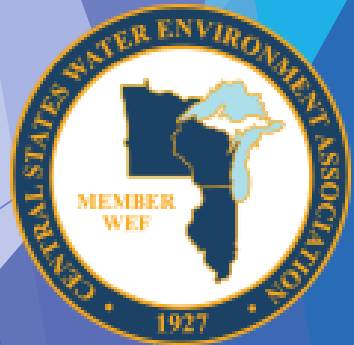




# The Path to Energy Neutrality A Midpoint Perspective

Patrick Shea  
Director of Public Services



**89<sup>th</sup> ANNUAL MEETING**

*of the Central States Water Environment Association*  
Wisconsin | Minnesota | Illinois



## WASTEWATER SERVICES

- ▶ WASTEWATER TREATMENT, BIOSOLIDS RECYCLING, COLLECTION

## WATER SERVICES

- ▶ WATER TREATMENT, WATER DISTRIBUTION

## STORMWATER UTILITY

## HYDROELECTRIC UTILITY

CITY OF  
**ST.CLOUD**  
MINNESOTA



# WASTEWATER SERVICES





## ▶ ENERGY STATISTICS FOR THE CITY OF ST. CLOUD

- ▶ 2015 Sources of Electricity
- ▶ 2015 Energy Use by Department

## ▶ ENERGY INITIATIVES (MOVING TOWARD ENERGY NEUTRALITY)

- ▶ Resource Recovery and Energy Efficiency Master Plan - R2E2
  - ▶ Efficiency Improvements and Upgrades
  - ▶ Biogas Utilization
  - ▶ High Strength Waste Receiving Station
  - ▶ Water Reuse
  - ▶ Biosolids and Nutrient Harvesting

