🏫 Fatima Central Secondary School

🧱 Project Report on Carbon Cut Bricks – Using Fly Ash & Agricultural Residues

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Class : 9-B

1 Introduction

Carbon Cut Bricks are an eco-friendly alternative to clay and cement bricks. They use fly ash, rice husk ash, and sugarcane bagasse ash as key ingredients, converting waste into durable building materials. These materials cut CO_2 emissions by nearly 60% compared with traditional production.

2 Background & Need

Brick production in India emits around 250 million tons of CO_2 annually. Clay extraction damages farmland; open burning of crop residues causes severe air pollution. Carbon cut Bricks address both by recycling waste while lowering energy demand.

3 Objectives

- Reduce CO_2 and particulate emissions.
- Utilize industrial and agricultural waste.
- Lower production cost by 25–30%.
- Encourage sustainable rural entrepreneurship.

4 Raw Materials

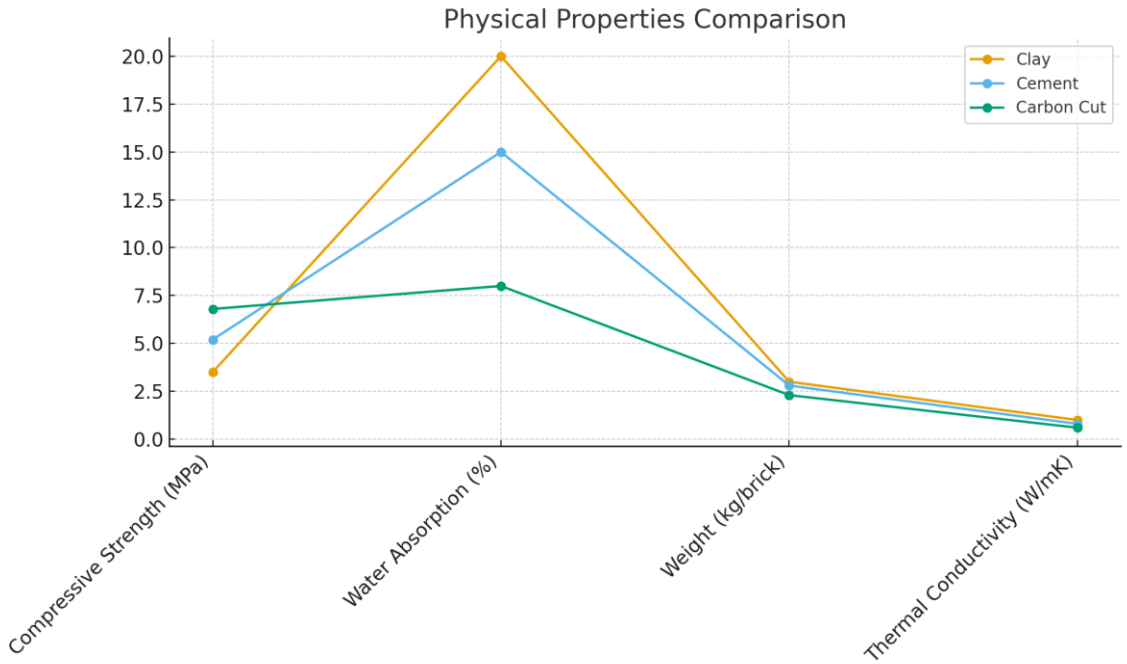
Material	Source	Function	% by weight

Fly Ash	Thermal Power Plants	Pozzolanic binder	60
Rice Husk Ash	Agriculture	Silica strengthener	20
Lime & Gypsum	Chemical Plants	Binding agents	10
Water & Additives	—	Plasticity control	10

