California Commissioning Collaborative
Advisory Council Meeting

April 21, 2008
# Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
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<tbody>
<tr>
<td>1:00 PM</td>
<td>Welcome, Introductions, and Announcements</td>
<td>Don Frey</td>
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<tr>
<td>1:10 PM</td>
<td>CCC Policy Initiative</td>
<td>Kirstin Pinit</td>
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<td>1:25 PM</td>
<td>Verification of Savings: M&amp;V Guide progress</td>
<td>David Jump</td>
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<td>2:05 PM</td>
<td>Universal Translator Demo</td>
<td>Reinhard Seidl</td>
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<td>2:35 PM</td>
<td>Break</td>
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<td>2:50 PM</td>
<td>Commissioning Industry Needs Survey</td>
<td>Hannah Friedman</td>
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<tr>
<td>3:20 PM</td>
<td>CCC Analysis and Development of Educational Opportunities</td>
<td>Kirstin Pinit</td>
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<td>3:50 PM</td>
<td>New Training Initiative</td>
<td>Phil Welker</td>
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<td>4:10 PM</td>
<td>Wrap - Up</td>
<td>Don Frey</td>
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<td>4:20 PM</td>
<td>Advisory Council Meeting Adjourns</td>
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<tr>
<td>4:30 PM</td>
<td>Reception on Cardiff Patio</td>
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Introductions & Announcements
CCC Announcements

• 2007 California Retrocommissioning Market Characterization Report now available on CCC site

• Owner Outreach Project: *Real Reasons for Optimizing Building Performance*
  – Pre-conference workshop this morning
  – How and why owners decide to do RCx
  – Case studies from Cushman & Wakefield, Marriott, and Target
  – 20 registrations
CCC Policy Initiative

• **Objective**
  - Help ensure that CA policies and standards support the effective use of commissioning to deliver energy efficiency in commercial buildings

• **Focus**
  - Energy Efficiency Policies
  - M&V Standards
  - Workforce Training and Development

• **Value for CCC stakeholders**
  - A presence in the policy-making arena
CCC Policy Initiative

• Activities
  – Support Title 24 revision and enhancement
  – Attend hearings, workshops, etc.
  – File comments and offer testimony
  – Networking and collaboration with stakeholders
  – Research

• Outcomes
  – Visibility for CCC
  – Consideration for Cx in policies, codes, and standards
CCC Policy Initiative

• **Research Scope:** Compliance and Enforcement of Title 24 Acceptance Requirements
  – Factors contributing to non-enforcement and non-compliance
  – Ways to improve compliance & enforcement
  – Ways to increase code stringency

• **Major Tasks:**
  – Conduct survey of building departments and code officials, CEC officials, utility stakeholders, building owners
  – Analyze survey results
  – Develop recommendations
CCC Policy Initiative

- **Next Steps**
  - Secure funding
  - Recruit staff – *you can help!*
  - Begin code compliance research
  - Establish action plan for policy involvement
CCC Policy Initiative

• Policy Staff: Desired Qualifications
  – ~50% FTE
  – Sacramento or Bay Area preferred
  – Deep knowledge of Cx and/or energy efficiency
  – Prior experience/participation in policy-making processes
Verification of Savings – M&V Guide Progress

David Jump
QuEST
Universal Translator

Reinhard Seidl
Taylor Engineering
Break

2:35 – 2:50
Envisioning the Future of the Commissioning Industry

• CCC is sponsoring the NCBC “Town Hall Meeting”
  – Thursday, 9:00-noon in Salon D
• Interactive discussion with industry leaders and stakeholders
• Why?
  – New and expanded opportunities for commissioning
  – Prepare to integrate into the market in new ways
• Roadmap
  – Strong vision statements and rationale for where we want the industry to go
Cx Industry Surveys: 1998 and 2008

• In 1998, PECI surveyed industry, sponsored by US DOE
  – Over 50 responses, 8 reviewers
  – Created a National Strategy for Building Cx
• In 2008, PECI surveyed 5,910 industry contacts
  – 149, responses received (2.5%)
  – Survey results to be presented at NCBC Town Hall Meeting
1998 National Strategy, Then….

