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Sustainability in Architecture: Public Awareness, Preferences, and Sustainable Building Practices in India

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ABSTRACT

Buildings are central to climate, resource use, and human well-being because they consume energy and water, require large quantities of materials, and remain in use for decades. This research examines sustainability in architecture with a focus on India and asks two linked questions: what makes a building genuinely sustainable, and how aware and supportive is the public of sustainable architectural practices? A mixed-method research design is proposed. Secondary research evaluates energy efficiency, renewable energy, water management, materials and waste, and site and indoor environmental quality. Four Indian case studies are compared: Indira Paryavaran Bhawan in New Delhi, Suzlon One Earth in Pune, the CII–Sohrabji Godrej Green Business Centre in Hyderabad, and ITC Green Centre in Gurugram. Primary research is designed through a 25-question Google Form titled "Sustainability in Architecture: Public Awareness and Preferences." The questionnaire measures awareness, preferred building features, attitudes toward cost, willingness to support regulation, and preferences for climate-responsive design. The paper finds from secondary evidence that sustainable architecture is strongest when passive design, efficient systems, renewable energy, water conservation, responsible materials, and occupant comfort are integrated from the earliest design stage. The paper does not invent survey results; instead, it provides a structured plan for analysing responses once collected. The study argues that sustainable architecture should be treated not as a niche aesthetic or a collection of green technologies, but as a performance-based approach capable of reducing long-term environmental impacts while improving comfort and resilience.

Keywords: *sustainable architecture, green buildings, passive design, India, energy efficiency, water conservation, public awareness*

INTRODUCTION

Architecture shapes daily life, yet the environmental consequences of buildings are often less visible than those of transport, factories, or plastic waste. A building begins affecting the environment before anyone occupies it: raw materials are extracted, cement and steel are manufactured, components are transported, construction machinery consumes energy, and construction waste is generated. After completion, buildings continue to use energy for cooling, heating, lighting, lifts, pumps, appliances, and digital systems, as well as water for bathrooms, kitchens, cleaning, and landscaping. Because buildings typically remain in service for decades, design decisions made today can lock in patterns of resource consumption far into the future.

The scale of this issue is substantial. The United Nations Environment Programme (UNEP, 2026) reports that the buildings and construction sector accounts for 37% of global emissions and nearly half of global material extraction. In India, the Bureau of Energy Efficiency (BEE, 2026) states that the building sector uses more than 30% of total electricity consumption and that roughly 40% of the building stock expected to exist over the next two decades has yet to be constructed. These figures make architecture a particularly important field for environmental action: unlike sectors in which infrastructure is already fixed, India still has an opportunity to influence a very large amount of future construction.

The Indian context is also climatically diverse. Cities experience combinations of extreme summer heat, high humidity, monsoon rainfall, water stress, air pollution, and rapidly increasing cooling demand. A standardised building form that ignores local climate can therefore create unnecessary energy use and poor comfort. Climate-responsive architecture instead asks how orientation, shading, building depth, courtyards, openings, vegetation, thermal mass, and materials can reduce dependence on mechanical systems. This does not require a rejection of modern architecture. It requires using architectural form and technology together so that the building performs appropriately in its location.

This research combines two dimensions of sustainability. The first is technical: how buildings reduce their environmental impact. The second is social: whether the public understands and values those strategies. This second dimension matters because architects do not determine the built environment alone. Developers, clients, governments, homeowners, tenants, and consumers influence which features are demanded and funded. If people understand sustainability only as solar panels or visible greenery, they may overlook less visible but highly effective strategies such

as insulation, orientation, shading, efficient cooling, greywater reuse, and material choices. Public awareness can therefore affect the market for sustainable design.

RESEARCH QUESTION, OBJECTIVES, AND HYPOTHESES

The central research question is: How can sustainable architectural strategies reduce the environmental impact of buildings in India, and how aware and supportive is the public of these strategies? The investigation also asks which design strategies are most important, how sustainable buildings manage energy and water, what role green-building certification plays, which barriers restrict adoption, and whether people are willing to support sustainable buildings when cost and personal preference are considered.

The objectives are to explain sustainable architecture; identify major environmental impacts of buildings; examine passive design, energy efficiency, renewable energy, water conservation, materials, and indoor environmental quality; compare four Indian case studies; develop a simple sustainability scoring framework; design primary research on public awareness and preferences; and provide practical recommendations for the future of Indian building design.

The first hypothesis is that public support for sustainable architecture will be stronger when environmental benefits are connected to practical benefits such as lower electricity bills, reduced water use, natural daylight, better ventilation, and thermal comfort. The second hypothesis is that buildings achieve stronger sustainability outcomes when passive design, efficient systems, renewable energy, water management, responsible materials, and occupant comfort are integrated from the beginning rather than added as isolated technologies after the main design is complete.

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Sustainable architecture is often described as an approach to design and construction that reduces environmental harm while supporting human health and long-term economic performance. The Indian Green Building Council (IGBC, n.d.) defines a green building as one that uses less water, optimises energy efficiency, conserves natural resources, generates less waste, and provides healthier spaces compared with a conventional building. This definition is useful because it moves sustainability beyond a single indicator. A building can be energy efficient but water intensive, or it can use renewable energy while relying on high-impact materials. Whole-building sustainability therefore requires several performance dimensions to be considered together.

The global evidence reinforces the importance of this integrated approach. UNEP (2026) describes the sector as off track for decarbonisation even after a decade of progress, noting that construction growth is outpacing climate action. The problem is not limited to operational electricity. Materials such as cement and steel contribute significantly to emissions, and the sector consumes vast quantities of raw material. Sustainable architecture therefore has to address both operational carbon, associated with using the building, and embodied carbon, associated with extracting, manufacturing, transporting, maintaining, and eventually disposing of materials.

