Towards Net Zero 2070: Potential of Indian Cities

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Introduction

What is Net-Zero?

Global ambition to **limit anthropogenic warming to 2°C** requires a radical transformation of the energy system.
To avert the worst impacts of climate change and preserve a livable planet, global temperature increase needs to be **limited to 1.5°C above pre-industrial levels**.
The goal of net-zero GHG emissions is expressed in the Paris Agreement as a system that achieves a **balance between anthropogenic emissions by sources and removals by sinks**.
Emissions need to be reduced by 45% by 2030 and reach net zero by 2050 to achieve net zero.

Why focus on urban?

Existing urban areas contribute approximately **75% of fossil fuel CO_2 emissions** and future urban GHG emissions are anticipated to increase due to growth trends in urban population.
In 2025, approximately **58% of the global population, lives in urban areas which is projected** to **increase to 68% by 2050**.
In response to accelerating urbanization and climate change impacts, global GHG emissions need to be rapidly reduced towards net zero.

Global Scenario

China - currently the biggest producer of CO_2 worldwide - is aiming for **"carbon neutrality" by 2060**. Its electric vehicle sales and renewable energy sector have been growing rapidly.

The US has historically been the biggest carbon emitter, and still emits more than China per head. It has pledged to reach **net zero by 2050**.
The EU, the third biggest emitter of CO_2, also has a **2050 net zero target**. In March 2023, it announced its own green investment package, called the Net Zero Industry Act.

India's Net Zero Commitments

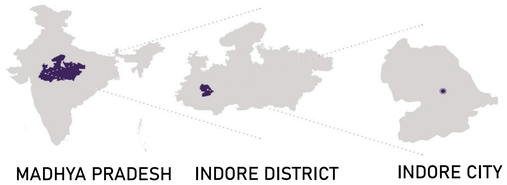
India has been one of the world's fastest-growing economies in recent years.
Since 2000, India has been responsible for more than **10% of the increase in global energy** demand. On a per capita basis, energy demand in India has grown by more than **60% since 2000**.
Coal demand per capita increased from 25% of the world average in 1990 to 60% in 2019 and, mainly for this reason, carbon dioxide (CO_2) **emissions per capita increased from a little over 15% of the world average to a little under 40% over this period.**

2021: COP 26

1. By 2030, India will **reduce the carbon intensity of its economy by less than 45%.**
2. India will take its **non-fossil energy capacity to 500 GW by 2030.**
3. India will meet **50% of its energy from renewable energy by 2030.**
4. India will **reduce the total projected carbon emissions by one billion tones from now till 2030**
5. By the year **2070, India will achieve the target of net-zero**

Case Study: Indore

Indore is the **largest city and commercial hub** of Madhya Pradesh, prominent for sectors such as engineering, pharmaceuticals, food processing and textiles. It is the **fastest developing urban centers** in Central India.



Data Collection and Analysis

A study highlighted Indore as one of India's cities that would face acute water risk due to water stress and population growth, and called for urgent measures to enhance its resilience to climate-related risks.

- **Water-stressed city,** faces high vulnerability in terms of water resources.
- Has a higher baseline vulnerability value for **drought**.
- Faces **frequent heatwaves, and floods**.

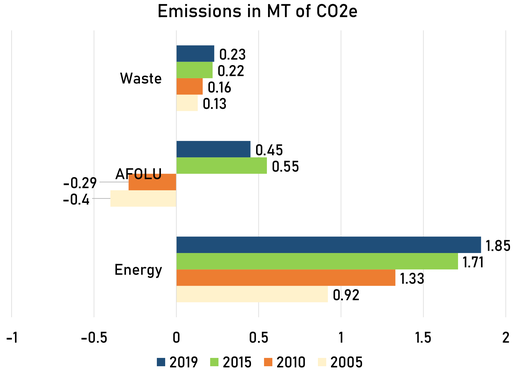
Demographic Profile (2020)	
Population	2.57 million
City Area	505.35 sq. km
Municipal Area	276.80 sq. km
Population Density	5,092 people/sq. km
GDP	₹648.13 billion

Indore Sectoral Emissions

Per Capita Emissions tones CO_2e./person

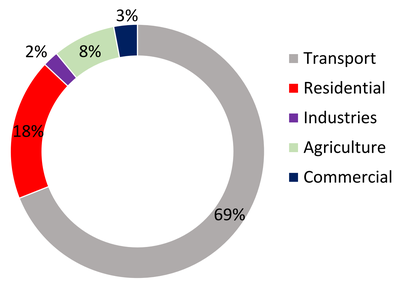
Indore- 0.62

Economy-wide emissions have **increased by 291% since 2005**



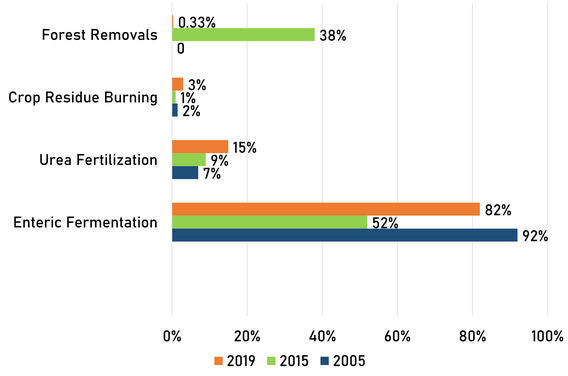
- Energy sector contributes **73%,** AFOLU (agriculture, forestry, and other land-use) contributes **18%** and waste contributes **9%** of total GHG emissions.
- Till 2011, **AFOLU was a net sink**. Post 2011, the **forest area dropped by 25 sq km** (until 2015) causing high emissions
- Waste sector has grown at a **CAGR of 4.52 percent and its contribution dropped from 12% (in 2005) to 9% in 2019.**

Percentage share in total energy emissions

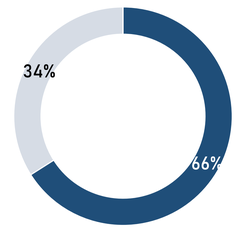


Between 2005 and 2019, **emissions from energy sector have doubled** (from 0.92 Mt of CO_2e in 2005 to 1.85 Mt of CO_2e in 2019).

