PERSPECTIVES ON ENERGY POLICIES AND REGULATIONS

NEW ZEALAND

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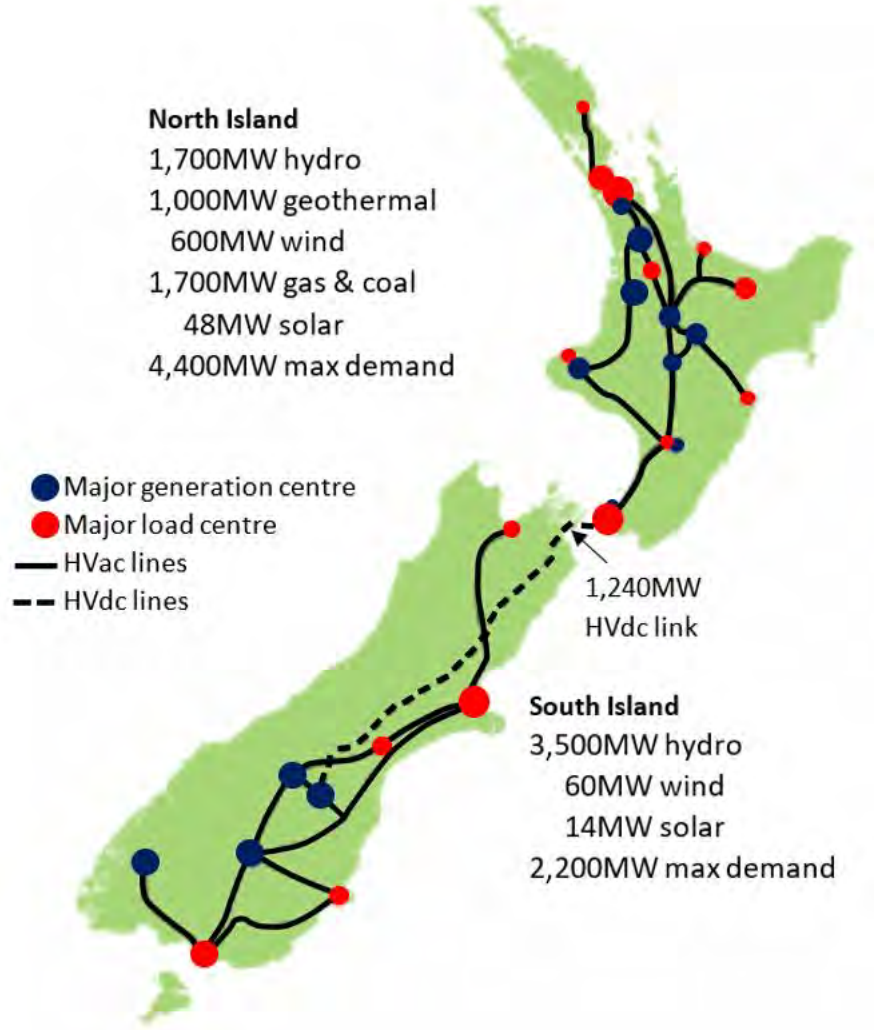
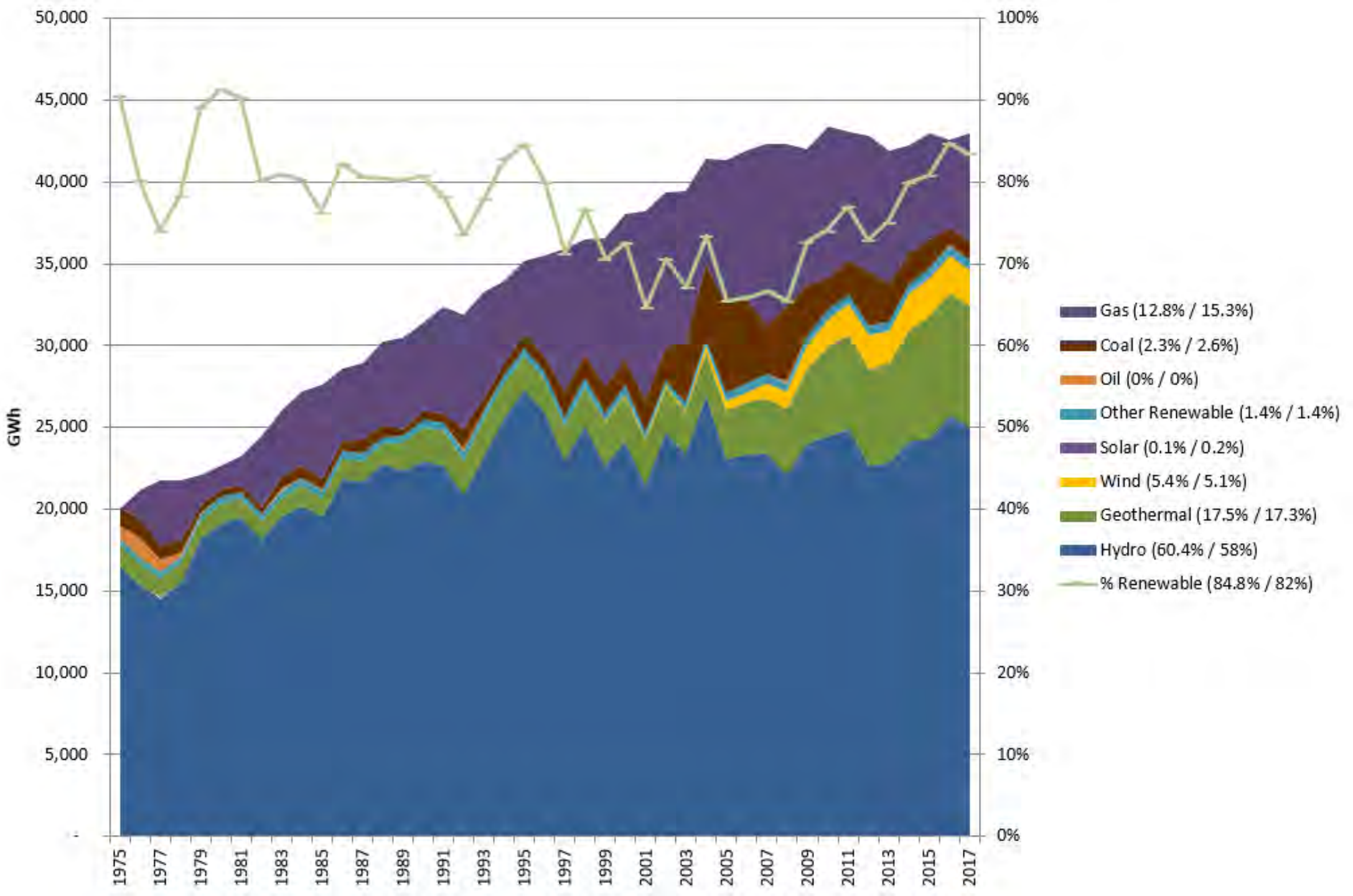
New Zealand is different

