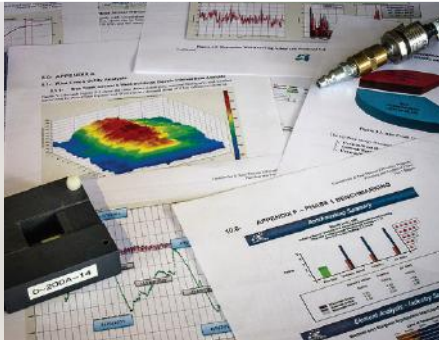




**Graphet**  
DATA MINING  
<Empowering Energy Efficiency>

# Strategic Energy Management Program Minneapolis Star Tribune

Conserve.



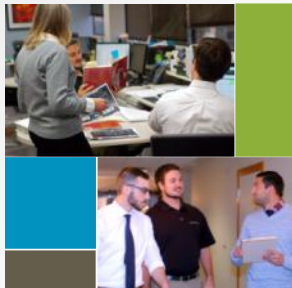
Manage.

Save.



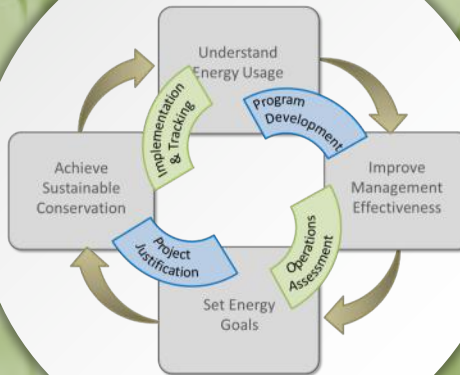
# Empowering Energy Efficiency

## People



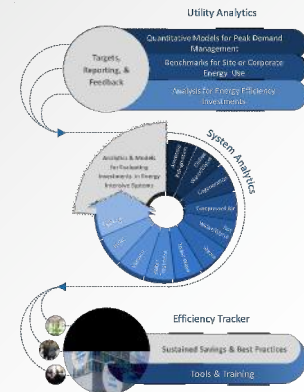
Team of niche problem solvers

## Process



Strategic Energy Management for sustainability

## Technology

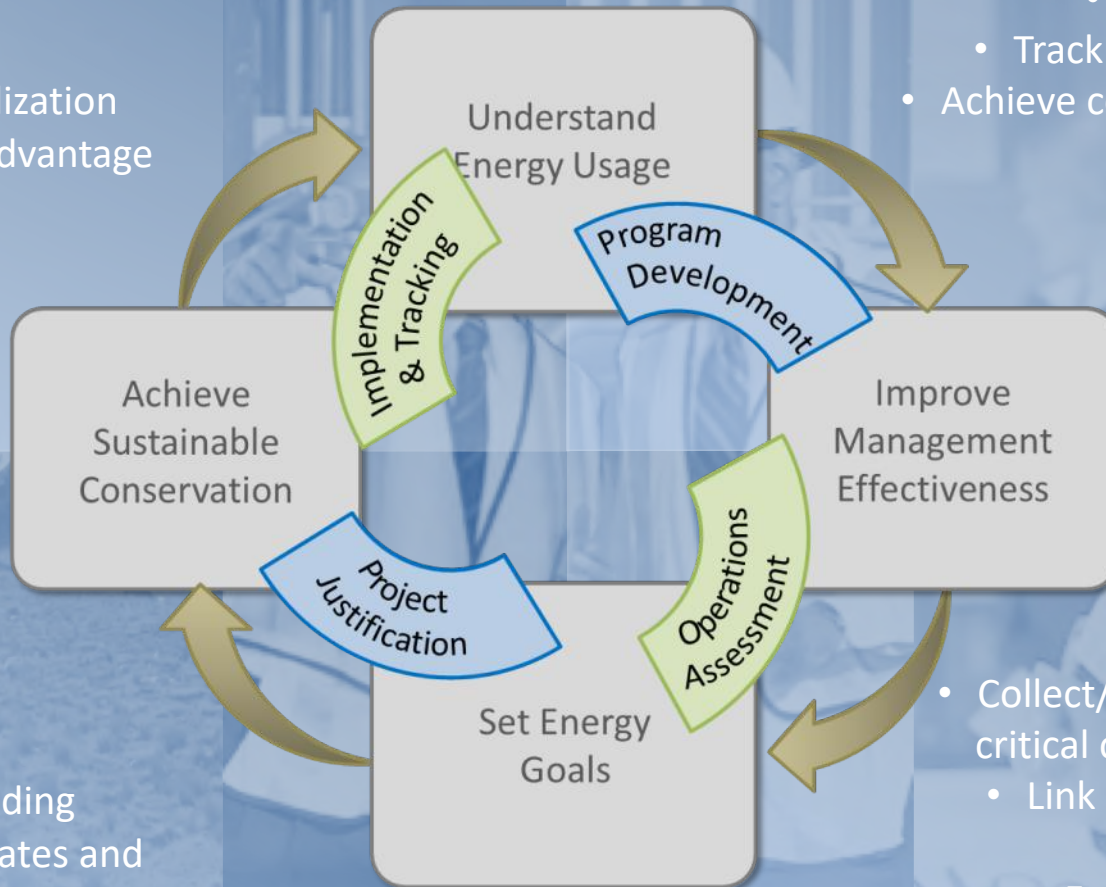


Visualization tools and methods for results

# Graphet's SEM Program Deliverables

- Review updates
- Evaluate efforts
- Improve capital utilization
- Gain competitive advantage

