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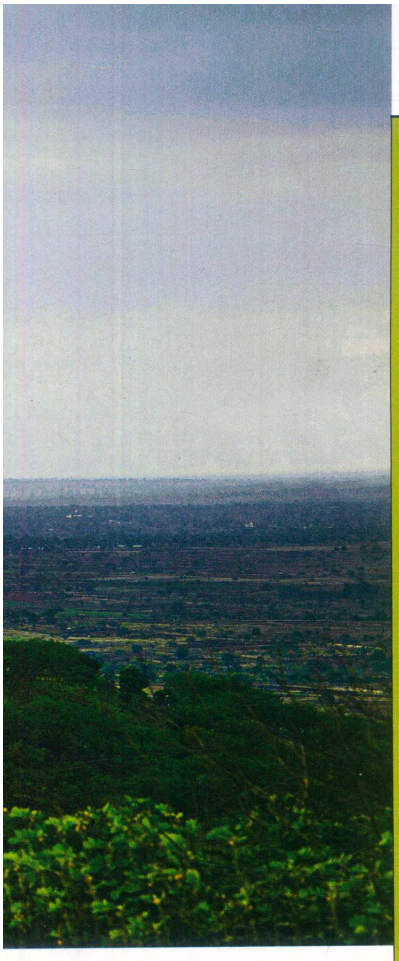
| ANNIVERSARY • NET ZERO |

GREENING INDIA

AS INDIA AIMS FOR ITS GOAL OF GETTING TO NET-ZERO EMISSIONS BY 2070, WHAT IS DONE OVER THE NEXT FIVE YEARS WILL HELP BUILD A ROBUST FOUNDATION

BY **NIDHI SINGAL**

INDIA IS NOT the worst offender in carbon emissions, but its carbon footprint is growing as it strives to develop and is projected to peak in 2040-45. India's carbon emissions cannot be tackled overnight: they come from sectors key to economic growth. The big ones are the energy sector, which relies mainly on burning coal to generate electricity; industrial activity, which ranges from manufacturing to



construction; and transportation, both private and logistics.

Despite the current government's commitment to climate action and hitting the target of net zero by 2070, the new government that will be in place around June has to recharge efforts to phase out fossil fuels and invest in technologies. The green lobby wants to eliminate the use of fossil fuels, reduce emissions, and sustainable growth. It is up to the private sector and governments to figure out how to do it without killing the economy. India needs a comprehensive approach towards renewable energy that integrates government policies, technological advancements, financial incentives, and the community's involvement.

CHARTING A GREEN COURSE

1. **India is the third-largest carbon emitter. Carbon emissions in the country will peak between 2040 and 2045 before beginning a gradual fall**

2. **India is facing the critical challenge of reducing GHG emissions and transitioning to a low-carbon economy**

3. **India has been actively working towards achieving net zero by 2070 ever since it committed to it at COP26 in November 2021**

4. **As part of the 2023-24 Union Budget, $4.3 billion was allocated for priority capital investments towards energy transition initiatives, net-zero objectives, and energy security targets**

5. **India needs to integrate government policies, technical advances, financial incentives, and community involvement in the next five years to reach net zero**

RENEWABLE IS THE KEYWORD

India's priority is economic growth aimed at powering hundreds of millions out of poverty, but such growth will cause energy demand to surge. The way out? A rapid increase in the use of renewable energy. Easier said than done.

The Carbon Markets Association of India (CMAI), which brings together industry experts working for a structured carbon trading system, says targets, investments, efficiency and affordability are the pillars of a renewable energy strategy.

"The government should look to reinforce policies supporting renewable energy, offering incentives, tax benefits, and a stable regulatory environment to attract investments. Financial incentives, including subsidies and low-interest loans, would make renewable projects more financially viable," says Manish Dabkara, chairman and MD EKI Energy Services Ltd and President of CMAI. "Grid infrastructure improvement and investment in energy storage solutions are crucial for accommodating the intermittent nature of solar and wind power," Dabkara says.

Sameer Jain, managing director of Primus Partners, a business and management consulting firm, says innovations in technology will drive this transition. "Increasing research and development funding for advanced renewables like offshore wind, floating solar, and green hydrogen production will open new possibilities for clean energy," says Jain. He says India has to increase the manufacture of equipment and parts used in renewable energy systems to reduce costs, create jobs, and work out smart grid technologies and microgrid solutions to make power grids flexible and resilient.

Financing has to be a strategic mix of public and private resources. Green bonds and climate-friendly investment strategies can attract private-sector funds. Carbon capture and storage (CCS) pilot projects can provide solutions for industries that are facing challenges in decarbonising.

