Cambium Datasets

Pieter Gagnon
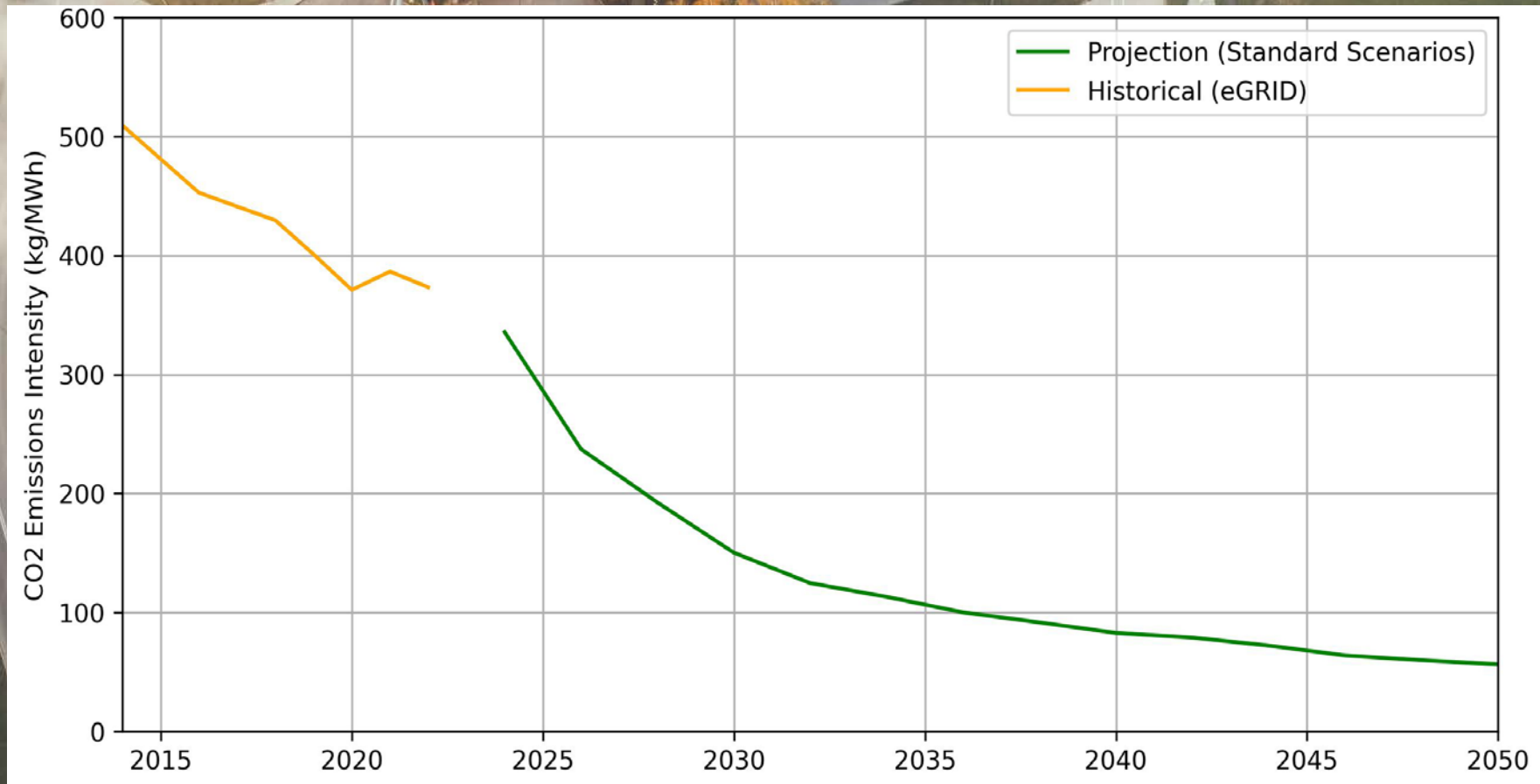
National Renewable Energy Laboratory

Aug. 13, 2024

Forward-looking analysis...

...with a changing electric grid.

Example: Grid Emissions Intensity Over Time

What Is Cambium?

