



# Campus on a Carbon Diet:

## Sustainability Efforts at Colorado State

There are no passengers on Spaceship Earth.  
We are all crew.

Marshall McLuhan - 1965



# Commitments & Accomplishments

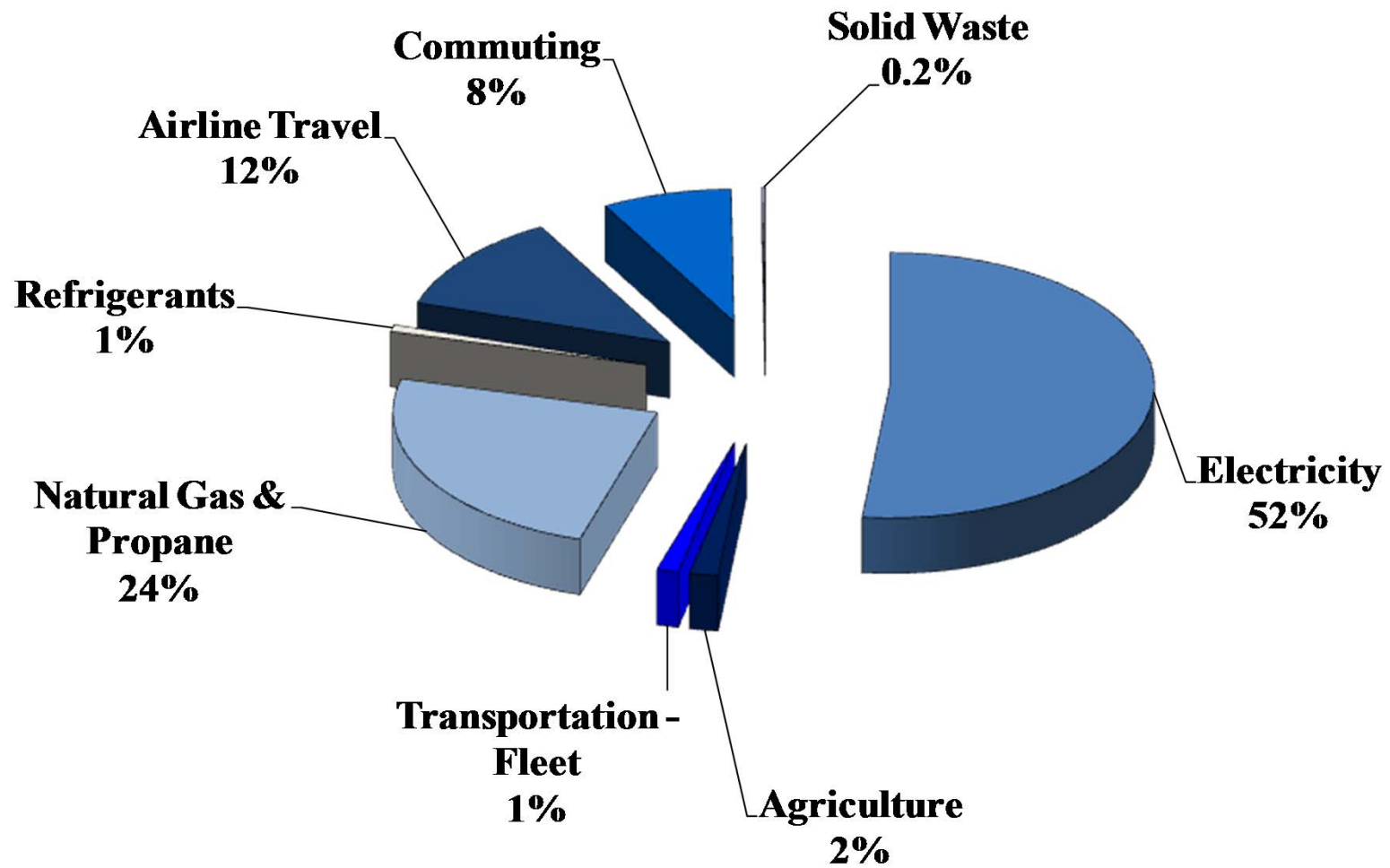


- Sustainability Tracking, Assessment & Rating System (STARS) - Gold
- American College and University Presidents Climate Commitment (ACUPCC)
  - Signed June 2008
  - Comprehensive GHG inventories each year
  - Climate Action Plan September 2010
- Mandatory GHG reporting to EPA began January 2010

