cref™: Aligning Buildings with Business

Partnering to Bring Climate Tech to Healthcare: *Unique Challenges and Lessons Learned*

CleanMed Solutions Session

May 22, 2024

Salt Lake City, Utah

Dr. Lindsey Butler, PhD, MSc

Vice President, Sustainability Solutions

CleanMed SALT LAKE CITY MAY 21-23 2024

Speakers

Lindsey Butler, PhD, MSc

Vice President
Sustainability Solutions
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Patrick Murphy

President
East Region
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Josh Patterson

Client Executive
West Region
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Amit Gupta

Chief Executive
Officer
Aeroseal

Agenda

1. Introduction
2. Review the Scope of the Problem
3. Aeroseal™ Technology
4. Healthcare Case Studies
5. Partnership Approach Panel Discussion

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End-to-End Strategic Real Estate Solutions

Designed by Operators for Operators, our expertise and innovative solutions help complex organizations get the most out of their physical infrastructure. As a trusted partner, we streamline operations, enhance resiliency, and unlock value, preparing you for the future with our holistic, long-term approach.

Our Integrated Services

Real Estate Advisory

Align & Optimize

- Owner & Tenant Representation
- Property Management
- Lease Administration
- Real Estate Strategy
- Transaction Management

Planning, Design & Construction

Plan & Represent

- Feasibility Studies
- Owner's Representation (Owner's Project Management)
- Programming & Fit Plans
- Comprehensive Planning

Regulatory & Facilities

Prepare & Manage

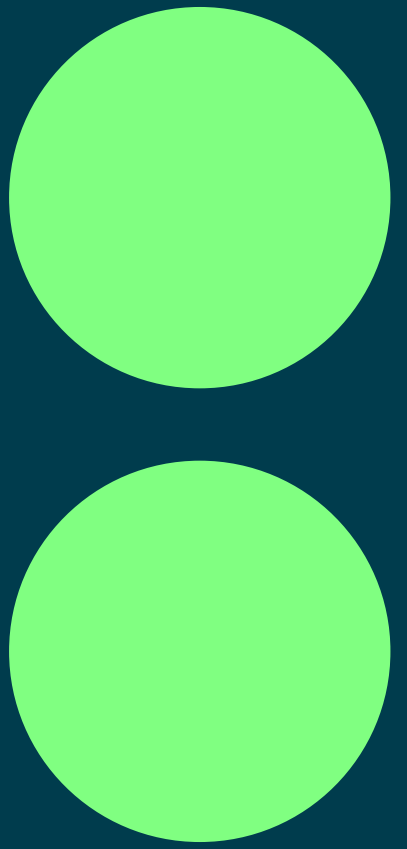
- Regulatory Readiness Programs
- Facility Management Support
- Biomedical & Clinical Engineering
- Business Continuity & Resiliency Planning

Sustainability Solutions

Sustain & Evolve

- Program Design & Governance
- Sustainability Communications & Reporting
- Energy Optimization Projects
- Climate Adaptation & Resilience

Scope of the Problem



The Problem | We need to make healthcare more energy efficient

- US healthcare system and it's supply chain represent 8.5% of domestic emissions
- Hospitals high EUI
- Aging infrastructure
- Deferred maintenance
- We need to electrify, but must reduce energy load
- We don't give adequate attention to energy efficiency – where we can also achieve significant co-benefits
  - Cost savings
  - Improved indoor air quality
  - Infection control

The Problem | Further challenges in the acute care setting

- 24/7 operational
- Complicated and disparate systems with many moving pieces
- Several assets representing different eras of building materials and technologies
- Highly regulated environments
- Ability to manage change requires incredible planning and time
- ICRA and PCRA
- How can we minimize disruption to the clinical setting?

