The HVAC system subcommittee suggests the following performance/analysis criteria: May 15, 2006

1) Building envelope tightness to conform to ASHRAE Std. 90.1-2004 Section 5.4.3 Air Leakage as an absolute minimum—tighter would be better.
2) Fenestration solar transmission to be controlled according to Std. 90.1, and preferably much better through glazing selection and external shading.
3) At least the following HVAC Systems Shall be analyzed with and without thermal storage:
   (a) Full Dedicated Outdoor Air System (DOAS) (i.e. 100% ventilation air delivered to each space independently, capable of meeting the entire space latent load, at a DBT equal to the required supply air DPT, using high induction diffusers, employing heat recovery as required by Std. 90.1-2004 in section: 6.5.6.1, and roof mounted) with a parallel chilled ceiling sensible load control system.
   (b) Full DOAS with a parallel active multi-service chilled beam sensible load control system.
   (c) Full DOAS delivered by a displacement ventilation system with a parallel passive multi-service chilled beam sensible load control system.
   (d) Full DOAS with a parallel fan coil (FCU) load control system. DOAS air to be introduced down stream of the FCU coils.
   (e) Full DOAS with a parallel Variable Air Volume (VAV) system.
   (f) Dual path through the air handling unit VAV system (i.e. OA treated independently of the return air).
   (g) VAV that guarantees Std. 62.1-2004 section 5.2.1 is always met and can overcome all of the following inherent problems of VAV:
      (i) Poor air distribution
      (ii) Poor humidity control
      (iii) Poor acoustical properties
      (iv) Poor use of plenum and mechanical shaft space
      (v) Serious control problems
      (vi) Poor energy transport medium, i.e. air.
      (vii) Poor resistance to unwanted biological events
      (viii) Poor and unpredictable ventilation performance.
   (h) VAV with all-air floor delivery that guarantees Std. 62.1-2004 section 5.2.1 is always met and can overcome all of the inherent problems of VAV.

The results of the 8 system analyses shall be ranked in the following table, Importance weighting category (1-5 with 5 most important--weightings have been suggested for each category) and System performance rating (1-8 with 8 best—design team to suggest these performance ratings.) In each intersection is then entered the product of the performance rating and the importance rating (for example if the team rated the performance of the first system type 1st cost to be 8, then 32 would be placed in the cell as shown in the example). The sum of these yields the total points entered in the right column (max points is 348):

Sys Type (Importance weighting, 1-5)	1st $ (4)	LCC $ (5)	DBT ctl. (3)	RH Ctl. (5)	Distrib'n of bio agents (5)	AHU (1)	Office churn accom (4)	Maint. $ (3)	Duct-work (2)	Plenum depth (2)	Noise (4)	Zoning (5)	Lost usable floor area (5)	Total points
DOAS-Radiant	32													
DOAS-Act beam														
DOAS-pas beam														
DOAS-FCU														
DOAS-VAV														
VAV														
Dual Path VAV														
VAV w/ floor deliv														

4) Ventilation to be the greater of ASHRAE std. 62.1, plus 30% or 15 cfm/person (design combined floor and occupant components) to garner a LEED point.
5) Maintain building pressurization and humidity control 24/7.
6) OA Filtration to address the risk of Biological agents. In addition to the filtration enhancement, all outside air intakes to be protected.
7) Manage the utility rates, i.e. demand charges, to minimize operating cost.
8) Simple Controls, in the Einstein vein, that also provide continual performance monitoring, and "look only" web access to every ASHRAE member in real time.
9) All control to be native BACnet.
10) First priority LEED points should be obtained as follows:
    - **a)** optimized HVAC energy performance, 10 points
    - **b)** enhanced HVAC commissioning, 01
    - **c)** enhanced refrigerant management, 01
    - **d)** HVAC measurement and verification, 01
    - **e)** outdoor air delivery monitoring, 01
    - **f)** increased ventilation, 01
    - **g)** indoor chem. and poll source control, 01
    - **h)** HVAC control of system for thermal comfort, 01
    - **i)** HVAC innovation. $\geq$ 2

Judging criteria for the ASHRAE Student Design project competition follow. Should we expect any less in the presentations from our Design Team?
http://www.ashrae.org/template/AssetDetail/assetid/43949

