

# Library



# Athens, Greece 2020

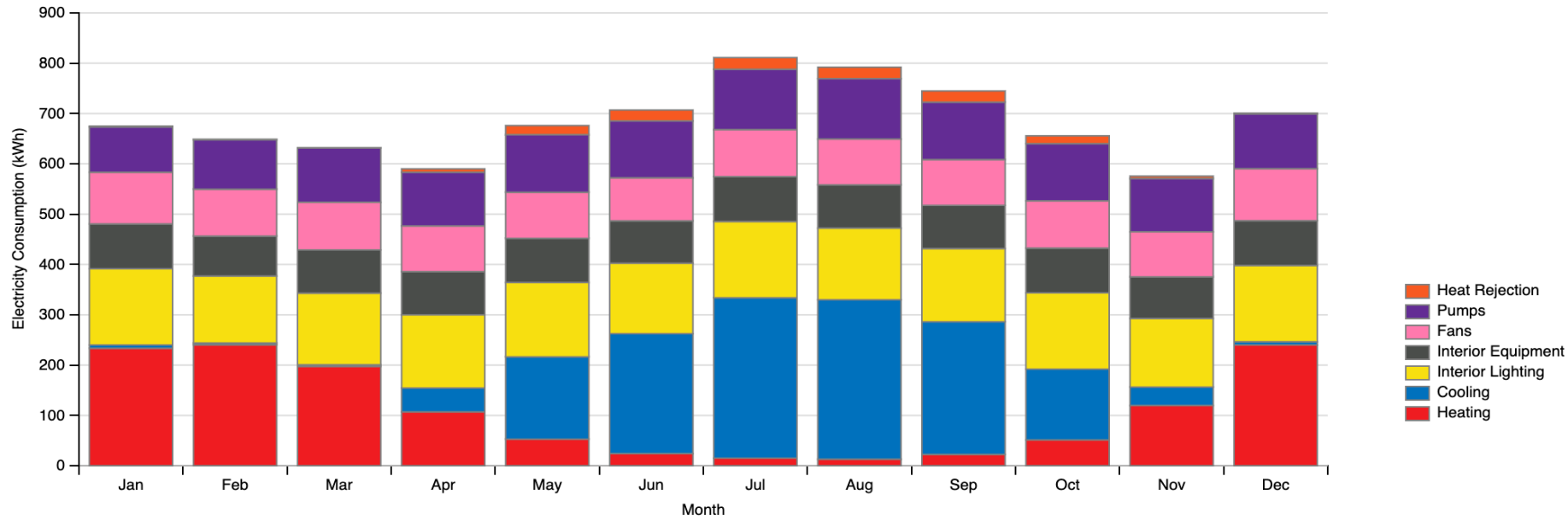
Total Site Energy: 8.208 kWh

Total Building Area: 60m<sup>2</sup>

Total Site EUI: 136.81 kWh/m<sup>2</sup>

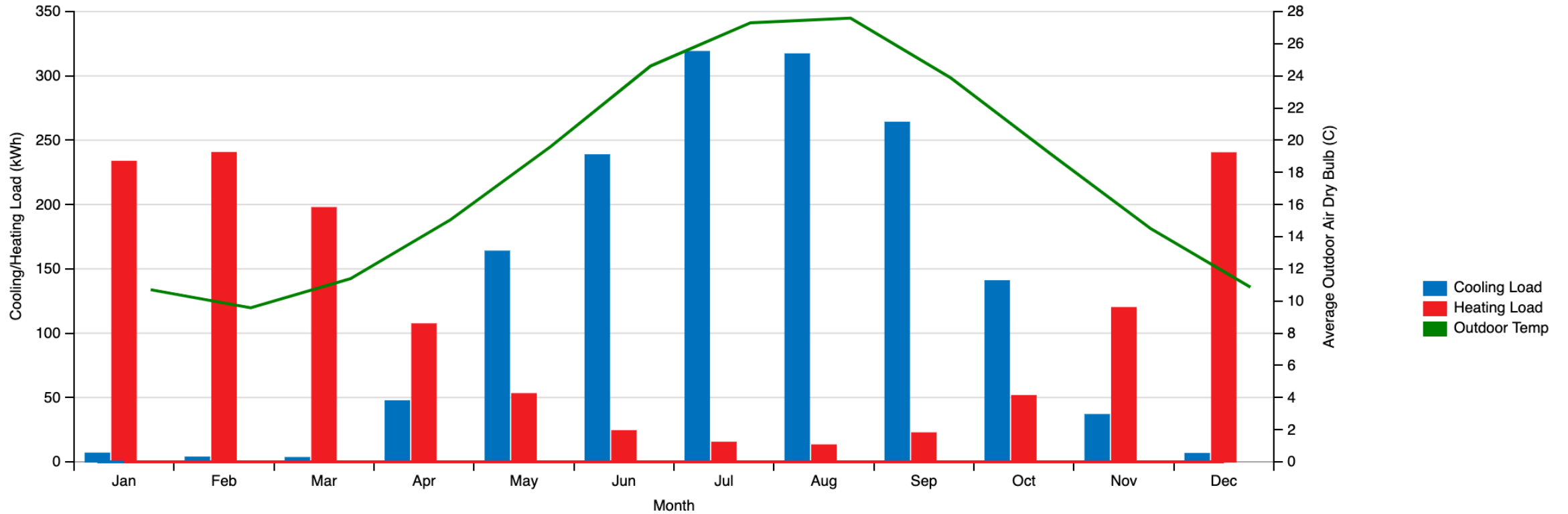
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	233.43	240.25	197.45	107.1	52.84	24.06	15.05	12.99	22.36	51.34	119.75	240.05	1316.69
Cooling	6.61	3.56	3.18	47.29	163.62	238.5	318.79	316.9	263.81	140.62	36.6	6.33	1545.8
Interior Lighting	151.57	133.34	142.37	145.49	147.8	140.06	151.57	142.37	145.49	151.57	136.3	151.57	1739.48
Exterior Lighting													
Interior Equipment	89.11	79.3	86.04	85.84	87.74	84.14	89.11	86.04	85.84	89.11	82.77	89.11	1034.13
Exterior Equipment													
Fans	102.54	93.08	94.58	90.88	91.54	85.52	93.54	90.98	90.96	93.72	89.5	103.34	1120.19
Pumps	90.0	98.26	107.98	106.65	114.46	113.03	119.95	120.07	114.11	113.79	106.04	108.82	1313.17
Heat Rejection	1.78	1.09	0.42	6.74	18.08	21.63	23.1	22.69	22.3	15.56	4.56	1.57	139.52
Humidification													
Heat Recovery													
Water Systems													
Refrigeration													
Generators													
<b>Total</b>	<b>675.03</b>	<b>648.89</b>	<b>632.03</b>	<b>589.99</b>	<b>676.09</b>	<b>706.94</b>	<b>811.1</b>	<b>792.05</b>	<b>744.87</b>	<b>655.7</b>	<b>575.51</b>	<b>700.79</b>	<b>8208.99</b>

### Athens, Greece 2020



- May – October: cooling consumes most of the energy
- November – April: heating consumes most of the energy
- Pumps, fans and interior equipment/light remain constant throughout the year

