

# Washington D.C. Smart Roof Program

Program Overview

October 2013



## DGS Smart Roof

A strategic approach to portfolio-based roof management

- 435 buildings including schools, police stations, fire stations, parks/rec centers and office buildings
- 321 acres of roof area
- Roofs, energy, sustainability
  1. Asset management: maximum roof service life and reliability at the lowest cost
  2. Roof's impact on building energy consumption
  3. Roof's potential as a renewable energy platform



## D.C. Public Schools

This K-12 school district includes 152 buildings and 6.7 million square feet of roofs

- Old buildings with chronic leak issues
- Broken leak response process
- DCPS needed roof inventory and condition, and an organized way to manage this expensive building asset
- BLUEFIN assessed the roofs, developed plans and budgets, dealt with immediate leak issues, procured repair of corrective maintenance items, and rolled out a program to identify and preserve good candidates for roof restoration.

### Results:

- Leaks dropped by 75%
- Capital requirements dropped by 25%
- Safety issues have been resolved
- More budget dollars are going towards classroom enhancements.



DISTRICT OF COLUMBIA  
PUBLIC SCHOOLS

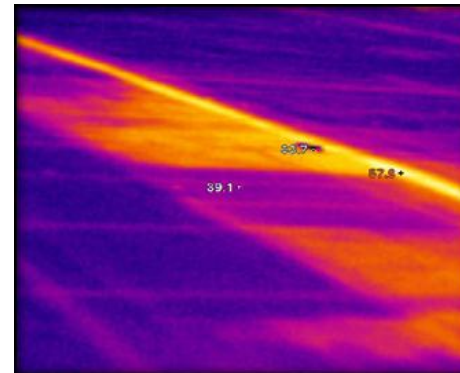
“The roof asset management program gave us the real truth – what we had to do and when to extend our resource dollars.”  
– *District of Columbia Public Schools, Stephen Kitterman, Program Manager*

# Weathering the Storm, and Beyond

	2011 Hurricane Irene	2012 Hurricane Sandy
Leak Response Calls	<b>208</b>	<b>28</b>

\*Source: Bluefin Leak Response Database; January 2013

- The DCPS asset management program provided an immediate reduction in leaks – in this case with NO NEW ROOFS – just repair and proper maintenance
- Reducing leaks preserves the roof system, and the option for restoration



Infrared reveals water trapped in the roof system that silently kills the roof from the inside out.

