

Your Trusted Sustainability Partner.



Ameresco Preliminary Energy
Assessment Findings/Next Steps

City of Northfield

EQC Presentation Sept 014, 2017



Ameresco Introduction
Energy Savings Performance Contracting
Renewable: Solar PV Systems
Preliminary Assessment Findings
Next Steps



Ameresco Introduction

Who is AMERESCO?

Leading Independent Energy Services Provider

1,000

More than 1,000 Employees

\$5B

Over \$5 Billion in Energy Solutions delivered since inception
(including our predecessors)

\$750M

\$750 Million Bonding Capacity
with a Per Project
Maximum of \$150 Million

\$2.3B

Sourced and raised over \$2.3 Billion
of project financing

\$651.2M

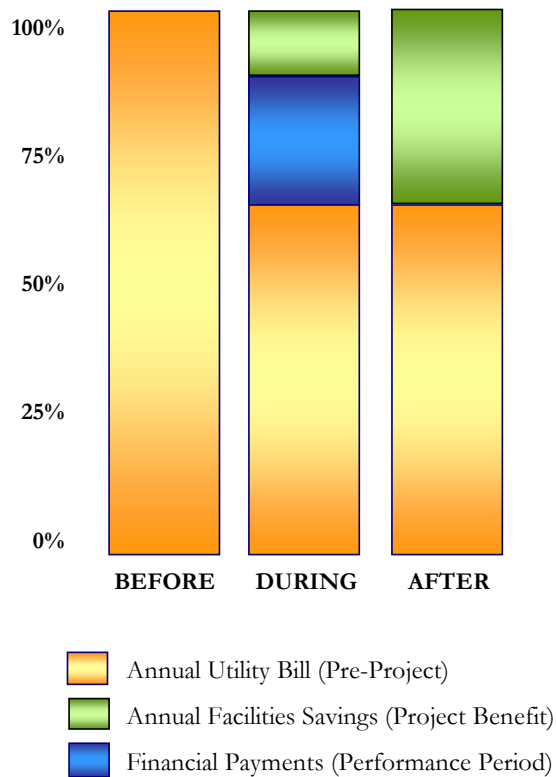
2016 Annual Revenue



Energy Savings Performance Contracting

Energy Savings Performance Contracting

CHANGES TO YOUR
ANNUAL UTILITY BUDGET



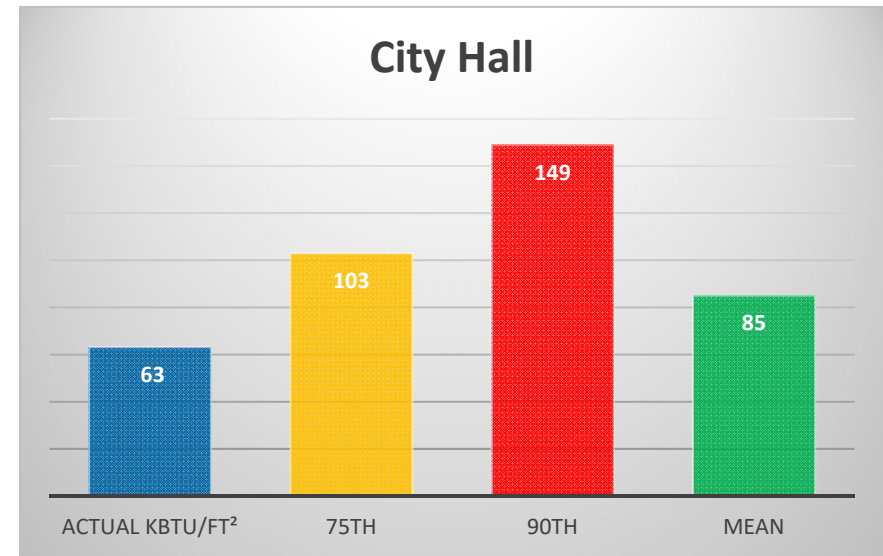
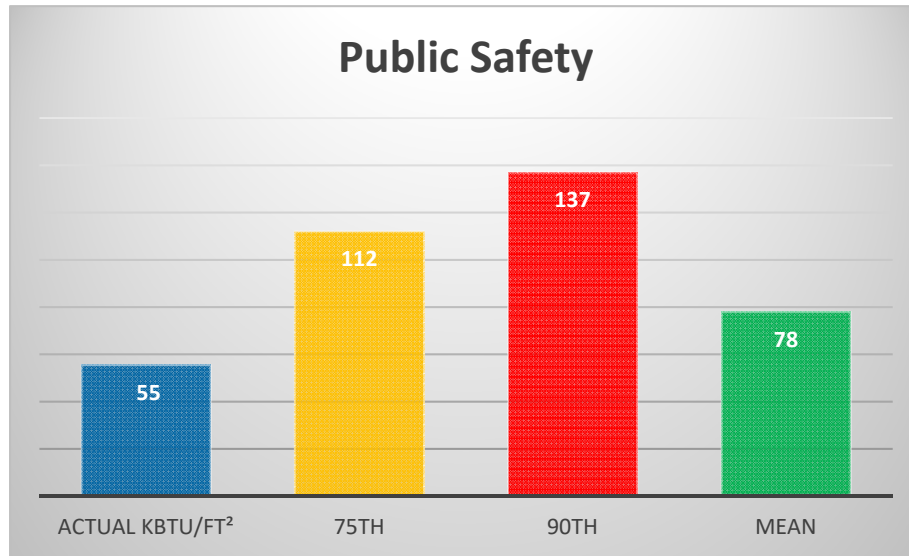
- Minnesota State Statute [§471.345](#) Energy Efficiency Projects
- Energy savings pay for infrastructure improvements
- Energy savings guaranteed
- Take advantage of grants, utility rebates, local incentives, etc.
- Self-funded with little or no capital
- Project Guaranteed up to 20 Year Term
- Flexible and Competitive Financial packages

