Healthier Buildings and Efficiency at Scale

75F

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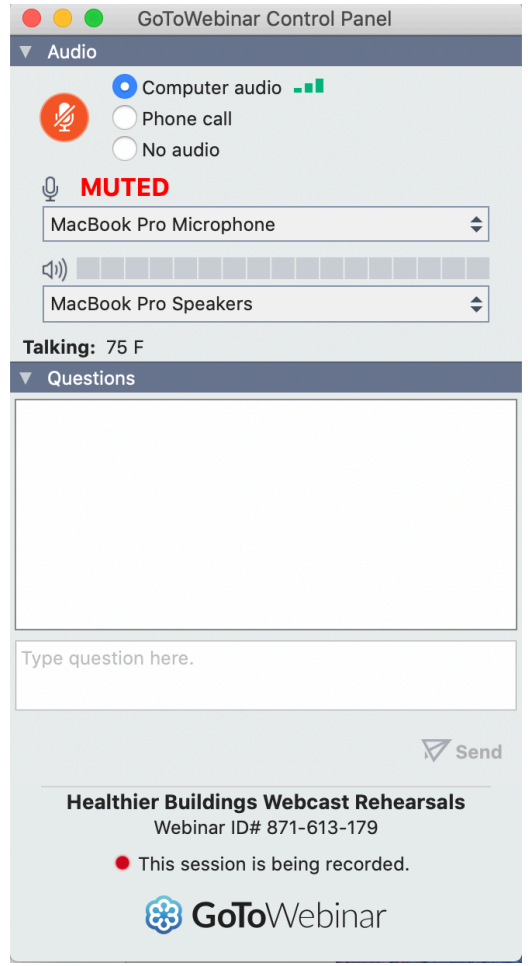
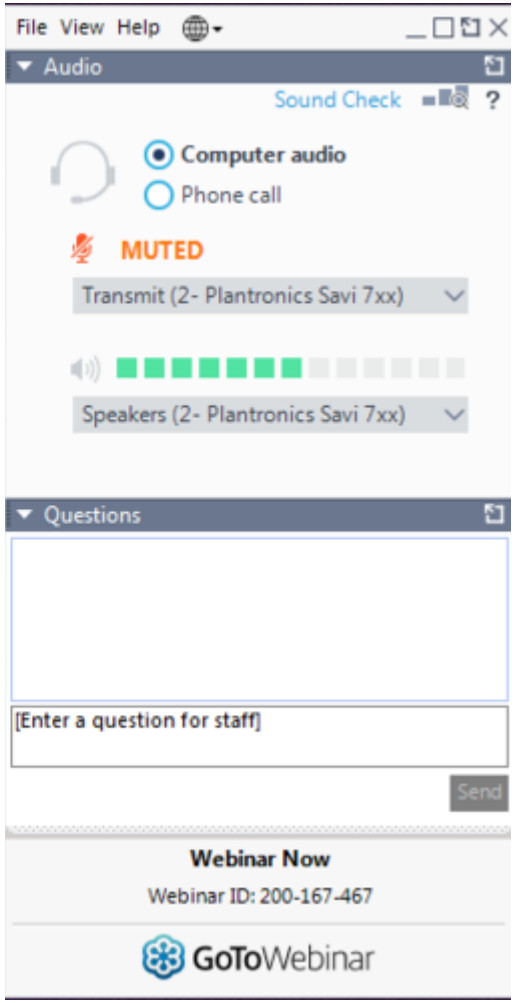


To Ask a Question



TEMPERATURE CHECK

Healthier Buildings and Efficiency at Scale

1. Recap: Guidelines and Science
2. How Ventilation Systems Work in Commercial Buildings
3. How to Follow the Guidelines
4. Energy Implications of Increasing Outdoor Air Flow Rates
5. Dalkia Energy Solutions: Scaling Across a Portfolio
6. Q & A

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CDC

COVID-19 Employer Information for Office Buildings

ASHRAE EPIDEMIC TASK FORCE

Commercial COVID-19 Guidance

CDC and ASHRAE Summary

Both the Centers for Disease Control and Prevention and ASHRAE currently recommend increasing outside air ventilation rates as the principal means of lowering risk of transmission.

- Increase the percentage of outdoor air, (e.g., using economizer modes of HVAC operations) potentially as high as 100% (first verify compatibility with HVAC system capabilities for both temperature and humidity control as well as compatibility with outdoor/indoor air quality considerations).
- Increase total airflow supply to occupied spaces, if possible.
- Disable demand-control ventilation (DCV) controls that reduce air supply based on occupancy.
- Flush the air in a building for two full hours before and after occupancy.
- Improve central air filtration to the MERV-13 or highest compatible with the filter rack.
- Use methods to physically separate employees in all areas of the building, including work areas and other areas such as meeting rooms, break rooms, parking lots, entrance and exit areas, and locker rooms. Adjust controls for partial occupancy.

Contact Tracing

Resources for conducting contact tracing to stop the spread of COVID-19.

Protect Yourself While Shopping

Cover your mouth and nose with a cloth face covering when you have to go out in public.

Limit Visits to the Pharmacy

Plan to order and pick up all your prescriptions at the same time.

CDC: How COVID-19 Spreads

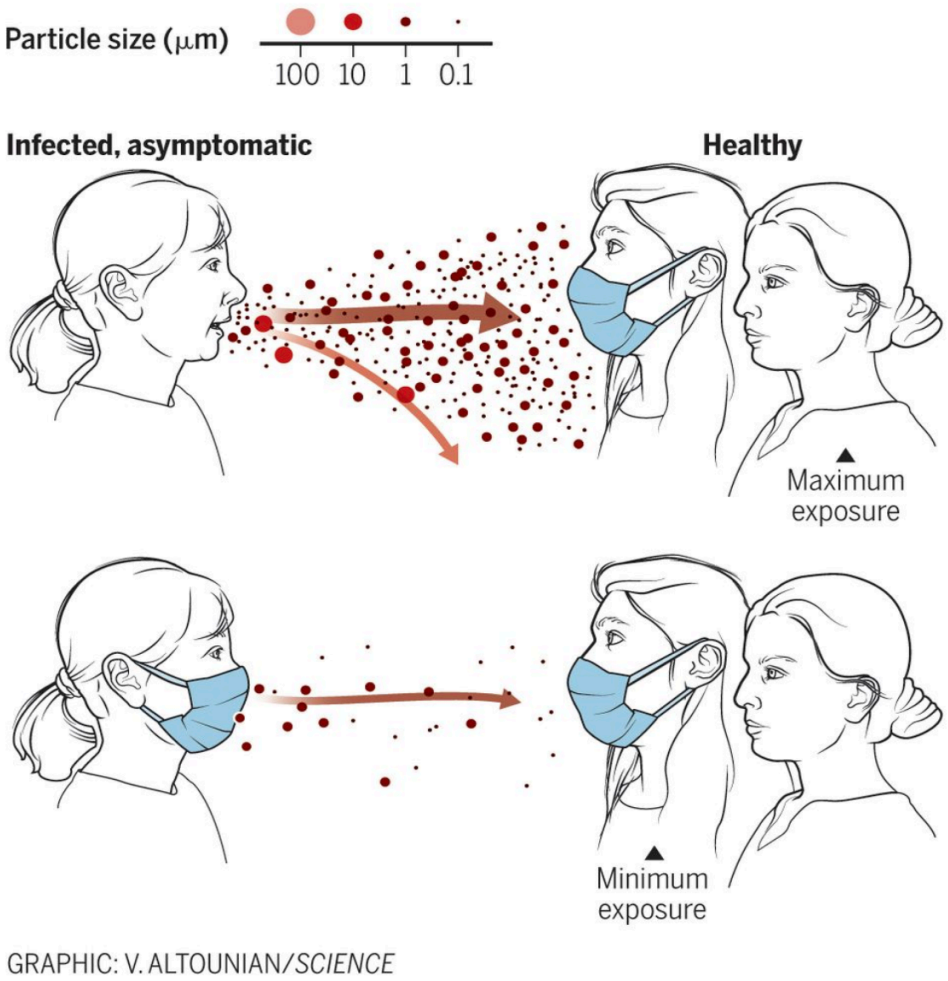
The virus is thought to spread mainly from person to person.

