

# India's First Net Zero Magazine

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April-23



## Leading India towards Net Zero



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**Ankit Sharma**  
**Co-Founder & Editor-in-Chief**

All India Solar which is now Net Zero Wired is a platform that we have developed to promote the Net Zero and its associated segment like carbon market, energy efficiency, renewable energy, energy security, decarbonization of industrial sectors and energy financing.

Net Zero is not a technology or solution that any company or an individual can invent or develop. Its a lifestyle that everyone have to adopt

# Blockchain-based P2P Energy Trading: Transforming India's Energy Landscape One Trade At a Time

In December 2015, the Indian Government announced that India had upscaled its target of renewable energy (RE) capacity to 175 GW by the year 2022. Now that we're past 2022, it's a good time to ask: Has India achieved this goal?

Recent data from the Ministry of New and Renewable Energy suggest that the answer is "no". By the end of 2022, India had installed only 119.09 GW of RE capacity. This shortfall of 32% could prevent the country from meeting its other RE and sustainability goals: to generate 500GW of non-fossil fuel energy by 2030 and to become a "net-zero" emitter by 2070.

There are many reasons why India has not managed to achieve the full potential of RE: the lack of effective distribution infrastructure, inefficiencies in the grid, problems integrating RE with the power grid, and the inability of Indian buyers to "purchase" RE from outside the grid.

Blockchain-based peer-to-peer (P2P) energy trading has emerged as a viable solution to these challenges. In fact, it is poised to revolutionize India's energy sector by making RE available in a seamless and democratic fashion to any Indian consumer. And this is great news for an energy-hungry country that is getting hungrier by the minute!

## Blockchain and P2P Energy Trading: The Potential to Transform India's Energy Landscape

P2P RE trading refers to a borderless, multidirectional, decentralized energy trading ecosystem where energy-surplus and energy-deficit entities can generate, trade, and consume energy in a transparent and secure manner. The system will create a market where RE can be easily exchanged, bought, and sold like any other commodity.

This market will enable consumers to actively participate in the energy market and get more control over their energy usage and costs. It will also drive the greater utilization of RE sources, help to balance energy supply and demand, and ultimately, create a more energy-equitable and energy-independent India.