The Problem | Additional organizational challenges facing healthcare

- Missing critical data related to physical assets
- Shortage of skilled labor and expertise
- Loss of institutional knowledge
- Ambitious climate commitments with little to no budgetary or personnel resources
- Competing constituencies and shifting priorities
- Financial challenges
  - CMS reimbursements
  - Complexity of private insurance market
  - Inflation
  - Pharmaceutical costs
  - Growing labor costs

Ideal Solutions

- Enhance energy efficiency
- Drive cost savings over time
- Qualify for incentives, grants or alternative financing models
- Can be applied to existing aging infrastructure
- Can be implemented with limited disruption to clinical operations
- Can meet or exceed regulatory requirements and expectations for the hospital setting
- Bring additional co-benefits
  - Improved indoor air quality
  - Improved infection control
  - Improved management of temperature and humidity

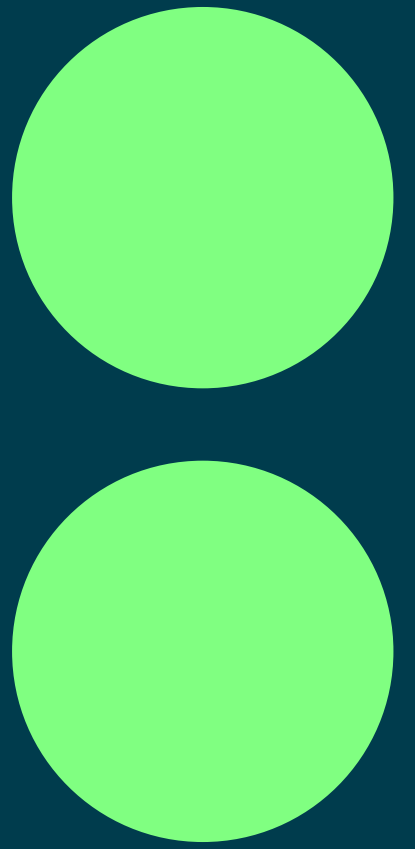
Commercial buildings are responsible for about how much of US GHGe?

A. About 29%, consuming about 35% of the country's electricity.

In commercial buildings, about how much energy is wasted?

A. In commercial buildings, **30%** of energy is **wasted**, costing $150 billion annually.

9% of emissions serving no purpose



aeroseal®

Aeroseal™ is a cleantech company focused on increasing building efficiency by reducing HVAC losses in the duct system and leaks in the building envelope using patented technologies.

Air leakage is a leading source of energy waste in buildings

cref:

A better environment for patients and staff

- Fix air flow and ventilation issues
- Reduce particulate and pathogen spread
- Improve indoor air quality
- Increase humidity and temperature control
- Boost energy efficiency
- Reduce noise
- Comply with regulations

Simple, safe, cost-effective implementation

- Diverse deployment options
- ICRA certified
- Brings existing HVAC systems to optimum performance
- Deep understanding of healthcare facilities
- Sealant is completely safe and has no VOC off-gas after installation

Easy 3-step process

1.Set up the Aeroseal™ system per ICRA standards

2. Seal the ductwork with our patented, non-invasive process

3. Achieve immediately measurable, verifiable and certified results

Verification

aeroseal DUCT

COMMERCIAL LEAKAGE REPORT

Duct sealing performed at:
Clemson
5637 peachtree cir east
Ridgefield, Ct 06877

Building Type: Library
Seal Date: MM/DD/YYYY
Barometric Pressure (Inches in HG): XXX

Aeroseal Gen 2.1 Case ID: XXXX
Manometer Model: 900361
Manometer Serial Number: 2121-SS-0025

Seal Specifics
System Description: ERV-1
Operating Pressure (WG): 0.40 inches
Fan Capacity: 900 CFM
Seal Description: 2nd Floor Exhaust
Seal Type: Exhaust
Seal CFM: 5,400 CFM

Duct Class (WG): 0.5 inches
Test Pressure (WG): 2 inches
Seal Class: C

	Rectangle	Round
Test Duct Surface Area (ft²)	483	365
SMACNA Leakage Class	16	8
Leakage Allowed at 2" WG	25	12.5

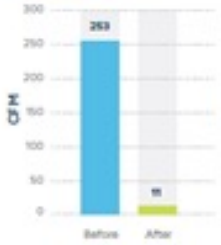
Allowable Leakage
165 CFM

Leakage Before Test
253 CFM

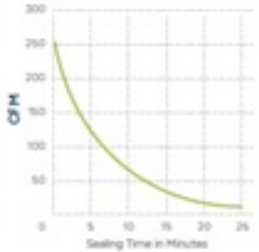
Leakage After Test
11 CFM

Leakage Test
PASS

Leakage at .40" WG



Leakage at .40" WG



Duct sealing performed by:
Technician
Dealer Name
54 Danbury Road Suite 171
Ridgefield, Ct 06877
Phone: 203-921-8994

Dealer Logo

Note: Duct leakage results reported by Aeroseal conform to the calculations laid out in method D of ASTM E 1154: Standard Test Methods for determining air leakage of air distribution systems by fan pressurization.