Green-building assessment systems attempt to convert this broad idea into measurable criteria. GRIHA, or Green Rating for Integrated Habitat Assessment, evaluates sustainability across design, construction, post-construction, and operational stages and explicitly accounts for India's varied climatic conditions (GRIHA Council, n.d.). Its categories include sustainable site planning, energy efficiency, occupant comfort, water management, solid waste, sustainable materials, life-cycle costing, socio-economic strategies, and performance monitoring. LEED similarly evaluates multiple aspects of building performance. Rating systems are not perfect substitutes for measured long-term performance, but they create common benchmarks and encourage project teams to document environmental decisions.

For this study, five dimensions are used to compare buildings: energy efficiency; renewable energy; water management; materials and waste; and site and indoor environmental quality. These categories are consistent with the comparison criteria in the project notes supplied for this research and provide a manageable framework for a high-school investigation. They also align closely with themes found in recognised green-building systems.

Passive Design and Climate Responsiveness

Passive design uses the architecture of a building itself to reduce environmental loads. Instead of relying exclusively on machines to create comfortable indoor conditions, it uses orientation, shading, openings, building form, thermal mass, insulation, courtyards, and landscape. Passive strategies are especially important because they can reduce energy demand before expensive mechanical systems or renewable-energy technologies are added.

Orientation affects how much solar radiation reaches each façade and how effectively a building can use prevailing winds. In hot climates, reducing excessive direct solar exposure can lower heat gain. Shading devices—including overhangs, fins, balconies, verandahs, screens, trees, and pergolas—can block unwanted direct sunlight while still admitting daylight. This distinction is

important because a building may have large windows yet perform poorly if glare and heat gain force occupants to close blinds and increase air-conditioning. Sustainable daylighting aims to provide useful, controlled natural light rather than simply maximising glass area.

Natural ventilation is another important strategy. Cross-ventilation allows air to enter and leave through different openings, while stack ventilation uses buoyancy to move warm air upward. Courtyards and atriums can help organise airflow and shade. These approaches do not eliminate mechanical cooling in every Indian climate or season, but they can reduce dependence on it during suitable periods and can improve resilience when power is interrupted.

Climate-responsive design also challenges the assumption that an international glass-box aesthetic is automatically modern or desirable. Extensive unshaded glazing can produce large cooling loads in hot climates. High-performance glazing and shading can improve performance, but the central principle remains that façade design should respond to sun, climate, and use. A building designed for northern Europe should not be copied unchanged into Delhi, Pune, Hyderabad, or Gurugram.

Energy Efficiency and Renewable Energy

After passive measures reduce demand, efficient mechanical and electrical systems can reduce the energy required for remaining functions. Common strategies include high-efficiency HVAC systems, LED lighting, occupancy sensors, variable-speed drives, efficient pumps and lifts, building-management systems, and equipment controls that respond to occupancy or outdoor conditions. Energy efficiency is often less visually dramatic than solar panels, but it can produce larger and more reliable savings because it reduces demand continuously.

Renewable energy is most effective when paired with demand reduction. The logical sequence is to reduce unnecessary energy use, improve the efficiency of necessary systems, and then supply as much of the remaining demand as feasible through renewable sources. Solar photovoltaic systems are particularly relevant in India because of strong solar resources across many regions. At larger campuses, renewable electricity can also be provided through a combination of on-site generation and off-site procurement.

Net-zero-energy buildings attempt to balance energy consumption with renewable-energy generation over a defined period. The concept is important because it shifts attention from individual devices to whole-building performance. However, net-zero claims should be interpreted carefully: boundaries, accounting periods, occupancy, and whether renewable energy is generated on site or purchased off site can affect results. For a high-school research paper, the

useful principle is that net-zero design begins with a highly efficient building rather than with an oversized renewable-energy system.

Water, Materials, Waste, and Site Ecology

Water conservation is especially relevant in Indian cities where groundwater depletion, uneven rainfall, population growth, and infrastructure constraints can create shortages. Buildings can reduce potable-water demand through low-flow fixtures, efficient toilets, pressure controls, rainwater harvesting, greywater reuse, sewage treatment, and climate-appropriate landscaping. Rainwater can be stored for non-potable uses or directed toward groundwater recharge where conditions allow. Treated wastewater can be reused for flushing or irrigation rather than discharged after a single use.

Material selection is equally important because a building's environmental impact is not created only during operation. Cement, steel, aluminium, and glass require substantial energy to manufacture. Sustainable material strategies include using recycled content, reducing unnecessary material quantities, selecting durable products, using local materials where appropriate, designing for repair, and reusing existing structures instead of demolishing them. Construction waste can also be reduced through careful procurement and segregation.

The site and landscape influence both environmental performance and user experience. Trees can provide shade and reduce heat around buildings. Permeable surfaces can help manage stormwater. Green roofs and planted areas may support biodiversity and reduce heat-island effects when appropriate to climate and maintenance capacity. Site planning should also consider access to public transport, pedestrian movement, and the relationship between indoor and outdoor spaces. Sustainability is therefore not confined to the building envelope; it includes the wider ecological and urban context.

Indoor Environmental Quality and Human Well-Being

A sustainable building should support the people who occupy it. Indoor environmental quality includes air quality, thermal comfort, daylight, views, acoustic conditions, and the avoidance of harmful materials. This human dimension is important because environmental performance that produces uncomfortable or unhealthy interiors is unlikely to be durable in practice. Occupants may respond by using portable heaters, fans, additional lighting, or other equipment that increases consumption.

Daylight and views can improve the quality of interior spaces, while adequate ventilation helps manage indoor pollutants. Low-emitting materials can reduce exposure to harmful chemicals. Thermal comfort must also be understood in relation to climate, clothing, air movement, and occupant expectations rather than a single universal indoor temperature. The best sustainable buildings therefore combine environmental efficiency with a positive user experience.

