



Following a Proven Path: Capitol Complex – A Success Story

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**Greening Facilities
in the New Energy Economy**

May 1, 2008



Governor's
Energy Office



Division of Central Services Performance Contract 2002 – 2009

Office of the State Architect

Project No. IH-02035 A & B
1313 Sherman Street
Denver, Colorado



May 1, 2008



COLORADO STATE CAPITOL COMPLEX

- 16 Buildings located in the Denver metro area and 1 Building in Grand Junction.
- 1.8 million square feet.
- Building age from 1890's to 1970's
- Existing HVAC Equipment dating back to the 1930's.



DPA/Central Services Performance Contract

- **PROJECT TEAM**
- Central Services Maintenance Personnel
- Office of the State Architect
- GEO Consultants for M&V, Commissioning Oversight and Contract Review.
- Chevron Energy Solutions
- CTG Energetics (LEED EB Consultants)
- Colorado Department of Labor and Employment
- Judicial and Higher Education through the Judicial Heritage Complex



PHASE I

• Lighting 18 Buildings	\$820,000
• Water Conservation 13 Buildings	\$137,229
• Upgrade DDC Controls	\$784,470
• Central Plant Improvements	\$696,859
• Optimize Chiller Controls	\$659
• Water Side Economizers (Flat Plates)	\$188,563
• Replace Chiller, Pumps and Tower	\$617,736
• Replace District Steam w/ Boilers	\$2,236,523
• Add Insulation Weather Stripping	\$17,065
• Delete Unused Water Meters	\$0
• Energy Conservation Manager	\$95,238
• Direct Purchase of Natural Gas	\$0



PHASE 2

Rolled in from Phase I	\$1,483,411
Lighting Controls 1 Building	\$32,960
Expand DDC Controls	\$123,023
Install Water Side Economizers (Flat Plates)	\$322,432
Replace Central Plant Chiller & Add Cooling Tower	\$496,585
New Chiller Plant at 690 & 700 Kipling	\$1,825,273
Replace District Steam with Boilers (Judicial)	\$0
Replace Boiler at CDLE	\$181,280
Replace Windows at CDLE	\$262,595
Misc. projects from back up pumps to VFD's	\$773,488
Energy Star Rating and LEED-EB for three buildings	<i>In Above</i>



“PROPOSED” PHASE 3

- 10 KW PV DEMONSTRATION SYSTEM AT THE CAPITOL
- 100 KW PV SYSTEM AT 1881 PIERCE STREET
- GEOEXCHANGE HEATING AND COOLING SYSTEM AT GOVERNOR’S RESIDENCE
- UPGRADE/RENOVATE HVAC SYSTEMS AT GOVERNOR’S RESIDENCE
- CAPITOL EXTERIOR LIGHTING UPGRADES

Funded and Installed Phase 3 work.

- 9.8 KW PV SYSTEM AT CARRIAGE HOUSE
- ATTIC INSULATION AT GOVERNOR’S RESIDENCE
- METERING AND UTILITY VISION



Flat Plates





Utility Budget Savings

• 2005 Utility Budget	\$3,260,396
Phase 1 Guaranteed Savings	\$ 631,000
Phase 2 Guaranteed Savings	\$ 179,000
Phase 3 Guaranteed Savings	<u>\$?-----</u>
	\$2,450,396

25% Saving on Utility Budget \$810,600

Phase 3 will put us over \$1,000,000 per year in
Avoided Utility Costs



Environmental Savings

Phase I 7,508,849 Phase II 2,111,152 kWh saved

Fuel Type	Acid Rain	Smog	Acid Rain
Phases I	CO2 lb/k/wh	NOx g/k/wh	SO2 g/k/wh
Coal Not Burned	18,021,238	30,035,396	75,088,490
Oil Not Burned	15,017,698	14,266,813	40,547,785
Gas Not Burned	9,761,504	157,685,829	0
Phase II			
Coal Not Burned	5,066,765	8,444,608	21,111,520
Oil Not Burned	4,222,304	4,011,189	11,400,221
Gas Not Burned	2,744,498	44,334,192	0



DPA LEED- EB PROGRAM

PHASE 2

- | | | |
|----------------------------|------|-----------|
| • JUDICIAL/HERATIGE CENTER | 1976 | Certified |
| • STATE SERVICES | 1957 | Certified |
| • HUMAN SERVICES BUILDING | 1953 | Certified |

PHASE 3

- | | | |
|--------------------------|--------|---------|
| • STATE CAPITOL BUILDING | 1896 | Pending |
| • GOVERNOR'S RESIDENCE | 1908 | Pending |
| • CDLE 251 | 1950's | Pending |

- **Currently 52 LEED EB Certified or above in the world.
8 of the 52 are in Colorado and 4 of the 8 are State Projects**

LEED EB Implementation



- Energy Star Rating is key. (USGBC has recognized that energy is a key component and is raising the minimum from 60 to 69)
- Continuous Commissioning as part of Audits
- High Performance Operations
- Energy Savings Monitoring
- Records Management
- Employee Transition
- Raises the bar for M&V
- LEED provides a third party review
- Greening Government Documentation
- Carbon Footprint



Performance Contract Lessons Learned

- Look at entire systems not components.
- Flexible ESCO and Budgets. GMP pricing on each ECM
- Lighting pays for other work. Leverage the ECM
- Design work is not complete at time of Audit
- Energy Star ratings give you a benchmark.
- Size of the building does not matter.
- You cannot document what you cannot measure.
- Use the Performance Contract to pay for LEED Certification.
- Plan for LEED EB
- Maintenance Staff
 - History of Equipment
 - Cooperation they need to buy into the new systems for future maintenance.
 - Recommendations



LEED EB Lessons Learned

- Justification
- Start Early
- Go back and look at all systems again.
- Staff Buy-in, Education
 - Enhanced Operations and Performance
 - On-Going monitoring
- Tenant Buy-in
- Identify your Performance Period
- Green Housekeeping and Contracting obligations.
- *The higher the “Energy Star” score the lower the utility costs
- *Cost of LEED EB Implementation \$0 to \$6.46 per SF. \$2.43 SF average.
- *Average Operating costs of LEED EB buildings is lower than BOMA average operating costs.
- More Lessons to be learned. They will never end!!!!



USGBC/DEPARTMENT OF PERSONNEL AND ADMINISTRATION PARTNERSHIP “PORTFOLIO PROGRAM” PILOT

**DPA has committed to have 70% of our buildings LEED EB Certified.
The “Portfolio Program” allows a streamlining of LEED EB
implementation.**

- One time review and approval of credits
- Lowered registration and review costs.
- Potential to have a pre-approved package of 12 to 18 LEED EB credits for all State Buildings. 34 Points required for certification under v2008.
- The State has 61,801,856 SF of Built Space.
- Higher Education is 68% of State Square Footage
- The State adds less than 1,000,000 SF per year of new construction to the existing inventory.



Future for Performance Contracts

- **Controlled Maintenance**

 - 5 Year Plan calls for \$100,000,000 per year.

 - Actual \$30,000,000 to \$50,000,000

 - 2009 projections in the 15 to 20 million range

- **Capitol Renewal Project**

 - Major renovations

- **New Construction**

 - Budgets

CONCERNS and OPPORTUNITIES



- State and XCEL contract “indemnification” issues
- “Greenwashing”
- Greening Government 20% utility reduction, while decrease in Controlled Maintenance
- Higher Education Exemptions
- State Controlled Maintenance, Capitol Renewal and New Construction
- Educating Architects and Engineers of the Potential



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Questions & Answers