Aeroseal | aeroseal.com | 877-FIX-DUCT | info@aeroseal.com

aeroseal DUCT

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Seal Specifics
Aeroseal Gen 2.1 Case ID: XXXX
Seal Date: MM/DD/YYYY
Building Type: Library
System Description: ERV-1
Seal Description: 2nd Floor Exhaust

Duct surface area calculator

Rectangular				
Sect. No.	W (in.) X H (in.)		Len. (ft)	Surface Area (ft²)
1	16	8	2.6	83.2
2	6	6	5.9	94.4
3	10	8	0.8	19.2
4	8	8	2.3	49.1
5	8	6	8.6	161
6	10	8	3.2	76.8
			Total	483

Round			
Sect. No.	Diam. (in.)	Len. (ft)	Surface Area (ft²)
1	4	18.8	157
2	5	11.4	119
3	6	7	88
4			
5			
6			
		Total	365

Note: Duct leakage results reported by Aeroseal conform to the calculations laid out in method D of ASTM E 1154: Standard Test Methods for determining air leakage of air distribution systems by fan pressurization.

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Case Studies

Case Study – Florida Children's Hospital

PROJECT OVERVIEW

BUILDING
11-story outpatient medical facilities located on the Nemours Childrens' Clinic Jacksonville campus

LOCATION
Jacksonville, Florida

AEROSEAL CONTRACTORS
Aeroseal Southeast

CONTRACT ENGINEER
Carrier Corporation

GOAL
Improve HVAC system airflow; reduce the risk of nosocomial infections from germs being distributed through leaks in HVAC ductwork

BEFORE AEROSEAL
Total system leakage: 4,912 CFM

AFTER AEROSEAL
Total system leakage: 723 CFM

RESULTS
Sealed ductwork to 85% leakage reduction; Stopped the spread of germs through duct leakage; Improve HVAC airflow throughout facility

In order for a hospital to be clean, you have to manage the building's airflow. By sealing the exhaust shafts using Aeroseal, we ensured that the right amount of stale and potentially infectious air is being adequately and continually removed from the building.

Derrick Rhodes
President
Aeroseal Southeast

Cardiovascular Health Center

If duct leakage was the problem, we were facing the possibility of having to actually replace the hospital's entire duct system – then we heard about Aeroseal. After conducting extensive research on the technology, our health and safety officer approved its use. It then took Aeroseal less than a day to effectively seal one of the hospital's ventilation shafts. The positive impact that Aerosealing the shaft had on system performance was clear and immediate. We are now looking at using Aeroseal elsewhere throughout the hospital to improve the efficiency of our ventilation system.

Michele Emond
Project Manager
University of Ottawa Heart Institute

PROJECT OVERVIEW

BUILDING
University of Ottawa Heart Institute

LOCATION
Ottawa, Ontario

AEROSEAL CONTRACTORS
AWS Technologies

CONTRACT ENGINEER
GENIVAR | Constructive People

GOAL
Eliminate duct leakage as a cause of building-to-building air contamination

BEFORE AEROSEAL
Up to 800 CFM* of leakage

AFTER AEROSEAL
10 CFM of leakage

RESULTS
Virtually eliminated ventilation leakage; Improved system efficiency; Reduced utility costs

Partnership Approach | Combining Product and Expertise

Aeroseal

- How can we take this technology that is highly effective in a residential setting and apply it to one of the most energy intensive commercial sectors (healthcare) that can also benefit from
  - Improved indoor air quality
  - Improved infection control
  - Better control of temperature and humidity
- How can we ensure safe, effective, timely implementation in a 24/7 operational acute care setting

CREF

- What are the innovative climate technologies that can make a difference in existing assets?

