



City Facilities and Operations

Energy Performance Contracting 101

McKinstry

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**CML Lunch and Learn
April 10th, 2014**

Are you at the right lunch?

- Capital Improvement budget is too small
- Energy is 2nd or 3rd largest budget item
- ‘Response Maintenance mode’ = expensive emergencies
- Comfort issues: persistent and expensive to fix
- Maintenance costs are rising
- Staff training budgets low



Energy Performance Contract

- **The Colorado Energy Office (CEO) administers the energy performance contracting program**
 - 14-year-old program
 - Currently ranked 4th in Nation for performance
 - Completed 154 projects; \$330M in construction
- **What is Energy Performance Contracting (EPC)?**
 - A simple, quick way for facility owners to implement and finance building improvements and energy conservation measures
 - Energy conservation measures are funded through **guaranteed** future energy savings



What is Energy Guarantee Contracting?

WHAT

Removing energy, operational and maintenance waste from facilities

HOW

Design and implement improvements with guaranteed performance

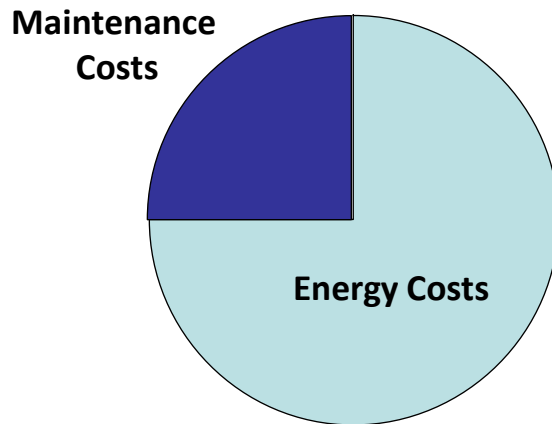
COST

Pay for improvements over time through operation, maintenance and energy cost savings – not Capital budgets

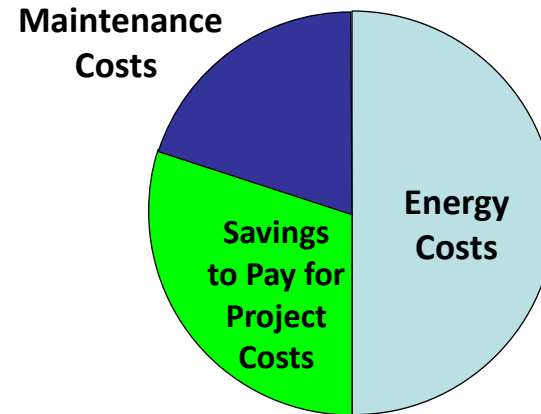
Energy Performance Contract

- **EPC – Budget Neutral**

- Finance infrastructure improvements over longer terms (up to 25 years)
- Energy savings generated from improvements are used to make the lease payments

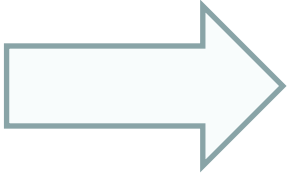


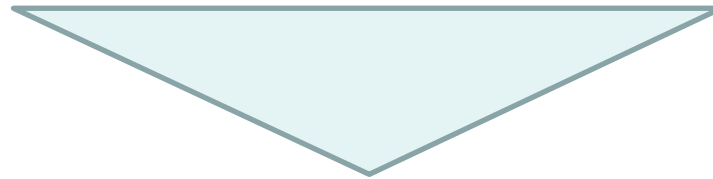
Before Performance Contracting



After Performance Contracting

Typical Facility Energy Savings Opportunities

20%  **40%**



Annual savings occur by increasing equipment and operational efficiency

Boulder's EPC Goals

- **Reduce energy use, water use and costs across all city operations**
- Upgrade aging infrastructure in a fiscally constrained funding environment
- **Reduce GHG emissions by 20 percent**
- Leverage ARRA, State and utility funding opportunities
- Improve comfort, aesthetics, productivity
- Incorporate renewable technology and maximize demand side management opportunities
- Add/Improve building automation systems
- **Lead by example**

