



# Update on Fan-Efficiency Regulations Finalized for California and In Progress for the U.S. Department of Energy

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*Session Moderator*

- Joined AMCA in February 2019
- Responsible for development of AMCA's education programs; staff liaison for the Education & Training Committee
- Projects include webinars, online education modules, presentations at trade shows, AMCA Speakers Network and many other items.



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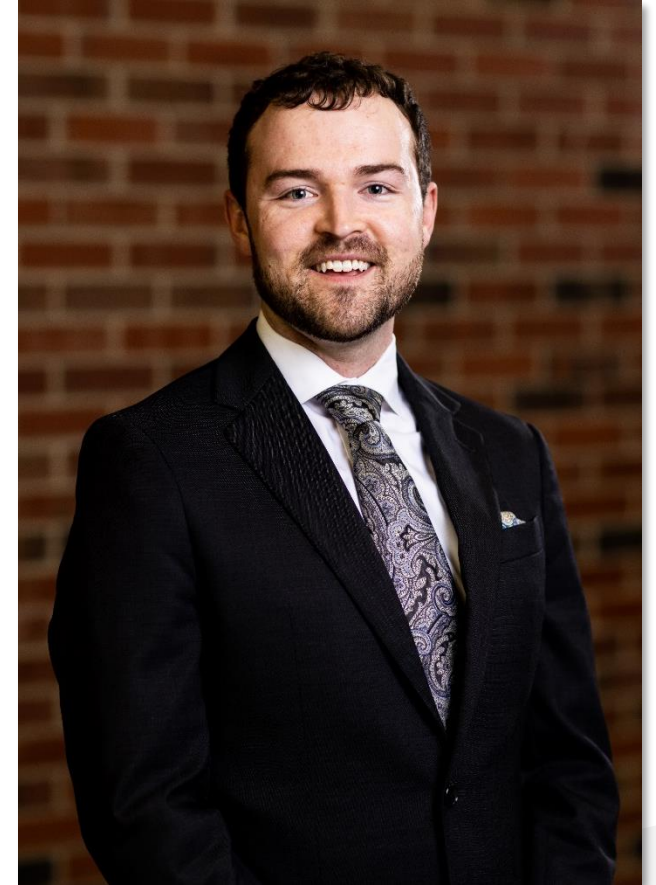
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# Aaron Gunzner, PE

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- Joined AMCA in May 2019
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# Zachary Johnson

## Codes & Standards Engineer AMCA International

- Joined AMCA December 5, 2022
- Supports Air Movement and Control industry advocacy objectives in U.S. model state codes and standards, including those developed by the ICC, IAPMO, ASHRAE, NFPA, and others.
- Advocates for accelerated adoption of the leading commercial and industrial fan metric in state codes.
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# Session Description/Purpose

- This presentation will provide an overview of the California Title 20 regulation for Commercial and Industrial Fans and Blowers, which will take effect on November 16, 2023, and an update on the U.S. Dept. of Energy's (DOE's) test procedure for fans, which is in the rulemaking stage.
- We will focus on the elements of the California regulation important to designers and owners, and describe how they can find compliant fans in the California-compliant database.
- We also will describe how the DOE fan regulation is shaping up to potentially impact ASHRAE 90.1 and IECC fan-efficiency provisions and the state energy codes that have adopted them.

# Learning Objectives

At the end of this presentation, you will be able to:

1. Describe details of the California Title 20 regulation for commercial and industrial fans and blowers.
2. Explain how the regulation affects different industry stakeholders, including designers and owners.
3. Outline information about the history of work conducted in developing a U.S. Dept. of Energy fan rulemaking.
4. Identify how fan regulations impact model and state energy codes.

# Agenda

- Overview of California Title 20 Regulation for Commercial and Industrial Fans & Blowers
- Overview on U.S. Dept. of Energy Regulation for Fans & Blowers – so far
- Regulations' effect on model and state energy codes
- How do these affect designers, owners, operators?



# California Energy Commission's Title 20 Fan Regulation

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# California Title 20 - Scope

- Title 20 – The Appliance Efficiency Regulation set forth by the California Energy Commission (CEC)
- Appliances sold or are offered for sale in California.
  - Includes minimum levels of operating efficiency, and other cost-effective measures, to promote the use of energy- and water-efficiency appliances.
- Responsibility of appliance manufacturers to test products at CEC-approved laboratories and receive third-party certification.



