

Review on the LCT Planning of **HANG TUAH JAYA CITY, MELAKA**

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Findings on the LCT Planning of Hang Tuah Jaya City

➤ Basic Information

➤ Malacca

- Population of 900,000
- More than 14 million tourists per year
- Aimed to achieve “green” status by 2020

➤ Hang Tuah Jaya City

- A township and state capital in Ayer Keroh, Malacca
- Sustainable Development Green City
- Development area of 5153 acres (= 20.85 km²)
 - ◆ 8 MW Solar Farm Project (Completed Dec 2014)
- All buildings and development shall comply with building rating certifications i.e. GBI, LEED, Green Star, Green Mark and Melaka Green Seal.



City Center



Rehabilitation Center



8 MW Solar Farm



Chronology of Implementation of LCCF in Hang Tuah Jaya Municipal Council

Timeline	Event
28 th Jun 2012	Signing of Memorandum of Understanding (MoU)
December 2012	Brief project report
March-July 2013	Data collection for year 2012
July-August 2013	Data analysis and baseline report
July-November 2013	Implementation of action plan
11 th October 2013	Provisional Certificate award
August-November 2013	Data collection for year 2013
December 2013	Data analysis and full report for 2013
2014	Reduction of carbon competition 2014
December 2014	Data collection for year 2014
2015	Data analysis and full report for 2014
2016	LCCF and Diamond Rating award

LCCF Performance Criteria: Based on Carbon Footprint

4 Elements for GHG Reductions in Cities and Townships

<p>Urban Environment</p>	<p>Urban Transportation</p>	<p>Urban Infrastructure</p>	<p>Building</p>
<ul style="list-style-type: none">• Site Selection• Urban Form• Urban Greenery & Environmental Quality	<ul style="list-style-type: none">• Shift of Transport Mode• Green Transport Infrastructure• Clean Vehicles• Traffic Management	<ul style="list-style-type: none">• Infrastructure Provision• Waste• Energy• Water	<ul style="list-style-type: none">• Low Carbon Building• Community Services

4 Elements

13 Performance Criteria*

35 Sub Criteria

*Performance Criteria are measurable strategies to reduce carbon emission through:- Policy control, technological dev., better process & product management, change in procurement system, carbon capture, consumption strategies & others.

Performance Criteria for Urban Environment(UE)

UE 1 : Site Selection

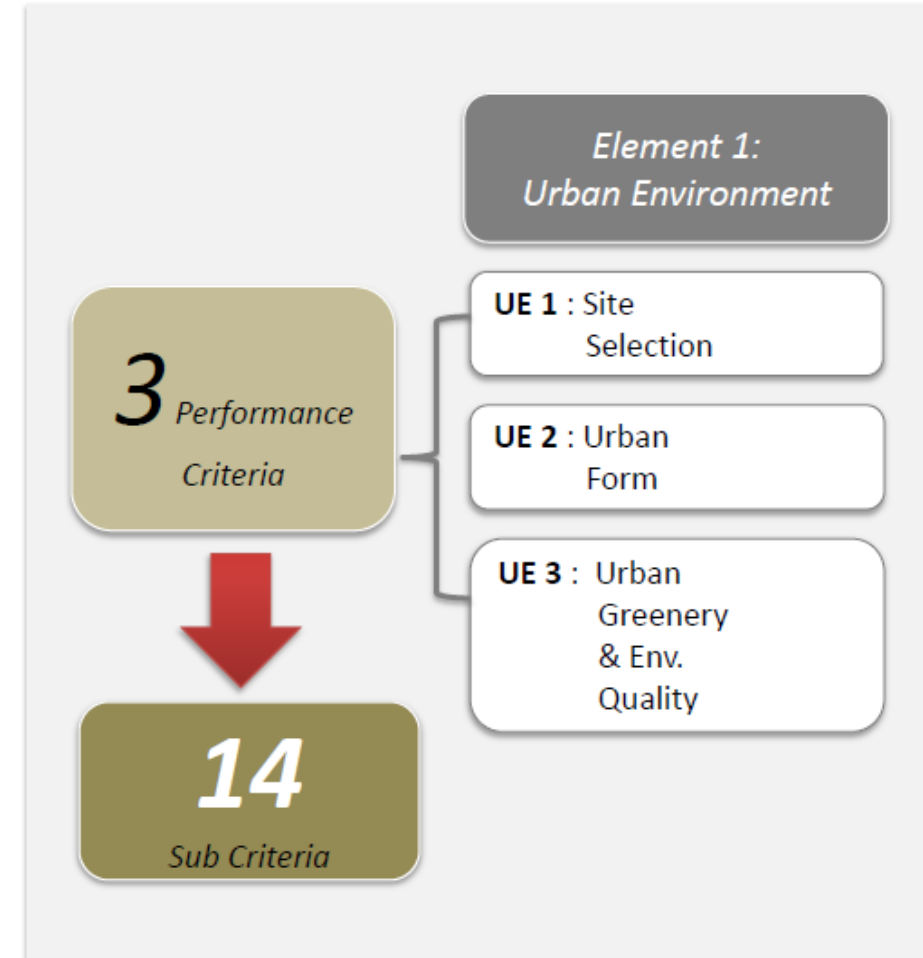
- 1-1: Development within defined urban footprint
- 1-2: Infill development
- 1-3: Development projects within transit nodes and corridor
- 1-4: Brownfield and Grey field redevelopment
- 1-5: Hill slope development