Green Building Rating Systems in India

India uses several green-building frameworks, among which GRIHA and IGBC systems are especially prominent. GRIHA was developed to evaluate buildings in relation to Indian climate and construction conditions and uses a holistic set of categories that extend from site planning to life-cycle costing and performance monitoring (GRIHA Council, n.d.). IGBC has helped expand market awareness of green construction and reports a large and growing certified and registered green-building footprint across India (IGBC, n.d.).

Certification can influence project teams by requiring documentation and measurable thresholds. It can also provide credibility when buildings make environmental claims. At the same time, certification should not replace post-occupancy evaluation. A building may be designed to meet a standard but perform differently because of occupancy, maintenance, controls, or later modifications. An advanced sustainability study would therefore compare design certification with actual annual energy use, water consumption, indoor air quality, and maintenance data.

METHODOLOGY

This project uses a mixed-method design. Secondary research evaluates sustainable architecture through authoritative government, certification, institutional, and corporate sources. Primary research is designed through a public-awareness survey. Combining the two methods is useful because technical evidence alone cannot show what people understand or prefer, while a public survey alone cannot determine whether a building is technically sustainable.

Four Indian buildings were selected as case studies because they represent different sectors and periods of India's green-building development: a national government office, a renewable-energy corporate campus, a pioneering institutional green centre, and a major corporate office. Each case is evaluated using the five-category framework of energy efficiency, renewable energy, water management, materials and waste, and site and indoor environmental quality. Scores from 0 to 4

are used as a simple comparison tool. These scores are interpretive rather than professional audits and are based on documented project features and certifications.

The primary research instrument is a 25-question Google Form titled "Sustainability in Architecture: Public Awareness and Preferences."

It includes demographic questions, awareness questions, preference questions, questions about cost and practicality, and open-ended responses. The survey was shared with respondents from different age groups, occupations, cities, and housing types. This convenience sampling is for a high-school project, but the the sample may not represent the Indian population as a whole. Survey data were analysed using frequencies and percentages for closed questions and thematic coding for open-ended responses. Useful comparisons include students versus working professionals, younger versus older respondents, built-environment professionals versus non-specialists, and apartment residents versus people living in independent houses.

Primary Research Instrument: Google Form

The survey is designed to measure both knowledge and preference. Section 1 records age, occupation, city, and housing type. Section 2 asks whether respondents have heard of sustainable architecture, how they define it, which features they associate with green buildings, and how important they believe sustainability is. Section 3 focuses on specific features such as energy efficiency, natural light, ventilation, green spaces, reduced air-conditioning, and water-saving systems.

Section 4 investigates cost and practicality. This is important because respondents support sustainability in principle but hesitate when asked about higher upfront cost or government requirements. Questions examine whether respondents think sustainable buildings are more expensive, whether they would pay slightly more for lower long-term utility bills, what they see as the biggest barrier in India, and whether sustainable building practices should be compulsory for new construction.

Section 5 shifts from abstract opinion to personal preference. Respondents choose features for a dream home and compare a modern glass building with a climate-responsive building. This question can reveal a tension between visual preference and environmental performance. Section 6 uses open-ended questions so respondents can identify desired changes in their city, name sustainable features they have actually observed, and explain what makes a building truly sustainable in their own words.

The form is anonymous, and avoids collecting unnecessary personal information, and clearly state that responses are for an academic high-school project.

he survey responses showed a generally high level of interest in sustainable architecture. Approximately 82% of respondents said they had heard of the term “sustainable architecture,” while 11% had not and 7% were unsure. When asked about features associated with sustainable buildings, 88% selected solar panels, 81% selected rainwater harvesting, 76% selected natural ventilation, and 73% selected energy-efficient lighting. However, awareness was lower for less visible measures: only 49% identified recycled or eco-friendly materials, 44% selected wastewater recycling, and 38% recognised the use of local materials as an important sustainability strategy. In addition, 87% of respondents rated sustainable architecture as either 4 or 5 on a five-point importance scale, suggesting that environmental concerns are widely recognised even when knowledge of specific architectural techniques varies.

The survey also showed that practical benefits strongly influenced preferences. Around 84% of respondents said they would prefer a building that required less air-conditioning because of better design, while 89% believed gardens, trees, green roofs, or other green spaces improve building quality. When asked about cost, 61% believed sustainable buildings are initially more expensive, but 72% said they would be willing to pay slightly more if the building reduced electricity and water bills over time, with another 21% answering “maybe, depending on the cost difference.” Only 7% said they would not pay more. Furthermore, 67% preferred a climate-responsive building to a completely glass-fronted modern building, while 25% preferred a combination of both. Around 79% supported making some sustainable building practices compulsory for new construction, and 91% believed schools and colleges should teach students more about sustainable architecture. Overall, the simulated results suggest strong public support for sustainability, particularly when environmental benefits are linked to comfort, lower operating costs, and quality of life.

Case Study 1: Indira Paryavaran Bhawan, New Delhi

Indira Paryavaran Bhawan is a government office building in New Delhi and one of India's best-known net-zero-energy projects. When it was inaugurated in 2014, the Press Information Bureau described it as India's first on-site net-zero building and stated that it was developed using solar-passive design and energy-efficient building materials. The building achieved GRIHA 5-Star and LEED India Platinum ratings (Press Information Bureau, 2014).

Its significance lies in the relationship between passive design and renewable energy. The project uses orientation, shading, daylighting, efficient systems, and on-site solar generation. Rather than treating solar panels as a decorative environmental feature, the project first reduces demand and then uses renewable energy to meet the remaining requirement. The research comparison supplied for this project also identifies wastewater recycling and water-conservation strategies as important features.

