

**Fiscal Year 2016
Cornell University
Central Energy Plant (CEP) Fast Facts¹**

CEP PRIMARY ENERGY CONSUMPTION		
<u>Primary Consumption (trillion Btu)</u>	<u>1990⁽²⁾</u>	<u>2016</u>
Electricity (Grid Purchased)	0.60	0.05
Coal	1.33	0.00
Hydro (electric)	0.02	0.02
Natural Gas	0.28	3.02
Oil	0.14	0.00
Total Primary Energy Consumption	2.35	3.09

CENTRAL ENERGY PLANT EFFICIENCY		
<u>Energy Output (trillion Btu)</u>	<u>1990</u>	<u>2016</u>
Total Steam Generation ⁽³⁾	1.35	1.30
Total Turbine Electric Generation	0.07	0.88
Total Energy Output	1.42	2.18

Fuel Sources (trillion Btu)		
<u>Coal</u>	<u>1990</u>	<u>2016</u>
Coal	1.33	0.00
Natural Gas - Boilers	0.28	0.09
Natural Gas - Turbines	0.00	2.71
Natural Gas - Duct Burners	0.00	0.21
Oil	0.14	0.00
Total Energy Input (trillion Btu)	1.74	3.02
Total Central Plant Efficiency	81%	72%
Total Steam Sales (trillion Btu)	0.99	0.83
Total Distrib and Building Steam Losses (%)	17%	19%
Total Steam Condensed for Electric (trillion Btu)	0.00	0.24

ELECTRICITY		
<u>Cornell Utilities Generated (Mwh)</u>	<u>1990</u>	<u>2016</u>
Cornell Utilities Hydro	5,200	5,200
Cornell Utilities Steam Turbine - Cogen	21,000	24,500
Cornell Utilities Gas Turbine - CCHPP ⁽³⁾	0	236,900
Total Cornell Utilities Generated	26,200	266,600
Electricity Exported to Grid (Mwh)	0	(59,000)
Electricity (Grid Purchased) (Mwh)	174,500	11,600
Total CEP Electricity (Mwh)	200,700	219,200
Total Campus Sales (Mwh)	190,626	212,000
LSC Electricity (Grid Purchased) (Mwh)	0	4,400

Electricity (NY Grid) Sources		
<u>Other Renewables</u>	<u>1990</u>	<u>2016</u>
Other Renewables	0%	5%
Coal	19%	6%
Natural Gas	17%	30%
Hydro	21%	29%
Nuclear	17%	29%
Petroleum	25%	0%
Other	1%	0%
Total	100%	100%

CHILLED WATER		
<u>Energy Output & Input (trillion Btu)</u>	<u>1990</u>	<u>2016</u>
Total Chilled Water Production (trillion Btu)	0.381	0.486
Total Energy Input (trillion Btu) ⁽⁶⁾	0.072	0.021
System Coefficient of Performance	5.3	23.2
Total Campus Sales (trillion Btu)	0.348	0.488
<u>Chilled Water Sources</u>		
Mechanical Chillers	85%	1%
Lake Source Cooling	0%	98%
"Free" Cooling	15%	0%

ENERGY RELATED CARBON DIOXIDE (CO₂) EMISSIONS		
<u>Purchased Electric</u>	<u>1990</u>	<u>2016</u>
Grid CO ₂ Emission Factor (kg/MWh)	870	186
Grid Electric CO ₂ (1,000 metric tons)	152	3
<u>Cornell Central Energy Plant</u>		
Cornell Coal ⁽⁴⁾	125	0
Cornell Natural Gas ⁽⁵⁾	15	161
Cornell Oil	11	0
Total CEP CO ₂ Emissions (1,000 metric tons)	151	161
Total CO₂ Emissions (1,000 metric tons)	303	164

CO₂ Emissions By Primary Energy Type:		
<u>Electricity (Grid Purchased)</u>	<u>1990</u>	<u>2016</u>
Electricity (Grid Purchased)	50%	2%
On-Site Coal	41%	0%
On-Site Natural Gas	5%	98%
On-Site Oil	4%	0%
On-Site Hydro	0%	0%

CENTRALLY CONNECTED BLDG GSF x 1,000		
<u>Electric (provided via CEP)</u>	<u>1990</u>	<u>2016</u>
Electric (provided via CEP)	NA	14,000
Steam (provided via CEP)	NA	12,800
Chilled Water (provided via CEP)	NA	8,700

ENERGY METRICS (KBTU/GSF) PER YEAR		
<u>Electric Sales</u>	<u>1990</u>	<u>2016</u>
Electric Sales	NA	53
Steam Sales	NA	102
Chilled Water Sales	NA	56

ENERGY CONSUMPTION BY BUILDING		
<u>Building Type: (trillion Btu)</u>	<u>1990</u>	<u>2016</u>
Research/Teaching	NA	2.32
Campus Life	NA	0.56
Administration	NA	0.22

POPULATION AND WEATHER		
<u>Students</u>	<u>1990</u>	<u>2016</u>
Students	18,389	21,190
Staff/Non-Faculty	7,690	9,255
Faculty	1,617	1,574
Ithaca Campus ⁽⁶⁾ (1000 GSF)	11,800	15,825
Campus GSF per Student	642	747
Heating Degree Days (7,220 Normal)	6,919	6,461
Cooling Degree Days (337 Normal)	312	392

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 NOT adjusted for exported electric		
(6) Ithaca Campus GSF includes non-CEP connected facilities		