Government Greening

The Dane County Justice Center
Green Building Project

Madison, Wisconsin

Tackling the Politics of Building Green

- Clear policy – Dane County Green Building Ordinance, April 2000
- Committed owner – County Executive strong supporter and gatekeeper
- Budget – Secure green building allocation within overall budget; deliver a green building with no additional funds
- Green standard – Follow national green building standard. Track and demonstrate points achievable (budget limitations compelled self-verification)

Dane County Justice Center:

- **Nine stories, 216,000 gross square feet**
- **$44 million project cost, $36 million construction cost**
- **$400,000 allocated to green building within overall budget**
- **First green building under county Green Building Policy**

Rendering of the Dane County Justice Center
A/E: The Durrant Group

Adopting a "Whole Building" Design Approach

- Follow LEED™ Green Building Rating System to save energy, resources and water and create a healthy work environment
- Recognize that all building systems are interdependent and the building should integrate with its site and the community
- Identify project green building advocate (Sherrie Gruder, University of Wisconsin-Extension)
- Hire energy efficiency/ LEED™ consultant (The Weidt Group)
- Use a collaborative approach among occupants, design and construction teams and county staff
- Educate throughout the process

LEED™ Scoring

	e County Courthouse	Total LEED™ Points	24 In design	11 Add Items
	SITE			
	Erosion and Sedimentation Control	0		
	Site Selection	1		
	Urban Redevelopment	1		
	Brownfield Redevelopment	1		
Credit 4	Alternative Transportation: bus, rail distance	1		
Credit 4	Alternative Transportation: bicycle facilities, shower	1		
Credit 4	Alternative Transportation: alternative refueling stations	1		
Credit 4	Alternative Transportation: minimize parking, carpool	1		
Credit 5	Reduced Site Disturbance: limit disturbance or native planting	1		
Credit 5	Reduced Site Disturbance: reduce development footprint	1		
Credit 6	Storm Water Management: manage runoff	1		
Credit 6	Storm Water Management: treatment systems	1		
Credit 7	Reduce Heat Islands: shaded or light colored landscape	1		
Credit 7	Reduce Heat Islands: energy star or green roof	1		
Credit 8	Light Pollution Reduction	1		
	WATER			
Credit 1	Water Efficient Landscaping: high efficiency irrigation	1		
Credit 1	Additional: zero irrigation	1		
Credit 2	Innovative Wastewater Technologies	1		
Credit 3	Water Use Reduction: 20% reduction	1		
Credit 3	Additional:10% reduction	1		
	ENERGY & ATMOSPHERE			
Prerq 1	Fundamental Building Systems Commissioning	0		
Prerq 2	Minimum Energy Performance	0		
Prerq 3	CFC reduction in HVAC&R Equipment	0		
Credit 1	Optimize Energy Performance: 20% (10% rehab) better	2		
Credit 1	Additional : 10% (10% rehab) better	1		
Credit 1	Additional : 10% (10% rehab) better	2		
Credit 1	Additional : 10% (10% rehab) better	2		
Credit 1	Additional : 10% (10% rehab) better	2		
Credit 2	Renewable Energy: 5% of total load	1		
Credit 2	Additional: 5% of total load	1		
Credit 2	Additional: 5% of total load	1		
Credit 3	Additional Commissioning	1		
Credit 4	Elimination of HCFCs and Halons	1		
Credit 5	Measurement and Verification	1		
Credit 6	Green Power	1		
	INDOOR ENVIRONMENTAL QUALITY			
Prerq 1	Minimum IAQ Performance	0		
Prerq 2	Environmental Tobacco Smoke (ETS) Control	0		
Credit 1	CO2 Monitoring	1		
Credit 2	Increase Ventilation Effectiveness	1		
Credit 3	Construction IAQ Management Plan: SMACNA, filtration	1		
Credit 3	Construction IAQ Management Plan: 2 week flushoutt	1		
Credit 4	Low Emitting Materials: adhesives	1		
Credit 4	Low Emitting Materials: paints and coatings	1		
Credit 4	Low Emitting Materials: carpets	1		
Credit 4	Low Emitting Materials: composite wood & agrifiber	1		
Credit 5	Indoor Chemical and Pollutant Source Control	1		
Credit 6	Controllability of Systems: operable windows, perimeter lighting	1		
Credit 6	Controllability of Systems: non-perimeter lighting, temp, flow	1		
Credit 7	Thermal Comfort: comply with ASHRAE 55	1		
Credit 7	Thermal Comfort: temperature, humidity monitoring	1		
Credit 8	Daylight and Views: 75% spaces daylit	1		
Credit 8	Daylight and Views: 90% spaces to view windows	1		
	MATERIALS & RESOURCES			
Prerq 1	Storage and Collection of Recyclables	0		
Credit 1	Building Reuse: 75% structure and shell	1		
Credit 1	Building Reuse: 100% structure and shell	1		
Credit 1	Building Reuse: 100% structure and shell, 50% non shell	1		
Credit 2	Construction Waste Management: salvage recycle 50%	1		
Credit 2	Additional: salvage recycle 25%	1		
Credit 3	Resource Reuse: 5% salvaged refurbished materials	1		
Credit 4	Additional: 5% salvaged refurbished materials	1		
Credit 4	Recycled Content: 25% recycled materials	1		
Credit 4	Additional: 25% recycled materials	1		
Credit 5	Local Materials: 20% materials within 500 mi	1		
Credit 5	Additional: 50% of that cradle to gate within 500 mi	1		
Credit 6	Rapidly Renewable Materials	1		
Credit 7	Certified Wood	1		
	INNOVATION CREDITS			
Credit 1	LEED Innovation Credits	1		
Credit 2	LEED Accredited Professional	1		