# Athens, Greece 2020

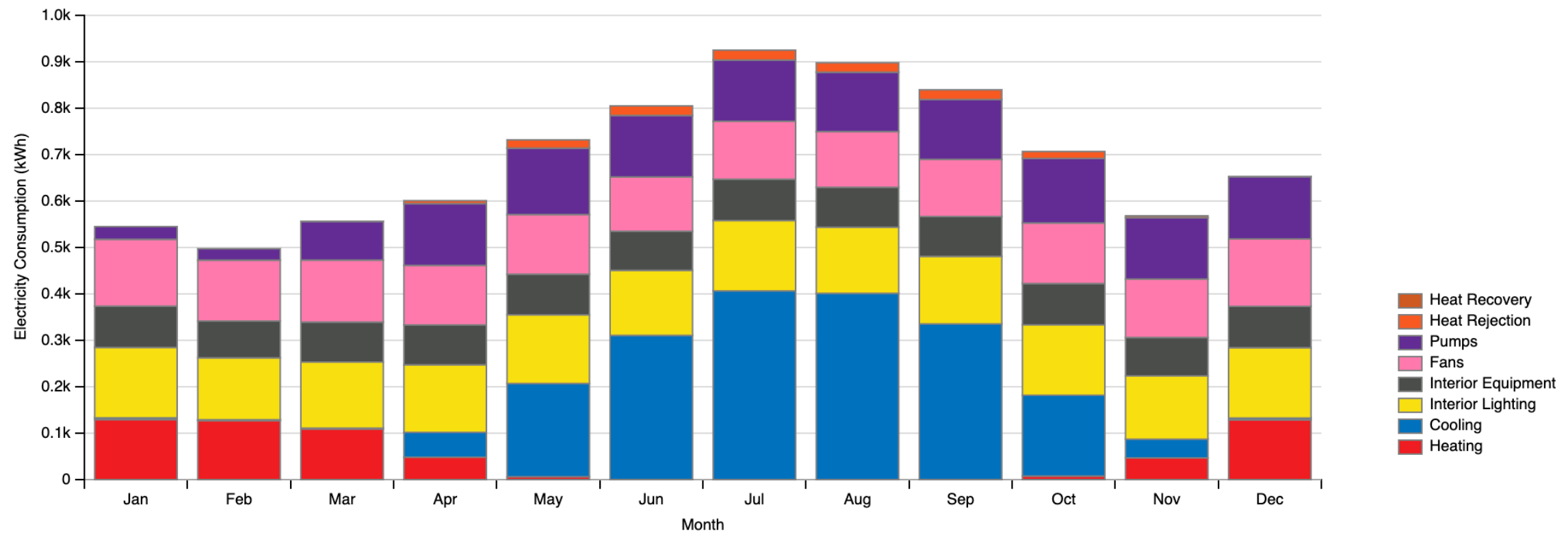


Total Site Energy: 11,211 kWh  
Total Building Area: 60m<sup>2</sup>  
Total Site EUI: 186.85 kWh/m<sup>2</sup>

# Athens Greece 2020 with Hvac

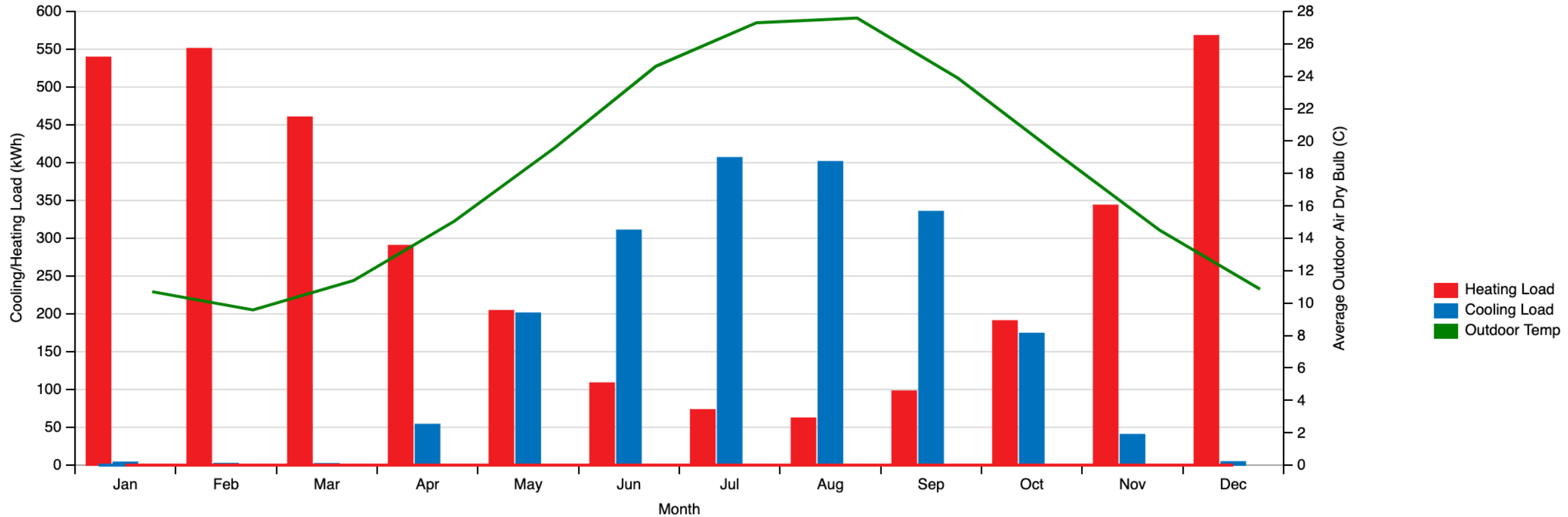
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	129.32	126.9	109.06	48.18	6.16	0.12			0.1	7.62	46.74	128.37	602.57
Cooling	3.72	2.07	1.82	53.67	200.89	310.53	406.44	401.27	335.33	174.09	40.34	4.23	1934.39
Interior Lighting	151.57	133.34	142.37	145.49	147.8	140.06	151.57	142.37	145.49	151.57	136.3	151.57	1739.48
Exterior Lighting													
Interior Equipment	89.11	79.3	86.04	85.84	87.74	84.14	89.11	86.04	85.84	89.11	82.77	89.11	1034.13
Exterior Equipment													
Fans	143.84	131.11	133.54	128.14	128.34	117.06	124.67	119.94	122.98	130.33	125.86	145.18	1550.99
Pumps	27.46	24.54	83.17	133.22	142.98	132.44	131.86	127.88	128.99	139.05	132.23	133.95	1337.78
Heat Rejection			0.03	6.3	17.9	20.68	21.45	20.35	20.9	15.03	4.05	0.15	126.85
Humidification													
Heat Recovery													
Water Systems													
Refrigeration													
Generators													
<b>Total</b>	<b>545.02</b>	<b>497.25</b>	<b>556.04</b>	<b>600.83</b>	<b>731.81</b>	<b>805.03</b>	<b>925.1</b>	<b>897.85</b>	<b>839.62</b>	<b>706.8</b>	<b>568.29</b>	<b>652.55</b>	<b>8326.2</b>

