ITI Promoting Innovation Worldwide

Subject: Additional Comments of ITI: Proposed Rules on Energy Conservation Standards for Battery Chargers (EERE-2020-BT-STD-0013), Energy Conservation Standards for External Power Supplies (EERE-2020-STD-0006), and related Certification Requirements and Labelling Provisions (EERE-2023-BT-CE-0001).

To the Department of Energy (DOE):

The Information Technology Industry Council (ITI) is the premier global advocate for technology, representing the world's most innovative companies. Founded in 1916, ITI is an international trade association with a team of professionals on four continents. We promote public policies and industry standards that advance competition and innovation worldwide. Our diverse membership and expert staff provide policymakers the broadest perspective and thought leadership from technology, hardware, software, services, and related industries.

We are writing to provide additional comments on the Proposed Rule for Energy Conservation Standards for External Power Supplies,[1] the Proposed Rule on Certification Requirements and Labelling Provisions[2], and the Proposed Rule for Energy Conservation Standards for Battery Charging Systems.[3] We provide these as one submission because these topics are linked by technological similarities (*i.e.*, USB-C as the charging mechanism), regulatory energy efficiency requirements, and other, non-energy related regulatory requirements *(e.g.,* PFAS, RoHS, REACH, VOC, packaging requirements).

We believe that careful consideration of our comments is crucial because of the impact the proposed standards will have on the availability of products. As we explain in our detailed comments below, we are particularly concerned about future compliance[4] rates for Dual Port USB-C power supplies because our analysis reveals that the proposed standards are higher than Max Tech standards. Yet, Dual Port USB-C power supplies provide many advantages from a convenience perspective because they allow two products to charge at once and the environmental benefit of reduced plastics and manufacturing costs.

Our comments are summarized as follows and explained in detail in subsequent numbered sections.

[1] Energy Conservation Standards for External Power Supplies, 88 Fed. Reg. 7284 (Feb. 2, 2023).

[2] Certification Requirements, Labeling Requirements, and Enforcement Provisions for Certain Consumer Products and Commercial Equipment, 88 Fed. Reg. 67458 (Sept. 29, 2023).

[3] Energy Conservation Standards for Battery Chargers, 88 Fed. Reg. 16112 (Mar. 15, 2023).

[4] For the purposes of this submission, 'compliant' or 'in future compliance' means that the External Power Supply meets both the proposed efficiency and no-load requirements. For Adaptive External Power Supplies, it means that they additionally meet the appropriate proposed requirements at the lowest-voltage test point (i.e. for USB-PD adapters that they meet the proposed lower voltage requirement when testing at 5V). For Multiple-Voltage External Power Supplies, it means that they additionally meet the proposed requirements for Multiple-Voltage External Power Supplies at the lower voltage. If an Adaptive Multiple-Voltage External Power Supply did not declare efficiency at the lower voltage (as is prohibited by one of two DOE databases), it is assumed to comply with those future requirements.

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On External Power Supplies Standards

1. DOE's technical analysis and Notice of Proposed Rulemaking (NOPR) do not show evidence that Single-Voltage *Adaptive* Power Supplies were considered in standard setting. If such power supplies were considered, DOE should appropriately annotate its Engineering Analysis and allow parties to comment on the revised analysis. If such power supplies were not considered, DOE must include them in a Supplemental Notice of Proposed Rulemaking (SNOPR) and allow for appropriate comment as the standards are otherwise arbitrary as applied to these supplies.
2. For Multiple-Voltage Adaptive External Power Supplies, if DOE's proposed efficiency standards apply to *both* the highest- and lowest-voltage rail, as the revised test method seems to have clarified, DOE's proposed standards are arbitrary because the docket record shows no evidence that DOE tested or relied upon test data at the lowest-voltage rail for these supplies.
3. For Multiple-Voltage External Power Supplies, DOE's proposed standards are arbitrary because they are supported by data that DOE knows is stale and has confirmed contains multiple deficiencies without explaining why that is a reasonable way to proceed.
4. For Multiple-Voltage External Power Supplies, the Engineering Analysis's flaws led DOE to arbitrarily propose more than Max Tech standards, especially for Multi-Port USB-C supplies.
5. For External Power Supplies "not supplied with a wire or cord and for which the manufacturer does not recommend one,"[5] DOE's proposed standards are arbitrary because DOE did not evaluate or consider any evidence as to how the new testing requirement of Appendix Z would impact future compliance rates of these External Power Supplies—because the test method introduces additional losses by requiring a test with a cord with a conductor that is minimally sufficient to carry the maximum required current.

On Related Certification Requirements and Labelling Provisions

6. For USB-PD adapters, DOE should require the disclosure of the round-trip resistance of the recommended USB-C cable instead of a particular gauge of cable and length.
7. DOE should expand the Certification requirements for External Power Supplies to include the proposals from the 2019 Test Procedure NOPR[6] that were inexplicably abandoned in 2021.

On Battery Chargers Standards

8. The lack of data transparency and disclosures throughout the standard-setting process make it impossible for ITI to provide more meaningful comments and thus constitute a failure to provide adequate notice and opportunity to comment.
9. As with the cable selection criteria for External Power Supplies, DOE did not consider the effect of new External Power Supply selection criteria on future compliance rates for battery chargers sold without a power supply and without a recommended one from the manufacturer.

[5] 10 C.F.R. Part 430, Subpart B, Appendix Z § 4(g).

[6] Test Procedure for External Power Supplies, 84 Fed. Reg. 67106 (Dec. 6, 2019).

If the Proposed Standards Are Adopted Despite Our Objections:

10. If DOE intends to pursue standard setting despite our objections, we request a compliance date of at least January 2027, which would align the Battery Charger Systems and the External Power Supplies dockets, to reduce the disruption and uncertainty to consumer electronics launched in the upcoming Calendar Years.

