

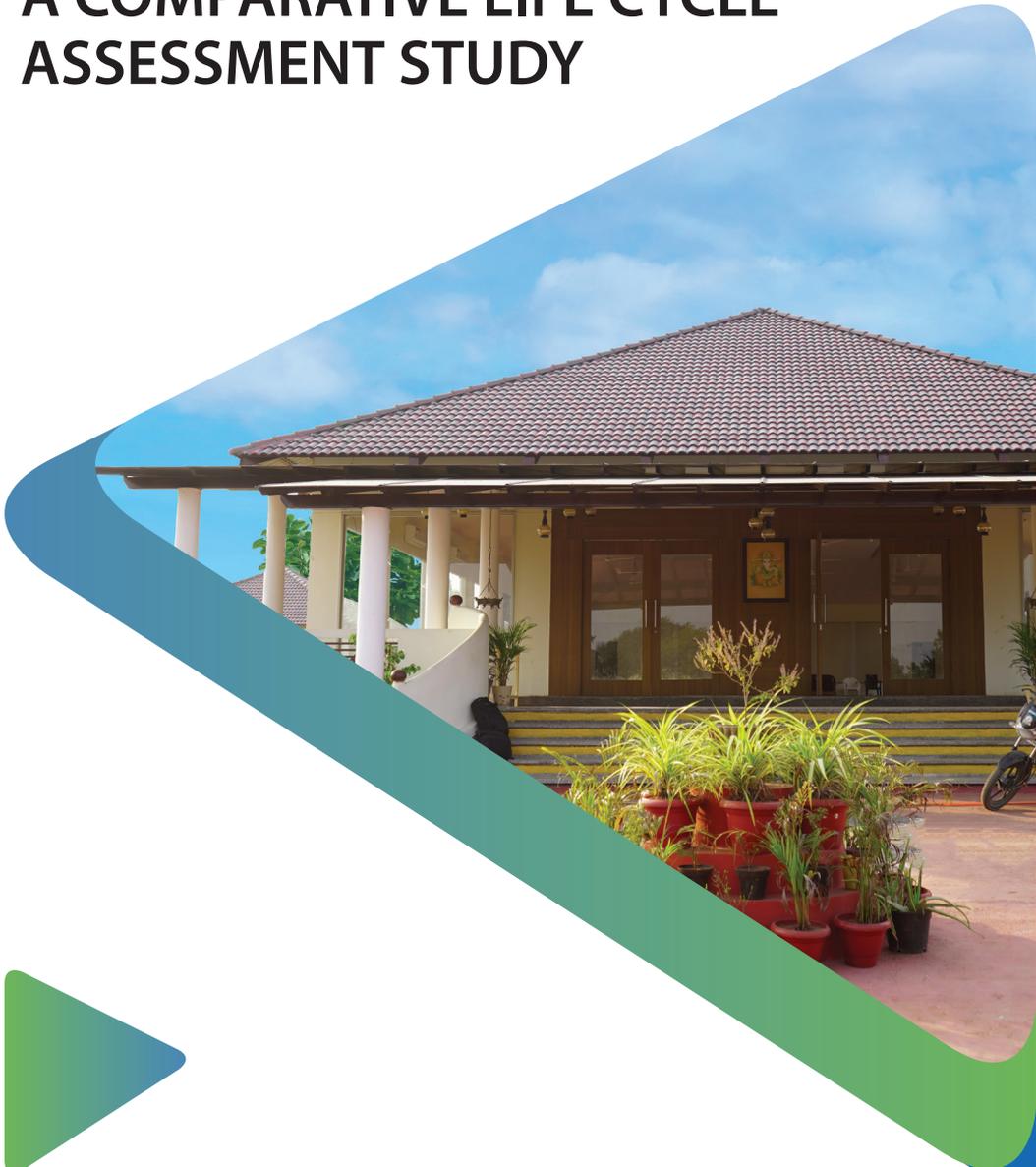
TATA STEEL

#WeAlsoMakeTomorrow



HABINEST & CONVENTIONAL BUILDING:

A COMPARATIVE LIFE CYCLE ASSESSMENT STUDY





WHAT IS LIFE CYCLE ASSESSMENT (LCA)?

LCA is a holistic way of accounting the environmental impact of a product considering the entire life cycle stages of the product thus avoiding any shifting of impacts between life cycle stages.

