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Uninterruptible Power Supplies Standard Evaluation

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Executive Summary

The Northwest Energy Efficiency Alliance (NEEA) contracted with Michaels Energy (the evaluation team) to conduct an independent evaluation to qualitatively assess NEEA and its partner organizations'[1] influence on the establishment of the federal standard for uninterruptible power supplies (UPS) and to quantitatively assess the savings from the standard influenced by the combined efforts of those same organizations. The U.S. Department of Energy (DOE) started the UPS test procedure and standard rulemaking in 2016 by issuing notices of proposed rulemakings for both. All proceedings for the test procedure concluded that same year, and the final rule of the test procedure was issued as a part of the test procedure for all battery charger technologies. The proceedings for the standard also concluded in 2016, but the federal government put the final ruling on hold until, by court ruling, it was published in the federal register in 2020. The compliance date was January 10, 2022.

As part of its Codes and Standards program, NEEA supported this standard's development and adoption. NEEA and its partners provided comments on the test procedure and standard that influenced DOE's analysis and, ultimately, the final rules for the standard and the test procedure.

To conduct its evaluation, Michaels Energy first reviewed the materials on the DOE's docket for the standard and test procedure. The evaluation team then interviewed stakeholders active in the rulemaking process, including manufacturers, manufacturers' associations, energy-efficiency organizations, utility industry associations, and utility consultants.

In our qualitative assessment, the evaluation team found that NEEA engaged in some of the activities in NEEA's Standards Initiative Logic Model (Figure 1), specifically collaborating with its partners to provide written comments. The most significant influence that NEEA and its partners had on the federal UPS standard was through an activity not in the current Logic Model: participating in the rulemaking process for the California state UPS standard. NEEA and its partners' participation in the California rulemaking led to the adoption of a state standard. NEEA and its partners then assisted in getting a UPS standard adopted in other states. The adoption of state standards for UPS led the DOE to initiate a rulemaking for UPS as there was no statutory requirement requiring it to regulate them. There was no requirement because UPS was a first-time standard and did not fall under the six-year review requirements. The DOE will typically start a rulemaking on a product class once one or several states have published standards to ensure that manufacturers will not be subject to multiple different standards.

In our quantitative assessment of the share of savings influenced by NEEA and its partners' activities, we assessed the activities conducted by NEEA and its partners, the effectiveness and outcomes of those activities, their ultimate influence on the standard and test procedure, and the role NEEA and its partners played. We assigned a percent significance to each barrier, a percentage effectiveness to each activity, and a percentage to the role NEEA played in each activity. We multiplied those percentages to calculate the share of savings for each activity.

[1] NEEA's partner organizations are energy-efficiency and advocacy organizations such as Appliance Standards Awareness Project (ASAP), Alliance to Save Energy (ASE), Natural Resources Defense Council (NRDC), Northeast Energy Efficiency Partnerships (NEEP) and the Northwest Power and Conservation Council (NWPCC).

Then, we summed the share of savings for each activity to estimate the total share of savings. We concluded that the activities NEEA and its partners participated in influenced **6.0%** of the total energy savings from the standard.

1 Introduction

This report presents the results of an evaluation of NEEA and its partners organizations'[2] influence on the most recent (2016) federal uninterruptible power supplies (UPS) standard and the share of savings influenced by their efforts. The evaluation team performed: 1) a qualitative assessment of NEEA and its partners' actions and their influence on the standard using NEEA's logic model for its Standards Initiative as a guide (Figure 1), and 2) a quantitative analysis of the proportion of savings that resulted from NEEA and its partners' influence.

Prior to this rulemaking, the U.S. Department of Energy (DOE) had attempted to regulate UPS via a broad 2011/2012 battery charger rulemaking that included external power supplies (EPSs), battery chargers, and UPS. Due to manufacturer pushback, the three classes of equipment were broken into separate rulemakings. The DOE first published the standard for EPSs followed by the standard for battery chargers. There was no statutory requirement requiring the DOE to regulate UPS products since it was a first-time standard and did not fall under the six-year-lookback review provision of the 1975 Energy Policy and Conservation Act (EPCA). The rulemaking for UPS began again in 2016 after California adopted its 2014 efficiency standard for UPS. Table 1 summarizes DOE's activities during this rulemaking process.

Table 1. Timeline of DOE's UPS Efficiency Standards Rulemaking Process

Date	Activity
May 2016	The DOE released a notice of proposed rulemaking (NOPR) for the battery charger and UPS test procedure and invited comments from stakeholders.
July 2016	The DOE closed the comment period for the test procedure.
August 2016	The DOE released the NOPR for the UPS standard and held a public meeting. Stakeholders submitted written comments along with supporting data and analyses and made verbal comments during the meeting.
October 2016	The DOE closed the comment period for the standard.
December 2016	The DOE issued its final rule for the test procedure.
January 2017	The final rule for the test procedure went into effect (was published in the federal register).
January 2020	In response to a lawsuit filed by NRDC and other organizations in November 2018, the Ninth Circuit Court of Appeals ruled in October 2019 that the DOE must publish the final rule for the UPS standard in the federal register. The final rule was published in January of 2020.
February 2020	Corrections to the final rule were effective.
March 2020	The standard's final rule was effective.
January 2022	Compliance with the final rule on the UPS standard was required.

[2] NEEA's partner organizations are energy-efficiency and advocacy organizations such as Appliance Standards Awareness Project (ASAP), Alliance to Save Energy (ASE), Natural Resources Defense Council (NRDC), Northeast Energy Efficiency Partnerships (NEEP) and the Northwest Power and Conservation Council (NWPCC).

As part of NEEA's Codes and Standards program, NEEA and its partners supported the development and adoption of the standard and test procedure, advocating for the most stringent, technologically feasible, and economically justified standard to maximize energy savings. They did this by submitting written comments during the rulemaking.

1.1 Purpose of the Study

The purpose of this study was to assess, both qualitatively and quantitatively, NEEA and its partners' influence on the federal UPS standard. The evaluation team investigated the challenges and barriers to the adoption of the federal UPS standard and the activities conducted by NEEA and its partners to push forward the most stringent, technologically feasible, and economically viable standard. Based on our investigation, the evaluation team provides two assessments:

1) A qualitative assessment of NEEA and its partners' influence on the standard using NEEA's Standards Logic Model (Figure 1) as a guide, and

2) A quantitative determination of the proportion of total energy savings that resulted from NEEA and its partners' influence.