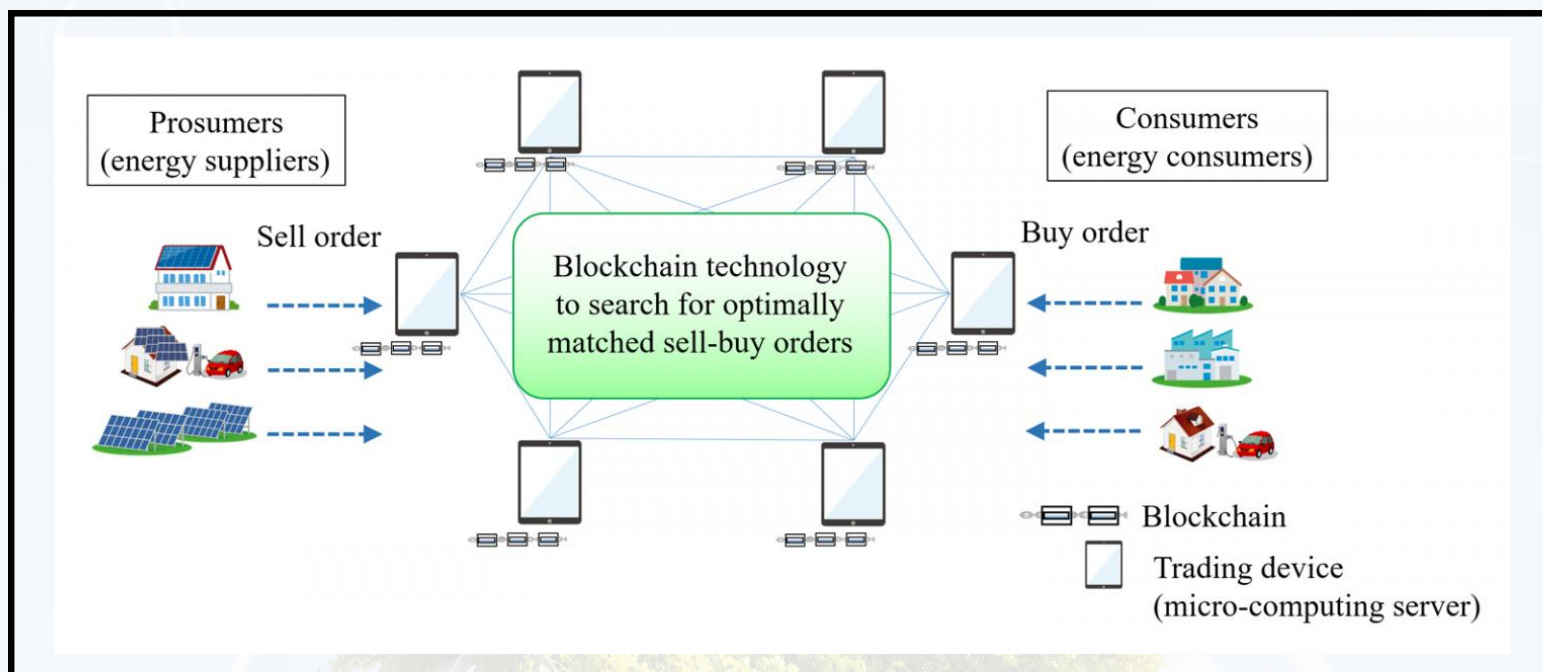


Image Credit: eurekaalert.org

## The Future of P2P Energy Trading in India

In recent years, many state governments, such as Uttar Pradesh and Delhi, have announced pilot projects for P2P trading. Many other states are pressing the pedal on RE generation and adoption – Jharkhand is a good example – so they are also likely to be open to new-age ideas like blockchain-based P2P trading, smart contracts, smart meters, and Generation Based Incentives (GBI) for RE users.

Many state governments have also set ambitious targets for RE adoption and decentralized energy systems. Delhi, for example, plans to increase solar generation to 6,000 MW by 2025. Advancements in blockchain technology and trading platforms will play a huge role in helping states realize these targets and in making P2P trading even more efficient, secure, and transparent. Also, as more smart meters and IoT devices are deployed throughout India, P2P trading will be seamlessly integrated with demand response and energy management systems. In this way, it will help to increase RE penetration and democratize India's energy landscape.

But for now, there is a big gap between what's possible and what's actually happening with P2P RE trading in India. These barriers could prevent the country from meeting its RE generation and adoption goals, so it's vital to identify and address them as soon as possible.



## Expanding the Scope for P2P Energy Trading in India: Barriers to Entry and Possible Solutions

The lack of a nation-wide regulatory framework to govern, standardize, and promote the idea of P2P energy trading is one of its biggest barriers to entry. A lack of awareness among Indian consumers and stakeholders is also a hindrance to its adoption. The government must take a proactive approach to remove these barriers. This approach should include the development of a regulatory framework and guidelines for P2P trading, as well as awareness campaigns to increase the general public's understanding of P2P trading and its benefits.

Another problem is that India's existing grid infrastructure is not equipped to handle two-way (bidirectional) energy flows, which can limit the scope of P2P trading. The government must upgrade the grid infrastructure with new enhancements, such as smart grids, advanced metering infrastructure (AMI), distribution automation systems (DAS), and better-quality energy storage systems. These new investments will enable two-way energy flows, thus allowing for seamless energy trading between energy producers and consumers. They will also help to promote the use of RE sources, improve energy efficiency, and empower India to build a more sustainable, resilient, and democratic energy system.

### Conclusion

In recent years, interest in P2P energy trading has gone up across India. This is a good thing because the idea can potentially eliminate the (many) problems that plague the energy sector. If the idea is adopted and implemented on a country-wide scale, it will accelerate India's transition to a sustainable, net-zero future. However, this will require close collaboration between the government, energy stakeholders, and technology providers like Voltreum. When such collaboration happens, P2P energy trading will become a game-changer for the country's energy future.



Rahul Awati  
Co-founder - Voltreum

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Solartrade is an Indian platform that aims to empower local solar businesses and entrepreneurs in the renewable energy industry. Founded in 2019, Solartrade offers a comprehensive solution for businesses, including digitization tools, business resources, and an ecosystem for collaboration and growth.

The company's mission is to transform the renewable energy industry by enhancing the growth of local solar businesses and accelerating the adoption of clean energy in India.

