

# R806: Unvented Roof Assembly

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## Project Objectives

- Design a cost effective hybrid unvented roof assembly
  - efficiently utilizes an under decking radiant barrier
  - Uses under-sheathing open cell spray foam
- Address the moisture that gets trapped in the attic.

## Background

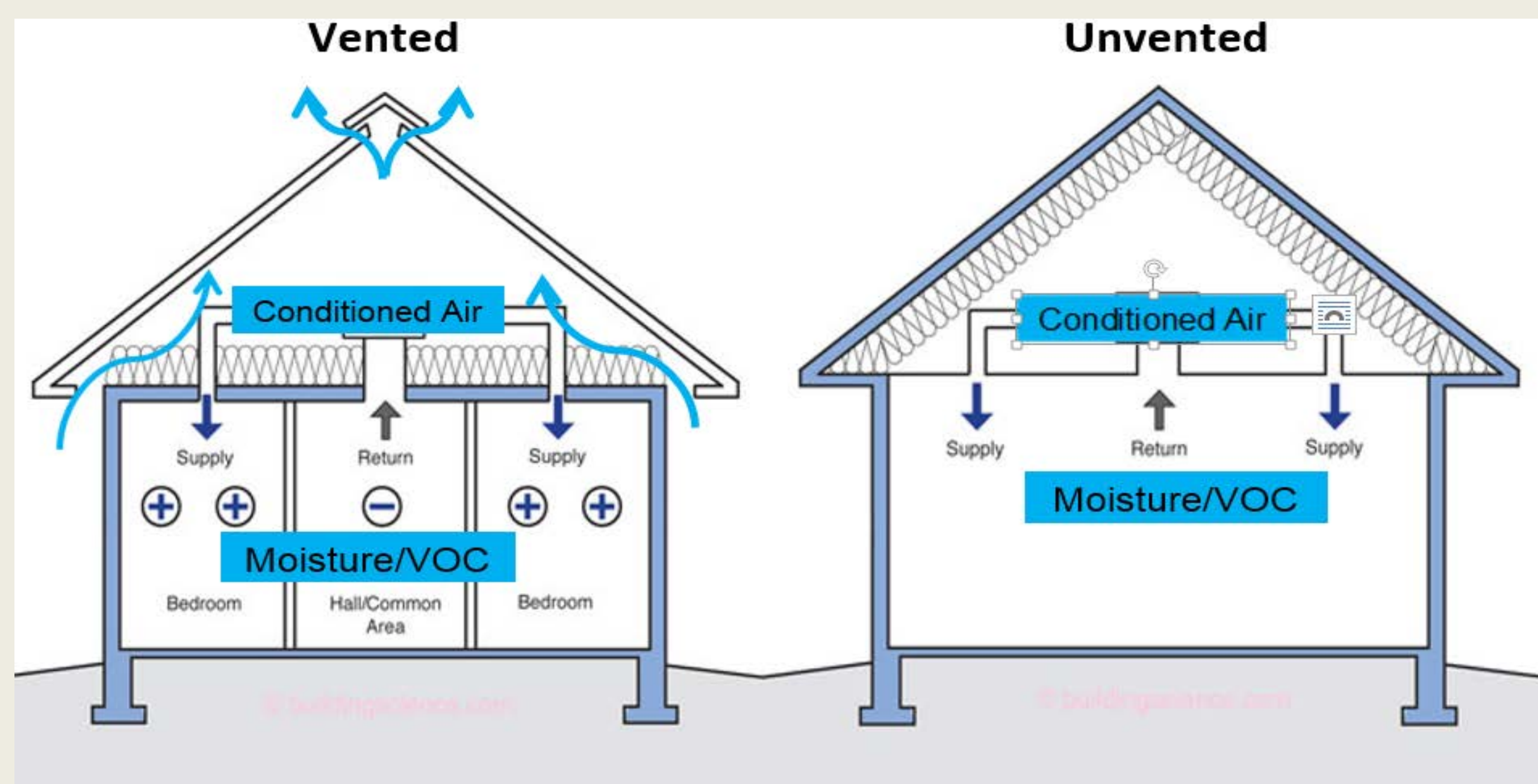
R806 is the residential code on how to properly build and insulate the roof deck of a home