But India's renewable energy story cannot be written by only the Union government: the states must work in tandem.

Anish De, consultancy firm KPMG's Global Head for Energy Natural Resources & Chemicals, says India has built a strong enabling environment with favourable policies, regulations, and proactive infrastructure that includes transmission, renewable parks, and demand aggregation. "There is still a challenge at the state level...state policies and regulations are not always favourable and are also inconsistent at times," says De. The states could provide a massive fillip to the use of renewable energy, from grid-scale to rooftop applications.

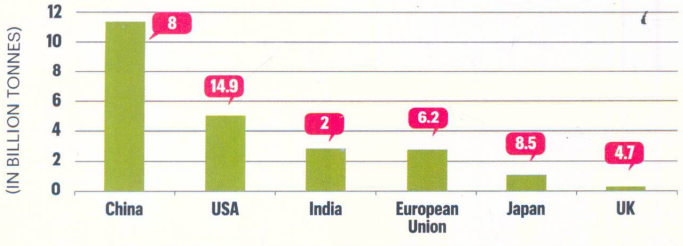
DECARBONISING INDUSTRIES

Industry accounts for around 28% of total greenhouse gas (GHG) emissions, most coming from metals, minerals, manufacturing, and rubber & plastic. All these rely heavily on electricity generated from fossil fuels. What could be done for these sub-sectors over the next five years?

One way is to develop and adopt automation and energy management systems in industries such as cement, steel, construction and textiles. Steel, cement, and fertilisers can move towards power from green hydrogen, produced by splitting water molecules using solar power. The hydrogen is then made to react with oxygen across an electrochemical cell to generate electricity.

A GREY AREA

- China is the biggest GHG emitter globally, followed by the US and India
- However, India's per capita emissions are much lower than in most other countries

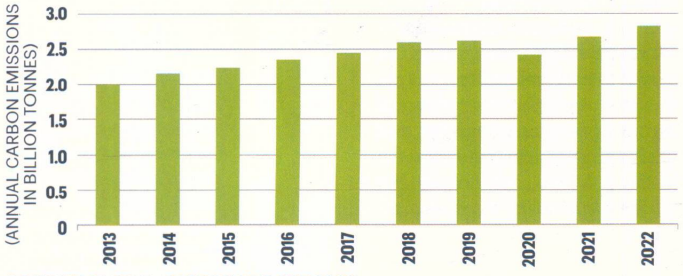


● ANNUAL CO_2 EMISSIONS ● PER CAPITA EMISSIONS (IN TONNES)

SOURCE GLOBAL CARBON BUDGET 2023

INDIA'S CARBON EMISSIONS

- India is a developing economy with most of the urban infrastructure yet to be built; its carbon emissions are on the rise and will peak in the next two decades

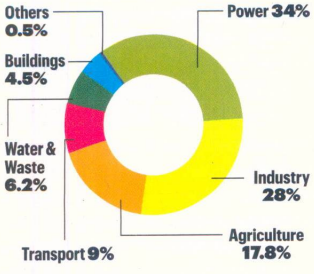


SOURCE GLOBAL CARBON BUDGET 2023

PHOTO BY **GETTY IMAGES**

CARBON TRACKER

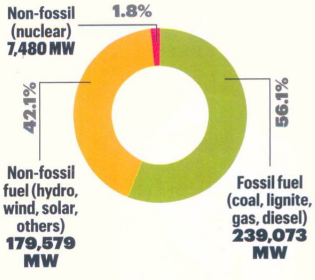
- The power sector emits the most, especially coal-fired power plants
- Among industries, cement, steel, and textiles are the biggest emitters



SOURCE DECARBONISING INDIA: CHARTING A PATHWAY FOR SUSTAINABLE GROWTH; 2019

FOSSIL RECORD

- Fossil fuels include coal, lignite, gas, and diesel
- Non-fossil fuels include hydro, wind, solar, and others



SEGMENT-WISE CARBON EMISSION CONTRIBUTION TO INDIA'S POWER SECTOR; DATA AS OF NOVEMBER 30, 2023; **SOURCE** MINISTRY OF POWER

INDIA'S NET-ZERO COMMITMENT

- Net zero by 2070
- Reduce emissions intensity of GDP by 45% by 2030, from the 2005 level
- Achieve 50% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030
- In the Union Budget 2023-24, nearly $4.3 billion (₹35,740 crore) was allocated for priority capital investments towards energy transition initiatives, net zero objectives, and energy security targets

SOURCE *BT* RESEARCH

Currently, green hydrogen costs more than energy from burning fossil fuels. But India's efforts to develop green hydrogen production capabilities, bolstered by the 2021 National Green Hydrogen Mission that aims to reduce fossil fuel imports by ₹1 lakh crore and cut CO_2 emissions by 50 million tonnes a year by 2030, is expected to help industrial decarbonisation significantly.