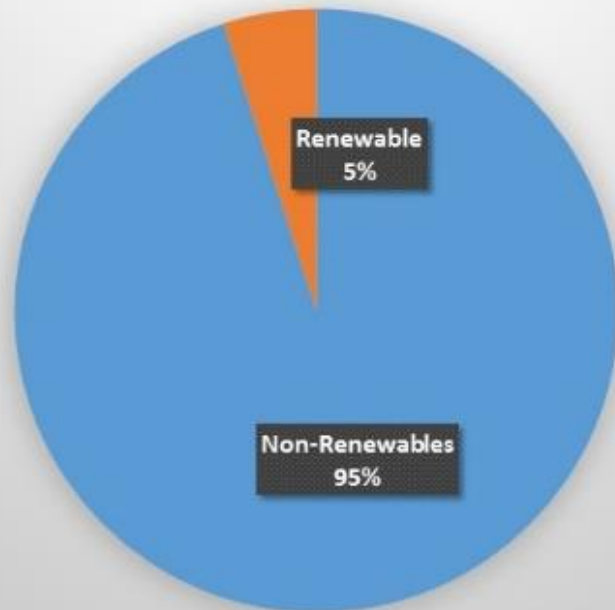
## ▶ SOLAR INITIATIVES

## ▶ OTHER CITY INITIATIVES

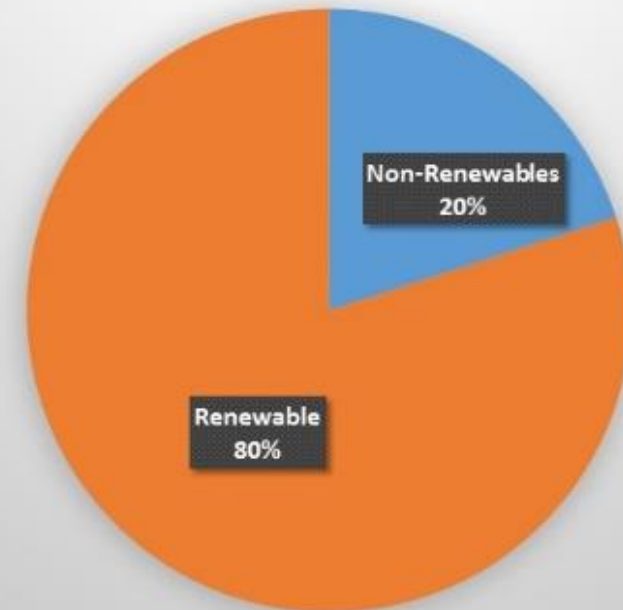


# 2015 VS. PROJECTED 2018 ENERGY SOURCES

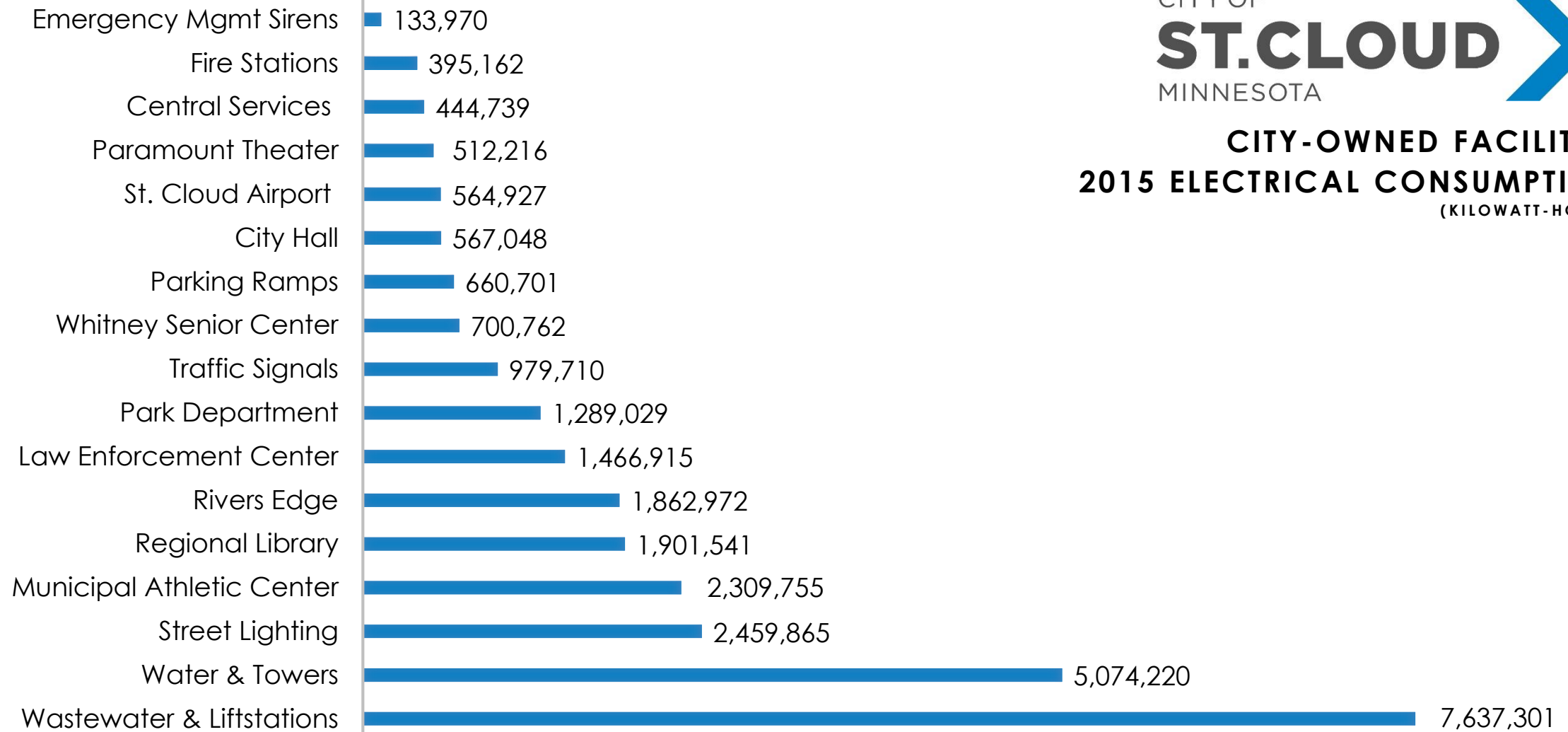
**2015 ENERGY SOURCE ALLOCATIONS  
FOR CITY'S ELECTRICAL DEMAND**



**2018 ENERGY SOURCE ALLOCATIONS  
FOR CITY'S ELECTRICAL DEMAND**



**CITY-OWNED FACILITIES**  
**2015 ELECTRICAL CONSUMPTION**  
(KILOWATT-HOURS)



