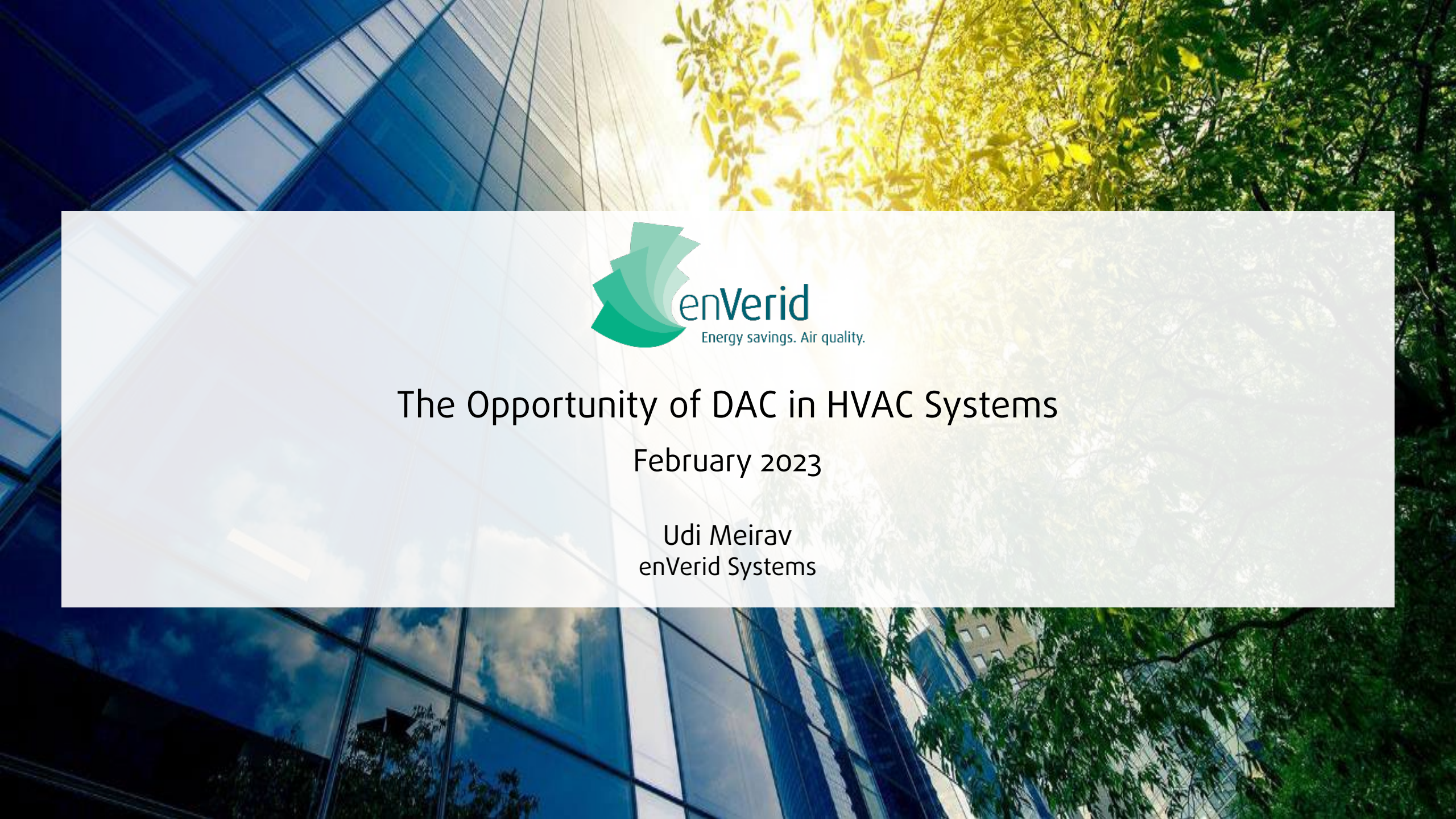

enVerid
Energy savings. Air quality.

# The Opportunity of DAC in HVAC Systems

February 2023

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enVerid Systems

# Overview of enVerid Systems

- Boston based manufacturing company, founded 2010
- Air scrubbing ➔ saving HVAC energy & capital costs
- Specialized sorbents and hardware systems
- Modes of deployment:
  - ✓ Added to existing HVAC systems (“Retrofit”)
  - ✓ Designed alongside new HVAC installations (“Plan & Spec”)
  - ✓ Built-in module in OEM products (“Integrated”)
- ASHRAE compliant with ~1000 systems deployed worldwide


