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Way for an Indian city to become low carbon

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Why in News:

By 2050, seven billion people will be living in cities. In 2020 itself, these cities dumped a whopping 29 trillion tonnes of carbon dioxide into the atmosphere.

Importance of energy-system transitions

Release of carbon dioxide along with other greenhouse gases poses a serious health hazard.

It also manifests as extreme weather events, leading to the loss of lives, livelihoods, assets, and social wellbeing.

Given the significant impact that cities have on the environment, low-carbon cities are crucial to mitigate the effects of climate change.

Transitioning to low-carbon or even net-zero cities requires us to integrate mitigation and adaptation options in multiple sectors, including energy, buildings, transportation, industry, and urban land-use.

This is called the 'sector-coupling approach', and it is necessary to decarbonise urban systems.

An energy-system transition could reduce urban carbon dioxide emissions by around 74%.

With rapid advancements in clean energy and related technologies and nose-diving prices, we have also crossed the economic and technological barriers to implementing low-carbon solutions.

Methods of energy transition

The transition must be implemented both on the demand and the supply sides.

Mitigation options on the supply side include phasing out fossil fuels and increasing the share of renewables in the energy mix, and using carbon capture and storage (CCS) technologies.

On the demand side, using the 'avoid, shift, improve' framework would entail reducing the demand for materials and energy, and substituting the demand for fossil fuels with renewables.

Second, to address residual emissions in the energy sector, we must implement carbon-dioxide removal (CDR) technologies.

Indeed, we have the appropriate technologies and knowledge base to build net-zero urban systems through energy transitions. The only impediments at this time are social and political in nature.

Different strategies for different cities

Which mitigation and adaptation strategies to implement varies based on some of a city's characteristics. Transitioning to renewable energy sources is not as simple as replacing fossil fuels with clean energy.

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There are multifarious issues of energy justice and social equity to be dealt with. This is a key consideration when we frame energy-transition policies that are socially and environmentally fair.

The considerations are a **city's spatial form, land-use pattern, level of development, and the state of urbanisation.**

An established city: They can retrofit and repurpose its infrastructure to increase energy efficiency, and promote public as well as active transport like bicycling and walking.

Walkable cities: They are designed around people can significantly reduce energy demand – as can electrifying public transport and setting up renewables-based district cooling and heating networks.

A rapidly growing city: These cities can try to colocate housing and jobs by planning the city in a way that brings places of work closer to residential complexes, thus reducing transport energy demand. Such cities can also leapfrog to low-carbon technologies, including renewables and CCS

New and emerging cities: They have the most potential to reduce emissions using energy-efficient services and infrastructure, and a people-centric urban design. They can also implement building codes that mandate net-zero energy use and retrofit existing buildings, all while gradually shifting to using low-emission construction materials.

Need and importance of Just Energy transition

Energy systems are directly and indirectly linked to livelihoods, local economic development, and the socio-economic well-being of people engaged in diverse sectors.

So a one-size-fits-all approach is unlikely to ensure a socially and environmentally just transition.

For example, transitioning to renewable-energy sources could disproportionately affect groups of people or communities in developing economies and sectors that depend on fossil fuels.

Broadly, the energy supply needs to be balanced against fast-growing energy demand (due to urbanisation, e.g.), the needs of energy security, and exports.

Additional justice concerns include -land dispossession related to large-scale renewable energy projects, spatial concentration of poverty, the marginalisation of some communities, gendered impacts, and the reliance on coal for livelihoods.

For instance, developing economies, including Nigeria, Angola, and Venezuela, owe a significant fraction of their gross domestic products (GDPs) to fossil-fuel exports.

Transitioning away from these industries could devastate their economies, with the consequences landing particularly heavily on the workers employed in the fossil-fuel sector.

Similarly, in economically developed countries, many communities suffer energy poverty, and inequity due to high energy costs, low incomes, and inadequate infrastructure.

In the U.S., expenditure on energy bills is a significant chunk of the total income of low-income households. This can crowd out expenses for other amenities like healthcare and nutrition.

Many communities in the Global North also face environmental injustices related to energy production and distribution.

For example, low-income communities and communities of colour in the U.S. are often disproportionately affected by fossil-fuel pollution and climate change. These communities may also have limited access to renewable energy

options, exacerbating existing inequalities.

Transition for foreground Justice

Ensuring a transition to low-carbon energy systems in cities at different stages of urbanisation, national contexts, and institutional capacities requires strategic and bespoke efforts.

They must be directed at governance and planning, achieving behavioural shifts, promoting technology and innovation, and building institutional capacity.

We must also adopt a comprehensive approach to address the root causes of energy and environmental injustices. This includes mitigation and adaptation responses that engage multiple stakeholders in energy governance and decision-making, promoting energy-efficiency, scaling up investments, and capturing alternate knowledge streams (including indigenous and local lived experiences).

Conclusion

In sum, transitioning to low-carbon cities is essentially a commitment to social equity and justice. This is why we must account for the complex, multifaceted issues in different regions and contexts, and adopt a wholesome approach that is attentive to multiple voices and experiences.