

Serious Games: Crafting Sustainable Solutions Through Play

ISWG, May 21, 2015



Sustainable Facilities Tool

Building sustainable practices, one decision at a time.

Image: Wayne J. Morse Courthouse

What can I do here?

You're here because you care about efficient, healthy buildings and environmentally-responsible purchasing. Check out summaries of each section of the site to start exploring.

Where do I start?

To access the information you need quickly, view user guides tailored to professional roles – taking you straight to the topics that interest you the most.



Learn About Sustainability

Learn about sustainability topics, such as indoor environmental quality (IEQ) and plug loads



Buy Green

Discover which products and services meet different environmental programs, such as BioPreferred or Energy Star



Practice Going Green

Try your hand at sustainable building management with Green the Building.



Plan a Project

Review sustainable strategies for both new construction and renovation projects



Explore a Building

Walk through a sustainable building to learn about strategies and products for each workspace and building system



Be Social

Share case studies and read the latest social content about green building topics



GSA Sustainable Facilities Tool

- Government's one-stop-shop for building and buying green content
- Discover and put into action the sustainability concepts, strategies, and relationships necessary to create transformative impact
- Available on all devices at sftool.gov



New in SFTool

[Hot Annotated EO 13653](#) (Climate Adaptation)

[Customized Agency Content w/in GPC](#)

[User Guides and Intro Pages](#)

[API and Developer Page](#)

SFTool – What do I do here?

Welcome to the Sustainable Facilities Tool! You're here because you care about efficient, healthy buildings and environmentally-responsible purchasing. Whether you're a facility manager, purchasing agent, designer, tenant, or just curious, SFTool can help you take action to green your buildings, purchases, and operations.

Here are a few things you can do here:

Learn – Got a topic on your mind? Read [descriptions](#), [tips](#), and [case studies](#) about everything from [water efficiency](#) to [plug load reduction](#). Click through annotated [legislation](#), like [Executive Order 13653](#), and understand the impact of policy on sustainability.

Plan – Starting a project? Get [strategies](#) for building green or turning an existing space into a healthier environment. Try approaches that look at material [lifecycles](#), help your building use [clean energy](#) or establish a [solid waste reduction plan](#). Make sure you're preparing for the long term impacts of [climate change](#).

Explore – Roam around our [virtual building](#) to compare materials and design strategies. Understand the interactions between [building systems](#) and the [people](#) they serve. See how your [role](#) helps a team reduce costs and increase environmental sustainability.

Procure – The products we consume have a tremendous impact on long-term costs and natural resources. Find out what [sustainability criteria](#) to seek across hundreds of product categories. Buy [products](#) with recycled content and [services](#) with environmental contract requirements.

Practice – Ready to take action? Try your hand at [Green the Building](#) and see if you have what it takes to manage a building. Use [MyProjects](#) to link your project goals to SFTool content and track your progress with your team.

Share – Have a story to tell? Send us your [case studies](#) and read about others' sustainability projects. Interact with us on [Twitter](#), [Facebook](#), and [Pinterest](#). Building your own app? Get SFTool content sent directly via our [API](#).

Why did we build the SFTool?

The General Services Administration is tasked with putting our nation's public servants into efficient, healthy buildings and buying goods and services that provide maximum value to the taxpayer. With each green building, waste and utility costs drop, people breathe better air and we conserve resources for future generations. Helping the Federal Government learn, plan and explore how to build and buy green is our mission, but we built SFTool to inspire and prepare everyone to take action. Learn more about GSA's [Office of Federal High-Performance Green Buildings](#).

SF Tool Guide

What is the Sustainable Facilities Tool?

The Sustainable Facilities Tool (SFTool) helps you conserve resources and reduce operating costs by bringing together the sustainability information you need to green your buildings. Use SFTool as your quick reference for day-to-day questions or dig deeper to understand more about efficiency, indoor environmental quality, conservation and the connections between them.

Sustainability is a team effort — understanding other's goals and perspectives can help you work toward sustainable operation!