### Vented

- Typically common design
- Does not include attic in thermal space
- Attic can reach temperatures of 130°F
- Great Temp difference between attic and space
- Moisture is vented out of attic

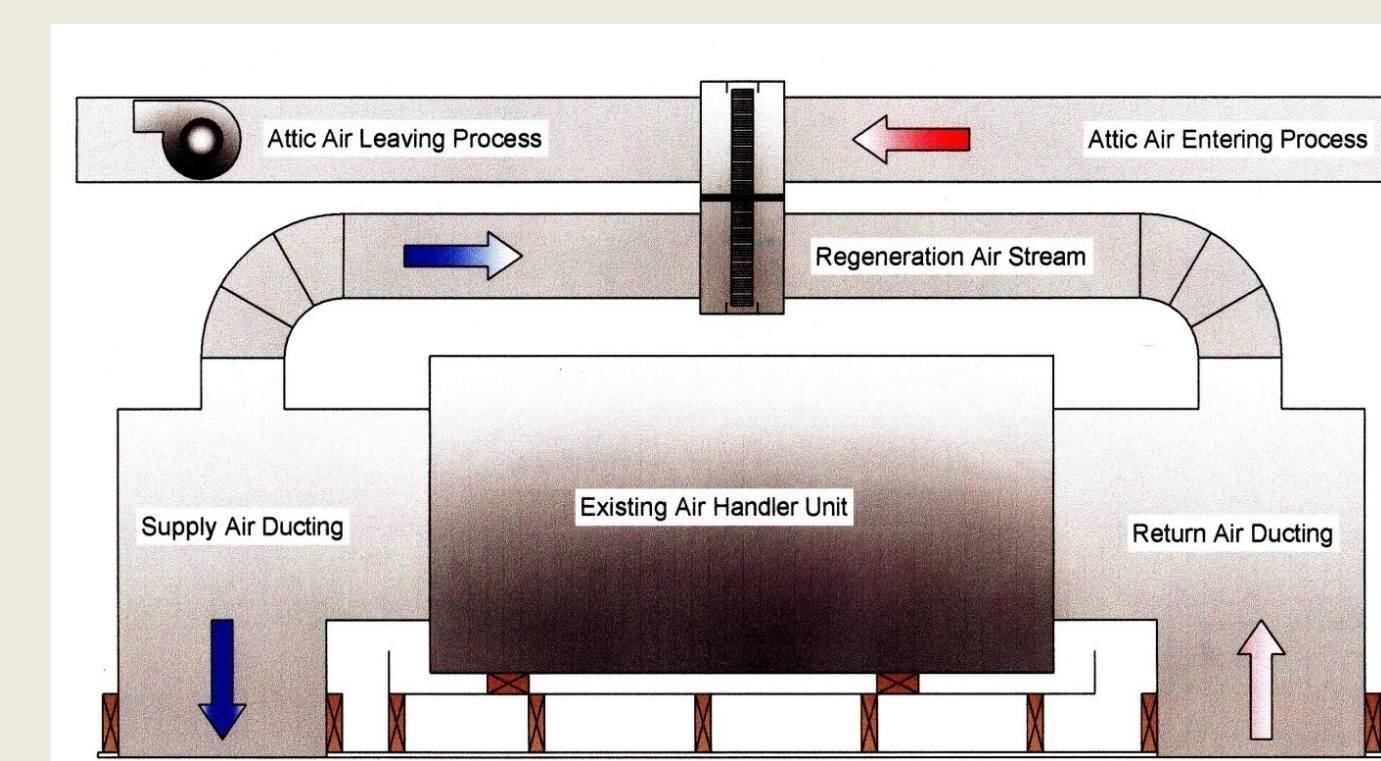
### Unvented

- Put into Practice in 2006
- Includes Attic in Thermal space
- Attic is only 5-10°F warmer than set point of space
- Duct work is in semi-conditioned space
- Moisture gets trapped in attic



