

The EPCA also directed the Department of Energy (DOE or the Agency) to conduct two cycles of rulemakings to determine whether to amend the standards set forth in the statute.¹ 42 U.S.C. §6295(e)(4). Following the first review cycle, DOE concluded that the standards should be updated, and promulgated new efficiency standards, published in the *Federal Register* as a final rule on January 17, 2001. Those standards took effect on January 20, 2004, and are currently in effect. 66 Fed. Reg. 4474 (Jan. 17, 2001) (the 2001 Final Rule). The DOE commenced the second mandated review cycle for residential water heaters in September 2006. 71 Fed. Reg. 67825 (Nov. 24, 2006). In April 2010, after the conclusion of the second review cycle, the DOE promulgated a final rule which sets forth the new Water Heater Efficiency Standards to take effect on April 16, 2015. 75 Fed. Reg. 20112 (Apr. 16, 2010) (the 2010 Final Rule); 10 C.F.R. § 430.32(d).

The Water Heater Efficiency Standards set forth the energy efficiency equations which establish the maximum energy usage for each of six classes of water heater products. The maximum energy usage is measured in terms of a minimum energy factor (EF), which varies depending on the water heater's storage volume, the type of energy it uses, and whether it is a storage, instantaneous, or tabletop model. 75 Fed. Reg. at 20122-20123. For example, relevant to the instant Application, the current minimum energy factor for electric storage water heaters is $EF = 0.97 - (0.00132 \times \text{Rated Storage Volume in gallons})$.² 10 C.F.R. § 430.32(d). Effective April 16, 2015, the minimum required energy efficiency level for electric storage water heaters will depend on the storage capacity of the unit. For units with a rated storage volume at or below 55 gallons, the standards require a minimum energy efficiency level of that $EF = 0.960 - (0.0003 \times \text{Rated Storage Volume in gallons})$. The consumption standard for units whose rated storage volume exceeds 55 gallons is $EF = 2.057 - (0.00113 \times \text{Rated Storage Volume in gallons})$. *Id.* The amended Water Heater Efficiency Standards will effectively require utilization of heat pump technology in water heaters larger than 55 gallons in order to achieve the energy efficiency levels specified by the new standards. The Agency projects that the new standards for water heaters will yield a cumulative energy savings of 2.58 quadrillion British thermal units (quads) over the next 30 years (2015-2045). 75 Fed. Reg. at 20115.

B. The Application for Exception

Vaughn, headquartered in Salisbury, Massachusetts, is a small firm engaged in the manufacturing of residential and commercial water heaters and electronic water heater controls. The firm requests exception relief for its "ME" series of electric storage water heaters with storage capacities of 80, 100, and 120 gallons (models ME80, ME100, and ME120, respectively). The ME line of electric storage water heaters is used by electric utility companies in electric thermal storage (ETS) or demand response (DR) load management programs. Such water heaters are equipped with electronic two-way communication devices which allow an

¹ The EPCA provides that any new or amended energy conservation standard that DOE prescribes must be designed to "achieve the maximum improvement in energy efficiency . . . which the Secretary determines is technologically feasible and economically justified." 42 U.S.C. § 6295(o)(2)(A).

² The Rated Storage Volume equals the water storage capacity of a water heater, in gallons, as specified by the manufacturer. 10 C.F.R. § 430.32(d).

electric utility or grid operator to manage peak loads and store energy generated during off-peak hours.

In its Application, Vaughn asserts that water heaters that use heat pump technology are not capable of the same functionality as electric resistance water heaters for use in ETS or DR programs, and this “incompatibility” of heat pump water heaters makes exception relief necessary. Application for Exception at 8. Vaughn contends that “several studies . . . confirm that heat pump water heaters are not ready for use in mass markets.”³ *Id.* at 3, n. 3.

Vaughn maintains that, in the absence of exception relief, the firm “will be precluded from manufacturing a significant percentage of one of its core products, utilities will be precluded from enjoying the benefits of traditional ETS programs in addition to facilitating renewable energy integration and fast regulation services from grid-enabled products . . . , consumers will be denied the opportunity to participate in programs that help keep electric water heating costs affordable, and society will be denied the opportunity to reduce carbon emissions by substituting generation sources such as wind and solar for more traditional fossil fuel sources.” *Id.* at 9. Therefore, Vaughn asserts, denial of exception relief “will result in serious hardship, gross inequity or unfair distribution of burdens to Vaughn and others” *Id.* at 14.

