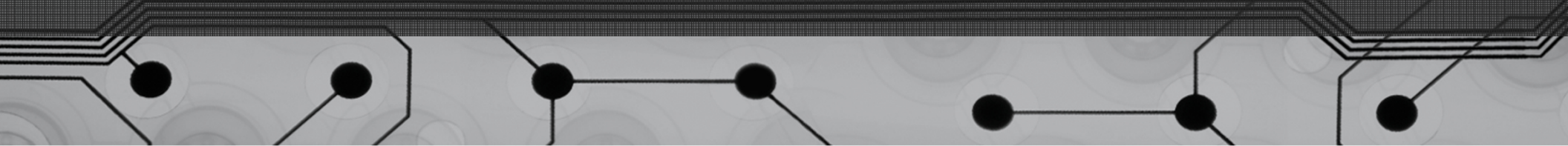


Energy Study



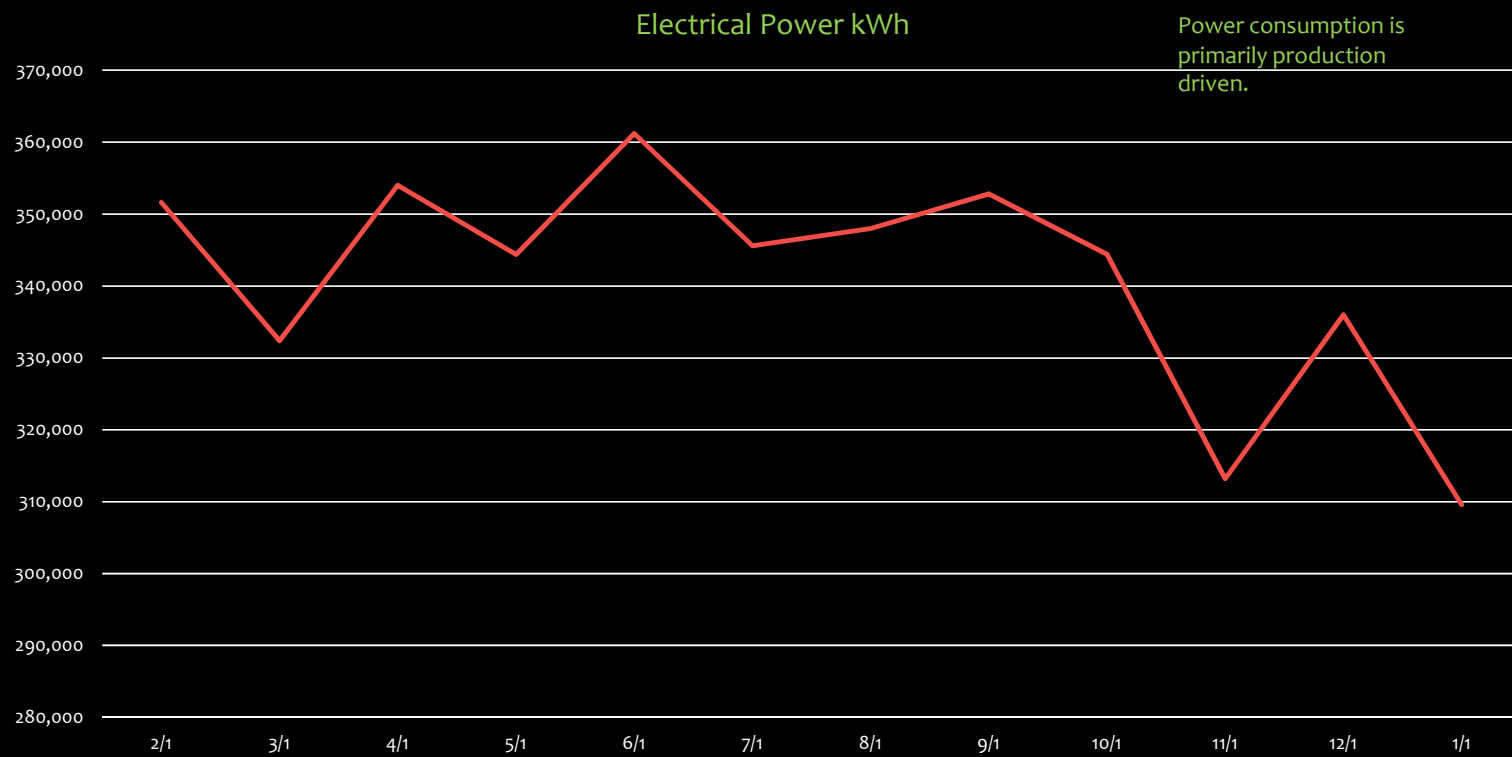
# Energy Study Objectives

- Understand Electrical Usage and Savings Opportunities
- Understand Natural Gas Usage and Savings Opportunities
- Inventory Facility Equipment and Recommend a Building Management System
- Network Layout

