



# Managing carbon with hybrid energy systems

## The Morris Model

**A green campus:**  
high energy, low consumption.

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# Morris: Carbon Neutral by 2010

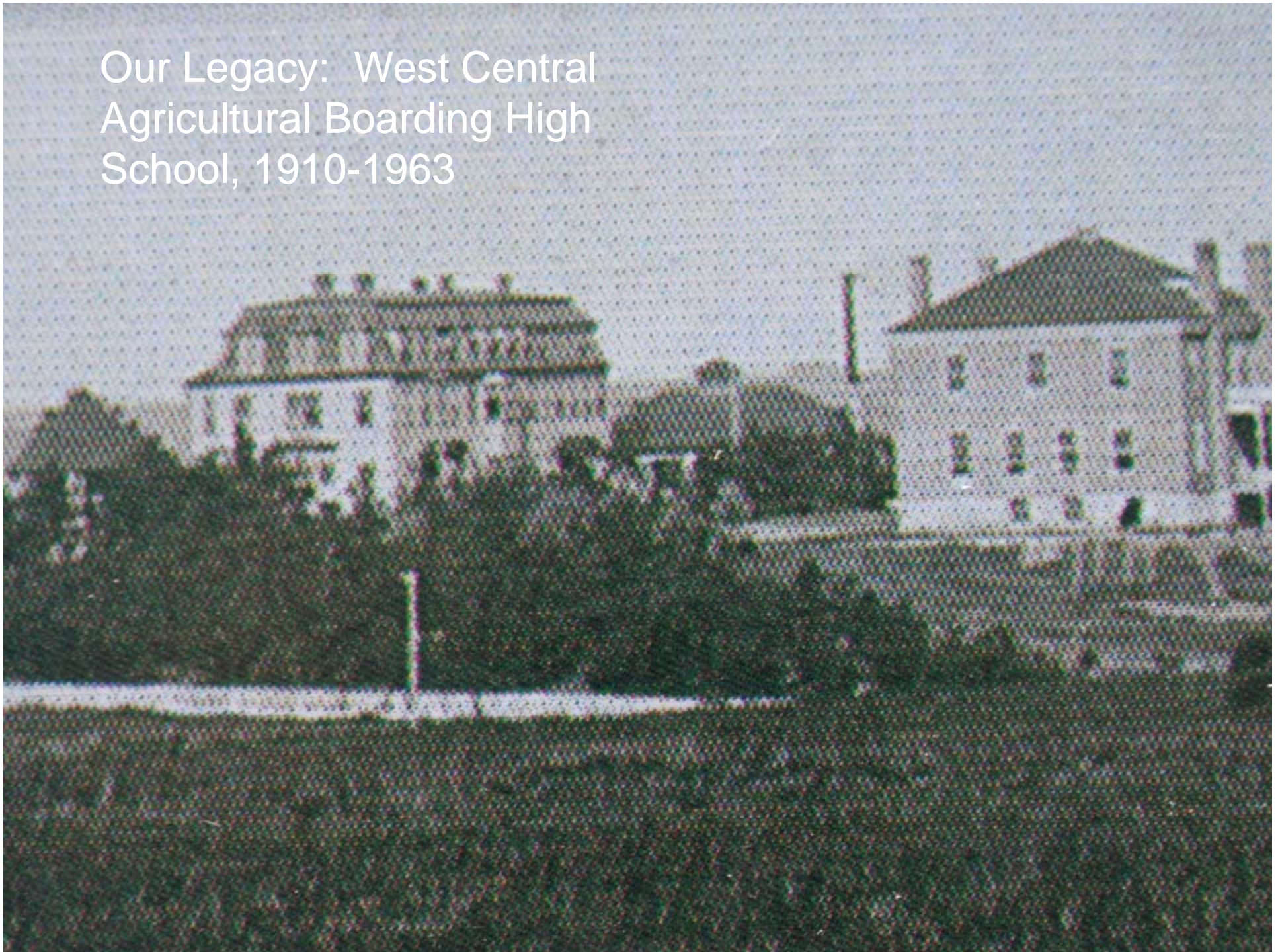
By 2010, Morris will have reduced green house gas emissions through:

- On-site generation of electrical and thermal needs
- Use of renewable, sustainable local resources
- Use of wind and gasification of local biomass products
- Use of existing technology in new, integrated ways

Our legacy: American  
Indian Industrial Boarding  
School, 1887-1909



Our Legacy: West Central  
Agricultural Boarding High  
School, 1910-1963





# Morris, today: University of Minnesota, Morris

- Rural, residential undergraduate focused
- 1700 students in small-town West Central Minnesota
- **Public** liberal arts (one of two dozen nation-wide)
- Part of University of Minnesota five campus system
- Emphasis on global citizenship, civic engagement, and environmental stewardship



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## Morris Today: Wind

- 1.65 MW Vestas V-82
- Produces 5.45 mil kWh/yr
- First large-scale research turbine on a public campus in US
- Provides energy for more than half of campus buildings
- Two more turbines anticipated
- US DOE & EPA Green Power Leadership Award, 2005

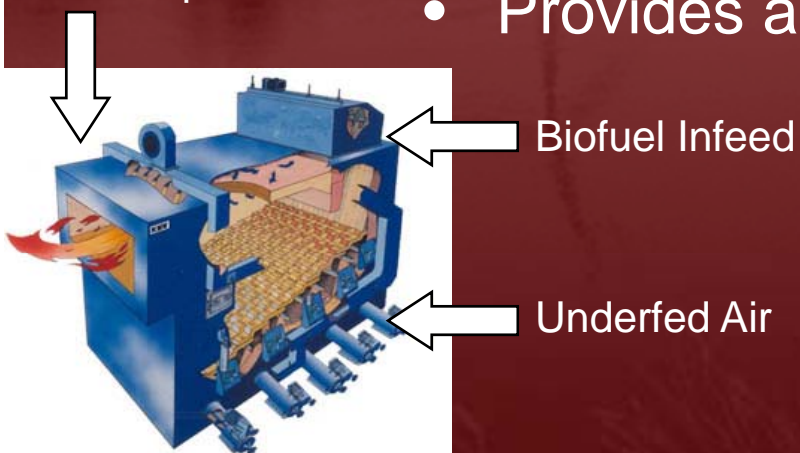




## Morris Today: Biomass/Gasification Plant

- Burns 8000 tons of biomass/year
- At \$50/ton adds \$400,000 to local economy/year
- Avoids 8,000 tons of CO2 discharges
- RGGI carbon markets as high as \$8/ton CO2.  
\$64,000
- Provides approx. 80% of campus heating needs

Producer  
Gas Output



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# Morris Today: Carbon Management

- Onsite renewable distributed dispatchable energy generation.
- Integrated combined heat and power plant
- District heating and cooling
- Hybrid energy platforms



# Morris Today: Drivers of Change

- Sustainable ecosystems
- Volatile fossil fuel markets
- Energy security
- Economic security
- Carbon cap and trade

