Building Upgrades for Energy Efficiency

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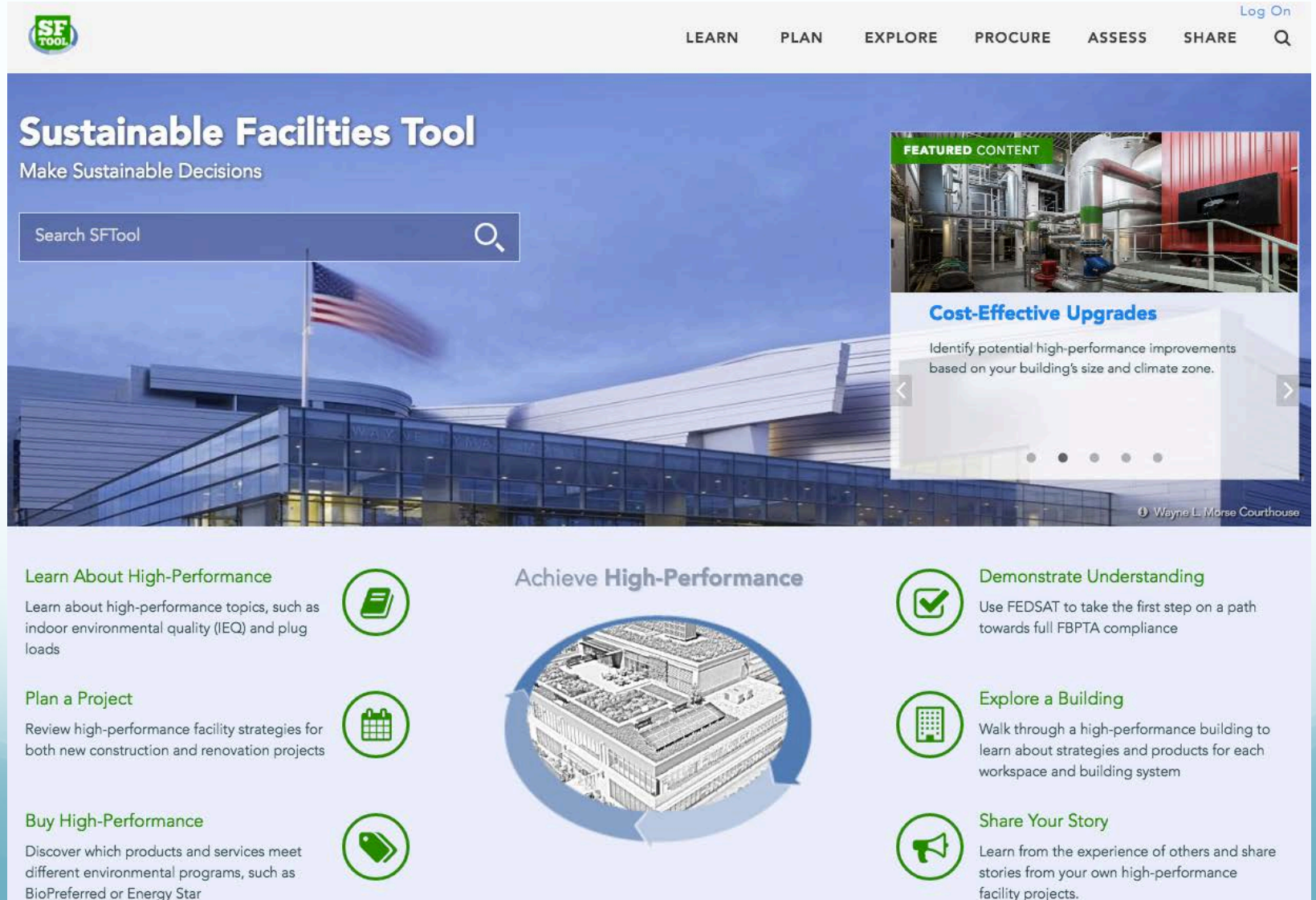
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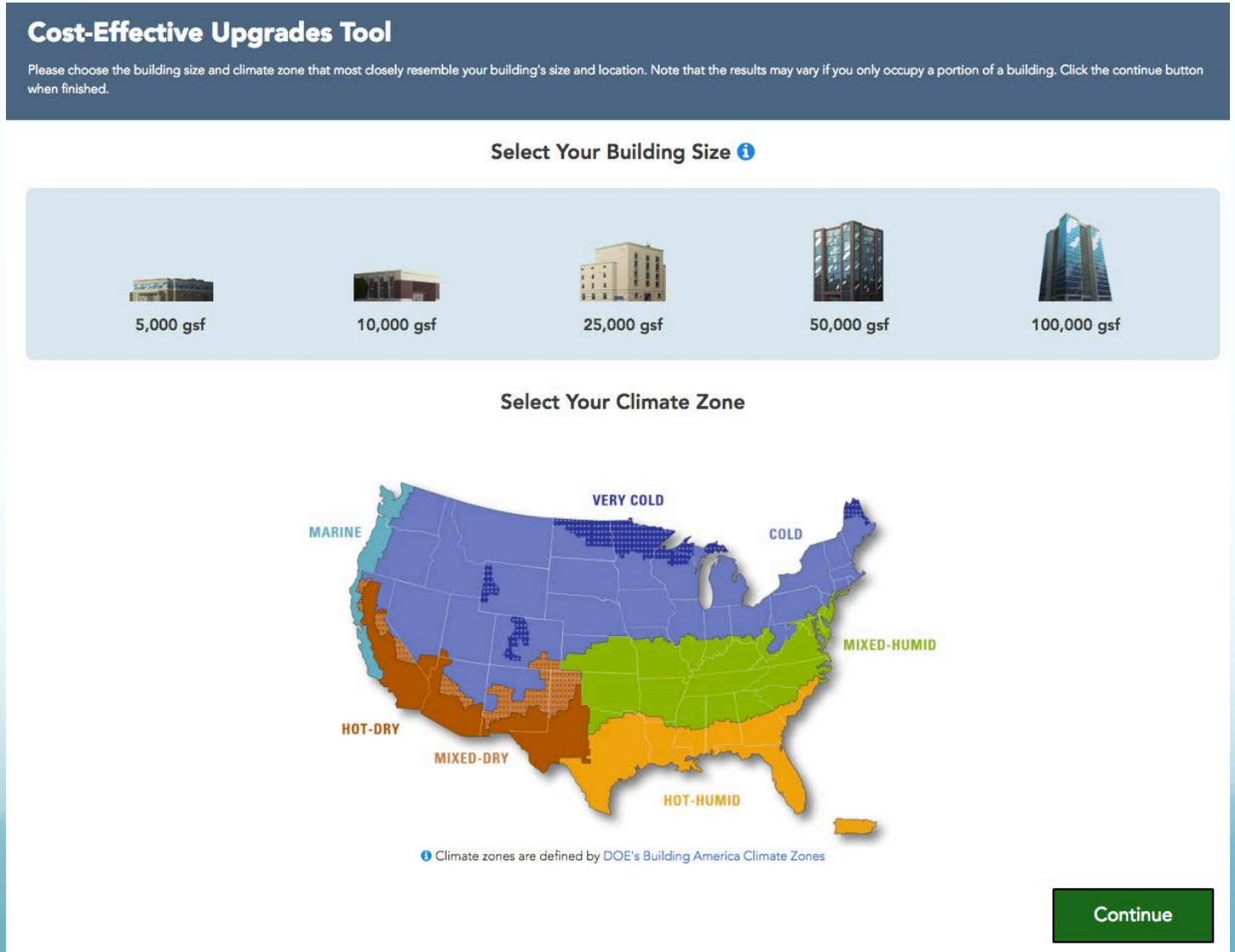
FEATURED CONTENT
Cost-Effective Upgrades
Identify potential high-performance improvements based on your building's size and climate zone.
Wayne L. Morse Courthouse
Learn About High-Performance
Learn about high-performance topics, such as indoor environmental quality (IEQ) and plug loads
Plan a Project
Review high-performance facility strategies for both new construction and renovation projects
Buy High-Performance
Discover which products and services meet different environmental programs, such as BioPreferred or Energy Star
Achieve High-Performance
Demonstrate Understanding
Use FEDSAT to take the first step on a path towards full FBPTA compliance
Explore a Building
Walk through a high-performance building to learn about strategies and products for each workspace and building system
Share Your Story
Learn from the experience of others and share stories from your own high-performance facility projects.

