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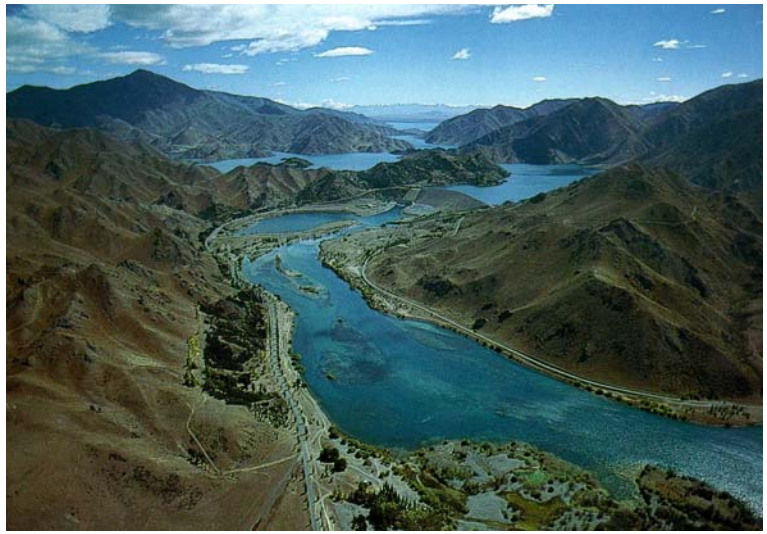
Macro economic issues arising from energy constraints

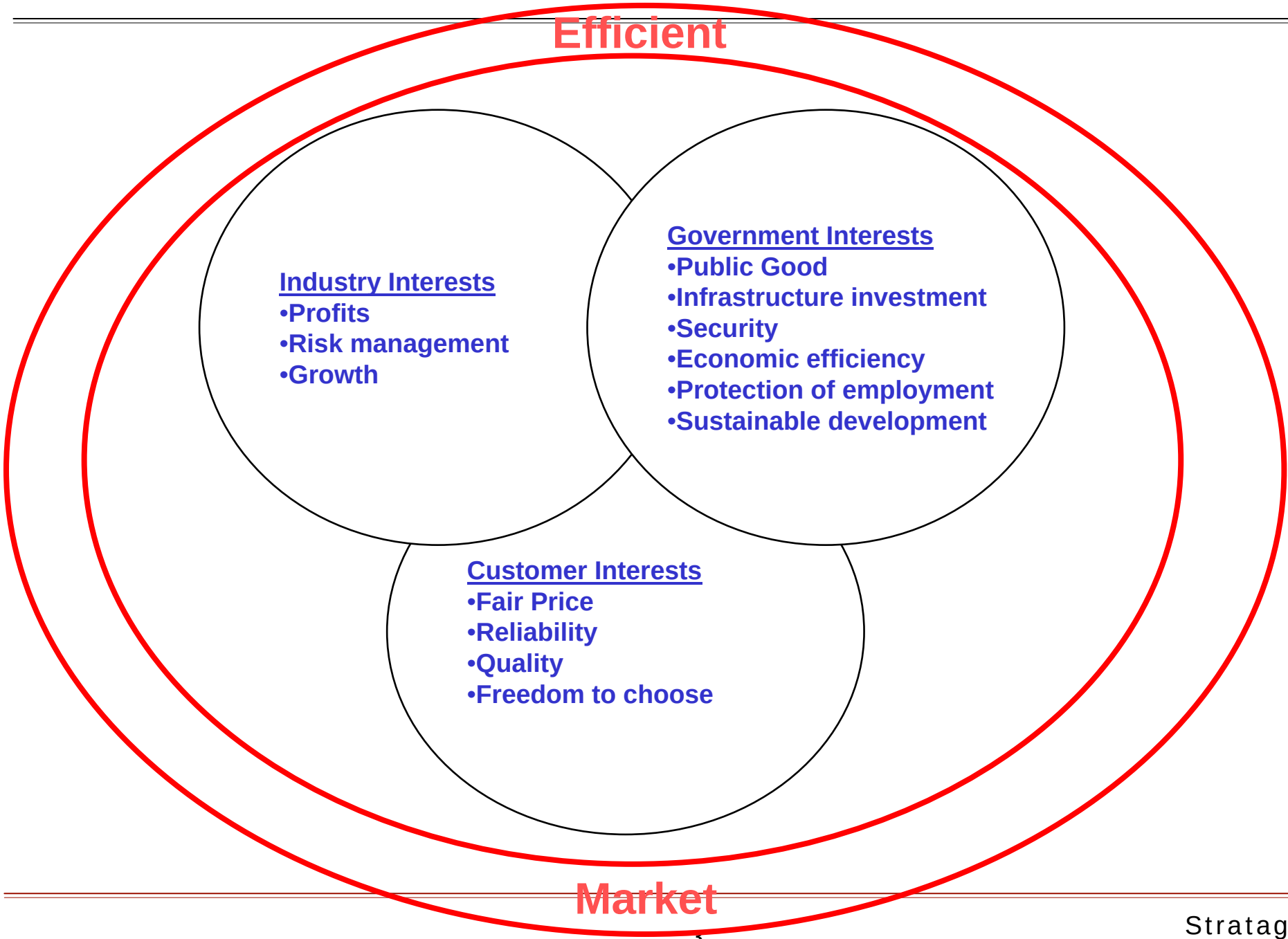
New Zealand case study

New Zealand Tourism

A day trek from the Grand Chateau, Tongariro National Park

Natural New Zealand – 70% Renewable Electricity Supply




Efficient
Industry Interests
•Profits
•Risk management
•Growth
Government Interests
•Public Good
•Infrastructure investment
•Security
•Economic efficiency
•Protection of employment
•Sustainable development
Customer Interests
•Fair Price
•Reliability
•Quality
•Freedom to choose
Market

