

## Heating Group Mitigation Ideas

1. Adjust academic calendar
  - Later into May
  - Reduce each semester by two weeks. Less school days in winter. Could have educational/mental health benefits
  - Study abroad in summer could be affected by not matching other universities
  - Non-traditional schedule could help build school identity and make students feel involved with sustainability efforts. Could bring in new demographic of students
  - More tours/educational resources related to the steam plant
2. Passive solar utilizing south facing campus windows
  - Cleaning existing windows, removing obstructions
3. NexTerra gasification boiler
  - Organic wood waste used for powering boiler
4. Retrofitting old buildings (Edwin Duncan, IG Greer, others) with energy efficient windows, building materials, etc.
5. Variable refrigerant flow systems
  - Requires knowledgeable technicians
6. District heating and cooling
  - Potential replacement for steam as main heating mechanism
  - Inverter technology on compressors for each building
7. Clearly defined metrics for passive building standards
  - Benefits of more efficient technology vs. renewables?
8. Increase salary for more maintenance people
9. Different ways of calculating returns on investment (cost-benefit) for new building projects
  - Projecting long-term cost feasibility of passive buildings etc. beyond just 10 years
10. Investigating different carbon capture technologies
11. Allowing dorm heating to be turned off by residents
  - Cap on maximum temperature
  - Heat is currently running high with no optional control (Summit, others?)
  - Sun hits and warms the south side of the building, heat continues to run high
  - Stadium lights on 24/7
  - Issues with differences in thermal comfort
  - Discussions around tailoring a possible lower temperature in dorm rooms
  - Campus/state policies may restrict the allowable temperature control
  - Room comfort issues have to go through RA's and then work order, may need a more efficient system
12. Radiators in IG Greer outdated, running high with windows open (Which have to be open to avoid overheating room)

13. Diesel used for some backup generators (propane as well), possibility of switching to biodiesel
  - Issues with storage to address
  - Transportation issues with biomass, may require separate boiler system
  - Electric boilers
    - Carbon impact depends on source of electricity
14. Super-sized pipe system
  - UNC example with regional utility plants
15. Heat recovery in individual buildings to preheat the air that will travel to others
  - Heat recovery wheels
  - Could this be done with ventilation?
  - Air circulation systems to move air from sunny side (preheated) to shaded side
  - This is already done but not from building to building, would require infrastructure and technology updates
  - Variable air Volume (VAV) systems can heat/cool individual spaces within a building
    - College of Education as an example building for this system
    - Economizes to free cooling
16. Large volume of water used for cooling
  - Maximum in august/september
17. Air cooled air source heat pump technology (closed loop air to water heat pumps)
  - Option for high efficiency on all-electric system that could also save water
  - Older buildings have small mechanical rooms that may not fit modernized equipment. Large maintenance costs, part ordering issues, system downtime
  - Asbestos must be purged when retrofitting old buildings
18. Recovering heat from human waste/sewage system
19. Building into Earth to regulate temperature and rely less on outside systems
  - Think EarthShip houses
  - Fresh air brought in from outside
20. Maintaining consistent temperature can avoid bringing in outside air, but CO2 builds over time