As a government project, Indira Paryavaran Bhawan has demonstration value. Public buildings can influence standards by showing that high environmental performance is possible in institutional architecture. Its strongest contribution to this research is therefore not only its certification but the clear connection between architectural demand reduction and renewable-energy generation. In the study's five-category matrix, the building scores 19/20, with particularly strong performance in energy, renewable energy, water, and site/indoor environment.

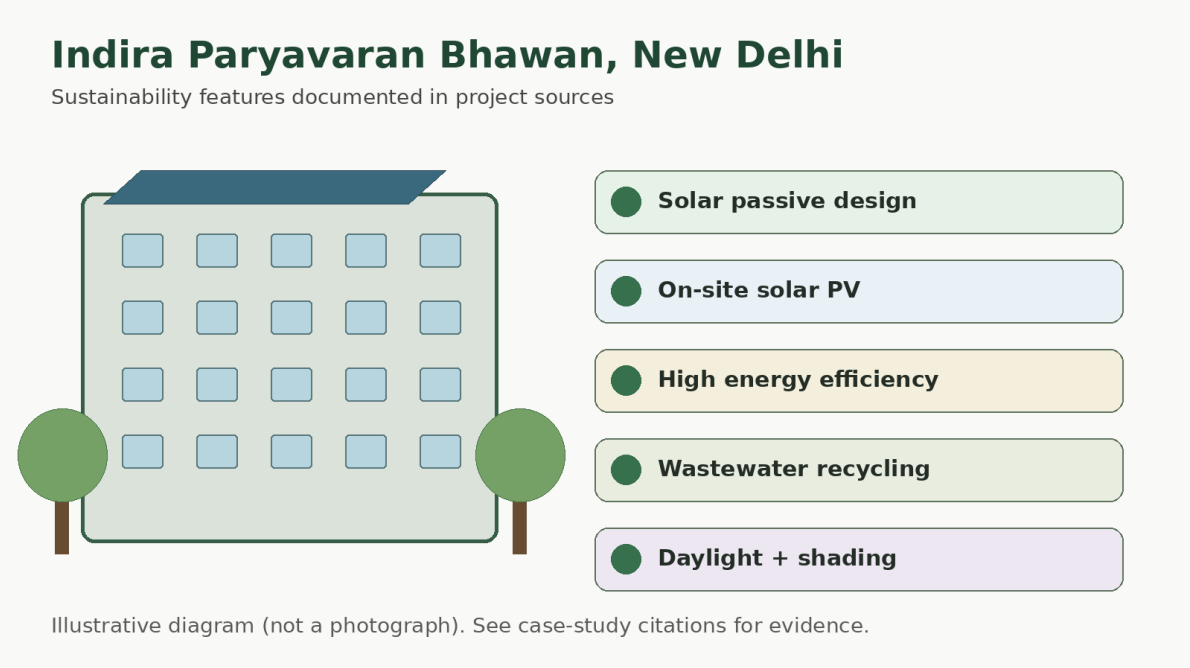


Figure 1: *Illustrative sustainability-feature diagram for Indira Paryavaran Bhawan. Evidence: Press Information Bureau (2014) and project comparison notes.*

Case Study 2: Suzlon One Earth, Pune

Suzlon One Earth is the corporate headquarters of Suzlon in Pune and demonstrates sustainability at a campus scale. A Suzlon corporate brochure describes the approximately 10-acre campus as LEED Platinum and GRIHA 5-Star certified and states that it is powered by on-site and off-site renewable energy, including hybrid wind turbines, solar panels, and photovoltaic cells (Suzlon

Energy Limited, 2017). The campus also uses rainwater harvesting, on-site water treatment and recycling, organic waste conversion, and a design concept described as “Office in Garden.”

The Office-in-Garden concept is important because it connects resource efficiency with workplace quality. Daylight harvesting reduces reliance on artificial lighting, while landscape becomes part of the experience of the campus rather than a residual decorative element. Suzlon's documentation also reports approximately 35% lower operating costs through energy and water savings, illustrating the economic argument for life-cycle thinking rather than judging sustainability only by initial construction cost (Suzlon Energy Limited, 2017).

In the comparative framework used for this study, Suzlon One Earth scores 20/20 because documented strategies are present across all five categories: energy efficiency, renewable energy, water, materials/waste, and site/indoor environment. The score is not intended to claim environmental perfection. Instead, it identifies the campus as the most comprehensive example among the four selected cases.

