U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

A Guide for Incorporating Energy Efficiency in State Energy Plans

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Foreword

This guide, written for all U.S. states, describes 10 steps that are commonly incorporated into state energy plans. The guide provides tips and examples from state energy plans to help each state support data-driven energy planning that can enhance energy efficiency.

In 2018, the National Association of State Energy Officials (NASEO) updated their State Energy Planning Guidelines, which provide a step-by-step approach for how states can conduct energy planning across all common energy sectors (Figure 1).[i] NASEO's Guidelines serve as a resource for states on how to conduct energy planning. The Guidelines advise state planners to include a separate section in their plans focused on energy efficiency that contains data, policies, implementation actions, as well as information on evaluating and measuring enacted energy efficiency policies.

This guide is designed to enhance existing information on state energy efficiency planning efforts; it is not meant to be a comprehensive review of how to conduct energy planning. This guide is prepared by: U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, State Energy Program.

Preface

State Planning and Energy Efficiency

Implementing energy efficiency measures and technologies has the potential to boost energy reliability and affordability. Energy efficiency is the reduction of energy use while maintaining the same level of service. Energy efficiency is often coordinated with energy conservation, which focuses on using less energy, or with demand-response programs that seek to lower the use of energy at specific times of the day or year when high energy demand may adversely affect system reliability. The U.S. Department of Energy (DOE) estimates that energy efficiency improvements could save consumers and businesses approximately 741,000 gigawatt-hours

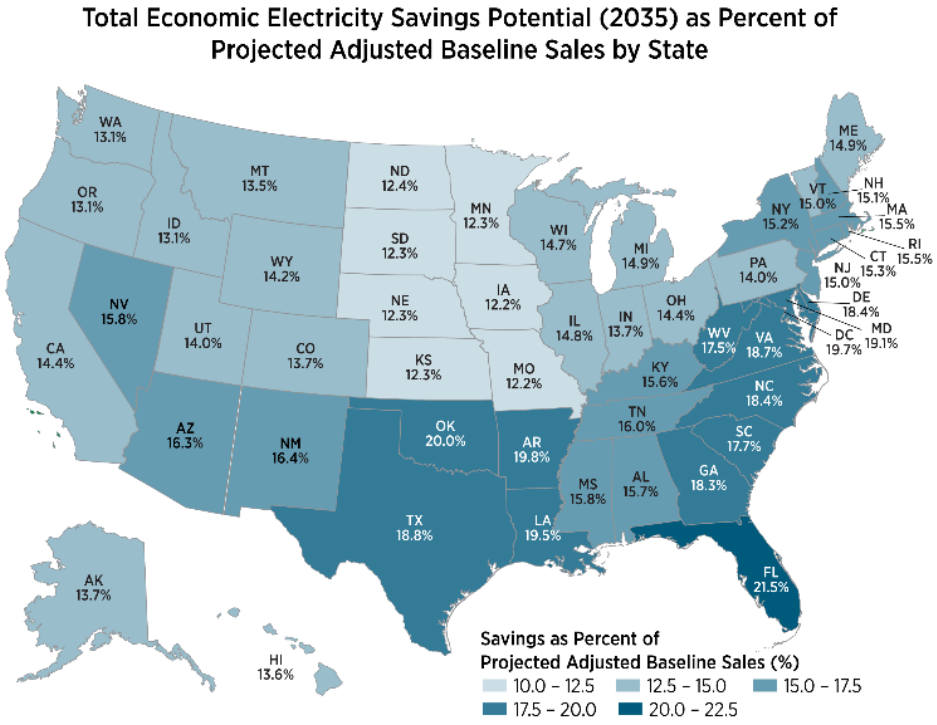

Figure P-1. Total economic electricity savings potential in 2035 as the percentage of projected adjusted baseline sales by state

of electricity between 2016 and 2035, which is equal to 16% of baseline retail sales in the United States in 2035.[ii] At the state level, savings range from 12% to 21% of retail electricity sales. See Figure P-1 for the percentage of electricity savings potential per state in 2035.

States use energy planning to set strategic goals, develop programs, and measure progress toward a shared vision of a desired energy future. The two most cited goals of the forty states with active energy plans as of 2017 are to: (1) ensure a reliable supply of energy and (2) manage costs so energy is affordable for businesses and residents,[iii] and energy efficiency is an important strategy for achieving both goals. Reducing demand for energy helps to alleviate grid congestion, which improves electric system reliability.[iv] Energy efficiency can also have a dampening impact on the wholesale price of electricity because the cost of energy efficiency programs funded by customers of investor-owned utilities (averaging $0.05 per lifetime of kWh savings[v]) is often less than the levelized cost of energy for baseload generation sources, which are estimated to range from $0.06/kWh to over $2.00/kWh).[vi]

Recognizing the value of energy efficiency on reliability and affordability, Vermont's 2016 Comprehensive State Energy Plan emphasizes energy-saving strategies that, upon implementation, are expected to provide quantifiable cost-savings for consumers and businesses. Examples include goals for expansion of thermal and electric efficiency in residential and commercial buildings to replace oil-fired boilers, and the targeting of energy efficiency to alleviate grid congestion and associated payments by Vermont ratepayers that account for the state's share of peak load costs in New England.[vii]

Energy plans that include well-crafted energy efficiency programs may also reveal opportunities to align energy savings efforts with other policy priorities, including economic growth and environmental protection. In developing its 2016 plan, the Iowa Economic Development Authority Energy Office determined that Iowa had high energy imports relative to neighboring states. As a result, the final plan prioritized energy efficiency to lower the "leakage of funds outside of the state that pay for imported energy".[viii]

In recent years, states, often through leadership of state energy offices, have adopted more sophisticated planning practices. For example:

- States have increasingly used modeling when developing energy plans. Scenario modeling can, in particular, help states identify potential economic development or other benefits of energy efficiency programs and understand policy tradeoffs. In 2011, the Utah Governor's Office of Energy Development used economic modeling to quantify annual industry and employment impacts from energy efficiency programs to help inform priorities in Governor Herbert's 10-year Strategic Energy Plan.[ix] To build on the vision of the Plan, the office released the Energy Action Plan in 2018. This document is a roadmap for the next two years and cites how continued improvement in energy efficiency is helping support new investment and jobs to meet needs of the state's growing population.[x]

- Since 2014, at least six states[1] have adopted energy plans embedded with performance targets or metrics to track outcomes. Often targets are coupled with specific actions to advance priority energy efficiency policies and strategies. Upon finalizing the 2015 energy plan, Rhode Island's Office of Energy Resources created an Energy 2035 Implementation Matrix. The matrix catalogues statewide energy strategies–starting with enhanced least-cost procurement of energy efficiency resources–through 2035. Least Cost Procurement prioritizes energy efficiency in state energy planning by directing the utility to invest in energy efficiency first, whenever it proves cost-effective and less expensive than energy supply. For each strategy, the matrix identifies the key sectors and policy actions along with a timeframe for implementation.[xi]

In addition to economic development, states may also wish to use energy planning processes to ensure energy efficiency investments align with other goals such as grid security, energy assurance or resilience, and air quality improvements.

Tip: *Even though this guide is focused on energy-savings opportunities in residential, commercial, and industrial sectors, it is important for state energy office officials to understand the significant energy impact of the transportation sector. It is, however, expected that technological advancements (i.e., the evolution and adoption of electric vehicles) will result in increased electricity consumption, but decreased energy use (or increased "energy productivity") overall. The so-called "transportation-energy nexus" is likely to impact state planning, policy, and regulatory frameworks.*

[1] These states refer to New York, Minnesota, Missouri, Rhode Island, South Carolina and Virginia.

Tip: *DOE's Office of Energy Efficiency and Renewable Energy's State Energy Program supports all states in their efforts to develop, enhance, and implement energy solutions within state energy planning processes. Energy planning resources are also posted at DOE's State and Local Solutions Center.*

Acknowledgments

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Nomenclature or List of Acronyms

CHP	Combined Heat and Power
DOE	U.S. Department of Energy
EIA	Energy Information Administration
EWR	energy waste reduction
NYSERDA	New York State Energy Research and Development Authority
SEO	state energy office
SLED	State and Local Energy Data
NASEO	National Association of State Energy Officials

Executive Summary

State energy planning offers an opportunity for states to develop a vision of their energy future. States that include energy efficiency policies and programs in their energy plans are well-positioned to develop programs that support energy policies that increase energy affordability, reliability, and resiliency.

The two most cited goals of the forty states with active energy plans as of 2017 are to: (1) ensure a reliable supply of energy and (2) manage costs so energy is affordable for businesses and residents.xii Energy efficiency is an important strategy for achieving both goals.

To explore these areas fully, states may also wish to update or build on their existing state energy plans. States may want to consider the use of enhanced stakeholder engagement experts and/or modeling approaches described in this guide. Energy planning teams–often led by state energy offices–should also consider the use of metrics or other approaches to track implementation progress over time.

States may wish to use the examples, plans, and resources referenced as they develop their own unique energy plans.

Table of Contents

List of Figures

List of Tables

State Energy Planning Process

By nature, state energy planning is an iterative process. The National Association of State Energy Officials (NASEO), in its State Energy Planning Guidelines, identified 10 common steps used in developing state energy plans.[xiii] This report is designed to complement NASEO's more broadly focused guidelines, which provide a step-by-step approach for how each state can conduct energy planning across all common energy sectors.

Below is a description of each step along with tips, examples, tools, and other resources to help states maximize the opportunities to increase lasting energy savings for all sectors. While certain steps (i.e., goals and actions) represent more concrete opportunities to define and prioritize cost-effective energy savings, the planning process is not always comprised of discrete steps, with overlapping discussions and input.