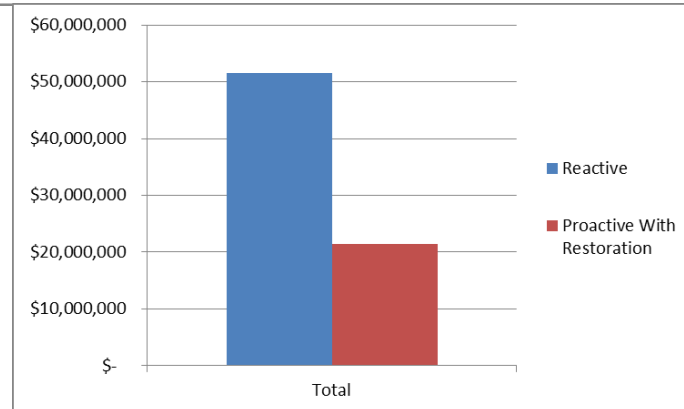
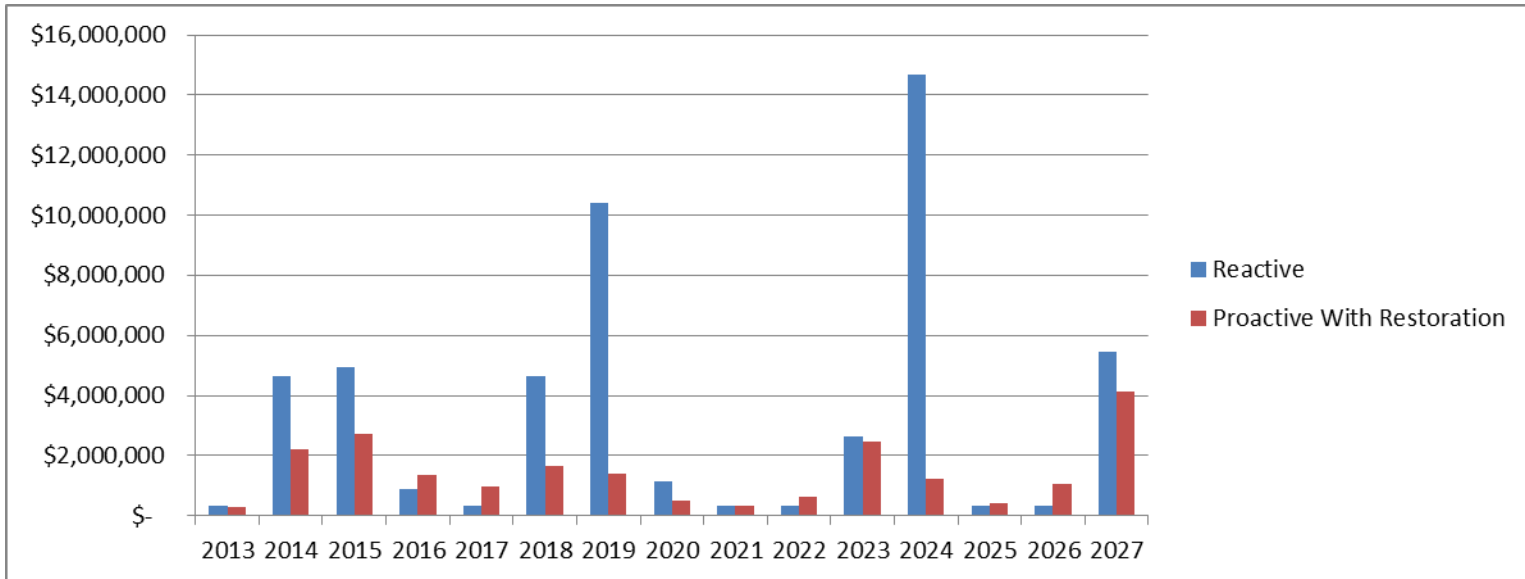
# Roof Restoration - Orchard Elementary

## Assessment and Roof Restoration Saved PV Program, and a Lot of Money

- Old roof with serious problems – estimated roof replacement \$400k
- Needed roof service life to last as long as the schools' Purchase Power Agreement contract terms – 20 years
- Long-term restoration solution: 15-year warranty, \$300k less than replacement



