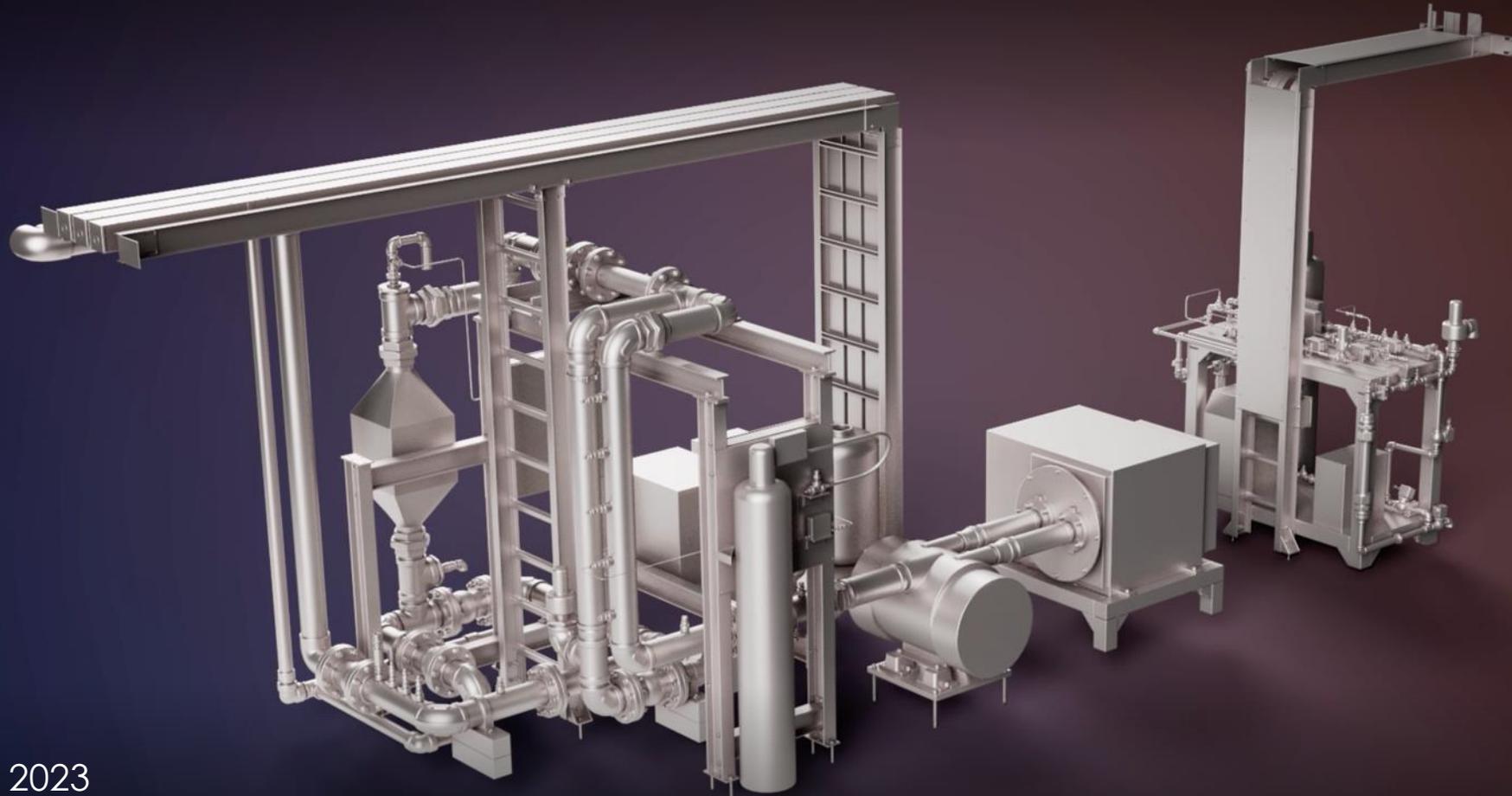




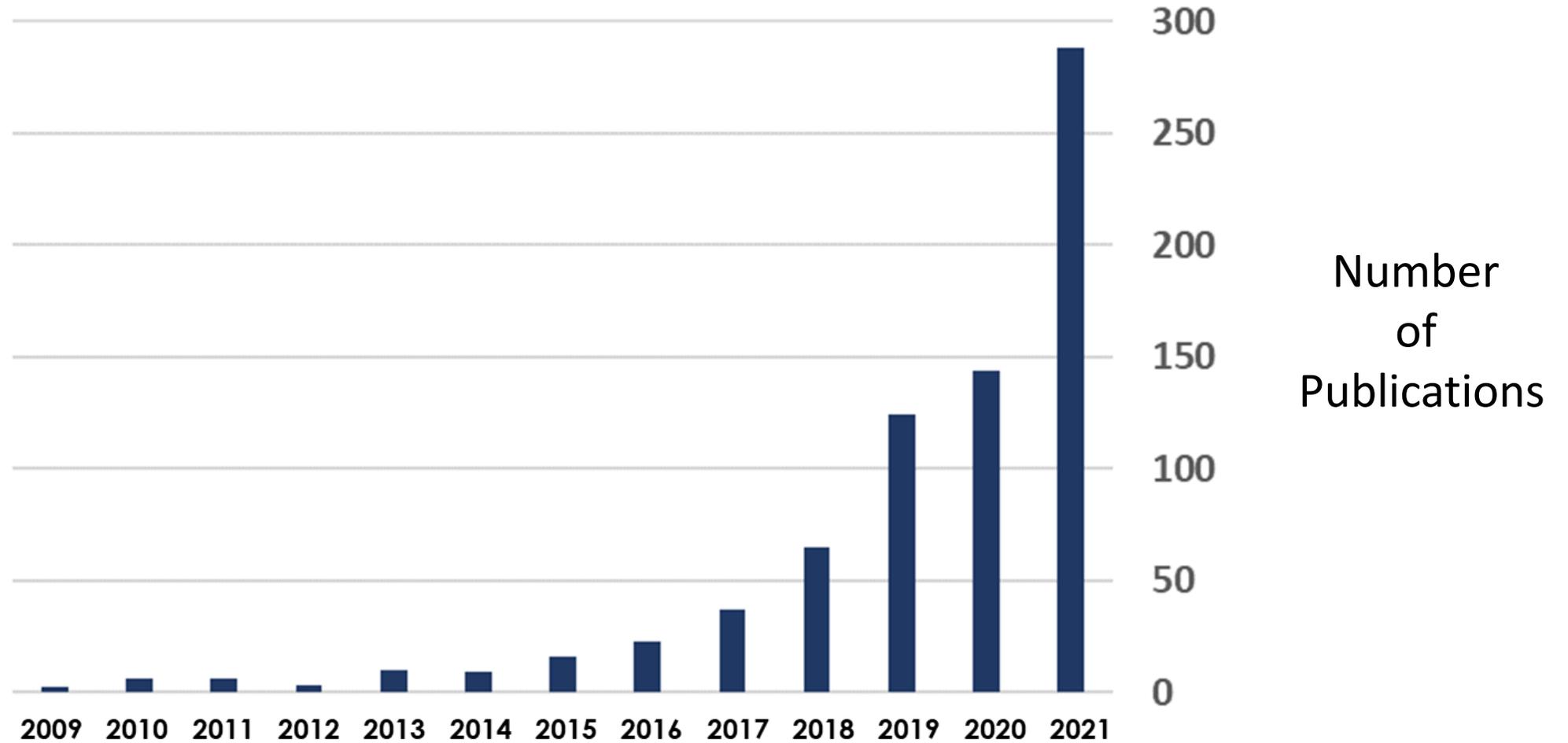
NETL DIRECT AIR
CAPTURE CENTER



August 29, 2023

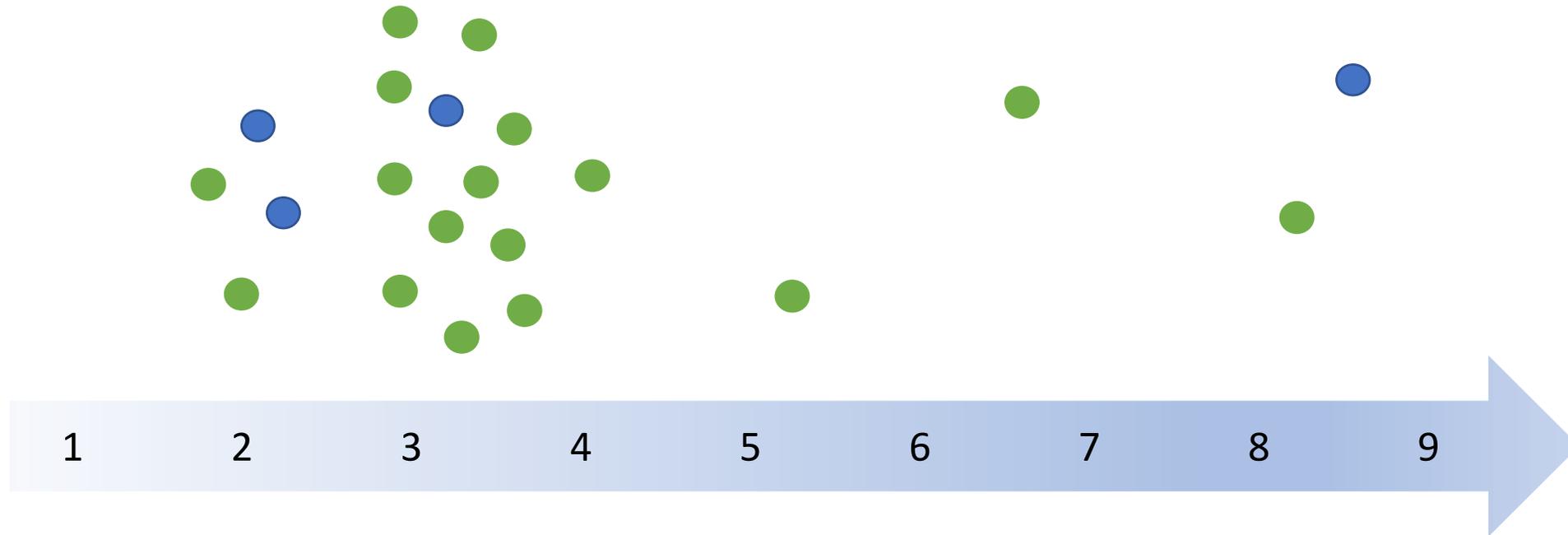


Exploding Interest in DAC



Source: Science Direct database

DAC Technology Readiness



- Solvent
- Sorbent

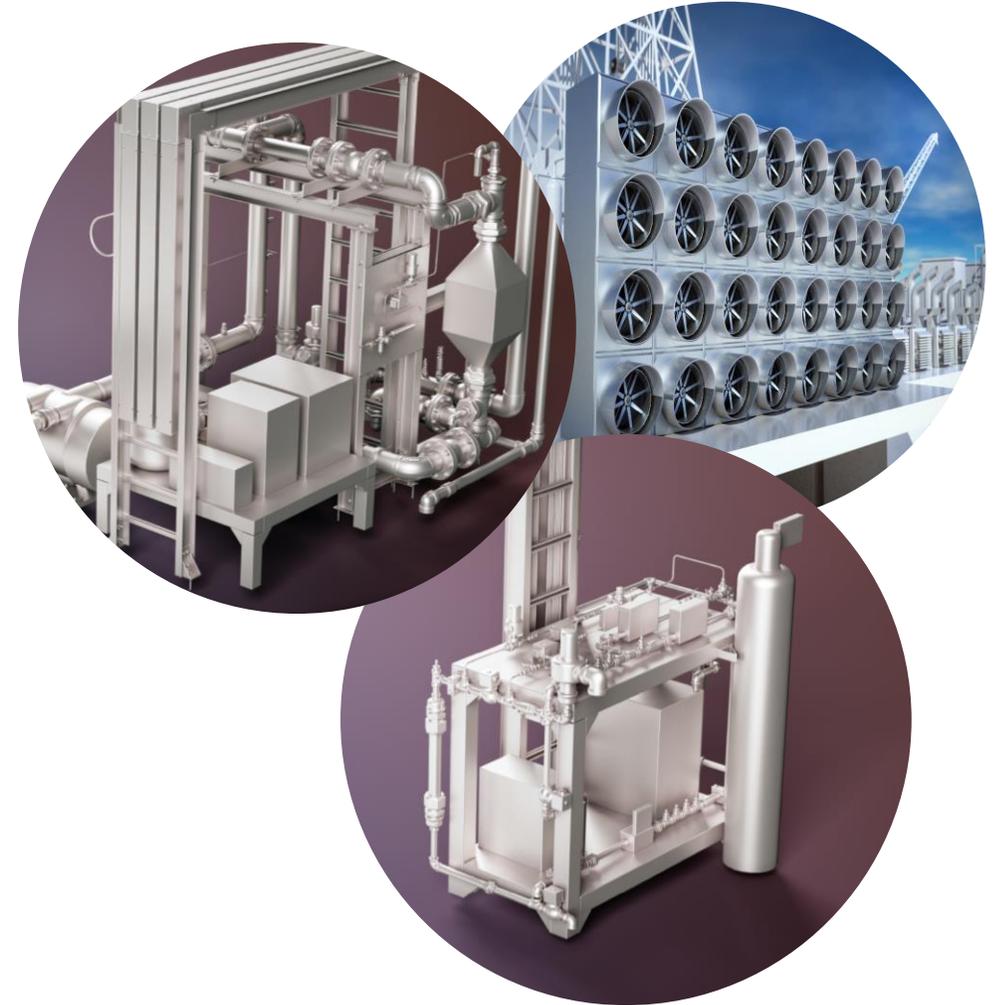
TRL

Conceptual