Information for your role

The SFTool has great information to help you reduce environmental impact and save your organization money. To speed your access to the information you need, we've developed a set of user guides to take you straight to the topics that might interest you most.

Click on the role below that best describes you to go to that user guide. When you're done, feel free to check out other user guides and explore the rest of the site!



Facility
Manager



Procurement
Professional



Leasing
Specialist



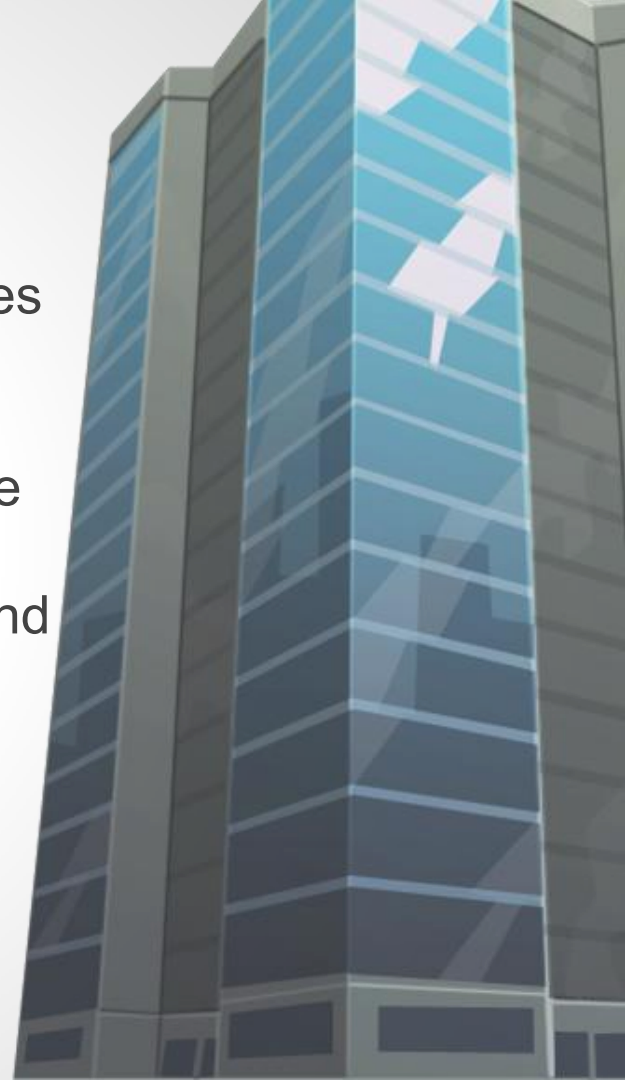
Project
Manager

Get value with the SFTool

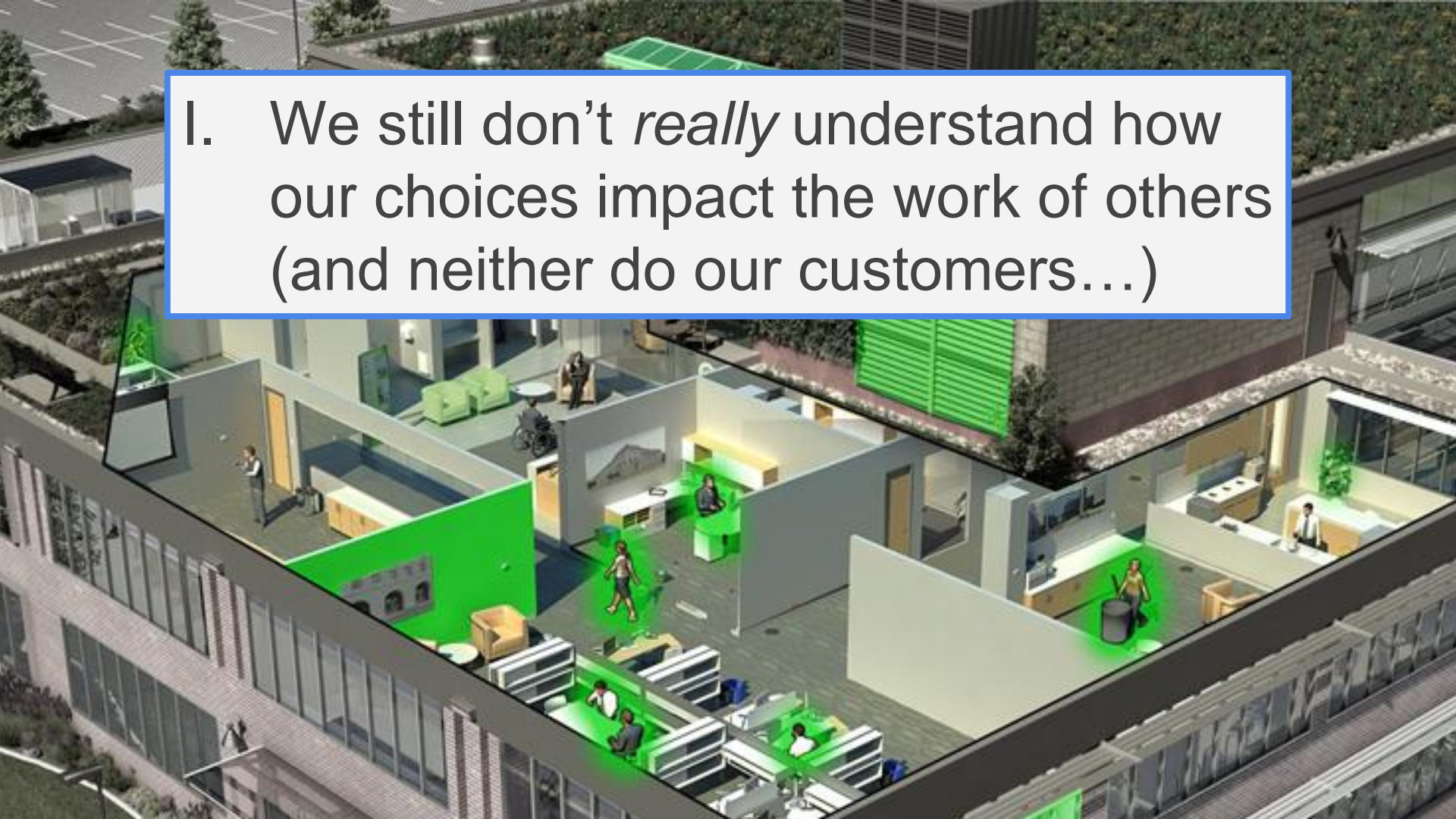
- ✔ Learn the basics about sustainability topics, from sustainable sites to water conservation
- ✔ Start planning your upgrade or building project and track your material selections through the tool
- ✔ Explore workspaces and building systems to understand how to optimize performance
- ✔ Put your building sustainability knowledge to the test with Green the Building
- ✔ Link your project goals to SFTool content and track your progress with MyProjects
- ✔ Choose sustainable alternatives to traditional supplies and equipment with the Green Procurement Compilation
- ✔ Stay up to date on building rating systems and Federal mandates
- ✔ Share your success stories with others and see how your peers are achieving success

What's the Problem?