One of Solartrade's key features is its suite of software tools, which includes free business reviews, customer relationship management (CRM) tools, and site survey tools. These tools help businesses transform their operations digitally, which is critical in today's rapidly evolving renewable energy sector. Solartrade is committed to providing businesses with the tools they need to stay competitive. In addition to its software tools, Solartrade is actively creating a thriving ecosystem for the renewable energy industry. This ecosystem provides businesses with access to a wide range of products and services, as well as a supportive community of peers and experts.

By connecting, collaborating, and growing together, businesses on the Solartrade platform can achieve greater success in the renewable energy sector.

Solartrade is constantly evolving and growing, with several exciting new features and capabilities in the pipeline. The company's team of experts is committed to staying ahead of the curve and providing businesses with the best possible tools and resources to succeed.

Whether you are a seasoned business owner or just starting in the renewable energy sector, Solartrade is the ideal platform to help you achieve your goals.



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1000+  
Products Delivered



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## Carbon Market Chapter 5: An Overview Of Carbon Trading In India And Its Legal Aspect

The companies in the developed world are required to meet certain carbon emission target set by their respective government. However if these companies are not able to meet their emission targets, they have an alternative of purchasing these carbon credits from the market i.e. from someone who is successful in meeting these targets and who has a surplus of these credits. This process is known as carbon trading. Carbon trading is also very advantageous for the companies of the developing world as it provides monetary gains in exchange of carbon credits which help these companies to purchase or change their technology. This change in technology eventually helps the companies to reduce carbon emission.

### Need for Carbon Trading and Clean Development Mechanism

The need for carbon trading was felt when it was realized that the industries have been the biggest polluter of green house gases which has resulted in global warming. A lot of effort was put in by the NGOs and other institutions to bring the attention of the world towards the problem of global warming. But this issue was not taken very seriously as a result of which nothing much was done in this regard. Thus it was realized that the only way to get the attention of the world towards these problems was by attaching some financial incentive to it. As a result the concept of Carbon trading was introduced.

### Clean Development Mechanism

The Clean Development Mechanism (CDM), defined in Article 12 of the Protocol, allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing countries.

### Carbon Trading in India

Indian industries were able to cash in on the sudden boom in the carbon market making it a preferred location for carbon credit buyers. It is expected that India will gain at least \$5 billion to \$10 billion from carbon trading (Rs 22,500 crore to Rs 45,000 crore) over a period of time. Also India is one of the largest beneficiaries of the total world carbon trade through the Clean Development Mechanism claiming about 31 per cent (CDM).



India's carbon market is one of the fastest growing markets in the world and has already generated approximately 30 million carbon credits, the second highest transacted volumes in the world. The carbon trading market in India is growing faster than even information technology, bio technology and BPO sectors. Nearly 850 projects with an investment of Rs 650,000 million are in the pipeline. Carbon is also now being traded on India's Multi Commodity Exchange. It is the first exchange in Asia to trade carbon credits.

### **Legal aspect of Carbon Trading in India**

The Multi Commodity exchange started future trading on January 2008 after Government of India recognized carbon credit as commodities on 4th January. The National Commodity and Derivative Exchange by a notification and with due approval from Forward Market Commission (FMC) launched Carbon Credit future contract whose aim was to provide transparency to markets and help the producers to earn remuneration out of the environment projects.

Carbon credit in India is traded on NCDEX only as a future contract. Futures contract is a standardized contract between two parties to buy or sell a specified asset of standardized quantity and quality at a specified future date at a price agreed today (the futures price). The contracts are traded on a future exchange. These types of contracts are only applicable to goods which are in the form of movable property other than actionable claims, money and securities. . Forward contracts in India are governed by the Indian Contract Act, 1872.

Under the present provision of the Forward Contracts Regulation Act, the trading of forward contracts will be considered as void as no physical delivery is issued against these contracts. To rectify this The Forward Contracts (Regulation) Amendment Bill 2006 was introduced in the Indian Parliament. The Union Cabinet on January 25, 2008 approved the ordinance for amending the Forward Contracts (Regulation) Act, 1952. This ordinance has to be passed by the Parliament and is expected to come up for consideration this year. This Bill also amends the definition of 'forward contract' to include 'commodity derivatives'. Currently the definition only covers 'goods' that are physically deliverable. However a government notification on January 4th paved the way for future trading in CER by bringing carbon credit under the tradable commodities.