# Energy Study Objective

Understand Electrical Usage and Savings Opportunities

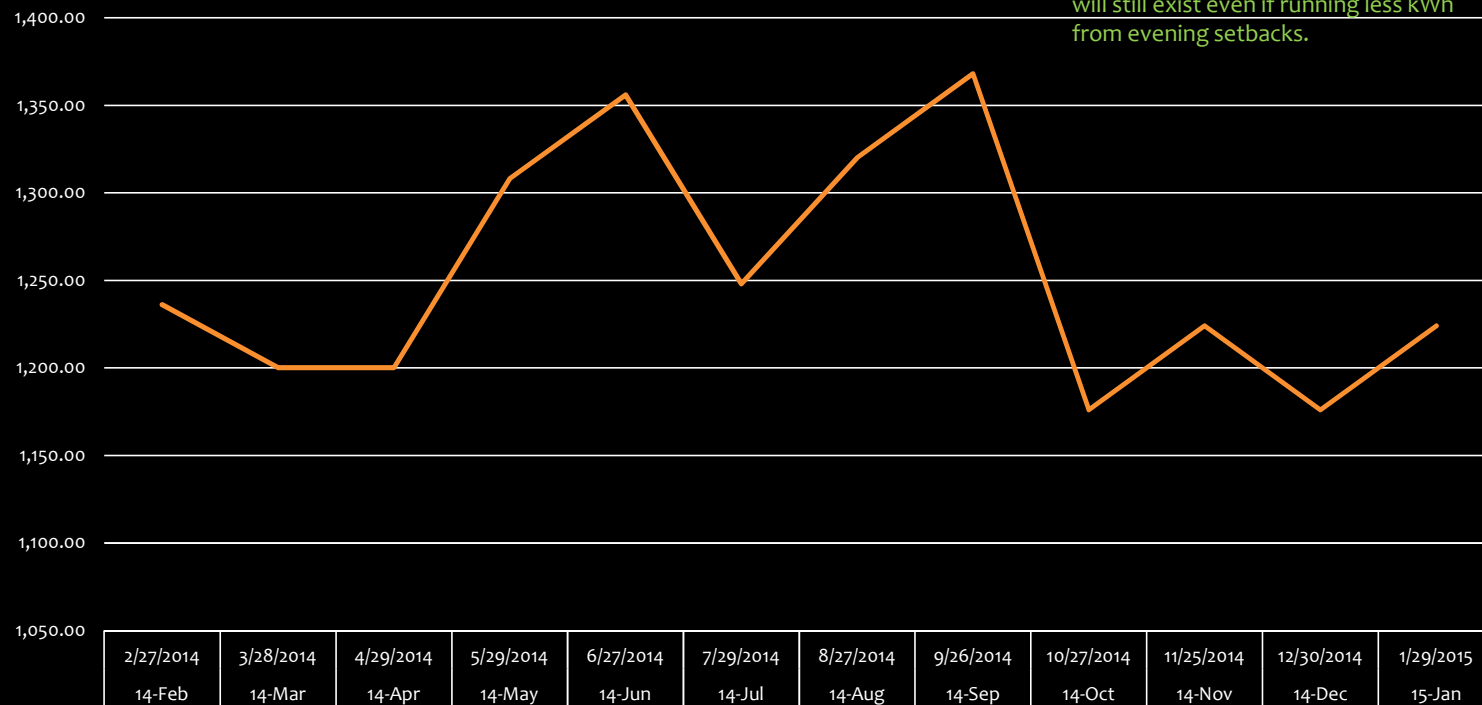
# Electrical Usage



# Electrical Usage

Electrical Demand kVA

Demand is based on peak values which will still exist even if running less kWh from evening setbacks.



# Electrical Usage

Baseline consumption is 336,000 kWh while average consumption is 341,000 kWh. This leaves very little to reduce during the summer months.

