JOINT WEBINAR

SUSTAINABLE BUSINESS MODELS ON CIRCULARITY IN THE BUILT ENVIRONMENT

WEDNESDAY 28TH OF MARCH 2018 (14H00-15H00 CEST)
Introduction by moderator

Mr. Pekka Huovila
Coordinator
Sustainable Building and Construction Programme of the One Planet network
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

AGGREGATING EFFORTS OF MEMBERS

RESEARCH AND PROJECTS

GAINING INTERNATIONAL VISIBILITY

EXCHANGING KNOWLEDGE

Sustainable Tourism Programme
http://sdt.unwto.org/sustainable-tourism-10yfp

Sustainable Buildings and Construction
http://www.oneplanetnetwork.org/sustainable-buildings-and-construction

JOIN US!
Tips for a smooth session

• All attendees are on listen-only mode.

• Attendees can ask questions to the panelists anytime throughout the webinar by posting them in the questions box of the control panel.

• When typing the question, please indicate to which panelist it is addressed.

• At the end of the webinar, during the Q&A session, the organizers will be reading out the questions and the panelists will share their replies.

• If you need to contact the organizers for other reasons e.g. connection problems, please use the chat box and address your message to « organizers ».

• The session is being recorded and a link will be shared tomorrow with all attendees.
Objectives of the webinar

The construction sector is the largest consumer of resources including raw materials. Therefore, embracing long-term design thinking, technology and innovation and adopting new production and consumption models throughout the supply chain can lead to sustainable business models. The tourism sector is growing exponentially and also responsible for decoupling its growth from environmental degradation. Given the extensive supply chain of the sector and its connection with the built environment, integrating approaches for more sustainable construction in tourism can result in enhanced competitiveness, environmental benefits and overall destination image.

- Provide testimonials of frontrunning organizations developing and implementing circular models in the built environment;

- Explore examples of profitable business cases of circular construction and management of buildings within the tourism industry.
Circular Economy in practice

28 March 2018

Nitesh Magdani
Group Director of Sustainability
BAM
“Doing more good not just less bad, delivering more **value for clients**. By collaborating with our **supply chain**, encouraging **innovative** thinking through our products, and **realising the benefits of circular economic business models**, we aim to have a **net positive** impact in the long term (towards 2050)”
Innovation to date

• BAM projects - City hall Brummen, ABN Amro Pavilion Amsterdam, RHDHV Office Amsterdam, Rabobank refurbishment, Circular ‘House’ pavilion (UK), Bijlmer prison in Amsterdam

• Interior of BAM (NL) premises - circular office interiors (refurbishment and reuse of existing furniture, refurb and maintain agreements on new with supplier Desko)

• Clients - Circular consultancy for large UK development. growing number of clients interested.

• Supplier engagement – Workshop series with follow on projects, inc Armstrong, Tata, Tarmac, Arcelormittal...

• CE Publication – Co-author of Circular Economy business models publication

• Partnerships – Ellen MacArthur Foundation CE100 and EU H2020 funded ‘Building as a Material Banks’ project
To maximise the value from a circular economy there are several enabling factors which will be needed. Generally these fall into 3 categories - design, information and collaboration. As a result additional value will be created through the operation, with benefits for the asset value and waste production - as outlined below.

### Enabling factors

**Design**
- Deconstruction
- Reassembly
- Future flexibility

**Information**
- Cost / condition
- Resource productivity
- Life cycle data
- Ownership
- Warranty
- Traceability

**Collaboration**
- Share incentivisation
- Transparency
- Innovation → new products
- Longer term business models vs short term

### Expected outcomes

**Operation**
- Performance over ownership
- Better utilisation
- More consumer choices

**Asset**
- Materials and products kept at highest value for longer
- Maintenance and replacement certainty
- Total cost benefits

**Waste**
- Material security
- Waste reductions over life cycle in use
- Open and closed loop solutions
• Not originally a CE approach in design

• Modular, prefabrication, design for ‘demountability’ and re-use of materials wherever possible

• Alternative approach of internal/external engagement
- Early contractor and supply chain involvement has been key

- Focus on life cycle thinking, and trial of new CE concepts (reuse, take back, performance contracts)

- Procurement evaluation matrix - strong emphasis on residual value
Circl Amsterdam, ABN Amro

