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United States Environmental Protection Agency

Background and Draft Methodology for Estimating Energy Impacts of EE/RE Policies

SECTION I: INTRODUCTION

States, tribal and local agencies with non-attainment areas for air pollutants regulated under the National Ambient Air Quality Standards (NAAQS) are required to submit State Implementation Plans or Tribal Implementation Plans (SIPs/TIPs) to the U.S. Environmental Protection Agency (EPA) that describe how they will attain the NAAQS by a certain date. To help state, tribal, and local agencies examine the role of energy efficiency and renewable energy (EE/RE) policies and programs in SIPs/TIPs, EPA has developed a draft methodology for estimating the energy impacts of key EE/RE "on the books" policies that are not explicitly reflected in the Energy Information Administration's (EIA) Annual Energy Outlook (AEO) 2013 electricity projections. These policies include energy efficiency resource standards (EERS), dedicated sources of EE program funding that are adopted in state law and/or codified in rule or order, and renewable portfolio standards. EPA also conducted a detailed state-by-state policy review and, on this basis, applied the draft methodology to produce numeric estimates[1] of the energy impacts of state EE/RE policies not accounted for in AEO2013 forecast. The time period covered by this analysis is 2013-2030.

These estimates are intended for use by state, tribal, and local agencies responsible for developing SIPs/TIPs for ozone and other criteria air pollutants. These agencies can use EPA's EE/RE energy impact estimates to quantify the resulting emissions reductions, and then include these reductions in their SIP/TIP submittals. Alternatively, agencies can apply EPA's draft methodology to develop their own estimates of EE/RE impacts and associated emissions reductions. Jurisdictions not currently preparing a SIP/TIP, but interested in better understanding the energy and emissions impacts of EE/RE policies, can likewise use EPA's methodology and numeric estimates to identify strategies for staying in attainment with the NAAQS.

> At the current time – in order to finalize these energy impact estimates – EPA is seeking feedback from state and other federal agencies, as well as energy efficiency and renewable energy policy experts. EPA plans to revise its methods based on feedback during the public input period and as new information becomes available. In recognition of this opportunity to gain insights from experts during a public comment period, this version of the methodology is labeled *draft*.

[1] For more information, go to http://www.epa.gov/statelocalclimate/state/statepolicies.html.

SECTION II: OVERVIEW OF METHODOLOGY & APPROACH

The EPA undertook three steps to analyze the "on the books" EE/RE policies that are not explicitly accounted for in the reference case forecast currently used by EPA (e.g., AEO2013):

- Step One: Understand policy assumptions in the current reference case forecast (e.g., AEO2013 Reference Case Forecast[2] (AEO2013)).
- Step Two: Identify key state-level EE/RE policies not explicitly included in the current reference case forecast (e.g., AEO2013) and collect relevant design details.
- Step Three: Develop analytical methods to estimate incremental[3] impacts of state-level EE/RE policies relative to the current reference case forecast (e.g., AEO2013).

While EPA has applied these steps to the AEO2013, states can consider applying this methodology to other electricity forecasts.

Step 1: Understand Energy Efficiency/Renewable Energy Policy Assumptions in the Current Reference Case Forecast

To understand the EE/RE policy assumptions included in the AEO2013 forecast, EPA reviewed the EIA's documentation for the AEO2013 reference case forecast and consulted with EIA staff. From the review, it is clear that AEO2013 explicitly includes the impacts of several existing EE/RE policies,[4] including:

- Federal appliance and equipment standards for residential and commercial categories[5]
- Lighting efficiency standards for various types of lighting technologies[6]
- Tax credits for EE appliances and equipment, and investment tax credits for EE/RE technologies[7]
- Federal EE programs and funding
  - American Recovery and Reinvestment Act[8]
  - State Energy Program and Energy Efficiency Community Block Grant
  - Weatherization Program
  - Green Schools
  - Smart Grid expenditures
- Building energy codes for residential and commercial new construction[9]

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[2] The reference case is a business-as-usual projection that generally assumes that laws and regulations remain unchanged throughout the projection period. For more information, go to http://www.eia.gov/analysis/.

[3] Incremental impacts of EE/RE policies relative to AEO2013 refers to the impacts not captured within AEO2013, taking into account any embedded impacts reflected in the forecast.

[4] This discussion highlights several of the most important policies, but is not intended as a comprehensive review of AEO assumptions. See http://www.eia.gov/forecasts/aeo/assumptions/pdf/appendix_a.pdf for further information.

[5] EIA (2013c), Appendix A, pp. 187-204

[6] EIA (2013c), Appendix A, pp. 187-204

[7] Ibid.

[8] EIA (2013c), pp.32

[9] Ibid.

    - E.g., all states adopt and enforce International Energy Conservation Code (IECC) 2006 (Residential Building Code) by 2017
- State Renewable Portfolio Standards (RPS)[10]
    - 30 states and Washington, D.C. effective as of October 2012

Step 2: Identify and Review "On the Books" Energy Efficiency/Renewable Energy Policies not in the Reference Case

Based on its review, EPA identified three key "on the books" state-level EE/RE polices not explicitly included in the reference case forecast. EPA focused its analysis on EE/RE policies that are currently codified in regulations, statutes, or state public utility commission (PUC) orders that require parties to achieve minimum levels of EE and/or RE, or to fund programs. The EE/RE policies listed below are the set of "on the books" state EE/RE policies EPA identified for this analysis.

State EE policies

- Energy Efficiency Resource Standards (EERS) adopted or updated as of June 2013
- Funding for EE Programs adopted or updated as of June 2013
    - EE programs funded by Public Benefits Funds (PBFs)
    - EE programs funded by the Regional Greenhouse Gas Initiative (RGGI)[11]
    - EE programs funded by Forward Capacity Market (FCM) revenues[12]

State RE policies:

- RPS policies adopted or updated between October 2012 and June 2013.

After identifying the applicable EE/RE policies, EPA scanned all 50 states to determine which had adopted one or more of these policies as of June 2013. Once EPA identified which states had EE/RE policies, EPA reviewed the relevant design details for each state policy using publically available information, such as state legislation, state rules and regulations, PUC orders, summary reports from the American Council for an Energy-Efficient Economy (ACEEE),[13] and the Database of State Incentives for Renewables & Efficiency (DSIRE).[14]

Step 3: Develop Methods to Estimate Incremental Impacts of Energy Efficiency/Renewable Energy Policies Relative to the Reference Case

Once EPA understood the state-level policy characteristics, EPA developed analytical methods to estimate the impacts of the "on the books" EE/RE policies. These analytical methods produced the following incremental impact estimates relative to the reference case: annual energy savings and generation for 2014-2030 and peak impacts and hourly load impact curves for 2020, 2025, and 2030.

