

Green AV

How AV Can Impact Green Buildings and Their Level of LEED Certification

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President / CEO - **Waveguide**

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Scott Walker, CTS-D, LEED® AP

- BSEE from Clemson University
- Independent AV and acoustical consultant since 1989
- Founded Waveguide in 1996
- Obtained CTS-D from InfoComm in 2000
- President of InfoComm International in 2004
- Made history in 2007 as world's first CTS-D, LEED® AP
- Current chair of InfoComm ANSI Standards Committee
- Experience with 500+ AV projects representing >\$100M in AV including numerous LEED projects



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Session Goals and Objectives

- Review **current trends** in sustainable design and the **rapid adoption** of the LEED rating system.
- Review the LEED rating system—including **LEED 2009**—and highlight specific credits where **AV can contribute to or hinder** a project's LEED goals.
- Provide summary recommendations for what **you and your AV solutions providers** should do to align AV solutions with the growing sustainability movement.

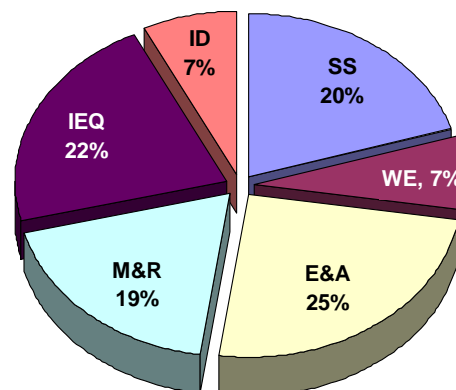
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The LEED Point System and Implications for AV

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LEED Certification Point System (Current)

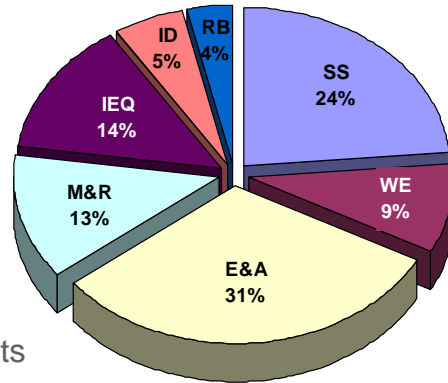
- Five Major Categories, plus Innovation and Design Process
 - Sustainable Sites (SS)
 - Water Efficiency (WE)
 - Energy and Atmosphere (EA)
 - Materials and Resources (MR)
 - Indoor Environmental Quality (IEQ)
 - Innovation and Design (ID)



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LEED Certification Point System (2009 – Under Public Review)

- Same general categories plus new **Regional Bonus Credits**
 - Sustainable Sites (SS)
 - Water Efficiency (WE)
 - Energy and Atmosphere (EA)
 - Materials and Resources (MR)
 - Indoor Environmental Quality (IEQ)
 - Innovation and Design (ID)
 - **Regional Bonus Credits (RB)**
- Points per categories and total points have changed (from **69 to 110**)



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LEED Sustainable Sites

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Sustainable Sites New Construction

- This credit area includes **1** prerequisite (construction pollution control) and **14** points, covering such topics as:
 - Site selection (the greenest site is one that's already developed)
 - Density (connectivity to nearby services for reduce car travel)
 - **Alternative transportation** (access to public transit, bike rack, designated parking for alt. fuel vehicles)
 - Site development (protect habitats, green space)
 - Storm water management
 - Heat-island effect control (green roofs)
 - **Light pollution control**



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Sustainable Sites Existing Building

- Includes 4 points for alternative commuting transportation, including telecommuting:
 - 1 pt for 10% reduction in conventional commuting trips
 - 2 pts for 25% reduction in conventional commuting trips
 - 3 pts for 50% reduction in conventional commuting trips
 - 4 pts for 75% reduction in conventional commuting trips
- Videoconferencing, distance learning, and rich media systems *could* contribute here
- Rich-media program for college or university
 - Use rich media to reduce in-person class time (M-W-F classes meet twice; T-Th meet once)
 - Could reduce building square-footage, parking surface area, construction materials/costs by 40% **and** reduces commutes



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Sustainable Sites 2009

- Points allocated to alternative transportation have jumped from 4 to 12
- In June the InfoComm Board of Governors sent a request to USGBC to add a 13th credit (worth up to 2 points) for deployment of videoconferencing technologies
- If accepted this will mark the first points specifically designated for use of AV technologies
- This may help pave the way for more building technology related credits in future LEED revisions



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LEED Water Efficiency

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Water Efficiency

- This credit area includes **0** prereqs and **5** points covering such topics as:
 - Water-efficient landscaping
 - Innovative wastewater technologies (reuse of gray water)
 - Overall water use reduction (low-flow fixtures, storm water reuse)
- LEED 2009 doubles all points and includes a prerequisite now for 20% water reduction versus baseline
- Use digital signage to educate building occupants about their water usage