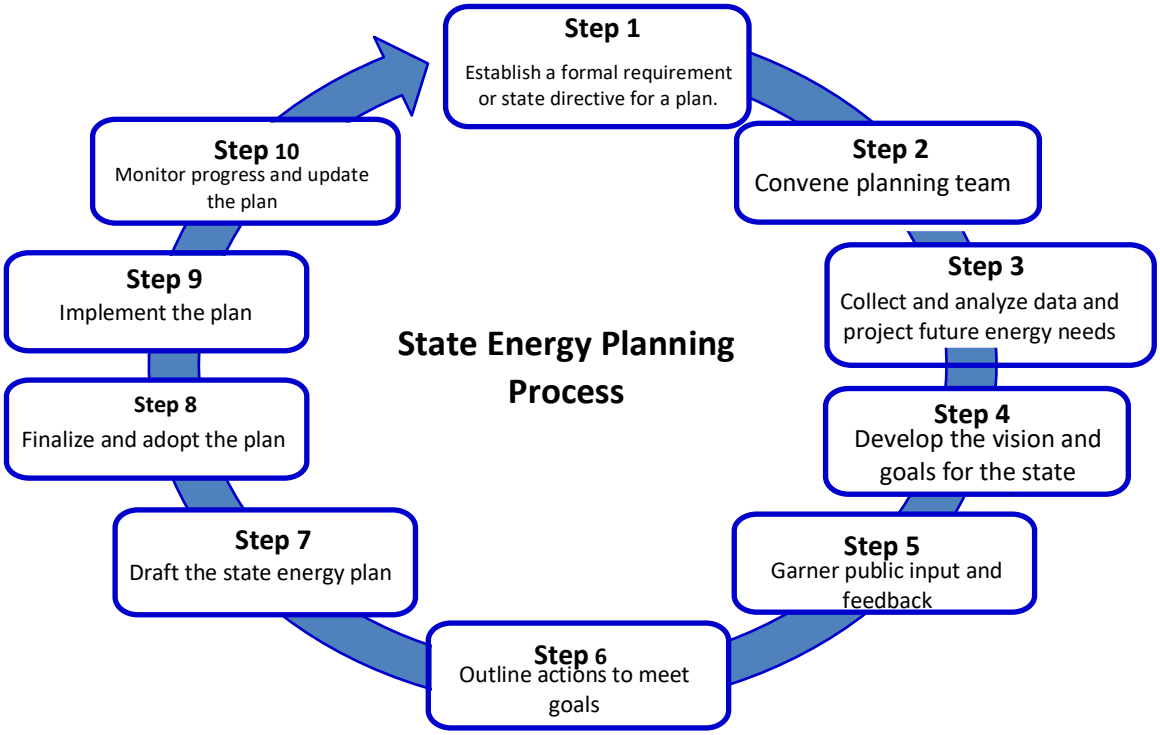

Figure 1. Steps in the state energy plan development process (adapted from the NASEO State Energy Planning Guidelines)[xiv]

Step 1: Establishing a Requirement and Scope

The most effective way to prioritize deployment of energy efficiency in state energy plans is through leadership from both executive and legislature branches of state government. In many cases, the directive to create an energy plan originates from the state legislature. In other cases, the governor calls for the establishment of a plan via an executive order. These directives often outline the process and timeline for drafting the plan and may include key considerations, such as deploying energy efficiency as a resource and engaging stakeholders to support plan implementation. In terms of scope, almost all energy plans represent either formal or informal collaboration between the executive and legislative branches of state government.

California's 2015 energy plan, the Integrated Energy Planning Report is required to be completed every other calendar year.[xv] In 2014, Governor Jerry Brown called for a "doubling of energy savings from existing buildings by 2030. "The governor's goal was complemented by Senate Bill 350, which directed the California Energy Commission to establish targets to double statewide energy efficiency savings by 2030, the targets for which are laid out in the 2017 Integrated Energy Planning Report. Biannual updates to the Integrated Energy Planning Report are led by the California Energy Commission in partnership with the California Public Utilities Commission.

In Missouri, Executive Order 14-06 issued in 2014, directed the Department of Economic Development's Division of Energy to develop a comprehensive state energy plan.[xvi] The announcement emphasized that establishing policies to encourage the efficient use of energy in all sectors of the economy would allow Missouri citizens to manage their household budgets effectively and Missouri businesses to run more profitably. The final plan recognized that efficiently using available energy resources is the most cost-effective first step to optimize meeting the state's energy needs. There have been ongoing efforts by the Missouri legislature to codify the plan with a biennial update and stakeholder process.

> ***Tip**: State energy plans that represent a collaboration between the governor and legislature may help states foster internal and external support for ongoing or periodic updates to the plan.*

Of the existing state energy plans (both active and inactive), over 80% were authorized by legislative action. In most cases, the state energy office (SEO) played a leading role in drafting the plan, even in lieu of a formal mandate to do so. Table 1 details state energy plan authorities.

Table 1: State Energy Planning Authority by State (2016)[xvii]

State	Plan Authority
Alabama, Alaska, Arkansas, California, Connecticut, Delaware, District of Columbia, Florida, Hawaii, Idaho, Illinois, Kentucky, Maryland, Maine, Massachusetts, Minnesota, Mississippi, Nebraska, New Hampshire, New Jersey, New York, Nevada, New Mexico, North Carolina, North Dakota, Oregon, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, Washington, and West Virginia	Legislation (state statute), legislative resolution, or legislative commission
Arizona, Michigan, Missouri	Executive Order
Colorado, Georgia, Indiana, Iowa, Montana, Ohio, Oklahoma, Texas, Utah, Wyoming	Governor or agency-directed plan or appointed task force (not executive order)
Tennessee	Plan developed by the Tennessee Valley Authority
Kansas, Louisiana, South Dakota, Wisconsin	No plan in place

In West Virginia, energy planning is required every five years by legislative code.[xviii] The Office of Energy, located in the West Virginia Development Office, is an agency of the West Virginia Department of Commerce and is responsible for updating the energy plan; the state legislature is responsible for providing review and

approval of the final plan. The length of time between plans affords the SEO, in partnership with the legislature, the opportunity for state planners to educate stakeholders on a wide swath of innovative energy-saving measures; the 2013–2017 energy plan included a detailed discussion on how performance-based rate making and rate design can support energy-savings benefits for the state.

Step 2: Convene a Planning Team

Stakeholder engagement is a critical component in the state energy plan development process. The stakeholder engagement process often begins with identifying two teams: a planning team and a leadership team.

The planning team advances the day-to-day activities of the state energy plan development. It provides direction, manages external stakeholders, and maintains the timeline and budget. A planning team, which is often led by the SEO, may include other state and local officials as well as private sector or other energy representatives. The planning team may wish to designate specific meetings to discuss energy efficiency as part of their work to develop the plan.

The leadership team is typically comprised of senior public officials, such as agency directors with authority to make policy or regulatory changes that impact the energy system. A state might wish to include private, academic or nonprofit stakeholders with specific influence or expertise. This brings additional viewpoints, "thought" leadership, and targeted technical expertise into the process, and can help build support for the plan's implementation. To ensure that energy efficiency plays a prominent role in the energy plan, the team should include stakeholders from local, regional or national energy efficiency organizations and energy efficiency trade associations.

Iowa's energy plan included a leadership team comprised of Lt. Governor Kim Reynolds (currently Iowa's Governor), Iowa Economic Development Authority, and Iowa Department of Transportation representatives. The state's leadership team helped guide a broader planning team comprised of stakeholders from around the state, including working group members, state agencies, industry organizations, and members of the public to ensure the energy plan prioritized the importance of energy efficiency throughout the energy planning process.[2]

> ***Tip**: States should consider partnerships between executive agencies to help ensure energy plans align with priorities across state government.*

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While the composition of planning teams will vary by state, all stakeholders' roles and responsibilities should be defined upfront – as the scope of the energy plan is being developed. States also should consider the appropriate facilitation approach to use in the planning process (i.e., whether to hire outside facilitators or use in-house staff).

In 2012, the Idaho Legislature's Committee on Energy, Environment and Technology led development of the state's first integrated energy plan. The committee worked in partnership with the Idaho Strategic Energy Alliance, which was comprised of about 200 state, local, business, and nonprofit stakeholders as well as energy efficiency trade associations. The Idaho Strategic Energy Alliance, which was established by former Governor

[2] The leadership team consisted of Lt. Governor Reynolds, Iowa Partnership for Economic Progress (IPEP) members, Iowa Economic Development Authority (IEDA) and Iowa Department of Transportation (Iowa DOT) representatives.

Butch Otter to support development of the plan, helped the committee prioritize recommendations for the adoption of utility rate designs that encourage more efficient use of energy in utilities' service territories.[xix]

> ***Tip**: State planners may find it helpful to identify a neutral facilitator with expertise in energy policies and regulations to manage stakeholder discussions on energy efficiency.*

Step 3: Collect Data, Develop a Baseline and Energy Forecast

Effective state energy plans incorporate measurable goals to ensure a data-driven strategy for saving energy. To incorporate energy efficiency data into plans, states may do one or more of the following:

- Collect data to develop a baseline and projections of energy supply and demand.
- Develop an energy-efficiency potential study to illuminate future saving opportunities in programs or sectors.
- Use modeling to compare multiple options for future energy policies.

Energy Data Collection and Sources

Many plan analyses incorporate demographic data and other variables that are expected to impact energy supply and demand (e.g., economic growth, regulations, and regional energy infrastructure). Some include information on air emissions and water supplies associated with energy savings.

