

# Chapter-41

## Carbon Net Zero Emission: Future of India

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### Abstract

Today the whole world is suffering from global warming. The main cause of global warming is CO<sub>2</sub> and other greenhouse gases. The concept of net carbon zero emission is to achieve a balance between the amount of greenhouse gases produced and the amount removed from the atmosphere. It requires drastic reduction in emission often by over 90% with remaining hard to emission offset through natural forests or technology carbon capture with a global target of 2050 to limit warming to 1.5. In our present abstract various methods are discussed to mitigate carbon emission.

**Keywords**-Carbon footprints, carbon calculators, greenhouse gasses, mitigation, carbon capture

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### Introduction

#### About Carbon Footprint?

The total amount of greenhouse gases such as carbon dioxide, methane, nitrogen oxides produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO<sub>2</sub>).

For Example:

When you drive a car, the engine burns fuel which creates a certain amount of CO<sub>2</sub>, depending on its fuel consumption and the driving distance.

(CO<sub>2</sub> is the chemical symbol for carbon dioxide).

When you heat your house with oil, gas or coal, then you also generate CO<sub>2</sub>.

Even if you heat your house with electricity, the generation of the electrical power may also have emitted a certain amount of CO<sub>2</sub>.

When you buy food and goods, the production of the food and goods also emitted some quantities of CO<sub>2</sub>.

#### Methodology

Your carbon footprint:

#### : Measuring CO<sub>2</sub>

Your carbon footprint: The sum of all emissions of CO<sub>2</sub> (carbon dioxide), which were induced by your activities in a given time frame.

Usually, a carbon footprint is calculated for the time period of a year.

The carbon footprint is a very powerful tool to understand the impact of personal behaviour on global warming.

Most people are shocked when they see the amount of CO<sub>2</sub> their activities create!

If you personally want to contribute to stop global warming, the calculation and constant monitoring of your personal carbon footprint is essential.

## Related Work

### CALCULATION OF CO<sub>2</sub>

The best way is to calculate the carbon dioxide emissions based on the fuel consumption.

In the next step you can add the CO<sub>2</sub> emission to your carbon footprint.

Below is a table for the most common used fuels: u

Examples:

For each (UK-) gallon of petrol fuel consumed, 10.4 kg carbon dioxide (CO<sub>2</sub>) is emitted. u

For each (US-) gallon of gasoline fuel consumed, 8.7 kg carbon dioxide (CO<sub>2</sub>) is emitted.

If your car consumes 7.5-liter diesel per 100 km,

then a drive of 300 km distance consumes  $3 \times 7.5 = 22.5$ -liter diesel,

which adds  $22.5 \times 2.7 \text{ kg} = 60.75 \text{ kg CO}_2$  to your personal carbon footprint.

Fuel Type	Unit	CO2 emitted per unit
Petrol	1 gallon (UK)	10.4 Kg
Petrol	1 litre	2.3 kg
Gasoline	1 gallon (USA)	8.7 kg
Gasoline	1 litre	2.3 kg
Diesel	1 gallon (USA)	12.2 kg
Diesel	1 gallon (UK)	9.95 kg
Diesel	1 litre	2.7 kg
Oil (heating)	1 gallon (UK)	13.6 kg
Oil (heating)	1 gallon (USA)	11.26 kg
Oil (heating)	1 litre	3 kg

Types of Carbon Calculator

1. Individual Calculator
2. Business Calculator
3. Event Calculator u

Series of Questions are asked for calculation, the questions are based on your daily activities, such as:

Travel §

Home Energy §

Public Transport §

Food §

Vehicle

TerraPass:

<https://www.terrapass.com/carbon-footprint-calculator>

Carbonfootprint:

<https://www.carbonfootprint.com/calculator.aspx>

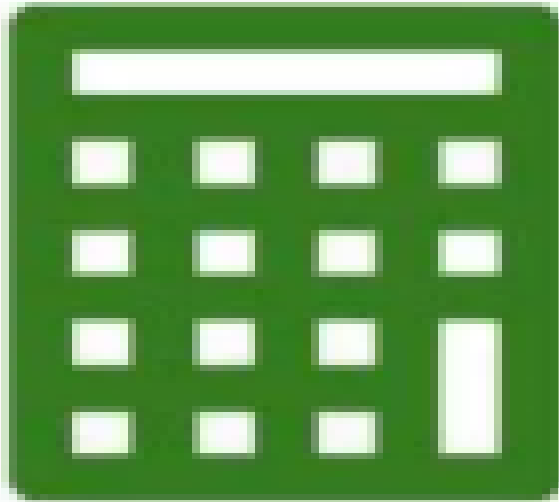
Footprint Calculator:

<http://footprint.wwf.org.uk/>

The Nature Conservancy:

<https://www.nature.org/greenliving/carboncalculator/index>

National e-Governance Division  
In 2009, National e-Governance Division was created by the Ministry of Electronics & Information Technology as an Independent Business Division under the Digital India Corporation (erstwhile Media Lab Asia), a section 8 not-for-profit company. Since 2009, NeGD has been playing a pivotal role in supporting MeitY in Programme Management and implementation of e-Governance Projects; providing technical and advisory support to Ministries/ Departments, both at Central and State levels along with other Government organizations.



### Carbon Footprint Calculators

A carbon footprint is the total amount of greenhouse gases—like carbon dioxide and methane—that human activity produces.

According to estimates from 2020, India has a carbon footprint of approximately 2411.73 metric tons, and each individual there has a carbon footprint of 1.85 tons on average.

Around the world, the average carbon footprint is **closer to 4 tons**.

To have the best chance of preventing a rise in global temperatures of 2°C, the average annual global carbon footprint must fall to less than 2 tons by 2050.

By making little behavioural changes, such as

Taking public transportation,  
Abstaining from using plastic,  
Scheduling fewer connecting flights  
Producing less solid and liquid waste  
we can begin to make a big difference.



[https://web.umang.gov.in/web\\_new/department?url=dept%2F20013&dept\\_id=20013&dept\\_name=Carbon%20Neutral](https://web.umang.gov.in/web_new/department?url=dept%2F20013&dept_id=20013&dept_name=Carbon%20Neutral)

#### Carbon Neutrality

Based on annual consumption, provide answers.

Note: You could compute your carbon footprint for the past year with the help of this service.

#### Carbon Neutral

Defined as having net-zero carbon dioxide emissions.

#### Carbon Offsetting

By extracting carbon dioxide from the atmosphere, or by balancing carbon dioxide emissions with removal, this can be accomplished (typically through carbon offsetting).

By responding to a few simple questions, we can compute the level of CO<sub>2</sub> emission using UMANG application.

[https://web.umang.gov.in/web\\_new/department?url=carbon\\_neutral%2Fservice%2F60057&dept\\_id=20013&dept\\_name=Calculate%20Your%20Carbon%20Footprint&fromService=true](https://web.umang.gov.in/web_new/department?url=carbon_neutral%2Fservice%2F60057&dept_id=20013&dept_name=Calculate%20Your%20Carbon%20Footprint&fromService=true)

#### Carbon Credit

One Carbon Credit is equivalent to 1000 Kg of CO<sub>2</sub>

A carbon credit also represents one metric tons of carbon dioxide

Generated from projects that reduce, remove and avoid greenhouse gas (GHG) emissions.

These projects can include renewable energy projects, reforestation efforts or energy efficiency improvements.

#### Calculation of Carbon Credits

To determine carbon credits

**Base Line emissions:** Amount of emission that would occur if the project is not implemented.

**Project Emission:** Amount of emission that would occur with the project in place.

**Emission Reduction:** The difference between the baseline and project emission, which represent the number of carbon credits generated.

Based on annual consumption, Household chores of Family are considered

Individual/Family

Transport

Holiday

House Energy

Waste Management

[https://web.umang.gov.in/web\\_new/department?url=carbon\\_neutral%2Fservice%2F60057&dept\\_id=20013&dept\\_name=Calculate%20Your%20Carbon%20Footprint&fromService=true](https://web.umang.gov.in/web_new/department?url=carbon_neutral%2Fservice%2F60057&dept_id=20013&dept_name=Calculate%20Your%20Carbon%20Footprint&fromService=true)

Based on annual consumption

**Carbon Dioxide produced Per Year**

Individual/Family:

Q How many people live in your home?