Potential for “Deeper” Facility Upgrades



Preliminary Assessment Findings

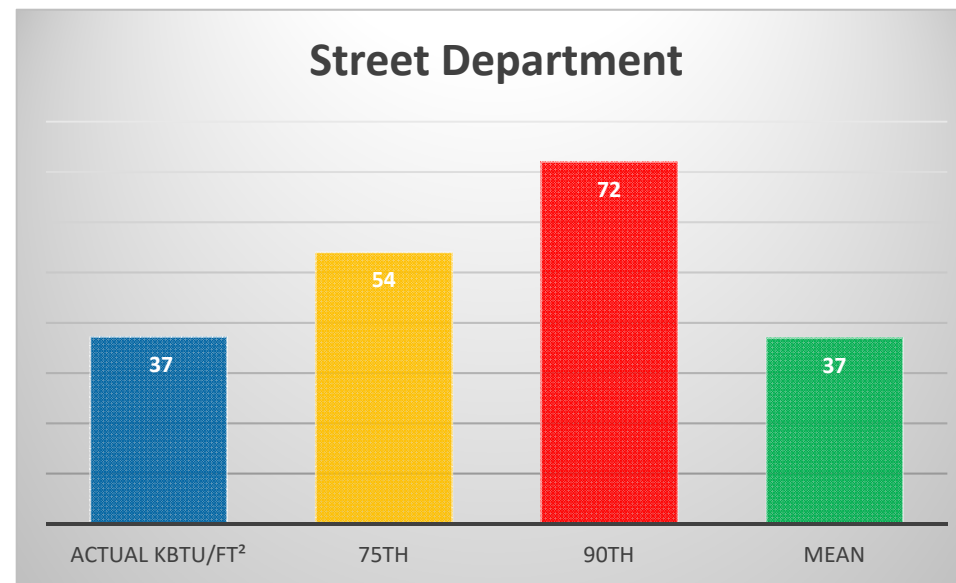
City of Northfield Energy Use Index (EUI)



Comparison with CBECS* Standards

- ◆ 75% of CBECS
- ◆ 90% of CBECS
- ◆ Mean/Ave.

* Ref Standard: Building Energy Use Index from the Commercial Building Energy Consumption Survey (CBECS) / ASHRAE 2003



Self -Funding

Est Cost: \$750 K

Benefits

- City Infrastructure Improvements using Energy Conservation Measures
- Energy cost savings pays for **entire project!**
- Self-Funding from Cost Savings
- How? - Repurpose current utility budget dollars to fund improvements
- Upgrade equipment/systems to new efficient equipment/systems
- Reduces Future O&M costs (materials and service contracts)



Self-Funded Project	
Estimated Project Cost	\$750 K
Est Annual Cost Savings	\$37 K
Utility Rebates Estimate (one time only)	\$5 K
Capital Contribution Required	\$0

