Appliance Standards Awareness Project
American Council for an Energy-Efficient Economy
Natural Resources Defense Council

September 26, 2022

Mr. Jeremy Dommu
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Building Technologies Office, EE-5B
1000 Independence Avenue SW
Washington, DC 20585

RE: Docket Number EERE-2021-BT-STD-0018: Notification of Data Availability for Energy Conservation Standards for Commercial and Industrial Pumps

Dear Mr. Dommu:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), American Council for an Energy-Efficient Economy (ACEEE), and the Natural Resources Defense Council (NRDC) on the notification of data availability (NODA) for commercial and industrial pump standards. 87 Fed. Reg. 49537 (August 11, 2022). We appreciate the opportunity to provide input to the Department.

In the NODA, DOE presents shipment estimates and potential energy savings for pump categories currently subject to standards as well as additional pump categories, while also discussing a potential efficiency improvement approach based on motors and controls. We encourage DOE to perform a subsequent full economic analysis for all pump categories. In particular, we urge DOE to fully evaluate the motors and controls efficiency approach for the next phase of the rulemaking. We also encourage DOE to analyze an additional efficiency level (EL) associated with advanced motors for pumps greater than 1 hp and to analyze horsepower bins for each equipment class. Finally, we encourage DOE to consider standards for small vertical in-line (SVIL) pumps that effectively require ECMs to mitigate potential substitutions with circulator pumps.

We urge DOE to fully evaluate the motors/controls efficiency approach for the next phase of the rulemaking. Variable-speed drives (VSDs) allow a pump motor's speed to be adjusted to match the requirements of the system, which can reduce energy consumption significantly. For example, due to the cubic relationship between speed and power for pumps, reducing a pump's speed to reduce flow by 25% reduces power consumption by more than 50%. VSDs were considered as a technology option in the 2016 Final Rule but were ultimately screened out.[1] In the NODA, DOE discusses a motors/controls efficiency approach that considers improved motors and use of VSDs. While DOE acknowledges that the potential energy savings of the motors/controls approach could be substantially higher than estimated for the hydraulic re-design efficiency approach,[2] the Department did not include any results from the motors/controls approach in the downstream analysis.

[1]EERE-2011-BT-STD-0031-0056, pp. 3-29–3-35, 4-5. www.regulations.gov/document/EERE-2011-BT-STD-0031-0056
[2]87 Fed. Reg. 49548.

As discussed in our prior request for information (RFI) comments, VSDs offer large potential energy savings and operational benefits in both variable- and constant-load pumping applications even under high static head pressure conditions.[3] For example, a 2019 NEEA study found that about half of the pumps examined were used in variable-load applications, and energy savings of 43% could be achieved in these applications by utilizing VSDs. Importantly, even pumps with VSDs used in constant-load applications had estimated energy savings of 23%. For example, many pumps are oversized, so use of a VSD can provide significant energy savings even in constant load applications by "right-sizing" the pump to the actual system requirements. Thus, we encourage DOE to fully evaluate the motors/controls approach and incorporate it into the downstream economic and energy savings analysis.

In the NODA, DOE expresses concern about potential consequences and market disruptions associated with any standard level that would essentially require that pumps be sold with motors. While we acknowledge the concerns around the bare pump replacement market, the potential energy and cost savings of potential standard levels requiring motors/controls, including consumers replacing a bare pump, could be significant. A full economic analysis could include the impacts on replacement purchasers to better understand the overall cost-effectiveness of the proposed motors/controls efficiency approach.

We encourage DOE to analyze an additional EL associated with advanced motors for pumps greater than 1 hp. In Table III.10 of the NODA, DOE considers improved single-speed induction motors and VSDs as technology options at higher potential ELs for pumps larger than 1 hp. However, DOE should also include an "advanced motor" EL to include newer, more efficient motor topologies. For example, pumps sold with ECM motors, which were considered as a technology option for SVILs, are available up to at least 30 hp.[4] Further, other advanced motor topologies, such as synchronous reluctance motors, up to and exceeding 250 hp are on the market.[5] Thus, DOE should analyze additional ELs for the motors and controls approach based on the most advanced motor systems available on the market.