LCA studies are guided by ISO 14040 & 44 and involves a complete list of inventory flows in each stage that includes materials, energy, wastes, emissions, etc.

Objective of this Study

Quantify the life cycle environmental impacts of a HabiNest structure and compare it with a conventional structure of similar size and application.

Identify if HabiNest is an environmentally preferable solution as compared to conventional structure.

Study's Scope

Cradle to Grave (Raw Material production + Transportation of Raw Materials + Construction + End of Life).

Study excludes the "Use-Phase" operational impact of both the structures but considers end of life impact.

Key Findings

HabiNest offers significant environmental savings when compared with a similar size conventional structure, these savings are equivalent to:



GHG savings which are equivalent to 3 lakh kms of distance not driven by an average passenger car or 40,000 kg of coal not getting burned.*



Savings in Primary Energy Demand which are equivalent to saving 68,086 units of electricity in India.**

* Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

** Source: GaBi database - 1 unit of India Grid Mix electricity has PED of 13.25 MJ

Cover Images: HabiNest unit at Greenko (Left) & under construction HabiNest Classroom Building, Jamshedpur
Image : RMHS area inside TSL Jamshedpur Plant

NEST-IN HABINEST

HabiNest is one of the branded products of Tata Steel's Nest-In construction solution. It is a light gauge steel frame solution, suitable for building academic institutional buildings, residential buildings, plant offices, community centres, cafeterias and much more. The HabiNest buildings are constructed in almost one-third the time it takes for conventional construction, and are completely hassle-free.

A Life Cycle Assessment study was carried out for a recently constructed HabiNest structure of a classroom building for a new medical college coming up in Jamshedpur. The total built area of the construction is 2400 square feet. A similar size of conventional structure was considered for comparison.

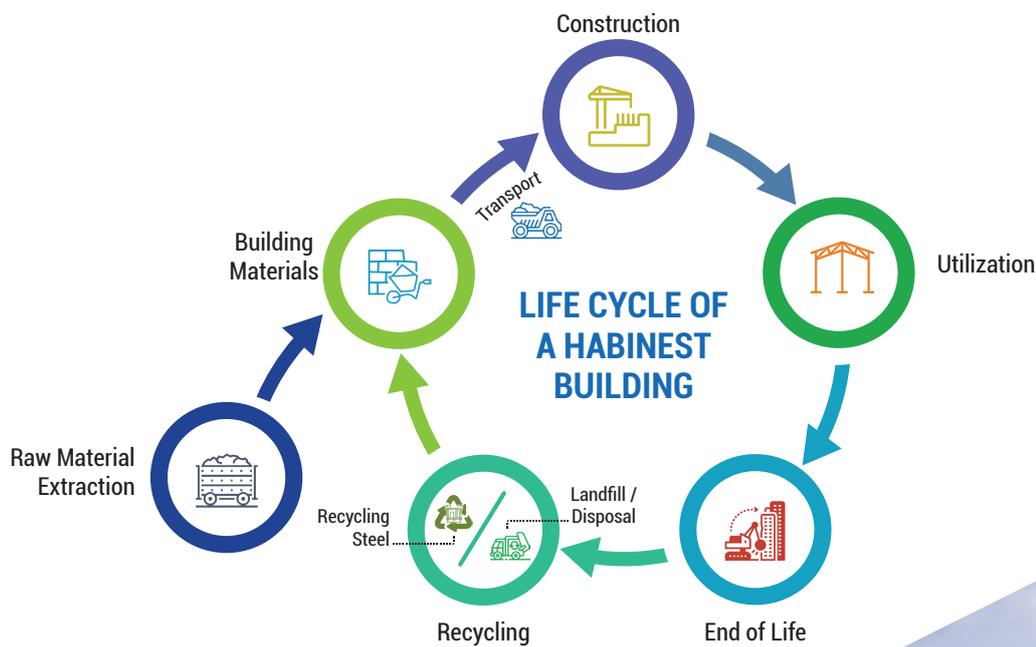
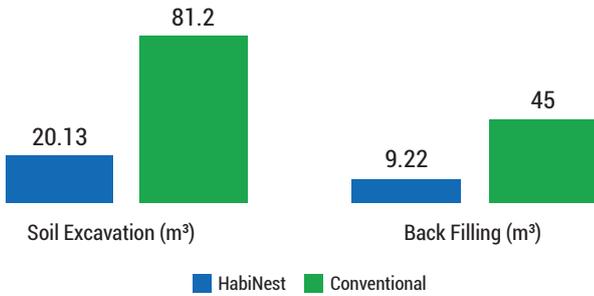