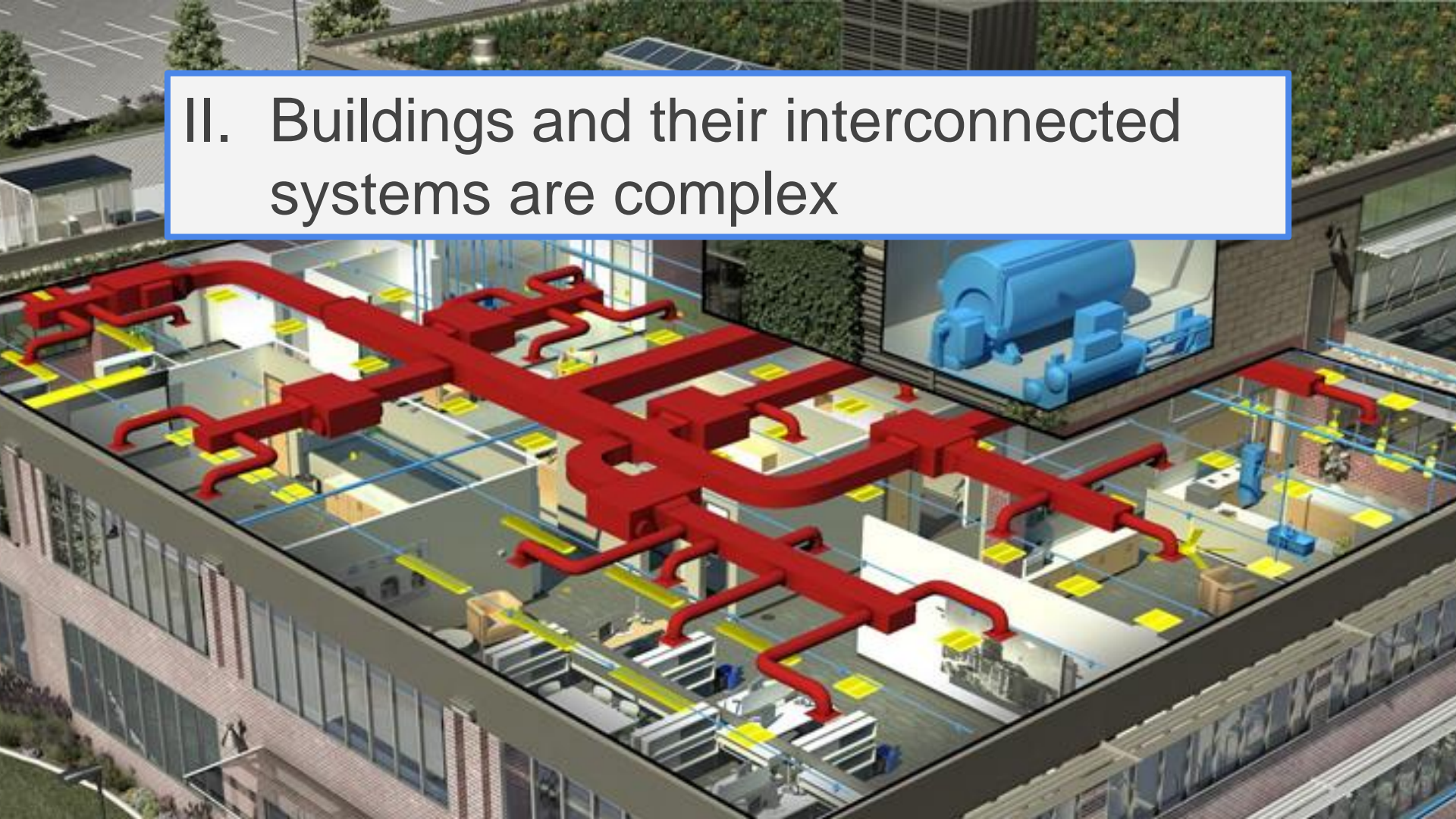
- I. We still don't *really* understand how our choices impact the work of others (and neither do our customers...)
- II. Buildings and their interconnected systems are complex
- III. Successful management requires a breadth and depth of knowledge across professions
- IV. Traditional jargon and checklists simply don't resonate with all audiences. They don't teach.



