A Revolutionary Method of Saving Energy for Commercial And Industrial Fan Systems

Michael Ivanovich, Air Movement and Control Association International, Inc
Mark Bublitz, The New York Blower Company
Tom Catania, University of Michigan
Nazme Mohsina, Air Movement and Control Association International, Inc.
Trinity Persful, Twin City Fan Companies, Ltd.
Mark Stevens, Air Movement and Control Association International, Inc.
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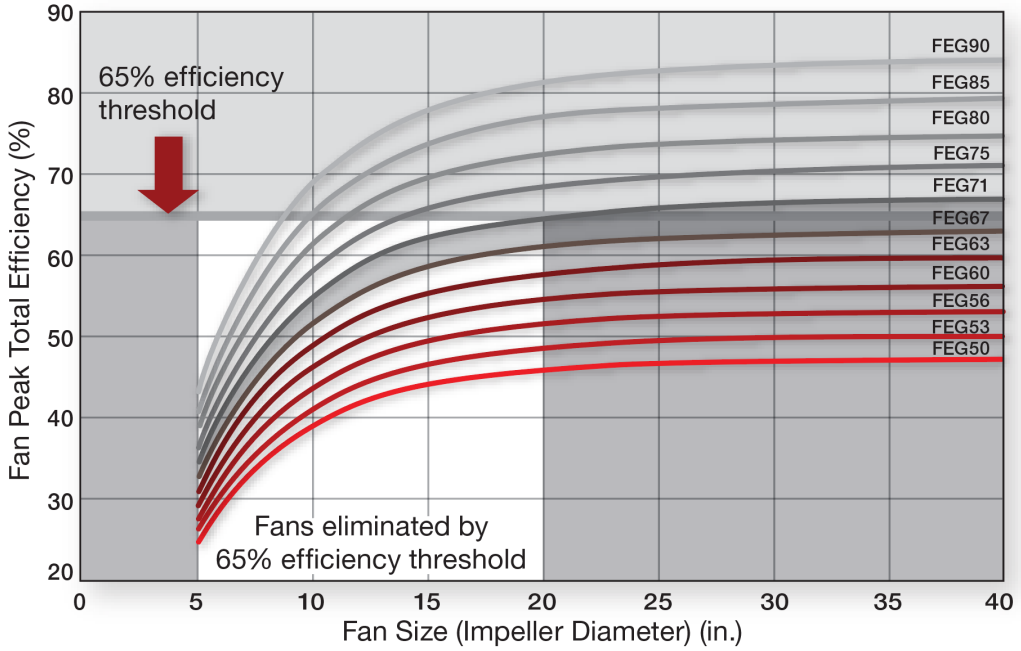
The Peculiar Nature of Fans

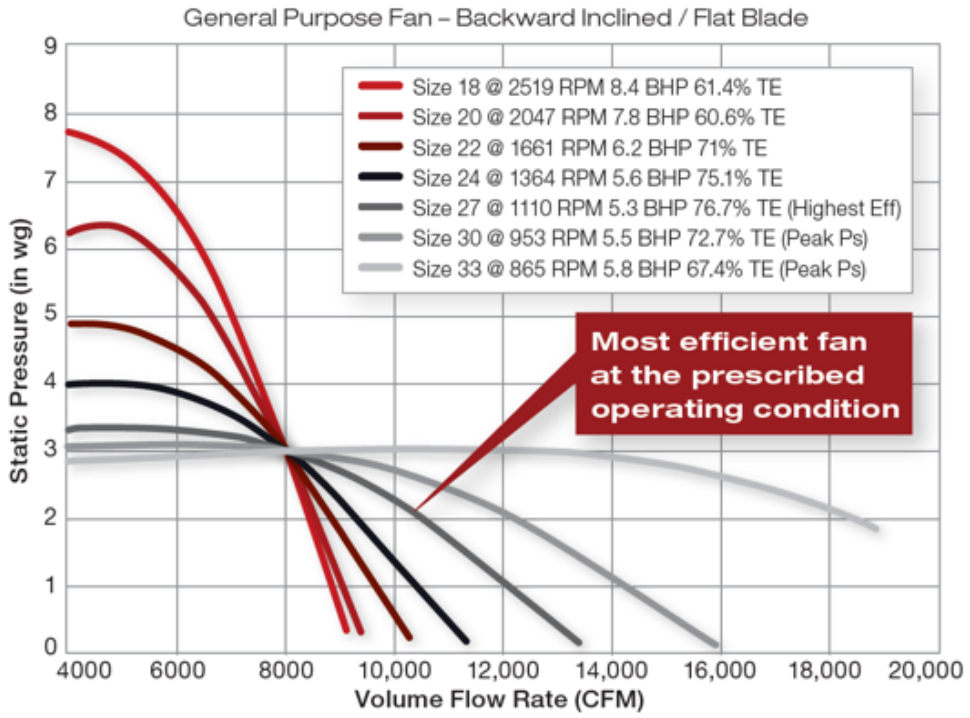
- What does a fan deliver?
- What does fan consume?
- Efficiency Capability ≠ Efficiency Captured in Operation