1-20

Transport How many vehicles does your household have?

Vehicle Detail: Petrol/Diesel

KMs driven in a year: 1 - XX Km

[https://web.umang.gov.in/web\\_new/department?url=carbon\\_neutral%2Fservice%2F0057&dept\\_id=20013&dept\\_name=Calculate%20Your%20Carbon%20Footprint&fromService=true](https://web.umang.gov.in/web_new/department?url=carbon_neutral%2Fservice%2F0057&dept_id=20013&dept_name=Calculate%20Your%20Carbon%20Footprint&fromService=true)

Based on annual consumption,

**Carbon Dioxide produced Per Year**

Transport: Holiday Flight:

How many return flights in these categories have you taken within the past 1 year? (Only include private flying, not work related) \*

Short distance flights(0-1000KM): 0-20

Medium distance flights(1001-5000KM):0-20

Large distance flights (5001KM or more):0-20

Train:

Kilometer Travelled by train for last 1 year

0-XXXXXXXX km

Buses

0-XXXXXXXX km

[https://web.umang.gov.in/web\\_new/department?url=carbon\\_neutral%2Fservice%2F0057&dept\\_id=20013&dept\\_name=Calculate%20Your%20Carbon%20Footprint&fromService=true](https://web.umang.gov.in/web_new/department?url=carbon_neutral%2Fservice%2F0057&dept_id=20013&dept_name=Calculate%20Your%20Carbon%20Footprint&fromService=true)

Based on annual consumption,

## **Carbon Dioxide produced Per Year**

House Energy:

Do you use gas for cooking in your home?

How many LPG cylinder does you use per year? -10

What is the primary heating source in your home?

If Electricity, Mention KWh (Year)

Waste Management

Number of plastic bags used per year?

Solid Waste in Kg per Year?

Liquid waste in Kg per Year?

[https://web.umang.gov.in/web\\_new/department?url=carbon\\_neutral%2Fservice%2F0057&dept\\_id=20013&dept\\_name=Calculate%20Your%20Carbon%20Footprint&fromService=true](https://web.umang.gov.in/web_new/department?url=carbon_neutral%2Fservice%2F0057&dept_id=20013&dept_name=Calculate%20Your%20Carbon%20Footprint&fromService=true)

Carbon Footprint Calculators in an Organization

Based on annual consumption,

## **Carbon Dioxide produced Per Year**

Life Cycle Assessment (LCA) :

This methodologies assesses emissions across all stages of a product or service's life cycle.

How to measure the carbon footprint of a Company

Carbon Footprint = Activity Data X Emission Factor

Activity Data: The parameter that defines the level of activity that generates greenhouse emission.

Emission Factor: Amount of Green House gases emitted for each activity

To calculate a company carbon footprint, it is need to calculate data on its greenhouse gas emissions (GHG) from various sources such as

Energy Use

Transportation

Waste etc.

Then used established emission factors to quantify these emissions and

Finally sum up the emissions from each activity to determine the total footprints

## **Collect Data**

**Energy Use:** Gather data on electricity, natural gas, fuel oil and other energy consumption.

**Transportation:** Collect data on employees commuting, business travel and freight transportation.

**Waste:** Measure the amount of waste materials and the type of waste disposal methods used

**Materials:** Track the number of raw materials used in the production and the associated emissions.

**Other Activities:** Collect data on any other activities that could contribute to emissions such as water usage or use of chemicals.

