

# Aircuity Installation

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# Project Team

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## ■ Project Services

- Allen Shiroma – Asst. Director Renovations
- Matt Gudorf – Campus Energy Manager
- Adam Feuerstein – Project Manager

## ■ Contractor

- Yardley-Zaretsky, Inc.
  - Roman Zaretsky

## ■ EH&S

- Lisa Mahar - Senior Mgr, Occupational Health & Safety

# Scope of Work

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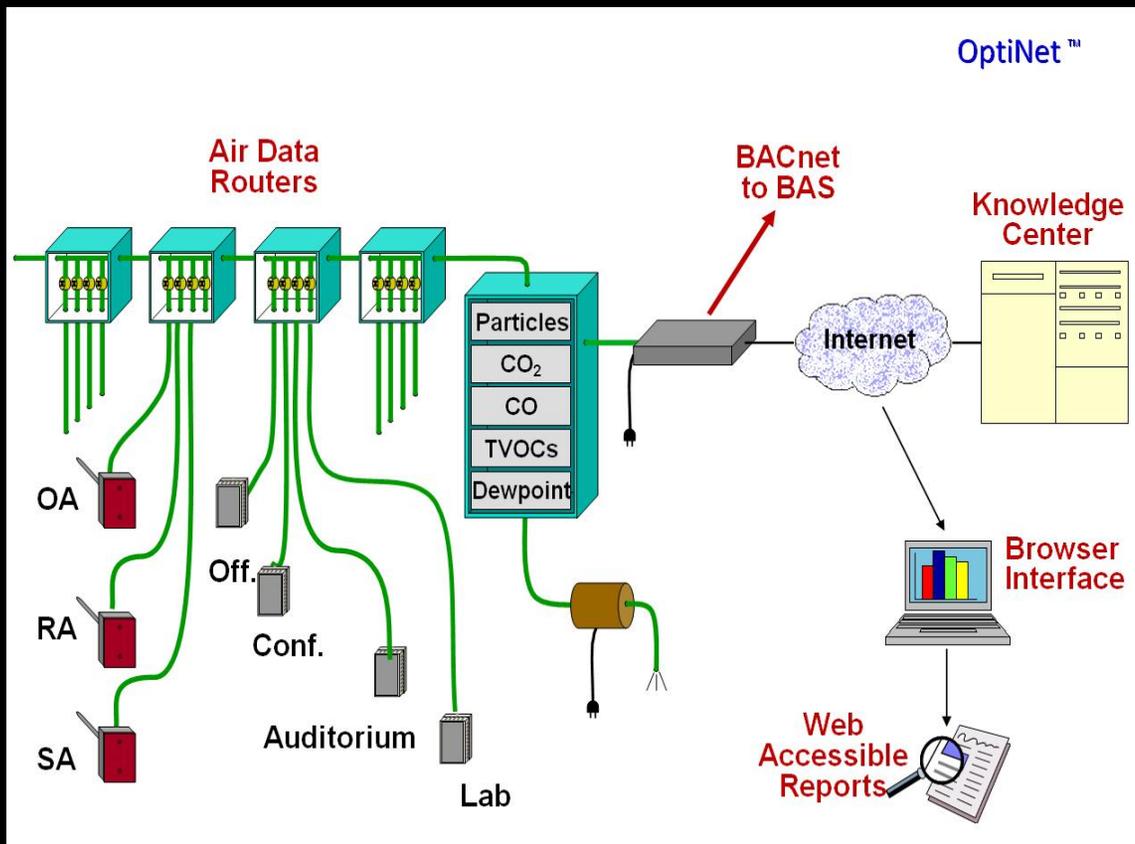
- Install Aircuity Sensor Suites and Air Data Routers in Electrical Rooms
- Install Aircuity Duct Probes, emergency pushbuttons, local display units, occupancy sensors, and audible alarms in Laboratories.
- Commission Aircuity System to monitor Indoor Air Quality and control building air change rates.

