

OP-5 Building Energy Consumption

Totals for STARS

	Performance Year	Baseline Year
	2018-19	2005-06
	MMBtu	MMBtu
Grid Purchased Electricity	648,704.13	437,736.31
Electricity from On-site Renewables	1,455.00	0.00
Off-site District Steam	0.00	0.00
On-site Natural Gas + Diesel + Solar Thermal	2,312,884.24	2,051,366.72
TOTAL	2,963,043.37	2,489,103.04

Subtotals for STARS

North Campus Totals

	Performance Year	Baseline Year
	2018-19	2005-06
	MMBtu	MMBtu
Grid Purchased Electricity	583,098.84	407,804.72
Electricity from On-site Renewables	355.00	0.00
Off-site District Steam	0.00	0.00
On-site Natural Gas + Diesel	2,082,288.39	1,890,721.22
On-site Solar Thermal	0.00	0.00
TOTAL	2,665,742.23	2,298,525.94

Totals for All Other Sites

	Performance Year	Baseline Year
	2018-19	2005-06
	MMBtu	MMBtu
Grid Purchased Electricity	65,605.29	29,931.59
Electricity from On-site Renewables	1,100.00	0.00
Off-site District Steam	0.00	0.00
On-site Natural Gas	230,550.85	160,645.50
On-site Solar Thermal	45.00	0.00
TOTAL	297,301.13	190,577.09

North Campus District Energy System Reference Data & Calculations

North Campus Electricity Split (Grid-Purchased vs. DES-Produced)

	Performance Year 2018-19	Baseline Year 2005-06
% Grid-Purchased	75.18%	70.63%
% DES-Produced	24.82%	29.37%

Note: For our North Campus where our district energy system (DES) is located, we import roughly 70% of our electricity from the grid and produce roughly 30% on site using natural gas - this number varies slightly from year to year. The calculation done here is to apply the percentage that was purchased to the total electricity consumption to get our purchased electricity amount for North Campus. The North Campus purchased electricity amounts are then added to the purchased electricity from all other sites within our STARS boundary. The remainder of the energy due to electricity consumption on North Campus is accounted for under the "other" category where natural gas and diesel used by our on-site district energy system are measured.

Electricity

Electricity is used directly by buildings, but it is also used in the DES to produce chilled water. To get total purchased electricity consumption, we need to account for both of these uses.

	Performance Year 2018-19	Baseline Year 2005-06
Electricity consumed for CHW (kWh)	20,204,685.00	13,628,210.54
Electricity consumed by buildings (kWh)	207,111,748.40	155,592,698.61
Total electricity consumed (kWh)	227,316,433.40	169,220,909.15
Total electricity consumed (MMBtu)	775,603.67	577,381.74
Total grid-purchased electricity consumed (MMBtu)	583,098.84	407,804.72
Total DES-produced electricity consumed (MMBtu)	192,504.83	169,577.02

Natural Gas and Diesel

The DES uses primarily natural gas as a fuel source, with diesel as back-up fuel. The DES produces all of the heating steam for North Campus. Since the UAlberta DES serves customers beyond its North Campus, the following calculations are used to determine the portion of the natural gas and diesel inputs used by North Campus.

	Performance Year	Baseline Year
	2018-19	2005-06
Natural gas consumed directly by buildings (GJ)	103,695.16	60,872.78
Natural gas consumed directly by buildings (MMBtu)	98,284.04	57,696.25
Total DES-produced electricity consumed (MMBtu)	192,504.83	169,577.02
Heating steam consumed by buildings (kg)	561,718,355.00	402,688,044.00
Heating steam consumed by buildings (MMBtu)	1,478,442.71	1,059,874.93
Total energy consumed (steam + electricity) (MMBtu)	1,670,947.54	1,229,451.95
Heating plant efficiency	84.22%	67.07%
DES natural gas + diesel inputs (MMBtu)	1,984,004.36	1,833,024.97
Total natural gas + diesel consumed (MMBtu)	2,082,288.39	1,890,721.22

Data for All Other Sites Except North Campus

	Performance Year	Baseline Year
	2018-19	2005-06
<u>Electricity (kWh)</u>		
Augustana Campus	3,418,270.00	1,350,000.00
CSJ	1,945,680.00	1,285,000.00
UAlberta Botanic Garden	586,130.00	385,448.00
Ellerslie	87,240.00	800,125.00
Kinsella	500,230.00	483,579.00
Others	327,820.00	1,340,865.00
South Campus	12,362,440.00	3,127,430.00
Total electricity consumption (kWh)	19,227,810.00	8,772,447.00
Total electricity consumption (MMBtu)	65,605.29	29,931.59
<u>Natural Gas (GJ)</u>		
Augustana Campus	38,206.87	30,696.00
CSJ	23,070.41	12,936.00
UAlberta Botanic Garden	13,985.94	7,350.00
Ellerslie	752.75	25,526.00
Kinsella	2,320.62	1,967.00
Others	3,184.32	9,784.00
South Campus	161,723.14	81,231.00
Total natural gas consumption (GJ)	243,244.05	169,490.00
Total natural gas consumption (MMBtu)	230,550.85	160,645.50