External Power Supplies Standards

1. **DOE's technical analysis and Notice of Proposed Rulemaking (NOPR) do not show evidence that Single-Voltage *Adaptive* Power Supplies were considered in standard setting. If such power supplies were considered, DOE should appropriately annotate its Engineering Analysis and allow parties to comment on the revised analysis. If such power supplies were not considered, DOE must include them in a Supplemental Notice of Proposed Rulemaking (SNOPR) and allow for appropriate comment as the standards are otherwise arbitrary as applied to these supplies.**

We first discuss the apparent lack of inclusion in DOE's technical analysis of Single-Voltage Adaptive Power Supplies—a growing class of power supplies with the proliferation of USB-PD External Power Supplies. As DOE is aware, USB-PD power supplies can alter their output voltage during active mode based on an established communication protocol with the end-use application without any user-generated action—making them "Adaptive Power Supplies" within the meaning of Appendix Z. For the past few years,[7] USB-PD External Power Supplies have seen widespread adoption by consumers and have become de facto "universal" chargers for a variety of consumer electronics.[8] Acknowledging these realities, DOE's test procedure in Appendix Z features explicit processes to test Adaptive Power Supplies, and USB-PD power supplies in particular; ITI thanks DOE for working on these changes.

However, despite the test procedure change, we find no evidence within the docket that DOE considered these power supplies in standard setting.

To start, in the January 2023 Technical Support Document,[9] DOE explains that it considered 8,477 External Power Supplies for its Engineering Analysis. In a footnote on page 5-3, DOE disclosed the use of the Compliance Certification Database (CCD) (within the Compliance Certification Management System (CCMS)) on July 18, 2019. Our concern is that DOE references only a *single* database, namely one for External Power Supplies "Other Than . . . Adaptive Single Voltage External Power Supplies."[10] Thus, either DOE did not consider any products found within the *other* CCD for "Adaptive Single Voltage External Power

[7] And accelerated by the EUs common charge initiative.

[8] Most USB-C power supplies are USB-PD power supplies—although using the USB-C connector does not require the implementation of the USB-PD protocol.

[9] DOE, 2023-01 Technical Support Document: Energy Efficiency Program for Consumer Products and Commercial and Industrial Equipment: External Power Supplies, EERE-2020-BT-STD-0006-0026, at 5-3 (Jan. 19, 2023), https://www.regulations.gov/document/EERE-2020-BT-STD-0006-0026 ("Technical Support Document: External Power Supplies").

[10] *Appliance & Equipment Standards Program | CCMS*, DOE Energy Efficiency & Renewable Energy, https://www.regulations.doe.gov/certification-data/CCMS-4-External_Power_Supplies_-_Other_Than_Switch-Selectable_and_Adaptive_Single-Voltage_External_Power_Supplies.html#q=Product_Group_s%3A%22External%20Power%20Supplies%20-%20Other%20Than%20Switch-Selectable%20and%20Adaptive%20Single-Voltage%20External%20Power%20Supplies%22 (last visited Mar. 27, 2023).

Supplies" where USB-PD are registered; or DOE made a typographical error in the Engineering Analysis and failed to disclose the use of these power supplies.[11]

While the footnote on page 5-3 may be an oversight that DOE should clarify, ITI notes that the Technical Support Document does not clearly indicate whether any testing was conducted at the lowest-voltage test point for USB-PD External Power Supplies to establish a cost-efficiency relationship. On pages 5-18 through 5-20 of the Technical Support Document, DOE clarifies that it tested AC-DC Basic Voltage External Power Supplies at the Power Levels 2.5W, 12W, 24W, and 120W. Yet, the same discussion does not indicate that DOE tested them at the lowest-voltage test point. Concerningly, the charts on page 5-19 do not plot any efficiency data at the 10W test point, the required lowest-voltage test point for USB-PD power supplies under Appendix Z. As to the discussion on page 5-20 on "Low-Voltage EPS," DOE specifically states there that "DOE did not test or tear down representative units to establish a cost for AC-DC Low Voltage EPSs, but instead relied on extrapolating data from the AC-DC Basic Voltage Analysis to this product class."[12] While ITI does not comment on the appropriateness, or lack thereof, of performing no testing on *Low-Voltage* External Power Supplies, ITI stresses that this lack of testing, combined with the details on page 5-19 for *Basic-Voltage* External Power Supplies, suggests that Single-Voltage *Adaptive* External Power Supplies were either not tested at the lowest-voltage point or not considered at all.

Finally, for Single-Voltage Adaptive External Power Supplies, even if DOE holds there is good reason not to conduct additional testing at the lowest-voltage test point, ITI finds no explanation for why DOE did not consider efficiency measurements at the lowest-voltage rail for Adaptive Power Supplies in the methodology used to set Energy Levels (ELs) on pages 5-8 through 5-10 of the Technical Support Document. There, DOE explains that it "bin[ned]" representative units based on a heatmap generated in Section 5.3 of the report and set equations for Basic-Voltage AC-DC External Power Supplies to achieve desired compliance rates. Then, as explained, DOE considered no-load values of all basic models in particular bins against a fixed value—adjusting the value as appropriate to ensure that the *combined* pass rate remained within an acceptable range. While ITI agrees that calculating *combined* pass rates is necessary and appropriate, ITI finds no evidence that DOE additionally considered the lowest-voltage test point in determining *combined* pass rates for Adaptive External Power Supplies.

In any case, if Adaptive Power Supplies were considered, DOE should appropriately annotate its Engineering Analysis and give interested parties an opportunity to comment. If such supplies were not considered, DOE must update its Technical Support Document and issue a SNOPR; otherwise, the standards are arbitrary because the methodology employed to set Candidate Standard Levels does not seem to consider evidence or the impact of the proposed standards as to Adaptive Power Supplies.