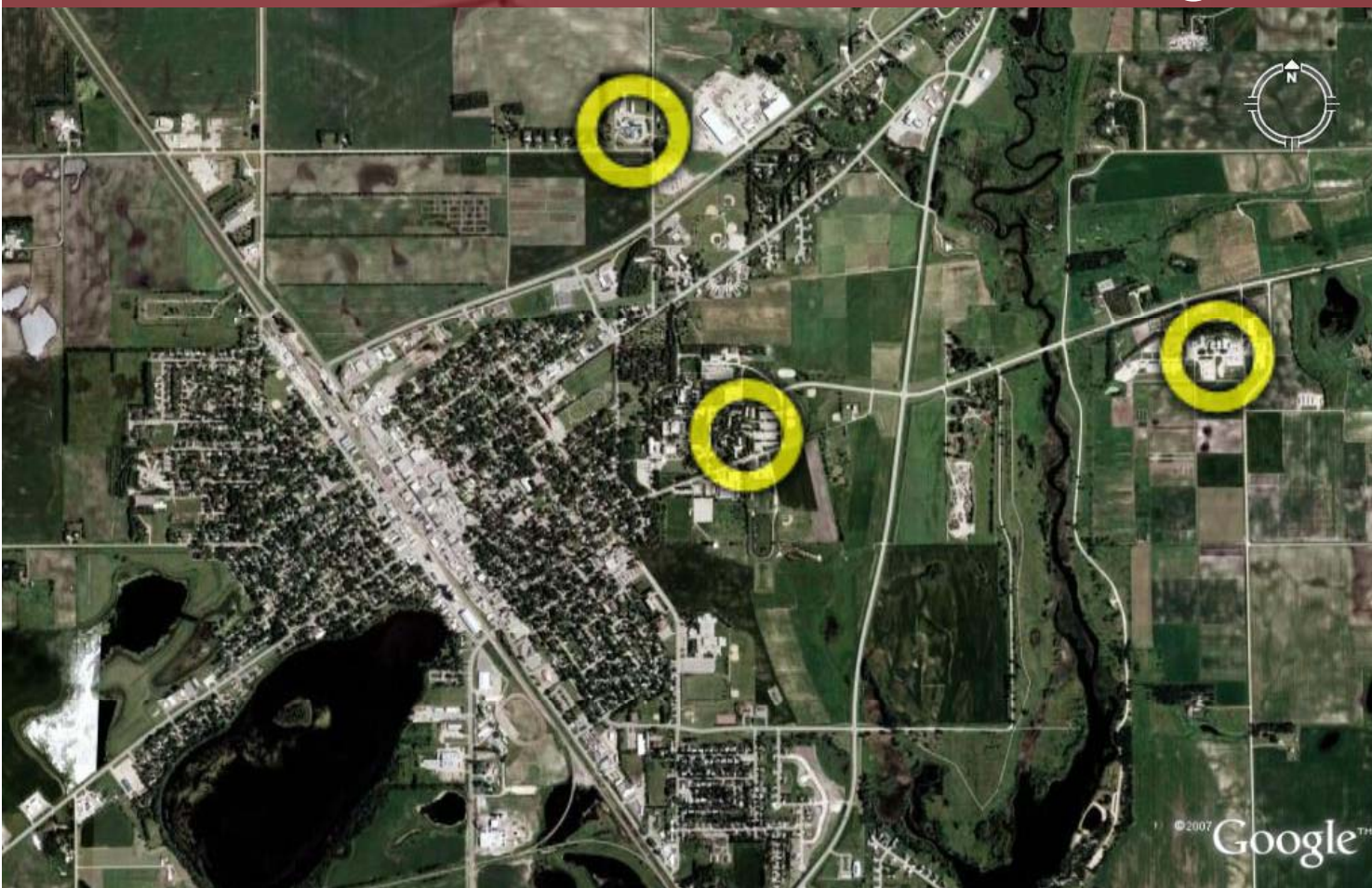


## Why Morris? Why Now?

- Partnerships: public and private
  - USDA ARS research in soils, alternative fuel stocks, and carbon sequestration
  - U of MN Outreach Center agricultural production and hybrid wind to ammonia production
  - U of MN Morris thermal gasification of biofuels and environmental studies.