Historic Metrics

- Based on the *efficiency capability* of the product



Many Options



Revolutionary Metric

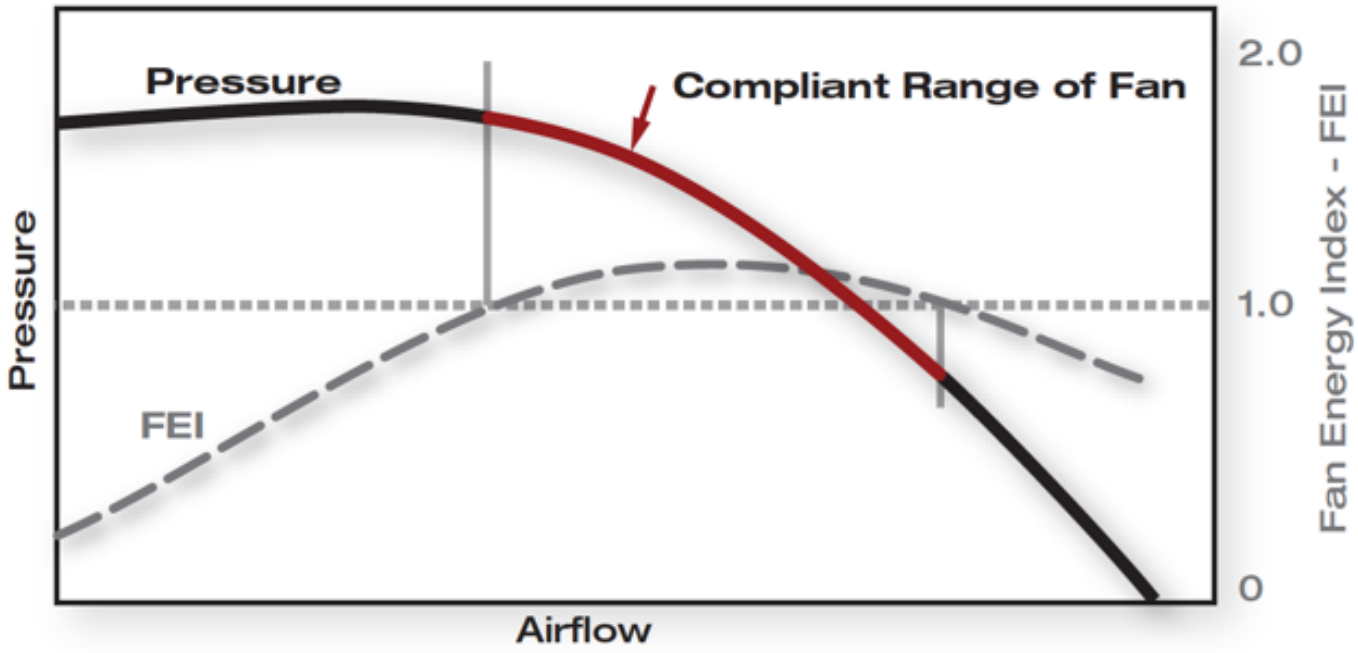
- Based on the efficiency capability of the product *as specified*