- Between people who are in close contact with one another (within about 6 feet).
- Through respiratory droplets produced when an infected person coughs, sneezes, or talks.
- These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.

The virus may be spread in other ways.

- Touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes. This is not thought to be the main way the virus spreads.

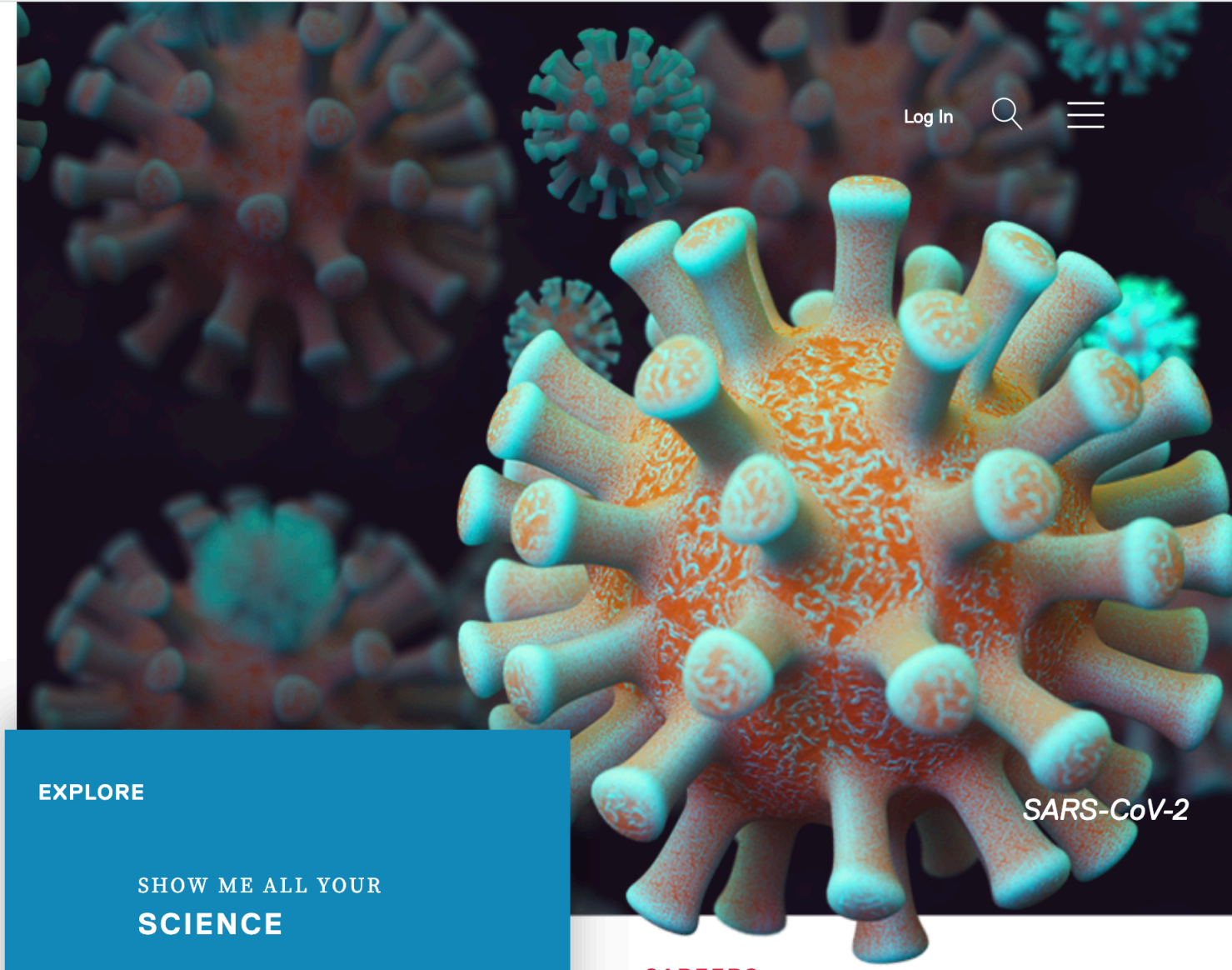
Source: CDC



GRAPHIC: V. ALTOUNIAN/*SCIENCE*

AMERICAN SOCIETY FOR MICROBIOLOGY

Log In



ASM NEWS

COVID-19 Research Registry

This registry includes top-ranked, COVID-19 research articles curated by experts and serves as a resource for scientists working to accelerate scientific research on SARS-CoV-2.

VISIT THE REGISTRY →

EXPLORE

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SCIENCE

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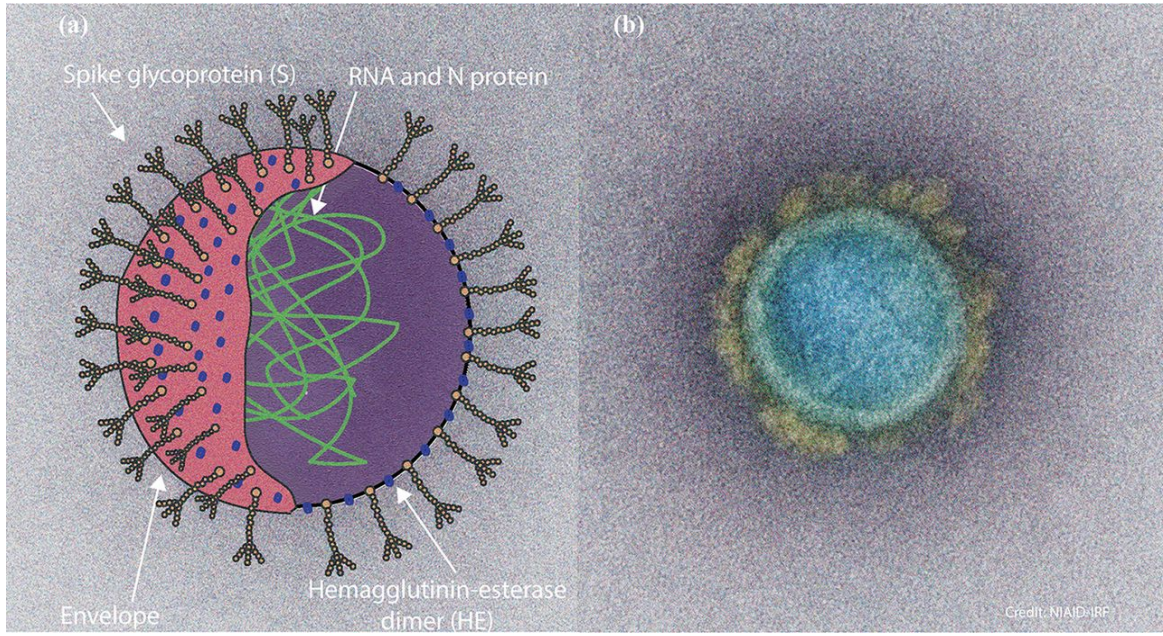
ASM: Ventilation and COVID-19