Facility Lighting Improvements – Interior and Exterior



Lighting Solutions

- ◆ Retrofit Interior/Exterior lighting fixtures w/LED technology
- ◆ Increase use of controls & sensors to optimize operations
- ◆ Interconnect existing Building Automation System (BAS) for unoccupied control
- ◆ Optimize light levels



Benefits

- ◆ Reduces energy and operating costs
- ◆ Improves overall lighting quality
- ◆ Increases avoided future O&M and capital cost needs
- ◆ Reduces summer building cooling loads
- ◆ Standardization of lighting type
- ◆ Improves work environment
- ◆ Improves safety and security

LED Street Lights

Lighting Solutions

- ◆ Retrofit/Replace existing HID street lights with an LED equivalent
- ◆ Optional use of controls & sensors to optimize operations
- ◆ Optimize light levels
- ◆ 200+ City owned street lights

Benefits

- ◆ Energy cost savings
- ◆ Maintenance cost savings, service life expectancy
- ◆ Improves overall lighting quality (Dark Sky compliant)
- ◆ Increases avoided future O&M and capital cost needs
- ◆ Improves visibility for safety and security



Building Control Improvements

Building Control Solutions

- ◆ Upgrade Building Automation System program to optimize occupied/unoccupied space setback temperatures
- ◆ Standardize city wide control set points
- ◆ Upgrade graphical display for easy operation, monitoring and reports
- ◆ Install additional controls – CO2, CO, NO sensors for makeup and outdoor air systems



Benefits

- ◆ Energy consumption/costs reduction
- ◆ Enhanced operator control
- ◆ 24/7 system wide troubleshooting and monitoring
- ◆ Demand Control Ventilation
- ◆ Historical trending for operational costs analysis
- ◆ Improved comfort / work environment

Motor & Speed Control Improvements

Motor and Speed Control Solutions

- ◆ Upgrade remaining high efficiency electric motors
- ◆ Implement variable speed controls/drives to precisely match operational needs for Air Handling Units or Equipment



Benefits

- ◆ Energy consumption/costs reduction
- ◆ Increases equipment/motor life cycle
- ◆ Improved operational control of building/equipment
- ◆ Capital cost avoidance for future equipment replacement (old motors)



Mechanical Insulation Improvements

Mechanical Insulation Solutions

Insulate Exposed Piping and Equipment

- ◆ Piping
- ◆ Valves
- ◆ Pumps
- ◆ Flanges

Benefits

- ◆ Reduces thermal loss
- ◆ Reduces potential for staff injuries/burns
- ◆ Reduces corrosion potential



WWTP Boiler Pumps

Building Envelope Improvements

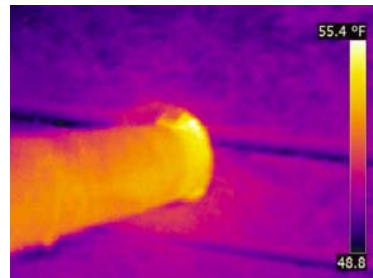
Infiltration Solutions

- ◆ Wall / Roof connections
- ◆ Address window leaks/insulation needs
- ◆ Seal wall penetrations and air leaks
- ◆ New caulk/add weather-stripping

