WHPA Goal 2: CQM Standard 180 User Guide (T) Working Group
Tuesday September 12, 2017 Meeting Notes

Call to Order

The meeting was called to order at 10:06 am PDT by Marc Pickett, Chair.

Roll Call

The Chair considered one member of each organization to be a voting member for this working group. 9 of 17 voting members in attendance would constitute a quorum. 5 voting members, 3 non-voting members, 0 guests and 1 staff were present for a total of 9 attendees.

P = Present at meeting
A = Absent from meeting; if proxy has been assigned it will be noted below.
Although Voting Members have been designated by Staff, this group acts primarily by consensus.

CQM User Guide Working Group Voting Members				
ACCA (Air Conditioning Contractors of America)	Donald	Prather	Contractor Association	P
Air Management Industries	April	Yungen	Contractor (Nonresidential)	
Aire Rite AC & Refrigeration	Don	Langston	Contractor (Nonresidential)	
AMS (American Mechanical Services) CHAIR	Marc	Pickett	Contractor (Nonresidential)	P
Charles Segerstrom, Energy Efficiency Consulting	Charles	Segerstrom	Energy Efficiency Program Consultant	
CLEAResult (formerly PECI)	Todd	Van Osdol	California IOU	P
FDSI (Field Diagnostic Services Inc.)	Dale	Rossi	Third Party Quality Assurance Providers	
GWP (Goodheart-Willcox Publisher)	Sandy	Clark	Educator, Trainer	
Honeywell E&ES, Commercial Buildings, Trade	Michael	Lawing	Controls (Manufacturer or Distributor)	P
HSE (Honeywell Smart Energy Solutions)	Shayne	Holderby	Energy Efficiency Program Consultant	
Marina Mechanical	Denny	Mann	Contractor (Nonresidential)	
National Comfort Institute	Jeff	Sturgeon	Educator, Trainer	
Richard Danks Consulting – FacilityPro VICE-CHAIR	Rick	Danks	Other Stakeholder	
SCE (Southern California Edison)	Scott	Higa	California IOU	
Tre' Laine Associates	Pepper	Hunziker	Energy Efficiency Program Consultant	P
Western Allied Corporation	Mike	Gallagher	Contractor (Nonresidential)	
Warren Lupson and Associates	Warren	Lupson	Other Stakeholder	
CQM User Guide Working Group Non-Voting Members				
BELIMO	Darryl	DeAngelis	Controls (Manufacturer or Distributor)	
BMI (BuildingMetrics, Inc.)	Pete	Jacobs	Energy Efficiency Program Consultant	
Brownson Technical School	Bill	Brown	Educator, Trainer	P
CLEAResult (formerly PECI)	Michael	Blazey	Energy Efficiency Program Consultant	
HSGS (Honeywell Smart Grid Solutions)	Steve	Varnum	Energy Efficiency Program Consultant	
PG&E	Christian	Weber	California IOU	
SCE (Southern California Edison)	Steve	Clinton	California IOU	P
XCSpec	Janet	Peterson	Controls (Manufacturer or Distributor)	P
Adrienne Thomle, Consulting**	Adrienne	Thomle+		
AirTest Technologies	Mike	Schell	HVAC Manufacturer	
HVACRedu.net	Chris	Compton	Educator, Trainer	
Little Caesar's **	Wendy	Gallo+		
WHPA Staff (Non-Voting)				
BBI (Better Buildings Inc.)	Mark	Lowry	WHPA Executive Advisor/BBI COO	
BNB Consulting/WHPA Staff	Bob	Sundberg	Energy Efficiency Program Consultant	P (scribe)

Enpowered Solutions/WHPA Staff (WHPA Co-Director)	Shea	Dibble	Energy Efficiency Organization	

*** Organization is Not a Member of the WHPA; + Individual is NOT Registered with the WHPA; (P) after last name = Member/Registrant is Pending Approval from the WHPA Executive Committee*
To avoid repetition, the name of the member organization will not be repeated in the body of the minutes past the first identification with the name of the representative participant.

Welcoming and Member Introductions

No new members or guests.