Opportunity for Improving Existing Buildings

- A typical office building can cut energy use
  - By up to 25% implementing no & low cost measures
  - By up to 45% by pursuing deeper retrofit measures
- Impacts: reduced operating costs, improved occupant comfort, greater asset value, and other related benefits

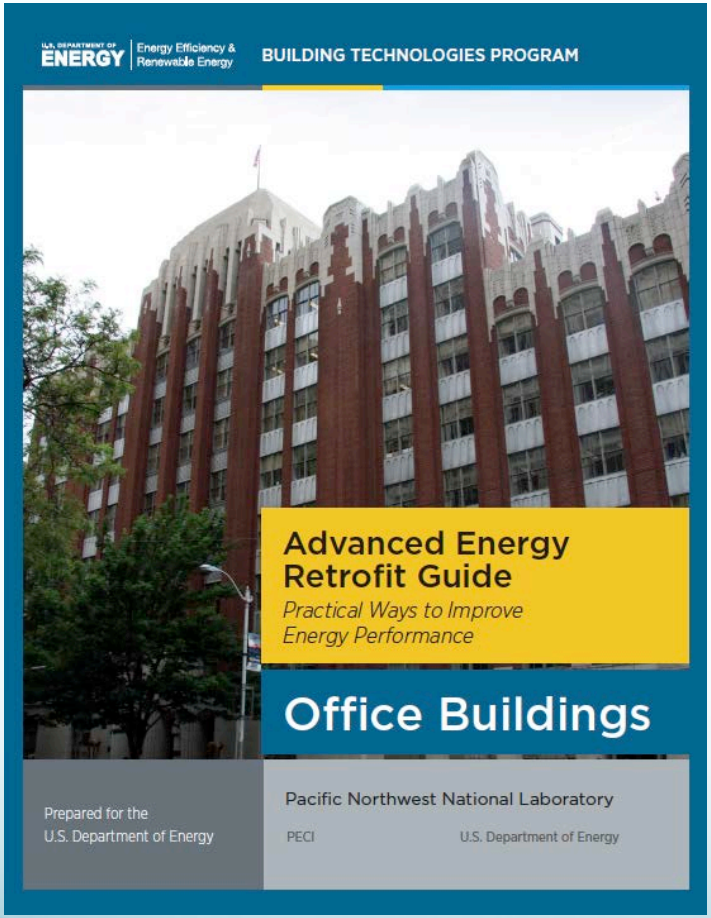
Introducing . . . Cost-Effective Upgrades



Cost Effective Upgrades Demo

Background

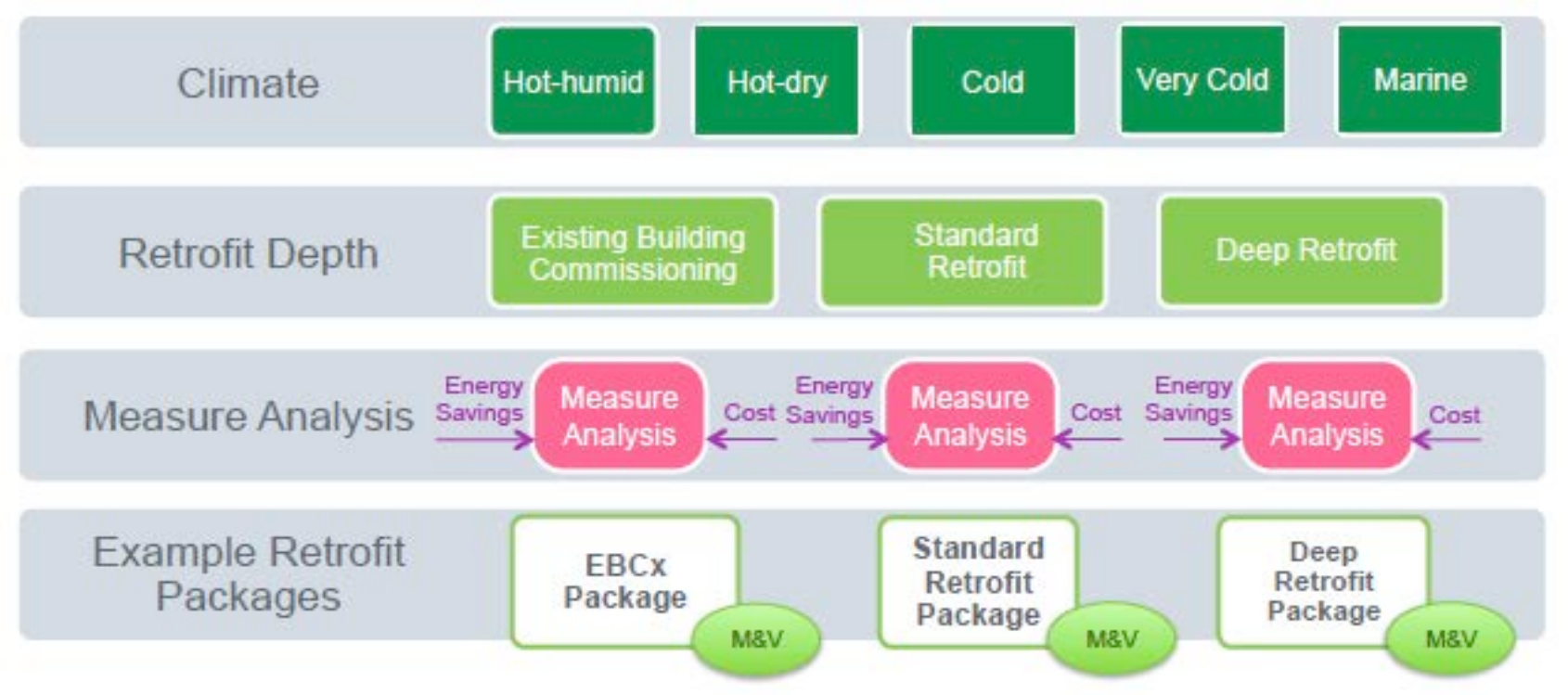
Advanced Energy Retrofit Guide for Office Buildings