NETL DAC Center

Supporting Rapid Technology Development for Atmospheric CO₂ Capture

- ✓ Inclusive, State-of-the-Art Testing Facilities
- ✓ Collaborative Access to NETL's World Class Expertise
- ✓ Standardized and Bespoke Testing Options Representing the "Gold Standard" in Technology Validation
- ✓ Authoritative Lifecycle Analysis as an Outcome of Partnerships



DAC Center Capabilities

Targeting Technologies TRL 3 – 6

CAPABILITIES



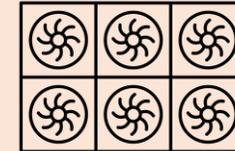
Lab scale

systems for novel solvent and sorbent material assessment
(~0.1 kg CO₂/day)



Bench scale

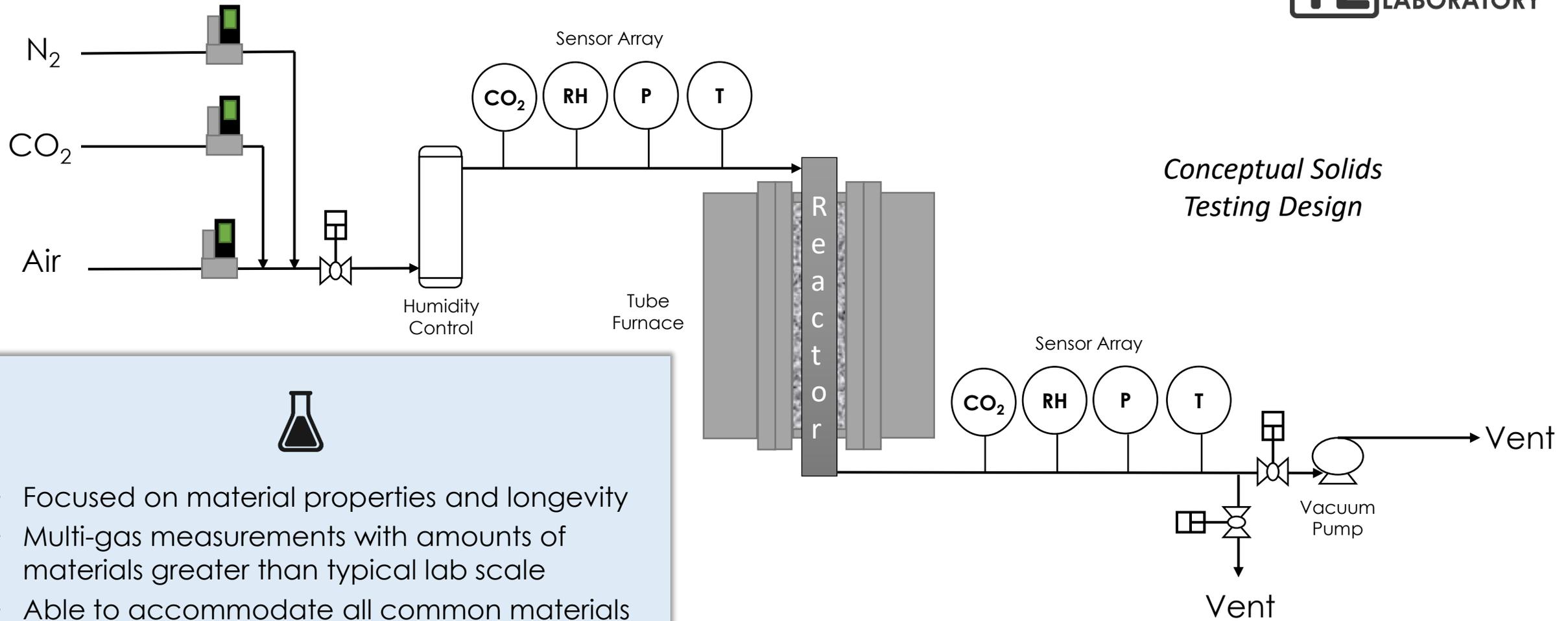
test beds with flexible reactor designs
(~4 kg CO₂/day)