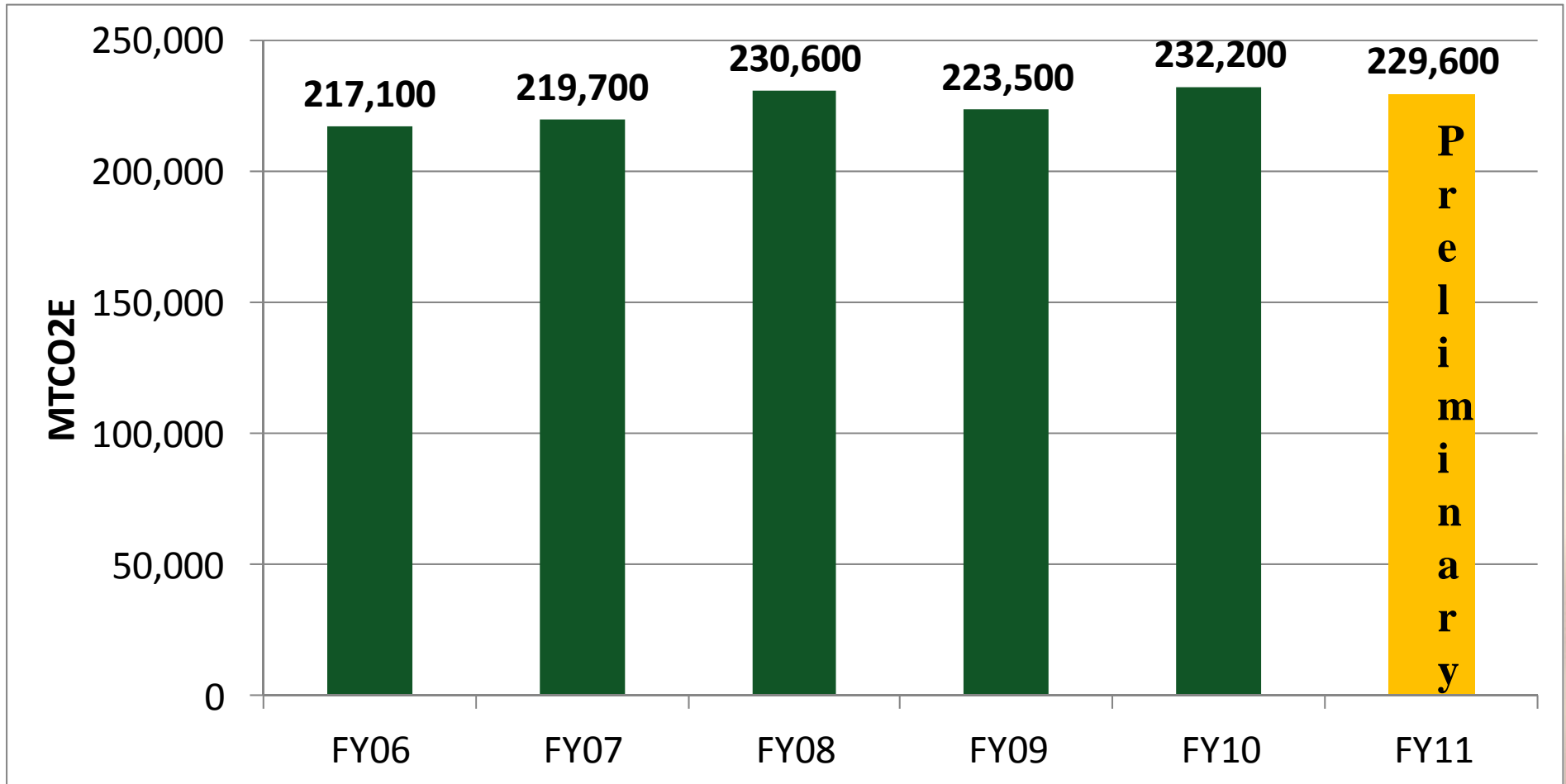




# GHG Footprint – FY11



# GHG Footprint Trends



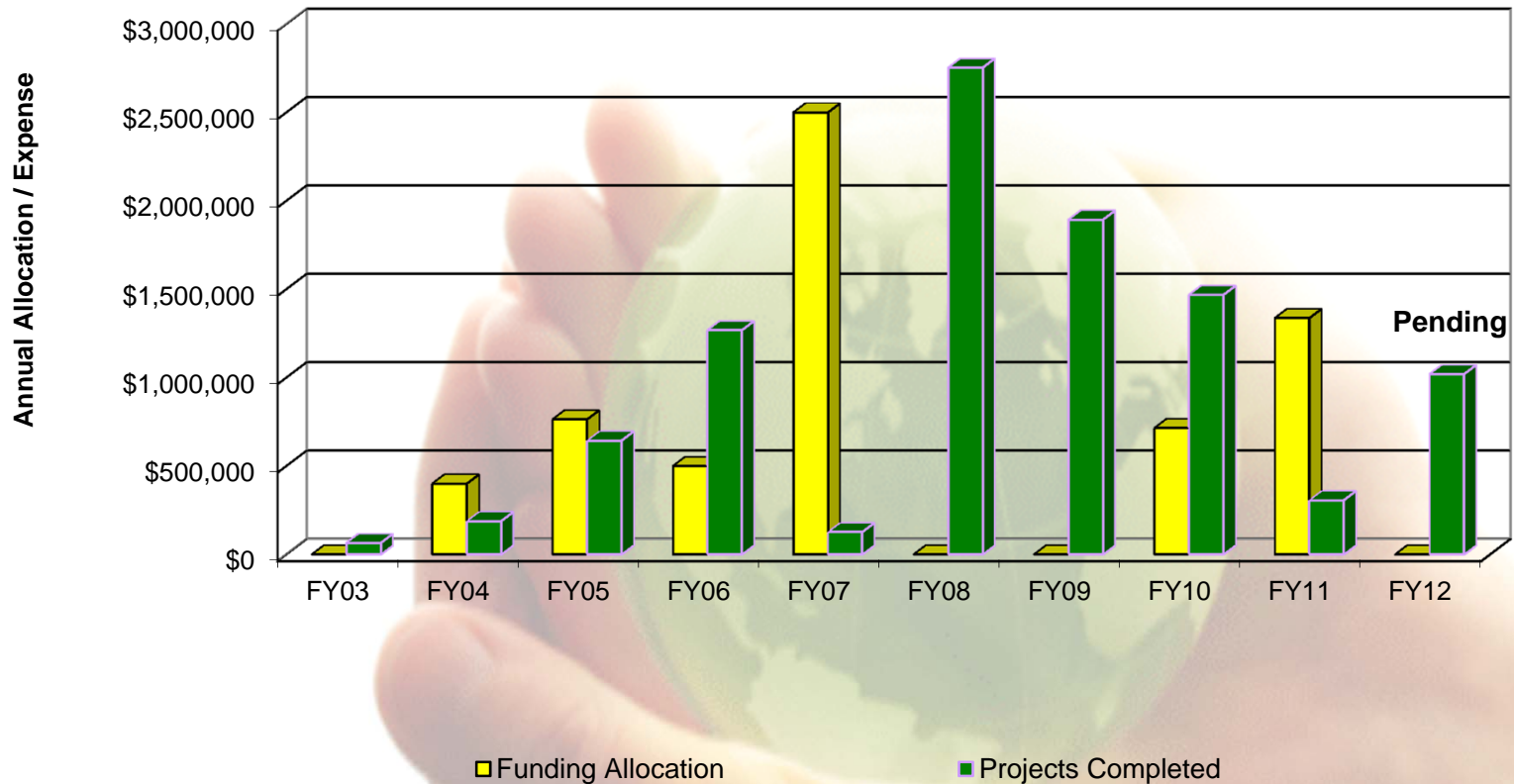


# Efficiency & Conservation



# Energy Fund Allocations & Spending

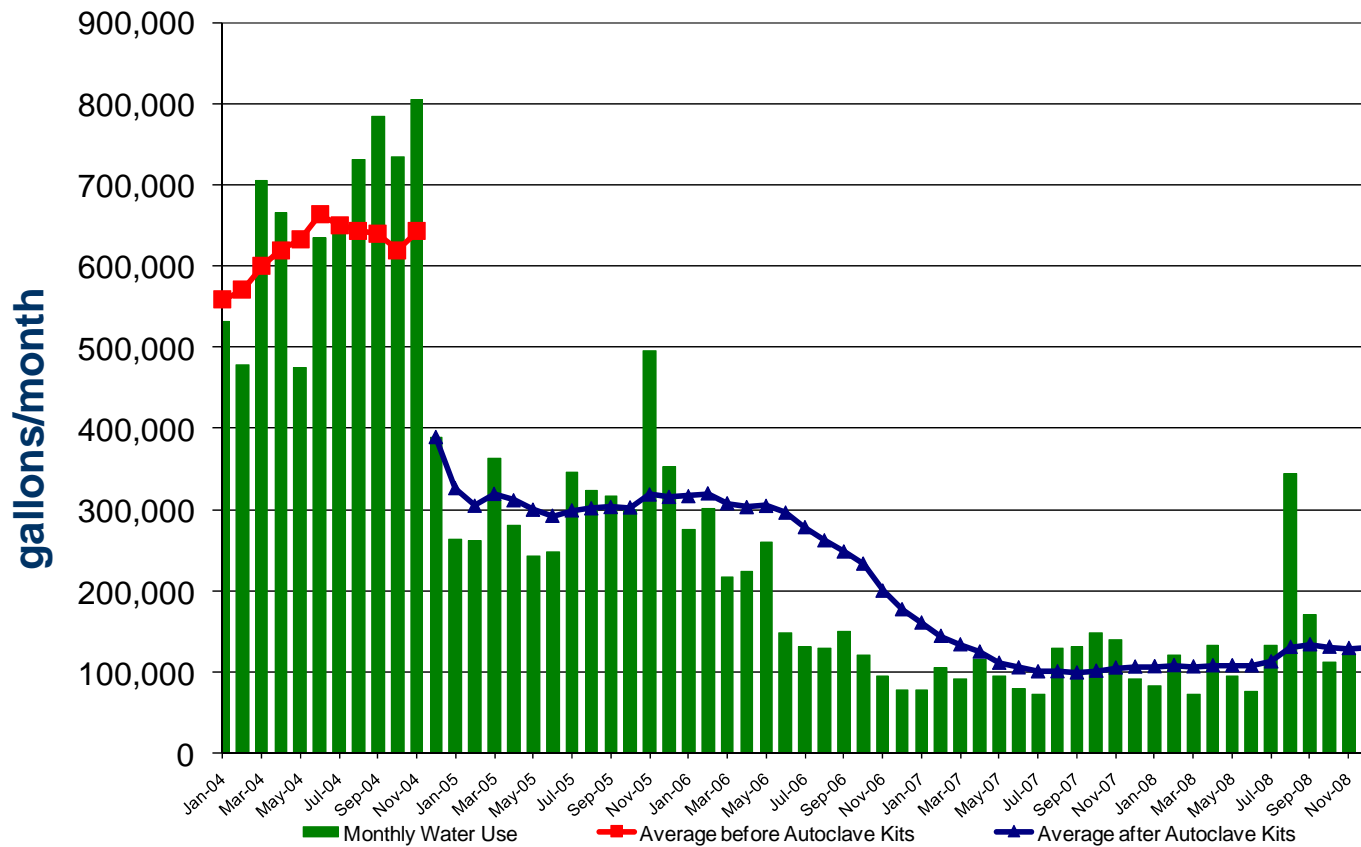
Long History of funding energy & water efficiency projects. Average allocation >\$500,000/yr since FY04



# Water Conservation



Microbiology Water Use  
Effect of 9 Autoclave Retrofits



42 Autoclaves retrofit kits installed across campus are saving the university 15 million gallons of water/yr



# Energy & Water Conservation: Behavioral Engagement Campaigns



## Joint Efforts with Housing & Dining, Facilities

- Green Warrior Campaign
  - Student focused campaign launched in 2010
  - Self reporting of conservation strategies can earn incentives
  - 250 Participants in inaugural year
- Green is Gold
  - Focused on Faculty & Staff
  - 50 teams registered
- Pilot Program
  - Pilot underway for more focused effort in TILT Building





# Green Buildings

## LEED Buildings

- ❖ Guggenheim Classrooms – CI Silver
- ❖ Transit Center – GOLD
- ❖ Aspen Hall – GOLD
- ❖ Academic Training Center – GOLD
- ❖ Rockwell West – GOLD
- ❖ Human Performance Clinical Research Lab – GOLD
- ❖ Indoor Practice Field - GOLD
- ❖ CSFS Office – Certified
- ❖ Research Innovation Center – GOLD
- ❖ Behavioral Science - GOLD