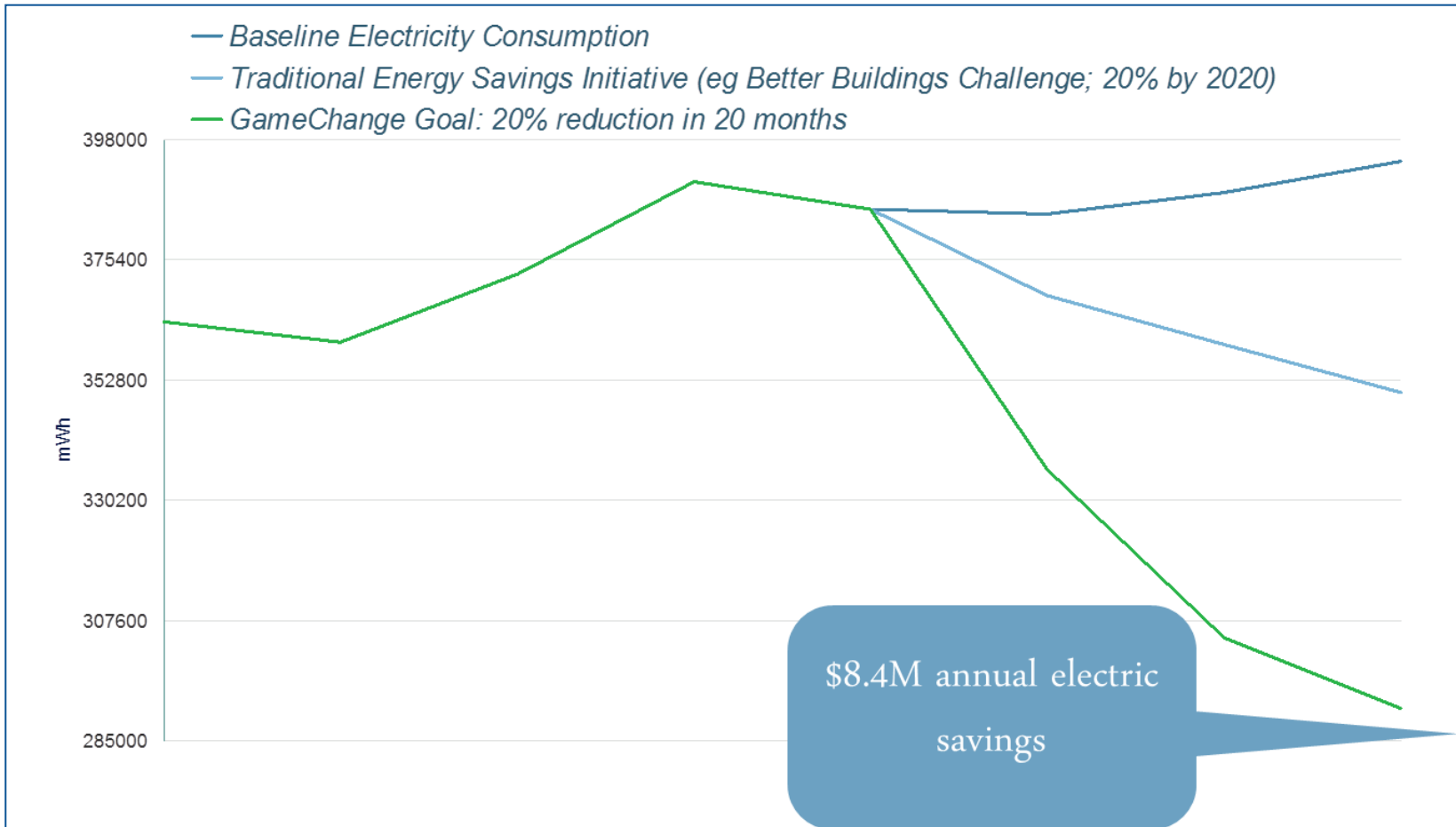
# Conclusion: Better Roofs for a Lot Less Money



**Once the roof systems are stable,  
we can optimize them from an energy standpoint**



# DGS Energy Goal





## Smart Roof Objectives

- Conserve Energy: Insulating, air-barrier, and day-lighting
- Reduce Runoff: Collecting, retaining, and re-using rainwater
- Reflect Heat: Reducing temperatures across the city
- Collect Solar Energy: Producing electricity and hot water
- Manage Carbon: Tracking and reducing carbon footprints
- Lead: Demonstrating best practices and directly involving the community



# Results of Screening Process

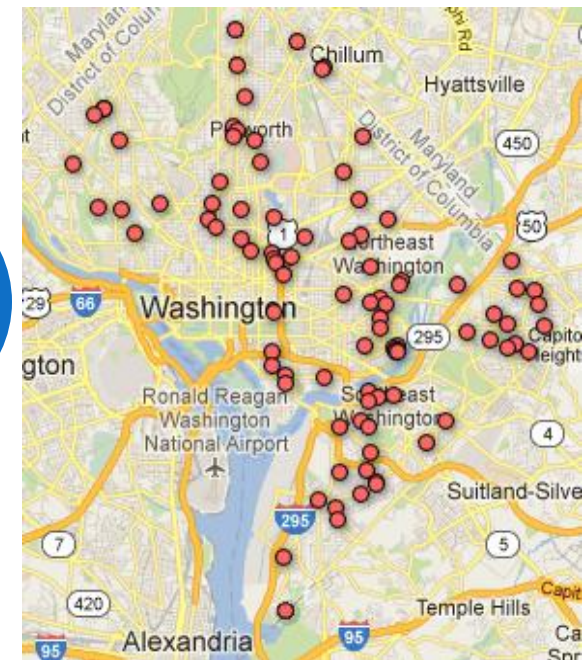
Developed screening criteria for each technology