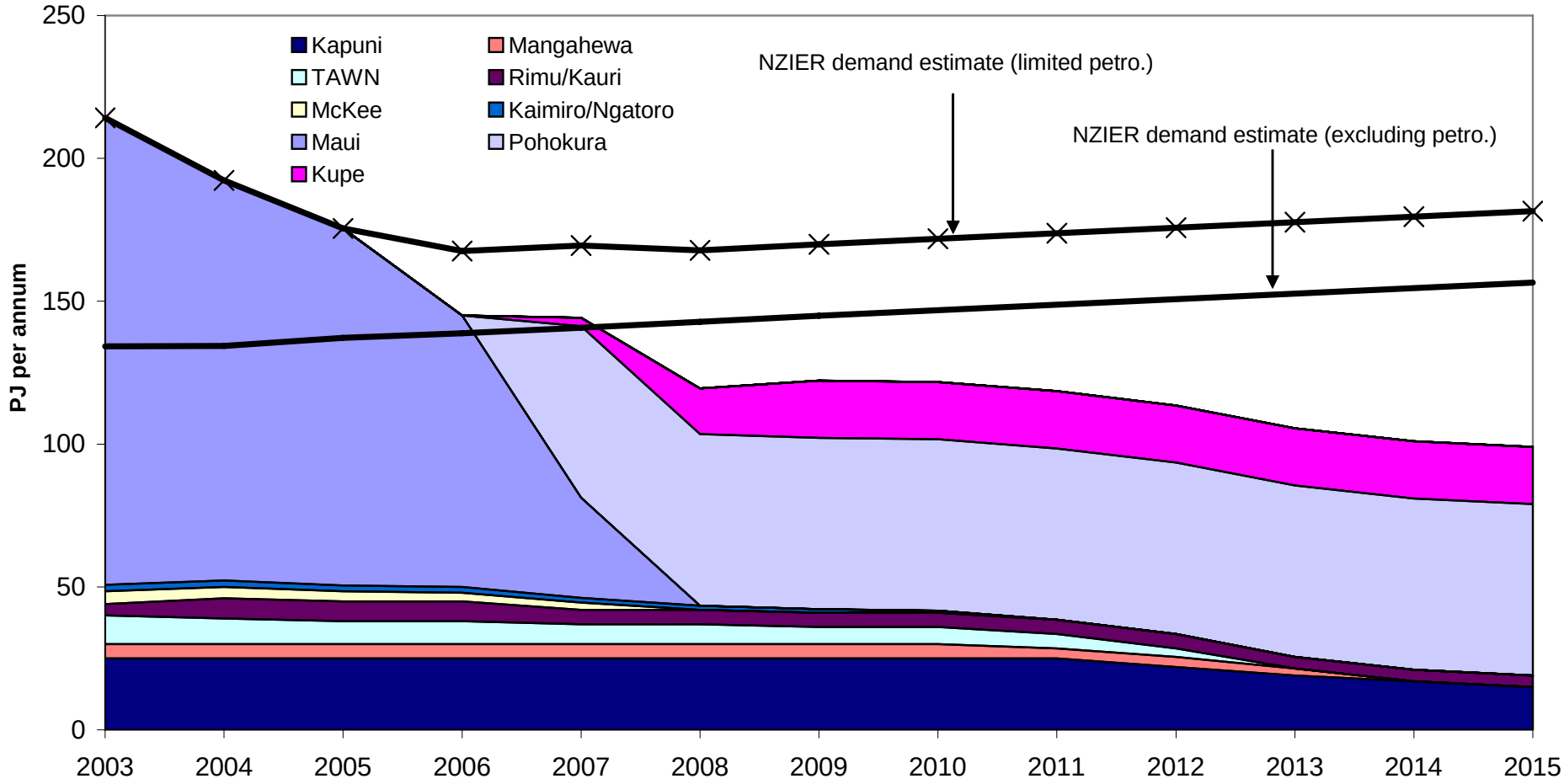
Macro economic issues arising from supply constraints

- **New Zealand's electricity outlook**
  - **Energy constraints**
  - **Transmission constraints**
  - **Other significant factors**
- **Implications for the national economy**
- **The role of demand response**

