

Application for Exception
United States Department of Energy
Office of hearings and Appeals

In the Matter of:)

Vaughn Thermal Corporation)
P.O. Box 5431)
26 Old Elm Street)
Salisbury, MA 01952)

Case No.: _____

Pursuant to regulations of the Department of Energy (“DOE”), Office of Hearings and Appeals (“OHA”), 10 C.F.R. Part 1003, Subpart B, Exceptions, GE Appliances & Lighting (“GE”) files these comments in response to the Application for Exception Relief (“Application”) filed by Vaughn Thermal Corporation (“Vaughn”) in the above matter. The energy conservation standard from which Vaughn seeks relief is set forth in 10 C.F.R. Pt. 430.32(d) (“Final Rule”). It provides that large capacity electric resistance water heaters, i.e., 55 gallons or larger, manufactured on or after April 16, 2015 must have an energy factor of $2.057 - (0.00113 \times \text{Rated Storage Volume in gallons})$ or greater.

For the reasons discussed, *infra*, Vaughn’s application does not meet the criteria for relief set forth in 10 C.F.R. Part 1003.20 and should be denied.

December 3, 2014
General Electric Co.,
operating as GE Appliances & Lighting

I. Background

GE Appliances & Lighting (“GE”), is an operating division of General Electric Company. The Appliances component manufactures major household appliances, including, as relevant to this proceeding, heat pump water heaters (“HPWH”). GE produces these products at one of its factories at Appliance Park in Louisville, Kentucky, which is the headquarters of the Appliances business and its largest manufacturing operation.

The HPWH was the first new product to be introduced at Appliance Park in its 50-year plus history. The decision to add this product to the business’ line-up marked a reversal of a business model built on outsourcing. The HPWH was the exemplar of the new insourcing model: its first version had been built in China but in 2010, 180 jobs were added to the Appliance park workforce to manufacture the second generation replacement model.

EPA was the first to recognize the superior energy performance of HPWHs when it selected GE’s product as the first to qualify for the ENERGY STAR Program in 2008. In 2006 DOE commenced the water heater energy conservation rulemaking that resulted in the 2010 Final Rule at issue here requiring heat-pump technology for electric water heaters \geq 55 gallons.¹ DOE’s and EPA’s focus on HPWHs played critical roles in GE’s decisions to develop its first model.

On September 27, 2006, DOE commenced the rulemaking that resulted in the Final Rule² and the Notice of Proposed Rule was issued on December 11, 2009.³ The Secretary’s decision to commence a rulemaking for large-capacity water heaters was supported by an analysis, issued with the Final Rule that showed the new standard will result in energy savings equal to 2.58 quads during 2015–2045, which is equivalent to all the energy consumed by nearly 13.8 million American households in a single year. These energy savings will result in cumulative greenhouse gas emissions reductions of approximately 151 million tons (Mt) of carbon dioxide (CO₂), or an amount equal to that produced by approximately 42 million cars every year.⁴ Clearly, the policy objectives of the Energy Policy and Conservation Act⁵ are advanced by energy savings and avoided GHG emissions of this magnitude.

In anticipation of the 2015 effective date of the Final Rule, GE began developing an 80 gallon HPWH, which is now being sold. Vaughn acknowledges that HPWHs are significantly more

¹ Energy Conservation Program: Energy Conservation Standards for Residential Water Heaters, Direct Heating Equipment, and Pool Heaters; Final Rule 75 Fed. Reg. 73, 20112 (April 16, 2010) (codified at 10 C.F.R. Pt. 430.32), referred to hereinafter as “Final Rule.”

² Rulemaking Framework for Residential Water Heaters, Direct Heating Equipment, and Pool Heaters, http://www.eere.energy.gov/buildings/appliance_standards/residential/pdfs/heating_equipment_framework_092706.pdf (2006).