Image: HabiNest Classroom Building, Jamshedpur

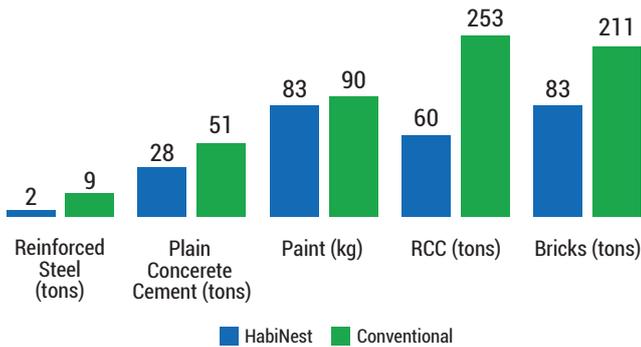
COMPARISON OF MATERIAL CONSUMPTION BETWEEN HABINEST STRUCTURE AND CONVENTIONAL STRUCTURE



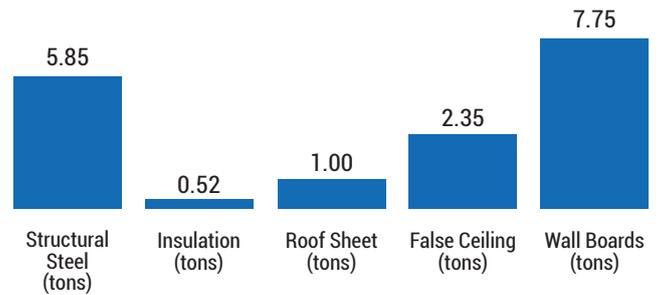
Earthwork Comparison



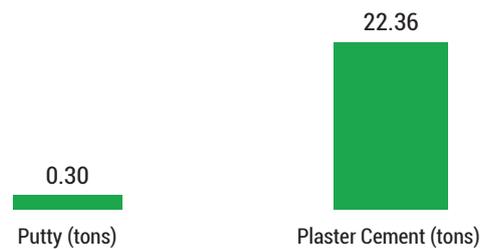
Comparison of Materials used in both Structures



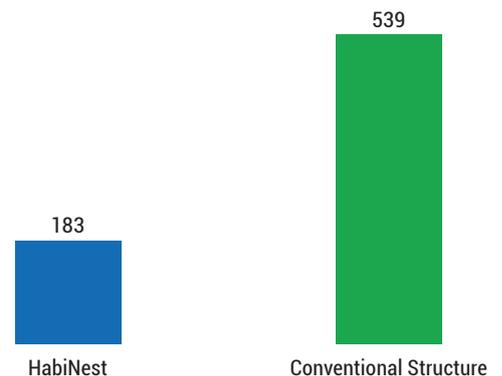
Materials used only in HabineSt Structure



Materials used only in Conventional Structure



Waste to landfill (tons)



SUMMARY

Total tonnage of materials used in HabineSt is about 192 tons while for a similar conventional structure it is about 547 tons. Though different types of materials are used in constructing HabineSt, this type of construction consumes only 35% of the material resources when compared with a conventional structure, thus conserves resources.

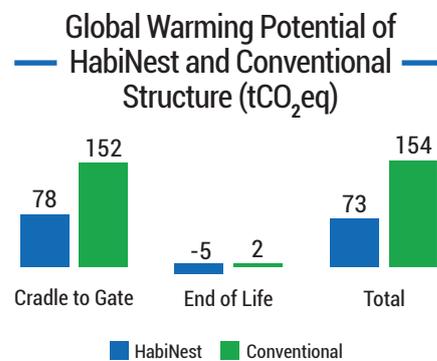
At the end of life, reduction of 66% waste to landfill is achieved using the HabineSt structure leading to less burdens on the waste disposal system and the existing landfills.

Life Cycle Inventory (LCI) data flows were collected, analysed and modelled into LCA software GaBi. Results were taken for HabineSt and Conventional structures on the following categories – Global Warming Potential, Acidification Potential, Eutrophication Potential, Human Toxicity Potential, Primary Energy Demand from renewable & non-renewable resources and Total freshwater consumption. It is assumed that both the HabineSt and Conventional structures have a life of 70 years.

