



» New Fan Energy Ratings regulation will have a huge impact on the HVACR industry when they go into effect in 2019.

Regulations

RSES Journal's first-ever Double Feature issue includes two double features.

The following double feature focuses on regulations related to the U.S. Department of Energy's Fan Energy Ratings (FER) and upcoming refrigerant rules. The FER regulation feature discusses the potential for regulatory compliance to actually drive technical innovations in the HVACR industry. The refrigerants feature provides a global perspective on a handful of worldwide refrigerant regulations and how they are impacting the industry.

IS *Regulation* THE MOTHER OF INVENTION?

How regulatory compliance—including DOE’s Fan Energy Ratings (FER)—can drive technical innovations that benefit the HVACR industry.

BY DEEP DEY

New or revised federal regulations intended to reduce energy consumption, emissions and other environmental issues can blindside corporations. In many cases, the regulation can doom entire product lines to obsolescence in a matter of years. Across industries, a new regulation may require investing millions of dollars in research, development and retooling to meet the deadlines for the new guidelines—an often heavy and unwanted investment.

Yet paradoxically, regulatory demands can accelerate innovation and competition, as engineering enhancements initially intended simply to satisfy the new energy requirements turn into competitive advantages and novel technologies.

For example, from 1975–2007, a series of federal mandates required the automotive industry to increase the average fuel economy of cars from 15 mpg in 1975 to an unimaginable 35 mpg by 2020—regulations considered by many in the industry to be unreasonable, if not impossible. Yet, striving to meet the new standards yielded unexpected benefits for automakers and consumers. The new, more fuel-efficient cars sold briskly, dramatically increasing the domestic market share against foreign imports. The U.S. moved from being an oil importer to an oil exporter as demand for gasoline fell. Consumers are saving an average of \$8,000 over the life of their cars. This led to hybrid and electric cars coming to the market. All of these are positive side effects of regulatory compliance¹.

DOE’s Fan Energy Ratings (FER)

In June 2014, the Department of Energy (DOE) issued a new regulation imposing the first national efficiency standards for furnace fans. The new standards, which would take effect in 2019, specify maximum fan energy ratings based on the airflow provided by furnace fans, with the rating disclosed on every fan, much as ENERGY STAR rating stickers are attached to household appliances.

The goals of the FER mandate are to reduce energy consumption in furnaces by approximately 40% in 30 years, saving an equivalent of 500 billion kWh—energy savings equal to the annual electricity use of about 47 million U.S. households—and lower CO₂ emissions by 180 million megatons. With furnace fans consuming an average of 10% of a home’s total energy cost, the regulations promised to save consumers \$29 billion over decades². The potential economic and environmental impacts are huge. Rhea Suh, President of the Natural Resources Council noted, “They will save about the same amount of energy as all the coal burned in the U.S. to generate electricity in a year.”³

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For fan and motor manufacturers, the 33 pages outlining the FER standards⁴—and the short deadline—promise an equally huge impact on their businesses. The last furnace energy standards were set in 1987; the 2014 rules are the first regulations specifically aimed at furnace fans⁵. Bringing their product lines up to the new standards would likely require an investment in redesigning existing motors or developing new technologies.

The new requirements are having a significant impact on motor manufacturers, HVAC OEMs, fan and motor OEMs, distributors, contractors, technicians and households—and the impact and cost were largely unknowns initially.

Different motor manufacturers responded to the new FER regulations in different ways. Some argued that the four-year turnaround to meet the 2019 deadline would be impossible. Others report they have yet to test their motors to determine what energy efficiency improvements will be required. Other companies simply made the investment, developed innovative solutions, and performed the work necessary to make their motors and fans compliant by July 2019—looking for competitive advantages along the way.

A compliance resource channel

Motor manufacturers worked to ensure that their product lines met the FER guidelines. But the companies and OEMs that would be incorporating the motors into their furnaces, HVAC systems and fan arrays had their own compliance challenges: specifying the right FER-compliant motors for the output, performance requirements, physical configurations and controls of their products, without significantly higher costs.