# What Is Aircuity

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- A network of air sampling stations which deliver packets of air to a centralized sensor suite.
- The sensor suite monitors for
  - Carbon Dioxide
  - Carbon Monoxide
  - Airborne Particulates
  - Relative Humidity
  - Total Volatile Organic Chemicals (TVOC)
- The central sensor suite is maintained by replacing the sensors every 6 months to insure the system is properly calibrated.
- After installation minimum ventilation rate will be set at 4 ACH in occupied and 2 ACH unoccupied with dynamic adjustment up to 100% design airflow of the valve from when contaminants are sensed until they are no longer sensed.

# How Does Aircuity Work



- Collects Sample packets of air from each zone
- Transfers packets of air to Air Data Routers
- Air Data Routers funnel air packets into sensor suite for analysis of Indoor Air Quality
- Sensor Suite records Indoor Air Quality
- If Indoor Air Quality is outside of acceptable normals the Sensor Suite sends a signal to the Supply Air Valves to increase Air Flow until normal IAQ levels are met.

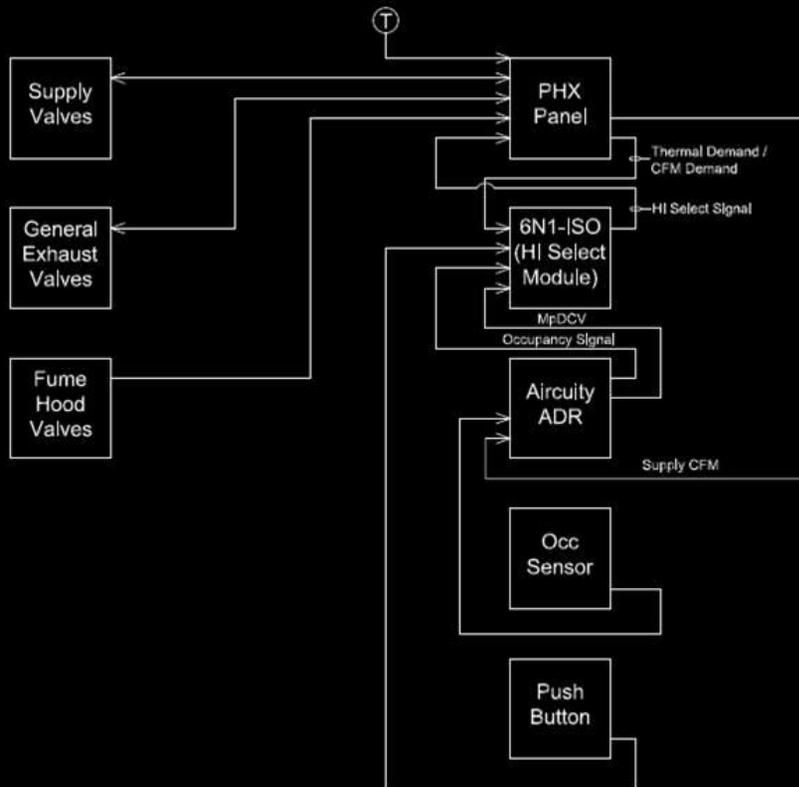
# How Is Aircuity Incorporated Into My Building