# Athens Greece 2020 with Hvac





# Athens Greece 2020 with Hvac



### Athens, Greece 2050

Total Site Energy: 8,153 kWh

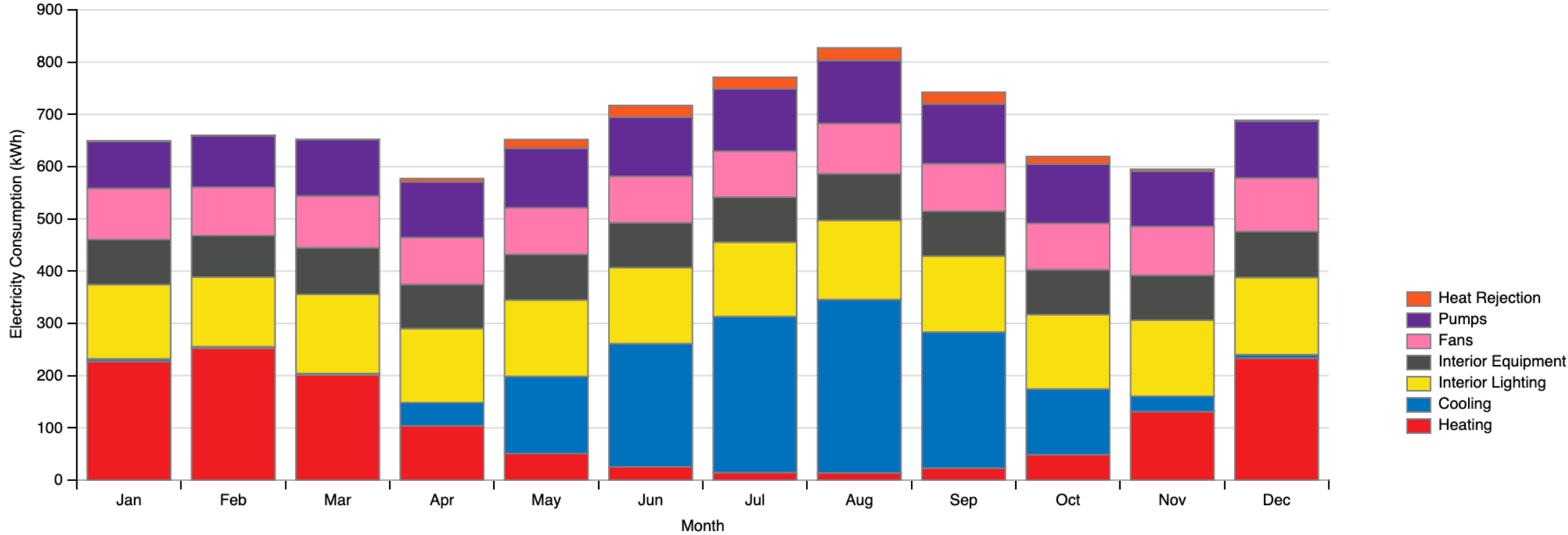
Total Building Area: 60m<sup>2</sup>

Total Site EUI: 135.88 kWh/m<sup>2</sup>

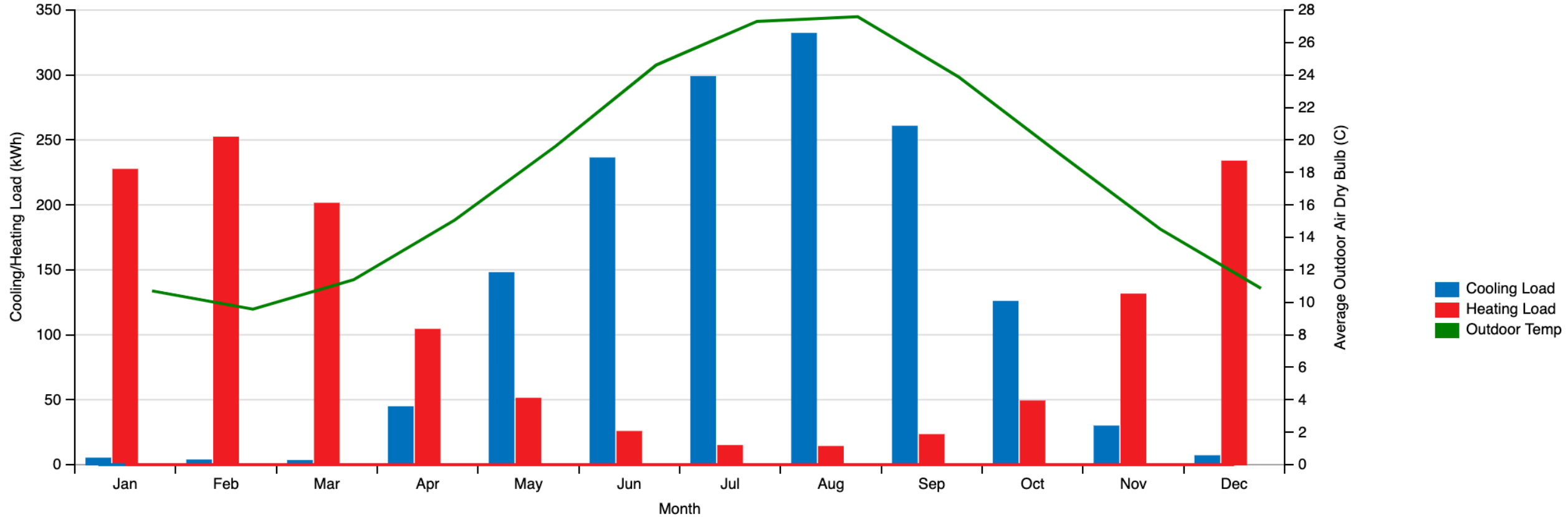
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	227.18	251.98	201.05	104.01	50.93	25.36	14.52	13.78	22.95	48.83	131.14	233.51	1325.24
Cooling	4.87	3.4	2.98	44.38	147.63	235.96	298.59	331.85	260.37	125.52	29.53	6.68	1491.76
Interior Lighting	142.37	133.34	151.57	141.73	146.14	145.49	142.37	151.57	145.49	142.37	145.49	147.8	1735.72
Exterior Lighting													
Interior Equipment	86.04	79.3	89.11	84.47	87.41	85.84	86.04	89.11	85.84	86.04	85.84	87.74	1032.77
Exterior Equipment													
Fans	98.01	92.73	99.1	89.77	89.24	88.9	88.15	96.1	90.93	88.73	93.62	102.49	1117.77
Pumps	89.68	98.4	108.06	106.54	113.89	113.18	119.24	120.76	114.09	113.47	105.65	108.69	1311.65
Heat Rejection	1.37	1.0	0.31	6.44	16.72	22.35	22.28	24.18	22.85	14.36	3.85	1.79	137.51
Humidification													
Heat Recovery													
Water Systems													
Refrigeration													
Generators													
<b>Total</b>	<b>649.52</b>	<b>660.15</b>	<b>652.18</b>	<b>577.34</b>	<b>651.96</b>	<b>717.07</b>	<b>771.19</b>	<b>827.34</b>	<b>742.51</b>	<b>619.33</b>	<b>595.12</b>	<b>688.7</b>	<b>8152.42</b>