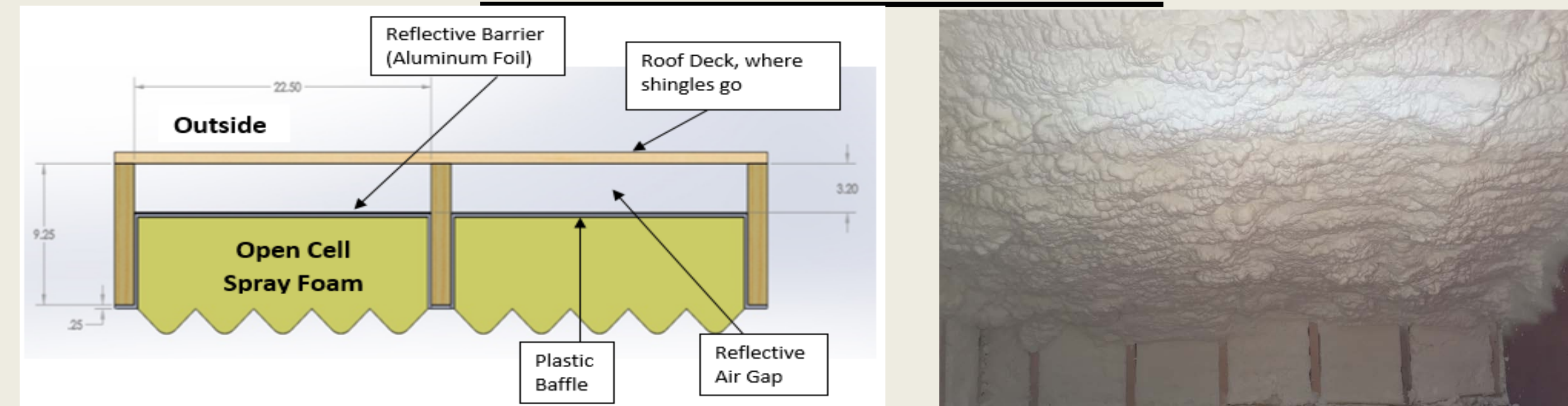
<http://www.buildingscience.com/documents/insights/bsi-074-duct-dynasty>

## Moisture Extraction method for Retrofit Homes



- The desiccant wheel absorbs moisture from the attic airstream.
- This moisture is released from the wheel into the return air stream
- Moisture condenses at the evaporator coil.

## Reflective Insulation



This is a model of baffle system that has a reflective material attached to it in order create a reflective air gap with an R-value of 9.5.

## Engineering Specifications

- Constraints of R806.5
- Roof deck R-value of at least 38
- Less than 16% moisture content in wood
- Utilizes Open Cell Spray Foam and Reflective Insulation

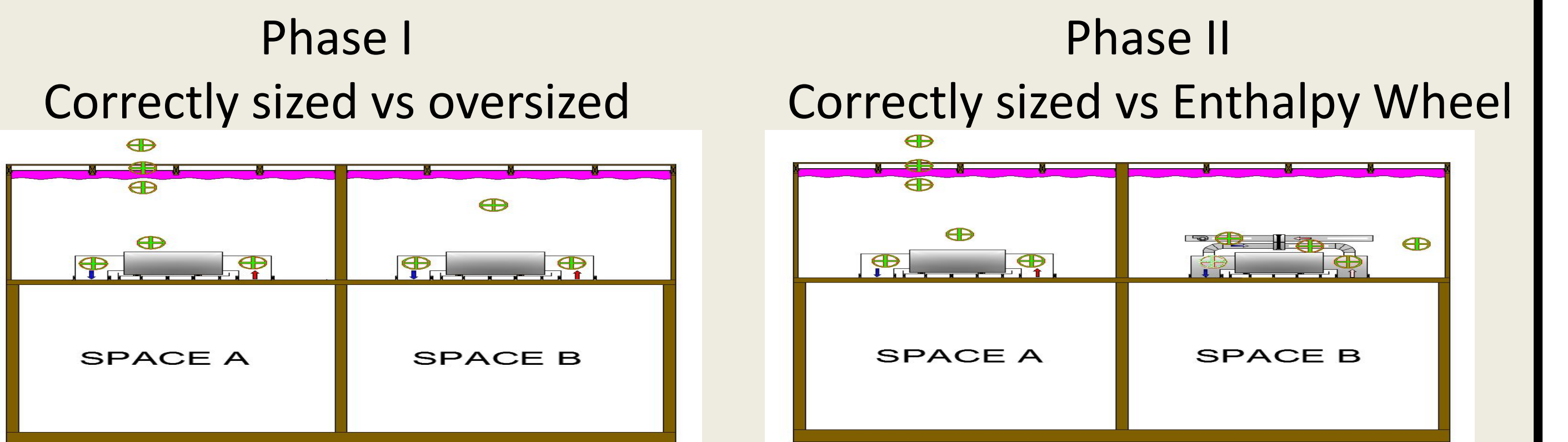
House Conditions		Design Conditions	
	Space	Attic	
RH (%)	50	35	
Temp (°F)	75	± 5-10	
		City : Baton Rouge, Louisiana	
		Summer	Winter
		92°F db	77°F wb
			30°F db

## New Construction Houses

- Designing for new construction the moisture issue can be addressed by proper sizing of the HVAC equipment using a tedious method called Manual J.