UE 2 : Urban Form

- 2-1: Mixed-use development
- 2-2: Compact development
- 2-3: Road and parking
- 2-4: Comprehensive pedestrian network
- 2-5: Comprehensive cycling network
- 2-6: Urban Heat Island (UHI) effects

UE 3: Urban Greenery And Environmental Quality

- 3-1: Preserve natural ecology, water body and bio-diversity
- 3-2: Green open space
- 3-3: Number of trees



Performance Criteria for Building (B)

B1 : Low Carbon Buildings

1-1: Operational Energy Emissions

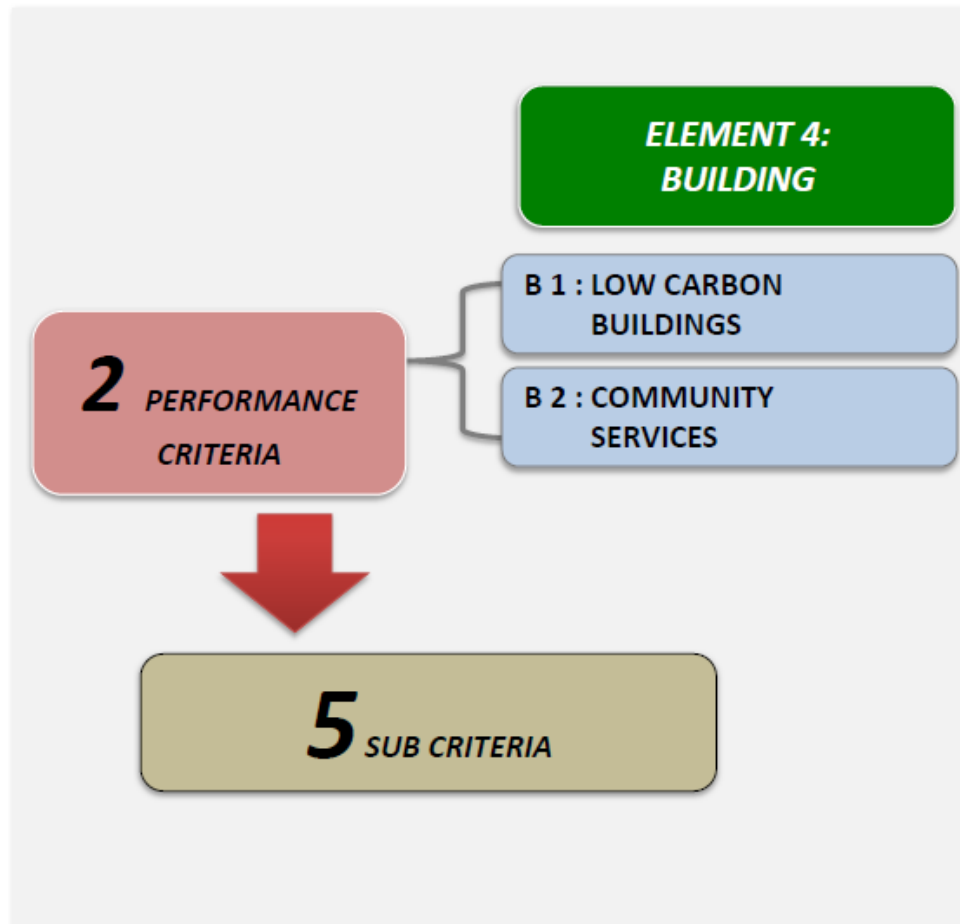
1-2: Operational Water Emissions

1-3: Emission Abatement Through
Retrofitting

1-4: Building Orientation

B2 : Community Services

2-1: Shared facilities and utilities
within building



Findings on the LCT Planning of Hang Tuah Jaya City

Short Term	Long Term
<p>Carry out a program to save the energy and water consumption up to 10% (without cost)</p> <p>(Energy management; Water management)</p>	<p>Plantation of tress with high absorption of carbon dioxide</p> <p>Eg. Local bamboo and Eucalyptus</p> <p>(Greenery)</p>