## **Scope & Boundaries**

**Scope 1** Direct emission from sources owned or controlled by the company

**Scope 2** Indirect Emission from the generation of purchased electricity, heat, or steam used by the company.

**Scope 3** All other indirect emissions that occur in the company's value chain (e.g. emissions from Suppliers, Transportation of Goods, Employees Commuting)

**Organizational Boundary: Determine which part of the Company's Operation and Value Chain to include in the Calculation**

Let's calculate Carbon Emission in DIGITAL WORLD

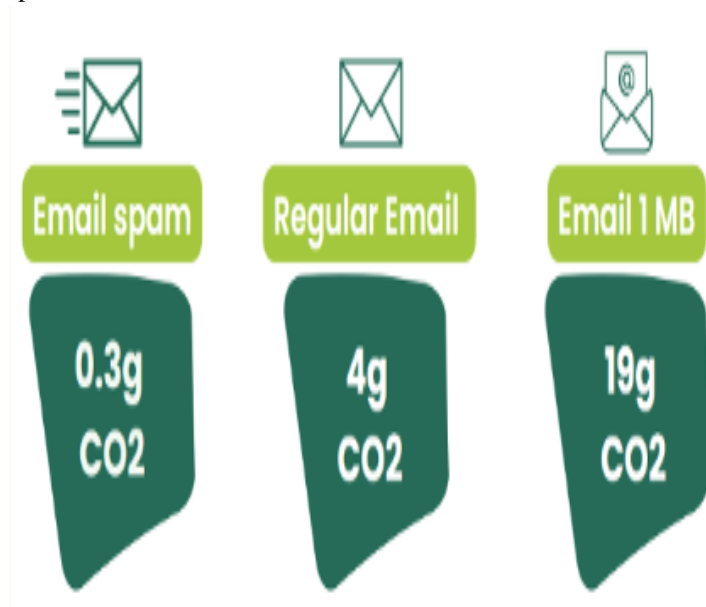
A single Google search on an energy-efficient laptop emits around 0.2 g CO<sub>2</sub>, while an older desktop computer increases that footprint to 4.5 g CO<sub>2</sub>.

Even something as small as a text message carries a cost of 0.014 g CO<sub>2</sub>.

Now, imagine the cumulative impact of billions of emails, searches, and messages sent daily.

The digital world isn't as "clean" as it seems.

Carbon Footprint of an E-Mail



we can reduce the emissions to As Low As Reasonably Practicable (ALARP) by adopting the recommendations

References: How Bad are bananas? by Mike Berners-Lee

Fifth Assessment Report of UN's Intergovernmental Panel on Climate Change

Let's calculate Carbon Emission in DIGITAL WORLD

Sending a short email is estimated to add about 4 grams (0.14 ounces) of CO<sub>2</sub> equivalent (CO<sub>2</sub>) to the atmosphere

To put this into perspective, the carbon output of hitting **SEND on 65 mails is on Par with driving an average-sized car a kilometre**

Sending an email with large attachments puts about 50 grams of CO<sub>2</sub> equivalent (CO<sub>2</sub>) into the atmosphere

Five such messages are like burning about 120 grammes of Coal

The average business email user is responsible for 131 kg of CO<sub>2</sub>e per year in e-mail related emissions and 22 percent of that figure is spam-related

Let's calculate Carbon Emission in DIGITAL WORLD: SPAM e-MAILS

Receiving Spam Message (even if you do not open it) has an environmental impact of 0.3 g of CO<sub>2</sub>.

The global carbon footprint from spam annually is equivalent to the GHGs pumped out by 3.1 million passenger cars using 7.6 billion trees of gasoline in a year.

Users viewing and deleting spam: Largest energy drain associated with spam, almost 18 billion KWh or 52% of Total Spam Energy

Let's calculate Carbon Emission in DIGITAL WORLD: SPAM e-MAILS

Globally, annual spam energy use total 33 billion kilowatt-hours (KWh), 33 terawatt hours (TWh)

That's equivalent to the electricity used in 2.4 million homes in the United States, with the same GHG Emission

3.1 million passenger cars using two billion United States gallons of Gasoline

**Spam filtering saves 135 TWh of electricity per year.: That's like taking 13 million cars off the road.**

What Uses Energy??