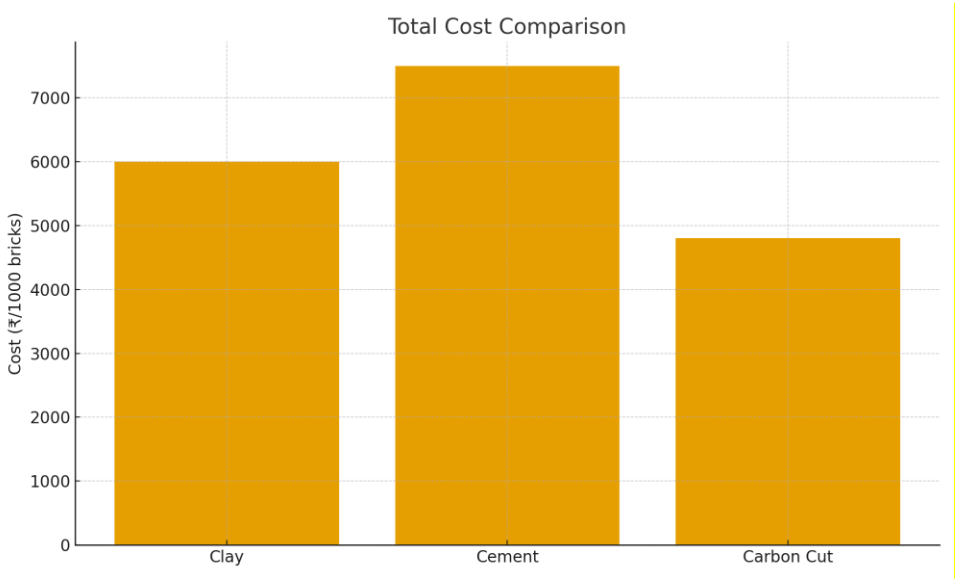
5 Manufacturing Process

1. Collect and dry raw materials.
2. Grind to uniform fineness.
3. Mix with water to semi-plastic consistency.
4. Press into molds under 8–10 MPa.
5. Cure for 7 days in steam or sunlight.

