SHARING SOLUTIONS, SUSTAINING OUR FUTURE

CampusEnergy2018

MARCH 5-9, 2018 ▲ HILTON BALTIMORE ▲ BALTIMORE, MD

FARRIS ENGINEERING

Cold Climate Chiller Plant SOUTH DAKOTA STATE UNIVERSITY

March 8, 2018

Agenda

01 Evaluation

02 Construction

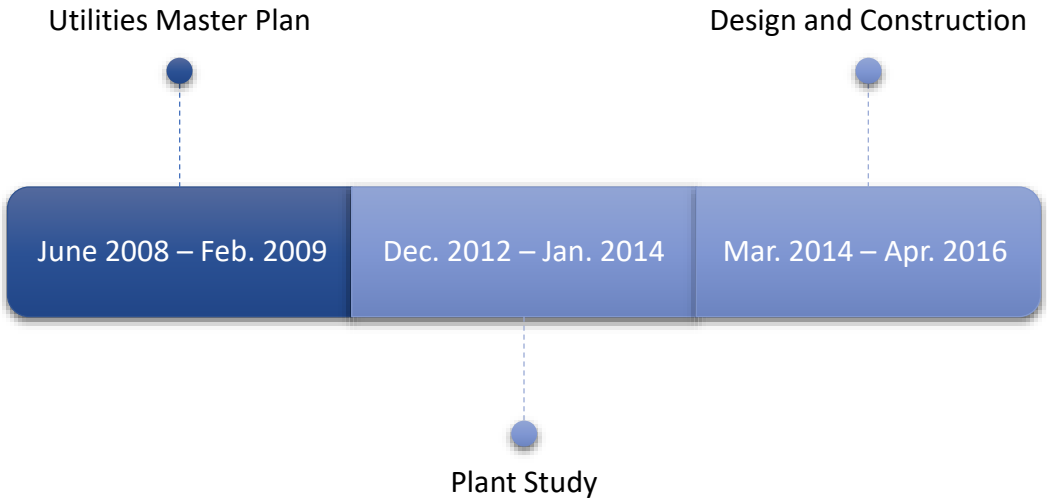
03 Energy Use

04 Lessons Learned

Evaluation

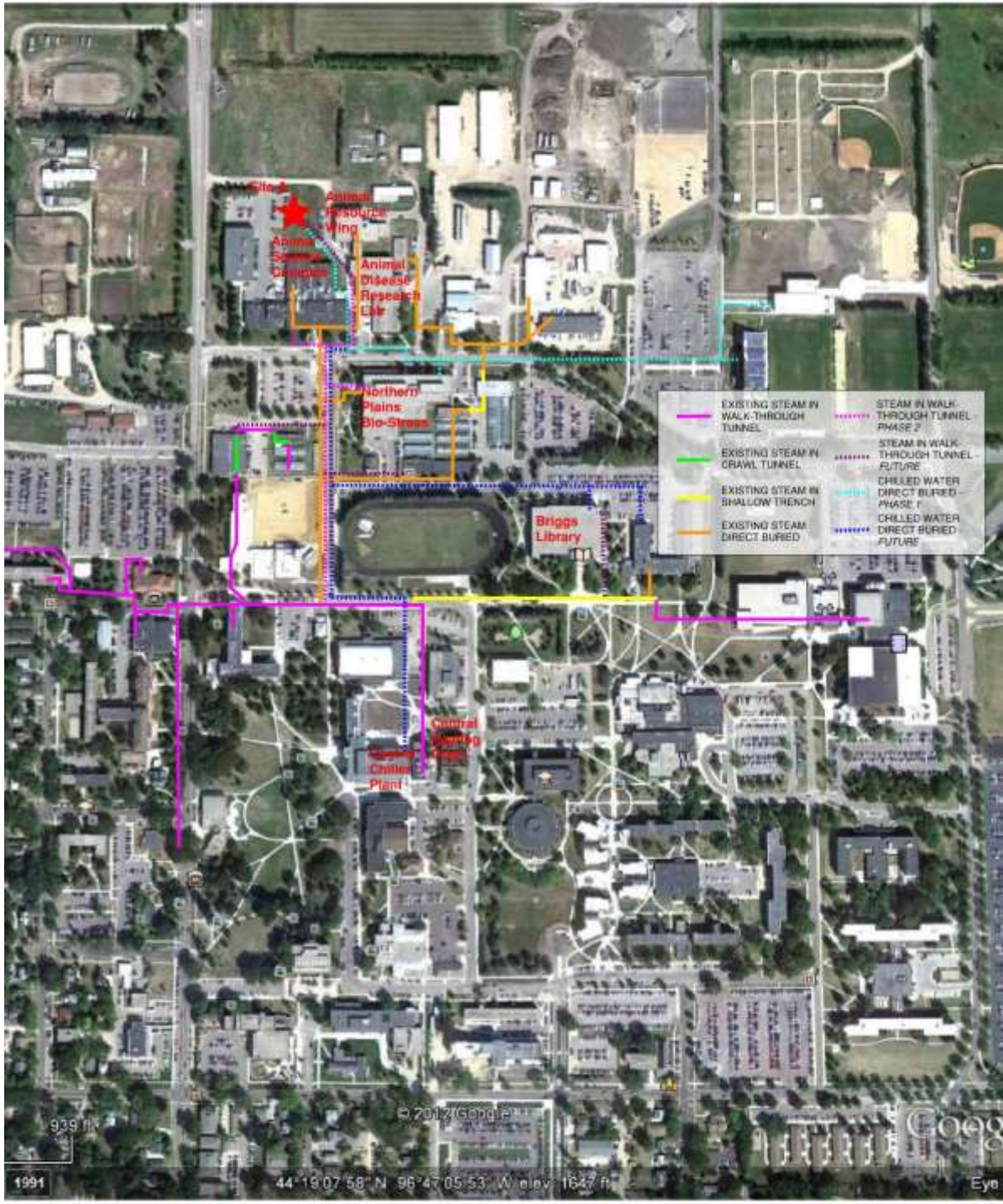
Results from 2005 Campus Master plan for 2025.