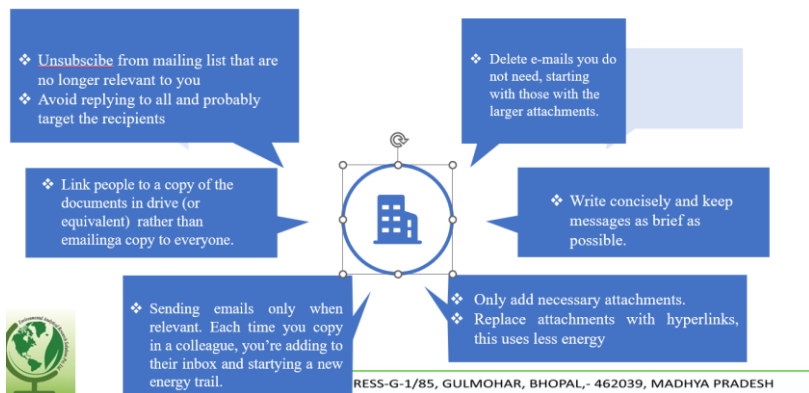
Every email processed uses electricity.

When using a message, the device is using electricity.

When an email sent, the network connection uses electricity, as well as the server that transfer the message to the recipients.

Everything online is physically stored on a device somewhere in the world, typically warehouse contain large amount of computers, consuming a large amount of energy

Recommendations for Carbon Emission in DIGITAL WORLD



## CARBON FOOTPRINT IN ARCHITECTURE

A carbon footprint in architecture refers to the total greenhouse gas (GHG) emissions, particularly carbon dioxide (CO<sub>2</sub>), associated with the lifecycle of a building or construction project.

It encompasses emissions from various phases, including

Material production,

Construction,  
Operation, and  
Eventual demolition or disposal.

# CARBON FOOTPRINT



## FACTORS INFLUENCING CARBON

Footprint in Architecture

**Building Design:** The efficiency of the design in utilizing space and energy.

•**Material Selection:** Choice of low-carbon, recyclable, or renewable materials like timber, bamboo, or recycled metals.

•**Energy Source:** Renewable vs. non-renewable energy sources used during operation.

•**Construction Techniques:** Prefabrication, modular construction, and 3D printing can reduce waste and emissions.

Durability and adaptability to changes reduce the need for reconstruction and associated

## IMPORTANCE OF CARBON FOOTPRINT IN ARCHITECTURE

Why is it Important?

•**Climate Change Mitigation:** Buildings contribute to roughly 40% of global CO<sub>2</sub> emissions.

Reducing their carbon footprint is critical for achieving climate goals.

- Sustainability:** Low-carbon buildings use fewer natural resources and promote long-term environmental balance.
- Cost Savings:** Energy-efficient designs reduce operational costs over time.
- Compliance:** Governments worldwide are enforcing stricter regulations to reduce emissions in construction and architecture.

## GLOBAL EFFORTS TO REDUCE CARBON EMISSION

### 1.Green Building Standards and Certifications

- LEED (Leadership in Energy and Environmental Design):** A widely recognized certification promoting energy-efficient and environmentally friendly construction practices.
- BREEAM (Building Research Establishment Environmental Assessment Method):** Focuses on sustainability across the building lifecycle.
- EDGE (Excellence in Design for Greater Efficiencies):** A certification for resource-efficient buildings, emphasizing energy, water, and material efficiency.

## GLOBAL EFFORTS TO REDUCE CARBON EMISSION

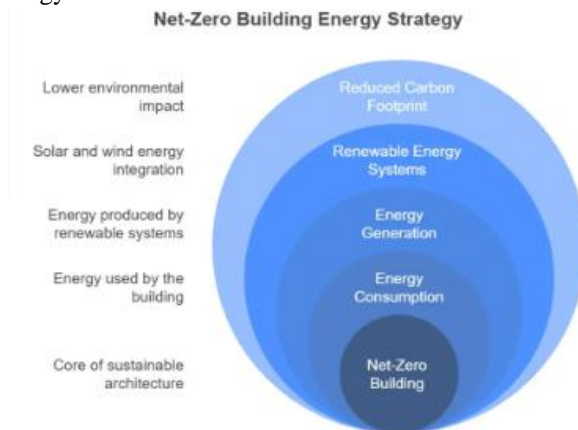
### 2. Sustainable Building Materials

- Low-carbon materials:** The use of materials like cross-laminated timber (CLT), bamboo, and recycled steel reduces embodied carbon.
- Carbon-sequestering materials:** Innovative materials like carbon-absorbing concrete and bio-based insulation (e.g., hempcrete) contribute to reducing carbon footprints.