1.2 Description of DOE Adoption Process

The DOE is the government agency that develops national appliance and equipment energy-efficiency standards. In general, the DOE standard rulemaking process occurs as follows:

- The DOE sends out a Request for Information for the upcoming rulemaking.
    - Stakeholders, including manufacturers, energy-efficiency organizations, utilities, end-users, industry organizations, and foreign government agencies, may make written comments and provide data.
- The DOE creates a Framework Document and makes it available.
    - Stakeholders may make written comments and provide data.
- The DOE may form an Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) working group which meets regularly throughout the rulemaking process.
- The DOE writes a Preliminary Technical Support Document (TSD) and makes that available.
    - Stakeholders may make written comments and provide data.
    - The DOE holds a public meeting.
- The DOE writes a Notice of Proposed Rulemaking (NOPR) and makes it available.
    - Stakeholders may make written comments and provide data.
    - The DOE holds a public meeting.
- If applicable, the DOE issues a Notice of Data Availability (NODA) and Supplementary Notice of Proposed Rulemaking (SNOPR).
    - Stakeholders may make written comments and provide data.
    - The DOE holds a public meeting.
- The DOE issues the final rule.

The test procedure is a separate rulemaking which follows a similar process.

During these processes, which take years to complete, stakeholders may give input via verbal or written comments to influence the adoption of the final standard. Stakeholders, which include manufacturers, energy-efficiency organizations, utilities, end-users, industry organizations, government agencies (domestic and foreign), and other organizations, may also provide data, engineering analyses, market analyses, cost information, anecdotal experiences or case studies, and design requirements to help influence the final standard and test procedure.

The federal standard rulemaking process for UPS was shortened compared to the typical process. It was shortened because UPS were originally a part of a broader battery charger rulemaking. Manufacturers convinced the DOE to separate the standards for UPS, battery chargers, and EPSs. By the time UPS were separated out, many of the first steps of the rulemaking process had occurred. This separation of equipment classes resulted in the process for UPS consisting of the following steps:

- The DOE published a NOPR, opening it up for comment.
    - Stakeholders made comments.
    - The DOE held a public meeting.
- The DOE issued the final rule.

The process for the UPS test procedure followed the same truncated steps as the UPS standard since it is a subsection of the general battery chargers test procedure.

2 Methodology

The sections below describe our methodology for evaluating NEEA and its partners' influence on the federal UPS standard. We begin by describing our data collection approach and its limitations and then describe the specific methodologies we used for the qualitative and quantitative assessments.

2.1 Data Collection Approach

The evaluation team started data collection with a document review. The team reviewed all documentation on the DOE docket for the equipment standard and the test procedure. This included the NOPR, final rule, written comments, unified agenda, transcripts of meetings, and supporting materials.

The team then built a list of potential interviewees based on stakeholders' participation in the rulemaking. The team created this list with the intention of gathering a variety of perspectives, including those of manufacturers, industry associations, utilities, and energy-efficiency organizations involved in the rulemaking. We prioritized interviews with organizations that we believed would be able to provide insight into the rulemaking process, the issues and challenges that arose during the process, who the main stakeholders were, and NEEA and its partners' influence. We conducted these interviews first and asked interviewees to recommend others we should consider interviewing.

The evaluation team created an interview guide to facilitate conversations with interviewees. The guide included questions about various barriers to the establishment of the standard that we found in our document review and asked whether the interviewee recalled any other barriers. After adding in additional barriers mentioned by the interviewee, we asked the interviewee to rank each barrier on a scale of 0 – 5, with 0 meaning not applicable and 5 meaning the barrier was extremely challenging to overcome. Then, we asked interviewees to comment on each specific activity that NEEA and its partners participated in. We also asked interviewees whether they knew of any other actions taken by NEEA and its partners that impacted the rulemaking. We asked interviewees what the outcomes of NEEA and its partners' activities were, what influence the activities and outcomes had on the final standard, and what role NEEA and its partners played in each activity they participated in.

The evaluation team completed interviews by February 9, 2022. Interviewees included one representative from NEEA, one manufacturer, one manufacturer industry organization, two energy-efficiency advocates, one utility industry organization, and one utility consultant. We conducted a total of seven interviews.

2.2 Limitations

Most of the rulemaking process occurred in 2016. The final rule was not published in the final register (which makes the rule official) until 2020 due to delays caused by the new Presidential administration. This resulted in two challenges. First, many potential interviewees had either moved

to a different company or retired, making it difficult to contact them for an interview. We contacted individuals who participated in the rulemaking.

Of the fifteen organizations that we reached out to, we were able to schedule a total of seven interviews, and eight either declined or were unresponsive. Our results may therefore be somewhat biased by who we were able to interview and the lack of perspectives from some of the standard's other stakeholders.

Additionally, the interviewees we were able to recruit had difficulty remembering the details of the rulemaking, what activities the different organizations partook in, and what the effects of those activities were. During the interviews we provided examples and prompts when interviewees needed help remembering the details of the rulemaking. This may have introduced bias into interviewees responses.

To help mitigate these issues in the future it would be beneficial to consider whether it is possible to conduct the evaluation sooner after the rulemaking is completed. It is likely that response rates and the quality and accuracy of interviewees' responses would be higher if the evaluation took place sooner.

2.3 Methodology to Assess NEEA and Partners' Influence

To determine NEEA and its partners' influence on the rulemaking process, the evaluation team used NEEA's Standards Initiative Logic Model, shown in Figure 1, as a reference. Starting at the Activities level and moving down to the Outcomes, we numbered each box in the logic model (Figure 1). These numbers correspond with the findings presented in Table 2, Section 3.1.