Screening entire DGS portfolio

All DGS  
435 Bldgs.  
12.5 Million SF

Prime  
Targets  
107 Bldgs.  
2.8 M SF

Energy  
Technologies  
A-F Rated



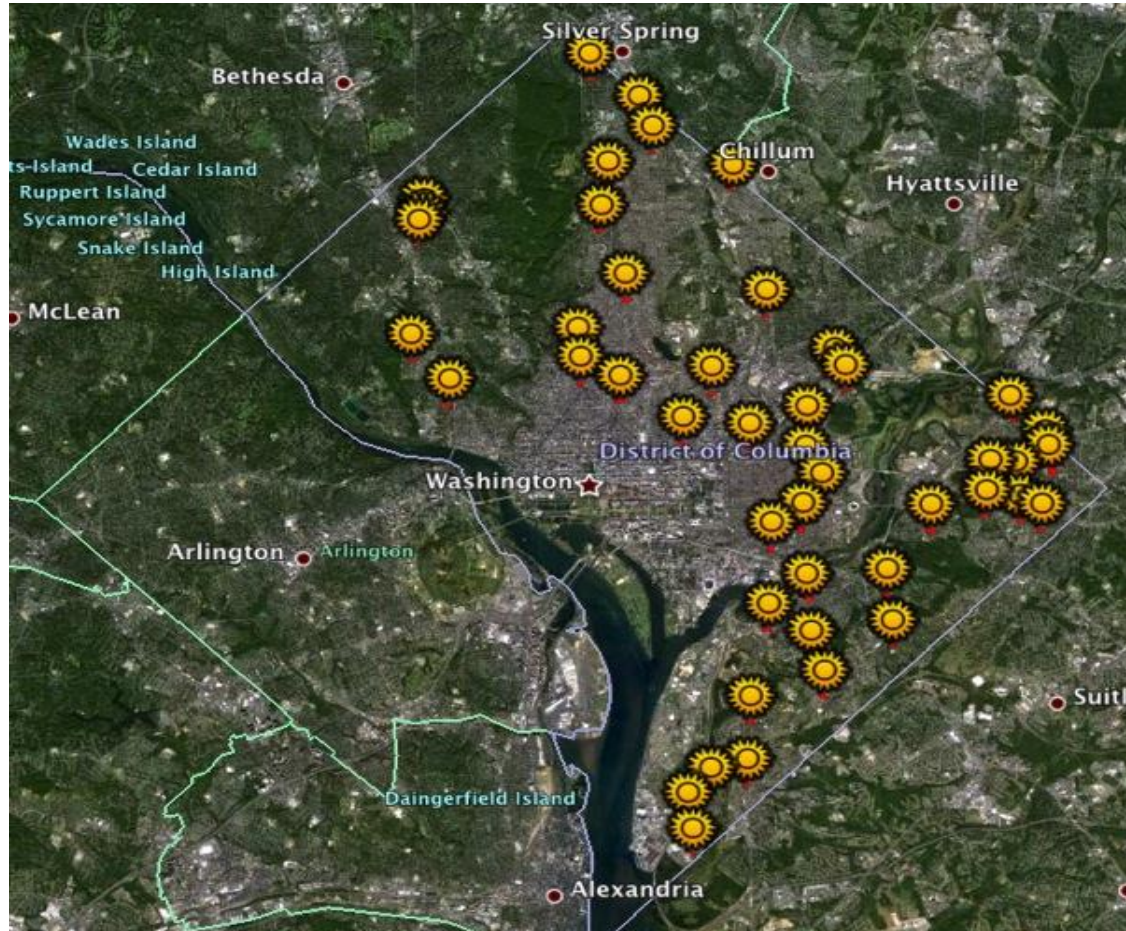
# Solar PV Summary

## 8.5 MW at 47 Sites (working to identify up to 10 MW)

- 38 sites/6.5MW can be developed immediately
- 9 sites/2MW require roof restoration prior to PV installation
- 20 - 25 year PPA – large single procurement with “carve out” for local participation
- \$17 - \$20M in utility savings over PPA term
- Annual benefits
  - 10,000+ MWh generated (based on 8.5 MWh systems)
  - 7,000 tons CO<sup>2</sup> displaced
- Economic benefits of construction
  - \$16.5M into economy
  - 68 jobs created
  - Knowledge transfer: training for local green jobs will be provided



