

Scenario approach

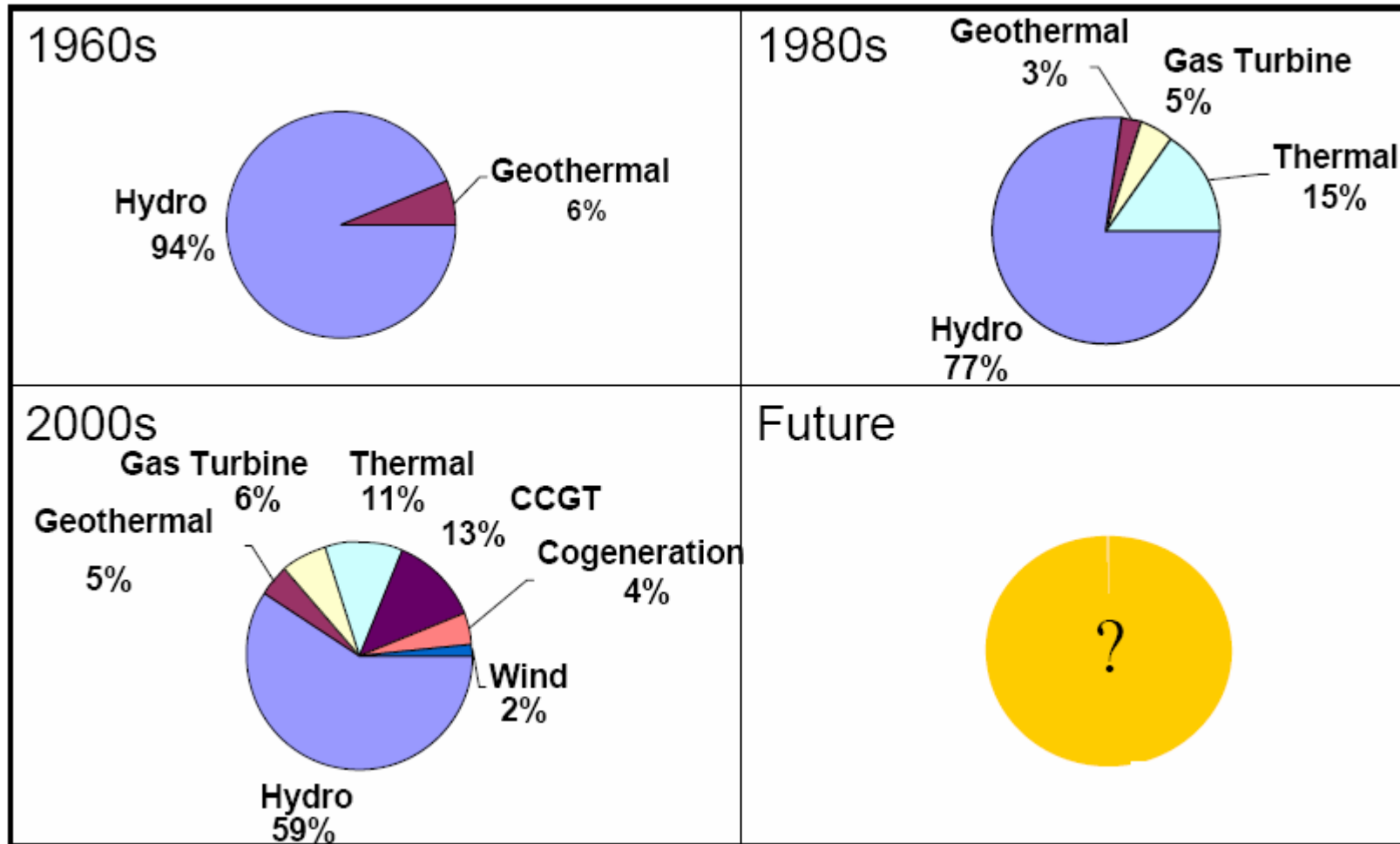
Magnus Hindsberger

8 September 2008

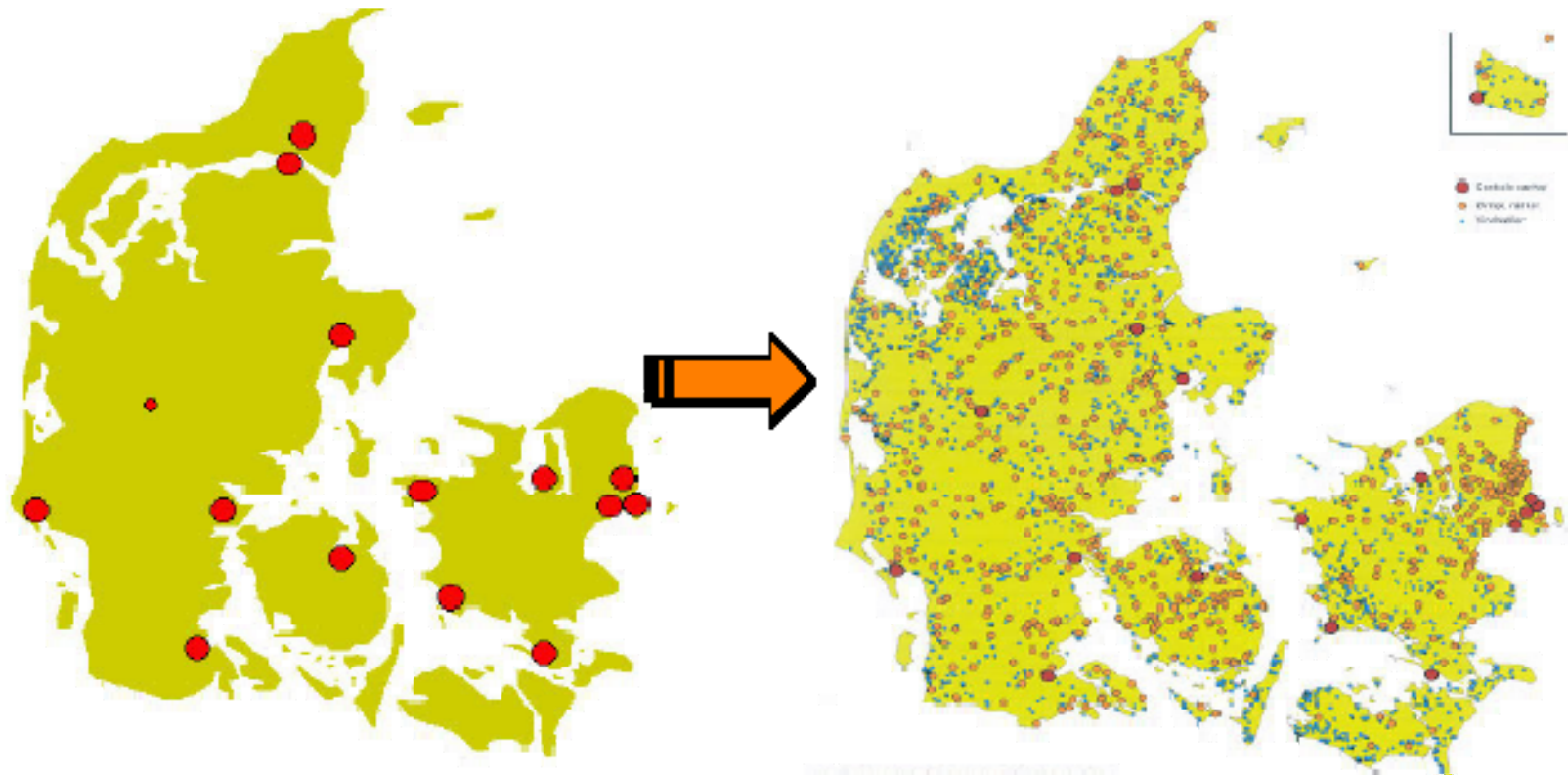
TRANSPower



A changing system - NZ



A changing system - DK



**Electricity supply in Denmark
around 1970**

**Electricity supply in Denmark
around 2000**





The
future
???



