



New Zealand vs Iowa in the Race Towards 100% Renewable Electricity

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Overview

NZ/IA Profiles

Current Electricity Breakdowns

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Available Paths to a 100% Renewable Grid

Expected Outcomes

New Zealand Profile

- NZ is separated into two islands, the North Island is where most people live and where most electricity is consumed, the South Island is where most of the electricity is generated using hydropower
- Main Industries:
 - Agriculture
 - Services
 - Tourism
- Population: 4,875,200
- Area: 103,483 sq mi
- Population Density: 46.4 per sq mi
- GDP: \$215.1 billion
- GDP Per Capita: \$44,069



Iowa Profile

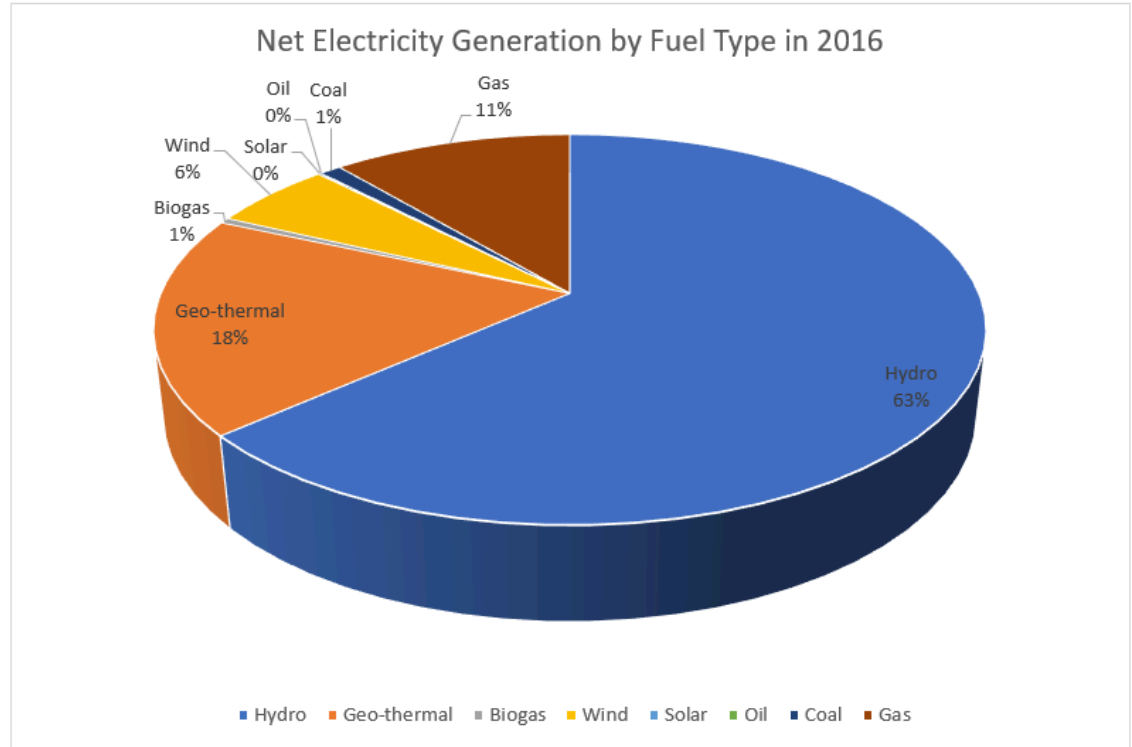
- Iowa is a landlocked state in the United States. Power stations are distributed evenly throughout Iowa, and US News ranked it as the state with the most stable power grid for 2017.
- Main Industries:
 - Agriculture
 - Services
 - **Manufacturing - \$31.2 billion vs \$11.52 billion for NZ**
- Population: 3,145,711
- Area: 55,857 sq mi
- Population Density: 54.5 per sq mi
- GDP: \$157.2 billion
- GDP Per Capita: \$50,315