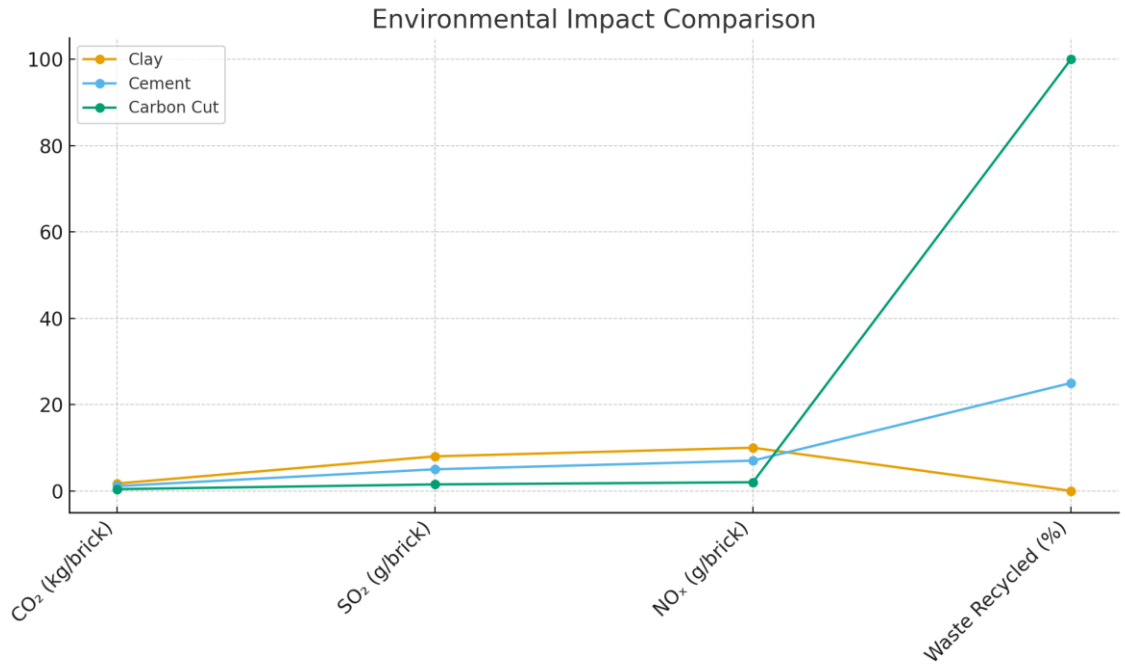
6 Physical Properties Comparison



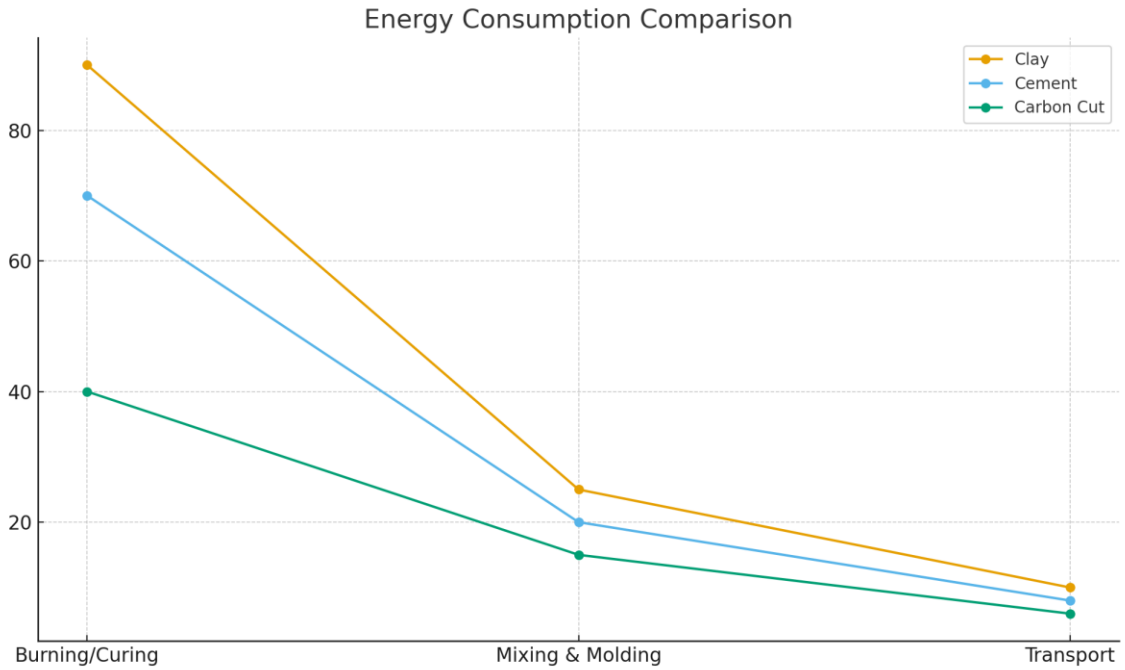
7 Cost Analysis



8 Environmental Impact



9 Energy Consumption



10 Advantages

🌿 Environmental: Uses waste, lowers emissions by ~70%.

💰 Economic: 20–30% cheaper than clay bricks; less fuel use.

🏗️ Technical: Higher strength and thermal insulation.

⚙️ Operational: Shorter curing time → faster production.

11️⃣ Applications

🏠 Low-cost housing

🏛️ Government projects (PMAY)

🏙️ Smart city infrastructure

🛣️ Eco-friendly pavements

⛑️ Disaster relief shelters

12️⃣ Future Innovations

- Solar-powered curing chambers to achieve net-zero production.
- Addition of nano-silica for enhanced strength.
- Integration of AI for mixture optimization.

13️⃣ Conclusion

Carbon Cut Bricks demonstrate that industrial and agricultural waste can be repurposed into strong,

economical, and eco-friendly construction materials. If adopted nationwide, these bricks could cut India's construction-sector CO_2 emissions by over 40%.

14 References

1. Central Pollution Control Board (India) – Fly Ash Utilization Report 2024

2. Bureau of Energy Efficiency – Brick Sector Energy Benchmarking

3. UN Sustainable Development Goals (9, 11, 12, 13)

4. NITI Aayog Sustainability Review 2023

End of Report

15 Impact of Old-Fashioned Bricks on India

- Traditional brick kilns use outdated technologies that burn large amounts of coal, releasing high levels of CO_2 and black carbon.

- Brick kilns in India account for about 250 million tons of CO_2 annually, contributing heavily to global warming.

- Clay extraction for bricks removes fertile topsoil, reducing agricultural productivity and harming rural livelihoods.

- Unregulated kilns often operate without emission controls, worsening local air quality and increasing respiratory diseases.

▪ The old-fashioned brick industry employs inefficient practices that increase production costs and environmental damage.

16 Delhi Pollution Due to Traditional Bricks

▪ Delhi's air pollution is aggravated by emissions from nearby brick kilns, especially during winter months.

▪ Incomplete combustion of coal in old kilns releases fine particulate matter (PM2.5) that contributes to severe smog.

▪ Satellite data shows that brick kiln clusters around Delhi are major contributors to its air quality index (AQI) deterioration.

▪ Toxic gases such as sulfur dioxide (SO_2) and nitrogen oxides (NOx) are produced, leading to respiratory and cardiovascular issues.

17 Cost-Effectiveness & Safety of Carbon Cut Bricks

▪ Production cost is 25–30% lower compared to conventional bricks due to the use of waste materials.

