



Washington D.C. Smart Roof Program

Program Overview

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DGS Smart Roof

A strategic approach to portfolio-based roof management

Across 435 buildings including schools, police stations, fire stations, parks/rec centers and office buildings that make up 321 acres of roof area.

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

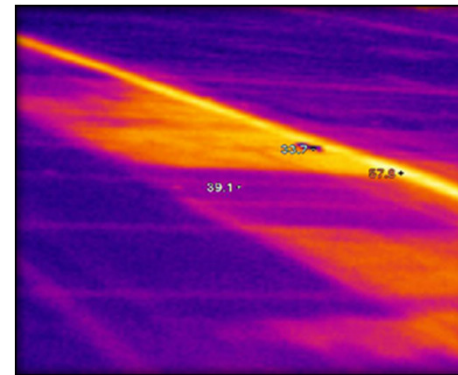
The asset management program gave us the real truth – what we had to do and when to extend out resource dollars.”
– *District of Columbia Public Schools, Stephen Kitterman, Program Manager*

Weathering the Storm, and Beyond

	2011 Hurricane Irene	2012 Hurricane Sandy
Leak Response Calls	208	28

*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

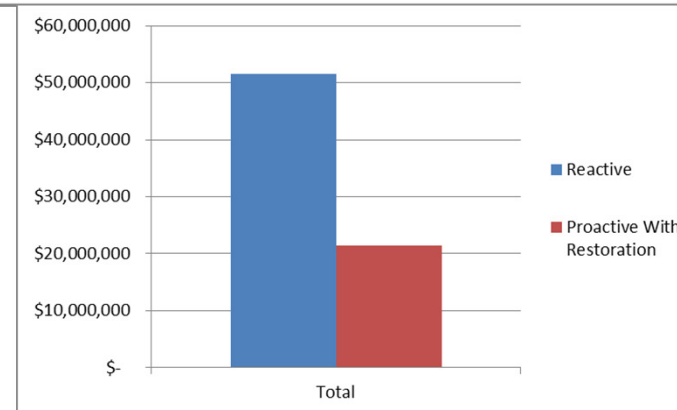
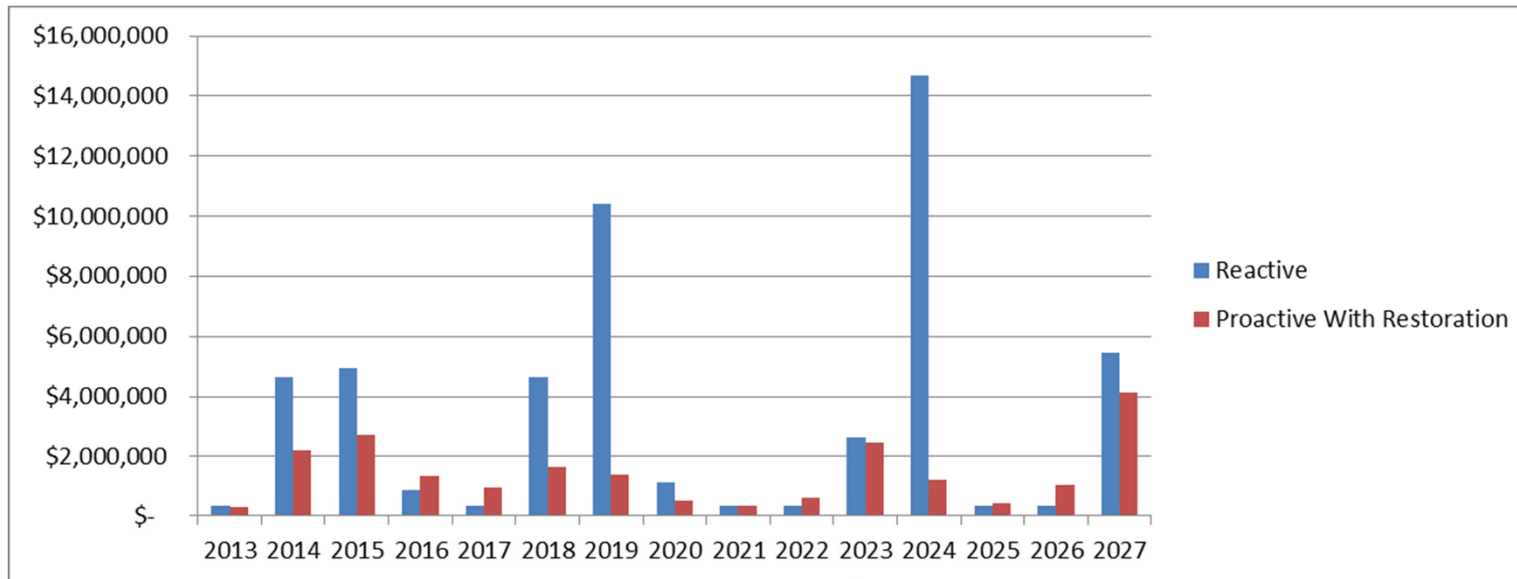
Assessment and Roof Restoration Saved PV Program, and a Lot of Money