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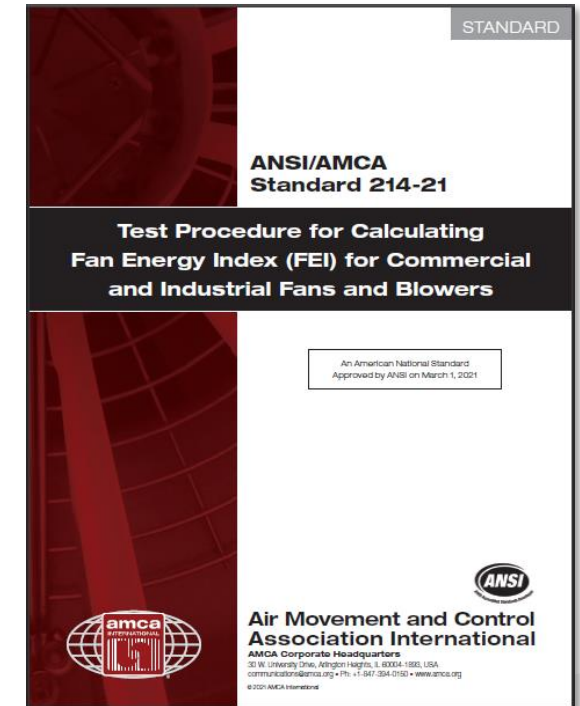
# CA Title 20 – General

## Commercial and Industrial Fans and Blowers (CIFB)

The CEC Title 20 regulation includes definitions, a test procedure, and reporting and labeling requirements.

- Referenced test standard:

*ANSI/AMCA 214-21, Test Procedure for Calculating Fan Energy Index (FEI) for Commercial and Industrial Fans and Blowers*





# CA Title 20 – Definitions/Scope

*“Commercial and industrial fan and blower” means a rotary-bladed machine used to convert electrical or mechanical power to air power, with an energy output limited to 25 kilojoule per kilogram (kJ/kg) of air. A commercial and industrial fan or blower has a rated fan shaft power greater than or equal to 1 horsepower, or, for fans without a rated shaft input power, an electrical input power greater than or equal to 1 kilowatt (kW); and a fan output power less than or equal to 150 horsepower. They consist of an impeller, a shaft, bearings, and a structure or housing. It may include a transmission, driver, and/or controller at the time of sale.*

- Key points:
  - Scope – fans between 1 and 150 HP
  - Includes custom fans, not just series-produced fans
  - Lots of exemptions

# CA Title 20 – Excluded Fans

(1) Commercial and industrial fans and blowers do not include:

- ➡ (A) safety fans as defined in Section 1602(d) of this Article;
- ➡ (B) ceiling fans as defined in 10 CFR 430.2;
- (C) circulating fans;
- (D) induced-flow fans;
- ➡ (E) jet fans;
- (F) cross-flow fans;
- ➡ (G) embedded fans as defined in ANSI/AMCA Standard 214-21, including embedded fans sold exclusively for replacement of another embedded fan;
- (H) fans mounted in or on motor vehicles or other mobile equipment;
- (I) fans that create a vacuum of 30 in. water gauge or greater;
- ➡ (J) air curtain unit as defined in Section 1602(d) of this Article; and
- (K) a fan that is designed and marketed to operate at or above 482 degrees Fahrenheit (250 degrees Celsius).

# CA Title 20 – Other definitions

- “Safety fans”
  - Explosion-proof items
  - PPVs
  - Others
  - Note: spark-resistant fans are not exempt
- Other fan types
- Questions on other definitions? → check regulatory language
  - [TN#248451](#) posted on CEC docket, Jan. 19, 2023

# California Title 20 – Compliance

***November 16, 2023*** - Compliance Deadline

## Compliance Requirements

- Tested to AMCA 214-21 Standard
  - Fan must be rated at a Fan Energy index (FEI) rating of **FEI  $\geq$  1.00**
  - Fans rated at design point of operation
    - 100% flow requirement for a VAV system
    - For constant volume systems, select fan at airflow requirement

# California Title 20 – Compliance (continued)

## Compliance Requirements

- Modernized Appliance Efficiency Database System (MAEDbS)
  - **Fan data entry into the MAEDbS**
  - Specific data needed -- outlined in Title 20; Table X (Section 1606)
- Appliance Nameplate
  - Specifics that need to be included on physical nameplate

# AMCA 214-21

- Developed to simplify adoption of FEI metric in efficiency regulations, test procedures for calculating FEI
- *Not meant for energy codes and standards, but may be applicable*
- Integrates other AMCA publications and standards for FEI calculation, and references AMCA and ISO test standards
- Developed in ANSI, consensus-based process
  - Committee members included industry, energy advocates & regulators





