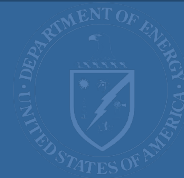




CESER Guidance on Developing a State Energy Profile

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This guidance is provided by the U.S. Department of Energy's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) to aid states in the development of State Energy Security Plans (SESPs). States may choose to follow parts or all of the provided guidance. States are encouraged to adapt or supplement the guidance provided to better address state-specific needs and situations. This document is not intended to be prescriptive or suggest non-statutory expansion of State Energy Office responsibilities, which may vary significantly from state to state.



This document contains the outline for the state energy profile section of a State Energy Security Plan. The energy profile is part of the pre-event baselining activities performed during “blue sky” days, which can be used for comparison purposes while assessing consequences during event response. The profiles map and catalog key energy infrastructure and graph energy supply and demand and may be used to inform state policy and/or investment decisions.

The outline contains key pieces for a comprehensive energy profile. States do not have to follow the order but are encouraged to include all relevant items for their state.

1. Electricity

1.1. Electricity Consumption

- 1.1.1. Retail Sales Graph
- 1.1.2. Map of Major Utilities
- 1.1.3. Table of Major Utilities

1.2. Electricity Supply

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 - 1.2.5.2. Balancing Authority Electricity Overview
 - 1.2.5.3. Balancing Authority Electricity Generation by Energy Source Graph

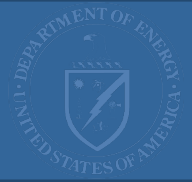
2. Liquid Fuels

2.1. Petroleum Products Consumption

- 2.1.1. Gasoline
- 2.1.2. Distillate
- 2.1.3. Jet Fuel
- 2.1.4. Residual Fuel Oil
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- 2.2.2. Table of Refineries serving the state
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- 2.2.5. Table of Relevant Ports
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2.3. Crude Oil

- 2.3.1. Crude Oil Production Graph
- 2.3.2. Crude Oil Map (pipelines, wells, refineries)

2.4. Biofuels

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- 2.4.2. Ethanol and Biodiesel Production Facility Table

3. Natural Gas

3.1. Natural Gas Consumption

- 3.1.1. Graph of State Natural Gas Consumption
- 3.1.2. Map of Natural Gas Distribution Company Territories
- 3.1.3. Table of Natural Gas Distribution Companies, Sales

3.2. Natural Gas Supply

- 3.2.1. Natural Gas Production Graph
- 3.2.2. Natural Gas Map (pipelines, storage, LNG facilities, processing plants)
- 3.2.3. List of Key Natural Gas Pipelines
- 3.2.4. Table of Storage Facilities
- 3.2.5. Table of Processing Plants



DETAILED STATE ENERGY PROFILE OUTLINE

1. Electricity

1.1. Electricity Consumption

1.1.1. Retail Sales Graph

Key aspects: Line chart with monthly data to show seasonality of electric consumption.

How to: Graph the latest year’s data by month using the [EIA Electricity Data Browser](#) “Retail sales of electricity” data set filtered for the state.

1.1.2. Map of Major Utilities

Key aspects: A visual to easily differentiate between utility territories, with labels and different colors for each major utility. The cutoff for major utilities may differ for each state but is likely between 10,000 – 50,000 customers for visibility. Shows location of major utilities in the state

How to: Ideal option is to create a custom GIS map, pulling in DHS’s Homeland Infrastructure Foundation- Level Data’s ([HIFLD](#)) [public electric retail service territories layer](#), based on key aspects. A second option is to use the electric retail service territory layer in EIA’s [Energy Atlas](#) but it may be difficult to identify specific utility territories as the map boundaries can overlap and there is only one color.

1.1.3. Table of Major Utilities, listing number of customers, retail sales

Key aspects: Table shows size of major utilities in the state. Table columns should include: Utility Name, Ownership Type, Total Customer Count, % of State’s Customers, Total Sales (MWh).

How to: Pull data from [EIA-861](#) Annual Electric Power Industry Report

Utility Name	Ownership Type	Total Customer Count	% of State’s Customers	Total Sales (MWh)

1.2. Electricity Supply

1.2.1. Map of Electric Generating Units in the State

Key aspects: Map different fuel sourced generators, with relative size of icons representing generator capacity, label largest generators on map and create legend. Consider if a capacity threshold needs to be set to prevent overcrowding (such as greater than 250-MW).