- Annually-updated database
- 5th edition upcoming
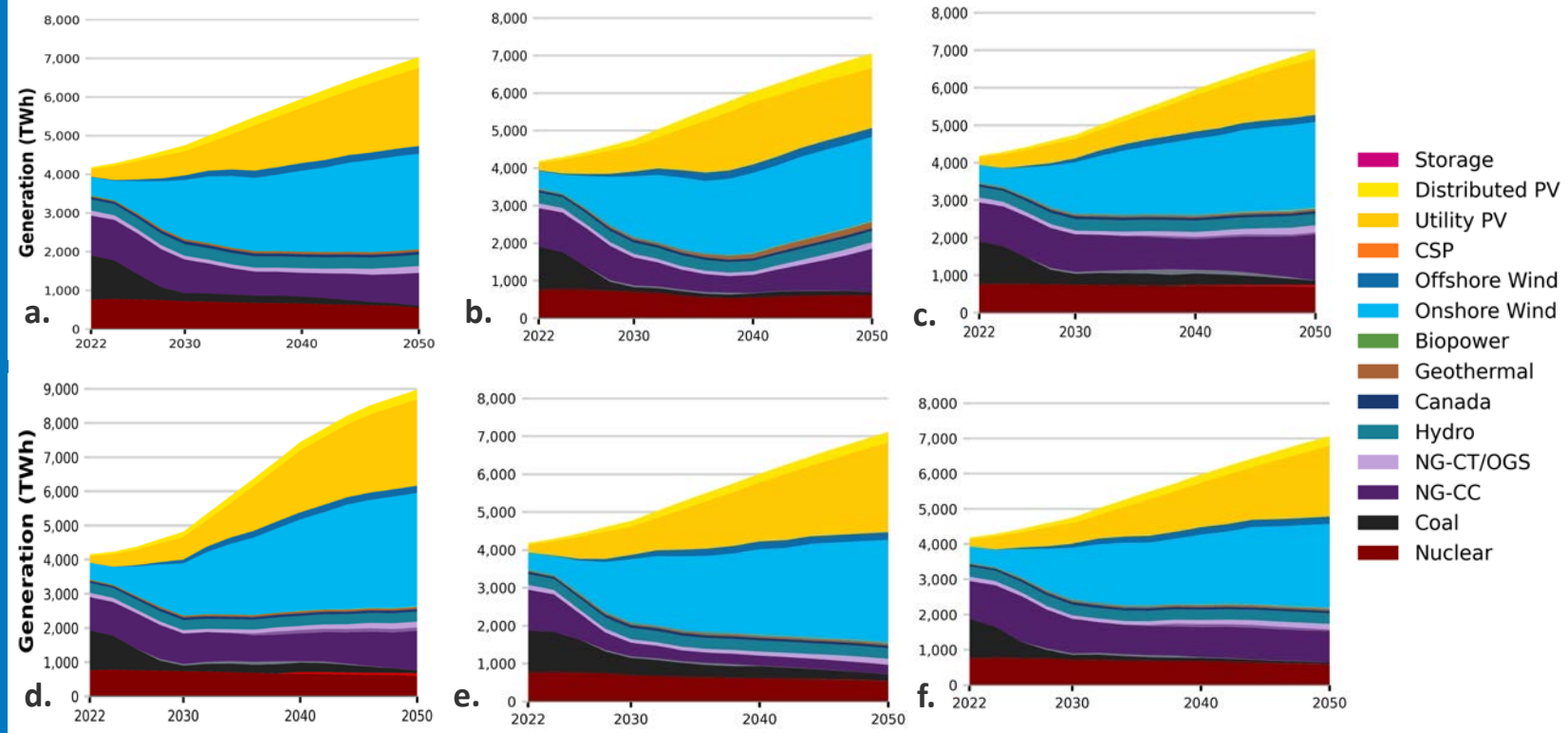- 6 business-as-usual-style scenarios, 2 decarbonization projections