- 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.





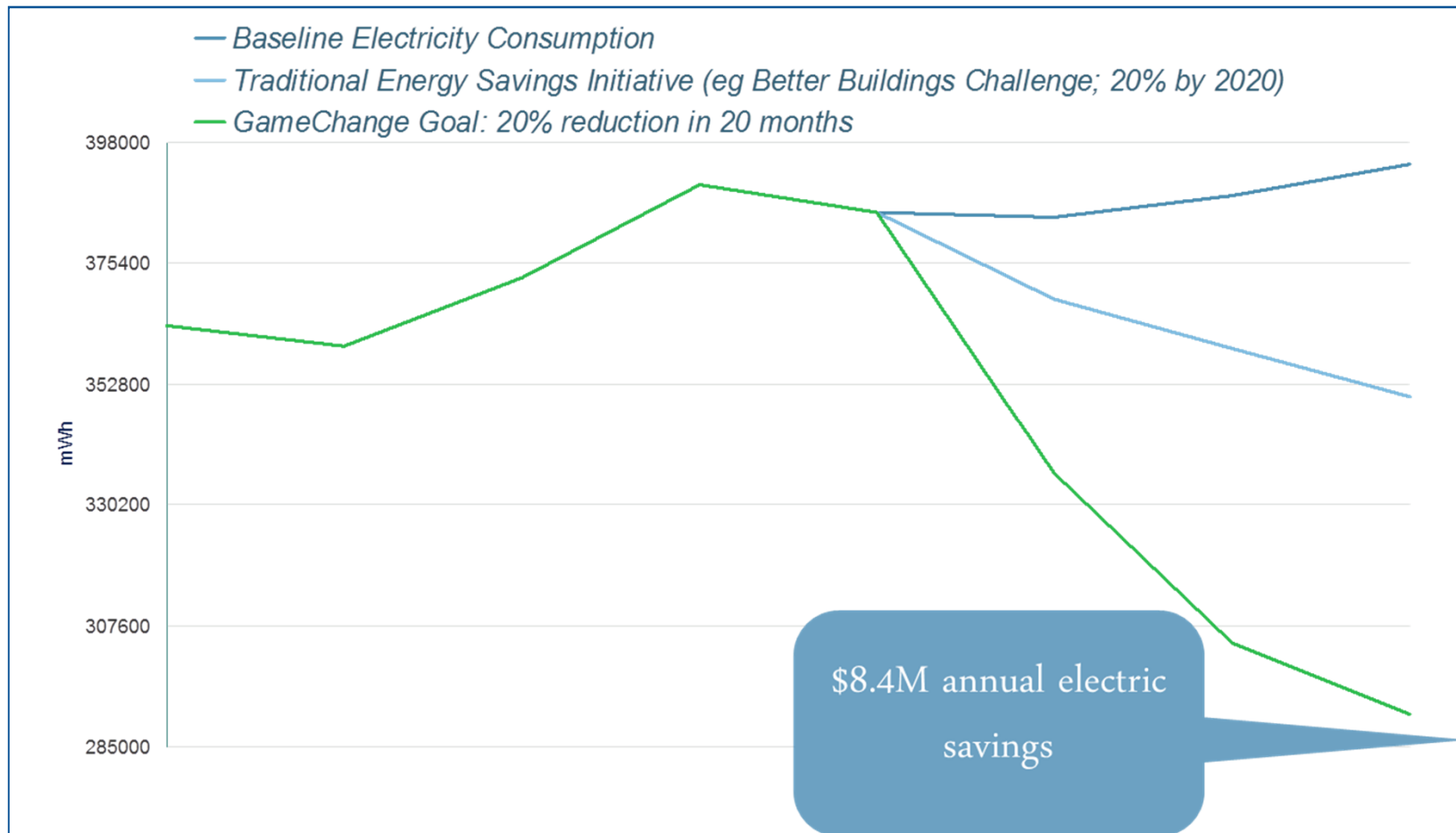
Conclusion: Better Roofs for a Lot Less Money