ASHRAE
Student Activities Committee
2006 Dallas Power & Light Student Design Project Competition Evaluation F

College: _____

Project Category: HVAC System Selection

HVAC System Selection Matrix Criteria Evaluation	Max Points	Actual Points
Performance requirements	10	
Capacity requirements	10	
Spatial requirements	20	
First Cost	10	
Operating Cost	10	
Reliability	10	
Flexibility	10	
Maintainability	10	
Sustainability	10	
TOTAL	100	

HVAC System Selection Goal: Life Cycle Cost	Max Points	Actual Points
Discussion of Life cycle analysis	50	
Accurate and detailed life cycle calculations	50	
TOTAL	100	

HVAC System Selection Goal: Environmental Impact	Max Points	Actual Points
Discussion of the impact of the building's mechanical systems on the indoor and outdoor environment. (Refrigerants, water use, power use, fuel use, indoor air quality, etc.)	50	
Discussion of how ASHRAE Standard 90 was used to guide the discussion	50	
TOTAL	100	

HVAC System Selection Goal: Comfort and Health	Max Points	Actual Points
Discussion/compliance with ASHRAE Standard 62 and 55. (Proper outdoor air quantities, temperature/humidity control)	75	
Discussion/use of zoning/temperature control systems	10	
Discussion/use of air filtration	10	
Discussion/use of motivations: Rental Income, Productivity/sales and better employees	5	
TOTAL	100	

HVAC System Selection Goal: Green Design	Max Points	Actual Points
Discussion of Green Design	50	
Creativity	50	
TOTAL	100	

HVAC System Selection Goal: Synergy with Architecture	Max Points	Actual Points
Discussion of architectural synergy	100	
TOTAL	100	

HVAC System Selection Communication of Results	Max Points	Actual Points
Presentation of how and why the final HVAC systems were selected	100	
Presentation of drawings and flow diagrams	100	
General presentation	300	
SUBTOTAL	200	
Penalty - (Project exceeds 35pages)	20	
TOTAL	400	

HVAC System Selection Summary of Results	Max Points	Actual Points
HVAC System Selection Criteria Matrix	100	
Low Life Cycle	100	
Low Environmental Impact	100	
Comfort and Health	100	
Creative High Performance Green Design	100	
Synergy with Architecture	100	
Communication of Results	400	
TOTAL	1000	

ASHRAE
Student Activities Committee
2006 Student Design Project Competition Evaluation Form

College: _____

Project Category: HVAC System Design

HVAC System Design Life Cycle Cost	Max Points	Actual Points
Estimate the operating and maintenance costs for the system	50	
Estimate the first cost of construction for the system	50	
Estimate the 20 year lifecycle cost for the system	100	
TOTAL	200	

HVAC System Design Green Building Design	Max Points	Actual Points
Discussion of the impact of the building's mechanical systems on the indoor and outdoor environment. (Refrigerants, water use, power use, fuel use, indoor air quality, etc.)	50	
Discussion of how ASHRAE Standard 90.1 was used to guide the discussion	40	
Discussion/compliance with ASHRAE Standard 62 and 55. (Proper outdoor air quantities, temperature/humidity control)	40	
Discussion/use of zoning/temperature control systems	20	
Discussion/use of air filtration	20	
Did design meet LEED 2.1 Prerequisites?	10	
Points for additional LEED credits (5 points each, maximum of 10) after satisfying Prerequisites	10	
General Evaluation	10	
TOTAL	200	

HVAC System Design Creativity	Max Points	Actual Points
Creative, original design concept	100	
Application of existing equipment to achieve design concept	75	
Did the design achieve synergy with the architectural concept?	100	
General evaluation	25	
TOTAL	300	

HVAC System Design Communication of Results	Max Points	Actual Points
Presentation of written segment	100	
Presentation of design plans and flow diagrams	100	
Presentation of calculations	50	
General presentation	50	
TOTAL	300	

HVAC System Design Summary of Results	Max Points	Actual Points
Life Cycle Cost	200	
Green Building Design	200	
Creativity	300	
Communication of Results	300	
TOTAL	1000	