- Market was being invented, growing
- Cx was thought of as mainly an external intervention (3rd-party model)
- Barriers to market growth
  - Lack of awareness of Cx process and benefits
  - Perception that Cx is an unnecessary layer
  - Lack of cost-benefit data to convey a clear, positive financial outcome
  - No mature channels to obtain Cx services
1998 National Strategy, Then....

• Identified key needs and opportunities
  – Increase availability of qualified providers
    • Cautious that pace of training would exceed demand
  – Quality and consistency of Cx services
    • Should there be certification? Requirements?
      – NEBB Cx Certification Program (1993)
  – Tools to reduce costs and improve process delivery
… and Now

10 years later, we want to look at:

• Key accomplishments
  – Where are we?

• Vision for the future
  – Where are we going?
  – Build on accomplishments to further develop the industry
Key Accomplishments in Last 10 Years

• Professional Organizations and Collaborations
  – BCA (1998)
  – ASHRAE Guideline 0-2005

• Market and Technical Research, Tools & Resources
  – CEC, Energy Design Resources Cx Assistant, CCC, NEEA, US DOE, EPA, ASHRAE

• Utility Incentive Programs (9 major utilities: RCx incentives)
2008 Survey Questions

• In your specific role what is your…
  – Biggest problem?
  – Biggest opportunity?

• What is the industry’s…
  – Biggest problem?
  – Biggest opportunity?

• What drives your thinking/understanding of the market?
  – Market trends, resource availability, regulatory and financial constraints, technology application, etc.
Survey Respondents

- 149 responses received
  - 1 Architect
  - 2 Utility representatives
  - 3 Researchers
  - 3 Unknown
  - 4 Government representatives
  - 16 Program implementers
  - 17 Engineers
  - 17 Owner/operators
  - 86 Commissioning Providers
### Key Findings – Utility Program Implementers (16)

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<th>What is the industry’s biggest problem?</th>
<th>What is the industry’s biggest opportunity?</th>
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<td>• Difficulty / cost of measuring and verifying savings to utility req’s</td>
<td>• Lots of interest in energy efficiency driving increase in work</td>
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<td>• Lack of technical expertise and training</td>
<td>• Process improvements through shared knowledge / best practices</td>
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<td>• Lack of owner awareness of value</td>
<td>• Standardizing both Cx process and CxP training</td>
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<td>• Lack of standard procedures / tools</td>
<td>• Increased interest in green building / LEED</td>
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### Key Findings – Owner/operators (17)

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<td>• Poor or inconsistent quality of workmanship / Lack of qualified CxPs, no standard training</td>
<td>• Ongoing Cx using automated Diagnostics</td>
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<td>• Maintaining and measuring benefits</td>
<td>• Systems to ensure that operational changes persist</td>
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<td>• Lack of training of building operators in implementing RCx measures</td>
<td>• Ensuring quality through standard documents, procedures, etc.</td>
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<td>• Lack of communication within team of owner, contractor, engineer, CxP</td>
<td>• Development and use of advanced technology in RCx</td>
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## Key Findings – Consulting Engineers (17)

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<td>• Lack of knowledge and understanding of Cx by owners &amp; developers</td>
<td>• RCx as part of LEED® requirements</td>
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<td>• Lack of clear value proposition in face of high perceived costs</td>
<td>• Continuous Cx</td>
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<tr>
<td>• Lack of standard procedures</td>
<td>• Ability of RCx to increase efficiency and reduce costs in the face of rising energy costs</td>
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<td>• Need for training for providers, and also owners &amp; operators</td>
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Key Findings – Cx Providers (86)

What is the industry’s biggest problem?

- Lack of qualified staff/ Competing firms that underbid for projects and do poor work
- Educating owners and managers on the need, value, process, costs & benefits of Cx - “Why should we pay extra for this?“
- Lack of industry standards and various competing standards

New Construction Cx
- Need to start Cx work in design phase
- Lack of support/cooperation from contractors, subs, vendors
- Lack of coordination among engineers, architects, owners
## Key Findings – Cx Providers (86)

### What is the industry’s biggest opportunity?

- Visibility of LEED and green movement in general
- Government mandates requiring energy efficiency in public buildings
- Increased penetration of new markets (hospitals, schools)
- RCx more common as new construction slows down and energy costs increase
Survey Results Summary

