Fan Efficiency Regulations: Where Are They Going?

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The U.S. Department of Energy (DOE) estimates that commercial fans and blowers consume 139,533 million kWh of electricity per year and industrial fans and blowers consume 90,057 million kWh of electricity per year. In total, this amounts to 0.79 quads of energy, which is equivalent to consuming approximately 28.4 million tons of coal per year.

To date, DOE has not regulated the energy efficiency of commercial and industrial fans and blowers, nor have model codes and standards for energy or green construction promulgated fan-efficiency requirements.

But things are set to change—drastically.

Since AMCA published AMCA 205 Energy Efficiency Classification for Fans in 2010, groundwork for establishing fan-efficiency requirements that began in 2007 has increased in momentum and is beginning to appear in published regulatory documents.

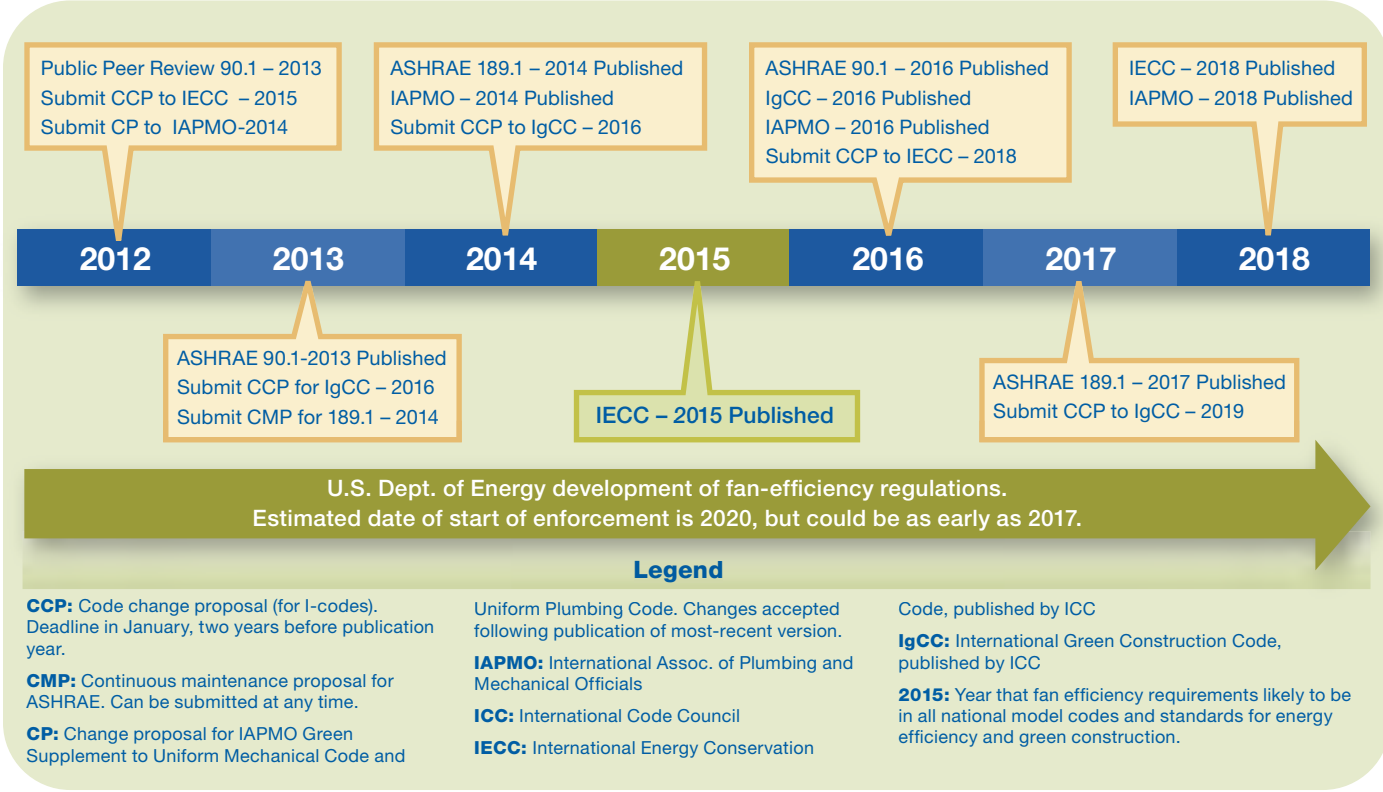
As shown in Figure 1, beginning with the 2012 International Green Construction Code (IgCC), fan efficiency requirements are expected to appear in the next issue of the model codes and standards as follows:

- 2012: International Green Construction Code
- 2013: ANSI/ASHRAE/IES 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings
- 2014: ANSI/ASHRAE/IES/USGBC 189.1 Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings
- 2014: IAPMO Green Supplement to Uniform Mechanical Code and Uniform Plumbing Code
- 2015: International Energy Conservation Code.