▪ Reduced energy requirement minimizes fuel expenses and lowers dependency on coal.

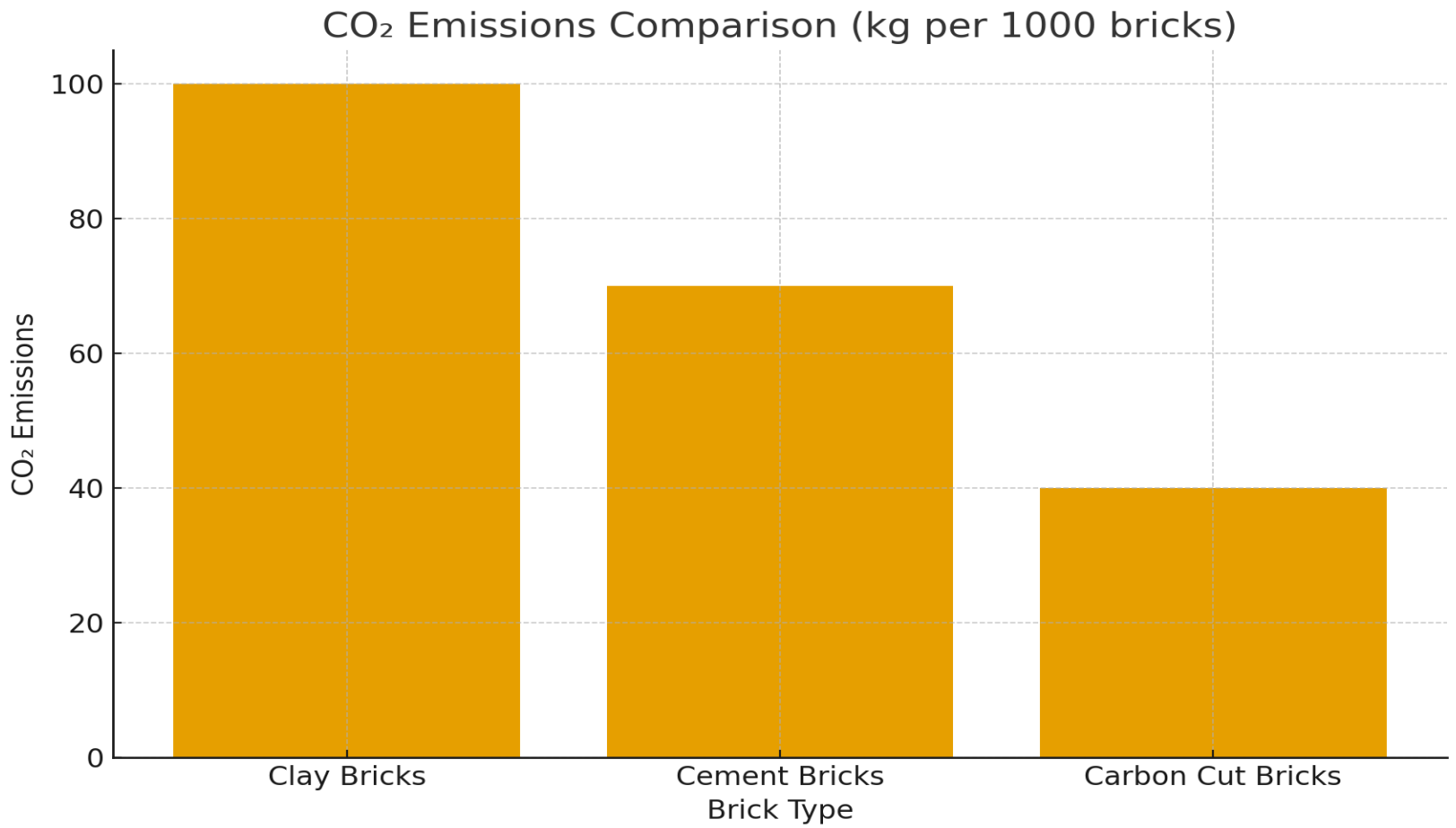
▪ The curing process is safer, eliminating the need for high-temperature kilns that emit harmful gases.