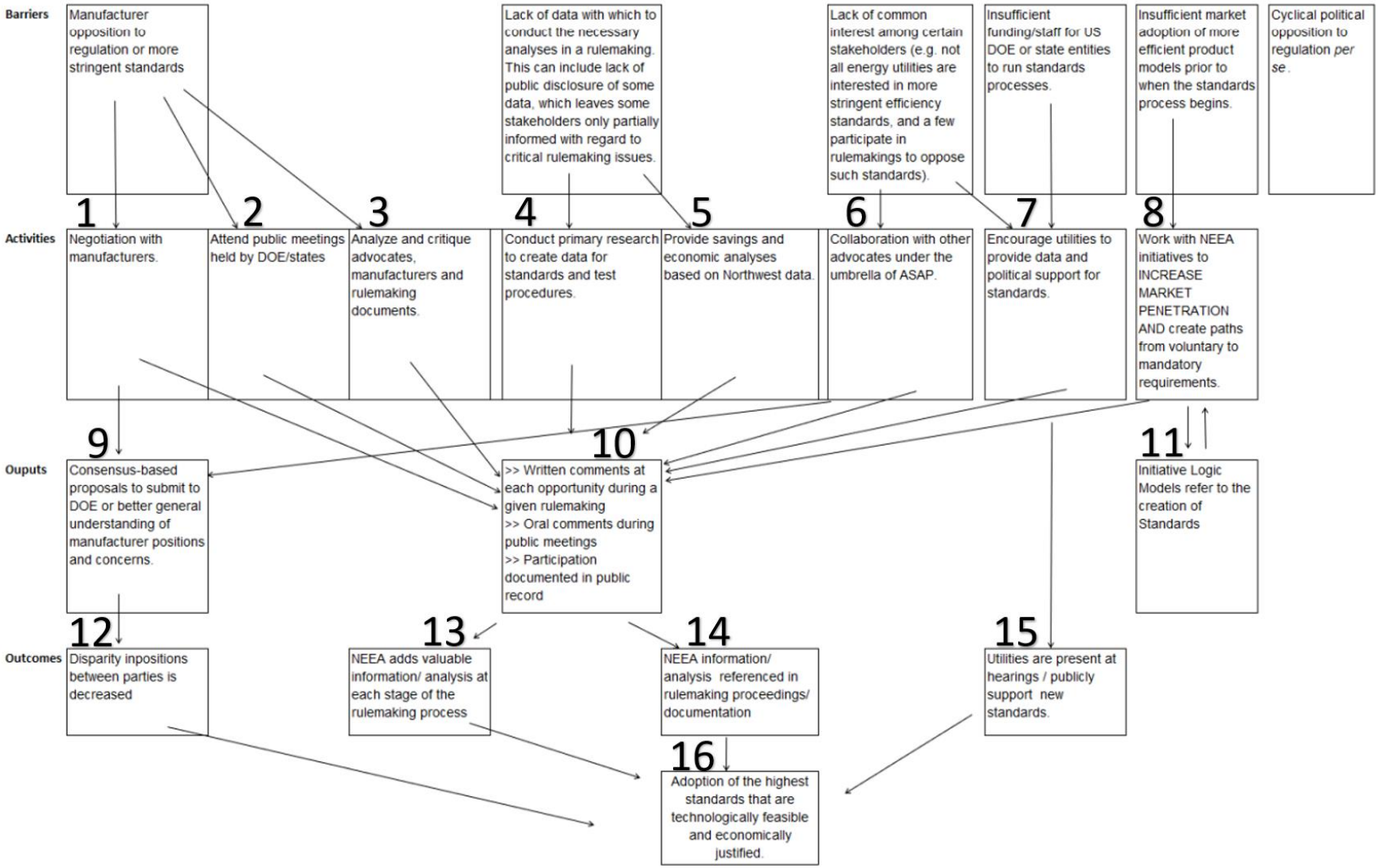

Figure 1. NEEA's Standards Initiative Logic Model

We determined whether NEEA and its partners participated in the activities and generated the outputs and outcomes shown in the logic model through our document review and interviews. Table 2 in Section 3.1 provides a narrative of the influence that we found NEEA and its partners had in each step in the logic model. The evaluation team rated NEEA and its partners' participation in an activity/creation of an output or outcome as a "Yes" if they had clearly been involved, provided comments, data, or analysis, or participated; a "No" if they clearly did not undertake the activity or generate the output or outcome; and a "Some" if they undertook some of the activity, undertook a related activity, or caused some of the desired output or outcome.

2.4 Methodology to Estimate Share of Energy Savings from NEEA and Partners' Efforts

To estimate the share of savings influenced by NEEA and its partners' activities, we followed a framework developed by NEEA and its stakeholders and used in past evaluations. We summarize the steps included in this framework below. We note that we completed some of the steps below in our data collection efforts.

2.4.1 NEEA Standards Evaluation Framework

1. **Identify all barriers** to the development and the adoption of the standard through the document review and the stakeholder interviews. Many of the barriers will align with NEEA's logic model for standards rulemaking, in Figure 1 above, but some may not.
2. **Estimate barrier significance** and assign a percent significance to each barrier, including the barriers not addressed by energy-efficiency organizations, which can be grouped together for simplicity. The sum of the percentages for all the barriers is 100%. The evaluator uses their professional judgment to determine the percentage for each barrier.
3. **Identify all activities** undertaken by the energy-efficiency organizations, their outcomes, and which barriers they were designed to address.
4. **Estimate each activity's significance** by assigning a percent to each activity. In past evaluations, the following assignments were used: high effectiveness = 60%, medium effectiveness = 40%, and low effectiveness = 20%. The evaluator uses their professional judgment to determine the percentages for each effectiveness level (i.e., high, medium, and low). The evaluator consistently uses the assigned percentages for each level, with exceptions made for activities that may have had a much larger or much smaller impact on overcoming the intended barrier. The evaluator provides a compelling rationale for deviating from the standard percentages.
5. **Estimate the effectiveness of each activity relative to all the other activities** by multiplying the significance of each barrier (2) by the significance of each of its associated activities (4). This calculation results in an estimate of the effectiveness of each activity relative to all efficiency organization activities to overcome all barriers.
6. **Quantify the role energy-efficiency organizations played** in each activity relative to all participants by applying a specified percentage to primary, major, or minor roles played. In past evaluations, the percentages were specified as follows: primary (led effort to support the DOE) = 50%, major (did not lead but contributed significantly) = 30%, and minor (did not contribute significantly) = 15%. The evaluator uses their professional judgment to determine the percentages for each role (i.e., primary, major, and minor). The evaluator

consistently uses the assigned percentages for each role with exceptions made when energy-efficiency organizations played a much greater or a much smaller role. The evaluator provides a compelling rationale for deviating from the standard percentages.

7. **Calculate the share of savings from efficiency organizations' activities** by first multiplying the results of the effectiveness of each activity (5) by the relative role of energy-efficiency organizations (6). This calculation estimates the savings, as a percentage of total savings from the standard, from each activity. Summing these percentages results in the total savings (as a percentage) that were influenced by NEEA and its partners' activities.

Table 3 in the Results section shows our calculations using this framework.

3 Results

3.1 NEEA and Partners' Influence Assessment Results

Table 2 presents NEEA and its partners' influence on the federal UPS standard and test procedure through the lens of NEEA's Standards Initiative Logic Model.

The most significant influence that NEEA and its partners had on the federal UPS standard was participating in the rulemaking process for the California state UPS standard. This activity addressed a barrier not currently in NEEA's Standards Initiative Logic Model (Figure 1): DOE Lacks Evidence that Standard Update or Creation is Necessary. The DOE had tried initially to regulate UPS via a broad battery charger rulemaking that included EPSs, battery chargers, and UPS. Due to manufacturer pushback, the three equipment classes were broken into separate rulemakings. The DOE first published the standard for EPSs, followed by the standard for battery chargers. There was no statutory requirement requiring the DOE to regulate UPS products since it was a first-time standard and did not fall under the six-year review requirements. The DOE tends to start a rulemaking on a product class once one or several states have published standards to ensure that manufacturers will not be subject to multiple different standards. In fact, manufacturers often petition the DOE to intervene. In addition, once a standard has been adopted in a large state, such as California, manufacturers have much less evidence that they cannot meet a standard since they have already had to do so for a portion of the country. NEEA and its partners were highly involved in the California standard and helped get the standard adopted in some other states.