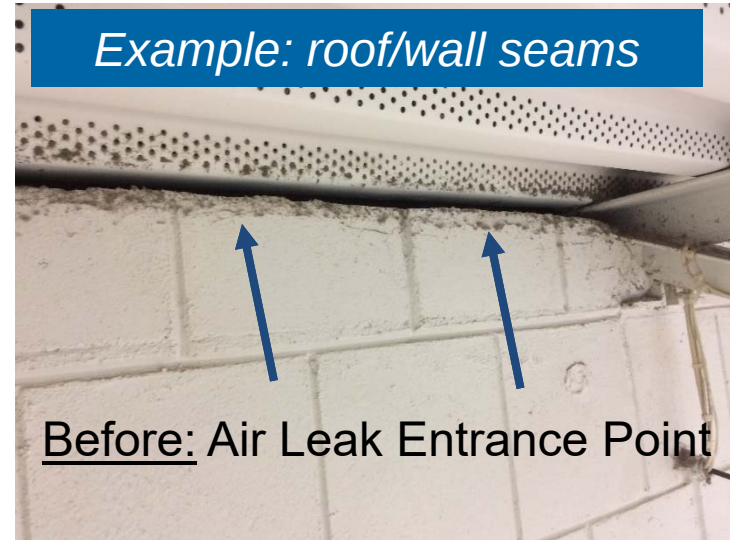
Benefits

- ◆ Reduce energy costs
- ◆ Eliminate drafts
- ◆ Moisture barrier

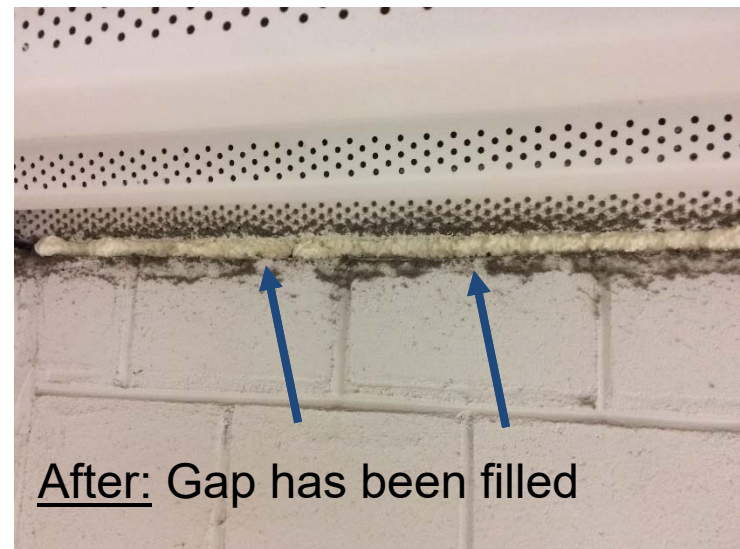
Example: wall penetrations



Example: roof/wall seams



Before: Air Leak Entrance Point



After: Gap has been filled

Vending Machine Controls

Vending Machine Solution

- ◆ Add controls to turn off vending machine lights based on occupancy

Benefits

- ◆ Reduce energy costs



Example of Control Sensor



Arena Vending Machine



Preliminary Assessment Findings Additional Considerations

Consideration of Other Improvements

Other Capital Projects (Improvements) to Consider

- ◆ Upgrade WWTP positive displacement blowers w/ new high efficiency blowers (12 blowers)
- ◆ Upgrade WWTP make-up air units w/ new high efficiency units (all 10 MAUs)

Note: Northfield already has WWTP projects (above) scheduled for replacement

- ◆ City Hall - Steam Boiler conversion to efficient Hydronic Condensing boiler system
 - Install two small (w/redundancy) hydronic boilers, piping, radiant heater upgrade to HW
- ◆ Replace select City Hall package roof top units
- ◆ Upgrade Ice Arena Lighting w/ programmable LED lighting
- ◆ Solar PV system – renewable onsite energy generation

Benefits

- ◆ Energy consumption/future capital costs reduction now
- ◆ Future capital cost avoidance project (as these projects are already on the City's replacement schedule)

Project - Leveraging Savings

Est Cost: \$1.2 M - \$2.4 M

Benefits

- Includes self-funding project Scope of Work
- Bundle self-funding ECMs with short term payback to benefit ECMs with longer term paybacks
- Reduces Future O&M costs(not yet determined)
- Leveraging up to \$725 K to complete \$2.4 M of infrastructure improvements



Leveraging Cost Savings	
Estimated Project Cost	\$1.2 M - \$2.4 M
Est Annual Cost Savings	\$62 K - \$67 K
Utility Rebates Estimate (one time only)	\$13 K - \$15 K
Capital Contribution; Future Capital Cost Avoidance	\$200 K - \$725 K

Northfield WWTP Solar PV Opportunities



50 kW AC

Size based on
available space and
energy consumption
needs

Further Investigation required for
Optimal Solar PV sizing

170 kW AC



Waste Water Treatment Plant Blowers and MAUs

Scope

- ◆ Install new make-up air units (MAUs)
- ◆ Install new turbo blowers
- ◆ Transition new blower connections to existing piping as required
- ◆ Recommission controls associated with blowers for optimal operations

Benefits

- ◆ Reduces **WWTP Electric consumption!**
- ◆ Replaces scheduled blowers now
- ◆ Reduces future O&M costs
- ◆ Sound/noise reduction



Example of positive displacement blower



Proposed blower

Ice Arena – LED Lighting and Controls

LED Lighting Solutions

- ◆ Replace existing fluorescent fixtures with new LED fixtures
- ◆ Install lighting controls