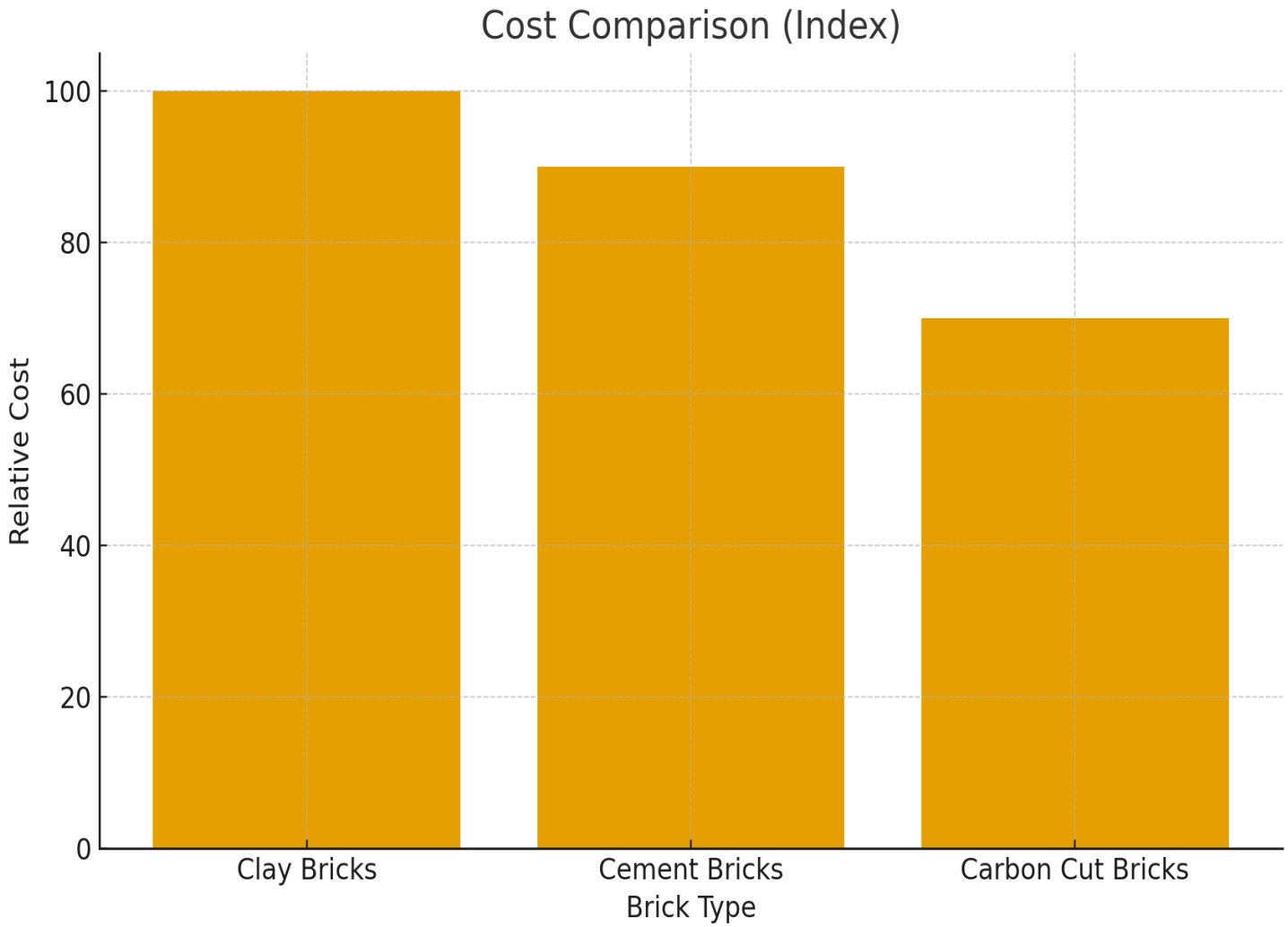
▪ Carbon Cut Bricks are lighter, stronger, and thermally more stable, ensuring long-term structural safety.

▪ Adoption of Carbon Cut can save millions in healthcare costs by reducing air pollution and worker exposure to toxins.

18 Graphical Analysis

The following graphs compare the CO_2 emissions and cost efficiency of different brick types:


CO₂ Emissions Comparison (kg per 1000 bricks)
CO₂ Emissions
0
20
40
60
80
100
Clay Bricks
Cement Bricks
Carbon Cut Bricks
Brick Type


Cost Comparison (Index)
Relative Cost
100
80
60
40
20
0
Clay Bricks
Cement Bricks
Carbon Cut Bricks
Brick Type