We close this subsection with a short discussion as to why Adaptive Power Supplies must be included in any analysis. Quite simply, Single-Voltage Adaptive Power Supplies contain electrical characteristics that are distinctly different than (albeit in some respects similar to) Non-Adaptive Power Supplies. Briefly, they contain voltage regulators that must operate at a much broader range of output power. Next, USB-C/USB-PD Adaptive Power Supplies contain controllers to communicate with a multitude of end-use products to guarantee functional safety—controllers that *must* operate in "no-load." Finally, the USB-PD protocol contains specific voltage/current limitations that, when tested with a cable (as required), can skew

[11] ITI acknowledges that a third distinct possibility is that DOE may consider Adaptive External Power Supplies out of scope for the purposes of efficiency standards prompting their exclusion from the Engineering Analysis. ITI does not further discuss this option in these comments because DOE has specifically updated its test method to accommodate these supplies over the years.

[12] Technical Support Document: External Power Supplies, at 5-20.

compliance rates due to resistive losses scaling with the square of the current.[13] These differences, at the very least, indicate that DOE has an obligation to analyze the appropriateness of standards on these power supplies by including them in the Engineering Analysis or include clarifying language to 10 C.F.R. § 430.32(w) confirming that the level VII standards do not apply to Single-Voltage Adaptive External Power Supplies because the standard setting exercise never independently considered them.

2. **For Multiple-Voltage Adaptive External Power Supplies, if DOE's proposed efficiency standards apply to *both* the highest- and lowest-voltage rail, as the revised test method seems to have clarified, DOE's proposed standards are arbitrary because the docket record shows no evidence that DOE tested or relied upon test data at the lowest-voltage rail for these supplies.**

For Adaptive External Power Supplies, which DOE has indicated must be tested twice,[14] if DOE is requiring compliance with two efficiency requirements, ITI highlights that the proposed standards impose *stricter* requirements for USB-PD Multiple-Voltage Adaptive External Power Supplies than for USB-PD Single-Voltage Adaptive External Power Supplies when tested at the lowest-voltage rail. Yet DOE does so without having considered any test data for Adaptive Multiple-Voltage External Power Supplies at the lowest-voltage test point.

That the standards are oddly more stringent for Multiple-Voltage Adaptive External Power Supplies is easily demonstrated by example, where the proposed Level VII standards yield the following requirement at the 10W (5V, 2A) test condition for USB-PD Multiple Voltage Adaptive External Power Supplies:

$$\eta_{VII} = 0.0782 * \ln(P_{out}) - 0.0013 * P_{out} + 0.643$$
$$= 0.0782 * \ln(5 * 2) - 0.0013 * 5 * 2 + 0.643$$
$$\eta_{VII} = 81.01\%$$

Meanwhile, for USB-PD Single-Voltage Adaptive External Power Supplies, the efficiency standard at the lowest-voltage rail is:

$$\eta_{VII} = 0.0834 * \ln(P_{out}) - 0.0011 * P_{out} + 0.609$$
$$= 0.00834 * \ln(5 * 2) - 0.0011 * 5 * 2 + 0.609$$
$$\eta_{VII} = 79.00\%$$

ITI notes that this is an enormous increase in standards for Multiple-Voltage Adaptive External Power Supplies, where the previous requirements would impose requirements below 72% at the 10W load point. Yet, for Single-Voltage Adaptive External Power Supplies, DOE concluded that only a minor increase in standards from Level VI to Level VII is technologically feasible and economically justified (from 78.7% to 79.00%). ITI believes that DOE has not justified the large jump for Multiple-Voltage External Power

[13] $P_{CableLoss} = I^2R$

[14] Test Procedure for External Power Supplies, 87 Fed. Reg. 51200, 51209 (Sept. 19, 2022).

Supplies, especially since the docket contains no evidence that Multiple-Voltage Adaptive External Power Supplies were tested at this lowest-voltage point.

Further, as we discussed in Item 1 *supra*, DOE never considered or disclosed that it considered *any* data from the Single-Voltage Adaptive External Power Supplies database—nor did DOE ensure that ELs were based on *combined* pass rates that include the lowest-voltage test point. For Multiple-Voltage Adaptive External Power Supplies, examining the respective discussions in the Engineering Analysis yields the same conclusion. Assuming then that DOE only examined the "Other Than . . . Single-Voltage Adaptive External Power Supplies" database, that database does not contain *any* data at the lowest-voltage test point[15] providing no basis to set Candidate Standard Levels (CSLs). Thus, we urge DOE to clarify how it concluded that the standards at the lowest-voltage test point are appropriate for Multiple-Voltage Adaptive External Power Supplies without any certification data for these power supplies at the lowest-output voltage and corresponding load points. Without this clarity—and unless and until DOE properly accounts for these results—the standards are arbitrary.

3. **For Multiple-Voltage External Power Supplies, DOE's proposed standards are arbitrary because they are supported by data that DOE knows is stale and has confirmed contains multiple deficiencies without explaining why that is a reasonable way to proceed.**

To set ELs, DOE explains in Section 5.4 of its Technical Support Document that it relied on data in the CCD and adjusted efficiency formulas as appropriate to reach combined pass rates for different "bins" of products. Yet, DOE ignored that its more-than-five-year-old data[16] contains power supplies tested without the clarifying procedures adopted in 2022 for Single-Voltage External Power Supplies with multiple-output busses[17] and for Multiple-Voltage Adaptive External Power Supplies.[18] Unsurprisingly, relying on a version of the CCD before clarifying test procedures were issued will yield data that does not adequately reflect the efficiency of power supplies in the market. Indeed, DOE on page 5-25 of the Technical Support Document discloses that the data in its CCD is deficient:

> DOE initially identified 10 representative units, one for each EL at each power level, but observed that the tested active mode efficiency and no-load power for some of these representative units did not match their certified values in the CCD nor the requirements of the EL they were meant to represent.[19]

Yet, DOE does not explain why, despite being on notice of multiple deficiencies in its dataset, DOE did not revisit the appropriateness of relying on this data to set ELs—and from those, CSLs.