## NET-ZERO BUILDING ENERGY STRATEGY

### Energy Efficiency in Design

- Passive design strategies:** Architects focus on optimizing natural ventilation, insulation, and lighting to reduce reliance on mechanical systems.
- Net-zero buildings:** These structures produce as much energy as they consume by integrating renewable energy systems like solar panels and wind turbines.
- Smart technologies:** Sensors, energy management systems, and AI-driven designs ensure efficient energy use



## Urban Planning and Retrofitting

•**Compact urban design:** Promotes reduced transportation needs and efficient land use.

•**Retrofitting existing buildings:** Upgrading insulation, HVAC systems, and windows in old structures improves energy performance and reduces emissions.

### GLOBAL EFFORTS TO REDUCE CARBON EMISSION

#### Global Policies & Agreements

**Paris Agreement:** Many countries have committed to achieving net-zero carbon emissions by mid- century. Architecture plays a significant role in meeting these targets.

**EU Green Deal:** Focuses on renovating existing buildings to improve energy efficiency as part of the goal to be climate-neutral by 2050.

**COP Conferences:** Regular updates to guidelines and frameworks for sustainable building practices.



## Biophilic and Nature-Integrated Design

**Green roofs and vertical gardens:** Reduce heat islands, improve air quality, and absorb CO<sub>2</sub>.

**Integration with ecosystems:** Designs that incorporate natural habitats and reduce urban sprawl help maintain ecological balance

### GLOBAL EFFORTS TO REDUCE CARBON EMISSION

#### Education and Awareness

•**Architectural education:** Integrates sustainability into curricula to prepare architects for designing low- carbon structures.

•**Public awareness campaigns:** Highlighting the environmental impact of construction and promoting sustainable living choices.

### GLOBAL EFFORTS TO REDUCE CARBON EMISSION

#### Innovative Architectural Approaches

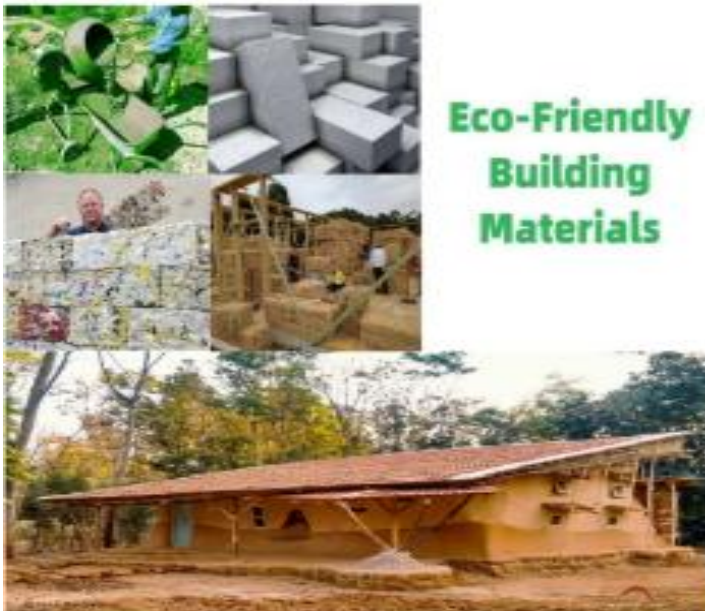
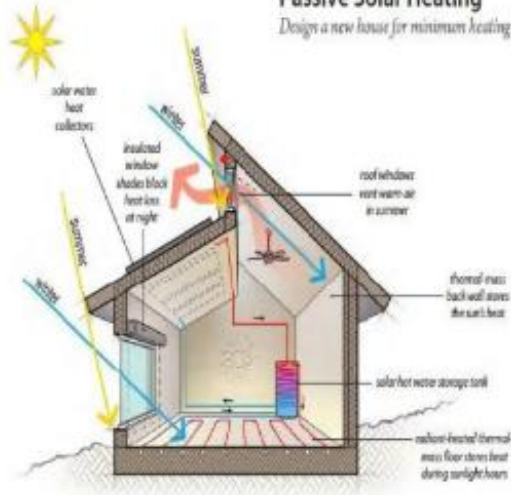
•**Circular economy in construction:** Designing buildings for disassembly and reuse of materials.