Dreamstime.com

New Zealand Electricity Breakdown

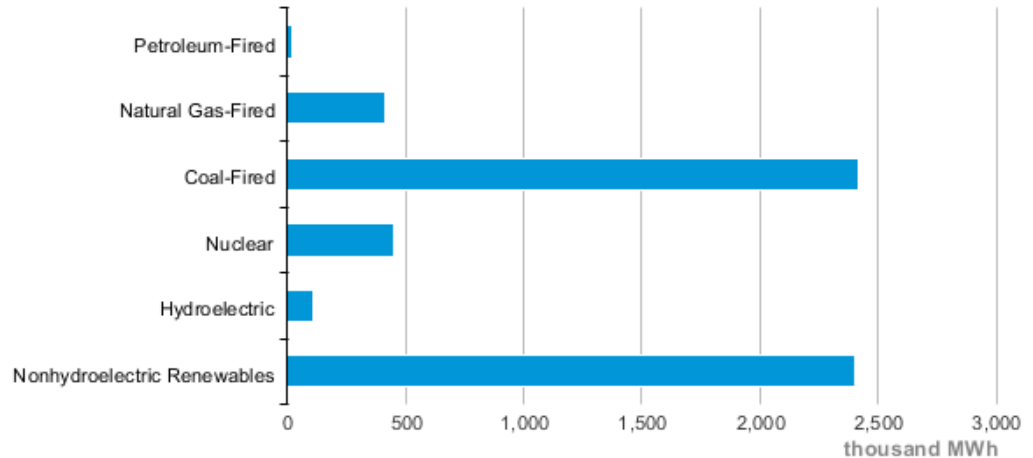
- Renewable generation was at an all-time high of **85%** in 2016.
- Total installed capacity was **9.9 GW** in 2014 with 54% hydro
 - Geothermal is the second most used renewable in NZ
- Coal+Gas made up 26% of capacity in 2014
- Hydro's share has risen as fossil fuel units come offline
 - 2016 was also an exceptionally wet year, causing an increase in hydro's share



Iowa Electricity Breakdown

Iowa Net Electricity Generation by Source, Jan. 2018

- Iowa had a nameplate capacity of **18,461 MW** in 2016
 - 6,035MW Coal
 - 6,935MW Wind
 - Coal still had slightly higher generation
- Iowa is the fifth highest energy consumer per capita in the US
- Wind and coal generation are the majority of power generation
- Hydroelectric is the second most popular renewable
- Renewables were **37%** of Iowa's electricity generation in 2017