Approve Previous Meeting Draft Notes

The August 22 meeting draft notes were distributed August 25. Members were asked to provide any additional suggested revisions or corrections after which finalized meeting notes would be posted to the WHPA website by Bob Sundberg.

ACTION Items

August 22 ACTION: Jeff Sturgeon volunteered to read through the HVAC Maintenance Focus Groups study conducted by EMI in 2011 to extract goals and goal related metrics mentioned in those discussions. Bob Sundberg, WHPA staff would provide Jeff and the entire WG with pdf copies of the two documents. Completed

August 22 ACTION: Marc Pickett and Pepper Hunziker offered to review the Salesforce and Service Gaps working group work product. Completed.

New Business – Marc Pickett, Chair

None.

AGENDA

Topic	Discussion Leader	Desired Outcome
Welcome, Roll Call, Member Introduction, Approve Past Meeting Notes, Review Action Items, New Business, Meeting Agenda	Bob Sundberg, WHPA Staff Marc Pickett, Chair	Record attendees, welcome any new members, approve previous meeting minutes, review status of any open Action items, planned agenda and bring up any new business items for the WG to consider addressing.
Re-visit EMI/BBI/SCE Focus Group reports	Marc Pickett, Chair Bob Sundberg, staff	Members share a clear understanding of the study findings – top & lowest perceived benefit priorities
Goals/benefits from EMI/BBI/SCE Focus Group Studies	Marc Pickett, Chair Bob Sundberg, staff	Add to draft list of perceived QM goals/benefits and goals metrics
Goals/benefits from Sales Force and Service WG GAPS report	Marc Picket, Chair Pepper Hunziker	Add to draft list of perceived QM goals/benefits and goals metrics
Goals/Metrics list	Marc Pickett, Chair Bob Sundberg, staff	Review, update goals/metrics draft list
Measurement, Data Collection and Report Making (UG Topic #5)	Marc Pickett, Chair	Agreement on how to pursue this user guide topic, next steps, sequence and assignment for next 3-4 meetings for WG work product
Confirm next meeting date/time, assign actions and proposed agenda and adjourn.	Bob Sundberg, WHPA Staff, for Don Langston, Chair	Clear understanding of member responsibilities for the next meeting. Next meeting date/time established.

Conclusion from 2016 CQM STD 180 User Guide Working Group final report:
This document was made to think through some key parts of Standard 180 and to document the experience of various stakeholders when selling and implementing Standard 180-based maintenance. The next step is to start producing the User Guide. The story arc of the proposed User Guide might be:

1. Introduction to and overview of Standard 180
2. Selling Standard 180-based maintenance
    a. The value proposition
    b. Qualifying the customer
    c. The sales process
3. Making a maintenance program
4. Implementing a maintenance program
5. Measurement, data collection, and report making
6. Validating Standard 180-based maintenance
7. Conclusion

Re-visit 2011 EMI/BBI/SCE Focus Group reports – Marc Pickett, Chair

At the previous WG meeting, several members had recalled that these studies revealed a surprisingly low priority for energy savings expressed by building owners and facility managers. Bob Sundberg, WHPA staff, requested that Ellen provide clarification on this point and an explanation as to how high a priority energy savings was regarded in these studies.

Bob Sundberg, WHPA staff, conferred with Ellen Steiner prior to the meeting. Ellen was the principal researcher at EMI who conducted both of the focus group studies about prioritizing potential benefits from HVAC mechanical maintenance. One study was conducted for BBI and the second study conducted for SCE. Bob provided information from the study to correct the previously held conclusions that energy consumption was a low priority. In fact, reducing energy consumption was a high or top priority in these studies closely followed by HVAC system cost avoidance elements.