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[10] EIA (2013a), pp. 14-17

[11] For more information, go to: http://www.rggi.org/.

[12] For example, several states participating in ISO-NE's forward capacity market are using auction revenues to fund energy efficiency

[13] ACEEE (2012).

[14] DSIRE (2013).

SECTION III: OVERVIEW OF THE DRAFT METHODOLOGY AND ANALYTICAL STEPS FOR ESTIMATING EE/RE POLICY IMPACTS

EPA applied the following analytical steps to estimate the projected annual energy savings of EE Policies:

- Step One: Generate a baseline (i.e., business as usual (BAU)) forecast of state electricity sales consistent with AEO2013 regional forecasts.
- Step Two: Estimate projected impacts of key state "on the books" EE policies already embedded in AEO2013 forecast of electricity sales.
- Step Three: Estimate projected total EE savings from key state "on the books" EE policies
  - EERS (25 states)
  - Funding for EE Programs in non-EERS states (e.g., dedicated funding from PBFs, RGGI and FCM revenues) (5 states)
- Step Four: Generate state-adjusted national energy forecast that reflects the energy savings not captured in (i.e., incremental to) the baseline forecast.

For peak demand savings, EPA applied the following analytical steps to estimate the hourly savings of state EE policies and for the single hour that corresponds to the peak demand within a given year (see Section IV):

- Step 1: Develop regional savings impact profiles[15] to represent typical hourly changes in load from representative EE programs.
- Step 2: Develop state-specific savings impact profiles for select analysis years (2020, 2025 and 2030) by allocating the projected total energy savings in that year across all 8,760 hours, proportional to the representative regional savings profiles developed in Step 1.
- Step 3: Identify the peak generating hour applicable to each state using historical generation. The energy savings from that corresponding hour in the state-specific savings impact profiles (from Step 2) is the projected peak savings for that year.

For RE policies, EPA applied the following key analytical steps to estimate the projected annual energy impacts (see Section V):

- Step 1: Estimate RE generation from RPS policies adopted or revised between October 2012, when the AEO2013 RPS assumptions were formulated, and June 2013, when this analysis was released in draft form. (Minnesota and Hawaii)
- Step 2: Generate state-adjusted forecast reflecting policy changes.

[15] A savings impact profile provides the estimated load impacts (savings) associated with the relevant set of EE programs for hours 1 through 8760. See Peak Energy Savings Summaries for the profiles developed for this analysis.

Draft Methodology for Generating a Baseline Forecast of State Electricity Sales to Represent Annual Energy Outlook 2013 Regional Forecasts

State-level baseline sales[16] data were developed by first using 2012 historical state sales data from the EIA[17] and then applying the electricity sales growth rates from AEO2013. Annual Energy Outlook 2013-based "annual average growth rates" (AAGR) were calculated for each Electricity Market Module (EMM) region across the 2012-2040 forecast period. These regional growth rates were then applied to the 2012 historical sales for each state. For states whose boundaries cross EMM regions, state-specific growth rates were derived by using a historical sales weighted average of EMM region growth rates.[18] The 2012-2040 AAGR was used to forecast sales for 2013-2040. Table 1 shows the EMM regions and the AAGRs used to forecast sales for each state.

Table 1: Electricity Market Module Region and Annual Energy Outlook 2013 Sales Growth Rates by States

State/Jurisdiction	Electricity Market Module Region	Average Annual Growth Rates (2012-2040)
Arizona	AZNM, NWPP	1.30%
Arkansas	SPNO, SPSO, SRDA	0.87%
California	AZNM, CAMX, NWPP	0.90%
Colorado	AZNM, NWPP, RMPA, SPNO, SPSO	1.22%
Connecticut	NEWE	0.22%
Delaware	RFCE	0.51%
District of Columbia	RFCE	0.51%
Florida	FRCC, SRSE	1.18%
Hawaii	HI[19]	0.78%
Illinois	MROW, RFCW, SRGW	0.43%
Indiana	RFCW	0.41%
Iowa	MROW, SRGW	0.54%
Maine	NEWE	0.22%
Maryland	RFCE, RFCW	0.50%

[16] Note that AEO2013 does not include state-level forecasts, so incremental impacts are calculated against the BAU electricity sales forecast developed as described in Section III.

[17] EIA (2013b).

[18] Each state was first mapped to one or more EMM regions, depending on the geographical overlap. The share of each state's electricity sales (from EIA-861) in a given EMM region was calculated as a percentage of total sales for that state. These shares represent the contribution of each EMM region's growth rate to the state's growth rate. The growth rate of each EMM region overlapping a state was then weighted by the share of each state's sales within that EMM region.

[19] Because the AEO2013 does not include Hawaii, the US Average Annual Growth Rate was applied.

Massachusetts	NEWE	0.22%
Michigan	MROE, MROW, RFCM, RFCW	0.33%
Minnesota	MROW	0.54%
Montana	MROW, NWPP, RMPA	0.94%
Nebraska	MROW, RMPA	0.55%
Nevada	AZNM, NWPP	1.20%
New Hampshire	NEWE	0.22%
New Mexico	AZNM, NWPP, RMPA, SPSO	1.18%
New Jersey	NYUP, RFCE	0.50%
New York	NEWE, NYCW, NYLI, NYUP, RFCE	0.20%
North Carolina	SRCE, SRVC	1.10%
Ohio	RFCW	0.41%
Oregon	NWPP	0.97%
Pennsylvania	NYUP, RFCE, RFCW	0.48%
Rhode Island	NEWE	0.22%
Texas	AZNM, ERCT, SRDA, SPSO	0.89%
Washington	NWPP	0.97%
Wisconsin	MROE, MROW, RFCW	0.41%
Vermont	NEWE	0.22%

Draft Methodology for Estimating Energy Savings of State Energy Efficiency Policies Embedded In Annual Energy Outlook 2013

As explained in the introduction, the goal of this analysis is to produce numeric estimates of the energy impacts of state EE/RE policies not accounted for in AEO2013 forecast. In order to estimate the impacts *not accounted for* in the baseline electricity sales forecast, the analysis necessarily must define the impacts *already accounted for* in the baseline. The impacts already accounted for in the AEO 2013 Reference Case forecast are characterized in this analysis as *embedded* savings. Embedded savings are subtracted from estimates of total state EE/RE policy impacts to yield the incremental savings effects on the baseline, thus avoiding potential double counting.