## Certification Pending (anticipating GOLD)

- ❖ Student Recreation Center
- ❖ Lake Street Parking Garage



# Student Recreation Center



Student Recreation Center  
931 Meridian Avenue

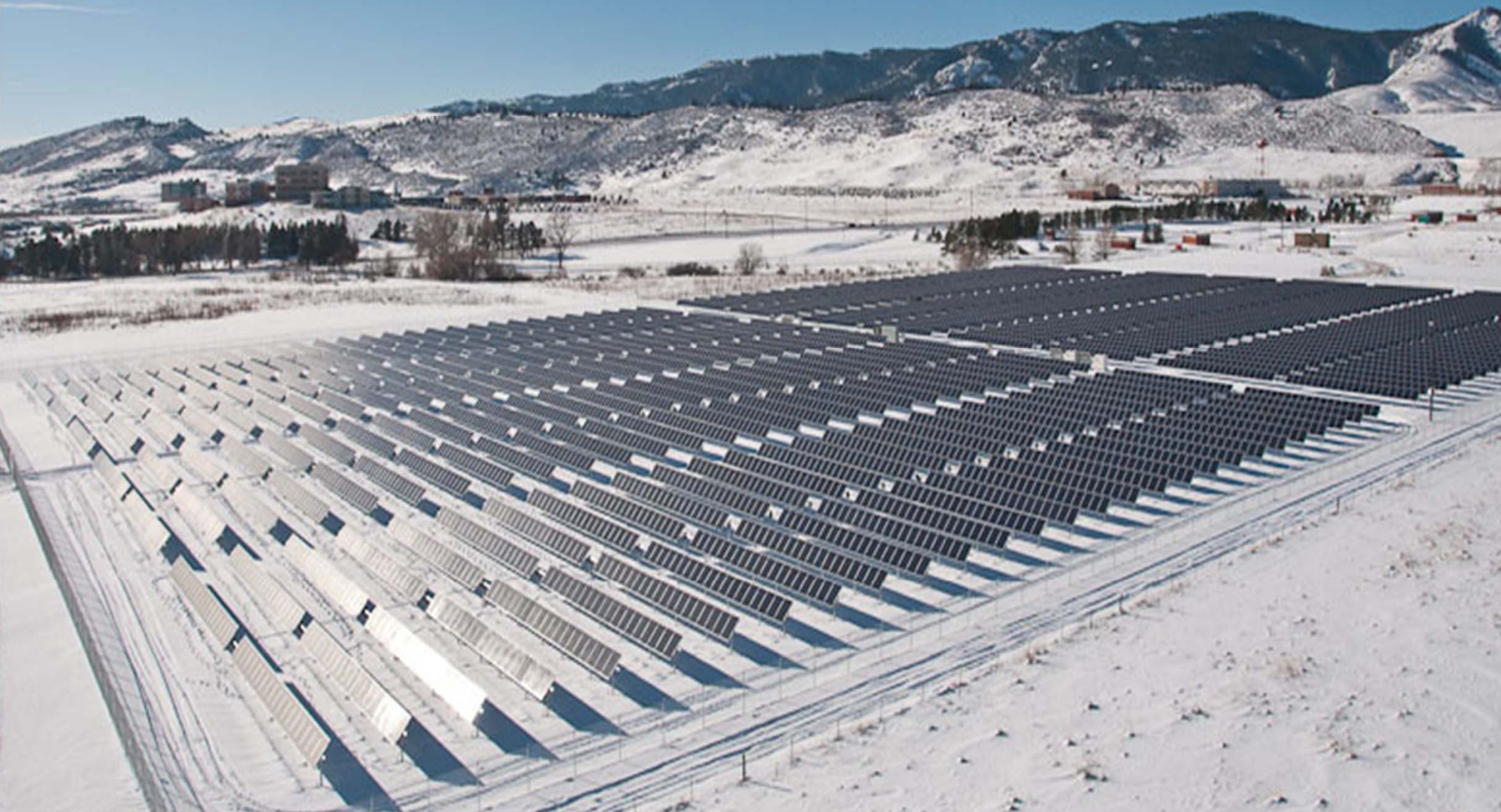



# Renewable Applications



# Photovoltaic Projects

Phase I - 2,000 kW  
Plant at Chrisman  
Field



An aerial photograph of a vast solar farm. The foreground and middle ground are filled with a dense grid of dark blue solar panels, each mounted on a silver metal frame. The panels are arranged in long, parallel rows that stretch towards the horizon. In the lower-left quadrant, a person wearing a red jacket and a white hard hat stands on the solar panels, providing a sense of scale. The background shows a dry, hilly landscape with sparse vegetation and a few buildings under a clear sky.

**The addition of Phase Two increases the site 5,300 kW and makes it one of the largest solar plant on a US university campus**



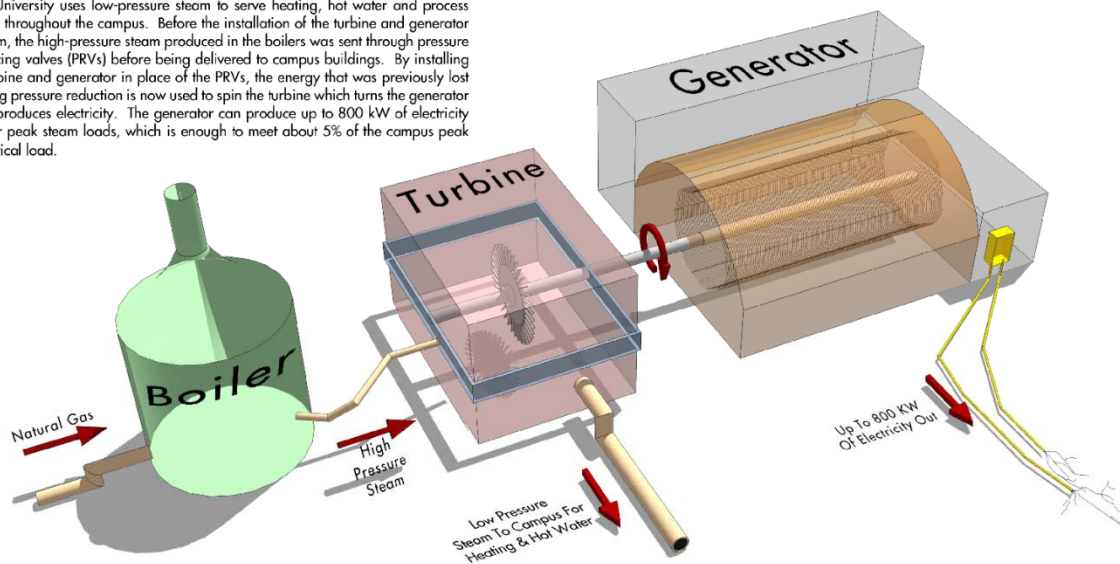
# Biomass Boiler



- ❖ Partnership with the Colorado State Forest Service
- ❖ Produces hot water for building heat at Foothills Campus
- ❖ 96% fewer overall emissions than natural forest fires
- ❖ 97% fewer emissions than prescribed burning.
- ❖ Very low net carbon emissions
- ❖ Small – 46 bhp, but future phases envisioned