"Business-As-Usual" Cases:

a. Mid-Case
b. Advanced Renewable Energy
c. Conservative Renewable Energy
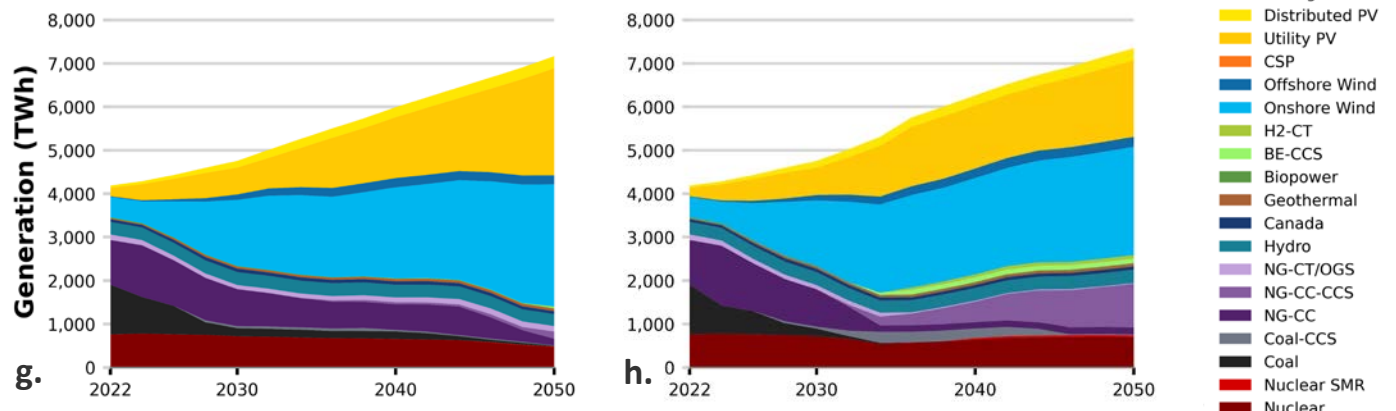d. High Demand Growth
e. High Gas Prices
f. Low Gas Prices

Decarbonization Cases:

g. 95% by 2050
h. 100% by 2035

Six "Business-As-Usual" Style Projections

Two National Decarbonization Projections

What Is Cambium?

- Annually-updated database
- 5th edition upcoming
- Six business-as-usual-style scenarios, two decarbonization projections
- Data designed to support other analyses
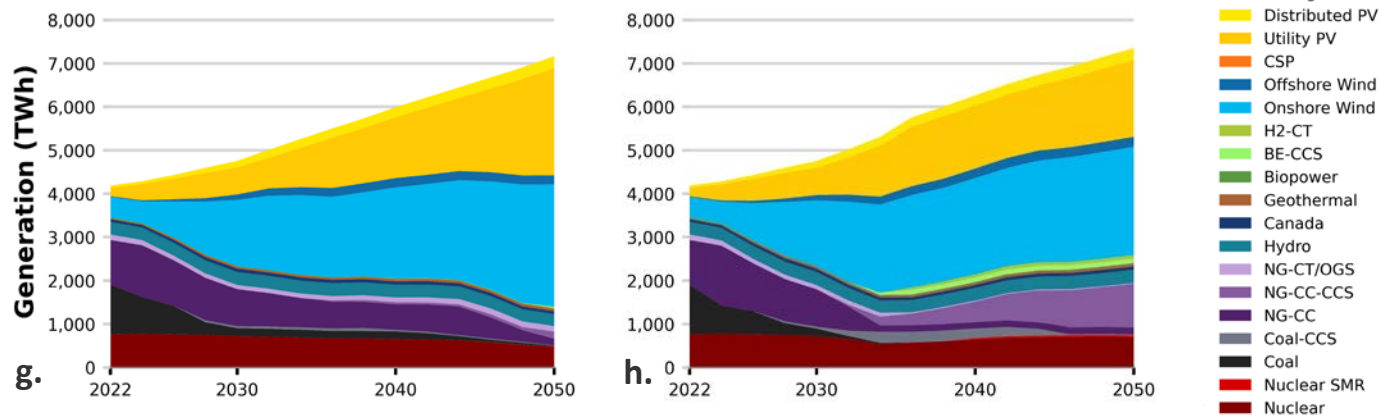- Primary model is NREL's ReEDS

What Is ReEDS?

