

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.

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

Strawclay bricks as insulation bricks for Passive solar heated buildings construction in Ladakh, India

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 *

Rohit Ranjan

5. Your organisation *

Himalayan Institute of Alternatives, Ladakh

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. *

It falls under several of SDGs.

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). *

The straw which is a huge burden in the punjab region of India, is rescued and transported to Ladakh where it is used to manufacture straw-clay bricks, a local intervention. These straw-clay bricks are low-density and hence have higher insulation properties. Thus, a strawclay brick saves pollution twice, once in Punjab (or Delhi NCR) and then in Ladakh, a climate-sensitive zone.

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. *

Not Applicable

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). *

To mainstream the concept of passive solar heating and the use of high insulation in Buildings, It is critical that the local and national government make policy modifications and promote the usage of such low-carbon building materials that go beyond sustainability, and have a regenerative impact on the environment.

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 provide a low-cost, low carbon, solution to meet the space heating needs of the region through usage of sun above our head, earth below our feet and by-products of other processes.

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).

The project focuses on construction of passive solar heated buildings that donot need any active heating to maintain an indoor temperature of 15 degC using local materials and straw rescued from Punjab.

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

Ongoing

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 recyclate 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).

The project found that the PSH buildings stay at above 15 degC while the conventional buildings stay around 12-15 degC when heated and upto -5degC in the non-heated rooms. Furthermore, the entire cost of constructing a passive solar heated building can be recovered in around 11 years or lesser, depending upon the location of construction.

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).

Mr Sonam Wangchuk led the development along with Architectural team of HIAL and several volunteers at SECMOL contributed to development of the building.

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 recyclate and to certify products incorporating recyclate composites. 5. A large number of companies experience a relatively small percentage of composite production scrap material).

1. The new design of PSH buildings at Phyang achieved indoor temperatures of around 22 °C average without any back-up heating when outside temperatures were around -10 to -15 °C when non heated rooms in non PSH buildings were at around -3 °C.
2. The PSH buildings are capable of achieving full autonomy through passive solar heating in Ladakh.
3. The cost of heating of conventional buildings exceeds the construction cost of the PSH buildings itself in roughly 11 years.
4. There is a need of developing a sustainable chain of transport of straw from Punjab to Leh.
5. There is a need to mechanise the straw-clay brick production to bring its cost down.
6. There is a need to incentivise PSH buildings in Ladakh.
7. Government will benefit immensely from incentivising these PSH buildings.

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. several cold arid regions of the world can benefit from the passive solar heated buildings.

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). *

yes. Their is just a need of intent fro the government and the capability to meet those requirement in the upcoming years will be established soon enough.

20. What are the 3 main challenges (1000 characters) you encountered? And why?(e.g. Quality assurance of recyclate and to certify products incorporating recyclate 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 recyclate and product certification incorporating recyclate composites was a hindrance). *

1. Hesitation of government in adopting the technology, as it is not in the government schedule list, yet.
2. Lack of financing opportunities to incentivise the locals to the technology.
3. Transportantion of Straw for the construction of the bricks.

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 recyclate and product certification). *

1. The new design of PSH buildings at Phyang achieved indoor temperatures of around 22 °C average without any back-up heating when outside temperatures were around -10 to -15 °C when non heated rooms in non PSH buildings were at around -3 °C.
2. The PSH buildings are capable of achieving full autonomy through passive solar heating in Ladakh.
3. The cost of heating of conventional buildings exceeds the construction cost of the PSH buildings itself in roughly 11 years.

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

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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). *

NA

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

Not yet. It is still under study at HIAL.

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 recources. Verified by one of the authors, namely Al Amin Mohamed Sultan). *

yes. The buildings performance has been studied. However, no publication has happened yet.

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

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