<p>Standardize air-conditioning temperature in every building involved at 24°C</p> <p>(Buildings; Energy management)</p>	<p>Using renewable energy which is Photovoltaic Solar Energy</p> <p>(Renewable energy)</p>
<p>Carry out Rain Water Collecting System (SPA) for landscape, toilet and general cleaning</p> <p>(Water management)</p>	<p>Using energy saving equipment in every building (LED/T5 lamp, notebook, inverter air-conditioner)</p> <p>(Buildings; Energy management)</p>
<p>Using sunlight as light source in a building (reduce energy usage)</p> <p>(Buildings; Renewable energy)</p>	<p>Having at least 10% or more green open area than the total amount of buildings</p> <p>(Town structure; Greenery)</p>

Evaluation on the Application of the LCT- I System

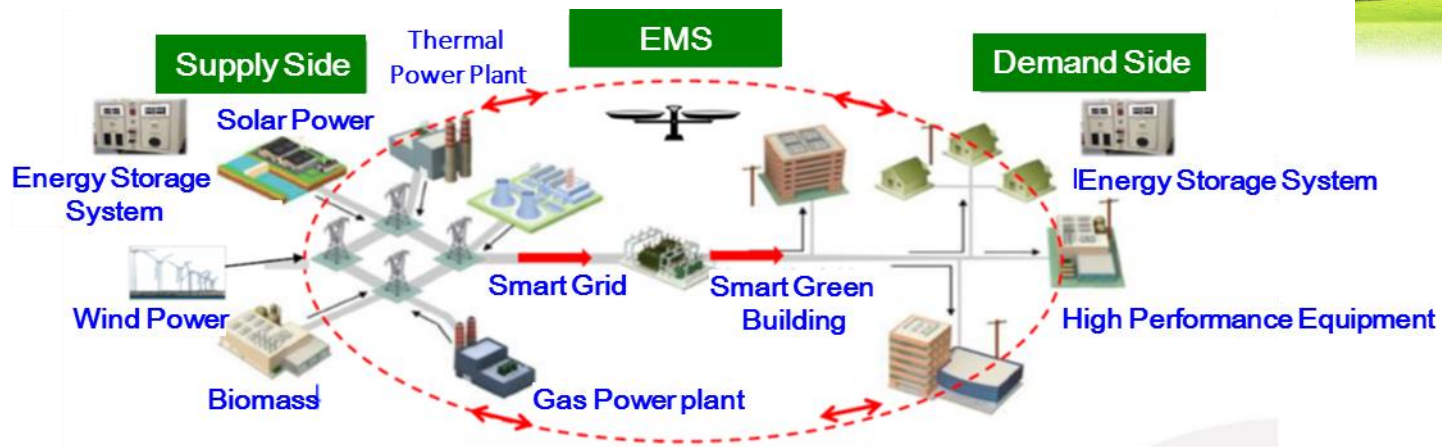
Question	Excellent	Good	Average	Below Average	Poor
Information of the LCT-I Volunteer Town		✓			
Understanding of each LCT-I System indicators			✓		
Explanation (evidence) provided for the self-evaluation				✓	
Collection of data necessary for the evaluation				✓	
Calculation of CO2 emissions		✓			