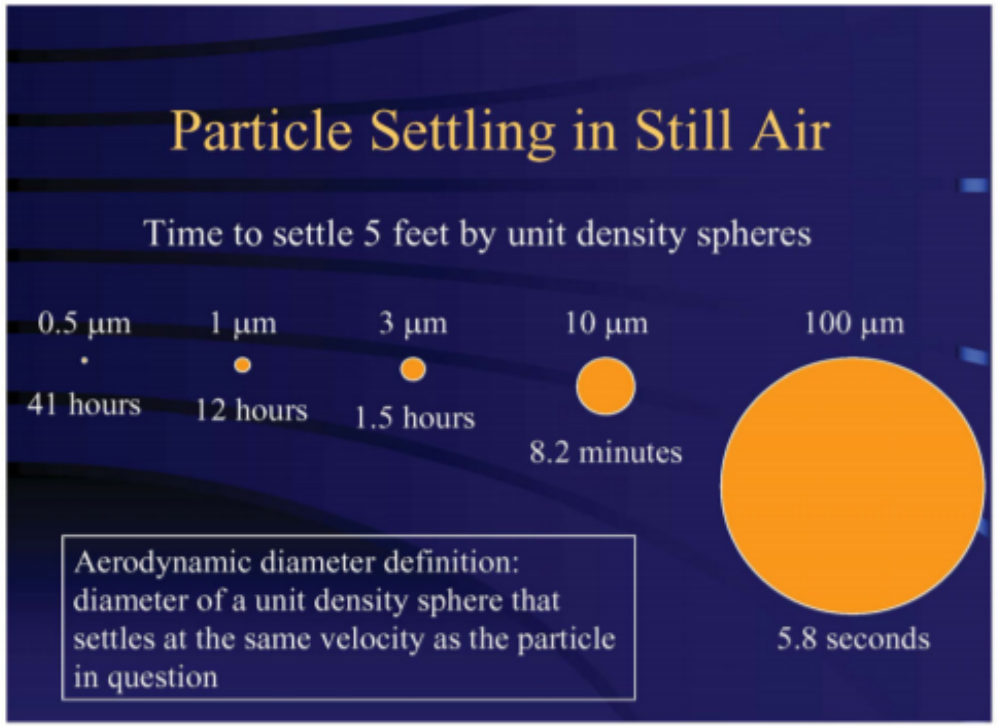
- Higher outside air fractions and increased exchange rates can help dilute the viral load indoors.
- "Increasing airflow rates that simply increase the delivery of recirculated indoor air, without increased outside air fraction, could potentially increase the transmission potential."
- This paper indicates relative humidity above 40 percent is detrimental coronaviruses and can slow down airborne dispersal of a virus by encouraging larger droplet formation.



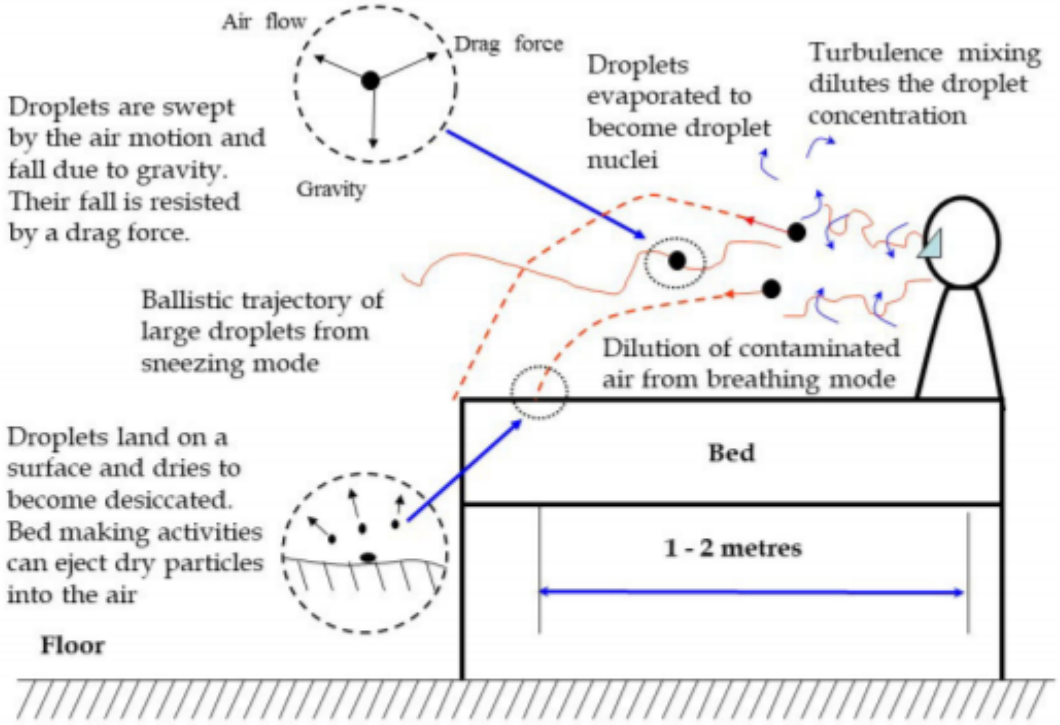
It is essential to understand the potential transmission dynamics of COVID-19 within the built environment, and the ways that human behavior, spatial dynamics, and building operation can mitigate the spread and transmission of COVID-19.

Graphic source: American Society for Microbiology

ASHRAE: Settling Rates



(a)



(b)

Figure 1 (a) Comparative settling times by particle diameter for particles settling in still air (Baron n.d.) and (b) theoretical aerobiology of transmission of droplets and small airborne particles produced by an infected patient with an acute infection (courtesy Yuguo Li).

Increasing Call for Recognition of Airborne Transmission

The New York Times

The Coronavirus Outbreak › | LIVE Latest Updates | Maps and Cases | Reopenings and Closings | Risk Factors for Covid-19 Death

239 Experts With One Big Claim: The Coronavirus Is Airborne

Published July 4, 2020 Updated July 7, 2020

The W.H.O. has resisted mounting evidence that viral particles floating indoors are infectious, some scientists say. The agency maintains the research is still inconclusive.

Published July 7, 2020 Updated July 9, 2020

After hundreds of experts urged the World Health Organization to review mounting scientific research, the agency acknowledged on Tuesday that airborne transmission of the coronavirus may be a threat in indoor spaces.