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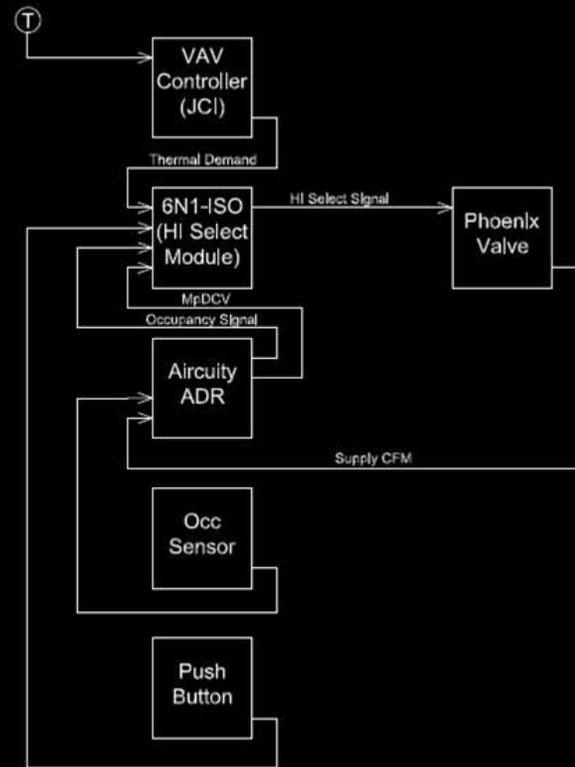
- Minimum Air Change Rate for Unoccupied Space will be set to highest value of the following inputs...
  - 2 Air Changes an Hour
  - Minimum ACH required to comply with CAL-OSHA and maintain 100 ft/min. face velocity at Fume Hoods
  - Minimum ACH required to meet cooling load in each zone
  - 100% design airflow of the valve from when Aircuity senses contaminants are sensed until they are no longer sensed.
  - 100% design airflow of the valve from when the Red Button is Pushed.
- Minimum Air Change Rate for Occupied Space will be set to highest value of the following inputs...
  - 4 Air Changes an Hour
  - Minimum ACH required to comply with CAL-OSHA and maintain 100 ft/min. face velocity at Fume Hoods
  - Minimum ACH required to meet cooling load in each zone
  - 100% design airflow of the valve from when Aircuity senses contaminants are sensed until they are no longer sensed.
  - 100% design airflow of the valve from when the Red Button is Pushed.
- If Aircuity were to fail it does so setting the minimum ACH to 6.

