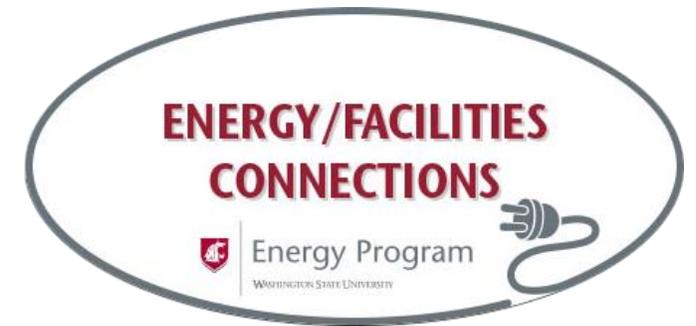


Bringing Balance to **Managing Your Assets**, Their **Service Life**, and **Energy Efficiency Goals** in a Changing Political Climate



Roofs | Walls | Pavement



May 7, 2019

What We Want To Share With You

- Our Charge
- Our Challenge
- Your Concerns
- How Do We Get There
- Real-World Case Study
- Questions?

Question for CANDY!!

Question: What is the oldest structurally sound, usable building (with roof) today?

Answer: Newgrange tomb in Ireland

....and after five millenniums the roof is still waterproof!!



It's amazing what can happen without budget constraints. Unfortunately we can't all live in that world so today's presentation showcases how you can balance your budget, energy and government challenges while still keeping top performing assets.

Our Charge



...to be more intelligent about how our facilities impact our environment...



Your Concerns

- I've had my budget cut but am being asked to do more, **how do I prioritize projects?**
- I've heard roof color is important but **how do I select the right one?**
- Do I put **solar PV** on roofs? I've heard that there can be major conflicts between roof performance and solar. How do I know the best approach?
- What about those **solar leases, power purchase agreements, direct purchase?** Which is best?
- My power bill includes **significant demand charges**. How do I use renewable energy, demand management and storage to reduce demand charges and save money?
- Can I use any of these strategies to shift more spending from **my operating budgets to my capital budget?**
- I'm already reducing energy use, but I have **more stringent goals to meet**. How do I get there?
- I have local government pressure to increase performance but I feel like **I'm doing everything I can?**
- How does the "climate" in **the other Washington** affect me?

Our Challenge

“The **K-12 sector alone spends \$6 billion annually** in the U.S. on energy bills, more than textbooks and computers combined, and second only to teacher salaries. Reducing energy usage by 20% across the education sector would result in **energy cost savings of more than \$3.3 billion** that K-12 schools, colleges, and universities can better spend on educating students.”

~ Office of Energy Efficiency & Renewable Energy - 2016

“A huge wave of campus facilities construction in the 1960s, which accommodated the surge in Baby Boomers, is reaching the end of its usefulness in the next decade, creating significant stress on institutions as to what to do with those buildings. This wave of aging buildings now represents 40 percent of the space on campuses.”

~ GlobeNewswire - 2018

Our Challenge

“Selecting the right roof color is an easy way to decrease a school’s energy consumption. Conversely, choosing the wrong roof color can be a costly mistake: One study found that in northern climates during the heating season, the **thermal heat loss associated with a white membrane is 30 percent higher than that of black EPDM**. Because a roof is a long-term investment, choosing the right color can help reduce a school’s energy consumption and increase its sustainability for decades.”

~ School Planning & Management - 2016

“Green roofs can reduce heat gain/loss and cooling needs. Green roofs can also act as sound insulation. Other **potential benefits are reduction in the size of HVAC equipment, insulation, and roof drains**. Green roofs can potentially incorporate cooling and/or water treatment functions and stormwater management requirements, depending on the local jurisdiction.”

~ WA State K-12 High-Performance Schools Protocol - 2015

How do we get there?