Feedback on the Self-Evaluation

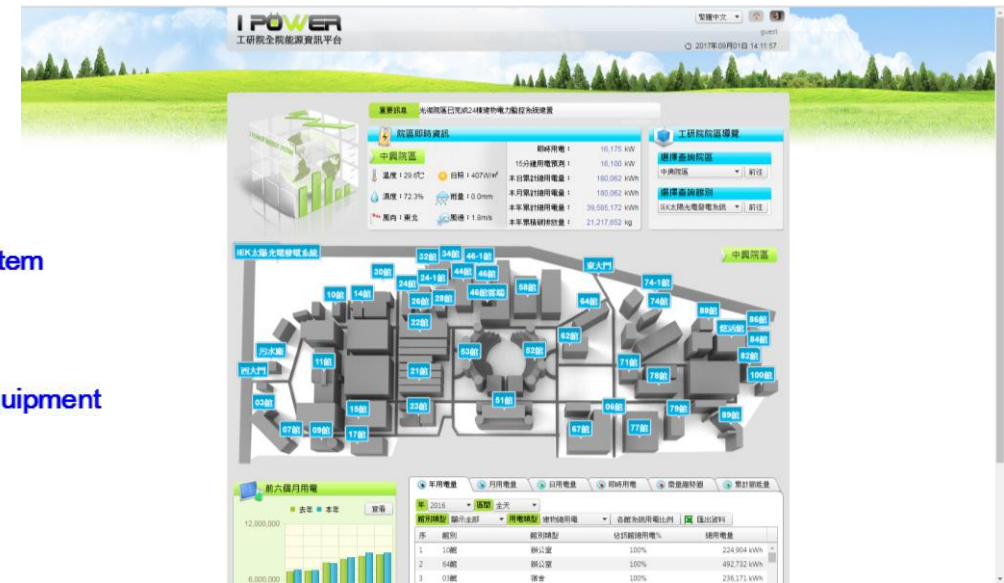
Tier 1	Tier 2	Tier 3	Comments
Demand	<ul style="list-style-type: none"> Buildings 	Energy Saving Construction	Several buildings has complied the green rating building under Green Building Index (GBI) and Melaka Green Seal (MGS)
Demand	<ul style="list-style-type: none"> Transportation 	All items	Good green transportation(Electric Bus) to reduce carbon emission
Supply	<ul style="list-style-type: none"> Renewable Energy 	Introduction of Renewable Energy	8 MW Solar Farm(Completed Dec 2014)
Demand & Supply	<ul style="list-style-type: none"> Energy Management System 	Energy Management of Buildings/Area	14 buildings in this area used a system that called "Building Consumption Input System"
Environment & Resources	<ul style="list-style-type: none"> Greenery Water & Waste Management Pollutions 	All items	No any data in it, need to describe more data to evidence the effort in the part.
Governance	<ul style="list-style-type: none"> Policy Framework Education & Management 	All items	No any data in it, need to describe more data to evidence the effort in the part.