How to: Ideal option is to create a custom GIS map, pulling in [EIA’s public generator layer](#), based on key aspects. An alternative option is to label generators on the map from the [CESER State Energy Risk Profile](#), which includes power plants > 50MW. A third option is to use [EIA’s Energy Atlas](#) and the screengrab function in the bottom left corner of the screen.



1.2.2. Table of the Largest Generators by Capacity

Key aspects: Table columns should include generator name, owner, county, summer net capacity, annual generation in MWh, type, % of consumption in the state. This will show which generators are most important to the state to ensure adequate supply of electricity.

How to: Identify largest generators using [EIA-860M](#) (list the largest 10-20). Find the generation at those top generators on the [EIA-923](#) data for the latest year, calculate the % of consumption by placing generation over the state retail sales from the [EIA State Electricity Profiles](#). Comment on supply security aspects of critical generators, i.e., where coal or natural gas is sourced and by what mode.

Generator Name	Owner	County	Summer Net Capacity (MW)	Type	2021 Annual Generation (GWh)	% of State Consumption

1.2.3. Assessment of Net Importer or Exporter of Electricity

Key aspects: Assess if your state makes more electricity than customers need or if you are dependent on generation outside of the state.

How to: Compare retail sales to generation for the latest year (data from [EIA State Electricity Profiles](#)). If retail sales are higher, then the state is a net importer; but if they are lower, then the state is a net exporter.

1.2.4. Generation Mix Pie Chart by Fuel Type

Key aspects: Understand which fuel/generation types are most critical in your state.

How to: Create a pie chart from the latest year’s data in the [EIA Electricity Data Browser](#) “Net Generation” data set filtered for the state.

1.2.5. Key Balancing Authorities

1.2.5.1. Description and Map of Balancing authority boundaries

Key aspects: Describe and show the boundaries of the balancing authority territory.

How to: Find a stock map from the authority’s website or other online source.

1.2.5.2. Balancing Authority Electricity Overview Graph

Key aspects: Graph the balancing authorities’ electricity demand, net generation, and total interchange. Analyze seasonality and amount of positive or negative interchange.

How to: Use the [EIA Hourly Electric Grid Monitor](#) to select the relevant balancing authority and use chart options on the electricity overview to select daily data for the latest year. Download the data from past 3 years to create a robust chart. Alternatively, clip the latest year of data from the dashboard.

1.2.5.3. Electricity Generation within Balancing Authority by energy source Graph

Key aspects: Graph the balancing authorities’ electricity generation by energy source

How to: Use the [EIA Hourly Electric Grid Monitor](#) to select the relevant balancing authority and use chart options on the electricity generation by energy source graph to select daily data for the latest year. Download the data from the past 3 years to create a robust chart. Alternatively, clip the latest year of data from the dashboard.



2. Liquid Fuels

2.1. Petroleum Products Demand (consumption graphs and stocks with seasonality)

Key aspects: It's best practice to layer 5-year average, 5-year range, plus the most recent year's data. Assess the seasonality of product consumption and of stock withdrawals and builds. Consumption and stock graphs can be used during disruption events to assess relative storage position (higher or lower than average).

How to: Create charts for each product. For consumption, consider using [EIA Prime Supplier Sales volumes](#) or EIA SEDS consumption volumes. For stocks, pull data from [EIA Refinery Bulk Terminal, and Natural Gas Plant Stocks by State](#).

- 2.1.1. Gasoline
- 2.1.2. Distillate (add heating fuel usage context)
- 2.1.3. Jet Fuel/Kerosene
- 2.1.4. Residual Fuel Oil
- 2.1.5. Propane (add heating fuel usage context)
- 2.1.6. State Fuel Specifications

Resources: [EPA Reformulated Gasoline](#) and [RVP list](#), Insert any state-specific fuel specifications that are more stringent than the EPA required specifications.

2.2. Petroleum Products Supply

2.2.1. EIA PADD Transportation Fuels Study Regional Infrastructure Map

How to: Pull the map for the appropriate region from EIA Transportation Fuels Markets Reports ([PADD 1 and 3](#), [PADD 2 and 4](#), [PADD 5](#)) Note: Maps are from 2017. Flag any updates including refinery capacities that have changed in recent years.