I. We still don't *really* understand how our choices impact the work of others (and neither do our customers...)



II. Buildings and their interconnected systems are complex





III. Successful management requires a breadth and depth of knowledge across professions

IV. Traditional jargon and checklists simply don't resonate with all audiences. They don't teach.

www1.eere.energy.gov/femp/pdfs/fr_notice_cfr433_

Attribute	Baseline	Tier 1 High Performance *	Tier 2 High Performance **	Tier 3 High Performance ***	Measurement & Verification	Plans & Specs	Calculations & Analysis	Basis of Design	Verification
Air Movement	ASHRAE 55-2010 Less than 0.2 m/s (40 fpm) at occupied level	ASHRAE 55-2010 Occupant controlled between 0.1 and 0.76 m/s (20 and 150 fpm)	ASHRAE 55-2010 Occupant controlled between 0.1 and 0.76 m/s (20 and 150 fpm)	ASHRAE 55-2010 Occupant controlled between 0.1 and 0.76 m/s (20 and 150 fpm)	ASHRAE 55-2010 N/A	ASHRAE 0 ASHRAE 1.1 SMACNA Baseline: No Tier 1 High Performance: Yes Tier 2 High Performance: Yes Tier 3 High Performance: Yes	ASHRAE 0 ASHRAE 1.1 Baseline: Yes Tier 1 High Performance: Yes Tier 2 High Performance: Yes Tier 3 High Performance: Yes		Describe air speed performance and how it will be achieved by the proposed design.
Pressure	2009 ASHRAE Handbook – HVAC Fundamentals Positive building pressure when occupied, and higher than 8°C (47°F) when unoccupied.	2009 ASHRAE Handbook – HVAC Fundamentals Active pressure control by floor to achieve 12Pa (0.05" wc) positive building pressure when occupied, and when outside dew point is higher than 8°C (47°F) when unoccupied.	2009 ASHRAE Handbook – HVAC Fundamentals, Lstiburek (1999), Quirouette (2004) Maintain building perimeter zones at 12 Pa (0.05" wc) positive pressure with respect to outdoor; control per exposure per floor when outside dew point is higher than 8°C (47°F). No design negative pressure building.			ASHRAE 0 ASHRAE 1.1 SMACNA Baseline: Yes Tier 1 High Performance: Yes	ASHRAE 0 ASHRAE 1.1 Baseline: Yes Tier 1 High Performance: Yes		Coordinate with Building Enclosure Air Tightness metric.

2003 baseline, energy targets are established for all new construction. The A/E must design all new buildings to have an energy performance below the EISA 2007 energy target or 30 percent below ASHRAE 90.1, whichever is lower.

...design through each design phase, th...
...nstrate that it meets the energy...
... modeling that includes the...
...e systems in concert with...
...ms and provides documentation...
...stems were chosen based on a life-...
.../sis.

...es use the public safety buildings targ...
...s of entry perform the energy analysis...
...building, commercial building, and...

1.8.2 Energy Use Intensity Design Maximums

Serious Games

The background of the slide is a stylized, low-poly landscape. It features a range of green hills in the foreground, a city skyline with several buildings of varying heights in the middle ground, and two prominent blue mountains in the background. The sky is a light, hazy blue. The overall aesthetic is clean and modern.

Our Approach: Educational Games

Why games? Games offer:

- Models (an operable system)
- Roles (agency in the model)
- Context (a reason to make choices)



Systems Thinking

The world is comprised of *systems*:
interlocking, contingent things

We need to be able to think in terms of
systems to understand systems

Games model systems *with* systems—
computational ones



Role-Play

Playing a role isn't just for kids

We can also play a role with our future knowledge

Experiencing life by different rules

“Performance before competence”



Context

Choices are only meaningful in context

We can't recreate context, but we can reproduce some of it in a game

Immersion as feeling constrained by the rules of a model, rather than being sensorily overwhelmed

