COMMON MISTAKES IN INNOVATION
26TH September 2018

By: Ir. Ng Yong Kong
IN1: INNOVATION

INTENT
To provide opportunity for the project to be awarded points for exceptional performance above the requirements set by GBI rating system.

DESCRIPTION
Reward innovation and initiatives.

REQUIREMENTS
Encourage project team to score points for exceptional performance above the requirements set by GBI rating system:

1 point for each approved innovation and environmental design initiative up to a maximum of 9 points, for innovative ideas such as, but not limited to:
• Use of Industrialized Building System (IBS) for the retrofit component (minimum CIDB IBS score of 30);
• Condensate water recovery (accounting for at least 50% of total AHUs/FCUs) for use as cooling tower make-up water or other suitable application;
• Co-generation / Tri-generation system;
• Thermal / PCM / Thermal Mass storage system (accounting for at least 25% of total required cooling capacity);
• Solar thermal technology / Solar Air conditioners (generating at least 10% of total required cooling capacity);
• Heat recovery system (contributing to at least 10% of total required capacity);
• Heat pipe technology (contributing to at least 50% of relevant applications);
• Light pipes (generating at least 1% of the total lighting capacity);
• Auto-condenser tube cleaning system (fitted to plant equipment serving at least 50% of total capacity);
• Non-chemical water treatment system (serving at least 50% of total capacity);
• Air and dirt separator system for chilled water system
• Vacuum degasser cleaning system for chilled water piping system
• Dynamic balancing control valve system (for entire chilled water system)
• Mixed mode / low energy ventilation system;
• Advanced air filtration technology (serving at least 50% of the GFA);
• Waterless urinals (fitted to at least 75% male toilets);
• Central vacuum system (serving at least 50% of NLA);
• Central Pneumatic Waste Collection system (serving at least 50% of NLA);
• Self-cleaning façade (for at least 10% of facade);
• Electrochromic glazed façade (for at least 10% of facade);
• Refrigerant leakage detection and recycling facilities (for at least 90% of HVAC plant);
• Car park mechanical ventilation fans provided with VSD and controlled by CO2/CO sensors;
• Recycling of all fire systems (sprinkler and wet riser) water during regular testing;

Project team may submit any innovation not listed above to GBI for consideration and approval of credit point.
## Approved List of Innovations (10 July 2014)

<table>
<thead>
<tr>
<th>Innovation in Design &amp; Environmental Design Initiatives</th>
<th>Qualification Details</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance Air Filtration</td>
<td>Serve at least 50% of NLA.</td>
<td>✓</td>
</tr>
<tr>
<td>Air &amp; Dirt Separator System for Chilled Water System</td>
<td>Provide for 100% of chilled water system.</td>
<td>✓</td>
</tr>
<tr>
<td>Auto Condenser Tube Cleaning System</td>
<td>Provide for 100% of chilled water system (water-cooled chillers)</td>
<td>✓</td>
</tr>
<tr>
<td>Bioswales</td>
<td>Provide for at least 25% of building perimeter.</td>
<td>✓</td>
</tr>
<tr>
<td>Central Conveyance System (waste or material handling)</td>
<td>Serve at least 50% of NLA for NR and 100% of all residential units</td>
<td>✓</td>
</tr>
<tr>
<td>Central Vacuum System</td>
<td>Serve at least 50% of NLA.</td>
<td>✓</td>
</tr>
<tr>
<td>Charging Station for Hybrid or Electric Car</td>
<td>5% of the total parking spaces provided, up to a maximum of 20 nos.</td>
<td>✓</td>
</tr>
<tr>
<td>Cold Aisle Containment System</td>
<td>Provide for entire Data Centre air-conditioning system (applicable to Data Centre building only)</td>
<td>✓</td>
</tr>
<tr>
<td>Co-generation / Tri-generation</td>
<td>Serve at least 90% of the building's cooling capacity.</td>
<td>✓</td>
</tr>
<tr>
<td>Condensate Water Recovery</td>
<td>Account for at least 50% of installed AHU/FCUs.</td>
<td>✓</td>
</tr>
<tr>
<td>CUI ( \leq 0.5 \text{ m}^3/\text{m}^2 )</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Dessicant Heat Recovery Wheel</td>
<td>Account for at least 50% of total building exhaust air system</td>
<td>✓</td>
</tr>
<tr>
<td>Dynamic Balancing Control Valve System for chilled water piping system</td>
<td>Provide for 100% of chilled water system.</td>
<td>✓</td>
</tr>
<tr>
<td>Electrochromic Glazed Façade</td>
<td>Provide only 5-Star Energy Efficient Appliances approved by KeTTHA (ST), e.g. Air-Conditioning, Refrigerator, Fan, Television etc</td>
<td>✓</td>
</tr>
<tr>
<td>Energy Efficient Appliances</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>External Shading Devices</td>
<td>Provide for at least 50% of glazed façade.</td>
<td>✓</td>
</tr>
<tr>
<td>Fire System Water Recycling during regular testing</td>
<td>Provide for all Sprinkler and Wet Riser systems.</td>
<td>✓</td>
</tr>
<tr>
<td>Fire Pipe Technology</td>
<td>Not applicable to Hose Reel system.</td>
<td>✓</td>
</tr>
<tr>
<td>Heat Pipe Technology</td>
<td>Provide for at least 75% of PAHUs for purpose of RH control/improvement.</td>
<td>✓</td>
</tr>
</tbody>
</table>
INTENT
Provide the design team by providing the opportunity to be awarded points for exceptional performance above the requirements set by GBI rating system.