NEEA and its partners proposed trial standard level (TSL[3]) 3 in a written comment, but they were not successful in influencing the stringency of the standard. The DOE originally proposed adopting TSL 2, which was supported by some manufacturers. However, the DOE updated its analysis between the NOPR and the Final Rule to 1) account for the differences between DOE's test procedure and the ENERGY STAR test procedure[4] 2) adjust its equations for the standard to account for the fact that DOE's best-fit curves for voltage independent (VI) UPS overshoot at certain data points, resulting in equations for the standard that were marginally more stringent than intended by as much as one-tenth of a percent[5], and 3) update its national energy savings analysis to use the Energy Information Administration's Annual Energy Outlook data from 2016 instead of 2015[6]. In its Final Rule, the DOE states that, "In selecting a given standard, DOE must choose the level that achieves the maximum energy savings that is determined to be

[3] Higher trial standard levels (TSLs) correlate with higher efficiencies.
[4] Energy Conservation Program: Energy Conservation Standards for Uninterruptible Power Supplies; (Final Rule January 10, 2020) § https://www.regulations.gov/document/EERE-2016-BT-STD-0022-0035
[5] Documentation of Changes between the draft Final Rule submitted to the Office of Information and Regulatory Affairs (A=OIRA) and the issues; (Final Rule January 2, 2017) §https://www.regulations.gov/document/EERE-2016-BT-STD-0022-0028
[6] Compare: Energy Conservation Program: Energy Conservation Standards for Uninterruptible Power Supplies; (Notice of proposed rulemaking (NOPR) August 5, 2016) and (announcement of public meeting) § https://www.regulations.gov/document/EERE-2016-BT-STD-0022-0007 and 2017-01-02 Documentation of Changes between the draft Final Rule submitted to the Office of Information and Regulatory Affairs (A=OIRA) and the issues (Final Rule) § https://www.regulations.gov/document/EERE-2016-BT-STD-0022-0028

technologically feasible and economically justified. In making such a determination, DOE found that TSL 2 is no longer economically justified as a result of the above changes." As a result, the DOE adopted TSL 1.

It is also noteworthy that NEEA and its partners "set the stage" for future rulemakings on two significant issues. NEEA and its partners wrote a comment strongly recommending "that DOE revise the load points used in the output metric to be more representative of typical load points." While the DOE did not adopt the load points recommended by NEEA and its partners, it did state that it would "monitor the UPS market and may consider other loading points and weightings in future rulemakings." NEEA and its partners also provided comments recommending DOE use a test load representative of typical UPS applications. While the DOE did not change the reference test load, it stated that it would "continue to monitor the UPS market and may consider adopting other reference test loads in future rulemakings."

Table 2. Qualitative Analysis of NEEA and its Partners' Influence by NEEA Standard Logic Model Element

Box #	Element	Description	Did NEEA and its partners have influence?	Findings
1	Activity	Negotiation with manufacturers	No	Based on our document review and interviews, no negotiations with manufacturers occurred.
2	Activity	Attend public meetings held by DOE	Yes	Per the public meeting transcript, representatives of ASAP and NRDC were present at the meeting on the standard. The NRDC representative attended the meeting on the test procedure. NEEA did not attend.
3	Activity	Analyze and critique advocates, manufacturers, and rulemaking documents	Yes	NEEA and its partners provided comments on both the standard and the test procedure. ASAP led these efforts, and NEEA was more peripherally involved but contributed to and signed on to the joint comments.
4	Activity	Conduct primary research to create data for standards and test procedures	No	Interviewees stated that the California IOUs conducted primary research for the California state standard, and none, outside of the DOE's own limited laboratory research, was conducted for the federal standard. Additional primary research would have been helpful as a lack of data on equipment lifetime, product turnover, charging behaviors, market size, and equipment performance were all barriers to the standard development process.
5	Activity	Provide savings and economic analyses based on Northwest* data	Some	NRDC, NEEA, and ASAP provided a comment on the test procedure that included data from the ENERGY STAR® 2014 Unit Shipment and Market Penetration Report demonstrating the need for the DOE to use a test load representative of typical UPS applications.
6	Activity	Collaboration with other advocates under the umbrella of ASAP	Yes	ASAP led the advocates' (NEEA and its partners) efforts on this standard. They provided written comments on the UPS standard and test procedure after meeting to discuss any differences of opinion and how each organization could contribute.
7	Activity	Encourage utilities to provide data and political support for standards	No	The California IOUs were involved in this standard. They attended the public meeting and provided written comments. However, they participated on behalf of their codes and standards programs and without outside encouragement from

				NEEA and its partners or other stakeholders. No other utilities participated in the federal standard rulemaking.
8	Activity	Work with NEEA initiatives to increase market penetration and create paths from voluntary to mandatory requirements	N/A	There is no NEEA initiative for UPS.
9	Output	Consensus-based proposals to submit to DOE or better general understanding of manufacturer positions and concerns	Some	Manufacturers and their representatives submitted their own comments, as did NEEA and its partners. There were no consensus-based proposals wherein NEEA and its partners agreed with manufacturers. However, NEEA and its partners did provide the DOE with comments that showed consensus amongst energy-efficiency advocates.
10	Output	Written comments at each opportunity during a rulemaking Oral comments during public meetings Participation documented in the public record	Yes	Unlike other federal standards rulemaking processes, the UPS standard had a single opportunity for stakeholders to make comments, as did the rulemaking for the test procedure. NEEA and its partners submitted comments on the standard signed by ASAP, Alliance to Save Energy, NEEA, NRDC, NEEP, and Tom Eckman the Northwest Power and Conservation Council), wherein they recommended TSL 3 instead of a lower standard level. NEEA and its partners also commented on the test procedure, recommending criteria for differentiating residential UPS from commercial UPS and suggesting that the DOE revise the procedure's test points and use a test load that is more representative of typical applications. ASAP spoke in the public meeting for the standard about the decline of desktop computers and UPS being used for a broad array of other products. ASAP and NRDC urged the DOE to consider TSL 3 instead of TSL 2 in the public meeting for the standard. NRDC spoke in the test procedure public meeting questioning DOE's selection of the load points used in the test procedure. The DOE ultimately used TSL 1. All these activities were documented in the public record.

11	Output	Initiative logic models refer to the creation of standards	N/A	There is no NEEA initiative for UPS.
12	Outcome	Disparity in positions between parties is decreased	Some	Interview respondents reported that NEEA and its partners successfully resolve any disparities in positions in ASAP-convened meetings. NEEA and its partners did not engage in any discussions with manufacturers, so no disparities in positions were decreased with manufacturers outside of the formal comment process.
13	Outcome	NEEA** adds valuable information/analysis at each stage of the rulemaking process	Some	Unlike other federal standards rulemaking processes, the UPS standard had a single opportunity for stakeholders to make comments and a single public meeting, as did the rulemaking for the test procedure. NEEA and its partners provided information or comments at each phase. The DOE did not use the information provided by NEEA and its partners in its final rule. However, the DOE stated that it "may consider adopting other reference test loads in future rulemakings" and "may consider other loading points and weightings in future rulemakings," which were items that NEEA and its partners provided comments and data on.
14	Outcome	NEEA** information/analysis referenced in rulemaking proceedings/documentation	Yes	The DOE references information provided by NEEA and its partners in the final rules for this standard and test procedure. Specifically, the DOE references their analysis of the energy that would be saved by adopting TSL 3 and their observation that the use of UPS is growing beyond desktops in the final rule on the standard. In the final rule on the test procedure, the DOE references NEEA and its partners' provision of data from ENERGY STAR, demonstrating the need for the DOE to use a test load representative of typical UPS applications and their argument that the proposed loading points were not representative of desktops. While the DOE referenced this information, it did not adopt the TSL proposed by NEEA and its partners, nor did it change the test load to be more representative of typical UPS applications.
15	Outcome	Utilities are present at hearings/publicly support new standards	No	The California IOUs were involved in this standard (attending meetings and writing comments) on behalf of their own codes and standards programs. The California IOUs had a consultant representative present at the public meeting on the standard,