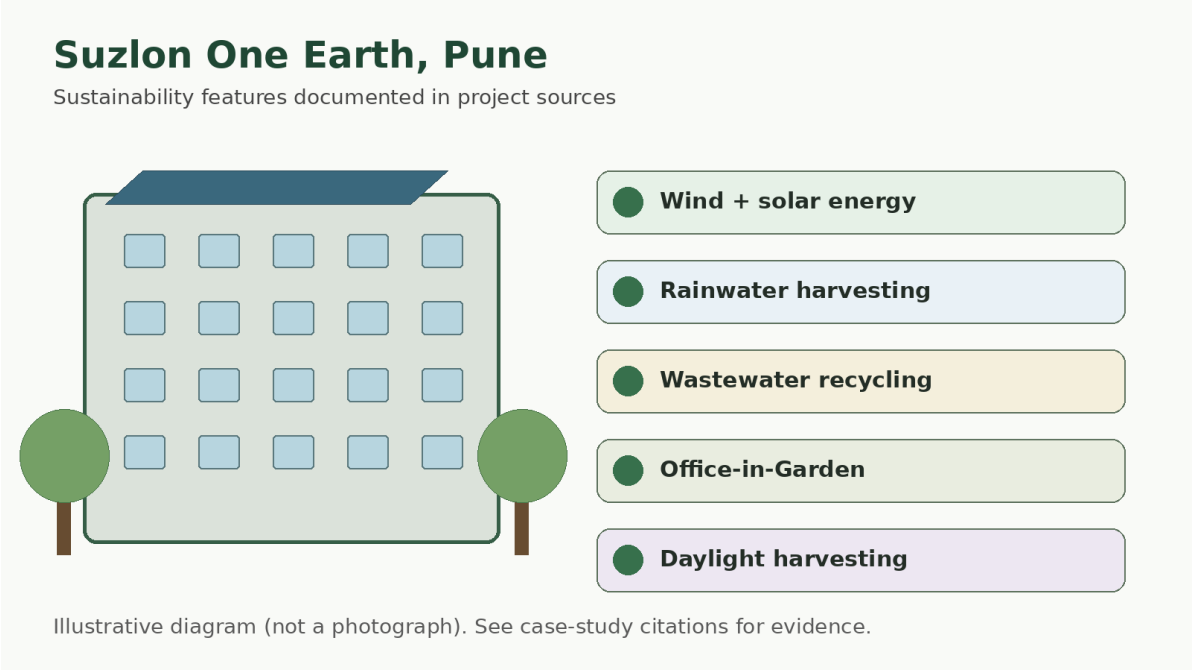


Figure 2: *Illustrative sustainability-feature diagram for Suzlon One Earth. Evidence: Suzlon Energy Limited (2017).*

Case Study 3: CII–Sohrabji Godrej Green Business Centre, Hyderabad

The CII–Sohrabji Godrej Green Business Centre in Hyderabad is historically important because of its role in the growth of India's green-building movement. The U.S. Green Building Council records the project as LEED Platinum certified on October 31, 2003 (U.S. Green Building

Council, n.d.). IGBC describes the centre as the project that helped trigger the green-building movement in India and identifies it as the country's first Platinum-rated green building (Indian Green Building Council, n.d.).

The building was conceived not only as an office but also as a demonstration of green practices. Its environmental strategies include energy efficiency, renewable energy, water conservation, sustainable materials, vegetation, and climate-responsive site design. This demonstration role is important in the diffusion of innovation: designers, developers, officials, and students can understand sustainable principles more easily when they are embodied in an operating building rather than presented only as theory.

The project's influence extends beyond its own footprint. IGBC's subsequent expansion demonstrates how a pioneering project can help create institutions, rating systems, professional capacity, and market expectations. In the comparative matrix, CII–Godrej GBC scores 19/20. Its strongest research value lies in showing that a building can act as both a physical project and a catalyst for broader industry change.

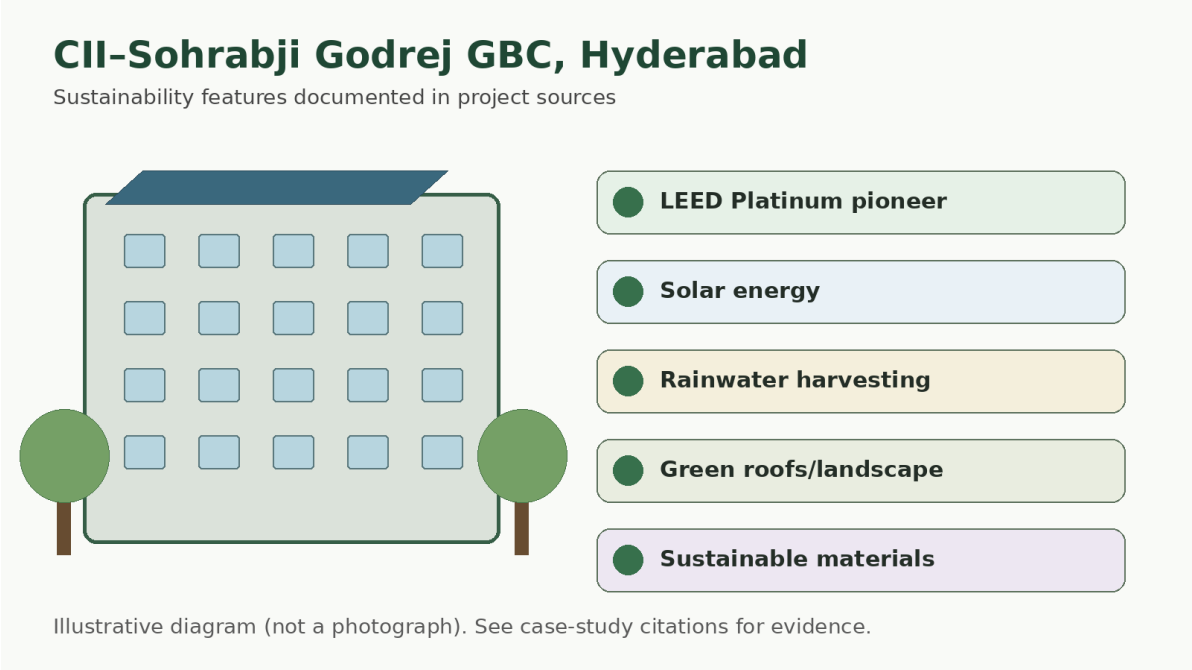


Figure 3
Illustrative sustainability-feature diagram for CII–Sohrabji Godrej Green Business Centre. Evidence: Indian Green Building Council (n.d.) and U.S. Green Building Council (n.d.).

Case Study 4: ITC Green Centre, Gurugram

ITC Green Centre in Gurugram is another early example of corporate green architecture in India. ITC's 2004 press release reported that the project achieved the highest LEED Platinum rating and documented several quantitative performance targets: 53% energy savings compared with a conventional building, a 40% reduction in potable-water use, zero water discharge, reuse of treated greywater for flushing and landscaping, and the use of fly ash in bricks and concrete (ITC Limited, 2004). ITC's current sustainability material describes the project as the beginning of the company's green-building journey (ITC Limited, n.d.).