Speakers

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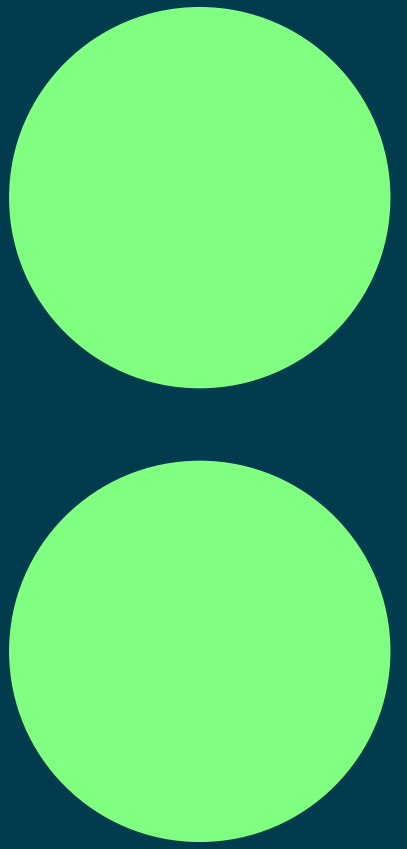
Appendix



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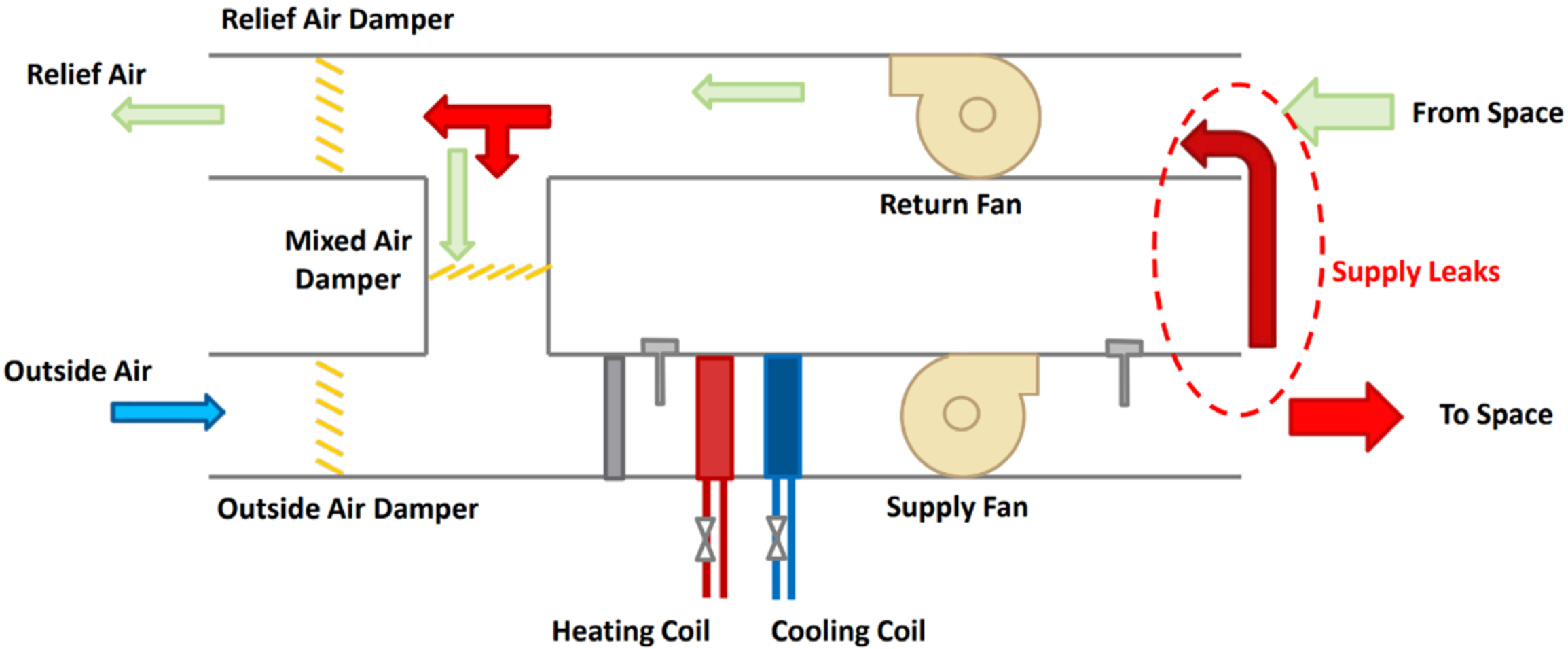
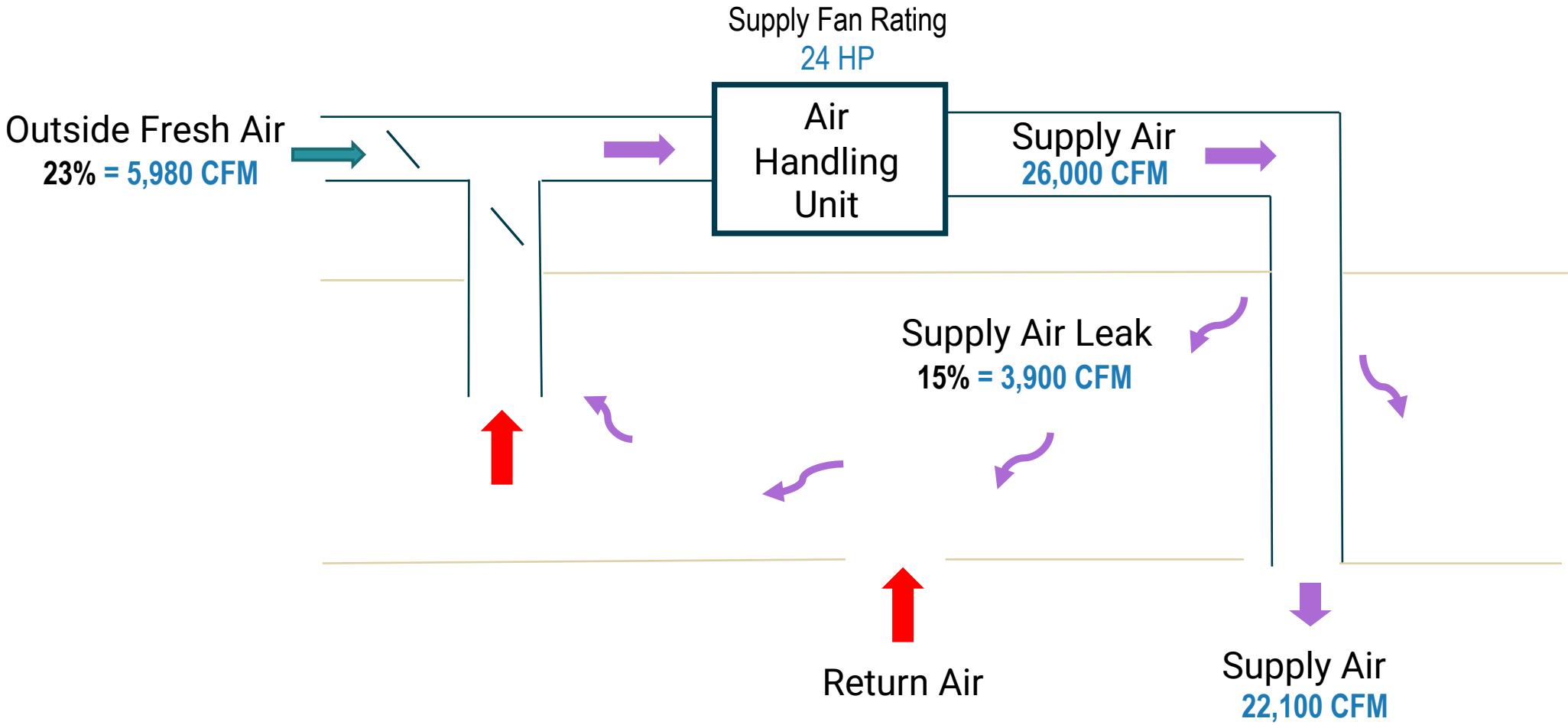
Energy Saving Mechanisms with Aeroseal?