# The Green Prairie Alliance: Bio-mass/Bio-energy Research Triangle

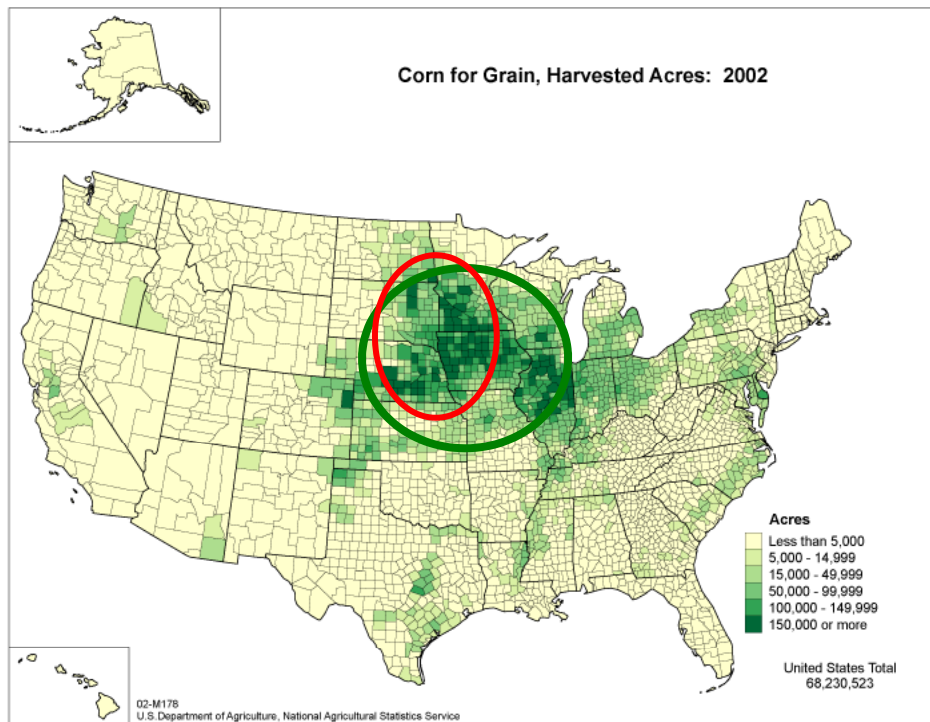


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# Strategic Resources



Soil, Moisture, &  
Sun

Excellent Wind  
Resource

&

20,000MW

Stranded Wind

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# Why Morris: Vision for the Future

- Distributed Renewable Generation
  - Rethinking energy distribution
  - Using RE to manage carbon
  - Creating local bioenergy ecosystems
  - Creating sustainable communities
  - Value added biofuels products



## Why Morris: National Leadership

- Designing first wind to hydrogen production
- First research turbine at public university
- One of the first ag fuel gasification platforms
- One of the first hybrid renewable energy platforms
- Prototype of future distributed renewable dispatchable community based energy systems.



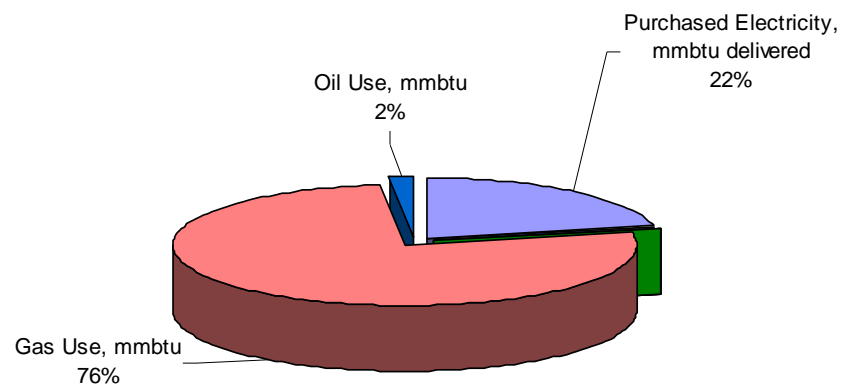
## Morris: Today's Technology, Tomorrow's Promise

- The following slides represent what Morris is doing today with today's technology.
- The Morris campus is 1 million square feet.
- Carbon neutral, 2010; carbon negative, 2011.



# Carbon Footprint 2004 12,000 tons

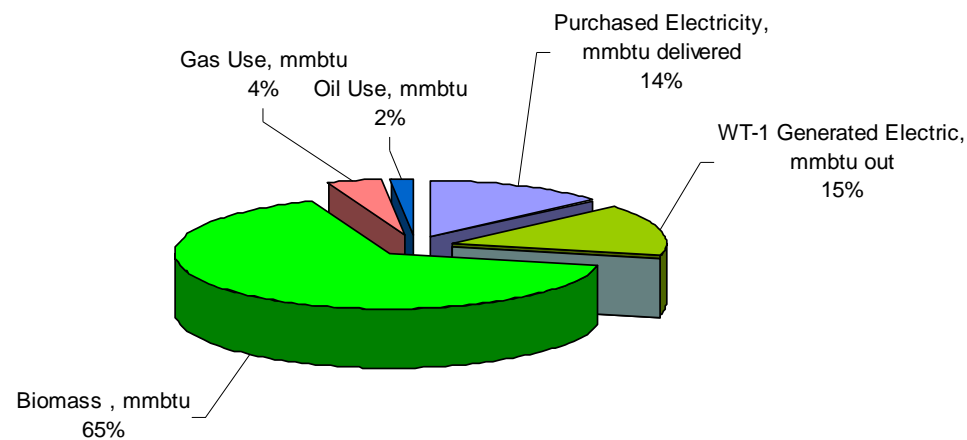
2004 UM Morris Campus Energy Source Breakdown