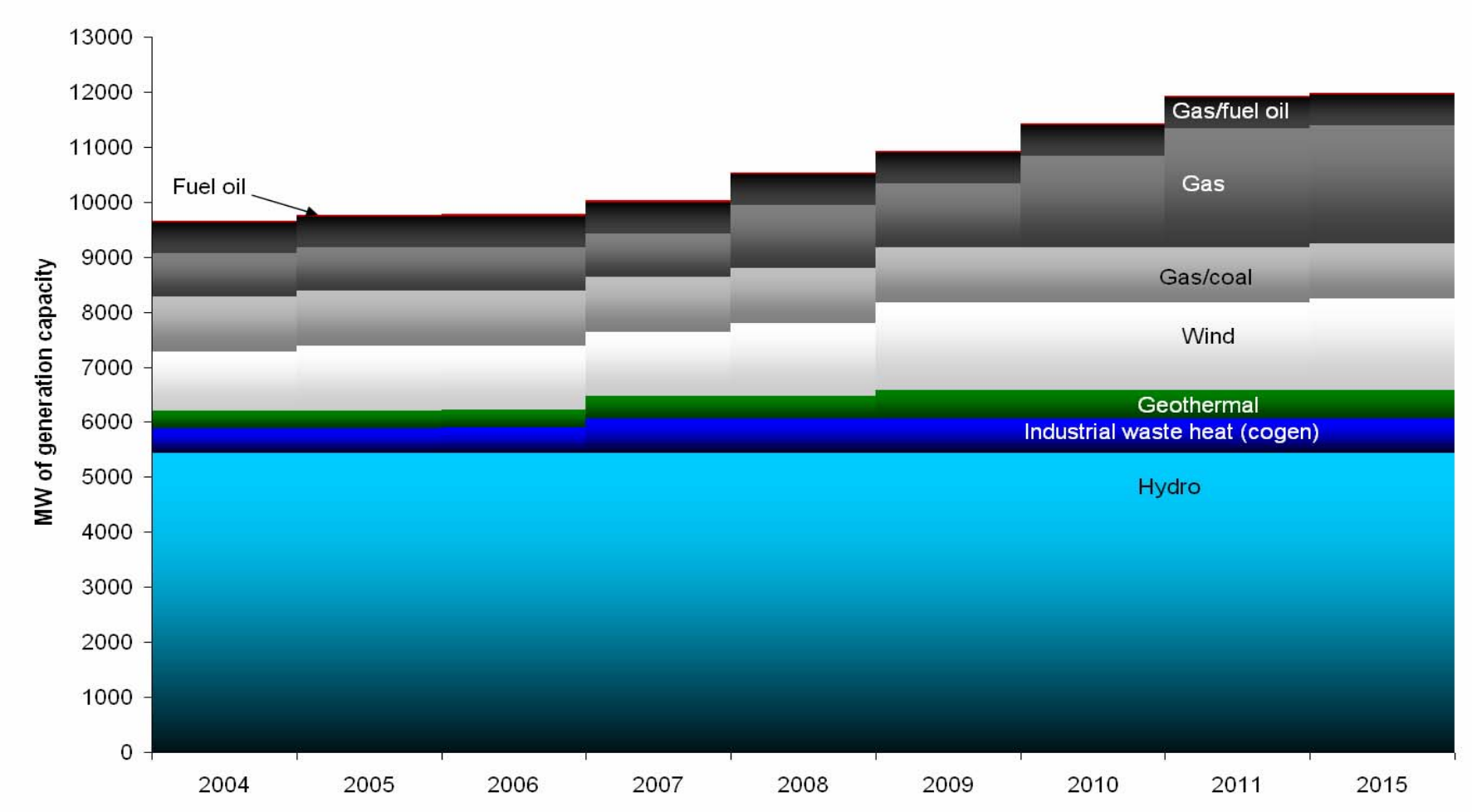
Energy constraints - key issues

- **Reducing supply of primary energy**
- **Increasing demand**
- **Reduced security and higher prices**
- **Increased consenting and compliance process**
- **Carbon emission legislation, emissions trading and levies**
- **Increased Government intervention and regulation**
- **Increased uncertainty and risk for investors**
  - **Electricity suppliers**
  - **Industrial and commercial consumers**