Measures Chosen

- Lighting audit and retrofits
 - 10,239 fixtures to be retrofit = 1,382 KW of existing lighting power
- Water conservation audit - 57 buildings & irrigation
 - Kudos to the city on conserving irrigation water
 - 1,591 fixture to adjust/modify/calibrate
- Building envelope: 57 buildings audited; “weatherization” at 43
- Solar PV at 13 locations – total output of 1,061 kW
- Solar thermal pool heating systems at 2 Recreation Centers
 - 19,300 annual therm output
- Mechanical Replacements (chillers, boilers, air handlers, etc.)
- Variable frequency drives
- Building controls, scheduling and optimization/re-commissioning
- Employee Education/Behavioral Change

EPC Financials by Phase

Item	Phase 1	Phase 2	Phase 3	Total
Total Project Value	\$2,888,711	\$8,138,999	\$5,205,250	\$16,232,960
Xcel Energy Solar PV Rewards Rebate – one time	(\$632,064)	(\$778,900)	(\$75,000)	(\$1,485,964)
Xcel Energy Standard Offer Rebate – one-time	(\$80,885)	(\$417,230)	(\$58,878)	(\$556,993)
Project Cost to Boulder	\$2,175,762	\$6,942,869	\$5,071,372	\$14,190,003
EECBG	(\$213,501)	(\$146,499)	--	(\$360,000)
City Capital	(\$462,261)	(\$398,337)	(\$1,524,460)	(\$2,385,058)
Financed Amount	\$1,500,000 QECCBs @1.46% - 13Y	\$6,398,033 @3.5% - 15Y (refi with Ph 3)	\$3,241,229 @2.65%- 15Y	\$11,139,262

QECCB – Qualified Energy Conservation Bonds

EPC Financials & Benefits

Item	Total
Total Project Value	\$16,232,960
- Electric and Gas Utility Rebates – one time	(\$2,042,957)
- Energy Efficiency and Conservation Block Grant	(\$360,000)
- City Capital	(\$2,385,058)
Financed Amount	\$11,139,262

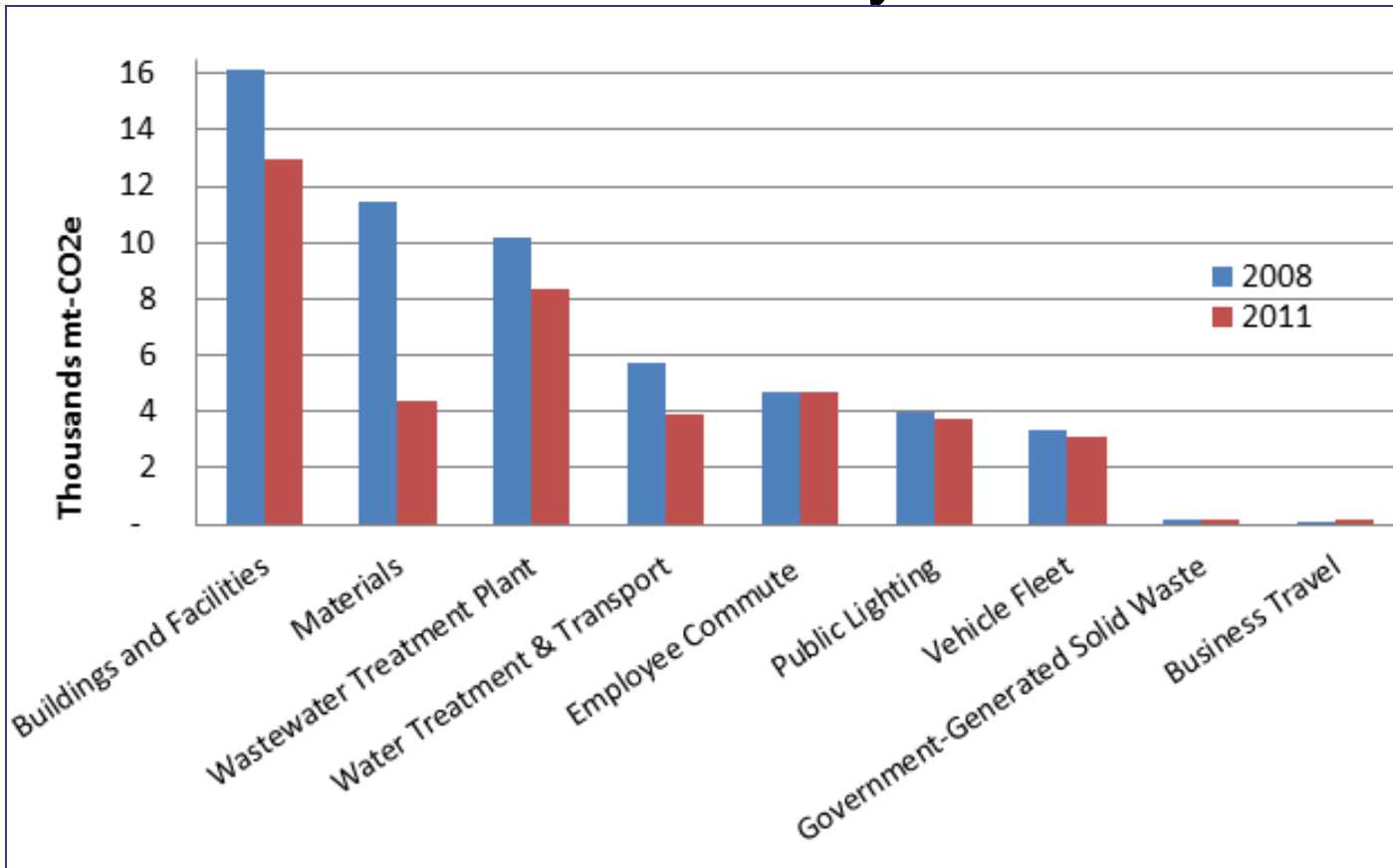
- Stimulus funding (EECBG) only 2% of funds
- 24 of 28 (86%) of contractors in Colorado, with 13 (54%) in Boulder area
- \$11.5M to subcontractors
 - \$6M for labor with **422 people** employed in 3-year timeframe
- ESCo (McKinstry) professional staff increased from 14 to 35 in 3 years

