

Responsibly Sourced Materials in a Circular Built Environment Project Template

The Sustainable Buildings and Construction Programme (SBC) aims at improving the knowledge of sustainable construction and to support and mainstream sustainable building solutions. Through the programme, all major sustainable construction activities can be brought together under the same umbrella. The work involves sharing good practices, launching implementation projects, creating cooperation networks and committing actors around the world to sustainable construction. The purpose of this template is to capture, report and publish case studies related to circular economy in the built environment for the purpose of knowledge and information sharing including cross collaboration.

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The SBC Programme is one of six programmes under the One Planet Network (UN 10YFP).



One planet
build with care

Please give us more information on the project.

1. Title of project (e.g. Circular Economy Ownership Models: A view from South Africa Industry). *

PULLUVILA THOTA

2. Region(s) of project *

- Africa
- Asia/Pacific
- Europe and Central Asia
- Latin America
- Middle East
- North America
- Central America
- Caribbean
- Global/All regions

3. Country/countries of project(s). (e.g. South Africa) *

India

4. Your name *

M Rajesh Kumar Jain

5. Your organisation *

R LEEF regional low energy environment friendly, architects and consultants

6. Other than the SBC Programme, is this project related to any of the other 10YFP/One Planet Network Programmes? *

- Sustainable Tourism Programme
- Consumer Information for SCP
- Sustainable Food Systems
- Sustainable Lifestyles and Education
- Sustainable Public Procurement
- Not related

7. If this case study is related to any other program, please list the program. *

No

8. Overview/Summary (1000 characters). (e.g. Waste materials are not remanufactured, reused or recycled successfully. This study focuses on the South African industry's view on composite waste. The study found that cost reduction was a major driver and sustainer for recycling of composites). *

Utilizing the strength of material, technologies reducing volume of material required, reducing , burnt products, reducing high energy consumption material, utilising skills of workers ,training on site for alternative technology, using site resources to maximum, integrated climatic approach for design.Rain water harvesting, DEWATS, solar renewable energy for all energy , kitchen waste biogas, bio swimming pool, permaculture system of organic plantation and vegetation, reducing the use of cement and steel, Reuse of old doors and windows, tandoor hand cut flooring, using discarded ceramic tiles , filler slabs,cuddapah for shelves short spans roof, falling arch for stairs, , stabilized compressed interlocking mud bricks and bricks for vaults manufactured , vault filling with fly ash , lime wash for painting , wardrobe shelves with granite, shutters with pinewood with pivot concept ,load bearing structures with arch foundation. All resulted in net zero energy, net zero waste

9. Keywords *

- Policies promoting circularity
- Construction and demolition waste management
- Design for disassembly, reuse and easy to recycle
- Adaptability, flexibility and refurbishment of buildings and neighbourhoods
- Sharing and multi-use of spaces
- Use of reused or recycled content in new products and buildings
- Circular water
- Circular energy
- Financing circular processes
- Reconstruction

9.1 If the keywords above are not adequate, please specify other keywords. *

selection of materials which reduces health effect on human, achieve natural lighting and ventilation reduce long distance materials and products, approach for understanding the total life cycle of the material and products, which harms nature. "look for low energy build forms"

10. Life Cycle Phase(s) *

- (re-)Manufacturing of building materials
- (re-)Design
- (re-)Build
- (re-)Use
- (re-)Purpose
- Dismantling

11. What do you want other people to know about your project? (e.g. To develop appropriate national models for circular economy, it is important to reduce cost for recycling composites to encourage South African companies to transition towards circular economy). *

Involve client in the every process, literate him about design and materials. Not to stress about cost but to stress about need/requirement, technology will reduce the cost. Health should be the priority in list. Need to give better environment to our children (should be the approach) will make a person adopt it. Involve intern students in such approaches. Government should respect such structures-Incentive in some way, publish in local newspaper. One big approach-Give a booklet(example we have developed) along with every sanction plan, display posters in sanctioning department building so it reaches directly to home builders, make compulsory subject in institutions. Teaching construction related to spread fast.