# Carbon Foot Print 2008 4,000 tons

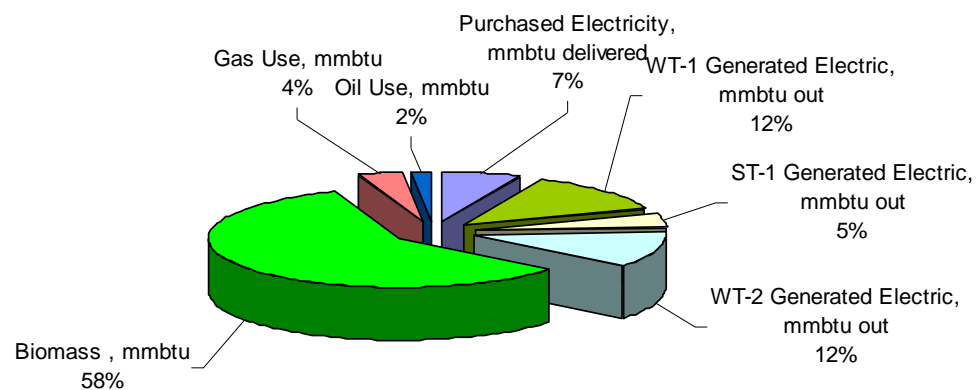
2008 UM Morris Campus Energy Source Breakdown





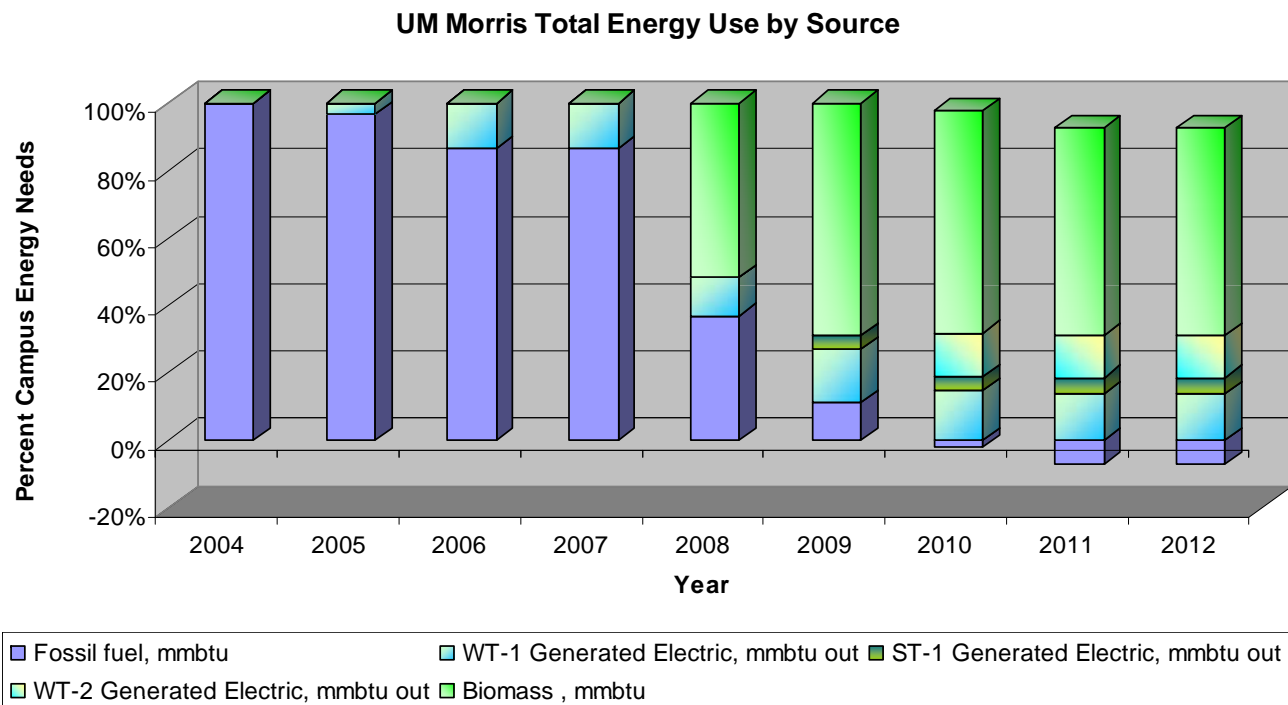
# Carbon Foot Print 2010 Less than 2,000 tons