# Fan Energy Index (FEI)

- FEI is a measure of the efficiency of an entire fan system
  - "Wire to air"
  - Calculated using data from performance tests
  - Covers fans rated to static or total pressure
  - Replaces Fan Efficiency Grade metric; does not need sizing/selection window
  - Compares electrical input power to a reference fan that is reasonably efficient
  - The higher the FEI rating, the more efficient the fan
- Title 20 requirement:  **$FEI \geq 1.00$**

# CA Title 20 – Compliance (manufacturers)

Modernized Appliance Efficiency Database System  
(MAEDbS)

- This is where engineers/owners find compliant fans
- Access via [California Energy Commission website](#)

# CA Title 20 – Compliance Filing

## Section 1606 Table X specifies compliance data

Appliance	Required Information	Permissible Answers
<u>Commercial and Industrial Fans and Blowers manufactured after November 16, 2023</u>	<u>Fan type</u>	Centrifugal housed, centrifugal inline, centrifugal unboxed, centrifugal PRV supply, centrifugal PRV exhaust, axial inline, axial PRV, inline mixed-flow, power roof/wall ventilators, axial panel, radial housed
	<u>Fan impeller diameter (in.)</u>	
	<u>Type of Motor (if fans sold with a motor)</u>	None, Single-phase induction, Polyphase induction, Synchronous DC (including ECM), Permanent magnet AC, or Other
	<u>Motor nameplate horsepower (if fan sold with an induction motor) (hp)</u>	

	<u>Pressure type</u>	S = Static pressure T = Total pressure
	<u>Transmission type (if fan is sold with a transmission)</u>	Direct, V-belt, synchronous-belt, flexible coupling, none
	<u>Type of Controller (if fan sold with controller)</u>	None, Variable frequency drive, or Other
	<u>Maximum fan speed (RPM)</u>	
	<u>Airflow at maximum fan speed (CFM)</u>	
	<u>Pressure at maximum fan speed (inches water gauge)</u>	
	<u>FEP<sub>act</sub> at maximum fan speed (kW)</u>	
	<u>FEP<sub>ref</sub> at maximum fan speed (kW)</u>	
	<u>Maximum pressure (inches water gauge)</u>	
	<u>Airflow at maximum pressure (CFM)</u>	
	<u>Fan speed at maximum pressure (RPM)</u>	
	<u>FEP<sub>act</sub> at maximum pressure (kW)</u>	
	<u>FEP<sub>ref</sub> at maximum pressure (kW)</u>	
	<u>Maximum air flow (CFM)</u>	
	<u>Pressure at maximum airflow (inches water gauge)</u>	

	<u>Fan speed at maximum airflow (RPM)</u>	
	<u>FEP<sub>act</sub> at maximum airflow (kW)</u>	
	<u>FEP<sub>ref</sub> at maximum airflow (kW)</u>	
	<u>Is the model a Series tested fan?</u>	Yes, No
	<u>Associated Series Tested Fan Model Number (if not a series tested fan)</u>	Fan product line and model. (Field is N/A if it is a Series tested fan)
	<u>Method used to determine FEP<sub>act</sub> of test method in section 1604(d)(2), (ANSI/AMCA Standard 214-21)</u>	Section 6.1, 6.2, 6.3, 6.4, or 6.5 of the test method in section 1604(d)(2), (ANSI/AMCA Standard 214-21)

# CA Title 20 – Nameplates

Required marking on all fans after compliance date (Nov. 16, 2023)

## Section 1607

(A) For Commercial and Industrial fans and blowers the label shall include the following information:

Fan Energy Index  $\geq 1.00$  Efficiency boundaries

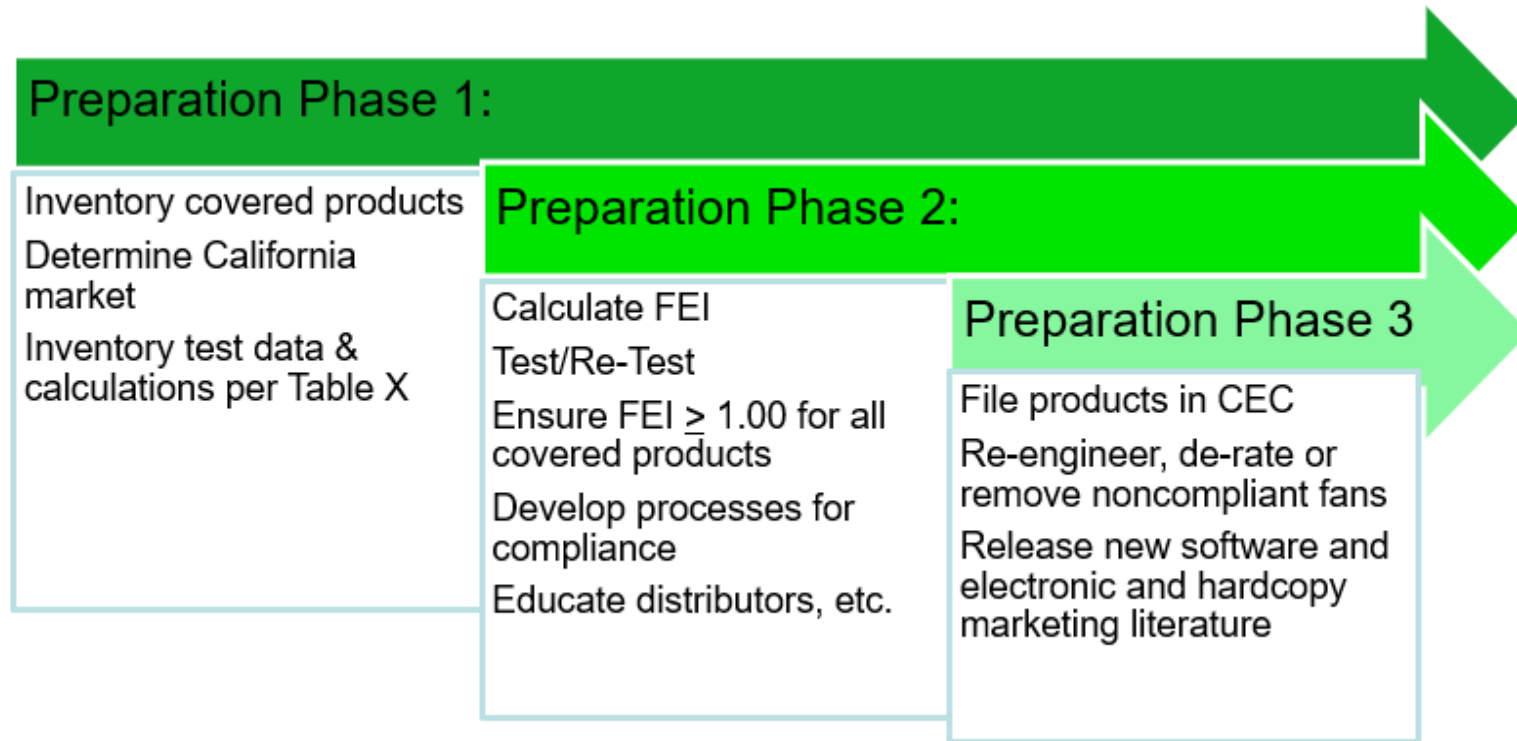
- a. maximum air flow (CFM);
- b. maximum fan speed (RPM);
- c. maximum pressure (inches water gauge); and
- d. type of pressure ("static" or "total").

NOTE: Operation outside of these boundaries will result in an energy inefficient operation.

# CA Title 20 – Manufacturers preparing for compliance date

**November 16, 2022**  
**1-year grace period begins**

**November 16, 2023**  
**CEC Compliance Deadline**





# Title 20 Fan Regulation – “Need to Knows” for Designers, Owners, Operators

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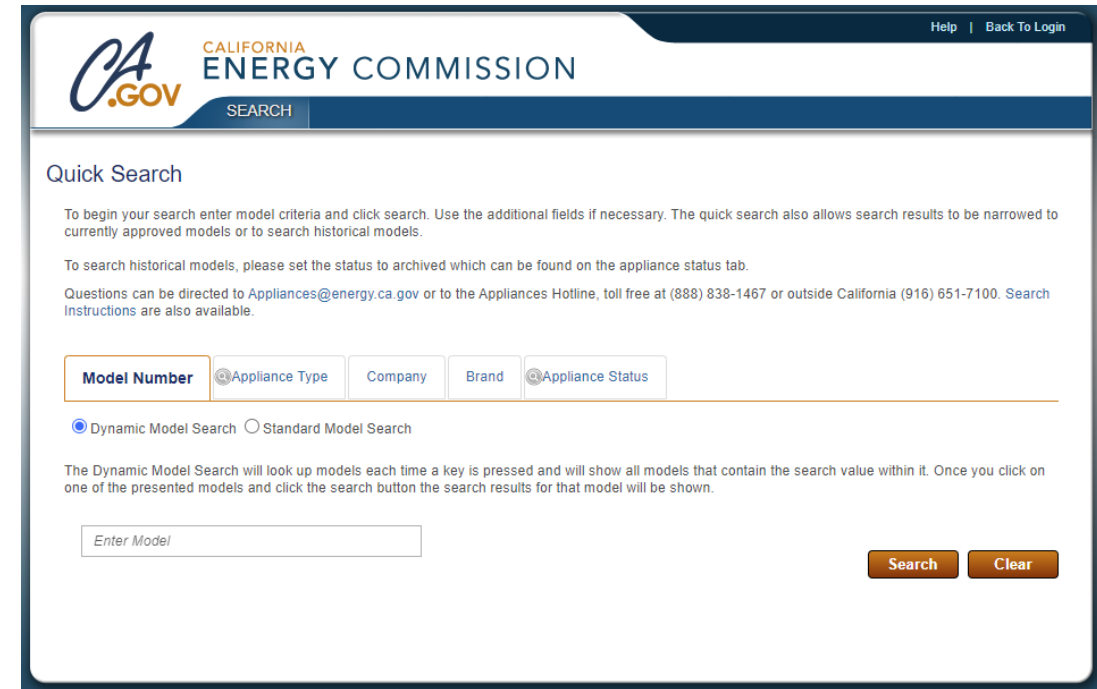
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# Title 20 “Need to Knows”