After collecting and reviewing appropriate data, states should develop a baseline that defines existing energy resources. Along with a baseline states should consider an analysis to forecast future energy use and savings potential for relevant end-use sectors.[3] Most energy planning efforts develop baselines for all sectors and fuel; however, states may choose to focus on fewer sectors or fuels (e.g., liquid fuels or electricity), depending on priorities and available resources. Two examples of U.S. Department of Energy (DOE) resources to support baseline development are:

Energy Information Administration's (EIA) State Energy Data System provides access to sector-specific energy data for all states and territories at no cost. EIA data can serve as a useful starting point to help states understand sectors with the highest energy intensity, which could be good candidates for energy efficiency investments.[xx]

DOE's State and Local Energy Data (SLED) contains state and local energy efficiency data. The tool aggregates information on electricity generation, fuel sources and costs, and applicable policies, regulations, and financial incentives at the city and state levels. SLED also provide data on energy consumption trends over time.

With data provided by the EIA's State Energy Data System, Connecticut stakeholders learned that the state's per capita energy expenditures for buildings ranked among the highest in the country. This led Connecticut to focus its 2014 Energy Plan on reducing building-sector energy costs through the procurement of energy efficiency as a resource. Connecticut's 2017 Comprehensive Energy Strategy continues to prioritize, as a goal, the procurement of energy efficiency as a supply resource for buildings. The Strategy includes analyses

[3] This guide focuses on the four most common sectors in energy plans: public, residential, commercial, and industrial end-use energy sectors. While some plans address energy-efficient transportation, this topic is beyond the scope of this paper.

showing how the state's investments in energy efficiency is projected to flatten electric demand statewide through 2024.[xxi] In 2018, the state released the 2018 Comprehensive Energy Strategy including the new data on savings from investments in energy efficiency and peak demand.[xxii]

By compiling energy baseline data and other relevant information, states may already possess key inputs needed to conduct a more comprehensive evaluation of new or enhanced energy efficiency programs. The section below provides examples of data, tools, and models used by states to analyze opportunities for the inclusion of energy efficiency in energy plans.

Energy Efficiency Potential Studies

When developing energy plans, states may wish to conduct an energy efficiency potential study to examine opportunities for energy savings across sectors. Potential studies can serve as a resource for energy planners and as a baseline for future analyses. DOE hosts a catalog of all existing state- and utility-level energy efficiency potential studies, which can provide helpful background for planning. While these exercises involve complex forecasts, they can help states understand the size of potential state energy savings. Potential studies help states do the following:

- Assess what energy-efficient technologies and products are available
- Understand the degree to which those technologies and products may be further deployed in their market
- Identify the potential cost effectiveness of these resources.

In December 2016, the Michigan legislature approved energy legislation (PA 341 and PA 342 of 2016),[xxiii] which extended gas and electric energy efficiency savings targets (referred to as energy waste reduction [EWR]) through 2021, removed cost collection caps that unnecessarily restricted deeper cost-effective savings programs, and required the EWR to be included into utility integrated resource plan assessments. The energy legislation also required a statewide assessment of EWR savings potential, completed in August 2017, which showed cost-effective achievable potential through the next 20 years.[xxiv] In 2015, electric utility providers met a combined average of 121% of their electric energy savings targets, achieving reductions of over 1.1 million megawatt-hours.[xxv] The 2016 savings will be provided in a report due to the legislature in February 2018.

Figure 2 contains a map of future energy-savings projections by state. The analysis that underlies this map was the first consistent analysis of economic electricity efficiency potential across all states and sectors: residential, commercial, and industrial. The model used in this analysis is conservative; for example, the model excluded programs that target behavior change and does not account for any energy-savings from technological innovation. (More information on energy efficiency potential studies is included in Step 4.)

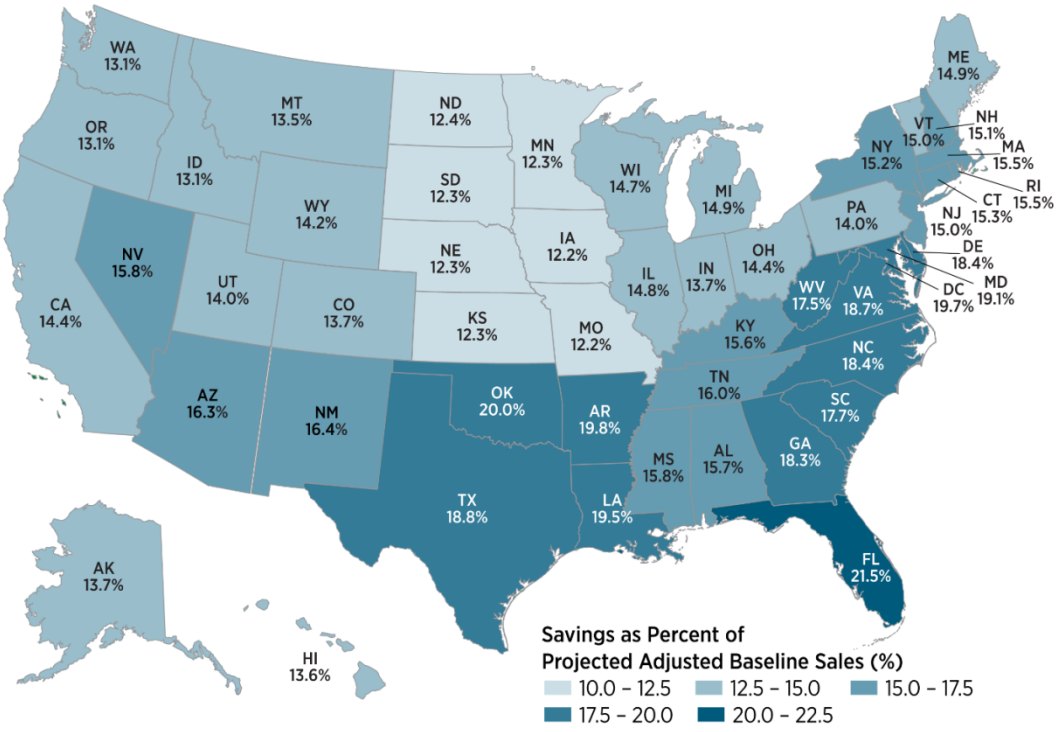

Figure 2. Economic electricity savings potential (2016–2035) as percent of projected adjusted baseline sales by state (Electric Power Research Institute 2017)[xxvi]

Separate from potential studies, states may decide to use economic modeling to help energy planners envision future energy scenarios under consideration. Such scenarios are typically based on goals identified during this step as well as costs and benefits to allow for consideration of a range of credible outcomes (also known as "sensitivity analyses").

Step 4: Develop the Vision and Goals

Most state energy plans include a vision for success and measurable goals related to the vision. The vision is typically a high-level, aspirational summation of the objectives of the state energy plan. Understanding how and where energy is consumed will assist in informing a vision statement for the state energy plan that prioritizes energy efficiency. In some cases, the vision statement may need modification throughout the planning process.[xxvii]

In Iowa, the SEO hired a consultant early in the energy planning process to examine strengths, weaknesses, opportunities, and threats to Iowa's energy markets and energy economy. The analysis informed the team's vision statement, which emphasizes the use of energy efficiency in urban and rural communities to reduce energy costs to enhance sustainability and economic development.[xxviii]

Iowa 2016 Energy Plan: Vision Statement

Iowa is committed to the development of an affordable, reliable and sustainable energy system that maximizes economic benefits for our state. **We will continue to embrace energy efficiency**, a mix of energy resources, infrastructure, and technologies to position all of Iowa–both rural and urban–for future growth. As a clean energy leader, our efforts will drive innovation, foster research and development, create business and career opportunities and promote environmental stewardship. (Emphasis added.)

Once a vision is developed, the state planning team should seek to discuss and define tangible goals for the state's plan.[xxix] Some states have energy savings goals defined in statute or legislation as part of an energy efficiency resource standard, which are long-term energy-savings targets for utilities or program administrators. While important, an energy efficiency resource standard does not preclude additional programs that may complement these energy-savings targets. Examples include energy-savings pilots for multifamily housing and energy saving performance contracts for public buildings or building energy code improvements. At the goal stage, states may wish to conduct economic modeling to help improve understanding of energy efficiency opportunities under consideration by stakeholders.

New Hampshire has established statewide energy goals through a statewide energy efficiency resource standard. Between 2018 and 2020, New Hampshire utilities must achieve cumulative energy savings of 3.1% of the electric utilities delivery sales and 2.25% of natural gas delivery sales, from a 2014 baseline. To compensate utilities for the lower energy sales and lost revenue associated with these programs, a lost revenue adjustment mechanism was established. Outside of the utility program, the state has adopted an energy-savings goal for public buildings statewide.[xxx]

> ***Tip:*** *DOE Energy Efficiency and Renewable Energy's State and Local Solution Center contains information on existing state energy efficiency resource standards, goals and programs suitable developing an energy plan.*

Vermont's 2016 state energy plan contains a goal to support energy affordability in part by reducing energy consumption by more than one-third by 2050, from a 2011 baseline. To meet this goal, the state plan defines a set of strategies focused on deployment of cost-effective demand-side thermal and electric efficiency in residential and commercial buildings, including the expanded use of heat pumps to replace oil-fired boilers.[xxxi]

Energy Efficiency Potential Studies

Building on a vision for energy savings, state energy plan goals may emphasize achieving all cost-effective energy efficiency, which seeks to reduce energy waste whenever it is cheaper to do so than invest in new supply, such as a new power plant.[xxxii] A variety of resources can help a state understand its cost-effective[4] energy efficiency potential, including a series of 2016–2017 state-level potential studies published by DOE:

- Economic electricity savings potential (2016–2035) from residential and commercial sector efficiency report and maps available)[xxxiii]
- Economic electricity and total energy savings available from residential single-family homes (report, map, and state profiles available)
- Economic electricity and total energy savings available from industrial sector efficiency (memo and maps available)[xxxiv]
- Achievable energy savings available from building energy codes for new and renovated residential and commercial buildings (report and map available)[xxxv]
- Technical electricity potential from Combined Heat and Power (CHP) Partnership (report, map, and state profiles available).[xxxvi]

DOE compiled roughly 80 energy efficiency potential studies published between 2007 and 2016. These studies, completed by states, utilities, and nongovernmental organizations, represent information from 44

[4] While states use different methods to calculate cost-effectiveness, most rely on cost-benefit tests to assess efficiency programs.

states. The individual state energy-efficiency potential studies are available on the DOE website. Two-thirds (66%) found an average annual savings rate of 1% to 2.5% from prior year electricity sales in economic or achievable potential.[xxxvii] These existing studies can provide a useful starting point for states, but the assumptions and details need to be understood before a state uses any of the numbers for planning purposes.