³ 74 F.R. 237 (2009)

⁴ Energy Conservation Program: Energy Conservation Standards for Residential Water Heaters, Direct Heating Equipment, and Pool Heaters, 75 F.R. 73 at 20115-16.(2010)

⁵ 42 U.S.C. 6291 et seq.

efficient than conventional electric resistance water heaters.⁶ Notwithstanding its energy efficiency, however, Vaughn contends that HPWHs “have certain limitations that would prevent their use in grid-interactive electric thermal storage applications currently and for an undefined transition period.”⁷

The basis of Vaughn’ Application is the claimed

“... marketplace challenges to [HPWH] use in either ETS programs or, importantly, in the transition to full GIWH application. For instance, HPWH’s require more space than is normally available in homes that traditionally have used utility ETS programs. In addition, the ability of HPWH’s to heat water to high temperatures when using only the compressor is not well established.

Likewise, in GIWH [grid-interactive water heater] applications, HPWH compressors are operationally unable to cycle on and off rapidly in small, discrete increments like electric resistance heating elements can, making the vapor-compression component of the heat pump water heater unable to provide frequency regulation services utilizing GIWH control technology. This severely limits a heat pump water heater’s ability to perform as a substitute for fossil fuel generation for grid services.”⁸

As discussed more fully, *infra*, even is accepted as valid—and the facts do not support that conclusion—Vaughn is not entitled to Exception relief.

II. Section 504 Exception Relief is equitable in nature and available only on a showing of extraordinary circumstances beyond the control of petitioner.

OHA’s authority is limited to that granted by Section 504. It can relieve a manufacturer from the impact of unintended consequences such as external events that occur *after* a standard has been adopted or development of new products or features not contemplated by the standard.

Thus, OHA granted Diversified Refrigeration, Inc.,⁹ an additional six months to comply with the 2001 built-in refrigerator efficiency standard because DRI had been unable to attract engineers

⁶ Application, p. 6.

⁷ Vaughn argues that its products contain “a bridge technology that will assist in the transition from current ETS (where a water heater may be controlled by something as simple as a time clock) to full integration of [grid-interactive water heater] GIWH with its panoply of functions including the provision of ancillary services.” *Ibid.*, p. 6.

⁸ *Ibid.* p.7, referring to comments submitted by “numerous electric cooperatives” to DOE’s 2012 RFI, <http://www.regulations.gov/#!docketBrowser;rpp=25;po=0;dct=PS;D=EERE-2012-BT-STD-0022>, the results of which led to DOE’s Notice of Proposed Rulemaking, <http://www.regulations.gov/#!docketBrowser;rpp=25;po=0;dct=PS;D=EERE-2012-BT-STD-0022>.

⁹ VEE-0079 (2001); “[T]he record indicates that DRI encountered significant difficulties hiring and retaining, either as employees or on a contract basis, the number of engineers that it needed. DRI attributes these problems to the competitive environment for engineers, which was exacerbated in the refrigeration industry by the approaching effective date of the new standards.”

to develop compliant products. OHA granted a two-year extension when the lighting industry's ability to comply with more stringent efficiency standards for certain CFL lamps was impeded when China restricted export of rare earths from which critical phosphors are derived.¹⁰ And it exempted refrigerator manufacturers from energy testing requirements because the test procedure did not contemplate features developed after that rule had become final.¹¹

But, OHA cannot relieve a manufacturer from the impact of business decisions made with knowledge that regulations would disrupt its operations.

In ECR International,¹² OHA noted the following:

[Petitioner] does not argue that it is unable to produce a unit which complies with the [the] standard. Rather, its arguments focus on the inconvenience and undesirability of redesigning the unit. These arguments – that the company does not have time to redesign the unit and that the customer does not want a redesigned unit – are insufficient justifications for an exception from the energy standards. Neither assertion outweighs the importance of energy conservation, particularly in light of the nation's growing energy needs.

