Transition to Stable Operations
National Conference on Building Commissioning 2013

Christian Williss
Sustainability Program Administrator
City and County of Denver
May 7th, 2013
Learning Objectives

• Identify the main issues during and after a commissioning or re/retro-commissioning project that owners are left with.

• Describe and recommend key elements of involving the O&M and other owner’s staff in the commissioning and re/retro-commissioning process.

• List all the documentation that is needed at the turn-over phase.

• Recognize the owner’s perception and perspective regarding the scope of a Cx Provider’s and owner’s role in a commissioning or re/retro-commissioning project.
Agenda

- Overview of Denver’s energy efficiency program
- New buildings
- Existing buildings
- Observations, recommendations, and topics for discussion
• Facilities Management
  • 125 buildings
  • 6 million SF

• Strategic Initiatives
  • $29 million annual budget

• Purchasing
  • $260 million annually
Vision for Energy Efficiency

Greenprint Denver

• Energy and Emissions
• Natural Resource Stewardship
• Materials and Waste Management
• Land Use and Transportation
• Community and Economic Development

Executive Order 123
Municipal Green Building

New Construction

• “All new City buildings and major renovations shall be certified to LEED-NC (New Construction) Silver Certification, with the goal of achieving LEED-NC Gold.”

Executive Order 123:

• “It shall be the policy of the City to improve efficiency in all City facilities and to pursue renewable energy projects and programs.”
New Construction

- 1st LEED Projects
- Enhanced commissioning for Detention Facility and Courthouse
- M&V results indicated performing as expected but opportunities for improvement

Justice Center Parking Garage

Van Cise-Simonet Detention Facility

Lindsey-Flanigan Courthouse
New Construction

Better Denver Bond

- $550 million
- 319 projects
- Deferred maintenance, new and renovated vertical and horizontal construction including 10 new buildings
Additional Prerequisites:

- **Energy Commissioning**: Ensure enhanced commissioning per LEED NC ver. 3.0, Energy & Atmosphere (E&A) Credit 3.

- **Energy – Optimize Energy Performance**: Earn at least 8 points by achieving an increased level of energy performance above the baseline established by ASHRAE/IESNA Standard 90.1-2007 per LEED-NC, ver. 3.0, EA Credit 1.
New Construction

LEED PLATINUM:
• Denver Municipal Animal Shelter

LEED GOLD:
• Eastside Human Services Office Building
• Denver Police Traffic Operations/Training Facility
• Denver Crime Lab
• Central Park Recreation Center
• Green Valley Ranch Library
• Eastside Human Services Office Building
• Sam Gary Library
• Central Platte – Fleet Maintenance
• Central Platte – Gary Price Ops
• Owner is not always familiar with/understands value of commissioning (or enhanced)
• Priorities among building stakeholders not always aligned
• Building operator is not always engaged
• Cx recommendations aren’t always addressed by the owner
• Challenges of turnover – poor communication, training, documentation
• Cx ensures that a building operates as designed which isn’t necessarily as efficient as possible
• Think outside the scope
• Invest in enhanced commissioning/M&V
• Educate stakeholders on commissioning process
• Include facilities staff from the beginning
• Ignore Cx recommendations at your peril
• Challenges of turnover – staff isn’t engaged or lacks necessary expertise, training is inadequate, staff or leadership turnover
New Construction – Cx Questions

• How do we educate owners and other stakeholders on the commissioning process?
• Is the LEED commissioning process adequate and if not how do we go above and beyond (and bring more owners along)?
• How do we improve the transition process?
• Can we build more optimization into the Cx process?
• What can you do as providers?
Greenprint Denver:
• “Reduce energy use by 1% per year...per building square foot in City government facilities.”
• “Reduce energy use by 5% from 2006 levels...per building square foot in...City facilities.”

