

Intel Energy Analysis Dashboard – Tableau Report

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Project Overview

Intel, the semiconductor manufacturing powerhouse, is planning to build a new data center. Energy availability and sustainability are key considerations in selecting the location. For instance, which U.S. regions produce a surplus of energy and may offer lower prices? Which regions rely more on renewable energy sources, aligning with Intel's green goals?

In this project, developed in partnership with Intel's Sustainability Team, I created a suite of Tableau dashboards that analyze regional trends in net energy production, renewable energy generation, and hourly energy behavior. These interactive visualizations help decision-makers explore the optimal region to build Intel's next data center.

Data Sources

- `energy_dataset` – Includes hourly net generation and demand per U.S. region.
- `energy_data_by_source` – Breaks down generation by energy type (e.g., coal, wind, solar) and balancing authority.

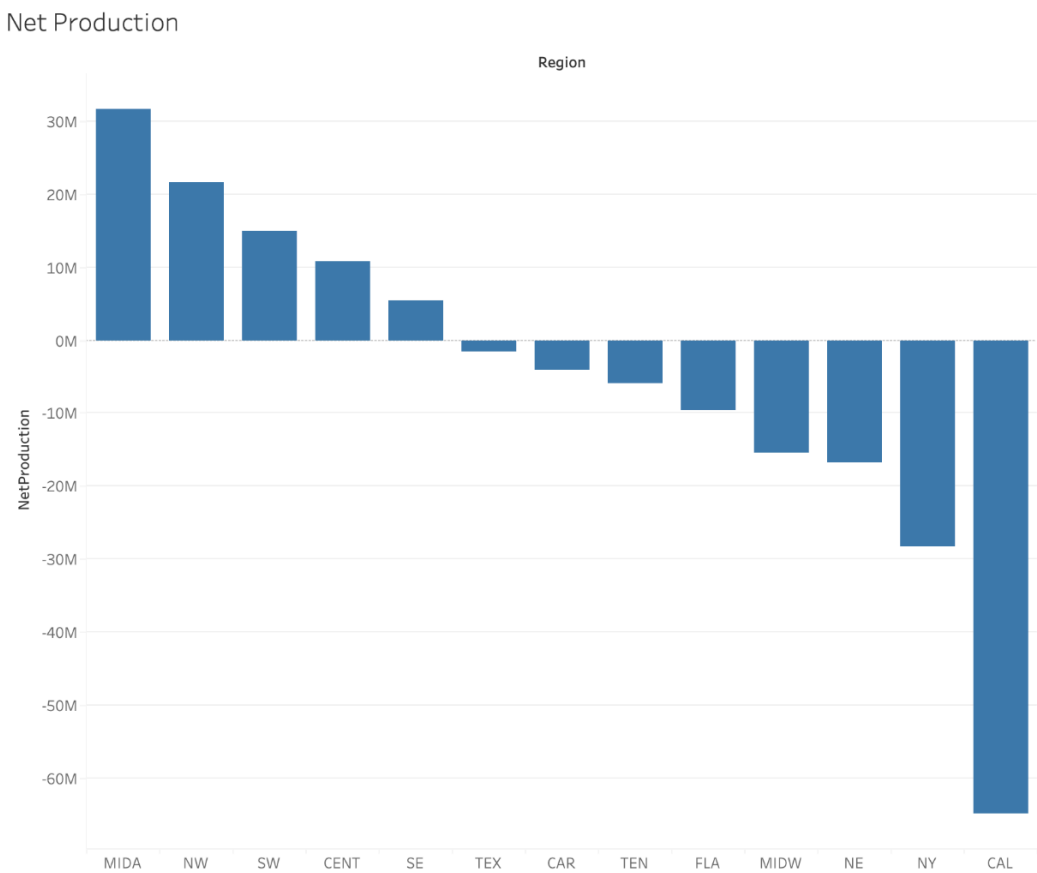
Both datasets contain timestamps, enabling time-based analysis by hour, day, week, or month.