Gas – proven and probable production

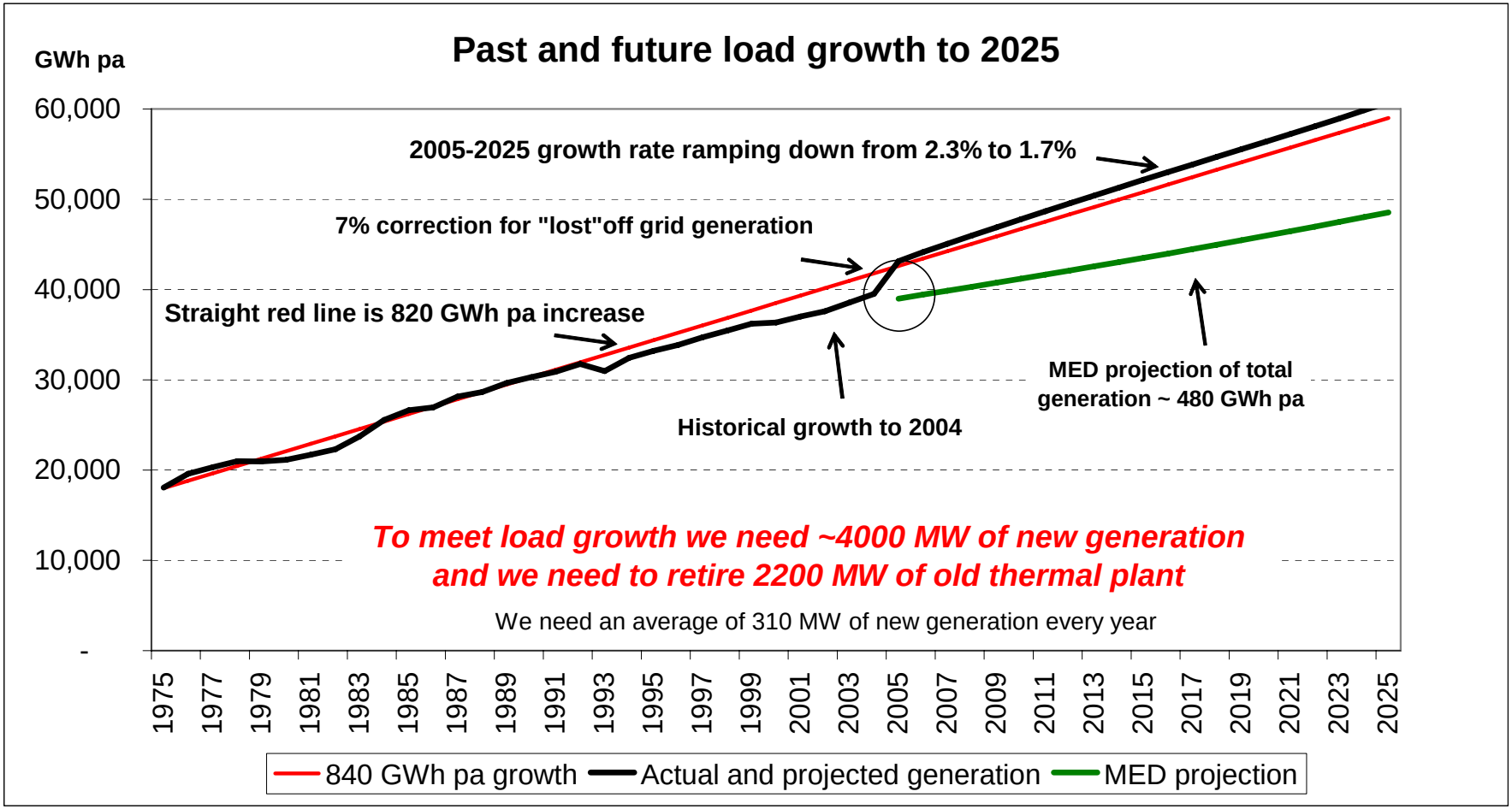


One view of New Zealand's future electricity generation



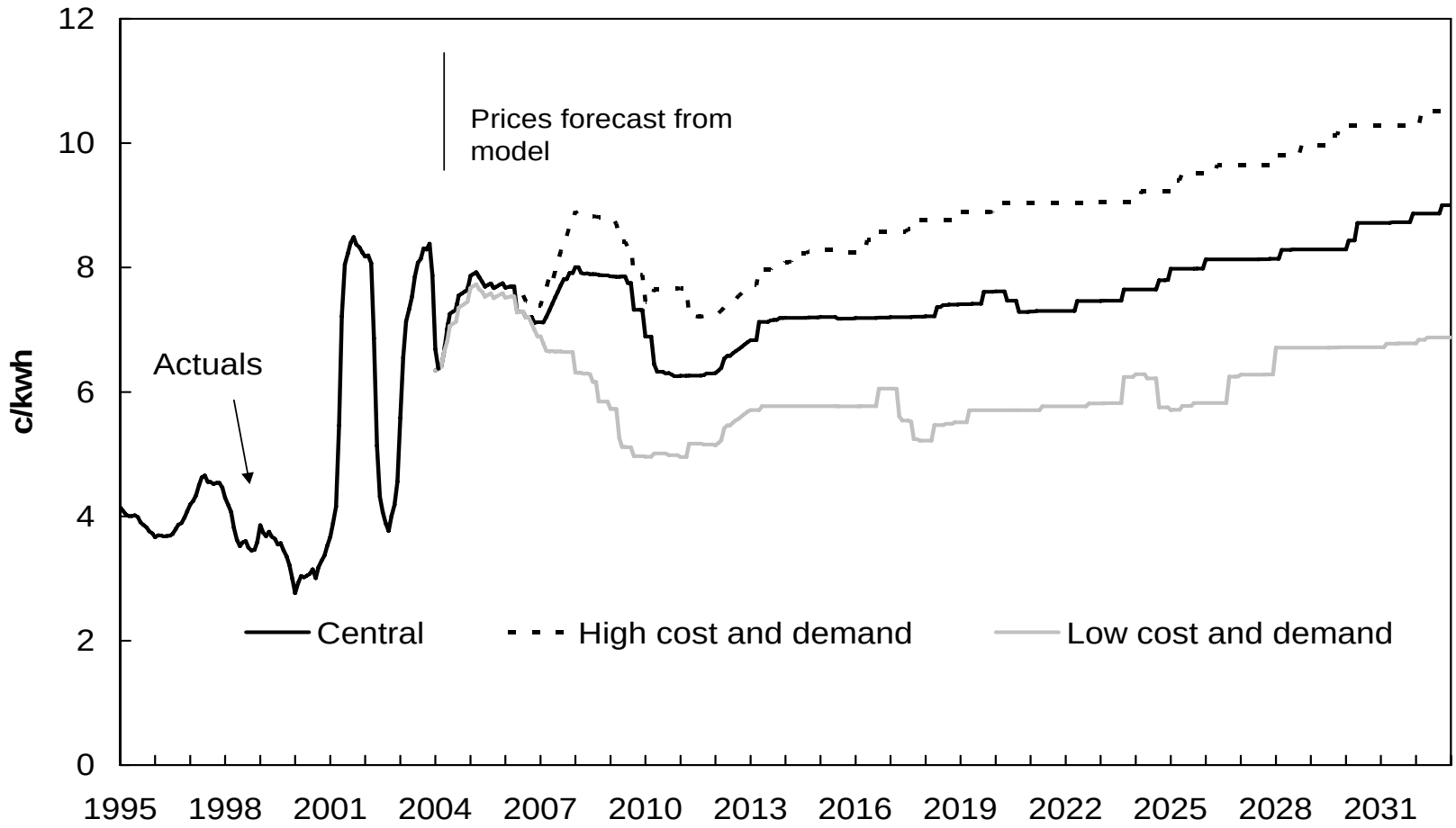
Source: NZIER

Electricity demand growth



Electricity spot-price forecast

(Mean hydro inflows, rolling annual average Haywards price, c/kwh)