Under the Energy Policy and Conservation Act (EPCA) and the corresponding Process Rule, DOE must ensure that the CSLs accurately reflect what is achievable in the Multiple-Voltage External Power Supply market. If DOE's attempt to test ten Multiple-Voltage External Power Supplies yielded *multiple* mismatches, then DOE cannot conclude that its standards are appropriate without discounting the effect of unclear test procedures in 2019 on certifications in the CCD.

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[15] DOE recently declined to change certification requirements for Multiple-Voltage Adaptive External Power Supplies, although ITI is unsure why this occurred. *Id.* ("However, DOE is not adopting the proposed amendments to the certification requirements. DOE may consider proposals to amend the certification requirements and reporting for EPS under a separate rulemaking regarding appliance and equipment certification.").

[16] Technical Support Document: External Power Supplies, at 5-3.

[17] 87 Fed. Reg. 51200, 51208.

[18] *Id.* at 51209.

[19] Technical Support Document: External Power Supplies, at 5-25.

We note that the same issue may affect the Single-Voltage External Power Supplies with multiple-output busses analysis. However, because of the relative volume of Single-Voltage External Power Supplies with multiple-output busses as compared to those without multiple-output busses, this is unlikely to have appeared as prominently in DOE's analysis due to limited testing.

4. **For Multiple-Voltage External Power Supplies, the Engineering Analysis's flaws led DOE to arbitrarily propose more than Max Tech standards, especially for Multi-Port USB-C supplies.**

ITI believes that the proposed standards based on a flawed analysis, as highlighted in Items 2 and 3, *supra*, will result in a drastic impact on the Multi-Port USB-C supply market and urges DOE to further investigate the impacts of the proposed standards on Product Availability and Utility. Before this, however, we engage in a short discussion on the stringency of no-load standards for Multiple-Voltage External Power Supplies and efficiency standards as compared to the Single-Voltage External Power Supplies they can practically replace.

Specifically on no-load standards, in 2023, we commented[20] that we were concerned that DOE did not consider standards based on the number of output busses or ports. Rather, DOE's proposed standards simply set a no-load limit of 0.075W for all Multiple-Voltage External Power Supplies up to 49W, and 0.125W for Multiple-Voltage External Power Supplies above 49W. Subsequent to our comment, an email commenter[21] from July 2023 additionally inquired as to why the proposed no-load standard for Multiple-Voltage External Power Supplies with a nameplate output power above 49W was set at 0.125W, while the equivalent no-load standard for similarly sized Single-Voltage External Power Supplies is set at 0.150W. In essence, DOE's NOPR analysis concludes that power supplies with more output capabilities should consume less power than equivalently sized power supplies with less functionality—yet from a first principle approach (*i.e.,* examining technology differences between Multiple-Voltage and Single-Voltage Power Supplies), there is no reason why Multiple-Voltage External Power Supplies should, as a product class in the aggregate, consume *less* no-load power than equivalently sized Single-Voltage External Power Supplies. This is especially not true as to Adaptive Multiple-Voltage External Power Supplies for which additional microcontrollers may be needed to control each port. This contradiction alone indicates that DOE's standards for Multiple-Voltage External Power Supplies are highly restrictive and arbitrary.

As to the efficiency requirements, DOE's proposed standards impose standards based on the maximum nameplate output power even if no single port may deliver that much power—in effect imposing stricter requirements on some dual port Multiple-Voltage External Power Supplies than the (at least two) individual Single-Voltage External Power Supplies they replace. For example, if a Multiple-Voltage External Power Supply had two ports supplying 25W when each port was operating alone but only half that value when the ports operate simultaneously (*i.e.,* 12.5+12.5W), the new proposed standards would require a minimum efficiency equal to the proposed formula for Multiple-Voltage External Power Supplies using 25W as the nameplate output power (86.22%). If, however, that Multiple-Voltage External Power Supply had two ports each capable of providing 25W even when tested simultaneously, the efficiency requirement jumps because 50W would be used as the nameplate output power (88.5%). Meanwhile, two Single-Voltage Power Supplies capable of supplying up to 25W are only subject to the 25W requirement for Basic-Voltage External Power Supplies (86.97%). Thus, a Multiple-Voltage Power Supply

[20] ITI, 2023-03-01 Comment Response to the Published Notice of Proposed Rulemaking and Announcement of Public Meeting, EERE-2020-BT-STD-0006-0039 (Mar. 1, 2023), https://www.regulations.gov/comment/EERE-2020-BT-STD-0006-0039.

[21] Eric Zhang, 2023-07-04 Comment Response to the Published Notice of Proposed Rulemaking and Announcement of Public Meeting, EERE-2020-BT-STD-0006-0045 (July 4, 2023), https://www.regulations.gov/comment/EERE-2020-BT-STD-0006-0045.

providing 25W out of two ports simultaneously, replacing two Single-Voltage External Power Supplies, is subject to a higher efficiency standard (88.5% vs 86.97%). This result discourages building these Multiple-Voltage Power Supplies even if the technology to convert 115V to the voltage necessary to convert AC to DC might be similar, or even more complex to ensure the DC output may come from two ports.

In any case, the above, coupled with Items 2 and 3, *supra,* leads to concerning impacts on Product Availability and Utility for Multi-Port USB-C Power Supplies, a subclass of Multiple-Voltage External Power Supplies.

