

# Economizers: Design, Performance, and Commissioning Issues

The Perfect Economizer



Instructor:

- David Sellers
- Senior Engineer
- Facility Dynamics Engineering
- February 6, 2018

# What's In This Module?

- The Perfect Economizer's Operating Profile
- Creating an Economizer Diagnostic Based the Perfect Economizer

# Assessing the Perfect Economizer Using The Relationships We Developed Earlier

What is a Perfect Economizer?

- Does not provide cooling if the preheat process is active
- Promotes good mixing
- Based on the true mixed air temperature
- Set point is properly coordinated with other HVAC processes occurring in the system
- Integrated with mechanical cooling to minimize energy consumption
  - Mechanical cooling not used until outdoor air can not meet set point
  - Outdoor air setting returned to the minimum requirement when outdoor air conditions make it no longer suitable for cooling
- Disabled when the system is not in operation

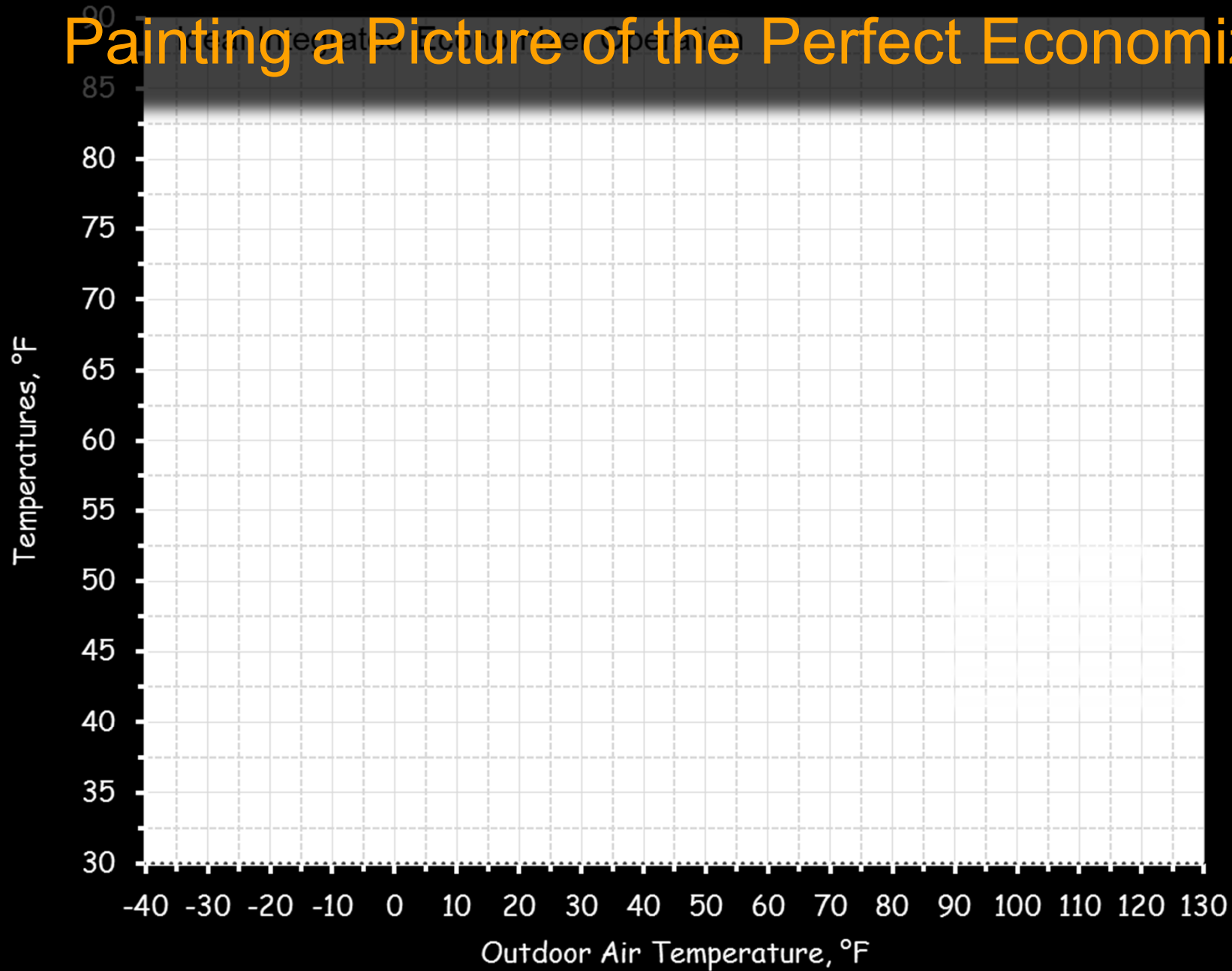
# Painting a Picture of the Perfect Economizer

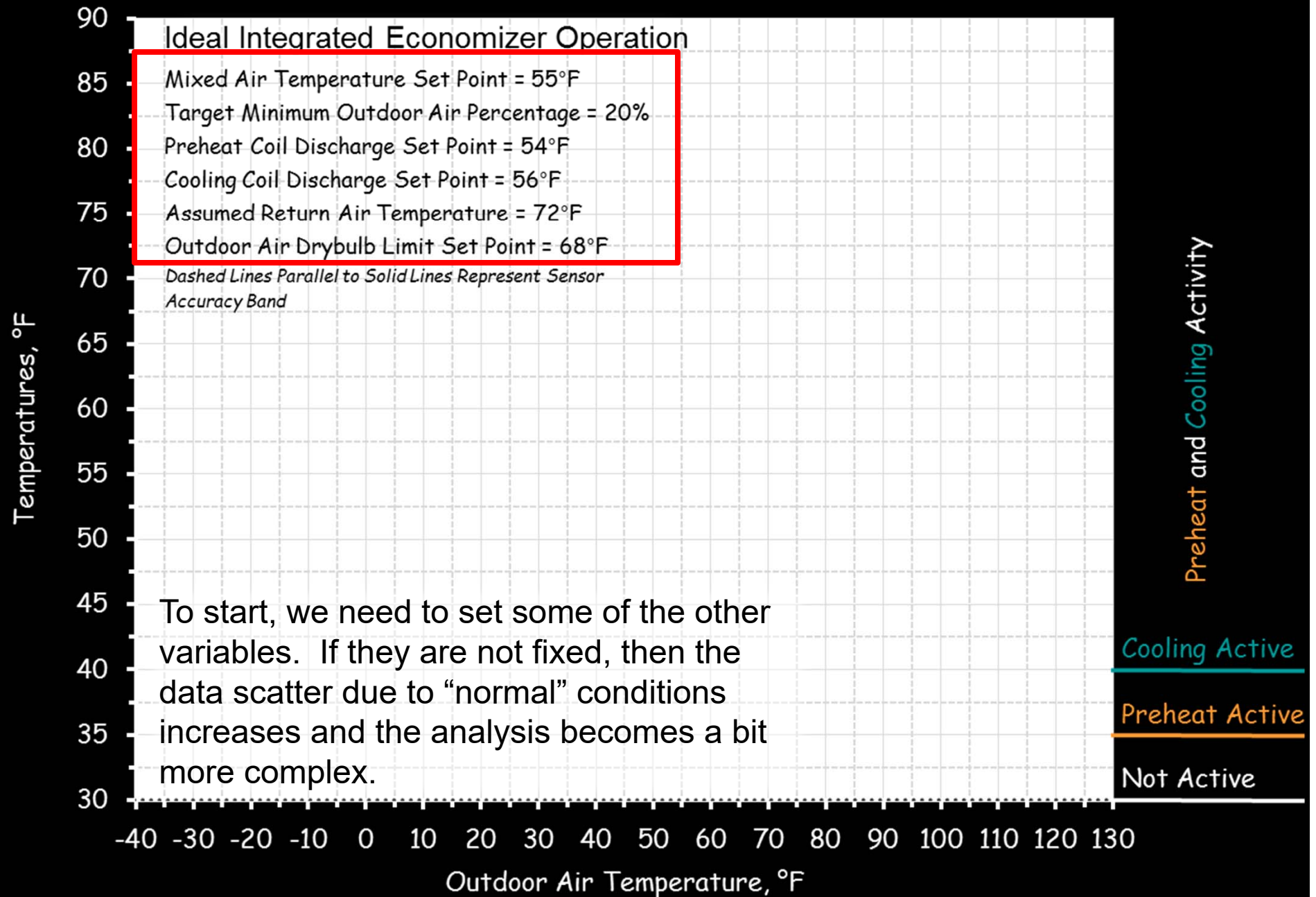
Plot mixed air temperature (the dependent variable) as a function of some other economizer related parameter like outdoor temperature (the independent variable)

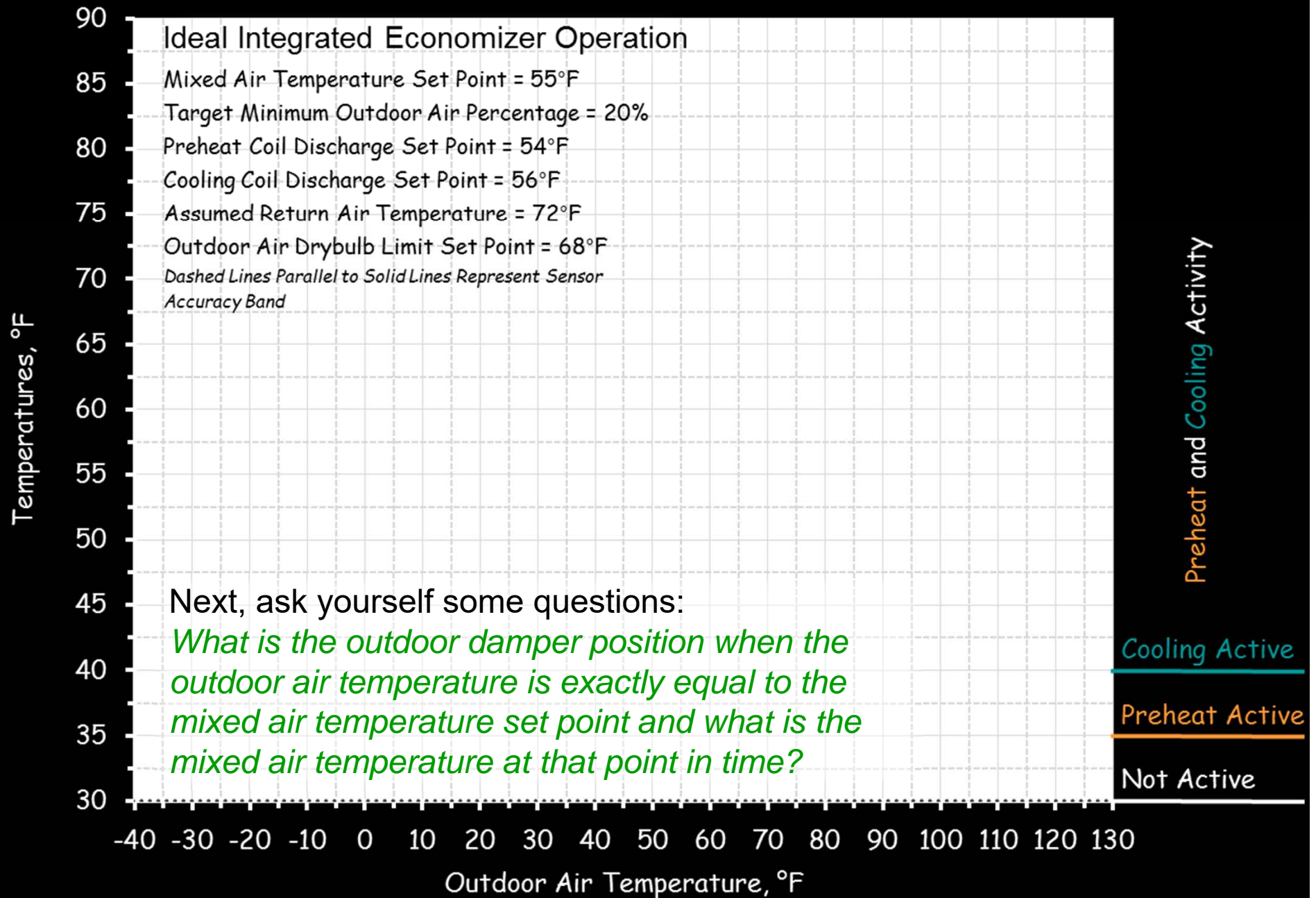
- There should be a predictable mixed air temperature for every value of the dependent variable
- The predicted data points for a perfect economizer will draw a line on the graph
- The data points for a real economizer will create a cloud when you plot them
  - Cloud follows the perfect economizer line – Good
  - Cloud doesn't follow the perfect economizer line – Bad (and a clue about What is Wrong)