- Visualize performance
- Track actual vs projected use
- Achieve consensus for next steps



- Select projects for implementation
- Request capital funding
- Apply available rebates and seek pre-approvals

- Collect/organize data including critical operating requirements
  - Link energy management to business objectives
  - Engage key site personnel

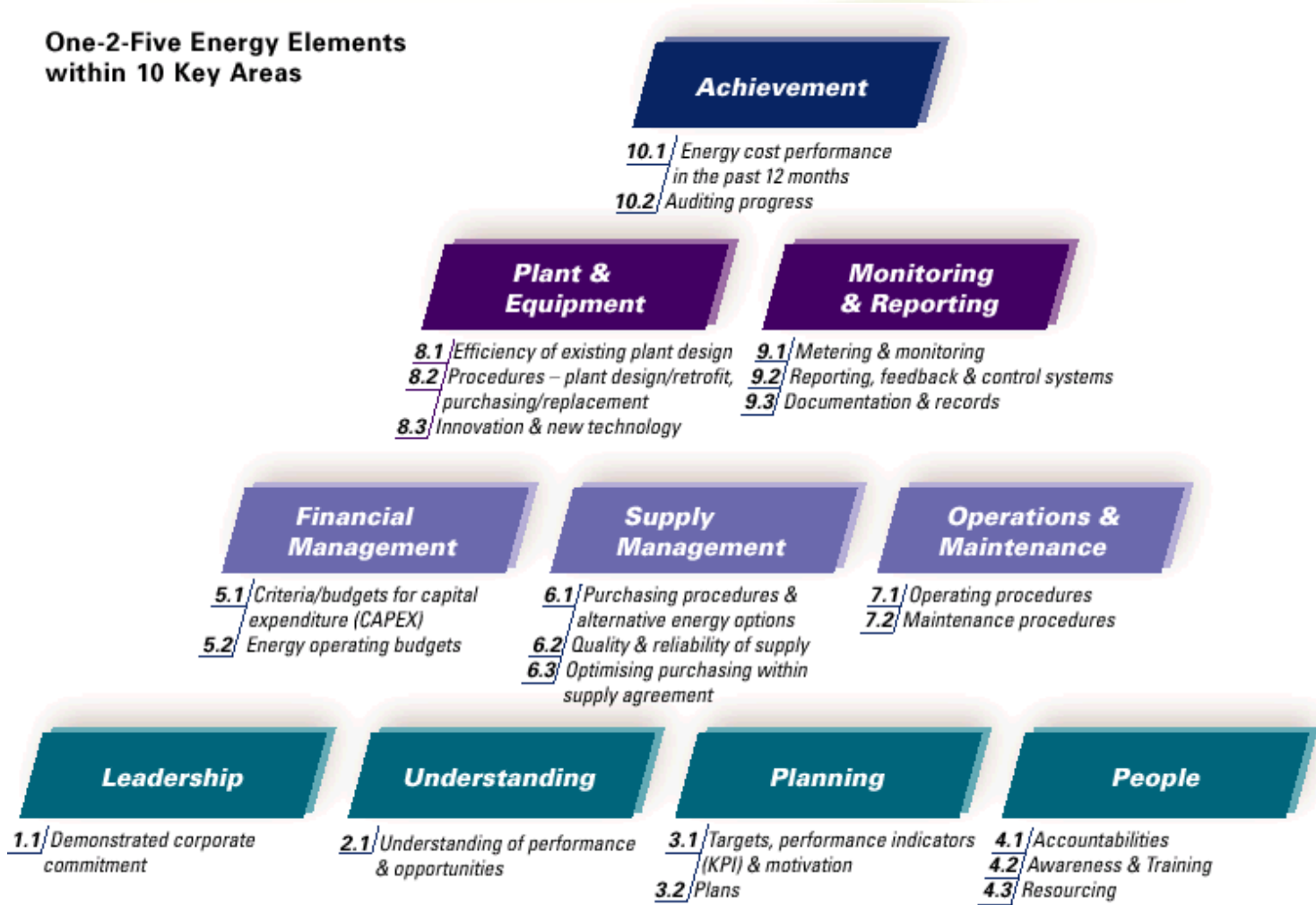
# Process Efficiency Program Drives SEM Objectives

- How are we managing energy?
- What is our potential for savings?
- How do we prioritize opportunities for implementation?
- Can we track and verify the impact of implementing energy projects?