Evaluation


Utilities Master Plan
Design and Construction
June 2008 – Feb. 2009
Dec. 2012 – Jan. 2014
Mar. 2014 – Apr. 2016
Plant Study

Evaluation

- Northwest Part of Campus
- Research Centers which were utilizing air cooled condensers provide base loading

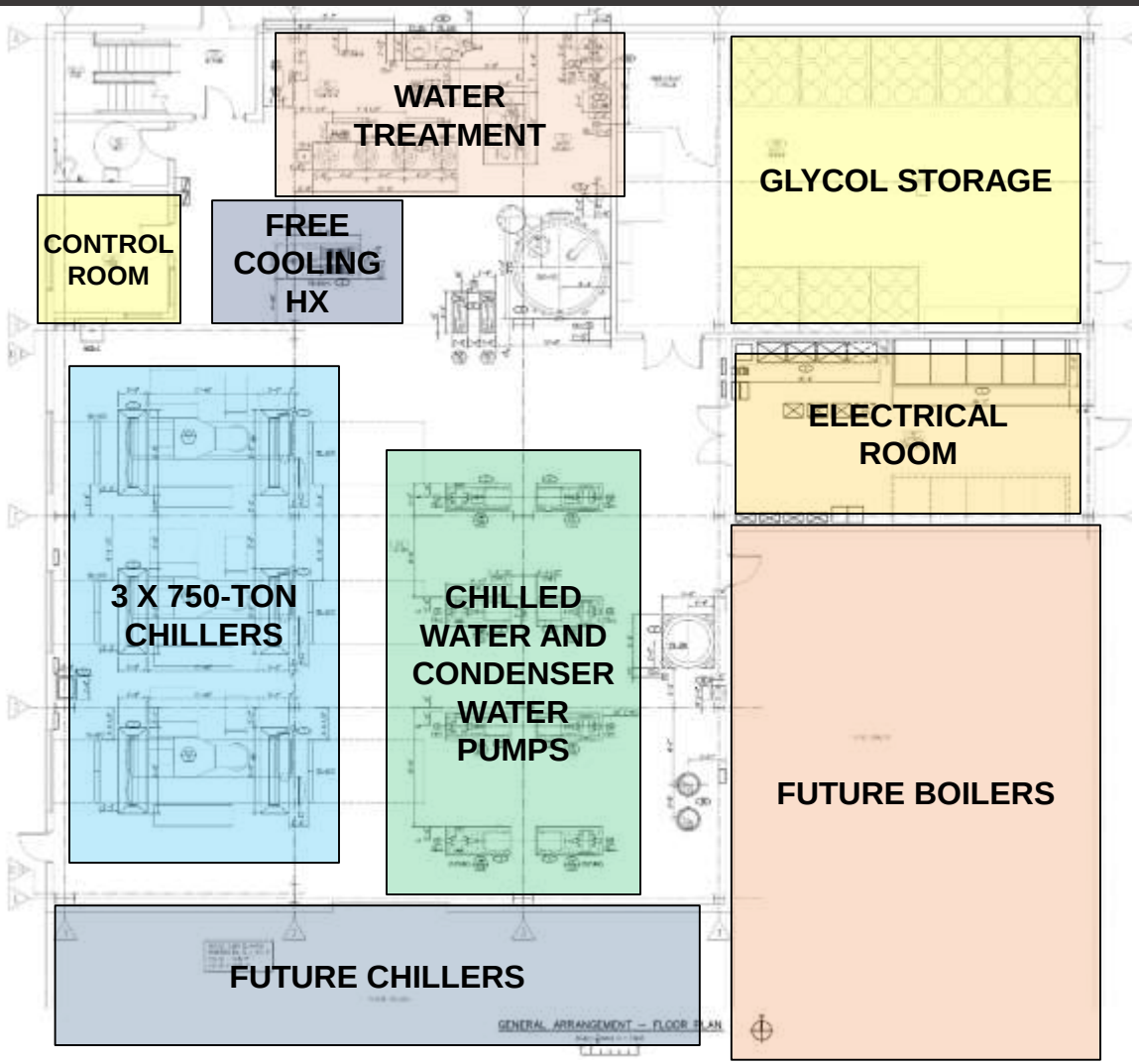


Construction

- **Football Stadium construction moved up. Changed Distribution System installed Day 1.**

- **New Precision Ag Building announced the week prior to factory testing the chillers. Plant went from N+1 to N-all most meet peak.**

Plant Design



Construction

Construction PPT Piping

Construction

Most of the piping was fabricated at the factory to minimize the on site fusion welding.

Construction

Equipment connections at chillers and pumps were steel.

Construction

Extensive filtration to maintain water quality

Construction

Construction

Free Cooling Heat Exchanger

Cooling Tower Drain Down Tank

Comparison

Cooling Degree Days

- 2015 – 526
- 2016 – 591
- 2017 – 501

Electrical (Consumption and Demand)