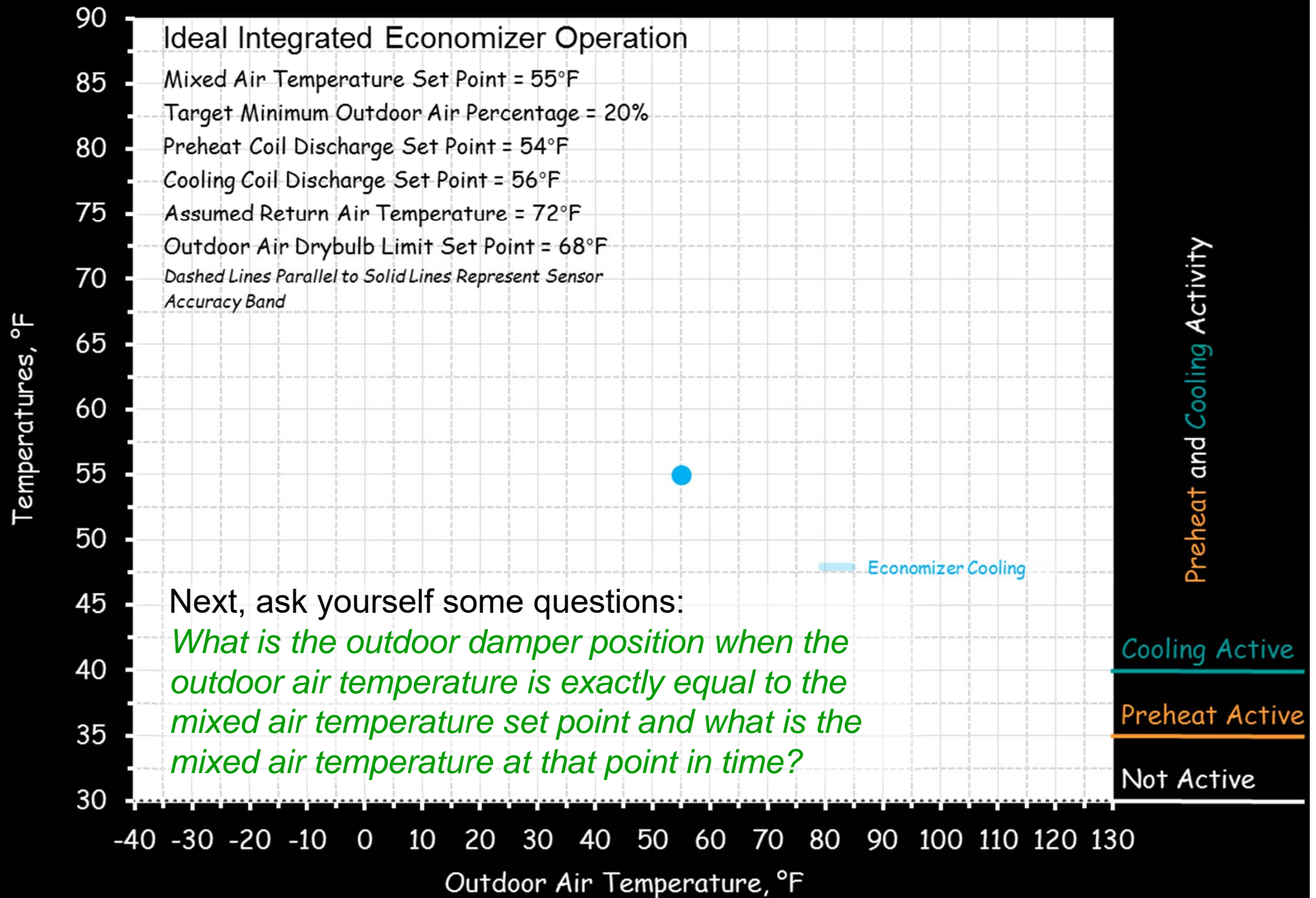


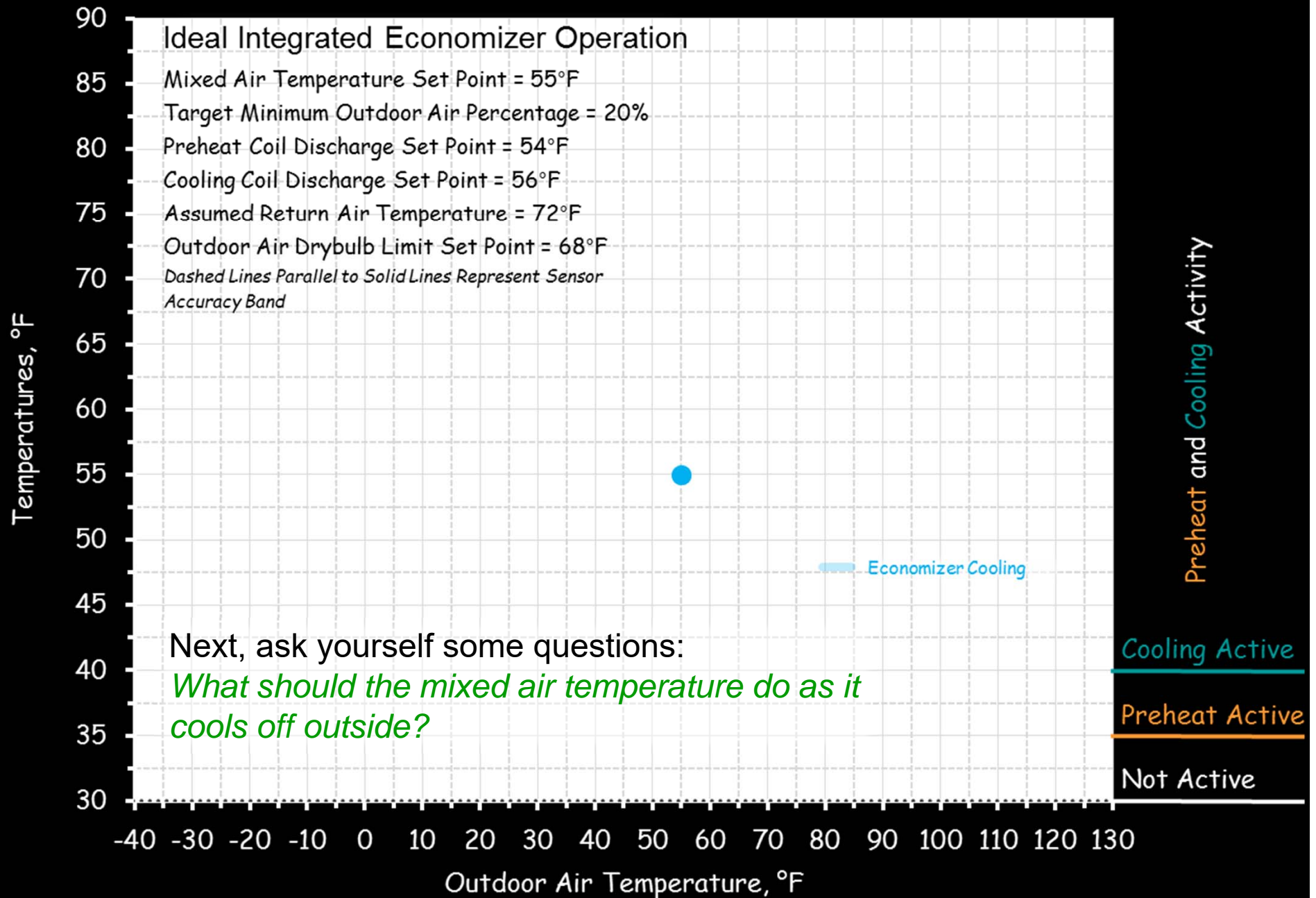
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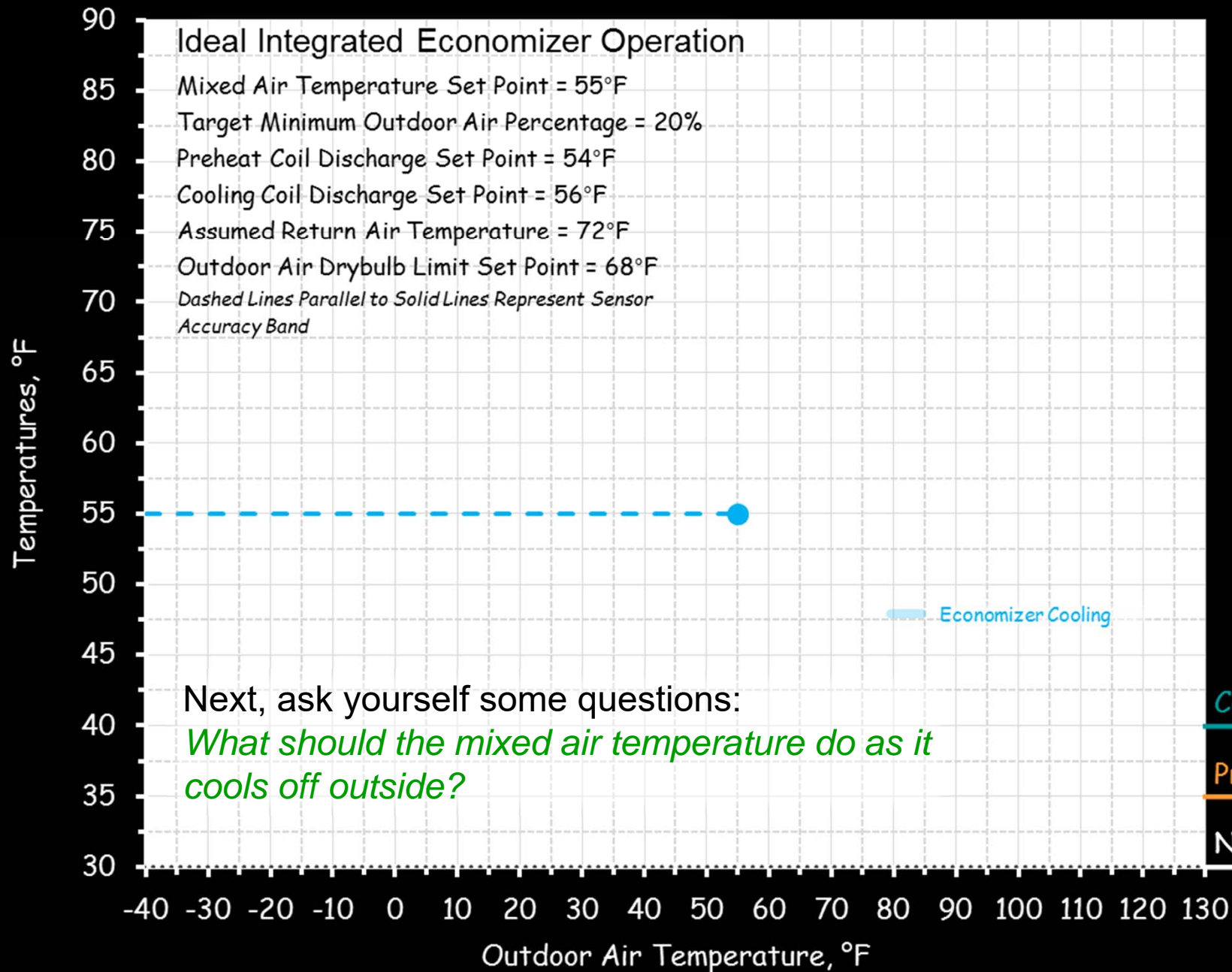