# Control Diagram

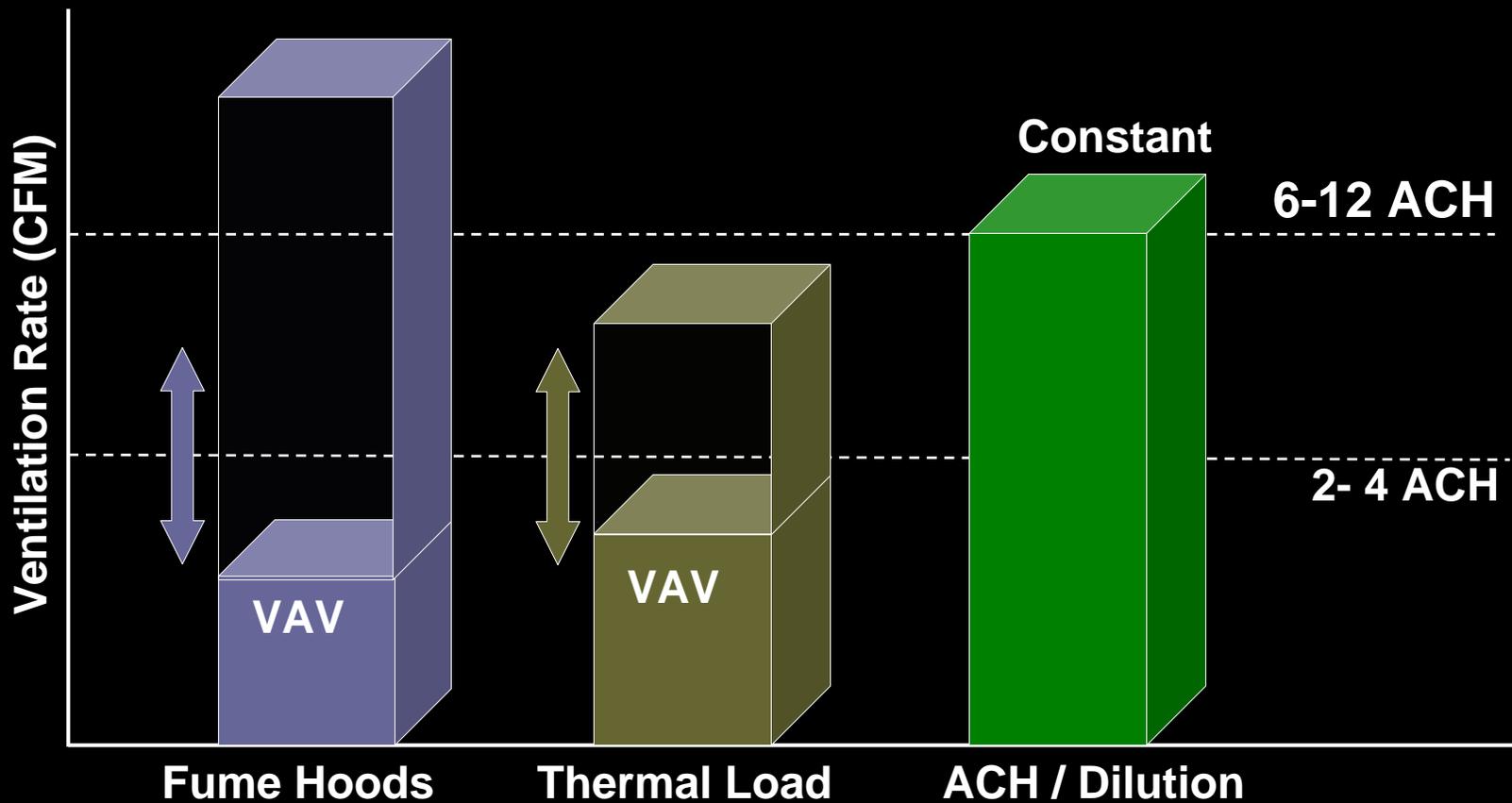
For Labs with Fume Hoods



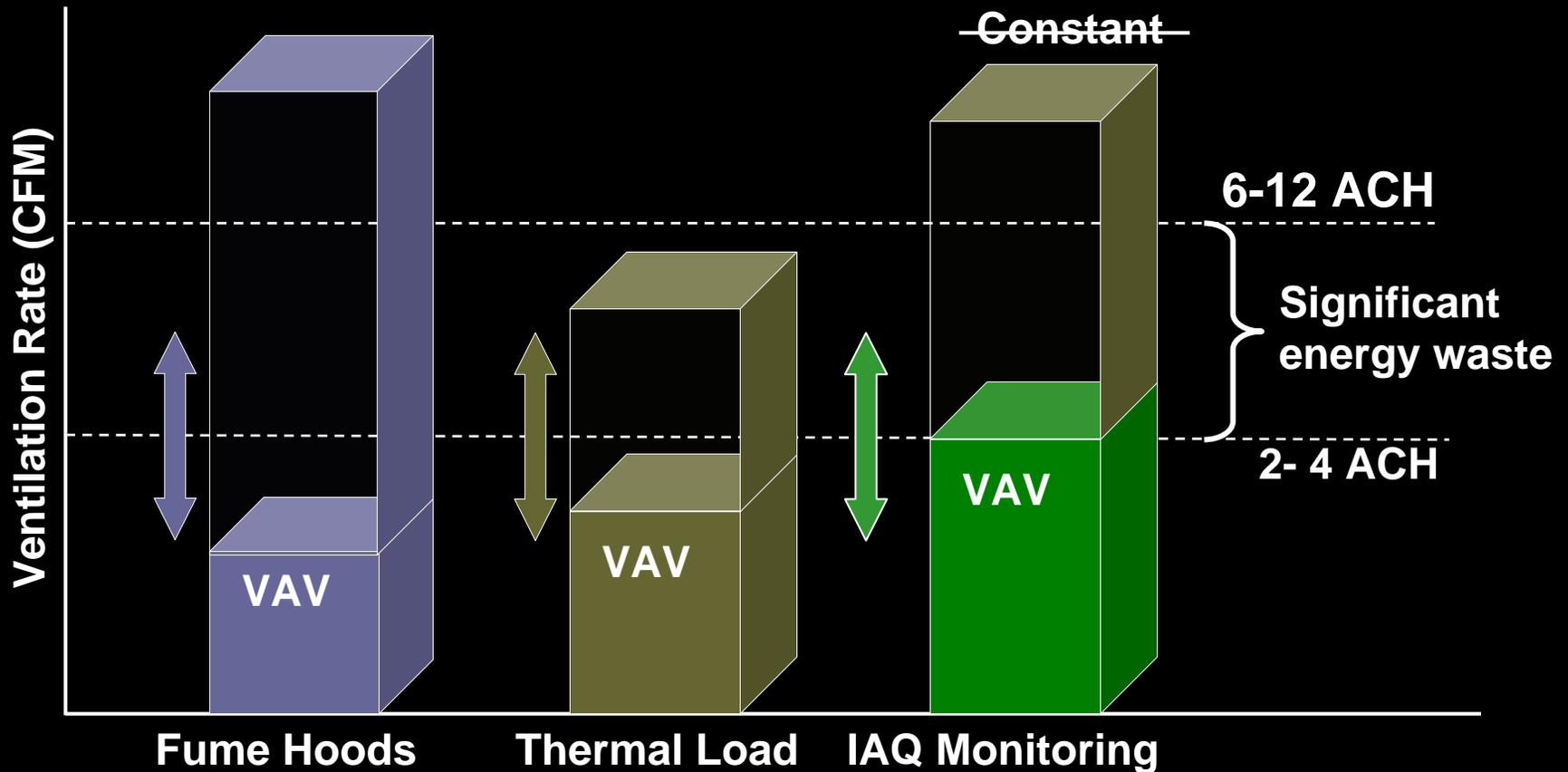
For Labs without Fume Hoods



# Operation Before Aircuity

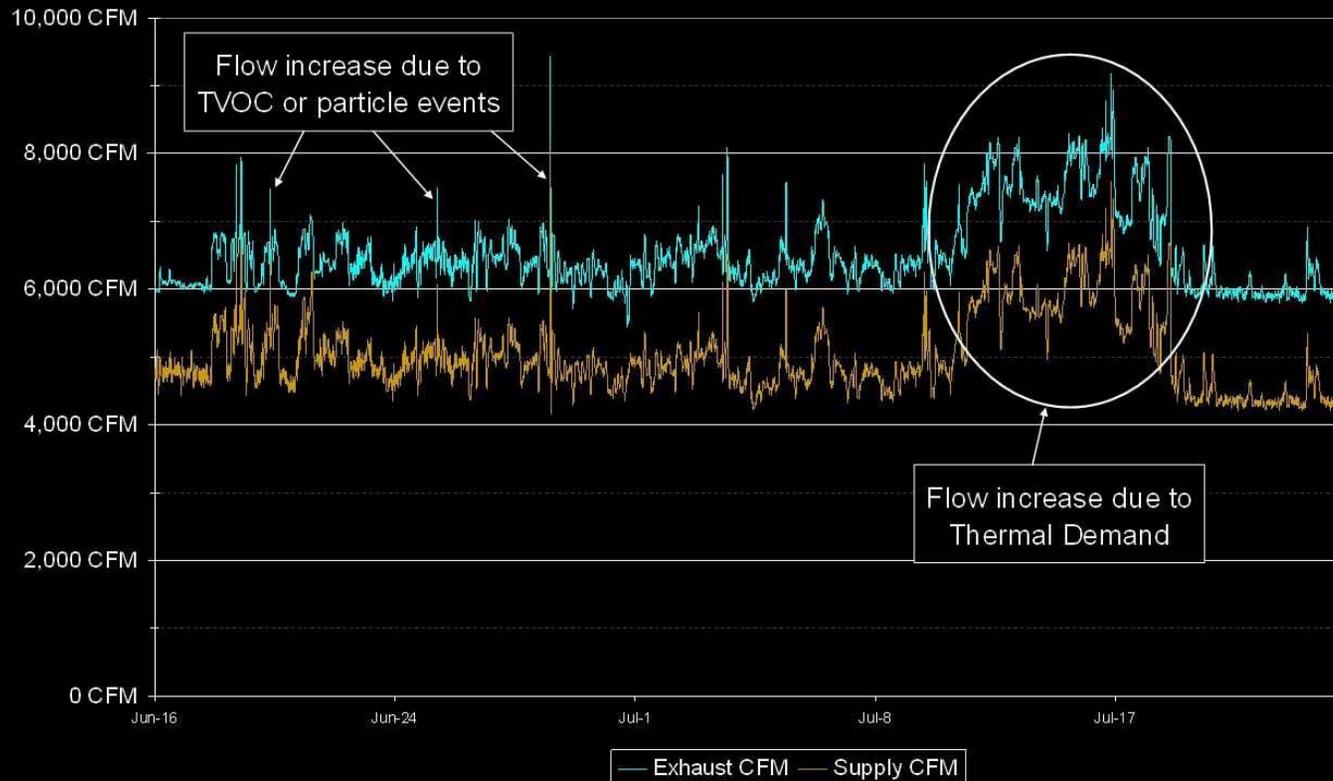


# Operation After Aircuity



# What Would an Event That Increases the Air Change Rate Look Like

ASU Biodesign B - Aircuity Pilot Program Results



# Advantages of Aircuity

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- Provides Continuous Monitoring of Indoor Air Quality (IAQ)
- Increases Air Change Rate when IAQ is outside norms.
- Provides record of IAQ
- Can be utilized to notify EH&S when IAQ is outside acceptable norms.
- Centralized Sensor Suite reduces maintenance cost and failures associated with calibrating sensors in a distributed sensor network.
- Replacement of sensor suite every 6 months allows for new technology to be implemented economically as it is developed.
- Occupant comfort may improve in labs that currently have excessively high ACH.

# Work Plan

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- Installation will take approximately 1 month.
- Building Manager will let you know the what days Installers will be in each Laboratory
- EH&S will be performing Bench Top Assessments of each zone
- Building Operations will not be changed Immediately