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LEED Energy and Atmosphere

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Energy and Atmosphere

- According to the U.S. DoE, buildings consume approx 40% of all energy and 70% of all electricity produced in the U.S.
- This credit area includes **3** prerequisites and **17** points (35 points in new 2009 version):
 - **Prerequisites**
 - Prereq. 1: Fundamental commissioning of building energy systems
 - Prereq. 2: Minimum energy performance (ASHRAE 90.1-2004 compliance)
 - Prereq. 3: Fundamental refrigerant management (elimination of CFCs)
 - **Credit Topics**
 - **Optimize energy performance (up to 10 points, 19 points in 2009 version)**
 - On-site renewable energy (up to 3 points, 7 points in 2009 version)
 - **Enhanced commissioning**
 - Enhanced refrigerant management
 - **Measurement and verification**
 - Purchasing green power

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Energy and Atmosphere

- **Optimize Energy Performance** (up to 10 pts) for percentage of energy consumption below ASHRAE/IESNA 90.1-2004:

New Buildings	Major Renovation	Points
10.5%	3.5%	1
14%	7%	2
17.5%	10.5%	3
21%	14%	4
24.5%	17.5%	5
28%	21%	6
31.5%	24.5%	7
35%	28%	8
38.5%	31.5%	9
42%	35%	10

- As of June 26, 2007, **all LEED for new construction projects must earn 2 energy performance credits** (i.e. be 14% below baseline of ASHRAE 90.1-2004)

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Energy and Atmosphere Optimize Energy Performance

- Energy consumption breakdown in commercial building
 - HVAC – 30% to 50% depending on climate/humidity
 - Lighting – 25% to 35% plus heat load resulting from lighting
 - Miscellaneous electrical load – 25% to 35% for computers, printers, vending, elevators, kitchen equipment, etc.
- The primary energy modeling option LEED allows factors in 25% for “process energy” (i.e. the misc. elec. loads above)
- So what happens in an AV-intensive building?

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Energy and Atmosphere Optimize Energy Performance

- Let's look at a case study of a hypothetical 750-sf classroom
 - For lighting ASHRAE 90.1-2004 calls for no more than 1.6W/sf; 14% below that would be 1.4 W/sf or approximately 1,000W
 - A typical AV presentation system with projector, router, control system, sources, and power amp could **easily** consume 1,000W
 - If only the projector power was switched on and off, the standby load could be 500W
 - Over 24 with 8 hours of this classroom in use the lighting system might consume 8 kW, but the AV system would consume 16 kW!
- If 50%+ of your building was made up of these classrooms, the AV system alone may consume more power than lighting, not to mention all the other electrical equipment!
- **How long before AV gets noticed!?! What should we do?**

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Energy and Atmosphere Optimize Energy Performance

- Action plan for optimizing AV energy performance
 - First, your AV consultant or integrator needs to **be aware** of the energy their systems consume and **be prepared** to discuss **strategies** to minimize its impact
 - Calculate each system type's power consumption per hour in use and per hour in standby; **estimate annual operating cost per room and for the entire AV project**
 - All other factors being equal, we should specify the **more efficient device**
 - Don't think just lumens and watts; **think lumens/watt**
 - Look at AV solutions in terms of **total cost of ownership**, not just first cost
 - AV professionals shouldn't indiscriminately leave all the rack gear **on all the time**

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Energy and Atmosphere

- **Enhanced Commissioning**
 - Begins early in design and extends beyond opening day
 - CxA must be completely independent of project design or construction team but can work for the owner
 - CxA reviews
 - Owner's project requirements (OPR) document
 - Basis of design (BOD) documents produced by design team
 - All major, applicable design and construction submittals
 - CxA must develop an owner's operations manual for commissioned systems and verify training of owner's staff
 - CxA must review building operation within 10 months of move in
 - **Shouldn't AV/IT technologies fall under the CxA's purview?**

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Energy and Atmosphere Measurement and Verification

- Intent: Provide ongoing accountability of the building's energy consumption
- Must model energy consumption during design phase, then develop a plan for measuring and verifying those energy models after move-in
- Measurement and verification (M&V) period must cover no less than one year of post-construction occupancy
- So is M&V a threat or an opportunity for AV?
 - AV systems may stick out as energy hogs or...
 - We could design AV solutions that monitor usage patterns and capture actual energy use by department/user (revenue stream?)