C. Comments

OHA received several interested-party comments regarding Vaughn’s Application for Exception. In a comment filed jointly by the Natural Resources Defense Council (NRDC), the National Rural Electric Cooperative Association (NRECA), and the American Council for an Energy-Efficiency Economy (ACEEE) (collectively, “the public interest groups”), the groups recognized the potential benefits of grid interactive-water heating, but noted that “the technical, economic, and environmental analysis of grid-interactive and storage water heating is complex, dynamic, and at a nascent but rapidly improving state.” Public Interest Groups Comment at 2. The groups further stated that while it may be possible to achieve the same benefits from grid-interactive heat pump water heaters as from grid-interactive electric resistance water heaters, “that remains undemonstrated and an area for further analysis, and does not fit with [Vaughn’s] current capabilities and approach.” *Id.* at 2-3. The groups opined that Vaughn’s approach “appears thoughtful,” and “the risk of leakage or bypassing of the water heater efficiency standards without commensurate development of grid-interactive and storage capabilities appears limited.” *Id.* at 2.

Edison Electric Institute (EEI), the association that represents all U.S. investor-owned electric companies, filed a comment “for the limited purpose of emphasizing the energy savings benefits and demand response benefits associated with large-scale grid interactive water heaters – savings

³ In its Application, Vaughn relied on a 2013 study undertaken by the DOE’s Pacific Northwest National Laboratory (PNNL), “Demand Response Performance of GE Hybrid Heat Pump Water Heater.” Vaughn cites the study’s “conclusion” that “further research is required” due to the limited nature of the experiment. *See* Application for Exception at 7. However, that caveat aside, the report ultimately concluded that heat pump water heaters are equally capable of performing the load management functions necessary for ETS or DR programs. *See* “Demand Response Performance of GE Hybrid Heat Pump Water Heater”, <http://www.pnnl.gov/main/publications/eternal/technical-reports/PNNL-22642.pdf>.

and benefits that will be lost if Vaughn and other manufacturers must discontinue production.” EEI Comment at 1.

Similarly, Steffes Corporation (Steffes), a manufacturer of electronic communication devices applied to grid-interactive water heaters, filed a comment in support of Vaughn’s request for exception relief. In its comment, Steffes asserts that “many parties will suffer hardship in the absence of relief, including Vaughn, utilities, renewable energy developers and, most especially, consumers.” Steffes Comment. Steffes further maintains that heat pump water heaters are not adequate substitutes for electric resistance water heaters in ETS or grid-interactive applications. *Id.*

PJM Interconnection (PJM), a grid operator, filed a comment emphasizing the benefits of grid-interactive programs using electric resistance technology to consumers and the electric utility industry. PJM Comment at 1. PJM asserts that the use of electric resistance water heater technology for grid-interactive programs was “not thoroughly considered when the [2010] Final Rule was promulgated” and exception relief is necessary to abate unintended consequences of the rule. *Id.* at 2.

GE Appliances and Lighting (GE) filed the lone comment in opposition to Vaughn’s Application for Exception. In its comment, GE asserts that Vaughn had ample notice of the impending efficiency standards and did not make the necessary investments or adjustments in its research and production. Therefore, GE contends that, to the extent that Vaughn suffers any hardship following implementation of the new efficiency standards, such hardship is attributable to Vaughn’s “discretionary business decision” not to pursue alternate technology, rather than to the new standards themselves. GE Comment at 4-5. In addition, GE contends that heat pump water heaters are an adequate replacement for electric resistance water heaters in ETS and grid-interactive programs. In that regard, GE notes that its own GeoSpring heat pump water heater is capable of attaining the same functionality as electric resistance water heaters in such programs. *Id.* at 8-10.

II. Analysis

Section 504 of the Department of Energy Organization Act, 42 U.S.C. § 7194(a), authorizes the Secretary of Energy to make “such adjustments to any rule, regulation, or order” issued under the EPCA, consistent with the other purposes of the Act, as “may be necessary to prevent special hardship, inequity, or unfair distribution of burdens.” The Secretary has delegated this authority to the DOE Office of Hearings and Appeals (OHA), which administers exception relief pursuant to procedural regulations codified at 10 C.F.R. Part 1003, Subpart B. Under these provisions, persons subject to the various product efficiency standards of Part 430 promulgated under DOE’s rulemaking authority may apply to OHA for exception relief. *See, e.g., Diversified Refrigeration, Inc.*, OHA Case No. VEE-0073 (2001); *Midtown Development, L.L.C.*, OHA Case No. VEE-0073 (2000); *Amana Appliances*, OHA Case No. VEE-0054 (1999). Prior OHA decisions clearly place the burden upon the applicant to establish the basis for its claim for exception relief from DOE regulatory provisions. *See, e.g., Sauder Fuel, Inc.*, OHA Case No. TEE-0059 (2009); *Diversified Refrigeration, Inc.*, OHA Case No. VEE-0079 (2001); *Amana Appliances*, OHA Case No. VEE-0054 (1999).