EPC Results

Item	Total (Annual)
Electricity Reduction	7,883,532 kWh
Gas Reduction	180,680 therms
Water Reduction	2,796 kgals
Utility Cost Savings	\$667,614
Maint Cost Savings	\$52,615 (3-years only)
CO2 Reduction	8,216 mtons (24.4%)
Future Capital Avoided	\$3,354,460 (one-time)
On-going Incentives: - PV REC payments - Colorado Carbon Fund REC payments	\$97,062 \$50,000 total (one-time)

Boulder Emission Sources

2008 & 2011 GHG Emissions by Sector



Reductions

Buildings – 20%

Materials – 62%

Wastewater – 19%

Water – 32%

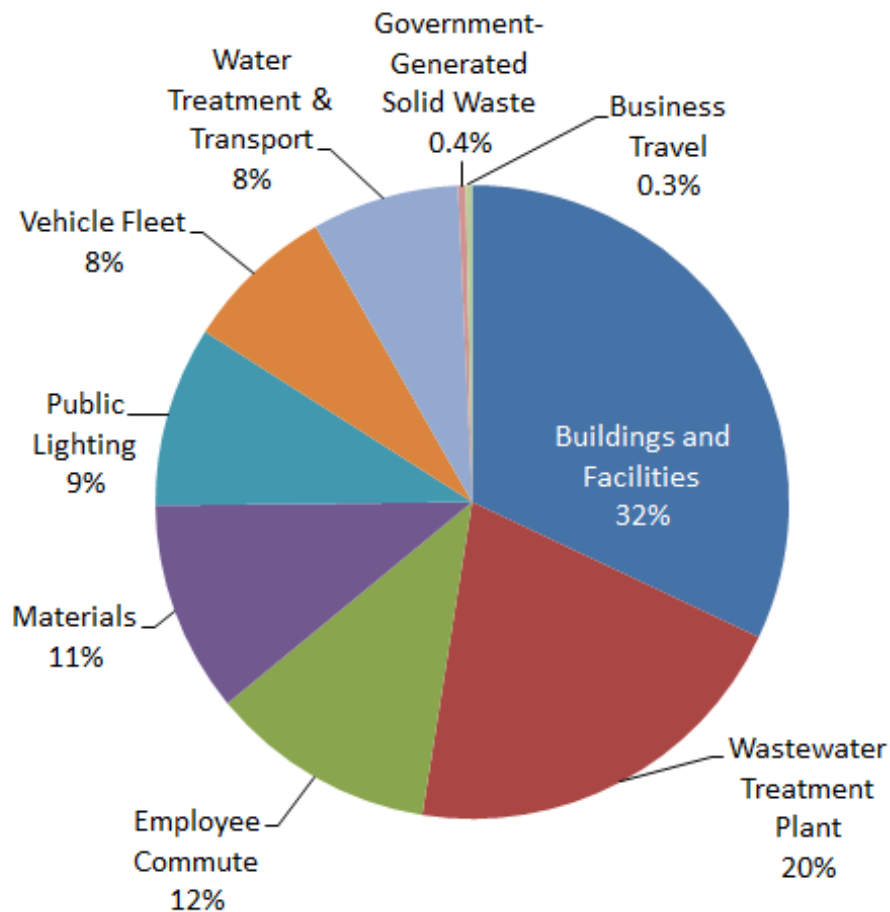
Public Lights – 6%

Fleet – 5%

Overall: 26% decrease from 2008 to 2011

Boulder Emission Sources

2011 GHG Emissions by Sector



Awareness & Engagement

powerED program:

- Behavior change educational campaign for city facility occupants
- Goal is 10%
- Collaborative partnership between McKinstry and the City of Boulder

peoplepowerplanet



Focuses on:

- People: engage **occupants** and increase awareness
- Process: engage **operators** and optimize systems
- Performance: energy savings progress tracking and reporting (dashboard)



Dashboard

powerED by McKinstry Smart Building Dashboard

OVERVIEW
SAVINGS SUMMARY
SAVINGS DETAIL
BILL DATA
ABOUT

City of Boulder

- 63rd Water Treatment Facility
- 75th Wastewater Treatment Facility
- Atrium
- Betasso Water Treatment Facility
- East Boulder Community Center
- FAM Maintenance Building
- Fire Station 1
- Fire Station 2
- Fire Station 3
- Fire Station 4
- Fire Station 5
- Fire Station 6
- Fire Station 7
- Fleet Services Center
- Iris Center
- Main Library
- Meadows Library

Top 10 Facility Ranking

Click here to view all results:

Facility	% Total Savings
OSMP Foresberg	~65%
Park Central	~55%
West Senior Center	~50%
FAM Maintenance Building	~45%
OSMP Cherryvale	~42%
Municipal Service Center	~40%
Fleet Services Center	~35%
63rd Water Treatment Facility	~32%
Municipal Building	~30%
South Boulder Recreation Center	~28%

Right-click graph to export or print data

City of Boulder

SAVINGS PROGRAM TO DATE	<p>% TOTAL SAVINGS</p> <p style="font-size: 1.5em; font-weight: bold;">25 %</p>	<p>COST AVOIDANCE</p> <p style="font-size: 1.5em; font-weight: bold;">\$855,951</p>
IMPACT PROGRAM TO DATE	<p>HOMES POWERED</p> <p style="font-size: 1.5em; font-weight: bold;">1,695</p>	<p>CARS OFF THE ROAD</p> <p style="font-size: 1.5em; font-weight: bold;">2,665</p>
BENCHMARKS	<p>ENERGY STAR</p> <p style="font-size: 1.5em; font-weight: bold;">N/A</p>	<p>ENERGY USE INDEX</p> <p style="font-size: 1.5em; font-weight: bold;">113</p> <p>ENERGY COST INDEX</p> <p style="font-size: 1.5em; font-weight: bold;">\$1.77</p>

City of Boulder:

25 %



Dashboard – Maint Bldg

powerED Smart Building Dashboard

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Atrium

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East Boulder Community Center

