7th Regional Workshop on Integrated Resource Management in Asian Cities: the Urban Nexus
Tanjungpinang, Indonesia 19-21 July 2017

Climate Change Resilient Pilot Housing (CCRPH)

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President of Bicol State College of Applied Sciences and Technology (BISCAST) Naga City Philippines
BISCAST?
Integration of Urban NEXUS approach into BISCAST
CCRPH Design & Plan
Building Technology
Climate Change Resilience
Green Building
Financing CCRPH
Ongoing Activities & Future Plans
The Bicol State College of Applied Sciences and Technology (BISCAST) is a government higher educational institution established by virtue of RA 10231 in 2012. Its mandate is to:
“provide advanced education, higher technological, professional and vocational instruction and training in the sciences, arts, education, entrepreneurship, engineering and other related courses. It shall also undertake research and extension services and provide progressive leadership in its areas of specialization.”
As a State College, it is mandated to deliver three core functions:

❖ INSTRUCTION
❖ RESEARCH
❖ EXTENSION
BISCAST is a meso-level partner of Urban Nexus Project

BISCAST is tasked to promote the Urban NEXUS approach in the City of Naga (a Nexus partner-city,) in the Bicol Region as well as in the Philippines

Receives advisory services from GIZ – Urban NEXUS Project as part of the GIZ / BISCAST cooperation
CCRPH
Design & Plan
➢ Two-story row house for the urban environment
➢ 72 square meters
➢ Accommodation for up to 4 to 5 people
➢ Low income home owner
➢ Safe shelter during Floods / Typhoon
the Plan

FRONT ELEVATION

REAR ELEVATION

SECTION THRU “M-I”
the Plan

SECTION THRU “D-A”
CCRPH
Building Technology
Technology
Vibrating Machine, Molder & Slab HCB
Technology
Hollow Concrete Blocks
Vibrating Table
For Pre-cast Beam
Slab Construction
➢ approx. 40% reduction of concrete due to HCB slab
➢ approx. 30% reduction of steel works in the slab
➢ approx. 50% reduction in mortar use due to closed bottom HCB
➢ wall insulation due to the use of closed HCB
➢ reduced consumption of wood as no wooden formwork is used
➢ modular architectural systems reduces additional formwork and reduction of waste and water on site approx. 30%
➢ efficient use of resources (PV, Rain-Water-Harvester, energy and water efficient appliance), operational cost of the building are reduced and thereby making its installation affordable in the long run
CCRPH & Climate Change Resiliency
Climate change resilient housing defined…

“capacity to resist, absorb and accommodate the effects of climate hazards and to return to normal conditions in a timely and effective manner without significant changes to its basic functions and structures”

### PHILIPPINE GREEN BUILDING INITIATIVE (PGBI)

**PROJECT NAME:** Climate Change Resilient Pilot Housing at BICAST  
**LOCATION:** Naga City  
**OWNER:** BICAST  
**ACCREDITED ASSESSOR:**  
**ACCREDITATION NUMBER:**

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#### PGBI SELF ASSESSMENT RATING

<table>
<thead>
<tr>
<th>6 CLIMATE CHANGE RESILIENCY</th>
<th>7 Points</th>
<th>YES</th>
<th>?</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit CCR1: Soundness of structure</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
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<tr>
<td>Credit CCR2: Water and wind tightness</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Credit CCR3: Spatial flexibility</td>
<td>1</td>
<td>1</td>
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<td>1</td>
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<tr>
<td>Credit CCR4: Own emergency provisions</td>
<td>1</td>
<td>1</td>
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<td>1</td>
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<tr>
<td>Credit CCR5: Emergency egress</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
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<tr>
<td>Credit CCR6: Disaster risk management plan</td>
<td>1</td>
<td>1</td>
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<td>1</td>
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<tr>
<td>Credit CCR7: Passive lighting and ventilation (Prerequisite)</td>
<td>0</td>
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<tr>
<td><strong>TOTAL POINTS</strong></td>
<td><strong>6</strong></td>
<td><strong>6</strong></td>
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</table>
Is the CCRPH Climate Change Resilient?