The AEO2013 does not *explicitly* include the impacts of state EE policies such as EERSs and dedicated sources of EE program funding. However, the AEO forecasts are understood to *implicitly* represent the impacts of EE policies implemented at the state level. This implicit representation of energy efficiency occurs in two key ways:

1) The AEO forecast incorporates historical data that reflect energy consumption levels and trends influenced by state-level EE policies in place at that time. The effects of these existing policies lower the sales level in the last historic year (e.g., if 2011 is the last

historical year of data in AEO2013, then the 2011 energy demand was lower than it would have been in the absence of existing EE policies) and may also affect AEO's near-term growth rates partially derived from recent historic demand growth trends (which otherwise would have been expected to be higher in the absence of existing EE policies).

2) The AEO forecast assumes an ongoing and persistent savings from energy efficiency policies and programs that expire after a defined period of time, or "measure lifetime." Typically, the impacts of EE programs are estimated in terms of first-year savings, plus the persistent savings realized from that program (or EE measure) over an assumed "measure lifetime" (a 13-year lifetime is used for this analysis). EPA's assessment of the AEO forecast, however, does not identify the expected end of these persistent savings (i.e., does not identify a consequent increase in energy intensity that should accompany the end of an EE savings stream), leading to the conclusion that the AEO forecast assumes an ongoing stream of savings beyond the lifetime of the efficiency measure. [20]

Recognizing that AEO2013 is implicitly affected by these historic and persistent effects of state EE policies and programs, EPA concludes that some portion of the total policy- and program-induced EE savings are embedded in the AEO2013 regional forecast and the AEO2013-based state-level BAU forecast. EPA therefore developed a methodology for estimating these embedded savings for each state.

This methodology involves two steps: estimating national savings from energy efficiency, and then allocating these national savings to the states covered in the analysis.

For national savings, reported cumulative energy efficiency savings from programs implemented in prior years (reported as "annual effects" via EIA-861, and as aggregated in EIA's Electric Power Annual for residential, commercial, and industrial sectors) are divided by reported electricity sales (also reported via EIA-861, and as aggregated in EIA's Electric Power Monthly, Retail Sales of Electricity by State by Sector by Provider). This calculation yields national average energy efficiency savings as a percentage of sales within the given year. Because the national average savings is calculated from the most recent year's total cumulative savings, this value is divided by the average energy-efficiency "measure lifetime," here assumed to be 13 years. This yields a percentage representing the ongoing annual effects of energy efficiency that are embedded in the AEO forecast (0.29%).[21]

Allocating the national average embedded savings to the individual states in this analysis uses state-specific data for first-year energy efficiency savings reported by the American Council for an Energy-Efficient Economy (ACEEE). Assuming that cumulative savings are generally proportional to first-year savings, the national average embedded savings percentage (0.29%) is divided by the ACEEE national first-year average savings (0.62%)[22] to define the relationship between the embedded savings and first-year savings data (0.47).[23] The resulting relationship is then multiplied by the state's first year savings percentage to calculate the embedded savings

[20] Synapse Energy Economics (2012).
[21] Synapse Energy Economics (2013).
[22] ACEEE (2013)
[23] This is the "calibration value" discussed in Synapse Energy Economics (2013).

for the state as a percentage of sales. These embedded savings estimates used in the EPA analysis are presented in Table 2.

Table 2: Energy Efficiency Savings Estimated to be Embedded in Annual Energy Outlook 2013[24]

State	Savings Estimated to be Embedded in AEO2013 (percent of BAU Sales in Each Year)
Alabama	0.04
Alaska	0.01
Arizona	0.64
Arkansas	0.06
California	0.63
Colorado	0.30
Connecticut	0.61
Delaware	0.08
District of Columbia	0.00
Florida	0.12
Georgia	0.05
Hawaii	0.61
Idaho	0.38
Illinois	0.31
Indiana	0.27
Iowa	0.48
Kansas	0.04
Kentucky	0.12
Louisiana	0.01
Maine	0.49
Maryland	0.27
Massachusetts	0.67
Michigan	0.47
Minnesota	0.56
Mississippi	0.07
Missouri	0.20
Montana	0.27
Nebraska	0.13
Nevada	0.34
New Hampshire	0.30

[24] Synapse Energy Economics (2013), Exhibit 3.

State	Savings Estimated to be Embedded in AEO2013 (percent of BAU Sales in Each Year)
New Jersey	0.32
New Mexico	0.22
New York	0.58
North Carolina	0.18
North Dakota	0.03
Ohio	0.57
Oklahoma	0.09
Oregon	0.46
Pennsylvania	0.48
Rhode Island	0.58
South Carolina	0.15
South Dakota	0.08
Tennessee	0.15
Texas	0.09
Utah	0.40
Vermont	0.99
Virginia	0.05
Washington	0.43
West Virginia	0.01
Wisconsin	0.27
Wyoming	0.04

EPA estimates embedded savings for each state by multiplying the percentages shown in Table 2 by the BAU sales for that state. For example, estimating the embedded savings for Arizona in 2013 involves multiplying the percentage from Table 2 (0.64%) by the BAU sales for 2013 (75,898 GWh) to yield 486 GWh of embedded savings in that year, and then subtracting the cumulative total of the state's embedded savings from the state's total EE policy savings to yield the impacts that are incremental to AEO2013. EPA only estimated embedded savings for years in which states achieve savings from EE policies and, to the extent possible, for the segments of state electricity load to which the EE/RE policies apply. The next section of this paper includes discussion of how the cumulative total of the state's embedded savings is subtracted from the state's total EE policy savings to yield the impacts that are incremental to AEO2013.