		Month	2014 Volume (kWh)	2014 Cooling Degree Days	Cooling kWh	Deg. D=75	Deg. D=70	% Degree day savings per deg. Reduced	Projected Savings (Therms)	Projected Savings %	Projected Savings \$
Slope	129.3066	Jan	309,600	-	(26,425)	-	-	#DIV/o!	#DIV/o!	#DIV/o!	#DIV/o!
Baseline	336024.7	Feb	351,600	-	15,575	-	-	#DIV/o!	#DIV/o!	#DIV/o!	#DIV/o!
		Mar	332,400	-	(3,625)	-	-	#DIV/o!	#DIV/o!	#DIV/o!	#DIV/o!
Working Shifts/Month	20	Apr	354,000	-	17,975		-	#DIV/o!	#DIV/o!	#DIV/o!	#DIV/o!
Setback Temperature	75	May	344,400	39	8,375	1	20	19.00	7,823.91	2.27	672.86
		Jun	361,200	150	25,175	28	107	14.77	18,277.57	5.06	1,571.87
\$ / kWh	0.086	Jul	345,600	83	9,575	9	55	16.73	7,874.95	2.28	677.25
\$ / kWh Delivery	0	Aug	348,000	159	11,975	25	110	15.45	9,099.40	2.61	782.55
		Sep	352,800	40	16,775	10	29	13.10	10,807.53	3.06	929.45
		Oct	344,400	-	8,375	-	-	#DIV/o!	#DIV/o!	#DIV/o!	#DIV/o!
		Nov	313,200	-	(22,825)	-	-	#DIV/o!	#DIV/o!	#DIV/o!	#DIV/o!
		Dec	336,000	-	(25)	-	-	#DIV/o!	#DIV/o!	#DIV/o!	#DIV/o!
										1Yr. Total	4,633.97