# Solar PV Target Buildings



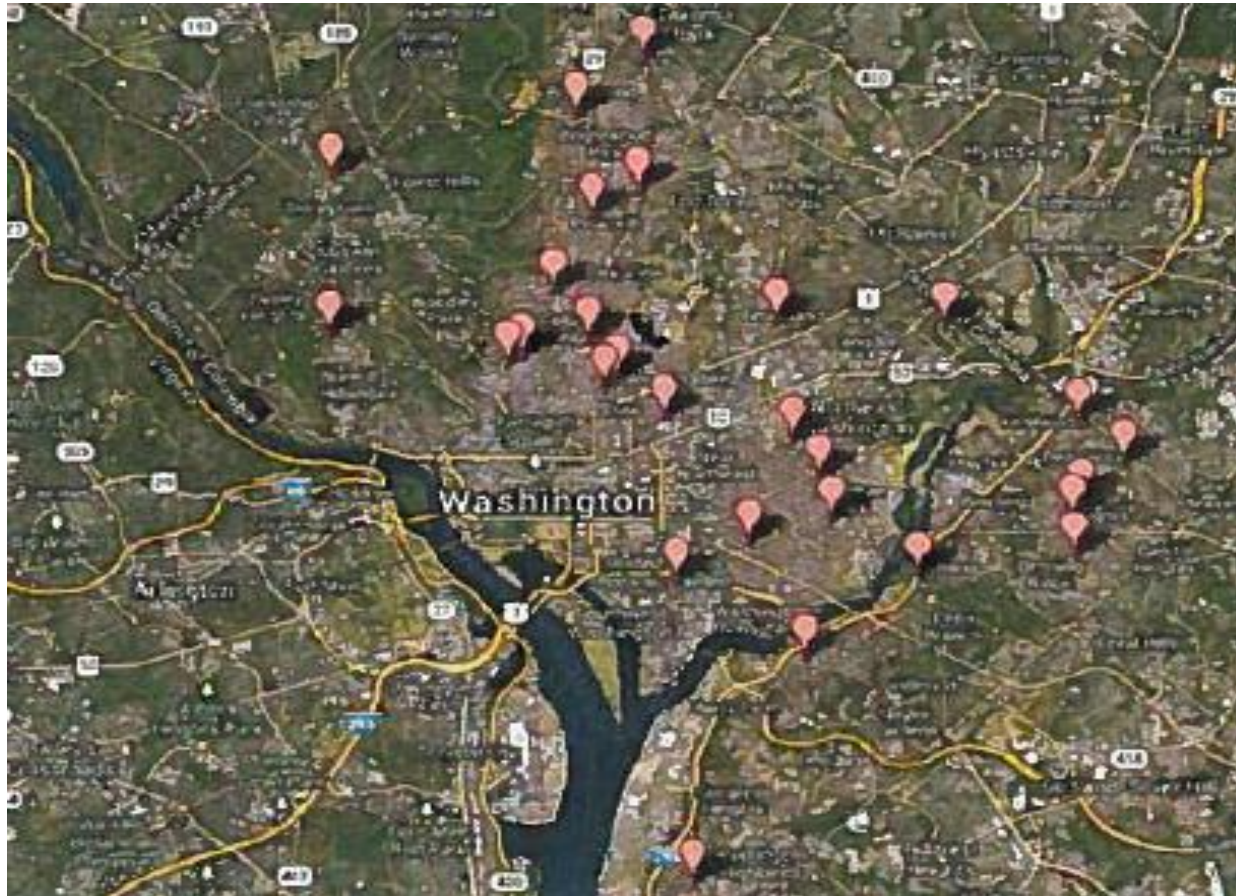
# Solar Thermal Summary

13 schools and 5 recreation centers with indoor pools

- Domestic hot water, building heating/cooling and pool heating
- Direct appropriation and/or a solar-thermal PPA
- \$9.6M in utility savings over 20 years
- Annual benefits:
  - 1,800 MWh generated
  - 2,300 MWh natural gas offset
  - 2,250 metric tons CO<sup>2</sup> displaced
- Economic benefits of construction:
  - \$11.9M into economy
  - 49 jobs created
  - Knowledge transfer: training for local green jobs will be provided