2011 EMI Study for BBI,
Section 2.2, page 5 & 6
Top Perceived Benefits of Quality Maintenance

- Decreased environmental impact / "green company image"
- Decreased repair costs
- Extended unit life / delayed capital expenditure
- Improved "customer" environment
- Improved employee productivity
- Improved equipment reliability / reduced downtime
- Improved occupant safety / reduced liability
- Improved thermal comfort
- Increased indoor air quality
- Lower utility bills
- Minimizing the total cost of HVAC ownership
- Reduced energy consumption
- Reducing the number of unplanned repair calls

Study Table 2-1

Table 2-1: Top Perceived Benefits of HVAC QM

Benefit	First (highest ranked)	Second	Third	Fourth	Fifth	Total
Improved equipment reliability / reduced downtime	2	2	2	0	0	6
Reduced energy consumption	1	1	2	0	2	6
Reducing the number of unplanned repair calls	0	3	2	0	0	5
Extended unit life / delayed capital expenditure	1	0	2	1	1	5
Decreased repair costs	1	0	0	1	1	3

*** KEY: the higher the score, the higher the perceived benefit.

Study comments and conclusions:
Out of 13 perceived QM benefits, four out of five related directly to mechanical system/unit cost avoidance. The fifth related to reduced energy consumption. Note that participants ranked reduced energy consumption, another cost, as #2 in priority and they didn't rank lower utility bills in the top five, which was a very similar benefit. Study comments included that participants might have viewed reduced energy consumption as already addressing reducing utility bills.

Two forum study participants ranked "thermal comfort" in their top-five lists. This revealed that for many customers, cost avoidance ranked highest but for others in different facilities, occupant thermal comfort would rank very high.

2011 EMI Study for Southern California Edison (SCE)
This study focused on input from both contractors as well as from owner occupants & facility managers. Here are the results for owner occupants and facility managers. The study included many comments made by individual participants and is worth looking at in more detail. A "card sort" was conducted for all participants who were individually asked to prioritize the following value proposition statements associated with HVAC maintenance. Their "top priority" was to be given a score of 1, "lowest priority" given a score of 9 or 10. Scores of participants for each group were averaged. Owner-occupants scored "reduced energy consumption" the highest, average score of 2.5. Facility managers also scored "reduced energy consumption" the highest, average score of 3.4.

Customer Value Proposition Elements	Ranking - FG 2 (owner-occup)					Aver
Reduced energy consumption (lower utility bills)		6	2	1	1	2.5
Decreased/fewer repair costs		2	5	3	2	3.0
Extended unit life (delayed capital expenditure)		3	6	4	3	4.0
Improved occupant comfort/productivity		4	3	5	5	4.3
Improved equipment reliability (reduced down-time)		1	8	6	6	5.3
Improved indoor air quality		7	4	2	9	5.5
Decreased environmental impact ("green" company image)		8	1	8	8	6.3
Peace of mind (confidence in contractor and equipment health)		5	7	7	7	6.5
Improved occupant safety and reduced liability		9	9	9	4	7.8

Customer Value Proposition Elements	Ranking - FG 4 (fac mgmt)					Aver
Reduced energy consumption (lower utility bills)	4	5	2	5	1	3.4
Extended unit life (delayed capital expenditure)	3	2	5	6	2	3.6
Decreased/fewer repair costs	1	4	3	3	8	3.8
Improved occupant safety and reduced liability	5	9	-	1	3	4.5
Improved equipment reliability (reduced down-time)	2	3	4	7	7	4.6
Improved occupant comfort/productivity	10	6	7	2	5	6.0
Peace of mind (confidence in contractor and equipment health)	6	1	6	8	10	6.2
Facilities management company competitive advantage	8	10	-	3	6	6.8
Decreased environmental impact ("green" company image)	7	8	1	10	9	7.0
Improved indoor air quality	9	7	8	9	4	7.4

*** Note that this study was scored differently from the EMI study conducted for BBI. The lower the score, the higher the perceived benefit – the closer to being a #1 priority.

Following the focus group summary tables in the study for SCE, the report included many individual participant comments about each maintenance benefit statement. WG members were asked to review those to help clarify the variety and range of responses.

Study conclusions: "Both groups rated "reduced energy consumption" highest and both groups selected other cost avoidance statements, such as "decreased/fewer repair costs" and "extended unit life," in their top five out of ten choices. Interestingly, "improved air quality," a staple value in other utility maintenance programs and one of only three primary goals of Standard 180, was determined to be fairly low on both lists."

Sales Force and Service Working Group GAPS Report – Marc Pickett, Chair

Marc Pickett, Chair – three gaps were identified by this Working Group (WG).

