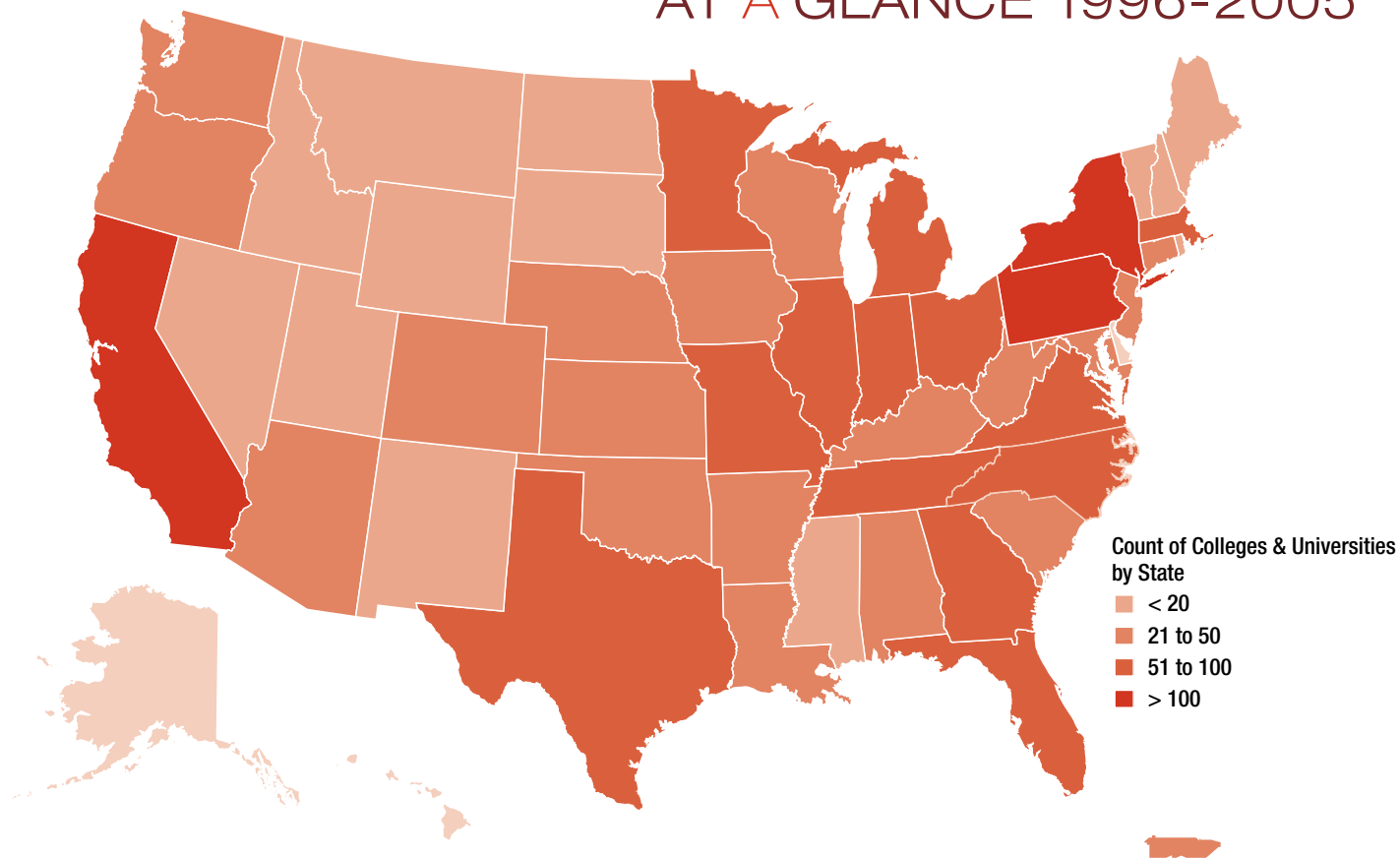


US EPA ARCHIVE DOCUMENT

# COLLEGES & UNIVERSITIES

AT A GLANCE 1996-2005<sup>1</sup>



3,663 facilities  
 3,634 ▼ 1%

1,258,979 employees  
 1,508,355 ▲ 20%

\$270 billion revenue  
 \$341 billion ▲ 26%

# Latest Environmental Statistics<sup>2</sup>

**Emissions of Criteria Air Pollutants:** 73,000 tons

**Hazardous Waste Generated:** 26,000 tons

**Hazardous Waste Managed:** 24,000 tons

*The data discussed in this report are drawn from multiple public and private sources. See the Data Guide and the Data Sources, Methodologies, and Considerations chapter for important information and qualifications about how data are generated, synthesized, and presented.*

## Profile

The Colleges & Universities sector includes schools granting degrees at baccalaureate or graduate levels such as major universities, military academies, business colleges, medical and law schools, music conservatories, and seminaries.