				participated in the meeting on the test procedure, and wrote a joint comment. No other utilities participated in this standard rulemaking.
16	Outcome	Adoption of the highest standards that are technologically feasible and economically justified	No	NEEA and its partners proposed TSL 3. The DOE originally proposed TSL 2, which was supported by some manufactures. However, the DOE selected TSL 1 in its Final Rule. The DOE updated its analysis between the NOPR and the Final Rule to 1) "account for the differences between DOE's test procedure and the ENERGY STAR test procedure" 2) adjust its equations for the standard to account for the fact that DOE's best-fit curves for VI UPS overshoot at certain data points resulting in equations for the standard that were marginally more stringent than intended by as much as one-tenth of a percent, and 3) update its national energy savings analysis to use the Energy Information Administration's Annual Energy Outlook data from 2016 instead of 2015. The DOE stated in the Final Rule that the further analyses concluded that TSL 2 was no longer economically justified.
Bonus	Activity	Engage in rulemakings at state and regional levels	Yes	NEEA and its partners participated in the rulemaking process for the California state UPS standard. The DOE had tried initially to regulate UPS via a broad battery charger rulemaking that included EPS, battery chargers, and UPS. The DOE completed the EPS and battery charger standards but had not started a rulemaking for UPS when California started their rulemaking. After California published its standard and other states followed, the DOE elected to commence a rulemaking for UPS.

*For this evaluation, we considered the provision of any regional data or studies as NEEA and its partners influencing this activity. We did this because NEEA acts in conjunction with its partners, who are not all from the Northwest. We recommend reconsidering the wording of this activity in the next revision of the logic model.
** For this evaluation, we consider NEEA to be NEEA and its partners. We recommend reconsidering the wording of this activity in the next revision of the logic model.

3.2 Share of Energy Savings from NEEA and Partners' Efforts

The following section presents the share of savings influenced by NEEA and its partners' activities during the most recent federal UPS standard rulemaking process. It describes the evaluation team's rationale and findings that support our quantitative assessment of the significance of the challenges this standard faced, the effectiveness of the activities NEEA and its partners participated in, and NEEA and its partners' role in each activity. **The evaluation team estimates that the total share of savings influenced by NEEA and its partners' activities is 6.0%.** We provide more detail on how we quantified the significance of each barrier, the effectiveness of each activity and NEEA and its partners' role in Table 3 below.

Table 3. Estimated Share of Savings

	a			b			c	d		e
Barrier	Relative significance for energy savings	Significance of barrier (%)	Significance of activity relative to the barrier (%)	Activity	Effectiveness of activity in addressing barrier	Effectiveness of activity in addressing barrier (%)	Effectiveness of activity relative to ALL barriers: a x b (%)	NEEA and its partners' role	NEEA and its partners' relative role in activity (%)	Relative savings influenced by the activity: c x d (%)
Manufacturer Opposition	High	35%	15%	Recommended adopting the highest (TSL 3) tier instead of the middle tier (TSL 2)	Not Effective	0%	0%	Primary	50%	0.00%
			9%	Recommended that DOE revise the load points used in the output metric to be more representative of typical load points	Not Effective	0%	0%	Major	30%	0.00%
			11%	Recommended DOE use a test load representative of typical UPS applications	Not Effective	0%	0%	Major	30%	0.00%
Lack of Data	Medium	15%	15%	Provided data to show that the power factor some desktop computers without power factor correcting functionality can be low and urged DOE to evaluate the potential differences in UPS efficiency	Not Effective	0%	0%	Major	30%	0.00%
Lack of common interest among stakeholders	Low	5%	5%	Collaborated with partners under ASAP to write comments	High	60%	3%	Primary	50%	1.50%
Insufficient funding/staff for DOE	Low	5%	5%							
Insufficient market adoption of more efficient options	Low	10%	10%							
Cyclical political opposition	Medium	15%	15%							
DOE lacks evidence that standard update or creation is necessary	Medium	15%	15%	Engaged in standards rulemakings at the state and regional level	High	60%	9%	Primary	50%	4.50%
									Total Savings %	6.00%

3.2.1 Rationale for Weighting Significance of Barriers

Based on the information gathered in the interviews and interviewees' rankings of the barriers from NEEA's logic model plus the additional barrier, DOE Lacks Evidence that Standard Update or Creation is Necessary, the evaluation team assigned a percentage to represent the significance of all the barriers. The team estimated barrier significance by assigning a percent significance to each barrier, including the barriers not addressed by NEEA and its partners. The sum of the percentages for all barriers is 100%. Below we explain our rationale for the significance of each barrier.

3.2.1.1 Barrier 1: Manufacturer Opposition

Significance: High (35%)

Rationale and Findings:

- Manufacturer opposition was consistently rated as the biggest issue by energy-efficiency organizations, utilities, manufacturers, and industry associations interviewed by the evaluation team.
- Manufacturers expressed concern about product turnover/lifecycle. Manufacturers commented that the DOE's lifecycle cost and payback period analysis overestimated the market's willingness to absorb costs and made manufacturers less willing to invest in a declining or changing market. In other words, the electronics market is very fast moving, and consumers expect new products and products with new features on a very fast timeframe. Manufacturers may not have time to recoup costs if the market changes significantly and they have invested in making their existing products more efficient only to have to redesign them for new consumer demands.
- Manufacturers expressed concern that the standard would decrease customer options, increase costs, and result in a loss of features.
- Manufacturers expressed concern that a TSL 2 standard would be too stringent.
- Manufacturers and foreign government officials expressed concern that importation of UPS from China would be adversely affected if the standard was too stringent.
- Manufacturers and their representatives expressed concern that regulation would have a negative impact on jobs.
- Manufacturers and their representatives expressed concern that the DOE's models underestimated overhead costs for manufacturers.
- Manufacturers had a general anti-regulatory stance, which included the following:
    - Manufacturers, foreign government officials, and their representatives wanted the DOE to use "consensus" test procedures and their related scope of products (the International Electrotechnical Commission's test procedures and related product scopes) to ensure there was "international harmonization."
    - Manufacturers of related products thought the scope of standard was too broad. Specifically, one manufacturer was concerned that the scope would include UPS for emergency lighting.
    - Energy-efficiency advocates and manufacturer representatives disagreed on the classification of products.