## Testing

Test 2 identical 8'X8' scale model Unvented homes

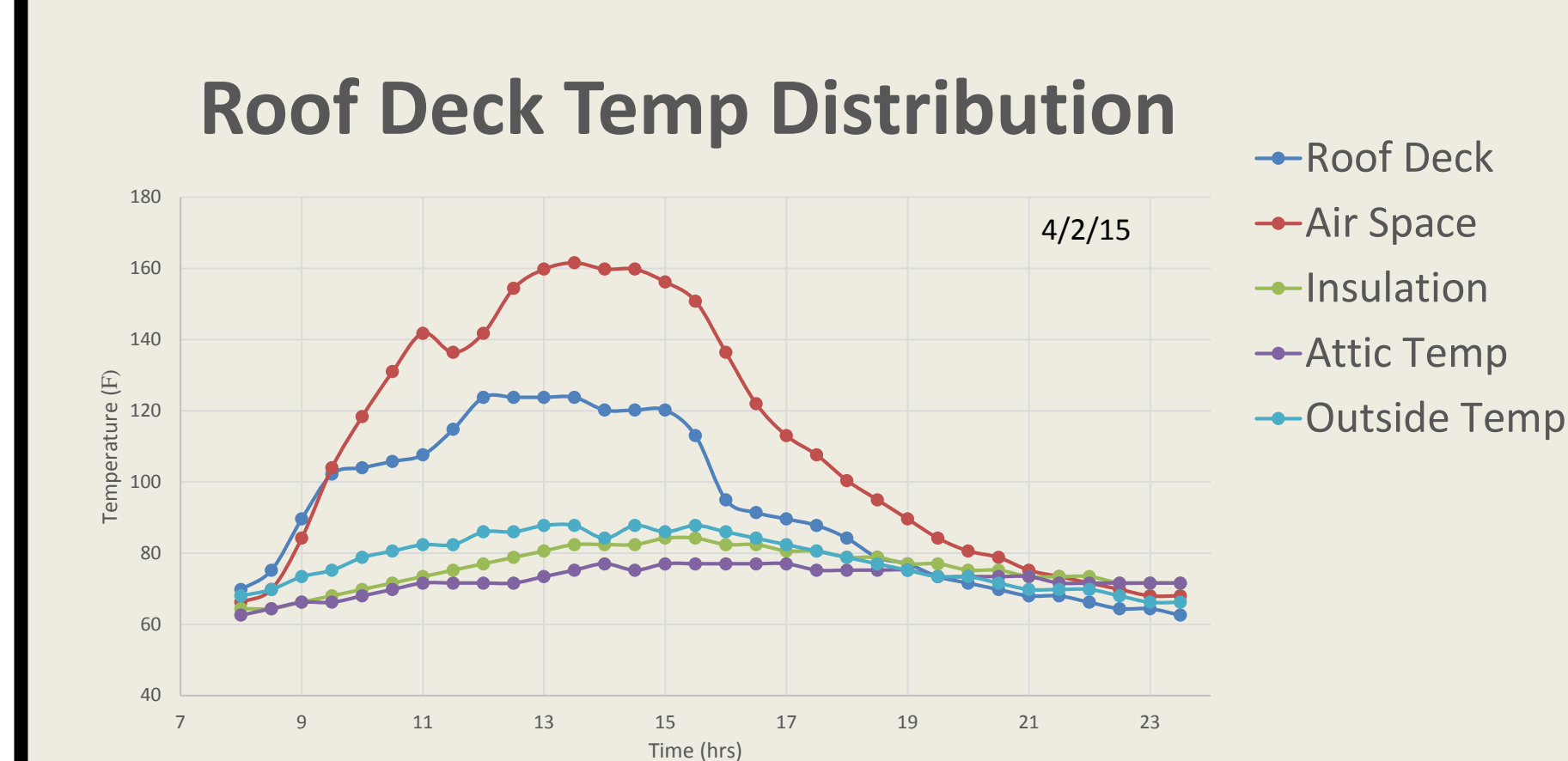


### Testing apparatus

- Humidistat, Thermocouples, Moisture Meter, Watt meter



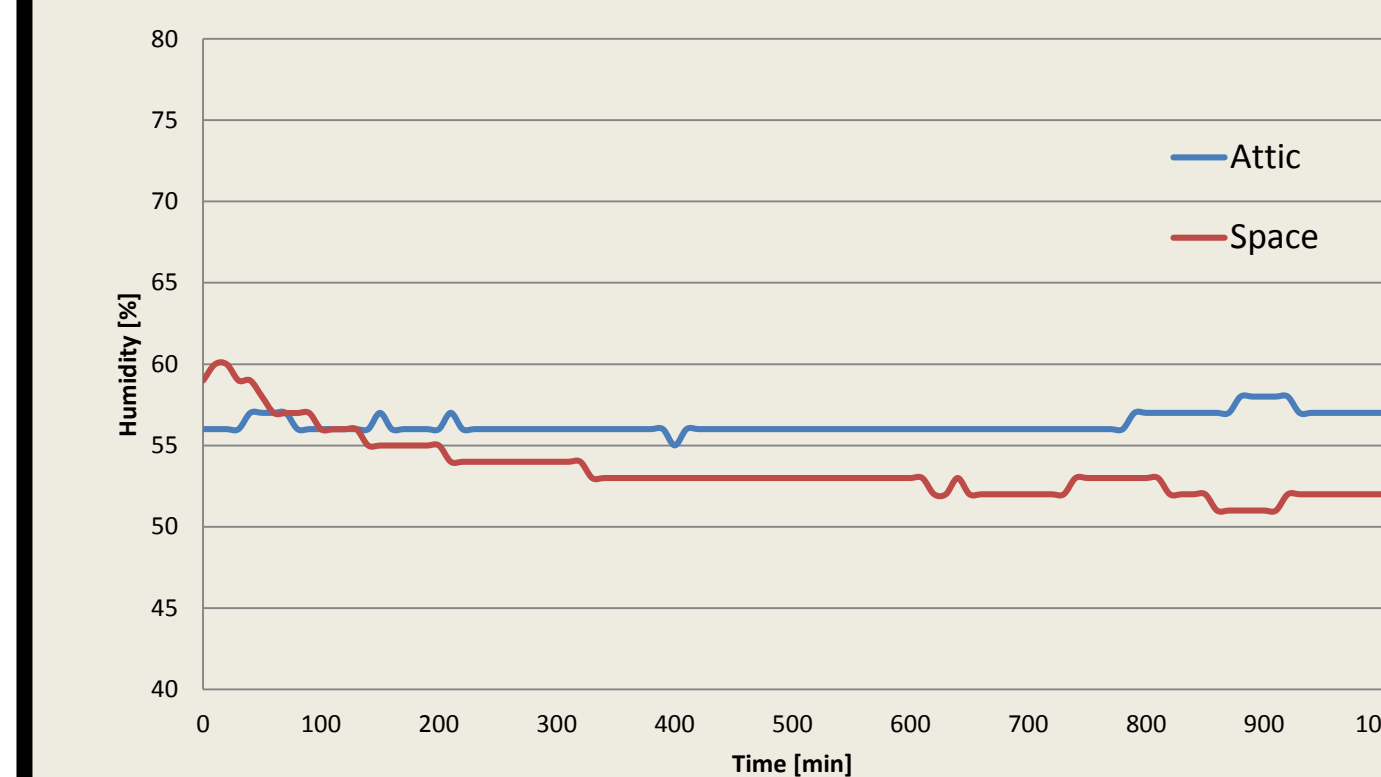
## Results



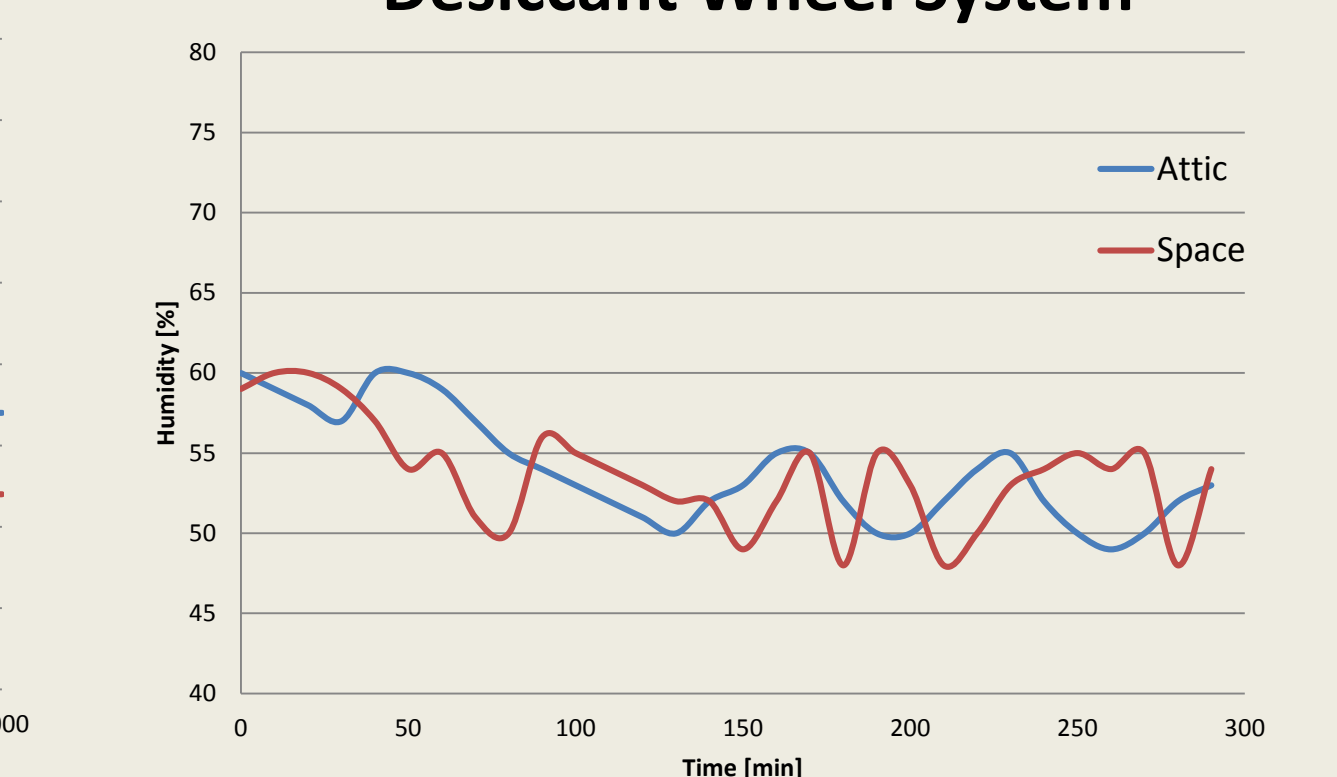
Peak Values	
Sensor Location	°F
Outside Temp	87.8
Roof Deck	123.8
Air Space	161.6
Insulation	82.4
Attic Space	75.2

Time: 1:30 PM

### Proper Sized System Humidity



### Desiccant Wheel System



## Safety

	Mechanical	Electrical	Bio/Chemical
Hazard	<ul style="list-style-type: none"> <li>Motors</li> <li>Fans</li> </ul>	<ul style="list-style-type: none"> <li>Shock</li> <li>Fire</li> </ul>	<ul style="list-style-type: none"> <li>VOCs</li> <li>Wood Rot</li> </ul>
Engineering Control	<ul style="list-style-type: none"> <li>Safety Guards</li> </ul>	<ul style="list-style-type: none"> <li>Wire Coating</li> <li>Secure Connections</li> <li>Sealed electrical boxes</li> </ul>	<ul style="list-style-type: none"> <li>Control Infiltration</li> <li>Moisture Removal</li> </ul>
Behavioral Control	<ul style="list-style-type: none"> <li>Warning Signs</li> </ul>	<ul style="list-style-type: none"> <li>Warning signs</li> <li>Smoke detectors</li> </ul>	N/A

## Timeline and Budget