### **Value Added Tax**

The government of Delhi in a recent notification has declared that the Certified Emission Reductions (or 'Carbon Credits' as we know) are to be considered as goods and thus their sale is liable to value added tax in the State. The Commissioner of Trade and Taxes has declared that the nature and aspects of Carbon credits have to be examined and tested against the definition of goods to arrive at the conclusion that carbon credit are no different from ordinary commodities bought and sold in the market and thus a sale transaction of carbon credit would attract value added tax on sale.

Content Credit: [legalservicesindia.com](http://legalservicesindia.com)



## Green Hydrogen Chapter 3: Electrolysers used in Green Hydrogen Technology

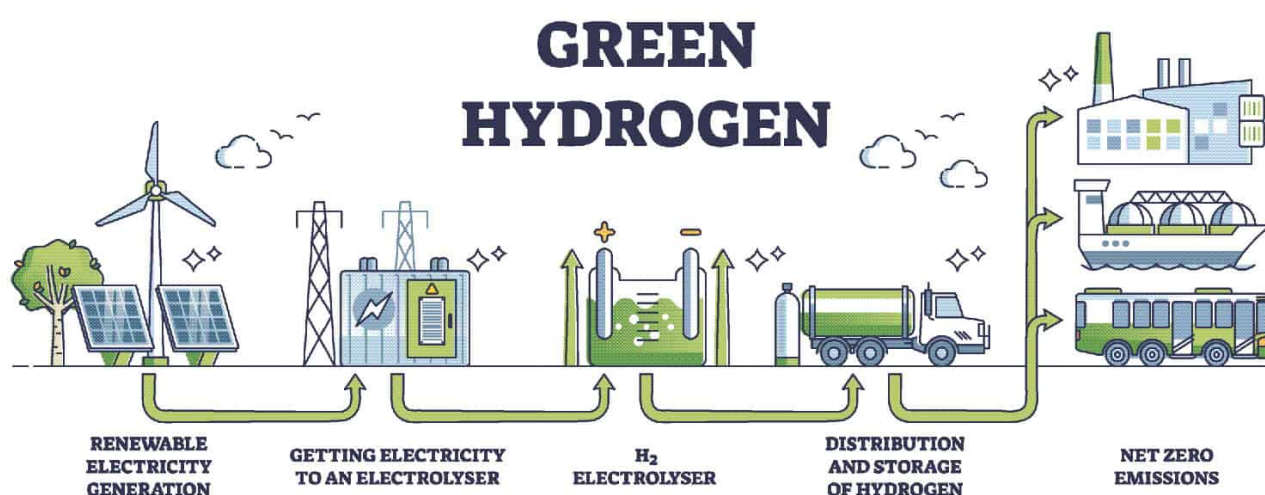
An electrolyzer is a device that uses electricity to split water or other components into their constituent elements through electrolysis. Electrolysis is a chemical reaction where an electric current passes through a substance, causing it to decompose into its basic components.

In the case of water electrolysis, an electrolyzer uses an electric current to split water molecules into hydrogen and oxygen gases. The hydrogen gas can be stored as either compressed gas or liquefied. The oxygen created is released back into the air or captured and stored to supply to other industrial processes.

### The components of an electrolyzer

The basic form of an electrolyzer unit contains an electrolytic cell with two electrodes – a cathode (negative charge) and an anode (positive charge) – and a membrane. An electrolyzer system contains the electrolyzer cell stacks, pumps, vents, storage tanks, a power supply, a separator and other operating components.

Electrolysis occurs within the cell stacks when an electric current is applied across the electrolytes. The anode attracts the negatively charged hydroxide ions ( $\text{OH}^-$ ), releasing oxygen gas ( $\text{O}_2$ ). The cathode attracts the positively charged hydrogen ions ( $\text{H}^+$ ) and releases hydrogen gas ( $\text{H}_2$ ).



## What are electrolyzers used for?

Electrolyzers are mostly used to produce hydrogen gas. Hydrogen is essential for industrial processes, including ammonia production for fertilizers and fuel for fuel cell applications such as buses, trucks and trains. They can be used for energy storage by converting excess electricity from renewable energy sources, such as wind, solar and hydropower, into hydrogen gas. The gas can then be compressed, stored and used as needed.

