Commissioning: Global & Local Development, GBI CxS Submission Compliance & BAS Impact

13th to 15th Apr 2016
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Paper 7: Capability & Capacity of Prevailing CxS Expertise & Supporting Industries

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Capability & Capacity of Prevailing CxS Expertise

• 12 active CxS out of 23 registered with GBI
• How many are knowledgeable in the DESIGN, CONSTRUCTION, and OPERATION of systems to be ultimately commissioned?
• Individually? As a Team?
• How many CxS are still in the mould of TAB service providers?
• How many are still willing to be engaged only for part services?
New Incentive Schemes

1. GITA (PROJECTS) for GBI buildings
   [Green Investment Tax Allowance]

2. GITE (SERVICES) for GBIF & CxS companies
   [Green Income Tax Exemption]

EFFECTIVE 25/10/13 - 31/12/20
Income tax exemption of 100% of statutory income from the year of assessment 2013 until the year of assessment 2020.

The company must comply with the conditions stated in the approval letter.
For a company which undertake green technology services activities, the company must meet the criteria of green services as follows:

a) At least one competent / qualified personnel in green technology;

b) Must have a green policy related to environmental/sustainability; and

c) 100% income must be derived from green technology services
Eligibility Criteria cont’d

Note:

- Competent person is defined as holding a certificate of competency as a service provider in the related field of green technology

- Green Policy is a statement about the commitment to sustainability and environment management by the company
Qualifying Activities

Green Building
Services related to testing and commissioning of green building equipment and system, and services related to green building design and consultancy services
Income Tax Exemption

Qualifying Date

However ......

Eligible companies must be registered or operationalized after 25th October 2013!!
COMPETENCY EXAM FOR COMMISSIONING SPECIALIST

GET READY!
Capability & Capacity of Prevailing CxS Expertise

- Hands-on experience is absolutely necessary, and NOT collection of certificates (for attending overseas seminars or even registration with 'related' bodies)
- Experience is gained from learning from mistakes and not to repeat the same
- Design knowledge is a MUST and is the 1st prerequisite to becoming a good CxS Energy, Electrics, Controls, Thermodynamics, etc....
  ....... HVAC will encompass all these
- Construction aka Installation knowledge is the 2nd prerequisite
- The 3rd prerequisite is Operation knowledge which covers trouble shooting, improvement and enhancement

EXPERIENCE EXPERIENCE EXPERIENCE EXPERIENCE!!!
GBI criteria directly related to CxS

Since 2009 ....

- EE6 - ENHANCED COMMISSIONING OF BUILDING ENERGY SYSTEMS
- EE7 - POST OCCUPANCY COMMISSIONING
- EE8 - VERIFICATION
- EE9 - SUSTAINABLE MAINTENANCE
EE6 - ENHANCED COMMISSIONING

• Ensure building’s energy related systems are designed and installed to achieve proper commissioning so as to realise their full potential and intent.

• Appoint an independent GBI recognised CxS at the onset of the design process to verify that comprehensive pre-commissioning and commissioning is performed for all the building’s energy related systems in accordance with ASHRAE Commissioning Guideline or other GBI approved equivalent standard/s by:
EE6 - ENHANCED COMMISSIONING

1. Conducting at least one commissioning design review during the detail design stage and back-check the review comments during the tender documentation stage.
2. Developing and incorporating commissioning requirements into the tender documents.
3. Developing and implementing a commissioning plan.
4. Verifying the installation and performance of the systems to be commissioned.
5. Reviewing contractor submittals applicable to systems being commissioned for compliance.
6. Developing a systems manual that provides future operating staff the information needed to understand and optimally operate the commissioned systems.
7. Verifying that the requirements for training operating personnel and building occupants are completed.
EE6 - What to submit at DA?

**DA submittal requirements:**
1. Form EE6 must be signed by the appointed CxS
2. Letter of CxS appointment from the owner to be submitted

**Some common problems:**
1. EE6 will not be awarded points if CxS is not already on board when submitting DA ... and will also not be awarded at CVA stage even if CxS is appointed by then. This is because the appointed CxS should have already commenced his work by the time the project is ready for DA submission
2. It is not acceptable for a CxS to be appointed to perform only part of the scope as required by GBI
3. CxS ought to be appointed directly by the owner as he represents the owner's interest. Other methods of CxS appointment must demonstrate his independence to fulfil his scope
EE6 - What to submit at DA?

**Some common problems:**
4. There was one past case relating to misuse of an unappointed CxS's signature!
   Take note that fraud committed by a regulated professional is a very serious offence which can lead to deregistration!