Scenario objective

- Discussing and agreeing on how the system might develop in the longer term and why we believe so
- Will tell us how different paths will affect the *demand for transmission services*
 - on average
 - from fluctuations due to demand/weather

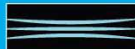
Objective of scenario work package: *To identify future demands for transmission services out to 2050 on a regional basis*



Transmission services

The transmission grid:

- Connects generation with consumers
- Can provides different service levels
(N-1 vs N security)
- Facilitates an effective electricity market



Starting point

Existing scenario studies:

- SoO scenarios, MED Energy Outlook, Future Currents, etc.

Megatrends/trends/drivers affecting the future NZ power system:

- RFI and this workshop

Generation data:

- SoO / TTER generation data
- Other areas needed? DG, DSP, CCS

Demand data:

- Customer forecasts plus normal GDP/population forecasts

Fuel and carbon prices:

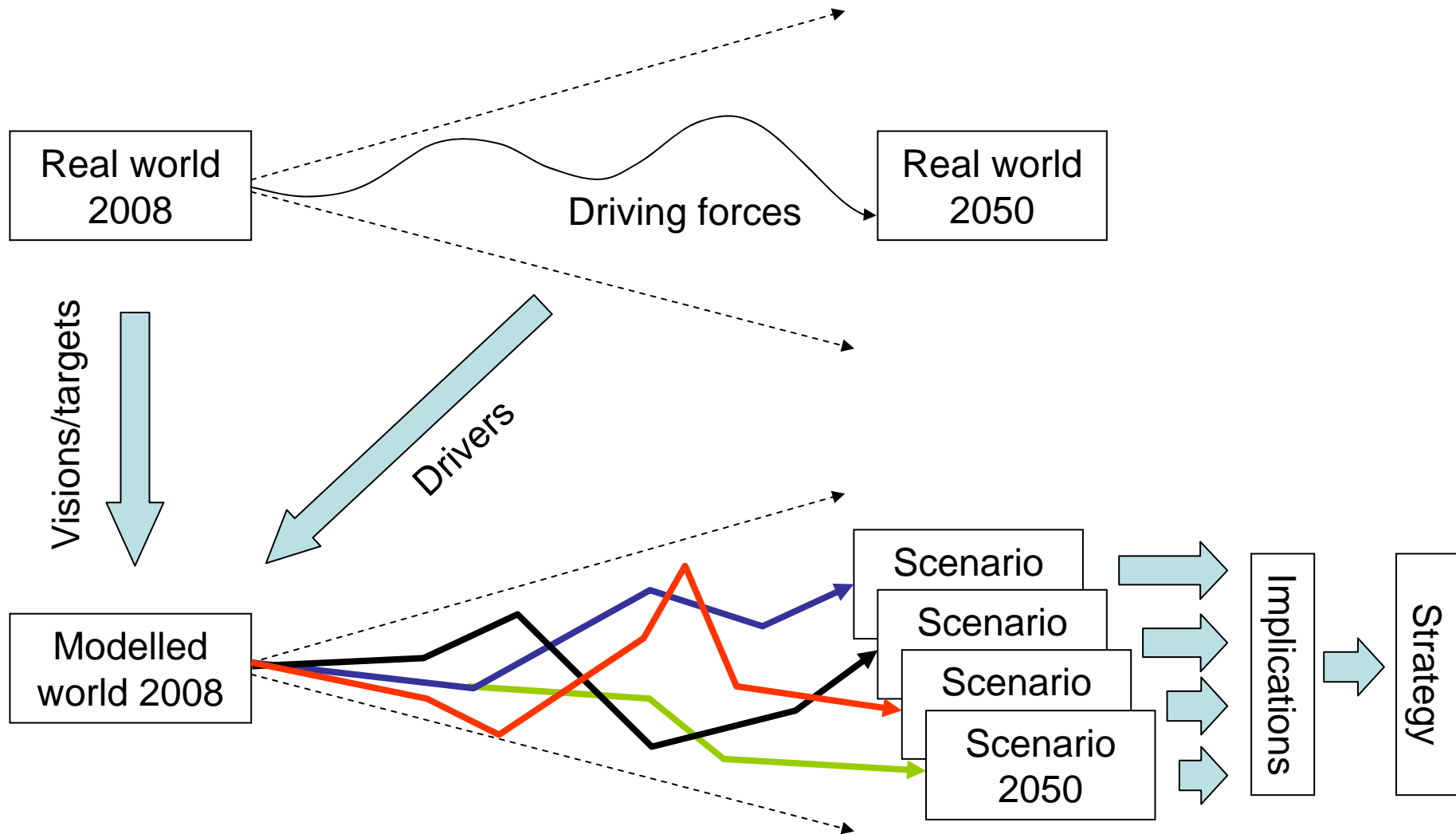
- Identify sources. Theme for future workshop?