# Athens, Greece 2050



# Athens, Greece 2050

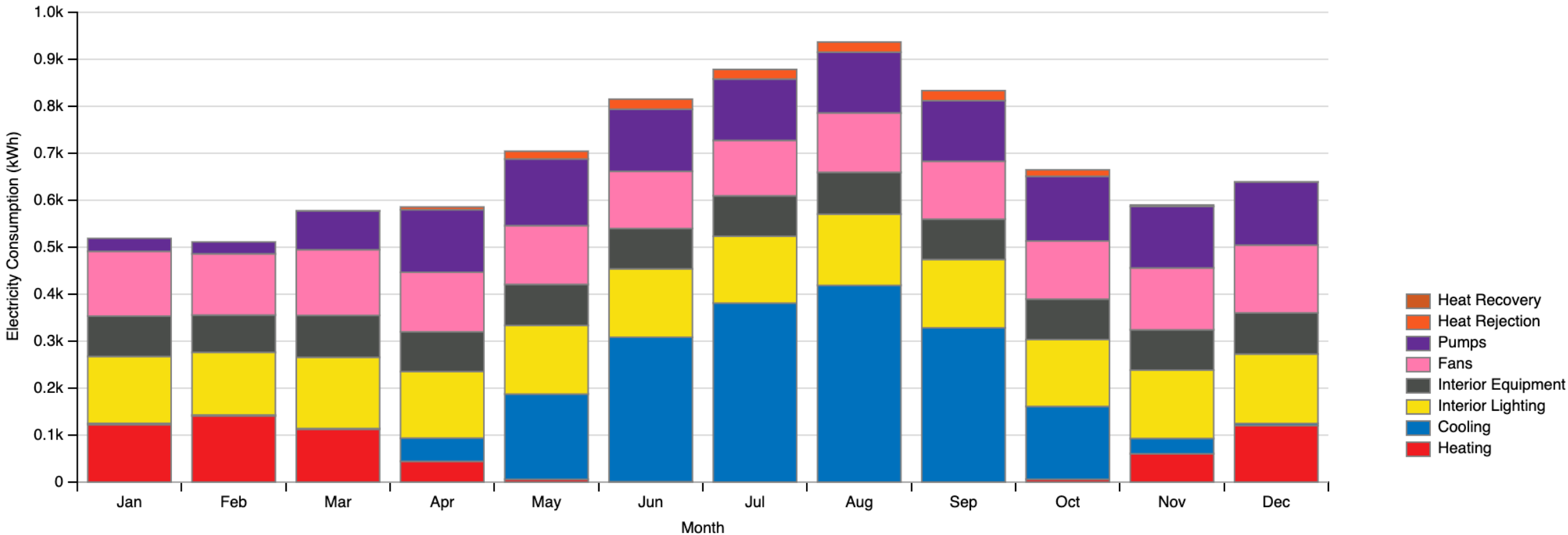


### Athens, Greece 2050 with Hvac

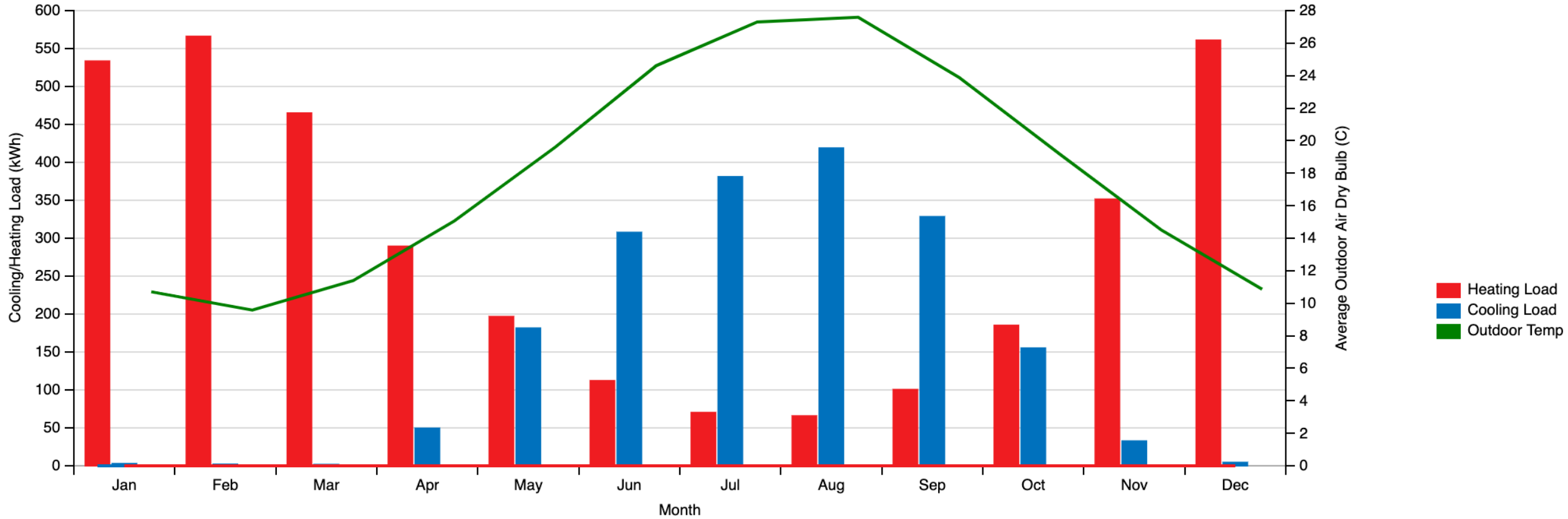
Total Site Energy: 11,136 kWh  
 Total Building Area: 60m<sup>2</sup>  
 Total Site EUI: 185.60 kWh/m<sup>2</sup>

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	122.4	140.98	112.52	44.27	5.92	0.88			0.09	5.98	60.34	120.46	613.85
Cooling	2.74	1.97	1.64	49.42	181.48	307.59	381.03	418.79	328.31	155.12	32.58	4.36	1865.02
Interior Lighting	142.37	133.34	151.57	141.73	146.14	145.49	142.37	151.57	145.49	142.37	145.49	147.8	1735.72
Exterior Lighting													
Interior Equipment	86.04	79.3	89.11	84.47	87.41	85.84	86.04	89.11	85.84	86.04	85.84	87.74	1032.77
Exterior Equipment													
Fans	137.66	130.41	139.84	126.76	125.02	121.68	117.97	126.48	123.21	123.71	131.59	144.12	1548.44
Pumps	27.59	25.21	82.7	133.02	141.81	132.34	130.48	129.16	129.14	137.7	130.95	134.34	1334.43
Heat Rejection			0.03	6.05	16.58	21.39	20.54	21.65	21.27	13.85	3.15	0.15	124.67
Humidification													
Heat Recovery													
Water Systems													
Refrigeration													
Generators													
<b>Total</b>	<b>518.8</b>	<b>511.2</b>	<b>577.4</b>	<b>585.72</b>	<b>704.36</b>	<b>815.2</b>	<b>878.45</b>	<b>936.75</b>	<b>833.35</b>	<b>664.77</b>	<b>589.93</b>	<b>638.97</b>	<b>8254.89</b>