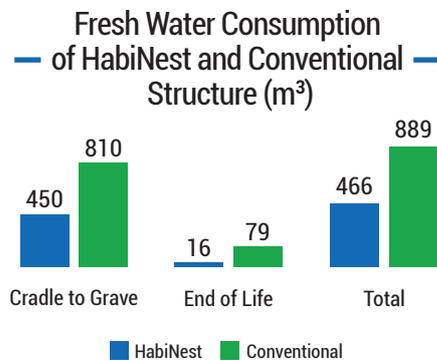


LIFE CYCLE IMPACT ASSESSMENT RESULTS OF HABINEST AND CONVENTIONAL STRUCTURE

LCIA Impact Categories	Unit of measurement	HabiNest			Conventional Structure			% savings w.r.t. conventional structure
		Cradle to Grave	End of Life	Total	Cradle to Grave	End of Life	Total	
Global Warming Potential (100 years), excluding biogenic carbon	ton CO ₂ eq.	78	-5	73	152	2	154	53%
Acidification Potential	kg SO ₂ eq.	407	11	418	948	57	1004	58%
Eutrophication Potential	kg PO ₄ ³ -eq	34	3	37	85	8	93	61%
Human Toxicity Potential	kg DCB eq.	14836	-463	14373	35674	99	35773	60%
Primary energy demand from ren. and non ren. resources (net cal. value)	GJ	798	2	800	1599	103	1702	53%
Total freshwater consumption	m ³	450	16	466	810	79	889	48%



SUMMARY
Greenhouse gas related impacts (Global Warming Potential) of HabiNest structure is 53% lesser than Conventional structure. Constructing conventional structure releases 154 tons of CO₂eq whereas HabiNest releases only 73 tons of CO₂eq considering over its lifecycle.

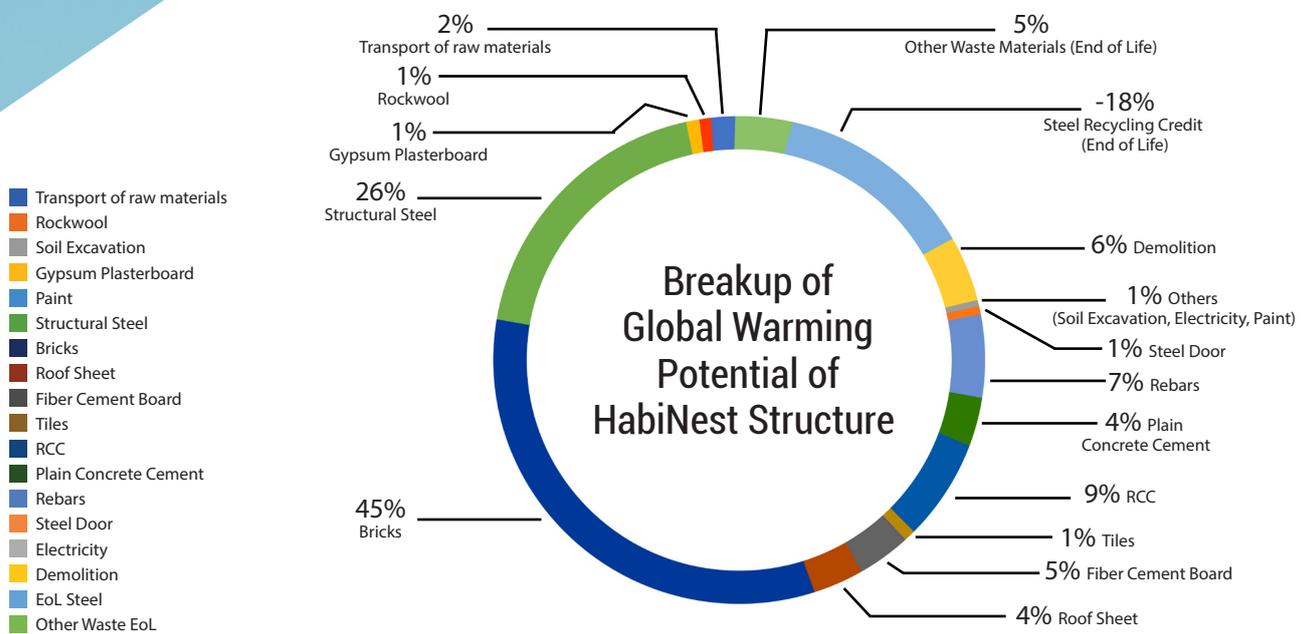


SUMMARY
Constructing HabiNest structure consumes 48% less fresh water than a similar conventional structure over its life cycle.