Vision and strategy documents

- NZ Energy Strategy, Transport Strategy, Transpower vision, etc.



Scenario framework



Definitions

Driver: a driver or driving force is a variable that will shape the future of the issue in focus. A driving force behind electricity transmission built is electricity demand, which itself has some drivers (population, GDP, etc.)

Trend: a pattern of change over time for a variable of interest (the driver). One of the most obvious, and largest trends, is the increase in world population. The term “megatrend” is often used to indicate a widespread (i.e., more than one country), long-lasting trend of major impact, typically composed of subtrends which in themselves are capable of major impacts.

Emerging issue/Trend break: This term describes sources of change, which could be a break away from an otherwise perceived trend.

Wild cards: low probability but high impact changes – like a global plague – usually in the form of (sudden) events rather than gradually unfolding changes.



Some trend studies I

The Extreme Future - the top trends, that will reshape the world in the next 20 years:

- Fueling the future
- Climate change
- Longevity of medicine
- Globalisation
- US-China
- Securing the future
- Next workforce
- Innovation Economy
- Future of the individual
- Weird science

Oil: Is there more and can we get it?

Population growth and age distribution

Is it true and what can we *agree* to do about it?

Who will operate the system in 2040?

Fewer, larger global vendors. Efficiency gains, but risk of market power



Some trend studies II

Forecasting the future of electricity – The Galvin Electricity Initiative

Analysed 100 drivers of economic and social change. They were grouped into these 6 clusters, that were most likely to shape the future US demand for electricity

- Demographics
- Economics
- Environment
- Security and health
- Society and culture
- Technology

Aging population, demand for reliable in-house medical care.

Housing pattern – suburban sections or return to high density urban living



Some trend studies III

Infratil portfolio aligned with Megatrends –
Boston Consulting Group:



Trends and scenarios

“A trend is a trend until it bends”

- When a trend bends, the greatest risk of loss or potential for income arise.
- Whether the first or latter will happen depend on the actors preparedness of change and whether he/she is reacting or acting in advance.
- Scenarios can help investigating impacts of change and prepare/train in dealing with such discontinuities.



Visions/targets

- International trend is towards 50%+ reduction by mid century for OECD countries (and 20%+ by 2020 in EU)
- 90% renewables by 2025:
 - Realistic goal? Ambitious, but possible
 - Will it remain?
- NZ carbon commitments:
 - 1990: The Government stated that its aim was to bring CO₂ emissions 20% below 1990 level by 2005.
 - 1997: Kyoto target, reduce to 1990 level by 2008-2012
 - 2008: Aim of ETS: “reducing New Zealand’s net emissions below business-as-usual levels”.
- How should political objectives be included in the scenarios?