We encourage DOE to analyze horsepower bins for each equipment class. DOE's analysis presented in the NODA suggests that about half of pumps currently subject to standards are at the maximum-technologically feasible (max-tech) level, EL3, for the hydraulic re-design approach. Analyzing pumps in specific hp bins would enable DOE to consider revising standards for certain hp ranges. For example, data from the compliance certification database (CCD) suggest that there are many smaller hp pumps with efficiencies that significantly exceed the current standards. Figure 1 plots PEI as a function of pump hp for all bare pumps in the CCD.[6] While the calculation of PEI is intended to normalize pump efficiency across different sizes and specific speeds, it is apparent that most pumps with PEIs significantly below the current standard (e.g., less than PEI = 0.9) are 50 hp or less;[7] this suggests a significant energy savings opportunity from improved standards for smaller pumps since many models in the CCD consume 10-30% less energy than pumps just meeting the current standards. Thus, DOE should analyze hp bins

[3]EERE-2021-BT-STD-0018-0007, pp. 2-3. www.regulations.gov/comment/EERE-2021-BT-STD-0018-0007
[4]See for example: www.tacocomfort.com/product/oe-package/
[5]See for example: new.abb.com/motors-generators/iec-low-voltage-motors/process-performance-motors/synchronous-reluctance-motors
[6]Accessed on August 29, 2022. www.regulations.doe.gov/certification-data/#q=Product_Group_s%3A
[7]This trend is evident for three classes (ESCC, ESFM, and IL) when plotted individually, but is not observed for the RSV and VTS pump classes.

for each equipment class and consider revising standard levels for either some or all of the hp ranges depending on the results of this subsequent analysis.

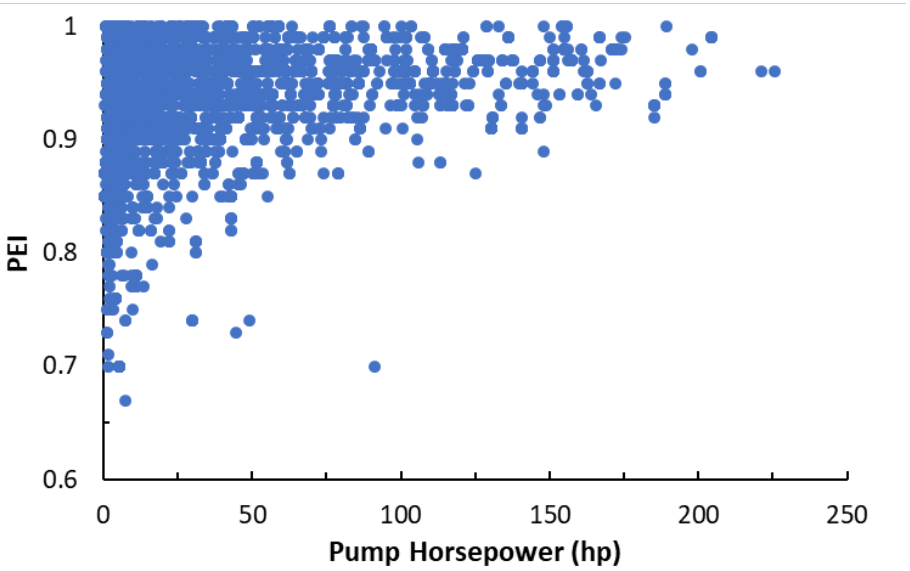

Figure 1: Certified bare pump PEIs as a function of pump horsepower for models in the CCD.[7]

We encourage DOE to consider standards for SVILs that effectively require ECMs to mitigate potential substitutions with circulator pumps. Consistent with the Circulator Pump Working Group (CPWG) recommendations,[8] there was broad support in response to the April 2022 pumps test procedure NOPR for inclusion of SVILs as commercial and industrial pumps. However, DOE has received conflicting feedback on whether potential SVIL standards should align with inline (IL) pumps or with circulator pumps. We understand that the potential for SVILs to be substituted for circulator pumps was the rationale for their suggested inclusion as commercial and industrial pumps as part of the CPWG. We also understand that SVILs are typically sold with motors/controls rather than as bare pumps. Thus, we encourage DOE to consider SVIL standards that effectively require SVILs to be sold with ECMs, which is consistent with the recommended EL for circulator pumps in the CPWG term sheet.[9] This would mitigate any potential concern with substitution of SVILs for circulator pumps.

Thank you for considering these comments.

Sincerely,

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[8]EERE-2016-BT-STD-0004-0058, pp. 1-2. www.regulations.gov/document/EERE-2016-BT-STD-0004-0058
[9]EERE-2016-BT-STD-0004-0098, p. 1. www.regulations.gov/document/EERE-2016-BT-STD-0004-0098

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