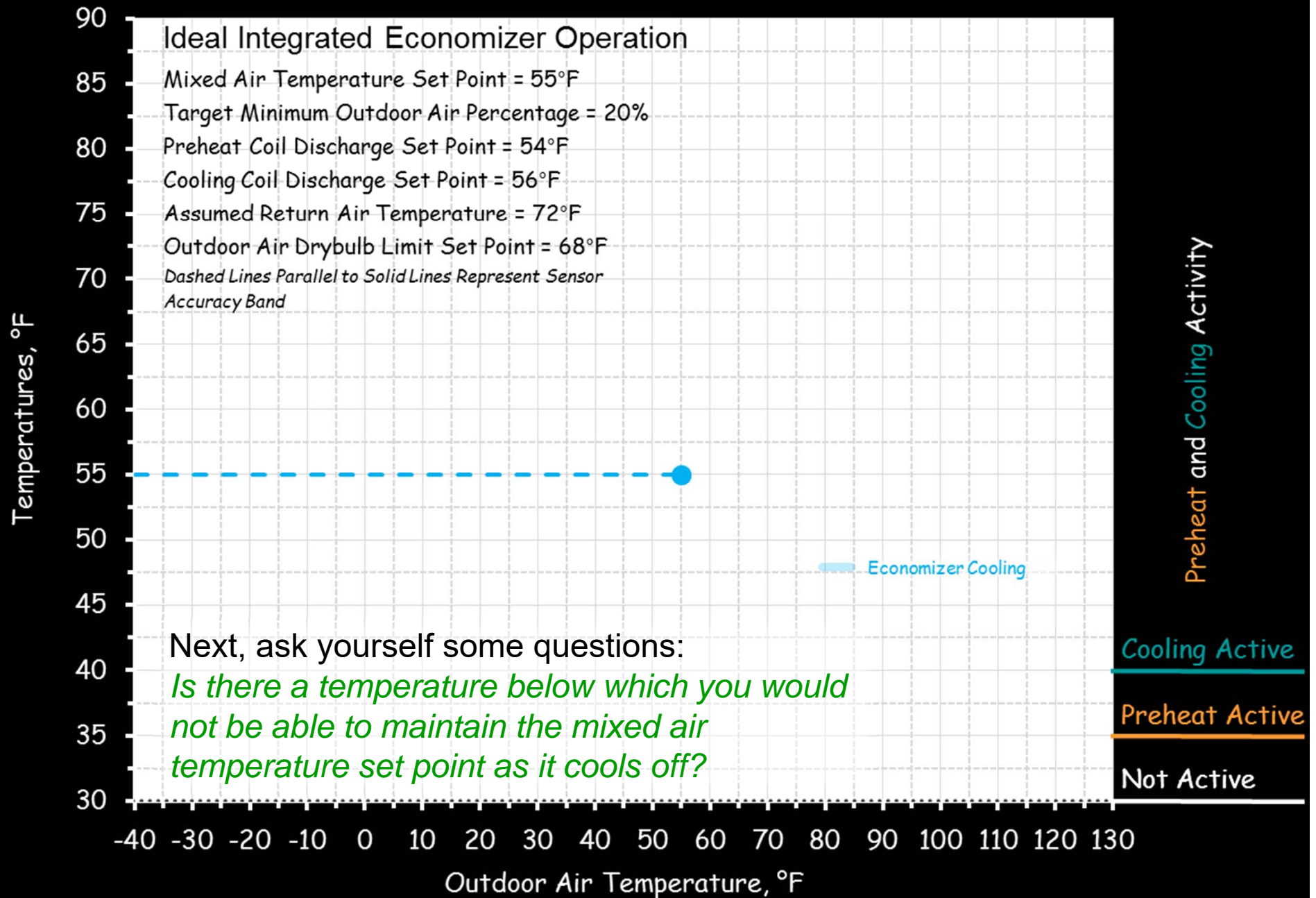


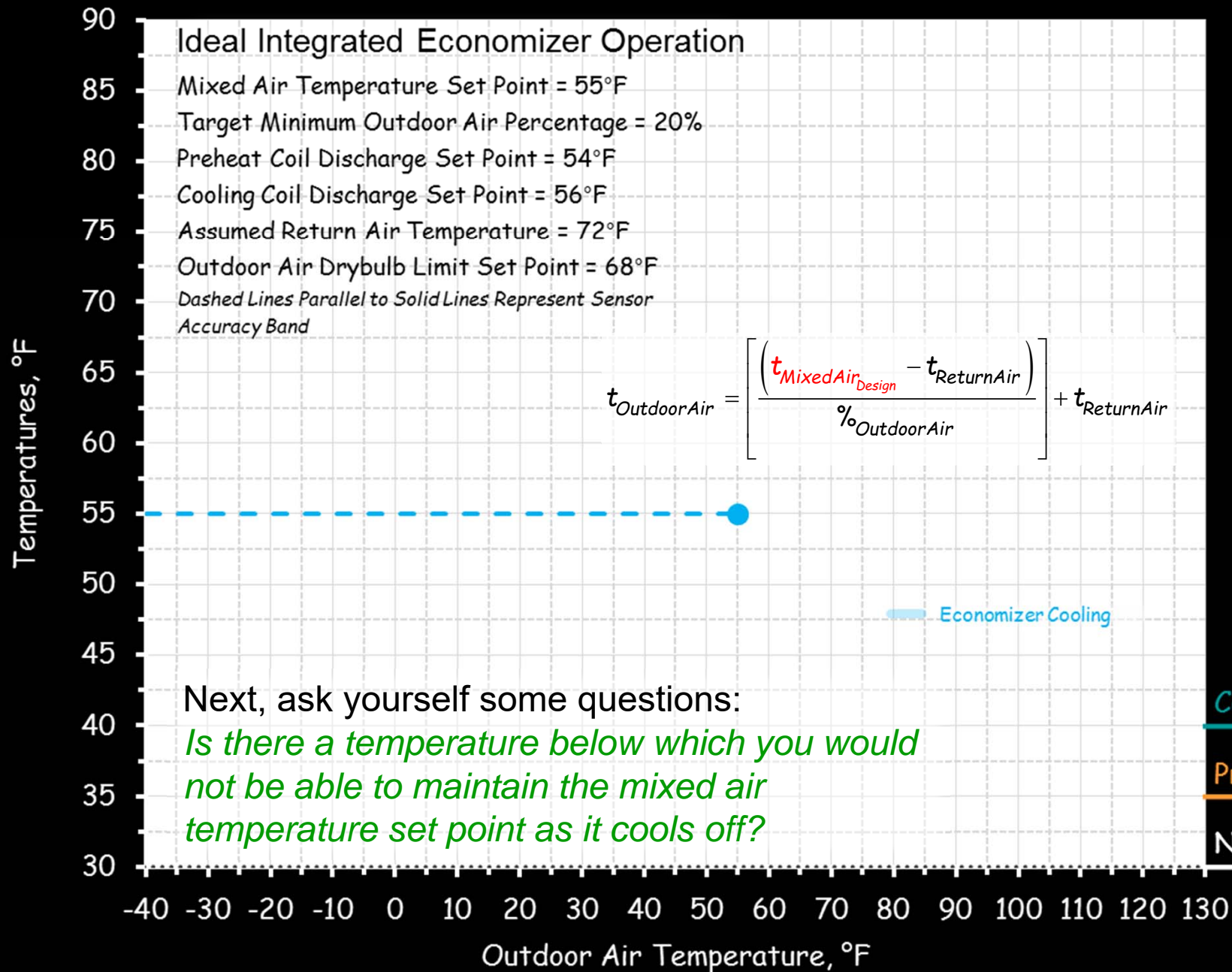












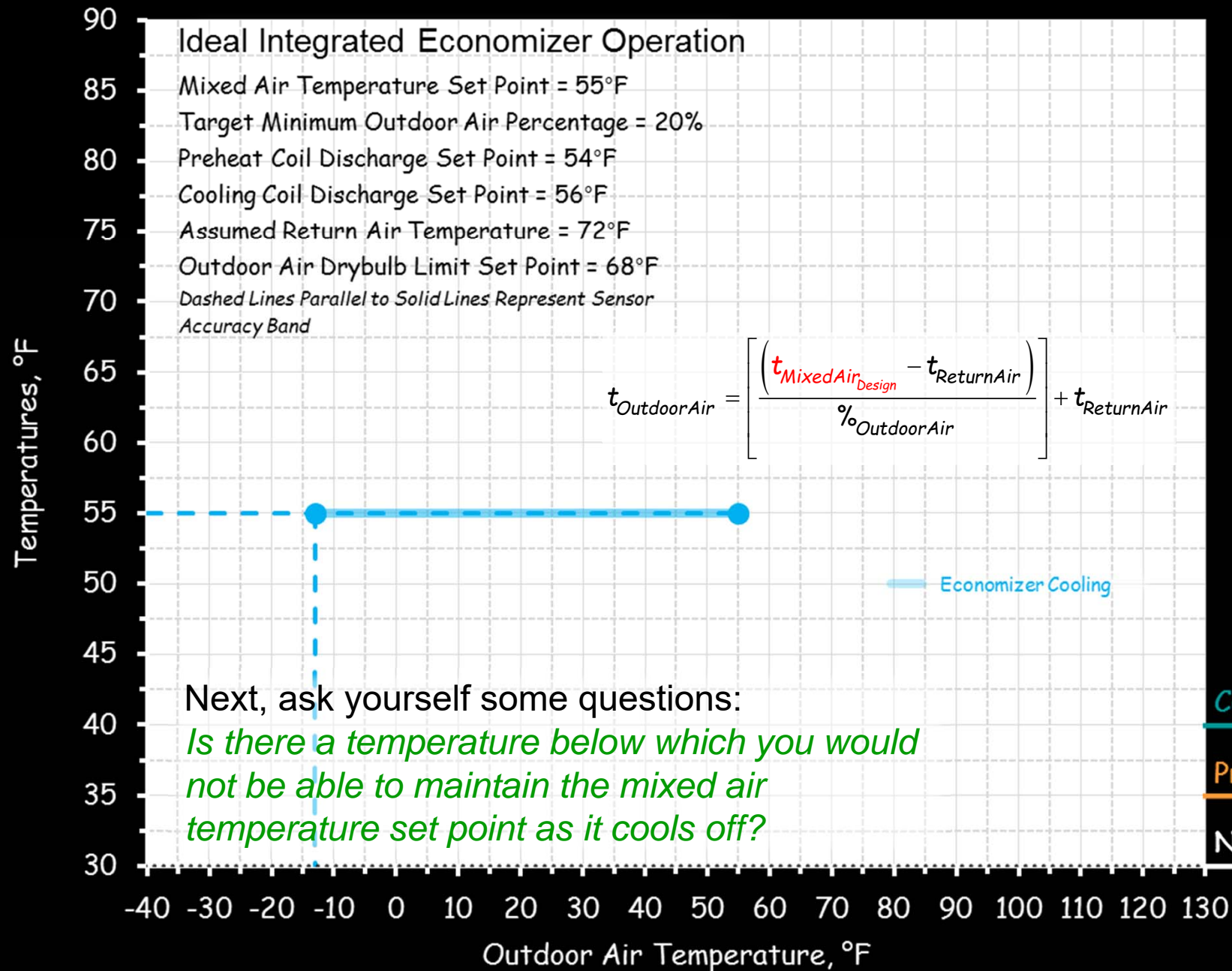
Preheat and Cooling Activity

Cooling Active

Preheat Active

Not Active



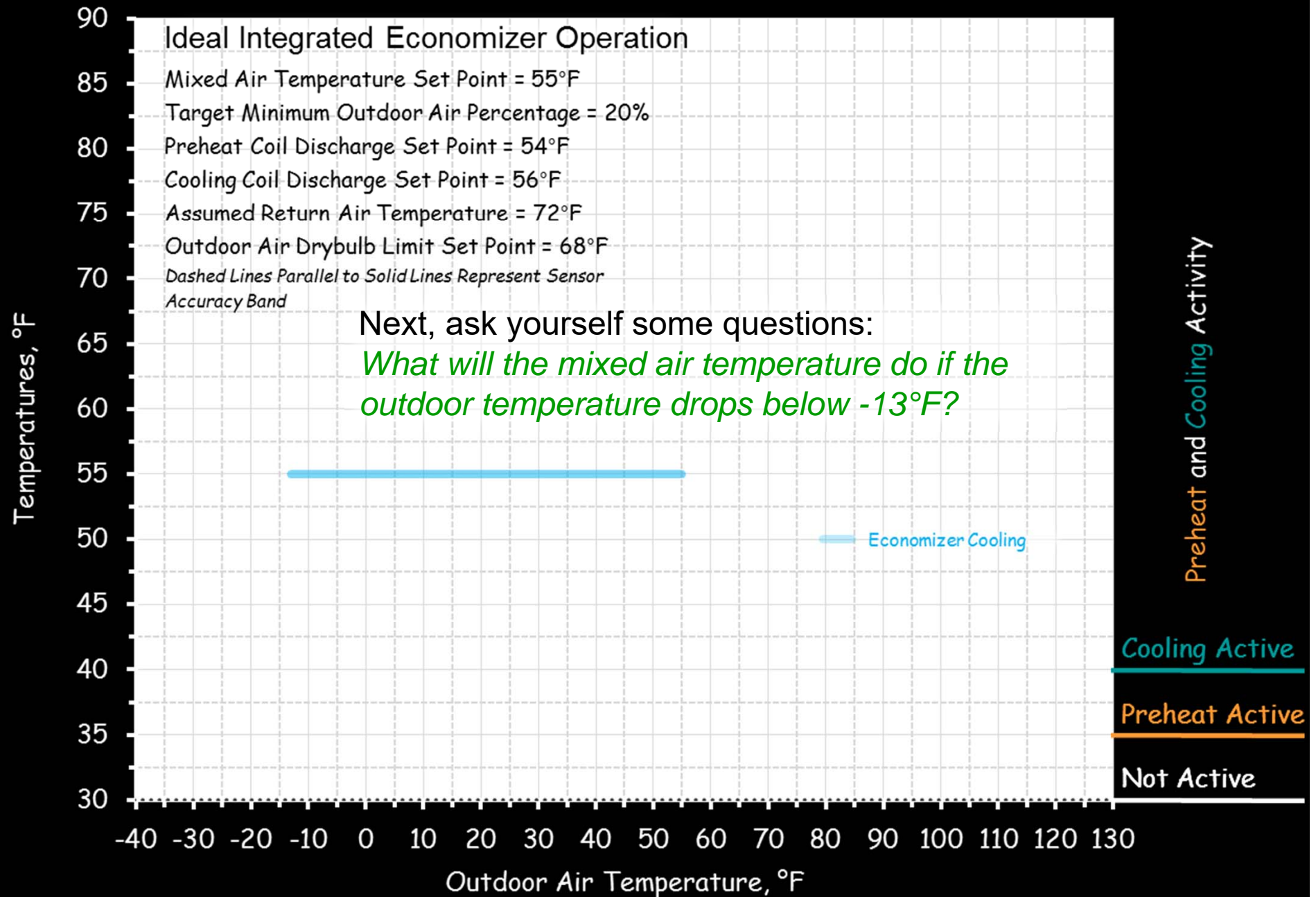


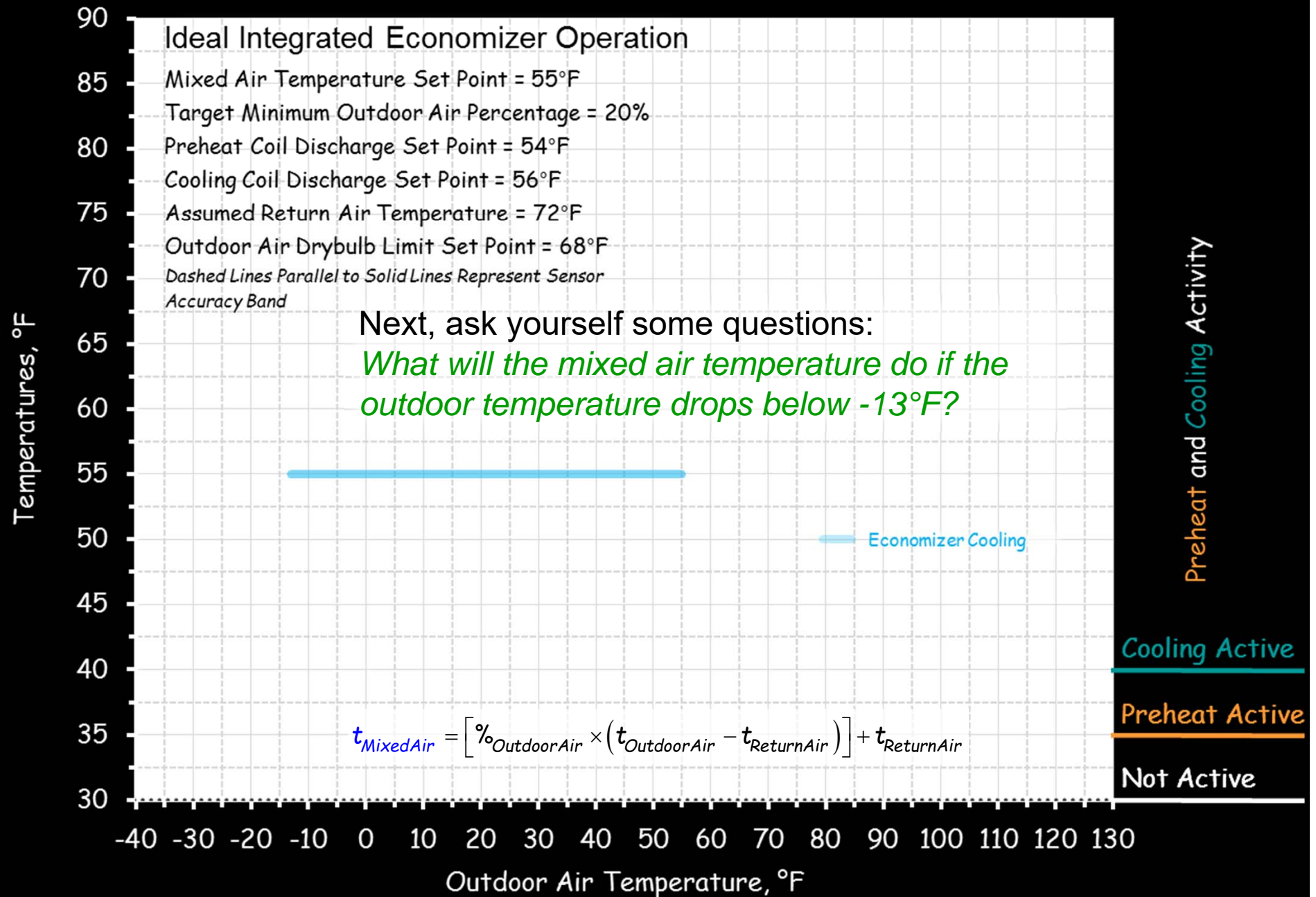