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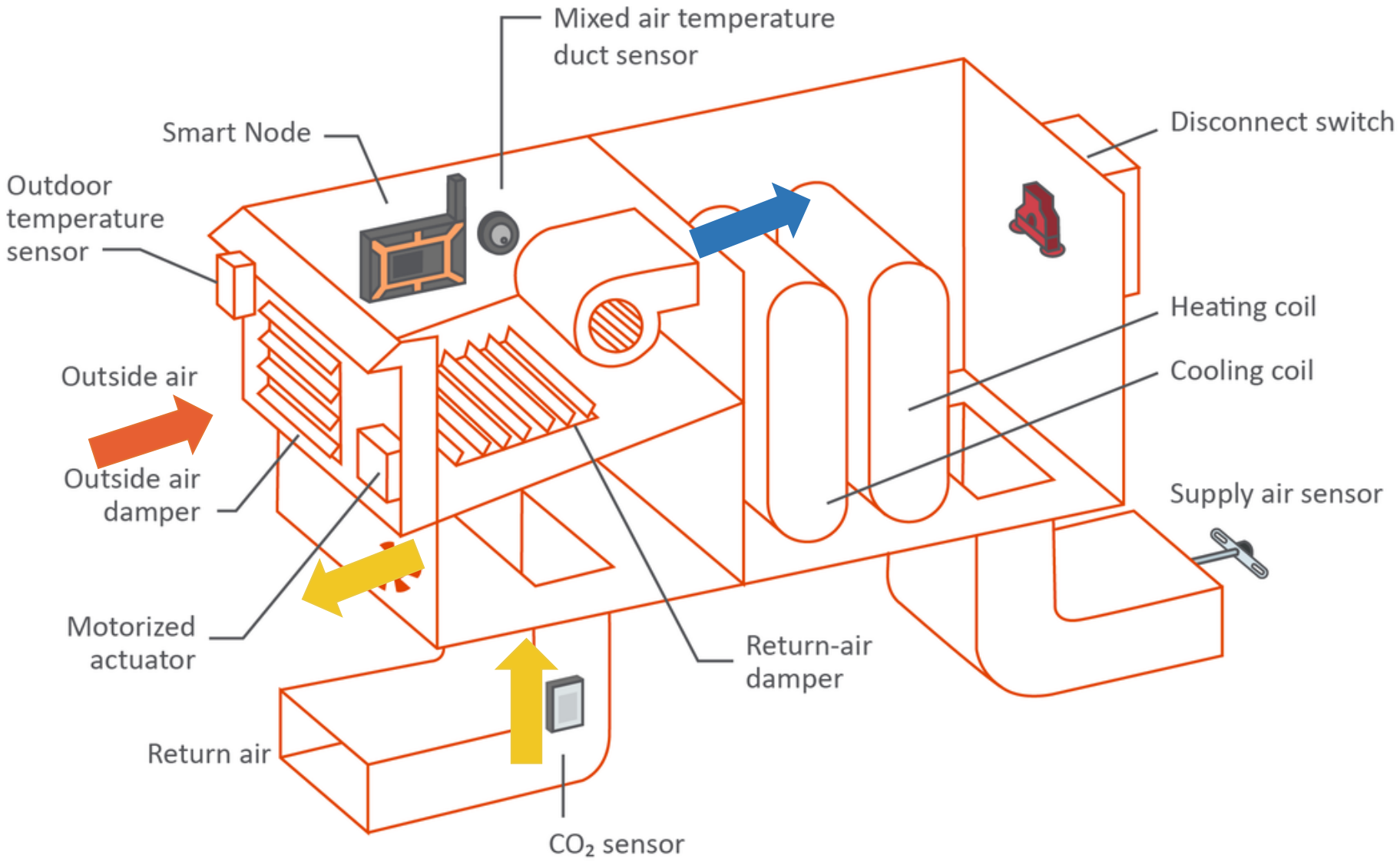
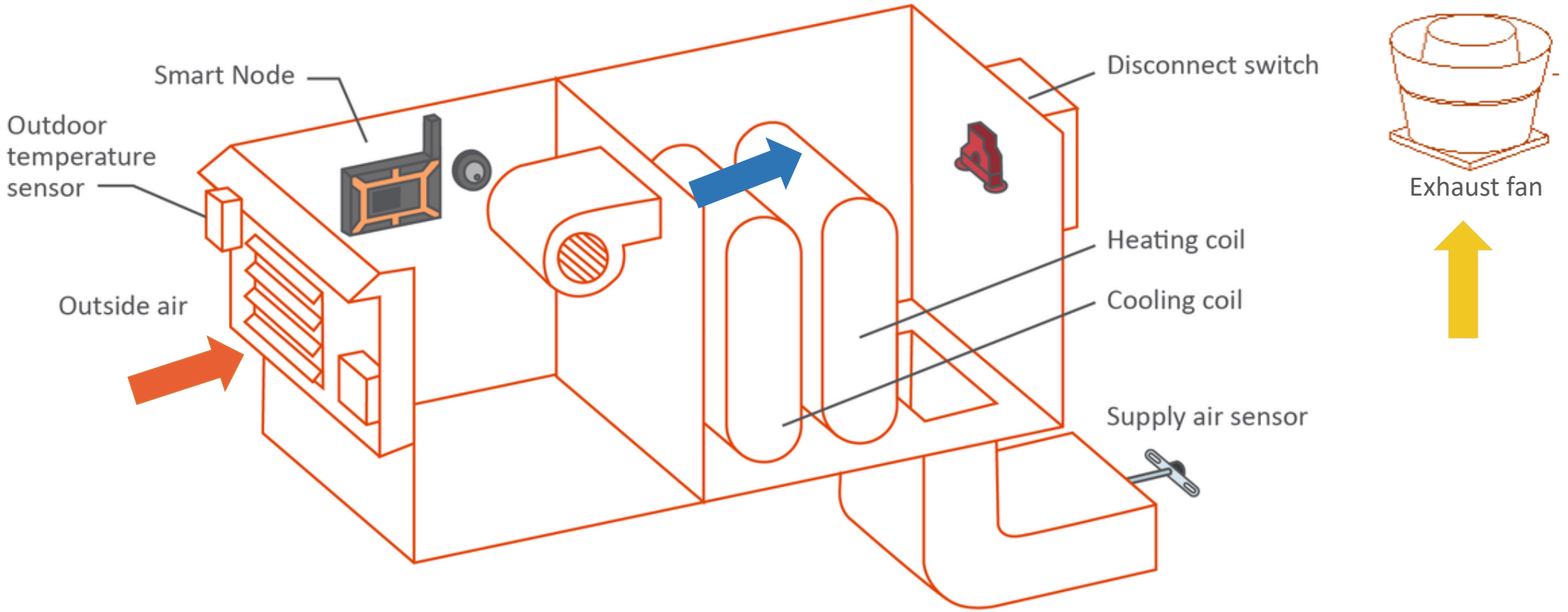
Packaged Rooftop Units and Air Handlers



Dedicated Outside Air Systems (DOAS)



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3

Sequences of Operation

The following sequences are required to follow the guidance after re-opening a building:

- During occupied hours, open Outside Air (OA) dampers as high as 100% if possible
- Purge the building with fresh outside air for 2 hours before and after occupied hours.
- Disable Demand Control Ventilation – a sequence that uses CO2 sensors to automatically adjust the amount of OA.
- For VAV systems, increase discharge air temperature to max to encourage open VAV terminal dampers.

Sequences of Operation — Outside Air Damper Maximum Opening

RTUs and AHUs are not designed for 100% OA loads. Extreme weather conditions can create very uncomfortable conditions and even worsen risk of infectious aerosols.

Fresh Air Damper

- **Thermostats**:
  - Get on the roof and open up your OA damper
  - If you can open up your OA damper, turn the fan to “on” all the time. “Auto” will cycle on and off
  - If you have an economizer, call an HVAC tech to set the minimum position to 100% if possible
- **Typical Building Automation System**:
  - Edit setting for the OA damper minimum position to 100% if possible & Turn off DCV
- **75F Building Intelligence System** – engage the **75F Epidemic Mode**™ sequence that automatically detects the maximum amount of OA any unit can provide for the current weather conditions. As ASHRAE or CDC changes their guidance, updates to the sequence are automatic and over-the-air.

Sequences of Operation — Pre and Post Purge

The guidance to purge the building for two hours before and after occupancy can be accomplished these ways:

- **Thermostat**: If you have a programmable thermostat, change your program to start two hours before occupancy and end two hours after occupancy.
- **Typical BAS**: Edit the fan setting to cover two hours before and after occupancy. If not possible, adjust the occupied schedule.
- **75F Building Intelligence System**: Select the **75F Epidemic Mode**™ application and **Smart Purge**™ setting which will automatically start the fan for a two-hour pre and post purge while keeping the OA damper open.
    - Machine Learning will automatically determine what time to start conditioning for Optimum Start based on predicted weather and previous conditioning rate patterns.
    - As ASHRAE or CDC changes this guidance, updates to the sequence are automatic and over the air.

Sequences of Operation — Maximize Discharge Air Temperature

The guidance to increase discharge air temps – usually 60 degrees – so that VAV terminal units will open more:

- **Typical BAS:** For systems with modulating cooling capacity, edit the Leaving Air Temperature reset to the highest possible option.
- **75F Building Intelligence System:** Select the 75F Epidemic Mode™ setting which will automatically adjust Leaving Air Temperature to the highest option.
  - If ASHRAE or CDC changes the guidance, updates to the sequence are automatic and over-the-air.