For the Improvement

Tier 1	Tier 2	Suggest
Supply	<ul style="list-style-type: none"> Renewable Energy 	<ul style="list-style-type: none"> Accomplish the framework for solar power plant, biomass energy Encourage people to set up solar panel on the building roof Replace BIPV glass of regular glass to earn more power
Demand & Supply	<ul style="list-style-type: none"> Energy Management System 	Establish a city or region size Energy management System, for energy monitoring, prediction and smart control



Smart Energy Management System



ITRI IPOWER Platform

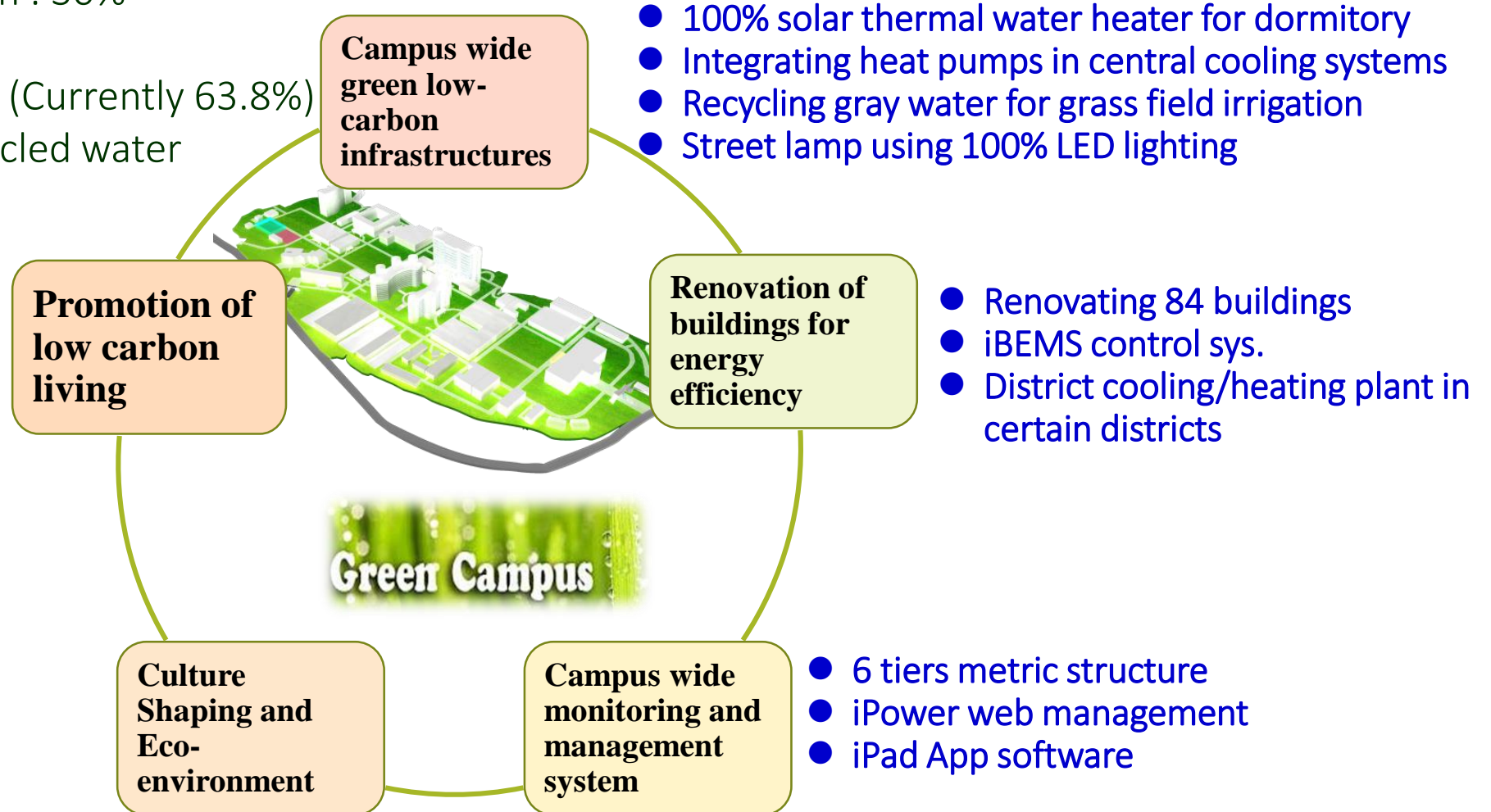
ITRI Green Campus Program

➤ Goals (based on 2010)

- Electricity use reduction : 30%
- CO₂e reduction : 40%
- Green coverage > 75% (Currently 63.8%)
- Irrigation by 100% recycled water