1. Lack of awareness for potential energy savings both for more energy efficient HVAC systems and for more comprehensive (Q) maintenance
2. Contractor sales training
3. Energy savings estimation tools

Marc saw a common need or gap related to the work of this WG. The need for contractors or other service providers to show progress toward a program goal, a metric quantifying the status toward that goal. There seemed to be a large gap in little practice for showing, demonstrating the benefit of the service being delivered. Without that quantification, those metrics and a system of program evaluation becoming common in the industry, they would never achieve a method for demonstrating the value of quality maintenance practices. That need was applicable to all the perceived benefits of QM just discussed in the EMI studies for BBI and SCE.

Pepper Hunziker, Tre' Laine Associates – she noted that many of the WHPA committees and working groups had come around to the same conclusions and, like this WG, were attempting to implement solutions to fill some of those

gaps. She recalled that the Gap 1 lack of awareness for potential savings led directly into Gap 2 where this needed was recommended to become part of utility program and general contractor sales training. Gap 3 led to the development of the WHPA energy savings estimation tools clearinghouse now posted at the WHPA website. She wondered whether there was a way to take these previous efforts and findings and thread them into the proposed user guide document. She thought it would be very valuable to refer back to and highlight those earlier findings. That would help produce a history of how WHPA groups had addressed these common issues.

Bob Sundberg, WHPA staff – he asked Pepper how she thought this document fit in and how it might be included or referenced in the current effort to develop a Standard 180 User Guide? He referred to the outline of a user guide developed by the 2016 User Guide Working Group. The user guide was not intended to be a sales training manual but could address some of the underlying issues commented on in the Gaps Report. He asked Pepper how this WG might best make use of that previous information? In what sections of the proposed outline of user guide topics would that information or reference to that study best be located?

Pepper Hunziker – she didn't have a ready answer for where it might be referenced but was mostly interested to see that current WG members were aware of those previous findings which could help shape the present document.

Donald Prather, ACCA – in the previous EMI study results, he was pleased to see that energy savings, reduced energy consumption, was rated a higher priority than lowering utility billing. That choice, to him, indicated their understanding that energy pricing fluctuated over time and that their focus should be on reducing the actual amount of energy being consumed. He thought that focus fit in pretty well with Section 4 of Standard 180 where they intended to evaluate and revise the maintenance program based on metrics and important markers of progress.

Marc Pickett, Chair – he thought that all three studies emphasized how important it was to have maintenance programs with identified goals and for each goal to go further to identify metrics in order to measure and evaluate progress. The results of those metrics would constitute that customer's "value proposition" against which they could determine the overall value of this QM approach. The takeaway for him was how important it was for contractors, clients and in-house maintenance staffs to become educated on the importance of establishing meaningful metrics for their highest priority program goals. This was a large area which was under trained and methods which were under-utilized.

Michael Lawing, Honeywell E&ES, Commercial Building Products – he agreed with Marc but added that each different customer would have different goals and metrics. Discussion about goals and metrics needed to be communicated and discussed in the language which that decision-maker understood. That varied greatly depending on where they were in their organization's hierarchy. Maintenance supervisors, property managers, energy managers, asset managers, CEOs, CFOs or their equivalent, all operated with different vocabularies. It was critical that discussions about goals and establishing those meaningful metrics needed to be conducted in the specialized language of the area of responsibility they had, at a level where they operated. Energy savings might save money but it might also help make their customers or tenants more comfortable and happy. The user guide needed to explain the, sometimes multiple, benefits from a single goal.

Marc Pickett – restated Michael's remarks, the user guided needed to speak the language of more than just one type of end user. A CFO vs. a facility manager or maintenance supervisor. Acknowledge that the user guide needed to address the more complex chain of decision-makers and market segments and languages in which those parties operated.

Jan Peterson, Chair – commented that she'd spoken with many energy auditors. They'd commented that it was difficult to convince owners to even conduct audits and monitoring which was needed to provide the evidence of value. Many didn't want to even spend the money to explore ways of achieving savings. This would be even tougher for maintenance providers to gather evidence for the value of the services they delivered.

