

EPA Clean Energy-Environment Technical Forum
Gathering and Using State-Level Energy Data
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I. Introduction

In response to changing energy markets, evolving regulatory structures, and environmental challenges, state energy and environment professionals are analyzing energy trends and their impacts. To do so, states need access to current and reliable data so they can understand their energy profile as a basis for understanding their current energy situation and assessing options for the future. They also need the ability to locate sources of energy data and determine what types of data are relevant to the energy and environmental issues that are deemed most important.

Energy data has a variety of uses. For example, states can examine their current or expected future fuel mix to determine if a shift would impact environmental goals. Analyzing energy prices can help states budget their facilities expenses and help states understand energy price impacts on consumers and the economy. Comparing demand to available capacity can identify reliability issues that should be addressed, by measures such as reducing demand or adding supply.

Since the opportunities for analysis are extensive and potentially resource intensive, a state needs to prioritize the energy and environmental issues of greatest importance and its analytical data needs. Common to the analysis of most of these issues is the development of a state’s current energy profile. This document focuses on improving the understanding of how to develop a state energy profile. It does not explore other uses of state energy data, such as the development of a baseline or forecast, assessing emissions impacts from energy use, tracking energy savings from individual energy activities, or creating a comprehensive energy plan. These topics may be taken up in future documents.

States most commonly use the following three types of data to determine their current energy profile:

- Total energy consumption;
- Energy supply, reserves, and capacity; and
- Energy prices.

The following table summarizes how these types of data can be used to assess energy trends in several important areas:

Table 1 – Using Data to Assess Energy Trends

Examples of Data Use	Total energy consumption	Energy supply, reserves and capacity	Energy prices
Evaluate capacity		X	
Examine fuel mix	X	X	
Identify clean energy options with greatest potential		X	X
Explore energy-related emissions	X	X	
Understand price trends or price effects	X		X
Develop energy baseline or forecast	X	X	X

The remainder of this background paper summarizes the sources of each type of these data and how states use them (Section II, *Summary of Available Data*); provides detailed descriptions of each type of data (Section III, *Energy Consumption Data*, Section IV *Energy Supply Data*, and Section V, *Energy Prices*); and presents brief examples of how states have developed their own energy profiles (Section VI, *State Examples*).

II. Summary of Available Data

The following key resources provide credible and up-to-date energy data:

Table 2: Summary of State Energy Data

Source	Data	Description	How states use data	Why states use data
EIA <i>The Department of Energy (DOE) Energy Information Agency (EIA)</i> provides detailed state-by-state data on total energy consumption, state energy supplies, electricity consumption and generation capacity, electricity prices, heating fuels and other key data.	Energy Consumption	Consumption data vary by fuel source and end-use. EIA provides 2005-2006 data for fuels and 2007 data for electricity generation.	States use consumption data to develop a current energy profile, analyze historical trends and establish a baseline for energy forecasts.	Determine the rate of growth; compare to energy supply to determine adequacy and potential price changes.
	Energy Supply	EIA provides both supply and reserve data for all available fossil fuels in the state. It also provides total electricity supply and generation capacity.	States often use supply data to determine fuel mix, and which fuels have the greatest potential for future growth.	Most frequently used to determine if the states' supply and reserves are meeting or can adequately meet demand. Can also assess the age of infrastructure.
	Energy and Fuel Prices	EIA provides up-to-date data on electricity prices by end use consumer, fossil fuel costs, and final energy costs.	States can use price data to see price trends and measure changes in demand as prices have risen/fallen.	Price data provide key economic signals to states on which energy sources they should avoid or develop in the future. They can also assess whether consumers may need energy assistance.
NERC <i>The North American Electric Reliability Corporation (NERC)</i> provides data on energy and capacity, including data on planned transmission upgrades for each region.	Energy supply and capacity	NERC publishes electricity supply and demand information for North America encompassing both current and historical long-term capacity and demand projections.	States use NERC data to determine capacity resources, capacity purchases and sales, and generating capacity by fuel. The data also provide planned transmission upgrades, planned generating units, and planned changes to generators.	States use capacity data to evaluate reliability concerns and to develop their production baseline, which will help them determine their fuel mix and plan for future capacity expansion, particularly for renewable resources.
eGRID <i>EPA's Emissions & Generation Resource Integrated Database (eGRID)</i> provides plant boiler and generator specific data for every power plant in the country. eGRID also	Specific power plant generation data	Contains plant-specific data for all U.S. electricity generating plants. Data include generation resource mix in megawatt-hours and percent share; emissions data; and ownership, corporate	States use data to determine plant-level and state-level emissions and fuel mix information.	Allows states to evaluate the environmental impact of electric generation in their state. eGRID provides nitrogen oxide, sulfur dioxide, carbon dioxide, and mercury emissions for every generating plant in the U.S.