- PR promotion
- Internal communication and education

- Water recycle
- Waste recycle
- Ecological built environment
- Green transportation
- Green procurement
- Carbon foot-print labeling restaurant



ITRI Green Campus Program- 1. Low-Carbon Infrastructure

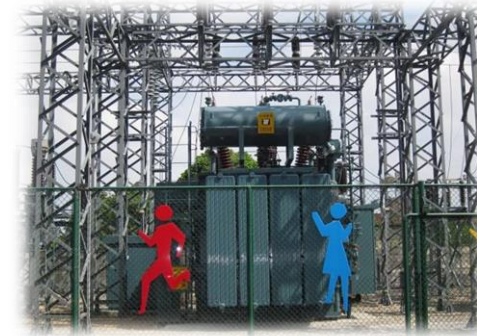
- **Hot water:** solar heaters, HPs for dorm and offices
- **Efficient lighting:** LED street lights, T5 fixtures, IR triggers
- **Others:** power system upgrade, storm water mgnt system, waste recycling, and water recycling, etc.



Solar heaters



HPs



Power system upgrade



LED Lighting



T5 fixtures



IR triggers

ITRI Green Campus Program-2. Building Renovation

- Totally 84 buildings in the campus will be renovated in 6 years (2012~2017)
- B10: the very first model that has successfully saved 33% energy by deploying ITRI's own technologies.
- B64: currently the 2nd highest performance bldg and undergoing several new techs demo.
- DHC: remodel B15, 17, 23 and a new green house to become a DHC system.



Human factors design (@ B64)



Piping (@ B15 + B17)



Piping (@ B17)



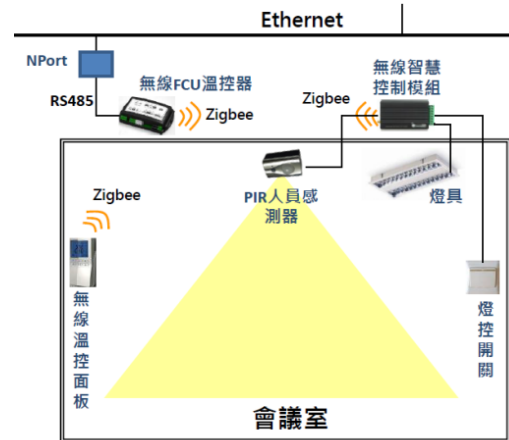
VFD Centrifugal Chiller

ITRI Green Campus Program-3. Power Monitoring and Management

- iPOWER: campus wide power monitoring system
 - A 6-tier metric structure covering each campus buildings
- iBEMS: individual bldg. energy management system
- Office and conference room automation
- iExpert: water loop VFD control