Small pilot scale

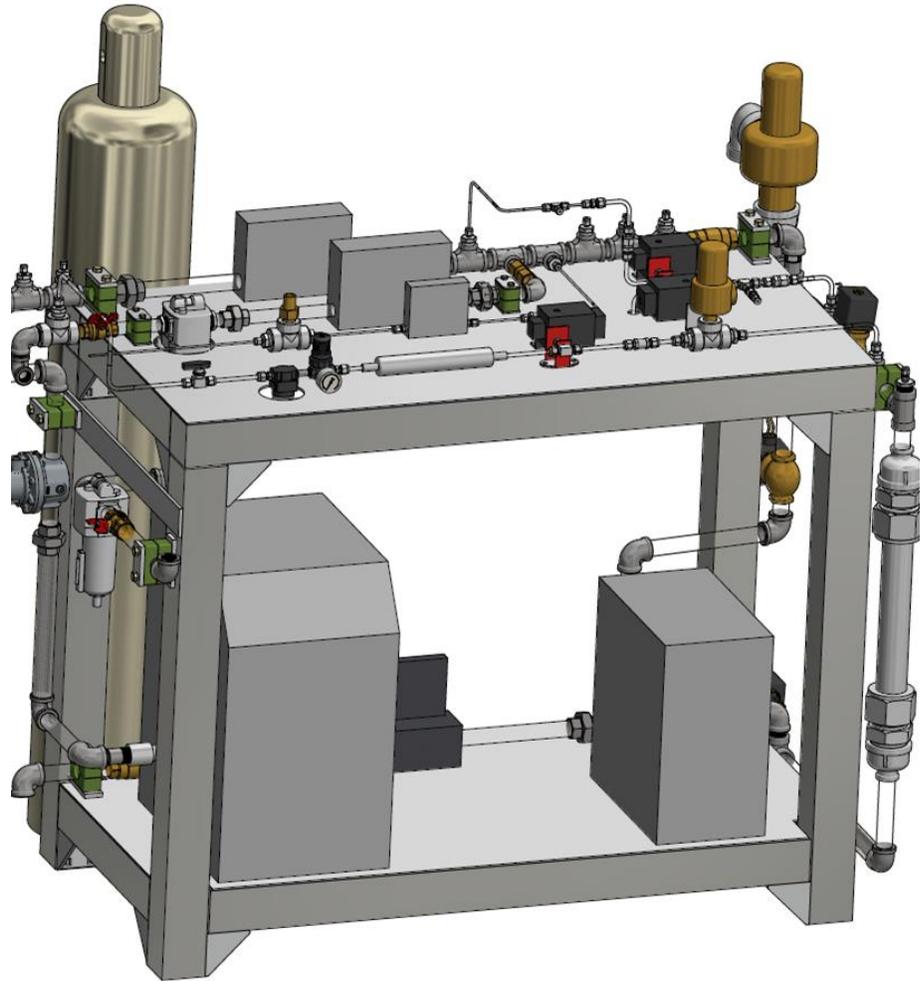
bays for evaluating developer-built DAC skids
(~30 kg CO₂/day)