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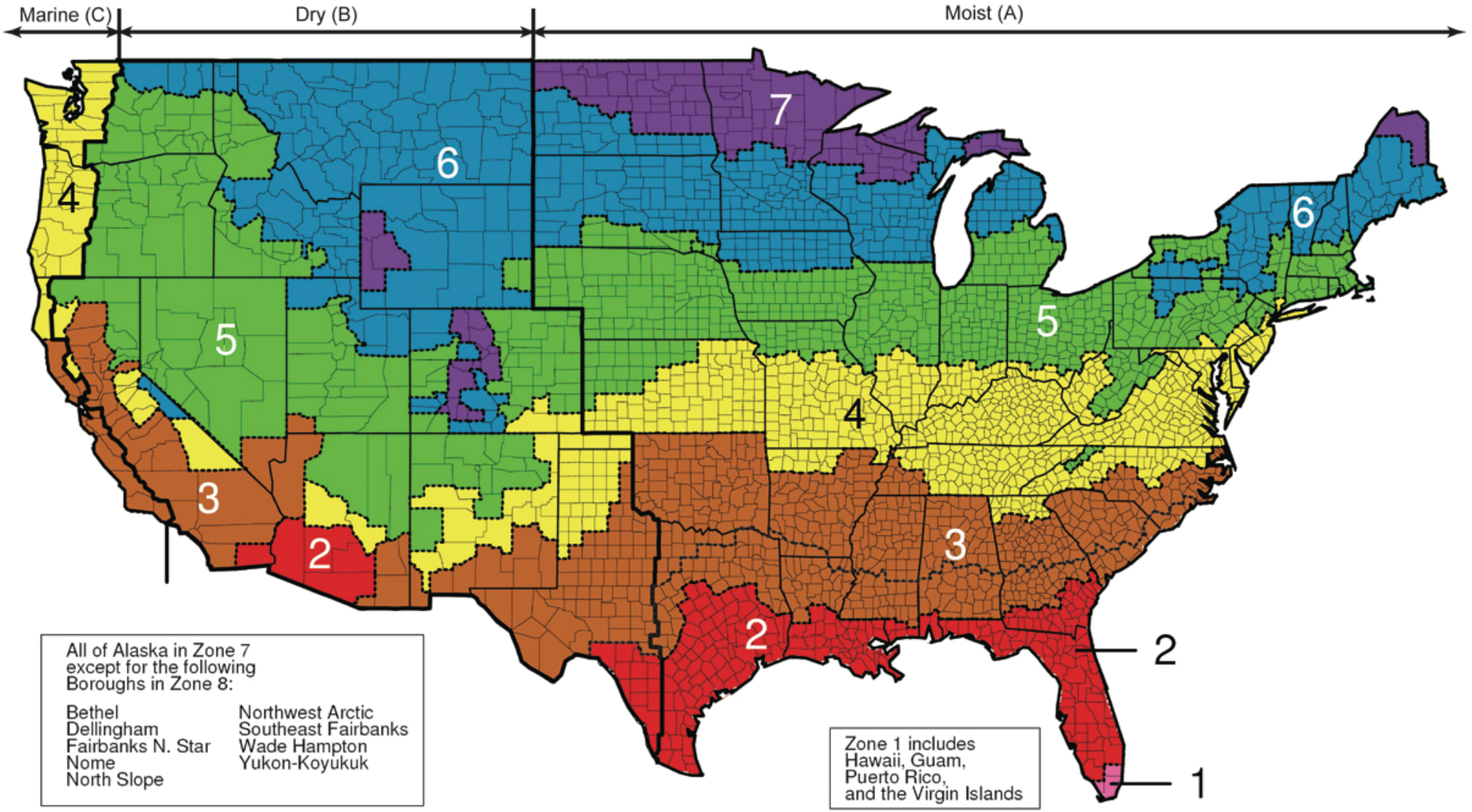
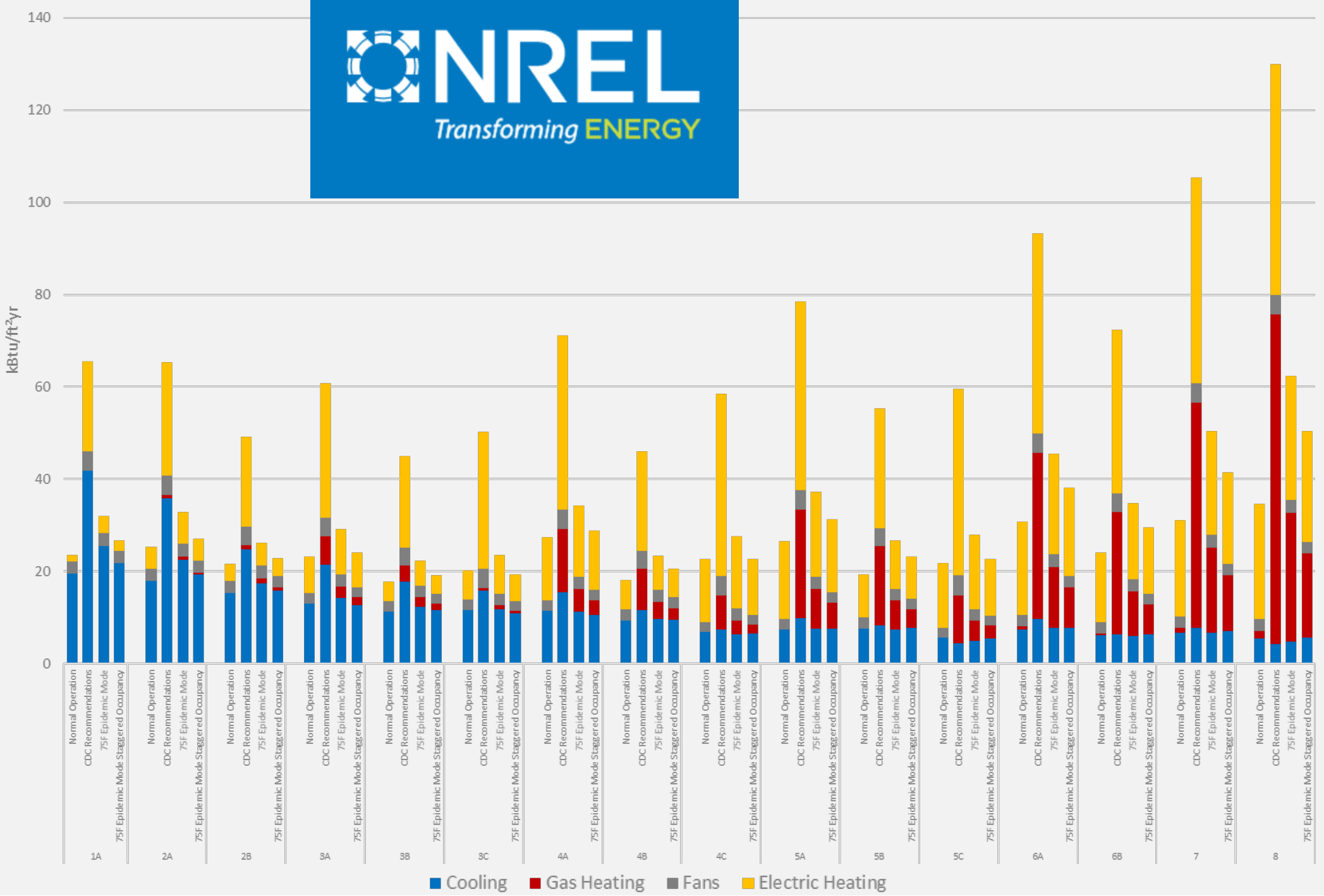
U.S. Climate Zone Map