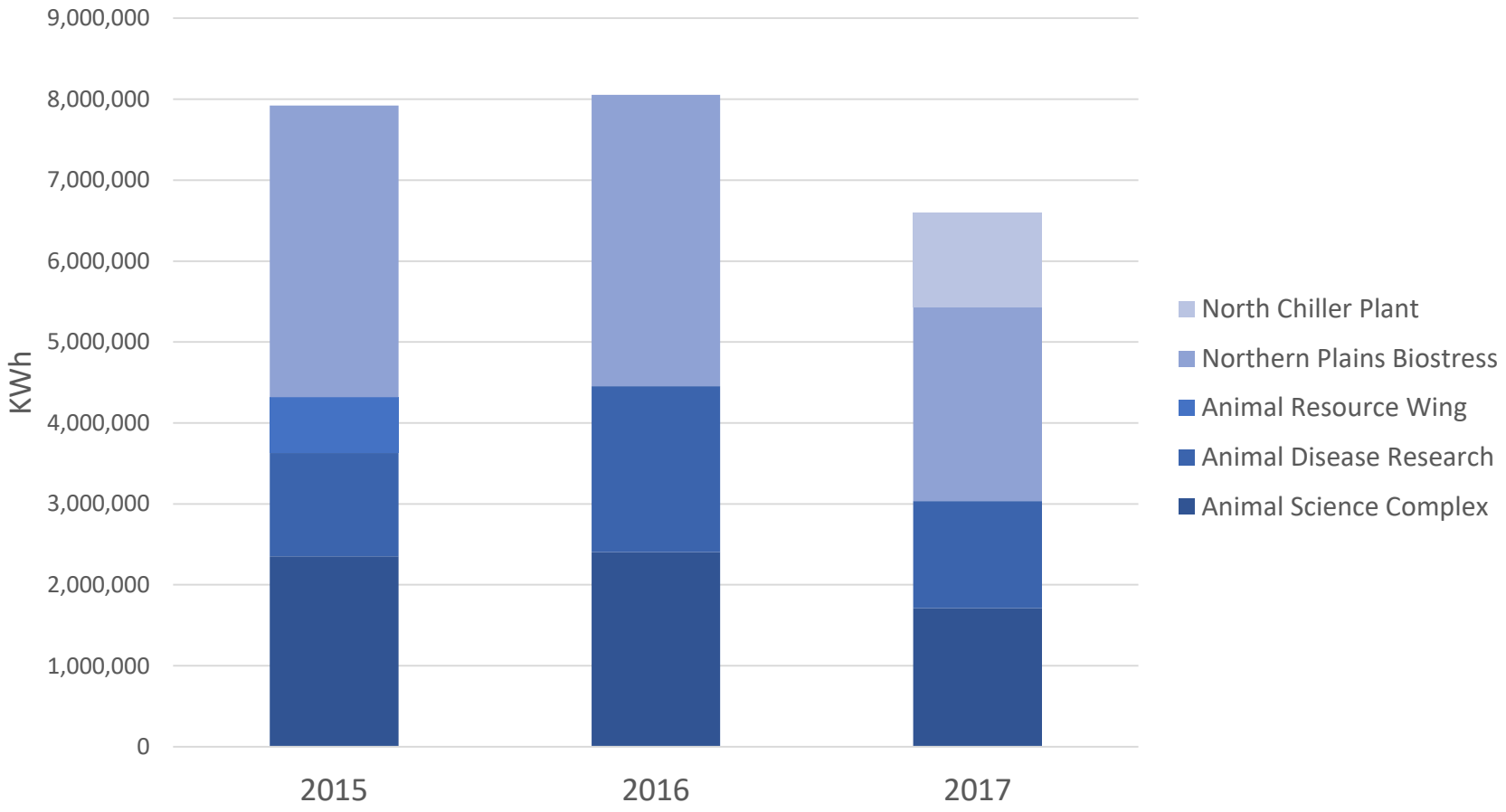
Water Use

- Air cooled chillers were sprayed with water to increase capacity.