Draft Methodology for Estimating Projected Energy Efficiency Savings from Energy Efficiency Policies

The EPA estimated state-level EE savings from EERS policies and dedicated sources of EE program funding that are adopted in state law and/or codified in rule or order. Because these categories are not mutually exclusive, EPA took steps to avoid double-counting of energy savings for states with EERSs by treating EERS targets as overall goals that include savings from individual public benefit funded programs, RGGI-funded programs, and FCM revenues (in the states that have them). The EPA found that qualifying individual programs were not incremental to the EERS target, so each state with reported savings has either EERS savings, or dedicated sources of EE program funding.[25]

For each policy category, EPA estimated annual first-year electricity savings (i.e., savings achieved in a given year from programs implemented during that year), and cumulative savings from EE measures implemented in the current year and past years. The EPA calculated cumulative savings using state-specific measure lifetimes (see Table 3 below) and assuming no decay of savings over the life of the measures. The EPA used a default lifetime of 13 years where state-specific assumptions were not available. The EPA did not estimate first-year savings beyond the requirements of each state's policy period except for a limited set of states whose policy indicated a continuation of savings beyond the policy period; these assumptions are documented within the 2013 Annual Energy Savings and Generation workbook. For the majority of states, however, the forecast reverts to the AEO2013 reference-case-based forecast after the EE policy period ends.

Table 3: Measure Lifetime by State[26]

State	Measure Lifetime (Yrs)
Connecticut	13
Iowa	15
Massachusetts	13
Minnesota	13
Nevada	13
New Jersey	14
New Mexico	9
New York	15
Oregon	12
Rhode Island	11
Texas	13
Vermont	13
Wisconsin	12
Default	13

Energy Efficiency Resource Standards

An energy efficiency resource standard (EERS) is a policy that sets targets for energy savings over a specified time frame from end-use EE programs operated by utilities or other program administrators. States typically specify annual first-year or cumulative targets as percentages of electricity sales or as absolute energy savings. They use different bases for specifying EERS goals: some states specify goals based on sales from investor-owned utilities, while others have

[25] For more information, go to: http://www.epa.gov/statelocalclimate/state/statepolicies.html.

[26] ACEEE (2009a), Table 1.

mandated savings (i.e., megawatt-hours (MWh)) targets based on total sales or a subset of total sales.

The EPA estimated energy savings for each state using formulas specific to the state's EERS, as shown below. The EPA identified the appropriate sales basis for each state and, if the basis was not total sales, EPA used 2011 utility-level sales data from EIA[27] and AEO2013-based growth rates to develop baseline forecasts of sales of affected utilities (see Table 1). Because 2012 utility-level sales data were not available from EIA at the time of this analysis, EPA used the ratio of affected utility sales to total sales in 2011 to estimate the affected utility sales as a share of total sales for 2012. For most states, EPA assumes full achievement of EERS targets for all years in the compliance period. However, there are some states for which EPA does not assume full achievement of EERS targets in all years because of the way the programs are designed. One example is an EERS policy that includes cost/rate caps or other design features (e.g., counting savings from building energy codes or historical EE programs) that may not lead to incremental energy savings relative to AEO 2013[28] or are otherwise inconsistent with the EERS targets.[29] Additionally, savings were not estimated for purely voluntary EERSs.

The general formulas used to estimate annual first-year and cumulative energy savings for each year (t) were:

1) <u>EERS with Annual First-Year EE Savings Targets Specified in Percent Terms</u>

$A(t) = r(t) * Z(t-1)$
$C(t) = A(t) + A(t-1) + \ldots + A(t-L+1)$
$I(t) = C(t) - E(t)$
$Z(t) = B(t) - I(t)$

Where:
r is the annual first-year percent savings target,
A is the annual first-year energy savings,
L is the measure lifetime,
B is the baseline sales of utilities affected by these specific policies,
C is the cumulative energy savings,
E is the cumulative savings embedded in the AEO2013 forecast,
I is the cumulative savings incremental to AEO2013 forecast, and
Z is the adjusted sales after application of cumulative incremental savings.

2) <u>EERS with Annual First-Year EE Savings Targets Specified in Absolute Terms</u>

[27] EIA (2013b).
[28] Building energy codes are already incorporated in the AEO 2013 forecast, so any associated savings from those existing building codes already assumed in the AEO 2013 would not be incremental to the AEO forecast, and thus are removed from the applicable state's EERS target.
[29] For more information, go to individual state summary sheets at http://www.epa.gov/statelocalclimate/state/statepolicies.html.

$C(t) = A(t) + A(t-1) + \ldots + A(t-L+1)$
$I(t) = C(t) - E(t)$
$Z(t) = B(t) - I(t)$

Where:
A is the annual first-year energy savings target,
L is the measure lifetime,
B is the baseline sales of utilities affected by these specific policies,
C is the cumulative energy savings,
E is the cumulative savings embedded in the AEO2013 forecast,
I is the cumulative savings incremental to AEO2013 forecast, and
Z is the adjusted sales after application of cumulative incremental savings.

3) <u>EERS with Cumulative EE Savings Targets Specified in Percent Terms</u>

$A(t) = C(t) – C(t-1) + A(t-L)$

If *r*(t) available,
$C(t) = r(t) * B(t)$
$I(t) = C(t) - E(t)$
$Z(t) = B(t) - I(t)$

If *r*(t) not available,
Z(t) calculated by interpolation
$I(t) = B(t) - Z(t)$
$C(t) = I(t) + E(t)$

Where:
r is the cumulative percent savings target,
A is the annual first-year energy savings,
L is the measure lifetime,
B is the baseline sales of utilities affected by these specific policies,
C is the cumulative energy savings,
E is the cumulative savings embedded in the AEO2013 forecast,
I is the cumulative savings incremental to AEO2013 forecast, and
Z is the adjusted sales after application of cumulative incremental savings.

4) <u>EERS with Cumulative EE Savings Targets Specified in Absolute Terms</u>

$A(t) = C(t) – C(t-1) + A(t-L)$

If *C*(t) available,
$I(t) = C(t) - E(t)$

Z(t) = *B*(t) - *I*(t)

If *C*(t) not available,
Z(t) calculated by interpolation
I(t) = *B*(t) - *Z*(t)
C(t) = *I*(t) + *E*(t)

Where:
C is the cumulative energy savings target,
A is the annual first-year energy savings,
L is the measure lifetime,
B is the baseline sales of utilities affected by these specific policies,
E is the cumulative savings embedded in the AEO2013 forecast,
I is the cumulative savings incremental to AEO2013 forecast, and
Z is the adjusted sales after application of cumulative incremental savings.

Some special considerations that warranted adjustments to the general formulas were:

1) RPS that defines EE as a qualifying resource: The States of Nevada and North Carolina have RPSs that treat EE as a qualifying resource, subject to a quantitative limit. The National Energy Modeling System (NEMS), which is used to produce the AEO, does not currently have the capability to evaluate tradeoffs between EE and RE in cases where both are eligible RPS resources; so, it relies on RE to meet RPS requirements. For RPS policies explicitly included in AEO2013, no incremental energy savings were estimated.