Preheat and Cooling Activity

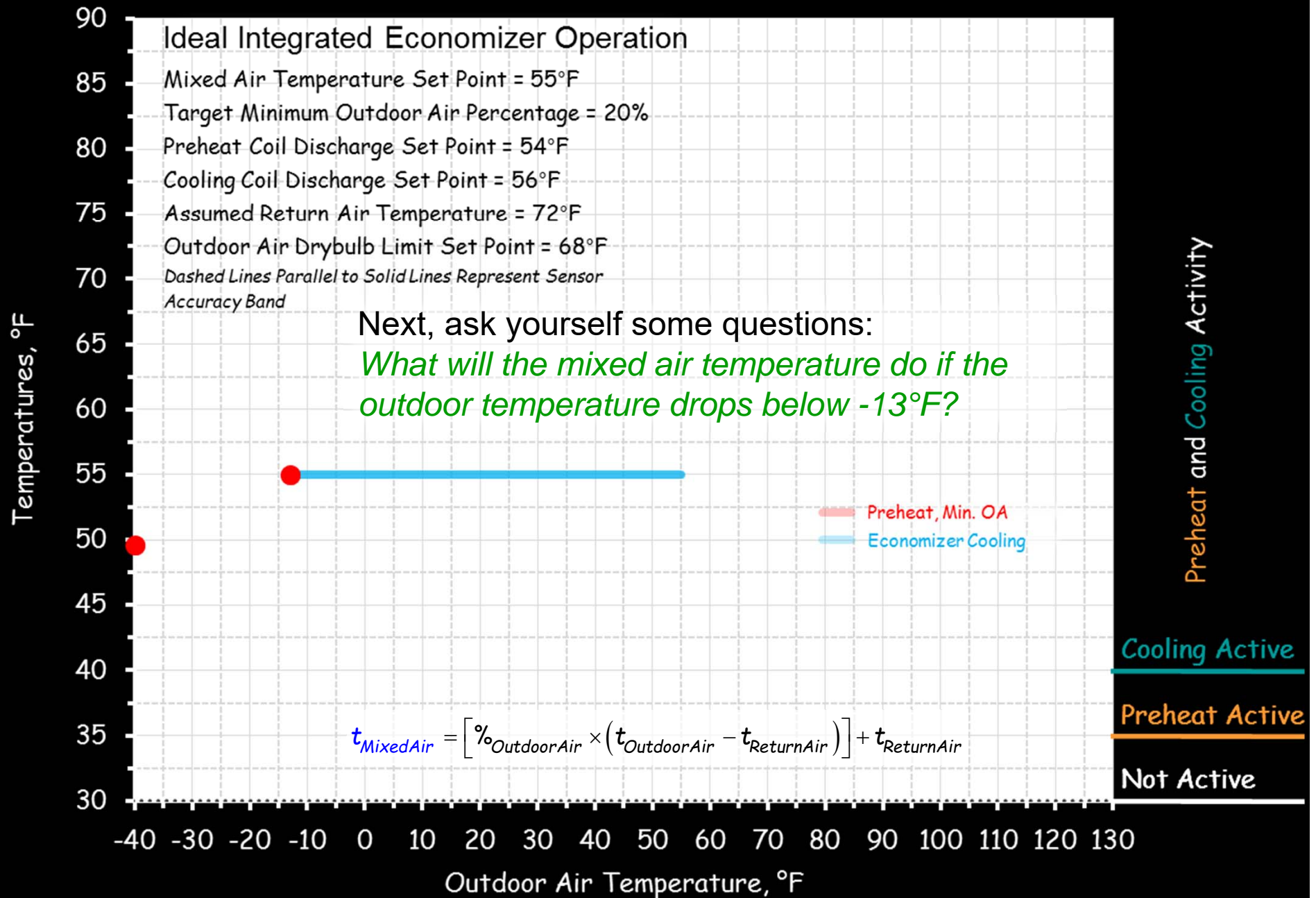
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Preheat Active

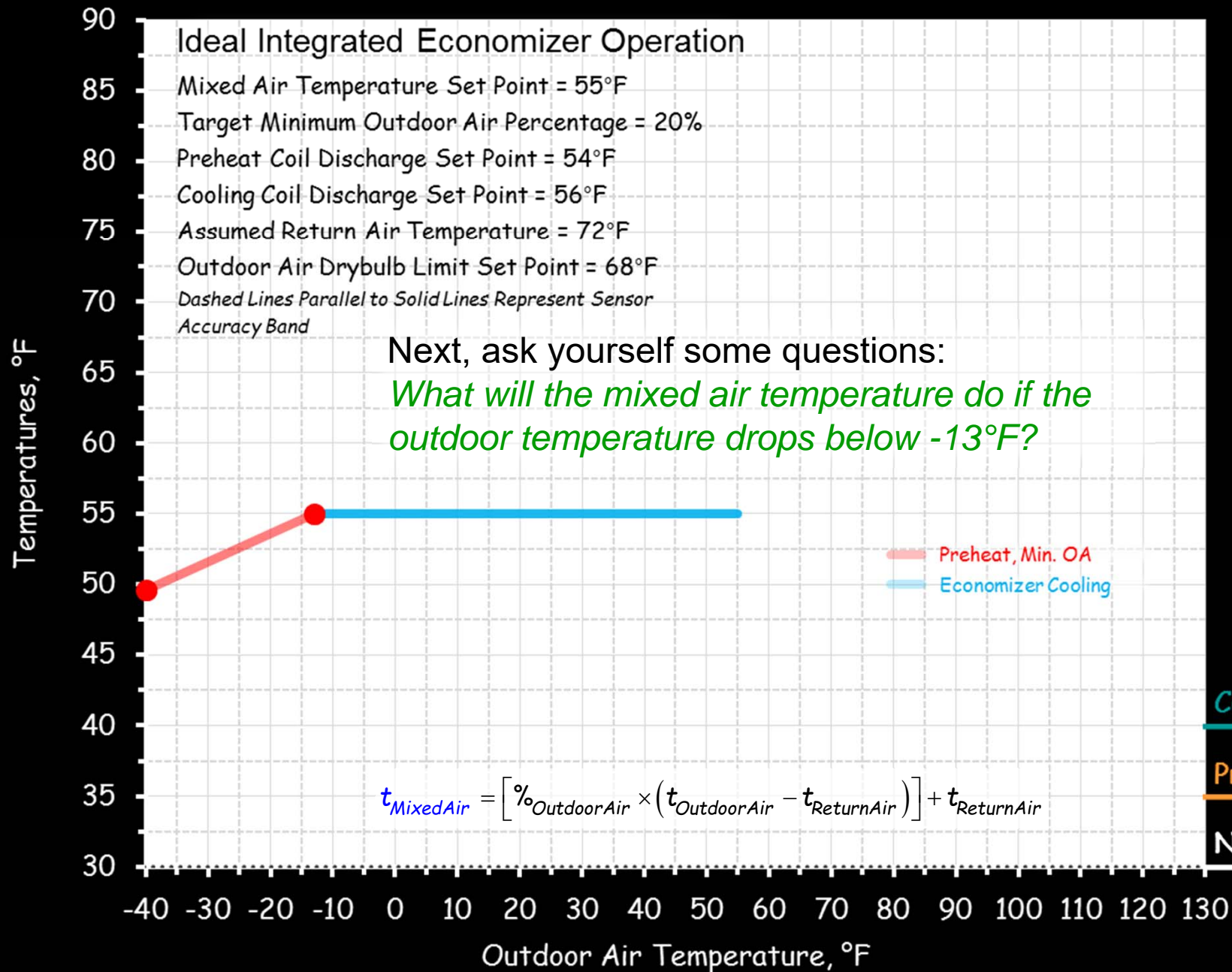
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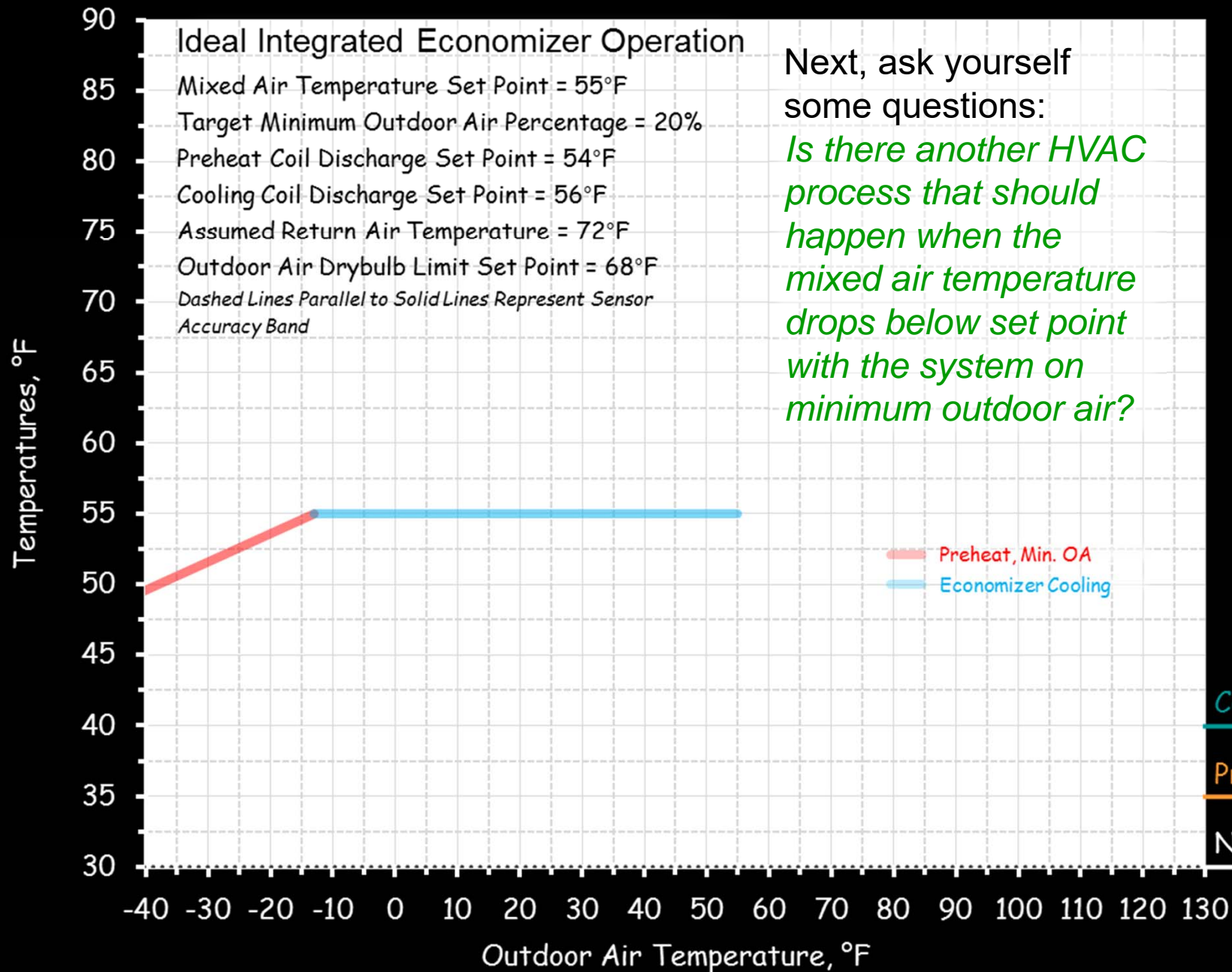












Next, ask yourself  
some questions:

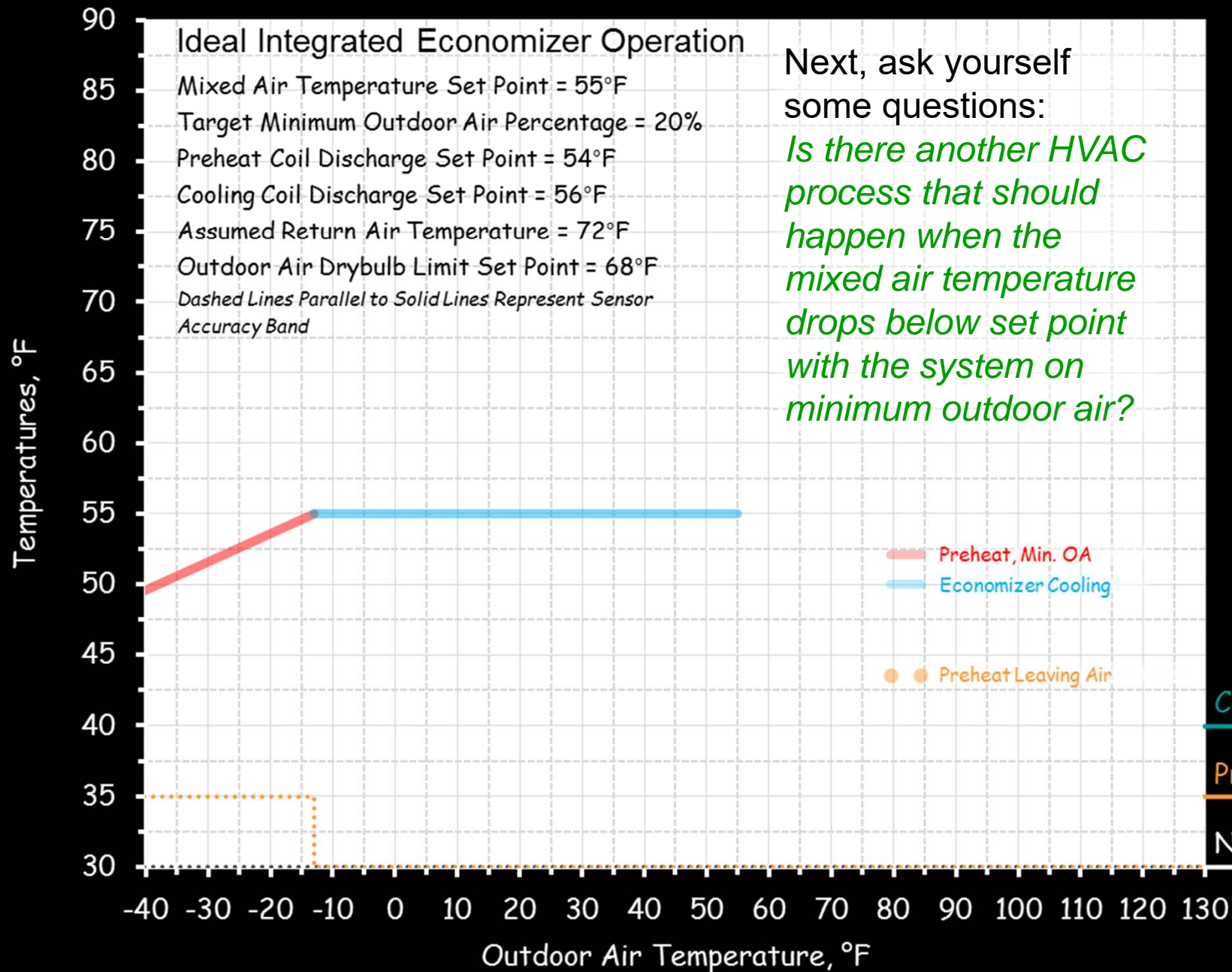
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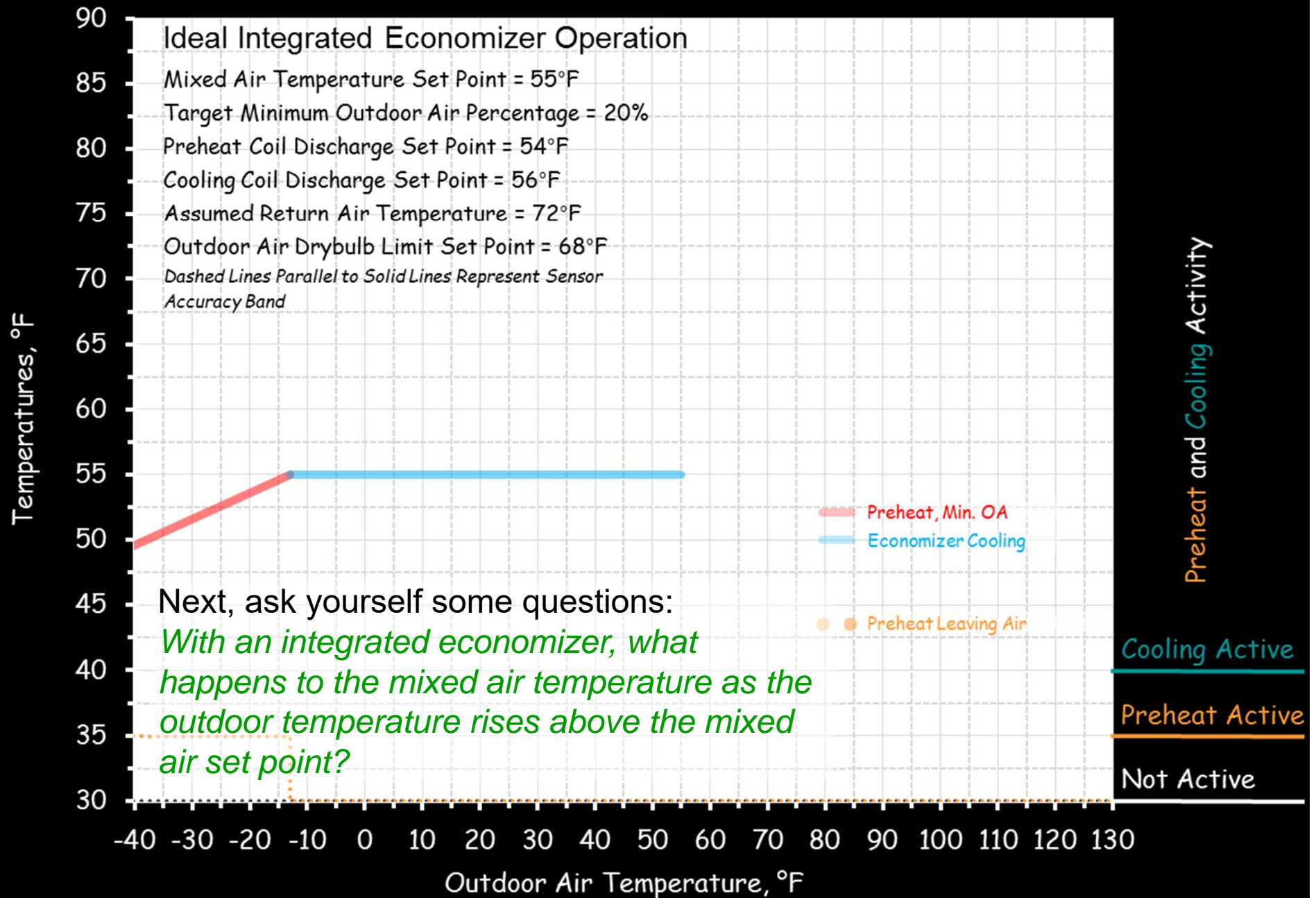
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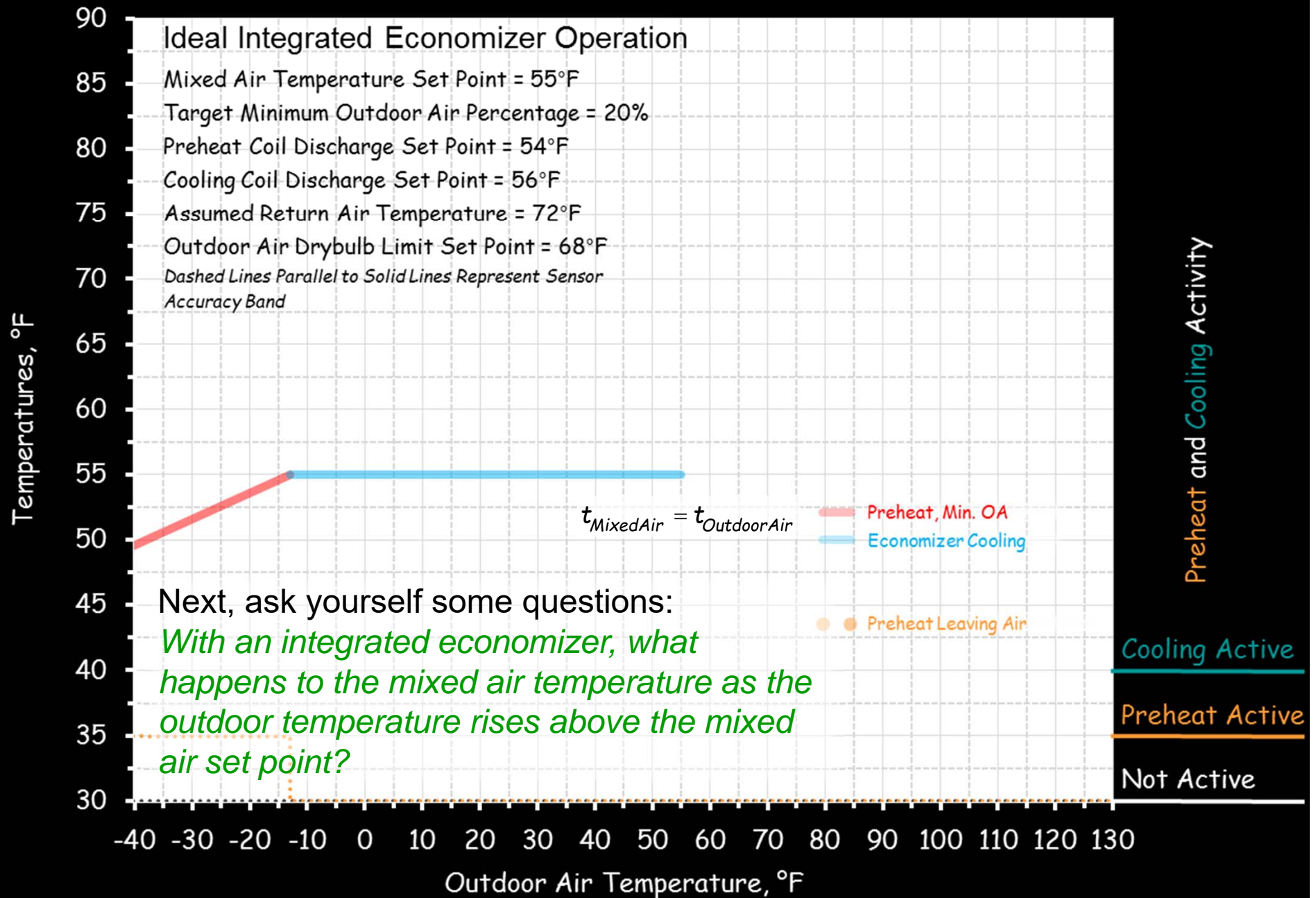
Cooling Active