## Process

The University uses low-pressure steam to serve heating, hot water and process loads throughout the campus. Before the installation of the turbine and generator system, the high-pressure steam produced in the boilers was sent through pressure reducing valves (PRVs) before being delivered to campus buildings. By installing a turbine and generator in place of the PRVs, the energy that was previously lost during pressure reduction is now used to spin the turbine which turns the generator and produces electricity. The generator can produce up to 800 kW of electricity under peak steam loads, which is enough to meet about 5% of the campus peak electrical load.

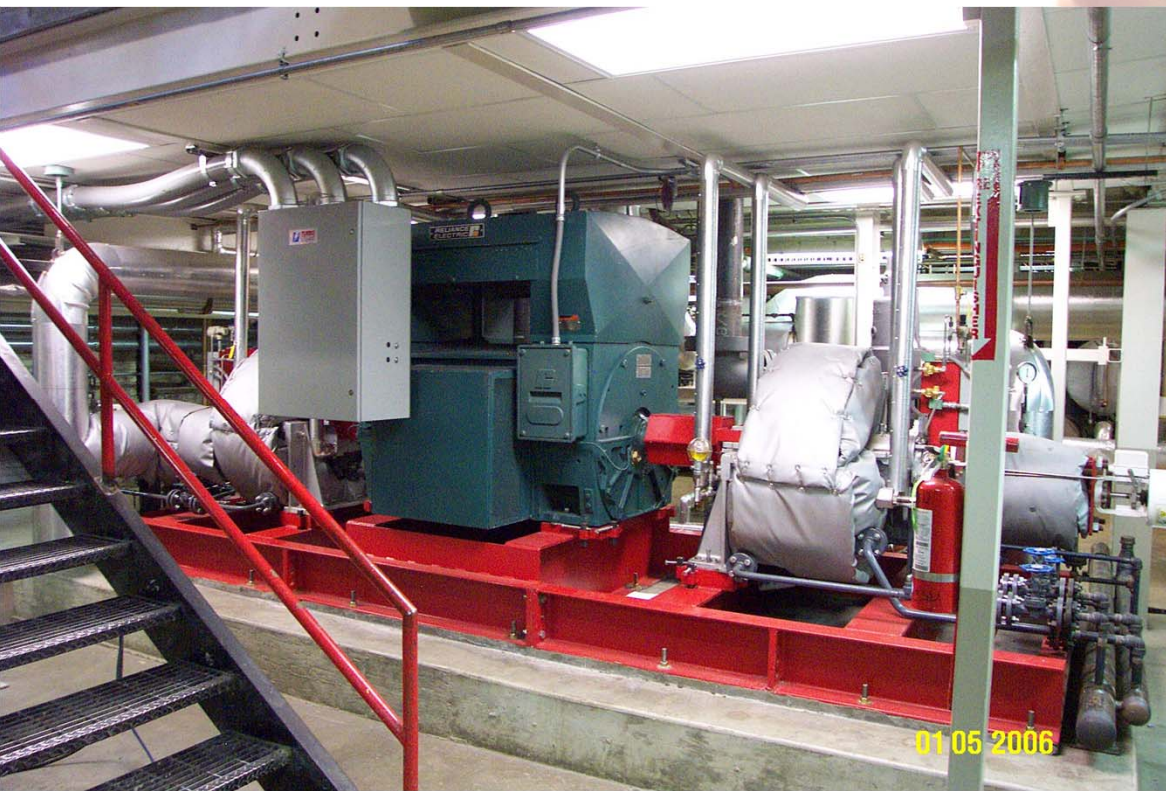


# District Energy Plant Steam Turbine

Steam Turbine Generator At The District Heating Plant

Colorado State University

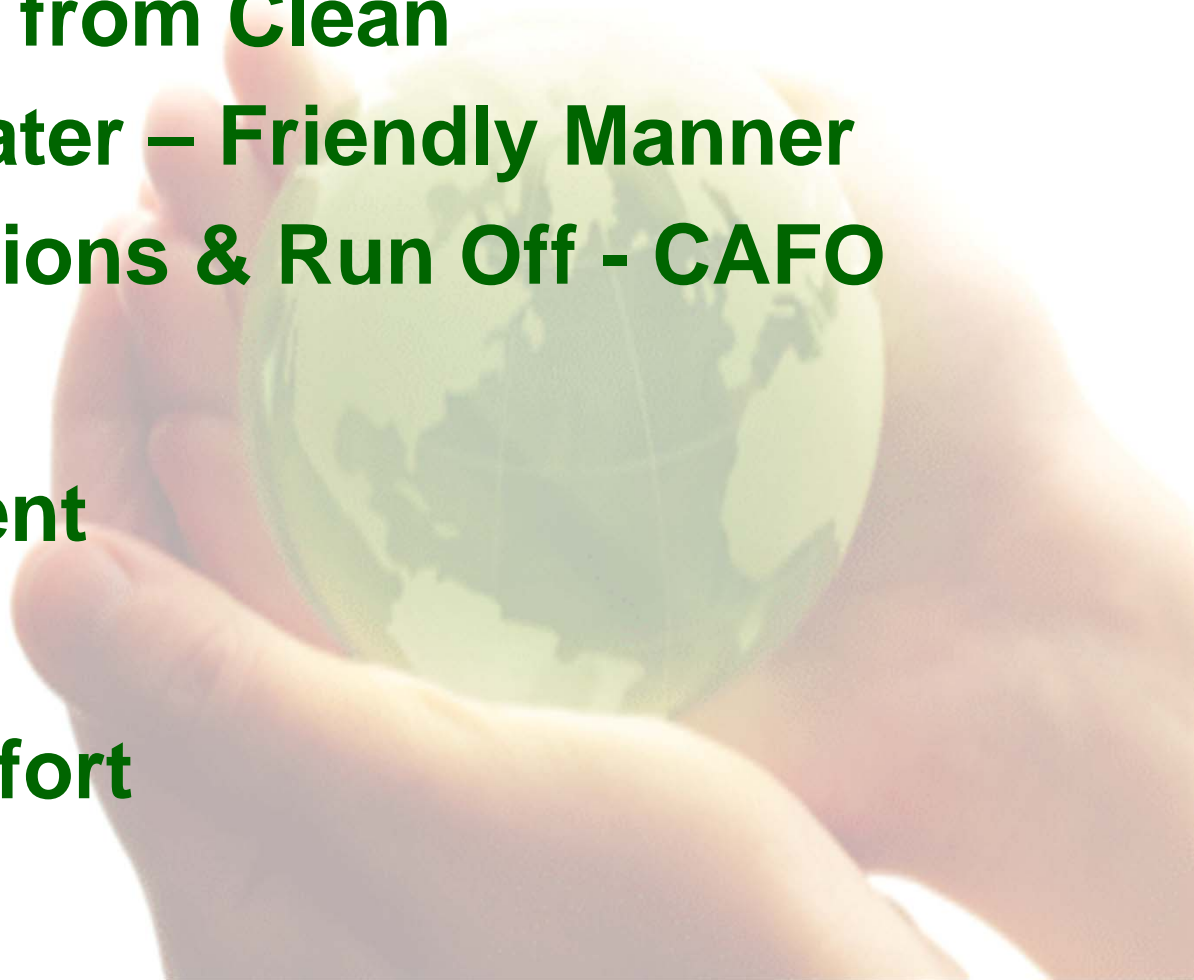
2005 Partial Funding Provided By City of Fort Collins Utilities



- Peak Rating 800 kW
- Annual Output 3,200,000 kWh/yr
- Total cost savings since installation \$850,000

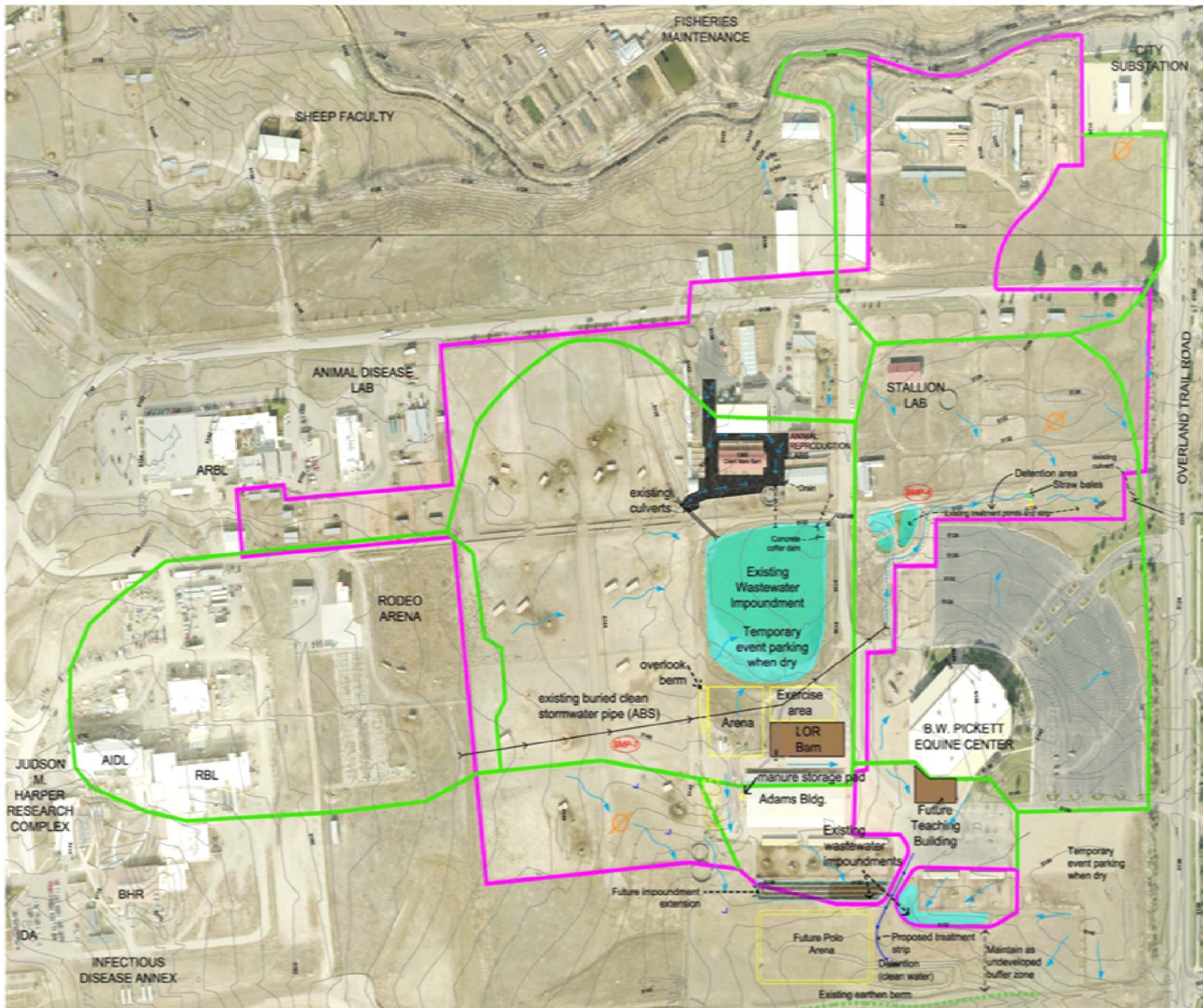
# Ag Efforts

- **Storm Water Concepts**
  - Separate Dirty from Clean
  - Clean Dirty Water – Friendly Manner
  - Equine Operations & Run Off - CAFO
- **Mount Manure**
  - Soil Amendment
- **Composting**
  - Community Effort