Todd Van Osdol, CLEAResult – he identified the difference between short/near term benefits vs. longer term cost reduction benefits. Cutting down on energy consumption could be tracked short term. But, it took a greater commitment to establish goals for longer term benefits like extending equipment life to reduce future capital expenditures. A lot of this depended on each customer's building and system use timeframe. In his experience, most of the greater benefits from better commercial maintenance were from seeking longer term ones. The user guide needed to point out this difference between some longer term greater potential benefits and some shorter-term ones for the client to consider. There were different combinations of value proposition elements to consider and prioritize depending on a given customer's timeline for wanting to realize those benefits. There were some good long-term studies on longer term benefits of maintenance by LaSalle which highlighted higher returns for net present value of assets.

Jones Lang Lasalle – Determining the Economic Value of Preventive Maintenance
http://www.waspbarcode.com/buzz/preventative-maintenance-fixed-assets/
http://pmmi.files.cms-plus.com/MS/certified/newsletters/PreventiveMaintenance.pdf

Additional resources found from Google search of "HVAC preventive maintenance value"
https://energy.gov/eere/femp/downloads/operations-and-maintenance-best-practices-guide
http://www2.emersonprocess.com/siteadmincenter/PM%20Central%20Web%20Documents/plantweb-ops-maint.pdf
https://www.reliability.com/industry/articles/article37.pdf
http://c.ymcdn.com/sites/www.rfmaonline.com/resource/resmgr/facilitator_searchable_pdfs/roipreventativejan14.pdf
http://www.facilitiesnet.com/maintenanceoperations/article/Thinking-Like-a-CFO-Prevention-Pays-Analysis-Shows-Facilities-Management-Maintenance-Operations-Feature--1505

Michael Lawing, Honeywell – he described examples for how every dollar of energy savings could increase the "cap rate" or value of the property by some significant amount. Those would-be terms which a facility manager could relate to. The language and context for benefits discussed needed to be oriented to the perspective of that decision-maker. The maintenance supervisor could care less about increasing facility value and was more concerned with the immediate costs for delivering maintenance. Choice of benefits to explore and the context within which a benefit was discussed would make all the difference in whether that decision-maker might value that benefit.

Donald Prather, ACCA – that was exactly the point he'd tried to make earlier in their meeting. In talking to a CEO about Btu's, he said he might have just as well have been shouting in Chinese. The CEO couldn't relate to that term or potential benefit until it was translated into terms he understood and valued. He needed to show the CEO bills with different charges for the same rate of energy consumption, translate the consumption into dollars of cost for it to make sense. Even then, the CEO needed to have the info confirm with his own people. That energy unit costs had gone up.

Bob Sundberg, WHPA staff – somewhere in sections 3 or 4 of the user guide, it seemed to him that some members would need to develop some of those examples to demonstrate for readers that benefits/goals needed to be discussed in terms which THAT decision-maker understood and valued. Not everyone would adopt the same goals. And for the same general goals, they might develop different metrics for tracking how that goal was doing over time to evaluate progress or achievement. Also, that some goals were short-term while others required a longer-term commitment to realize a benefit, like extended equipment life to reduce capital expenditures. Members were going to need to step up and volunteer to help pen those sections.

Michael Lawing, Honeywell – he reminded the group of the market segment matrix which Pepper Hunziker had helped develop for the 2016 User Guide WG. It contained much of the content which would be valuable in authoring this user guide. This group didn't need to re-invent all the information captured in that matrix.

Pepper Hunziker, Tre' Laine Associates – she suggested the user guide make historical references to the various relevant WHPA work products that had already been produced and were foundational to the development of the user guide. Possibly provide links to the WHPA site where they were posted in list them in an appendix at the end of the

work product. The group might also consider providing a footnote in the user guide whenever a section leveraged the section of an earlier work.

Bob Sundberg, WHPA staff – he agreed that adding those references to previous works would certainly be informative for those coming cold to this user guide or for new WG members to realize the work that had previously led to the current work. The challenge was that WG members would need to step up and volunteer to provide that user guide detailed editing for it to happen. He invited Pepper to help compile a chronology of previous CQM WG work products which formed the foundation for the current work.

Pepper Hunziker, Tre' Laine Associates – agreed to assist.