To evaluate this impact, ITI downloaded DOE's latest databases[22] of External Power Supplies and filtered the 795 entries that were identified as "Multiple-Voltage External Power Supplies."[23] ITI included both databases because DOE's CCMS system has confusing titles and allows the registration of *Multiple-Voltage Adaptive External Power Supplies* in the database intended for *Single-Voltage Adaptive External Power Supplies,* while not permitting tested efficiencies under 10 C.F.R. Part 430, Subpart B, Appendix Z § 6(b)(1)(iii)(B) to be registered in the database for *Power Supplies Other than Single-Voltage Adaptive External Power Supplies*.[24] Thus, using both databases produces more accurate future compliance rates with the proposed standards.

Then, ITI membership staff identified the number and type of output ports of each supply, *i.e.*, whether they contained USB-C ports, USB-A Ports, or other ports. To do this, staff used search engines to match publicly available data with the Basic Model Number, Output Power, Output Voltage(s), and Brand Name of as many power supplies as possible, identifying the ports of 220 Multiple-Voltage External Power Supplies. While we acknowledge that we have not analyzed the entire database of Multiple-Voltage External Power Supplies,[25] we note that our sample size is not far off the sample size that DOE analyzed (220 ITI vs 334 DOE).

Once power supplies were categorized, it was possible to determine future compliance rates with the proposed standards. Doing so indicates that the NOPR standards would impose greater than Max Tech standards on certain sub-types of Multiple-Voltage Power Supplies. Alarmingly, entire categories of Multiple-Voltage External Power Supplies would potentially be eliminated from the market as is illustrated in Table 1, *infra*. For example, of the 220 Multiple Voltage Power Supplies, ***none*** **of the identified forty-four dual-port USB-C power supplies registered in DOE's database would comply.** This result indicates that the proposed standards are greater than Max Tech for these products, leading to their potential

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[22] *Appliance & Equipment Standards Program | CCMS*, DOE Energy Efficiency & Renewable Energy, https://www.regulations.doe.gov/certification-data/CCMS-4-External_Power_Supplies_-_Other_Than_Switch-Selectable_and_Adaptive_Single-Voltage_External_Power_Supplies.html#q=Product_Group_s%3A%22External%20Power%20Supplies%20-%20Other%20Than%20Switch-Selectable%20and%20Adaptive%20Single-Voltage%20External%20Power%20Supplies%22 (last visited Mar. 27, 2023); *Appliance & Equipment Standards Program | CCMS*, DOE Energy Efficiency & Renewable Energy, https://www.regulations.doe.gov/certification-data/CCMS-4-External_Power_Supplies_-_Switch-Selectable_and_Adaptive_Single-Voltage_External_Power_Supplies.html#q=Product_Group_s%3A%22External%20Power%20Supplies%20-%20Switch-Selectable%20and%20Adaptive%20Single-Voltage%20External%20Power%20Supplies%22 (last visited Mar. 27, 2023).

[23] 801 Power supplies were actually in the database but six 'true' duplicates were removed because they had the same model number, brand name, and electrical characteristics.

[24] As discussed in footnote 15, *supra*, DOE previously acknowledged this possible confusion but then declined to make changes to the certification requirements to address this. 87 Fed. Reg. 51200, 51209.

[25] Doing so proved impossible as many External Power Supplies did not have any publicly available documentation that could be located with a web search.

elimination from the market regardless of the brand.[26] We note that future compliance with the proposed standards does seem possible for Multiple-Voltage Adaptive External Power Supplies employing a single USB-C and a single USB port, with 24% of the seventy-four registered power supplies meeting the proposed standards. However, as soon as the number of ports grows beyond this, few, if any, would comply.

Finally, there remain some power supplies in the dataset that are likely electrically identical but sold under a different brand name and registered separately. We do not explicitly filter them from our results because we are unaware whether DOE conducts this step in its analysis. Nonetheless, had we removed them, future compliance rates would only have marginally improved (~5%).

Table 1: Expected Compliance Rates of Multiple-Voltage External Power Supplies with Proposed Standards

	# Identified in CCD	% Compliant with Multiple-Voltage VII Standards	% Non-Compliant with Multiple-Voltage VII Standards
Dual Port USB-PD Power Supplies	44	0 %	100 %
Single USB Type A Port + Single USB-PD Port	74	24.3 %	75.7 %
Single USB Type A Port + >1 USB-PD Ports	34	5.9 %	94.1 %
Other	68	5.9 %	94.1 %
Total: ITI Identified Multiple-Voltage Power Supplies	**220**	**11%**	**89%**

These results greatly concern us because they suggest a dramatic impact on product utility and product availability if the proposed standards are adopted, namely the complete elimination of dual-port USB-C External Power Supplies. Crucially, this result highlights that any standard setting exercise requires further sub-categorizations for Multiple-Voltage Power Supplies. Further, the standard setting fails to consider the embodied carbon and energy savings resulting from the manufacturing and sale of only a single Multiple-Voltage Adaptive External Power Supply with two USB-C ports to consumers as opposed to two, separate Single-Voltage Adaptive External Power Supplies. Our understanding of the technical support document indicates that DOE has not considered the economic impact of eliminating, or making it nearly impossible to participate in, this market segment.

ITI acknowledges that DOE tested ten Multiple-Voltage External Power Supplies to conduct its analysis.[27] However, ITI seeks to understand how many, if any, were adaptive and how many featured two USB-C ports.

[26] If DOE clarifies that Multiple-Voltage Adaptive External Power Supplies are not required to comply at the low-voltage test point, then five out of forty-four dual-port USB-C power supplies would comply. *See* Item 2, *supra*.

[27] Technical Support Document: External Power Supplies, at 5-25.

Finally, ITI cannot address any standards without DOE explaining how it intends to categorize these Multiple-Voltage External Power Supplies. DOE's failure to provide this information deprives ITI of the notice necessary to comment adequately in this rulemaking.