- **Compliance date: Nov. 16, 2023**
- In- and out-of-scope fans
- **Spec'ing a fan?**
  - Check MAEDbS listing!
  - <https://cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx>



The screenshot shows the 'CALIFORNIA ENERGY COMMISSION' website with a 'SEARCH' tab. The 'Quick Search' section includes instructions for searching current and historical models. It features a search form with fields for 'Model Number', 'Appliance Type', 'Company', 'Brand', and 'Appliance Status'. Below these fields are radio buttons for 'Dynamic Model Search' (selected) and 'Standard Model Search'. A text box labeled 'Enter Model' is at the bottom left, and 'Search' and 'Clear' buttons are at the bottom right.

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SEARCH

Help | Back To Login

### Quick Search

To begin your search enter model criteria and click search. Use the additional fields if necessary. The quick search also allows search results to be narrowed to currently approved models or to search historical models.

To search historical models, please set the status to archived which can be found on the appliance status tab.

Questions can be directed to [Appliances@energy.ca.gov](mailto:Appliances@energy.ca.gov) or to the Appliances Hotline, toll free at (888) 838-1467 or outside California (916) 651-7100. Search Instructions are also available.

Model Number Appliance Type Company Brand Appliance Status

☒ Dynamic Model Search ☐ Standard Model Search

The Dynamic Model Search will look up models each time a key is pressed and will show all models that contain the search value within it. Once you click on one of the presented models and click the search button the search results for that model will be shown.

Enter Model

Search Clear

# Title 20 “Need to Knows”

- Supply chain considerations
  - Talk with your suppliers
  - Ask questions now to avoid ‘crunch’ later in 2023
- ‘Replacement’ fans
  - For embedded fans: out of scope
    - *“(G) embedded fans as defined in ANSI/AMCA Standard 214-21, including embedded fans sold exclusively for replacement of another embedded fan;”*
  - For all other fans: in scope
- Fan arrays
  - Not specifically covered
  - Individual fans in arrays are covered
  - Model/State energy codes cover fan arrays
    - CA Title 24
    - ASHRAE 90.1
    - IECC



# Update on U.S. Dept. of Energy C&I Fans and Blowers Rulemakings

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# U.S. Dept. of Energy – Fan Rulemaking History



- Several years in development
- **Remains in process as of today**
- Aug. 19, 2021: Final determination of coverage for commercial and industrial fans
- Definition of “fan or blower” (<https://bit.ly/2021-17715>):

*A rotary bladed machine used to convert electrical or mechanical power to air power, with an energy output limited to 25 kilojoule (kJ)/kilogram (kg) of air. It consists of an impeller, a shaft and bearings and/or driver to support the impeller, as well as a structure or housing. A fan or blower may include a transmission, driver, and/or motor controller.*

# Dept. of Energy - Rulemaking Significance

Two main parts for appliance rulemakings:

## 1) Test Procedure (TP)

- Defines metrics, regulatory definitions, test methods, product classes/subclasses, rating calculation
- Test and rating standards may be adopted in part or in whole or as modified
- Typically takes effect 180 days after Final Rule Publication
- Draft release - July 2022; awaiting Final Rule – possibly Feb. 2023

# Dept. of Energy - Rulemaking Significance

## 2) Energy Conservation Standard (ECS)

- Defines minimum efficiency requirement
- Defines compliance, marking and surveillance processes
- Typically takes effect 5 years after Final Rule Publication



