



# **SUSTAINABLE DESIGN: INTRODUCTION AND SANDIA CASE STUDIES**

**DOE Pollution Prevention Televideo  
Conference**

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Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company,  
for the United States Department of Energy's National Nuclear Security Administration  
under contract DE-AC04-94AL85000.





## What Is Sustainable Design ?

- **Sustainable Design:** *Designing into the Facility's construction and operation, resource productivity and pollution prevention, for life cycle cost savings.*
- **Five Categories:**
  - *Sites*
  - *Water Efficiency*
  - *Energy and Atmosphere*
  - *Materials and Resources*
  - *Indoor Environmental Quality*





Sustainable Design  
=  
Green Building Design  
=  
High Performance Buildings  
=  
Good Design



## Environmental Impact of Buildings\*

- 65.2% of total U.S. electricity consumption <sup>1</sup>
- > 36% of total U.S. primary energy use <sup>2</sup>
- 30% of total U.S. greenhouse gas emissions <sup>3</sup>
- 136 million tons of construction and demolition waste in the U.S. (approx. 2.8 lbs/person/day) <sup>4</sup>
- 12% of potable water in the U.S. <sup>5</sup>
- 40% (3 billion tons annually) of raw materials use globally <sup>6</sup>

\* *Commercial and residential*



## How do we measure SD?



## Leadership in Energy & Environmental Design

A leading-edge system for designing, constructing, operating and certifying the world's greenest buildings.