# Athens, Greece 2050 with Hvac



# Athens, Greece 2050 with Hvac



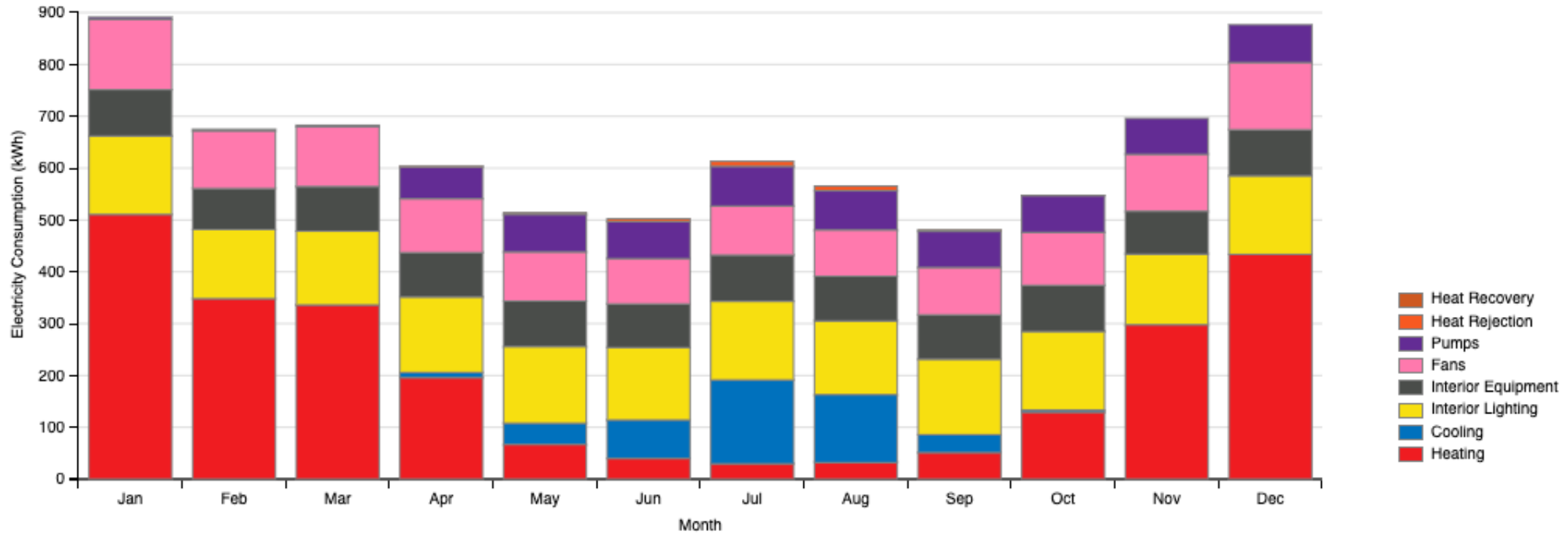
### Stockholm, Sweden 2020

Total Site Energy: 7,647 kWh  
 Total Building Area: 60m<sup>2</sup>  
 Total Site EUI: 127.45 kWh/m<sup>2</sup>

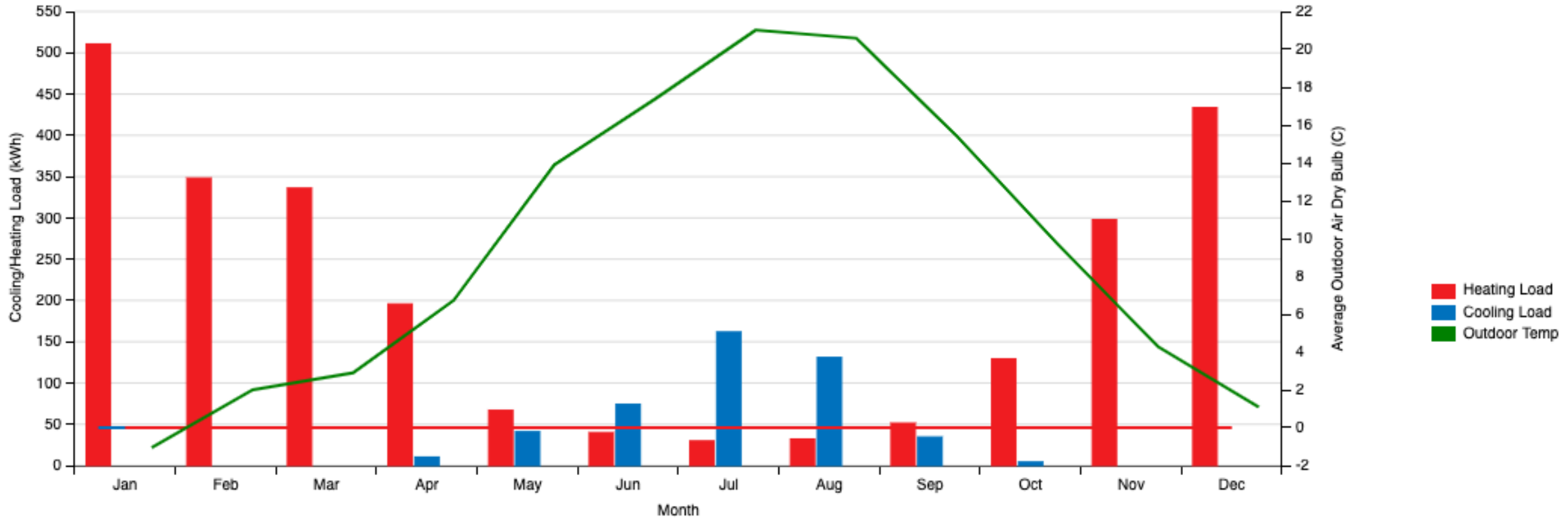
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	510.65	348.18	336.05	195.73	67.0	39.98	29.79	32.05	51.28	129.16	297.88	433.61	2471.35
Cooling				10.22	40.93	74.08	161.75	130.94	34.54	4.21			456.68
Interior Lighting	151.57	133.34	142.37	145.49	147.8	140.06	151.57	142.37	145.49	151.57	136.3	151.57	1739.48
Exterior Lighting													
Interior Equipment	89.11	79.3	86.04	85.84	87.74	84.14	89.11	86.04	85.84	89.11	82.77	89.11	1034.13
Exterior Equipment													
Fans	135.6	111.27	115.75	103.63	94.82	87.32	94.78	89.33	91.09	102.16	109.8	129.58	1265.12
Pumps	4.3	2.76	2.57	61.65	72.44	71.32	76.42	75.62	69.88	70.7	69.23	72.6	649.48
Heat Rejection				0.94	3.43	5.37	9.71	8.96	2.79	0.4			31.6
Humidification													
Heat Recovery													
Water Systems													
Refrigeration													
Generators													
<b>Total</b>	<b>891.21</b>	<b>674.84</b>	<b>682.78</b>	<b>603.49</b>	<b>514.16</b>	<b>502.27</b>	<b>613.12</b>	<b>565.31</b>	<b>480.91</b>	<b>547.3</b>	<b>695.97</b>	<b>876.46</b>	<b>7647.85</b>