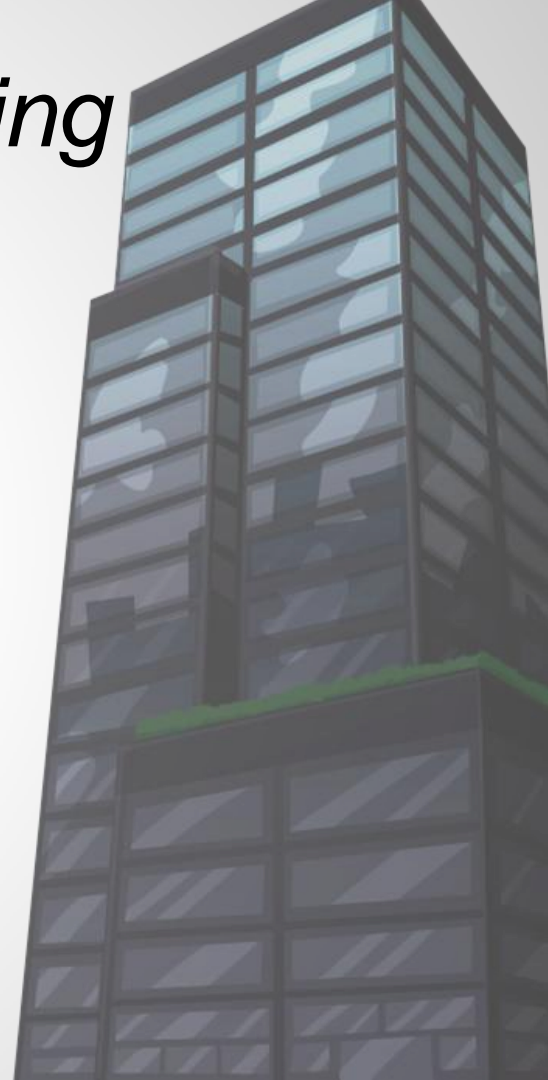


A graphic featuring the text "Green the Building" centered within a white rectangular box with a brown outline. The box is set against a background of a blue sky with light clouds and a grey silhouette of a city skyline. Two blue curved arrows form a circle around the box, pointing in opposite directions. The word "Green" is in green, "the" is in grey, and "Building" is in a larger grey font.

Green the
Building

Our Solution: *Green the Building*

- I. Grasp the whole system and try out building strategies free of risk
- II. Broaden the circle of those engaged in the solution process
- III. Leap far beyond static learning to “learning through action”
- IV. Direct decision support via SFTool’s vast knowledge base



The Game



Buy new buildings to manage and improve



Drennan Office Building

Sustainability	8
Target	73
Satisfaction	54%

100 Action Points

BUY



Brodeur Office Building

Sustainability	14
Target	79
Satisfaction	43%

110 Action Points

BUY



Chartier Office Building

Sustainability	13
Target	70
Satisfaction	43%

110 Action Points

BUY



Deming Office Building

Sustainability	10
Target	76
Satisfaction	44%

200 Action Points

BUY



Grimes Office Building

Sustainability	8
Target	70
Satisfaction	41%

220 Action Points

BUY



Loudermilk Office Building

Sustainability	9
Target	77
Satisfaction	44%

230 Action Points

BUY

Back to Building Portfolio

Drennan Office Building

Sustainability

Satisfaction

Action Income

Start

Year 0/20

Target

8

8

73

54%

+4 Income

54

Initial Income: 50



Drennan Office Building

Income Earned to Date

0

Initial cost: 100

Draw a New Card

(choose one of three)

Foresight Awards

Energy	☆☆☆
Occupancy	☆☆☆
Recovery	☆☆☆
Footprint	☆☆☆
Behaviors	☆☆☆

Cards in Play

Play a card from your hand!

Water Energy
Efficiency
Bundle

43

Install Energy-
Efficient HVAC
Heat Exchanger

40

Resize HVAC
Ductwork

56

My Cards 0/6

1
**Launch Single
Stream
Recycling
Program**

22



**Install Load
Sensing
Advanced
Power Strips**

20



**Upgrade
Chiller**

40





Practices

Recycling Optimization

Launch Single Stream Recycling Program



Action Cost

22

Add to Hand

Foresight Awards

None

Sustainability Effects

0 Energy

4 Water/Waste

Total Sustainability Gains

4

Building Satisfaction Gain +1%



Implement comprehensive commingled, or single stream, recycling programs with occupant engagement

[Learn more at SFTool.gov](#)



Workspace

Plug Load

Install Load Sensing Advanced Power Strips



Action Cost

20

Add to Hand

Foresight Awards

None

Sustainability Effects

3 Energy

0 Water/Waste

Total Sustainability Gains

3

Building Satisfaction Gain +0%



Install load sensing advanced power strips on 24/7 powered devices, including printers