New Zealand electricity system features

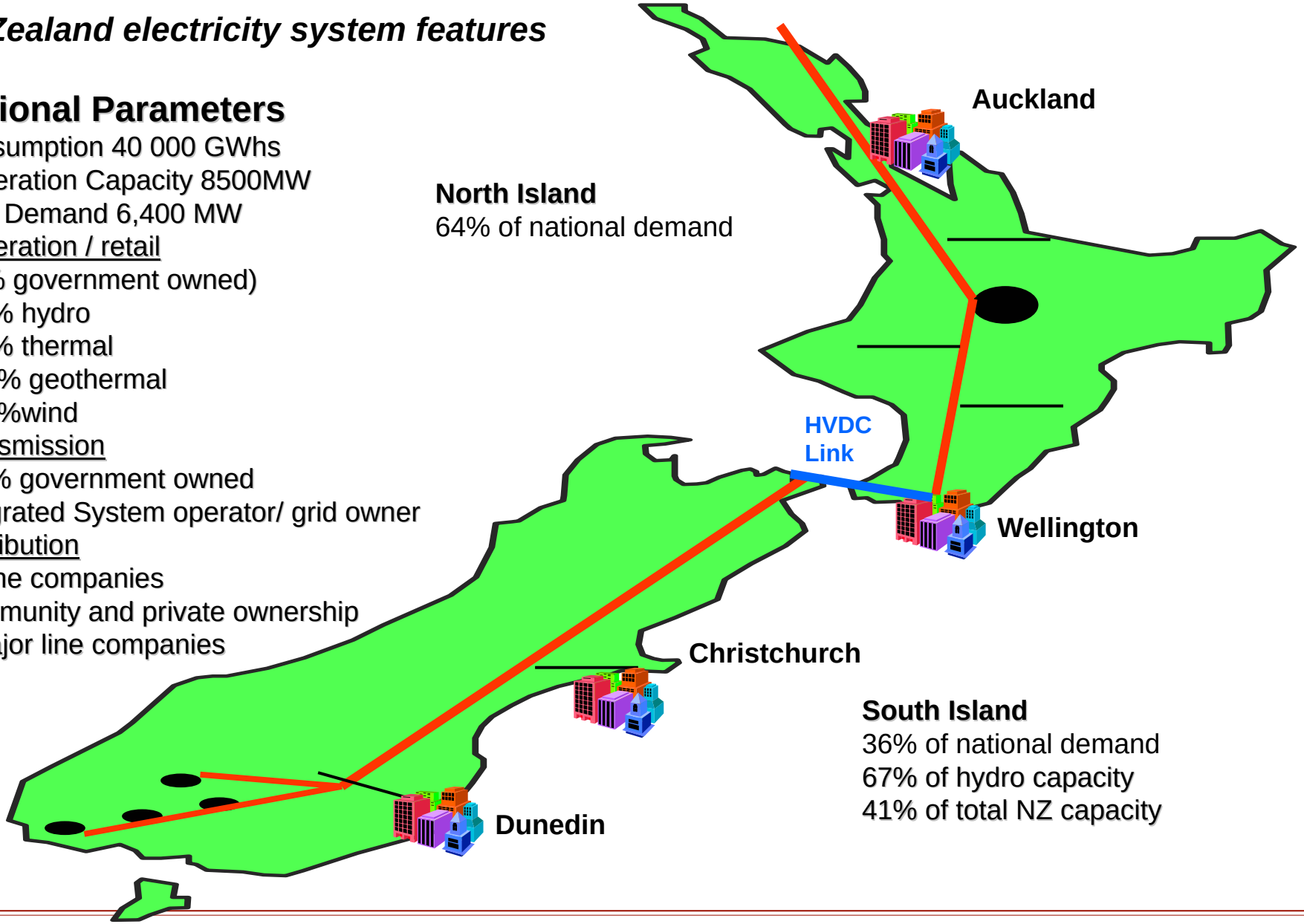
National Parameters

Consumption 40 000 GWhs
Generation Capacity 8500MW
Peal Demand 6,400 MW

<u>Generation / retail</u>
(65% government owned)
- 63% hydro
- 29% thermal
- 5.5% geothermal
- 2.5%wind

<u>Transmission</u>
100% government owned
Integrated System operator/ grid owner

<u>Distribution</u>
35 line companies
Community and private ownership
4 major line companies



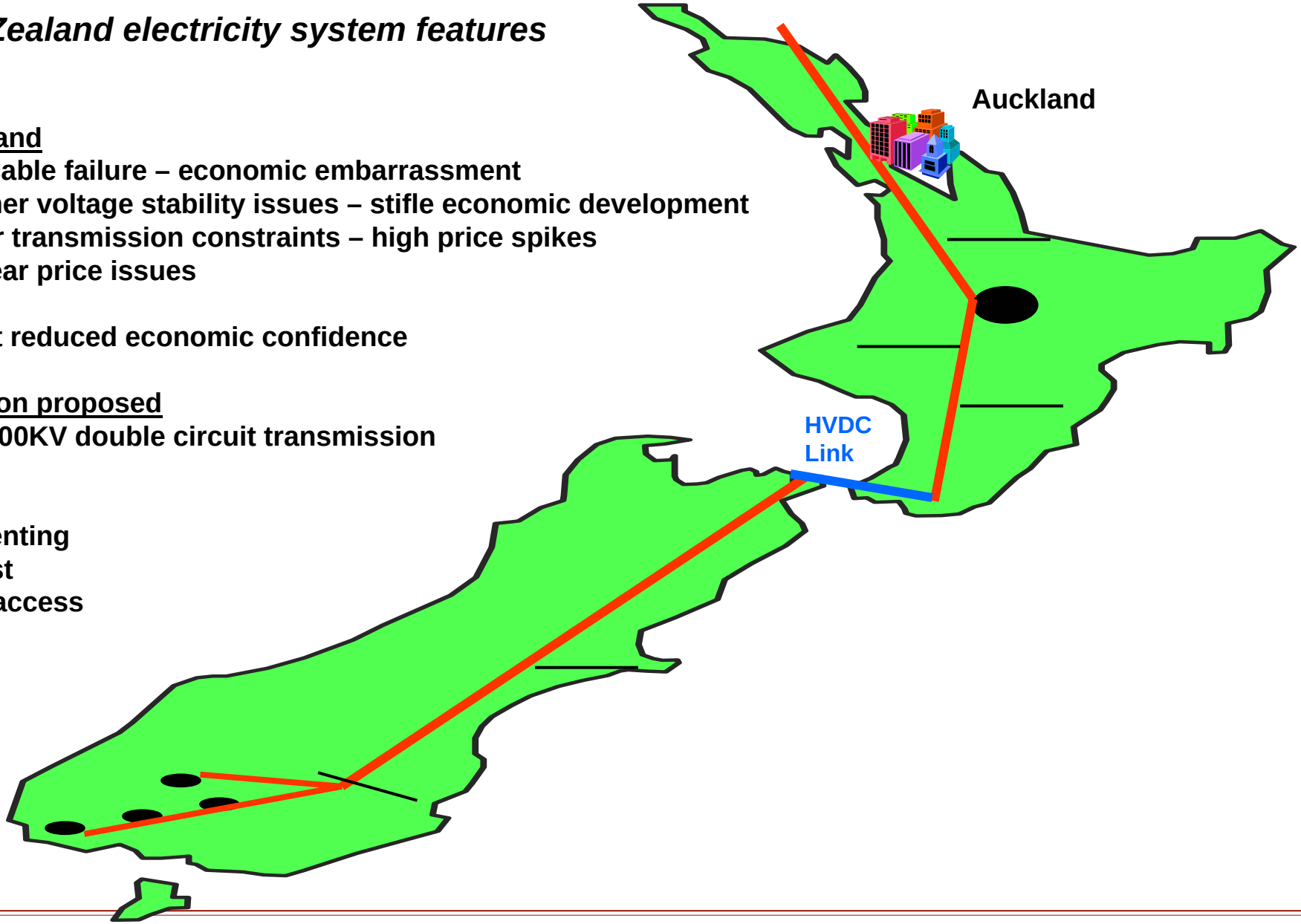
New Zealand electricity system features

Auckland
CBD cable failure – economic embarrassment
Summer voltage stability issues – stifle economic development
Winter transmission constraints – high price spikes
Dry year price issues