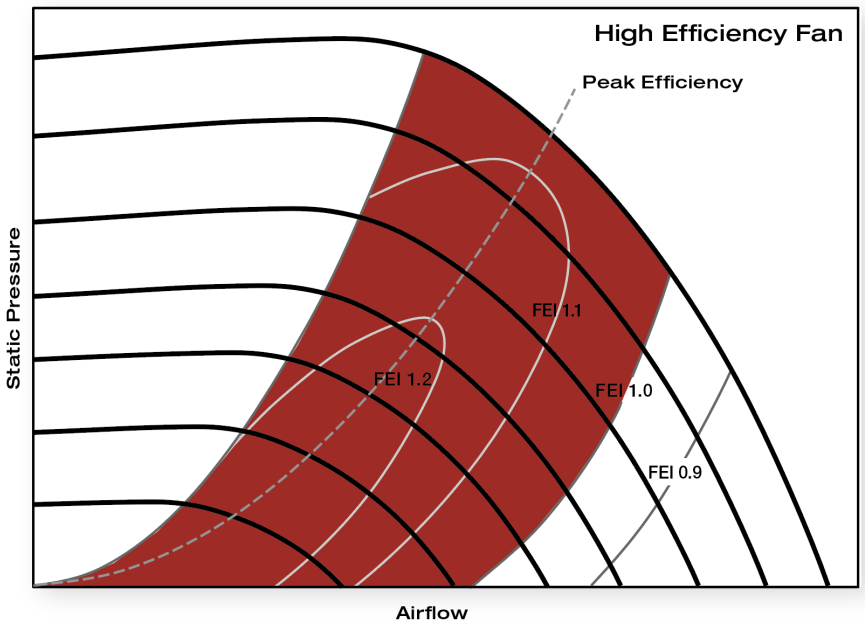
$$FEI = \frac{Fan\ \text{System}\ Efficiency}{Baseline\ Fan\ \text{System}\ Efficiency}$$

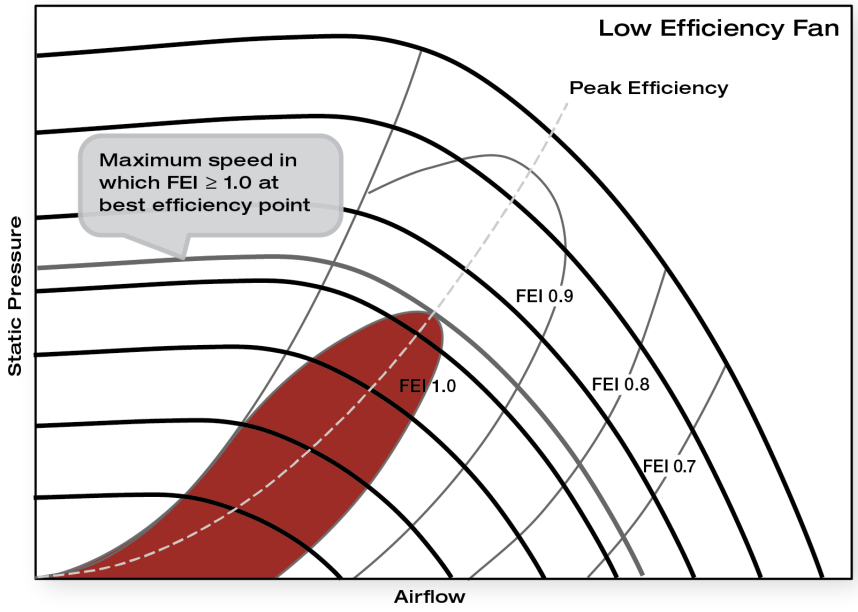
$$FEI = \frac{Baseline\ Fan\ Electrical\ Input\ Power}{Electrical\ Input\ Power}$$

$$FEI = \frac{FEP_{std}}{FEP\ rating}$$

Fan Regulatory or Voluntary Program Body	Possible FEI Requirement
U.S. Department of Energy	FEI ≥ 1.0 at Design Point
ASHRAE 90.1 or International Energy Conservation Code	FEI ≥ 1.0 at Design Point
ASHRAE 189.1	FEI ≥ 1.1 at Design Point
Utility Incentive Programs	FEI ≥ 1.1 at Design Point