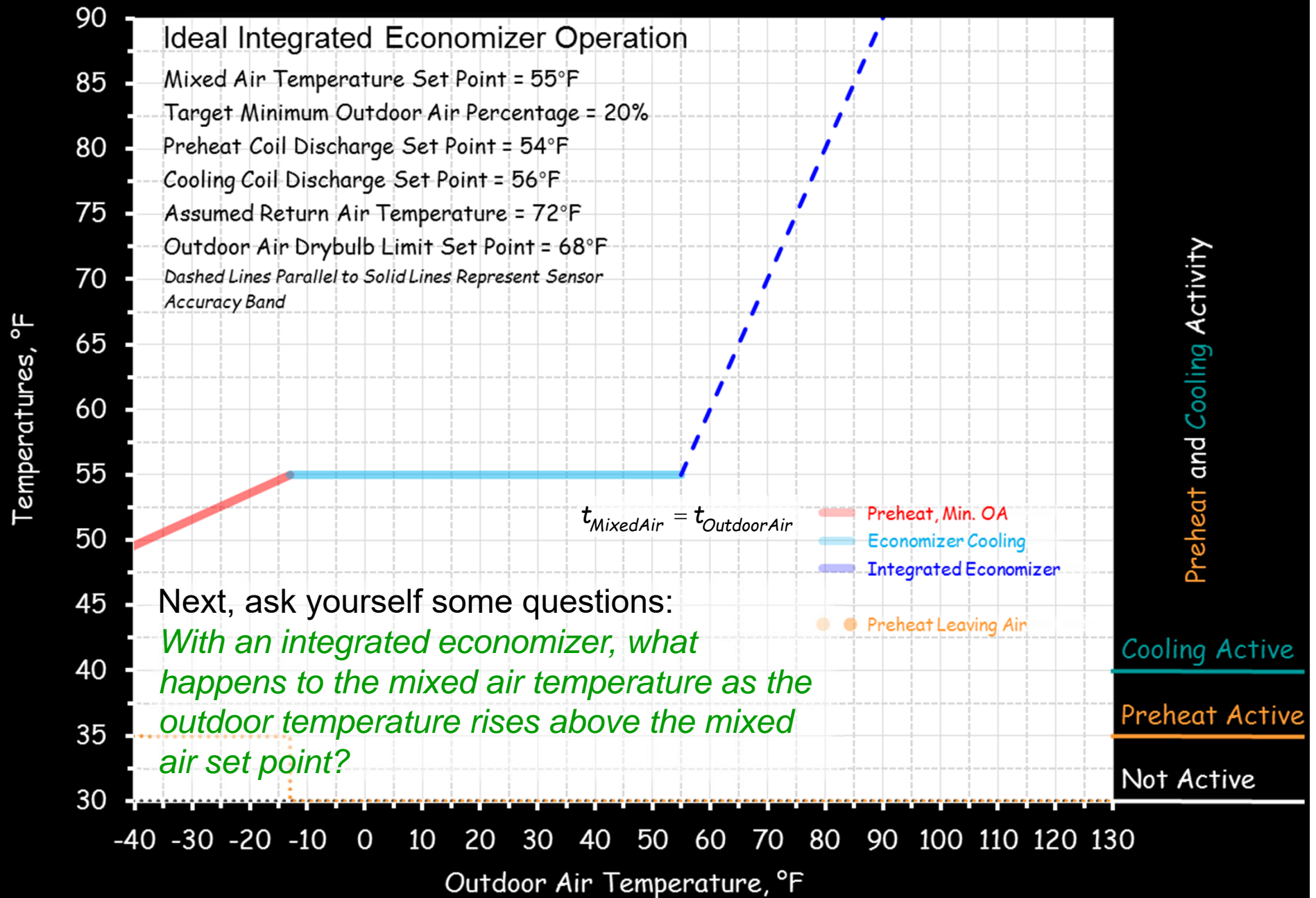
Preheat Active

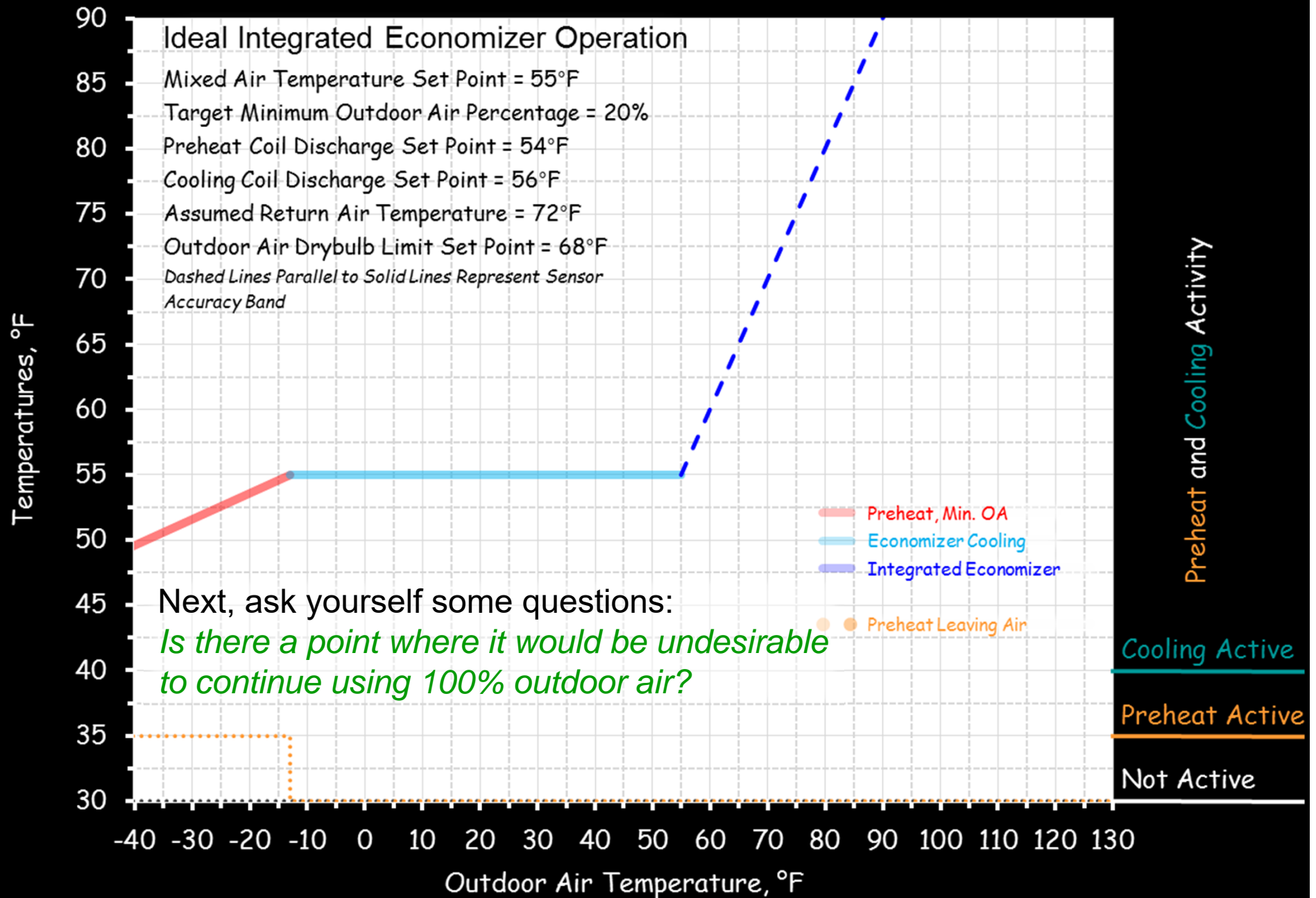
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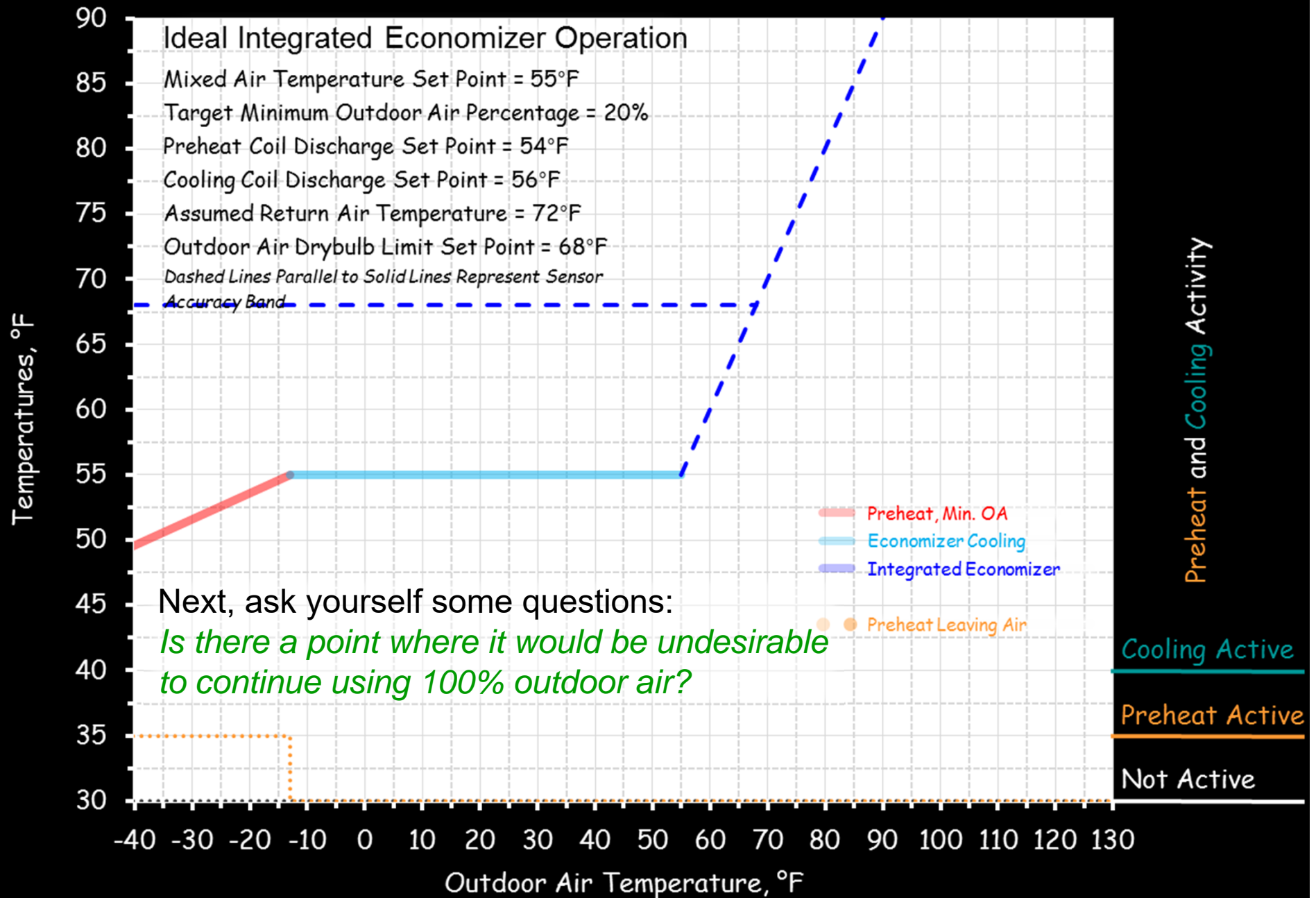