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



DGS Energy Goal



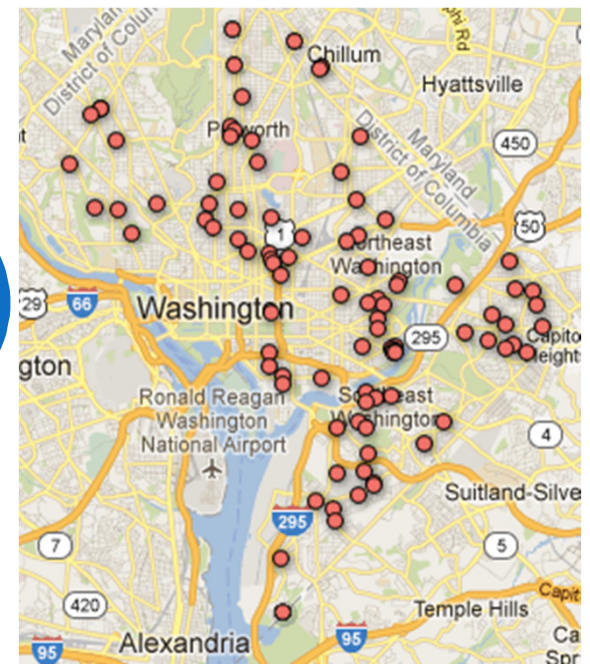
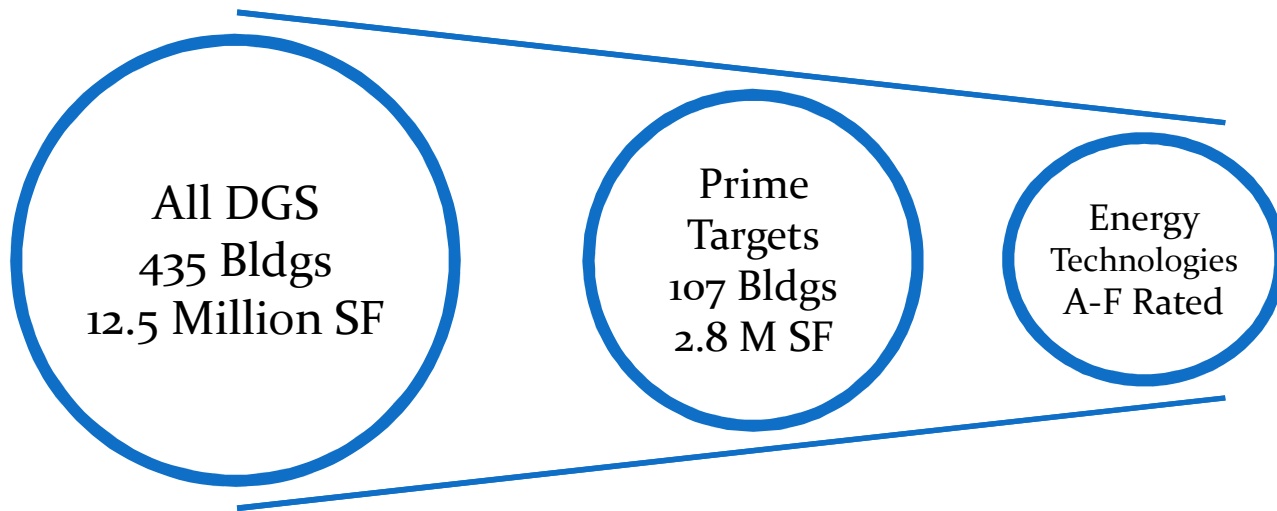
Smart Roof Objectives