IgCC

As mentioned earlier, the 2012 IgCC fan efficiency requirement is already available to the public. For buildings 25,000 ft^2 and less, stand-alone exhaust, supply, and return fans that are larger than 1 hp must have a fan efficiency grade (FEG) of 71 or more, and be selected to operate within 10 percentage points of their peak total efficiency. The 2012 IgCC references AMCA 205-10, the 2010 version of the standard.

Figure 1: Timeline of national codes and standards for adding fan-efficiency specifications in national codes and standards. Also, note that the U.S. Dept. of Energy is establishing a fan-efficiency standard for regulatory purposes during the entire timeline.



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ASHRAE 90.1

Next in line is ASHRAE 90.1, for which a "continuous maintenance proposal" is well into the ASHRAE process as Addendum u. Addendum u underwent an advisory public peer review in 2011, and is slated for an official public peer review during the summer of 2012. Because ASHRAE 90.1 is a baseline standard, the FEG level is 67 instead of 71, and selection band is within 15 percentage points of peak total efficiency, not 10. The Addendum also has exceptions for fans 5 hp or less; powered roof ventilators; fans that will operate only during emergencies; and fan arrays with an aggregate motor nameplate rating of 5 hp or less.

Addendum u is expected to complete the ASHRAE process in time for the publication of Standard 90.1-2013.

ASHRAE 189.1

The completion of Addendum u for 90.1 will trigger the development of a continuous maintenance proposal for 189.1. At that time, AMCA and other industry stakeholders will determine the appropriate FEG level, fan selection criteria, and exceptions.

IAPMO Green Supplement

IAPMO began publishing its Green Supplement to the Uniform Mechanical Code and Uniform Plumbing Code in 2010. The Supplement is on a biannual cycle, and is roughly split into plumbing and HVAC sections. The HVAC section is tightly connected to ASHRAE 90.1 through similar language and by reference. In 2012, AMCA International submitted a change proposal for the 2014 version of the Supplement that would insert language identical to the then-current version of Addendum u. Should Addendum u be modified as a result of public peer review, the IAPMO proposed language can be modified while the proposal is being evaluated.

IECC

The completion of Addendum u will also trigger the development of a code change proposal for the International Energy Conservation Code, so that it is harmonized with 90.1. The publication of the 2015 IECC will complete the first complete cycle of national model codes and standards for energy and green construction to have fan-efficiency requirements for buildings (except low-rise residential buildings).

Market Impact

Although the establishment of fan efficiency requirements in national codes and standards is certain, the timing and size of market impact is much less so. It is up to states and local jurisdictions to adopt model codes and standards, and some may eliminate fan efficiency requirements when they do so. Enforcement is another issue, as time-strapped code officials view safety codes as a higher priority. Moreover, AMCA's Fan Efficiency Grade metric is new to the industry, so training is needed so engineers, contractors, commissioning providers, test-and-balance-contractors, owner/operators, and code officials understand them and apply/enforce them correctly.

Federal Regulation

Also shown in Figure 1, the U.S. Department of Energy (DOE) signaled its intent to establish a federal efficiency standard for commercial and industrial fans, blowers, and fume hoods in June 2011. According to the DOE, its regulatory processes could have a fan efficiency regulation in effect and being enforced between 2017 and 2020.

DOE estimates that 20% energy savings for fans are possible, apart from system effects and other factors. The American Council for an Energy Efficient Economy (ACEEE) recently published an estimate of energy savings resulting from DOE regulation of fan efficiency in The Efficiency Boom: Cashing In on the Savings from Appliance Standards, 2012. The report "assumes that cost-effective energy savings of 10% were possible for centrifugal fans, and 56% for axial fans," based on options like including improved blade orientation, reduced friction losses, and improved design."

Based on ACEEE's estimate of average incremental cost of $1,400, a 2.2 year payback would be realized by a DOE efficiency standard, which would realize cumulative annual savings summing to 8.5 TWh in 2035 at a present value savings of $2 billion.

It's too early to tell what form the DOE efficiency standard will take, and how much energy it could ultimately save; however, AMCA International is working proactively with DOE and organizations that advocate for efficiency standards, such as ACEEE and the Appliance Standards Awareness Project.

Conclusion

Commercial and industrial fans and their application are now in the crosshairs of efficiency regulation. All forms of regulation are now in play:

- Baseline energy codes and standards (ASHRAE 90.1 and IECC)
- Stretch/green codes (ASHRAE 189.1, IgCC, and IAPMO)
- Federal efficiency standards.

The full suite of existing baseline and green codes and standards are expected to have fan efficiency standards by 2015. Federal regulation is expected to be complete and enforced between 2017 and 2020.

Follow Developments HERE

AMCA regularly reports developments in all codes, standards, and regulations impacting fan efficiency at www.amca.org/feg/codes-and-standards.aspx. You can also download a free copy of ANSI/AMCA 205-12 Energy Efficiency Classification for Fans at this location.