Much the same could be said of Vaughn's application. Its arguments, like those of prior cases where OHA has denied relief, disclose the "discretionary" nature of its business decisions not to invest in developing or make arrangement to purchase a compliant product. Vaughn's decisions, therefore, constitute the "primary" business decisions for which OHA has declined to provide relief:¹³

For example, in Refricenter International,¹⁴ OHA's analysis made the point that:

[E]xception relief is not appropriate where a firm makes a choice that does not reasonably take into account its regulatory obligations. In such cases, we refer to the choice as the "primary" cause of the firm's difficulty.¹⁵

DOE commenced the rulemaking that resulted in the Final Rule on September 27, 2006.¹⁶ That is the date from which Vaughn is deemed to have had notice that a new water heater standard

¹⁰ Phillips Lighting, et al. EXC-12-0001-3: " ... changes in the export quota have reduced the amount of rare earth available for export from China by almost half since the Final Rule was adopted in 2009."

¹¹ Liebherr Canada, Ltd., EXC-13-0004 (2013); See also GE Appliances & Lighting, OHA Case No. TEE-0077 (2011); see also DLU Lighting USA, OHA Case No. EXC-12-0010 (2012); United CoolAir Corp., OHA Case No. TEE-0062 (2010); Refricenter International, OHA Case No. TEE-0024 (2005).

¹² TEE-0034 (2006).

¹³ Refricenter International, *ibid.*, citing Viking Range Corp., 28 DOE ¶ 81,002 (2000).

¹⁴ TEE-0025 (2005).

¹⁵ Sub-Zero Freezer Co., GE Appliances, Whirlpool Corp. Case Nos. VEA-0015, VEA-0016 and VEA-0017 (2000), citing Ince Minerals Corp., 3 DOE ¶ 81,136 at 83,498 (1979).

would be promulgated. Thus, Vaughn and every other electric water heaters manufacturer has had almost ten years notice of the likelihood of the need to develop or enter into purchase arrangements for high-efficiency large-capacity products. And, since April 2010, they have had actual knowledge that a new standard for large-capacity products would become effective in April 2015. Yet, Vaughn has provided no evidence or information of research, product development or sourcing activities.

No fact or event has intervened since April 2010 to change the fact of the new standard or the consequences for conventional large-capacity products. Vaughn argues that electric thermal storage and demand response programs rely on conventional electric products

Utilities have conducted electric thermal storage and demand response programs well before 2010 and continue to do so today. Indeed, with the ever-increasing interest in renewables and also in avoiding the cost of adding capacity, utilities, governments and efficiency advocates have joined generators and aggregators to press for the expansion of these programs. Only the wilfully blind or the obdurately opposed would now be seeking a *deus ex machina* solution from OHA to save them from their failure to plan.

Nor is Vaughn confronted by “unique mitigating circumstances,[in which] a firm might be granted exception relief where the business decision was the most viable among more precarious options.”¹⁷

Like that case, Vaughn has made no such showing. Its Application must be seen as a standard-issue discretionary business decision.

Prior decisions of this office have long established that a firm may not receive exception relief to alleviate a burden attributable to a discretionary business decision rather than to the impact of a DOE rule, regulation, or order. See GE Appliances & Lighting, OHA Case No. TEE-0077 (2011); see also DLU Lighting USA, OHA Case No. EXC-12-0010 (2012); United CoolAir Corp., OHA Case No. TEE-0062 (2010); Refricenter International, OHA Case No. TEE-0024 (2005).¹⁸

In Refricenter Int’l, we denied exception relief to an appliance distributor. The appliance distributor *had been aware of DOE’s regulatory requirement for at least five years, as well*

¹⁶ Rulemaking Framework for Residential Water Heaters, Direct Heating Equipment, and Pool Heaters, http://www.eere.energy.gov/buildings/appliance_standards/residential/pdfs/heating_equipment_framework_092706.pdf (2006).