Energy Source	2015	2015
Electrical Energy	28,960,526 kilowatt-hours	\$2,937,526
Natural Gas	551,266 therms	\$423,705



# RESOURCE RECOVERY & ENERGY EFFICIENCY MASTER PLAN (R<sub>2</sub>E<sub>2</sub>)

- ▶ ENERGY EFFICIENCY UPGRADES
- ▶ RENEWABLE ENERGY OPPORTUNITIES
  - ▶ Solar
  - ▶ Biogas
- ▶ HIGH STRENGTH WASTE MARKET SURVEY
  - ▶ Biogas Production Potential
- ▶ WATER REUSE
- ▶ BIOSOLIDS MASTER PLAN
  - ▶ Organic Value
  - ▶ Nutrient's Value
- ▶ FUNDING AND PERFORMANCE CONTRACTING



## *ADOPTED ENERGY GOALS* *(JULY 2014)*

***R2E2***

5 YEARS	25% REDUCTION
10 YEARS	50% REDUCTION
20 YEARS	75% REDUCTION

**THE PARADIGM SHIFT**

FROM

**WASTEWATER TREATMENT**

TO

**RESOURCE RECOVERY**





# ENERGY EFFICIENCY & BIOGAS PROJECT (E<sub>2</sub>B)

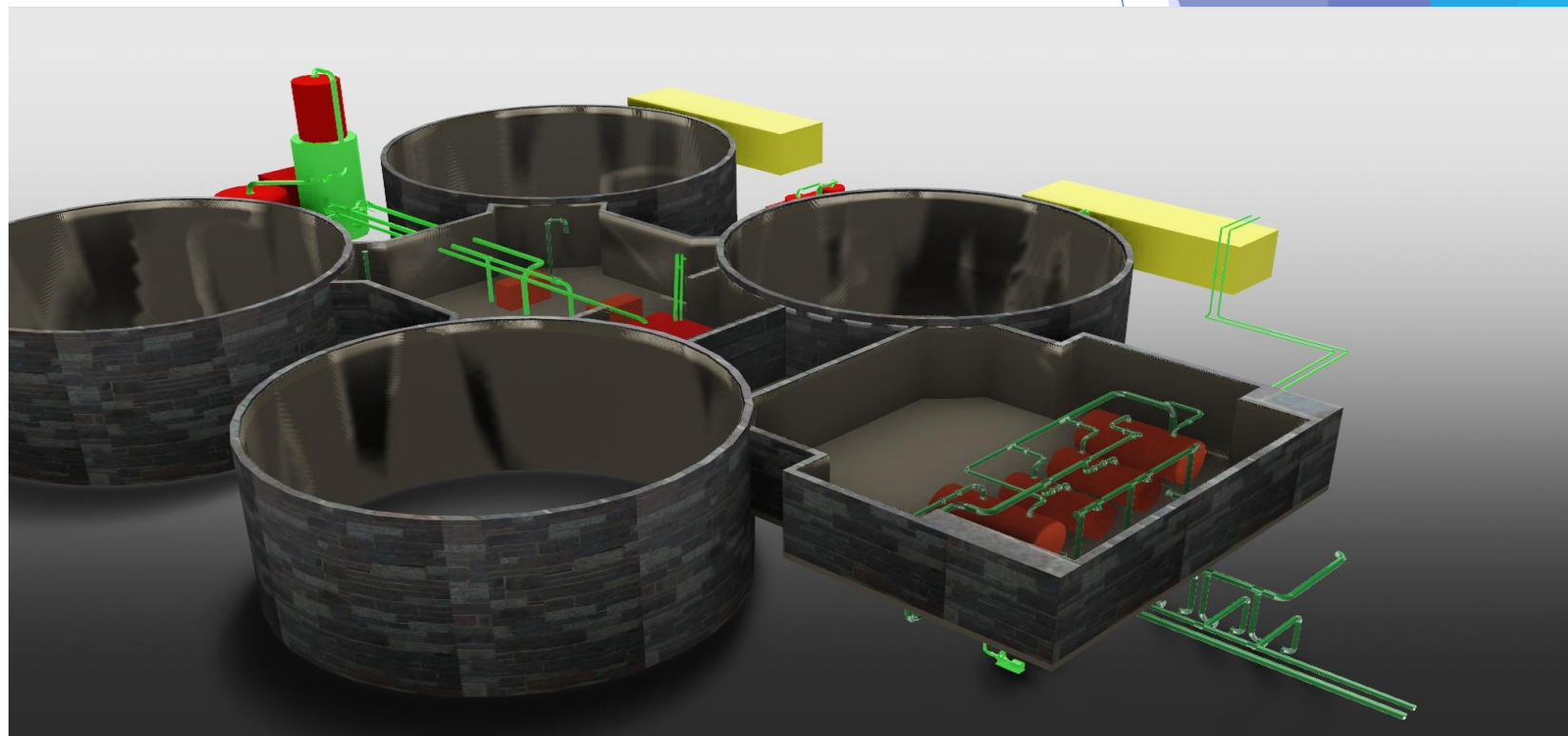
## ENERGY EFFICIENCY (E<sub>2</sub>)