Annual Results by HVAC End Use – Medium Office



Q&A

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5


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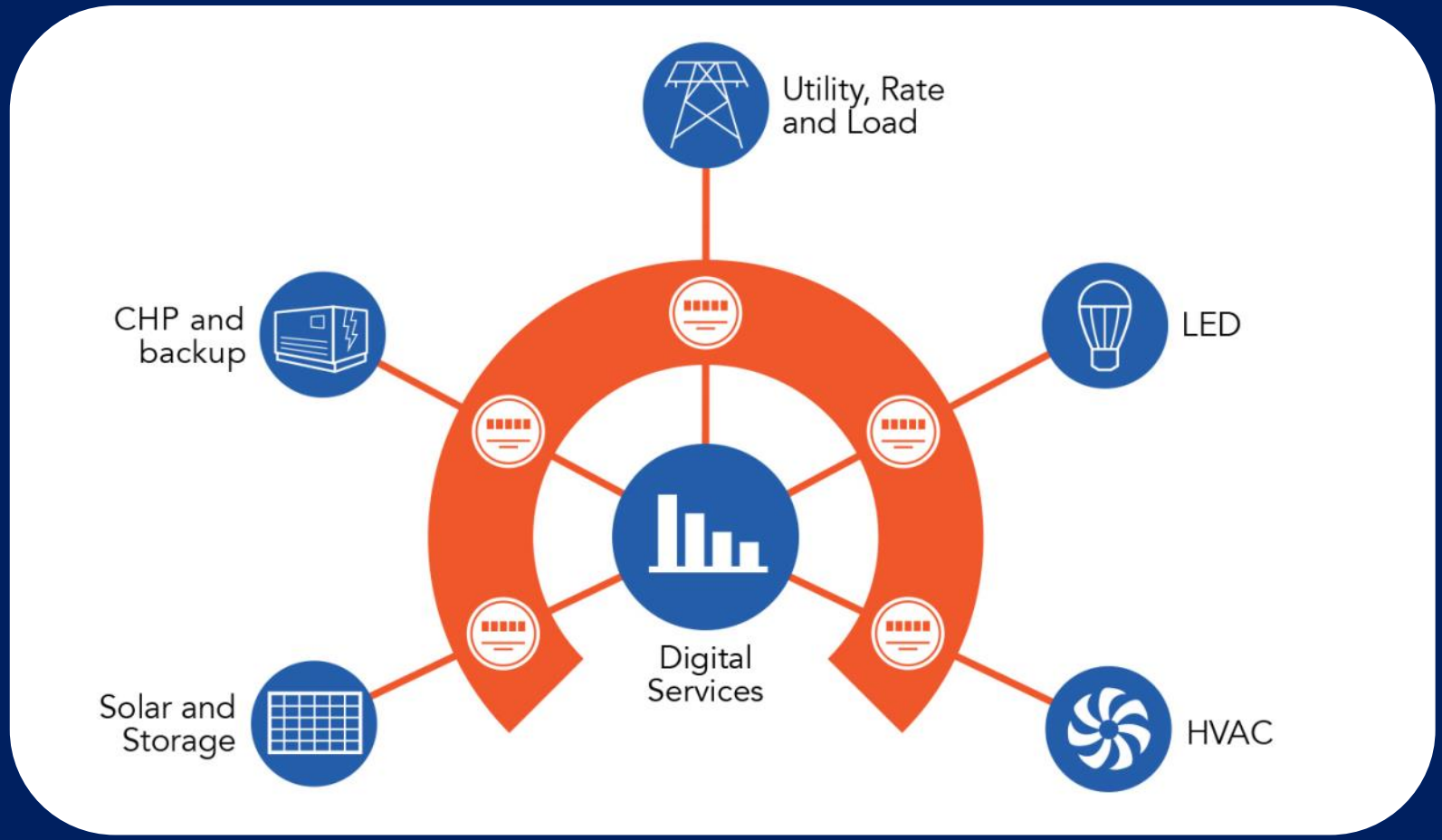
Reducing Energy and Greenhouse Gases in Existing Buildings



is the leading electricity company in the world.

EDF Group, through its subsidiaries in North America delivers results to utilities, commercial and industrial customers. Today EDF US affiliate companies are working together to bring energy services and solutions to US customers focused on decarbonizing the economy

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EDF GROUP

NATIONWIDE
MULTI-SITE
MULTI-MEASURE
TURN-KEY

OUR APPROACH IS SIMPLE:

SITUATION | ANALYSIS | IMPLEMENTATION | SAVINGS

SERVICES & SOLUTIONS

Energy Efficiency Services

- Boiler Systems
- Compressed Air
- Chillers
- Data Centers
- Energy Control Systems
- Energy Procurement and Utility Bill Analysis
- HVAC/RTU optimization
- Lighting and Controls
- Motor Applications
- Refrigeration
- Variable Frequency Drives

On-Site and Renewable Generation

- Backup Generation
- Combined Heat and Power
- Solar Photovoltaic

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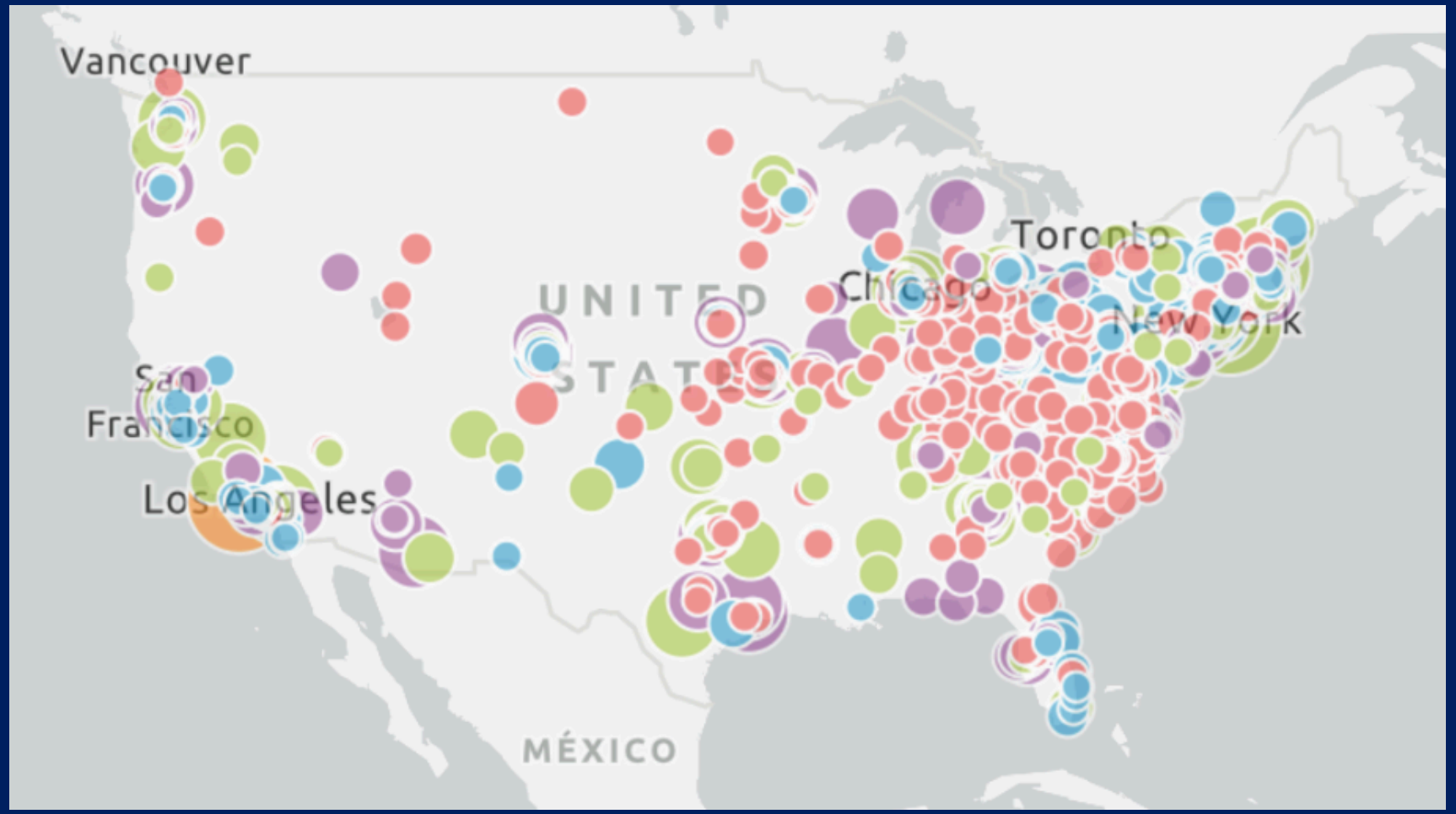
Dalkia Installed Energy Efficiency Projects