2) Compliance Type and Cost/Rate Caps: Several states have EERSs that use cost-containment provisions or other design features that may constrain the ability of EE program administrators to meet the EERS targets with incremental savings relative to the AEO. The EPA identified six states with such design features – Arizona, Illinois, Minnesota, Ohio, and Texas – and relied upon available, state-specific academic reports,[30] integrated resource plans,[31] and other studies[32] to make downward adjustments to the nominal EERS targets to reflect these design features.[33]

3) "All Cost-effective EE" Targets: Six states – Connecticut, Maine, Massachusetts, Rhode Island, Vermont and Washington – require utilities (or other EE program administrators) to implement all cost-effective EE. In states with an "all cost-effective EE" requirement *and* EERS targets, EPA used the EERS targets to the policy sunset date and then assumed first-year savings equivalent to the last policy year, going forward. In states with an "all

[30] Satchwell (2011).
[31] Ameren Illinois (2010), ComEd (2010).
[32] Good Company Associates (2010).
[33] For more information, go to http://www.epa.gov/statelocalclimate/state/statepolicies.html.

cost effective EE" target *without* an EERS target through 2020, EPA estimated savings based on utility plans[34] and EE resource potential studies.[35]

4) <u>State Legislature or PUC Disapproval of EE Program Budgets Necessary to Meet EERS Targets</u>: Two states – Florida and Wisconsin – did not approve requests for EE program budget increases necessary to meet growing EERS targets, opting instead to maintain current EE program offerings. In these states, EPA reduced the EERS nominal targets to levels achieved with approved EE program budgets.[36]

Energy Efficiency Program Funding

In states without an EERS policy but with one or more sources of EE funding, the EPA developed an approach for estimating the associated savings. The sources of funding evaluated by EPA include public benefit funds (PBFs), funding from the proceeds of Regional Greenhouse Gas Initiative (RGGI) allowance auctions, and funding from Forward Capacity Market (FCM) payments. Data for these EE programs are mainly available in terms of program administrator expenditures (i.e., costs to the utility of administering EE programs, exclusive of customer costs), so EPA calculated savings based on estimates of energy savings per program dollar spent. For each state with qualifying programs, EPA obtained information on annual program funding from state [37] or utility publications,[38] and projected funding for each future year as equal to the funding for the year for which the latest information is available. The funding information consists of either actual or committed expenditures, depending on the data source. Estimates of levelized costs of saved energy (LCSE) were available for some states from ACEEE (2009a). These are presented in Table 4. The ACEEE report presents costs of saved energy as reported by programs, except in cases where the methods used by program administrators to estimate the LCSE were different from ACEEE's standard approach. In such cases, ACEEE calculates LCSE as:

$$LCSE = (F * CRF)/A$$
$$CRF = (d *(1+d)^L)/((1+d)^L -1)$$

Where:
A is the annual first-year energy savings,
F is the annual program funding,
CRF is the Capital Recovery Factor,
L is the measure lifetime, and
d is the discount rate.

ACEEE uses a real discount rate of five percent to calculate the Capitol Recovery Factor, and estimates that the average LCSE across the states included in the report is $0.025/kilowatt hour

[34] DEEP-BETP(2012), Mass Save (2012), EMT (2010), EMT (2012), National Grid (2008), EERMC (2010), VEIC (2009).
[35] NWPCC (2010)
[36] For more information, go to http://www.epa.gov/statelocalclimate/state/statepolicies.html
[37] DCSEU (2012),DSEU (2013), NHEU (20129), NJ CEP (2013).
[38] MDU (2012), MECA (2011), NorthWestern Energy (2012).

(kWh). To apply ACEEE's LCSE estimates in a manner that is consistent with the methodology by which they were calculated, this analysis also used a discount rate of five percent.[39] The average LCSE of $0.025/kWh was used as the default LCSE where state-specific estimates were not available. In order to adjust for the effects of inflation, the EPA converted the dollar values employed in the ACEEE analysis (reported in 2007$) to 2011$, which is the price metric used throughout the AEO2013 analysis. Implicit price deflators for Gross Domestic Product (GDP) were assumed as the measure for conversion.[40] The EPA did not assume a decay of savings during the measure life, so savings for each year are equal to the lifetime savings averaged over the measure lifetime.

Table 4: Levelized Cost by State[41]

State	Levelized Cost of Saved Energy[42] (2007$/kWh)	Levelized Cost of Saved Energy (2011$/kWh)
California	$0.029	$0.031
Connecticut	$0.028	$0.030
Iowa	$0.017	$0.018
Massachusetts	$0.031	$0.033
Minnesota	$0.021	$0.022
Nevada	$0.019	$0.020
New Jersey	$0.026	$0.028
New Mexico	$0.033	$0.035
New York	$0.019	$0.020
Oregon	$0.016	$0.017
Rhode Island	$0.030	$0.032
Texas	$0.017	$0.018
Vermont	$0.027	$0.029
Wisconsin	$0.033	$0.035
Default (simple average)	$0.025	$0.027

The EPA estimated energy savings from ratepayer-funded programs in each year (t) using the following formulas:

$$CRF = (d * (1+d)^{L})/((1+d)^{L} - 1)$$
$$A(\mathrm{t}) = (F(\mathrm{t}) * CRF)/LCSE(\mathrm{t})$$
$$C(\mathrm{t}) = A(\mathrm{t}) + A(\mathrm{t}-1) + \ldots + A(\mathrm{t}-L+1)$$

[39] A five percent discount rate is also the average of the two rates (i.e., 3 percent and 7 percent) that EPA currently uses when performing economic analysis as a part of its rule development; for more information, go to http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html.
[40] BEA (2013), Table 1.1.9
[41] Source: ACEEE (2009a), Table 1.
[42] LCSE is based on program administrator costs, not on total resource costs (that include costs to participating utility customers).

Where:
CRF is the Capital Recovery Factor,
L is the measure lifetime,
d is the discount rate,
A is the annual first-year energy savings,
F is the annual program funding,
LCSE is the levelized cost of saved energy in 2011$, and
C is the cumulative energy savings.

For this analysis, the EPA did not estimate the magnitude of savings from EE programs funded by dedicated funding sources (i.e., RGGI and FCMs) separately, but instead incorporated their funds in the EE Program Funding category. This decision was motivated by the availability of state-level program budget information data which aggregated the funding sources.