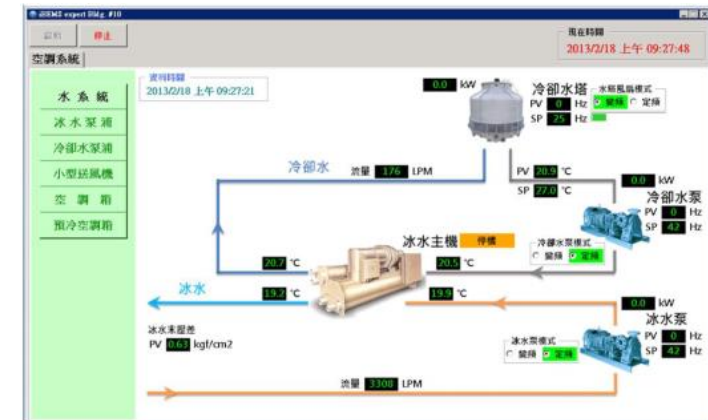


iPOWER



Office mngt system

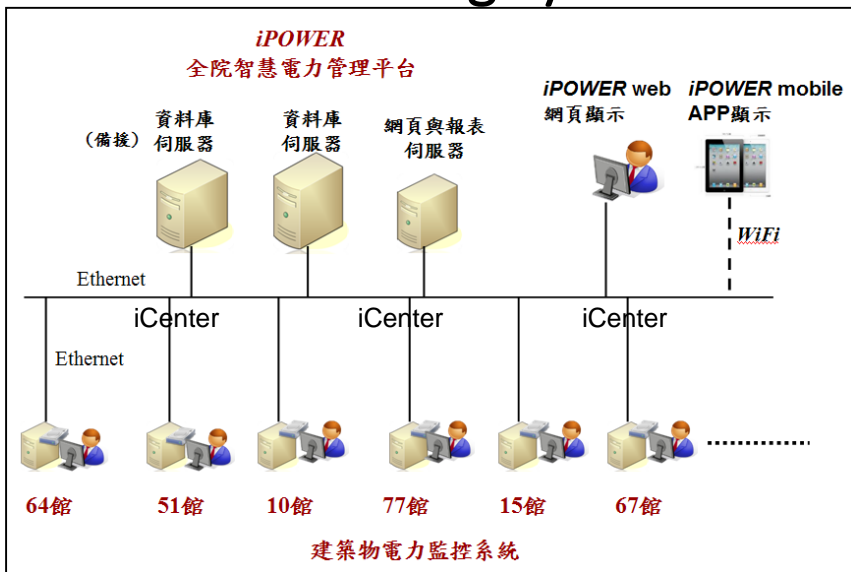
iBEMS



iExpert

ITRI Green Campus Program-3. Power Monitoring and Management

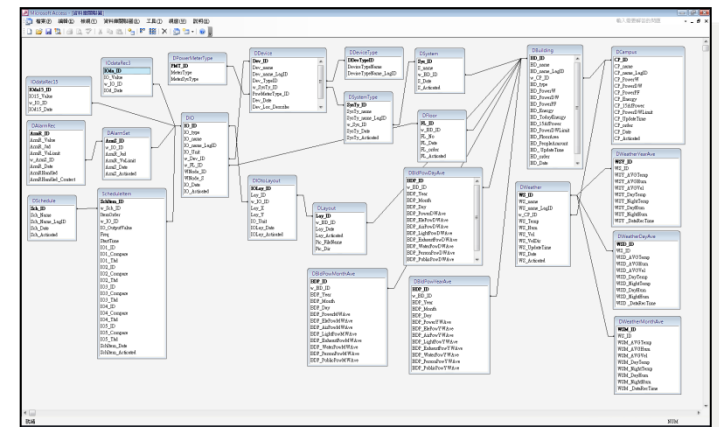
Campus Wide Power Monitoring System



iPOWER System Structure



iPOWER iPad APP



Power use SQL database



iPOWER Web

Mobile energy information service is used to increase user awareness.

ITRI Green Campus Program-4. Eco-environment

- Landscaping: eco-pond, external shading, etc.
- Green IT: **Conf.-call sys** (Lync) has saved at least 20% of commuting time for meetings and 600 thousand pieces of papers a year
- Off-time alert system for computers: idle rate drops from 16.3% to 3.4% during non-office hours
- **Low carbon transportation system**
- Carbon footprint meals



External shading (@ B51)



U-bike, e-scooters, coach btw ITRI to THSR station



Eco-pond (@ B64)



Carbon footprint meals

ITRI Green Campus Program-4. Eco-environment

Low-Carbon Transit and Food Services



EV Shuttle



Electro-
motorbike



u-BIKE



Food labeled by CO₂e

ITRI Green Campus Program-5. Promotion



Dr. Green

Green SMILE Campaign



Green ITRI e-Learning



Keep Green SMILE

Green Campus Website



Green Forum

Showcase



Conclusions

- LCT-I System indicators is a good system to diagnose the performance of the selected town.
- More effect data or evidence would be better to estimate the energy saving benefit for low carbon city.
- ITRI's Green Campus Program has exemplified a paradigm of green low-carbon campus.
- This program offers test-beds for ITRI developing technologies to improve the levels of technology readiness and acceptance by industries
- With intensive collaboration among laboratories in ITRI, it also facilitates the technology innovation and integration.



Thank You