Dane County Green Building Policy (excerpt)

Now, therefore, be it resolved, that the Dane County Board of Supervisors adopts the following as the Green Building policy for the buildings owned by Dane County: The overall goal of sustainable building by Dane County is to protect human health, be environmentally responsible, and fiscally prudent over the life of the building in the delivery of all new and renovated facilities.

Establishing Green Goals for the Project

Collaborate and create "buy-in" with building occupants, other county staff and County Board. Overall goals were to maximize:

- Indoor environmental quality (eliminate toxics, install operable windows, fresh air infusion and circulation)
- Daylighting for natural light illumination
- Energy savings
- Diversion of construction & demolition materials from landfill

Energy Efficiency and Daylighting Design

Suboptimal orientation (southeast and west) and building massing (deep with more interior than perimeter window space) were overcome through:

Energy Analysis and Design

- Sun penetration and shading analysis used for window design to maximize natural light without heat and glare
- DOE2.1E energy simulation analysis; energy & daylighting performance analyzed to optimize performance of building systems including building skin, lighting, mechanicals, and controls
- Green options/ decision making matrix with 55 conservation strategies was combined with cost and payback information. This enabled the county and design team to compare the energy savings & incremental construction costs of different combinations of energy saving strategies

Bundle Selections

Interactive Strategy Screening Tool — The Weidt Group

Note: Potential bundle savings estimates are calculated here by adding the savings for selected strategies and multiplying by a factor . This is a rough approximation of total savings to be used only as a tool; the actual total savings is likely to be different., and the incentive may vary. Final bundle simulation will determine the actual savings, which will then be used to determine the actual incentive.