Result reduced economic confidence

Solution proposed
New 400KV double circuit transmission

Risks
Consenting
Protest
Land access



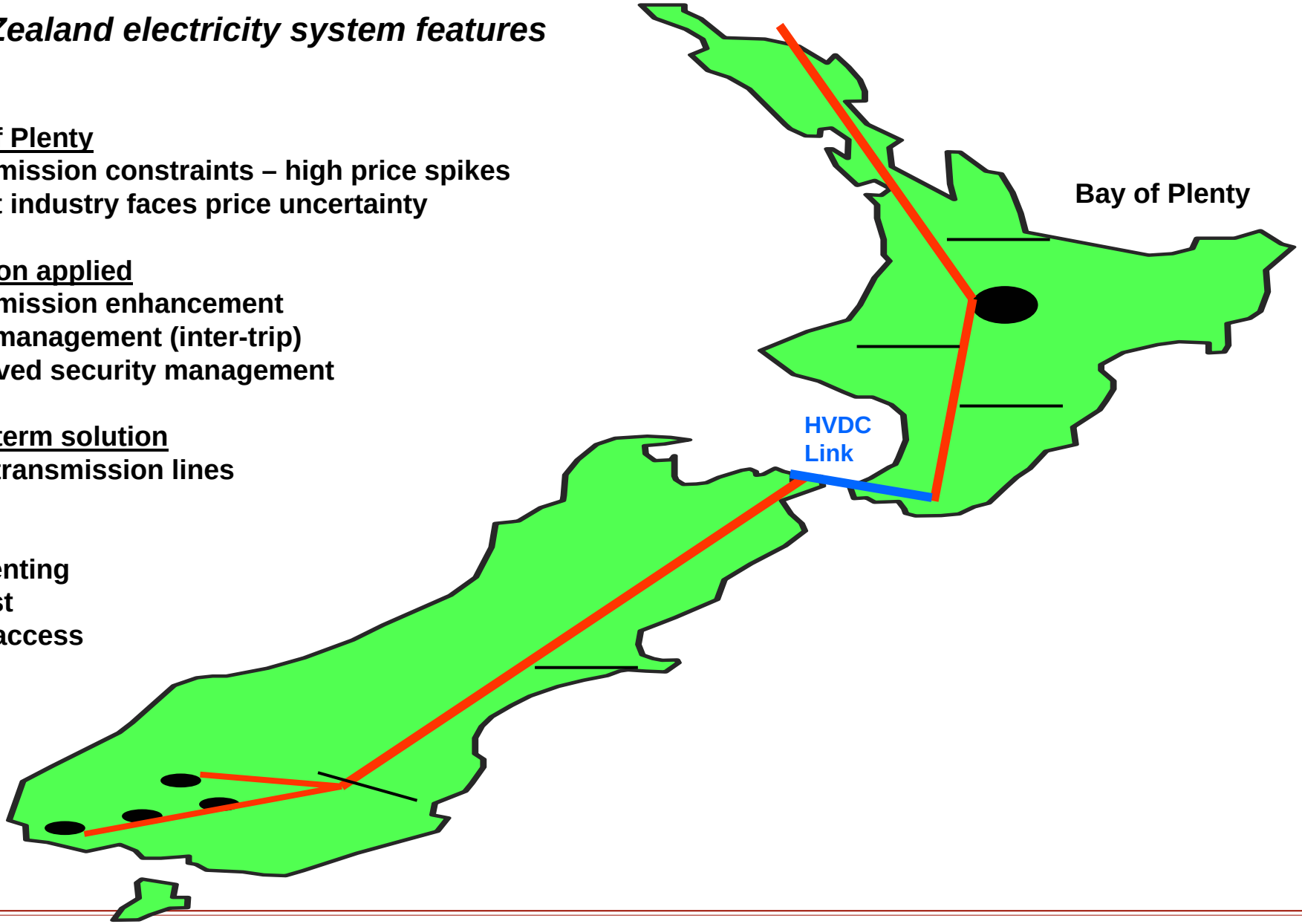
New Zealand electricity system features

Bay of Plenty
Transmission constraints – high price spikes
Result industry faces price uncertainty

Solution applied
Transmission enhancement
Load management (inter-trip)
Improved security management