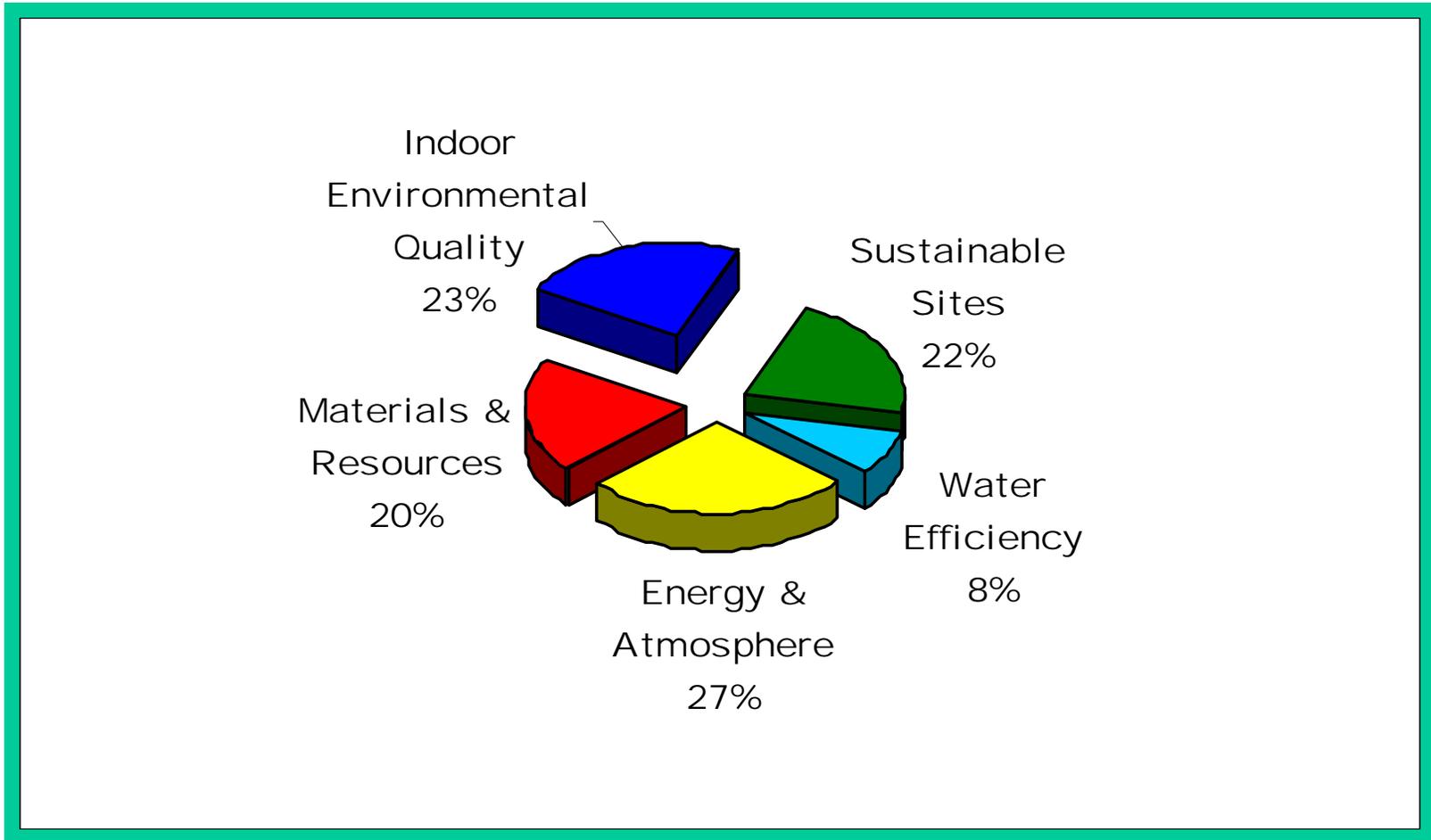


## Overview of LEED™

- **Green building rating system, for commercial, institutional, and high-rise residential new construction and major renovation.**
- **Existing, proven technologies**
- **7 prerequisites, 69 credits in 6 categories.**
- **Optimizes environmental and economic factors**
- **Four levels of certification**
  - **LEED Certified**      **26 - 32 points**
  - **Silver Level**      **33 - 38 points**
  - **Gold Level**      **39 - 51 points**
  - **Platinum Level**      **52+ points (69 possible)**



# LEED™ Point Distribution





# Environmental Performance Criteria



The Labs21 Environmental Performance Criteria (EPC) is a rating system specifically designed for laboratory facilities. It is the result of two complimentary efforts, LEED™ Green Building Rating System, and the Laboratories for the 21<sup>st</sup> Century (Labs 21) program. The EPC is being developed by a series of working groups that includes over 40 architects, engineers, facility managers, and health and safety personnel. Version 2.0 is now out in the pilot stage.



## **SD Requirements for DOE Sites**

- **Executive Order 13101**
- **Executive Order 13123**
- **DOE Order 450.1**
- **DOE Order 413.3**
- **DOE Order 430.2A**