Typical Air flow in an AHU & DuctWork



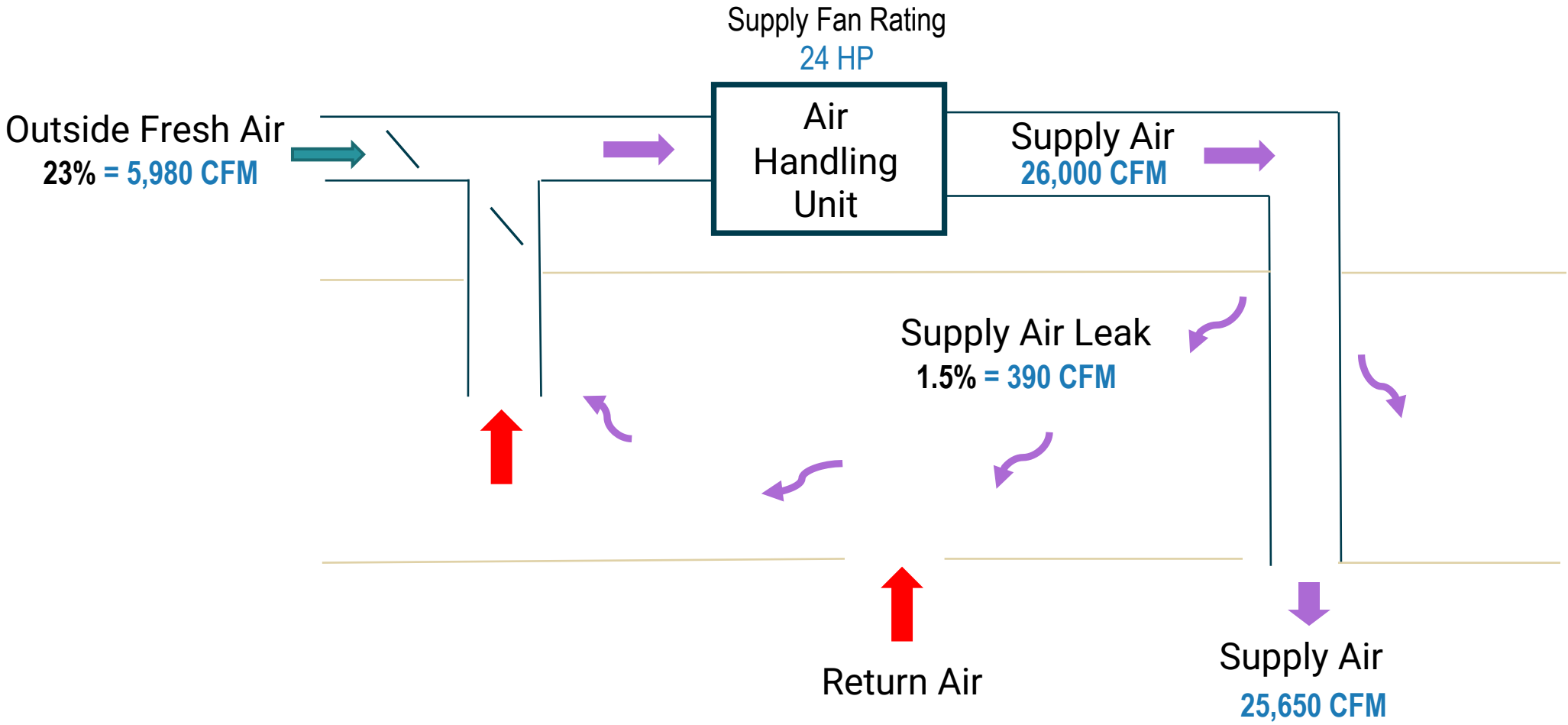
Typical Air flow in a Ductwork with high leakage rate