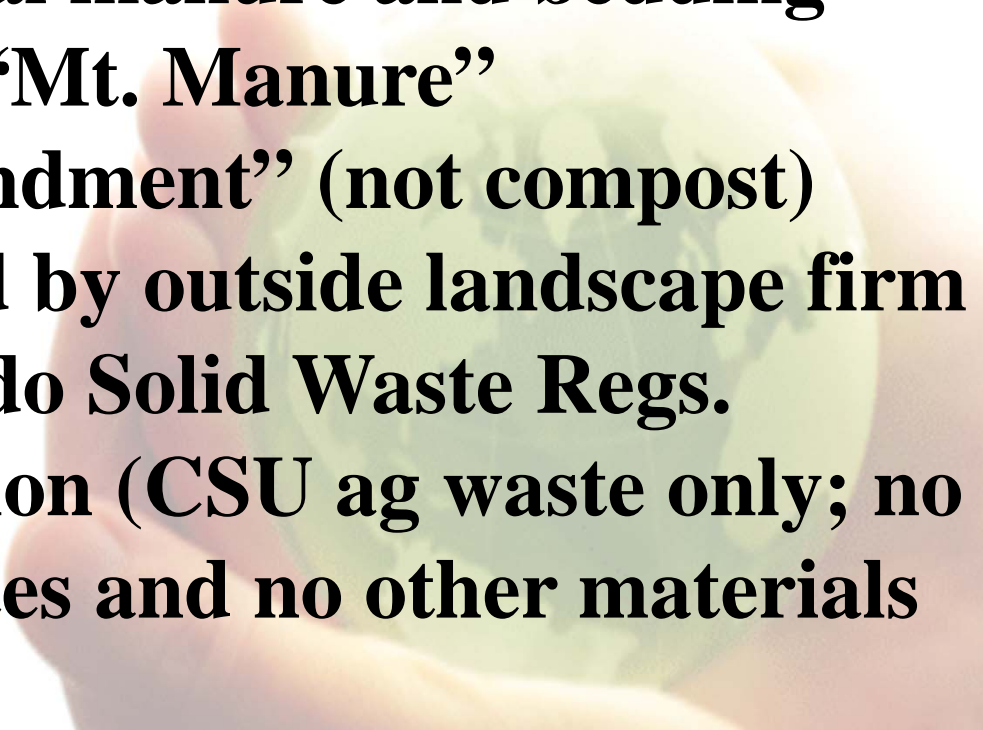




- LEGEND:**
- Production Area
  - Drainage Basins
  - No Detection, No BMPs (existing Condition)
  - Surface Water Flow Direction
  - Ponds