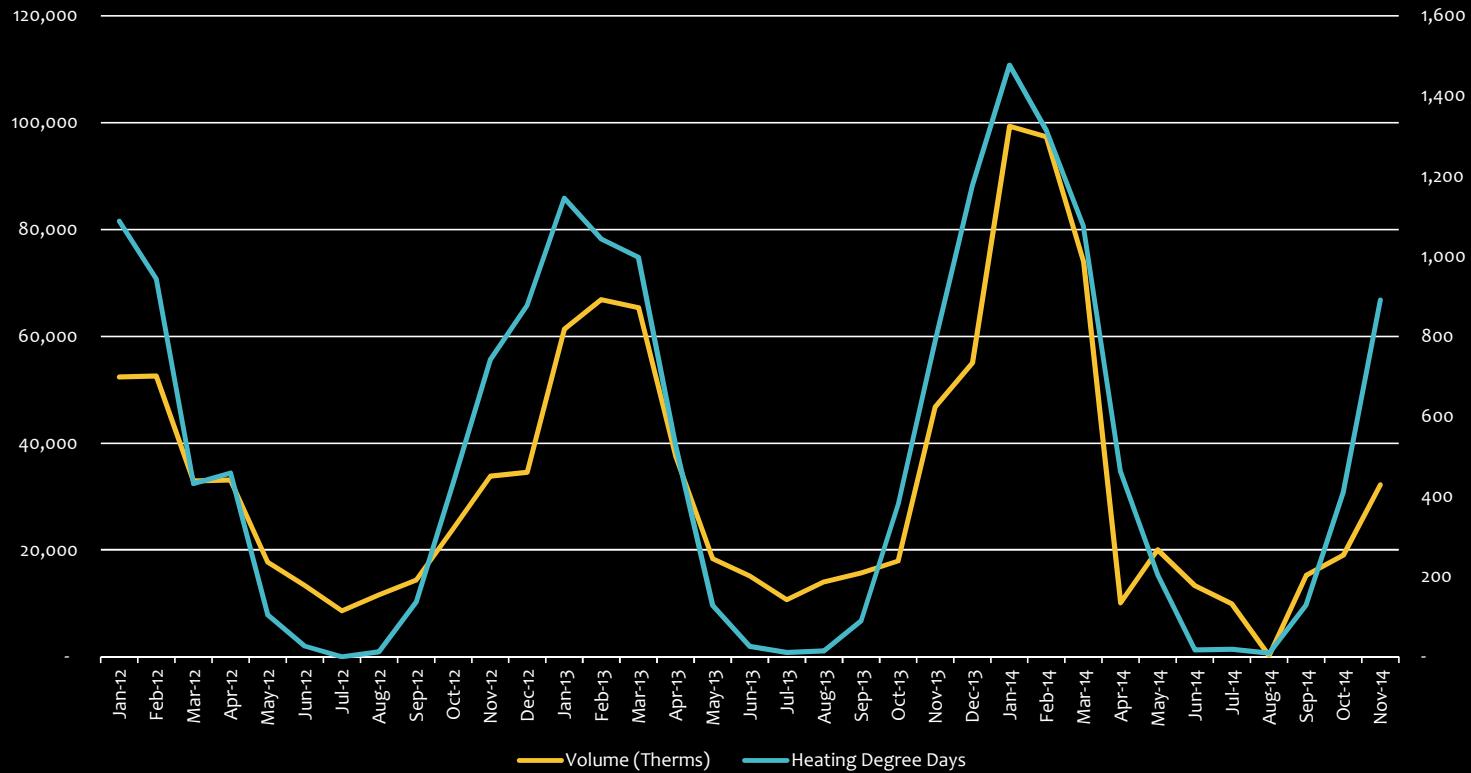
# Energy Study Objective

Understand Natural Gas Usage and Savings Opportunities

# Natural Gas Usage

Natural Gas Usage by Month

Consumption is cyclical with large swings based on season.