• Most common problems:
  – Lack of trained professionals and standardized training
    • Hard to find qualified staff to hire
    • Unqualified firms doing poor quality work
  – Low awareness among owners
  – Lack of industry standards (tools, process, quality)

• Key opportunities:
  – Monitoring and Ongoing Cx for lasting benefits
  – Increased visibility of green building / LEED®
  – Best practices to improve quality of Cx work
    • Formulation of industry standards
    • Training
Making Connections

Analysis and Development of Educational Opportunities

February 2008
Funded by CCC, study conducted by Nexant
Strengthening the Delivery Infrastructure

• Objectives:
  – Characterize the educational needs of Cx providers
  – Identify actions that the CCC might take to help expand and prepare the Cx workforce

• Asked: What’s important in preparing a new generation of commissioning and retrocommissioning providers?
  – Current commissioning providers (7)
  – Building owners or facility managers (5)
  – Utility RCx program managers (3)
  – Educators (colleges and utility-sponsored training centers) (8)
  – Instructors or organizers of training through professional associations (5)
  – Others (2)
What Do Providers, Educators, and Consumers Think?

- What skills do hiring firms want?
- What education and training do hiring firms want?
- What opportunities for education and training in commissioning are available?
- What are current commissioning supply needs?
- What options are there for expanding the commissioning workforce?
Responses: Skills and Expertise

Education

“More than 99% of engineering students never get any hands-on experience with HVAC equipment”

Expertise

“It takes 20 years of experience to be a senior Cx Agent”

Certification

“Experience matters more”
“Multiplicity is confusing to owners”

Cx & RCx

“There’s good consensus about how to do Cx, but a lack of consistency about RCx”
Responses: Education / Training Wish List

2-year programs – Community Colleges

“One year on coursework for RCx, one year as an intern, and additional semester for Cx design component”

Labs or field experience

“You really can’t do the work without field experience”

“Create an HVAC systems lab”

More attention to documentation

“Documentation is a challenge in the industry—it’s not just a checklist”

Collaborative teaching

“Use industry guest lecturers or team teaching”

On-demand on-line tutorials w/ Q&A
Education: Model Programs

• Two-year community colleges
  – Lane Community College Commercial Energy Analysis Program (Oregon)
  – Laney College Environmental Control Technology Program (Oakland, CA)
  – Future (2008?) multi-college Internet-based curriculum with local labs (initiated by Lane College)

• Four-year colleges
  – DOE-sponsored Industrial Assessment Centers (nationwide)

• Professional advancement
  – Pacific Energy Center (San Francisco)
  – Lane Community College Summer Session “boot camp”
Responses: Critical Supply Needs

- “The typical engineer doesn’t have adequate training in controls systems, controls logic”
- “Not nearly enough people have both controls and HVAC experience”
- “In colleges there seem to be no courses in mechanical systems”
- Diagnostic skills (“Getting from the fundamentals to evaluating an existing system”)
- Combination of analytical and fix-it skills (“We tend to get one or the other”)
- Data analysis skills, among technicians
- Engineering economics and life-cycle analysis
Responses: Critical Supply Needs

Overall

- Help meet state EE goals
- Offset loss of experienced consultants and staff through retirement

Levels: Shortest supply described as “technicians” and “mid-range”

Need quantitative assessment?

- CCC’s RCx Market Characterization analysis estimates the number of providers needed to meet the demand in California is 64 (lead providers)
Results and Recommendations

- Interviews resulted in a list of 50+ ideas
- PAC members reviewed and identified the ones they would recommend, combining and modifying as necessary
- Nexant compiled PAC members’ comments and identified recommendations for the CCC
- Five categories of recommendations
  - Education
  - Marketing and public relations
  - The web
  - Public sector agencies
  - Standards
Recommendations: Education

Key Theme: Collaboration
Maximize information dissemination and avoid overlap

• Facilitate brainstorming on curriculum development
  – College and university faculty, industry experts, DOE, BOC, BOMA, IFMA, and others

• Central information source (website)
  – Resources for colleges developing new programs
  – Share model programs from this and other fields

• Design a replicable internship program; identify funding
Recommendations: Marketing and Public Relations

• Use publicity to
  – Create awareness of career opportunities
  – Attract professionals with related skills
  – Promote available training resources