# Strategic Energy Management Elements

**One-2-Five Energy Elements  
within 10 Key Areas**



# Energy Management Practices: Typical Priorities

## Understanding of performance and opportunities

- Conduct a baseline study (energy audit) to establish energy consumption by major users and opportunities for savings

## Plans

- Develop a strategic, long term energy plan for at least the next two to three years, with specific actions to improve energy performance and management systems

## Operating procedures

- Recognize the linkage between energy efficiency and production throughput in all operating instructions and include actions to reduce energy use during turndowns, stoppages, and delays

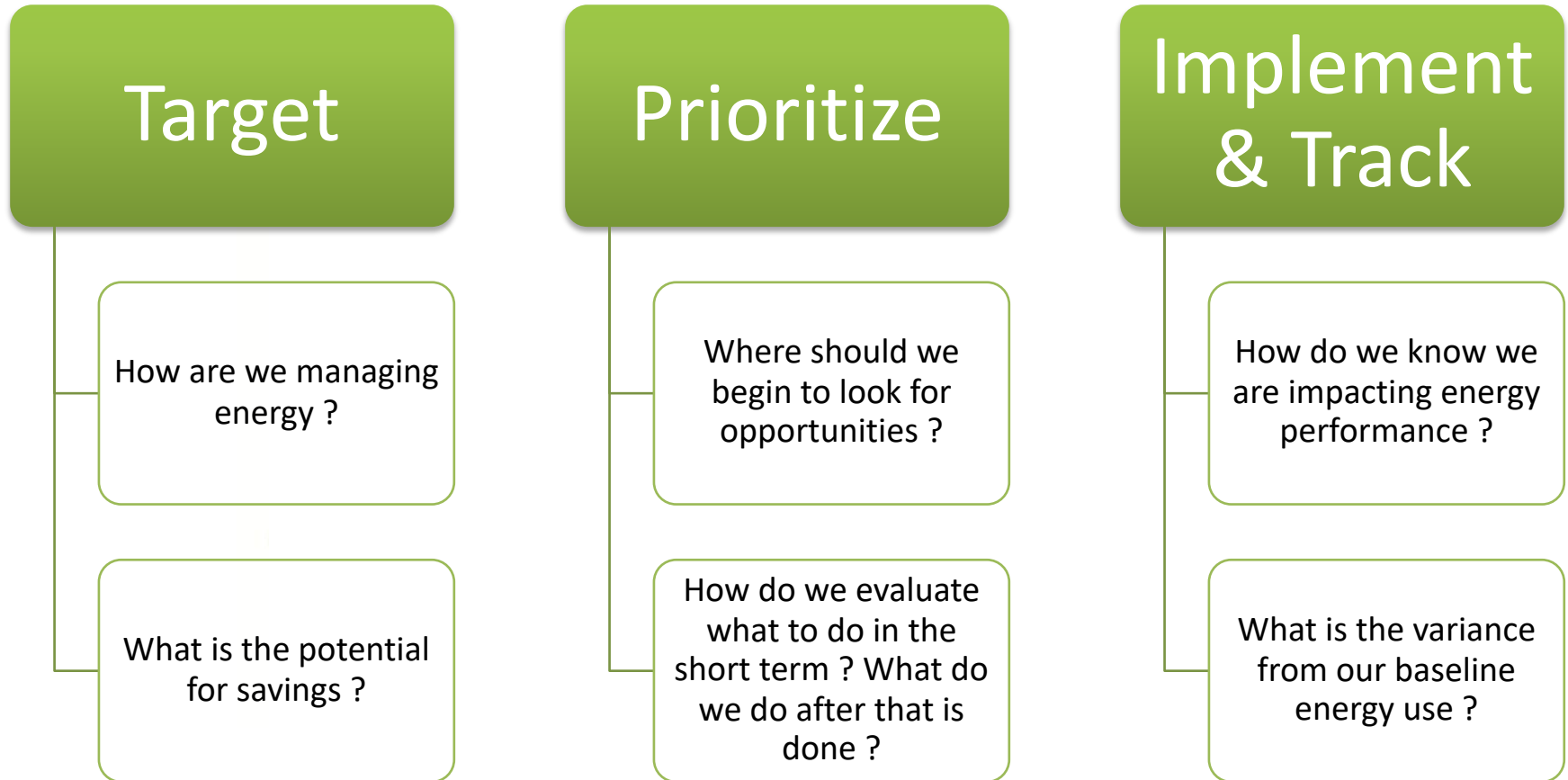
## Metering and monitoring

- Secure the capability to obtain interval metering (one hour or shorter intervals) for all major energy supplies

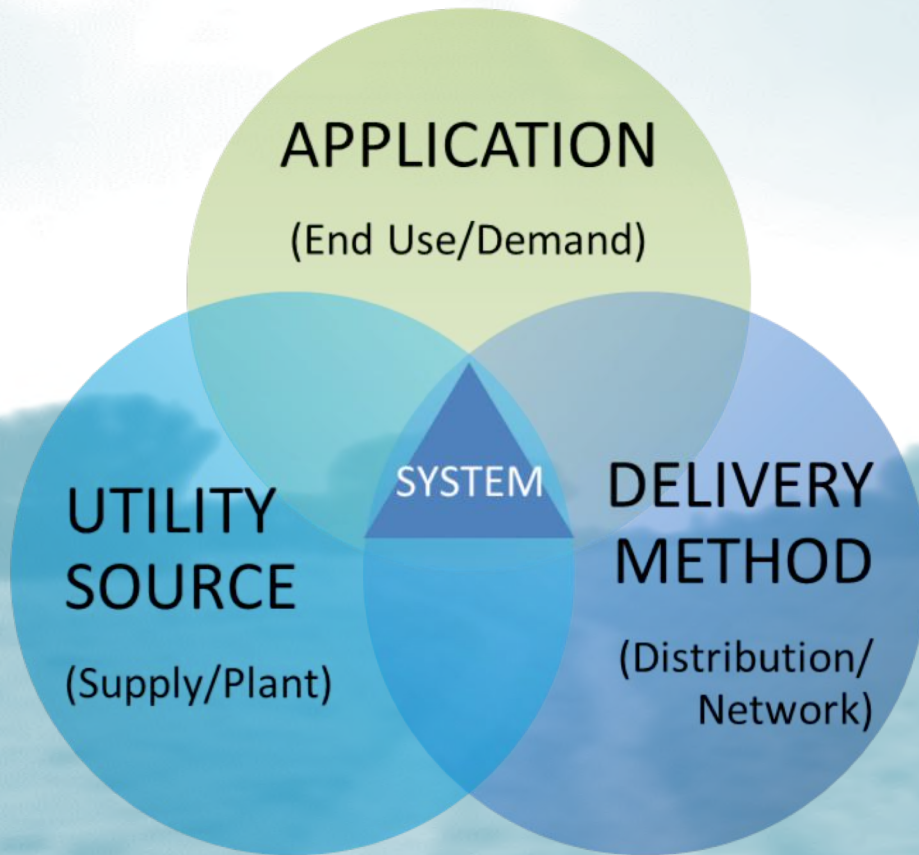
## Reporting, feedback, and control systems