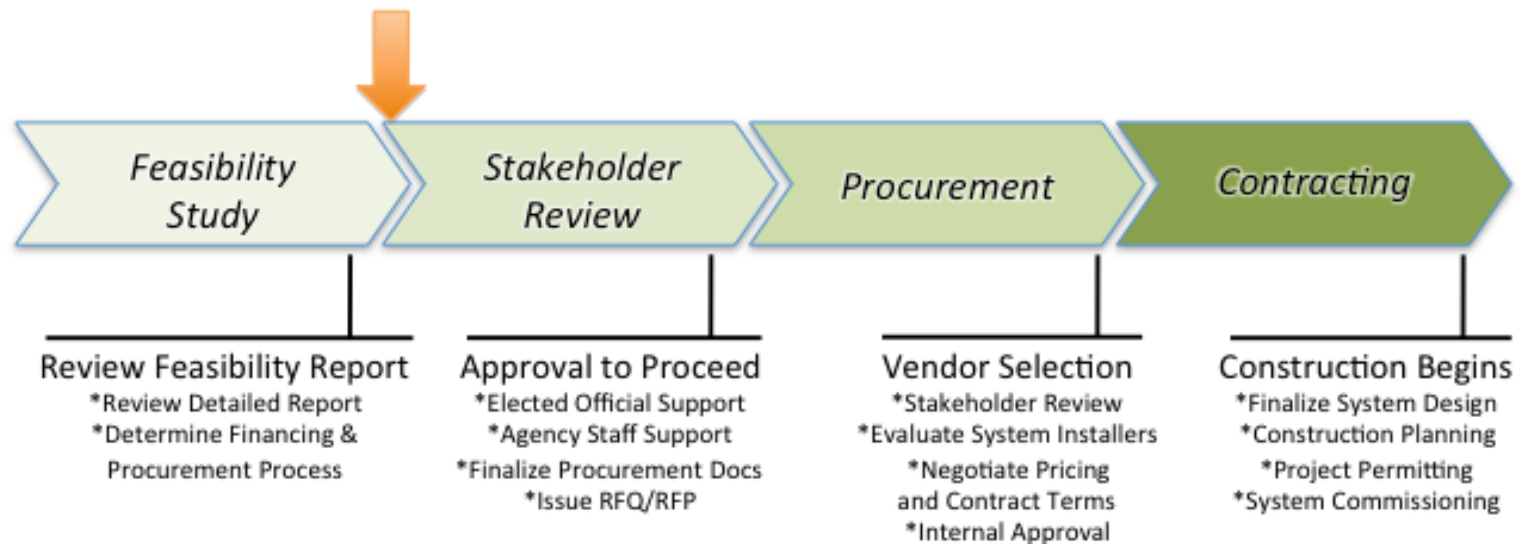


# Solar Thermal Target Buildings



# Solar PV and Solar Thermal

## Next Steps



# Cool Roof Restorations

Using low-cost/long-life roof restoration solutions that extend capital and reduce maintenance

- Training local workforce to install – economic development
- Gain significant UHI benefit
- Measurement and verification (M&V) will include atmospheric impact and building sub-metering





# Vegetative Roofs

EPA/DDOE has provided a grant in the amount of \$2,100,000 for green roof installations on DGS properties

- The Smart Roof process identified the most suitable locations for these installations
- 10 locations covering over 85,000 SF of roof-top



# Leadership in the Community

**Leadership:** “Buildings that teach” and knowledge transfer to the community

- Students learn botany on vegetative roofs
- Vocational education to students on renewable energy technologies
- Job creation and training in the local community – viable skills that can be sold into the economy without government subsidies



# Benefits of an Integrated Approach to Roof Asset and Energy Management



- Roofs will continue to protect occupants and building interior from the weather
  - Starting with a stable roof portfolio is key
  - Stabilizing roofs need not be expensive
- Holistic and objective approach to the building portfolio
  - No technology biases
  - Considers the whole portfolio: no cherry picking of projects
- Simplified procurement
  - An integrated approach significantly reduces number of transactions
  - Still includes local vendors

# Questions/discussion