Visualizations & Key Insights

1. Net Energy Production by Region

Chart Type: Bar Chart

This chart identifies regions that consistently generate more energy than they consume. The Northwest (NW), Central (CENT), Southwest (SW), Southeast (SE), and Mid-Atlantic (MIDA) regions are net producers. These surplus regions are more likely to offer reliable, competitively priced energy—making them ideal candidates for hosting energy-intensive infrastructure such as data centers.

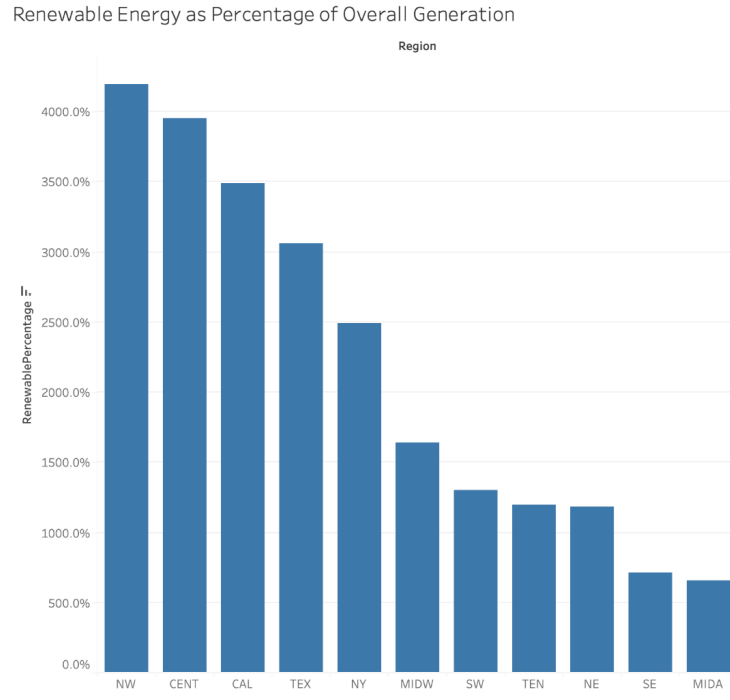


2. Renewable Energy as a Percentage of Generation

Chart Type: Sorted Bar Chart

This visualization shows how much of each region's energy comes from renewable sources. Top performers include NW (hydropower), CENT (wind), CAL (solar), TEX (wind & solar), and NY (hydro & nuclear).

Notably, NW produces over 135 million MWh from hydropower and CENT over 107 million MWh from wind. Both also have strong net production and mature infrastructure, indicating scalability and lower environmental impact.