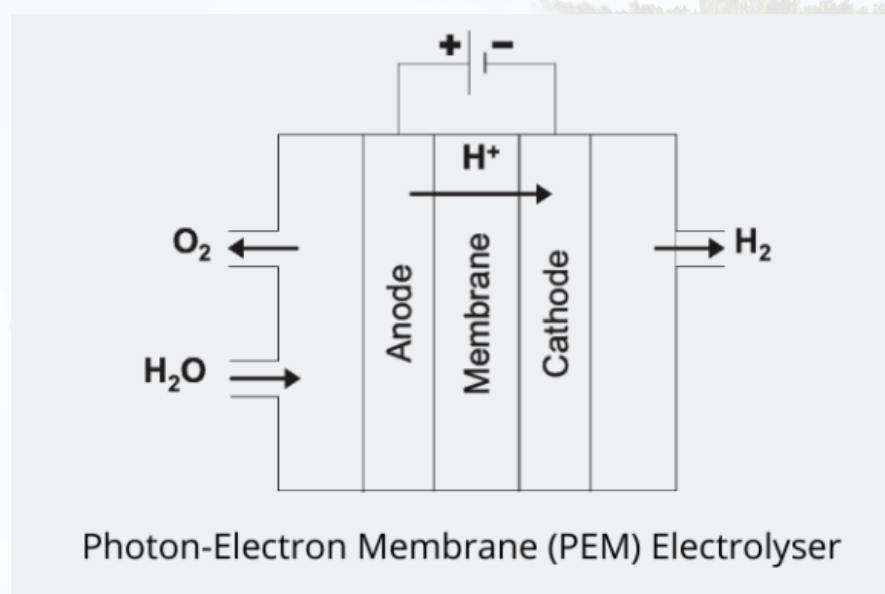
Varying in size and function, electrolyzers are scalable to meet various input and output needs. Their footprint can range from small industrial electrolyzer plants installed in shipping containers for on-site production to large-scale centralized hydrogen production facilities capable of delivering hydrogen by trucks or being connected to pipelines for natural gas blending.

Electrolyzers are also a complementary technology to fuel cells. Operating much like a battery, fuel cells produce electricity and heat. Unlike a battery, a fuel cell can produce endless electricity if a fuel – like hydrogen – is continuously supplied. Fuel cells that use hydrogen generate electricity that is zero emissions at the point of use for its applications, meaning fossil fuels are not needed, and no harmful emissions are created.

## The different kinds of electrolyzers

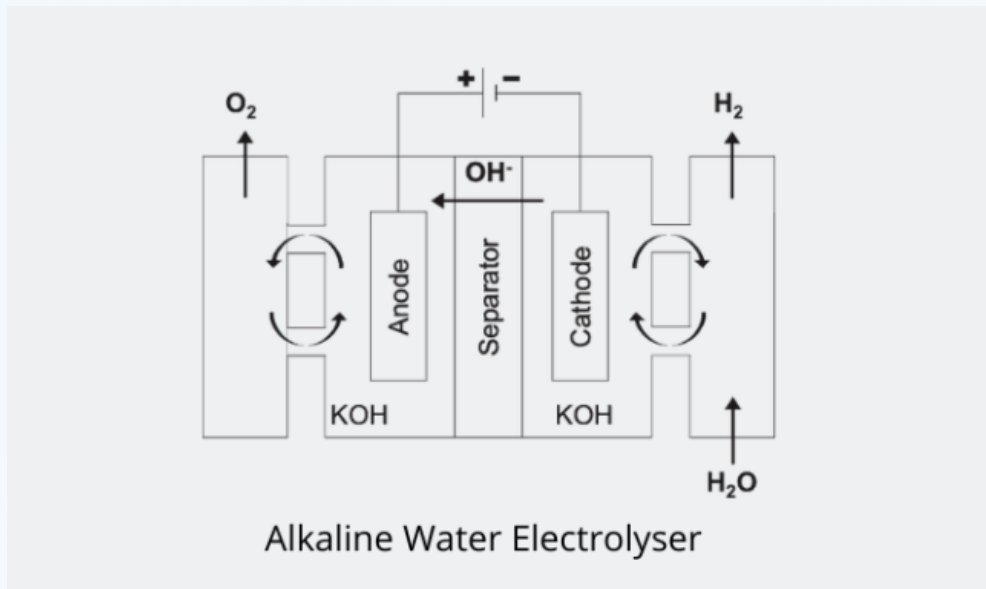
There are three main types of water electrolysis technology: proton exchange membrane (PEM), alkaline and solid oxide. Each electrolyzer functions slightly differently depending on the electrolyte material involved.