- Projects evolution of electric grid
- Least-cost, subject to reliability, operating, and policy constraints

Six "Business-As-Usual" Style Projections
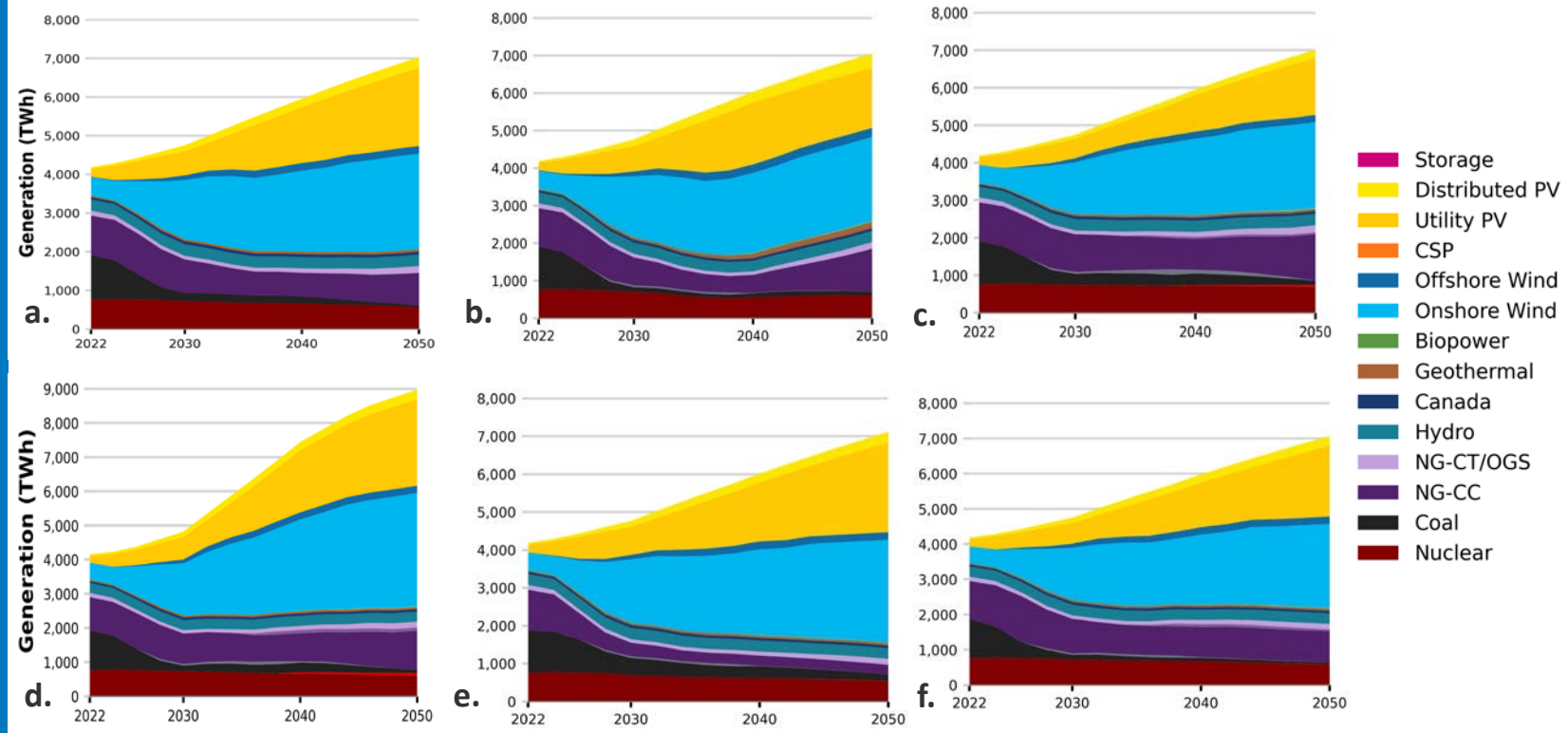
Two National Decarbonization Projections

What Metrics Are Available?