- ▶ Blower Optimization
- ▶ Lighting Upgrades and Improvements
- ▶ HVAC Improvements
- ▶ Building Envelope Improvements
- ▶ Pneumatic System Improvements

# ENERGY EFFICIENCY & BIOGAS PROJECT (E<sub>2</sub>B)

## BIOGAS

- ▶ Gas Conditioning System
  - ▶ Hydrogen Sulfide Removal - *BioGasClean*
  - ▶ Siloxane Removal - *Unison*
- ▶ Engine Generator
  - Dual Fuel,
  - 633kW *Jenbacher*



# HIGH STRENGTH WASTE

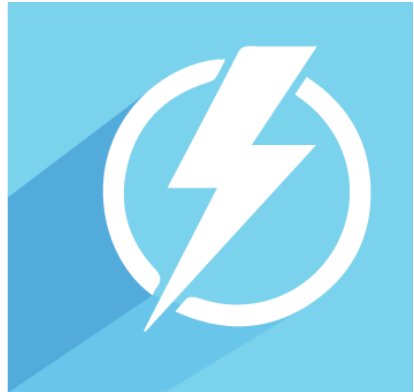




# E2B PROJECT

## E2 - Energy Efficiency

ENERGY SAVED



**660,000**  
KILOWATT-HOURS



**63**

HOMES' ELECTRICITY  
USE FOR ONE YEAR




**488,833**

POUNDS OF COAL



**1,083,580**

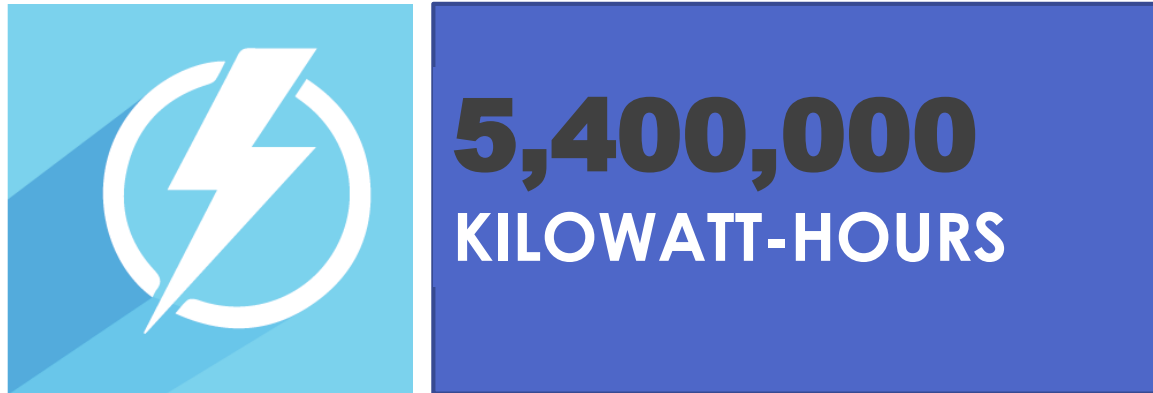
MILES DRIVEN  
BY A PASSENGER VEHICLE

**ST.CLOUD**  **SUSTAINABILITY**

# E2B PROJECT

## B - Biogas Utilization

ENERGY PRODUCED



=



**512**  
HOMES' ELECTRICITY  
USE FOR ONE YEAR



**3,999,544**  
POUNDS OF COAL

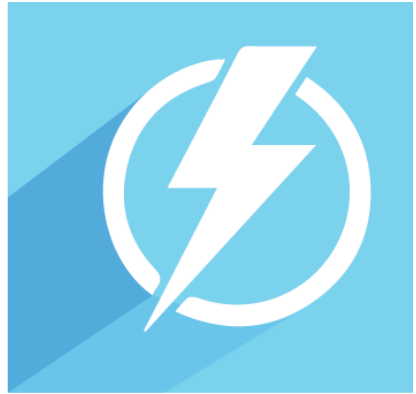


**8,865,656**  
MILES DRIVEN  
BY A PASSENGER VEHICLE



# E2B PROJECT

## *Environmental Benefits*



**6,060,000**  
KILOWATT-HOURS

=



**575**  
HOMES' ELECTRICITY  
USE FOR ONE YEAR



**4,488,377**  
POUNDS OF COAL



**9,949,236**  
MILES DRIVEN  
BY A PASSENGER VEHICLE



# SOLAR INITIATIVES

## Made in Minnesota Solar Program

- ▶ Wastewater Treatment Facility - 20 kW
- ▶ Police Station Headquarters - 40 kW
- ▶ Fire Station 1 - 40 kW
- ▶ Fire Station 2 - 40 kW

## Community Solar Gardens

- ▶ Subscriptions to 19 CSGs in Stearns County
- ▶ Subscription to CSGs installed on City property - 40% of 5 MW
- ▶ Host CSGs on City-owned buildings for commercial & residential participation

## Wastewater Behind the Meter Project

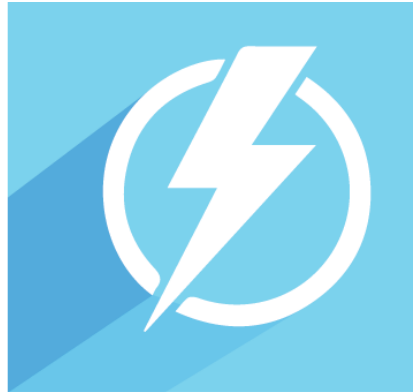
- ▶ Ground Mount PV - 220 kW

# MIM SOLAR GENERATION

## FOUR MIM SOLAR SYSTEM INSTALLATIONS

- MIM #1 - Wastewater Treatment Facility
- MIM #2 - Fire Station #1
- MIM #3 - Fire Station #2
- MIM #4 - Law Enforcement Center

