



3. Urban Heat Island (UHI)

Green buildings are eco-friendly and by design help to mitigate UHI. The roof and non-roof areas have either of the following:

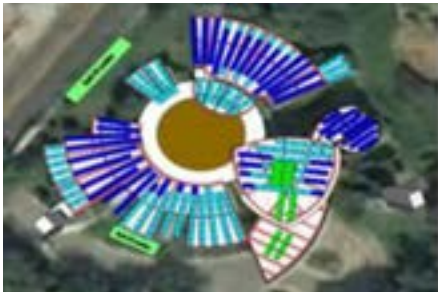
- For non-roof areas key applications are to have green vegetation or plantation of trees for shading
- Solar PV system can be installed over roof or high SRI (solar reflective index) coating over roof can be applied.



These measures lower the surrounding temperature in the vicinity of the project as compared to the temperature in urban areas.

4. Renewable Energy:

On-site renewable energy generation off-sets grid energy use and offers tangible benefits to the project. Green buildings may have renewable energy generation to the tune of 5 to 50% based on the building type and its connected load. Deployment of green measures also enables market transformation in RE sector.



5. Government Incentive for Promotion of Green Buildings

Ministry of Environment, Forest and Climate Change (MoEFCC) offers fast track environmental clearance for green building projects which are rated by IGBC. State Government agencies in Rajasthan, Punjab, West Bengal, Uttar Pradesh, Andhra Pradesh, Himachal Pradesh, Jharkhand, Maharashtra, Tamil Nadu, Gujarat, and Haryana have already been incentivised as IGBC-rated green buildings. Most of these states have witnessed multi-fold increase in their green building footprint which has resulted in reduced power and water demand, less stress on municipal infrastructure, greater preservation of trees and landscape, cooler micro-climate, etc.





Green buildings offer tangible benefits in the range of 30-35% as compared to a conventional building. Intangible benefits of the green buildings are increase in productivity by 8-12%, recognition of efforts at National/International level and reduction in carbon footprint year-on-year.





Transitioning to a fossil free energy economy: Solar power for mitigating carbon emissions

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Bhadla solar park in Rajasthan, the biggest solar park in India, curbs around 80,000 tonnes of carbon each year. Another 50 similar solar parks in India are under development or capacity expansion stage. These parks along with standalone utility scale solar projects make up for 58 GW of solar power and account for 14 percent of total installed capacity. This is significant considering solar energy which has picked up pace only in the last decade or less, mainly due to policy level interventions and decline in solar module cost which is presently at below par to the thermal power cost.

Transition to a fossil free electricity generation ecosystem is essential and critical to address climate change issues which have escalated exponentially in the 21st century. Emphasis is on electricity sector because, though it only accounts 18 percent of India's energy basket, but it is the biggest carbon emitter with 46 percent of all carbon emissions. Approx. one kilo gram of CO₂ is released into atmosphere in the process of generating a single unit of electricity, further making solar energy with no residual as an optimal alternative to coal based thermal power. Additionally, global uncertainties (most recent example being the Russian invasion of Europe) have uncovered the fragility of trade mechanism and subsequently; economies of the world are adopting a more conservative approach to ensure energy security. Coal reliant thermal power is no different and any shift in trade balance impacts the sector adversely with rise in price of coal in international market leading to high cost of electricity in Indian markets – India imports a large volume of coal (215 million tonnes in FY 2021 and 250 million tonnes in FY 2020).

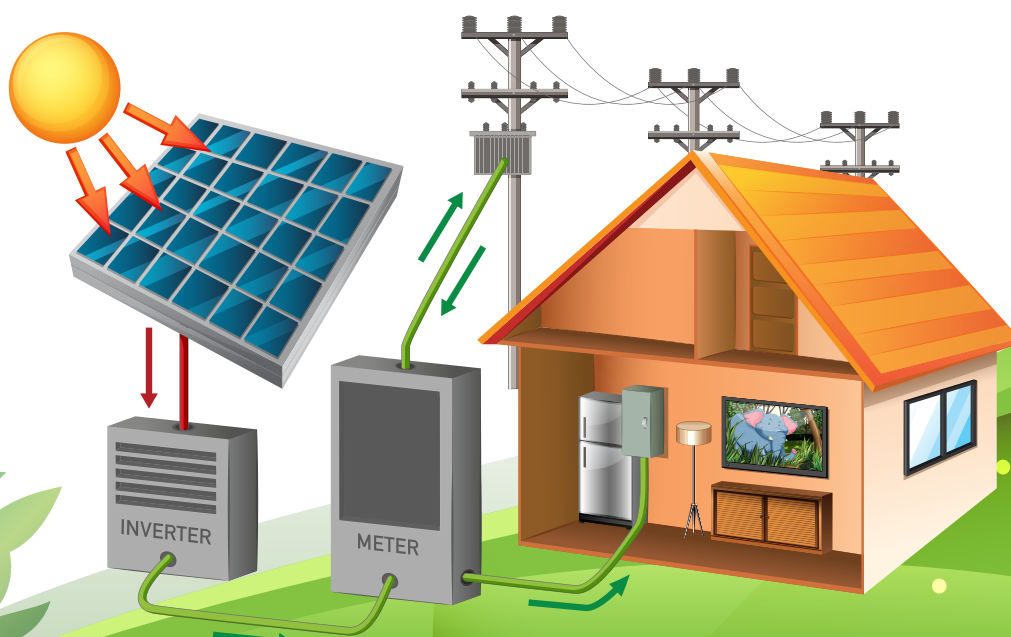
The panchamrit targets for 2030 announced at Conference of Parties in Glasgow last year are an evidence of India's confidence on solar for ensuring energy security and mitigating carbon emissions by installing 500 GW of renewable energy and meeting 50 percent of country's energy demand from this source of power.