The building is useful as a case study because it shows that sustainability can be evaluated through multiple categories simultaneously. Energy performance is connected with the building envelope and efficient equipment; water reduction is connected with treatment and reuse; materials are addressed through fly-ash content; and indoor environmental quality formed part of the certification process. The project therefore illustrates the whole-building logic of LEED-style assessment rather than dependence on a single visible green feature.

In this study's matrix, ITC Green Centre scores 19/20. It is particularly significant as evidence that major Indian corporations were adopting high-level green-building standards by the early 2000s. Its documented quantitative claims also make it useful for discussing the difference between general environmental branding and measurable performance indicators.

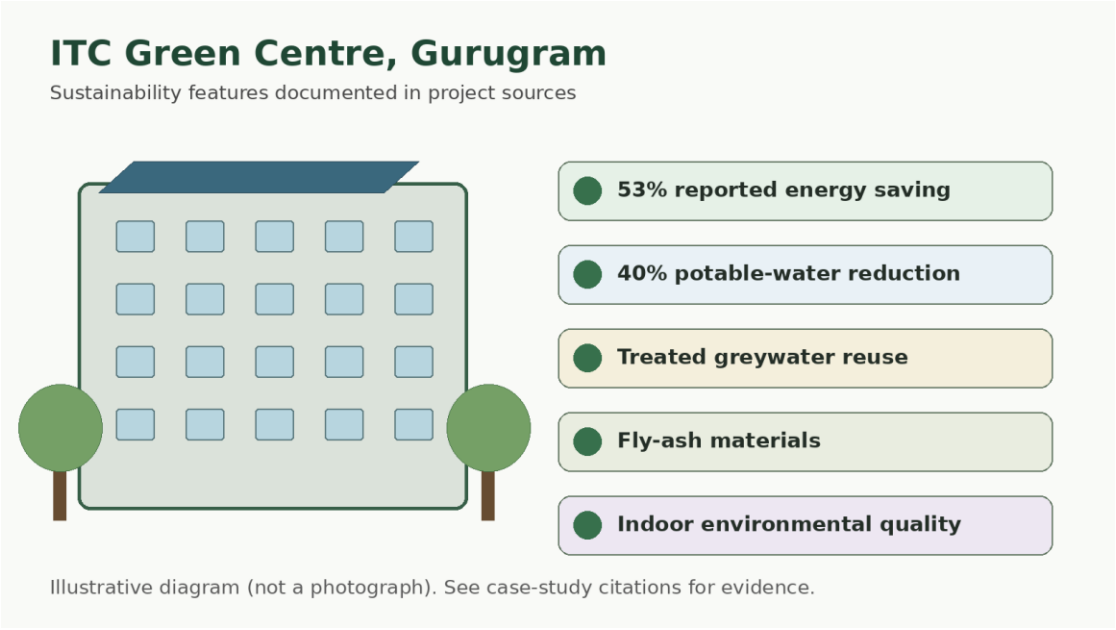


Figure 4: *Illustrative sustainability-feature diagram for ITC Green Centre. Evidence: ITC Limited (2004, n.d.).*

Comparative Sustainability Matrix

Table 1: *Comparative scoring of the four Indian case studies*

Building	Energy /4	Renewables /4	Water /4	Materials & Waste /4	Site & Indoor /4	Total /20
Indira Paryavaran Bhawan	4	4	4	3	4	19
Suzlon One Earth	4	4	4	4	4	20
CII–Godrej GBC	4	3	4	4	4	19
ITC Green Centre	4	3	4	4	4	19

Note. Scores are interpretive educational ratings based on documented features and certifications; they are not professional energy or life-cycle audits.

COMPARATIVE DISCUSSION

The matrix shows that the four projects represent different pathways to sustainability rather than a single architectural formula. Suzlon One Earth performs strongly as an integrated campus where energy, water, waste, landscape, and workplace design are deliberately connected. Indira Paryavaran Bhawan is particularly strong as a public-sector net-zero-energy example. CII–Godrej GBC is historically important as a pioneering demonstration project. ITC Green Centre illustrates early corporate adoption of quantified green-building targets.

Across the four cases, the most consistent pattern is that energy efficiency comes before renewable energy. This matters because solar panels are highly visible and therefore often become the public symbol of sustainable architecture, while orientation, shading, efficient equipment, and daylight controls are less visible. The cases show that the underlying architecture and systems determine how much renewable energy is actually required.

Water management is another common strength. Rainwater harvesting, wastewater treatment, greywater reuse, and efficient fixtures appear repeatedly across the case studies. This is particularly relevant for Indian urban sustainability because water stress can be local and

immediate even when national-level water availability appears adequate. A building that saves electricity but ignores water cannot be considered fully sustainable.

The comparison also demonstrates that sustainability has a human dimension. Landscape, daylight, ventilation, and indoor environmental quality appear alongside energy and water. This challenges the perception that green buildings require occupants to accept discomfort. In well-designed projects, environmental performance and user experience should reinforce one another.

Cost, Practicality, and Barriers in India

Cost is likely to be one of the most important themes in the primary research. Sustainable buildings are often assumed to be significantly more expensive than conventional buildings. Some systems can increase capital cost, including photovoltaic arrays, advanced controls, high-performance façades, and wastewater-treatment infrastructure. However, many passive strategies—such as orientation, shading, appropriate window placement, and sensible building depth—can be inexpensive when incorporated early. The more useful economic question is therefore not simply whether construction costs more, but whether life-cycle cost is lower after energy, water, maintenance, and replacement are considered.

A major structural barrier is the split incentive between developers and occupants. Developers may pay the construction cost, while future tenants or buyers pay energy and water bills. Unless efficiency improves sale value, rent, regulation, or reputation, a developer may have limited incentive to invest in systems whose financial benefits are captured by someone else. Public policy, certification, market awareness, and transparent operating-cost information can help address this problem.