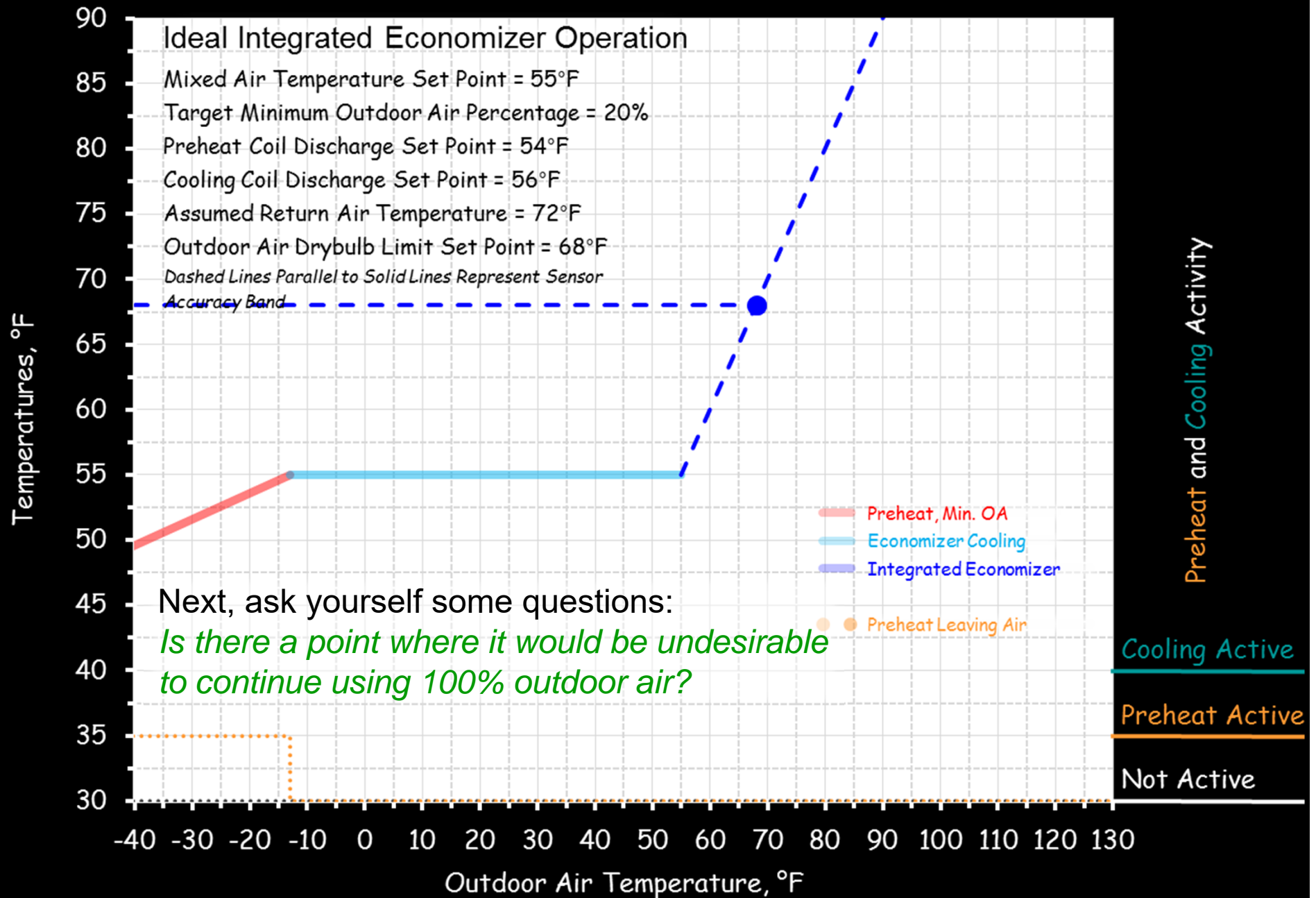




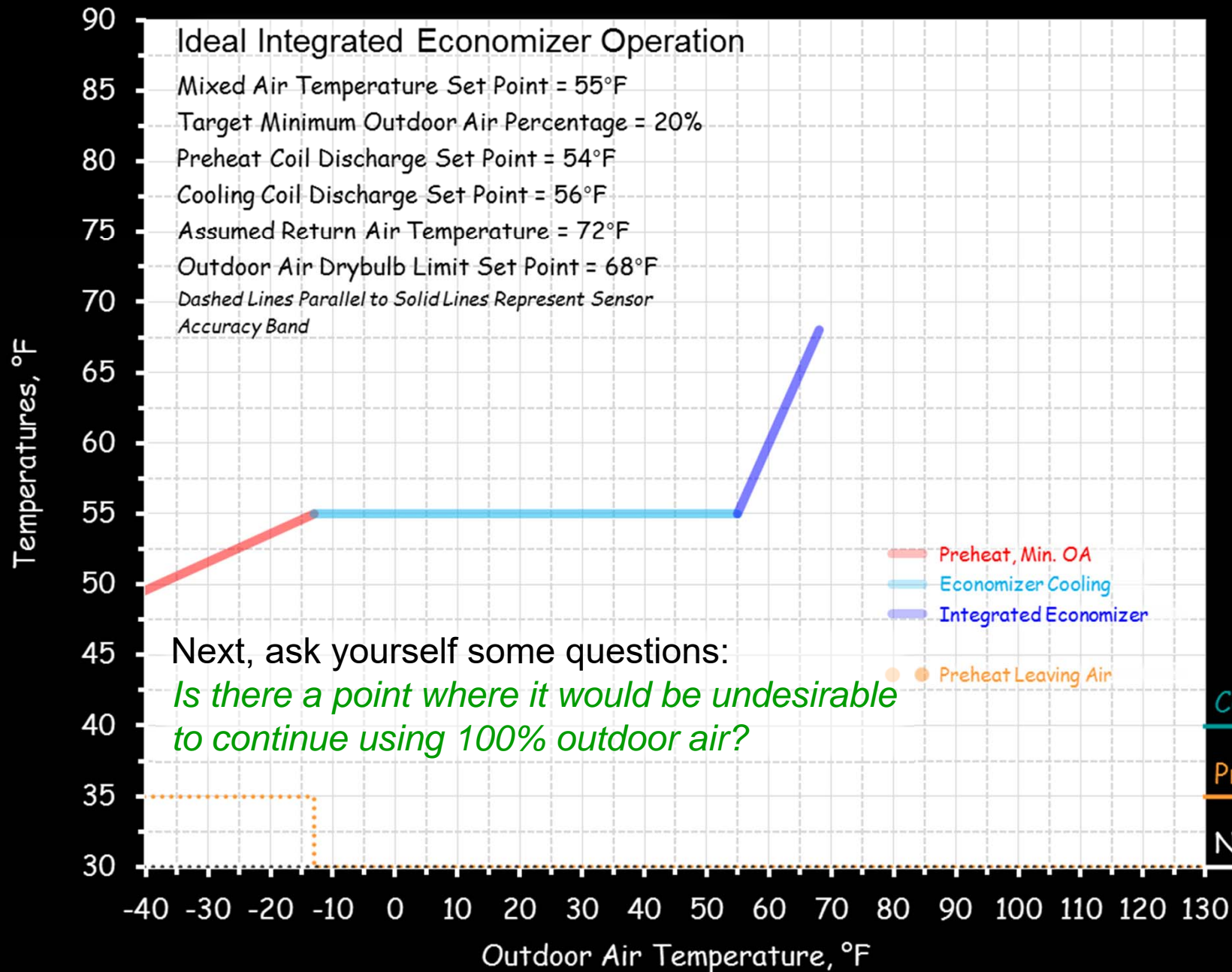










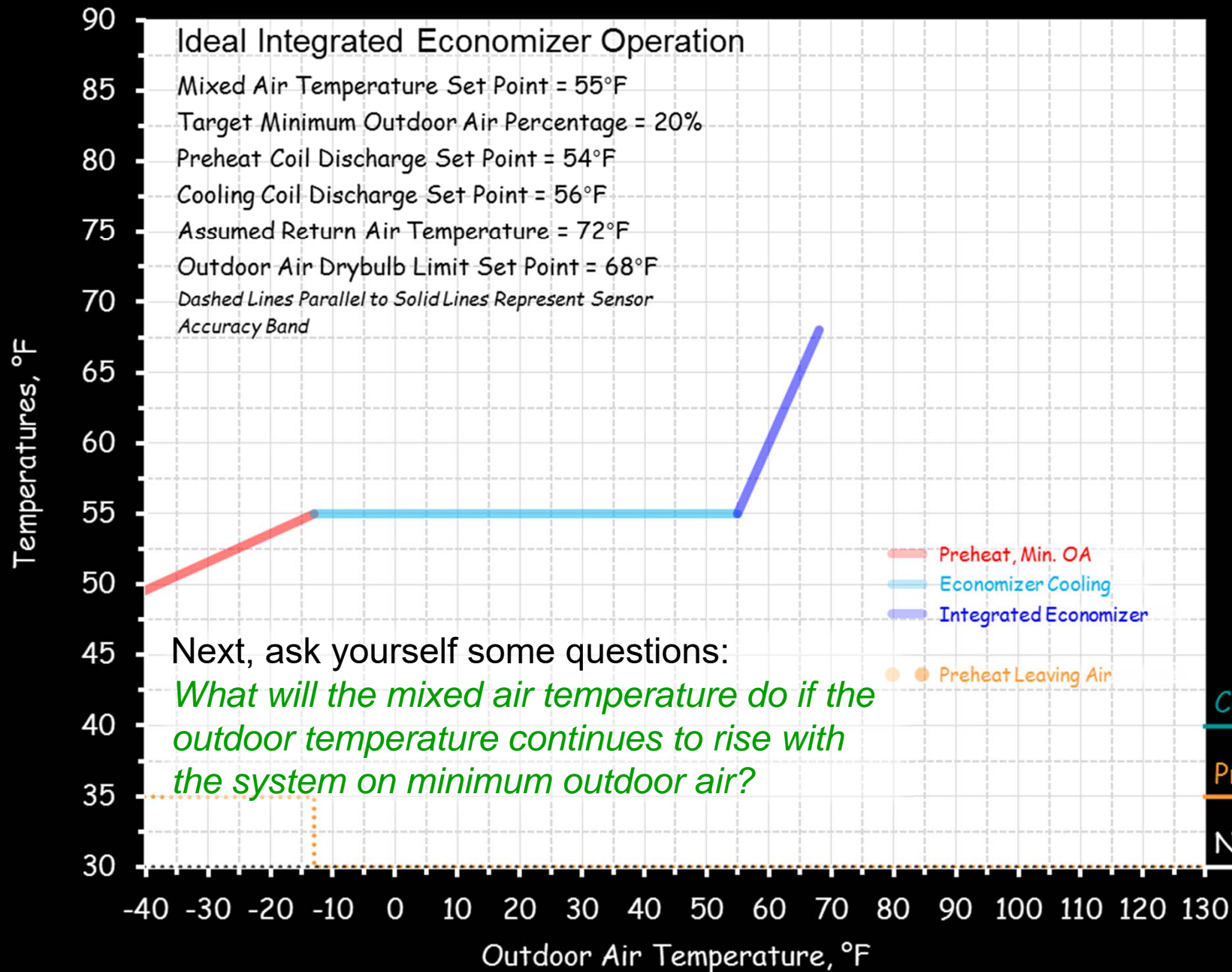


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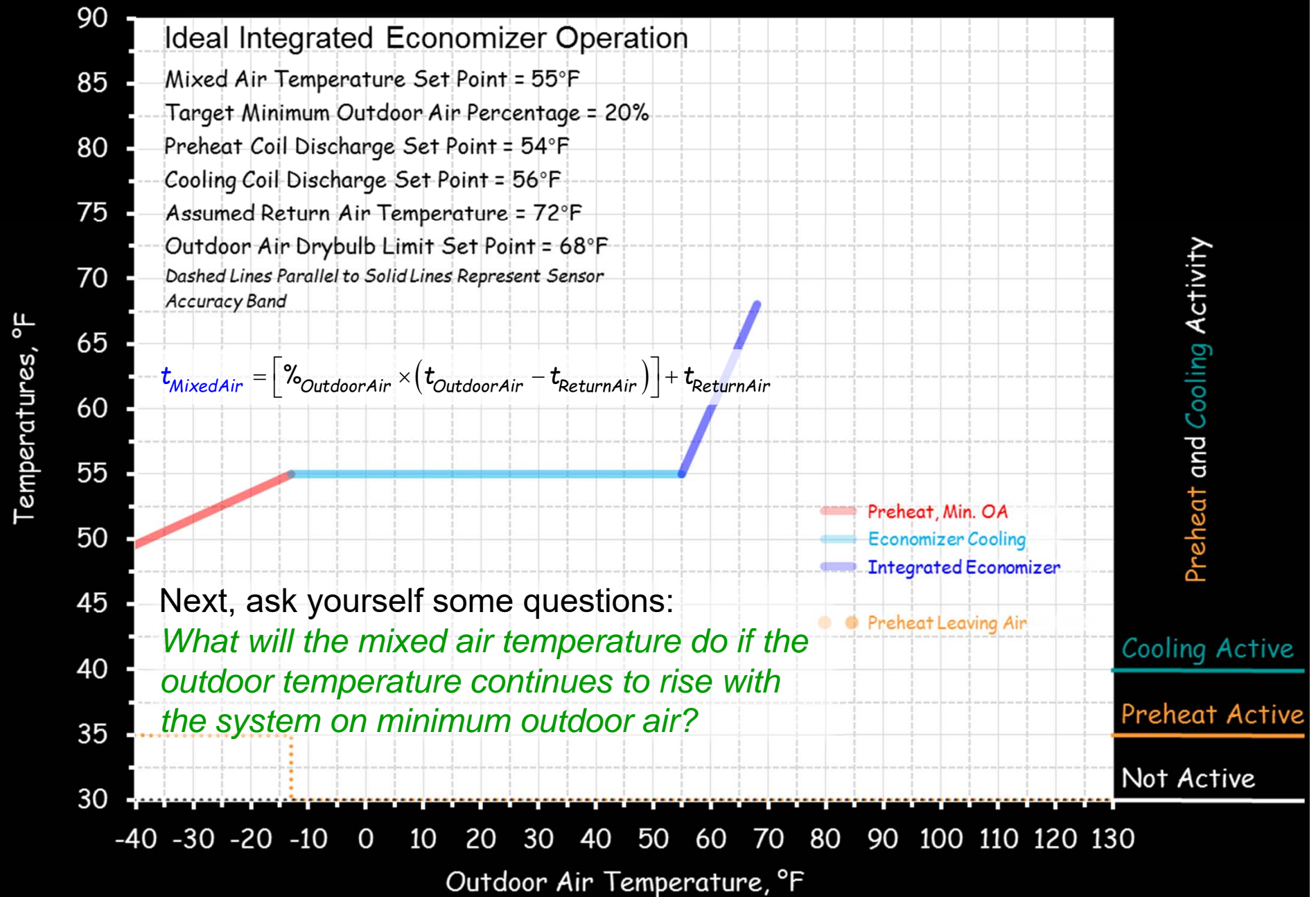