Source: Energy Information Administration, Electric Power Monthly

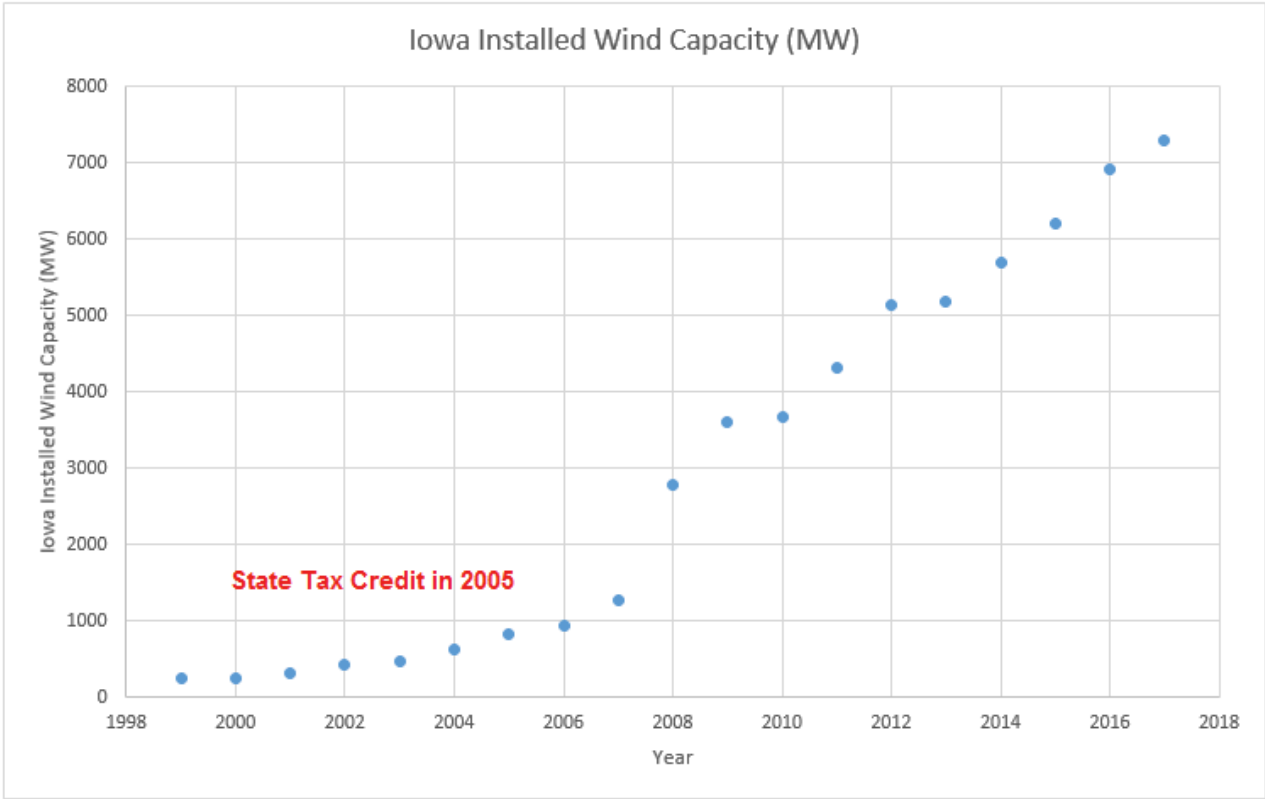
NZ Current and Proposed Govt Policies

- **NZ Emissions Trading Scheme**
 - Began in 2008 as part of an effort to reduce emissions
 - Varying by sector, companies are given a certain number of New Zealand Units (NZU) of carbon (1 tonne) that they can emit per year
 - Can buy more NZU from the government for \$25/NZU
- **The Electric Authority**
 - The EA is a crown entity responsible for the regulation of New Zealand's electricity grid
 - Ensures that all industry participants follow the Electricity Industry Participation Code
 - Generation and Distribution companies must be separated
 - NZ has 5 main generation companies that produce 95% of electricity
 - Both generation and distribution companies can be publicly traded, with the **government holding an interest in most**
- **New Zealand Energy Strategy 2011-2021**
 - The goal is to create a highly productive and low-emissions economy
 - Aims to accomplish this through legislating the government's support of renewables, and supporting policies such as solar panel installations on public buildings, and energy efficient upgrades to homes
- **Prime Minister Ardern**
 - Jacinda Ardern is a Labour Party politician - **Labour and the Green Party are working together to reach 100% renewables by 2035** pursuant to "The Agreement" reached in 2017



IA Current and Proposed Govt Policies

- **Iowa was the first US state to implement a Renewable Portfolio Standard (RPS)**
 - Iowa's RPS requires the states two investor-owned utilities to either own or contract for 105MW of wind power, started in 1983
- Iowa is a net metering state
- Iowa has no state-run grant or loan programs meant to foster investment in renewables
 - Iowa used to have utility-run programs meant to increase energy efficiency, but as of 3/7/18 those programs were removed through legislation, with politicians claiming that the programs were effectively an unfair tax on those who do not participate, especially renters
- The primary vehicle for renewable investment in Iowa has come through the Energy Policy Act of 1992's **Wind Production Tax Credit program and a State PTC**
 - Federal PTC gives wind producers a \$0.019/kWh tax credit for the first 10 years of a facility's life
 - State PTC gives wind producers a \$0.01/kWh tax credit for generation
 - **State PTC kick-started Iowa's wind industry**