Benefits to stakeholders in this CBM

**DESIGNER**
- Facilitates design / procurement packages to increase ROI

**SUPPLIER**
- Produces systems made to fulfill a specific function and for finite service life

**ASSET OWNER**
- Contributes to the depreciation of the asset

**USER**
- Has access to an asset that provides reduced performance over time

**LINEAR MODEL**
- Plans for adaptability, upgradability and reuse
- Incorporates a real estate evaluation matrix to make key decisions

**CIRCULAR MODEL**
- Jointly with co-makers thinks about residual value, as a percentage of the original materials cost
- Invests to increase the residual value of the asset in the future; increasing employee productivity; valuing space flexibility and adaptability
- Actively participates in the design and construction phases
- Higher operational certainty

Higher ROI for asset owners rather than considering only disposal cost

BAM’s real estate evaluation methodology has evidenced products with >50% residual values after initial use
• Refurbishment

• 10 yr tenancy agreement

• Residual value key for investment

• Initiator for circular building platform (digital market place)
Circular House, London Design Festival

• An experiment!
• Supply chain engagement
• Designed for Re-assembly
• Eventual return to manufacturers...
BAM wins large scale city redevelopment project in Amsterdam (Bijlmer Bajes)
- Energy neutral new build
- Ambition: 98% reuse of materials on site
Circular economy tips...

- Promote ‘life cycle’ solutions
- Understand your clients ‘value drivers’
- Understand and facilitate different design approaches
Circular buildings as businesses: challenges and opportunities

KE WANG (VITO)
One Planet Webinar
28 MARCH 2018
SCOPE

Sustainable Buildings

Energy

Materials

Air & Water

Bio-diversity

Well being

Social

Circular Buildings

Building level

Component level

Raw material level

One Planet Webinar, 28/03/2018
How to create short-term incentives?

- Very long life cycles
- Multiple ownership transfers
- Lack of taxation benefits
- Limited residual value

Why would owners/developers invest in building circularity in the first place?
LOWER CONSTRUCTION COST?

Reversible connections = Faster construction + Higher re-use potential

Source: Facadeolick

Source: Vrije Universiteit Brussel
Commercial building prices depend on their revenue generation potential.

Transformable buildings could reduce commercial risks and increase revenue potential.

Can transformability be translated into a higher building market value?
Re-use value chain informal and under-developed

Technical obsolescence

Cultural reluctance

Lack of regulations/standards

Cost?!

Can re-use building components be more cost competitive?
DATA-ENABLED COST REDUCTION IN RE-USE VALUE CHAIN?

Can data (e.g. manufacture, construction, location & use phase) help to reduce re-use costs (e.g. deconstruction, testing, reconditioning, inventory & transportation)?

Example: re-use steel beams often more expensive than new steel beams

(Dunant, et.al, JCP, 2018)
CIRCULAR BUILDINGS

Why?

Why Not!

Why?

Thank you for your attention
Webinar: “Sustainable Business Models on Circularity in the Built Environment”

Dr. Robert Wimmer
ZCR Project Lead

March 28, 2018

Zero Carbon Resorts
3 R Methodology
GrAT

Center for Appropriate Technology

- Independent not-for-profit association since 1986
- International R&D for sustainable development
- Implementation and Demonstration
- Consulting companies and governments
GrAT International

Headquarter at TU Vienna

Branch Office in Manila, the Philippines

Branch Office in Kathmandu, Nepal

Branch office in Boeheimkirchen
Zero Carbon Resorts Project!

ZCR Towards Sustainable Development of Tourism Sector in the Philippines and Thailand

Duration and Funding
4 Years: May 2014 to August 2018

European Union’s Switch-Asia Program

Austrian Development Cooperation
Overall objective(s):
To contribute to sustainable development of the tourism sector and its value chain in the Philippines and Thailand with a focus on reduction of resource consumption and CO2 emissions.

Specific objective(s):
In the Philippines and Thailand, a critical mass of SMEs demonstrate the value of green tourism by increasing resource efficiency and using renewable resources.
ZCR Methodology

- Project Team
- SME Frontier Group & Trainees
- Combi-Training & Analysis System
- Flagship Building/Training Centre
- Knowledge Dissemination
- Tools: Trained experts & handbook, web-tool, brochure, technical video, etc.
- 500+ Company
Reduce

Implementations with zero or low investment costs

Low-hanging fruits

Easy to achieve measures yet remarkable improvement in resource efficiency

Change in guest and staff behaviour lowering resource consumption
Peak Load Management

- Shifting of electrical loads to low use periods
- Denotes when is the best time to use specific appliances and equipment
Useless Consumption and Standby

**PROBLEMS**
- Some guests leave A/C, lights, and electric devices on when they leave the room.
- Outside lights are still on during the day.