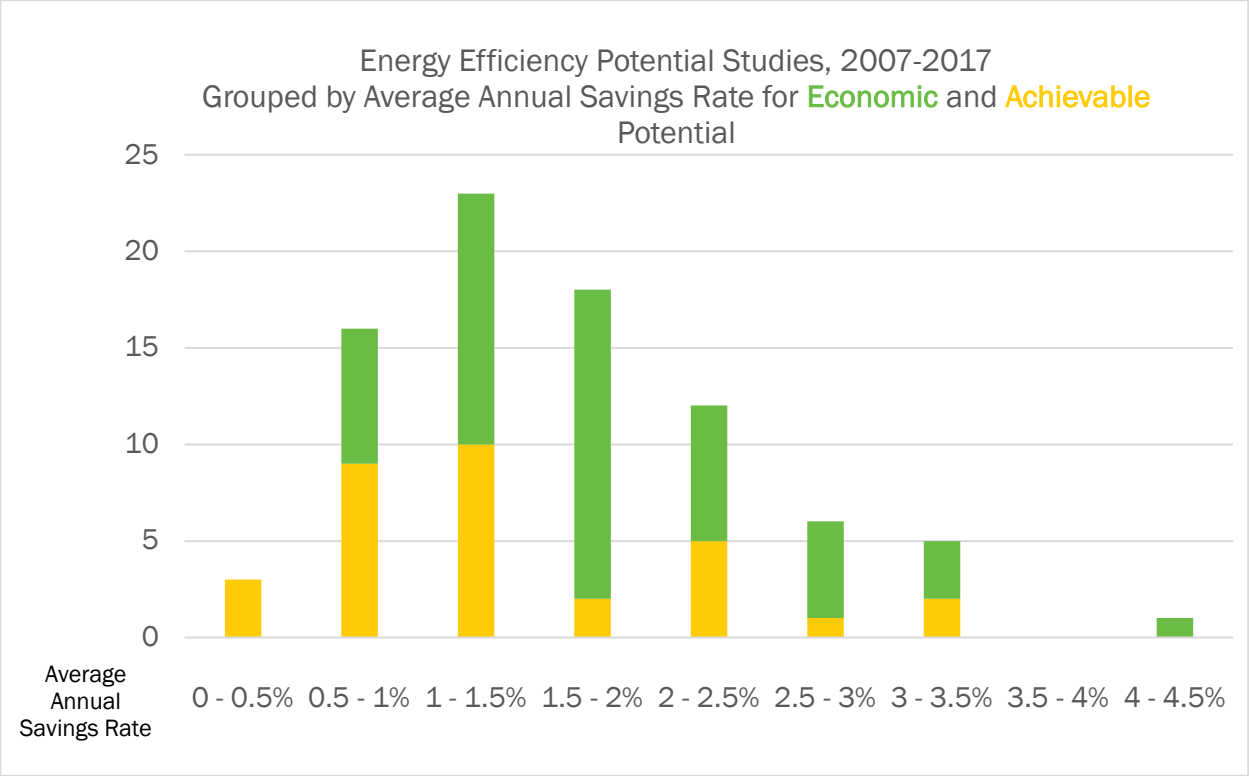

Figure 3 categorizes energy efficiency potential studies as a resource for energy planners and as a baseline for future analyses.

Figure 3. Seventy-nine energy efficiency potential studies for 43 States and the District of Columbia
(grouped by average annual savings rate for economic and achievable potential)[xxxviii]

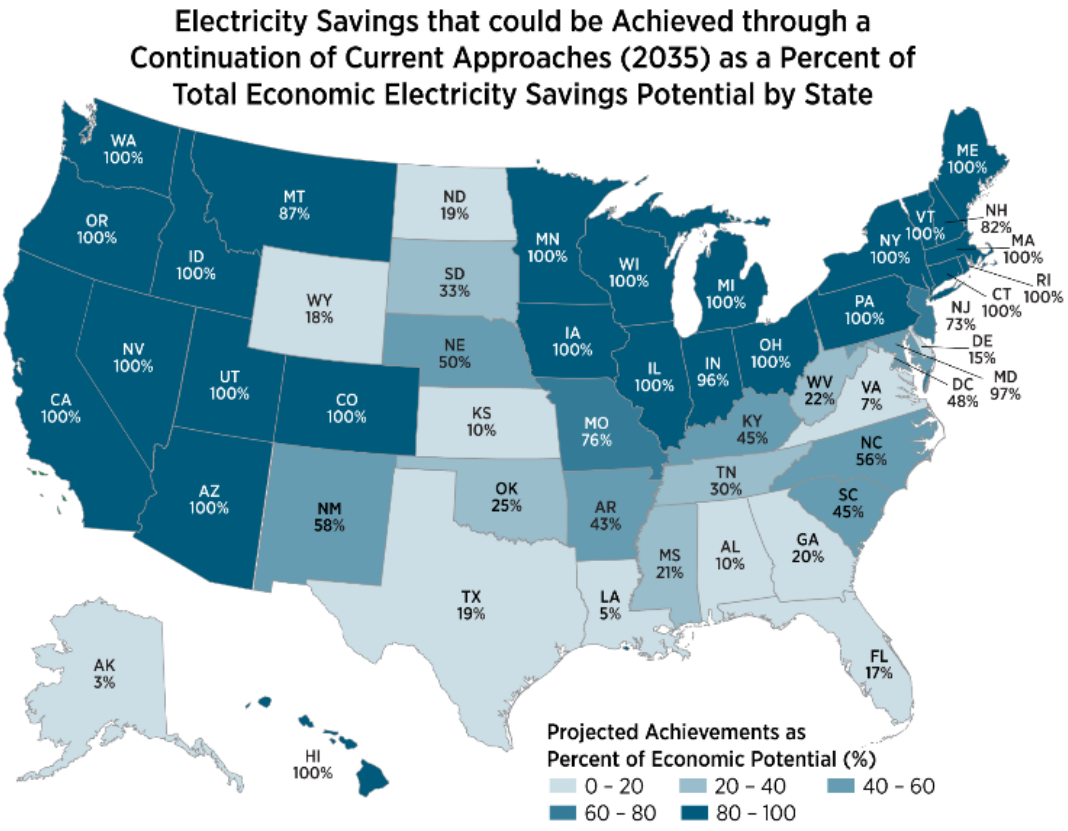

Figure 4. Electricity savings potential by state in 2035 based on a continuation of current approaches

In 2017, the Electric Power Research Institute analyzed the extent to which states are taking advantage of the cost-effective electricity efficiency potential available to them. Figure 4 above shows a comparison of state-level efficiency potential to the savings that could be captured if states continue to achieve their average historical, incremental energy efficiency savings. This analysis gives a sense of which states are already on a trajectory to take advantage of this cost-effective potential and which states have yet to develop programs and policies that will allow them to use energy efficiency as a low-cost resource.

The comparison shows that 22 states have developed policies or programs that, if continued at the same pace, would capture 100% of the Electric Power Research Institute model's projected cost-effective savings by 2035.[xxxix] Another 20 states are poised to achieve less than 50% of the energy efficiency savings modeled by Electric Power Research Institute.[xl] It is important to note that the Electric Power Research Institute model has limitations in quantifying energy efficiency savings. For example, the model does not cover the full suite of energy efficiency options; it does not account for technology innovations (e.g., the rapid deployment of new or improved smart home thermostats) and does not account for potential for improvements in program operations (e.g., better marketing, lower administrative costs). The limitations of the model mean the state-level estimates cited above may represent a more conservative savings projection.[5]

New York's state energy planning is under the authority of the New York State Energy Planning Board. The Board, which is chaired by the New York State Energy Research and Development Authority (NYSERDA), is required by law to incorporate energy efficiency potential analyses into its planning efforts. For the 2015

[5] Even those states achieving 100% of modeled savings have further cost-effective energy savings through a variety of approaches, such as identifying new efficiency measures to achieve more savings, taking greater advantage of both technological innovation and consumer-focused energy savings approaches that are not considered here.

Energy Plan, the Board directed the development of a study that estimated the potential for statewide energy efficiency savings from 2012–2023.[xli] The study also completed the following:

- Forecasted potential savings opportunities in the residential, commercial (including institutional and government buildings), and industrial sectors
- Incorporated existing and emerging technologies and practices to maximize the state's understanding of energy-savings benefits of end-use technologies (e.g., lighting)
- Assessed emissions reductions associated with energy savings for electricity, natural gas, and petroleum.