- Generate monthly reports depicting overall energy use per unit of activity (e.g. kWh per ton) and examine results where they show large cost or usage variance from target

# Impacting Energy Performance



# Data Mining Drives Real Solutions for Implementation



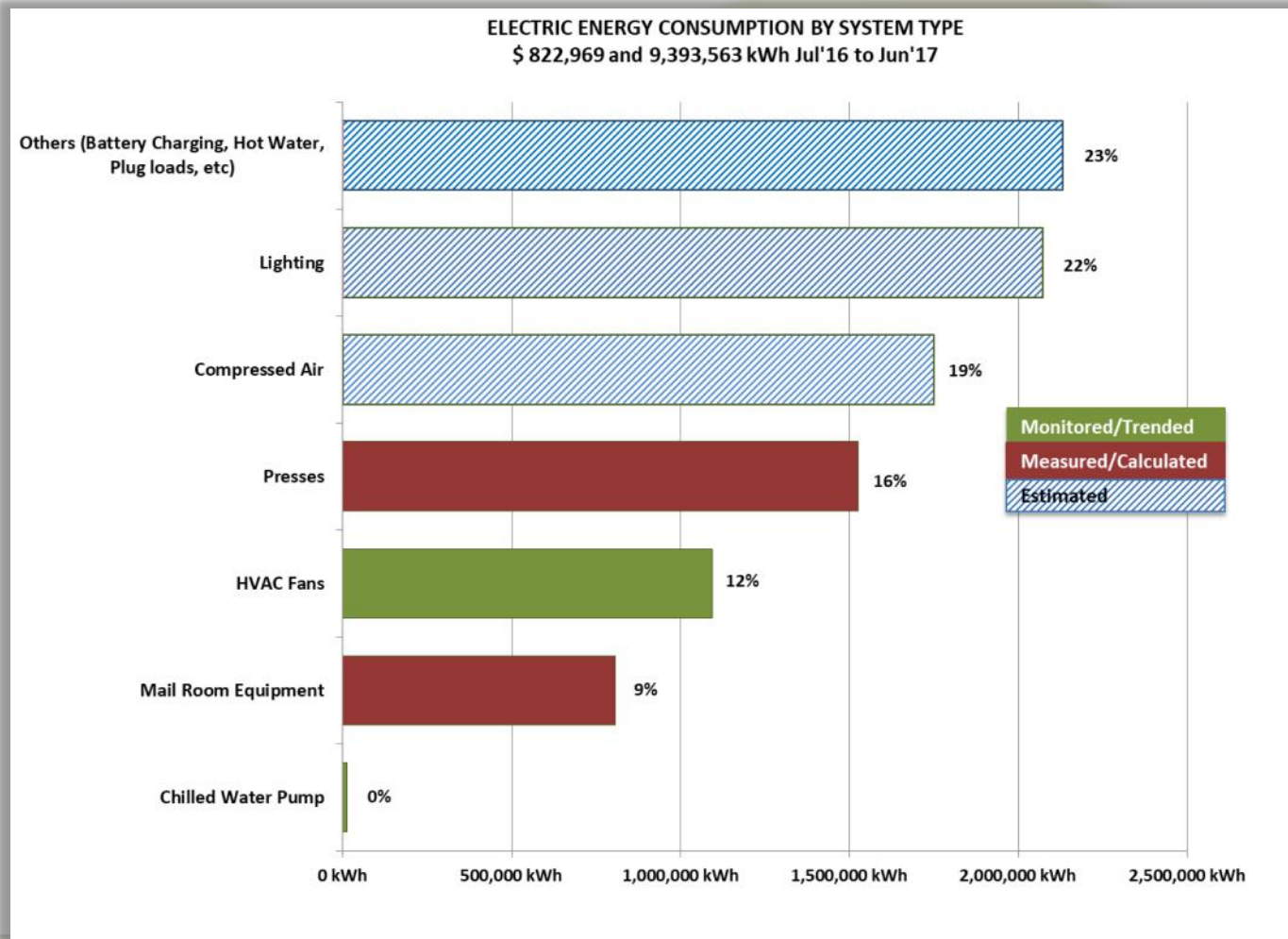
- Application Design Loads
- Critical Parameters
  - Quality (Temp/Pr/Rh)
  - Volume
  - Cycle time/Duration
- Demand Events
- Application Operating Loads





