions = Larger estimated cost



The Power of Visual Data



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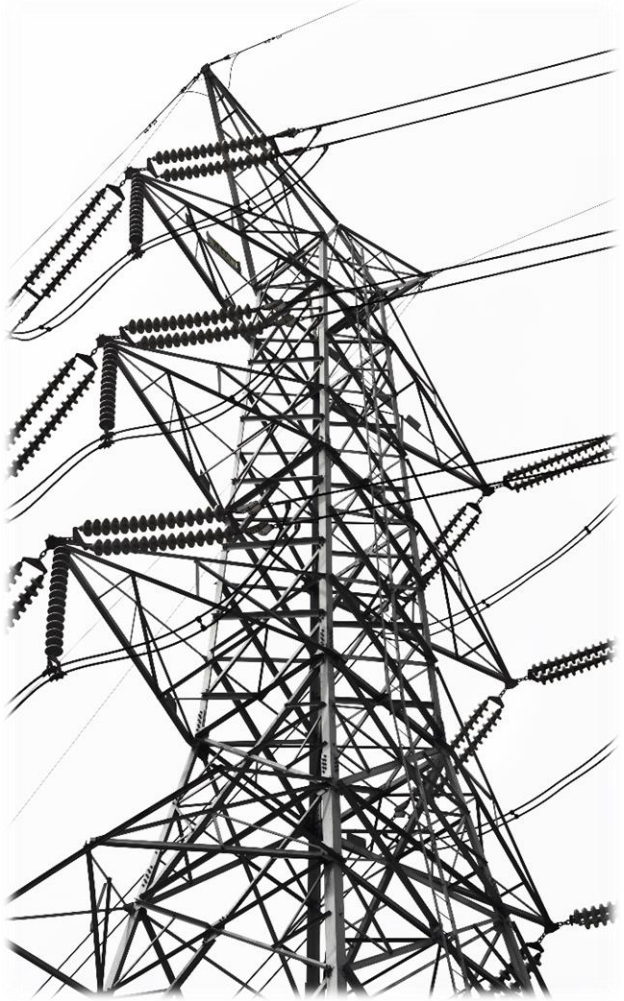
The Sell

Available data makes lives easier!

- Accelerates feasibility studies
- Accelerates network connections

Maps are incredibly useful!

- Identify network constraints
- Gives context to information



Question Time!