- Remote islands
- Hydro dominated
- Long thin transmission system
- Small government
- Well-connected business community
- 85% renewable electricity generation

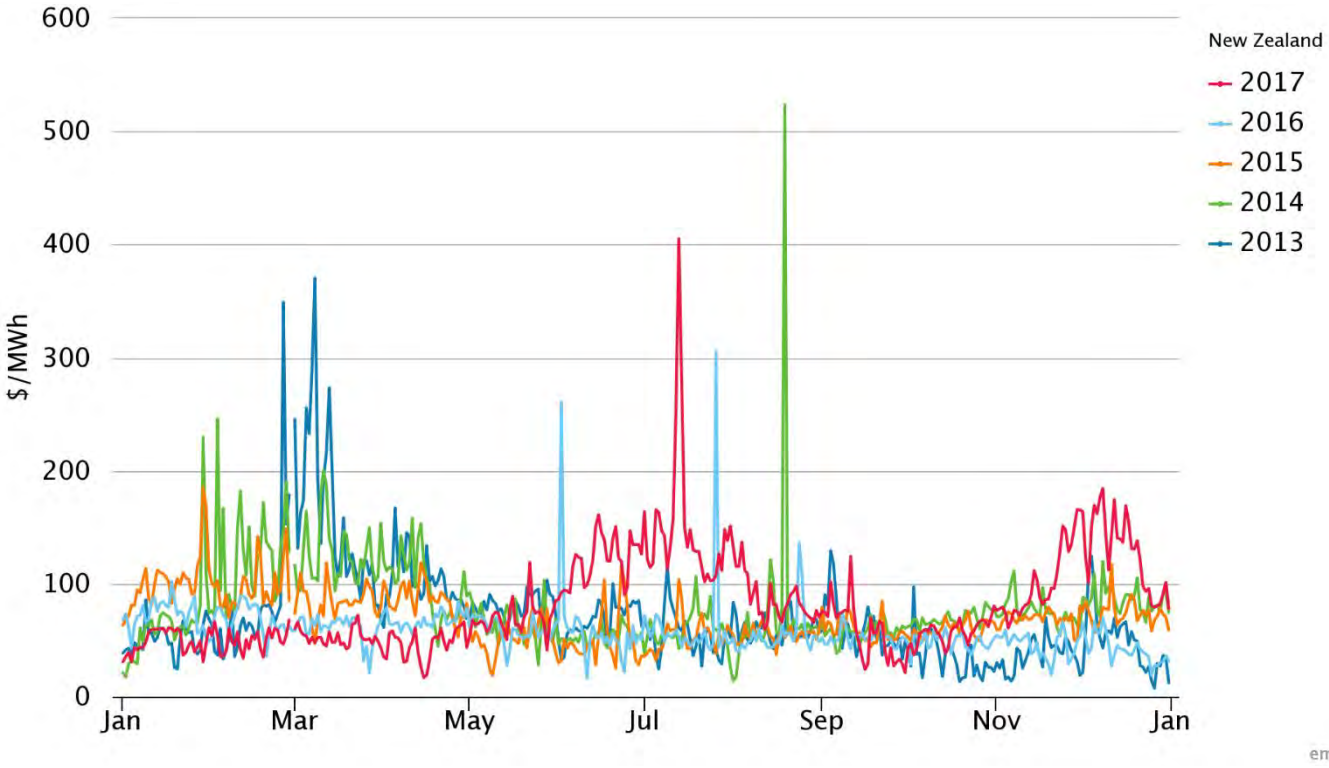



GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
-
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
Gas (12.8% / 15.3%)
Coal (2.3% / 2.6%)
Oil (0% / 0%)
Other Renewable (1.4% / 1.4%)
Solar (0.1% / 0.2%)
Wind (5.4% / 5.1%)
Geothermal (17.5% / 17.3%)
Hydro (60.4% / 58%)
% Renewable (84.8% / 82%)

The dry-winter adequacy challenge

National stored hydro energy (GWh)

Generation weighted average price ($/MWh)