2.2.2. Table of Refineries serving the state

Key aspects: This table gives readers a sense of how much production is at each refinery and how that production links to pipelines (and in turn dependent markets). The table should include: Owner, Location, Crude Oil Capacity, Pipelines feeding, and Takeaway Pipelines.

How to: Pull from [EIA Refinery Capacity Report Table 3](#). Research critical connectivity (crude and product pipelines, waterways, etc.)

Owner	Location	Crude Oil Capacity (b/cd)	Crude Pipelines Feeding	Product Takeaway Pipelines

2.2.3. Map of Transportation Fuel Infrastructure in the State

Key aspects: Labeling of refineries and key pipelines, different color pipelines, legend. The map shows how fuel comes into or travels through the state. It can be useful to see what alternative supply paths are available in case of disruption to a particular piece of infrastructure.

How to: Ideal option is to make a custom GIS map, pulling in [EIA Petroleum Refineries](#), [EIA Petroleum Product Pipelines](#), and [EIA Petroleum Product Terminals](#) layers, based on key aspects. Alternative option could be use [EIA Energy Atlas](#) to create the map.



2.2.4. Table of Key Refined Product Pipelines serving the state

Key aspects: Owner, Products, Origins, Destinations. If known, add the percentage of state demand met by the pipeline.

How to: Pull from [EIA Energy Atlas](#) and then review the relevant EIA Transportation Fuels Markets Reports ([PADD 1 and 3](#), [PADD 2 and 4](#), [PADD 5](#)) for additional information about pipeline products, origin, and destination.

Owner	Line Name	Products	Origin	Destination

2.2.5. Table of Relevant Ports

Key aspects: Understand relative importance of ports to petroleum product supply.

How to: Use EIA’s layer for petroleum ports from [EIA Energy Atlas](#) to produce a list of ports for your state. Then utilize [USACE Waterborne Commerce Statistics Center](#) to identify major petroleum ports and approximate volumes in your state.

Port	Crude Oil Inbound (b/d)	Crude Oil Outbound (b/d)	Products Inbound (b/d)	Products Outbound (b/d)

2.2.6. Table of Key Terminals

Key aspects: Identify key terminals with a table that includes Owner and City columns. *For states that want to include more detailed terminal information during continual plan improvements, additional categories to add include Fuel Types Stored, Storage Capacity, and Truck Rack Capacity.*

How to: Pull from [EIA Energy Atlas](#). *Advanced: Utilize Title V air permits within the state, if possible, to find terminal storage and truck rack capacities. Survey industry partners if needed.*

Owner	City	Fuel Types Stored	Storage Capacity (barrels)	Truck Rack Capacity (b/d)

2.2.7. Map of Natural Gas Liquids Infrastructure in the state

Key aspects: Labeling of refineries and key pipelines, different color pipelines, legend

How to: Ideal option is to make a custom GIS map, pulling in [EIA Petroleum Refineries](#) and [EIA Hydrocarbon Gas Liquids Pipelines](#) layers, based on key aspects. An alternative option could be using [EIA Energy Atlas](#) with the same layers and take a screengrab in the bottom left corner of the screen.



2.2.8. Table of Key Natural Gas Liquids Pipelines Serving the State

Key aspects: Table lists pipeline details including Owner, Products and pipeline Origin and Destinations.

How to: Pull from [EIA Energy Atlas](#) and then pull company-specific pipeline tariffs for products, origins, and destinations. Tariffs can be found on the company website or searched for the [Federal Energy Regulatory Commission's \(FERC\) Tariff List](#)

Owner	Line Name	Products	Origin	Destination

2.3. Crude Oil

2.3.1. Crude Oil Production Graph

Key aspects: Show 5-years of data on a line chart to analyze how much crude oil the state produces, in comparison with refinery consumption of crude oil and to understand how much crude oil is being transported within the state.

How to: Pull data from [EIA Crude Oil Production](#) and plot.

2.3.2. Crude Oil Map (pipelines, wells, refineries)

Key aspects: Labeling of refineries and key pipelines, different color pipelines, legend

How to: Ideal option is to make a custom GIS map, pulling in [EIA Petroleum Refineries](#), [EIA Crude Oil Pipelines](#), and [HIFLD Oil and Gas Wells](#) layers, based on key aspects. An alternative option could be using [EIA Energy Atlas](#) with the same layers and take a screengrab in the bottom left corner of the screen.