¹⁷ Viking Range Corp., *supra*

¹⁸ Felix Storch Inc., Case No.: EXC-14-0001 (2014)

*as the existence of technology capable of meeting the requirement. Yet, the appliance distributor chose not to invest in complying technology. (emphasis supplied)*¹⁹

III. Vaughn Corp. made a discretionary business decision to manufacture a product with full knowledge of the impending Final Rule from which it now seeks Exception Relief.

As Vaughn notes, in 2013 a group of stakeholders, including GE, agreed on compromise language to the Shaheen-Portman energy bill²⁰ that would have amended Section 325(e) of the Energy Policy and Conservation Act²¹ to provide *limited* and *temporary* relief from the 2015 standard to allow utility-sponsored programs to use large-capacity conventional electric resistance water heaters *until* the next scheduled DOE rulemaking, a rulemaking for which would begin no later than 2017.

In addition to the fact that Congress failed to act on Shaheen-Portman, OHA must not rely on the compromise agreement for other reasons. It was arrived at under the pressure of legislative scheduling, not careful analysis. Further, unlike Congress, OHA cannot impose the administrative systems necessary to provide requisite safeguards, such as

- requiring manufactures to report to DOE the number of units sold
- requiring utilities to report to DOE the number of units enrolled in electric thermal energy or demand response programs
- mandating that the Secretary of Energy establish procedures to capture the above information and to adopt other measures to prevent product diversion

As noted above, Vaughn has been aware of the *possibility* that large-capacity conventional electric resistance water heaters would be banned since 2006, and of the actual ban since April 2010. Yet, it continued to produce large-capacity conventional electric resistance water heater disregarding the multiple reaffirmations by the Secretary of the plan to transition to HPWH technology.

He first declined to do so when the Final Rule was adopted and once again when, on issuing the February 2013 Notice of Proposed Rulemaking on establishing a waiver process, the request to create a new grid-enabled product category was denied:

[T]he April 2010 Final Rule established an energy conservation standard that would effectively require the use of heat pump technology to meet the minimum energy conservation standard for large-volume electric storage water heaters. Utility companies

¹⁹ United CoolAir, *supra*.

²⁰ S. 761.

²¹ 42 U.S.C. 6295(e).

presented concerns about the feasibility of continuing ETS programs without the use of large-volume electric resistance water heaters (ERWHs). Utilities believe the practicability of heat pump water heaters (HPWHs) are such that HPWHs may not be able to fill the same role as large-volume ERWHs in ETS programs. (The capability of HPWHs or multiple small-volume (i.e., storage volume of 55 gallons or less) water heaters to serve the needs of ETS programs is discussed further in section O.) In light of the perceived lack of viable alternatives to large volume ERWHs for ETS programs, utility companies are concerned that participation in ETS programs may be reduced or eliminated after the standards take effect in 2015, which would eliminate the numerous benefits to consumers, utilities, and the Nation resulting from ETS programs. Because of their concerns, utilities requested that DOE consider allowing for the manufacture of large-volume ERWHs solely for ETS applications.

The Joint Utilities urged the Secretary to use the authority granted pursuant to 42 U.S.C. 6295(o)(2)(A) to develop a new standard for large-volume electric resistance water heaters that interact with the grid.

After considering the comments regarding the potential for establishing a separate product class for “grid- interactive water heaters” as proposed by the Joint Utilities, DOE has tentatively concluded not to propose such an approach. In particular, DOE agrees with the Joint Efficiency Advocates and GE that under 42 U.S.C. 6295(o)(1), DOE is prohibited from promulgating any standard that increases the maximum allowable energy use or decreases minimum energy efficiency of a covered product.²²

The above makes clear that the Secretary rigorously analyzed the information presented by Vaughn and other proponents of continued manufacture of large-capacity electric resistance water heaters and, for reasons founded on EPCA, rejected them.

Whatever the impact of the Final Rule on its operations, Vaughn has not exhausted all reasonable options before seeking OHA relief. Its Application does not recite failed efforts to develop or to partner with others to develop a compliant product. Nor does it discuss attempts to make arrangements to purchase compliant products to which it could install its grid-connected control. In any event and as discussed below, since HPWHs are indeed fully capable of ETS and DR functions, the Final Rule has not created a situation from which relief is needed.