# What are the Benefits?

Environmental

Energy

Better Business

Health and  
Safety

Increased  
Productivity

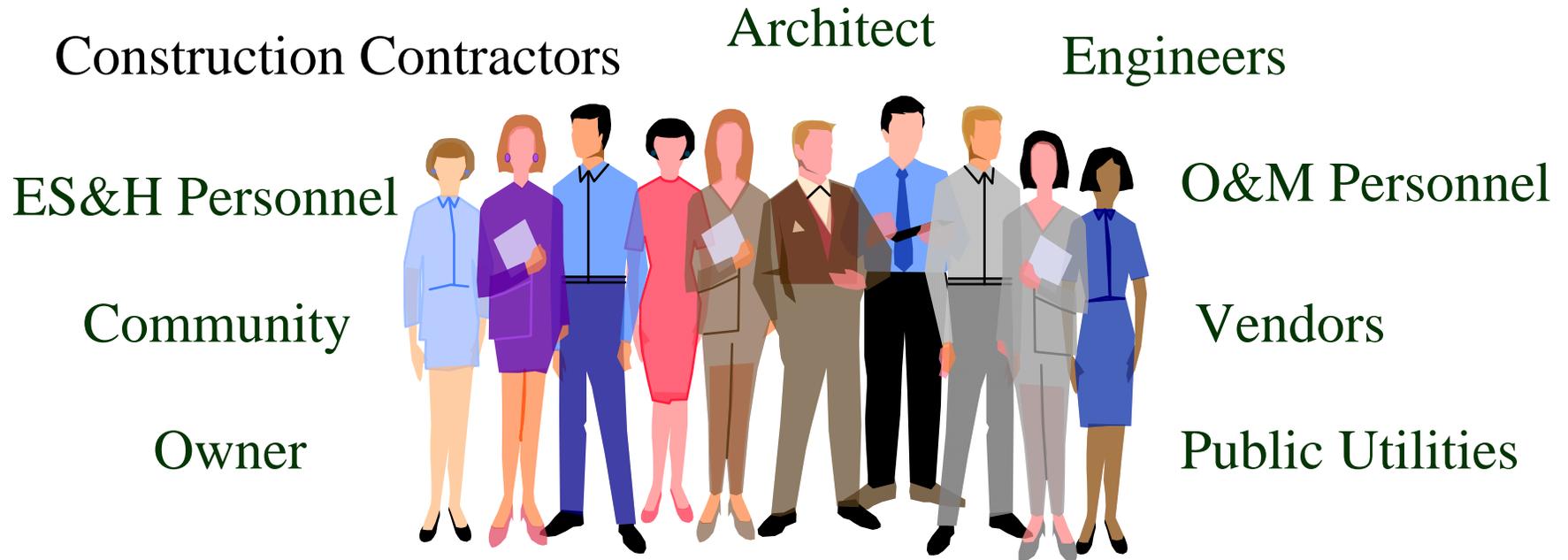
Community

Creative





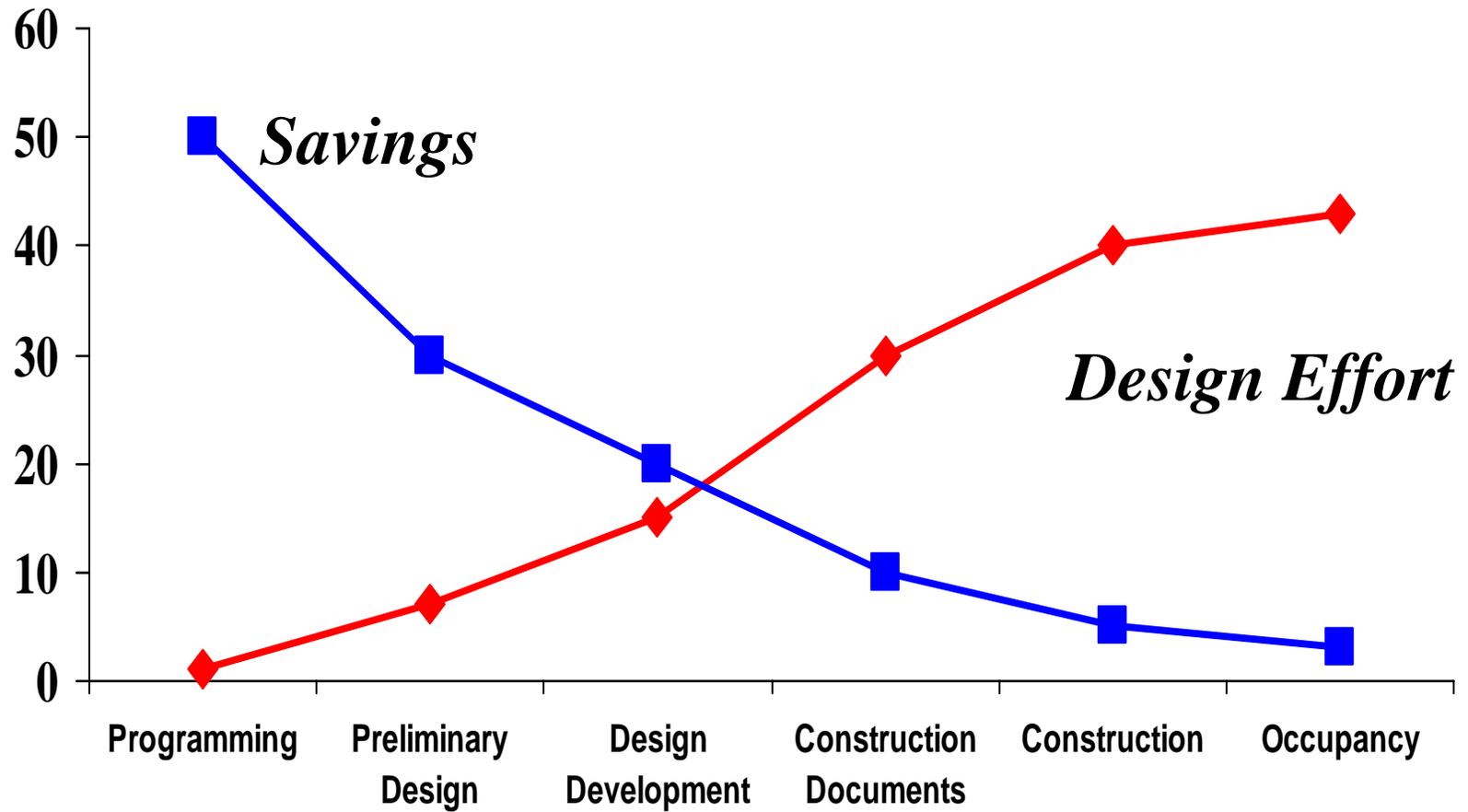
# SD - How to Do It?