Solar for long was perceived as a secondary source due to intermittent nature of power generation. Its application initially was limited to providing energy access to un-electrified regions and household electric equipment and later on extended to utility scale projects with grid integration. But with battery storage, solar can act as a base load for energy demand in the country. In line with this approach, the tenders issued by government organisations such as Solar Energy Corporation of India, National Thermal Power Corporations and several other public sector undertakings have transitioned from development of plain vanilla solar based projects to hybrid projects like solar with battery storage and solar-wind. The need is to have as much as solar energy installation with at least 25 percent of battery storage capacity along with other renewables like wind and hydro & waste to energy, biomass etc. in the energy spectrum to have an energy mix that is carbon emission free and completely eliminates the 46 percent stakeholder in climate change.

Still, the aspirations for becoming a net-zero economy by 2070 must extend beyond power sector and incorporate other major carbon emitting sectors of industry and transportation. Earlier this year, hydrogen policy was announced with the aim of meeting production targets of five million tonnes of green hydrogen per year by 2030. It was timely as green hydrogen across the globe was gaining momentum in becoming a cleaner source of energy especially for hard to abate industries like iron, steel, cement, fertilisers etc. Hydrogen can be utilised in multiple forms (liquid, compressed gas, ammonia) and finds application across multiple energy intensive sectors including transport. The conventional methods for manufacturing hydrogen are carbon friendly. If clean power from renewables is utilized for hydrogen manufacturing through electrolysis, the end product would be carbon emission free. The idea led to coining of the term 'green hydrogen' and promotes renewable energy further more. A recent report suggests that India would require 115 GW of renewable energy to meet targets envisaged under the hydrogen policy. Hydrogen is also considered as an alternate fuel for aviation, shipping and road transport. All these factors indicate a wide scope for green hydrogen and thus renewable energy.

Similar is the case for automotive industry. To offset carbon emissions from internal combustion vehicles, electric vehicles (EV) are promoted through subsidy and incentive schemes like FAME I & II and policies at central and state level. EVs with no tail pipe emissions are cleaner mode of transportation and further, if electricity for charging batteries of these vehicles is clean, we have an end-to-end emission free framework.

The nodalities of power, industry and transportation sector are such that solar/ renewable energy is the case of not just a single but multiple cogs in the wheel. The climate mitigation strategies whether formulated at a local or macro level must recognise the span of renewable energy across sectors and opportunities associated with technological innovations. We are perhaps in the last decade in which the combined efforts can still restrict climate change atrocities and solar will be a major enabler in exercising those efforts.





Tracing Bangladesh's energy efficiency journey: Learnings & way forward

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The journey began with the '**Energy Efficiency & Conservation (EE&C) Master Plan up to 2030**', launched by the **Ministry of Power, Energy & Mineral Resources (MPEMR)** of Bangladesh Government, declaring unyielding commitment of its implementation. A rapidly growing country, such as Bangladesh, needs huge amount of energy to feed its large growth appetite. In the past decade, primary energy consumption increased by over 100% and this trend is very likely to continue, thus leaving no room for wasting energy in this situation.

Bangladesh is vulnerable to rise in sea level, high tidal waves and river flood by cyclone, potentially caused by climate change through **Global Greenhouse Gas (GHG)** emission that results from fossil fuel consumption. The EE&C master plan implementation is not only for economic benefit but also closely links to protecting the country from such disasters.

Followed by the target set out in the master plan and findings of preparatory survey, **Japan International Cooperation Agency (JICA)** came up with the first ever project of its kind, titled '**Energy Efficiency & Conservation Promotion Financing Project (JICA-EEF)**' with the objective of promoting Energy Efficiency and Conservation measures, and to facilitate installation of Energy Efficient equipment in Bangladesh, so as to contribute to the development of sustainable society where power demand / supply balance is well under control. It is also expected to contribute to the reduction of Global Greenhouse Gas emissions.

Energy saving potential lies with industry/ commercial/ building sector through adoption of various equipments and processes. Industry & commercial sector component includes energy efficient equipments in sectors like textile and readymade garments, chemical fertilizer, paper & pulp, glass, cement & clinker grinding, iron & steel, food & beverage, telecommunication etc. Building sector components are heat reflective glass, elevator with permanent magnet motor, LED lighting, building energy management systems etc. The JICA-EEF is a project, whereby concessionary loans are extended to those investing in equipments that promote energy efficiency and conservation, which are generally more expensive than the conventional ones. Low-cost finance encourages the investors to opt for energy efficient equipments.

Seeing the success of JICA-EEF, other international development partner organisations particularly **Agence Française de Développement (AFD)**, **Kreditanstalt für Wiederaufbau (KfW)**, **Asian Development Bank (ADB)**, **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)** and World Bank are also supporting the Government of Bangladesh to tap into the Energy Efficiency Sector by promoting EE&C. **Green Climate Fund (GCF)** also extended credit line to Bangladesh for promoting energy efficiency under non-sovereign support. Notably, Bangladesh has USD 132 billion of climate-smart investment opportunity from 2018 to 2030 in Renewable Energy, Energy Efficiency and Green Building as per a report by International Finance Corporation.