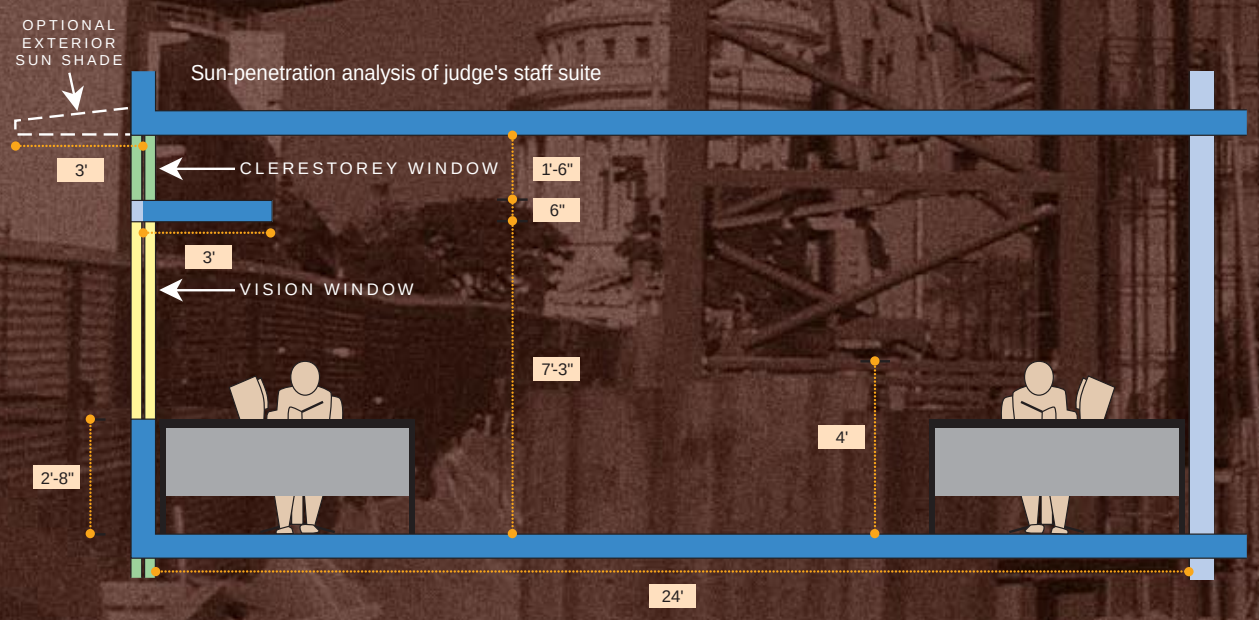
Summary Results	Savings vs. Code Base	Savings vs. Cost Base		
Energy Cost Savings	$56,381	$32,344	$34,207	$42,400
Percent Energy Cost Savings	22%	16%	17%	21%
Peak KW Savings	211.1	193.3	202.8	273.0
Percent KWH Savings	36%	13%	14%	16%
Pollution Savings (Tons/yr)	618,995	221,260	238,180	267,996
Incremental First Cost	$0	$145,637	$149,487	$285,911
Payback	immed	4.5	4.4	6.7