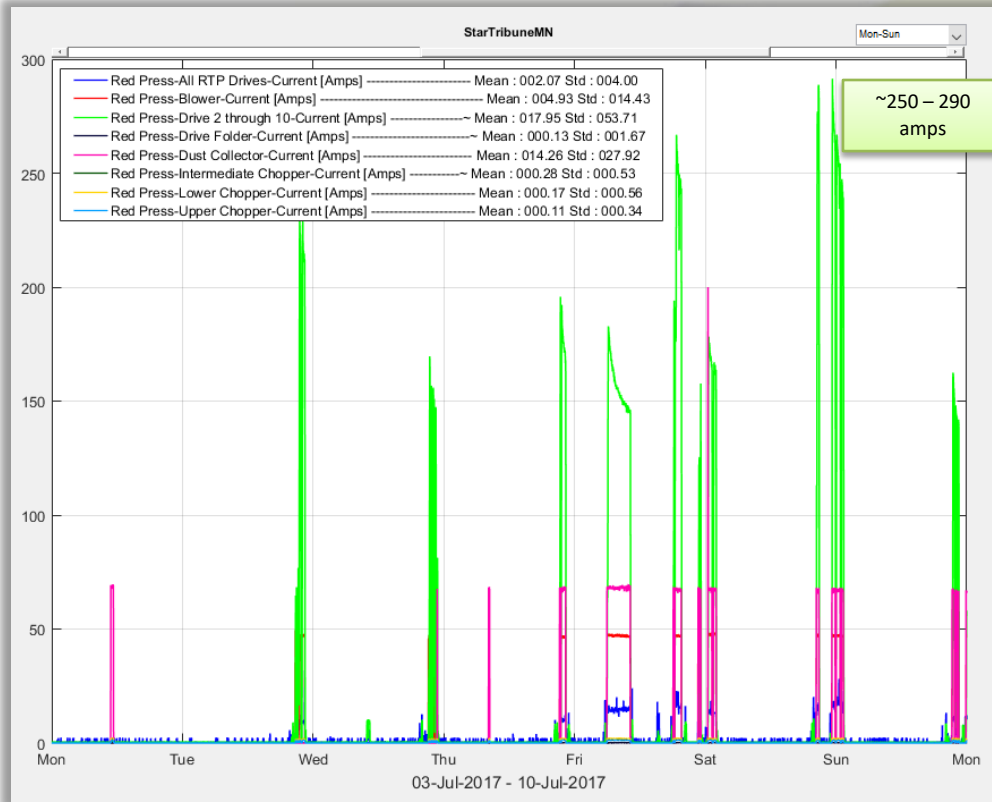
# Data Visualization Drives Decision Making