•**Prefabrication and modular construction:** Reduces construction waste and energy use.

•**3D printing:** Allows for precise use of materials, reducing waste.

## Passive Solar Heating

*Design a new house for minimum heating bills*



## Eco-Friendly Building Materials

### Vasudhaiv Kutumbakam

The Government of India has emphasized the principle of Vasudhaiv Kutumbaka A one world, one family, one future, where no one is left behind, a theme adopted by India for its G20 presidency.

As the most populous developing economy in the world, dealing with climate inequities aggravates the current social-economic-political-cultural inequalities due to its size, geography, and limited resources (energy, minerals, technology and finances).

India may need to select sub-optimal technologies to harness high impact transition opportunities.

Vasudhaiva Kutumbakam’ or ‘One Earth One Family One Future’ is drawn from the ancient Sanskrit text of the Maha Upanishad. The theme considers the value of all life of all kinds (human, animal, plant, and microorganisms) and their interconnectedness on the planet Earth and in the wider universe

Climate Change and India

India: Two challenges

Uemployability of the young generation

Urbanization.

In parallel to these two challenges,

Cclimate change: To maintain global temperature rises below 1.5 0C or even 2.0 0C

India’s development is very much necessary.

However, India focuses on mobilizing a large domestic and global capital flow to mitigate its sustainable development and climate change goals.

Currently, the per capita emissions are less in India compared to other countries.

But rapid growth in population for India will surpass China’s population by around 2025 (3,4)

India’s Green House Gas footprint today

India one of the Largest GHG (Green House Gas) emitter in the world along with United States, the EU and China.

96% of India’s GHG emissions are from energy, agriculture, industry, transportation and infrastructure/buildings –sectors.

To achieve net zero carbon emission, it is very much necessary that serious efforts are required to transform each of these sectors

Various Sectors Contributing to the GHGs Emissions



Decarbonizing India: A roadmap

As India grows richer, its energy and material consumption will also grow.

The LED lighting program: A good example of cleaner technology to mitigate large population demand.

Still, lots of work has to do to overcome or reduce carbon emissions.

To deal with such an issue, Green's new deal for India comprises 5 sectoral pillars and 4 horizontal enablers

Decarbonizing India: A roadmap

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### Proposed Techniques

To deal with such an issue, Green's new deal for India comprises 5 sectoral pillars and 4 horizontal enablers.

Pillar 1: Low-Carbon Energy

#### India : Third-largest electricity consuming nation in the world.

65% of total fossil CO<sub>2</sub> emissions in India is from the combustion of coal.

A multidirectional cycle representing low carbon energy movement

This includes Reduce, Replace and Remove policy.

Pillar 1 Low-Carbon Energy

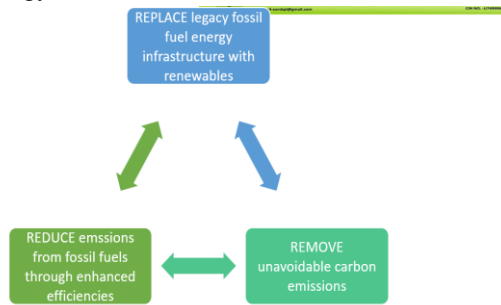


Fig : A multidirectional cycle representing low carbon energy movements

### Pillar 2 Green Mobility

In this condition, India needs to approach four goals for Decarbonization:

**Fuel efficiency:** India needs to focus on fuel efficiency standards to mitigate global standards beyond the current norms for cars, tractors, and construction equipment.