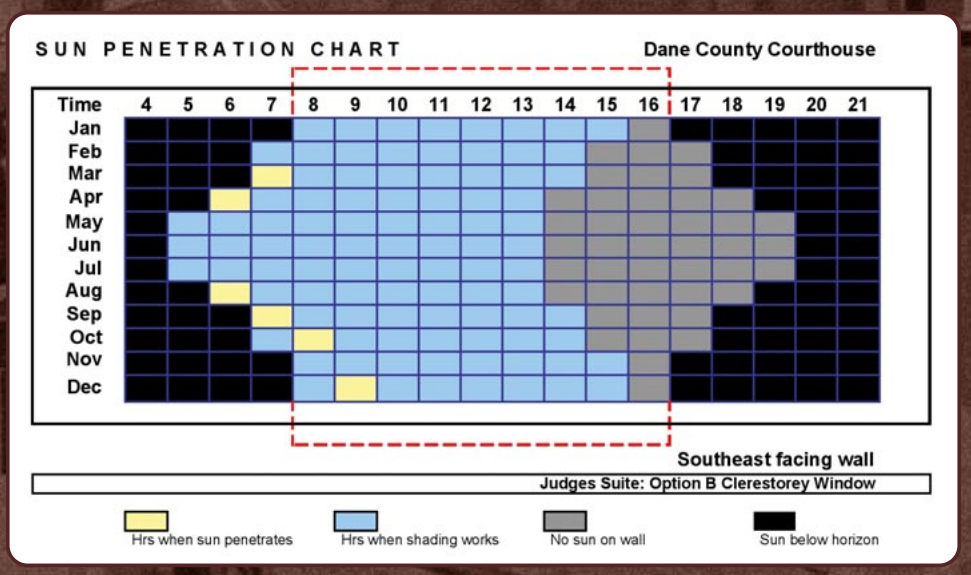
Dane County Courthouse

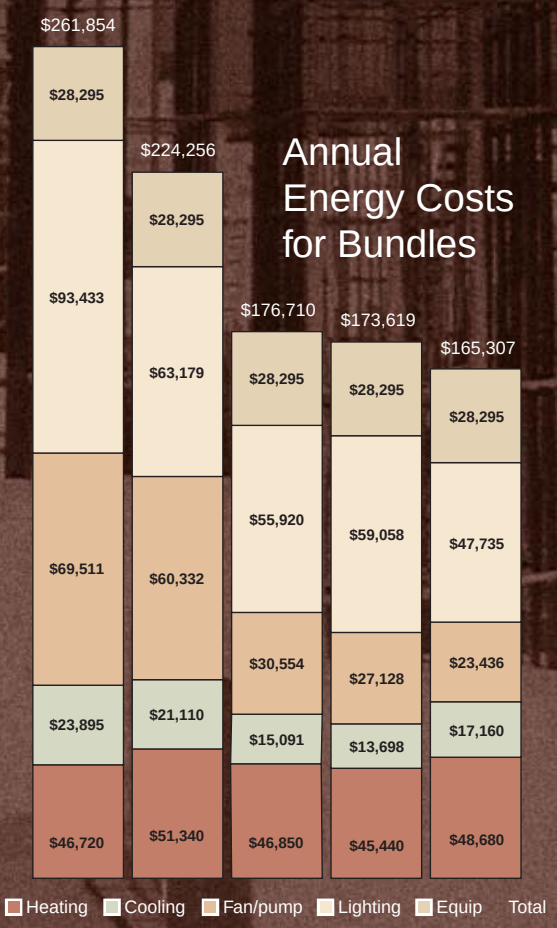
No.	Strategy Description	Savings vs. Cost Base: annual energy	first cost	pay-back years	Cost Base	Bundle 1	Bundle 2	Bundle 3
1	**Window Glazing Alternatives**							
	FLOORS 3-8: TINTED GLASS ON CURVE, CLEAR ON REST							
W4101	LowE glass	$0	$0	n/a	■	■	■	
W4201	LowE Hi VT glass	$475	$546,366	1,150.2				■
	WEST LEVEL 1-2 & SOUTHEAST LL-1 & 2							
W3201	Profilit double glazed	$0	$0	n/a	■			
W3301	Profilit double glazed LowE	$3,960	$91,740	23.2				
2	**Daylighting controls**							
D0601	Stepped controls in circulation corridors	$2,055	$0	imm				■
D0602	Stepped controls in offices: no Lightshelf	$6,671	$25,000	3.7				
D0603	Stepped controls in offices: w/ Lightshelf	$7,853	$25,000	3.2		■	■	■
3	**Envelope Insulation Levels**							
ER3W1	R-30 roof insulation	$543	$13,057	24.0				
ER2W2	R-16 wall insulation	$3,188	$48,954	15.4				
4	**Lighting Controls**							
LCOO1	Open office occup. sensor control	$1,009	$2,000	2.0		■	■	■
LCPO1	Private Office occup. sensor control	$5,011	$40,000	8.0				■
LCJD1	Judges Chamber occupancy sensor control	$906	$5,000	5.5		■	■	■
LCCN1	Conference/Hearing occup. sensor control	$4,565	$18,750	4.1		■	■	■
LCRR1	Restroom Occupancy sensor control	$1,653	$15,000	9.1		■	■	■
LCOO2	Open office multi level switching	$798	$12,000	15.0				■
LCPO2	Private Office multi level switching	$0	$0	n/a	■			■
LCJD2	Judges Chamber multi level switching	$0	$0	n/a	■	■	■	■
LCCN2	Conf/Hearing multi level switching	$0	$0	n/a	■	■	■	■
LCCT2	Court Room multiple lighting schemes	$0	$0	n/a	■	■	■	■
LCCT2	Court Room multiple programmed schemes	$0	$80,000	n/a				
LCCI3	Central EMS sweep after hours	$2,809	$0	imm				■
5	**Lighting Design Alternatives**							
	OPEN OFFICE							
LDOO2	Direct system at 50 fc	$0	$0	n/a	■	■	■	
LDOO3	Indirect system at 50 fc	($648)	$0	n/a			■	
LDOO4	Task/ Ambient (29 to 46 fc amb)	$0	$27,984	n/a				
LDOO5	Direct/indir at 45 fc	$161	$0	imm				■
	PRIVATE OFF/JUDGES CHAMBERS							
LDPO2	Direct system at 50 fc	$0	$0	n/a	■	■	■	
LDPO3	Indirect sys… fc	($3,776)	$0	n/a			■	
LDPO4	Task/ A… fc amb)	$2,478	$64,000	25.8				
LDPO5	Direc…		$0	imm				■
	C… NG							
LDCN2								