- 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

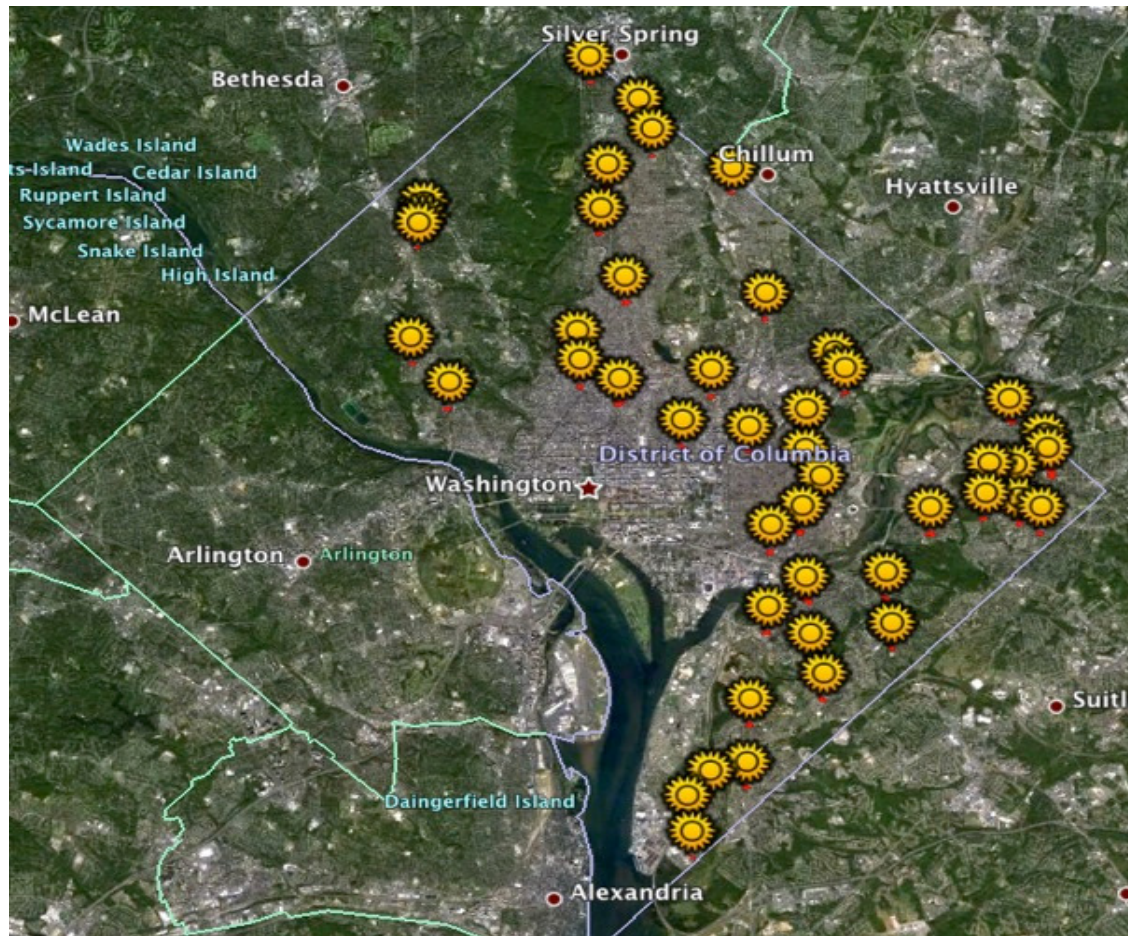
Developed screening criteria for each technology
Screening entire DGS portfolio



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
- 10,000+ MWh generated annually (based on 8.5 MW systems)
- 7,000 tons CO² Displaced Annually
- \$17M in utility savings saved over PPA term
- \$16.5M economic impact as a result of construction
- 68 jobs created during construction – Training for local green jobs will be provided