Contribution of categories in total AFOLU emissions



% share in waste sector



Waste sector emissions have increased by **77% since 2005.**

Current Sectoral Measures undertaken in the City

Energy and Green Buildings

- 98% LED streetlights
- Promoting adaptive reuse of older buildings
- 65% of redeveloped buildings to have solar

Urban Planning, Green cover and Biodiversity

- 20% green cover in municipal area
- Vertical gardens on rivers, nullah bridges

Mobility and Air Quality

- 10% public buses run on low-carbon fuel
- Clean air action plan is in place
- Shared scooter service

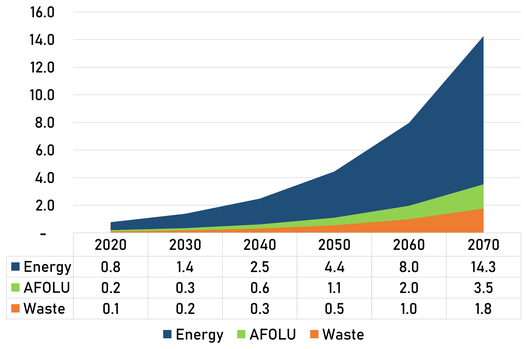
Water Management

- 629 traditional water supply sources along with wetlands restored
- Water resources management plan identifies for future demand

Waste Management

- 100% door to door collection
- 92% of dry waste is recycled
- Bioremediation in practice

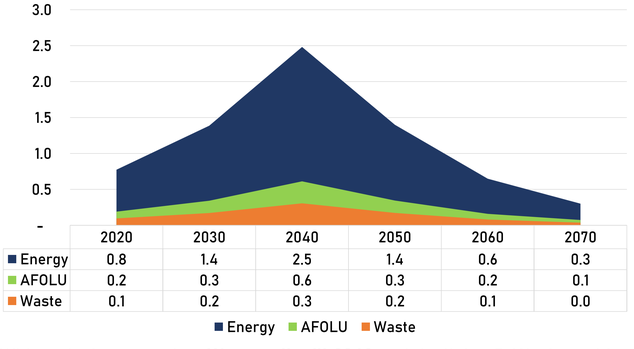
Business as Usual Scenario



	2020	2030	2040	2050	2060	2070
Energy	0.8	1.4	2.5	4.4	8.0	14.3
AFOLU	0.2	0.3	0.6	1.1	2.0	3.5
Waste	0.1	0.2	0.3	0.5	1.0	1.8

Urban GHG emissions are assumed to grow at **6% per year**, driven by rapid urbanization and rising energy demand without major climate actions.

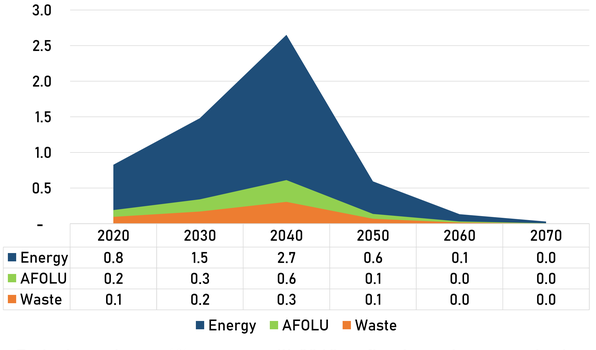
Net Zero 2070 with current measures



	2020	2030	2040	2050	2060	2070
Energy	0.8	1.4	2.5	1.4	0.6	0.3
AFOLU	0.2	0.3	0.6	0.3	0.2	0.1
Waste	0.1	0.2	0.3	0.2	0.1	0.0

With emissions growing **6% annually till 2040** and declining 7.4% after with existing efforts, **current measures won't achieve net zero by 2070.** Stronger action in energy, transport, and waste is essential.

Net Zero 2070 with strict measures



	2020	2030	2040	2050	2060	2070
Energy	0.8	1.5	2.7	0.6	0.1	0.0
AFOLU	0.2	0.3	0.6	0.1	0.0	0.0
Waste	0.1	0.2	0.3	0.1	0.0	0.0

Emissions rise at **6% per year** till 2040, reflecting urban growth, then decline sharply to achieve **net zero by 2070** through rapid decarbonization.

Conclusion

Indore's current measures, while important, are not enough to achieve net zero by 2070. Even with efforts to improve clean mobility, solar adoption, waste management, and green cover, emissions will continue to decline too slowly. To truly reach net zero, the city will need stronger and faster action — scaling up renewables, accelerating transport electrification, enhancing energy efficiency in buildings, and advancing carbon removal solutions. A more ambitious, integrated approach is essential for Indore to lead on climate action and set an example for other Indian cities. If adopted widely, such measures can help cities across India follow a similar path to a low-carbon, resilient future.

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