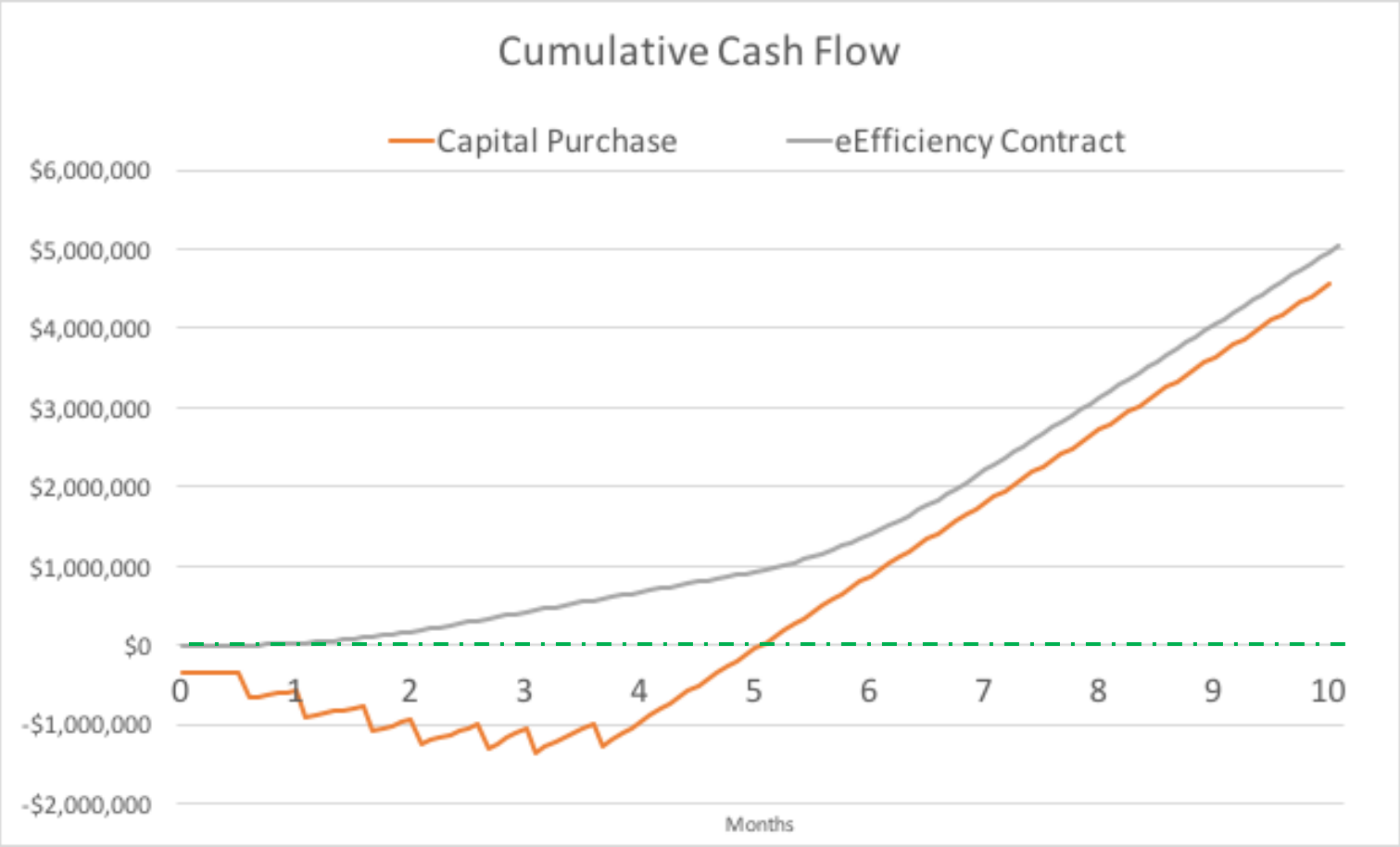


Over the past 5 years, Dalkia has installed at over 4,700 locations across the US

Saving customers over $100,000,000 in recurring annual savings

When is the best time to invest in energy efficiency?

Value of Scaling Quickly



Example of a customer that was budgeting energy efficiency at 200 sites and a 4 year rollout

Financing and completing in 12 months vs CapEx over the next 4 years provides $500K savings over 10 year period

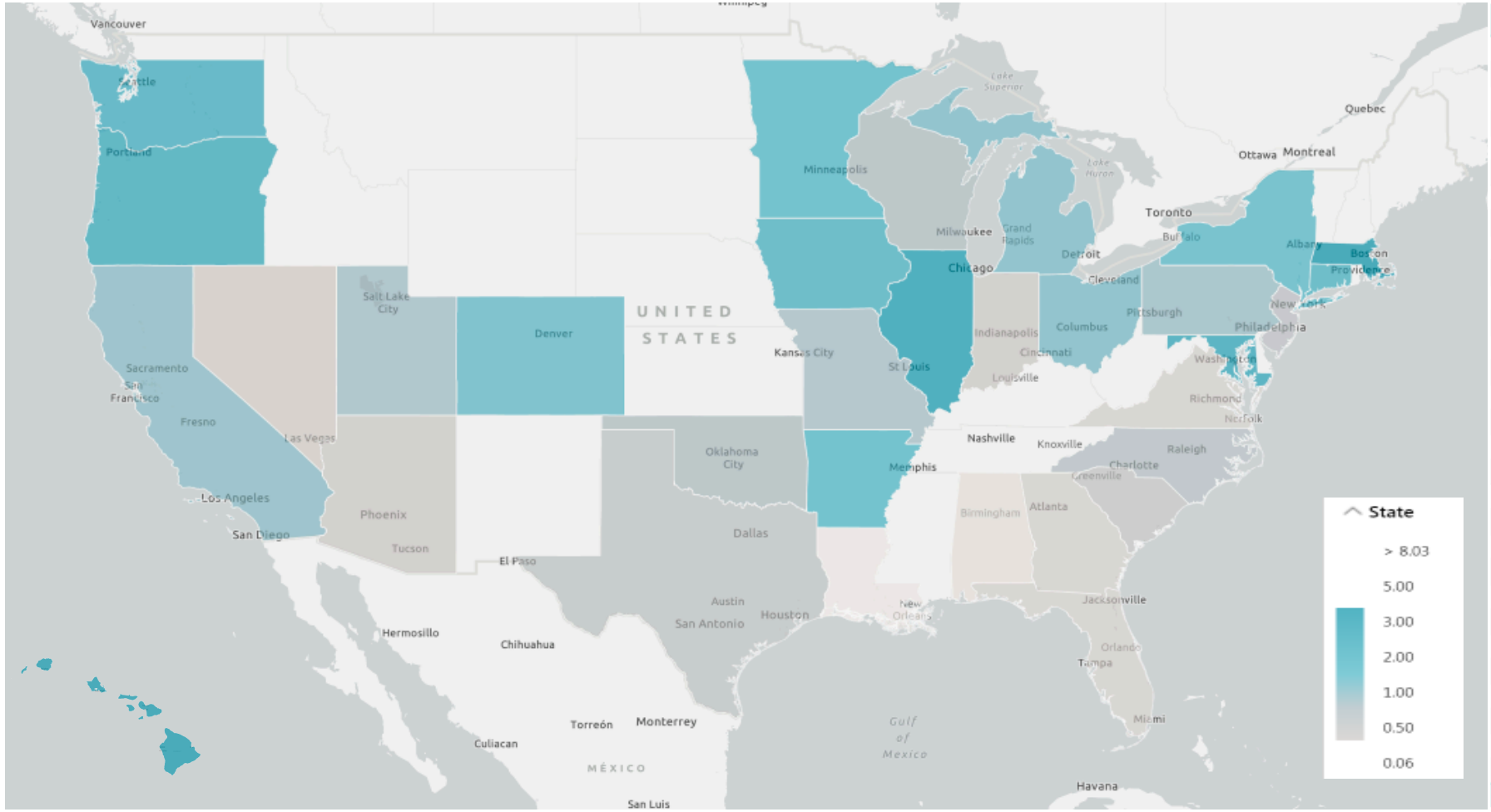
Financing paid off in 60 months by the time CapEx breaks even