INTEGRATED WHOLE BUILDING DESIGN



# When to Get Started





# SNL Sustainable Design Requirements

- **Based on LEED™ criteria, Labs21 approach and DOE O 430A.2 CRD**
- **Included in Program documents, design criteria and contractor selection**
- **34 Construction Specifications require SD**
- **Chapter 2 of Design Manual presents SD philosophy (Goals, Objectives, Life-cycle Analysis and Value Engineering, LEED Certification, Whole Building Design Approach, Commissioning**
- **Promote whole-building integrated approach**
- **Document the sustainable design decisions**
- **Graded Approach: Requirements for GPP buildings are less than those for Line Item projects**

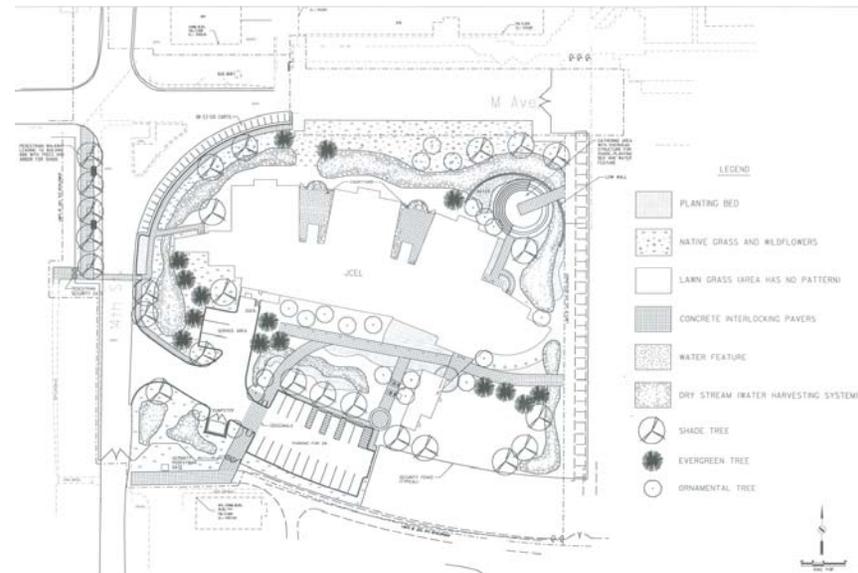


# JCEL - SD Summary



- SD Awareness meeting held to review SD needs and requirements
- Week long Charrette with integrated focus on SD and building design
- Preliminary and revised LEED scoring throughout project.

- LEED Certification included in construction bid package, Specification 1350, Environmental Requirements.
- Early meeting with selected contractor
- Title III A/E assembling documentation with SNL support





## JCEL - SD Summary



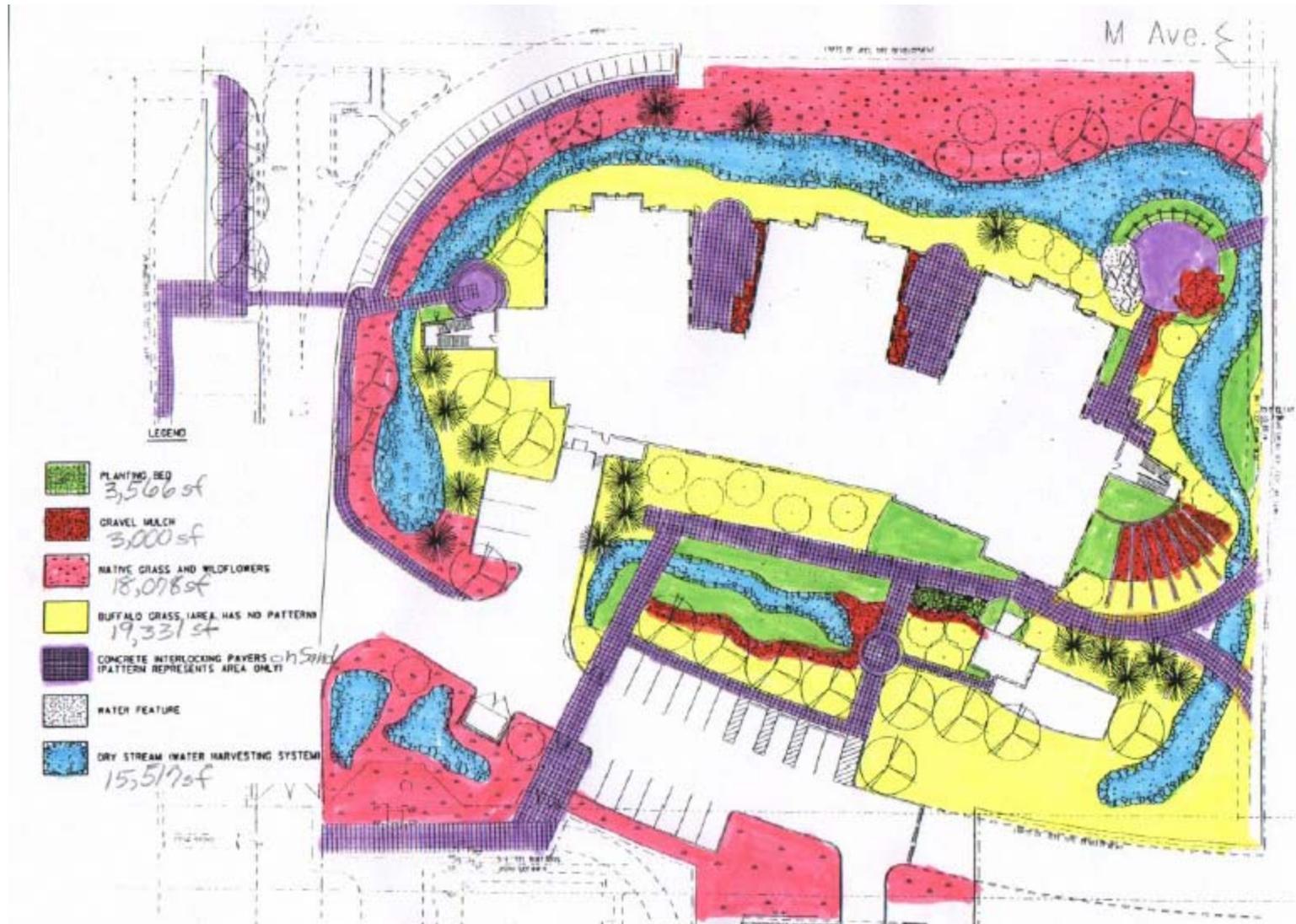
- **Recycled greater than 82% of all waste (cardboard, paper, concrete, wallboard, wood, metals)**
- **Environmentally preferable materials: recycled content, locally manufactured and harvested, certified wood, low VOCs paint, adhesives & sealants, carpet**