DESCRIPTION
Reward innovation and initiatives.

REQUIREMENTS
Encourage the design team by providing the opportunity to score points for exceptional performance above the requirements set by GBI rating system:

Project teams may submit any innovation items not listed below to GBI for consideration and approval. Innovation items shall be reviewed based on the impact they have on sustainable design and construction.

1 point for each approved innovation and environmental design initiative up to a maximum of 7 points, such as, but not limited to:
IN1: INNOVATION IN DESIGN AND ENVIRONMENTAL DESIGN INITIATIVES (7 POINTS)

- Bioswale (25% of the building perimeter)
- Central Vacuum System (50% of NFA)
- Central Pneumatic Waste Collection System
- Charging Station for Hybrid or Electric Car (5% of the total parking spaces provided, up to a maximum of 20 nos)
- Concrete Usage Index (CUI) \(\leq 0.5 \text{ m}^3/\text{m}^2\)
- External Shading Devices (50% of glazed façade)
- Herb and/or Food Garden (Landed-25% of landscaped area. Low-rise and High-rise-10% of landscaped area or 20m2 whichever is the larger)
- LED Façade Lighting (only where mandated by Local Authority)
- Light Pipes (1% of NLA)
- Substantial usage of Green Label Product
- Sustainable Construction Practice (with substantial environmental impact)
• Performance ‘over and above’ any of the Tool’s stated criteria (awarded on a case-by-case basis)
• Promote Biodiversity (with substantial environmental impact)
• Provide only 5-Star Energy Efficient Appliances approved by KeTTHA, e.g. Air-Conditioner, Refrigerator, Fan, Television etc.
• Real time energy and water usage display and educational facilities
• Recycling Fire System Water (Sprinkler and Wet Riser systems, where applicable) during regular testing
• Regenerative Lift (50% of installed lifts)
• Self-cleaning Façade (90% of façade area)
• Solar Hot Water System (composition to meet Shower requirement for all Bathrooms)
• Turbine Ventilator (all roofs) • Vertical Green Wall (10% of the façade area)
• Wind Chimney
INTENT
Provide the design team and project the opportunity to be awarded points for exceptional performance above the requirements set by GBI rating system.

DESCRIPTION
Reward innovation and initiatives.

REQUIREMENTS
Encourage the design team by providing the opportunity to score points for exceptional performance above the requirements set by GBI rating system. Project team may submit any innovation items not listed below to GBI for consideration and approval. Innovation items shall be reviewed based on the impact they have on sustainable design and construction.

1 Point for each approved innovation and environmental design initiative up to maximum of 9 Points, such as, but not limited to:
• Night watchman software installed for auto lights off and appliances
• Sweeper for power off
• Special materials usage
• Zoning and deployment of special working environment – like activity based settings etc.
• Any energy reduction design elements like screening / space planning that minimises heat gain within the office environment
• Psycho-escapism - use of color / green elements / art works/ murals/ paintings etc.
• Harvesting light via design; vertical atriums
• Rainwater harvesting
• Water recycling
• Metering & leak detection system
• 90% of the occupants seated with a view parallel to the outdoor
GBI M&E Green Cost Items

Common MISTAKES IN INNOVATIONS

GENERAL REMARKS:

1.) If going green results in 'cheaper' costs, then the green agenda is achieved.