Laboratory Scale Materials Testing Units

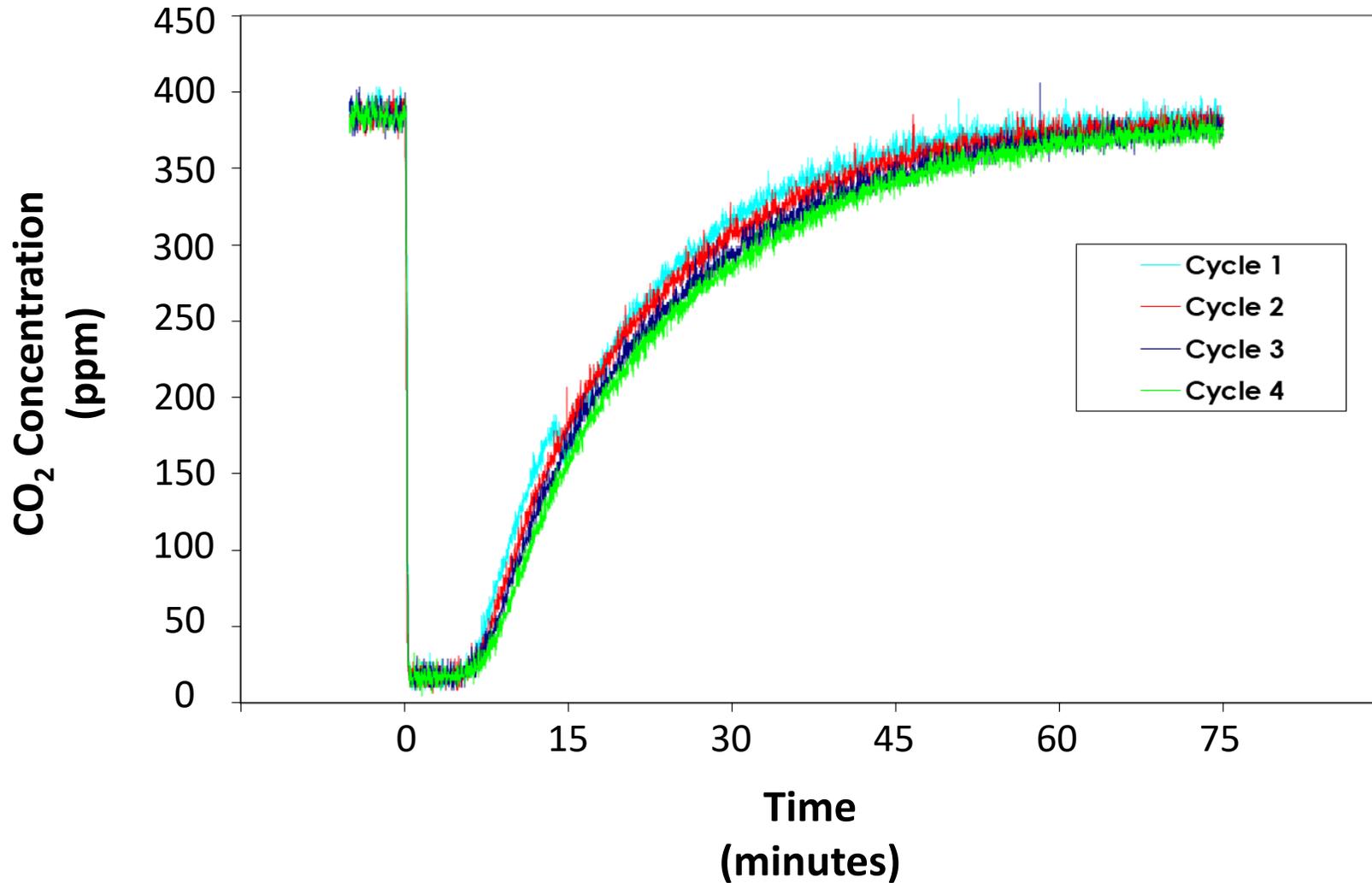


- Focused on material properties and longevity
- Multi-gas measurements with amounts of materials greater than typical lab scale
- Able to accommodate all common materials (liquid, powder, granular, fiber, structured)
- Automated for extended, multi-cycle testing

Laboratory Scale Materials Testing Prototype

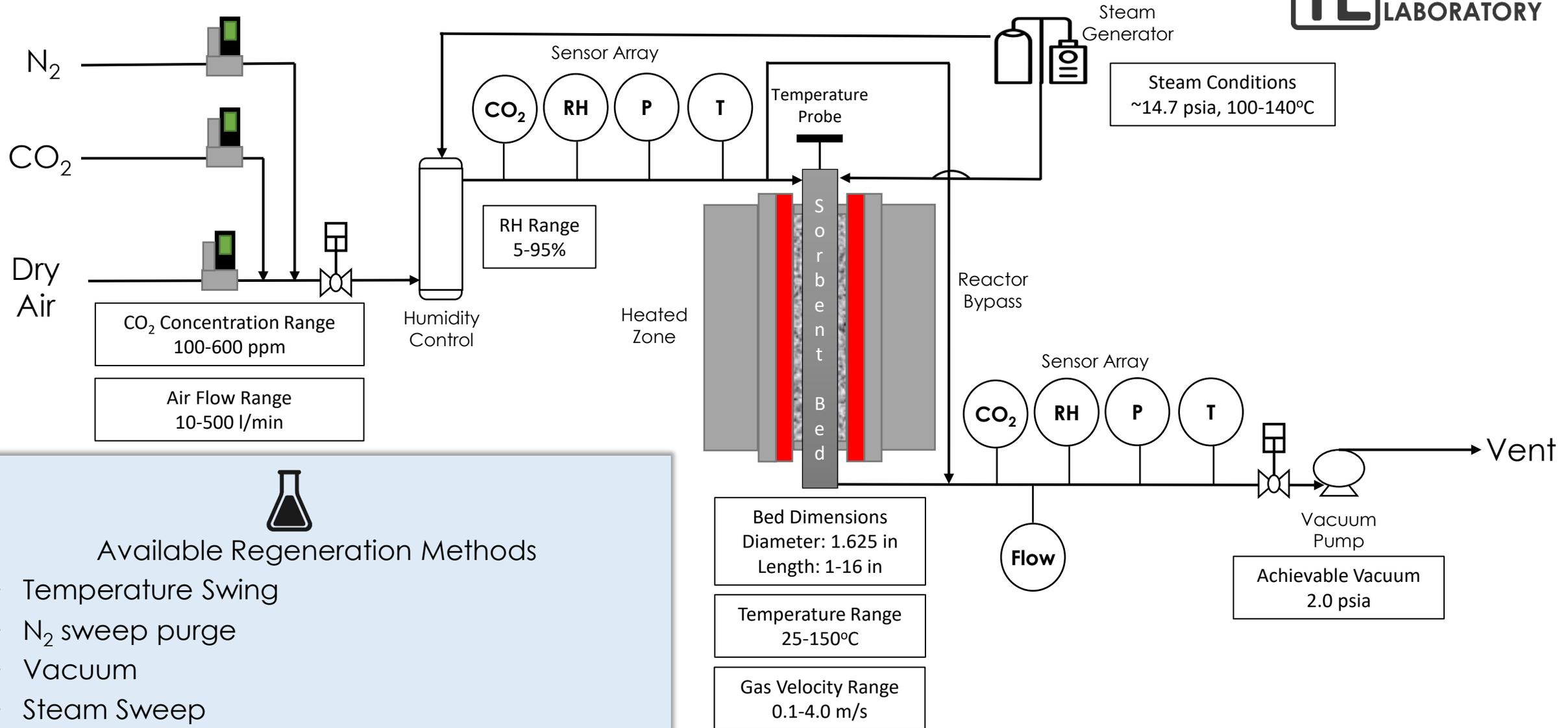


Laboratory Scale Materials Testing Prototype



Zeolite 13X
(8-12 mesh)