[Learn more at SFTool.gov](#)



HVAC

HVAC: Chiller

Upgrade Chiller



Action Cost

40

Add to Hand

Foresight Awards

Recovery ★☆☆

Sustainability Effects

4 Energy

1 Water/Waste

Total Sustainability Gains

5

Building Satisfaction Gain +1%



Upgrade chillers to high-efficiency model

[Learn more at SFTool.gov](#)



Practices

Recycling Optimization

Launch Single Stream Recycling Program

Action Cost

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Advanced Power Strip

Advanced power strips (APS) save energy by controlling the power supplied to plug-in devices during unoccupied periods. A variety of APS technologies exist on the market that vary in complexity, control strategies, data collection abilities, and costs.

Compare different APS control strategies in the compare materials matrix of the Explore section.

Research on APSs from GSA's Green Proving Ground found:

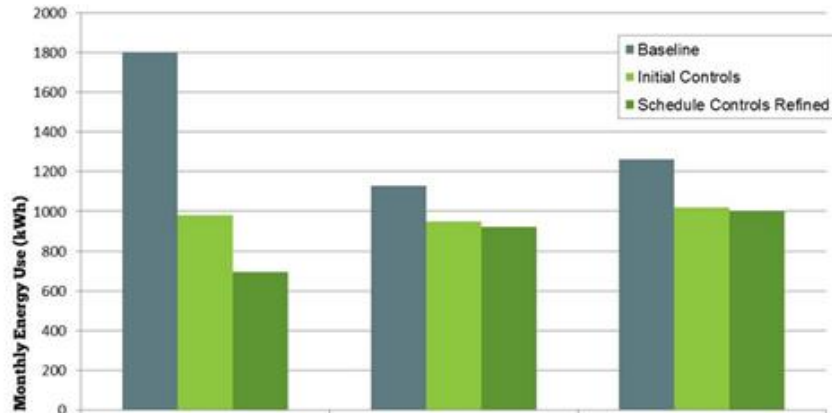


SCHEDULE TIMER MOST EFFECTIVE. Schedule timer controls are the most successful control strategy, with an average energy savings of 48% in the GPG study (see graph below). The largest savings are achieved when schedule timer controls are applied to devices that are powered 24/7, including printers, copiers and kitchen appliances (such as coffee makers and water coolers).

SHORT PAYBACK PERIOD. APS are cost effective. Schedule timer controls can have a simple payback less than 8 years. GPG research demonstrated: kitchens, 0.7 years; printer rooms, 1.1 years; and miscellaneous devices, 4.1 years. Even in workstations, where power management was in place, payback was 7.8 years.

SIMPLE CONTROL STRATEGIES ARE BEST. Occupant surveys can give you valuable insights! GPG surveys revealed that the majority of users did not wish to have more control over their individual APSs. However, they were willing to program power strips to reflect their personal work schedules. Users also wanted an easily accessible manual override. Understanding user preferences is important to creating to buy in.

JUSTIFICATION FOR WIDE DEPLOYMENT. Energy savings and low simple payback argue in favor of deployment of APS technologies throughout government and industry portfolios.





Starter Building



1 of 1



Changes in this building this year...

+6

Sustainability

3%

Satisfaction

+53

Income



Drought

Lowers action points by -4

Low precipitation = higher water costs & rationing

Your Footprint Foresight Award of ★☆☆☆☆ mitigates 25% of this issue.