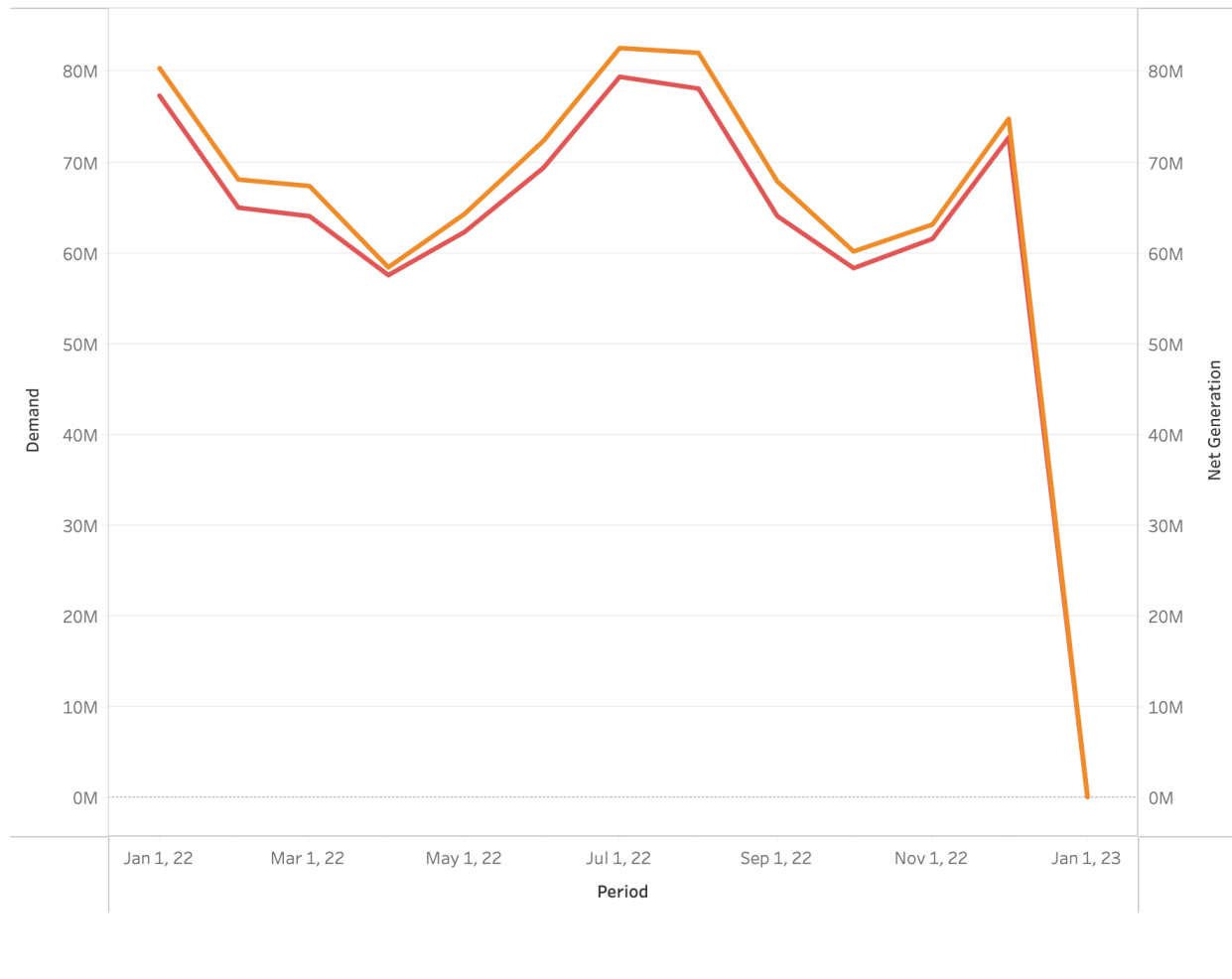


3. Net Generation vs Demand Over Time

Chart Type: Dual-Axis Line Chart

This chart compares generation and demand hour by hour. A surplus trend suggests reliable availability. In most regions, production slightly exceeds demand, supporting stability. August may have the greatest energy surplus because of high generation (likely from solar or high-capacity operations) combined with relatively moderate demand in the MIDA region

Supply and Demand By Region Over 24h



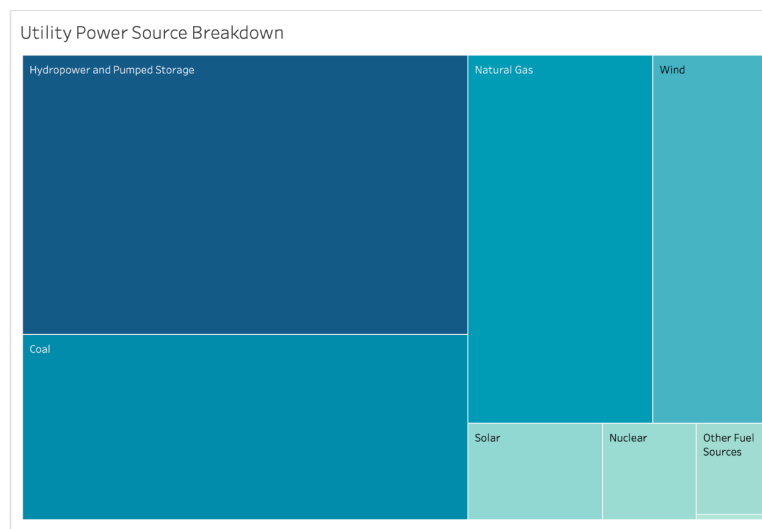
4. Energy Source Composition by Region

Chart Type: Treemap

This treemap illustrates which energy sources dominate in each region. For example:

- NW is led by hydropower, followed by natural gas and coal.
- CENT relies on wind, then coal and gas.