Facilities of the sector have a variety of environmental impacts across all environmental media. Campuses may, for example, operate power plants and wastewater treatment facilities, undertake construction projects, and maintain large areas of landscaping. Many consume large quantities of energy, generate tons of municipal waste and small quantities of hazardous wastes (primarily through laboratories), and manage stormwater runoff.

## Energy Use

There are no aggregate national data on energy use at campuses in the United States. Campuses use energy in many types of facilities, including classroom buildings, residences, laboratories, performing arts venues, and sports facilities. Campus parking lots and walkways use electricity to provide lighting. Heating, ventilation, and air conditioning units consume energy from natural gas, liquid propane, and electricity. Activities related to grounds keeping, transportation, and security also consume fossil fuels and electricity.

Many schools are taking action to improve their energy efficiency. For example, more than 75 colleges and universities have pledged to purchase power from renewable energy sources such as solar, wind, geothermal, biomass, and hydroelectric as part of EPA's Green Power Partnership. Schools in the Partnership annually purchase more than 1 billion kilowatt hours of green power, which is enough to power nearly 100,000 average U.S. houses for a year.<sup>3</sup>



## Air Emissions

Air emissions from the sector include criteria air pollutants (CAPs), greenhouse gases (GHGs), and others. The sector's air emissions originate primarily from fossil fuel combustion, but also from various sources such as construction, laboratory chemical reactions, and refrigeration systems. Indirect air emissions include emissions related to vehicle use and maintenance, campus transit systems, commuting, deliveries, and generation of purchased electricity. Sector-wide air emission information is not available, although some facilities are conducting emission inventories.

### **Saving Energy and Reducing Emissions with CHP**

Kent State University in Ohio took energy efficiency a step further by generating its own power with a new combined heat and power (CHP) plant that also is a working lab. CHP, also called cogeneration, increases energy efficiency through onsite production of thermal energy and electricity from a single fuel source. The system's 13-megawatt, natural gas-fired turbines produce almost 90% of the university's electricity during the winter and 60% during the summer. The system also uses waste heat from the turbines to produce half of the university's steam. The overall system reduces direct carbon dioxide (CO<sub>2</sub>) emissions by an estimated 13,000 tons per year, equivalent to the emissions from 2,100 cars. Kent State received a 2006 EPA ENERGY STAR CHP award for this effort.<sup>4</sup>

## Criteria Air Pollutants

Most CAP emissions in the sector result from burning of fossil fuels. In 2002, sulfur dioxide (SO<sub>2</sub>) accounted for the largest volume of CAP emissions, and was emitted by 95% of the facilities included in EPA's National Emissions Inventory.<sup>5</sup> Table 1 shows CAP and volatile organic compound (VOC) emissions from 442 facilities in the sector for 2002.

**TABLE 1**  
Criteria Air Pollutant and VOC Emissions 2002

|                   | Tons   |
|-------------------|--------|
| SO <sub>2</sub>   | 39,000 |
| NO <sub>x</sub>   | 20,000 |
| PM <sub>10</sub>  | 2,000  |
| PM <sub>2.5</sub> | 1,000  |
| CO                | 11,000 |
| VOCs              | 1,000  |

Note:  
PM<sub>10</sub> includes PM<sub>2.5</sub> emissions.  
Source: U.S. Environmental Protection Agency

## Greenhouse Gases

Despite the lack of aggregate trend data on GHG emissions, there is a rapidly growing campus awareness of GHG impacts. A growing number of school officials are committing to take action. More than 480 presidents of higher education institutions have committed to the American College and University Presidents Climate Commitment (ACUPCC). ACUPCC's goal is for participating schools to develop plans to achieve climate neutrality, starting with campus-wide GHG emission inventories and institutional action plans. Tangible actions may include

### Energy Conservation and Sustainability

Arizona State University (ASU) began a program to reduce electricity, natural gas, and water use in 2000. Lighting and system upgrades reduced consumption by 53 million kilowatt-hours per year. From 2002 to 2006, ASU reduced its energy bill by 10%, saving \$3.3 million annually. ASU received a 2007 ENERGY STAR CHP Award in recognition of a new natural gas CHP system that reduced fuel use by about 21% and CO<sub>2</sub> emissions by an estimated 16,000 tons per year. In March 2007 the ASU President pledged under ACUPCC, among other things, to develop an action plan within two years to become carbon neutral and to include sustainability in the curriculum. ASU recently set a goal of reducing its energy bill another 10%.<sup>6</sup>

green building, use of ENERGY STAR-certified products, the purchase of power from renewable resources, and increased use of public transportation.

## Water Use and Discharges

Sector facilities use water in many ways, including academic and residential buildings, student centers, cafeterias, laboratory and sporting facilities, hospitals and clinics, and landscaping and agricultural operations. For most campuses, clean water comes from publicly owned facilities, and water discharges are sent to Publicly Owned Treatment Works. A mix of modern, efficient water systems and older, inefficient systems exists on campuses.