AHU supply fan: 26,000 CFM; 3,900 CFM leakage – 22,100 CFM to occupied space



Typical Air flow in a Ductwork with low leakage rate

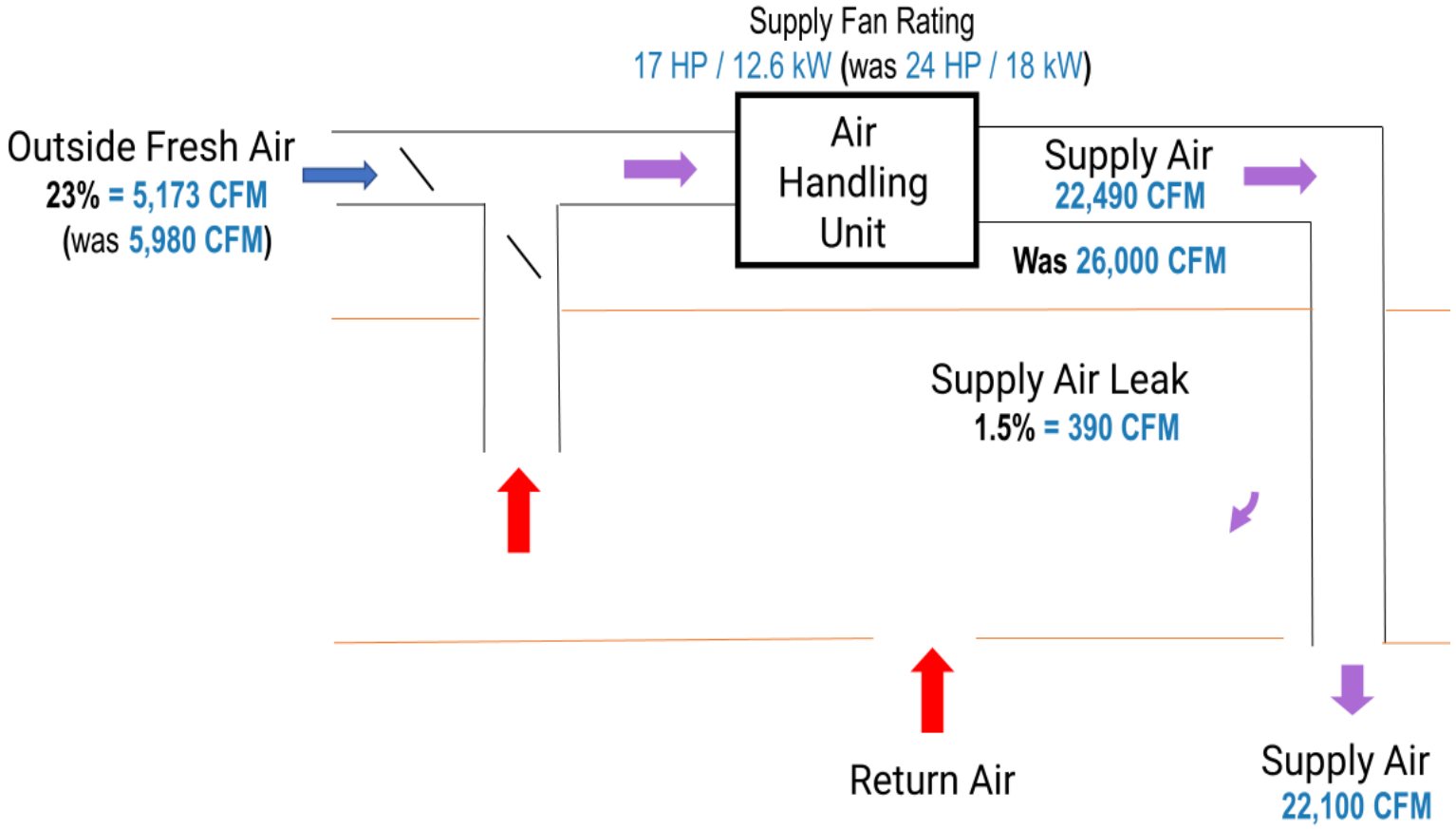
AHU supply fan: 26,000 CFM; 390 CFM leakage – 25,650 CFM to occupied space



How to Save Energy?

Example: Typical Steps

1. Reduce Leakage from 15% to 1,5%
2. Reduce 13.5% fan flow to match pre-seal zone CFM of 22,100
3. Outside fresh air heating/cooling reduction of 807 CFM



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Why Seal Leaks? – ENERGY SAVING

Additional air passes through the Fan.

This results in increased fan power to move that air.

Added fan power ultimately turns into creates more cooling load.

A fraction of conditioned air which was mixed with exhaust air, leaves the space without serving any purpose.

Additional cooling energy/heating energy is required to condition the outdoor air flow associated with supply duct leakage.

Energy Saving Overview

Energy Saving Mechanisms with Aeroseal?

- ❑ Reduced fan power from reduced fan flow
- ❑ Reduced outside air cooling from reduced fan flow
- ❑ Reduced outside air heating from reduced fan flow
- ❑ Reduced motor heat from reduced fan flow

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