Long term solution
More transmission lines

Risks
Consenting
Protest
Land access



New Zealand electricity system features

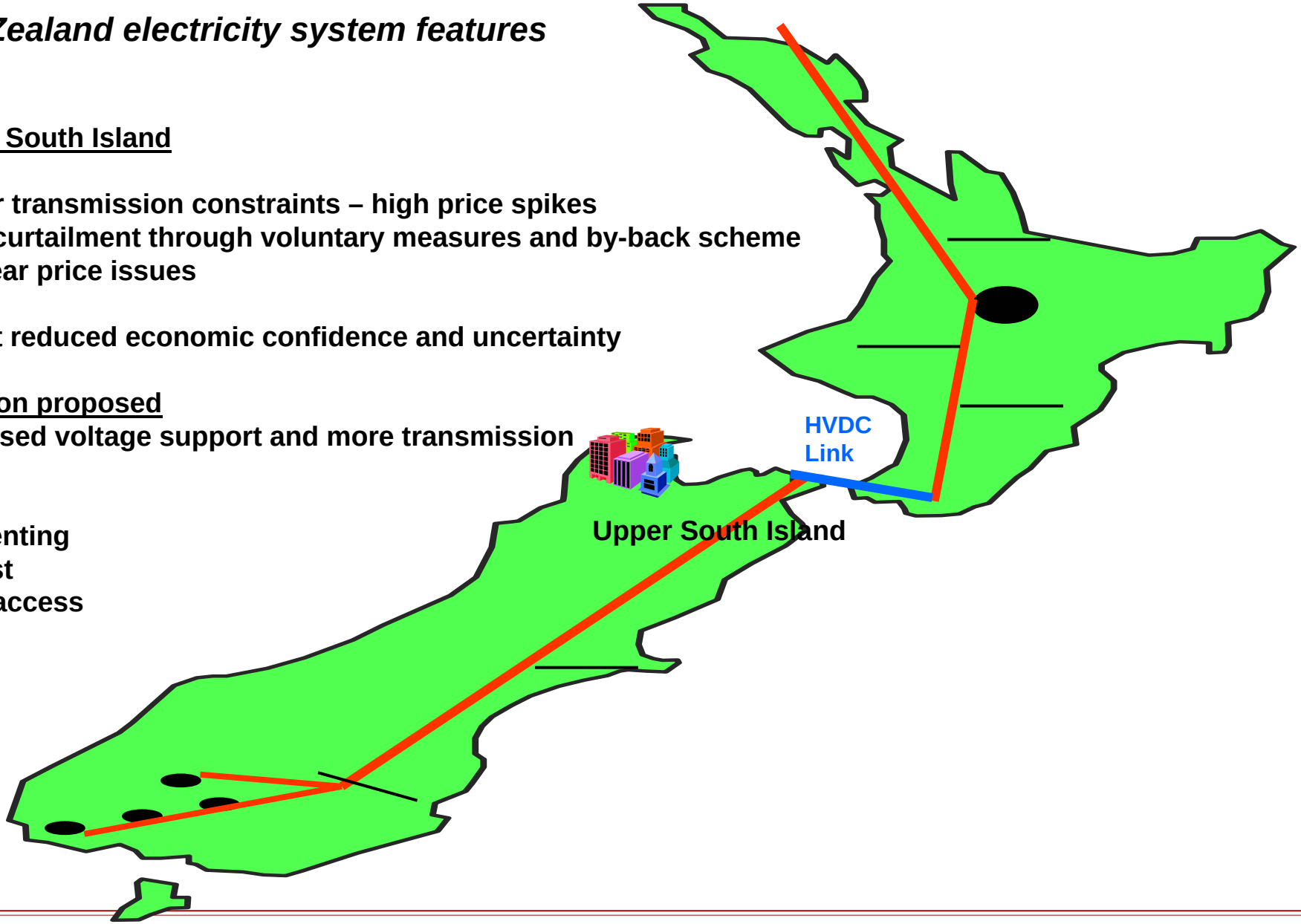
Upper South Island

Winter transmission constraints – high price spikes
Load curtailment through voluntary measures and by-back scheme
Dry year price issues

Result reduced economic confidence and uncertainty

Solution proposed
Increased voltage support and more transmission

Risks
Consenting
Protest
Land access



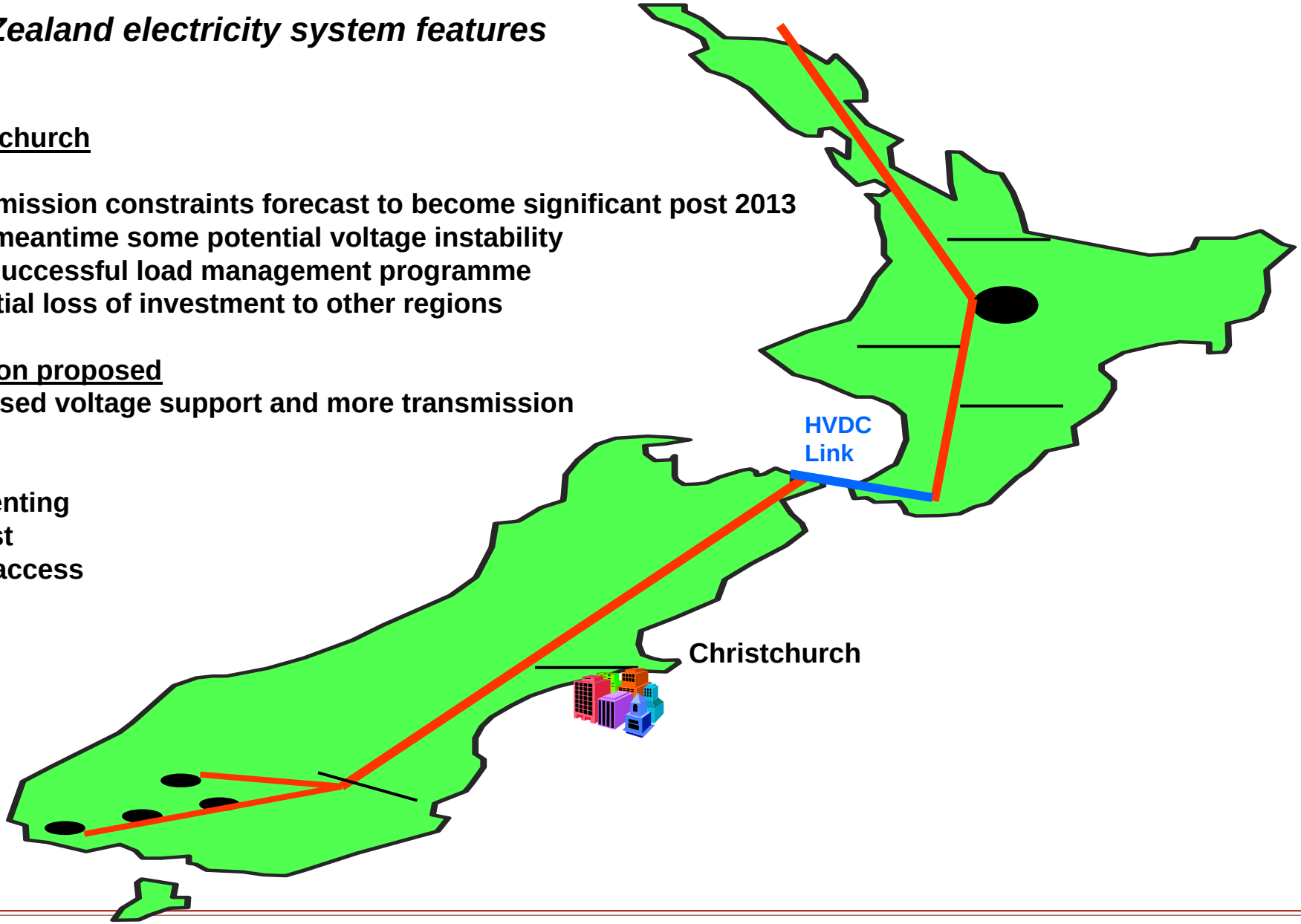
New Zealand electricity system features

Christchurch

Transmission constraints forecast to become significant post 2013
In he meantime some potential voltage instability
Very successful load management programme
Potential loss of investment to other regions