Based on the potential study results, NYSERDA and partners engaged with state agencies, the New York Independent System Operator, utilities, environmental organizations and others to further scope policy direction. Results of these discussions were used to set a statewide goal to reduce 92 terawatt-hours of electricity and about 441600 trillion British thermal units of fossil fuels by 2030.

Separate from potential studies, states may decide to use economic modeling to help stakeholders envision future energy scenarios under consideration. Such scenarios are typically based on goals identified during this step but may include multiple variations upon one or more of the identified goals as well as costs and benefits to allow for consideration of a range of credible outcomes (i.e., sensitivity analyses).

In Oregon's 10-year energy action plan, energy efficiency and conservation are high priorities for meeting 100% of projected new electricity demand through 2022.[xlii] The Northwest Power and Conservation Council estimates that since 1978, energy efficiency has saved Oregon over 6,000 average megawatts, equivalent to half the region's growth in demand for electricity during that period (enough power for five cities the size of Seattle).[xliii] To identify opportunities for further progress, Oregon commissioned an economic analysis that compared costs and benefits of over 200 emissions reduction strategies that helped the state prioritize available energy efficiency measures that will help meet new load growth through 2022 while providing net savings to consumers.[xliv]

In developing the state's 2015 energy plan, Rhode Island's team modeled three scenarios to identify how to maximize security, cost-effectiveness, and sustainability of the state's energy sector. Results indicated that energy efficiency was an essential component of each scenario, but especially important to achieving energy cost reductions. The modeling found that by extending the state's least cost procurement requirement for electric utilities through 2035, Rhode Island could reduce electricity consumption by 20% and provide net economic benefits to consumers of more than $1 billion. The state adopted the least cost procurement strategy when an extension of the mandate was signed into law by the governor in 2016.[xlv]

> ***Tip:*** *Selecting an appropriate tool or model for data collection depends on a combination of states' policy priorities and available resources (e.g., budget and in-house capabilities). States should identify question(s) or need(s) first and then pick the tool that will most effectively provide this information while also regarding key constraints (e.g., timeframe and available resources).*

Step 5: Garner Public Input on Plan's Goals and/or Priorities

Once there is a clear vison for the state energy plan, along with broad goals to achieve the vision, it is important to generate opportunities for public input to guide the development of the plan and help ensure transparency and accountability of state plans.

While there is not a standard approach when it comes to public engagement, states may wish to use multiple outreach methods to solicit feedback.[xlvi] Where possible, states should seek to ensure public engagement practices include an option for online engagement (e.g., surveys and web platform for public input). Ideally, in-person forums should also be used to solicit input (in addition to the use of web platforms).

> ***Tip:*** *The National Coalition for Dialogue and Deliberation Resource Guide on Public Engagement offers dozens of examples of well-practiced public engagement techniques.*

DOE has also developed several stakeholder engagement guides focused on energy efficiency planning. These guides may be useful to planners during this step in the planning process. Examples include:

- DOE's Energy Data Accelerator has a guide to help utilities and local governments design a stakeholder engagement process to improve energy data access; and
- DOE published a guide to highlight common elements of stakeholder collaborative efforts developed by utilities or public utility commissions that support state energy efficiency programs.[xlvii]

> ***Tip:*** *Public input should ideally be solicited at least three places during the energy planning process. First, focused public input should be sought on the plan's goals (Step 4); second, the public should be engaged during development of the draft plan (Step 7); and third, public sector stakeholders should be contacted before the energy plan is released and publicized (Step 8).*

During Iowa's energy planning process, the planning team solicited extensive stakeholder and public input. The state held over 30 workshops, hosted six public forums and received and responded to over 100 public comments.[xlviii] Based on input from these efforts, the state confirmed the value of focusing efforts on energy-saving actions in rural and underserved communities.

Step 6: Develop Policies and Actions to Meet the Goals

Once the state has received public feedback, it is important to develop a set of actions (i.e., policies, programs, and regulations) that collectively will help achieve the goals laid out in the state energy plan. Energy plans typically contain sector-specific energy-savings goals along with relevant actions to meet those goals (e.g., update building codes, create a financing program, etc.) that align with sector goals.

The Michigan Public Service Commission focused on implementing the EWR program goals mandated in PA 342 as well as other EWR-related aspects of the new energy law. For example, as part of the Public Service Commission rulemaking for a new voluntary on-bill financing program for residential EWR investments, the Public Service Commission, in partnership with the Michigan Agency for Energy, utilized DOE Energy Roadmap funding to support stakeholder outreach examining the attributes of a consistent statewide residential program, with the final report published in June 2017.[xlix] Rulemaking is expected to begin by the end of 2017.

New Mexico embarked on the creation of a State Energy Roadmap to complement the state's 2015 Energy Plan.[l] The Roadmap team, led by the Department of Energy, Minerals and Natural Resources, with support from the U.S. Department of Energy, used a facilitated planning technique to assist community stakeholders in developing energy polices (or enhancing policies from the existing plan) for all energy sectors. The team explored how energy efficiency can support job creation through the adoption of building-sector policies and the realignment of existing energy tax credits and incentives. A total of four stakeholder meetings were held that resulted in the establishment of various goals and strategies that support New Mexico's energy economy. The goals included increasing energy efficiency behaviors and policies that address energy efficiency standards and disincentives.

New York's state energy plan, released in 2015, serves as a framing document for the state's energy efficiency efforts. As such, it outlines the state agencies' responsibilities for delivering programs and working with utilities to meet the state's 2030 energy goals. Key programs include:

- The State Clean Energy Fund. NYSERDA directs $5 billion in state investments to support innovation in the energy sector. To deploy the State Clean Energy Fund, NYSERDA will support grants and provide financing and technical assistance to help building owners, operators, and residents take a variety of actions to support market development, leverage public funds and spur energy innovation. For energy efficiency, one example of this is NYSERDA's deployment of $234 million from the State Clean Energy Fund to support energy-saving retrofits of low-income affordable housing across the state.

- Reforming the Energy Vision. The state's emphasis on market-delivered distributed energy resources is seeking to change the traditional utility business model, providing new opportunities for energy efficiency, a core platform of the state energy plan.[li] Under the Reforming the Energy Vision, the New York Public Service Commission, NYSERDA and Con Edison are attempting to decrease electricity demand by up to 125 MW at a high-usage distribution node in New York City, in part by increasing energy efficiency within that node. If successful, this will eliminate the need for a $1 billion substation upgrade, saving ratepayer dollars and informing a new way to deliver energy efficiency to businesses and consumers.

South Carolina—In South Carolina, the state's 2017 energy plan, Energy in Action: South Carolina State Energy Plan, prioritized eight actions for the Office of Regulatory Staff to take to increase energy savings.[lii] These include:

- Examine possible finance options for state-wide energy efficiency initiatives. The state Office of Regulatory Service (utility regulatory authority) was tasked with convening a stakeholder group to explore best practices and the possibility of several funding program options–to include a public benefit fund. The funds would allow for investments in energy efficiency upgrades for electric and natural gas infrastructure that will reduce energy bills for consumers.

- Increase access to high-quality energy audits for state agencies. The SEO is planning to work with the State Fiscal Accountability Authority to add thoroughly vetted firms onto state contract.

- Investigate the impacts of adopting the most current building energy efficiency codes and standards. The SEO has convened a task force of design and construction professionals, building owners, local and state elected officials, contractors, and the conservation community to identify the potential impacts and costs associated with adopting the 2015 The International Energy Conservation Code and the American Society of Heating, Refrigeration, and Air Conditioning Engineers Standard 90.1-2013. In addition, this group will also examine whether the state's energy code should be returned to the former adoption process through the state's Building Codes Council.

Longer term, the state will explore how to reduce energy use in commercial buildings. The SEO will evaluate the need to convene a task force to engage city leaders who can showcase large commercial buildings that take steps to reduce energy. The program aims to make real-time energy savings available in dozens of public buildings for viewing by the public.

> ***Tip:*** *At this stage, states may wish to conduct further modeling to compare or evaluate the benefits (or costs) of one policy or a combination of policies. Further analysis should build on modeling in Step 3.*

Related Resources

When evaluating policies, DOE has numerous free tools that can help states identity, design, and implement energy-savings programs to meet plan goals. Examples include:

- Energy Efficiency Opportunities and Benefits—These opportunities and benefits contain energy-savings potential estimates (economic and technical) from seven different pathways in the residential, commercial, and industrial sectors.

- State and Local Energy Efficiency Action Network—The State and Local Energy Efficiency Action Network (also known as "SEE Action") provides resources, discussion forums, and technical assistance to state and local decision makers as they provide low-cost, reliable energy to their communities through energy efficiency. SEE Action hosts a series of working groups that seek to identify and share best practices for state and local policy implementation. SEE Action also has case studies and other resources on CHP.

- State and Local Solution Center—DOE's State and Local Solution Center provides searchable resources to advance successful, high-impact energy policies, programs, and projects. As of November 2017, the State and Local Solution Center identifies nearly 40 resources (e.g., reports, case studies, tools, etc.) from DOE and partners that can help state and local governments incorporate energy efficiency into plans.

- Better Buildings Solution Center—Since 2011, DOE's Better Buildings Initiative has advanced proven efficiency solutions by challenging market leaders to accelerate the pace of energy efficiency adoption, highlighting partner success stories and industry best practices, and encouraging the latest technological innovation.

- DOE's CHP Technical Assistance Partnerships—These partnerships promote and assist in transforming the market for CHP, waste heat-to-power, and district energy technologies through the United States, including market opportunity analyses, education and outreach, and technical assistance.

- DOE's Energy Savings Performance Contracting Guidelines for Developing, Staffing, and Overseeing a State Program—This DOE report provides information, best practices, and resources for state and local governments on how to develop an energy saving performance contract. It also contains examples of successful state and local energy saving performance contract programs and a toolkit containing replicable solutions for state and local governments.