2.) Do not adopt technology of insignificant advantage for application in Malaysia but yet costly.

3.) Do not offer the excuse “it is a GBI requirement”: eg. when redundant meters or sensors are installed.
- Recycling Fire Fighting Water System (Wet Sprinkler and Wet Riser systems, where applicable) during regular testing. Not applicable for Hose Reel System.

Probably one of the more economical and innovative design.
RECYCLING OF FIRE SYSTEM WATER DURING TESTING

Recycle water used during regular testing
- Sprinkler system
- Wet riser system

Innovations in Green Buildings
Alarm Gong
Recycling Fire System Water (Sprinkler and Wet Riser systems, where applicable) during regular testing

MISTAKES:

DA Submission:
1.) Submission for Wet Riser System only.

CVA Stage:
1.) Piping not connected.
2.) Piping connected wrongly.
3.) Recycling with only 20mm dia flow switch test pipes- this is encouraged but is not the important pipe.

NB: Piping to be recycled should be 65 mm dia. with the flowrate meter when testing the sprinkler pump and alarm gong.
Recycling with additional 65mm dia. pipe connecting discharge from pumps before the flowrate meter.
IN1: Herb and/or Food Garden (Landed-25% of landscaped area. Low-rise and High-rise-10% of landscaped area or 20m2 whichever is the larger)

MISTAKES :

DA — i.) NOT MEETING THE PERCENTAGE OR AREA REQUIRED.
       ii.) FAILED TO PROVIDE A LIST OF HERBS, FRUITS OR VEGETABLES PLANTS.

CVA — i.) NOTHING WAS PLANTED.
       ii.) GRASS PLANTED.
       iii.) NOT MEETING THE %age OR AREA.
• Charging Station for Hybrid or Electric Car (5% of the total parking spaces provided, up to a maximum of 20 nos)

PROVIDE 40A TPN ISOLATOR (Electric Socket Outlets)
• Charging Station for Hybrid or Electric Car (5% of the total parking spaces provided, up to a maximum of 20 nos)

MISTAKE: DA – SUBMITTED
CVA – i.) NOT PROVIDED
ii.) NOT ENOUGH TO MEET THE CRITERIA
• The minimum Electric Vehicle Charging station to be provided is one.

However ALL Green Vehicle Parking bay should be provided with at least junction boxes or power supply from DB.
RNC IN1: INNOVATION USING HIGH VOLUME LOW SPEED FANS
RNC IN1: INNOVATION USING HIGH VOLUME LOW SPEED FANS

• OPEN PUBLIC FUNCTION AREA
• CHILDREN PLAYGROUND
• OPEN TADIKA
• OUTDOOR GYM – YOGA/AEROBICS
LOCATION OF HIGH LOW SPEED FANS
The power generated by lifts traction machines are dissipated as heat. Regenerative Converter transmits the power back to the electrical distribution system.

**Normal mode**
- heavy load up
- light load down

**Regenerative mode**
- heavy load down
- light load up
IN1: Regenerative Lift (50% of installed lifts)

MISTAKES:
DA SUBMISSION:
1.) OUT OF 10 LIFTS, ONLY 2 LIFTS ARE REGENERATIVE TYPE WHILE 8 OTHERS ARE NOT – NOT MEETING THE CRITERIA.
2.) INSTALLED FOR 8 STOREYS AND BELOW.
3.) No lifts installation details (such as lift schematic diagram) to show total no. of lifts provided and no. of floors served.

NB:
1.) Regenerative lifts are eligible for innovation point for applications with more than 5 stops and lift speed above 1 m/s; and at least 50% of the lifts must be of regenerative type.
2.) Regeneration is most cost effective for heights exceeding 80m at 2.5 m/s and above.
3.) Effective for 20 storey and above buildings.
Waterless Urinals
(fitted to at least 75% male toilets)

MISTAKE:
DA & CVA STAGE:
INSTALLED FEW UNITS - NOT MEETING THE REQUIREMENT.
Eg. Installed 2 out of 10 urinals.
Innovations in Green Buildings

AIR CONDITIONING CONDENSATE WATER RECOVERY

Condensate
Water Tank @
Basement 1

To Cooling
Tower

insulated uPVC pipe

Pump
IN1: Condensate water recovery (accounting for at least 50% of total AHUs/FCUs) for use as cooling tower make-up water or other suitable application;

NRNC : MISTAKES

- CALCULATIONS DONE WRONGLY RESULTING IN NO USAGE OF POTABLE WATER FOR LANDSCAPE IRRIGATION & COOLING TOWER MAKE-UP WATER.
• Real time energy and water usage display and educational facilities
DYNAMIC EDUCATIONAL GREEN DISPLAY

Serves to encourage and create awareness of going green and to educate the public on the importance of Green Building.