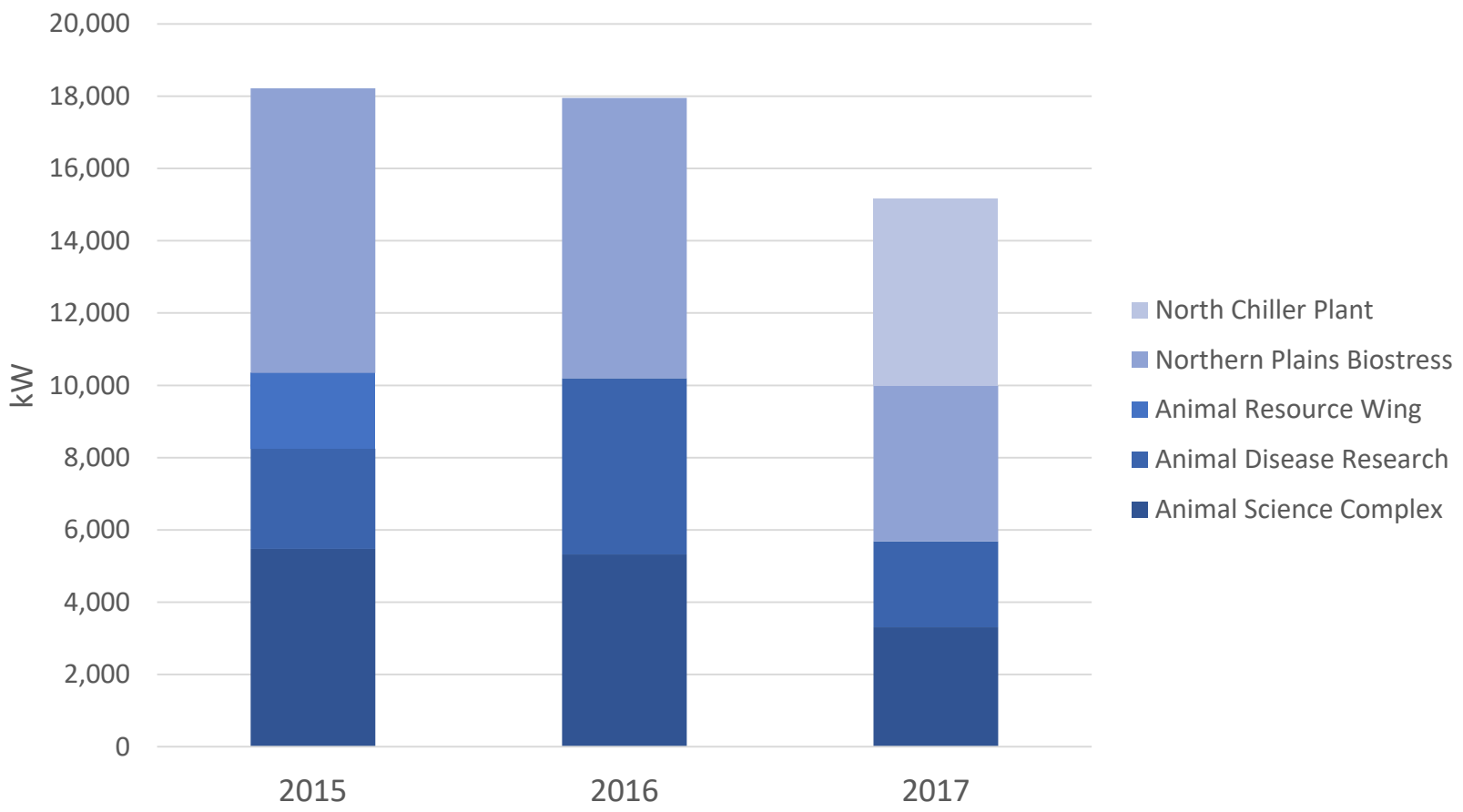
Sewer Use

- New Plant does not pay sewer charge for evaporated tower water (Make-up minus blowdown).