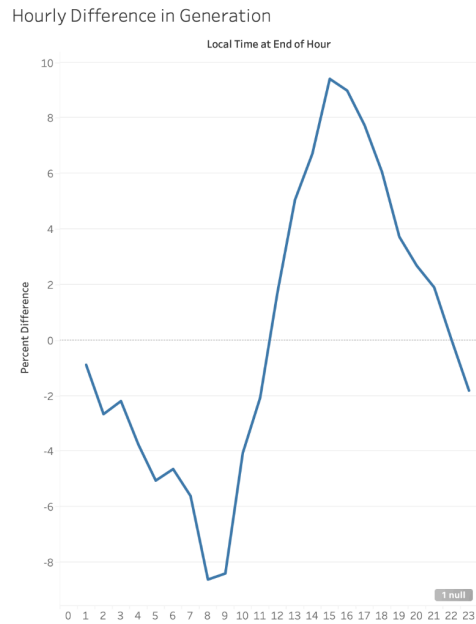
Regions like NW and CENT are strong renewable energy producers with dominant renewable sources (hydro and wind), but fossil fuels like coal and natural gas still play a crucial role in their overall energy generation mix.



5. Hourly Wind Energy Generation in CAL

Chart Type: Line Chart

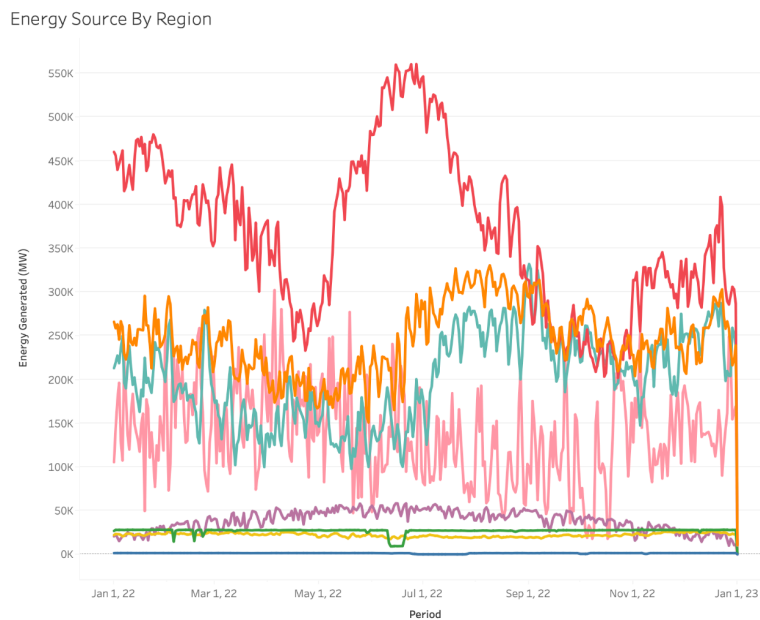
This line chart tracks how energy generation changes by hour. In California, wind generation increases from hour 12 to a peak at hour 15, before declining. From hour 12 to hour 21, California's wind energy generation is increasing compared to the previous hour. The highest increase (or the peak) occurs at hour 15 (i.e., 3:00 PM). The percent difference begins to decrease, indicating that generation is still occurring but at a slower growth rate, or possibly even beginning to drop off.



6. Energy Source Trends Over Time

Chart Type: Multi-Line Chart (Interactive)