# Dept. of Energy – Agenda for Fans

## DOE Agency Rule List for Fall 2022 – [linked here](#)

Estimated dates and releases for upcoming rulemakings

- **Feb. 2023** – Test Procedure for Fans and Blowers; final action
  - FEI is the metric?
  - AMCA 214-21 is referenced as test standard, but not all sections
  - Might cover circulating fans that are not ceiling fans, which is different from California
- **Oct. 2023** – Energy Conservation Standards for Fans and Blowers; NOPR
  - Would set a minimum FEI rating for fans
  - Also establishes compliance-filing and surveillance processes
  - Final rule takes effect 5 years after publication



# Energy Codes and Fan Regulations

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# Regulations vs Energy Codes

**Product regulations** are laws that govern appliances, products, and equipment at *point of manufacture*.

- Home appliances, lighting, commercial HVAC, fans, pumps, motors
- Established and enforced as laws by government agencies at national and state levels
  - U.S. Department of Energy
  - Energy Policy Act (EPACT) sections within “Code of Federal Regulations” (CFR)
  - U.S. DOE regulations often mirrored by Canada
  - California Energy Commission Title 20

# Regulations vs Energy Codes

**Energy codes** apply to buildings, systems, and applications within buildings

- Enforced by code officials who approve construction plans and inspect buildings and systems
- Administered by states (state energy offices) or other “jurisdictions” (such as cities)
  - Most states adopt a model code, such as ASHRAE 90.1 or IECC
    - Can adopt in whole or in part, and tweak provisions for state practices or goals
    - e.g.: Washington State Energy Code
  - Some states, such as California, have their own energy code
    - e.g.: California Energy Commission’s Title 24 Building Energy Efficiency Standards
- Stringency (effectiveness) is communicated as “effective year” of ANSI/ASHRAE/IES 90.1 or IECC based on a model energy code’s publication year

# Regulations vs Energy Codes

- Energy codes govern product *application*
- Two main parts:
  - Charging statement:
    - Metric, minimum-efficiency baseline, labeling/certification (if required), referenced rating test/calculation standard
      - e.g. → FEI, currently  $\geq 1.00$  ( $\geq 0.95$  for VAV), per AMCA 208-18 etc.
  - Exemptions or other scoping statements:
    - Size
    - Exclusions, such as safety products (explosion-proof, emergency operation, etc.)

# Regulations vs Energy Codes

- Regulations preempt (overrule) codes
- Federal regulations preempt state regulations
- Federal regulations will likely change ASHRAE 90.1 & IECC code language
- So – for fans:
  - California Title 20 regulation takes effect Nov. 16, 2023
  - DOE Fan Test Procedure will finalize in 2023
    - Do not know if typical 180-days grace period will be longer for fans due to complexity of fan testing
  - DOE Fan Efficiency Standard (regulation) may finalize in 2024
    - Five-year grace period because it's the first time fans are being regulated
    - Estimated effectiveness date is January 1, 2029, for discussion purposes
  - DOE regulation will preempt CEC Title 20 in 2029



# Wrap-up & Session Takeaways

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# Session takeaways

- California Title 20 - effective **November 16, 2023** and it affects “commercial fans & blowers” sold in California
  - Be familiar with regulation’s scope/exclusions; how to check compliance (MAEDbS); replacement fans
  - Supply chain considerations
- Department of Energy fan rulemakings – expected soon
  - AMCA to continue analyzing, provide updates, repository of information
- Crossovers and distinctions of regulations and energy codes

# Q & A

Survey QR Code:



# Thank you for your time!

*To receive PDH credit for today's educational session, you **must** complete the online evaluation, either via the QR code or a link, which will be emailed to you 2 weeks of this program.*

*PDH credits and participation certificates will be issued electronically **within 30 days**, once all attendance records are checked and the completed online evaluations are received.*

*Attendees will receive an email at the address provided on your 2023 AHR Expo registration, listing the total credit hours awarded and a link to a printable certificate of completion.*

*If you have any questions, please contact Lisa Cherney, Education Manager, at AMCA International ([lcherney@amca.org](mailto:lcherney@amca.org)).*



NEXT SESSION @ 2:30PM:

*Your Questions About Life-Safety  
Dampers Answered*



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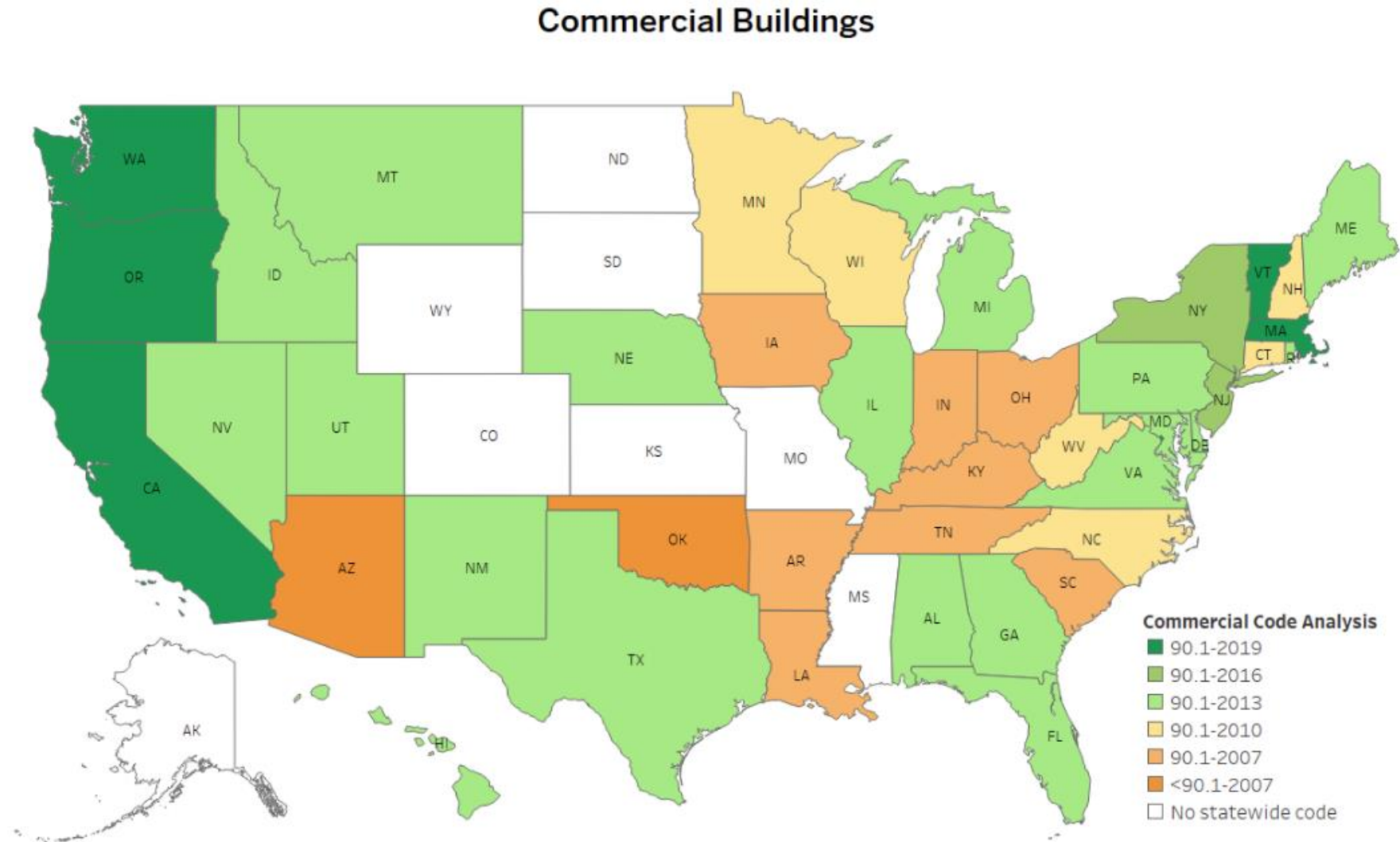
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# Energy Codes

- U.S. Department of Energy maintains a map of state energy-code “effectiveness”
  - Color of state denotes effective year
  - [www.energycodes.gov/status](http://www.energycodes.gov/status)
    - Has map and table
    - Table shows which model code and year is adopted by each state
    - Map shows effectiveness of each state code per an edition of ANSI/ASHRAE/IES 90.1