5. **For External Power Supplies "not supplied with a wire or cord and for which the manufacturer does not recommend one," DOE's proposed standards are arbitrary because DOE did not evaluate or consider any evidence as to how the new testing requirement of Appendix Z would impact future compliance rates of these External Power Supplies—because the test method introduces additional losses by requiring a test with a cord with a conductor that is minimally sufficient to carry the maximum required current.**

ITI believes that DOE is setting standards without considering the effect of the new cable selection protocols in the revised test method. We are specifically concerned with the below bolded language from Appendix Z:

> Test the external power supply at the end of the wire or cord that connects to an end-use product, regardless of whether the end of the wire or cord is integrated into an end-use product or plugs into and out of an end-use product. If a separate wire or cord is provided by the manufacturer to connect the external power supply to an end-use product, use this wire or cord and perform tests at the end of the cord that connects to an end-use product. An external power supply that is not supplied with a wire or cord must be tested with a wire or an output cord recommended by the manufacturer. **If the external power supply is not supplied with a wire or cord and for which the manufacturer does not recommend one, the EPS must be tested with a 3-foot-long output wire or cord with a conductor thickness that is minimally sufficient to carry the maximum required current.**[28]

While ITI is not per se opposed to DOE specifying a particular cable for testing in cases where manufacturers do not identify or recommend one, we are opposed to setting *efficiency standards* without DOE considering the effect of this change.[29] With the test procedure finalized, there is no evidence in the External Power Supply Standards docket that DOE considered the effect of the additional cable losses introduced by the test procedure change when promulgating future standards.[30] To be clear, ITI is not stating that DOE ignored cable losses entirely; rather the issue is that DOE never considered the *additional* cable losses from the new requirement to use a cord with a conductor thickness that is minimally sufficient to carry the maximum required current as compared to testing with any arbitrarily selected cable.

We are especially concerned with the impact on future compliance rates of USB-C External Power Supplies, *i.e.,* the power supplies most likely to be shipped without a cable due to their interoperability (and to reduce electronic waste). Aside from the practical implications of finding a specifically 3-foot USB-C cable, requiring a manufacturer to test with a cable with a *minimal conductor thickness sufficient to*

[28] 10 C.F.R. Part 430, Subpart B, Appendix Z § 4(g) (emphasis added).

[29] ITI commented during the External Power Supply test procedure NOPR and supported the idea when manufacturers did not recommend a cable. At the time ITI requested additional information to conduct an impact assessment. *See* ITI, 2021-12-21 Comment Response to the Published Supplemental Notice of Proposed Rulemaking and Request for Comment, EERE-2019-BT-TP-00012-0022, at 2 (Dec. 21, 2021), https://www.regulations.gov/comment/EERE-2019-BT-TP-0012-0022.

[30] Note that while this change may only impact a subset of products in the United States, other jurisdictions are considering adopting DOE's Level VII "international" standard and test method—but without permitting manufacturers to recommend a cable. The assumption is that DOE's test method and standard setting exercise considered the effect of cable losses in all permissible permutations of the test method.

carry the maximum required current is in effect asking for manufacturers to test with a cable with the highest possible resistance because the square of the conductor thickness of a cable is inversely proportional to the resistance of the cable (*i.e.*, the thinner the wire, the more resistance). It follows then that, because cable resistive losses are proportional to the resistance of the cable,[31] DOE's new test method requires manufacturers that do not supply a cord nor recommend one to test with a cable that will generate the *most losses* and therefore report *lower efficiencies* for the External Power Supply.

DOE acknowledged that the cable/cord has an impact on the energy efficiency as early as August 25, 2015,[32] and most recently acknowledged the importance of knowing which cable was used for testing by proposing to require manufacturers to disclose the specifications of the cable used for testing in a proposed rule in September 2023.[33] While we do not dispute that the current state of affairs (whereby test cables are not specified) is appropriate, DOE has an obligation to ensure that CSLs are set only after DOE has considered adverse impacts on product utility and product availability—in this case the effects of a new test method on the future compliance rates of power supplies without a recommended cable.[34]

We illustrate the magnitude of this problem by example.

We begin by assuming, for practical purposes, that the cable with a conductor thickness that is minimally sufficient to carry the maximum required current for a USB-PD power supply <60W results in a cable with a resistance of 250mW, because such a resistance results in the maximum allowable round-trip voltage drop for these supplies according to the USB-C specification. Thus, for a third-party test lab that had been testing a USB-C power supply with a generic 170mW USB-C cable because the manufacturer had not recommended one, the lab is now required to test with a 250mW cable (or 47% more losses). Critically, for a 27W power supply operating at 9V, 3A, the losses in the cable at full load grow from 1.7W to 2.25W or from 6.3% to 8.3% of the nameplate 27W output power.

The problem is more drastic at the 5V, 2A load point that is required for all USB-PD External Power Supplies. When testing at 5V and 2A, increasing the cable resistance from 170mΩ to 250mΩ increases cables losses from 6.8% to 10%. Averaging the impact at loading conditions one to four (as required by Appendix Z) results in a decrease of 1.5% in efficiency[35] at the 5V test conditions; that difference alone can easily make a power supply non-compliant with the proposed standards. This difference is much greater than the increase in efficiency that DOE concluded is "technologically feasible and economically justified,"[36] indicating that DOE's proposed rule would, in effect, severely impact the availability of external power supplies shipped without a cable and for which the manufacturer does not recommend one. This difference is further magnified for Multiple-Voltage External Power Supplies where, as we explained *supra*, the requirements at the lowest-voltage rail are inexplicably even more strict than those for Single-Voltage External Power Supplies. In any case, DOE's claim that the standards are technologically

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[31] $P_{Cable\ Loss}=I^2R_{Cable}$

[32] Test Procedures for External Power Supplies, 80 Fed. Reg. 51424, 51429 (Aug. 25, 2015).