## Electric Energy Breakdown by System & Equipment



# Baseline Energy Consumption

## Presses – Red Press Energy Baseline (No AHUs)

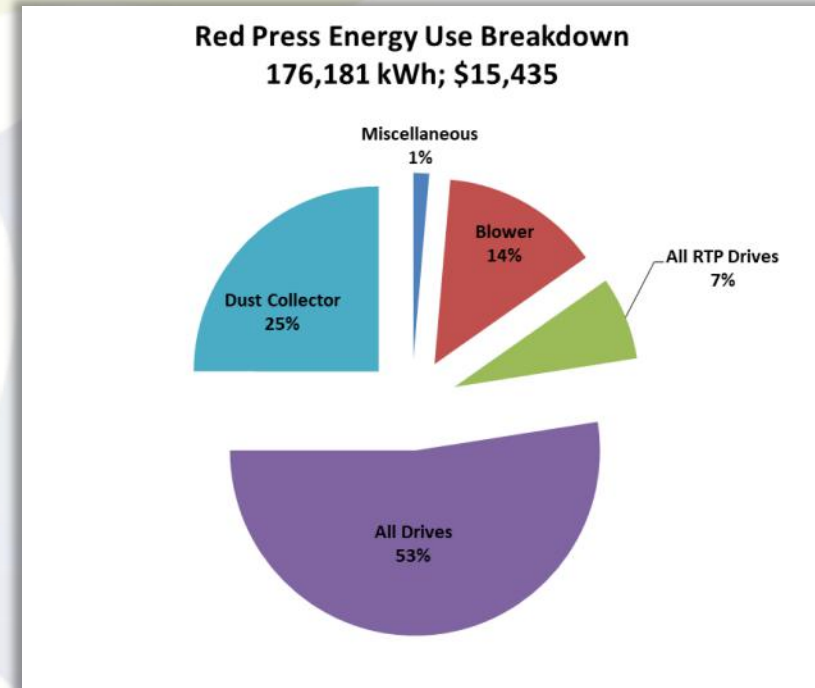


OFF on Mondays

Typical Night Mode  
~2hrs

Day (~4hrs)  
& Night (~2hrs)  
Mode on Fridays

Peaks on Sundays

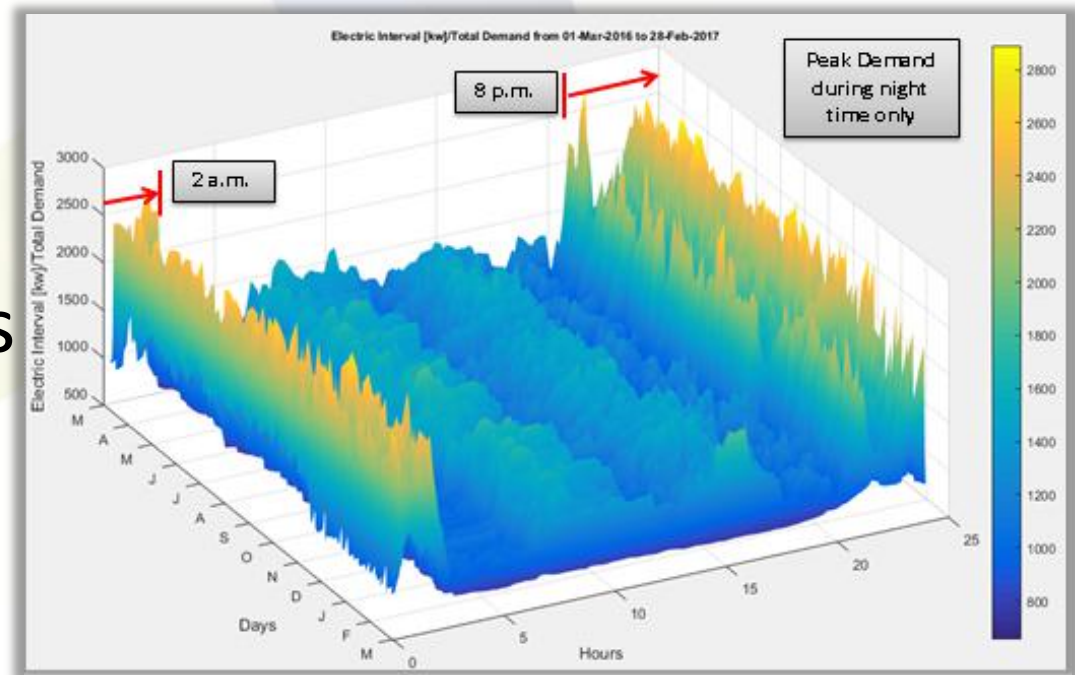


# Preliminary Savings Potential

Baseline Energy Consumption	9,308,555	kWh/Yr	1,531,065	ton -hrs				
Baseline Energy Cost	\$802,094	/Yr	\$623,434					
<b>Preliminary Energy Consumption</b>				<b>Preliminary Savings Estimate</b>		<b>Preliminary Savings Estimate</b>		
<b>System</b>	<b>(kWh/Yr)</b>	<b>Energy Cost (\$/Yr)</b>	<b>Percentage</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	
AHU Fans / Blowers /Dust Collection	1,826,133	\$157,353	20%	5%	10%	\$7,868	\$15,735	
Compressed Air	1,449,579	\$124,906	16%	5%	15%	\$6,245	\$18,736	
Production Equipment	2,533,833	\$218,334	27%	2%	5%	\$4,367	\$10,917	
Pumps	422,305	\$36,389	5%	5%	10%	\$1,819.45	\$3,639	
Lighting	2,073,492	\$178,667	22%	25%	45%	\$44,667	\$80,400	
Chilled Water	918,639	\$623,434	10%	2%	4%	\$12,469	\$24,937	
Mail Room Other	1,003,212	\$86,444	11%			\$0	\$0	
	10,227,194	\$1,425,528				\$77,435	\$154,365	
	9,223,982					10%	19%	
						987,340	1,968,244	
Baseline Energy Consumption	140,900	therms/yr						
Baseline Energy Cost	\$285,459	/Yr						
<b>Energy Consumption</b>				<b>Preliminary Savings Estimate</b>		<b>Preliminary Savings Estimate</b>		
<b>System</b>	<b>(therms/Yr)</b>	<b>Energy Cost (\$/Yr)</b>	<b>Percentage</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	
Base	60,000	\$121,558	43%	25%	50%	\$30,390	\$60,779	
Variable: Space Heating	80,900	\$163,901	57%	20%	40%	\$32,780	\$65,560	
	140,900	\$285,459				\$0	\$0	
						\$63,170	\$126,339	
						22%	44%	
						31,180	62,360	
						\$140,604	\$280,704	
						8.22%	16.41%	