- Manufacturer representatives expressed concern that the standard would lead to commoditization and a lack of competitive edge for manufacturers as ancillary features might be eliminated.
    - Manufacturers' perception was that the ENERGY STAR program is preferable to a standard since it is voluntary and can give manufacturers a competitive edge without mandates.
- Manufacturers expressed concern that the DOE was "picking the winners" instead of the market picking the winners.

3.2.1.2 Barrier 2: Lack of Data

Significance: Medium (15%)

Rationale and Findings:

- There was a lack of data about lifetime and product turnover.
- There was a lack of data about the charging and discharging power profiles of this technology in the different classes of UPS.
- There was a lack of data about the size of the market and market in general.
- There was a lack of performance data on the wide variety of UPS available on the market, including different designs, sizes, and ancillary functionality.

3.2.1.3 Barrier 3: Lack of Common Interest Among Stakeholders

Significance: Low (5%)

Rationale and Findings:

- In general, NEEA and its partners had few disagreements in their positions on this rulemaking.
- Small differences of opinion between NEEA and its partners as well as other efficiency advocates were resolved during ASAP-convened technical advisory group (TAG) meetings.
- Joint comments were filed demonstrating cohesion across stakeholders.

3.2.1.4 Barrier 4: Insufficient Staffing and Funding by the DOE

Significance: Low (5%)

Rationale and Findings:

- During the interviews, one manufacturer association stated that they thought the DOE was well funded, while another was not sure there was enough funding for everything that the DOE was doing at the time.
- A consultant who worked with the California IOUs on their standard stated that the DOE "did no testing or work on their own. They relied on old data that [the interviewee] had collected from 2005. They rely on manufacturers and stakeholders to provide data."
- Another association representative noted that the DOE was "cranking on the ECS [energy conservation standard] rules" during that period, so they did not seem to lack staff or funding overall but may not have had enough for each individual rulemaking.

- In general, while there may be disagreement across interviewees regarding whether the DOE was spending their funds and using their staff optimally, the comments received during the interviews and the interviewees' ranking of this barrier demonstrated significant lack of funding or staffing was not a barrier for this standard.

3.2.1.5 Barrier 5: Insufficient Market Adoption of More Efficient Options

Significance: Low (10%)
Rationale and Findings:

- One interviewee noted that there was a big price differential between efficient and less-efficient products, with each having a different market. This fact resulted in stakeholder (mainly manufacturer) concerns that there was not enough adoption in the less-efficient market, which is inherently different. According to the interviewee, "the challenge was in proving that efficient options had high availability and were not inherently more expensive to make."
- Manufacturers and industry associations rated insufficient market adoption of more efficient equipment as a significant barrier but did not provide data either to the evaluation team or to the DOE proving the validity of this concern. The efficiency advocates the evaluation team interviewed believed that manufacturers overstated this concern.
- One manufacturer commented that the initial energy-efficiency requirements proposed by DOE were excessive, stating that the proposed standard represented "best available" levels (i.e., the most efficient models currently available on the market). They said that "at least 30% of ENERGY STAR voltage and frequency dependent (VFD), 82% of ENERGY STAR voltage independent (VI), and 26% of ENERGY STAR voltage and frequency independent (VFI) UPS will be excluded from the market if the proposed requirements are in the Final Rule." Their argument was that the proposed standard would be more stringent than the ENERGY STAR requirements thereby excluding those products from the market because they would have efficiencies below the standard's requirements. However, an energy-efficiency advocate we interviewed noted that ENERGY STAR specifications are not always terribly aggressive.

3.2.1.6 Barrier 6: Cyclical Political Opposition

Significance: Medium (15%)

Rationale and Findings:

- While there was no political opposition to the development of the standard or its stringency, after the development of the new UPS efficiency standards, President Obama left office, and President Trump took office. The change in Presidential Administration resulted in a three-year delay until a court required publication in January 2020, resulting in a compliance date of January 10, 2022.

3.2.1.7 Barrier 7: DOE Lacks Evidence that Standard Update or Creation is Necessary

Significance: Medium (15%)

Rationale and Findings:

- The DOE had no statutory requirement to regulate UPS as this was the first rulemaking to address this technology specifically.
- According to interviewees, DOE typically addresses a technology once one or more states has made a standard to avoid having different standards for each state. In fact, manufacturers will often advocate for the DOE to intervene, so they do not have to comply with many different standards.

3.2.2 Weighting the Significance of Activities Relative to Each Barrier

Before analyzing the effectiveness of each activity, we determined the significance of each activity relative to its corresponding barrier. When there was only one barrier, the significance of the activity to the barrier was equal to the significance of the barrier. When there was more than one activity that addressed the same barrier, we used information collected through our document review and interviews to determine whether any manufacturers supported the action, how much manufacturers may have opposed the action, and how significant the activity was as measured by how often it was discussed and commented on to determine the relative significance of each activity. We used that information, along with our professional judgement, to assign a percentage to the significance of each activity relative to its barrier. The sum of the percentages for each activity equals the percent significance of the barrier.

3.2.3 Rationale for Weighting Effectiveness of Activities and Rating the Role of NEEA and its Partners in Each Activity

Using information gathered from the interviews and the document review, the evaluation team determined what activities NEEA and its partners undertook to overcome the identified barriers. We then assessed the effectiveness of each activity in overcoming the barrier by reviewing the information gathered in our interviews and re-reviewing documents to see if the action resulted in the desired outcome in the final rule. We gave each activity an effectiveness of high, medium low, or not effective. Highly effective activities achieved the desired outcomes. Activities with medium effectiveness achieved some of the desired outcomes, but not all. Activities with low effectiveness achieved very little of the desired outcomes or achieved outcomes with little impact on energy savings. Not effective activities didn't achieve any of the desired outcomes during this rulemaking. For example, NEEA and its partners recommended the DOE adopt the highest tier standard (TSL 3) instead of DOE's proposal to adopt the middle tier (TSL 2). After further analysis, the DOE concluded that even TSL 2 was not economically justified and adopted TSL 1. This activity was not effective in achieving its desired outcome (influencing the DOE to adopt the highest tier or, at a minimum, a tier between the highest tier and the lowest tier). Activities with high effectiveness were given an effectiveness rating of 60%. Activities with medium effectiveness were given an effectiveness rating of 40%. Activities with low effectiveness were given an effectiveness rating of 20%. Not effective activities were given an effectiveness rating of 0%. These ratings are described in Table 4 below.

Table 4. Activity Effectiveness Designations

Activity Effectiveness	Percent Assigned	Description
High	60%	Achieved desired outcome.
Medium	40%	Achieved some of the desired outcome, but not all.
Low	20%	Achieved very little of the desired outcome or achieved outcomes with little impact on energy savings.
Not effective	0%	Did not achieve any of the desired outcome during this rulemaking.