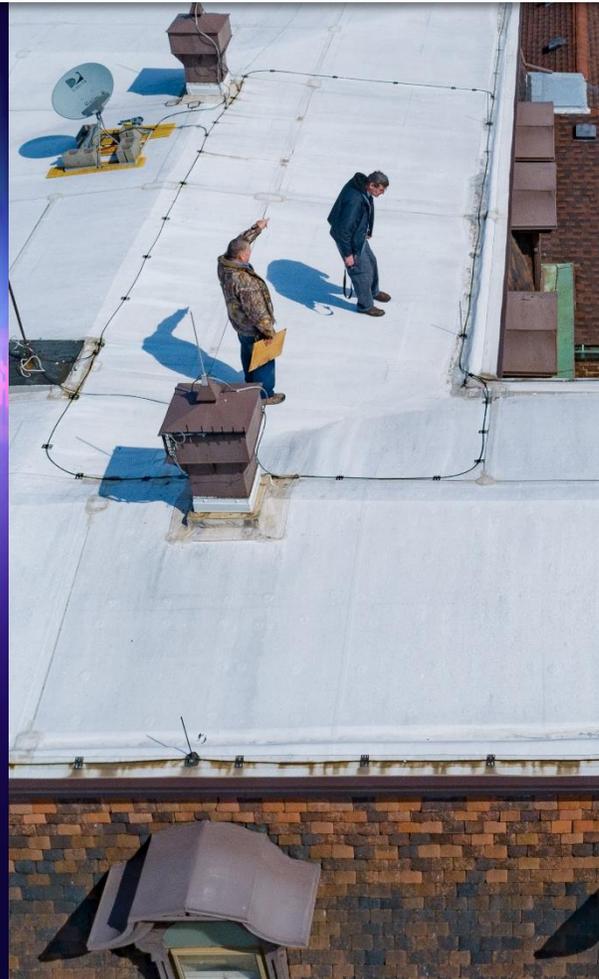
Non-Carbon Production



Demand Management



Conservation



Stormwater



CASE STUDY | DC Department of General Services (DGS)

- 400 buildings
 - Schools
 - Police stations
 - Fire stations
 - Parks/rec centers
 - Office buildings
- 11 million square feet of roofs
- 2,250 roof sections
- Asset value: \$234 million

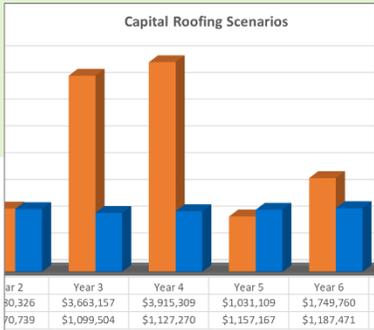


DGS | Program Goals

1. Maximize Roof Life Potential
2. Reduce Building Energy Consumption and CO2 Emissions
3. Employ the Roof as a Platform for Renewable Energy
4. Manage Stormwater – CSS Issue
5. Demonstrate Best Practices