The FER regulations define specific energy parameters for a wide range of motors and motor technologies; the motor manufacturers had to help OEMs select motors that would ensure fans and furnaces were compliant. With no central resource for information about the Furnace Fan Energy Rating program, furnace and fan manufacturers had to collect information and specifications about the program, as well as marketing information for their customers, from a wide array of sources.

The regulatory burden can become a regulatory advantage to those companies that see new guidelines as an opportunity to improve and innovate the performance of their products. Luke A. Stewart of the Information Technology & Innovation Foundation noted, “Regulations that are most effective at stimulating innovation will tend to require compliance

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innovation and, at the same time, will minimize the compliance burden and mitigate the risks. Regulation can promote more complete information about products and processes in the marketplace,”⁶ a spur to marketing the resulting consumer benefits.

In the case of the DOE FER regulations, compliance is bringing more efficient and higher-performance motors with more advanced technologies to the market already—one year before the 2019 deadline. 🌐

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MAPPING THE REFRIGERANT *Regulation* LANDSCAPE

Putting recent EPA SNAP, DOE, CARB, E.U. and Kigali refrigerant regulation developments into a global perspective

BY DR. RAJAN RAJENDRAN

For those who are attempting to keep track of the regulations surrounding the use of certain refrigerants in commercial refrigeration, chances are they may find themselves more than a little confused—and with good reason. The story which began in 2015 with the introduction of groundbreaking regulations saw its fair share of plot twists in the latter half of 2017 and early 2018—developments that frankly caught most of the industry off guard.

At the heart of the issue is the Environmental Protection Agency's (EPA) Significant New Alternatives Policy (SNAP) Rule 20, which was introduced in 2015 to phase down and delist the use of hydrofluorocarbon (HFC) refrigerants, which contain a higher global warming potential (GWP) in certain commercial refrigeration applications.

Since 2015, the industry has made significant progress across the board through product development initiatives targeted at meeting compliance challenges posed not only by SNAP, but also the energy-efficiency mandates from the Department of Energy (DOE). Per the guidelines of Rule 20, the transition to more environmentally friendly refrigeration technologies was well underway.

U.S. Court vacates SNAP Rule 20

Then, in August 2017, the U.S. Court of Appeals for the DC Circuit ruled to vacate EPA SNAP Rule 20. Responding to a challenge submitted by two HFC refrigerant manufacturers (Mexichem Fluor and Arkema), the court decided that the EPA had exceeded its authority to require the replacement of HFCs under the Clean Air Act, Section 612. Their decision was based on the reasoning that Section 612 was originally adopted to curb substances containing higher ozone depletion potential and was not specifically targeted to address the matter of greenhouse gases and their associated GWPs.¹

Immediately, the court's ruling elicited a wide range of responses from within the industry. Opponents of the decision—including leading alternative refrigerant manufacturers and third parties such as the Natural Resources Defense

Council (NRDC)—soon filed petitions with the DC Circuit Court of Appeals for a rehearing en banc of the case. But in late January 2018, the court announced that it would deny the intervenor/respondents' petitions for a rehearing.² Prominent stakeholders such as Honeywell, Chemours and the NRDC have already vowed to file appeals with the United States Supreme Court.³

Most recently, a group of bipartisan senators introduced a bill called the American Innovation and Manufacturing Act; if it is passed, it would entitle the EPA to phase down HFCs used in refrigeration and air conditioning, in consultation with the industry.⁴ This bill would operate in accordance with the guidelines set forth by the 2015 Kigali Amendment to the Montreal Protocol, a global treaty among 197 nations meant to phase out harmful greenhouse gases and ozone-depleting substances. It is important to note that while the U.S. has not yet ratified the Kigali Amendment, the U.S. State Department issued a statement on Nov. 23, 2017, at the 30th anniversary of the Montreal Protocol that it had "initiated the process to consider ratification."⁵

Suffice to say that the DC Circuit Court of Appeals ruling to vacate Rule 20 as initially enacted does not necessarily signify the end of the EPA SNAP, nor does it represent the global and state legislative efforts yet underway to reduce greenhouse gases. Let us take a look at some of this activity, starting with the state of California.