## 2017 RENEWABLE ENERGY PRODUCTION



**168,000**  
KILOWATT-HOURS




**15.9**  
HOMES' ELECTRICITY  
USE FOR ONE YEAR



**124,430**  
POUNDS OF COAL



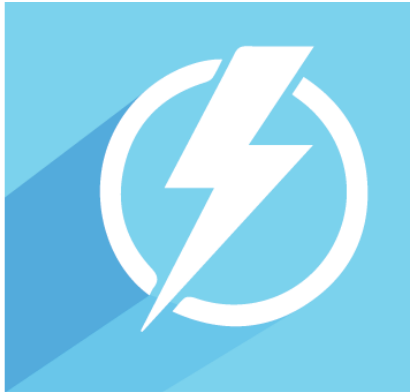
**275,820**  
MILES DRIVEN  
BY A PASSENGER VEHICLE

**ST.CLOUD**  **SUSTAINABILITY**

# SOLAR GENERATION SYSTEM

## WASTEWATER TREATMENT FACILITY BEHIND THE METER 220-kW SYSTEM

*2017 RENEWABLE ENERGY PRODUCTION*



**318,000**  
KILOWATT-HOURS

=



**30.2**  
HOMES' ELECTRICITY  
USE FOR ONE YEAR



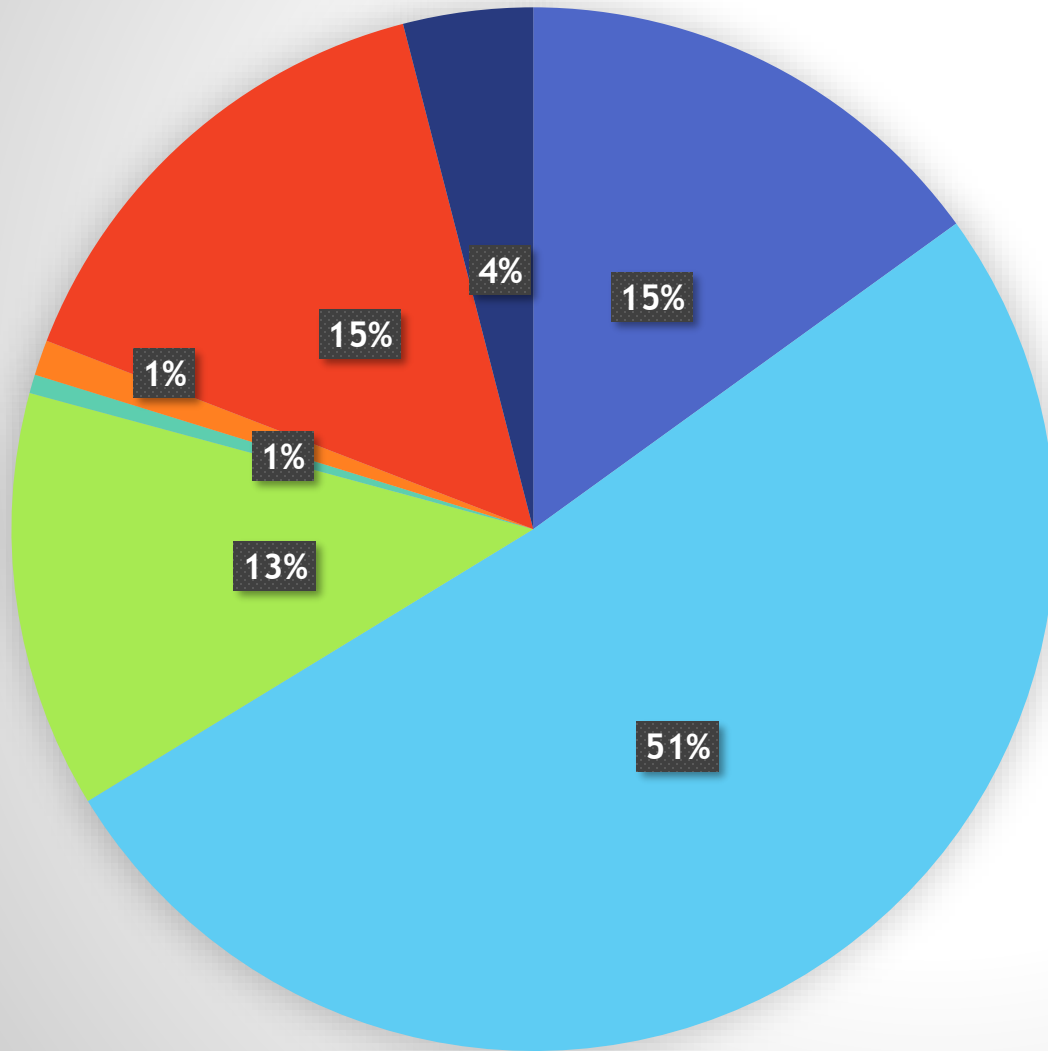
**235,529**  
POUNDS OF COAL



**522,089**  
MILES DRIVEN  
BY A PASSENGER VEHICLE

**ST.CLOUD**  **SUSTAINABILITY**

# PROJECTED ENERGY SOURCE ALLOCATIONS FOR CITY'S ELECTRICAL DEMAND



- Non Renewable Energy Source
- Community Solar Garden Subscriptions
- City-hosted Garden Subscription
- MIM Solar Projects
- Wastewater - Behind the Meter Solar
- Biogas
- Natural Gas to Electricity



# GUARANTEED SAVINGS PROJECTS

## *ENERGY EFFICIENCY AND BIOGAS PROJECT*

- *\$4.65M Energy Bond*
- *Project Status - Phase 1 near completion, construction to start in June for Phase 2*
- *Anticipating to receive over \$500,000 in Xcel Rebates in 2016 thru 2017*

## *STREET LIGHT IMPROVEMENT PROJECT*

- *\$7.1M Tax Abatement Bond*
- *Project Status - Finalizing Contract with Guaranteed Energy Provider*
- *Anticipating over \$250,000 in Xcel Energy Rebates in 2016 thru 2018*