²² Docket Number EERE-2012-BT-STD-0022, 78 F.R. 38 at 12971, 12978, 12979 and 12980.

IV. HPWHs are fully capable of performing grid-interactive electric thermal storage functions.

Many of the claimed HPWH shortcomings identified in 2012, have been resolved by GE and other manufacturers. For example, GE's 50- and 80-gal GeoSpring HPWHs do not take up more space than and can attain the same or higher (e.g., 175 F^o) temperatures as conventional electric resistance models, owing to GE's use of HFC 134a refrigerant. And, when operating in electric resistance mode, which they can do, they still operate with more overall operational efficiency than all-electric resistance models: with energy use reduction exceeding, on average, 60%, or \$368/year,²³ HPWHs provide superior consumer benefits that outstrip utility DR incentives, which average \$58/year.²⁴

Beginning in 2010, GE has worked with DOE to improve and demonstrate the capability of its HPWH, not only to deliver superior energy efficiency but also to function as a grid-interactive electric thermal storage product.

Because it recognized the role that water heaters can play in utility demand response programs, DOE asked the Pacific Northwest National Laboratory to analyze the suitability of HPWHs for inclusion in such programs. The July, 2013 report states:

Significant penetration of heat pump water heaters (HPWH) offers a significant opportunity for energy savings, with a theoretical energy savings of up to 63% per water heater and up to 11% of residential energy use (EIA, 2009). However, significant barriers must be overcome before this technology will reach widespread adoption in the Pacific Northwest region and nationwide. One barrier is that the demand response (DR) performance and characteristics of HPWHs is unknown. Previous research has demonstrated the potential of [electric resistance water heaters] ERWH to provide significant grid stability and control benefits through demand side management, or DR, strategies (Diao et al, 2012). However, if ERWH are to be replaced with HPWH to improve residential energy efficiency, it is important to understand the DR characteristics of HPWHs and how these characteristics will impact DR programs and overall grid stability now and in the future.²⁵

The PNNL paper concludes:

In general, the HPWH provides approximately 38% of the peak reduction or INC balancing response of the ERWH, when accounting for differences in power use and use profiles of the water heaters. The ERWH provides more dynamic response with a high magnitude of power increase or decrease per water heater. However, the HPWH has longer and more frequent operating times, which means the HPWH has a higher likelihood of being able to

²³ ENERGY STAR website, http://www.energystar.gov/index.cfm?c=heat_pump.pr_savings_benefits

²⁴ Per utilities' survey cited in their joint comments filed in waiver rulemaking, Docket Number EERE-2012-BT-STD-0022, 78 F.R. 38 at 12974.

²⁵ Demand Response Performance of GE Hybrid Heat Pump Water Heater, SH Widder, JM Petersen, GB Parker, MC Baechler, Pacific Northwest National Laboratory, U.S. Department of Energy, under Contract DE AC05 76RL01830 (July, 2013). See Exhibit 1, attached.

respond when an INC [Increase in generation capacity] event or peak curtailment is called for. In addition, the inherent efficiency savings of HPWH (61.7 ± 1.7%) will result in some permanent peak savings as well.

A team of investigators from Oak Ridge National Laboratory (ORNL), the Tennessee valley Authority (TVA) and Vanderbilt University resolved the demand response capability questions in its 2014 paper,²⁶ as did the study by Great Rivers Energy, a wholesale electric service to 28 distribution cooperatives in Minnesota and Wisconsin serving more than 650,000 households and a potential Vaughn customer. Its 2012 study, undertaken in anticipation of the 2015 Final Rule, concluded that HPWHs are suitable for peak load shaving and thermal storage programs. It also determined that their consumers like them.²⁷

Vaughn's last argument is that HPWHs cannot perform frequency regulation. This argument is based on the claim that HPWH compressors cannot cycle on and off as many times a day as utilities might require. But, as shown above, HPWHs can provide frequency regulation when operated in electric resistance mode.