Aluminium is one of the metal industries that needs large amounts of power 24x7 to run efficiently and needs incentives for the switch, says John Slaven, CEO of Vedanta Aluminium. "There is a need to incentivise the usage of renewable energy through subsidies and scale up policies supporting its adoption. A focus on energy efficiency programmes and the expansion of low-carbon technologies like green hydrogen will play a crucial role," says Slaven.

Industries that need power 24x7 require efficient power storage technologies. This will enhance the suitability of renewable energy sources such as wind and solar and make them more effective for integration into industrial operations.

Florence Verzelen, Executive VP of software solutions provider Dassault Systemes, says life-cycle analysis using a digital twin of a manufacturing process could help develop the required technology. "Supporting the implementation of life cycle analysis in product and process development... can be helpful," says Verzelen.

SUSTAINABLY BUILDING INDIA

Urban India is growing at a fast clip, which means more housing, more roads, and more flyovers. Urban planners must keep in mind key sources of greenhouse gases, such as fossil fuel use in transportation and unsustainable economic practices while looking into the future.

Anshuman Magazine, Chairman & CEO for India, South-East Asia, Middle East & Africa, CBRE, which claims to be a leader in global commercial real estate services, has the break-up of the carbon generated by the construction industry.

The production of materials used in the construction industry accounts for 25-27% of the carbon emitted across the project lifecycle, construction accounts for 2-3%, operations 69-70% and demolition approximately 2-3%, says Magazine.

How does one get sustainable numbers? Use on-site renewables, retrofit, and go for end-of-life replacement, coupled with efficient equipment use. Together, these can reduce energy consumption by 35%, he says. Magazine further says green transportation strategies, green procurement strategies, use of recycled materials, advanced EV charging infrastructure, and circular economy initiatives will help reduce carbon emissions by 35%.

De of KPMG says we must reduce both embodied carbon and operational carbon while developing infrastructure. "Embodied carbon can be reduced by using low carbon materials in building the urban infrastructure and buildings. Operational carbon can be reduced through energy-efficient design and operations," says De.

The bottom line: the government should work out strong building codes that are implemented and enforced.

GREEN TRAVEL

To address emissions of the largely oil-dependent transportation sector, India has already implemented several policies and initiatives to promote the adoption of electric vehicles (EVs) and accelerate the transition to a cleaner transportation future. Jain of Primus Partners calls for more tax rebates and subsidies. "The government could introduce attractive incentives such as cash rebates and tax breaks for EV purchases, making them more affordable than traditional petrol or diesel vehicles," says Jain. The government could nudge vehicle owners to replace polluting vehicles with EVs by scrapping subsidies on the petrol/ diesel ones.

Then, says Jain, why not have innovative subscription models similar to the ones in mobile telephony to make EVs more accessible across various income levels? This will address the upfront cost barrier.

Incentives and regulatory frameworks are also required to encourage the electrification of commercial fleets, including taxis and buses, promoting a quicker transition in high-impact sectors. In agriculture, the focus is and should continue to be on reducing emissions without compromising food security and should address methane emissions from livestock and rice cultivation.

Other than focussing on the key emitting sectors and putting policies and incentives in place, India should also prioritise a diverse range of international collaborations and partnerships.

How? Go for international collaborations and partnerships across sectors, says Viral Thakker, Partner & Sustainability Leader at consultants Deloitte India.

Thakker reels off the list of sectors in which India could focus while looking for collaborations with top universities: Sustainable practices for climate resilient agriculture, renewable energy, battery storage and energy-efficient technologies, developing carbon markets, climate finance and green investment, etc.

International cooperation is essential for tackling the global climate crisis, and India's leadership in this domain can pave the way for a more sustainable future for all. BT

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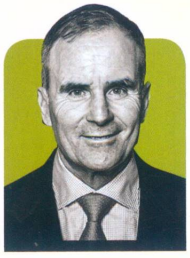

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JOHN SLAVEN
CEO, VEDANTA ALUMINIUM

"At the Government of India level, a strong enabling environment has been built. There is still a challenge at the state level, which needs to be overcome"

ANISH DE
GLOBAL HEAD FOR ENERGY NATURAL RESOURCES & CHEMICALS (ENRC), KPMG INTERNATIONAL