• Articles in professional and trade journals
• Provide information to career counselors
• Link commissioning with “sustainability”
  – Connect CCC with USGBC and other green leaders
  – Promote the value of high-performance buildings
  – Increase visibility and appeal for students in engineering and related disciplines
Recommendations: Website Utilization

• Draw more visitors to the CCC site
  – Reciprocal links with related organizations
  – Search engine optimization

• Enrich to site to engage new audiences
  – Highlight case studies and key resources
  – Incorporate interactive, dynamic content
Recommendations: Public Sector Agencies

• Educate state policy makers on the industry’s needs
  – Job recognition: Community colleges rely on state jobs forecasts – no Cx/RCx agent category

• Be sure that commissioning is incorporated in state-funded energy education plans
  – E.g., in California as part of the Governor’s commitment to create “20,000 New Engineers” in the next decade
Recommendations: Standards

- Promote industry standards for RCx
- Collaborate with current initiatives
  - ASHRAE commissioning certificate program
  - California utilities initiative to “reshape the HVAC industry”
Timing

• Short-term
  – Website improvements and some marketing/PR efforts

• Quick-start – near-term actions to develop longer-term initiatives
  – BOC commissioning component
  – Other curriculum/program development efforts
  – Internship program support/development

• Medium-term
  – Policy and standards involvement

• Long-term
  – Connecting commissioning with sustainability
  – Ongoing and sustained publicity around Cx career opportunities
Summary: Critical Connections for Work Force Expansion

• Utilize the CCC’s central position in the industry in California to connect people, businesses and institution that have expertise and resources with
  – Students
  – Career-changers
  – Persons seeking professional advancement
  – Educators

  to meet the need for qualified commissioning providers.
For More Information

- CCC Website to download the full report
  - Link on homepage

- Contact:
  Betty Smith
  Nexant, Inc.
  101 Second Street, 10th Floor
  San Francisco, CA 94105
  415-369-1037
  bsmith@nexant.com
New Training Initiative

- **Need**: Train and mentor new talent
- **Vision**: Take a bold step
- **Value**: Speed up the process
- **Solution**: Partnership
- **Outcome**: Highest quality industry professionals
- **Business Case**: Shared funding, minimized risk
- **Next Steps**: Support from provider firms
Future Agenda Topics – June 12

• Topics of Interest
  – LEED (overview of LEED-EB changes, performance of LEED-NC)
  – 2007 CA RCx Market Characterization report
  – Special Guests?
  – Other Ideas?

• Discussion:
  – Ideas?
Upcoming Meetings

• June 12 – Thursday (PG&E, Pacific Energy Center)
• August 28 – Thursday (Southern California, location TBD)
• November 6 – Thursday (SMUD)
CCC at NCBC

• Visit the CCC booth tomorrow during the exhibitor event
  – Take a turn staffing the booth if you can (See Kirstin)
NCBC Session Highlights - Tuesday

10:30-12:00
• Making Benefits Last: Persistence Strategies & Ongoing Monitoring
  – Gregg Cunningham, Don Frey
• HVAC Control Strategies
  – Reinhard Seidl

3:30-5:00
• Selling RCx to Commercial Building Owners
  – Paul Ham, Hannah Friedman
  – Features CCC Market Research
• RCx in Practice: Program Updates
  – Features SCE RCx and MBCx programs
NCBC Session Highlights – Wednesday

10:30-12:00
• Monitoring & Verification for Cx
  – David Jump
• HVAC Control Strategies
  – Reinhard Seidl

1:30-3:00
• Ensure Quality & Unlock Energy Savings in Small Buildings
  – Dan Burgoyne

3:30-5:00
• Shaping the Next Generation: Training and Education Needs for Providers
  – Features CCC Training Analysis (Nexant study)
NCBC Session Highlights – Thursday

9:00-12:00

• The Way Things Work: Publicly Available Cx Tools
  – Philip Haves (learnHVAC and LBNL Functional Test Data Analysis Tool)
  – CCC RCx Toolkit
  – Reinhard Seidl (Universal Translator)

• Envisioning the Future of the Cx Industry: An Interactive Discussion
  – Sponsored by CCC
Adjourn

Thanks to SCE and NCBC for hosting the meeting today!

Please join us on the Cardiff Patio for Happy Hour.