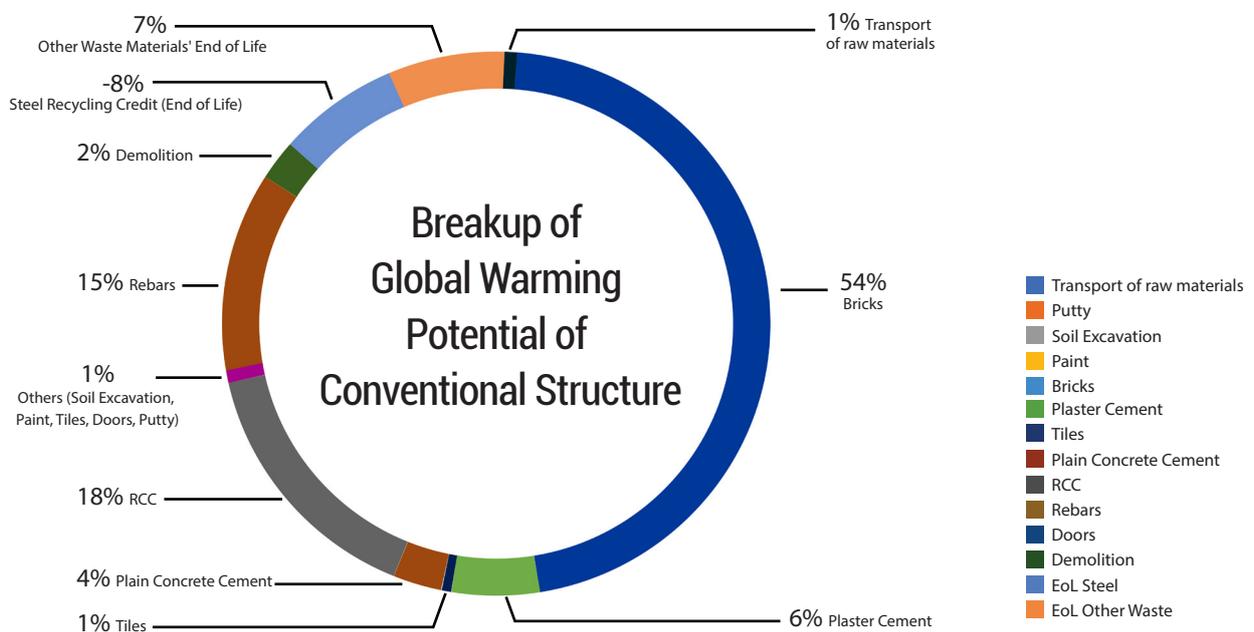
Environmental savings of HabiNest are found to be in the range of 48% to 61% when compared with a conventional structure.

Image: HabiNest Classroom Building, Jamshedpur

GLOBAL WARMING POTENTIAL



- Transport of raw materials
- Rockwool
- Soil Excavation
- Gypsum Plasterboard
- Paint
- Structural Steel
- Bricks
- Roof Sheet
- Fiber Cement Board
- Tiles
- RCC
- Plain Concrete Cement
- Rebars
- Steel Door
- Electricity
- Demolition
- EoL Steel
- Other Waste EoL



- Transport of raw materials
- Putty
- Soil Excavation
- Paint
- Bricks
- Plaster Cement
- Tiles
- Plain Concrete Cement
- RCC
- Rebars
- Doors
- Demolition
- EoL Steel
- EoL Other Waste



CONCLUSION

Overall, it was found that the environmental impacts of a steel based HabaNest structure is comparatively lesser than a similar conventional structure and so it is an environmentally preferable solution than a conventional one. In addition to having lesser “Cradle to Grave” impacts, HabaNest also offers environmental benefits during its end of life.

HabaNest structure is easy to disassemble during its end of life and the recovered steel materials can be recycled giving an environmental credit of -5 tons of CO₂eq, whereas in similar conventional structure, materials used are predominantly landfilled adding an environmental burden of 2 tons of CO₂eq.



TATA STEEL

WeAlsoMakeTomorrow

Tata Steel Limited
52, Jawaharlal Nehru Road
Kolkata - 700 071, India
www.tatasteel.com



www.nestin.co.in

Disclaimer : These findings are based on an internal LCA study carried out by Tata Steel's Corporate Sustainability Team