# Stockholm, Sweden 2020



# Stockholm, Sweden 2020

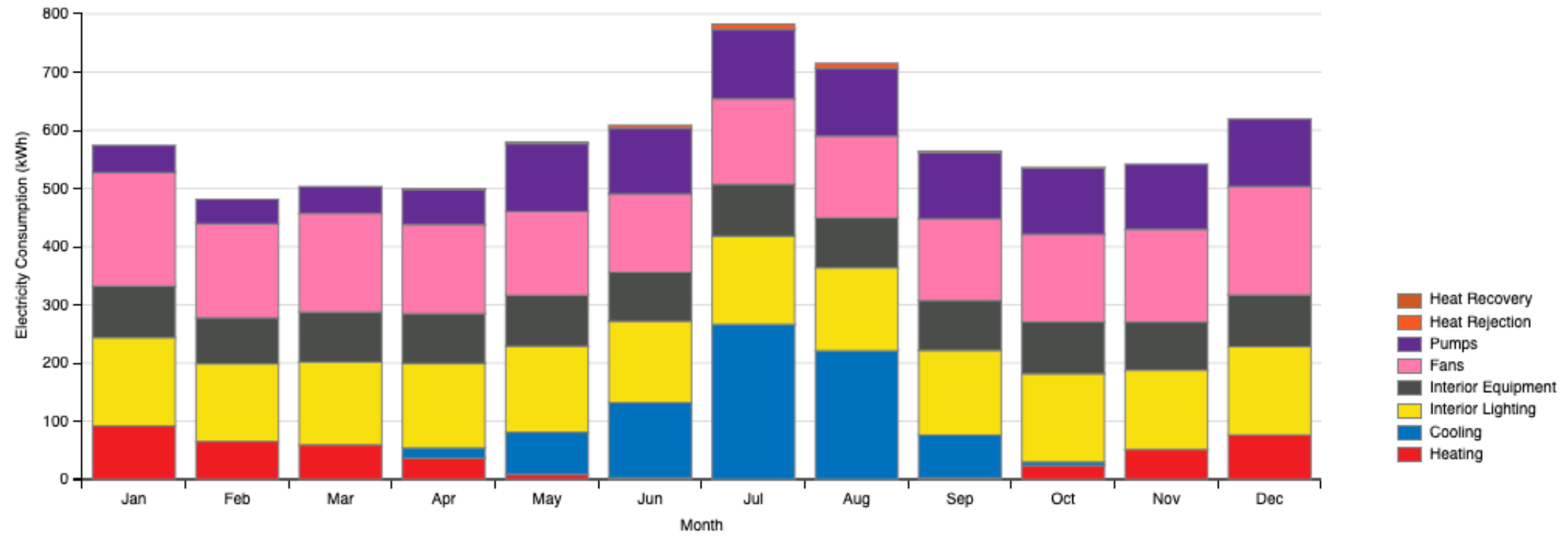


# Stockholm, Sweden 2020 with Hvac

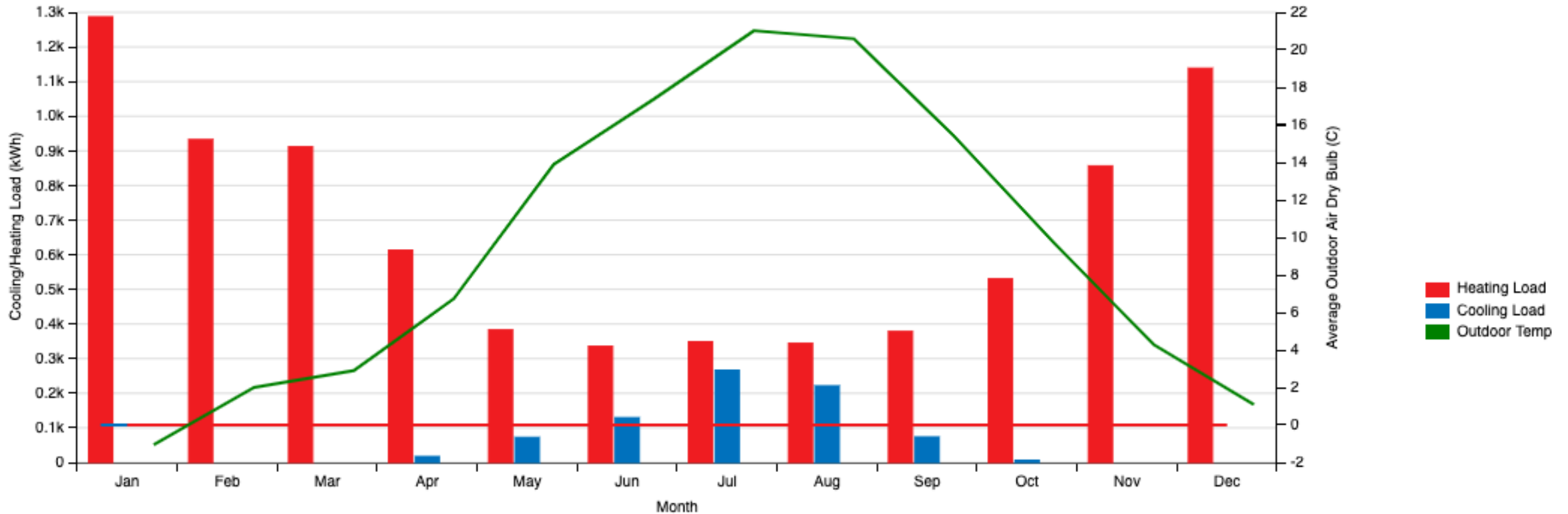
Total Site Energy: 14,647 kWh  
Total Building Area: 60m<sup>2</sup>  
Total Site EUI: 244.12 kWh/m<sup>2</sup>

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	91.82	65.12	59.34	36.57	8.49	2.43	0.04	0.02	2.41	23.64	51.32	76.4	417.61
Cooling				17.28	72.58	129.36	266.5	221.16	73.7	6.26			786.85
Interior Lighting	151.57	133.34	142.37	145.49	147.8	140.06	151.57	142.37	145.49	151.57	136.3	151.57	1739.48
Exterior Lighting													
Interior Equipment	89.11	79.3	86.04	85.84	87.74	84.14	89.11	86.04	85.84	89.11	82.77	89.11	1034.13
Exterior Equipment													
Fans	194.84	161.58	169.16	152.65	143.58	134.54	146.72	140.23	140.43	150.69	159.26	186.47	1880.15
Pumps	46.64	42.08	46.44	60.76	116.73	113.05	119.74	116.92	113.82	114.2	111.95	115.72	1118.04
Heat Rejection				0.83	2.84	4.93	9.02	8.44	2.59	0.18			28.81
Humidification													
Heat Recovery													
Water Systems													
Refrigeration													
Generators													
<b>Total</b>	<b>573.97</b>	<b>481.42</b>	<b>503.35</b>	<b>499.42</b>	<b>579.76</b>	<b>608.51</b>	<b>782.69</b>	<b>715.18</b>	<b>564.28</b>	<b>535.65</b>	<b>541.59</b>	<b>619.26</b>	<b>7005.08</b>