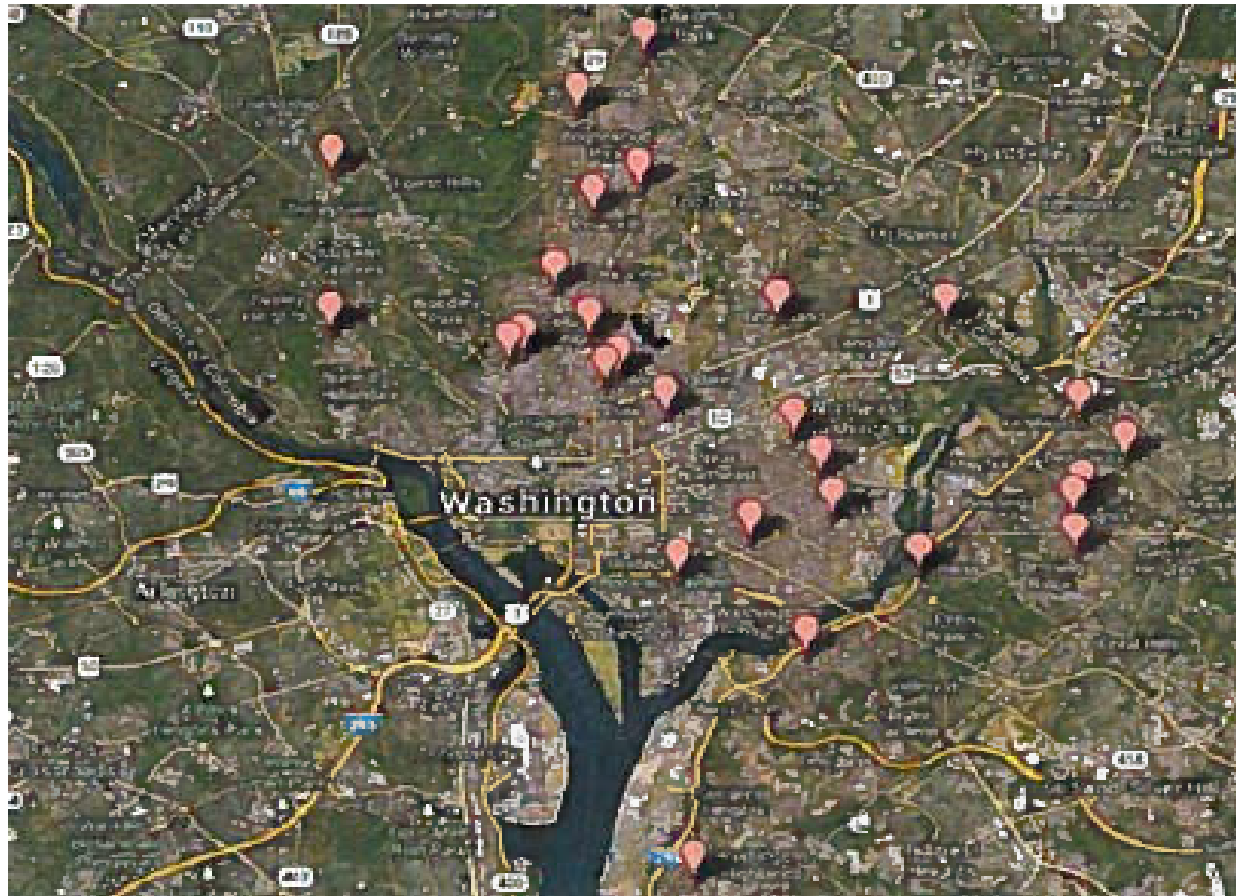
Solar PV Target Buildings



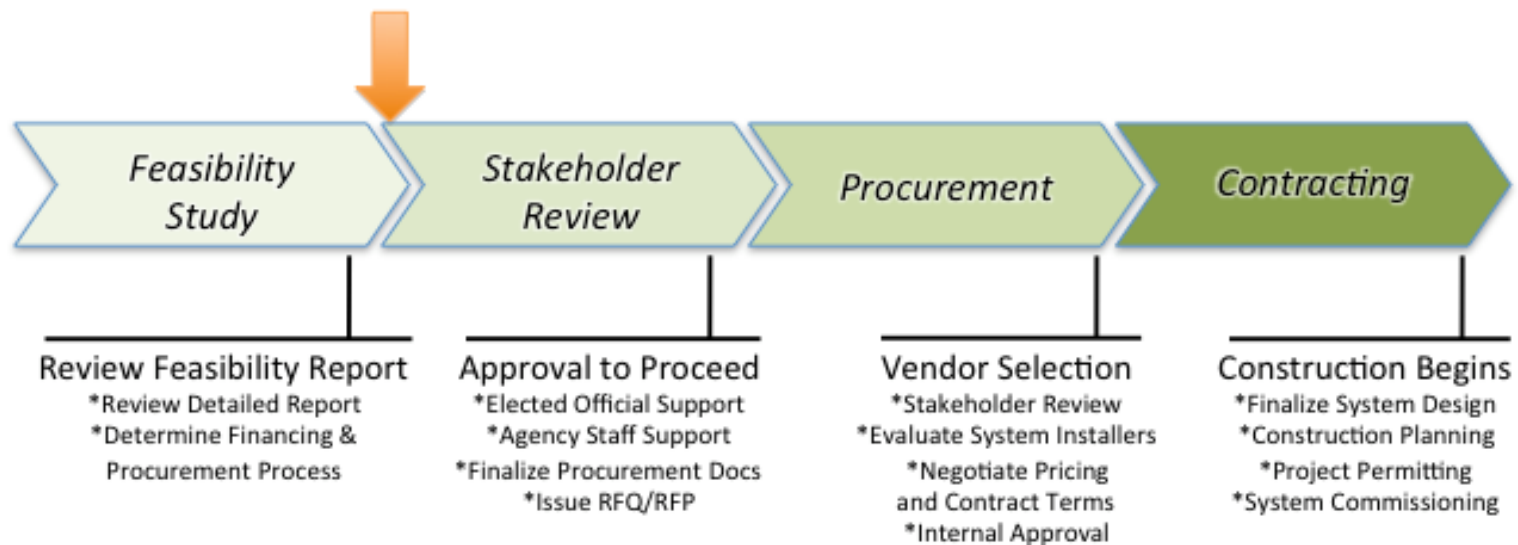
Solar Thermal Summary

- 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
- 1,800 MWh generated annually
- 2,300 MWh natural gas offset annually
- 2,250 metric tons CO2 Displaced Annually
- \$9.6M in utility savings over 20 years
- \$11.9M economic impact as a result of construction
- 49 jobs created during construction – Training for local green jobs will be provided

Solar Thermal Target Buildings



Solar PV and Solar Thermal Next Steps



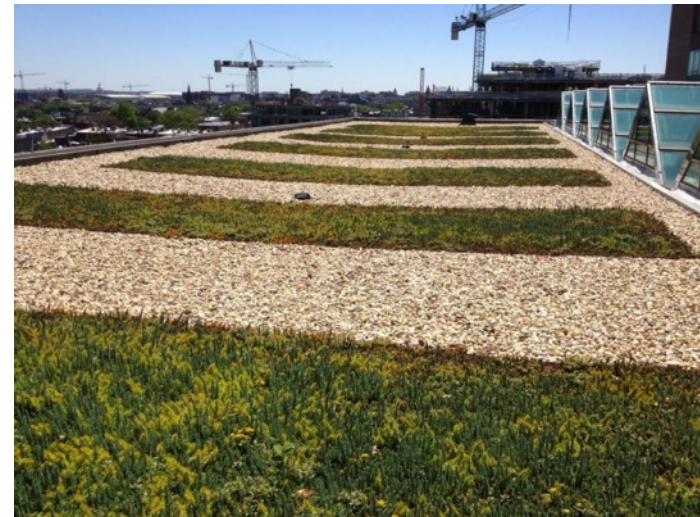
Cool Roof Restorations

- *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 has determined the most suitable locations for these installations.
- We are currently evaluating 10 locations covering over 85,000 SF of roof top space.



Leadership in the Community

Leadership: Examples of 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 are still primarily there to keep the weather out of the building – starting with a stable roof portfolio is key – but need not be expensive
- Holistic approach to the building portfolio - no presumed technology, no cherry picking of projects that might dilute the potential for the larger portfolio
- Simplified procurement – a portfolio approach significantly reduces the number of transactions while still including local vendors

Questions/discussion



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