**Provide Bottled
Water for
Employees**

40



**Run
Dishwashers
Only When Full**

2



**Install High-
Efficiency Water
Fixtures**

24





Water

Water: Drinkable

X

Provide Bottled Water for Employees

Action Cost

40

Add to Hand

Foresight Awards

None

Sustainability Effects

0 Energy

-2 Water/Waste

Total Sustainability Gains

-2

Building Satisfaction Gain +1%



Encourage employee hydration by providing bottled water in kitchenettes

[Learn more at SFTool.gov](http://SFTool.gov)



Water

Water: Dishwasher

X

Run Dishwashers Only When Full

Action Cost

2

Add to Hand

Foresight Awards

None

Sustainability Effects

1 Energy

1 Water/Waste

Total Sustainability Gains

2

Building Satisfaction Gain +0%



Provide instructions to occupants to run dishwashers only when full

[Learn more at SFTool.gov](http://SFTool.gov)



Water

Water Fixtures

X

Install High-Efficiency Water Fixtures

Action Cost

24

Add to Hand

Foresight Awards

Footprint ★☆☆

Sustainability Effects

2 Energy

2 Water/Waste

Total Sustainability Gains

4

Building Satisfaction Gain +0%



Install high-efficiency water fixtures

[Learn more at SFTool.gov](http://SFTool.gov)

**Install
Occupancy
Sensors for
Lighting**

12



**Convert to T-8
Fluorescent
Lighting**

24



**Economic
Lighting
Bundle**

36





Lighting

Lighting: On/Off

X

Install Occupancy Sensors for Lighting

Action Cost

12

Add to Hand

Foresight Awards

None

Sustainability Effects

2	Energy
0	Water/Waste

Total Sustainability Gains

2

Building Satisfaction Gain +0%



Provide sensors that turn on lights when occupants are detected (and off when the space is unoccupied)

[Learn more at SFTool.gov](#)



Lighting

Lighting: Type

X

Convert to T-8 Fluorescent Lighting

Action Cost

24

Add to Hand

Foresight Awards

None

Sustainability Effects

2	Energy
-1	Water/Waste

Total Sustainability Gains

1

Building Satisfaction Gain +1%



Replace any T-12 fluorescent fixtures with T-8 fixtures

[Learn more at SFTool.gov](#)



Bundles

X

Economic Lighting Bundle

Action Cost

36

Add to Hand

Foresight Awards

Energy ★☆☆

Sustainability Effects

3	Energy
1	Water/Waste

Total Sustainability Gains

4

Building Satisfaction Gain +4%



Upgrade lighting systems, occupancy sensors, and minimize overnight operations to reduce lighting usage

[Learn more at SFTool.gov](#)

Indoor Air Quality Bundle

62



Install Xeriscape Landscaping

32



Install Cooling Tower Conductivity Meters

16





Bundles

X

Indoor Air Quality Bundle

Action Cost

62

Add to Hand

Foresight Awards

Occupancy ★★☆☆

Sustainability Effects

0	Energy
---	--------

1	Water/Waste
---	-------------

Total Sustainability Gains

1

Building Satisfaction Gain +7%



Use low-emitting materials, entryway dirt capture, green cleaning + maintenance to raise indoor environmental quality (IEQ)

[Learn more at SFTool.gov](#)



Water

Landscape Optimization

X

Install Xeriscape Landscaping

Action Cost

32

Add to Hand

Foresight Awards

Recovery ★☆☆

Sustainability Effects

0	Energy
---	--------

3	Water/Waste
---	-------------

Total Sustainability Gains

3

Building Satisfaction Gain +0%



Utilize xeriscaping to limit the need for irrigation

[Learn more at SFTool.gov](#)



HVAC

HVAC: Conductivity Meters

X

Install Cooling Tower Conductivity Meters

Action Cost

16

Add to Hand

Foresight Awards

None

Sustainability Effects

0	Energy
---	--------

2	Water/Waste
---	-------------

Total Sustainability Gains

2

Building Satisfaction Gain +0%



Install conductivity meters in the cooling tower to reduce blowdown waste

[Learn more at SFTool.gov](#)

You can share!

Play and Share Green the Building with colleagues and customers

- Provide feedback - we'll name a building after you!
- Suggest new content cards and buildings that reflect your work
- Visit SFTool.gov
- [#GreenTheBuilding](https://twitter.com/SFTool)

Put what you've learned into practice

- Think about where gaming helps your mission



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[/SFTool](https://www.pinterest.com/SFTool)



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