# The common HVAC practice of air replacement is not sustainable.

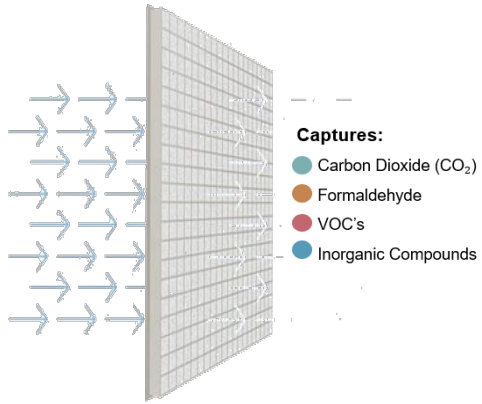
- Ventilating with outdoor air to maintain indoor air quality (IAQ) is
  - **costly** (oversized chiller systems)
  - **wasteful** (energy cost & carbon emissions)
  - **flawed** (indoor air quality)
- Indoor **air cleaning** offers superior outcomes on all these dimensions
  - Lower peak load → reduce HVAC equipment size & cost
  - Lower average load → energy savings and reduced carbon footprint
  - Less infiltration of outside pollution → superior IAQ

How? Cost effective, sorbent enabled **CO2 & VOC Scrubbing** of indoor air

# Our products remove CO2 and other indoor gas pollutants.

## Sorbents

## Molecular “Filters”




## Air Cleaning Systems


### Synthetic granular media

- Tested to meet all ASHRAE requirements
- Excellent capture of dilute CO2 and VOCs
- Very low regeneration temperature (50 – 60 C)

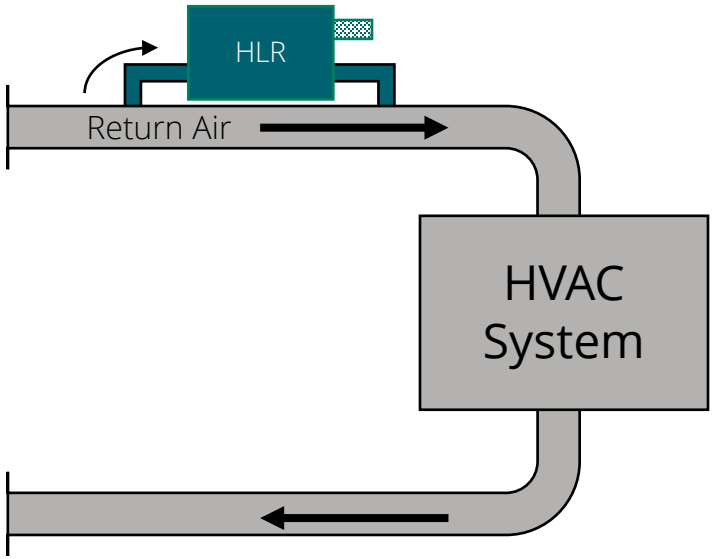
### Field replaceable 24×24” cartridge

- Very long lifetime
- Multiple cartridges per system (“V-bank”)
- Recyclable materials

### Combines with all types of HVAC

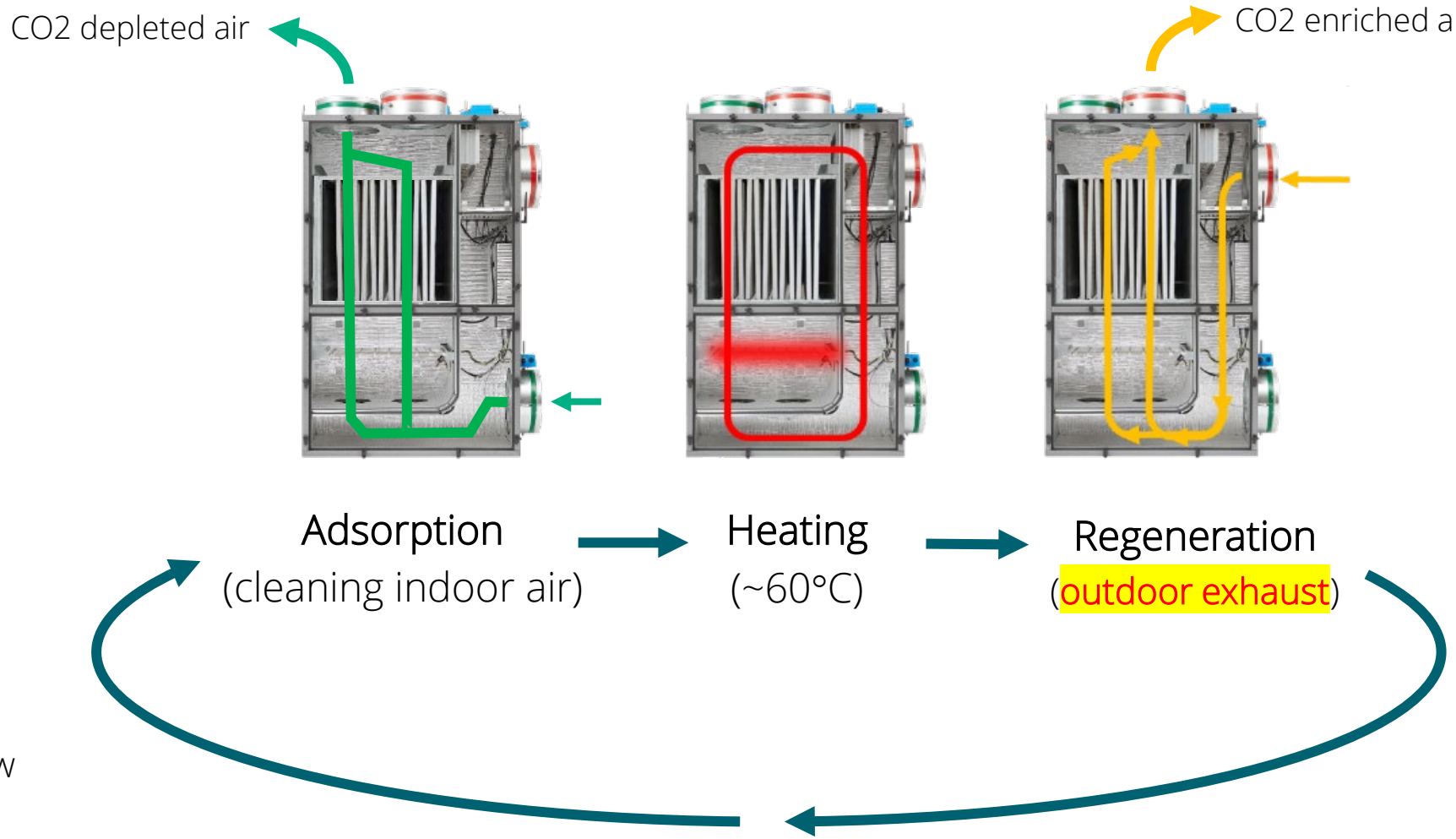
- enVerid branded products and OEM products
- Very small footprint (relative to HVAC)
- Slipstream → No “parasitic” pressure drop

