

# Introduction to Ceiling Radiant Technology with Dedicated Outdoor Air Systems (DOAS): Pros & Cons

*Orlando Energy  $\eta$  In Gov. Building  
Retrofits Workshop: February 5, 2005*

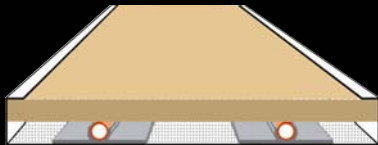
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<http://doas-radiant.psu.edu>

## Outline

- Radiant panel description and operating fundamentals
- Mumma's stake in radiant panels
- Current HVAC system of choice review
- Conceptual integration of radiant panels into an HVAC system
- WIIFMe, i.e. pros of radiant systems
- Perceived Cons of radiant systems
- Conclusions

## Ceiling Radiant Panel



## Ceiling Radiant Panel



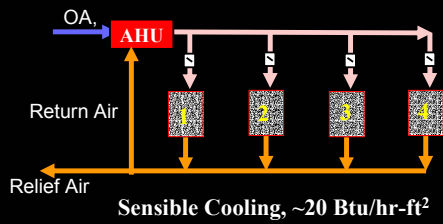
## Radiant Cooling



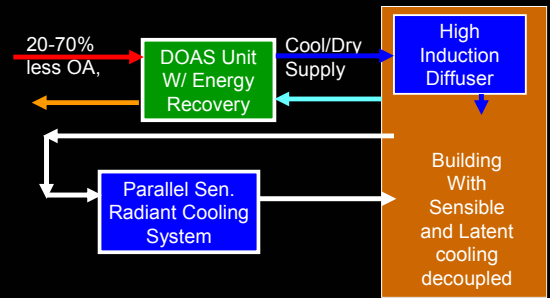
## Dr. Mumma's Stake in Radiant Systems?

1. An educator since 1974
2. Not invested in, or beholden to, any manuf., group, or person.
3. Committed to good stewardship of our environment and natural resources
4. Committed to advancing the state of the building industry
5. Want what is best for your building/practice/children and grand children!

## Variable Air Volume (VAV) Current HVAC system of choice



## Radiant Panel/Ventilation Air (DOAS) Arrangement



WIIFMe: #1,  
K.I.S.S. But no simpler

WIIFMe: #2,  
First Cost Reduced

WIIFMe: #3,  
Energy demand (kW),  
& use (kWh) reduced

WIIFMe: #4,  
Op Cost Reduced

WIIFMe: #5, 75% Smaller  
Mech. Rooms & Shafts

WIIFMe: #6,  
Reduced Maintenance

WIIFMe: #7,  
Easy access above  
ceiling for maint.

WIIFMe: #8, Enhanced  
Env. Quality

- Thermal Comfort

WIIFMe: #8, Enhanced  
Env. Quality

- Quick thermal response

WIIFMe: #8, Enhanced  
Env. Quality

- Flexible zoning

## WIFMe: #8, Enhanced Env. Quality

- Draft free,

## WIFMe: #8, Enhanced Env. Quality

- No Noise generation

## WIFMe: #8, Enhanced Env. Quality

- Proper heat balance on body

## WIFMe: #9, Enhanced IAQ, Productivity, & Safety

- No recirculation: i.e., 100% OA

## WIFMe: #9, Enhanced IAQ, Productivity, & Safety

## Other Economic Perspectives

WIIFMe: #10, Superior  
humidity control

WIIFMe: #11,  
Reduced Plenum Depth

WIIFMe: #12, A proven  
technology in the US

WIIFMe: #13, Applicable in  
many buildings, but not all

WIIFMe: #14, Applicable  
in virtually all climates

WIIFMe: #15, Generates  
up to 81% of the LEED™  
basic certification points

WIFMe: #16,  
Accommodates  
open office Churn

WIFMe: #17, Nearly  
Unlimited Interior  
Architecture freedom

The Perceived Cons

Perceived Con #1,  
Condensation

Perceived Con #2,  
Capacity

Perceived Con #3,  
High 1<sup>st</sup> Cost

## 6 story 186,000 ft<sup>2</sup> Office Building

## Conclusions

- Radiant Technology Introduced.
- 17 WIFMe Items Discussed
- 3 Perceived Cons dismissed
- Radiant-DOAS Mechanical Systems generate many LEED rating points
- Natural environment and resources preserved; plus human health, *Safety* & productivity enhanced with Radiant-DOAS !!
- Helps assure a future for Our Children and Grand Children
- I invite you to join with all of us who are implementing this exciting *green* technology for the future!

## Where to learn more?

Find 50 papers at the site below:  
<http://doas-radiant.psu.edu/papers.html>

## What Are We Trying To Preserve With Green And Sustainable Design Employing Radiant-DOAS Systems?

- Lets look and dream

# Questions