

**Fiscal Year 2013
Cornell University
Central Energy Plant (CEP) Fast Facts¹**

| CEP PRIMARY ENERGY CONSUMPTION | | |
|---|---------------------------|-------------|
| <u>Primary Consumption (trillion Btu)</u> | <u>1990⁽²⁾</u> | <u>2013</u> |
| Electricity (Grid Purchased) | 0.60 | 0.20 |
| Coal | 1.33 | 0.00 |
| Hydro (electric) | 0.02 | 0.01 |
| Natural Gas | 0.28 | 2.57 |
| Oil | 0.14 | 0.00 |
| Total Primary Energy Consumption | 2.35 | 2.79 |

| CENTRAL ENERGY PLANT EFFICIENCY | | |
|--|-------------|-------------|
| <u>Energy Output (trillion Btu)</u> | <u>1990</u> | <u>2013</u> |
| Total Steam Generation | 1.31 | 1.25 |
| Total Turbine Electric Generation | 0.07 | 0.73 |
| Total Energy Output | 1.38 | 1.98 |

| <u>Fuel Sources (trillion Btu)</u> | <u>1990</u> | <u>2013</u> |
|--|-------------|-------------|
| Coal | 1.33 | 0.00 |
| Natural Gas - Boilers | 0.28 | 0.16 |
| Natural Gas - Turbines | 0.00 | 2.11 |
| Natural Gas - Duct Burners | 0.00 | 0.30 |
| Oil | 0.14 | 0.00 |
| Total Energy Input (trillion Btu) | 1.74 | 2.57 |
| Total Central Plant Efficiency | 69% | 77% |

| | | |
|----------------------------------|----|------|
| Total Steam Sales (trillion Btu) | NA | 1.04 |
| Total Steam Losses (%) | NA | 17% |

| ELECTRICITY | | |
|--|----------------|----------------|
| <u>Cornell Utilities Generated (Mwh)</u> | <u>1990</u> | <u>2013</u> |
| Cornell Utilities Hydro | 5,200 | 4,000 |
| Cornell Utilities Steam Turbine - Cogen | 21,000 | 25,700 |
| Cornell Utilities Gas Turbine - CCHPP ⁽³⁾ | 0 | 189,100 |
| Total Cornell Utilities Generated | 26,200 | 218,800 |
| Electricity Exported to Grid (Mwh) | 0 | (38,700) |
| Electricity (Grid Purchased) (Mwh) | 175,000 | 54,400 |
| Total CEP Electricity (Mwh) | 201,200 | 234,500 |
| Total Campus Sales (Mwh) | NA | 223,000 |
| Electricity LSC (Grid Purchased) (Mwh) | 0 | 5,600 |

| <u>Electricity (Grid Purchased) Sources</u> | <u>1990</u> | <u>2013</u> |
|---|-------------|-------------|
| Other Renewables | 0% | 4% |
| Coal | 74% | 7% |
| Natural Gas | 5% | 44% |
| Hydro | 14% | 11% |
| Nuclear | 5% | 13% |
| Petroleum | 2% | 16% |
| Other Gases | 0% | <1% |
| Pumped Storage | 0% | 4% |

| CHILLED WATER | | |
|--|-------------|-------------|
| <u>Energy Output & Input (trillion Btu)</u> | <u>1990</u> | <u>2013</u> |
| Total Chilled Water Production (trillion Btu) | 0.338 | 0.535 |
| Total Energy Input (trillion Btu) ⁽⁶⁾ | 0.072 | 0.023 |
| System Coefficient of Performance | 4.7 | 23.2 |
| Total Campus Sales (trillion Btu) | N/A | 0.536 |
| Chilled Water Sources | | |
| Mechanical Chillers | 83.2% | 1% |
| Lake Source Cooling | 17% | 99% |

| ENERGY RELATED CARBON DIOXIDE (CO₂) EMISSIONS | | |
|---|-------------|-------------|
| <u>Purchased Electric</u> | <u>1990</u> | <u>2013</u> |
| Grid CO ₂ Emission Factor (lbs/MWh) | 1,918 | 501 |
| Grid Electric CO ₂ (1,000 tons) | 167 | 15 |
| Cornell Central Energy Plant | | |
| Cornell Coal ⁽⁴⁾ | 138 | 0 |
| Cornell Natural Gas ⁽⁵⁾ | 15 | 125 |
| Cornell Oil | 12 | 0.3 |
| Total CEP CO ₂ Emissions (1,000 tons) | 165 | 125 |
| Total CO₂ Emissions (1,000 tons) | 333 | 140 |

| <u>CO₂ Emissions By Primary Energy Type:</u> | <u>1990</u> | <u>2013</u> |
|---|-------------|-------------|
| Electricity (Grid Purchased) | 50% | 11% |
| On-Site Coal | 42% | 0% |
| On-Site Natural Gas | 5% | 89% |
| On-Site Oil | 4% | 0% |
| On-Site Hydro | 0% | 0% |

| CENTRALLY CONNECTED BLDG GSF x 1,000 | | |
|---|-------------|-------------|
| | <u>1990</u> | <u>2013</u> |
| Electric (provided via CEP) | NA | 13,700 |
| Steam (provided via CEP) | NA | 12,600 |
| Chilled Water (provided via CEP) | NA | 8,000 |

| ENERGY METRICS (KBTU/GSF) PER YEAR | | |
|---|-------------|-------------|
| | <u>1990</u> | <u>2013</u> |
| Electric Sales | NA | 58 |
| Steam Sales | NA | 100 |
| Chilled Water Sales | NA | 67 |

| ENERGY CONSUMPTION BY BUILDING | | |
|---------------------------------------|-------------|-------------|
| <u>Building Type: (trillion Btu)</u> | <u>1990</u> | <u>2013</u> |
| Research/Teaching | NA | 2.01 |
| Campus Life | NA | 0.56 |
| Administration | NA | 0.22 |

| POPULATION AND WEATHER | | |
|---|-------------|-------------|
| | <u>1990</u> | <u>2013</u> |
| Students | 18,389 | 20,329 |
| Staff/Non-Faculty | 7,690 | 9,118 |
| Faculty | 1,617 | 1,528 |
| Ithaca Campus ⁽⁶⁾ (1000 GSF) | 11,800 | 15,200 |
| Campus GSF per Student | 642 | 748 |
| Heating Degree Days (7,220 Normal) | 6,919 | 6,756 |
| Cooling Degree Days (337 Normal) | 312 | 581 |

| GLOSSARY & NOTES | | |
|--|--|--|
| Btu: British thermal unit | | |
| Primary: Central Plant Usage | | |
| MMBtu: Million Btu | | |
| Mwh: mega watt-hour | | |
| (1) Info for CEP only, not all campus facilities part of CEP | | |
| (2) Kyoto Base Year is 1990 | | |
| (3) Combined Heat & Power Plant start-up FY 2010 | | |
| (4) "Beyond Coal" begins FY 2012 | | |
| (5) GHG adjusted for exported electric | | |
| (6) Ithaca Campus GSF includes non-CEP connected facilities | | |