NZ Grid as a Renewable Energy Integration Case Study

NZ vs CA Electricity Generation Profile

NZ Electricity Market Overview

Transmission and Pricing

Historical Success and Failure in NZ

Potential for California ..?

- 268 km²
- Consumption: 38,800 GWh
- 82% Renewable Energy
- 800 MW Installed Geothermal

- 424 km²
- Consumption: 206,336 GWh
- 48% Renewable Energy
- 2,694 MW Installed Geothermal
Evolution of NZ Generation

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Natural Gas 26%
- Renewables 23%
- Large Hydro 12%
- Solar 8%
- Wind 7%
- Nuclear 7%
- Geothermal 3%
- Coal 3%
- Other 4%

Hydro 58%
- Gas 15%
- Coal 3%
- Other 2%
- Wind 5%
- Geothermal 17%
Evolution of NZ Generation

New Zealand Energy Generation Profile: 2017

- Hydro: 58%
- Geothermal: 17%
- Gas: 15%
- Wind: 5%
- Coal: 3%
- Other: 2%
Evolution of NZ Generation

Hydro 100%
*pre-1958
Evolution of NZ Generation

Coal

Hydro
Evolution of NZ Generation

New Zealand Energy Generation Profile: 2017

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NZ Electricity Market Overview

- ½ Hour Intervals
- Spot Market
- Locational Pricing
Transmission and Pricing

**North Island**
- 1,700MW Hydro
- 1,000MW Geothermal
- 600MW Wind
- 1,700MW Gas & Coal
- 48MW Solar

5,048 MW installed

4,400 Max Demand

**South Island**
- 3,500MW Hydro
- 60MW Wind
- 14MW Solar

3,574 MW installed

2,200MW Max Demand
Historical Success and Failure in NZ

- Locational Marginal Pricing
- Ancillary Service Co-optimization
- Spot Market

- Government Control
- Vertical Integration
- End-User Pricing
Potential for California

- ✔ Locational Marginal Pricing
- ✔ Ancillary Service Co-optimization
- ✗ Spot Market
- ✗ Government Control
- ✗ Vertical Integration
- ✗ End-User Pricing
Questions?

NZ Grid as a Renewable Energy Integration Study