The evaluation team also rated the role of NEEA and its partner organizations in each activity as primary, major, or minor. We used information gathered from the interviews and document review to make these assessments. A primary role means that NEEA and its partners either led the effort themselves or led an effort to support the DOE. A major role means that NEEA and its partners did not lead but contributed significantly to an activity. A minor role means that NEEA and its partners contributed, but not significantly to an activity. Based on precedent set in previous standards evaluations, the evaluation team assigned a percentage weight to each role rating that represents NEEA and its partners' relative role in an activity compared to other stakeholders. As in past evaluations, the evaluation team assigned 50% to a role rating of primary, 30% to a role rating of major and 15% to a role rating of minor. Below we explain the rationale behind our ratings. Table 5 shows these role designations and their corresponding percentages.

Table 5. Role of NEEA and its Partners Designations

Role of NEEA and its Partners	Percent Assigned	Description
Primary	50%	NEEA and its partners either led the effort themselves or led an effort to support the DOE.
Major	30%	NEEA and its partners did not lead but contributed significantly to an activity.
Minor	15%	NEEA and its partners contributed, but not significantly to an activity.

Below we explain the rationale behind our ratings.

3.2.3.1 Barrier 1: Manufacturer Opposition

Activity 1-1: Recommending Adoption of Highest Trial Standard Level (TSL) Tier

Activity: NEEA and its partners provided written comments recommending the adoption of the highest (TSL 3) tier instead of the middle tier (TSL 2). From the final rule:

"ASAP et al. recommended that DOE adopt TSL 3 instead of TSL 2 in order to increase energy savings. They noted that TSL 3 would increase FFC energy savings by 6.8 percent and CO_2 savings by 6.4 percent. ASAP et al. believe that DOE's proposal of TSL 2 over TSL 3 is influenced by overly conservative assumptions in its analysis. (ASAP et al., No. 0020 at pp. 1-2)"

Effectiveness: **Not effective**. The DOE elected to publish the standard with the lowest TSL level (TSL 1) even though NEEA and its partners pushed for TSL 3, and the manufacturers and their representatives pushed for TSL 2.

From the Final Rule: "With regard to TSL 3, DOE notes that the NOPR analysis showed a negative net present value using a 7 percent discount rate for VFD UPS at TSL 3, and marginally negative average life-cycle cost (LCC) savings for VFD UPS at TSL 3. For this reason, DOE determined in the NOPR that TSL 3 was not economically justified."

Role of NEEA and its Partners: **Primary**. NEEA and its partners led this effort. Interviewees explained that NEEA and its partners' role in standards work is to push for the highest standard, knowing that getting the next one down from what they ask for may still be a win. The DOE must also take input from manufacturers, and interview respondents shared that they believe that it is NEEA and its partners' role is to push back against the manufacturers when they advocate for lower TSLs.

Savings from Activity: **0.0%**

Activity 1-2: Comments on Revising Load Points

Activity: NEEA and its partners wrote a comment strongly recommending "that DOE revise the load points used in the output metric to be more representative of typical load points[7]." From the Final Rule on the test procedure:

"NRDC et al. argued that the proposed loading points are not representative of desktop computers attached to UPS and that DOE should instead adopt 0%, 5%, 10%, 25%, and 50% as loading points for VFD UPS with 0.1, 0.3, 0.3, 0.15, 0.15-time weightings for their loading points, respectively. Further, NRDC et al. requested DOE to analyze and revise loading points and associated time weightings for VI and VFI UPS as well. (NRDC, et al., No. 0006, EERE-2016-BT-TP-0018, pp. 3-6)"

Effectiveness: **Not effective**. From the Final Rule on the test procedure:

"DOE's output metric, loading points, and weightings are adopted from ENERGY STAR UPS V. 1.0, which is extensively supported and adhered to by the UPS industry. Further, the IEC 62040-3 Ed. 2.0 standard also uses the same loading points. DOE is refraining from adopting any loading points or weightings that differ from those in ENERGY STAR UPS V. 1.0 and IEC 62040-3 Ed. 2.0 as DOE has no data from which to conclude that it would be

[7] Load points are the percent of full load where technology can be tested. In this case, the DOE proposed testing UPS at 25%, 50%, 75% and 100% load.

necessary to do so. Therefore, DOE is adopting the proposed output metric, loading points, and weightings in this Final Rule. DOE will continue to monitor the UPS market and may consider other loading points and weightings in future rulemakings."

The DOE's test procedure requires manufacturers to determine UPS efficiency at four reference loading points: 25%, 50%, 75%, and 100%.

Role of NEEA and its Partners: **Major**. While some of the energy-efficiency advocates we interviewed said that NEEA and its partners led this effort, some manufacturers said that NEEA and its partners contributed some but did not lead this effort as this is an issue the manufacturers were also involved in. Therefore, we determined that NEEA and its partners were major contributors but did not lead the effort.

Savings from Activity: **0.0%**

Activity 1-3: Comments on Test Load Representative of Typical Applications

Activity: NEEA and its partners provided comments recommending DOE use a test load representative of typical UPS applications. From the final rule of the test procedure:

> *"NRDC et al. argued that a resistive reference test load (power factor greater than or equal to 0.99) may not be representative of common UPS applications such as desktop computers. NRDC et al. provided data to show that the power factor of a non-ENERGY STAR desktop computer without power factor correcting functionality can be quite low and urged DOE to evaluate the potential differences in UPS efficiency when serving loads with different power factors, including non-linear loads that are more representative of computers and other typical UPS applications. If the difference in measured efficiency between different load types is significant, NRDC et al. requested that DOE specify a reference test load that is more representative of common applications, particularly for VFD UPS, which commonly serve loads with low power factors. (NRDC, et al., No. 0006, EERE-2016-BT-TP-0018, p. 2-3)"*

Effectiveness: **Not effective.** As stated in the final rule for the test procedure:

> *"DOE is refraining from adopting a reference test load with a power factor that differs from that of ENERGY STAR UPS V. 1.0 or the IEC 62040-3 Ed. 2.0 because DOE does not have enough market information to assess the impact of such a divergence from ENERGY STAR UPS V. 1.0 and IEC 62040-3 Ed. 2.0. Therefore, DOE is adopting the proposed reference test load in this Final Rule. DOE will continue to monitor the UPS market and may consider adopting other reference test loads in future rulemakings."*

Role of NEEA and its Partners: **Major**. Interviewees told us that the California IOUs generally led this effort, but NEEA and NRDC helped.

Savings from Activity: **0.0%**

3.2.3.2 Barrier 2: Lack of Data

Activity 2-1: Providing Data Demonstrating the Need for a More Representative Test Load

Activity: In their efforts to urge the DOE to adopt a reference load that was more representative of typical UPS applications, NEEA and its partners "provided data to show that the power factor of a non-ENERGY STAR desktop computer without power factor correcting functionality can be quite low."