**SOLUTIONS**
- Instructional reminders inside guest rooms
- Centralized switch controls or key cards
- Automatic night lights or motion detectors
Some Simple Daylighting Techniques
Sealing of Gaps

PROBLEM
Gaps and insufficient sealing of A/C units

SOLUTIONS!
- Seal all air gaps
- Lock all thermostats in public areas
Dark colored roofs should be replaced with light colored ones.

Dark colors absorb the sun’s heat.
Replace

Switch to renewable energy resources or materials

Substituting outdated and inefficient technologies with more efficient ones

Implementations with medium to high investment costs
Solar Photovoltaic (PV) Panels
Solar Tubes

1. Capture Zone
   Sunlight is captured by the dome and directed down into the tube.

2. Transfer Zone
   Sunlight is directed downward through the attic.

3. Delivery Zone
   Sunlight is distributed throughout the room.
☑ High EER

☑ Inverter type A/C (40% to 60% electricity savings)
Heat Recovery from Air-Conditioner Condensing Units for Generation of Hot Water
Commercial Solar Water Heaters
Do-it-Yourself Appropriate Technology
Rice Hull Insulated Solar Water Heater

Front view of a Rice Hull Insulated SWH showing the main components: reservoir and FPC

Rice hull as insulation
Applications of ZCR Members

In Sabang – For staff Use

In Port Barton – For Guest Use
Redesign

Development of energy and water autonomous establishments

Adoption of knowledge from ZCR learning centers
The ZCR Learning Center: Bamboo Showcase Cottage, Palawan
GOAL: Demonstration of an innovative building concept that significantly reduces CO₂ over its whole life

DESIGN FEATURES:
• Principles of Passive Cooling
• Building Materials
• Renewable Energy
• Efficient Technologies
• Water
• Waste and Wastewater
• Building Monitoring System
# Consumption Comparison!

<table>
<thead>
<tr>
<th>Appliance or Equipment</th>
<th>Power Rating (W)</th>
<th>Time of use (h/day)</th>
<th>Time of use (specific)</th>
<th>Annual Energy Consumption (kWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>300</td>
<td>11</td>
<td>0600 – 0800</td>
<td>1,204.50</td>
</tr>
<tr>
<td>Air conditioner (living room, 2.5 hp)</td>
<td>1,865</td>
<td>8</td>
<td>1000 – 1400 1800 – 2200</td>
<td>5,445.80</td>
</tr>
<tr>
<td>Air conditioner (bedroom, 1.5 hp)</td>
<td>1,119</td>
<td>12</td>
<td>0000 – 1000 2200 – 2400</td>
<td>4,901.22</td>
</tr>
<tr>
<td>Computer</td>
<td>40</td>
<td>4</td>
<td>0700 – 0800 1300 – 1400 1900 – 2100</td>
<td>58.40</td>
</tr>
<tr>
<td>Cooking</td>
<td>1,500</td>
<td>3</td>
<td>0600 – 0700 1100 – 1200 1700 – 1800</td>
<td>1,642.50</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>100</td>
<td>12</td>
<td>0000 – 2400</td>
<td>438.00</td>
</tr>
<tr>
<td>Water heater</td>
<td>5,000</td>
<td>3</td>
<td>0600 – 0730 1900 – 2030</td>
<td>5,475.00</td>
</tr>
<tr>
<td>Television</td>
<td>100</td>
<td>2</td>
<td>0600 – 0700 1900 – 2000</td>
<td>73.00</td>
</tr>
<tr>
<td>Auxiliaries</td>
<td>3</td>
<td>24</td>
<td>0000 – 2400</td>
<td>26.28</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>19,264.70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>Power Rating (W)</th>
<th>Time of use (h/day)</th>
<th>Time of use (specific)</th>
<th>Annual Energy Consumption (kWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>80</td>
<td>6</td>
<td>0600 – 0700 1700 – 2200</td>
<td>175.20</td>
</tr>
<tr>
<td>Fan (living room and bedroom)</td>
<td>10</td>
<td>15</td>
<td>0000 – 0800 1300 – 1400 1700 – 1800 1900 – 2400</td>
<td>54.70</td>
</tr>
<tr>
<td>Computer</td>
<td>40</td>
<td>4</td>
<td>0700 – 0800 1300 – 1400 1900 – 2100</td>
<td>58.40</td>
</tr>
<tr>
<td>Cooking</td>
<td>0</td>
<td>3</td>
<td>0600 – 0700 1100 – 1200 1700 – 1800</td>
<td>0.00</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>45</td>
<td>24</td>
<td>0000 – 2400</td>
<td>394.20</td>
</tr>
<tr>
<td>Water heater</td>
<td>0</td>
<td>3</td>
<td>0600 – 0730 1900 – 2030</td>
<td>0.00</td>
</tr>
<tr>
<td>Television</td>
<td>25</td>
<td>2</td>
<td>0600 – 0700 1900 – 2000</td>
<td>18.25</td>
</tr>
<tr>
<td>Auxiliaries</td>
<td>3</td>
<td>24</td>
<td>0000 – 2400</td>
<td>26.28</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>727.08</td>
</tr>
</tbody>
</table>