2010 UM Morris Campus Energy Source Breakdown



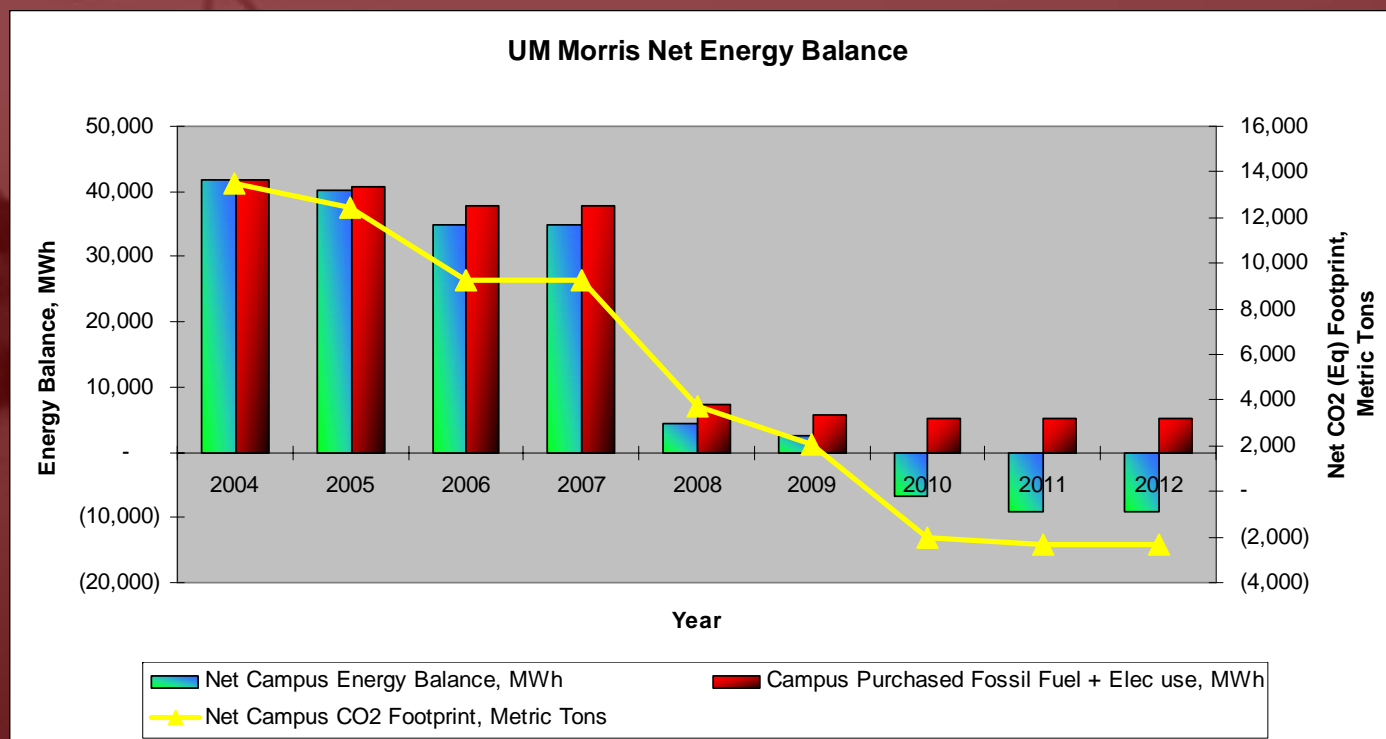


# Energy transformation





# Carbon negative





# University of Minnesota, Morris

- Green Prairie Alliance
  - West Central Research and Outreach Center
  - Agricultural Research Station
  - University of Minnesota, Morris
- Public and private partners.
- June 3 & 4 symposium – Sustainable Communities

A green campus:  
high energy, low consumption.

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