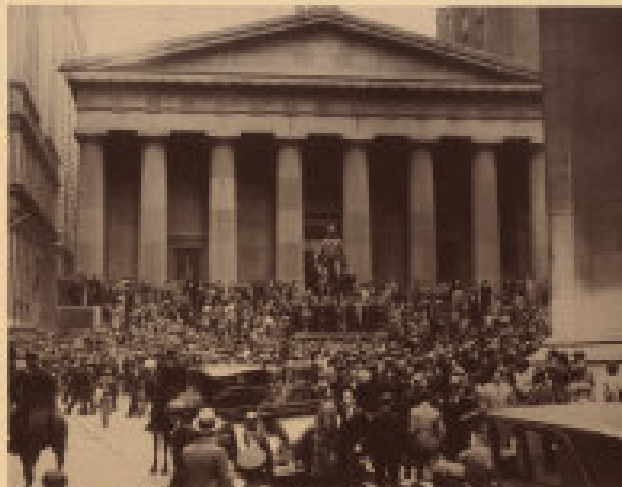
Environment



Security of supply

WALL STREET CRASH!

Black Thursday in America Stocks Plunge and Eleven Commit Suicide



Fading investors gather around the steps of George Washington on Wall Street.

Panic selling in the New York Stock Exchange. Market prices for many of the leading shares dropped sharply in the past few days.

Market's value in the early morning crashed as serious and heavy sell orders were poured in. Investors fled the market with orders that their accounts would be wiped out.

In the afternoon, when the market had fallen sharply, the price of stocks dropped still further. Many investors were unable to get any more and the value of some companies fell during the course of the morning.

The huge early morning crash followed a week of speculation in Wall Street and the London Stock Exchange. The market in London fell 1.125 per cent, and the price of stocks was no longer able to keep up with the other values of stocks.

What Went Wrong?

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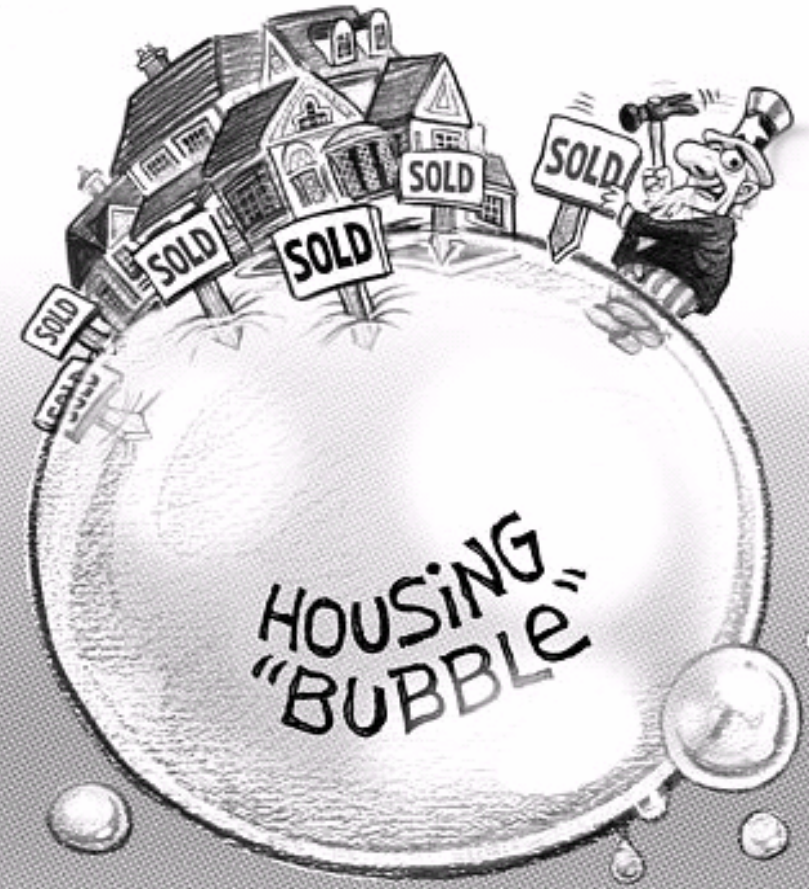
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OTHER NEWS