NZ Path to 100% Renewable

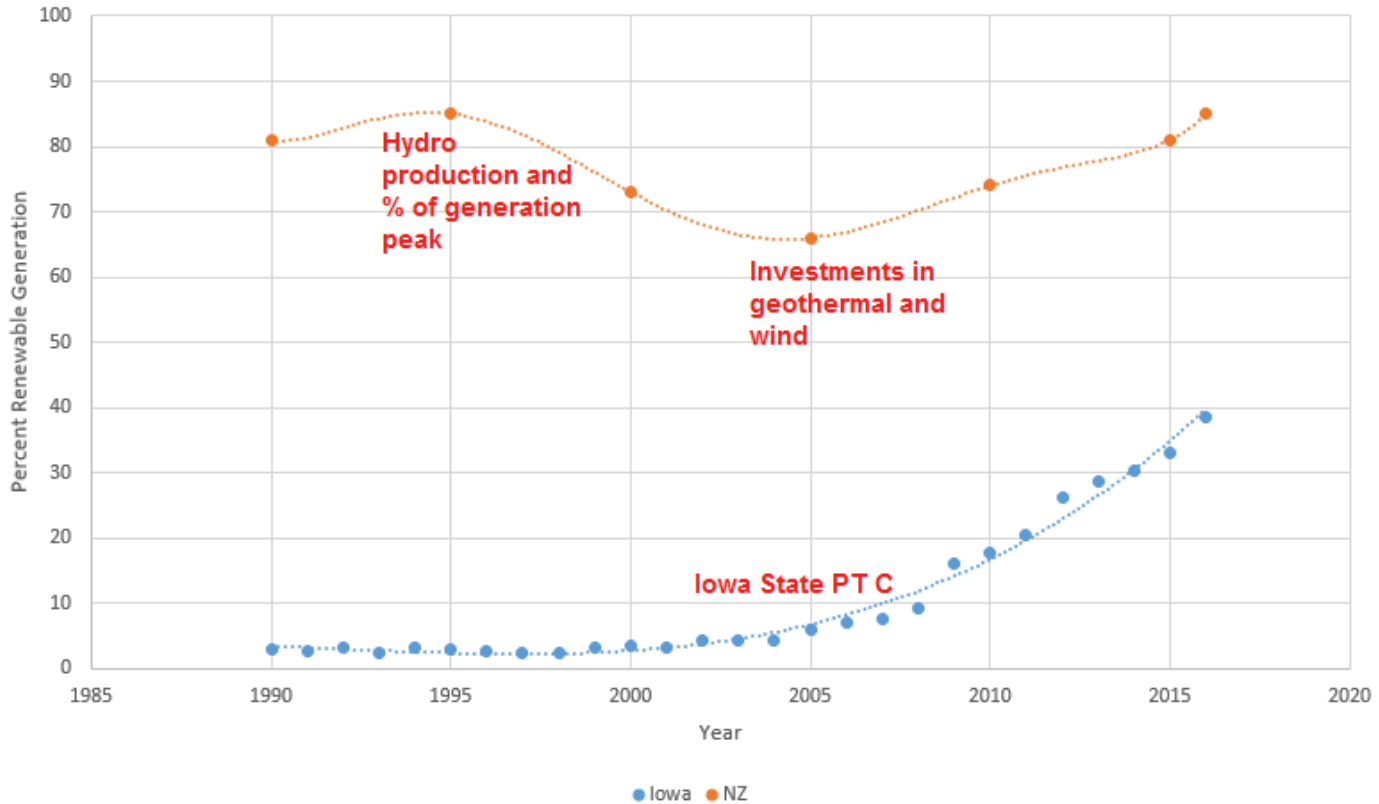
- Geothermal Energy
 - Positioned between 2 tectonic plates, New Zealand has a huge supply of potential geothermal energy
 - Geothermal has been described as one of the best possible sources of new energy for NZ, as most of the easy hydroelectric sites have already been built on - **Hydro hit an all-time peak in generation in 1995**
 - The government recently spent \$150,000 on research to help uncover new uses for geothermal
 - Tauhaura II with a nameplate capacity of 240MW is currently under construction and is expected to cost \$1billion - **10%< of capacity needed to make NZ 100% renewable**
 - There are currently at least 9 new geothermal projects in the planning stages or under construction
- Tidal Energy
 - A form of energy that is not currently producing any electricity in NZ
 - The areas around Kaipara harbor appear to be the most promising sites and have received the most investment. Other areas include Manukau and Hokianga Harbors
 - Tidal flows can be up to 12x that found in any of NZ's rivers
 - Neptune Power tested NZ's first tidal power turbine in 2012. The test was a resounding failure and Neptune declared bankruptcy and underwent liquidation
- Wind Power
 - New geothermal resources are limited, and tidal energy has been a bust
 - NZ has **2500MW** of consented wind power projects in development, with exploration continuing
 - Farms under development range from 7MW to 858MW, with 500ft 6MW turbines being planned for the 858MW Castle Hill Windfarm