# Stockholm, Sweden 2020 with Hvac



# Stockholm, Sweden 2020 with Hvac



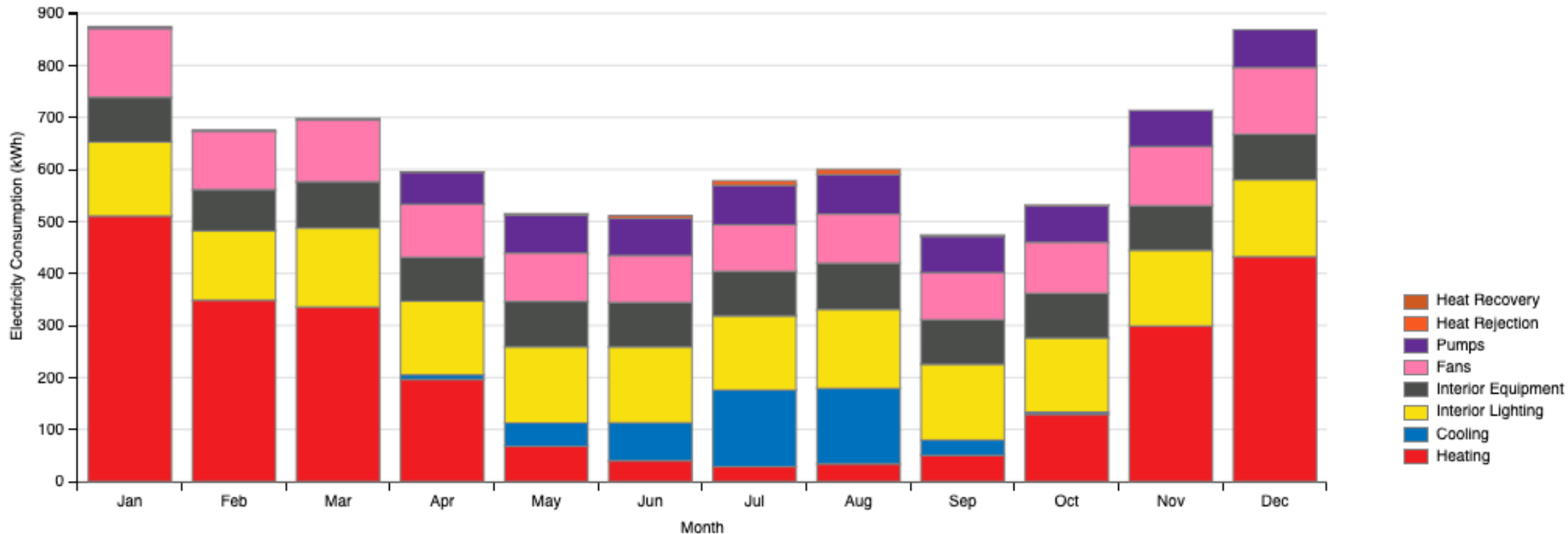
### Stockholm, Sweden 2050

Total Site Energy: 7,636 kWh  
 Total Building Area: 60m<sup>2</sup>  
 Total Site EUI: 127,27 kWh/m<sup>2</sup>

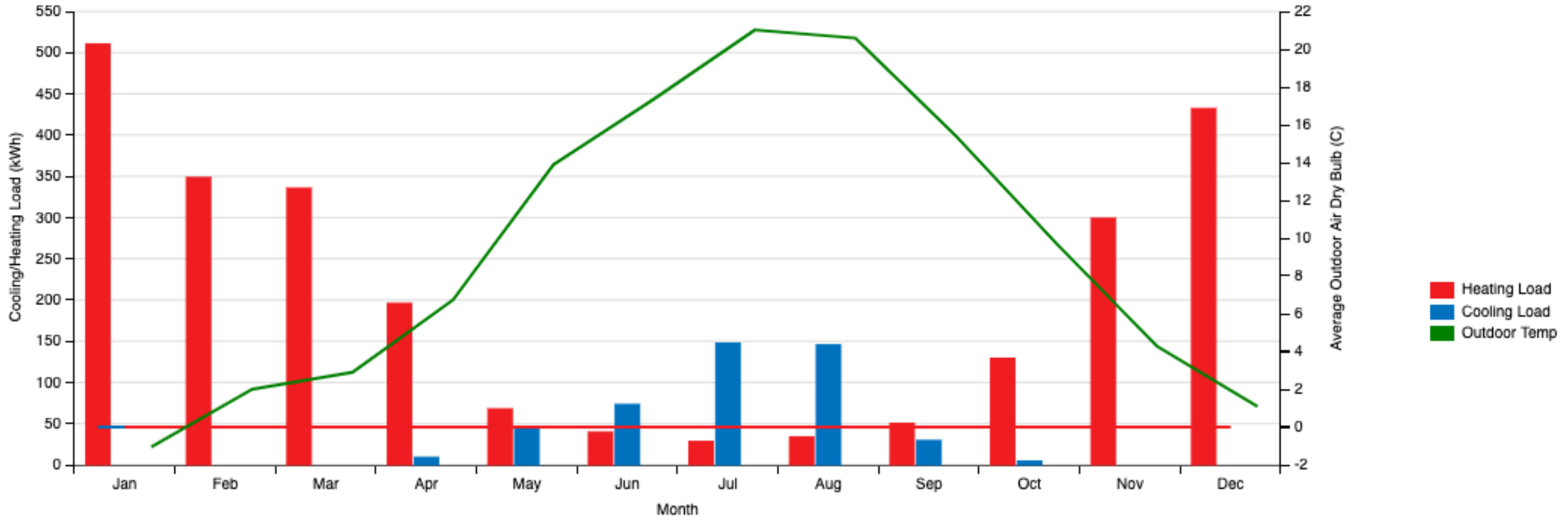
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	510.32	348.55	335.55	195.95	67.81	39.86	28.32	33.7	50.28	129.15	299.06	432.23	2470.78
Cooling				9.05	44.77	73.26	147.62	145.46	29.5	4.37			454.03
Interior Lighting	142.37	133.34	151.57	141.73	146.14	145.49	142.37	151.57	145.49	142.37	145.49	147.8	1735.72
Exterior Lighting													
Interior Equipment	86.04	79.3	89.11	84.47	87.41	85.84	86.04	89.11	85.84	86.04	85.84	87.74	1032.77
Exterior Equipment													
Fans	131.85	111.83	119.43	102.04	92.94	90.34	89.47	94.33	90.67	97.88	113.79	127.91	1262.49
Pumps	4.27	2.72	2.56	61.39	72.4	71.32	75.76	76.15	69.57	70.65	69.24	72.63	648.66
Heat Rejection				0.87	3.57	5.38	8.75	9.71	2.46	0.5			31.25
Humidification													
Heat Recovery													
Water Systems													
Refrigeration													
Generators													
<b>Total</b>	<b>874.85</b>	<b>675.74</b>	<b>698.22</b>	<b>595.5</b>	<b>515.02</b>	<b>511.5</b>	<b>578.34</b>	<b>600.01</b>	<b>473.81</b>	<b>530.96</b>	<b>713.42</b>	<b>868.32</b>	<b>7635.69</b>