- Published in 2011
- Office buildings represent 17% of energy use in U.S. commercial buildings
- 60% of existing office buildings were built before 1980
- Actionable information, practical methodologies, and objective evaluations of the most promising retrofit measures

https://energy.gov/eere/buildings/advanced-energy-retrofit-guides

Scope of Retrofit Guide



Levels of upgrade options

- O&M improvements through Existing Building Commissioning (EBCx)
- Standard retrofits – cost-effective, low-risk upgrade options including equipment, system and assembly retrofits
- Deep retrofits – require a larger upfront investment and may have longer payback periods

EBCx Results of Common Metrics

	Site Energy Use Intensity (EUI) (kBtu/sf/yr)			Annual Energy Cost per Square Foot		
	Baseline	Post-EBCx	% Reduction from Baseline	Baseline	Post-EBCx	Reduction from Baseline
Hot & Humid	88	75	15%	$2.09	$1.91	$0.18
Hot & Dry	97	75	22%	$2.16	$1.85	$0.30
Marine	94	68	27%	$1.99	$1.63	$0.36
Cold	86	66	24%	$2.24	$1.92	$0.32
Very Cold	91	68	25%	$2.00	$1.71	$0.29
Average	91	70	23%	$2.10	$1.81	$0.29

EBCx Energy Savings Results

	Electricity Savings (annual kWh)	Electric Demand Savings (peak kW)	Gas Savings (annual therms)	Site EUI Savings (kBtu/sf/yr)	Savings as % of Total Site Usage	Source EUI Savings (kBtu/sf/yr)	Savings as % of Total Source Usage
Hot & Humid	319,000	4	16,000	13	15%	24	11%
Hot & Dry	497,000	4	26,000	21	22%	38	16%
Marine	410,000	0	37,000	26	27%	35	21%
Cold	341,000	(20)	30,000	20	24%	33	16%
Very Cold	338,000	(60)	34,000	23	25%	35	18%

Measure - Daylight Harvesting

Climate Zone	Electricity Savings (annual kWh)	Electric Demand Savings (peak kW)	Gas Savings (annual therms)	Site EUI Savings (kBtu/sf/yr)	Savings as % of Total Site Usage
Hot & Humid	177,969	82	(3,110)	1.5	2.0%
Hot & Dry	173,328	78	(3,538)	1.2	1.6%
Marine	141,075	68	(4,335)	0.2	0.3%
Cold	156,231	69	(4,384)	0.5	0.7%
Very Cold	149,806	121	(4,761)	0.2	0.3%

Values presented in this table are total savings from the reference building baseline usage, not incremental savings from a current code baseline.

Measure - Daylight Harvesting

Climate Zone	Equipment Cost	Install Cost	Total Cost	Total Annual Energy Cost Savings	Annual O&M Cost Savings	Total Annual $ Savings	Simple Payback (years)	NPV
Hot & Humid	$32,143	$77,309	$109,452	$17,085	$(1,304)	$15,782	7	$72,057
Hot & Dry	$32,432	$78,004	$110,436	$14,119	$(1,446)	$12,674	9	$35,503
Marine	$33,588	$80,784	$114,372	$10,567	$(1,500)	$9,067	13	$(9,755)
Cold	$31,790	$76,459	$108,249	$14,659	$(1,663)	$12,996	8	$41,478
Very Cold	$31,661	$76,150	$107,811	$13,599	$(1,514)	$12,085	9	$31,404
Values presented in this table are total costs and savings, not incremental costs and savings from a current code baseline.								

Discussion