- **Proton exchange membrane (PEM) electrolyzers**

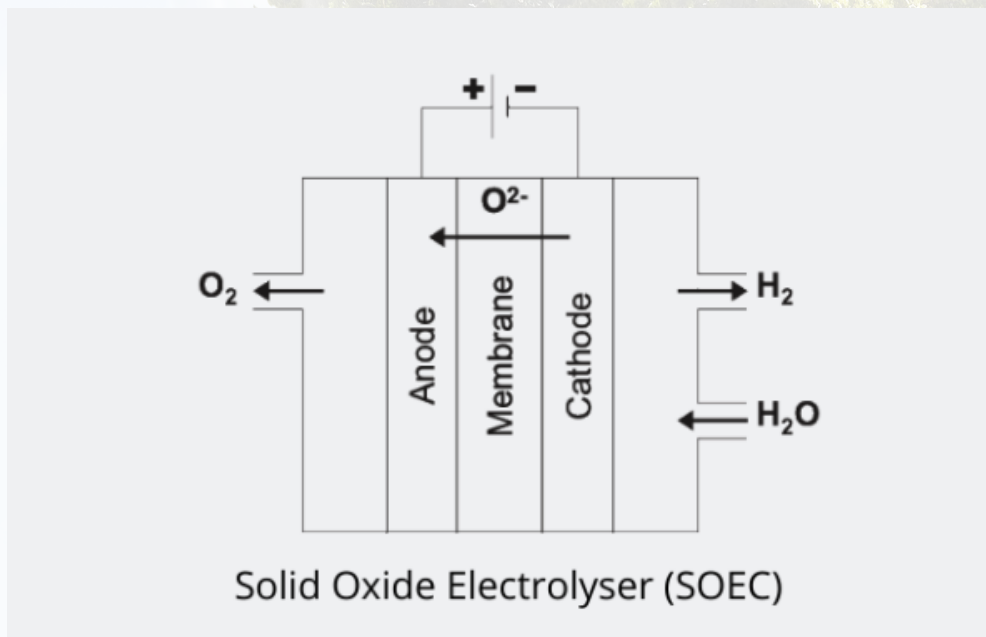




- **Alkaline Water Electrolyzer**



- **Solid Oxide Electrolyzer**



Content Credit: [accelerazero.com/](https://accelerazero.com/)



# Net Zero Wired: What is net zero? what challenges and opportunities India will face on its journey to Net Zero 2070?



To achieve its 2070 target, India needs an investment of \$10.1 trillion beginning now, a report titled Getting India to Net Zero in August showed. If the deadline is advanced to 2050, the amount rises to \$13.5 trillion.

“India has just set a net zero target...But it lacks concrete sectoral targets and trajectory...and short-term milestones and targets. There is much work for India to do,” Sunil Dahiya, Centre for Research on Energy and Clean Air (CREA)

Content Credit: [accelerazero.com/](https://accelerazero.com/)

# Decarbonization Chapter 4: Construction Industry of India

The health of the climate is getting worse day by day all due to air pollutants, especially black carbon. Global warming is increasing rapidly and the fourth biggest carbon emitter in the world is India. GHGs are the major pollutant in the environment and the construction industry is considered 19% responsible for it. But especially in a developing country like India, infrastructure is a basic need without which the country may not survive. Around 40% of the carbon footprint is generated by construction and buildings together due to various processes like lighting, cooling, and heating of building materials. By the year 2050, the carbon emissions from buildings are set to aim at zero as per the world resources Institute paper Paris Agreement. But as per today's scenario, there is not even one per cent of the total buildings that can help in achieving the target of zero.

Then the question still arises about how the target can be achieved, as the construction sector is the most crucial part of any nation that helps a nation to grow and its activities cannot be shut down. Designing an energy-efficient building that consumes less energy and using carbon-free renewable energy in place of fossil fuels used at construction sites are the two most significant steps taken by the company.

## Type of CO<sub>2</sub> emissions in Construction Sector

In any construction project, there are two types of CO<sub>2</sub> emissions that are direct and indirect. Both are equally harmful to the environment. Processes such as extraction of raw material, manufacturing installation, and demolition lead to climatic degradation.

## What are the possible solutions?

- Using AAC blocks in place of red bricks that reduce fly ash.
- Using environmentally friendly building materials.
- Purchasing carbon offsets.
- Minimizing the use of fossil fuels by generating renewable energy.