California Air Resources Board (CARB) HFC phase down

While California is subject to the rules handed down by the U.S. government's federal agencies, initiatives proposed by CARB continue to place the state into a class of its own. CARB has developed draft proposals that would not only preserve the federal framework set forth in EPA Rules 20 and 21, it would also call for more aggressive future phase-down measures in line with the E.U.'s fluorinated greenhouse gases (F-gases) efforts.

Initially, CARB looks to preserve the federal framework in new retail food refrigeration, food dispensing equipment, air-conditioning chillers and refrigerated vending machines. The second CARB proposal calls for future rules on refrigerant use according to their GWP and refrigerant charge in specific applications. Under these guidelines, refrigerants with a GWP of 150 or greater would be prohibited in new stationary refrigeration systems containing 50 or more pounds of refrigerant beginning in 2021. While these proposals are scheduled to take effect in mid-2019, CARB is giving the industry opportunities to provide input and has not yet set a deadline for comments.⁶

Canada ratifies Kigali amendment, HFC ruling

Canada was among the first countries to ratify the Kigali amendment to the Montreal Protocol, and its HFC phase-down guidelines are in step with its recommendations. Through an amendment to the Canadian Environmental Protection Act in Oct. 2017,⁷ the country proposed a significant HFC phase-down schedule spanning the next few decades. The ruling impacts several refrigeration categories, including: stand-alone refrigeration, centralized refrigeration and chillers.

F-gas regulation lowers HFC quota

Enacted in 2015, the E.U.'s regulation designed to control emissions from F-gases—including HFCs—is mandating the next step of its phase-down schedule in 2018. This significant step-change lowers the consumption quota from the previous 93% of the original baseline to 63%. The step is intended to further drive scarcity of HFCs in Europe, which will inevitably result in rising HFC prices, at least in the European market.⁸

Factoring energy into regulatory equation

Refrigerants are only one factor in the regulatory equation affecting HVACR industry; it is also dealing with energy mandates by the DOE. While these were introduced in 2014, they have evolved to present significant implications across three classes of equipment.

Commercial Refrigeration Equipment (CRE). Since the enforcement date of March 2017, new CRE have been subject to 20-86% energy reductions, depending on the specific class of equipment. Compliance equations are factored according to the unit's daily energy consumption (kWh/24-hour) and its total display area.

Automatic Commercial Ice Makers (ACIM). As of this past January, new ACIMs must achieve 5-25% energy reductions, as measured in kWh/100 lb of ice. Again, each equipment class has a specific equation to measure compliance, so OEMs must be certain of their particular class requirements.

Walk-in Coolers and Freezers (WICF). WICF manufacturers are looking at a 2020 enforcement date to reduce energy consumption by 30-37%. These reductions are measured according to the AHRI-1250 annual walk-in efficiency factor (AWEF) standard. It is worth noting that while the original benchmark set for this standard has been reduced through persistent industry negotiations, it still represents a significant energy reduction target for WICF equipment.

Opportunity to align refrigerant, efficiency regulations

One of the challenges with the EPA's original ruling was that the timing of its HFC phase-down schedule was not necessarily in step with the DOE's energy efficiency mandates. This placed a tremendous burden on equipment manufacturers who were potentially looking at separate design cycles to address each requirement individually. It also presented difficult decisions for end users who were trying to choose the most economical and sustainable path forward.

Perhaps a silver lining of the most recent regulatory developments is a new opportunity for regulators to better align the EPA's refrigerant guidelines with the DOE's energy efficiency mandates. It is in the best interest of all parties to push for greater coordination and cooperation between the two efforts. 🐼

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