- The goal will be to set the Laboratories to 4 occupied and 2 unoccupied air changes
- Building Managers will inform you the week of system commissioning.

# Bench-Top Evaluations

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- Room by Room Assessment
- Record the use of highly toxic, confirmed human carcinogen or reproductive toxin use outside of fume hood
- Determine whether general ventilation reduction is appropriate in all areas
- Decision on whether to reduce GV will be based upon several factors such as hazard, frequency of use, etc.

# Case Studies

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- UCI - Gross Hall
- Arizona State – Biodesign-B
- California State, Monterey Bay – Chapman Science Academic Center

# How You Can Help

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- **Take advantage of other space**
- **Work with EH&S on bench-top assessments**
- **Let us know**
  - **No one wants lost research or equipment so please work to let us know so we can help meet your needs.**
- **If you see something out of the ordinary question it!**
  - **Contractors will be working in the Electrical Rooms and Laboratory Areas**
  - **UCI staff carry ID and trades support wear blue shirts with their trade and name on their shirt**

# Why are we doing this?

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- The University of California is a leader in the effort to combat global warming. UC has committed to reduce its greenhouse gas emissions to 2000 levels by 2014 and to 1990 levels by 2020, and to achieving carbon neutrality as soon as possible.
- UC is also a founding signatory of the [American College and University President's Climate Commitment](#), a broad effort by the nation's higher education institutions to address global warming by tracking, reporting, and reducing their greenhouse gas emissions and by accelerating research and educational efforts to equip society to re-stabilize the earth's climate.

# Working to meet our goal

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- 304,613 kWh
  - $304,613 \times .524 = 159,617$  lbs CO<sub>2</sub> per year
- 43,049 therms
  - $43,049 \times 13.446 = 578,836$  lbs CO<sub>2</sub> per year
- Total Savings of 738,454 lbs CO<sub>2</sub> per year
- Or 335 metric tons of CO<sub>2</sub>

- Emissions rate (natural gas): 13.446 lbs CO<sub>2</sub> per therm
- Emissions rate (electric): 0.524 lbs CO<sub>2</sub> per kWh

# UC Budget Crunch

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- 304,613 kWh
  - $304,613 \times \$0.075 = \$22,844$  per year
- 43,049 therms
  - $43,049 \times \$0.78 = \$33,578$  per year
- Total Savings of \$56,424 per year