CapEx cannot catch up to the savings of financing

Cash flow positive throughout

Utility Incentives Nationally

Programs are available to reduce capital costs upfront but are often overlooked when implementing site by site



State	Spending	Average of % of Revenue
Massachusetts	$532,807,890	10.280 %
Hawaii	$18,667,919	8.029 %
Illinois	$452,685,037	6.850 %
Maryland	$114,626,581	5.490 %
Oregon	$85,681,659	4.870 %
Washington	$91,086,596	4.190 %
Iowa	$63,804,277	3.710 %
Connecticutt	$104,171,027	3.590 %
Minnesota	$107,451,885	3.220 %
New York	$365,271,798	3.023 %
Michigan	$245,794,060	2.600 %
Ohio	$125,595,988	2.587 %
California	$709,363,449	2.383 %
Pennsylvania	$124,297,945	2.213 %
Utah	$41,028,572	2.120 %
Missouri	$66,483,135	2.100 %
Wisconsin	$55,824,164	1.970 %
Oklahoma	$36,309,247	1.940 %
North Carolina	$151,877,226	1.775 %
New Jersey	$87,471,321	1.560 %
Texas	$121,837,767	1.385 %
South Carolina	$48,502,217	1.290 %
Indiana	$28,277,308	1.050 %
Arizona	$65,414,226	1.045 %
Nevada	$19,204,887	0.910 %
Georgia	$56,698,715	0.700 %
Virginia	$52,662,000	0.700 %
Florida	$120,179,750	0.667 %
Alabama	$3,444,670	0.060 %
Louisiana	$1,637,661	0.040 %
Total	**$4,098,158,977**	**2.667 %**

Utility spending on Energy Efficiency Programs as a Percent of Revenue

Observations on Working At Scale

- Staff
  - Sites and personnel skill sets and work loads vary widely, consistency is a challenge
- Service Providers
  - Vary by location and so do results
- Team
  - Running in parallel with a team instead of an individual
- Program
  - Need a programmatic view instead of site by site
- Automate
  - Any impactful program across a company needs a high level of automation

Findings in the field

Coil with damage

Outdoor air damper shut with actuator removed

Standard programmable thermostat set to hold

Broken belt on exhaust fan

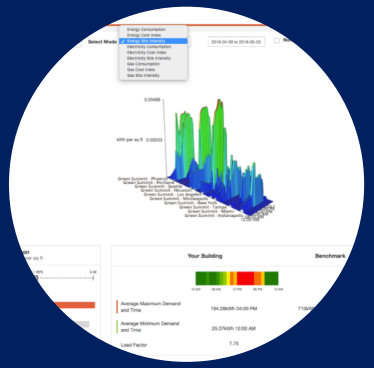
Clogged filters with signs of mold growth

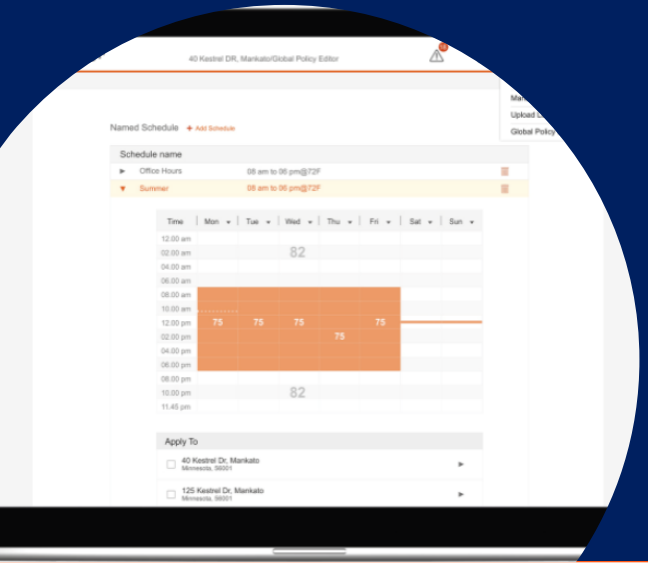
TEMPERATURE CHECK

Why we work with 75F

- Wireless Smart Thermostats (Sense Temp, Humidity, IAQ, OCC, Sound), Equipment Controllers, and Central Control Units
- Lower cost to Install than traditional systems
- Quick and Easy to Setup
- 2 - 4 Year Payback ($$$)
- Ongoing Visibility and Management in the Cloud
- Great system for buildings that typically don't have controls or need controls upgrades

"According to DOE, over 60% of commercial building floor space is served by packaged HVAC units, including outdoor rooftop units (RTUs) and indoor air handling units (AHUs)."





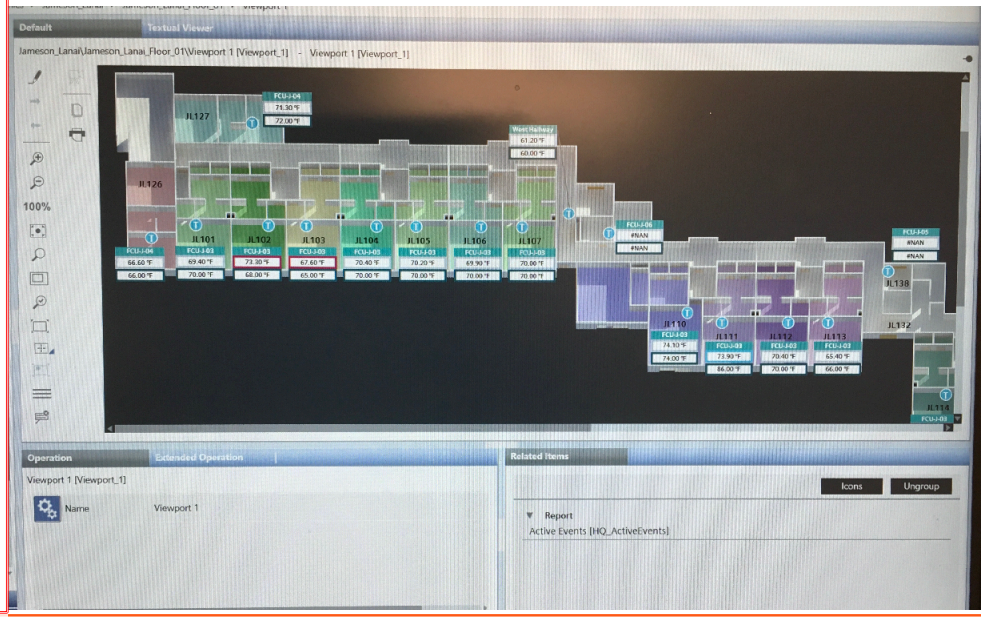
Remote Portfolio Management

- Remote Management via Cloud
- Proactive Monitoring
- Priority Support Access
- Ongoing Training
- Regular Performance Reviews
- Service Call Reduction ($$$)
- Post-Project Energy Optimization ($$$)

Comfort vs compliance

Real Time Indoor Environmental Quality Measurement

- Measure and report critical metrics:
  - CO_2 Levels
  - Humidity
  - Air Changes per Hour
  - VOCs, NO_2, others
- Tracking & Messaging
- Verification of performances
  - Interface of Facilities & Events



Process

Step 1

Assess Existing Conditions

- Data Collection; Utilities, Drawings
- Analyze Data
- Identify High Leverage Sites

Step 2

Audits

- Site Evaluation
- Model Costs and Savings
- Proposals

Step 3

Digital Building Upgrades

- 75F Installation + Other Efficiency Measures
- Remote visibility to site

Step 4

Manage and Report

- Leverage installed upgrades to drive cost savings; Energy + Operations
- Optimized portfolio management

Q&A

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