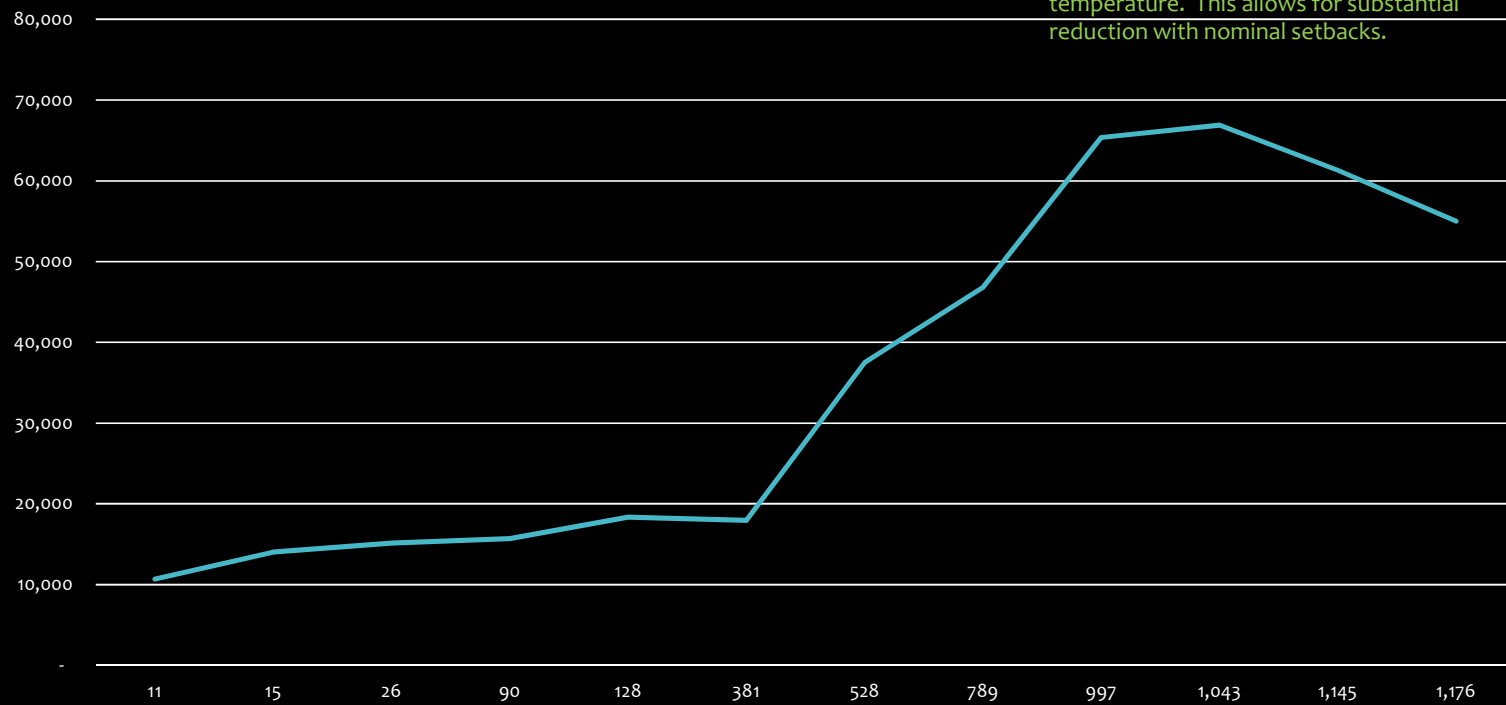




# Natural Gas Usage

2013 Natural Gas Usage vs Deg./Days

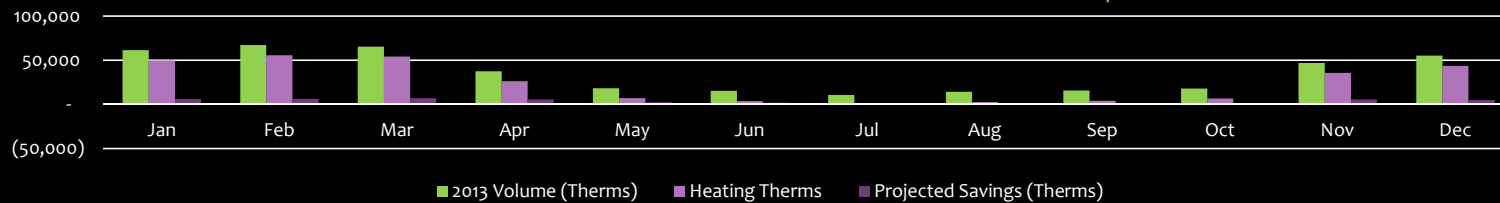
Consumption is primarily driven by outside temperature. This allows for substantial reduction with nominal setbacks.



# Natural Gas Usage

## Savings Projections

Baseline consumption is 11,500 therms while average consumption is 35,500 therms. This provides significant savings potential using setbacks and pressure control.



		Month	2013 Volume (Therms)	2013 Heating Degree Days	Heating Therms	Deg. D=60	Deg. D=65	% Degree day savings per deg. Reduced	Projected Savings (Therms)	Projected Savings %	Projected Savings \$
Slope	45.36961	Jan	61,278	1,145	49,812	968	1,123	2.76	5,794.77	9.46	2,820.37
Baseline	11465.99	Feb	66,890	1,043	55,424	913	1,053	2.66	6,210.88	9.29	3,022.90
		Mar	65,389	997	53,923	840	995	3.12	7,080.10	10.83	3,445.95
		Apr	37,506	528	26,040	409	542	4.91	5,385.70	14.36	2,621.28
Working Shifts/Month	20	May	18,333	128	6,867	95	160	8.13	2,351.37	12.83	1,144.44
Setback Temperature	62	Jun	15,144	26	3,678	20	48	11.67	1,808.36	11.94	880.15
		Jul	10,687	11	(779)	12	36	13.33	(437.49)	(4.09)	(212.93)
		Aug	14,041	15	2,575	20	51	12.16	1,319.40	9.40	642.16
\$ / Therm Gas	0.437	Sep	15,687	90	4,221	71	127	8.82	1,568.83	10.00	763.56
\$ / Therm Delivery	0.04971	Oct	17,940	381	6,474	291	406	5.67	1,545.61	8.62	752.26
		Nov	46,830	789	35,364	633	782	3.81	5,679.29	12.13	2,764.17
		Dec	55,010	1,176	43,544	1,016	1,171	2.65	4,858.04	8.83	2,364.46
										tYr. Total	21,008.77

# Energy Study Objective

Inventory Facility Equipment and Recommend a Building Management System

# Inventory Facility Equipment and Recommend a Building Management System

- 83 Devices Inventoried
- Estimated I/O Count for Quoting Purposes Only.
- Hard I/O Count and Device Selection Still Needs to Happen.