12. What is the aim of the project (50 words/350 characters)?(e.g. To identify the drivers and sustainers for the South African industry to consider reuse and recycling of production waste materials). *

To achieve net zero, chemical free low energy campus. Involve network of individuals and organization, educate client, labors, students and professionals. Sharing the process to society to accept positively. thermal security, food security, water management and security, energy security, reduce , recycle, and reuse . capacity building and learn more practical on site experiences

13. Explain what is special/unique about this case? (1000 characters) (e.g. This case study focuses solely on composites. Apart from the general reuses of recycled composites in a circular economy, it is also a good strategy to avoid or reduce high energy demand linked with the production of raw materials). *

Use of mud and stones for walls and roof 80% making it least energy and recyclable, utilize strength of each materials to optimize the sections. Using clear story and courtyard avoid need for artificial light during day time. Sizing and placement of windows reduces heat transmission, utilizing wind direction, and sit out roof replaced by solar panel facing south. Using solar inverter for grid free power for all purposes of campus , bio gas from kitchen for cooking , treated water from DEWATS feeding to plants, in site natural composting manure for plantation, permaculture concepts benefiting plants growth --for flora and fauna and building , bio pool using plants regeneration zone and air bubble/water fall . Breathing envelope with exposed bricks, acts as a micro cooling wall, vault haunches filled with fly ash, terrace surface WPC with broken ceramic tiles to reduce heat transmission from roof results in avoiding AC and fan , labour quarters structure built with C & D waste

14. Year of delivery or ongoing?(e.g. 2018 or ongoing). *

October 2021

15. What did the project achieve (1000 characters)? Please give an example.(e.g. The study identified that a large number of companies in the South African industry experience a small percentage of composite production scrap material and that quality assurance of recycle and product certification for the composites was a major barrier.With these key identifications, the SA industry can conduct future research on how to overcome this barrier and would ensure the use of materials more efficiently to reduce production costs). *

Bricks made from C and D waste, non-availability of research for compressive strength and life expectancy, presently used for non-load bearing walls and for light weight roofing structures. Rammed earth wall, 12" random rubble stone wall masonry demonstrated need more valid testing reports for people to accept. Arch foundation here is below ground, – the arch concept from traditional architecture visible above ground, people are yet know the potential. Bricks made on site, dry masonry with interlocking blocks—testing data to be made available using institutions and student's project will make people aware faster. Termite treatment with neem leaves and organics available avoids water contamination. Porous outdoor flooring for parking avoids heat islands around building .material which avoids side effects on human health should be made available to take decisions by society. Professionals should share with clients

16. Who was involved/who were your stakeholders, and what was their contribution?Please list the entire supply chain of stakeholders/actors.(e.g. Directors and senior managers in South African composite material users sector). *

RLEEF ARCHITECTS AND CNSULTANTS – CHIEF ARCHITECT M RAJESH KUMAR JAIN
 Design head RLEEF - Sanjay K -
 DEWAT system design - UN Ravikumar-past director CART-NIE college,and for permaculture system of plantation,
 Sustainable technology solutions - Mohan NA - bio swimming pool integrating plantation, solar power , plantation in campus
 Electrical consultant and contractor - Planetronics , Mr Vijayakesari. MS .
 Training and documentation 15 architect interns
 site supervisor, Yogesh MP , RLEEF.
 Dr.Yadunandan CN . Structural consultant
 Plumbing and sanitary --Prakash
 Client Retd Vice Admiral Michael Moraes

17. What were the output(s)/outcome(s)? Please list examples of any outcomes achieved.(e.g. A purely theoretical study, but outcomes are: 1. Identification of cost reduction as the biggest driver. 2. Sustainers for a circular economy cannot be assumed from a global perspective but have to consider the local environment. 3. The different ownership models could be assessed though detailed knowledge of the supply chain and composite volumes.4. The need for quality assurance of recycle and to certify products incorporating recycle composites. 5. A large number of companies experience a relatively small percentage of composite production scrap material). *

Using arch foundation-30% reduction in material used , interlocking stabilized mud blocks -reduction in plastering material and cement for mortar, No curing during wall construction no wastages, reused old door/Windows reduced the cost by 50%. Brick vault construction reduced steel and concrete by 60%, natural tandoor handcut flooring to avoid power requirement. over all steel reduction by 50 %, cement by 30 %, volume of other materials 25 %.