Benefits

- ◆ Reduced arena heat load
- ◆ Broadcast light quality and control



Example of LED Arena Fixture



Ice Arena Lighting

City Hall Boiler / Package Units Replacement

Boiler & and Roof-Top Replacement Solution

- ◆ Replace select City Hall package roof top units
- ◆ Replace existing steam boiler with high efficiency hydronic condensing boilers
- ◆ Install new hot water piping
- ◆ Convert radiators to hot water

Benefits

- ◆ Energy cost savings
- ◆ Operation and maintenance cost savings
- ◆ Improved temperature control
- ◆ Eliminates steam traps
- ◆ Improved occupant comfort



Existing City Hall Steam Boiler



City Hall Roof-Top Units

Funding Considerations/Further Investigation

Identify Additional Funding Options and Cost Savings

Possible use of Qualified Energy Conservation Bonds, QECBs
(Federal program to lower finance costs and encourage energy conservation)

- ◆ Lowering finance rate will reduce capital investment dollars or shorten the finance term

Determine Actual Operation and Maintenance Savings

- ◆ WWTP Blowers - \$/year?
- ◆ WWTP MAUs - \$/year?
- ◆ Identification annual maintenance cost avoidance will reduce the capital required or finance term

Develop Solar PV project for proper application and use

Determine possible residual value of equipment removed(if any)

Summary - Preliminary Assessment Scope

General list of facility improvements for further investigation

- ◆ Building lighting retrofits & controls
- ◆ LED Street lighting upgrade
- ◆ Building controls & automation
- ◆ Motor & VFD upgrade
- ◆ Mechanical Insulation
- ◆ Solar PV – onsite/renewable energy
- ◆ Building Envelope
- ◆ WWTP Blowers
- ◆ WWTP make up air units
- ◆ Ice Arena LED Lighting
- ◆ City Hall Steam to Hydronic boiler system conversion

Funding sources to be fully evaluated in Detailed Analysis

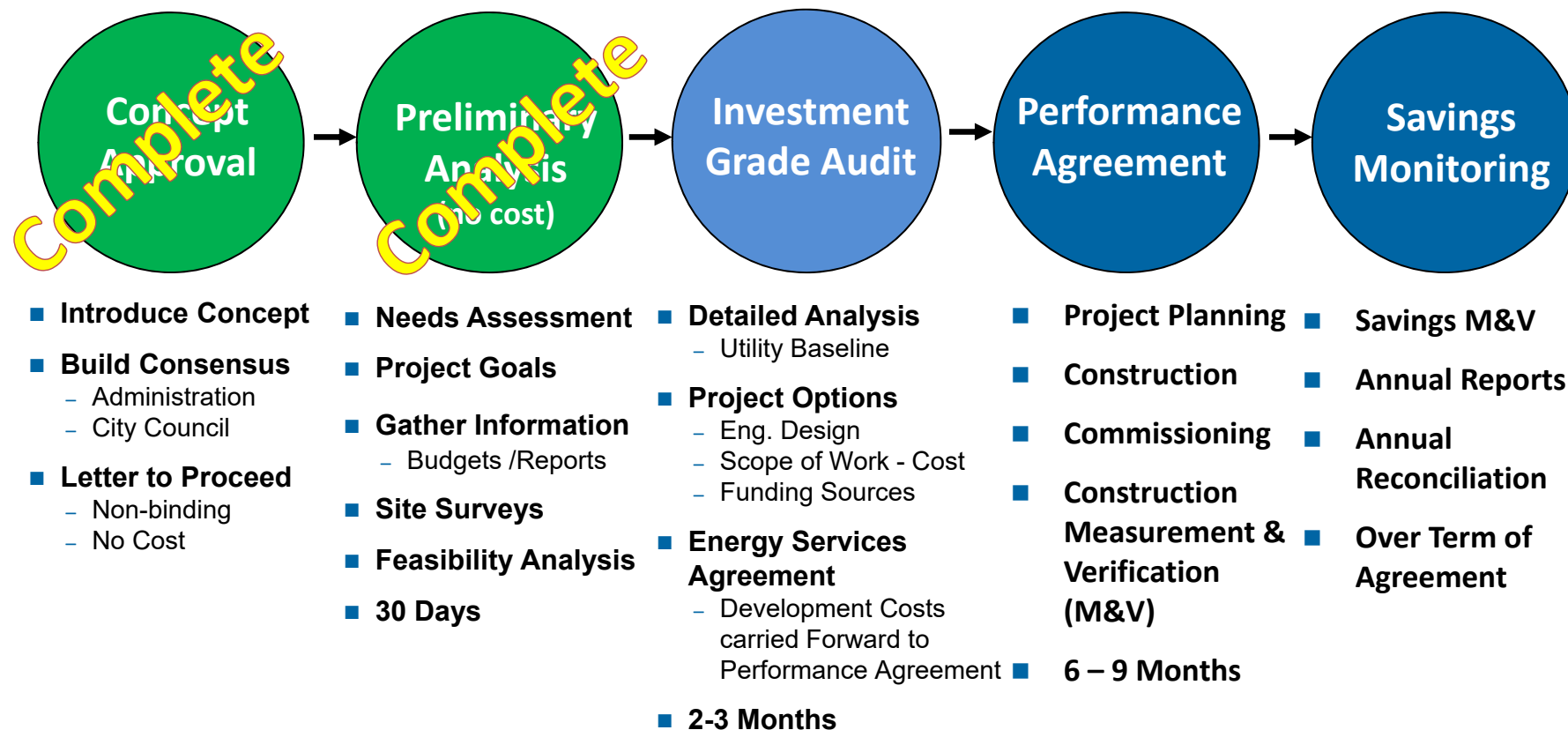
- ◆ Energy, operations and other short/long term budget savings opportunities
- ◆ Xcel Energy Rebates - (based on final project scope)
- ◆ 3rd Party Financing
- ◆ Other sources to be explored in next phase of project development