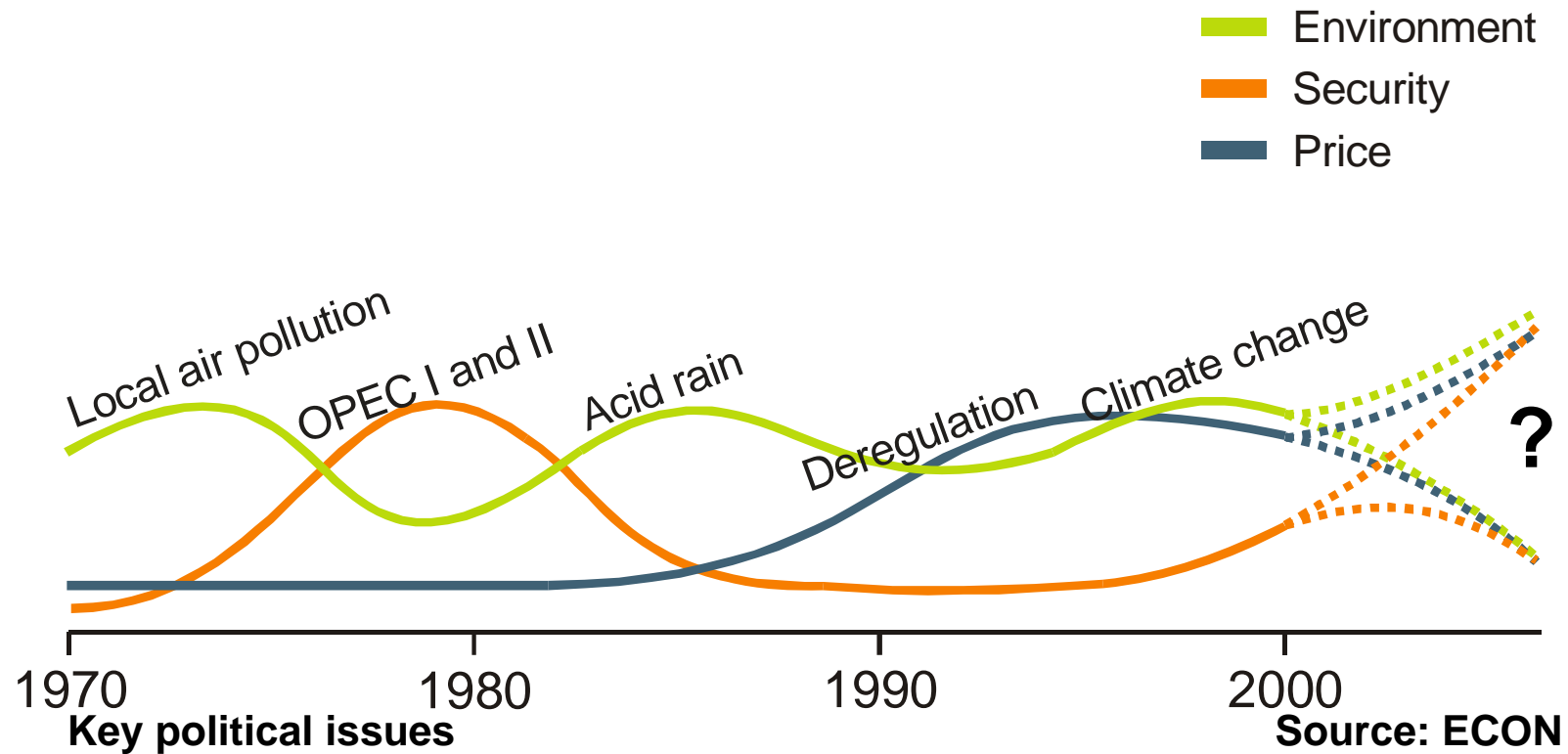
London News in Brief - The Government announced that all those who had been in the service of the Government since the outbreak of the war, which lasted in this country for 14 years, would be given a gratuity of £100.