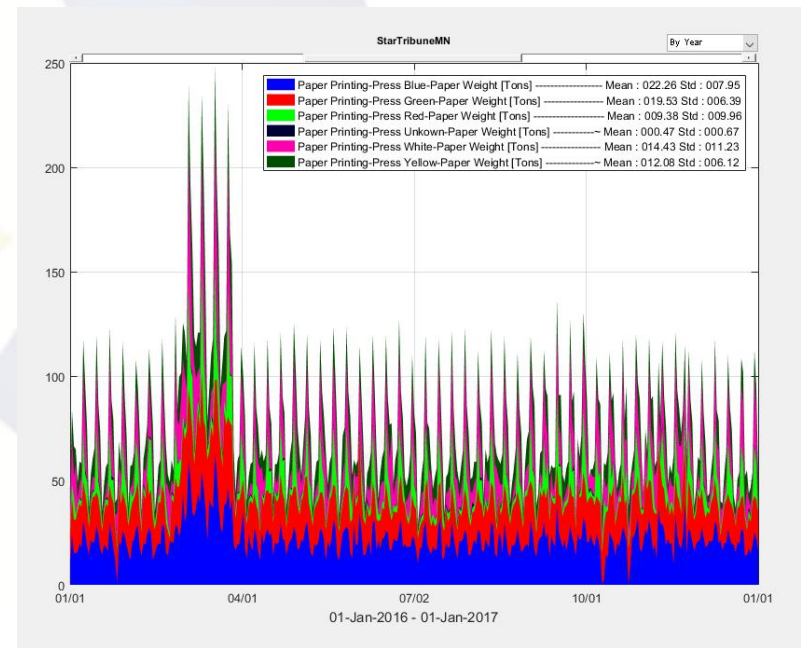
# Energy Decision Fundamentals

- Comparative analysis that is metrics based and data driven
  - Methodical
  - Comprehensive
- Baselines
- User requirements
- Operating modes

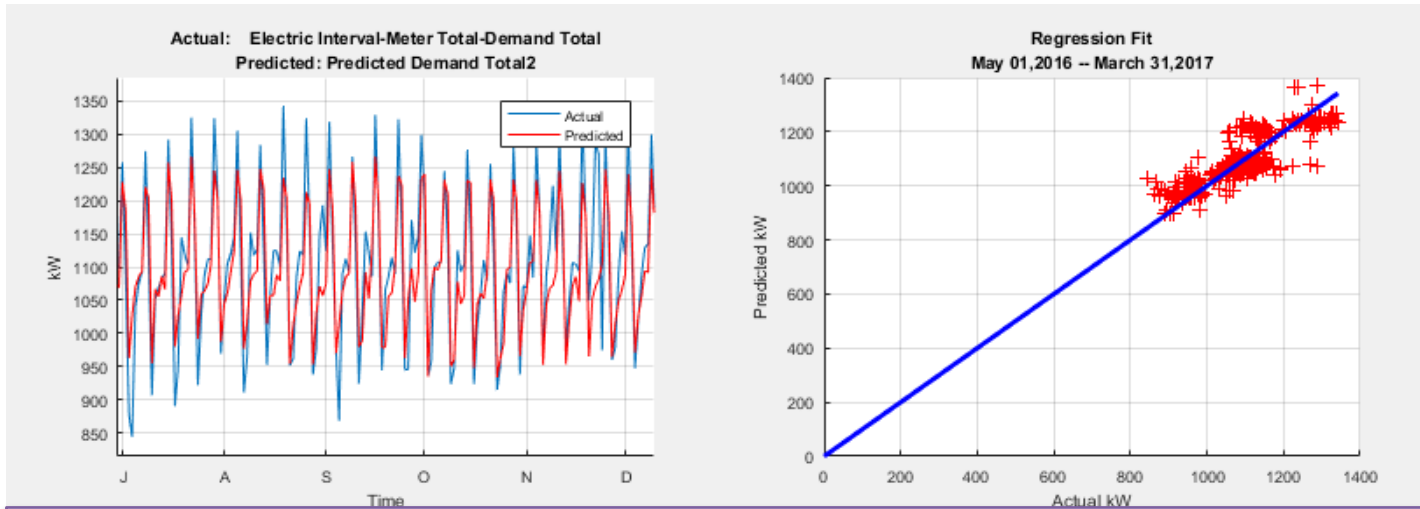


# Typical Metrics for Energy Tracking

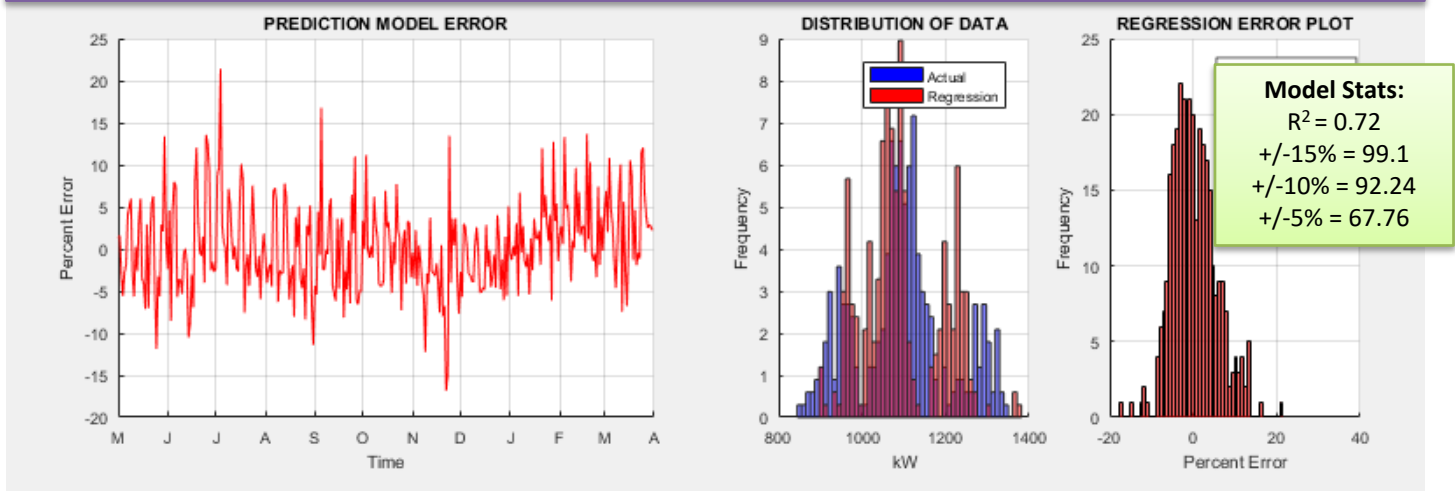
- Daily utility data
- Production key volume indicators
- Weather
- Day of the week