Table 2: Summary of State Energy Data

Source	Data	Description	How states use data	Why states use data
aggregates data by state, company and region.		affiliation, and locational information.		
ISOs <i>Regional Independent System Operators (ISOs)</i> provide forecasts, price data, transmission and distribution losses and energy efficiency data for the geographic areas they represent.	Price and transmission data	ISOs provide price data and data on transmission losses.	States can use price data to measure changes in demand as prices have risen/fallen. Transmission losses can be used for projecting and siting new energy capacity	ISOs have more recent data than EIA. ISO price data are in 5-minute and hourly increments.
	Load forecasts	Long-term forecasts are provided on population changes, economic development, industrial construction, and technology development.	Load forecasts help states model planned energy growth and help determine policies to meet demand.	Can be used when states begin to model policies for future energy growth.
PUCs/Utilities <i>PUCs/Utilities</i> in states that require <i>Integrated Resource Plans</i> , these filings can provide information on how utilities analyze the costs, benefits, and risks of all energy resources available to them, both on the supply and demand-side, with the ultimate goal of identifying a portfolio of energy resources that meets their future needs at lowest cost and/or risk. Some states may discover that data from utilities and regional ISOs are confidential and are made available on a case-by-case basis.	Integrated Resource Plans – electricity generation and capacity expansion	PUCs and utilities have data on generating capacity and have modeled capacity expansion plans.	States use these data to determine capacity resources, capacity purchases and sales, and generating capacity by fuel.	If available, states can use capacity data to develop their production baseline, which will help them determine their fuel mix, and plan for future capacity expansion, particularly with renewables.

III. Energy Consumption Data

Consumption data provide the total amount of electricity and heating and other fuels consumed by all end-users in the state. States must be able to determine how much energy is currently being used in the state in order to determine how to plan for future growth. The EIA provides several ways for states to analyze their consumption data, as described below:

[EIA State Energy Profiles \(SEP\)](#) is a gateway to all of EIA's state energy data, where states can find individual state energy consumption data, for the most recent year available, organized by the following categories:

- *Energy consumption by source.* Total energy consumption and total per capita are expressed in Btus. Energy consumption by source is provided for coal (in short tons), natural gas (in million cubic feet), and petroleum products (in thousand barrels).
- *Energy consumption by end-use sector.* Provided for residential, commercial, industrial, and transportation sectors (in billion Btus).
- *Consumption of electricity by fuel.* Provided in short tons of coal, million cubic feet of natural gas, and thousand barrels of petroleum.
- *Home heating data* expressed as a percentage share of all households.

Web site: <http://tonto.eia.doe.gov/state/>

[EIA State Data Directory for Consumption and Sales.](#) While this directory provides many of the same tables that are in the State Energy Profile, it also provides more detailed data on consumption and sales data by fuels. Data are presented either by state or by total U.S. consumption and sales. Available data include:

- Electric power sector consumption estimates
- Energy consumption by source and total consumption per capita
- Consumption of coal, natural gas, and petroleum for electricity generation by state and by sector
- U.S. coal, natural gas, and petroleum consumption by end-use sector.

Web site: http://tonto.eia.doe.gov/state/SEP_MoreConsump.cfm

[EIA State Energy Data Systems](#) provides integrated and comprehensive time series data for each state, the District of Columbia, and the entire U.S., and can be used to evaluate historical energy consumption trends. The site provides:

- Consumption in physical units, 1960–2005
- Total consumption, measured in Btus, 1960–2005

Web site: <http://www.eia.doe.gov/emeu/states/seds.html>

Other sources of energy consumption data vary by state and include:

- *Public utility commissions and ISOs.* In some states, these sources provide electricity consumption data. For instance, [ISO-New England](#) provides a web site of key data on each state's electricity markets, including consumption. The [California Energy Commission](#) develops its consumption database from state utility and PUC data.

- In states that require them, *utilities* compile integrated resource plans that contain consumption data, but much of this information may be classified as trade secret.

IV. Energy Supply Data

Energy supply data includes information on existing and planned power generation, available fuel resources, and energy distribution capabilities. This information is important because it can help a state ensure that it has a reliable and cost-effective supply of energy to meet future growth. It can also help states evaluate the environmental impact of electric generation. The following sources provide energy supply data:

[EIA's State Energy Profiles \(SEP\)](#) provide data on energy supplies and generation for the most recent year available, including:

- *Fossil fuel resources* such as coal, crude oil, and natural gas. States can find how much they produce and view estimates of total fuel reserves.
- *Net electricity generation*, available by generating source (i.e., coal, oil, petroleum, hydro, nuclear, and renewables).
- *Fuel stocks in storage*, such as motor gasoline, fuel oil, coal, and natural gas.