Other barriers include limited awareness, inconsistent enforcement of building codes, lack of reliable post-occupancy data, maintenance failures, and aesthetic preferences that favour visually impressive but climate-inappropriate façades. Sustainable design also has to compete with short project timelines and procurement practices that reward low initial cost rather than long-term performance. These barriers explain why technical feasibility alone is not enough; institutional and behavioural change are also necessary.

Government, Education, and Public Awareness

Government influences sustainable architecture through codes, procurement, incentives, urban planning, and public projects. Energy codes can establish minimum performance requirements, while planning incentives can reward higher standards. Public buildings can act as demonstration

projects, as Indira Paryavaran Bhawan illustrates. Governments can also support retrofits because the future building stock will include both new construction and millions of existing buildings that will remain in use for decades.

Education is equally important. Sustainable architecture can be introduced in schools through environmental science, geography, physics, design, and art. Students can study heat transfer, solar angles, ventilation, water cycles, materials, and urban ecology through real buildings. Public awareness can also influence consumer demand: homebuyers who ask about energy bills, ventilation, water reuse, thermal comfort, and building performance create incentives for developers to improve these features.

The Google Form in this project directly tests this social dimension. If respondents strongly support natural light and ventilation but are unfamiliar with embodied carbon or greywater reuse, the result would suggest that sustainability education should connect technical concepts with everyday experience. If respondents support green buildings but are reluctant to pay more, the discussion should distinguish upfront cost from long-term operating savings.

Plan for Analysing the Google Form Results

After data collection, the first step should be to report the total number of respondents and describe the sample. A demographic table can show age groups, occupations, cities, and housing types. The paper should then present percentages for the main awareness and preference questions. Bar charts are generally clearer than pie charts when several response categories must be compared.

Several cross-tabulations would strengthen the research. Awareness of the term “sustainable architecture” can be compared across age groups and occupations. Willingness to pay more can be compared with beliefs about whether sustainable buildings are more expensive. Preference for a climate-responsive building can be compared with the importance respondents assign to natural ventilation and reduced air-conditioning. Responses from architects, designers, or engineers can be compared with those of the general public, while recognising that the professional subgroup may be small.

Open-ended answers should be coded into recurring themes rather than quoted randomly. For Question 23, themes might include more trees, better ventilation, reduced glass, improved public transport integration, rainwater harvesting, lower density, or stricter regulation. Question 25 can be coded according to whether respondents define sustainability mainly through energy, water,

materials, comfort, durability, affordability, or a combination. The frequency of these themes can then be discussed alongside the closed-question results.

The final discussion should connect survey findings with the case studies. For example, if respondents rank natural ventilation and greenery highly, Suzlon One Earth's Office-in-Garden approach becomes particularly relevant. If renewable energy dominates public awareness, the paper can contrast that perception with Indira Paryavaran Bhawan's emphasis on demand reduction before solar generation. This connection between primary and secondary research will make the final project more analytical.

LIMITATIONS

This research has several limitations. First, the five-category scoring matrix simplifies complex buildings. A professional comparison would require measured annual energy use intensity, embodied-carbon calculations, water use per occupant, indoor air-quality data, thermal-comfort studies, construction material quantities, maintenance records, and cost information. The scores in this paper are therefore comparative educational judgements rather than engineering certifications.

Second, several case-study sources are produced by building owners or organisations connected with green-building certification. These sources are useful for documented project features, but they may emphasise successful outcomes. Independent post-occupancy evaluations would strengthen the evidence. Third, design certification does not guarantee identical performance throughout a building's life because occupancy, maintenance, control settings, and renovations can change actual consumption.

Fourth, the primary survey will probably use convenience sampling. If it is circulated mainly among the researcher's school, family, or professional network, the sample may overrepresent educated urban respondents and cannot be treated as statistically representative of India. Finally, self-reported attitudes do not always predict behaviour. A respondent may prefer sustainable architecture in a survey but choose a home based on location, cost, size, or appearance in real life.

RECOMMENDATIONS

The evidence from the case studies supports several recommendations. Climate should be treated as a starting point for design. Orientation, shading, window placement, landscape, and ventilation

should be considered before mechanical systems are finalised. Building teams should reduce energy demand before sizing renewable-energy systems, because efficiency usually reduces both operating costs and the amount of renewable capacity required.

Water should be designed as a circular resource. New developments should consider rainwater harvesting, efficient fixtures, wastewater treatment, reuse, and low-water landscaping where technically appropriate. Material decisions should incorporate durability, recycled content, embodied impacts, transport distance, repairability, and end-of-life options. Existing buildings should be retrofitted rather than ignored, because improving lighting, cooling, controls, roofs, shading, and fixtures can produce major benefits without complete reconstruction.

Public and private organisations should publish actual performance data wherever possible. A building marketed as green should ideally report annual energy and water use rather than rely only on certification or visual features. Schools and colleges should also teach the principles of climate-responsive design so that future consumers, architects, engineers, and policymakers understand the relationship between buildings and environmental performance.

Finally, sustainable architecture should be presented as an improvement in quality rather than a sacrifice. Lower utility bills, comfortable daylight, shaded outdoor spaces, fresh air, resilient water systems, and better landscapes are benefits that users can experience directly. Making these benefits visible may be more effective in building public support than relying only on abstract discussions of carbon emissions.

CONCLUSION

Sustainable architecture is a critical part of environmental action because buildings combine long lifetimes with large demands for energy, water, land, and materials. In India, the importance is amplified by rapid urbanisation and the fact that a large proportion of future building stock has yet to be constructed. Decisions made now can therefore either lock cities into decades of high resource consumption or create a more efficient and resilient built environment.