Operational

Generation
- Hourly generation by technology

Capacity
- Nameplate capacity by technology
- MWh of storage

Portfolio
- Renewable portfolio standards (RPS) and clean energy standards (CES) shadow prices
- RPS and CES fractions

Load
- Busbar load
- Busbar load for end-use
- End-use load
- Direct air capture load
- Load from storage charging
- Transmission losses
- Net load

Transmission
- Imports
- Exports

Operations
- Average distribution loss rate
- Marginal distribution loss rate
- Operating reserve demand
- Operating reserve shadow price
- Planning reserve margin
- Planning capacity
- Capacity shadow price
- Marginal generator technology
- Marginal energy source technology
- CO_2 shadow price

Costs (Busbar and End-Use)
- Hourly marginal energy cost
- Hourly marginal capacity cost
- Hourly marginal portfolio cost

Greenhouse Gas Emissions
- Average from in-region generation
- Average induced by in-region load
- Short-run marginal emission rate
- Long-run marginal emission rate

Several Temporal Resolutions Available

Hourly

Long-run marginal emission rate

Month-Hours

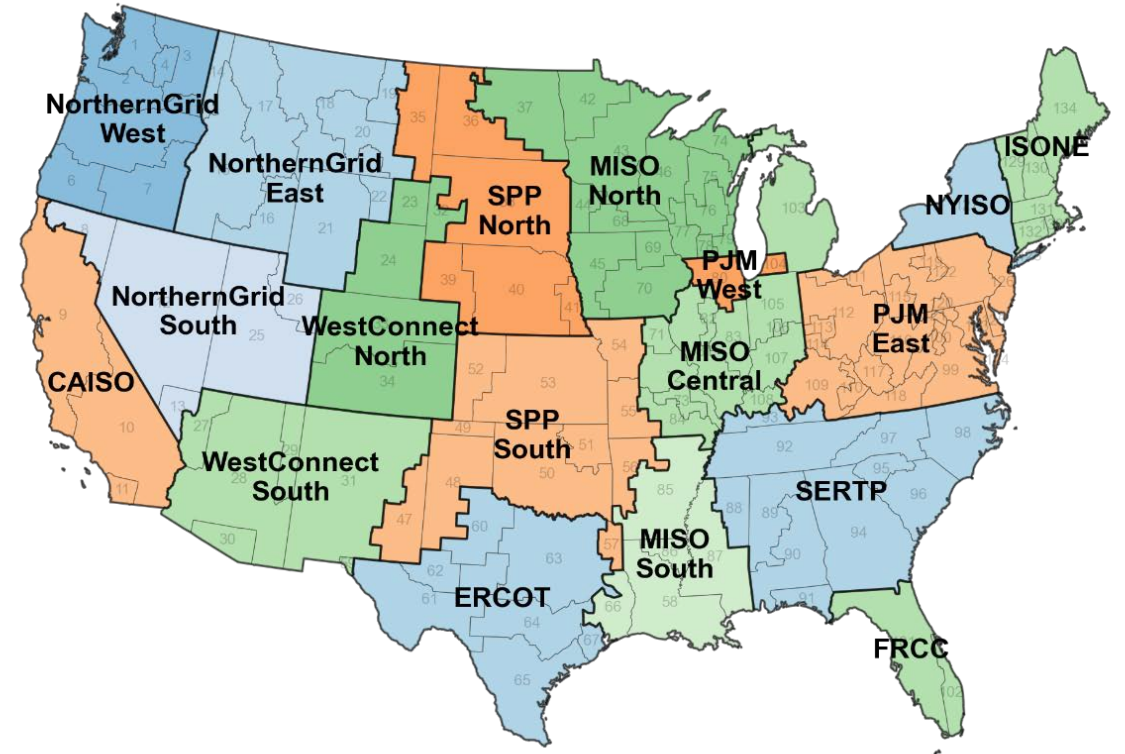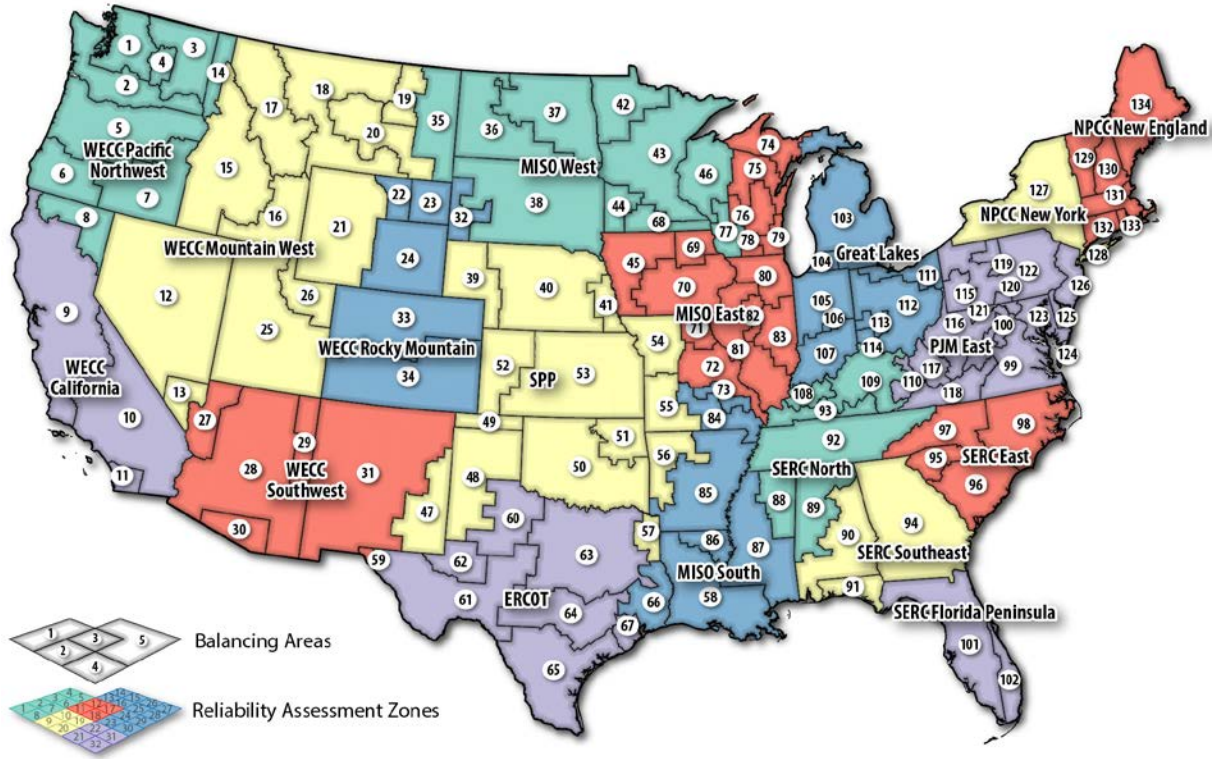**Time-of-Day**