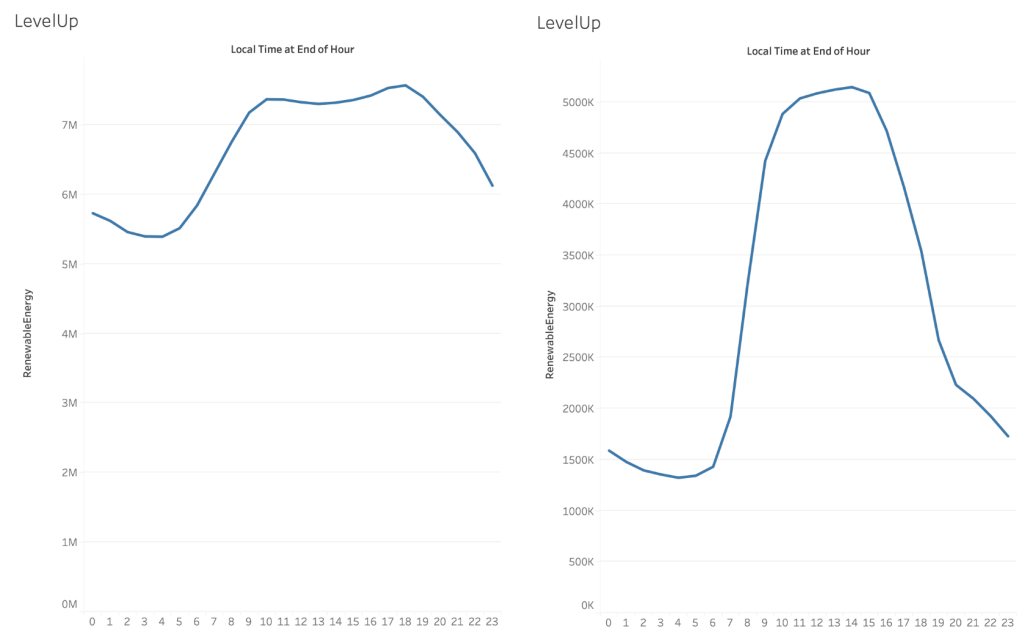
This chart allows users to select a region and time period (e.g., day, week, month) to explore how each energy source's contribution changes. For instance, in CAL, solar dominates during summer months, while in CENT, wind maintains consistent contribution year-round.



7. Hourly Renewable Energy by Region

Chart Type: Line Chart

Comparing CAL and NW, the difference in scale is stark: NW generates renewable energy in the millions, while CAL remains in the thousands. Additionally, NW's output is more stable across the day, while CAL fluctuates sharply due to its heavy reliance on solar energy.



Recommendation

Based on the data visualized in this dashboard suite, the Northwest (NW) region emerges as the most promising location for Intel's next data center. It consistently produces a large surplus of energy and derives the majority of its power from renewable sources, particularly hydropower. This ensures a low-carbon footprint, stable supply, and likely favorable pricing.

While other regions like CAL and TEX show strong renewable trends, they often lack the volume and consistency seen in NW. For example, California generates much less total renewable energy and is more sensitive to hourly fluctuations. Therefore, NW offers the best combination of sustainability, reliability, and capacity for Intel's long-term infrastructure needs.

U.S. Regional Energy Overview: Net Production, Renewable Share, and Source Composition

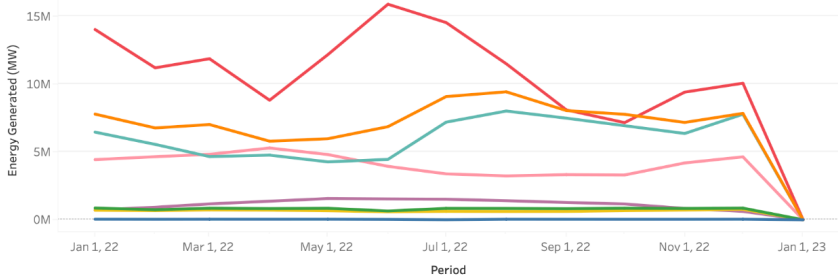
Use the dropdown menus below to explore energy source trends by region and time period. Analyze total production, renewable energy share, and the composition of energy sources.

Region NW

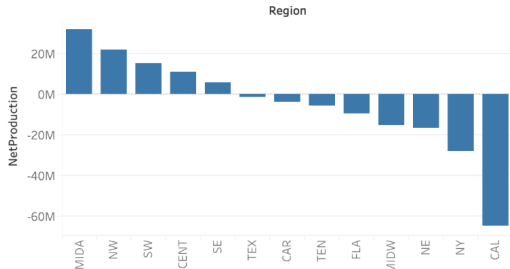
SelectPeriod month

- Energy Source
- All Petroleum Products
 - Coal
 - Hydropower and Pumped Storage
 - Natural Gas
 - Nuclear
 - Other Fuel Sources
 - Solar
 - Wind

Energy Source By Region



Net Production



Renewable Energy as Percentage of Overall Generation