[33] 88 Fed. Reg. 67458, 67472.

[34] *See generally* 10 C.F.R. Part 430, Subpart C, Appendix A § 6.

[35] $\Delta P_{max} = \sum(I^2_{LoadPoints}R_{Max})/4 - \sum(I^2_{LoadPoints}R_{actual})/4 = (0.5^2 + 1^2 + 1.5^2 + 2^2)/4 * (0.250 - 0.170) = 0.15W = 1.5\%$ of additional losses at 10W loading condition.

[36] For a USB-PD power supply required to be tested at 5V with the 100% load being 2A or 10W, DOE's new standards would require an efficiency of 79.0%. The current Level VI standards require 78.7%. *See* 10 C.F.R. § 430.32(w)(ii)–(iii); 88 Fed. Reg. 7284, 7286.

feasible is undercut if DOE added a new constraint in the test procedure but did not evaluate the effect of this on future compliance rates.[37]

Supporting the above discussion is a note found at the top of Appendix Z that acknowledges the impact of cables on Power Supplies:

> The provisions at section (4)(g) of this appendix regarding the testing of units for which a wire or cord is not provided by the manufacturer are not required for use until such time as compliance is required with any amended standards for external power supplies provided in § 430.32(w) that are published after January 1, 2021.[38]

As we understand it, this note was added to continue to permit manufacturers of External Power Supplies that do not recommend a particular cable to not be impacted by the sudden change to Appendix Z—at least until standards were published after January 1, 2021. It stands to reason then that, if compliance rates for External Power Supplies would be affected by the use of a new cable, that effect should be discounted or considered in the Engineering Analysis.

In any case, to account for this difference, DOE could (and should) have, for example, surveyed the market to determine the resistance of the average USB-C cable, or alternatively paused standard setting until the recent Proposed Rule amending Certification Requirements for External Power Supplies[39] is completed. That rule, as envisioned by DOE, would require manufacturers to disclose the tested cable and thus provide DOE with the information required to discount the efficiency of registered power supplies based on the impact of the tested cables.[40] We urge DOE to follow one of these courses because the other way to resolve the issues presented herein would be to amend the cable selection criteria from the Test Procedure to test with a cable of "average resistance"—an average DOE could determine by amending the certification requirement or simply surveying the market of existing USB-C cables provided with power supplies. However, given the test procedure docket is closed, surveying the market to discount efficiency *standards* may be more appropriate.

We close this discussion by highlighting that EPCA authorizes DOE to regulate only External Power Supplies, not detachable cables. By forging ahead with standards without considering whether it is feasible to comply with the standards with the cable with a thickness that is minimally sufficient, the proposed rules are arbitrary as applied to those manufacturers not supplying a cable or recommending one, or at the very least, force manufacturers to recommend a particular cable, something that EPCA does not authorize or contemplate.

ITI therefore urges that DOE pause standard setting at least until it collects sufficient data to prove that the new standards do not foreclose future compliance for manufacturers of External Power Supplies that do not recommend a specific cable. DOE should also provide a detailed explanation as to why it did not consider the utility and proliferation of interoperable USB-C power supplies in standard setting in accordance with Section (6)(b)(3)(i) and (iii) of Appendix A to Subpart C of Part 430. If DOE cannot establish that future compliance is possible with the use of a cable with a thickness that is minimally sufficient to

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[37] We also note that European authorities are considering adopting this 'worst-case' cable approach while simultaneously removing the "recommended" cable language, leading us to question whether the older Level VI standards are even appropriate.

[38] 10 C.F.R. Part 430, Subpart B, Appendix Z.

[39] 88 Fed. Reg. 67458.

[40] *Id.* at 67472.

carry the maximum current, DOE should reconsider the proposed standards or revise the test procedure and test with an average cable.

Labelling and Certification Provisions

6. **For USB-PD adapters, DOE should require the disclosure of the round-trip resistance of the recommended USB-C cable instead of a particular gauge of cable and length.**

ITI takes this opportunity to provide comments pertaining to the Proposed Rule on Certification Requirements, Labeling Requirements, and Enforcement Provisions for Certain Consumer Products and Commercial Equipment.

In this rulemaking DOE is proposing to add requirements to disclose the cable recommended or used for testing. We support this change generally but would ask that DOE require the disclosure of the *resistance* of the cable as opposed to a length + cable gauge. Because the USB-C specification has specific requirements on the maximum allowable round-trip voltage drop across the DC cable, the specification in effect imposes a maximum allowable resistance (or "direct current resistance" / "DCR") for a USB-PD cable that includes the connectors at the end of the cable. Manufacturers must keep this maximum resistance in mind when designing cables; thus, longer cables necessarily need to be thicker.

We note that DOE previously considered this when it decided how best to craft the language of Appendix Z:

> DOE acknowledges that resistance is a significant factor in determining the efficiency of output cords. Resistance of a cord is largely determined by three factors: cross-sectional area, material resistivity, and cable length. Table III.1 specifies the cross-sectional area with AWG, material resistivity with the use of copper, and cord length with an explicit value. DOE believes that specifying these three parameters would sufficiently define the resistance of the testing cable without requiring extra measurements or calculations during the testing procedure.[41]

While we do not disagree with the above, it is unclear how a test lab validating compliance in the CCMS should account for the resistance of the USB-C connector. Should the test lab use a random connector + the specified AWG sized cable? Or should the test lab size the connector such that the connector + the cable used has an equivalent resistance to the specified cable? To avoid these difficulties in practice and to reduce churn and retests, requiring that manufacturers declare the total DCR cable in the CCD would allow test labs to simply craft / cut a cable of *any length and diameter* so long as the total resistance is the same as that specified/recommended by the manufacturer in the CCD. Thus, the ultimate result is the same but avoids confusing language such as "gauge," which is not used in the USB-PD context, and an additional "length" dimension, and brings the requirement more in line with the way USB-PD cables are made. We also do not foresee any additional complications from this change for non-USB-PD power supplies.