Draft Methodology for Generating State-Adjusted Forecast that Reflects Incremental Energy Savings

The EPA estimated energy savings that are incremental to the reference case (AEO2013) by subtracting cumulative savings embedded in AEO2013 from total savings from EERSs, programs funded by public benefit funds and other program funding sources (e.g., RGGI and FCM):

$$I(t) = C(t) - E(t)$$

Where:
C is the cumulative energy savings,
E is the cumulative savings embedded in the AEO2013 forecast and
I is the cumulative savings incremental to AEO2013 forecast.

The state-adjusted electricity sales forecast includes the impact of EE savings that are incremental to the BAU reference case. State-level adjusted sales (*Z*) are calculated as:

$$Z(t) = B(t) - I(t)$$

Where:
B is the baseline total sales and
I is the cumulative savings incremental to AEO2013 forecast.

Important Sources of Uncertainty in the Analysis

In conducting this analysis, EPA used the best available information and adopted assumptions intended to reduce the likelihood of overstating the impacts of the states' EE/RE policies. The EPA plans to revisit its methods as new information becomes available and anticipates benefiting from the experience of parallel efforts aimed at accounting for the impacts of EE/RE policies in energy and environmental planning.

For this analysis, EPA is highlighting three sources of uncertainty to keep in mind when utilizing these estimates and employing similar methods:

- The impacts of state EE policies embedded in the AEO reference case
- PUC approval of EE program budgets necessary to meet the EERS targets
- Variations in state approaches for evaluating and reporting EE savings

As discussed in Section III, the AEO reference case likely includes the impacts of some programs that are not explicitly identified in the AEO documentation. Estimating the impacts of existing energy efficiency policies at the national level, and then applying these national savings to individual states requires significant simplifying assumptions about the degree to which these impacts are embedded in electricity sales projections and the associated magnitude of double counting. While some intrinsic uncertainty exists, EPA believes its assumptions are reasonable in light of available data.

Another source of uncertainty relates to PUC approval of EE program budgets necessary to meet the adopted targets. The EE policy that drives the core results of this analysis – EERS – depends on PUC approval of EE program budgets necessary to meet the targets. As discussed in Section III, several states' EERS legislation includes explicit cost or rate impact caps that may constrain the ability of EE program administrators to meet the nominal EERS targets, and EPA attempts to account for this design feature in its analysis. However, even in states without specific cost or rate impact caps, PUCs generally have authority over EE program budgets and, as the EERS targets increase in stringency (necessitating larger EE program budgets), there is uncertainty over whether PUCs will continue to approve the budgets necessary to achieve the EERS targets. While recent reports have documented steadily increasing EE program budgets[43] and generally good progress with states reporting achievement of EERS targets,[44] this will be an issue EPA tracks in the future as EERS targets increase.

A third source of uncertainty in EPA's analysis is the energy-savings definitions that states use when calculating and reporting program impacts. In some states, energy savings are evaluated and reported to Public Utility Commissions (PUCs) as "gross" savings – that is, savings attributed to an efficiency program that would have occurred even in the absence of the program (i.e., program savings not attributable to a specific program intervention). Other states require the reporting of "net" savings, which adjust gross savings by accounting for so-called "free-riders," or customers who receive program rebates even though they would have invested in the efficient equipment without the program. This difference in how energy savings are defined and measured complicates efforts to make cross-state comparisons. The degree of uncertainty this conveys to EPA's analysis is not precisely known, but ACEEE uses a negative adjustment factor of 10% applied to gross savings to reconcile the two values. Such an adjustment is not used in this analysis. A recent survey indicated that approximately 2/3 of states report gross savings and 1/3 report net.[45]

[43] IEE (2012).
[44] ACEEE (2011).
[45] ACEEE (2012a)

SECTION IV: DRAFT METHODOLOGY FOR ESTIMATING PROJECTED PEAK DEMAND SAVINGS OF ENERGY EFFICIENCY POLICIES

Energy efficiency programs are typically measured in terms of the electricity savings that they achieve over time, in term of MWhs. For example, savings occurring throughout the year or during the heating or cooling season. However, efficiency programs also save energy during specific "peak demand periods" when power costs are high and supplies are constrained. EPA estimates these peak savings, measured in megawatts (MW), by determining the energy savings impact of a state's EE programs during the single hour of the year that corresponds to the state's peak energy use.[46]

As background, it is important to define several key terms. Recognizing that these terms are not always used consistently across the industry, the definitions below apply only to this analysis. They are not intended as a definitive statement of how terminology should be applied universally.

- Savings impact shape: The distribution of savings (i.e., impacts on load) of a set of EE programs for a defined geography, sequenced from hour 1 to hour 8760. The savings impact shape is unitless, representing only the fraction of savings attributable to each hour; the sum of the savings impact shape thus necessarily equals 1.
- Savings impact profile: The distribution of estimated total annual savings (i.e., impacts on load, in MWh) from a set of EE programs for a defined geography, sequenced from hour 1 to hour 8760. The summation of the savings profile equals the total estimated electricity savings (kWh) for the year.
- Load profile: Historical data representing the distribution of load (kW) across each hour of a year, sequenced from hour 1 to hour 8760. For purposes of this analysis, it reflects the system load for a select region or state, though it could be scaled to specific types of loads (e.g., customer class) for other purposes.
- Load duration curve: Load profile sorted from maximum to minimum hour values for a period of time (e.g., whole year, season, week, day).

Draft Methodology for Generating Savings Impact Profiles for Energy Efficiency Policies

This analysis uses savings impact shapes previously developed for EPA[47] to represent the distribution of savings from EE programs for a defined geography within a given year (e.g., 8760 hours). These savings impact shapes are defined for the residential sector and commercial sector for each of the nine U.S. Census Divisions (New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific), and for the industrial sector for each of the four U.S. Census Regions (Northeast, Midwest, South, and West). The savings impact shapes are based on typical EE program mixes by region and sector. They do not represent a particular set of programs currently in place, but

[46] The EPA assumed that EE programs do not shift the peak. The EPA did not perform a dynamic analysis of peak demand.
[47] Savings impact shapes were developed using the Building Energy Analysis Console (Beacon™), ICF's proprietary model for simulating energy consumption by buildings.

instead aim to represent a typical program portfolio. The resulting savings impact shapes vary by region, depending upon considerations such as cost-effectiveness, regional building population, and climate.[48]

The EPA weighted and combined the sector-specific regional EE savings impact shapes into a composite savings impact shape for each state, and then multiplied the shapes by the state's total incremental savings projected by this analysis. EPA then used this information to develop savings profiles for each state for 2020, 2025 and 2030 using the following steps:

1) Estimating EE Savings Distribution by Sector
   - The EPA calculated average (O) national savings by sector[49] (X) as a percentage of national sales by sector[50] (Y) for 2009-2011 for the residential (r), commercial (c) and industrial (i) sectors.