Preheat and Cooling Activity

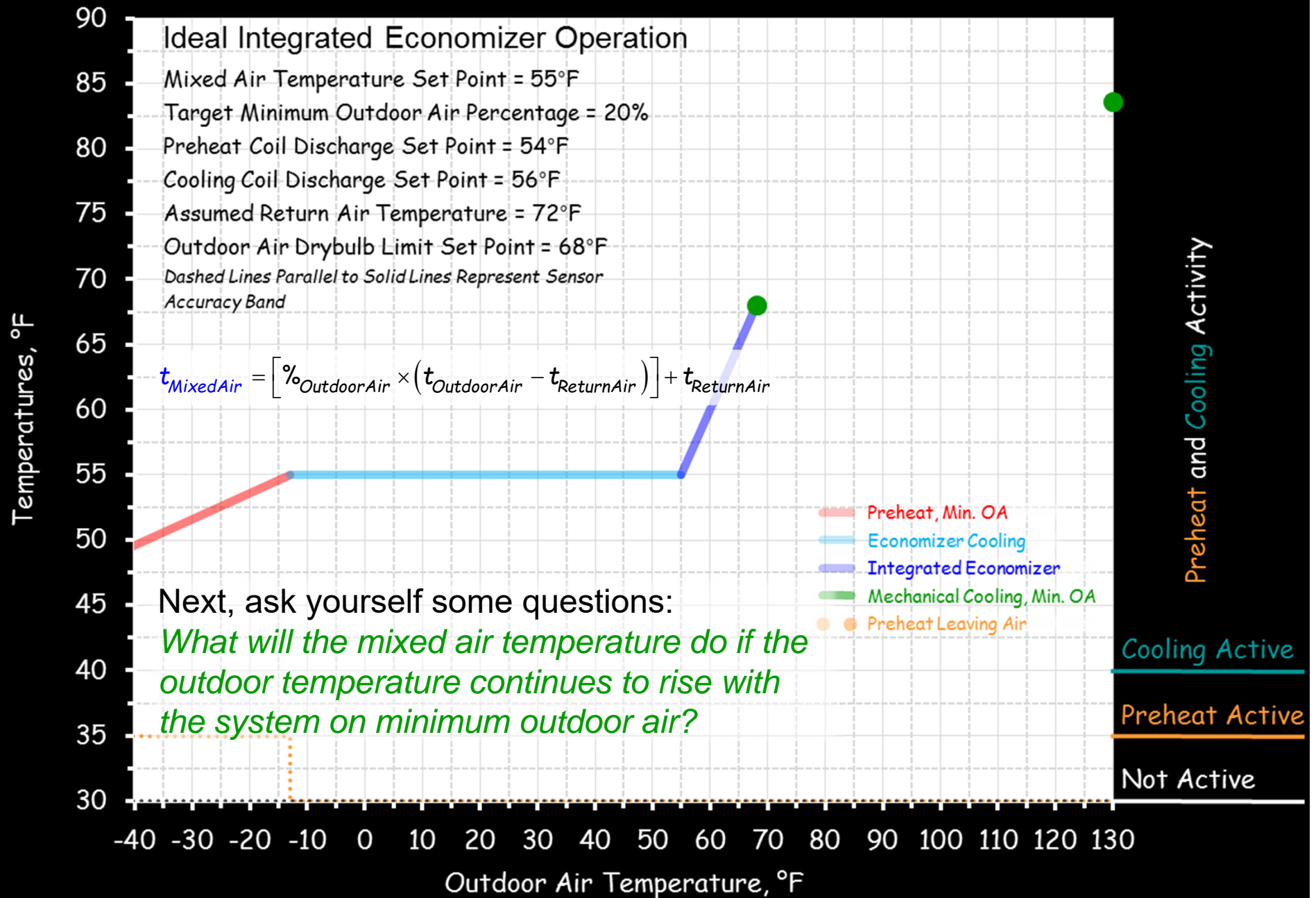
Cooling Active

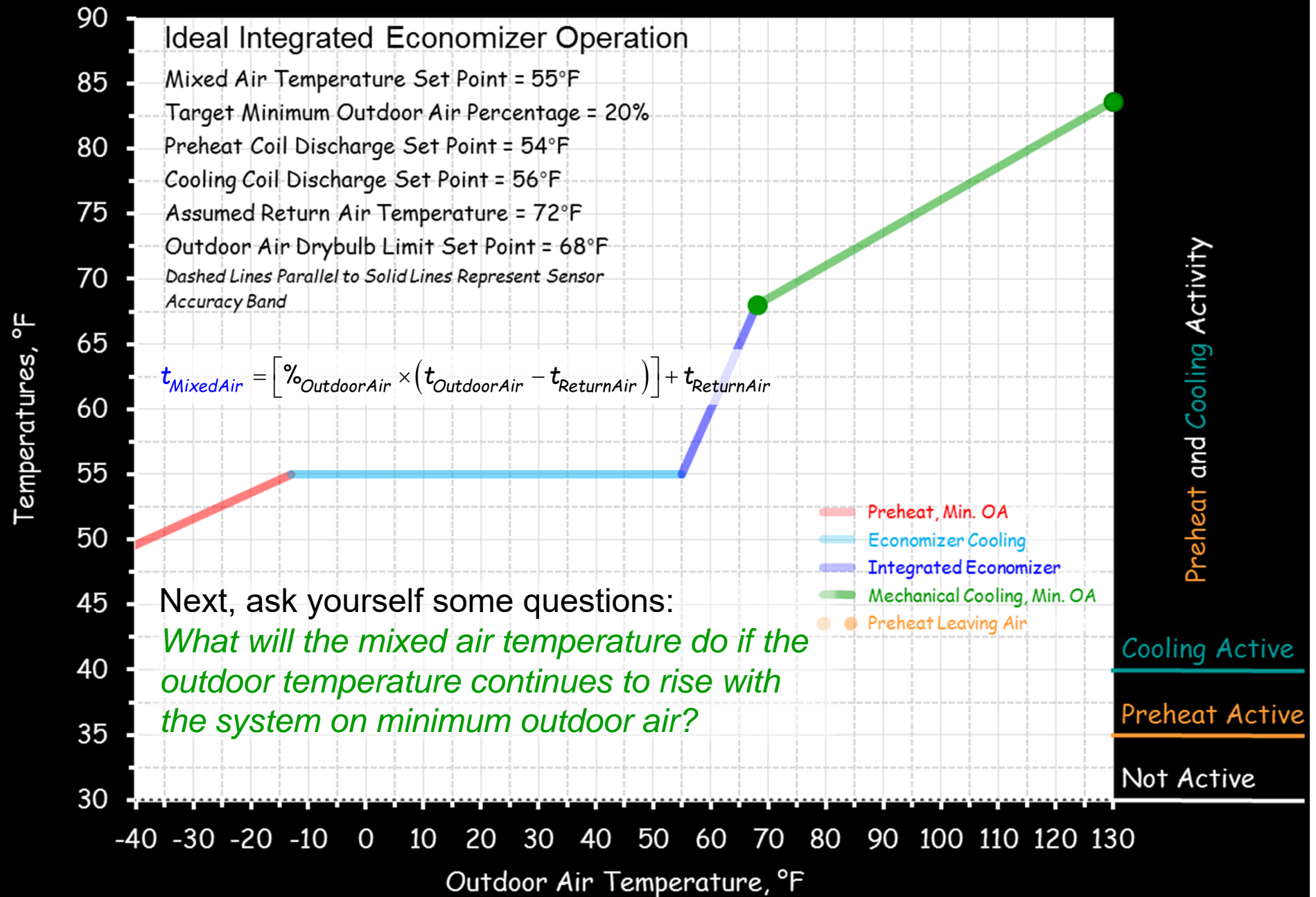
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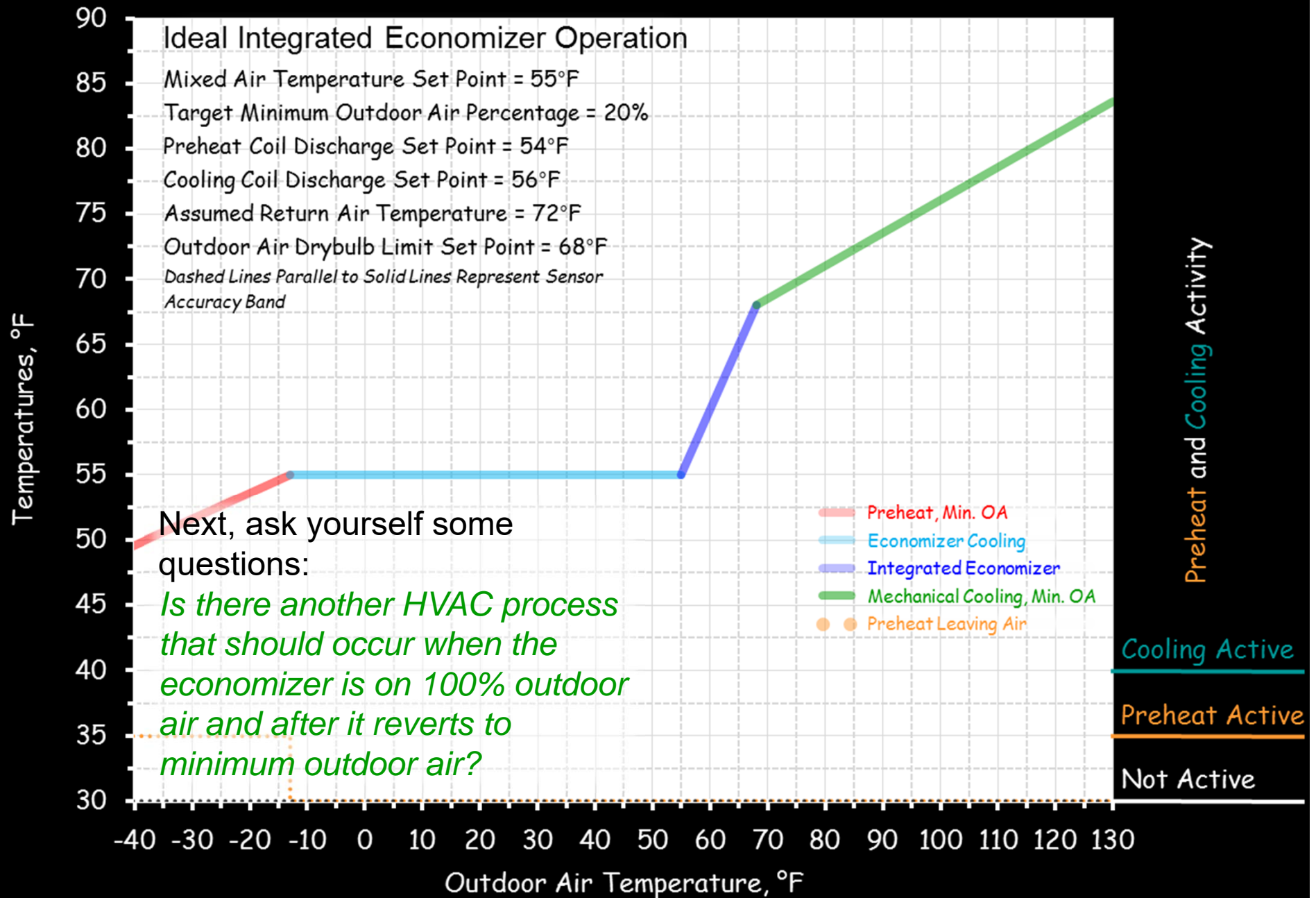
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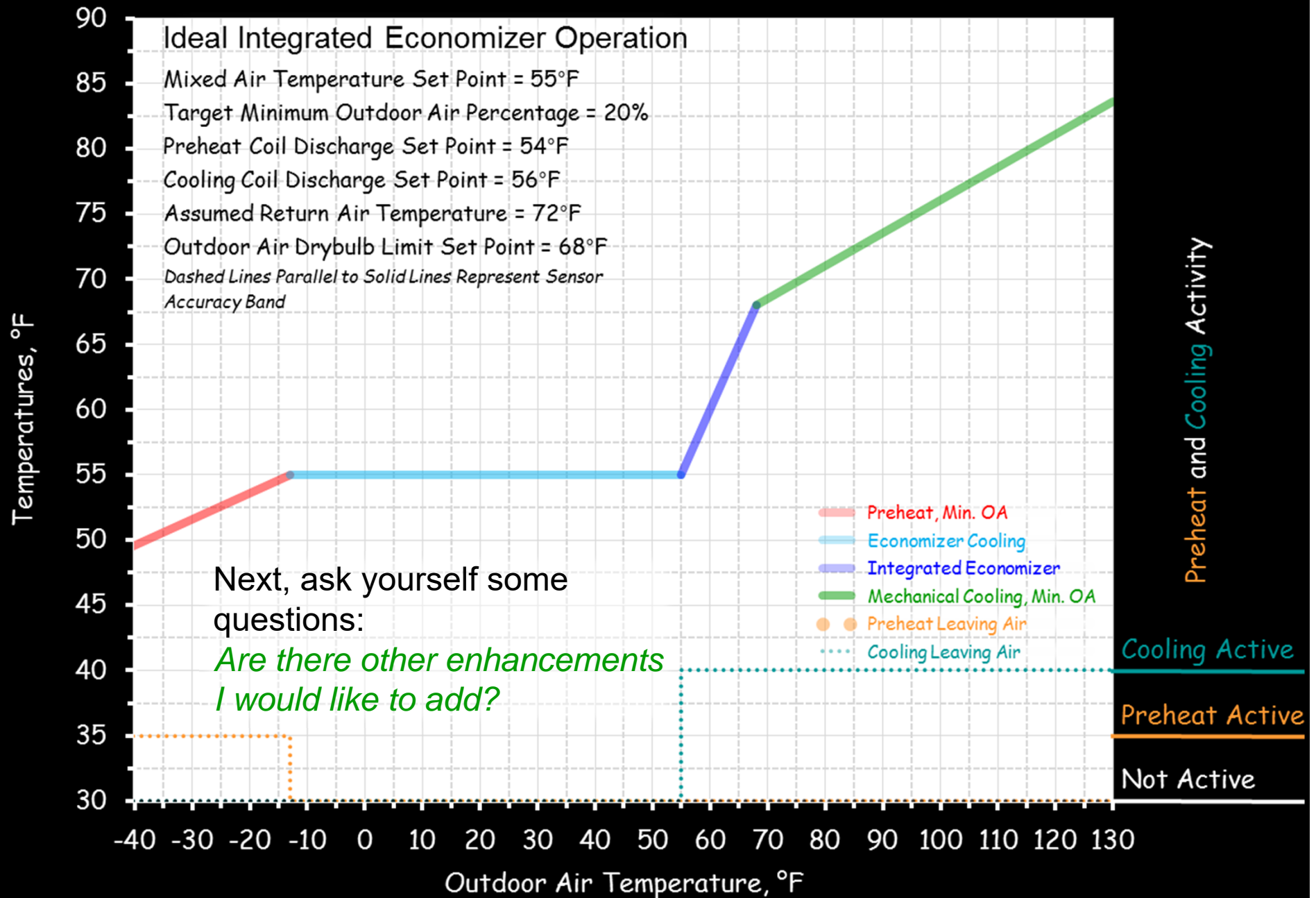




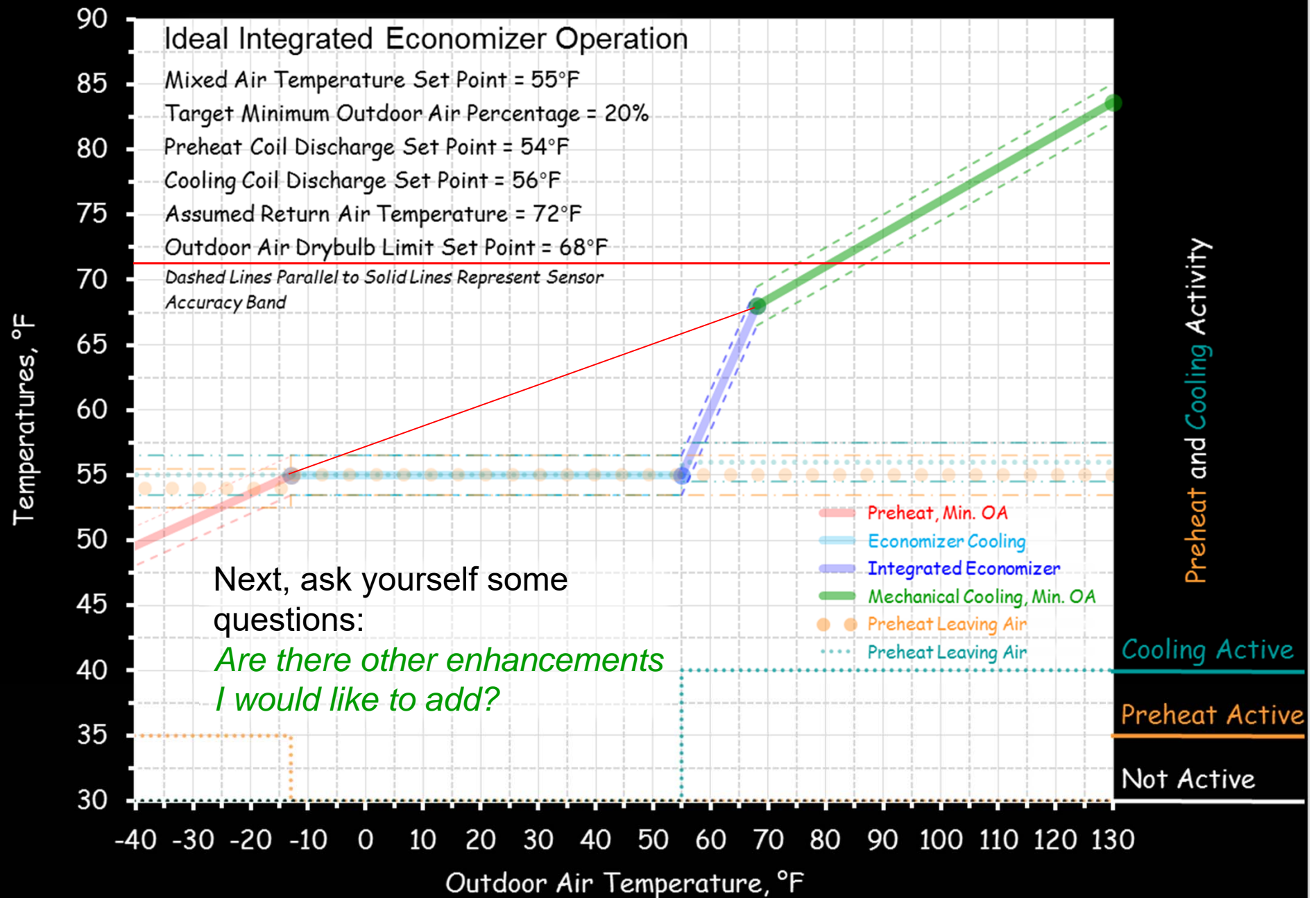


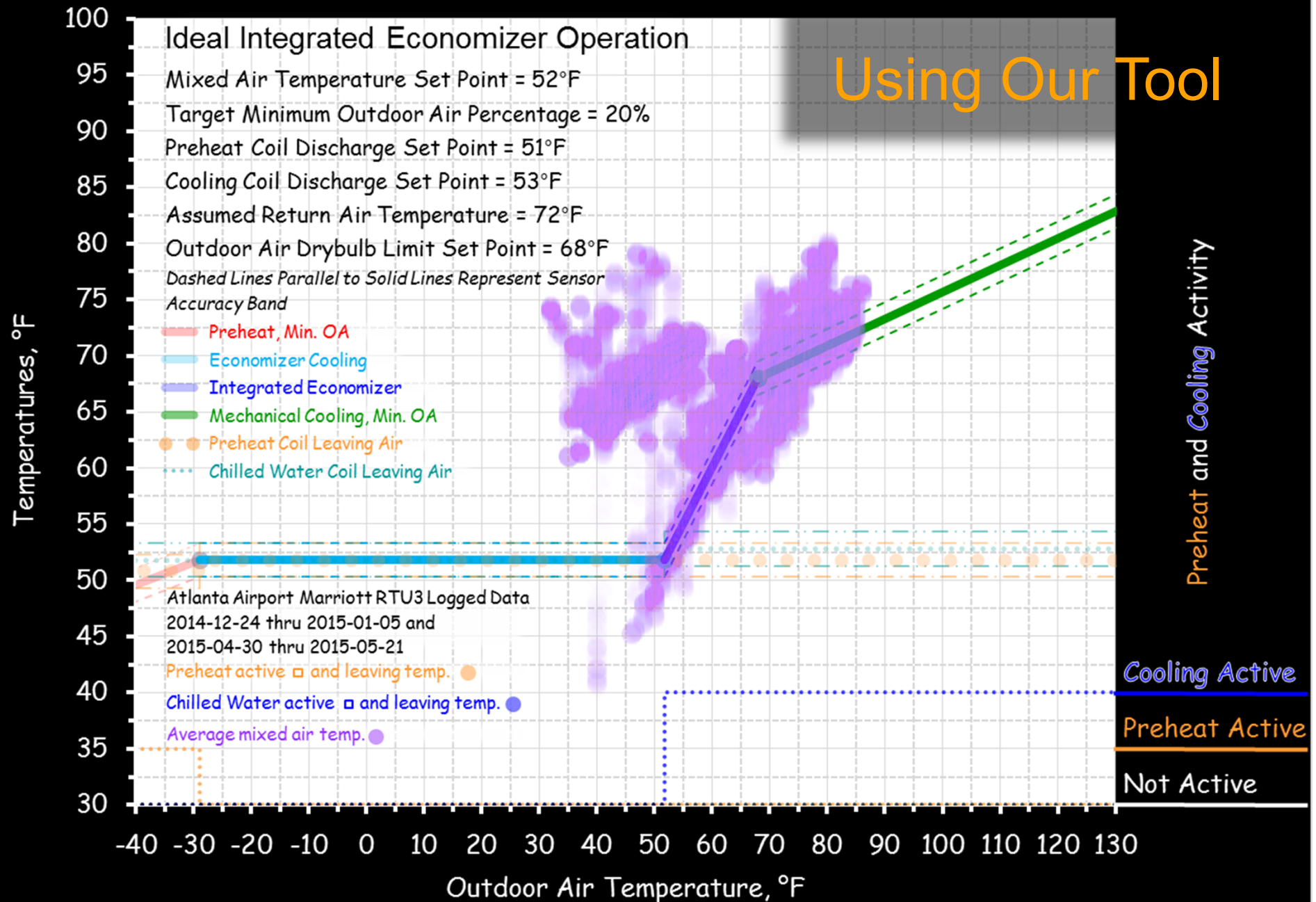












# Bottom Lines

- Fundamental physical relationships can be used to describe our HVAC processes
  - Frequently, the complexity can be reduced by making appropriate simplifying assumptions and substitutions
  - A simplifying assumption is different from a simplifying substitution
- Once they are understood, the relationships can be used to create useful analysis and diagnostic tools
- The tools will only be as good as the data inputs and assumptions
  - Mixed air temperature is a critical input parameter for the diagnostic tool we developed
  - Measuring mixed air temperature accurately can be tricky
- The Universal Translator has economizer diagnostics built into it along with many, many other useful features.