- DOE's State and Local Solution Center—provides an overview of financing and program design options for states implementing clean energy financing programs or projects, including bonding tools, energy savings performance contracting, and power purchase agreements.

- The Residential Programs Solution Center—provides examples of marketing and outreach campaigns used to target audiences to build awareness and drive residents toward investing in home energy upgrades.

In addition to analyses for individual policies or programs, states may decide to use modeling to help evaluate multiple polices or scenarios under consideration before developing policies and actions to meet the goals in the state energy plan. Such policy scenarios are typically based on goals identified during this step but may include multiple variations upon a goal and incorporate costs and benefits to allow for consideration of a range of credible outcomes (i.e., sensitivity analyses).

Step 7: Draft the Plan

After developing a state energy plan's goals and action, the leadership team should draft the plan for consideration by public and state stakeholders. In some cases, the structure of the plan is defined in statute. However, in most cases states have flexibility when outlining their plans, often with stakeholder and public input. Despite flexibility many plans have a similar structure in defining energy efficiency details within a specific section or sections.

NASEO's State Energy Planning Guidelines serve as a helpful resource for states to use when finalizing their energy plan.[liii] The Guidelines advise that states include a separate section covering energy efficiency that contains data, policies and implementation actions. For energy efficiency, the guidelines emphasize the importance of financing mechanisms and defining how to evaluate and measure the success of state energy efficiency policies.

DOE EERE's State and Local Solution Center provides examples of successful, high-impact energy plans which can serve as templates for state plans.

New Mexico is currently drafting a State Energy Roadmap that will update the state's 2015 Energy Plan.[liv] In drafting the Roadmap, the state team, led by the state's Department of Energy, Minerals and Natural Resources is engaging state and local government agencies, representatives from the energy sector, trade associations and others with expertise in energy efficiency. The outline of the Roadmap itself was developed at stakeholder meetings with additional opportunities for stakeholders to provide input to the structure through an online portal.[lv]

Step 8 Finalize, Adopt, and Publicize the Plan

At this step, states may wish to share the plan with senior decision makers across the state government, and ensure the legislature is engaged in an appropriate way. Energy offices should also conduct intrastate outreach to agency directors and department leads with expertise on various aspects of the plan to help identify resources for plan implementation. For energy efficiency components, state planners may wish to share proposed policies with economic development, environmental executive agencies and utility commissions to ensure policies and program are aligned with existing or future job creation goals as well as goals for environmental protection, and energy affordability and resilience.

> ***Tip:*** *Prior to final adoption of the plan, states should engage agencies focused on economic development, air pollution or water quality planning to ensure existing state programs align with plan priorities.*

In Connecticut, the SEO collaborated with the Office of Policy and Management to align the 2013 state energy plan with the 2015 Economic Development Plan. The Office of Policy and Management's Economic Development Plan outlines priorities for state and local governments to foster growth across six key industry clusters. By working together, the Office of Policy and Management and the SEO emphasized the consumer cost savings and employment benefits of the state's existing energy efficiency programs, emphasizing that more opportunity existed as part of a focused effort to advance a "green technology" cluster.[lvi]

Iowa's energy planning team solicited extensive stakeholder and public input upon the release of the draft plan. The state held workshops focused on energy efficiency and economic development to emphasize opportunities in rural and urban communities.[lvii] The state also solicited input via a public website.

Utah's 2014 Energy and Conservation Plan identified over two dozen strategies for how energy efficiency programs can improve both air and water quality. The Plan considered past efforts by Dallas-Fort Worth, Texas, and Washington, DC, respectively, to explore how energy efficiency actions could qualify for credit under a state implementation plan. See Box 1 below for more on state implementation plans and energy efficiency.[lviii]

> ***Box 1: Using Energy Planning to Support Air Quality Goals***

State air regulators are required to develop state implementation plans that detail how the state will meet the National Ambient Air Quality Standards for six "criteria pollutants," as set forth by the Clean Air Act. The U.S. Environmental Protection Agency has created a roadmap for incorporating energy efficiency policies and programs in state implementation plans.[lix]

Related to the roadmap, NASEO has developed templates based on SEO efforts in Illinois, Minnesota, and Virginia to engage state air quality regulators on the use of energy efficiency programs to support air quality improvements.[lx] *The templates provide case studies that summarize key elements of energy efficiency programs and policies, such as goals, authorities, funding, and implementation strategies. The intent of the templates is to promote collaboration between SEOs, regulators and environmental agencies, and other relevant bodies to explore potential roles for energy efficiency to support air quality management, whether for broad planning purposes or formal regulatory credit.*

Efforts should also be made to publicize the plan to the general public. State planners may also wish to share a final draft with those that contributed comments and participated in stakeholder or public meetings, or otherwise participated in the planning process. While public outreach takes many forms, SEOs typically manage this effort, often hosting a website for the plan to solicit feedback.

Step 9: Implement the Plan

The state team that drafted the plan often serves as the lead implementing agency. In this role, responsibilities may include outreach or technical assistance to executive agencies, the legislature or local government in support of implementation.

Since the release of the state energy plan in 2012, the Idaho Office of Energy Resources has worked in partnership with local stakeholders to implement the plan as part of the state's focus on keeping energy costs low. In that respect, one priority is the adoption of a statewide Lead by Example program to help officials in rural communities reduce energy use in public buildings.[lxi]

New Jersey offers another example of energy planning to support industrial and commercial energy efficiency policy. Recognizing that the state's large commercial sector consumes 51% of total end-use energy, the state crafted new CHP programs and refined old CHP policies, helping unlock energy efficiency in the commercial sector. In support of the New Jersey Energy Master Plan Update, the state committed to developing an additional 1,500 megawatts of CHP generation over the next decade.[lxii] To start the implementation process, in 2016 the New Jersey Board of Public Utilities issued $5.3 million in new incentives for CHP upgrades statewide targeting savings of 19.5 megawatt-hours per year. The funding reflects the state energy plan's emphasis on technologies that support energy resilience and cost savings for businesses, consumers, and public institutions.[lxiii]

Based on recommendations in New York's energy plan, the New York Power Authority has been leading BuildSmart NY, an effort to reduce energy use in state buildings by 20% by 2020, from a 2012 baseline. By expanding technical assistance, building energy data management, and financing, the New York Power Authority has saved state taxpayers millions of dollars. In addition, the program is helping local governments in Albany, Buffalo, Rochester, Syracuse, and Yonkers identify unique energy efficiency opportunities. Each city has access to a New York Power Authority energy manager to help adopt energy-savings programs such as building code improvements or benchmarking programs to facilitate operations and maintenance savings. Savings are expected to reach $400 million annually by 2025.

In Wyoming, the Energy Conservation Improvement Program directed implementation of the 2013 state energy plan. The plan required new, renovated, or retrofitted state-owned buildings to employ best-in-class methods to achieve measurable reductions in energy consumption. State agencies have focused on energy audits and remodeling work at state-owned buildings to incorporate best in class energy efficiency practices.

Participating facilities received technical guidance from the Construction Management Division of the Wyoming Department of Administration and Information. When the plan was updated in 2016, the SEO sought to further support buildings-sector upgrades documenting barriers to adoption of energy efficiency measures at school facilities.[lxiv]

> ***Tip:*** *NASEO, the National Governors Association and the National Conference of State Legislators all manage networks that may support state outreach and implementation of energy plans.*

DOE's Better Buildings Network has developed a robust set of partnerships and programs to help states implement plans. Efforts under the Better Buildings umbrella network include:

- The Better Building Challenge—This program helps state and local government leaders and other stakeholders develop and meet commitments to save 20% energy savings over 10 years.
- Better Buildings Accelerators—This program demonstrates specific innovative policies and approaches, which will accelerate investment in energy efficiency upon successful demonstration.
- The Better Buildings Residential Network—This network connects energy efficiency programs and partners to share best practices and learn from one another to increase the number of homes that are energy efficient.
- Better Plants—This program helped manufacturers and industrial-scale energy-using organizations demonstrate their commitment to improving energy performance by signing a voluntary pledge to reduce their energy intensity by 25% over a 10-year period.

Step 10: Monitor Progress and Update the Plan

A comprehensive state energy plan benefits from continual monitoring of progress and, as needed, refinement of goals and approaches. States have taken different approaches to updating energy plans, with some facing formal requirements for periodic updates and others seeking more targeted energy-savings efforts in key sectors or programs.

> ***Tip:*** *SEO updates should be offered to stakeholders, participants, and the public to track progress on actions taken and to maintain momentum.*

In Maine, the state is developing an Energy Roadmap that complements the existing state energy plan. The Governor's Office of Energy is leading the effort, which seeks to identify opportunities from enhanced energy programs, including how new state energy efficiency programs or policies might enhance economic competitiveness, innovation, and job creation. The state is also exploring the creation of new standards for evaluating energy policies that align with energy efficiency goals.[lxv]

The Minnesota 2025 Energy Plan identifies priority strategies for statewide action, with actionable steps and progress indicators for each strategy through 2025.[lxvi] One example is a state-led program to integrate energy efficiency into local economic development plans by creating local energy data sets, case studies, and planning tools to help over fifty smaller, rural communities align energy goals with comprehensive community plans.