Additional features of CCRPH

- Elevated floor by 35 cm from the ground
- Elevated electrical outlets and switches by 90 cm
CCRPH
Green Building
EDGE (Excellence in Design for Greater Efficiency)

World wide standard in 120 countries with focus on
- energy savings
- water savings
- embodied energy savings (material)

GREEEN (Geared for Resiliency & Energy Efficiency for the Environment)

One of the Philippine standards is which is quite comprehensive and detailed

BISCAST internal assessment of CCRPH design
Green Features Energy

CCRPH Electricity Consumption by Source 2016
Total 129 kWh (08.2016 – 12.2016)

83.42%

16.58%

Utility
Solar
Green Features

Energy Supply

Photovoltaic Electricity Supply

- 200 W PV module
- 200 Ah battery bank
- 600 W Pure sinus wave inverter
- 8 A Regulator
Green Features

- Energy efficient devices and monitoring
- LED light PIR sensor
- Electric meter and monitoring (CO2)
- Skylight
Green Features

**Water Supply**

**CCRPH Water Consumption by Source 2016 (08.2016 – 12.2016)**
- Utility: 80.08%
- RWH: 19.92%

**CCRPH Water Consumption by Source 2017 (01.2017 – 06.2016)**
- Utility: 48.72%
- RWH: 51.28%
Green Features

Water Supply

Gravity feed Rainwater- Harvester with carbon filter and UV light treatment for water
Green Features

Waste - Water Treatment and Utilization

Three chamber septic tank with strainer

Grey-water collection for irrigation purpose

36 m² Leach-field
Green Features

Water Conservation

- Sensor tap
- Low flush toilet 5,5 liter
- Drip irrigation for herbal plants on the balcony
Financing CCRPH
Financing of CCRPH

- The CCRPH was funded by BISCAST internal research fund (12.5% of the total internally generated income of the College goes to research)

- Technical advisory was supported by GIZ Urban NEXUS and financed by the German Federal Ministry for Economic Cooperation and Development (BMZ)
<table>
<thead>
<tr>
<th></th>
<th>AFFORDABLE HOUSING</th>
<th>BICAST HOUSING</th>
<th>CCRPH GREEN HOUSING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sub &amp; super structure</strong></td>
<td>5,492.48 Php / qm</td>
<td>9,221.25 Php / qm</td>
<td>10,827.06 Php / qm</td>
</tr>
<tr>
<td><strong>Roofing</strong></td>
<td></td>
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<tr>
<td><strong>Door &amp; windows</strong></td>
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<tr>
<td><strong>Water &amp; electricity supply</strong></td>
<td>389,966.08 Php</td>
<td>654,708.75 Php</td>
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<tr>
<td><strong>Staircase</strong></td>
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<tr>
<td><strong>Like Affordable Housing</strong></td>
<td></td>
<td></td>
<td><strong>Like BICAST Housing</strong></td>
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<tr>
<td><strong>Tiles</strong></td>
<td></td>
<td></td>
<td><strong>Rainwater harvester</strong></td>
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<tr>
<td><strong>Plaster</strong></td>
<td></td>
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<td><strong>Photovoltaic electricity supply</strong></td>
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<tr>
<td><strong>Skin coat</strong></td>
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<td><strong>Grey water &amp; effluent treatment</strong></td>
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<td><strong>Paint</strong></td>
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<tr>
<td><strong>Shading roof</strong></td>
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<tr>
<td><strong>Dual flush toilet</strong></td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>109.84 US$ / m²</td>
<td>184.42 US$ / m²</td>
<td>216.52 US$ / m²</td>
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<tr>
<td><strong>7,799 US$$</strong></td>
<td>13,094 US$$</td>
<td></td>
<td>15,374 US$$</td>
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Ongoing Activities & Future Plans
Ongoing Activities

➢ “Accreditation of Innovative Technologies for Housing” at National Housing Authority Philippines (20.07.17)
➢ Integration of the Urban NEXUS approach into BISCAST Strategic Plan 2018 – 2022
➢ Integrating Urban NEXUS in Student Research e.g. (30-year Sustainable Urban Development Plan of Naga City)
➢ Support to Naga City in the field of elaboration 30-year Sustainable Urban Development Plan
➢ Dissemination of CCRPH technology and training to interested partners
➢ Full implementation of Integrated Resource Management Plan at BISCAST
Future Plans

➢ Dissemination of Urban NEXUS approach to other State Colleges and Universities in the BICOL Region

➢ Support to other State Colleges and Universities wanting to integrate the Urban NEXUS approach

➢ After accreditation (NHA), dissemination of CCRPH technology and training to interested partners such as City of Naga or other Cities, NHA, PP, Philippine Green Building Initiative etc.

➢ Partnering with other international academic institution
Thank you!

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