[41] 87 Fed. Reg. 51200, 51213.

7. **DOE should expand the Certification requirements for External Power Supplies to include the proposals from the 2019 Test Procedure NOPR that were inexplicably abandoned in 2021.**

In 2019, DOE proposed to update the certification provisions for External Power Supplies found under 10 C.F.R. § 429.37(b).[42] Therein, DOE proposed to amend the certification requirements for "switch-selectable and adaptive EPSs at 10 CFR 429.37(b)(2)(ii) and (b)(2)(iii) to clarify that the requirements apply to both single-voltage as well as multiple-voltage switch-selectable and adaptive EPSs, respectively."[43]

Yet, DOE, without explanation, did not complete this portion of the rulemaking when finalizing the test procedure in 2022.[44] ITI fully supports completing this change as it would provide DOE with crucial data for Multiple-Voltage Adaptive External Power Supplies that is necessary to establish future standards for these products. In addition, ITI would also support changing the title of the Database for Single-Voltage Adaptive Power Supplies to strike the words Single-Voltage.

Battery Chargers Standards

8. **The lack of data transparency and disclosures throughout the standard-setting process make it impossible for ITI to provide more meaningful comments and thus constitute a failure to provide adequate notice and opportunity to comment.**

For reasons we have explained in our first submission to DOE under the Battery Chargers Docket,[45] there are structural flaws in DOE's Battery Chargers Engineering Analysis, and we continue to be unable to reproduce the conclusions of DOE from the NOPR on Battery Chargers. We once again urge that DOE release its dataset to ITI with any redactions required by law.

As we explained in our initial submission, we cannot iterate through an infinite number of methods to filter the data to reproduce DOE's results without further information from DOE. In addition, unlike the dataset for Multiple-Voltage External Power Supplies that is relatively small and allows us to check future compliance rates with the proposed standards, the dataset for Battery Chargers is so large that merely identifying a few products failing to comply with the proposed standards would likely not highlight opportunities to align the proposed standards with technology appropriately. Still, from our initial findings, the standards impose a heavy burden on Battery Chargers for (or integral to) laptop-sized products (~25–100Wh).

9. **As with the cable selection criteria for External Power Supplies, DOE did not consider the effect of new External Power Supply selection criteria on future compliance rates for battery chargers sold without a power supply and without a recommended one from the manufacturer.**

ITI stresses that the new Appendix Y1 features new External Power Supply selection criteria requiring a "minimally compliant" External Power Supply to be used for testing when a battery charger is not sold with one and when a manufacturer does not recommend one. Minimally-Compliant External Power Supplies feature lower efficiencies than *any* other External Power Supply, and thus, following similar logic

[42] *See* 84 Fed. Reg. 67106, 67114.

[43] *Id.*

[44] 87 Fed. Reg. 51200, 51209.

[45] ITI, 2023-05-15 Comment Response to the Published Notice of Proposed Rulemaking; Announcement of Public Meeting, EERE-2020-BT-STD-0013-0054 (May 16, 2023), https://www.regulations.gov/comment/EERE-2020-BT-STD-0013-0054.

as the section on cable selection above, DOE's Engineering Analysis on Standards for Battery Chargers should have considered this effect.

Compliance Dates

10. **If DOE intends to pursue standard setting despite our objections, we request a harmonized future compliance date of at least January 2027 for both the Battery Chargers and the External Power Supplies standards to reduce the disruption and uncertainty to consumer electronics launched in the upcoming Calendar Years.**

We understand that DOE intends to make the proposed standards effective two years after publication of each final rule in the Federal Register. With the publication of the Regulatory Agenda pointing to May 2024 and August 2024 for publication of the External Power Supply and Battery Charger Rules, ITI is concerned that the delta in future compliance dates will create risks to product availability. Thus, ITI requests that DOE align compliance schedules of both External Power Supplies and Battery Chargers to at least January 1, 2027, if, despite our objections, it intends to proceed with new proposed standards. We explain our rationale below.

In the world of consumer electronics, External Power Supplies and Battery Chargers go hand in hand. For example, a manufacturer of a coffee machine will not design a 24V power supply if its line of coffee machines cannot support 24V. Likewise, a smartphone or any battery powered device manufacturer has no incentive to create a fast-charge adapter if its line of devices cannot support the designed-for power specifications. In effect, for consumer electronics manufacturers, External Power Supplies are typically *complementary* products to Battery Chargers with product introduction and phaseout schedules *aligned with*, and not independent from, Battery Chargers.

If future compliance dates are not aligned, manufacturers of Battery Chargers that currently ship with a Level VI compliant, but not Level VII compliant, External Power Supply may need to either redesign the packaging of their Battery Chargers to accommodate a new External Power Supply, or simply pull existing Battery Chargers from the market early because of the proposed rule on External Power Supplies. Such disruptions are wholly unnecessary, and they can easily be avoided by setting a future effective date for both new standards of at least January 1, 2027. We note that, in the NOPR for both External Power Supplies and Battery Chargers, DOE assumed that 2027 was the first year of full compliance with the standards;[46] thus, a change to January 1, 2027 would better promote the objectives of the Process Rule (to lessen the impact of the proposed rule on product availability and utility) while not adversely impacting DOE's analysis.

[46] 88 Fed. Reg. 7287, 88 Fed. Reg. 16114.

Closing

ITI thanks DOE in advance for considering our additional comments on these important proposed rules. If you have any questions, please do not hesitate to reach out to me at rchaker@itic.org.

Sincerely,

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