Rhode Island's Office of Energy Resources created an Energy 2035 Implementation Matrix to track progress that prioritizes implementation of clean energy strategies, including least-cost procurement of energy efficiency resources through 2035. For each strategy, the matrix identifies the key agency leads and responsibilities along with interim and final timeframes for implementation.[lxvii]

In the Virginia 2007 energy plan, former Gov. Tim Kaine and the legislature prioritized energy efficiency, setting a goal to reduce 10.6 MWh of retail electricity sales by 2022, based on a 2006 baseline. To support further progress, former Gov. Terry McAuliffe accelerated the goal by two years to 2020 in the 2014 energy plan and appointed a chief energy efficiency officer to chair an expert committee of public and private sector thought leaders to identify energy efficiency programs to meet the goal. The governor charged the Department of Mines, Minerals and Energy with supporting implementation of recommendations, in part through an Energy Roadmap that outlines plans for energy efficiency action including benchmarking, building codes, commercial PACE, and utility programs.[lxviii]

In July 2017, West Virginia's SEO helped develop a progress report highlighting energy efficiency initiatives underway since the release of the state's current energy plan. The report promotes energy savings progress across the residential, commercial and industrial sectors, and outlines two utility programs that have saved about 70 GWh of energy per year, equivalent to about 0.2% of total statewide electricity consumption.[lxix] (The report notes that other states' savings range from 0.1 to 2% of electric consumption). Two other progress reports highlighted renewable energy and fossil energy. Building on the updates, West Virginia's SEO is currently developing the 2018—2022 energy plan.[lxx]

DOE's Office of Weatherization and Intergovernmental Programs launched an energy project map. The map summarizes a broad suite of energy projects executed by states. States may wish to reference the map to identify examples of state-led energy initiatives across the country that can reduce energy waste and associated consumer costs. As state energy plans are adopted by states they will be posted on the map.

Conclusion

This guide is designed to help states conduct energy planning that can identify energy efficiency programs or policies that increase energy affordability and reliability, while ensuring opportunities for economic growth. The most cost-effective energy efficiency policies found in state energy plans are often those that support such goals. These policies include energy code updates, lead-by-example policies for state operations, utility and public benefit programs, and CHP. As they conduct energy planning, states also may wish to explore alignment of energy goals with other priorities, such as economic development support for local communities

Appendix: Energy Resources, Models and Tools

To support energy planning, states rely on a wide range of information and analytical instruments, from publicly available data and spreadsheet tools to comprehensive policy design and evaluation consulting services.[lxxi] These include:

- **Data Aggregation—**These data sets provide publicly available information (e.g., EIA data sets) is available at the state level on power system (electricity and fuel) consumption, use, and emissions. This includes web-based portals summarizing state energy efficiency policies.
- **Policy Analysis Tools—**From these tools, states can use free or low-cost spreadsheet-based calculators to conduct a basic analysis of power sector impacts from deployment of energy efficiency policies.
- **Power Sector Modeling—**These models simulate operations of a power system and identify changes in energy resource mix or emissions at state, regional or utility-scale based on a policy or set of policies.
- **Economic Modeling—**Using these tools, states can estimate the macroeconomic impacts of electric sector policies (or policy scenarios) including employment, earnings and gross domestic product. These may include financial analyses that assess the impact of different energy policies or programs on energy pricing.

Table A-1 below provides examples of tools and models used in energy planning.[6]

Table A-1. Energy Resources, Models, and Tools Planning

Topic Area	Tool Name	Description	Data Requirements
Energy Market Information	EIA State Energy Portal	Allows users to compare state rankings of energy consumption, production, and prices across fuels and sectors, create maps and charts for each state	State-level data provided by states to EIA
Energy Market Information	EERE State and Local Energy Data Tool[lxxii] (SLED)	Aggregates energy-market information on electricity generation; fuel sources and costs; applicable policies, regulations, and financial incentives. The tool offers a catalogue of policies and actions that can be customized for local contexts.	The SLED tool is pre-populated with state and local energy data. Categories include buildings and efficiencies as well as programs focused on electricity use and infrastructure.

[6] The use of these models will likely require states to employ staff or pay an expert to operate them. Some require a licensing fee

Topic Area	Tool Name	Description	Data Requirements
Integrated Resource Planning	Long Range Energy Alternatives Planning System[lxxiii]	Software tool developed by the Stockholm Environment Institute used to quantify energy consumption benefits of energy policies	Flexible and can be scaled depending on the type and level of analysis; user inputs data
Energy Efficiency Cost-Benefit Analysis	Optimal Energy Portfolio Screening Tool[lxxiv]	Spreadsheet-based tool developed by Optimal Energy to evaluate cost effectiveness of energy efficiency policies and programs	User inputs numerous data points, including avoided costs, efficiency measure characteristics, and load shapes
Economic Impact of Policy Alternatives	Policy Insight PI+ Models[lxxv]	Available from Regional Economic Models, Inc., PI+ models evaluate economic impacts of specific policy initiatives and can forecast economic impacts from energy efficiency policies and programs	Modeling based on economic and demographic data from the U.S. Census, Bureau of Labor Statistics, Bureau of Economic Analysis, and others. Additional inputs will depend on the type of policy being modeled.
Economic Impact (New Jersey)	**R/ECON Tool– New Jersey (Rutgers Economic Advisory)**	**The Rutgers Economic Advisory Service (R/ECON) tools model the economic impact of various policies and programs.**	**Tools can be customized for local governments if employment and payroll data are either publicly available or provided.**

Note: This table is not intended to be an endorsement of modeling tools and resources nor a comprehensive list of every available tool, model, or resource.

References

[i] Cassie Powers, Sam Cramer. (2018). *NASEO's State Energy Planning Guidelines: Guidance for States in Developing Comprehensive Energy Plans and Policy Recommendations*. https://www.naseo.org/data/sites/1/documents/publications/SEPGuidelines_2018_Final.pdf
[ii] State Level Electric Energy Efficiency Potential Estimates. (2017): EPRI, Palo Alto, CA. https://energy.gov/eere/analysis/downloads/state-level-electric-energy-efficiency-potential-estimates-0
[iii] Josh Campbell. (2017). *2017 Update: 2014 white paper. The Impacts of State Energy Plans.* http://www.moenergyplan.org/resources.html.
[iv] Raynolds, Ned and Richard Cowart. (2014). *The Contribution of Energy Efficiency to the Reliability of the U.S. Electric System.* http://www.michigan.gov/documents/energy/ElecReliabilityWP_411710_7.pdf.
[v] Hoffman, Ian. (2014). *The Total Cost of Saving Electricity through Utility Customer-Funded Energy Efficiency Programs: Estimates at the National, State, Sector and Program Level.* DE-AC02-05CH11231. https://emp.lbl.gov/sites/default/files/total-cost-of-saved-energy.pdf.
[vi] Lazard. (2017). *Levelized Cost of Energy–Version 11*. https://www.lazard.com/perspective/levelized-cost-of-energy-2017/.
[vii] Vermont Comprehensive State Energy Plan. (2016). Section 10.2.2 Impact of Electric Efficiency Investments; pp. 204. https://outside.vermont.gov/sov/webservices/Shared%20Documents/2016CEP_Final.pdf.
[viii] Iowa Energy Plan. (2016). http://iowaenergyplan.org/.
[ix] Utah 10-Year Strategic Energy Plan. (2010). https://www.utah.gov/governor/docs/10year-stragegic-energy.pdf. pp. 27.
[x] Utah's Energy Action Plan Through 2020. (2018). http://energy.utah.gov/wp-content/uploads/Energy-Action-Plan-Website-Final-1.pdf pp. 12.
[xi] Rhode Island State Energy Plan. (2015). Energy 2035 Implementation Matrix, Table 5, pp. 73. http://www.energy.ri.gov/policies-programs/ri-energy-laws/state-energy-plan.php.
[xii] Josh Campbell. (2017). *2017 Update: 2014 white paper. The Impacts of State Energy Plans.* http://www.moenergyplan.org/resources.html
[xiii] Kate Marks, Julia Friedman. (2014). *State Energy Planning Guidelines: A Guide to Develop a Comprehensive State Energy Plan Plus Supplemental Policy and Program Options*. NASEO. http://www.naseo.org/Data/Sites/1/documents/publications/NASEO-State-Energy-Planning-Guidelines.pdf
[xiv] Ibid
[xv] Integrated Energy Policy Report. (2015). (CEC-100-2015-001-CMF / Docket # 15-IEPR-01). Pub. Res. Code § 25301(a). http://www.energy.ca.gov/2015_energypolicy/
[xvi] Missouri Comprehensive Plan. (2015). Department of Economic Development Division of Energy. http://www.moenergyplan.org/
[xvii] National Conference of State Legislatures. (2017). www.ncsl.org
[xviii] West Virginia Division of Energy. (2012). Energy Plan 2013-2017. http://www.legis.state.wv.us/wvcode/code.cfm?chap=05b&art=2F.
[xix] Idaho Energy Plan. (2012). Legislative Committee submittal letter. https://legislature.idaho.gov/wp-content/uploads/sessioninfo/2012/interim/enrg_energyplan_2012.pdf
[xx] U.S. Energy Information Administration. (2018). State Energy Data System. https://www.eia.gov/state/seds/seds-data-fuel.php.
[xxi] Comprehensive Energy Strategy. (2017). General Statutes Section 16a-3d, Connecticut Department of Energy and Environmental Protection. http://www.ct.gov/deep/lib/deep/energy/ces/2017_draft_comprehensiveenergystrategy.pdf.
[xxii] Connecticut Comprehensive Energy Strategy. (2018). http://www.ct.gov/deep/lib/deep/energy/ces/buildings_sector.pdf. pp: 83-84.
[xxiii] PA 341: http://www.legislature.mi.gov/documents/2015-2016/publicact/pdf/2016-PA-0341.pdf and PA 342: http://www.legislature.mi.gov/documents/2015-2016/publicact/pdf/2016-PA-0342.pdf.
[xxiv] Electric Energy Efficiency Potential Study for Michigan Lower Peninsula. (2017). Michigan Public Service Commission. http://www.michigan.gov/documents/mpsc/MI_Lower_Peninsula_EE_Potential_Study_Final_Report_08.11.17_598053_7.pdf.
[xxv] Energy Optimization Report to the Legislature. (2016). http://www.michigan.gov/documents/mpsc/2016_Energy_Optimization_Report_to_the_Legislature_with_Appendix_Nov_30_543919_7.pdf.
[xxvi] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. Savings Opportunities and Benefits. (2017). https://energy.gov/eere/slsc/energy-efficiency-savings-opportunities-and-benefits
[xxvii] Kate Marks, Julia Friedman. (2014). *State Energy Planning Guidelines: A Guide to Develop a Comprehensive State Energy Plan Plus Supplemental Policy and Program Options*. NASEO. http://www.naseo.org/Data/Sites/1/documents/publications/NASEO-State-Energy-Planning-Guidelines.pdf pp. 32-33.
[xxviii] Iowa Energy Plan. (2016). Economic Development and Energy Careers–Working Group Meeting #3. http://www.iowaenergyplan.org/docs/WG-M3-Summary-All-WG.pdf.
[xxix] Ibid
[xxx] American Council for an Energy Efficiency Economy. (2016). *New Hampshire.* http://aceee.org/sites/default/files/pdf/state-sheet/2016/new-hampshire.pdf.
[xxxi] Vermont Comprehensive State Energy Plan. (2016). http://legislature.vermont.gov/assets/Legislative-Reports/Executive-summary-for-web.pdf.
[xxxii] Annie Gilleo American Council for an Energy Efficiency Economy. 2014. *Picking All the Fruit: All Cost-Effective Energy Efficiency Mandates.* https://aceee.org/files/proceedings/2014/data/papers/8-377.pdf.
[xxxiii] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. (2017). State Level Electric Energy Efficiency Potential Estimates. https://energy.gov/eere/analysis/downloads/state-level-electric-energy-efficiency-potential-estimates-0
[xxxiv] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. (2016). Industrial Energy Efficiency Potential Analysis. https://energy.gov/sites/prod/files/2017/04/f34/energy-savings-by-state-industrial-methodology.pdf
[xxxv] Eric Wilson. (2017). *Electric End-Use Energy Efficiency Potential in the U.S. Single-Family Housing Stock.* National Renewable Energy Laboratory. NREL/TP-5500-65667. https://energy.gov/sites/prod/files/2017/01/f34/Electric%20End-Use%20Energy%20Efficiency%20Potential%20in%20the%20U.S.%20Single-Family%20Housing%20Stock.pdf
[xxxvi] U.S. Department of Energy, Advanced Manufacturing Office. (2016). Combined Heat and Power Technical Potential in the United States. DOE/EE-1328. https://energy.gov/sites/prod/files/2016/04/f30/CHP%20Technical%20Potential%20Study%203-31-2016%20Final.pdf
[xxxvii] U.S. Department of Energy. (2017). Energy Efficiency Potential Studies Catalog. https://energy.gov/eere/slsc/energy-efficiency-potential-studies-catalog.
[xxxviii] Ibid
[xxxix] State Level Electric Energy Efficiency Potential Estimates. (2017): EPRI, Palo Alto, CA. https://energy.gov/eere/analysis/downloads/state-level-electric-energy-efficiency-potential-estimates-0
[xl] Ibid.
[xli] New York State Energy Plan. (2014). http://energyplan.ny.gov/Plans/2014.aspx.
[xlii] Oregon Biennial Energy Action Plan. 2015-2017. (2015). http://www.oregon.gov/energy/Data-and-Reports/Documents/2015-2017%20Biennial%20Energy%20Plan.pdf. pp. 6.