Vaughn' argument for Exception Relief is based on utilities' need for products capable of the below listed functions. But, as noted, the facts do not support its position:

- Load management – the studies by PNNL and ORNL showed that load management can be fully achieved using HPWHs, while reducing the overall load, thereby reducing the need for extraordinary load management responses
- Renewable energy integration – the above studies also show that the thermal storage and demand response capabilities of HPWHs facilitate integration of renewables
- Frequency response – can be achieved using electric element switching for individual fast response, or with “banks” of HPWHs using either electric elements or operating the units in hybrid heat pump mode at the utilities' discretion.

GE's 80-gal GeoSpring model is accessible for communication and control via an RJ45 communication port positioned on the control face. Utilizing a wifi communication module and signals delivered to the unit by utilities or other aggregators through the GE Cloud, the

²⁶ Effect Of Setup Thermostat Schedule On Heat Pump Water Heater Energy Consumption, Coefficient Of Performance And Peak Load, Philip Boudreaux, Roderick Jackson, Jeffrey Munk and Anthony Gehl, Oak Ridge National Laboratory; David Dinse, Tennessee Valley Authority; Christopher Lune, Vanderbilt University.

²⁷ Great Rivers Energy's Heat Pump Water Heater Pilot Program, Vicki Belanger (2012). See Exhibit 2, attached.

GeoSpring can be made to respond with mode changes (e.g. Hybrid to Electric mode) to determine the “level” of affected load, and with temperature set point changes which can power or idle the selected heating source as required providing the ability to deliver peak reduction, peak shifting, electric thermal storage or frequency response benefits as needed by utilities. Vaughn’s controls can be applied to GeoSpring products. In situations where the on-off cycle requirement is extremely short, with development, Vaughn’s control could be configured with direct access to heating elements if the rate of communication benefit provided by such a device to an individual unit becomes crucial to the effective delivery of frequency response behavior for utilities. GE would be open to participating in such development activity should it be requested.

The advances in HPWH technology since DOE’s observation, relied on by Vaughn, that “[heat pump water heaters] that are *currently available* on the market that meet the April 2010 standard levels may not be practical to fulfill the needs of utility ETS programs ...”²⁸ make that observation invalid (emphasis supplied), no longer valid.

V. Conclusion


Vaughn’ Application for Exception Relief should be denied. The concerns raised by the Application are already being addressed by the Secretary per the Notice of Proposed Rulemaking to create a waiver procedure for water heater manufactures. That is a better process for analyzing the facts and balancing the conflicting policy objectives that Vaughn has raised.

For all the above reasons, the Application should be denied.

Respectfully submitted,

General Electric Co.

by:

A handwritten signature in black ink, appearing to read "Earl F. Jones", is written over a horizontal line. The signature is stylized and cursive.

Earl F. Jones,
its authorized representative

²⁸ Application, p. 6, citing 78 Fed. Reg 65, 12978 (2010)

CERTIFICATION

I hereby certify that GE has mailed a complete copy of its comments opposing the Appeal filed in Case No.: _____, Application of Vaughn Thermal Corp., to the below parties.

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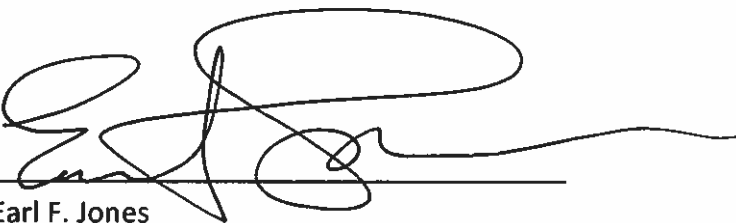
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DULY AUTHORIZED REPRESENTATIVE

I hereby certify that I have filed the foregoing Request for Extension of Time as the duly authorized representative of General Electric Co.



Earl F. Jones