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LEED Materials and Resources

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Materials and Resources

- Includes 1 prerequisite and 13 points:

- Prerequisite

- Prereq. 1: Provide space for recycling bins

- Credit Topics

- Building reuse: 75% - 95% of walls, floors, roofs and 50% of interiors (by surface area)
- **Construction waste management: Divert 50% - 75% of waste from landfill (by weight/volume)**
- Materials reuse: Reuse 5% - 10% of existing materials/products (based on cost)
- Use of recycled products: 10% - 20% recycled content (based on cost)
- Regional materials: 10% - 20% extracted, fabricated and manufactured within 500 miles (based on cost)
- **Use of rapidly renewable materials: 2.5% of total value of materials from RRM**s such as bamboo, **cotton insulation**, wool, cork, linoleum, etc.
- 50% wood from certified sustainable forests



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LEED Indoor Environmental Quality

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Indoor Environmental Quality

- Includes **2 to 3** prerequisites and **15 to 20** points:

- **Prerequisite**

- Prereq 1: Min indoor air quality performance (ASHRAE 62.1-2004)
- Prereq 2: Environmental tobacco smoke control
- **LEED for Schools Prereq 3: Min acoustical performance (ANSI S12.60-2002)**



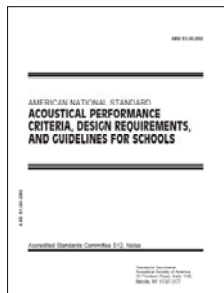
- **Credit Topics**

- Outdoor air delivery monitoring
- Increased ventilation
- Indoor air quality management during construction and **before occupancy**
- **Low-emitting materials: adhesives/sealants, paints/coatings, carpet, wood**
- Indoor chemical/pollutant control
- **Controllability of systems – thermal, lighting**
- Thermal comfort: design and verification
- **Daylighting & views: 75%-90% of spaces (classrooms in LEED for Schools)**
- **Enhanced acoustics (2 pts) in LEED for Schools/Healthcare**

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Indoor Environmental Quality

- ANSI S12.60-2002
 - Prereq 3 calls for compliance with S12.60's standards



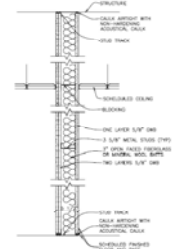
Reverberation Times



Background Noise



STC Ratings



- 1 point for beating S12.60 by 5 dB or RC(N) points
- 2 points for beating S12.60 by 10 dB or RC(N) points
- LEED 2009 aims to soften these acoustical goals

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Indoor Environmental Quality

- Low-emitting materials: adhesives/sealants, paints/coatings, carpet, wood
 - To reduce volatile organic compounds (VOCs) such as urea formaldehyde
 - This credit could apply to AV millwork, projection screens, etc.



- Controllability of systems: thermal and lighting
 - Individual control at workstations
 - Group control of any meeting space
 - LEED for Schools calls for AV lighting presets



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Indoor Environmental Quality

- Daylighting & Views: 75%-90% of spaces (classrooms in LEED for Schools) to have windows/outside views
 - Think about natural light like we do with zoned lighting systems



- Use the sun first (it's free), then use the room's lighting system
- Sensors, software, algorithms, and integration are the key

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LEED Innovation and Design Process

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Innovation and Design Process

- Up to **4 points** for **exemplary performance** on previous credits or **innovative solutions beyond LEED** categories
- This is where innovative AV solutions can and should play
 - Videoconferencing? Can you say “reduced carbon footprint?”
 - How about managing not only AV power, but lighting and HVAC loads from an AV scheduling interface?
 - Why **light** a room no one is in? Use the sun whenever and however you can as noted earlier.
 - Why **cool and heat** a room that’s not booked?
 - Could we approach an **energy-neutral AV plant**?
 - How about exemplary acoustical performance?
 - Use the building as a teaching tool (digital signage opportunity)



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My Green AV Prescription for Architects and Their AV Partners

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For Architects

- Invite us to the dance
 - LEED charrettes, benchmarking trips, etc.
- Make us dance
 - Challenge us to earn innovative points for AV-related solutions
 - Make us deal with the sun
 - Make us deal with energy consumption
 - Listen to us when we warn of the challenges of green buildings and AV/acoustical needs
- Reward our investment in dance lessons with repeat business

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For AV Consultants & Integrators

- Every consultant and integrator should have LEED APs on staff
- LEED certification begins early in design
 - We need to ask to be involved in LEED charrettes
 - Then go out there and get some doggone innovative AV points!
- Push manufacturers for real power consumption information
- Update our specs and preferred equipment list to align with the larger green building movement (power sequencers, green products, etc.)
- Integrators need to review their construction waste processes and follow the lead of the general contractor
- We need to sell more than AV features, but also long-term benefits, ROI, carbon-offsets, and inform clients of lifecycle costs

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Waveguide Consulting Overview

- **Independent** AV, acoustical and data/telecom consulting firm founded in 1996
- **Largest** AV consultant in the Southeast
- We offer full AV **software** programming services as well as **ongoing support**
- Opened **N.C.** office in 2005
- Opened **S.C.** office in 2006
- Opening **FL** office in 2008
- Focus on **sustainability** and **intelligent** building design



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Questions?

ASK AWAY!

or email me at swalker@waveguide.com

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