Annual

220 kg/MWh

Several Geographic Resolutions Available

How Is Cambium Data Being Used?

In Research:

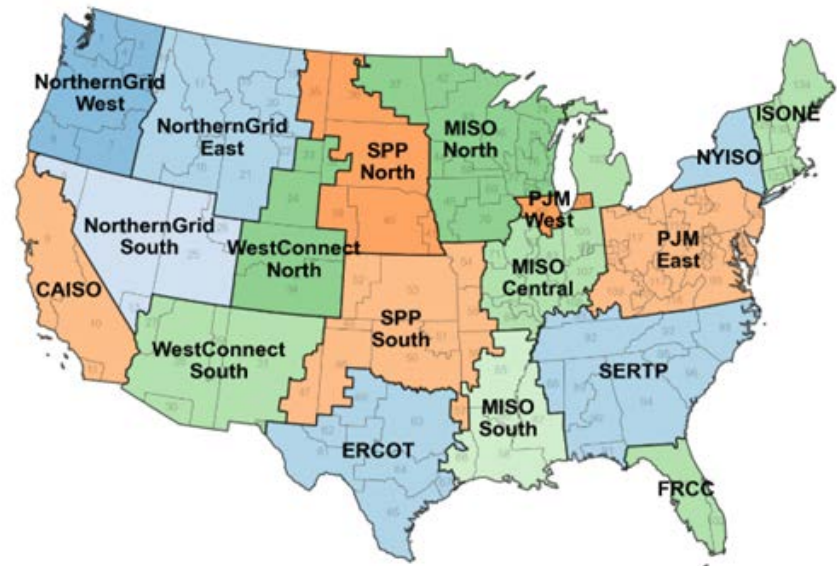# How Is Cambium Data Being Used?