We have carefully reviewed Vaughn's Application for Exception, as well as the comments received from interested parties. As explained below, we have determined that exception relief is not warranted in this case and, consequently, Vaughn's Application should be denied.

The central premise of Vaughn's Application is that heat pump water heaters are incompatible for use in ETS systems which currently rely on large capacity electric resistance water heaters. Vaughn asserts that, unlike heat pump water heaters, electric resistance water heaters can heat and store water at temperatures higher than required for normal residential use, which can further increase their thermal storage capacity. Vaughn further argues that heat pump water heater compressors are incompatible with ETS and DR technology since they are operationally unable to cycle on and off rapidly in small, discrete increments like electric resistance water heaters. Application for Exception at 7. According to Vaughn, a July 2013 PNNL study confirms that heat pump water heaters are not ready for use in utility ETS and demand response programs. *Id.* at note 14, citing "Demand Response Performance of GE Hybrid Heat Pump Water Heater", http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-22642.pdf. Quoting the report, Vaughn asserts that "since [heat pump water heaters] DR characteristics are currently unknown . . . further research is required." *Id.*

To that end, we note that PNNL has now conducted further research regarding the compatibility of heat pump water heaters with ETS and DR systems. PNNL's findings are set forth in two comprehensive reports issued in March 2015, which conclude in pertinent part:

Through experimental testing of one large-tank ERWH and one large-tank HPWH under identical environmental conditions, hot water draw patterns, and DR scenarios, it was demonstrated that large-tank HPWHs are technically capable of performing DR services in both existing DR programs (e.g., peak load reduction) and future programs that require frequent short-term responses (i.e., ramping), without adversely impacting efficiency, consumer delivery temperatures, or equipment life. The experiments indicate that the HPWHs can effectively be utilized in DR programs, especially in existing peak load management programs, without sacrificing the efficiency of the HPWH. In addition, even though ERWHs have 4 times the power demand than HPWHs, the HPWH showed to be ~10% and 5% more available to provide peak load reduction and short-term response services, respectively. With the inherent peak load reduction resulting from increased efficiency of HPWHs and the increased availability of HPWHs to provide DR services, it appears that HPWHs can be effectively and efficiently used in DR programs to curtail peak power use and manage 1–2 hour ramping events (short-term).

"Evaluation of the Demand Response Performance of Large Capacity Electric Water Heaters", http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23527.pdf, at 3.1–3.2 (March 2015); *see also* "Analysis of Large-Capacity Water Heaters in Electric Thermal Storage Programs", http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23697.pdf (March 2015). On the basis of the findings set forth in the more recent PNNL reports, we reject Vaughn's assertion that heat pump water heaters are incompatible with ETS systems.

Accordingly, we find no support for Vaughn's contention that the firm will suffer a serious hardship, gross inequity or unfair distribution of burdens as a result of the amended Water Heater Efficiency Standards that become effective April 16, 2015.

III. Conclusion

As explained above, Vaughn has failed to satisfy its burden of establishing that, if required to comply with the new Water Heater Efficiency Standards that will take effect on April 16, 2015, the firm will suffer serious hardship, gross inequity, or an unfair distribution of burdens as the result of a DOE rule, regulation, or order. Therefore, we find that exception relief is not warranted in this case.

It Is Therefore Ordered That:

(1) The Application for Exception filed by Vaughn Thermal Corp., on November 21, 2014, OHA Case No. EXC-14-0003, is hereby denied.

(2) Any person aggrieved or adversely affected by the denial of a request for exception relief filed pursuant to § 504 of the Department of Energy Organization Act, 42 U.S.C. § 7194, may appeal to the Federal Energy Regulatory Commission, in accordance with the Commission's regulations.

Poli A. Marmolejos
Director
Office of Hearings and Appeals

Date: April 9, 2015