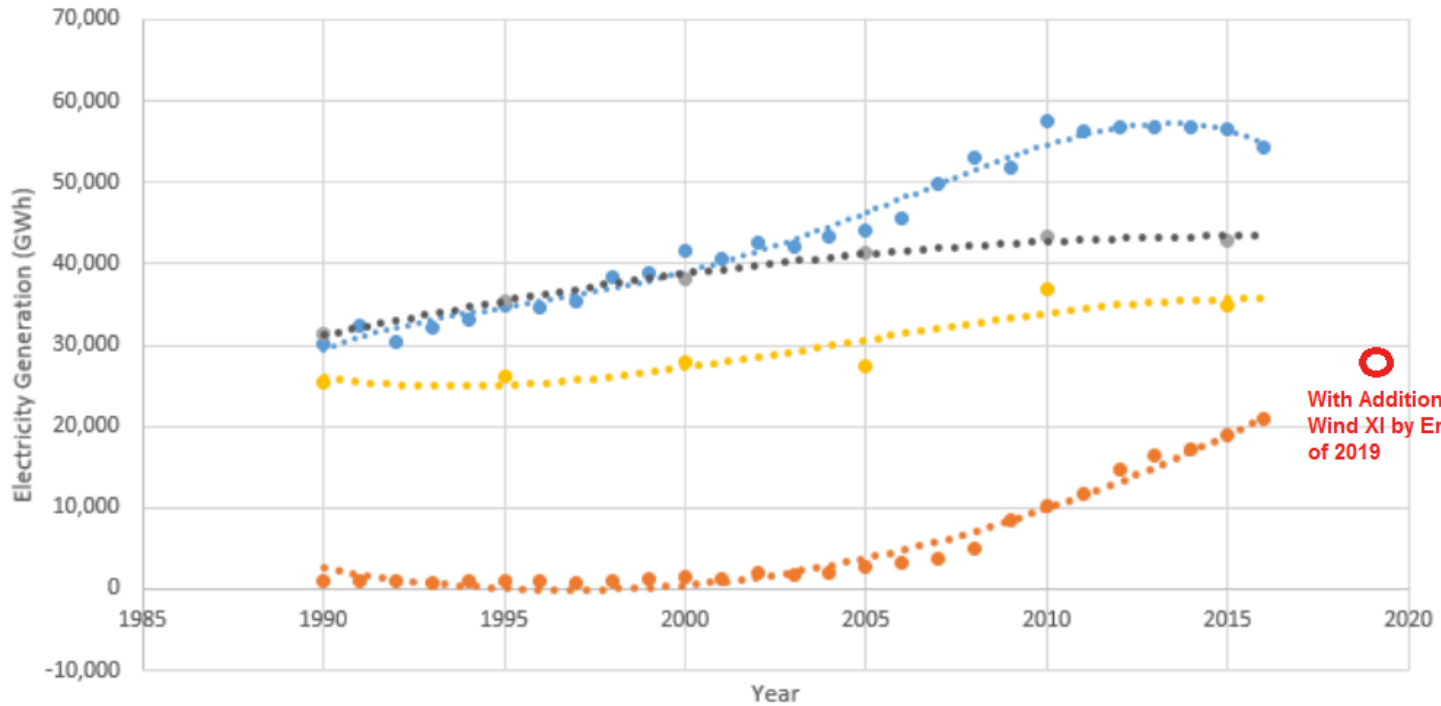
IA Path to 100% Renewable

- Wind Power
 - Wind is currently Iowa's largest renewable power source
 - In 2016 the State of Iowa approved a **\$3.6 billion investment by one of its two utilities, MidAmerican Energy for it to become 100% renewable**
 - To reach this goal, MidAmerican will build its Wind XI project, consisting of 1000 turbines at sites across the state, which it hopes will have a capacity of **2000MW** and bring it to 90% renewable
 - This addition would put Iowa's wind capacity at **9.3 MW**, nearly half of the state's current capacity, and 0.6MW short of NZ's current generation capacity
 - This project is being funded completely by the Wind Production Tax Credit program
 - Sets the standard for massive wind investment in IA and the US
 - In 2005 70% of MidAmerican's generation was coal, in 2017 it was 31%, versus 47% for wind
- Solar Power
 - Solar investment in Iowa has been largely suppressed by wind investment
 - Starting to make a comeback
 - Has gone from 0.1MW capacity to 27MW from 2010-2015
 - It is estimated that 20% of Iowa's electricity needs could from decentralized solar power

% Renewable Generation by Year



Electricity Generation



With Addition of
Wind XI by End
of 2019

Expected Outcome: Who Will Reach 100% First

- **Initial hypothesis that Iowa would reach 100% renewables first appears to be incorrect**
- New Zealand has significant federal backing for a 100% renewable grid, while the push has largely come from private interests in Iowa
 - NZ also has substantial investments in renewables underway, and has already peaked at 93% renewable generation at times
- New Zealand has a **much more diverse array of options** when it comes to deciding which options to employ, and is blessed with better baseline renewables such as hydro and geothermal
- Iowa companies are making good progress, MidAmerican specifically, with wind power
 - Many potential wind resources are not economic due to a lack of transmission lines
 - The potential end of wind subsidies due to the Trump Administration does not paint a favorable outlook, even if the subsidies are not reduced or removed, NZ is by far more supportive of renewables
- To reach 100% renewable Iowa must add **10GW** of renewables while NZ only needs to add **2GW**
- **Iowa can pass NZ in renewable generation, but not on a percentage basis**
- New Zealand has a plan to reach 100% renewable energy, while only one of two Iowa utilities has such a plan. New Zealand is by far the better environment for renewables, with more



Questions?

References



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