- **LEED Silver rating**
- **Brownfield Remediation (formerly contaminated with PCBs)**
- **Energy Performance : 30% better (ECB modeling process)**
- **Commissioning PECCI guidelines**
- **Optimized daylighting**
- **Construction IAQ Plans**



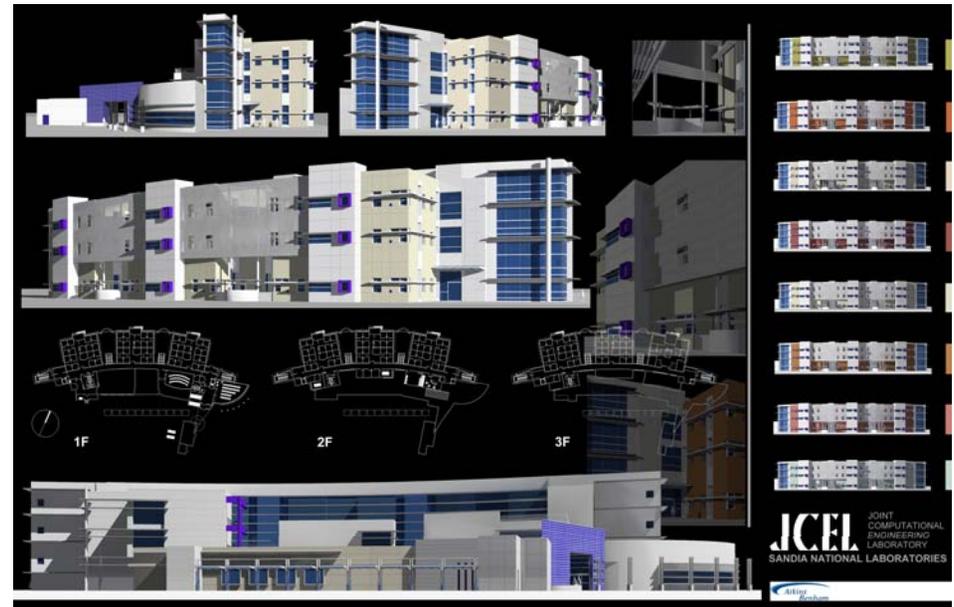


# JCEL Landscaping





# LEED Registered Buildings At SNL/NM



and  
WETL – Amarillo



## Next Presentations

- **10:25 - 10:40 - *DOE's first LEED rated Building, the Central Supply Center at Argonne National Laboratory* - Keith Trychta, Argonne National Laboratory**
- **10:40 - 10:55 - *Perspective on Sustainable Design for Monitored Geologic Repository (MGR) at Yucca Mountain* - James Gleason, PE., Yucca Mountain MGR**
- **10:55 - 11:10 - *Does Sustainable Design Cost More?* Judy Dorsey, P.E., CEM, The Brendle Group**  
**11:00 - 11:25 - Questions and Answers**