EPA effluent limitation guidelines vary according to campus makeup. For example, on-campus power plants may be regulated if power is distributed and sold, while effluents from educational research laboratories currently are not regulated.<sup>7</sup> Stormwater discharges may include fertilizers and pesticides from landscaping. Currently, the sector's stormwater discharges are not regulated, although there may be facility-specific requirements for certain industrial operations.<sup>8</sup>

### An Educational Green Building

At Oberlin College in Ohio, the Adam Joseph Lewis Center for Environmental Studies is an acclaimed integrated building and landscape system for study and proactive energy and environmental management. The center uses water-saving sinks and toilets. Its "Living Machine" system combines conventional water treatment and the center's wetland ecosystem to remove organic wastes, nutrients, and pathogens, allowing 60% to 80% of the water used to be treated and re-used in toilets and on the center's landscape. Stormwater from the center's roof, sidewalk, and parking lot drains into a wetland (which cleanses it) and into a 9,700-gallon cistern. During drier periods, rainwater stored in the cistern is used to maintain the wetland.<sup>9</sup>

## Waste Generation and Management

Although sector-wide information on the management of nonhazardous waste is not available, colleges and universities do generate, and can reduce or recycle, significant amounts of waste.<sup>10</sup>

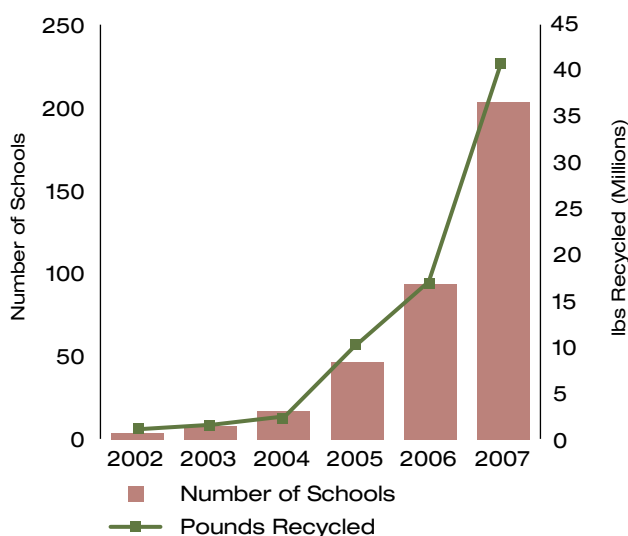
In 2007, more than 200 colleges and universities participated in RecycleMania, sponsored by the National Recycling Coalition in partnership with EPA's WasteWise program, to increase campus recycling.<sup>11</sup> The number

of schools participating and the amount of recyclables collected over the 10-week competition has doubled each year since starting in 2001, as shown in Figure 1. The 2007 competition reported a total of 41.3 million pounds of materials recycled. The materials collected prevented the discharge of 15,583 million metric tons of CO<sub>2</sub> equivalent—equating to GHG emissions from approximately 12,367 passenger cars in one year.<sup>12</sup>

### Expanding Recycling

Rutgers University in New Jersey was EPA's WasteWise 2007 College/University Partner of the Year.<sup>13</sup> Rutgers recycled 14,356 tons of materials in 2006, an 11% increase over the previous year. As one of many activities, the University installed new pulping and dewatering machines that remove up to 80% of the moisture from food waste; the resulting pulp is donated as livestock feed. In 2006 the machines helped Rutgers recover 3,422 tons of food waste and avoid \$758,929 in landfill costs.<sup>14</sup>

**FIGURE 1**  
RecycleMania Participation and Results



Source: U.S. Environmental Protection Agency

## Hazardous Waste Management

Colleges and universities generate hazardous waste from a variety of activities, such as laboratories, operation of pollution control devices, or remediation of past contamination.

Some 335 facilities reported to EPA's *National Biennial RCRA Hazardous Waste Report (BR)* generating 26,000 tons of hazardous waste in 2005. Of this total, 64% was material from state-mandated or voluntary cleanups, and 21% was laboratory wastes. More than 66% of the reported hazardous waste for the sector was lead, and more than 6% was ignitable waste, laboratory packs, and mercury.<sup>15</sup> In the same year, the sector reported managing 24,000 tons of hazardous waste.

## Additional Environmental Management Activities

Although the sector lacks metrics for many parts of its environmental and energy footprint, a growing number of schools are developing sustainability programs and actively tracking their individual progress. The nonprofit Sustainable Endowments Institute is evaluating these efforts on the national level in its 2008 College Sustainability Report Card. The report evaluates campus and endowment sustainability activities at the 200 colleges and universities with the largest endowments in the United States and Canada. The Report Card provides information on best operational practices of leading schools in such categories as climate change and energy, food and recycling, green building, and transportation.

The 2008 Report Card shows a growing commitment to sustainability within the sector, with 68% of the evaluated schools showing an improved "grade" from a year ago. Fifty percent of the schools have adopted carbon reduction commitments, and 69% now have green building policies. Some 42% of the schools now have hybrid or electric vehicles in their fleets, and 37% now have full-time staff dedicated to sustainability.<sup>16</sup>