Phase 1



Phase 2



Construction Management



Procurement

**Implement
The
Program**

Emergency Leak Response



Routine Maintenance and Periodic Inspection



Phase 3 – Optimization

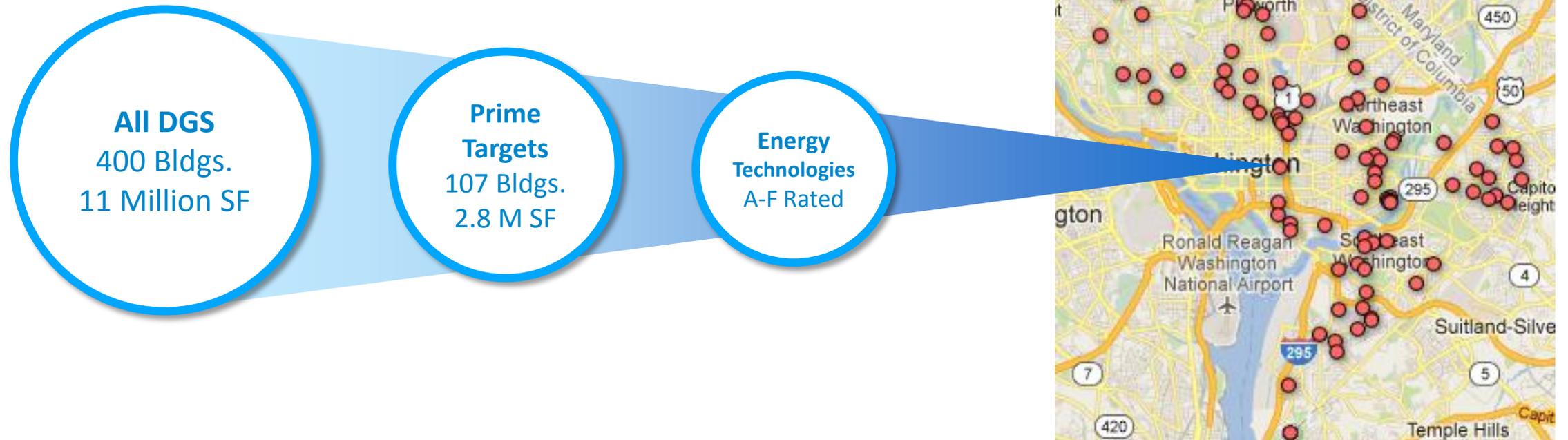
Potential Solutions

- **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 that directly benefit the community

Phase 3 – Optimization

Screening Process

- Developed screening criteria for each technology
- Screening entire DGS portfolio



RESULTS | DC SmartRoof Program

Producing renewable energy

12 MW of solar capacity on ~50 sites is the largest, roof-mounted, photovoltaic solar array installed by a single government.

Preventing storm water from polluting the Potomac River

Green roofs are thriving on 36 buildings. These roofs also provide work force training in horticulture and green roof installation through the DC Greenworks apprenticeship program.

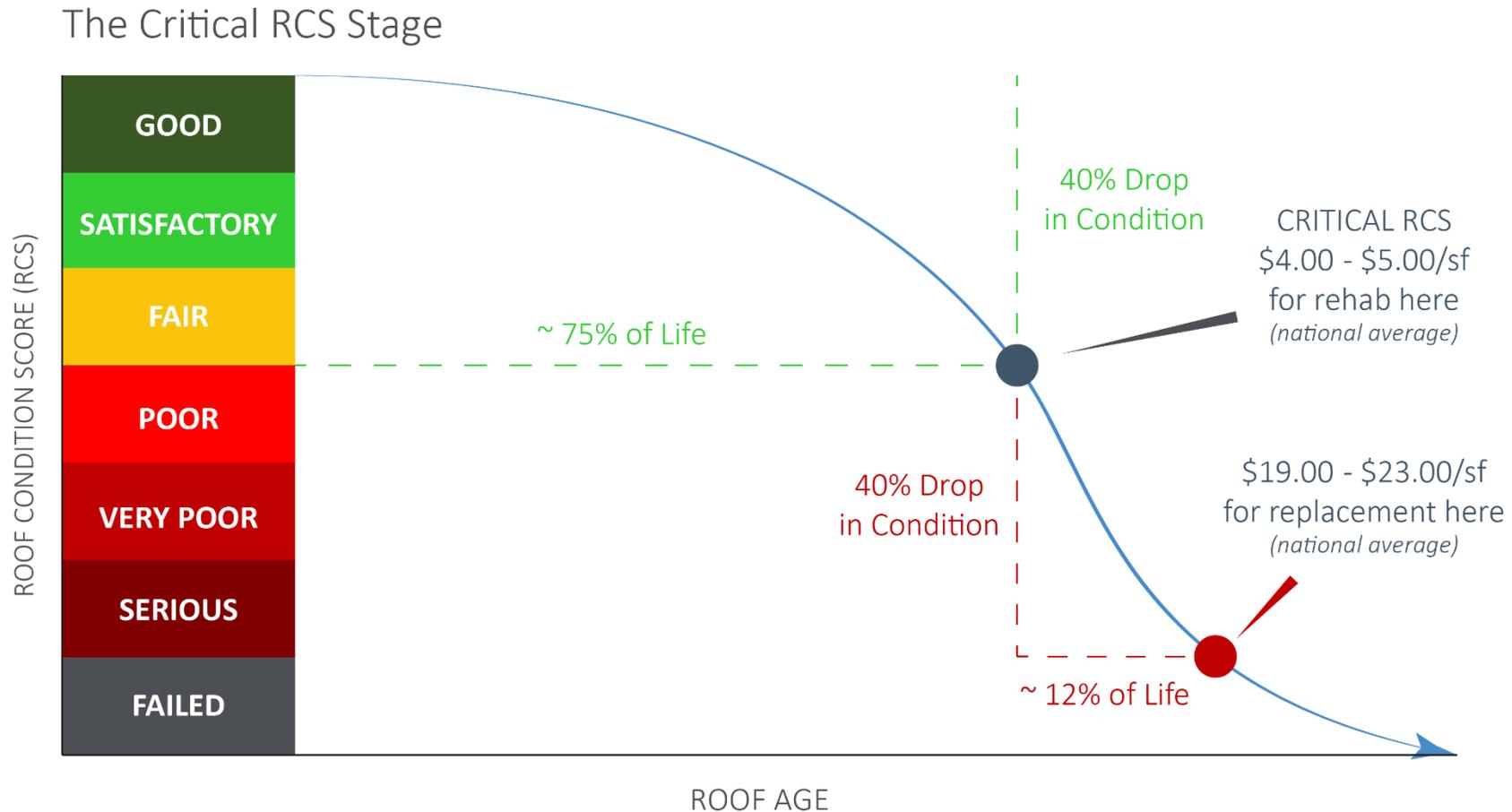
Solving urban heat island issues through cool roof restorations