Pressure
Compliant Range of Fan
FEI
Pressure
Airflow
2.0
1.0
0
Fan Energy Index - FEI


High Efficiency Fan
Peak Efficiency
FEI 1.1
FEI 1.2
FEI 1.0
FEI 0.9
Static Pressure
Airflow


Low Efficiency Fan
Peak Efficiency
Maximum speed in which FEI ≥ 1.0 at best efficiency point
FEI 0.9
FEI 1.0
FEI 0.8
FEI 0.7
Static Pressure
Airflow

Proper Metric for Fan Sizing

Fan Size	Fan Class	Fan Speed (RPM)	Fan Shaft Power (bhp)	Elect. Input Power (kW)	Motor Size (hp)	Outlet Area (sf)	Outlet Vel (ft/min)	TE (%)	FEI_T
18	III	3047	15.3	12.8	20	1.92	5,208	49%	0.83
20	II	2448	13.0	10.9	15	2.30	4,348	58%	0.98
22	II	1940	11.2	9.42	15	2.85	3,509	67%	1.13
24	II	1621	10.1	8.49	15	3.45	2,899	75%	1.25
27	I	1378	9.81	8.27	15	4.19	2,387	77%	1.28
30	I	1185	9.89	8.33	15	5.17	1,934	76%	1.27
33	I	1058	10.5	8.82	15	6.26	1,597	72%	1.20

Performance shown is for installation type B: Free inlet, Ducted outlet. Power rating (BHP) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). FEI_T values are calculated in accordance with AMCA 208 and are based on 4 pole TEFC motors of the size shown.

Questions

Additional Material for Questions

- Figure 1 from DRAFT AMCA 208

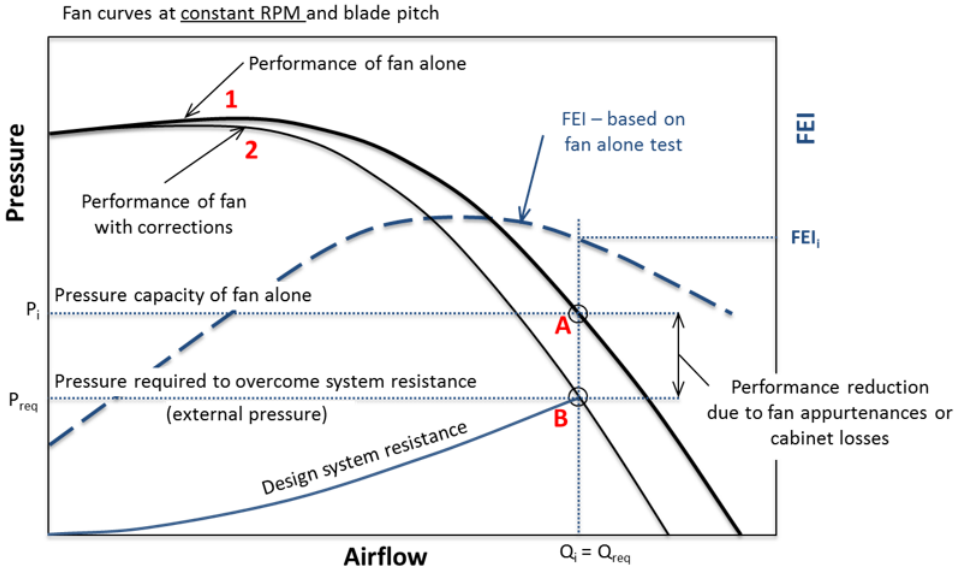


Figure 1

Additional Material for Questions

- Section B.2.2 from
  DRAFT
  AMCA 208