     $O_{r,n} = ((X_{r,n,2009}/Y_{r,n,2009}) + (X_{r,n,2010}/Y_{r,n,2010}) + (X_{r,n,2011}/Y_{r,n,2011}))/3$
     $O_{c,n} = ((X_{c,n,2009}/Y_{c,n,2009}) + (X_{c,n,2010}/Y_{c,n,2010}) + (X_{c,n,2011}/Y_{c,n,2011}))/3$
     $O_{i,n} = ((X_{i,n,2009}/Y_{i,n,2009}) + (X_{i,n,2010}/Y_{i,n,2010}) + (X_{i,n,2011}/Y_{i,n,2011}))/3$

   - The EPA calculated sales by sector (Y) in 2011 as a percentage (P) of total residential, commercial and industrial sales for each state (s).

     $P_{r,s} = Y_{r,s,2011}/(Y_{r,s,2011} + Y_{c,s,2011} + Y_{i,s,2011})$
     $P_{c,s} = Y_{c,s,2011}/(Y_{r,s,2011} + Y_{c,s,2011} + Y_{i,s,2011})$
     $P_{i,s} = Y_{i,s,2011}/(Y_{r,s,2011} + Y_{c,s,2011} + Y_{i,s,2011})$

   - The EPA calculated percentages by sector of EE savings (Q) in each state as:

     $Q_{r,s} = (P_{r,s} * O_{r,n})/(P_{r,s} * O_{r,n} + P_{c,s} * O_{c,n} + P_{i,s} * O_{i,n})$
     $Q_{c,s} = (P_{c,s} * O_{c,n})/(P_{r,s} * O_{r,n} + P_{c,s} * O_{c,n} + P_{i,s} * O_{i,n})$
     $Q_{i,s} = (P_{i,s} * O_{i,n})/(P_{r,s} * O_{r,n} + P_{c,s} * O_{c,n} + P_{i,s} * O_{i,n})$

     Table 5 shows savings percentages for each state.

Table 5: Distribution of Savings by Sector[51]

State	Distribution of Savings (percent)		
	Residential	Commercial	Industrial
Alabama	49.7%	30.7%	19.6%

[48] For more information, go to http://www.epa.gov/statelocalclimate/state/statepolicies.html.
[49] EIA (2010, 2011, 2012).
[50] EIA (2010, 2011, 2012).
[51] EIA (2010), File3; EIA (2011), File3; EIA (2012), File3; EIA (2010), File2; EIA (2011), File2; EIA (2012), File2.

Arizona	50.9%	41.7%	7.3%
Arkansas	51.5%	30.5%	18.0%
California	40.1%	51.1%	8.7%
Colorado	43.1%	43.0%	13.9%
Connecticut	49.0%	45.6%	5.4%
Delaware	48.5%	41.0%	10.5%
District of Columbia	19.9%	79.3%	0.8%
Florida	56.2%	40.7%	3.1%
Georgia	51.1%	38.1%	10.8%
Hawaii	39.4%	41.6%	19.0%
Idaho	48.5%	31.7%	19.9%
Illinois	42.5%	41.9%	15.6%
Indiana	45.5%	29.7%	24.8%
Iowa	43.6%	33.8%	22.6%
Kansas	43.7%	43.6%	12.7%
Kentucky	44.4%	28.1%	27.5%
Louisiana	48.6%	33.8%	17.6%
Maine	47.5%	39.9%	12.6%
Maryland	47.5%	49.1%	3.4%
Massachusetts	47.2%	37.6%	15.1%
Michigan	42.2%	43.0%	14.8%
Minnesota	43.2%	39.4%	17.5%
Mississippi	50.6%	33.0%	16.4%
Missouri	50.6%	40.0%	9.4%
Montana	44.9%	41.0%	14.0%
Mountain	44.8%	40.5%	14.7%
Nebraska	44.4%	37.4%	18.2%
Nevada	46.1%	33.1%	20.8%
New Hampshire	47.8%	44.1%	8.0%
New Jersey	43.0%	52.5%	4.5%
New Mexico	38.1%	47.1%	14.8%
New York	40.5%	55.4%	4.1%
North Carolina	52.3%	38.4%	9.2%
North Dakota	42.6%	41.8%	15.6%
Ohio	45.6%	36.7%	17.7%
Oklahoma	50.3%	37.1%	12.6%
Oregon	50.5%	37.6%	12.0%
Pennsylvania	48.1%	35.1%	16.8%
Rhode Island	45.7%	49.1%	5.2%
South Carolina	50.1%	32.2%	17.6%
South Dakota	47.8%	42.0%	10.3%
Tennessee	53.3%	33.0%	13.7%
Texas	48.1%	38.9%	13.0%

Utah	40.3%	43.5%	16.2%
Vermont	47.1%	40.8%	12.1%
Virginia	47.9%	45.2%	6.9%
Washington	49.1%	36.4%	14.5%
West Virginia	50.2%	30.5%	19.3%
Wisconsin	42.3%	40.4%	17.3%
Wyoming	26.1%	37.1%	36.8%

2) Scale Based on Savings Percentages by Sector for Each State
   - The EPA selected the regional residential and commercial hourly EE savings impact shapes for the U.S. Census Division and the industrial shape for the U.S. Census Region in which the state lies.
   - The EPA scaled the regional savings impact shapes by sector using the appropriate percentages of EE savings by sector (*Q*) estimated in Step 1 to develop scaled savings for each hour of the year (8,760 hours) by sector for each state.
   - The EPA summed the scaled residential, commercial and industrial savings by hour (8,760 hours) to get the total hourly shape of the energy savings for the state (this is still normalized to base 1).

3) Shift Based on First Day of the Year and Accounting for Leap Years
   - The original savings impact shapes were developed for a year that began on a Friday.
   - For each year of interest, EPA shifted the total hourly savings impact shape for a state ahead or behind by the least number of days to ensure that the first day of the savings impact shape corresponded with the first day of the year. The 2020 leap year was also taken into account.

