CHARACTERIZING IDAHO'S ENERGY SUPPLY AND CONSUMPTION

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ABSTRACT

Energy underpins the economy and understanding both energy supply and consumption is important for decision makers and policy formulation. This paper describes the methods used to characterize electrical energy supply and consumption in Idaho between 2016 and 2023. Idaho is part of the large Western Interconnection power grid and produces about half the electrical energy consumed in-state. The spatial distribution of energy consumption very closely follows population with Ada County consuming the most electricity annually.

KEYWORDS

Electricity, energy, supply, demand, consumption

INTRODUCTION

Idaho's economy, like all states in the United States --and arguably all western nations-- is underpinned by energy; the energy to power factories, drive machinery, and increasingly, push data bits across the Internet. Understanding Idaho's energy portfolio begins with a characterization of energy supply and consumption over time. This paper details the process used to complete this characterization.

METHODS

The data required to complete this characterization was acquired from Obika et al. (2025) and the Idaho Office of Energy and Mineral Resources (2025). Relevant data were extracted and converted as necessary into tabular format using Microsoft Excel. These data were then formatted to accommodate use in a geographic information system (GIS) by organizing the data into specific fields (columns) and records (rows) where the spatial entity (e.g., counties) was listed in a given field with its attributes (e.g., energy consumption) given in subsequent fields found to the right of the county field. A key field to maintain correct data relationships was the Federal Information Processing Standard (FIPS) field which uniquely identifies each county in the United States. For example, Bannock County is given the FIPS code 16005; where 16 indicates the state of Idaho (State FIPS) and 005 indicates Bannock County (County FIPS) and together, 16005 uniquely identifies Bannock County. Numeric Year (2016-2023) and Month (1-12) fields were added to facilitate querying these data within GIS software.

Energy supply and consumption data were provided in various units. For example, the US Energy Information Administration (EIA) expresses total electric consumption in million kilowatt hours (KWh) (NOTE: these data are found as the ESTCP Mnemonic Series Names (MSN) code in many documents and spreadsheets). In other instances, electric consumption is given in megawatt hours (MWh). This study converted all electric consumption values into MWh by multiplying KWh by 0.001.

Energy consumption data was far more granular than energy supply data. Specifically, these data were provided with hourly temporal granularity and county spatial granularity. For the purposes of this study, energy consumption was summarized by year (n = 8) for each county (n = 44) (NOTE: 8,760 hourly

records were summed for most years, while 8,764 hourly records were summed for leap years). In contrast, energy supply (production) data was only available with yearly temporal granularity and statewide spatial granularity.

Once these data were prepared and imported into a geodatabase polygon feature class (i.e., Counties), various spatial analyses were completed to understand electrical energy production and consumption in Idaho.

RESULTS AND DISCUSSION

While Idaho's population has increased nearly 19% between 2016 and 2024, electric consumption has increased only 15% while production has increased nearly 35% (**Table 1**). It is interesting that electric consumption has not risen equally with population growth which may be attributable to the increase prevalence of energy efficient devices and appliances.

Table 1. Annual comparison of electrical energy produced and energy consumed in Idaho.

YEAR	PRODUCTION (MWh)	CONSUMPTION (MWh)	PCT
2016	9,995,014	23,063,000	43%
2017	11,447,344	23,794,000	48%
2018	11,904,458	23,754,000	50%
2019	11,985,807	23,985,000	50%
2020	11,278,159	24,461,000	46%
2021	10,457,407	25,286,000	41%
2022	10,388,285	26,201,000	40%
2023	11,700,827	25,674,000	46%
2024	13,475,312	26,370,000	51%

Not surprisingly, the spatial distribution of energy consumption across the state follows population distribution closely (**Figure 1**). An analysis of per Capita energy consumption shows Idahoans consume an average of 13.8 MWh of energy annually (2020) which compares closely with the national average of 12.4 MWh. The slightly higher values seen in Idaho are likely due to the increased use of electricity during winter heating months and is fairly common in more northern states.

Mapping per Capita energy consumption revealed some Counties (e.g., Power County) had higher values than neighboring Counties. In the case Power County this is likely explained by the presence of the Pocatello Airport. A Chi-Squared test (i.e., observed versus expected) was calculated to learn if any of the differences between counties was significant. The result of that test indicates that while slight differences exist none were statistically significant ($P = 1.00$).

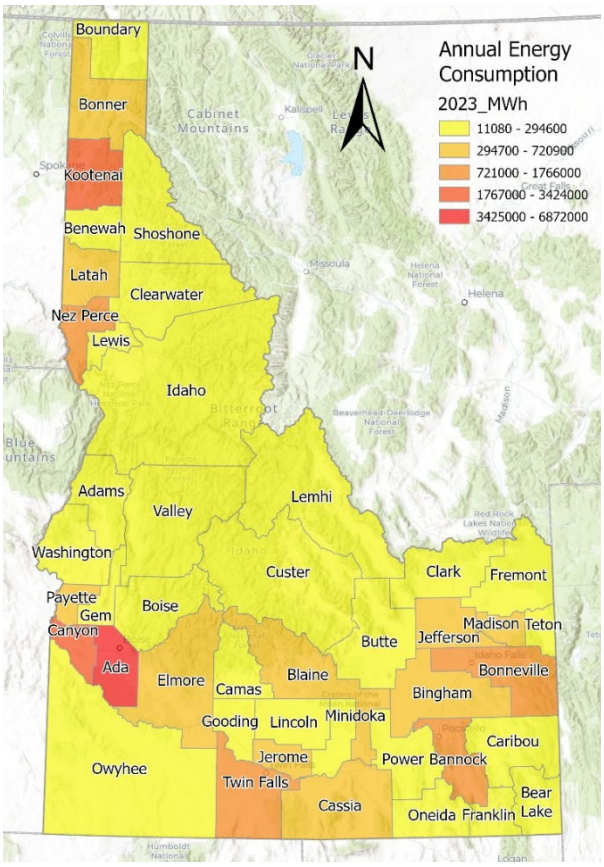

Figure 1. Spatial distribution of electrical energy consumption in 2023. Regardless of the year, electric consumption closely follows population distribution.

CONCLUSIONS

This brief technical report characterizes electrical energy production and consumption in Idaho for nearly the last decade. Both electrical energy production and consumption have increased and, not surprisingly, energy consumption follows population distribution closely. While Idaho's population is expected to continue increasing (approximately 1.5% annually), it is uncertain if energy production will keep pace with this trend. However, in-state electric production accounts for only about half of the electricity consumed in Idaho. Once produced, most of this energy becomes part of the much larger Western Interconnection power grid with electrical energy flowing across the entire grid to meet demand.

REFERENCES

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