This solution achieves an estimated lifecycle GHG reduction of 20,000 metric tons of CO₂ across 9 million square feet of roof surface. This method reduced capital requirements by 75% and provided local workforce development.



Monitoring Conditions Is Critical

Capturing this opportunity requires monitoring roof condition and scheduling projects at the Critical RCS stage



What challenges are you facing?

What keeps you up at night?

How do you keep track of your projects? Excel? Tableau? Maximo?

How often do you do a full asset inspection? Roofs, pavement and building exteriors?

How do you prioritize your projects?

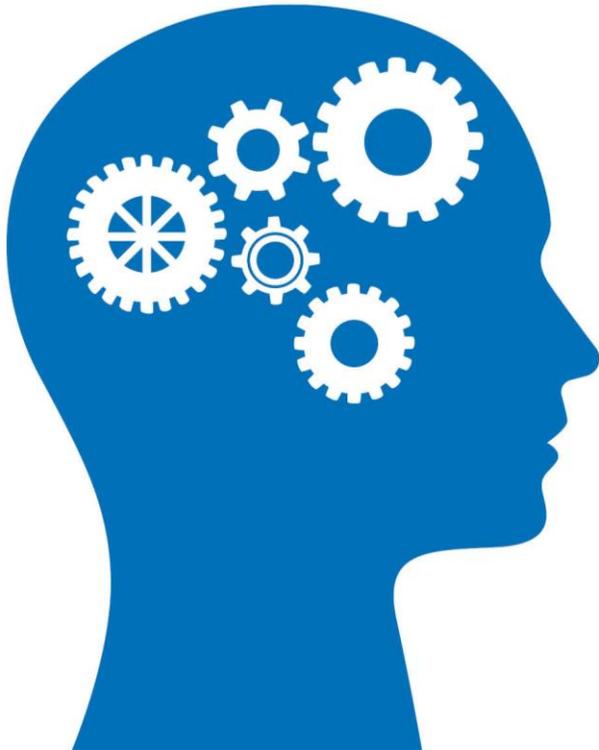
Questions?

Do you have an inhouse team that could be trained to do more detailed investigations?

How far out do you forecast projects?

How do you manage leak response?

Questions?



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