MISTAKE: 1.) NOT DYNAMIC
2.) Show once a month
Water Metering & leak detection system

WE5 : NRNC ( 2 points )

i.) 1st Point – No major issue.

ii.) 2nd Point – BIG PROBLEM

- RNC : Innovation for large water usage that had significant impact.
MISTAKES:

WE5

DA SUBMISSION:
1.) No installation details to show usage covered and no. of water meters used.
2.) Too many meters used.
3.) Using “high end” meters

CVA: 2nd Point – cannot interface with BMS m3 or m3/Hr. ???

What was the problem?
MISTAKES:

WE5 : CVA MISTAKES

1.) Plumber bought and installed the Mechanical or Pulse or Digital Water meter that cannot interface with BMS for 2\textsuperscript{nd} point.

WHY? – Not Specified.

2.) System Integrator do not provide Pulse Card or Controller.
Third party High Level interfacing

Modbus_RTU Interface

High Level Interfacing

*Building Automation system
*Utilities Metering System
*Energy management System
System Diagram

AMR – Automatic Meter Reader

[System Diagram with digital water meters, AMR units, and a computer connected through Modbus RS485 and Ethernet Converter]
NREB IN: CAR PARK MECHANICAL VENTILATION FANS PROVIDED WITH VSDs AND CONTROLLED BY CO/CO2 SENSORS

MISTAKES:

1.) SENSORS INSTALLED WRONGLY
2.) TOO FEW OR TOO MANY SENSORS
3.) SENSORS NOT ABLE TO COMMUNICATE WITH BMS AND VSDs
Typical Floor

10 meters per floor
20 storey Building;
Total no. of meters = 200 meters
Digital Water Meter Floor

One Digital Water Meter per floor
Office Building (20 floors)

One meter per floor
Total: 20 meters
RNC:

- Provide only 5-Star Energy Efficient Appliances approved by KeTTHA, e.g. Air-Conditioner, Refrigerator, Fan, Television etc.
MISTAKES: DA

- Provision of 5-star appliances - Fans only.

MAJOR POWER USAGE EQUIPMENT LIKE AIR CONDITIONING AND REFRIGERATOR, TV...
Limitation for 5 Star Air Cond.

Limited to 2.5 hp and below
Wall Mount Only?
NRNC/RNC : DA

• Provision of Bicycle Racks

MISTAKES :

i.) No Bicycle Tracks
ii.) No Shower Facilities
INTENT

• Use environmentally-friendly Refrigerants and Clean Agents exceeding Malaysia’s commitment to the Montreal & Kyoto protocols

REQUIREMENTS

• Use zero Ozone Depleting Potential (ODP) products: non-CFC and non-HCFC refrigerants/clean agents; (1 point)
• Use non-synthetic (natural) refrigerants/clean agents with zero ODP and negligible Global Warming Potential. (1 point)

Total = 2 Points
# REFRIGERANT TYPES

<table>
<thead>
<tr>
<th>CFC</th>
<th>HCFC</th>
<th>HFC</th>
<th>HFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>• R-11</td>
<td>• R-22</td>
<td>• R-134a</td>
<td>HFO1234fy</td>
</tr>
<tr>
<td>• R-12</td>
<td>• R-123</td>
<td>• R-404A</td>
<td>HFO1233zd(E)</td>
</tr>
<tr>
<td>• R-13</td>
<td>• R-401A</td>
<td>• R-407C</td>
<td>HFO 514a</td>
</tr>
<tr>
<td>• R-500</td>
<td>• R-401B</td>
<td>• R-410A</td>
<td>HFO 1223</td>
</tr>
<tr>
<td>• R-502</td>
<td>• R-402A</td>
<td>• R-507</td>
<td></td>
</tr>
<tr>
<td>• R-503</td>
<td>• R-402B</td>
<td>• FM200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• R-408A</td>
<td></td>
<td>Natural Refrigerant0</td>
</tr>
<tr>
<td></td>
<td>• R-409A</td>
<td></td>
<td>R-290 ( HC 290 )</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CO2</td>
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<td></td>
<td></td>
<td></td>
<td>NH3</td>
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<td></td>
<td></td>
<td></td>
<td>Water</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N2 Clean agent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Argon Clean agent</td>
</tr>
</tbody>
</table>
REFRIGERANT TYPES