FAM Maintenance Building

Fire Station 1

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Fire Station 6

Fire Station 7

Fleet Services Center

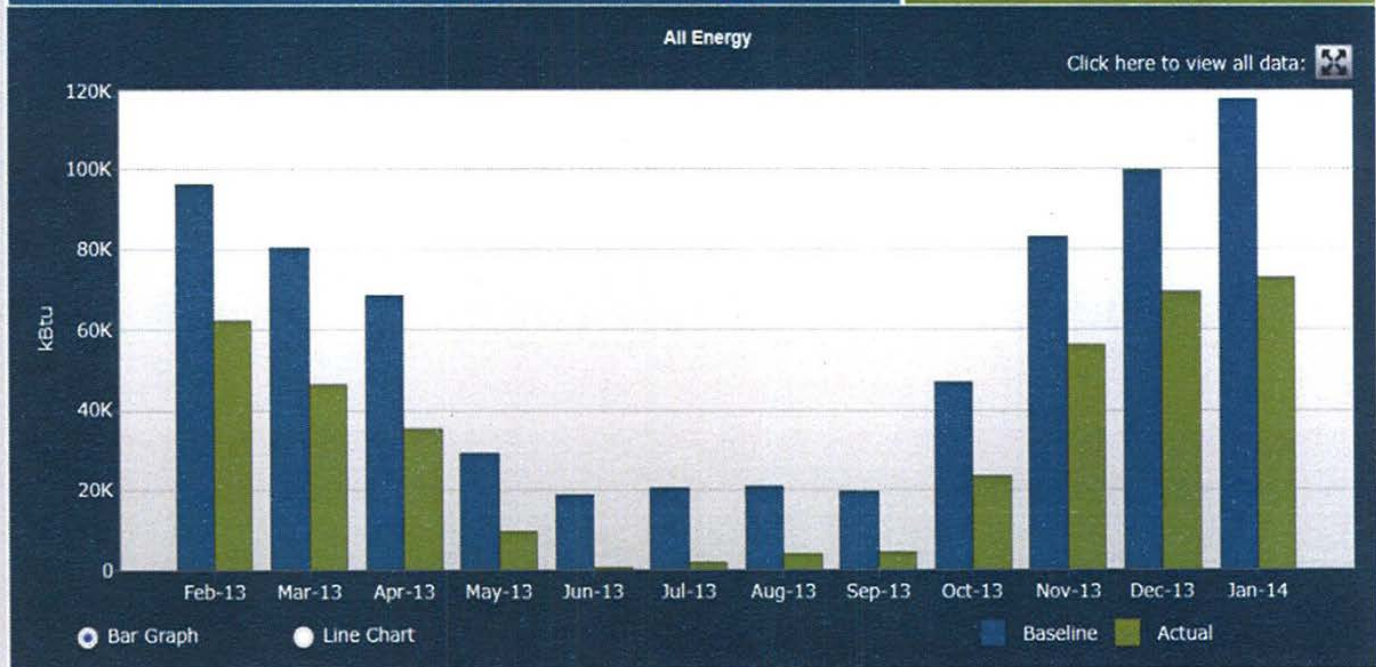
Iris Center

Main Library

Meadows Library

FAM Maintenance Building

CLICK A METRIC TO CHANGE GRAPH



City-Wide Emission Reduction Efforts

- EPC: 24.4% reduction from buildings sector for all 3 phases, 13.6% reduction in total GHG emissions
- Recycling, composting: +200 tons recycled, +11 tons composted (2009)~4% reduction waste – zero waste (2010)
- 2012 LED traffic signals: 100%
- Recycled asphalt: 20% (same)
- Vehicle fleet: 100% AFVs for new, maintain VMT budget, biofuels (B2-2011, B10 & B20 use), EVs with renewables
- Transportation: Ecopass, bikes and carpooling (same)
- Environmental purchasing policy (recycled paper, environmentally certified products, etc. - same)
- Hydro production, WWTP cogen, more solar / wind (same)

Recommendations

- **Go Big**

- Deep energy efficiencies – lowest cost measure
- Add water conservation
- Add employee engagement program
- Include Renewables (desert) - solar pV; solar thermal

- **Financing**

- Start early in process
- Select financing firm that knows EPCs
- Utility bonds can get excellent rates

- **Design/Build Performance Contract**

What's Next

**80 by 50 – 80 percent reduction by 2050
or
“Fossil-Free”**

Renewable Energy Study

**Fleet Electrification with Renewables
and Battery Storage**

Energy Efficiency Upgrades at City Facilities

<https://bouldercolorado.gov/public-works/energy-efficiency-upgrades-at-city-facilities-energy-performance-contract>



Thank you!

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