# Metrics for Energy – Methodology

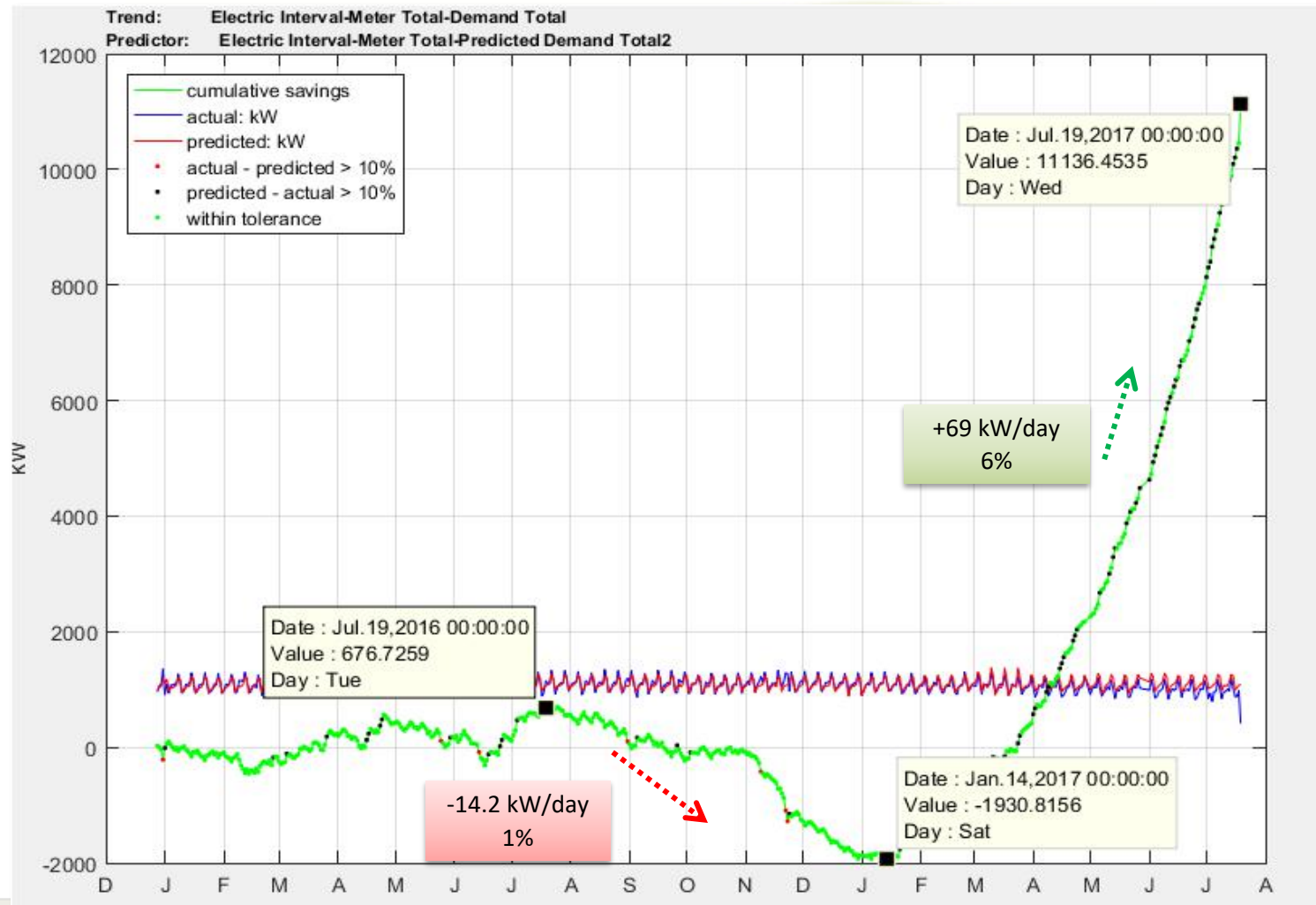


**Total Demand (kW) = Depends on Press Output / Day of the Week and Average Daily Temperature**



# Understanding Energy Performance

## Electric Interval Meters Total – Cumulative Savings Plot



# Funding Opportunities

## Grants, Rebates, and Incentives

- Industries can take advantage of utility rebates, federal and state programs that promote energy efficiency initiatives.
- Funding opportunities are possible for:
  - Energy management plan development
  - Technical support for energy management
  - Industrial energy efficiency software
  - Loans and grants for implementing energy conservation measures





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The image shows three stacks of gold coins of varying heights, each with a small green seedling growing out of the top. The stacks are placed on a mound of dark brown soil. In the background, there are solar panels and a blurred cityscape under a bright sky.

Thank You!