COLEMAN'S "WINGARNS"

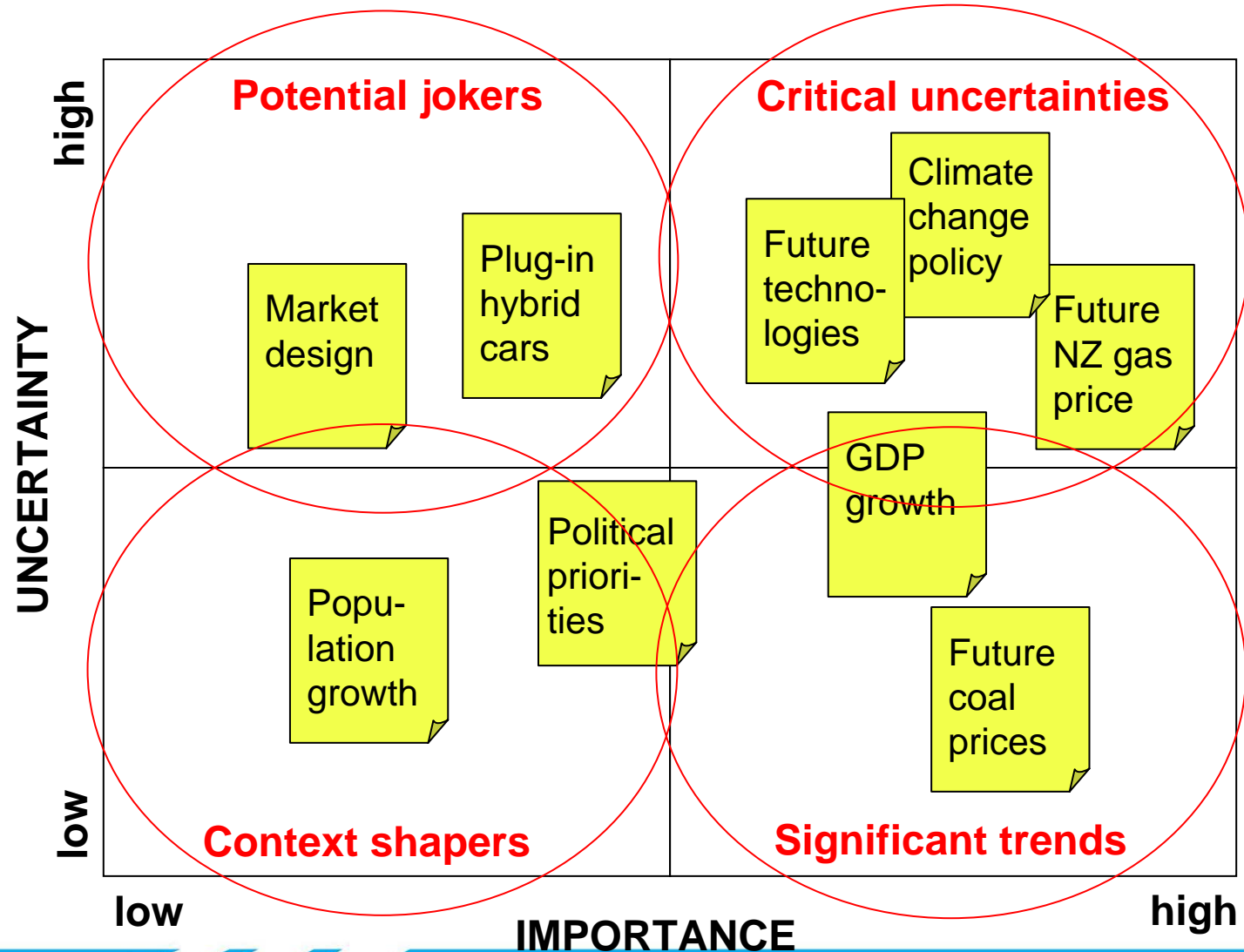


Economy

Trilemma – opposing forces



Critical uncertainties



Wild cards/HILP events

- Event analysis/wildcards:
 - Peak oil in 2010 globally
 - Major SI gas discovery
 - World unrest/climate change cause much higher NZ immigration
 - Large volcanic eruption/earthquake causing gas/power outages
 - Major power intensive industry leaves New Zealand
 - More energy intensive industry comes to NZ
- What will lead to the events?
- What responses would we see in society?
- Will the response/impact be lasting or temporary?



Objective of scenario work package: *To identify future demands for transmission services out to 2050 on a regional basis*