Market structure and regulation

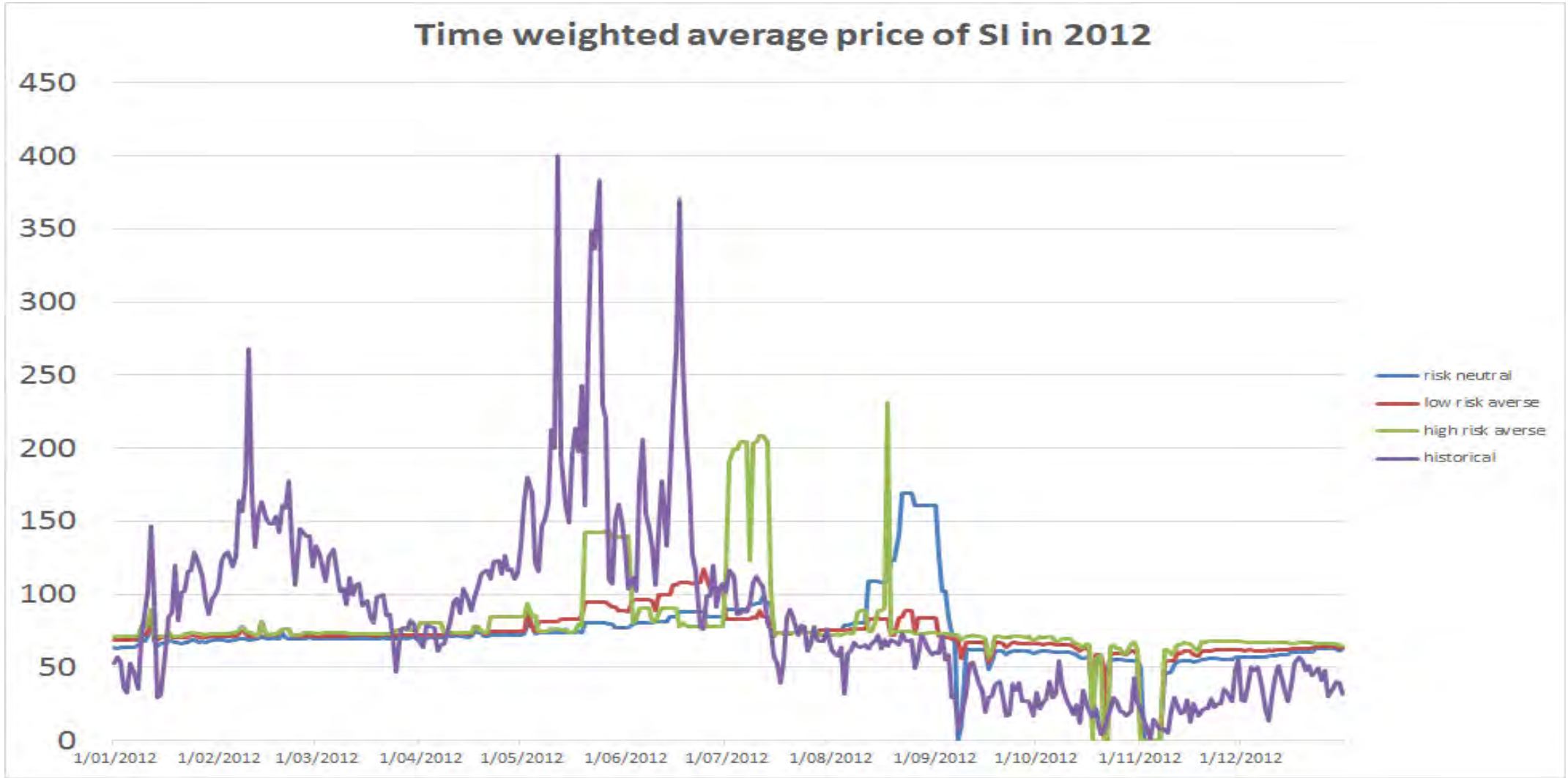
- State-owned independent ISO/transmission grid owner
- Regulated distribution companies
- No capacity market
- No day-ahead market
- Intra-day market is a nodal pool with 250 LMPs computed every 5 minutes.
- Ex-post prices settled for each 30 minutes trading period
- Vertically integrated retail and generation
- Some independent retailers and industrial loads.
- Forward contract market with (arguably) limited depth
- Historically light-handed regulation of EA motivated by workable competition
- Short-term exercise of market power tolerated by regulator

Regulatory timeline

- 1996: Wholesale spot market goes live
- 2001, 2003, 2008: Dry-winter electricity shortages
- 2009: Wolak report
- 2010: Electricity Industry Act sets up Electricity Authority
- 2012: Privatization of 50% of Government generation assets
- 2017: Jacinda Ardern becomes PM in coalition
- 2019: Electricity Price Review
- 2019: Climate Change Response (Zero Carbon) Amendment Bill

- Retail competition and energy hardship
- Liquidity in contract markets
- Wholesale market deemed workably competitive

Workable competition and perfect competition



New Zealand

New Zealand introduces bill for zero carbon emissions by 2050

Jacinda Ardern says law will address climate change but faces opposition from farmers over plans to reduce methane emissions