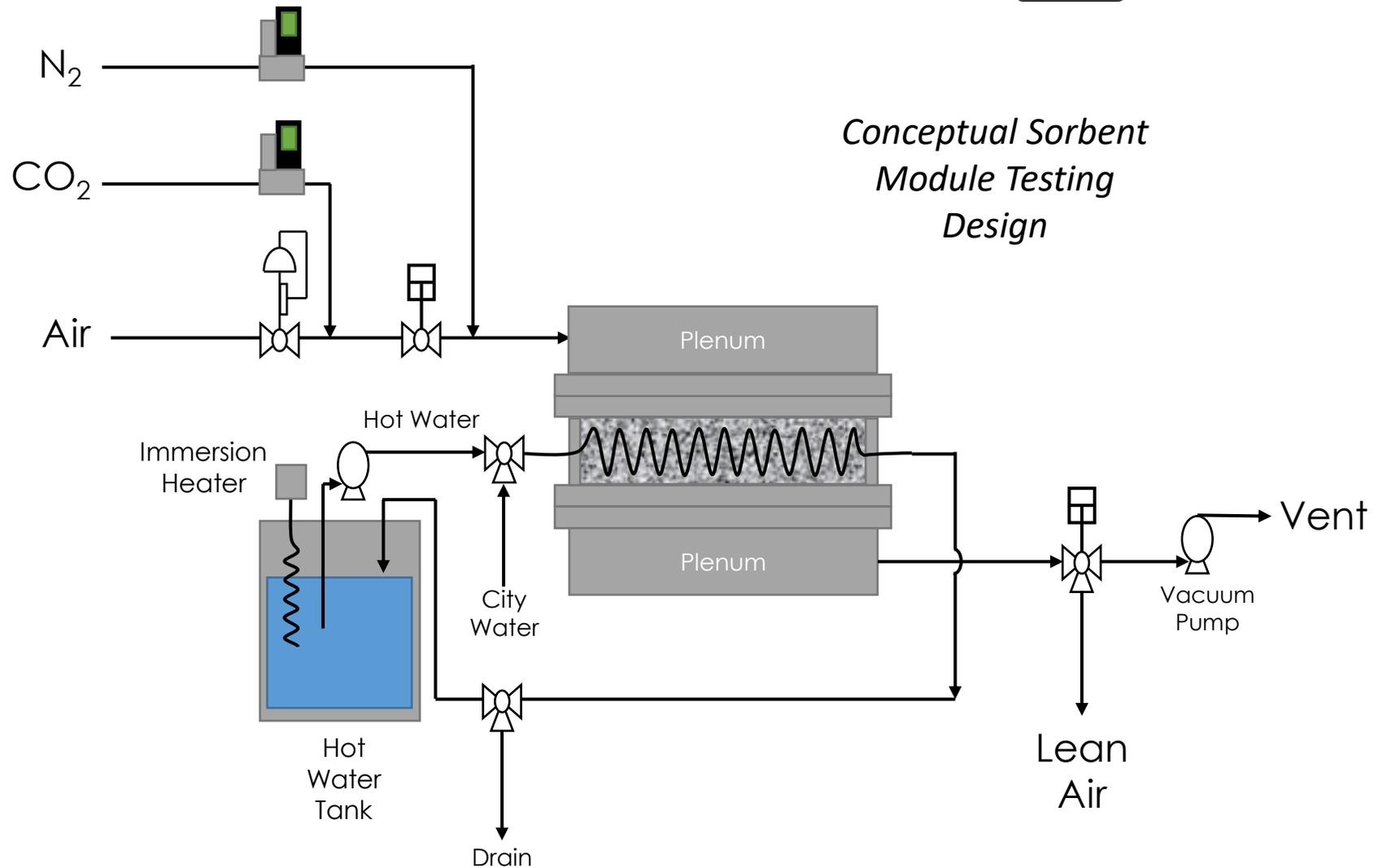
Laboratory Scale Materials Testing Units



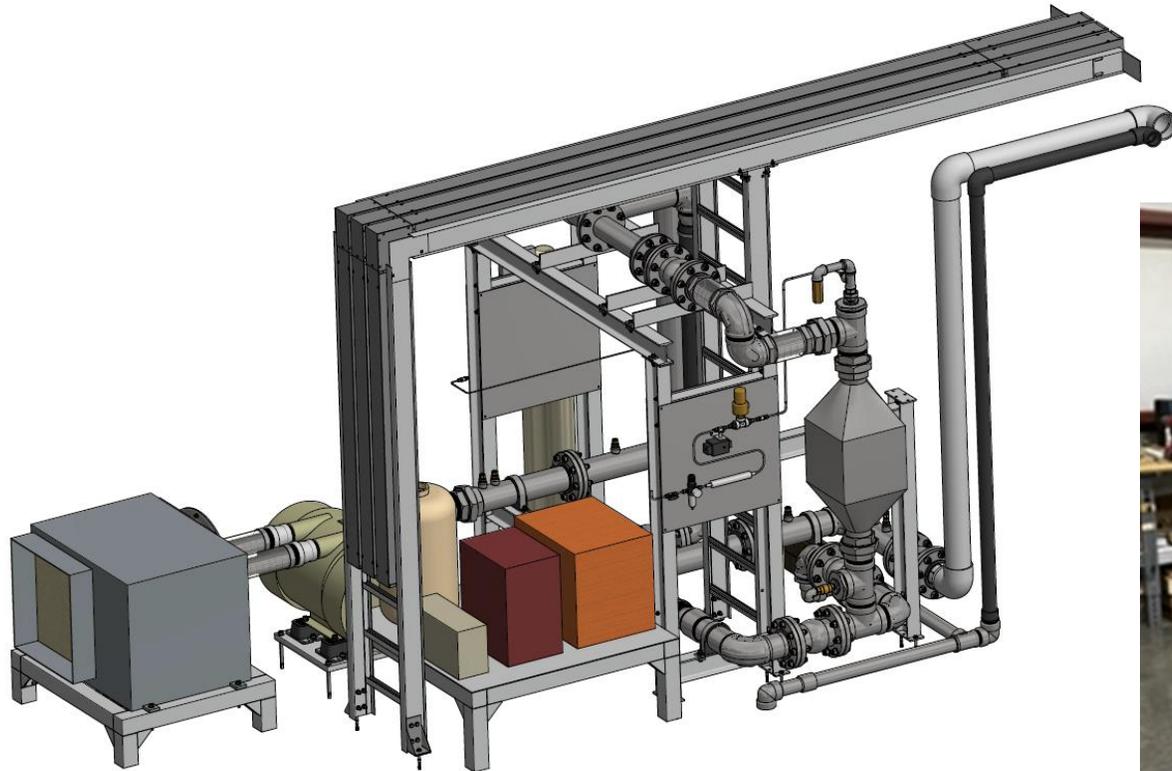
Bench Scale Module Testing Units



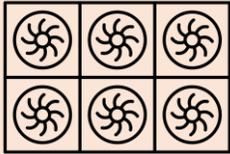
- Focused on module capture and flow measurements
- Sized for modules at typical scale: 12" X 12" X 12"
- Able to accommodate common form factors: granular solid, fiber mat, or monolith
- Instrumented to provide measurements of all parameters needed for prototyping models
- Designed to allow non-standard regeneration (Joule heating, microwaves)



