How to Power a **2.2 GW** *A.I.* **Data Center** *with* **Solar Wind** *&* **Batteries** *Alone*

Michigan
Indiana

South Bend

Existing Solar

The Honeysuckle Solar Project was developed by Lightsource bp and installed by Inovateus Solar in 2024 with 188 MW peak capacity.

Amazon's Project Rainier would need 34 Honeysuckle Solar Projects to fulfill the solar power component.

New Carlisle

A Stellantis battery manufacturing plant sits in between the two sites.

The Data Center

When complete, Amazon's ~$25 billion Project Rainier in New Carlisle **will draw 2.2 GW of power almost continuously, consuming 17.5 TWh of electricity per year**.

Thirty modules with a combined building footprint of 1.1 km² will sit on 6.5 km² of supporting property. All together that is about the same size as Honeysuckle.

The Challenge

Amazon is building a very large data center in Indiana, just west of South Bend. How can we build enough solar, wind, and battery energy storage resources to make sure the data center never has to resort to gas or another fossil fuel power source?

First, we need to be able to supply 2.2 GW 24/7/365. That means a mix of solar and wind resources much larger than 2.2 GW so that the battery system can keep providing power even after the sun sets and the wind stops blowing.

We will supply 60% of the power from wind and 40% from solar and overbuild our demand goal by 135%. This results in 1.8 GW of wind and 1.2 GW of solar (3 GW total). Dividing each of those target continuous loads by the capacity factor of wind and solar get us to 11.5 GW.

Instead of building 2.2 GW of capacity, we will need to build 11.5 GW—5 GW wind and 6.5 GW solar—along with 10 GWh of storage. This self-sustaining generation mix will help avoid data center demand adjustments or reliance on external clean firm resources.

On the left is the land area that 11.5 GW of **solar**, **wind**, plus **battery** power occupies.

Storage
10 GWh
0.10 km²

Wind
5 GW
16 km²

Solar PV
6.5 GW
130 km²

Installing solar, wind, and batteries is the least expensive way to provide 11.5 GW of reliable power in time to meet the rising demand from A.I.

Installing that much generation infrastructure will cost less than half as much as the capital investment in the 2.2 GW data center itself. Especially when including in the social cost of carbon, meeting this load with fossil fuel infrastructure will cost us all far more.

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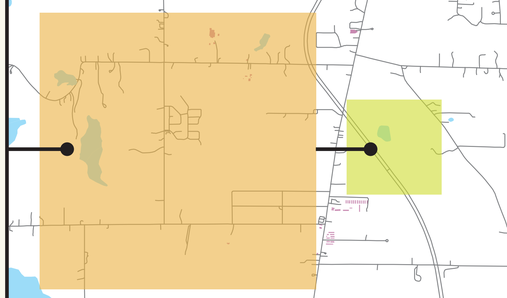
The Big Picture

Project Rainier will be 20% of Amazon's total data center capacity in 2027 at which point the company's data centers will be consuming a similar amount of electricity as the **entire State of Indiana**.

How to Power a City

Interestingly, Amazon's Project Rainier consumes around 9 times the power of the entire city of South Bend including Notre Dame.

The size of the energy landscapes required to power the city are therefore much smaller as you can see in the squares to the right.



It looks like the solar might even fit on the rooftops of the city (pink areas)

Installation density of solar photovoltaic is 50 MW/km². Land area for wind installation includes pads, roads, and auxiliary structures and assumes the spacing between towers is shared land use with agriculture.
Links: https://convergedigest.com/aws-activates-project-rainier-data-center-campus/; https://atb.nrel.gov/electricity/2023/utility-scale_pv; https://southbendin.gov/gosolar/; https://green.nd.edu/about/university-of-notre-dame-sustainability-strategy/sustainability-strategy-goals/.