Next Steps

Energy Performance Contract – Project Development Stages

Long-Term Partnership Process from Concept through Savings Reconciliation



Streamlined Implementation – Minimizes In-House Staff Time & Quicker Results

Next Steps

- EQC Recommends Ameresco's next project development step to the City Council
- Council approves Project Development Agreement (PDA) to develop self-funding Energy Savings project
 - ◆ Ameresco will complete a detailed analysis to identify a *self-funding* project, or there is No Cost to City of Northfield
 - ◆ In the event the City of Northfield does not move forward with a viable self-funding project, an agreed upon "exit fee" would be included as part of the project development agreement
- PDA Deliverables: Three Project Options; each w/ scope of work, energy and O&M costs savings, & funding options
 - ◆ Project A: Self-Funding Project
 - ◆ Project B: Includes Project A Scope w/ additional equipment Improvements (considers capital cost avoidance)
 - ◆ Project C: Includes Project B Scope w/ additional equipment Improvements (considers capital cost avoidance)

Project Benefits for the City of Northfield

- ◆ Self-funded infrastructure improvements
- ◆ New high efficiency systems require less future maintenance (avoided future cost savings)
- ◆ Improved building operational control
- ◆ Energy cost savings guarantee
- ◆ Combining a energy savings project with Solar PV allows the City to leverage energy savings to help fund Solar PV
- ◆ Low finance rates (finance rates may rise)
- ◆ Combining energy savings and capital now to complete capital improvements
- ◆ Ameresco will train operational/maintenance staff
- ◆ 1st year post-construction equipment & energy use monitoring

CITY OF APPLE VALLEY, MINNESOTA

Kent Wolf
Business Development Manager
612.315.6940
612.804.6274 Cell
Ameresco
9855 West 78th Street Suite 310
Eden Prairie, MN 55344

kwolf@ameresco.com

Contract Details

Contract Type:
Energy Savings Performance Contract

Customer Type:
City (Population 50,000)

Facility:
403,325 square feet
11 buildings

Technology Type:
Energy Efficiency

Energy Savings:
\$ 43,768 annually

Energy Project Size:
\$ 899,650

Summary

Ameresco completed construction on a \$899,650 Energy Savings Performance Contract (ESPC) at the City of Apple Valley, MN in the winter 2014.

Facility upgrades were implemented at 11 buildings, which included:



Apple Valley Municipal Center

Ameresco Company Overview - Watch on YouTube

<https://www.youtube.com/watch?v=A7sSIF1vgFw&feature=youtu.be>

Please also visit our website link to view videos of Ameresco projects implemented:

<http://www.ameresco.com/page/video-library>



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THANK YOU



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Energy Savings and Solar PV

- 400 kW Solar PV System installed on a closed City Landfill “First in Minnesota”
- Energy production began - Fall of 2015
- Secured an [Xcel RDF Grant Award](#)
 - \$960,000 Awarded
- 2017 Environmental Initiative Award



City of Hutchinson – Landfill Application

AMERESCO 