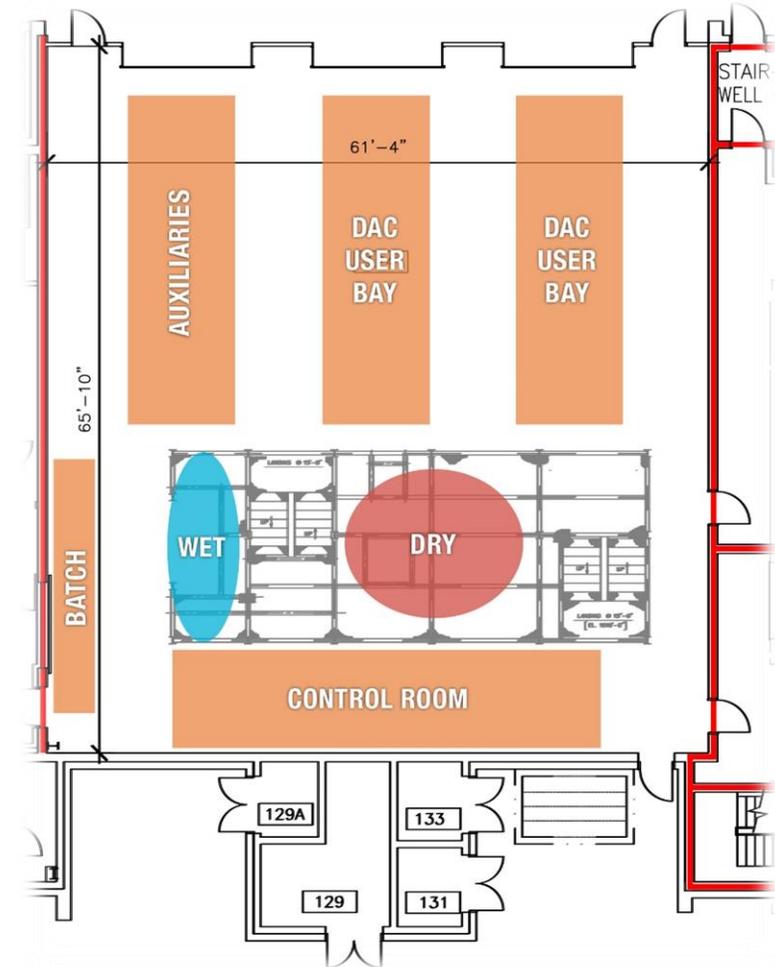
Bench Scale Module Testing Prototype



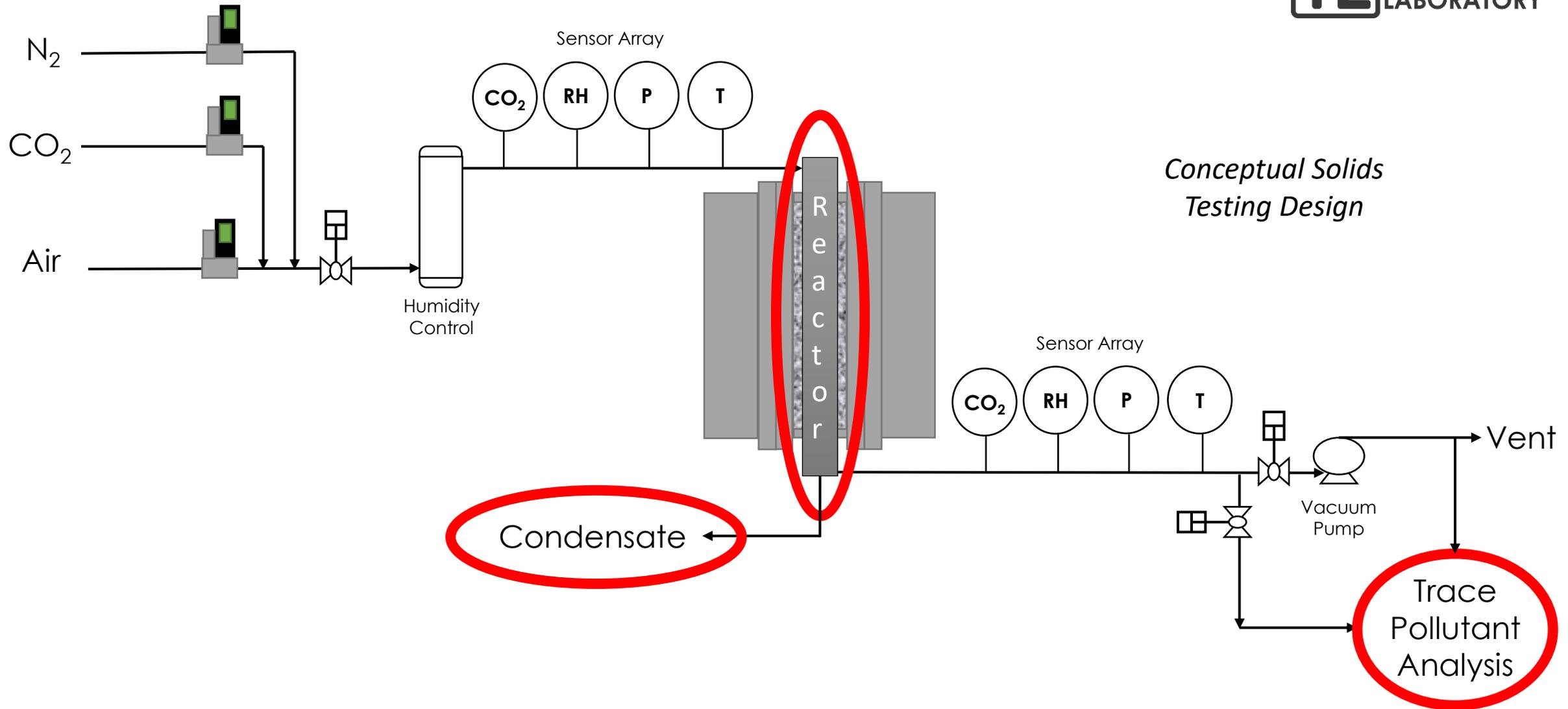
Small Pilot Scale Prototype Testing Units