Web site: <http://tonto.eia.doe.gov/state/>

[EIA State Data Directory for Reserves and Supply](#) provides more detail on energy supplies, categorized by specific fuels, including:

- Crude oil production
- Natural gas reserves
- Coal production
- Nuclear plant data
- Renewable electricity and fuel supplies.

Web site: http://tonto.eia.doe.gov/state/SEP_MoreReserves.cfm

[EIA State Energy Data System](#) provides production data needed to develop historical trends. Available data include state-level estimates for:

- Total energy production, 1970-2005
- Production by energy source, 1960-2005 (for natural gas – 1970-2005)
- Energy production rankings, 2005
- Production-consumption comparisons, 2005

Web site: http://www.eia.doe.gov/emeu/states/seds_production.html

[EIA Electricity Database](#). States can obtain data to assist them in characterizing the electricity sector.

The electricity database provides information on:

- Existing electricity generation
- Sales, revenues, and prices
- State electricity profiles (includes generation, summer capability, sales, average price of electricity)
- Existing, planned, and retiring capacity
- Status of restructuring by state

- *Electric Power Annual* report
- Forecasts from *Annual Energy Outlook* and *International Energy Outlook* reports
- Demand data
- State data tables with 1990-2006 data on generation, capacity, fossil fuel consumption, number of retail customers, revenues, average price of electricity, and financial information
- International data on generation, consumption, capacity, and imports and exports.

Web site: <http://www.eia.doe.gov/fuelelectric.html>

[Form EIA-860 Database, Annual Electric Generator Report](#). This database provides a generator-level data about generators at electric power plants owned and operated by electric utilities and non-utilities (e.g., independent power producers and combined heat and power producers). This data can be used by states to examine the capacity of electric generators in their state.

Web site: <http://www.eia.doe.gov/cneaf/electricity/page/eia860.html>

[EIA Bulk Power Supply Program](#) report collects information from U.S. power system planners about the electricity supply (i.e., capacity and energy) that is needed to serve current demand and for future growth.

Web site: <http://www.eia.doe.gov/cneaf/electricity/page/eia411/eia411.html>

[eGRID](#) provides generation, capacity and fuel mix information for all power plants in the U.S.

Web site: <http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html>

Other resources for data on energy supply include:

- [North American Electric Reliability Corporation \(NERC\)](#), which includes data on planned transmission upgrades by each individual NERC region.
Web site: <http://www.nerc.com/regional/>
- *ISOs and PUCs* may have data that show exports and imports of electricity across state lines. (Restructured states often find that their locally-generated electricity is delivered across state lines, where prices are higher.)
- *Utility Security Plans*. Utilities and state emergency management agencies have plans to deal with energy emergencies, blackouts, and fuel disruptions that could be a source of data on capacity needs for the state.
- *State Integrated Resource Plans (IRPs)* contain total generation capacity and planned capacity expansion.

V. Energy Prices

Rising energy costs are felt throughout state economies. States can analyze energy and fuel price data to assess the best way to meet future demand, the impact of future clean energy measures, and future regulations. Energy and fuel price data are available from the following sources:

[EIA State Energy Profiles \(SEP\)](#) provide data on energy prices for fossil fuels and electricity generation (for residential, consumer and industrial customers).

Web site: <http://tonto.eia.doe.gov/state/>

[EIA State Data Directory for Prices](#) also provides access to recent prices on fuel costs and electricity.

Web site: http://tonto.eia.doe.gov/state/SEP_MorePrices.cfm

[EIA State Energy Data System](#) provides the following data:

- Average retail price of electricity by state and by end-use sector (i.e., residential, commercial, industrial, transportation)
- Fossil fuel costs and generation by state
- Transmission costs (US data, not state by state).

Web site: http://www.eia.doe.gov/emeu/states/seds_production.html

In some cases, PUCs and ISOs make recent price data available for public access.

Table 3: Summary of data sources

	Energy Consumption	Energy supply, reserves, capacity	Energy prices
EIA State Energy Profiles (SEP)	X	X	X
EIA State Data Directory for Consumption and Sales	X		
EIA State Energy Data Systems	X	X	X
Public utility commissions, ISOs.	X	X	
Utilities	X	X	
EIA State Data Directory for Reserves and Supply		X	
EIA Electricity database		X	
EIA-860 Database		X	
EIA Bulk Power Supply Program		X	
eGRID		X	
North American Electric Reliability Corporation (NERC)		X	
EIA State Data Directory for Prices			X

VI. State Examples

Several states collect energy data from the EIA and other sources in their efforts to evaluate their current energy profile. Examples are presented below.