In comparison to a standard conventional resort cottage which may consume 19,264.70 kWh per year, the cottage consumes only 4% of that or 727.08 kWh per year.
Replication via Outreach in Cooperation with the Department of Tourism

ZCR Registered Members

866+ Registered hotels, resorts and other related tourism establishments covering 68,000+ Hotel rooms in 35 Provinces of the Philippines
## 265 ZCR Project Members Annual Savings (Philippines)

<table>
<thead>
<tr>
<th>Energy Consumption Equivalent of Homes</th>
<th>Water Consumption Equivalent of Homes</th>
<th>Fuel Consumption Equivalent of Cars</th>
<th>Avoided Emissions Equivalent of Cars</th>
<th>Power Plant Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>34,914,976.00 kWh</td>
<td>683,251,604.22 L</td>
<td>2,184,812.55 L</td>
<td>22,013,005.20 kg CO₂</td>
<td>34,914,976.00 kWh</td>
</tr>
<tr>
<td><strong>82,541 homes</strong></td>
<td><strong>5,587 homes</strong></td>
<td><strong>2,664 cars</strong></td>
<td><strong>10,482 cars</strong></td>
<td><strong>12 MW plant</strong></td>
</tr>
<tr>
<td>1 home = 423 kWh/yr</td>
<td>1 home = 122,275 L/yr</td>
<td>1 car = 820 L/yr</td>
<td>1 car = 2,100 kg CO₂/yr</td>
<td>Based on a 24/7 plant with 32.5% efficiency</td>
</tr>
</tbody>
</table>

Economic Returns

TOTAL ECONOMIC SAVINGS OF 265 COMPANIES PER YEAR!

PHP 433 Mio (~7,2Mio €)

And for 800 more participating hotels? For 1,000 hotels?
The Sustainable Tourism Certification developed by ZCR
What is this ANAHAW Certification?

✓ The certification is focused on enabling innovations that help reducing operational costs and carbon emissions through smart methods, processes, and technologies—all of which are measurable by indicators- and performance-based metrics.

✓ Philippine Sustainable Tourism Certification empowers business owners and engineers to choose from a wide variety of technical solutions while lowering operational costs and, thus, gaining savings.
ANAHAW Certification Development

Has been evolved bottom-up from the practical experience of the Zero Carbon Resorts Projects

Using success stories and benchmarks of ZCR members to make sure the goals are realistic and achievable

Employing the unique 3R Methodology of the ZCR Project
Certification Levels and Validity

I. Pass the indicators and Comply with all MANDATORY REQUIREMENTS

II. Certification Levels
• Level 1 - 50% to 59%
• Level 2 - 60% to 69%
• Level 3 - 70% to 79%
• Level 4 - 80% to 89%
• Level 5 - 90% to 100%

II. Validity
- Certification is valid for 2 years
Section 1. The Indicator

ENERGY INTENSITY: kilowatt-hour per guest-night

WATER INTENSITY: cubic meter per guest-night

- A very objective measure of environmental performance
- More accurate than kWh per square meter
- Proportional to the carbon footprint (GHG emissions)
Presented by:
Dr. Robert Wimmer
Managing Director
GrAT
E-mail: rw@grat.at

Thank you

Zero Carbon Resorts
For Sustainable Tourism

www.ZeroCarbonResorts.eu
Q&A session

Please send your questions through the questions box in the control panel
Thank you!
For more information on the webinar, please kindly contact the Coordination Desk below.

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