# How it works: A slipstream, in-situ regenerating scrubber



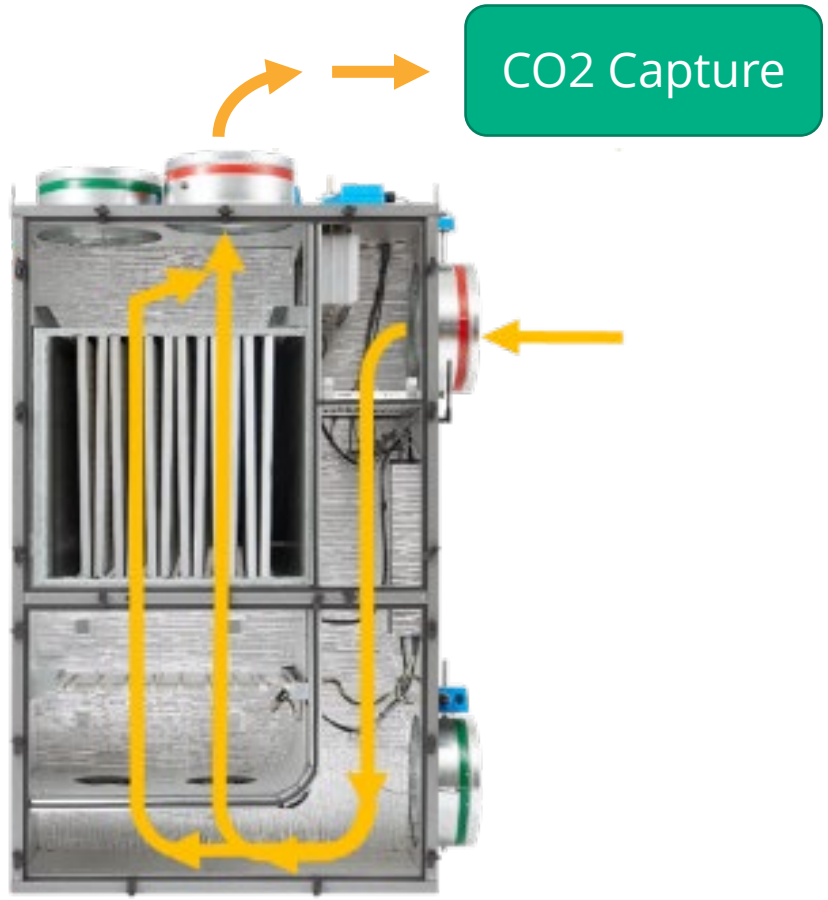

## Slipstream Topology

- Only ~5 % of airflow “detours” through scrubber
- Regen does not interrupt HVAC flow



# Can we collect the exhaust & achieve DAC?

- The idea is as old as our company
- It is possible - with significant investment & changes:
  - Extract CO2 without re-diluting it (major redesign)
  - Use larger % of overall HVAC air flow (in-line vs slipstream)
  - Develop and deploy distributed collection system
- Why have we never done it?



# We have recently begun studying HVAC-DAC in earnest.

## What enVerid can bring to the party

- Knowhow and infrastructure to produce DAC-CO2 sorbents
- Track record designing, manufacturing & operating modular, HVAC-based CO2 scrubbers
- How to “coexist” with HVAC systems
- Working with the building ecosystem, channels, regulations and culture

## Among the things we don’t know yet

- How best to extract high-concentration CO2 in a modular, low-footprint design
- What would be the architecture of a practical, distributed CO2 collection network
- What cost ($/MTCO2) can be achieved at scale?
- What is the right business model to maximize reach and impact in the long run?