## Green Construction is the answer

Green Construction, also known as Green Building, is the implementation of design in buildings that are environmentally sustainable and resource-efficient throughout the building's life cycle, i.e., from planning to design, construction, maintenance, renovation and demolition. In simple terms, it is an environmentally conscious building structure. Unlike traditional buildings, Green Building is made up of environmentally friendly and reusable material so as to minimize resource wastage and carbonization in the environment. Additionally, all the equipment and appliances used inside are also energy efficient and run through solar/wind energy, thus reducing the day-to-day carbon footprint production at an individual level.



### Technologies used in Green Buildings

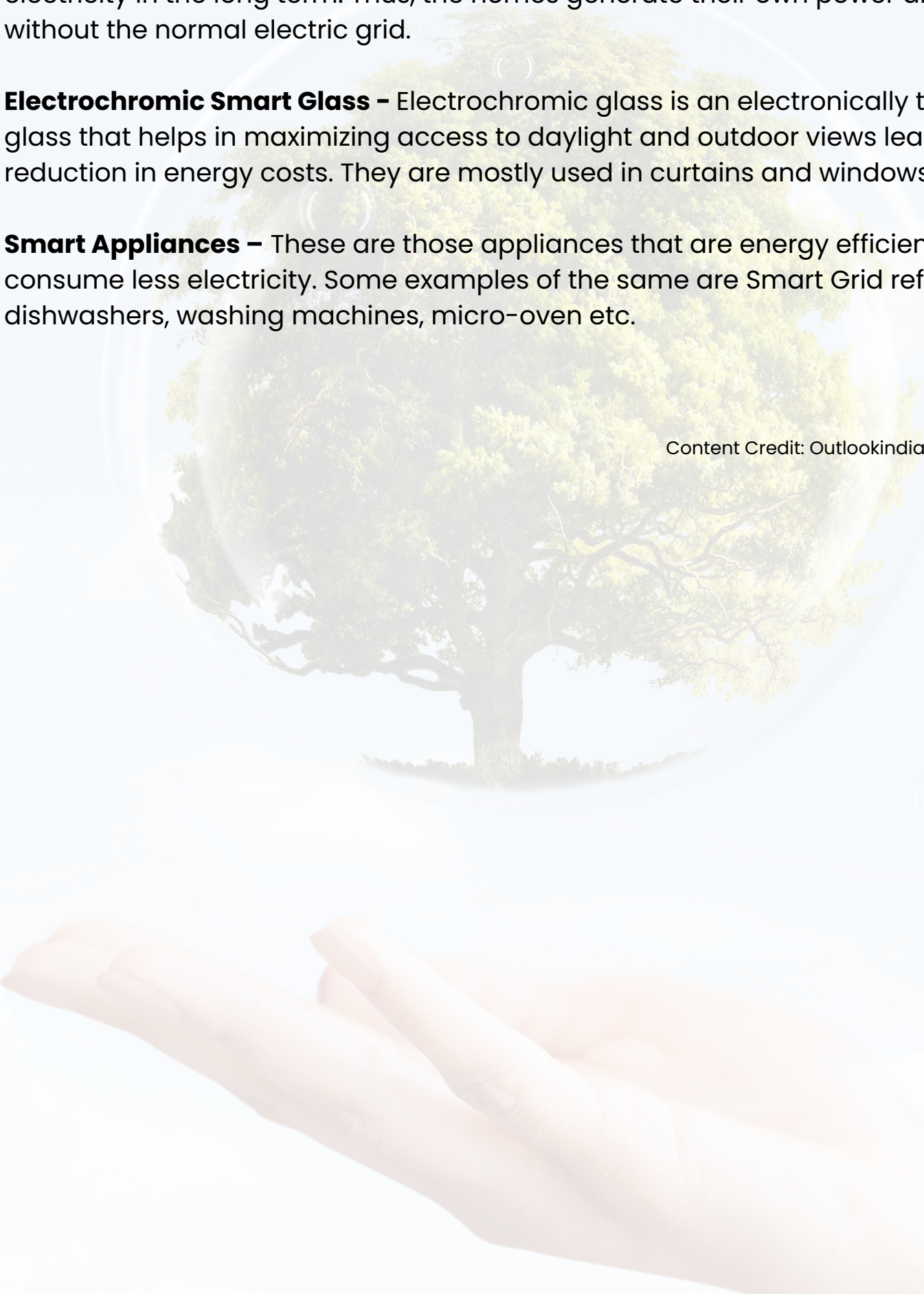
Real estate sector is leveraging technologies to design and construct these new-age green buildings.