Executive Order 123:
• “All capital improvement projects shall be designed and constructed using LEED best practices.”
Existing Buildings

- Capacity building + capital improvements
- Energy audits + strategic capital improvements
- Re/retro-commissioning + operational improvements
- Ongoing Commissioning + persistence of savings
• Re/retro-commissioning + operational improvements
• Ongoing Commissioning + persistence of savings
Energy Audits and Retro-Commissioning of City Facilities

Project Goals

1. Develop a comprehensive list of energy efficiency opportunities including project cost, energy and cost savings, payback, and emissions reduction information

2. Identify and implement no and low cost operational improvements that result in immediate energy use and cost savings

3. Enable more strategic energy efficiency investments for remaining EECBG and future capital funding

4. Project goals evolved leading to additional benefits
Energy Audits and Retro-Commissioning of City Facilities

- Phase I – 50 rec centers, libraries, and City data center
- Phase II – 9 large office buildings, high energy users, and 24/7 facilities, most with building automation systems
Project Results

Phase I (50 buildings)
- $8.1 million in improvements identified
- $743,000 in potential annual energy savings
- $321,000 in utility rebates
- 11.3 year overall simple payback

Phase II (9 buildings)
- $3.4 million in improvements identified
- $424,000 in potential energy savings
- $235,000 in utility rebates from Xcel Energy
- 6.7-year overall simple payback
Project Results

- **Recreation Centers**
  - Implementation Costs: $8.1 million
    - 88%
  - Utility Rebates: $321,000
    - 53%
  - Energy Savings: $743,000
    - 40%
  - GHG (CO2e) Reduction: 4,885 m-tons
    - 67%

- **Libraries**
  - Implementation Costs: $8.1 million
    - 12%
  - Utility Rebates: $321,000
    - 47%
  - Energy Savings: $743,000
    - 60%
  - GHG (CO2e) Reduction: 4,885 m-tons
    - 33%
RCx Improvements

Schlessman Family Library

Retro-commissioning/Improvements

Use/Cost Per Day

[Graph showing the trend of use/cost per day]
RCx Improvements

Fire Station #2

Retro-commissioning/Improvements
RCx/Capital Improvements

Blair Caldwell Library

Retro-commissioning/Improvements
Energy Efficiency is a Process

What happened here? And how do we prevent it?
Ongoing Commissioning and Persistence of Savings

- Phase III – 5 of the City’s largest energy users with a focus on all aspects of building operation and move toward ongoing commissioning
Ongoing Commissioning and Persistence of Savings

Project Scope
• 5 of the biggest energy users including 2 newer buildings
  • O&M baseline assessment
  • RCx/Level II energy audit
  • Ongoing commissioning plan
  • Asset tracking and diagnostic tool

• Documentation
  • O&M Assessment
  • RCx/Level II Report
  • OCx Plan
  • Executive Report
Phase III (5 buildings)
- $2.4 million in improvements identified
- $519,680 in potential annual energy savings
- 45 recommendations
- 4.6 year overall simple payback

Ongoing commissioning pilot in progress
RCx/OCx Challenges

- Documentation
- Staff engagement
- Project legacy (turnover)
- FIM implementation
- Measurement and verification
- Persistence of savings
- New technology
• Clear, consistent communication
• Facilities staff are an excellent resource and should be engaged throughout the process
• Improvement recommendations should be clearly documented with enough detail to make them actionable
• Project documentation should be written for the intended audience
• Don’t forget the QA/QC
• Think outside the scope
Observations – Owner

• Quality of the project is proportional to time invested
• Data is only as good as the ability to use it
• Newer buildings often have as much or more opportunity to reduce energy use
• Operational improvements are often more cost-effective than capital improvements
• The more skilled the staff and greater their ownership, the smaller the likely savings
• Retro-commissioning is an event – need to develop a process to sustain savings for the long term
• Be realistic – what are you trying to accomplish? Short term savings or advancing high performance building programs?
Christian Williss
Sustainability Program Administrator
City and County of Denver
christian.williss@denvergov.org