HFO

- HFO 1234 fy
- HFO 1223zd
- HFO 514a (74.7% R-1336mzz(Z) 25.3% R-1130(E))
- HFO 1234ze (E)

Natural Refrigerant

- R-290 (HC 290)
- CO2
- NH3
- Water
- N2 Clean agent
- Argon Clean agent

Zero ODP & Low GWP but they are synthetic refrigerants. And not Natural Refrigerants.
MISTAKES

DA SUBMISSION – PROVIDED

CVA STAGE – NOT INSTALLED.
MISTAKES

i.) Provision of refrigerant detection system only without the storage cylinders for recovery does not qualify.

ii.) Detection must be **Automatic** and not by manual.

iii.) Location of refrigerant SENSOR installed wrongly – 1.2 m HEIGHT.
Innovation in Green Buildings

Vacuum Degasser in Chilled Water Piping System (Closed Loop System)
Where to install VD & ADS

Control Valve

Filters

AHU

Pump

Evaporator

Expansion Valve

Compressor

Condenser

Cooling tower

Airside Loop (AHU & Air Duct)

Chilled Water Loop (CHWP, Piping & Cooling Coil)

Refrigeration Loop (Water-cooled Chiller)

Condenser Water Loop (CWP, Piping & Cooling Tower)
Vacuum Degasser cleaning system for Chilled Water Piping System

MISTAKES:
1.) Installed out of working pressure range
2.) Installed in an open loop system.

Note:
1.) Vacuum Degasser must be installed with a Closed Loop Hydro pneumatic expansion Tan
Conventional test: How do we test the flow switches?

Approximately 320 litres (86 US Gallons) of Water per water flow alarm test.
Automatic Flow Switch Testing System used in Wet Sprinkler Fire Fighting System.

According to NFPA 25, quarterly test is mandatory, whereas Factory Mutual Global (FM) insured, testing Is required monthly.

Malaysia-MS 1910:2006 section 19.3.2 – Flow switches requires to test quarterly.
This device pump circulates the existing water around the flow-switch.
Automatic Flow Switch Testing System used in Wet Sprinkler Fire Fighting System.

MISTAKES

1.) Installed wrongly
2.) Wiring all same color and connected wrongly
**IN2 Green Building Index Facilitator**

<table>
<thead>
<tr>
<th>MISTAKE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.) DA OR CVA STAGE</td>
</tr>
</tbody>
</table>

**GBIF CERTIFICATE – NOT CURRENT OR RENEWED**
1.) Proof of Letter of appointment of named GBI Facilitator ( GBIF ).

2.) Proof of the GBI Facilitator’s Current Registration.

3.) Green GBIF and Not De Green.
This is to certify that

Having satisfied the requirements of the
GBI Accreditation Panel

Has been duly registered as

GBI Facilitator

Date
1 April 2016

Chairman, GBIAP

The validity of this renewal certificate and registration expires on 31 December 2016

GreenBuildingIndex Sdn Bhd (845466-V)
A-12/13A Menara UOA Bangsar, 5 Jalan Bangsar Utama 1, 59200 Kuala Lumpur, Malaysia
Tel: 03 2283 2546 Fax: 03 2294 2546
www.greenbuildingindex.org | info@greenbuildingindex.org
Having satisfied the requirements of the GBI Accreditation Panel, this individual has been duly registered as a GBI Facilitator.

Registration No.: GBIF/0064

Date: 1 January 2017

The validity of this renewal certificate and registration expired on 31st December 2019.
IN2:
GBI Facilitator (GBIF) getting the new & inexperienced staff to do the submission and attending consultation.
NON-CHEMICAL WATER TREATMENT

Why Water Treatment?
• Prevent microbiological growth
• Prevent scaling

Why Non-chemical Water Treatment?
• Eliminates the use of toxic chemicals
• Reduces blow-down
Innovations in Green Buildings

PARKING GUIDANCE SYSTEM – Shopping Malls

NRNC - Office - ???
GENERAL STRATEGIES / APPROACH

1. Correct use of GBI Tools. Only propose design strategies that make a project better. “One size does not fit all”

2. When in doubt, follow the intent of each criteria and use common sense.
Thank You

By: Ir. Ng Yong Kong, email: nyk@nyk.com.my
Tel: + 6012 201 9319