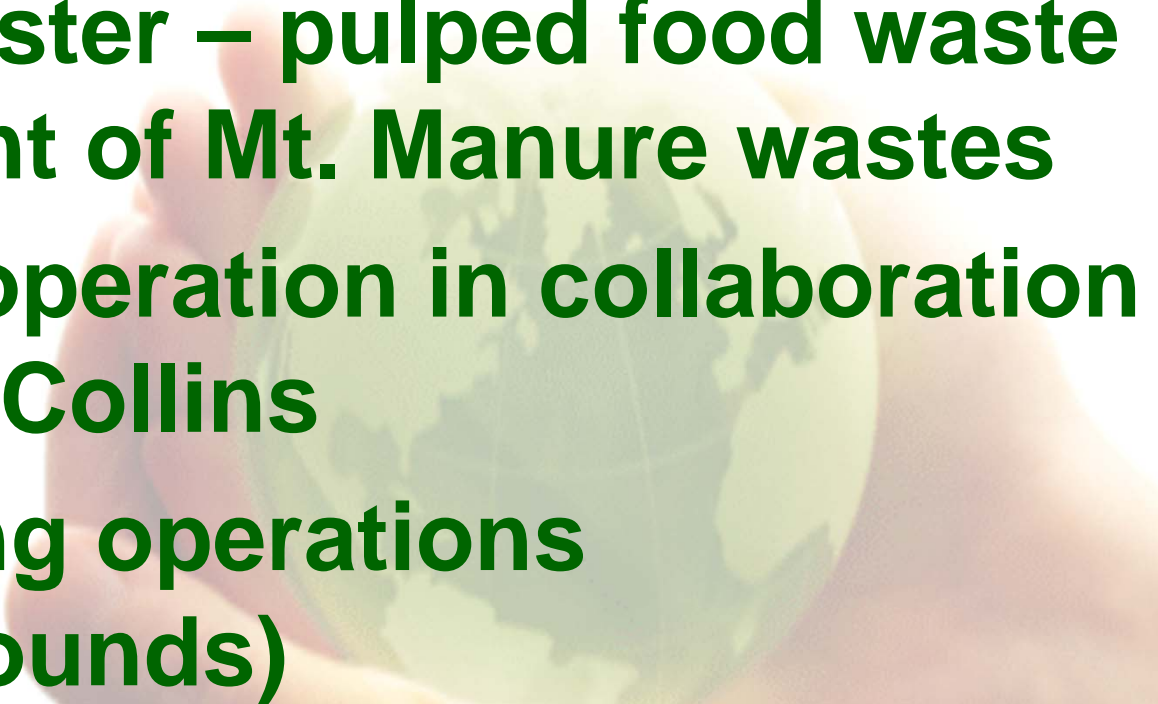


# **Manure Management Foothills Campus**

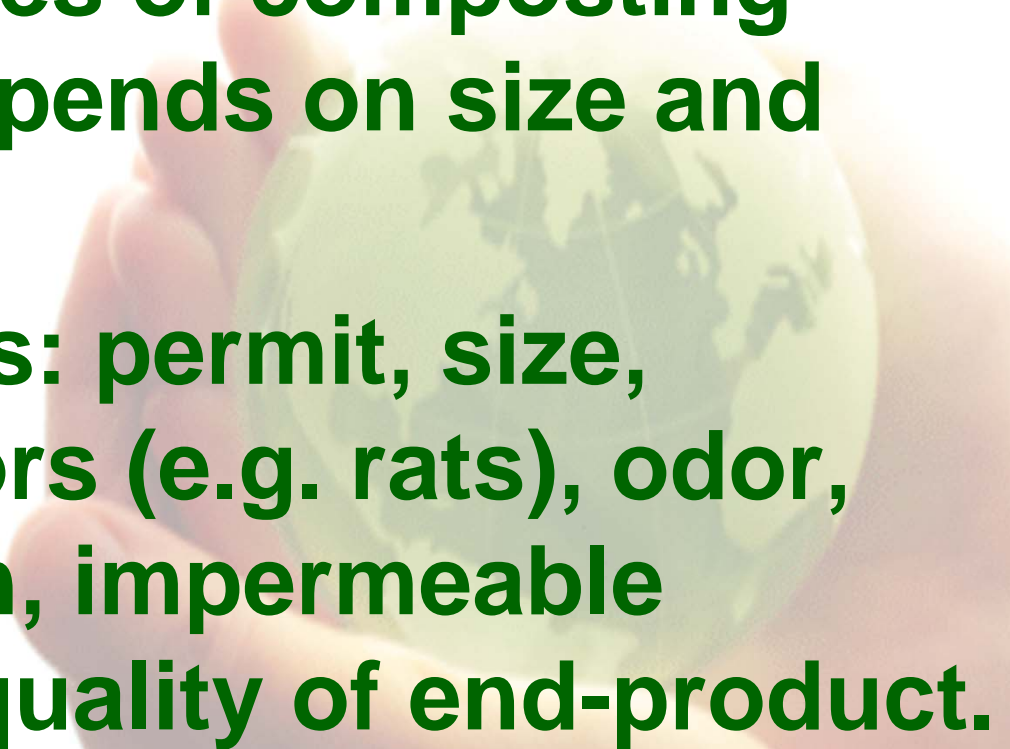
- **900 CY/month animal manure and bedding**
  - **Piled and turned at “Mt. Manure”**
  - **Generates “soil amendment” (not compost)**
  - **Managed and hauled by outside landscape firm**
  - **Regulations: Colorado Solid Waste Regs.**
  - **Agricultural exemption (CSU ag waste only; no infectious animal wastes and no other materials introduced).**
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# Composting Activities

- **In-vessel composter – pulped food waste and small amount of Mt. Manure wastes**
  - **Possible future operation in collaboration with City of Fort Collins**
  - **Small composting operations (greenhouse, grounds)**
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# Composting Regulations

- **Different classes of composting operations, depends on size and feedstocks**
  - **Considerations: permit, size, security, vectors (e.g. rats), odor, water pollution, impermeable working pad, quality of end-product.**
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# CSU Bioremediation Wetland University Greenhouse

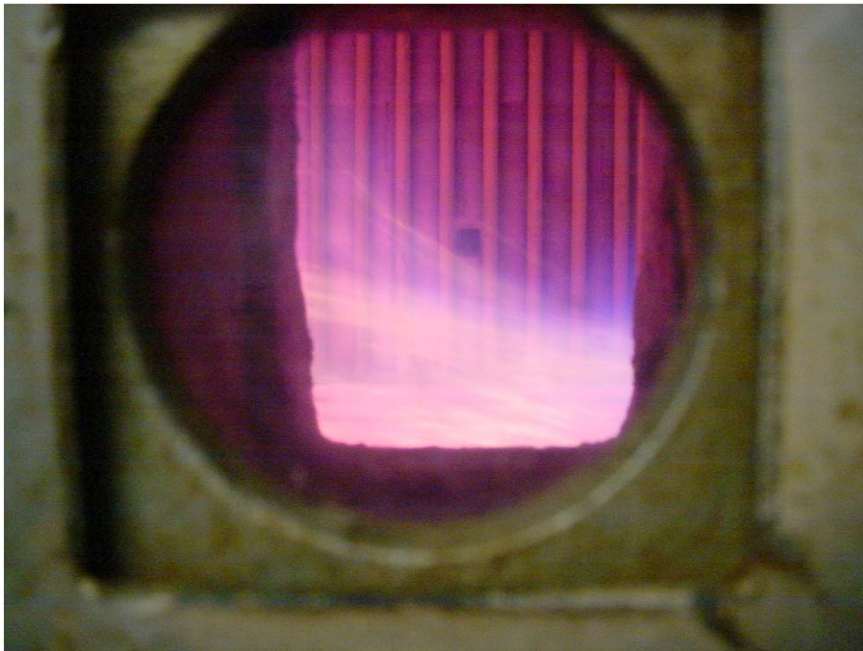






# Other Projects Being Studied

- Landfill Methane
- Solar Thermal for Pools or Residence Halls
- Larger Biomass
- Waste to Energy
- Wind Power



**To learn more about these projects  
and many more visit the Colorado  
State Sustainability Websites at  
[www.fm.colostate.edu/sustain](http://www.fm.colostate.edu/sustain)**

**or**

**[www.green.colostate.edu](http://www.green.colostate.edu)**



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