[xliii] Northwest Power and Conservation Council. (2017). Energy Efficiency in the Seventh Northwest Power and Conservation Plan. https://nwcouncil.org/media/7150202/efficiency7thplan.pdf.
[xliv] 10-Year Energy Action Plan Modeling: Greenhouse Gas Marginal Abatement Cost Curve Development and Macroeconomic Foundational Modeling for Oregon, Center for Climate Strategies. (2012). http://www.oregon.gov/energy/energy-oregon/Documents/2012%20Energy%20Action%20Plan%20Modeling%20Report.pdf.
[xlv] Rhode Island State Energy Plan. (2015). http://www.planning.ri.gov/documents/LU/energy/energy15.pdf. Figure 30; pp. 48.
[xlvi] *The National Coalition for Dialogue and Deliberation Resource Guide on Public Engagement*. (2010). http://www.ncdd.org/files/NCDD2010_Resource_Guide.pdf.
[xlvii] Michael Li, Joseph Bryson. (2015). U.S. Department of Energy's State and Local Energy Efficiency Action Network. Energy Efficiency Collaboratives. https://www4.eere.energy.gov/seeaction/system/files/documents/EECollaboratives-0925final.pdf.
[xlviii] Iowa Energy Plan. (2016). http://iowaenergyplan.org/.
[xlix] Roadmap to Implementing Michigan's New Energy Policy, Final Report. (2017). http://www.michigan.gov/documents/energy/Roadmap_to_Implementing_MI_New_Energy_Policy_-_Final_Report_603216_7.pdf.
[l] State of New Mexico, Energy Policy and Implementation Plan. (2015). http://www.emnrd.state.nm.us/EnergyPolicy/index.html.
[li] New York State Energy Plan. (2014). http://energyplan.ny.gov/Plans/2014.aspx.
[lii] Energy in Action: South Carolina State Energy Plan, South Carolina Office of Regulatory Staff, Energy Office. (2016). http://energy.sc.gov/energyplan.
[liii] Kate Marks, Julia Friedman. (2014). *State Energy Planning Guidelines: A Guide to Develop a Comprehensive State Energy Plan Plus Supplemental Policy and Program Options*. NASEO. http://www.naseo.org/Data/Sites/1/documents/publications/NASEO-State-Energy-Planning-Guidelines.pdf
[liv] State of New Mexico, Energy Policy and Implementation Plan. (2015). See: http://www.emnrd.state.nm.us/EnergyPolicy/index.html.
[lv] New Mexico Energy Roadmap project. (2016). http://www.emnrd.state.nm.us/ECMD/energyroadmap.html.
[lvi] Economic Development Strategy, State of Connecticut. (2015). http://www.ct.gov/ecd/lib/ecd/2015_strategic_plan_final.pdf.
[lvii] Iowa Energy Plan, Executive Summary. (2016). http://www.iowaenergyplan.org/docs/IEPExecutiveSummary.pdf.
[lviii] Utah 10-Year Strategic Energy Plan. (2010). https://www.utah.gov/governor/docs/10year-stragegic-energy.pdf. pp. 27.
[lix] U.S. Environmental Protection Agency. (2012). Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans. https://www.epa.gov/energy-efficiency-and-renewable-energy-sips-and-tips/energy-efficiencyrenewable-energy-roadmap.
[lx] National Association of State Energy Officials. (2016). Energy Efficiency Pathways. http://www.naseo.org/ee-pathways.
[lxi] Government Leading by Example, Rural Public Building Energy Efficiency Support. (2017). https://oemr.idaho.gov/wp-content/uploads/2016/06/gov_leading_by_example_overview_3.pdf.
[lxii] New Jersey Energy Master Plan: Update. (2015). http://nj.gov/emp/docs/pdf/New_Jersey_Energy_Master_Plan_Update.pdf.
[lxiii] New Jersey's Clean Energy Program. (2016). http://www.njcleanenergy.com/commercial-industrial/programs/large-energy-users-program.
[lxiv] Wyoming Strategic Energy Initiatives. (2016). See http://governor.wyo.gov/media/news-releases/2016-news-releases/governormeadannouncesupdatedenergystrategy.
[lxv] Maine Energy Plan. (2015). https://energy.gov/eere/wipo/downloads/state-energy-program-projects-maine.
[lxvi] Minnesota 2025 Energy Plan. (2015). http://mn.gov/commerce-stat/pdfs/mn-e2025-finalreport.pdf.
[lxvii] Rhode Island State Energy Plan. (2015). Energy 2035 Implementation Matrix, Table 5; pp. 73.http://www.energy.ri.gov/policies-programs/ri-energy-laws/state-energy-plan.php.
[lxviii] Virginia Energy Roadmap. (2018). https://www.dmme.virginia.gov/DE/LinkDocuments/GEC/4%20-%20Virginia%20Energy%20Efficiency%20Roadmap.pdf.
[lxix] West Virginia Center for Center for Business & Economic Research. (2017). http://www.energywv.org/assets/files/EnergyPlan/Energy-Efficiency-Opportunities-for-West-Virginia-2017-Update.pdf.
[lxx] West Virginia Division of Energy, Energy Plan 2018-2022. (2018). http://www.energywv.org/state-energy-plan.
[lxxi] Erin Boyd. (2016). U.S. Department of Energy. Presentation Slides on Energy Modeling 101. https://energy.gov/sites/prod/files/2016/02/f30/EPSA_Power_Sector_Modeling_FINAL_021816_0.pdf.
[lxxii] U.S. Department of Energy, State and Local Energy Data Tool. (2018). https://apps1.eere.energy.gov/sled/#/.
[lxxiii] Long-range Energy Alternatives Planning System (LEAP). (2018). http://sei-us.org/leap/.
[lxxiv] Optimal Energy Portfolio Screening Tool. (2014). http://www.optenergy.com/wp-content/uploads/2014/08/OEI-PST-User-Guide-v2.07.pdf.
[lxxv] PI+ Model. (2017). http://www.remi.com/products/pi.

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