18. Is the project replicable? If yes, how? (1000 characters)(e.g. Yes, with the application of similar cost reduction methods in different countries). *

yes, we need to have our commitment to explain the vision well in advance to client , explain about benefits of health we achieve , reduction of pollution . we need to give and commit more time for showing, explaining and showing references to make him comfortable . have a single point contact for all solutions and internally network with professionals to avoid obligation. during discussion we have choices to select appropriate solutions and arrive a better solution , and involve client at this level for his inputs .at site level involve all labours and site engineers , train them , take some awareness class, make them feel proud of their work , . also if possible take a turnkey architecture, structural design, execution, interiors, renewable energy all by one agency

19. Is the project scalable? If so, please explain (1000 characters)?(e.g. Yes, it has not been implemented in South Africa yet as this is a purely theoretical study). *

we need to include in curriculum of engineering and college level , organize seminars to create awareness, publishing in newspapers about benefits of using such things of sustainable and reusing/recycling C&D waste to make our surrounding clean, green and healthy. And enjoy the natural beauty of nature
Arches-seen done above ground , but here is done below ground. dry wall masonry also(Auroville)
Reusing C&D waste in appropriate way as required for project
Proper structural strength of materials in bring reduction of volume of material
mud base technology , clear stories and air vent @ roof level , effective use of openings will reduce the cost, meet all energy demand by renewable energy , wardrobe partition with stones, shutters with pivoted pine wood, polish , mix ceramic tiles accumulated, used with oxide finish
broken ceramic tiles on roof reflecting heat
available stones used for PCC under floor

20. What are the 3 main challenges (1000 characters) you encountered? And why?(e.g. Quality assurance of recycle and to certify products incorporating recycle composites,no consensus in the survey of composite manufacturing companies, government, local authority, product retailers/distributors, end users or third parties, should take responsibility for managing end-of-life product waste. Lack of QA for recycle and product certification incorporating recycle composites was a hindrance). *

To depute reliable site engineer. site is in remote area need to handle day to day activities, extra effort to motivate labours , gain confidence, guided on site to convince the system to labour is equally tough task.
Intention of client of the overall building to have a sustainable approach will give a broader spectrum for choices of different technologies and materials .
Working out an appropriate energy required by understanding the need and usage of the gadget, to economize the system with suitable ROI
Sited does not have power, all technologies to be implemented should be within its limits , which gave for lot of onsite development activities which does not require much power, utilize handmade products, human renewable energy was used extensively and less rely on modern adhesive and bonding agents
Being in par with owner's thoughts and making it possible by integrating new gadgets and facilities is need of the hour.

21. What are the 3 main successes (1000 characters) of this study? And why?(e.g. 1. Circularity can be progressed in SA. 2. Identification of cost reduction as a driver and sustainer for CE. 3. Quality assurance for recycle and product certification). *

Reducing volume of material using innovations, reducing use of cement and Steel , no harmful chemicals used reduce the cost to a certain extent. Increasing use of human energy and skill results in sustainability. Reusing old door/windows give a high value look . In time of overuse and shortage of resources recycling becomes a better option . Here C & D waste has been used for all non structural purposes so need for validity was not a point and the question reduced about strength. As it is private client gained trust in the process and he gave green signal. Example setup using various technologies, training labor team, coordination between different agencies involved gave us confidence and way forward. For new upcoming projects it become much more easier and simpler

22. Please indicate the cost of the project in USD. *

170000

23. Would you like to add any other relevant information (1120 characters)?(e.g. While this study is purely theoretical, it mainly identified the drivers and sustainers in CE for composite material users and also elements that would encourage the adoption of CE in South Africa). *

Now once we have set up this example, it gives future project a boost and easy to accept, based on satisfaction of results achieved. They can utilize the knowledge, resources and complete the future projects faster and easy. Documentation of such initiative publication of all information will multiply projects in future. We have to start explaining about health benefits instead of cost as a driving factor. i am ready for spreading the knowledge. organic farming also adds to develop the micro climate required for sustenance. once the requirements is understood, finding solutions makes easier . have onsite update daily to make any changes, explore possibilities , being on site gives wide variety of ideas. involve trainees, make on hand training for all architecture and engineering students as interns .invite public to see and experience , give some options so that they do not feel forced .

24. Are there any additional sources or websites for this project? If yes, please state. *

No

25. Has this project been verified? If yes, please state. If verification is ongoing, please indicate how long this may take.(e.g. Journal paper through RMIT University online library resources. Verified by one of the authors, namely Al Amin Mohamed Sultan). *

Not yet

26. Please upload any relevant images for the project. Please acknowledge credits for the photographer or source of images.

 arch foundation -...

 bio pool - Rleef.jpg

 filler slabs - Rlee...

 north view - Rlee...

 rain water with f...

 roofing system - ...

 solar sw view - RI...

 solar - Rleef.jpg

 south view - Rlee...

 west view - Rleef...

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