The Dane County Courthouse is designed to save:

- **50% in electric consumption and 37% overall annual operating energy**
- **$96,500 in annual costs compared with buildings designed to Wisconsin Code (simple payback of 4.8 years).**







Steps to Ensure Energy Savings

- Review construction documents to confirm energy decisions in design are carried through to construction. This process:
  - identified a loss of one third of the 37% energy efficiency savings
  - reevaluated omissions based on energy impacts and cost implications
  - amended construction documents
- Use measurement & verification process to check equipment installations and install dataloggers to measure that equipment is functioning optimally and delivering operational savings

Benefits of Energy-Efficient Design

- ✓ Cost Savings
- ✓ Reduced environmental impacts from fossil fuel energy use
- ✓ Improved indoor environmental quality

Energy analyses by
The Weidt Group

Record Setting Deconstruction

site before deconstruction

deconstruction in progress

There is Life After Demolition
–WI State Journal 9•19•02

"This is the single most comprehensive building project Dane County has undertaken to conserve resources and energy and keep valuable materials out of our landfill."

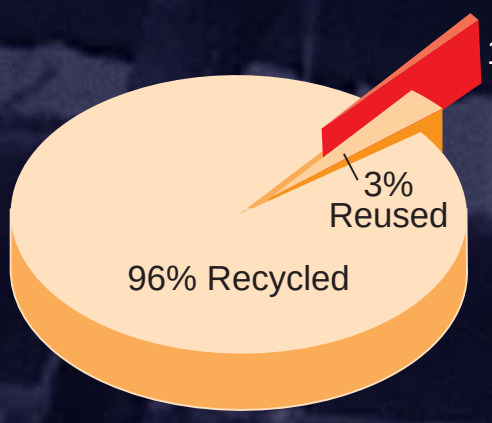
—County Executive Kathleen Falk

buildouts with all reused items, from ceiling tiles and doors to cabinetry and furniture

Law Office Crosses Lake
–The Capital Times 9•2•02

Reused Materials

- 552 items in 37 categories totaling 54.6 tons (replacement value – $204,325)
- Law office – 2-story brick building, 165 tons, moved intact (assessed value – $195,000)



Materials Analysis

99% of materials diverted from landfill

Tons	Use
220	reused
6,612	recycled
65	landfilled

Deconstruction Economics

	Costs	Savings
Tipping fees	$1,606	$245,952
Contract	178,000	72,000
Carpet recycling	4,500	4,317
Value of materials		204,325

This project saved the amount of resources that would fill a football field 5½ feet high.

Recycled Materials

Material recycled	Tonnage
Ceiling tile	21.0
Carpet & pad	8.8
Steel	140.0
Aluminum	1.6
Scrap	132.0
Concrete & asphalt	6,309.0
Total	6,612.4

metal

carpet and pad

florescent lighting

ceiling tiles

Greening Government Keys to Success:

- **Committed owner**
- **Design team with internalized sustainable design objectives**
- **Analysis of green elements and implications at each phase of the project**
- **Educate and keep elected officials and public informed**

shwec
Solid & Hazardous Waste Education Center

UW Extension

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