▲ The New Zealand National party says methane reduction targets for the country's huge dairy sector are too high. Photograph: William West/AFP/Getty Images

https://www.theguardian.com/world/2019/may/08/

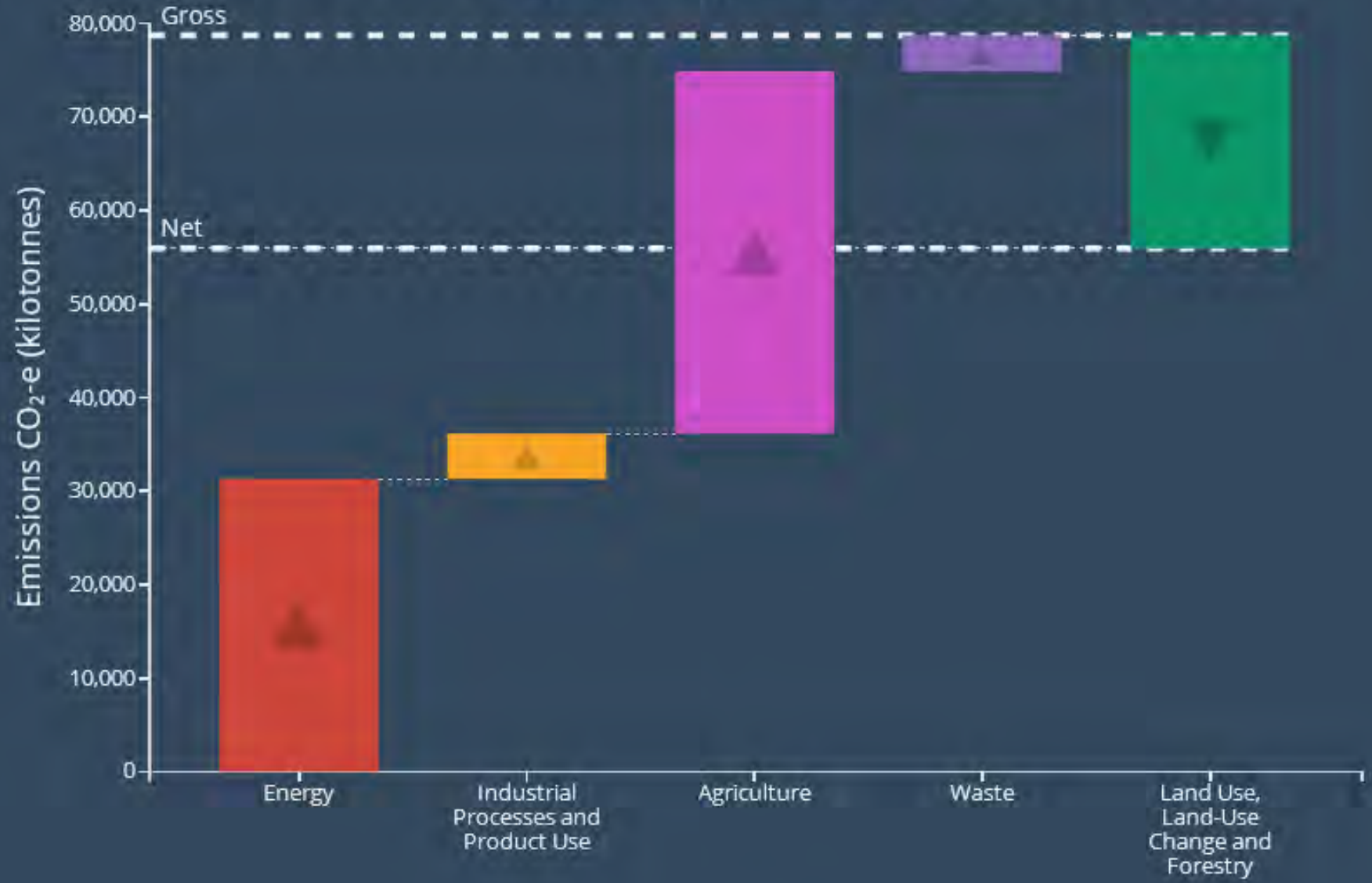
- Net zero CO2 emissions by 2050
- 10% reduction in methane by 2030
- 24-47% reduction in methane by 2050
- Big challenges for agriculture and process heat (milk drying)