**Cool Roofs** – Cool roofs are designed to offer increased solar reflectance i.e., reflecting the sun rays thereby reducing the heat transfer to the rooms. They also reduce thermal emittance and thus prevent the air inside (warm or cool) from escaping.

**Storm Water Management** – It involves designing and developing systems such as grass paving, rainwater reservoirs, infiltration fixation in parking lots, vegetated rooftops etc. to manage the surface runoff in order to conserve water resources.

**Geothermal Heating** – Geothermal Energy is an efficient source of renewable energy that's far more environmentally friendly than traditional sources of energy. It can be used for direct power generation for private or industrial buildings. It has its direct application in the heating system of aquaculture and heat storage as well.



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- A conceptual image showing a hand holding a globe. On the globe, there is a lush green tree. The background is a light blue gradient with faint circular patterns. The entire image is framed by a thin gold border on the left and right sides.
- **Solar Power** – Solar power plants utilize the heat of the sun to generate electricity. The solar power plant might have a high upfront cost, but one can get free electricity in the long term. Thus, the homes generate their own power and can run without the normal electric grid.
  - **Electrochromic Smart Glass** – Electrochromic glass is an electronically tintable glass that helps in maximizing access to daylight and outdoor views leading to a reduction in energy costs. They are mostly used in curtains and windows.
  - **Smart Appliances** – These are those appliances that are energy efficient thereby consume less electricity. Some examples of the same are Smart Grid refrigerators, dishwashers, washing machines, micro-oven etc.

Content Credit: Outlookindia & Investindaa



# India needs pumped storage hydro projects

The Ministry of Power, on February 15 2023, released its draft guidelines to promote pumped storage hydro projects for renewable energy storage. With the increased penetration of variable renewable energy (VRE) sources or intermittent sources like solar and wind, into the grid, there has been a need to incentivise technologies to support energy storage, said the ministry.

Pumped storage projects (PSPs), often called 'giant batteries,' have been around for a while and are an internationally accepted technology. It is conventionally used to stabilise the grid and maintain peak power. With the seasonal variability of renewable energy production, the importance of energy storage systems like battery storage and PSPs has assumed significance. These projects store appreciable amounts of energy and release it when required. The ministry claims that this technology is a preferred choice with the rise of renewable energy.

The PSPs comprise two water reservoirs connected through a tunnel or underground pipe at different heights. When there is more electricity production and less demand, these projects pump water from the downward reservoir to the upward reservoir. When more energy is needed, water is pushed from the uphill to the downhill via a turbine to produce the required power instantly.

## What are the draft guidelines?

Amongst the various technologies available for addressing this requirement of storage and ancillary services, Pumped Storage Projects (PSPs) are clean, megawatt-scale, domestically available, time tested, and internationally accepted. PSPs are clean, green, safe, and non-explosive. They don't produce any poisonous/ harmful by-products or pose disposal problems. The guidelines to promote PSPs are based not only on their usefulness in maintaining grid stability and facilitating VRE integration but also on their other positive attributes compared to other available energy storage systems

In its draft guidelines, the ministry has also asked states to consider exempting stamp duty and registration fees for the land for PSP projects, give government land at concessional rates for such projects, avoid double taxation, and provide relief in the State Goods and Services Tax (SGST). It has also defined a time period of two years for the project developers to start construction work, failing which can lead to the cancellation of the contract.

The norms also bat for keeping the project exempted from free electricity obligation, doing away with the need for Environmental Impact Assessment (EIA) studies and public hearings if such projects are built in existing dams or areas away from the main river water (off-the-river). The power ministry guidelines also mandated using green finance like sovereign bonds or concessional climate finance for funding such projects. Besides this, the norms discuss market reforms like fixing the appropriate tariff for power generation from PSPs.

### **Pumped Storage Projects in India:**

India has assessed that it needs at least 18.8 GW of pumped storage hydropower capacity to support the planned integration of wind and solar into India's grid by 2032, and potentially more if other energy storage systems are not financially viable. The Indian Government has also recently revised its figure of pumped storage hydropower potential from 96 GW to 106 GW.

Content Credit: Mongabay &cstep





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