**In line with GITE:**
1. CxS can only operate through his registered CxS firm as per the GBI register
2. Active CxS will be 'greened'
3. CxS who is active but his performance is not satisfactory to GBI will be 'degreed' temporarily
EE6 - What to submit at CVA?

Reference Guide: CVA submittal requirements:

1. Documentary evidence that the full scope of CxS works have been carried out during the contract admin phase (Reports relating to design review viz maintainability etc, and Minutes of Meetings; Inputs in Tender Documents & Technical Specs; Report on review of submittals)
2. The final Cx report including recommendations to owner regarding performance of the commissioned building energy related systems
3. A copy of the systems manual
4. Documented evidence of training of building management staff
GBI Conditions

GBI’s Rule on conflict of interests

- Appointment of GBIF and GBI CxS for the same project:
  i) GBIF and PSP/SP can be from the same organisation but must be different individuals.
  ii) CxS and PSP/SP cannot be from the same organisation.
  iii) GBIF and CxS can be from the same organisation but must be different individuals.

Can the owner appoint his own experienced staff as the CxS?
Yes, provided the said staff is a registered GBI CxS
EE7 – POST COMMISSIONING

Carry out post occupancy commissioning for all tenancy areas after fit-out changes are completed:

1. Design engineer shall review all tenancy fit-out plans to ensure original design intent is not compromised and upon completion of the fit-out works, verify and fine-tune the installations to suit (1 point)

2. Within 12 months of practical completion (or earlier if there is at least 50% occupancy), the CxS shall carry out a full post/re-commissioning of the building’s energy related systems to verify that their performance is sustained in conjunction with the completed tenancy fit-outs (1 point)
EE8 – EE VERIFICATION

Verify predicted energy use of key building services:

1. Use Energy Management System to monitor and analyse energy consumption including reading of sub-meters, **AND**
2. Fully commission EMS including Maximum Demand Limiting program within 12 months of practical completion (or earlier if there is at least 50% occupancy).

(Note that this Criteria can only score either 0 or 2 points)
**EE8 - What to submit at DA?**

**DA submittal requirements:**

1. Form EE8 must be signed by the appointed CxS.

Can the owner appoint a non CxS to carry out the EE verification including commissioning the EMS and MDL programming?

2. If CxS is not appointed, no points will be awarded at DA stage.
   Points will be awarded at CVA stage when the performance of this criteria are demonstrated.

3. For projects where EMS is not mandatory (<4,000m² ac area); points will be awarded with provision of adequate manually read sub-meters daily in conjunction with establishment of an Energy Management team.
EE8 - What to submit at CVA?

Reference Guide: CVA submittal requirements:

1. Actual verified BEI achieved, Renewable Energy generated and Water consumption for the completed building
2. Where EMS is installed, comprehensive printouts of EMS results including MDL program setting
3. Operation of MDL program must also be demonstrated

 .......... interim acceptance ..........

Note that MDL programming is dynamic and will need to be reprogrammed to suit the load profile of the building due to occupancy/usage changes
EE9 – SUSTAINABLE MAINTENANCE

Ensure the building’s energy related systems will continue to perform as intended beyond the 12 months Defects & Liability Period:

1. At least 50% of permanent building maintenance team to be on-board one (1) to three (3) months before practical completion and to fully participate (to be specified in contract conditions) in the Testing & Commissioning of all building energy services (1 point).

2. Provide for a designated building maintenance office that is fully equipped with facilities (including tools and instrumentation) and inventory storage AND

3. Provide evidence of documented plan for at least 3-year facility maintenance and preventive maintenance budget (inclusive of staffing and outsourced contracts) (2 points).
EE9 - What to submit at DA?

DA submittal requirements:

1. Identify building maintenance room and facilities in the design floor plan

2. Commitment to engage at least 50% of permanent building maintenance team before practical completion with org chart and staff positions identified

3. Provide 3-year facility maintenance budget inclusive of staffing and outsourced contracts
EE9 - What to submit at DA?

Some common defaults:

1. Maintenance room too small or located without access or mixed up with storage rooms

2. Organisation chart too light and without outsourced maintenance to justify

3. Missing or not realistic maintenance budget e.g. generic budget not tallying with systems installed
EE9 - What to submit at CVA?

Reference Guide: CVA submittal requirements:

1. Documentary evidence of engaging 50% maintenance team one to three months before practical completion who are involved in the full testing & commissioning of the building energy related systems (submit attendance lists together with minutes of training etc).
2. Comprehensive list of maintenance tools and instrumentation, and inventory storage items.
3. Evidence of documented plan for at least 3-year facility maintenance and preventive maintenance budget (inclusive of staffing and outsourced contracts).
EE9 - What to submit at CVA?