View Table

Export Data

Emissions from sectors

2016



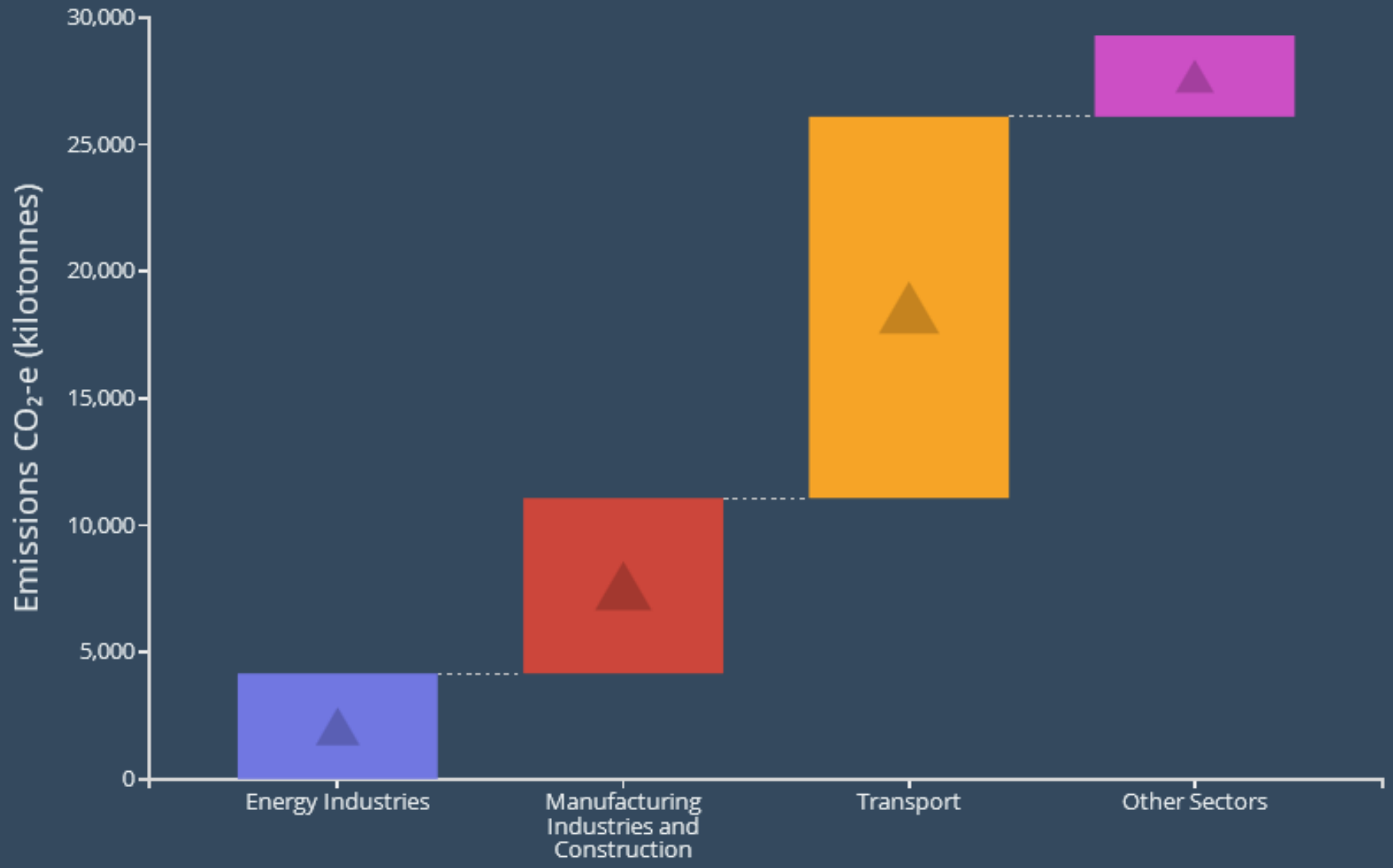
Sectors

View Table

Export Data