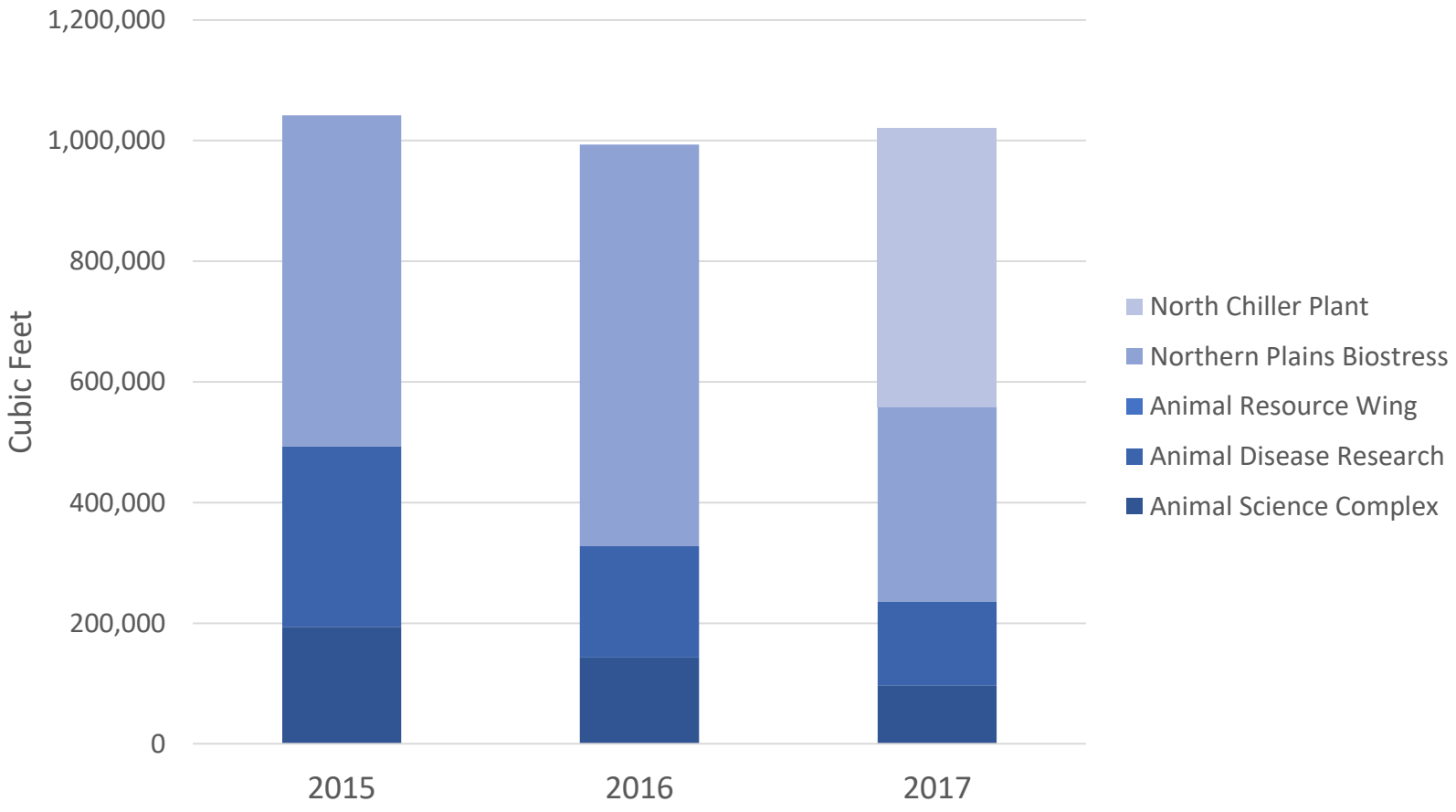
Electrical - Consumption



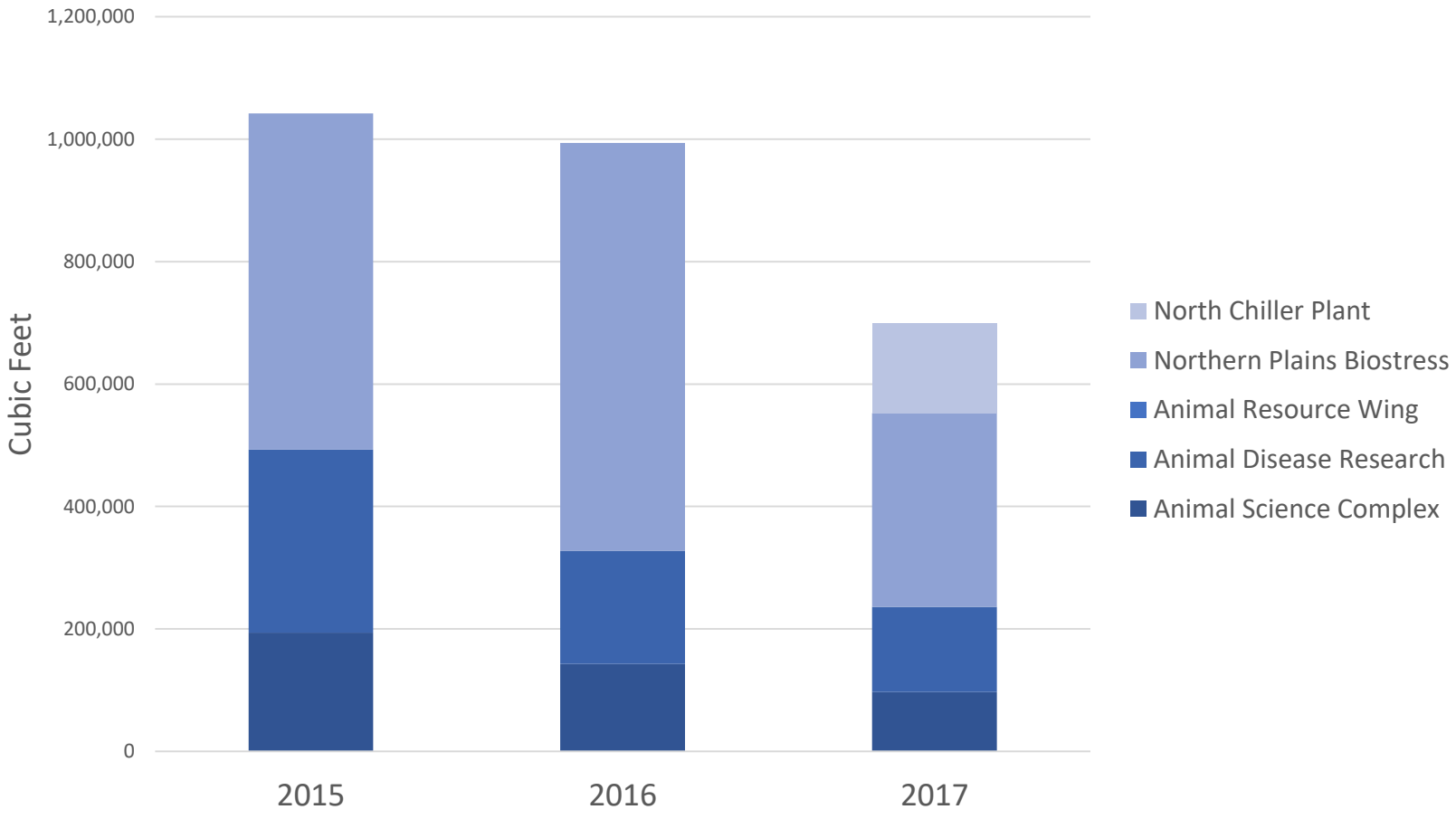
Electrical - Demand



Water Use


1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Cubic Feet
2015
2016
2017
North Chiller Plant
Northern Plains Biostress
Animal Resource Wing
Animal Disease Research
Animal Science Complex

Sewer Charge



Savings Summary

Annual Total Savings