T-Stat	Discharge Air Sensor	Heat Command	Cool Command	Fan/ Run Command	Heat % Command	Cool % Command	Fan/Run Stat	Burner Stat	Cool Stat	Fault Stat	Damper Stat	Filter Pressure
16	19	16	21	75	16	3	75	16	2	21	0	26

# Inventory Facility Equipment and Recommend a Building Management System

## Trane – Tracer SC

- Medium \$ per I/O
- Good Interface & Programmability
- Limited Flexibility

## Honeywell - Webvision

- Medium \$ per I/O
- Good Interface
- Limited Flexibility

## Rockwell Automation - PlantPAx

- High \$ per I/O
- Good Interface & Programmability
- Highly Customizable

## Siemens - Apogee

- High \$ per I/O
- Poor Interface & Programmability
- Limited Support

## Johnson Controls - Metasys

- High \$ per I/O
- Good Hardware
- Poor Interface & Programmability

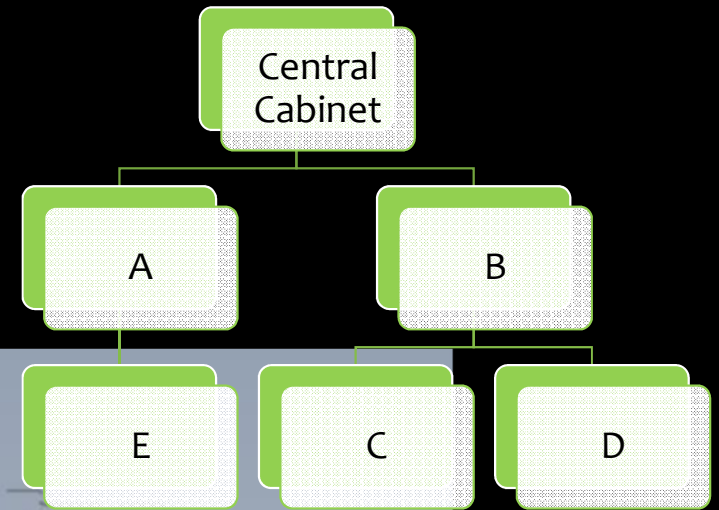
# Energy Study Objective

Network Layout

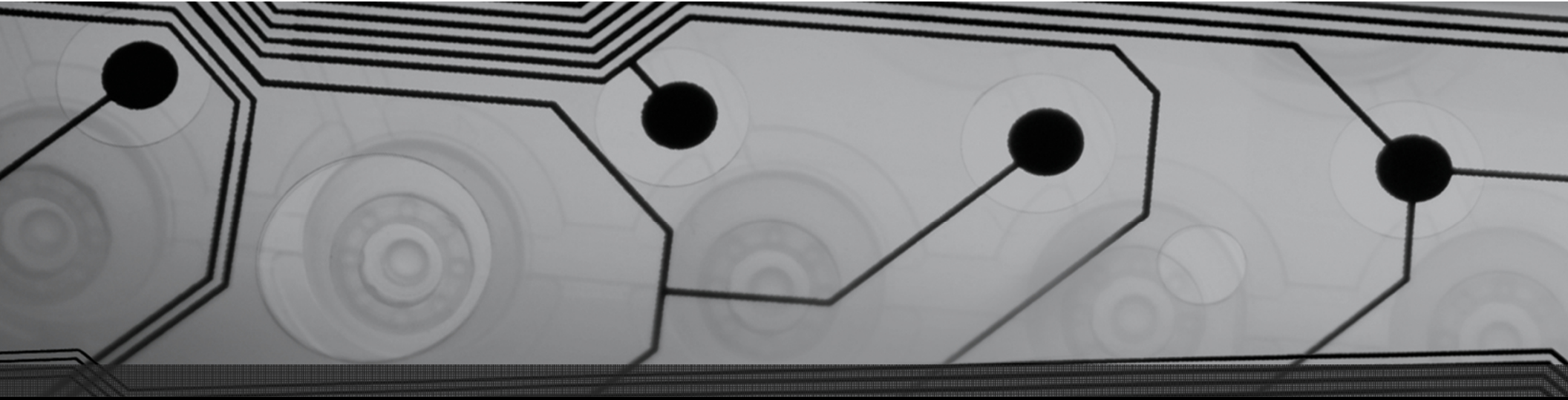
# Network Layout

- (1) Central Cabinet
  - (1) 8 port Layer 3 Manage Switch
  - (1) 24 port Layer 2 Managed Switch
  - (1) DHCP Server
  - (1) 24 position Copper Patch Panel
  - (1) UPS to provide ~10 Minutes Runtime
  
- (5) Remote Cabinets
  - (1) 24 port Layer 2 Managed Switch
  - (1) 24 position Copper Patch Panel
  - (1) UPS to provide ~10 Minutes Runtime
  - (1) 15U Wall Mount Cabinet

# Network Layout







Energy Study