# Status of State Energy Code Adoption - Commercial



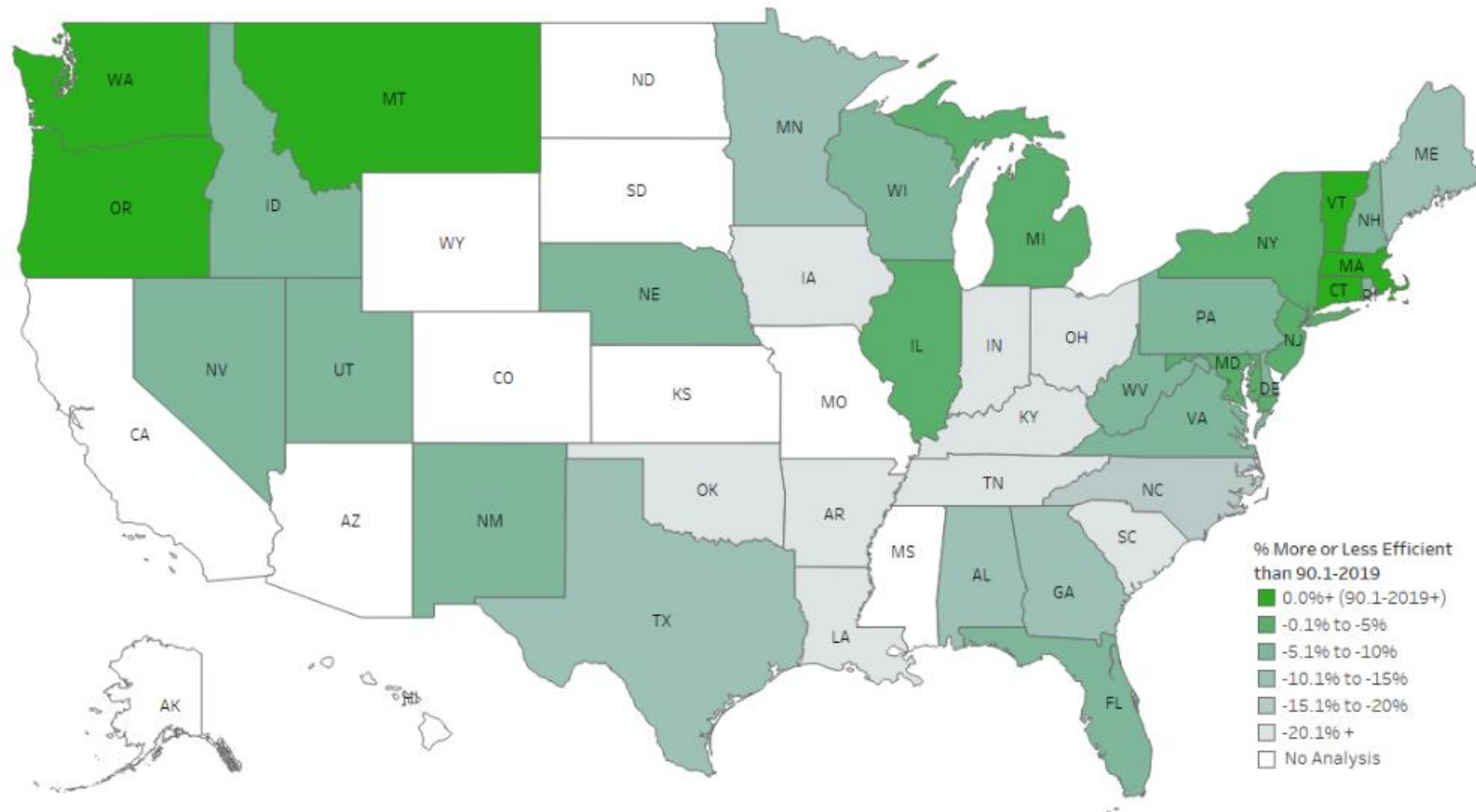
Updated as of 06/30/22

Source –  
<https://www.energycodes.gov/status/commercial>

# State Energy Index Relative to 90.1-2019

Figure 5: Commercial Energy Code: State Energy Index Relative to Current Model Code (Standard 90.1-2019)

Commercial Energy Code: State Energy Index Relative to Current Model Code (90.1-2019)



Source –  
<https://www.energycodes.gov/infographics>

US DOE BECP: Status of State Energy Code Adoption - <https://www.energycodes.gov/status/commercial>  
State Energy Index Data: [https://www.energycodes.gov/sites/default/files/2022-09/StateLevelResidentialCodesEnergyUseIndex\\_FY2022Q4.xlsx](https://www.energycodes.gov/sites/default/files/2022-09/StateLevelResidentialCodesEnergyUseIndex_FY2022Q4.xlsx)  
Updated as of 12/19/22



# Regulations vs. Energy Codes

- **Regulations** affect products at *point of manufacture*
  - Compliance burden is on *manufacturers*
  - ‘Manufacturers’ can be manufacturers, distributors, contractors
    - Whoever makes “final product” for sale
- State regulations (California Title 20, New York, Massachusetts, etc.)
  - State regulations tend to start in California and then spread
- Federal regulations (U.S., Canada, European Commission, Singapore, etc.)

# Regulations vs. Energy Codes

- **Energy Codes (states, cities)** affect *applications* and *take effect when product is specified (plan checking) and installed (field checking)*
  - Model energy codes (ASHRAE 90.1, IECC)
  - Most states/cities adopt a model energy code, sometimes with modifications
    - Washington, Florida, Denver
    - Some states develop their own code
      - California Title 24
  - Non-compliance can lead to product substitution