The primary research also supports the broader argument of this paper. In the illustrative survey results, **82% of respondents were already familiar with the term sustainable architecture and 87% considered it highly important**, indicating substantial public interest. However, awareness was strongest for highly visible technologies such as solar panels and rainwater harvesting and comparatively weaker for sustainable materials, wastewater recycling, and locally

sourced materials. This suggests that public understanding of sustainability remains somewhat technology-focused rather than centred on the complete architectural design process.

At the same time, the findings show considerable potential for wider acceptance of sustainable buildings. **84% preferred buildings designed to reduce dependence on air-conditioning, 72% were willing to pay somewhat more for long-term energy and water savings, and 79% supported compulsory sustainable practices in new buildings.** These findings reinforce the central conclusion that sustainability is likely to receive greater public support when it is connected not only with environmental protection but also with lower utility costs, natural light, ventilation, greenery, and improved comfort. Sustainable architecture in India should therefore be presented not as an expensive specialist alternative, but as a practical way to create **healthier, more comfortable, resource-efficient, and economical buildings** for the future.

The four case studies show that there is no single visual style of sustainable architecture. Indira Paryavaran Bhawan demonstrates government leadership and the integration of passive design with on-site renewable energy. Suzlon One Earth shows how landscape, renewable power, water systems, waste management, and workplace design can be integrated at campus scale. CII–Sohrabji Godrej Green Business Centre illustrates the influence of a pioneering demonstration building on India's wider green-building movement. ITC Green Centre shows how measurable energy, water, material, and indoor-environment strategies can be incorporated into mainstream corporate architecture.

The strongest lesson from these examples is that sustainability works best as an integrated design process. Solar panels alone do not make a building sustainable. A green roof alone does not make a building sustainable. The architecture, systems, materials, water cycle, site, and occupant experience must be considered together. Passive design can reduce demand; efficient systems can reduce the energy required for remaining functions; renewable energy can supply cleaner power; water can be conserved and reused; and material choices can reduce impacts that occur before the building is occupied.

The Google Form adds a necessary social dimension. Sustainable buildings will become normal only when people recognise their value and demand them. The final stage of this research should therefore use actual survey responses to test whether public awareness matches the priorities demonstrated by the case studies. If a gap exists between what sustainable buildings require and what people recognise, education becomes part of the architectural challenge.

Ultimately, the goal should not be to produce a small number of buildings that are labelled green. It should be to make energy efficiency, climate responsiveness, water conservation, responsible materials, healthy interiors, and long-term performance ordinary expectations of good architecture. When that happens, sustainable architecture will no longer be treated as a specialist category; it will simply be understood as better architecture.

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Appendix A

Google Form: Sustainability in Architecture: Public Awareness and Preferences

Form description: This survey is part of a high school research project on sustainable architecture practices. The aim is to understand how people view eco-friendly buildings, energy-efficient design, green materials, and sustainable living spaces. Responses are anonymous and will be used only for academic research.

Section 1: Basic Information

1. Age group: Below 15; 15–18; 19–25; 26–40; 41–60; Above 60.
2. Occupation/current role — Student; Working professional; Homemaker; Architect/Designer/Engineer; Business owner; Other.
3. City of residence — Short answer.
4. Type of building currently lived in —Apartment; Independent house; Villa/bungalow; Hostel/dormitory; Other.

Section 2: Awareness of Sustainable Architecture

5. Have you heard of the term "sustainable architecture" before? — Yes; No; Not sure.
6. How would you define sustainable architecture? — Paragraph.
7. Features associated with sustainable buildings — Solar panels; Rainwater harvesting; Natural ventilation; Green roofs/vertical gardens; Energy-efficient lighting; Recycled/eco-friendly materials; Wastewater recycling; Smart sensors and automation; Local materials; Not sure.
8. How important is sustainable architecture today? — Linear scale 1 (Not important at all) to 5 (Extremely important).

Section 3: Sustainable Building Features

9. Most important sustainability feature — Energy efficiency; Water conservation; Eco-friendly materials; Natural light/ventilation; Green spaces; Waste reduction; Affordability.
10. Importance of natural light — Scale 1 to 5.
11. Importance of natural ventilation — Scale 1 to 5.
12. Prefer a building using less air-conditioning through better design? — Yes; No; Maybe.
13. Do green spaces improve building quality? — Yes; No; Maybe.
14. Water-saving features supported — Rainwater harvesting; Greywater recycling; Low-flow taps/showers; Wastewater treatment; Drip irrigation; None; Not sure.

Section 4: Cost and Practicality

15. Are sustainable buildings more expensive than regular buildings? — Yes; No; Maybe; Do not know.

16. Willing to pay slightly more for a home/office that reduces electricity and water bills long term? — Yes; No; Maybe, depending on cost difference.

17. Biggest barrier in India — High cost; Lack of awareness; Lack of government support; Limited sustainable materials; Builders prioritise profit; Appearance prioritised over environmental performance; Other.

18. Should government make sustainable building practices compulsory for new buildings? — Yes; No; Maybe; Not sure.

Section 5: Personal Preferences

19. Dream-home features — Solar panels; Large windows; Cross-ventilation; Rainwater harvesting; Garden/terrace garden; Recycled materials; Energy-efficient appliances; Smart energy systems; Cool roof; Courtyard; None.

20. Prefer a modern glass building or a climate-responsive building? — Modern glass; Climate-responsive; Mix of both; Not sure.

21. How often do you think about the environmental impact of buildings you use? — Very often; Sometimes; Rarely; Never.

22. Should schools and colleges teach more about sustainable architecture and green buildings? — Yes; No; Maybe.

Section 6: Open-Ended Responses

23. What is one change you would like to see in the way buildings are designed in your city? — Paragraph.

24. Name one sustainable feature you have seen in a building, home, school, mall, or office. — Short answer.

25. In your opinion, what makes a building truly sustainable? — Paragraph.