Battery Storage, Electric Vehicle, and Hydrogen Developments in the United States

21st APEC workshop on energy statistics Vikram Linga, Renewable Energy Analyst September 12, 2023 | Tokyo, Japan



U.S. Energy Information Administration Independent Sta

Independent Statistics and Analysis www

www.eia.gov

Vikram Linga



Vikram Linga is a Renewables Analyst on the Electricity, Coal, & Renewables Modeling Team in EIA's Office of Long Term Energy Modeling. Vikram focuses on long-term modeling and analysis of renewable energy in the power sector, both domestic and international. He contributes to the Annual Energy Outlook, International Energy Outlook, and related studies and collaborations within the industry, with a focus on energy storage, hydrogen, and geothermal energy in the power sector.



Contents

- EIA Overview
- Battery Storage in the United States
- Electric Vehicles in the Untied States
- Hydrogen in the United States



EIA Overview

EIA Overview

The U.S. Energy Information Administration (EIA) is the statistical and analytical agency within the U.S. Department of Energy.

EIA is the nation's premier source of energy information.

By law, our data, analyses, and forecasts are independent of approval by any other officer or employee of the U.S. government.

List of products: <u>https://www.eia.gov/about/products_services.php</u>





Large-scale battery storage cumulative power capacity (2015–2024)

Data source: U.S. Energy Information Administration, 2022 Form EIA-860 Early Release, Annual Electric Generator Report



Data source: U.S. Energy Information Administration, 2022 Form EIA-860 Early Release, Annual Electric Generator Report Note: Solid yellow, green, and brown bars indicate generating total capacity of solar, wind, and fossil fuels that have battery storage on-site.

-Waiting on guidance for federal standalone investment tax credit subsidy (for hybrid systems, how would subsidy be applied)



Vikram Linga, APEC workshop, Tokyo, Japan September 12, 2023

Total installed capacity in all sectors, 2022 (history) and 2050 gigawatts



Data source: U.S. Energy Information Administration, *Annual Energy Outlook 2023* (AEO2023) Note: ZTC=Zero-Carbon Technology Cost; other=geothermal, biomass, municipal waste, fuel cells, hydroelectric, pumped hydro storage.



Hourly U.S. electricity generation and load by fuel for selected cases and representative years billion kilowatthours



Data source: U.S. Energy Information Administration, Annual Energy Outlook 2023 (AEO2023)

Note: Negative generation represents charging of energy storage technologies such as pumped hydro and battery storage. Hourly dispatch estimates are illustrative and are developed to determine curtailment and storage operations; final dispatch estimates are developed separately and may differ from total utilization as this figure shows. Standalone solar photovoltaic (PV) includes both utility-scale and end-use PV electricity generation.



eia

Electric Vehicles in the Untied States

Electric Vehicles in the Untied States



11

See: Monthly Energy Review



Vikram Linga, APEC workshop, Tokyo, Japan September 12, 2023

Electric Vehicles in the Untied States



year across the AEO2023 Reference case and side cases.

Vikram Linga, APEC workshop, Tokyo, Japan September 12, 2023

eia

Hydrogen in the United States

Hydrogen in the United States

- Inflation Reduction Act Section 45V: H2 Production Tax Credit
 - 3.00 2023\$/kg, 10 years from date of first service
 - 5x multiplier if prevailing wage and apprenticeship requirements met
 - \$0.60/ kg H2 if lifecycle emissions less than 0.45 kg CO2/ kg H2
 - 33.4% credit if between 0.45 1.5 kg CO2/ kg H2
 - 25% credit if between 1.5 2.5 kg CO2/ kg H2
 - 20% credit if between 2.5 4.0 kg CO2/ kg H2
 - Currently awaiting U.S. Treasury Guidance: Hourly/regional matching, additionality
- Clean Air Act Section 111(b)+(d) Natural Gas "Base Load" Turbines:
 - 30% co-fire w/ H2 by 2032, 96% by 2038
 - OR 90% CCS by 2035



Proposed Hydrogen Development in the United States

- Intermountain Power Project (Utah)
- Cavendish NextGen Hydrogen Hub (Florida Power & Light)
- New Fortress Energy (Ohio)
- EIA
 - EIA is in the process of developing an economy wide hydrogen model
 - EIA collects data for a small amount of hydrogen used in the refining sector



EIA Data Needs

- Battery Storage
 - National hourly charge/discharge data (standalone+hybrid)
 - Revenue streams, value stacking
- Electric Vehicles
 - Charging behavior (time of day, location, tech/speed)
 - Keep tracking global EV/battery technology options, characteristics and costs
- Hydrogen
 - Electroyzer, Fuel Cell, Turbine costs and efficiencies
 - Storage technology costs and deployment (geological, above ground/underground tanks)
 - Pipelines (costs, repurposing natural gas infrastructure, leakage/safety risks)



For more information

U.S. Energy Information Administration home page | <u>www.eia.gov</u>

Annual Energy Outlook | <u>www.eia.gov/aeo</u>

Short-Term Energy Outlook | <u>www.eia.gov/steo</u>

International Energy Outlook | <u>www.eia.gov/ieo</u>

Monthly Energy Review | www.eia.gov/mer

Today in Energy | <u>www.eia.gov/todayinenergy</u>

State Energy Profiles | <u>www.eia.gov/state</u>

Drilling Productivity Report | <u>www.eia.gov/petroleum/drilling/</u>

International Energy Portal | http://www.eia.gov/international/overview/world

