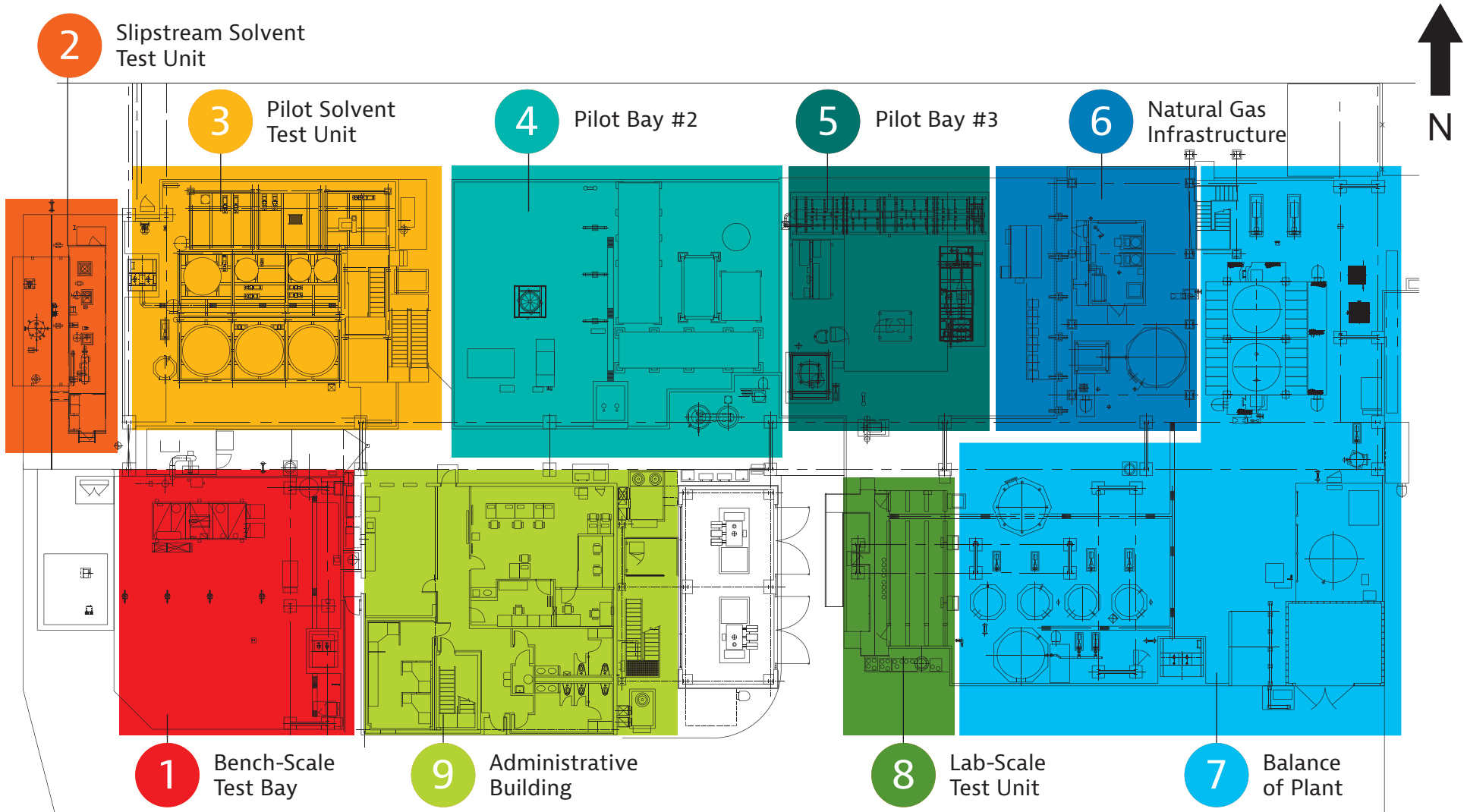


National Carbon Capture Center Infrastructure



- » Provides: 1) 3.5-MWe coal flue gas, or 2) 4.0-MWe natural gas flue gas
- » No CO₂ stored – gas returned to: 1) Gaston scrubber inlet, or 2) natural gas boiler stack
- » Steam for regeneration: 1) Gaston Unit 5 cold reheat, or 2) natural gas boiler
- » Independent from Gaston operation
- » 4,116 instrument data tags

National Carbon Capture Center Infrastructure

May 2023



U.S. DEPARTMENT OF
ENERGY



1. Bench-Scale Test Bay

- » Equipment scale: 0.005-MWe to 0.1-MWe; up to four developers can occupy simultaneously
- » Utility connections for flue gas, cooling water, steam, nitrogen, demineralized water and instrument air
- » Total area 40' x 50'; average module size 15' x 25'
- » Current skids:
 - › GTI ROTA-CAP – intensified solvent-based system using rotating packed beds for both absorption and regeneration

2. Slipstream Solvent Test Unit

- » Solvent-based system similar in arrangement to the Pilot Solvent Test Unit, but one-tenth the scale (~0.05-MWe)
- » Advantageous for developers who cannot manufacture enough solvent for the Pilot Solvent Test Unit (~200 gallons needed), but contains less instrumentation

3. Pilot Solvent Test Unit

- » ~0.5-MWe solvent-based system capturing ~10 tons per day CO₂ on coal-derived flue gas
- » Can operate on coal-derived (10.5% - 12.5% CO₂) or natural gas-derived (4% - 9% CO₂) flue gases
- » Absorber: 60' of Mellapak Plus 252Y packing separated into three beds with in-between intercooling
- » Regenerator: 40' of Mellapak Plus 252Y packing separated into two beds that can be operated together or without the top bed using steam to heat solvent for regeneration
- » Two other regeneration options: advanced flash stripper and continuous stirred-tank reactor
- » Requires ~2,000 gallons minimum solvent volume to operate. University of Texas at Austin is currently testing piperazine solvent in unit

4. Pilot Bay #2

- » Can host systems up to 1.0-MWe. Currently, two of four skids from Carbon America FrostCC™ (cryogenic capture system) occupy the east side. The west side contains skids from AirCapture (direct air capture technology)
- » Total pilot area 50' x 70'; can be divided into two or three tests

5. Pilot Bay #3

- » Can host systems up to 0.5-MWe. Currently unoccupied and awaiting UCLA/CarbonBuilt, a system for CO₂ utilization in concrete and a previous user of the space

6. Natural Gas Infrastructure

- » Provides steam and natural gas-derived flue gas for testing from a boiler unit with exiting CO₂ concentrations in the 4% - 9% range
- » Allows for independent testing operation from Gaston Unit 5
- » At 100% firing rate, can provide a maximum heat output of 37 MBtu/hr operating at 83.31% efficiency
- » Produces up to 37,000 lb/hr of 150 psig steam at 366 °F

7. Balance of Plant

- » Provides cooling water, nitrogen, tankage for process liquids (solvents, caustic, wastewater) and instrument air (provided from Gaston compressors)

8. Lab-Scale Test Unit

- » Trailer-sized laboratory space for small, tabletop-sized units that are not rated for outdoor duty, along with gas/liquid analyzers

9. Administrative Building

- » Contains control room wet lab for liquids analysis and lab for gas analyzers
- » Provides cubicle space, conference room and common breakroom for up to six developer teams simultaneously