Effectiveness: **Not effective**. The DOE ultimately adopted a test load that aligns with the ENERGY STAR specification stating that it

> *"is refraining from adopting a reference test load with a power factor that differs from that of ENERGY STAR UPS V. 1.0 or the IEC 62040-3 Ed. 2.0 because DOE does not have enough market information to assess the impact of such a divergence from ENERGY STAR UPS V. 1.0 and IEC 62040-3 Ed. 2.0. Therefore, DOE is adopting the proposed reference test load in this Final Rule. DOE will continue to monitor the UPS market and may consider adopting other reference test loads in future rulemakings."*

Role of NEEA and its Partners: **Major.** One interviewee stated that no one had collected much data on these products. In the final rule, only NEEA and its partners are referenced as arguing for a more representative test load and were the only ones that provided data to support this argument.

Savings from Activity: **0.0%**

3.2.3.3 Barrier 3: Lack of Common Interest Among Stakeholders

Activity 3-1: Collaborating with Other Advocates Under ASAP

Activity: NEEA and its partners collaborated via ASAP-convened TAG meetings to gather information, discuss their positions, and write joint comments.

Effectiveness: **High**. NEEA and its partners effectively presented a unified position during the rulemaking.

Role of NEEA and its Partners: **Primary.** NEEA and its partners led the charge in collaborating with ASAP. They also included the California IOUs in their discussions.

Savings from Activity: **1.5%**

3.2.3.4 Barrier 4: DOE Lacks Evidence that Standard Update or Creation is Necessary

Activity 4-1: Participating in Regional UPS Standards Rulemaking Processes

Activity: NEEA and its partners engaged in UPS standards rulemakings at the state and regional level. California created a state standard before the DOE decided to make a federal standard. Vermont, Colorado, and Washington adopted state standards in 2018 and 2019. NEEA and its partners were highly involved in the California standard and helped get the standard adopted in some of the other states.

Effectiveness: **High.** The DOE had originally tried to regulate UPS via a broad battery charger rulemaking that included EPSs, battery chargers, and UPS. Due to manufacturer pushback, the three classes of equipment were broken into separate rulemakings. The DOE first published the standard for EPSs followed by the standard for battery chargers. There was no statutory requirement requiring the DOE to regulate UPS products since it was a first-time standard and did not fall under the 6-year review requirements. The DOE tends to start a rulemaking on a product class once one or several states have published standards to ensure that manufacturers will not be subject to multiple different standards. In fact, manufacturers often petition the DOE to intervene. In addition, once a standard has been adopted in a large state, such as California, manufacturers have much less evidence that they cannot meet a standard since they have already had to do so for a portion of the country.

Role of NEEA and its Partners: **Primary.** Interviewees specifically mentioned NEEA and its partners as being instrumental in helping to get the California standard adopted and getting a similar standard adopted in Washington. California's standard faced significant opposition. NEEA and its partners' advocacy and comments during the California rulemaking were critical as they provided another perspective besides that of the California IOUs (who stood to gain savings from the passage of the standard). NEEA and its partners submitted different comments and did engineering work lending credibility to the work of the California IOUs. NEEA was present at every meeting regarding the California standard. NEEA was also critical to helping to get a UPS standard adopted in Washington after the California standard was adopted.

Savings from Activity: **4.5%**

The total share of savings from NEEA and its partners' activities is 6.0%.

4 Savings Duration

Currently, NEEA assumes the savings from its work on a standard have a duration of ten years. This duration of savings assumes that the market would have independently arrived at the same efficiency specified in the standard ten years after the standards' compliance date. In 2019 an analysis was conducted for NEEA that did not find any compelling evidence that supports the use of a different savings duration. In our research we did not find evidence to suggest that a different duration of savings should be used for UPS. We believe that ten years is a reasonable duration for the savings from this standard.

5 Future Energy Savings

5.1 Future Energy Savings

The evaluation team found that NEEA and its partners conducted some activities that "set the stage" for increased savings in future rulemakings. Indeed, this was a strategy mentioned by one of our interviewees. The following activities may result in future energy savings:

- NEEA and its partners wrote a comment strongly recommending "that DOE revise the load points used in the output metric to be more representative of typical load points." While the DOE did not adopt the load points recommended by NEEA and its partners, it did state that it would "monitor the UPS market and may consider other loading points and weightings in future rulemakings."
- NEEA and its partners provided comments recommending DOE use a test load representative of typical UPS applications. While the DOE did not change the reference test load, it stated that it would "continue to monitor the UPS market and may consider adopting other reference test loads in future rulemakings."

The evaluation team recommends that NEEA evaluate this standard again in the future to capture savings that may occur later due to activities that occurred during this rulemaking. Specifically, we recommend NEEA evaluate this standard again when a new standard or test procedure is published in the federal register (making it final) for UPS to see if any of NEEA and its partners' recommendations are adopted in the next rulemaking. We note that a rulemaking for a new test procedure for UPS is underway as of the writing of this report.

6 Conclusion and Recommendations

6.1 Conclusion

Based on the information collected and the evaluation team's analysis, NEEA and its partner organizations' influence on the federal UPS standard primarily came from their participation in the creation of the California standard for UPS. Cumulatively, we estimate that NEEA and its partners' activities, which included taking part in public meetings and writing comments to influence the final standard and test procedure, influenced **6.0%** of the total savings from the federal UPS standard. NEEA and its partners also conducted some activities that "set the stage" for increased savings in future rulemakings but did not lead to savings this time around.

6.2 Recommendations

The evaluation team has several recommendations for NEEA to consider including:

- Conduct the evaluation as soon as possible after the final rule is issued to ensure the evaluation team can conduct interviews with participants in the rulemaking (they will be less likely to have changed jobs, retired, etc.) and to ensure interviewees remember the details of the rulemaking.
- Consider increasing coalition building efforts/negotiations with electronics manufacturers to get them and energy-efficiency advocates in agreement on some items and to see if they could share data with either the energy-efficiency advocates or the DOE to help support the DOE's analysis. This could help NEEA and its partners to craft a more compelling proposal for the DOE that manufacturers might agree with. Several interviewees noted that the electronics industry is more "anti-regulation" than the HVAC or appliance industry. Many interviewees mentioned that more efficient electronics tend to be those with more features that are more expensive. Regulation, if not done carefully, can remove those additional features in the name of energy efficiency.
- If it is deemed helpful to the standard, encourage utilities besides the California IOUs to engage in the standard setting process. In addition to being another voice supporting more stringent standards, some utilities can offer useful data from previously conducted studies in their service territories or can invest in primary research to support the rulemaking process. This recommendation applies to all of NEEA's work on standards.
- Consider conducting primary research or independent analyses if budgets allow and there is a need. For electronics in particular, there is a lack of data and constant monitoring of the market is needed to understand product lifecycles, changing consumer desires and behaviors, and the market landscape. In particular,
    - Interviewees noted that electronics products have a very short product lifecycle, so it can be very difficult to predict what products will be on the market in the future, much less their energy performance characteristics. Perhaps due in part to the short product lifecycle, many interviewees noted that the lack of data on these products, how they perform, and the layout of the market was a big issue.
- Continue to monitor and participate in regional standards rulemakings as a significant way to influence the creation or updating of federal standards.