New Jersey. New Jersey's current draft of its [Energy Master Plan \(EMP\)](#) proposes a road map to guide the state toward a future with adequate, reliable energy supplies that are both environmentally responsible and competitively priced. New Jersey is required by state law to complete an EMP every ten years and to conduct an update every three years. The state obtained energy data for its EMP from the EIA, PJM Interconnection (the regional transmission organization), and the New Jersey Board of Public Utilities (BPU). For example, New Jersey accessed EIA's New Jersey Electricity Profile to determine the state's fuel mix and information on fossil fuel prices. The state also used Electric Power Monthly to evaluate the cost of natural gas for electricity generation. The state used the Form EIA-860

Database to find the age of their electricity generating facilities. In addition to the EIA data, New Jersey obtained summer load profiles and peak electricity demand forecasts from PJM.

Web site: <http://www.state.nj.us/emp/>

Ohio. Ohio is currently developing an comprehensive energy plan in response to the Governor's 2007 state energy plan, [Energy, Jobs and Progress for Ohio](#). The state has begun to use EIA data for energy consumption, supply and energy prices.

The Public Utilities Commission of Ohio (PUCO) provides current statistics and information about Ohio's production, consumption, and energy prices in its *Ohio Energy Data Report*, which compiles data from PUCO, EIA, and the Department of Energy's Petroleum Marketing Monthly. PUCO also developed *Ohio Long Term Forecast of Energy Requirements 2003-2023*, which presents year-by-year forecasts of the prevailing energy, economic, and demographic trends in the U.S., Ohio, and utility service areas in Ohio, for the next 20 years. This report also uses energy consumption, supply, and price data from both PUCO and EIA.

Web sites: *Energy, Jobs and Progress for Ohio*:

http://www.ohioairquality.org/energy/energy_jobs_and_progress_for_ohio.asp

Ohio Energy Data Report: <http://www.puco.ohio.gov/Puco/IndustryTopics/Topic.cfm?id=5494>

New Hampshire

New Hampshire developed a comprehensive energy plan in 2002, the *New Hampshire 10 Year Energy Plan*, which covers six major topic areas:

- Demand projections for electricity and natural gas.
- Adequacy of generation, transmission and distribution for both electricity and natural gas in New Hampshire and regional issues that will impact the State.
- Siting requirements for energy facilities.
- Fuel diversity, including renewable and alternative energy resources.
- Energy efficiency and conservation.
- The impacts of regional issues on New Hampshire.

To address these issues, New Hampshire used EIA's State Energy Data System energy consumption and price data by fuel type, and state restructuring information from the New Hampshire PUC. Following the energy plan, New Hampshire established the Energy Planning Advisory Board to monitor and assist in implementing the *New Hampshire 10 Year Energy Plan*. The board provides updated annual reports that use the latest energy data available.

Web site: <http://www.nh.gov/oep/programs/energy/StateEnergyPlan.htm>

VI. Resources

Gathering and Using State-level Energy Data: Resources	
Database	Web Site
EIA: State Energy Profile (SEP)	http://tonto.eia.doe.gov/state/

Gathering and Using State-level Energy Data: Resources	
Database	Web Site
EIA: State Data Directory for Consumption & Sales	http://tonto.eia.doe.gov/state/SEP_MoreConsump.cfm
EIA: State Data Directory for Reserves & Supply	http://tonto.eia.doe.gov/state/SEP_MoreReserves.cfm
EIA: State Data Directory for Prices	http://tonto.eia.doe.gov/state/SEP_MorePrices.cfm
EIA: State Energy Data System	http://www.eia.doe.gov/emeu/states/_seds.html
EIA: Electricity Database	http://www.eia.doe.gov/fuelelectric.html
EIA: Bulk Power Supply Program	http://www.eia.doe.gov/cneaf/electricity/page/eia411/eia411.html
ISO-NE	http://iso-ne.com/nwssis/grid_mkts/key_facts/index.html
eGRID	http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html
NERC	http://www.nerc.com/regional/
California Energy Commission	http://www.energy.ca.gov/electricity/index.html#consumption
State Report	Web Site
New Jersey: State Energy Master Plan	http://www.state.nj.us/emp/
Ohio Governor's Office: Energy Jobs and Progress Report	http://www.ohioairquality.org/energy/energy_jobs_and_progress_for_ohio.asp
Ohio PUC: Ohio Energy Data Report	http://www.puco.ohio.gov/Puco/IndustryTopics/Topic.cfm?id = 5494
New Hampshire: New Hampshire's 10 Year Energy Plan	http://www.nh.gov/oep/programs/energy/StateEnergyPlan.htm

VII. References

New Hampshire. 2002. New Hampshire's 10 Year Energy Plan. Available at <http://www.nh.gov/oep/programs/energy/StateEnergyPlan.htm>

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Ohio Public Utilities Commission. 2007. Ohio Energy Data Report. Available at <http://www.puco.ohio.gov/Puco/IndustryTopics/Topic.cfm?id = 5494>