$169,310

Electrical Consumption – 16.7%

Electrical Demand – 16.7%

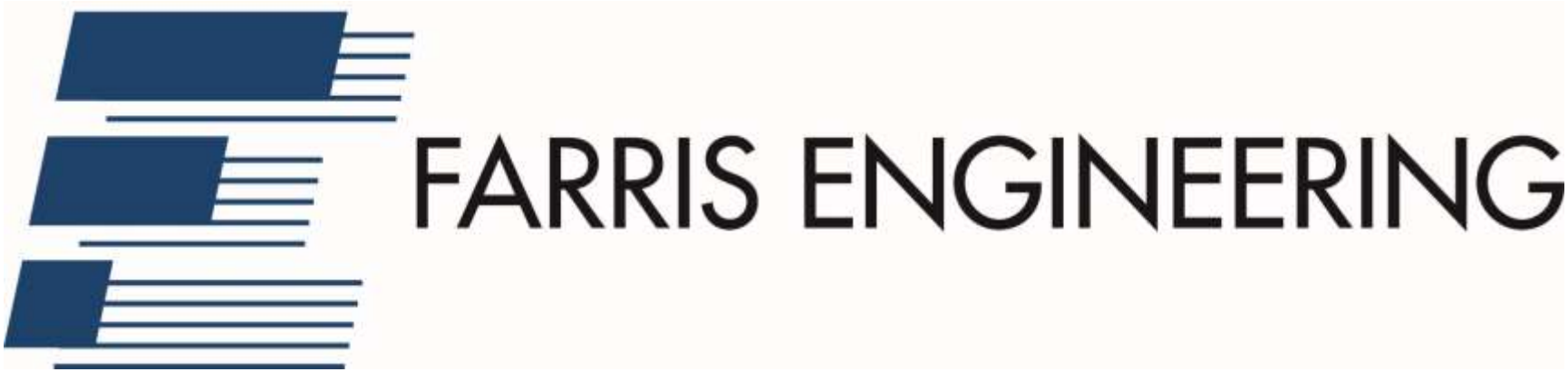
Water Use – 2%

Sewer Use – 32.9%

Total Plant Energy Use

	kWh	Btu	ton-hour	kW/ton
January	12,726	4,999,936	417	30.543
February	24,910	104,000,000	8,667	2.874
March	19,549	134,000,128	11,167	1.751
April	41,656	489,999,872	40,833	1.020
May	100,701	1,332,000,000	111,000	0.907
June	204,360	3,103,000,064	258,583	0.790
July	345,016	5,542,579,840	461,882	0.747
August	259,728	4,388,170,176	365,681	0.710
September	219,962	3,430,939,584	285,912	0.769
October	54,493	785,000,448	65,417	0.833
November	10,680	48,000,000	4,000	2.670
December	9,669	9,999,360	833	11.604
	1,303,450	19,372,689,408	1,614,391	0.807

Peak load – 1,050 Tons instantaneous
Sustained Peak - ~800 Ton



Questions