4) Scale Based on Total Incremental Savings for Each State
   - For each year, EPA multiplied the shifted and scaled hourly savings impact shapes by the total cumulative incremental savings estimated for that year, thus calculating the electricity savings in each hour. The resulting 8,760 hourly savings increments sum to the total annual cumulative incremental savings and represent the savings profile for the year.

Identifying the Peak Generating Hour and Projected Peak Demand Savings

To identify the specific hour of the year in which each state's electricity generation is at its maximum, EPA aggregated the load profiles of the relevant Integrated Planning Model™ (IPM) regions[52] located within a state (relying on state-specific capacity-weighting of IPM regions that

[52] "Model region" refers to the geographic regions defined for the "EPA Base Case using IPM® v.5.13," a projection of electricity sector activity that takes into account only those federal and state air emission laws and regulations whose provisions were either in effect or enacted and clearly delineated at the time the base case was finalized in August 2013. The peak hour is taken from load profiles used in EPA's Base Case using IPM®, which are compiled by

cross state boundaries) in EPA's Base Case. Table 6 presents the state-to-IPM-region mapping that was used. Since the load data used in EPA's Base Case were available for 2010, the peak hour for each year of interest was also shifted based on the first day of the year in the same manner as described in Step 3 ("Shift Based on First Day of the Year and Accounting for Leap Years") of the "Draft Methodology for Generating Savings Impact Profiles for Energy Efficiency Policies" above. For each state, EPA identified the peak hour for each year, and took the corresponding hourly EE savings (i.e., impact) from the EE policy or program as the peak savings.

Table 6: EPA Base Case Regional Mapping for Integrated Planning Model[53]

State	IPM Region
Arizona	WECC_AZ
Arkansas	S_D_REST, S_D_N_AR, SPP_WEST
California	WEC_CALN, WECC_SCE, WEC_LADW, WEC_SDGE, WECC_IID, WECC_PNW, WECC_AZ, WECC_SF, WECC_NNV
Colorado	WECC_CO
Connecticut	NENG_CT
Delaware	PJM_EMAC
District of Columbia	PJM_SMAC
Florida	FRCCS_SOU
Illinois	PJM_COMD, MIS_IL, MIS_MIDA, MIS_MO
Indiana	MIS_INKY, PJM_West
Iowa	MIS_IA, MIS_MIDA, MIS_MO, MIS_IL, MIS_MNWI, MAP_WAUE
Maine	NENG_ME
Maryland	PJM_SMAC, PJM_EMAC, PJM_PENE, PJM_AP
Massachusetts	NENGREST
Michigan	MIS_LMI, MIS_WUMS, PJM_West, MIS_MNWI
Minnesota	MIS_MNWI, MIS_IA, MIS_MAPP, MIS_LMI, MAP_WAUE
Montana	WECC_MT, MIS_MAPP, MAP_WAUE
New Hampshire	NENGREST
New Jersey	PJM_EMAC, NY_Z_J
New Mexico	SPP_SPS, WECC_NM
New York	NY_Z_C&E, NY_Z_F, NY_Z_D, NY_Z_G-I, NY_Z_J, NY_Z_K, NY_Z_A&B
Ohio	PJM_West, PJM_ATSI, S_C_KY, MIS_INKY, PJM_EMAC
Oregon	WECC_PNW
Pennsylvania	PJM_PENE, PJM_West, PJM_WMAC, PJM_ATSI, PJM_EMAC, PJM_AP

aggregating FERC-714 data to the model region level. See http://www.epa.gov/airmarkets/progsregs/epa-ipm/docs/v513/attachment2_1.xlsx for region-specific load duration curves used in EPA Base Case v.5.13.

[53] http://www.epa.gov/airmarkets/progsregs/epa-ipm/docs/v513/Documentation.pdf, Figure 3-1.

State	IPM Region
Rhode Island	NENGREST
Texas	ERC_REST, WECC_NM, SPP_SPS, ERC_WEST, SPP_WEST, S_D_WOTA
Vermont	NENGREST
Washington	WECC_PNW
Wisconsin	MIS_MNWI, MIS_WUMS

SECTION V: DRAFT METHODOLOGY FOR ESTIMATING RENEWABLE ENERGY SALES FROM RENEWABLE PORTFOLIO STANDARDS BEYOND WHAT IS CAPTURED IN ANNUAL ENERGY OUTLOOK 2013

The AEO2013 Reference Case incorporates RPS policies or substantively similar laws in place at the time of forecast development. In general, the AEO assumes that utilities will meet the RPS targets; however, where states have explicitly limited state funding for RPS implementation, AEO assumes utilities comply with RPS requirements only to the extent that state funding allows, as described in the AEO assumptions documents.

This analysis maintains consistency with these limiting assumptions. In this current version, the EPA included the RPS policies for only two states, Hawaii and Minnesota. The RPS-related energy production in Hawaii is considered incremental to the AEO forecast because the state is excluded from AEO2013 modeling.[54] Minnesota was added because its RPS target was changed[55] after the analysis underlying the AEO assumptions was performed. The expected increase of 1.5% for certain utility types after 2020 counts as incremental to AEO.

The EIA did not identify funding limitations for either state, and EPA assumed their full RPS targets would be achieved. Table 7 presents final RPS targets used in this analysis for the two states for which EPA identified updated RPS requirements.

Since the RPS targets for Hawaii were only available for 2015, 2020 and 2030, EPA estimated sales in intervening years by interpolation. Similarly, the Minnesota targets for 2016, 2020 and 2025 were used to interpolate expected sales levels for all years.

RPS requirements were frozen in percent terms for the years after the RPS policy period.

[54] "NEMS provides electricity market projections for the contiguous lower 48 states only." EIA (2013), Page 13.

[55] Law HF 279 was enacted on May 23, 2013. The 2020 target for Xcel Energy was increased from 30% to 31.5%. The target for Non-Xcel Public Utilities was increased from 20% to 21.5% in 2020 and from 25% to 26.5% in 2025. DSIRE (2013a)

Table 7: Renewable Portfolio Standard Assumptions Made in This Analysis

State	State RPS Generation (1,000 GWh)		
	2015	**2020**	**2030**
Hawaii[56]	1.39	2.16	3.43
Minnesota	0.00	0.64	0.65

[56] NEMS provides electricity market projections for the contiguous lower 48 states only, so impacts of Hawaii's RPS are not included in AEO2013.

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