# Stockholm, Sweden 2050



# Stockholm, Sweden 2050

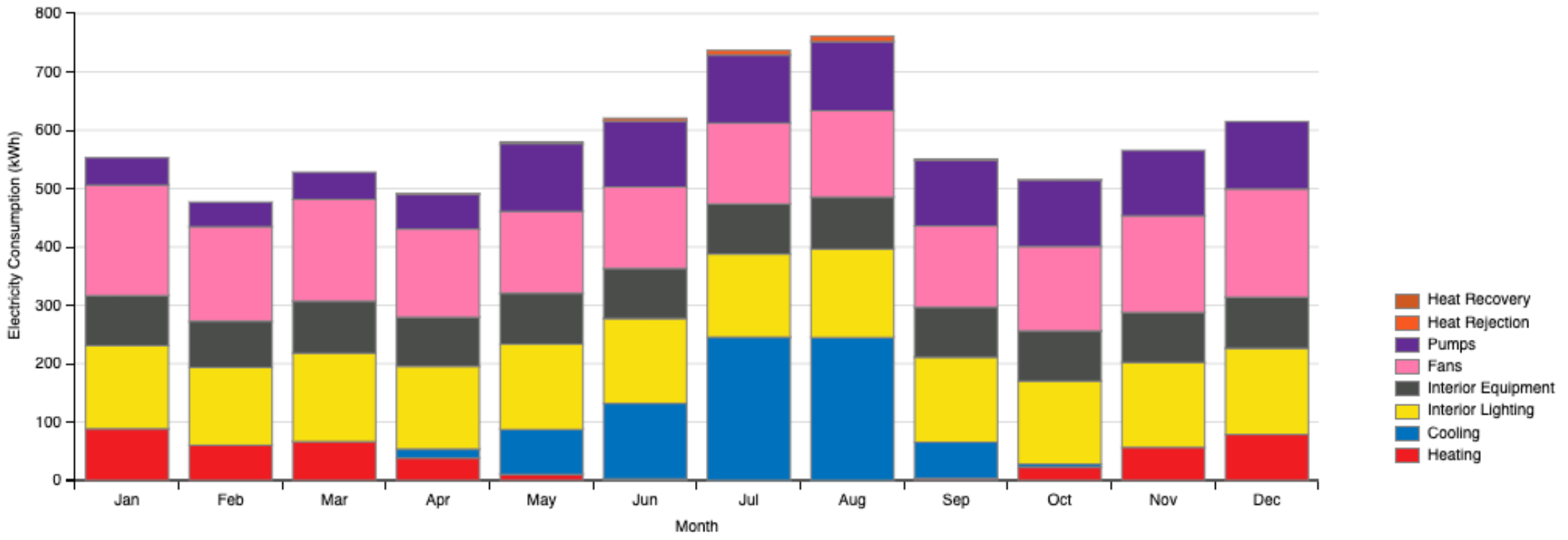


# Stockholm, Sweden 2050 with Hvac

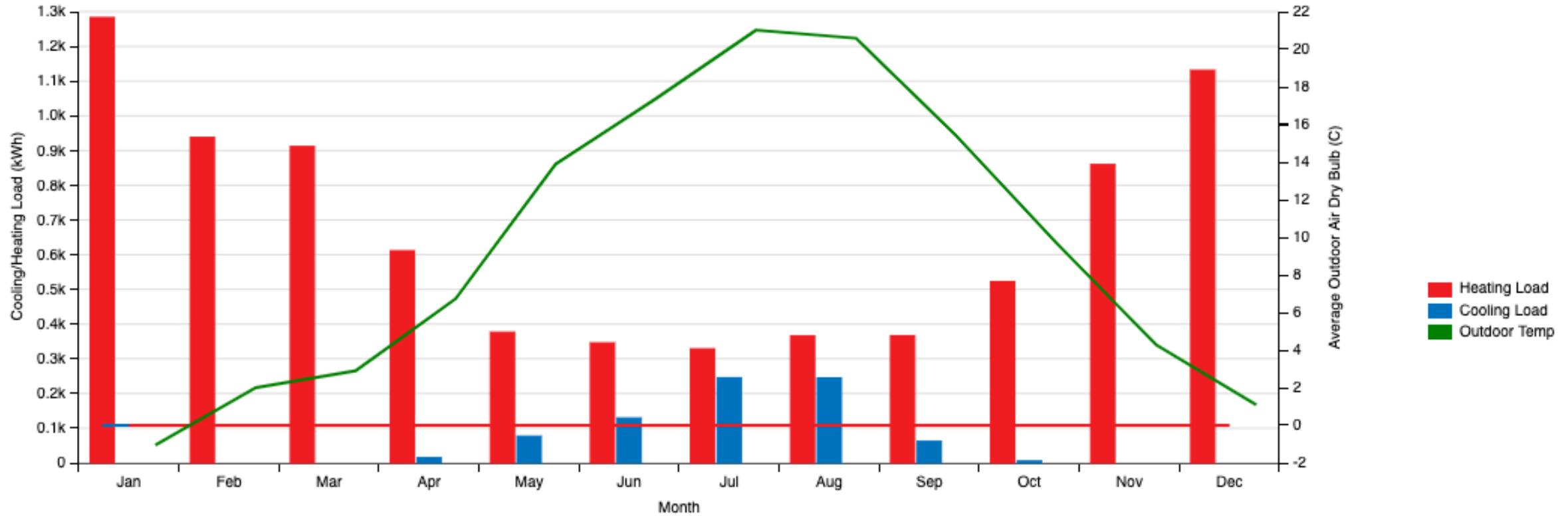
Total Site Energy: 14,606 kWh  
Total Building Area: 60m<sup>2</sup>  
Total Site EUI: 243.43 kWh/m<sup>2</sup>

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	88.37	60.13	66.41	38.15	10.19	2.41	0.07	0.0	3.21	22.3	56.54	78.5	426.29
Cooling				15.38	76.98	129.33	245.29	244.74	62.11	5.43			779.26
Interior Lighting	142.37	133.34	151.57	141.73	146.14	145.49	142.37	151.57	145.49	142.37	145.49	147.8	1735.72
Exterior Lighting													
Interior Equipment	86.04	79.3	89.11	84.47	87.41	85.84	86.04	89.11	85.84	86.04	85.84	87.74	1032.77
Exterior Equipment													
Fans	189.3	161.87	174.36	150.72	140.14	139.62	138.56	147.96	139.19	144.41	165.46	185.12	1876.7
Pumps	46.64	42.06	46.42	60.04	116.06	112.91	116.41	118.4	112.64	114.07	111.96	115.71	1113.33
Heat Rejection				0.73	3.04	5.02	8.05	9.11	2.11	0.18			28.23
Humidification													
Heat Recovery													
Water Systems													
Refrigeration													
Generators													
<b>Total</b>	<b>552.72</b>	<b>476.7</b>	<b>527.86</b>	<b>491.22</b>	<b>579.96</b>	<b>620.62</b>	<b>736.8</b>	<b>760.88</b>	<b>550.59</b>	<b>514.82</b>	<b>565.29</b>	<b>614.87</b>	<b>6992.31</b>

# Stockholm, Sweden 2050 with Hvac



# Stockholm, Sweden 2050 with Hvac



## Results

- Stockholms HVAC impact is higher than in Athens
- Athens HVAC impact is in a range of 100-200 kWh
- With HVAC you need less electricity for heating but more for fans and pumps
- With HVAC in stockholm you can save around 2000kWh