Some common defaults:

1. Committed maintenance staff not on board during CVA inspection, or inadequate staffing including outsourced staffing

2. Maintenance room doubling up as storage room and other use

3. Generic and/or unrealistic maintenance budget not relevant to the systems installed
Capability & Capacity of Supporting Industries

- Who are the supporting (and complementary) industries to the CxS?
- All the specialist trade contractors involved in energy related installations ..... 
- HVAC, Electrical, Hydraulics, Fire
- PV and RE, RWH, Water Recycling
- Facade glazing

- **BAS**
Some Common Deficiencies of these Supporting Industries
AHU Configurations
AHU Room with Optimal Acoustical (& EE) Features
Location of thermostat
Design & Installation problem?
Pre-Comm, Design & Installation problem
Variable Refrigerant System

High external static pressure fan

Total Solution?

78.4 Pa E.S.P.
Active Façade
Securities Commission Bldg, Malaysia
1999
Sky Radiant Temperature
10 – 20 °C at night
~ 25 °C
~ 95% RH

Radiation
Convection
Evaporation

~ 30 °C
PV Roof

~ 25 °C
Chiller

Pump

Chiller Condenser (heat rejection)
Open Space Application - open at 1 end?
Low ceiling height application?
Closed Space Application?
Hybrid Ventilation or Decoupled Cooling?
Green Roof Feature 4: Roof Light Trough

- Roof Light Trough
- View of Roof Light Trough from dome access panel platform
- Indirect daylight drawn into the Roof Light Trough to the space below
- Lounge area on Level 7 below the Roof Light Trough
Day-Lighting- Atrium

Atrium blind
(maximise use of daylighting)
Day-Lighting Office

- Mirror light shelf
- Fixed blinds for glare control
- Daylight reflected onto ceiling
**Façade Daylight Design**

The building is 50% daylit. The façade daylighting system consists of a mirror lightshelf and a white painted window sill. Both deflect daylight onto the white ceiling for improved daylight distribution until 5 meters from the façade + 2 additional meters of corridor space. Fixed white louvres with top surface mirror finish on the top side are mounted with a 30° tilt angle above the lightshelf for glare protection while still allowing daylight to be deflected onto the ceiling. To increase daylight throw into the rooms, the suspended ceiling was omitted giving a floor to ceiling height of 3.7 m.
Slab Cooling

About 40% of cooling delivered by floor slab cooling.

Increase thermal comfort and energy efficiency

Reduces peak-load

Address thermal bridge
Rainwater Harvesting

Rainwater for toilet flushing & irrigation

Rainwater Storage Capacity: 2400 gal

Water Saved: 35.2%

Water Saved: 818 m³/year
Reverse Stack Effect

When it is hot outside, a downward flow of air can occur in airconditioned buildings.
LEO BUILDING
Normal Stack Effect?
SEB Kuching
Reverse Stack Effect?
Is there HOPE?

• 1st Class Design ... pay for it and you will get it
• Got Class Installation ... engage main contractor with M&E site team and proper trade contractors AND engage full complement of resident site supervisory staff
• Best in class commissioning ..... engage experienced and well staff trade contractors ... or short cut .... engage CxS team at the onset .... (retro commissioning will cost more!)
• Sustainable maintenance ...... follow GBI requirements and ... engage CxS team at the onset

Note that COWs (renamed IOWs) will be compulsory (and be accountable) soon [1/72016]
Face the reality if we desire to get it right?

- M&E trade contractors used to provide comprehensive staffing team ranging from site engineers, supervisors, in-house TAB and T&C team, to in-house maintenance team.
- Today, ‘ALL’ M&E trade contractors have become merely Management Contractors with minimum site supervisors and out-source (inevitably to the cheapest) TAB, T&C and maintenance responsibilities.
- Today consultants are paid ‘cut-throat’ professional fees and many have degenerated into cut-n-paste designers.
How much is CxS cost to a project?

THE END RESULT TODAY .... AND REALITY HURTS

The industry have helped the owners to save and save .... to then short change these owners in the process.

We ought to have hope .... since many owners are willing to pay much much more for Project Management Team to enhance their projects

AND STOP POSTPONING THE PROBLEM BY EXTENDING THE DLP TO 18, 24 ... HECK EVEN 60 MONTHS!!!!!
The next slide depicts a typical existing installation. If you can identify the energy inefficiency problem associated with this installation and is able to offer the appropriate solution, then you ought to be able to pass the forthcoming CxS COMPETENCY EXAMINATION.
Sample exam question for CxS - Possible EE improvement?
THANK YOU