- Focused on testing of small pilot scale prototype DAC units
- Able to accommodate a wide variety of technology types
- Testing under conditions representative of many climates
- Automated for extended, multi-cycle testing
- Instrumented for measurement of all parameters needed for assessment of field deployment at NCCC or a DAC hub



Trace Emissions Analysis Needs



CAPABILITIES



Material Scale

systems for novel solvent and sorbent material assessment
(~0.1 kg CO₂/day)

Sampling

Solid: Elemental Analysis
(Offline)
Liquid: GCMS (Offline)
Gas: PTR-TOF-MS
(Online, Periodic)

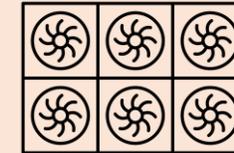


Module scale

test beds with flexible reactor designs
(~4 kg CO₂/day)

Sampling

Solid: Elemental Analysis
(Offline)
Liquid: GCMS (Offline)
Gas: PTR-TOF-MS
(Online, Periodic)



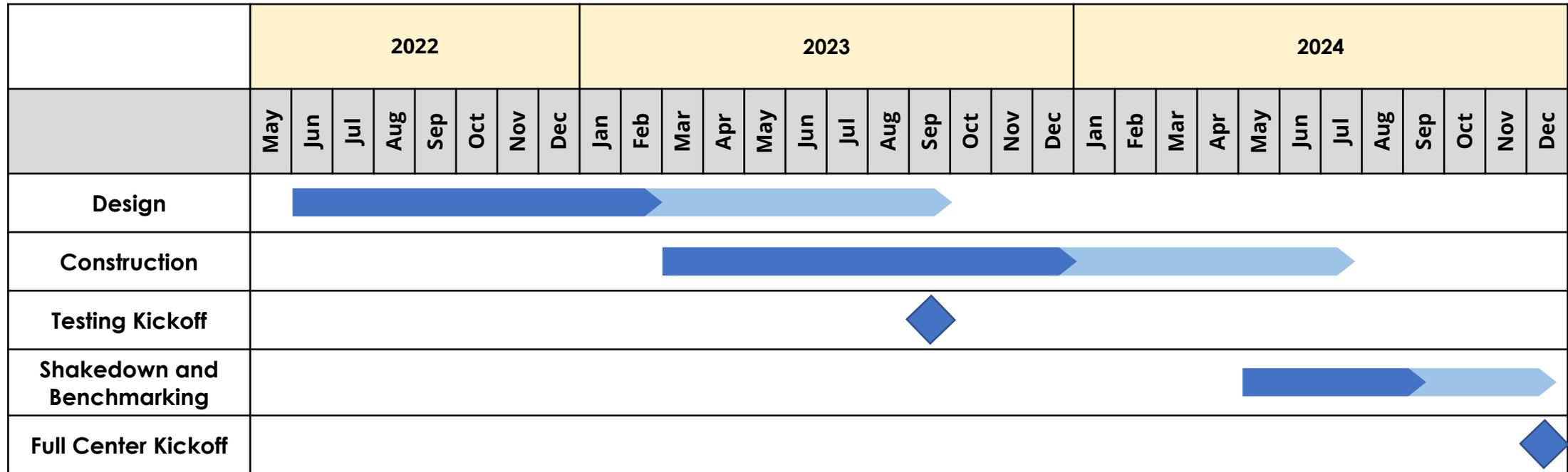
Prototype scale

bays for evaluating developer-built DAC skids
(~30 kg CO₂/day)

Sampling

Solid: Elemental Analysis
(Offline)
Liquid: GCMS (Offline)
Gas: PTR-TOF-MS
(Offline)

DAC Center Timeline



Partnering with NETL



The TOOLBOX



- Cooperative Research and Development Agreement (CRADA)
- Contributed Funds-In Agreement (CFA)
- Memorandums of Understanding (MOU)/ Memorandums of Agreement (MOA)
- Small Business Innovation Research (SBIR) & Small Business Technology Transfer (STTR) Programs
- Unsolicited Proposals (USP)
- Non-disclosure Agreement (NDA)
- Funding Opportunity Announcement (FOA)

Available Technologies

- NETL's technology portfolio contains a broad range of innovations that have resulted from research
- Technologies and intellectual property available for licensing on NETL's website.

Available Technologies: <https://www.netl.doe.gov/business/tech-transfer/available-technologies>

Funding Opportunity Announcement (FOA)

- NETL uses FedConnect.net, Grants.gov and FedBizOpps.gov to post FOAs
- Proposals and applications are only accepted electronically through FedConnect.net or Grants.gov

Funding Opportunities:

<https://www.netl.doe.gov/business/solicitations>

Partner with us!

- ✉ Email: david.luebke@netl.doe.gov
- ✉ DACCcenter@netl.doe.gov
- 🌐 NETL.doe.gov/direct-air-capture-center



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