Marc Pickett, Chair – also agreed to the effort to link previous work. He knew that at some point in the future, the work of this WG and the parallel one Jan was leading would have to be merged.

Goals and Metrics Lists – Marc Pickett, Chair and Bob Sundberg, staff

Bob Sundberg, WHPA staff – he'd compiled a draft document listing maintenance program goals and separate lists for goal metrics from the EMI studies and other sources such as the KPI documents Rick Danks had located and presentations he'd made. Bob noted that in previous meeting discussions, there seemed to be a mixing of HVAC system performance metrics/measurements with those of the overall maintenance program. He cautioned the group to be very careful to state clearly when they were addressing goals and metrics for the overall maintenance program and not include unit/system performance measurements or indicators.

The following draft list was shared online with attendees and distributed to all WG members.

Standard 180 User Guide – Maintenance Program Goal Metrics List

Caution – do NOT confuse maintenance program "performance" goals/metrics with HVAC system/unit "performance" goals/metrics

Maintenance Program Goals (primary sought benefits) - ** = top 5 goals/benefits

- Decreased environmental impact / "green company image"
- Decreased repair costs **
- Extended unit life / delayed capital expenditure **
- Improved employee productivity
- Improved equipment reliability / reduced downtime **
- Improved occupant safety / reduced liability
- Improved "customer" environment
- Improved thermal comfort (STD 180)
- Increased indoor air quality (STD 180)
- Improved energy efficiency (STD 180)
- Minimizing the total cost of HVAC ownership
- Lower utility bills (overall, electric, gas, water etc.)
- Reduced energy consumption **
- Reducing the number of unplanned repair calls **

Top Maintenance Program Benefits (Goals) Sought – EMI/SCE Focus Group Study (2011)

- Improved equipment reliability / reduced downtime
- Reduced energy consumption
- Reducing the number of unplanned repair calls
- Extended unit life / delayed capital expenditure
- Decreased repair costs

Maintenance Program Goal Metrics (benchmarking progress)

- Service calls per month (seasonalized)
- Response time from phone call to tech arrival
- Number of repeat calls for similar issues without service company management involvement
- AC down time (count/number of times/yr. or total hours downtime?)
- HVAC system related costs
  - Maintenance contract costs
  - Service/repair costs
  - Replacement/capital expenditure costs
  - HVAC related energy costs
  - System upgrade/improvement costs
- Repair costs (perhaps per season, or perhaps per year)
- Number of serious repairs/yr. (> $$XXX.00) (similar to: frequency of unscheduled repairs/serious ones)
- Occupant complaints
  - Temperature complaints – might establish an acceptable temperature range/window for a given space and monitor actual readings over time
  - After hours calls received by property management staff attributable to AC
- HVAC related energy costs
  - Review/compare energy usage/costs over time for previous years to current, raw and normalized for seasonal/weather variation
  - Consider goals for energy consumption (kWh), demand charges (kW) or both

Service Provider/Staff Goal Metrics (monitoring and measuring)

- Response time from phone call to tech arrival
- AC down time (count/number of times/yr. or total hours downtime?)

Maintenance Plan Technical Goal Metrics (monitoring and measuring)

- Condensate overflows from ceiling
- Air pressure drop across air filter bank
- Measured approach for any sort of heat exchanger
- Temperature alarms (typically from server rooms, etc.)
- Test results of various kinds (oil sample spectra-analysis, for instance, or air readings in a surgery room)
- Leaving air or leaving water temperatures during peak load and/or weather conditions

Measurement, Data Collection and Report Making – Marc Pickett, Chair

Not addressed.

Closing Comments/Adjournment

Bob Sundberg, WHPA staff – he indicated that there was a total of 9 meetings resourced for this WG July through December so this group could hold 3 to 5 additional meetings to complete their work product for 2017.

Marc Pickett, Chair – he wanted to circle back and confer with Jan Peterson as well as work on revising the initial draft of the work product before the group met next.

The next two meetings were scheduled for Tuesday October 10 and 24 at 10 am PT.

The meeting was adjourned at 11:08 am PDT.

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Action Items and Key Decisions

No new action items.