2.4. Biofuels

2.4.1. Biofuel Map

Key aspects: Show locations of ethanol and biodiesel production facilities with different icons and a legend

How to: Use [EIA Energy Atlas](#) and lay on biofuel production facilities.

2.4.2. Ethanol and Biodiesel Production Plants Table

Key aspects: Table includes Owner, Site, Type and Capacity

How to: Use [EIA Ethanol Plant Production](#) and [EIA U.S. Biodiesel Plant Production](#) to create a table.

Company Name	Site	Capacity (million gallons/year)	Capacity (thousand b/d)



3. Natural Gas

3.1. Natural Gas Consumption

3.1.1. Graph of State Natural Gas Consumption

Key aspects: Best practice is to layer 5-year average, 5-year range, plus the most recent year's data.

How to: Pull [EIA Natural Gas Consumption by End Use](#) total consumption and plot.

3.1.2. Map of Natural Gas Distribution Company Territories

Key aspects: Different colors for each major natural gas distribution company, labeling of major utilities. The cutoff for major distribution companies may differ for each state but is likely based on 1-10 MMcf/d of distributions for visibility.

How to: Ideal option is to create a custom GIS map, pulling in [HIFLD's natural gas service territories layer](#) based on key aspects.

3.1.3. Table of Natural Gas Distribution Companies, Sales

Key aspects: Columns for company and delivery volume

How to: Pull [EIA Natural Gas Annual Respondent Query System \(EIA-176 Natural Gas Deliveries\)](#) to generate a table including companies that have 1 MMcf/d of aggregated deliveries across the various sectors. Cross check with the list of Natural Gas Service Territories from [HIFLD's natural gas service territories layer](#).

Gas Distribution Company	Delivery Volume (MMcf/d)

3.2. Natural Gas Supply

3.2.1. Natural Gas Production Graph

Key aspects: Show 5 years of data on a line chart. This can be used to understand how much natural gas is being produced vs. consumed in the state and if/how much gas needs to be brought in from other states or via imports.

How to: Use [EIA Natural Gas Gross Withdrawals and Production](#) to pull data and plot.

3.2.2. Natural Gas Map (pipelines, gas-fired power plants, storage, LNG facilities, processing plants)

Key aspects: Label critical pipelines and storage locations.

How to: Ideal option is to create a custom GIS map, pulling in [EIA Natural Gas Underground Storage](#), [EIA Natural Gas Processing Plants](#), [EIA Natural Gas Interstate and Intrastate Pipelines](#), and [HIFLD Oil and Gas Wells layers](#), based on key aspects. An alternative option could be to use [EIA Energy Atlas](#) and layer on natural gas pipelines, natural gas processing plants, natural gas underground storage, and LNG import and export terminals and manually label. and LNG import and export terminals and manually label.



3.2.3. List of Key Natural Gas Pipelines

Key aspects: Pipeline, Owner, State to state Capacity, Descriptions

How to: Pull list from [EIA Energy Atlas Data page](#) for Natural Gas Interstate and Intrastate Pipelines by zooming in on your state and toggling on the feature “Filter as map moves” to narrow in the table listing on pipelines in your state. There are duplicative entries for many operators as they represent different segments of the same line. Use state-relevant capacities from [EIA U.S. State-to-State Capacity..](#)

Pipeline	Owner	Capacity (MMcf/d)	Description

3.2.4. Table of Storage Facilities

Key aspects: This table can be used to assess how much underground storage is located in the state and where it is located. Columns should include Company name, Reservoir name, County, Working Gas Capacity, Maximum Daily Delivery.

How to: Use [EIA Natural Gas Respondent Query System \(EIA-191 Field Level Storage Data\)](#) to generate table for your state.

Company Name	Reservoir Name	County	Working Gas Capacity (MMcf)	Maximum Daily Delivery (MMcf/d)

3.2.5. Table of Processing Plants

Key aspects: This table shows the relative importance of various processing plants in the state. The overall capacity can be compared to production within the state to measure excess capacity. Table columns should include Plant Name, Owner, County, Plant Capacity and Storage Capacity.

How to: Use [EIA Natural Gas Respondent Query System \(EIA-757 Processing Capacity\)](#) to generate table.

Plant Name	Owner	County	Plant Capacity (MMcf/d)	Storage Capacity (MMcf)