Emissions from Fuel Combustion - Sectoral approach

2016



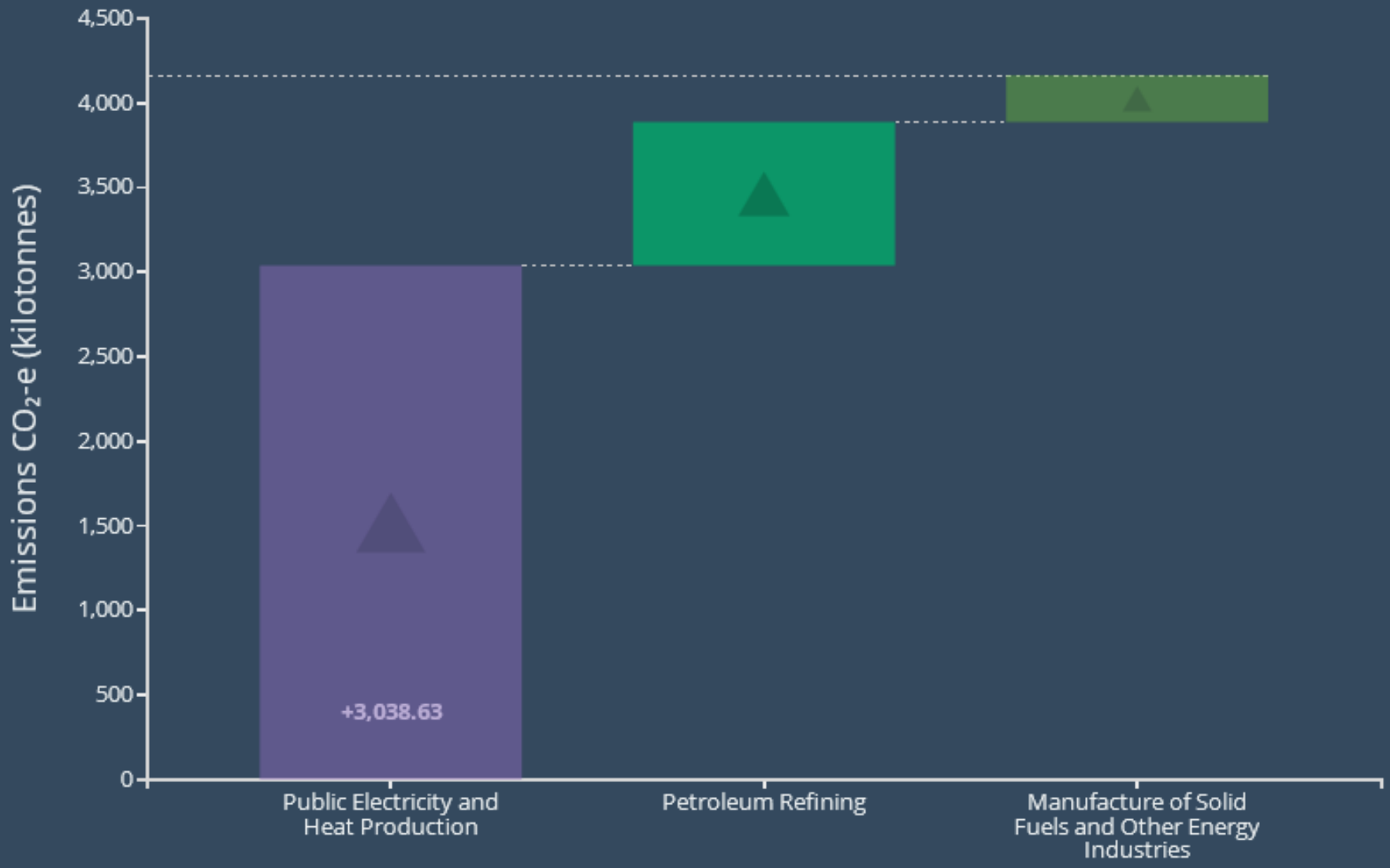
Energy

View Table

Export Data

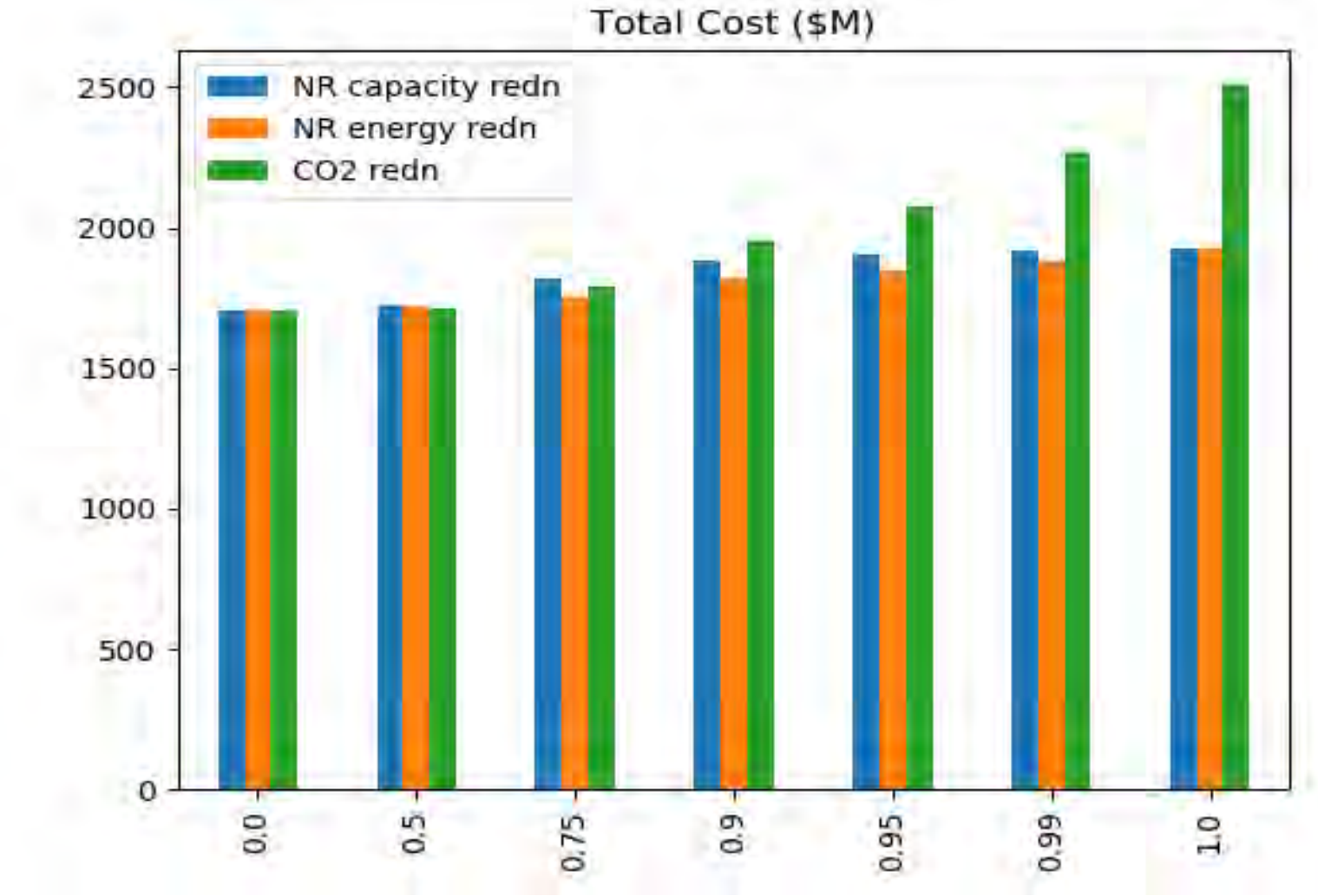
Emissions from Energy Industries

2016



Energy

The annual cost of 100% renewable electricity



Risk aversion: joint operation matters