In Standards:

ASHRAE 189.1

RESNET 301

Month-Hour Levelized Long-Run
Marginal Emissions Rates
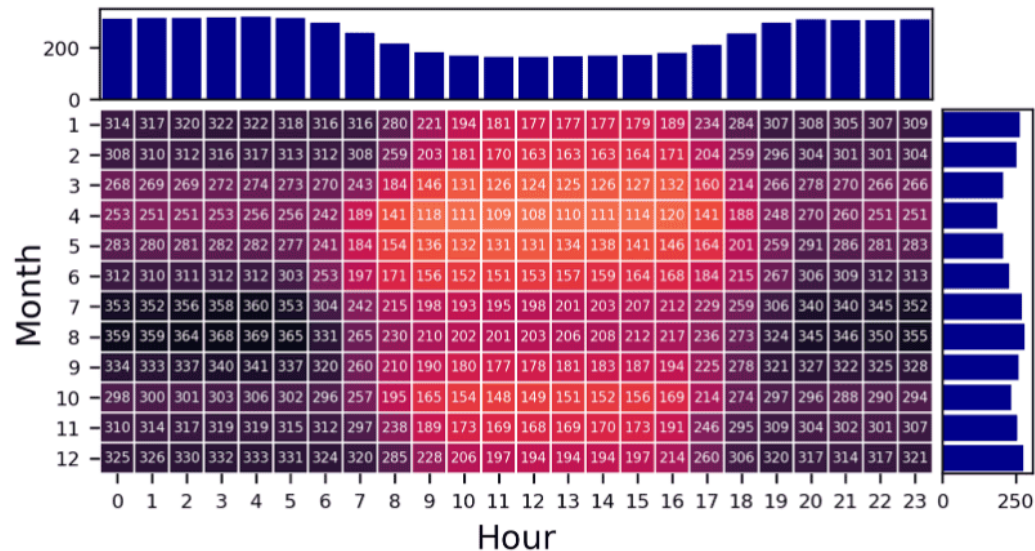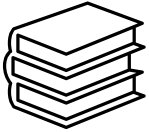

18 Regions for the United States

How Is Cambium Data Being Used?

In Decision Making:
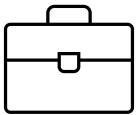
State and Local Governments

Academic Institutions

Utilities and Regulators

Global Clean Energy Organizations

Consulting and Commercial Sector

NREL and Amazon Aim To Create Guidebook for Emissions Impact Analysis

Improved Modeling Will Help Clean Energy Buyers Better Estimate Their Greenhouse Gas Emissions

Dec. 12, 2023 | By Connor O'Neil | Contact media relations   Share

How To Access the Data

Online Viewer

scenarioViewer.nrel.gov

CSV Download
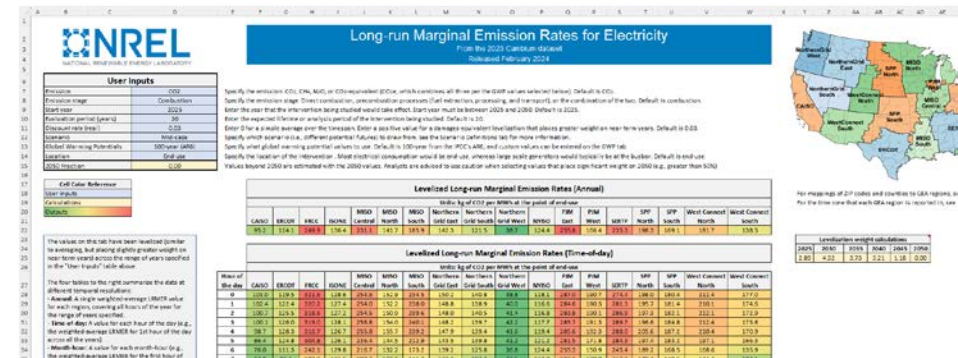
scenarioViewer.nrel.gov

Documentation

Cambium 2023 Scenario Descriptions and Documentation, Gagnon et al. 2024

Emissions Workbooks

Long-run Marginal Emissions Rates for Electricity Workbooks for 2023 Cambium Data

Questions?

www.nrel.gov

NREL/PR-6A40-90906

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