## STREET LIGHT IMPROVEMENT PROJECT

- ▶ Update all City owned street lights to LED
- ▶ Facility LED updates to 9 City buildings
- ▶ Smart street light system in Central Business District
- ▶ Payback of less than 15 years

## XCEL ENERGY PARTNERS IN ENERGY PROGRAM

- ▶ Community wide energy plan
- ▶ Complete in 2018

## ENERGY MANAGEMENT DEPARTMENT DEVELOPMENT

# STREET LIGHT IMPROVEMENT PROJECT

## *Environmental Benefits*

### ENERGY SAVED



**2.2 Million**  
KWH's Per Year




**208**  
HOMES' ELECTRICITY  
USE FOR ONE YEAR



**1,626,058**  
POUNDS OF COAL



**3,604,429**  
MILES DRIVEN  
BY A PASSENGER VEHICLE

**ST.CLOUD**  **SUSTAINABILITY**

## ***ADOPTED ENERGY GOALS (JULY 2014)***

5 YEARS	25% REDUCTION (2020)
10 YEARS	50% REDUCTION (2025)
20 YEARS	75% REDUCTION (2035)

## ***PROJECTED ENERGY REDUCTION***

2.5 YEARS      85% (2018)



# PROJECT LEADERSHIP

- ▶ Tracy Hodel, Assistant Public Utilities Director
- ▶ Chris Plautz, Wastewater Services Supervisor
- ▶ Emma Larson, Environmental Compliance Specialist
- ▶ Jacob Ethen, Industrial Electronics Technician
- ▶ Brian Schoenecker, Utilities Maintenance Mechanic

## PROJECT PARTNERS







***Thank You!***

**Patrick Shea**

*patrick.shea@ci.stcloud.mn.us*



**89<sup>th</sup> ANNUAL MEETING**

*of the Central States Water Environment Association  
Wisconsin | Minnesota | Illinois*