Solution proposed
Increased voltage support and more transmission

Risks
Consenting
Protest
Land access



New Zealand electricity system features

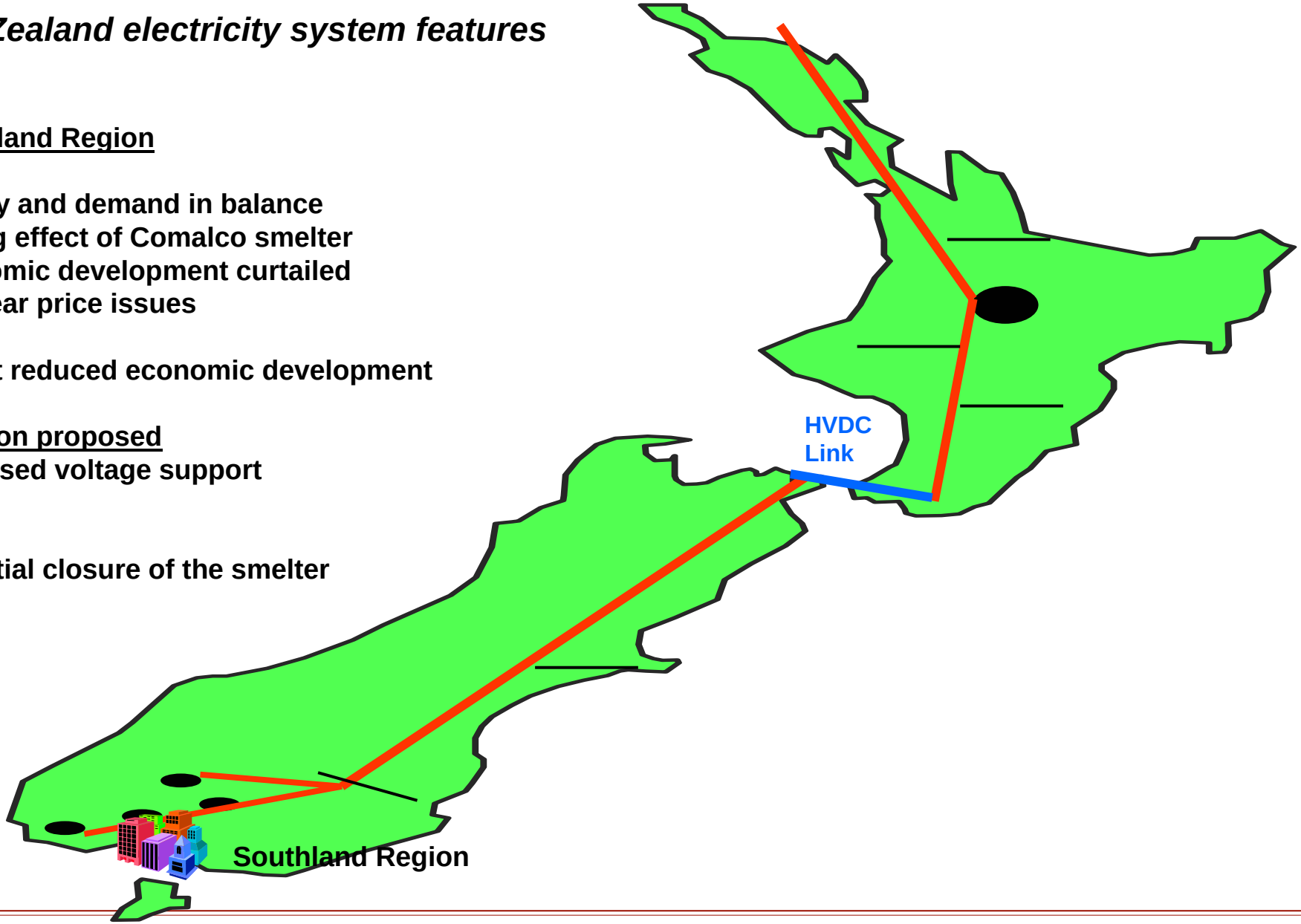
Southland Region

Supply and demand in balance
Strong effect of Comalco smelter
Economic development curtailed
Dry year price issues

Result reduced economic development

Solution proposed
Increased voltage support

Risks
Potential closure of the smelter



- **Reducing investor confidence leading to:**
  - **Existing businesses relocating**
  - **New businesses locating elsewhere**
- **New Zealand remains a commodity exporter rather than becoming an added value economy**
- **Knowledge and experience drain accelerates**
- **Higher costs and risks associated with primary energy exploration leading to difficulties attracting supply-side investment**
- **Eventual Government investment in major infrastructure and generation projects**

- **New Zealand maintains its clean green image developing fair, efficient and sustainable use of its resources**
- **Development of a knowledge and experience base in efficient energy use, demand response and efficient systems management**
- **Development of macro demand management techniques:**
  - **Optimum location of new industries**
  - **Holistic approach to resource management**
  - **Efficient infrastructure investment**
  - **Emissions trading expertise and opportunities**
- **Demand response fully utilised to provide efficient use of infrastructure**
- **Energy efficiency fully utilised to provide sustainable resource use**
- **New efficient technologies can be introduce incrementally**

- **It is certain that developing major supply side projects will become increasingly difficult.**
- **The a key option is to increase efficiency and manage demand.**
- **The only question is when will we do this:**

Summary

New Zealand's energy infrastructure is getting old and serious investment is required if projected growth rates of energy demand occur.

- **Our transmission lines are reaching full capacity in many regions**
- **Many of our distribution networks are in need of refurbishment and upgrade.**
- **We are uncertain where the fuel for our power stations will come from and where the power stations will be located.**

Given this uncertainty it is prudent to consider demand-side management as a means of managing supply security risk and providing additional 'free' capacity.

Under the direction of the GPS and to promote the achievement of NEECS goals the role of DSM must be fully explored. It is clear that for DSM to emerge as a credible solution there is a need for a leader and facilitator of DSM opportunities.

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