**Sustainable fuels:** More emphasis needs to be given to Biofuels, CNG, LNG and hydrogen

technology as these are cleaner burning than petrol & diesel and are viable too.

**Electric vehicles:** Electric vehicles are booming in India compared to other most efficient technology.

In near future, the share of electric cars and trucks may reach above 75%.

To reach this share Percentage, India has to focus on charging infrastructure and government policy regarding financial, behavioural, and infrastructure-related incentives.

**Hydrogen mobility:** Heavy mobility vehicles such as trucks fuel can be replace with hydrogen technology, an emerge viable fuel alternative.

Pillar 3: Decarbonization of Energy-Intensive Industries

India's manufacturing industries like iron, steel, cement, chemicals, and fertilizers contribute to CO emissions:

1. From fossil fuels more than 40% of emissions in these sectors and change over to another feedstock will require a complete makeover in the production process and technologies.

2. To produce high temperatures fossil fuels are required and burning of fossil fuels causes more than 30% of carbon emissions.

Use of renewable power in place of fossil fuels will require a transition with technical feasibility.

3. Rebuilding new processes with a lower Green House Gas footprint is significant

#### Pillar 4: Green Buildings, Infrastructure and Cities Sustainable Agriculture

The top 25 cities of India contribute to more than 15% of India's estimated greenhouse gas emissions.

India will continue to urbanize through this century; at the end of 2050 the projected urban population grow from ~480 million today to 814 million.

Urban carbon generation can reduce through:

1. Development of city with concern of city sprawl minimization.
2. An approach to improve energy efficiency in water management processes.
3. Facilities for disposal, waste generation optimization, and collection.

#### Pillar 5 Sustainable Agriculture

18% of gross national emissions are coming out from Agriculture and livestock.

80% of total nitrous oxide emissions and 45% of total methane emissions are coming out from agriculture waste burning.

From livestock production 80% of agricultural methane is emitted.

#### Cross-Sectoral Enablers to Accelerate Green Transition

India needs four cross-sectoral enablers in its green transition:

##### Enabler 1: Green Innovation

R&D and new business development model in every aspect of the economy is required for decarbonization.

For green innovation option needs to take in consideration are low cost renewables, commercially scale battery storage, new sources of energy, distributed generation and transmission optimization in the energy sector.

It is demand of current situation that use of alternative fuels for electric transport continue to evolve and will need to reach common commercial used.

At the same time technology innovation in the area of industry, agriculture, and buildings/infrastructure is also required.

##### Enabler 2: Green Finance

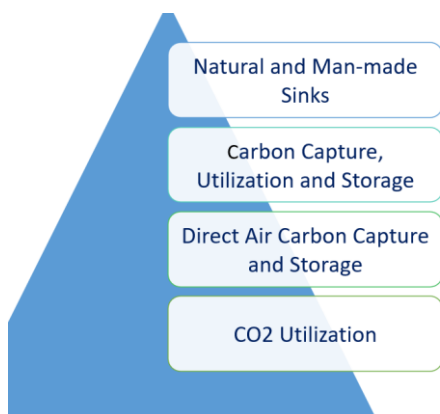
**To focus on India's green transition following points are very much necessary**

- 1) Private and Government and capital flows to build India's new green infrastructure.
- 2) Encourage individuals and develop new technologies to move to greener consumption patterns.

Though it is a challenge for India to provide a mature green finance for India's net-zero transition.

##### Enabler 3: Carbon Sequestration Methods

India will need an equally ambitious sequestration agenda to enable its net-zero transition.



#### Enabler 4: Climate Adaptation

To halt the impacts of climate change completely, reducing carbon emissions and sequestering carbon is not enough.

Public and private both sector stakeholders will need to do a plan for climate adaptation.

There will be certain incentive provided in all the sections to promote this activity.

The activity should start with individual or residential complexes.

The academic institutes are always proven the capabilities to implement such activities with proper action plan.

The management irrespective of domain should focus on the climate change battle action plan and take the follow up time to time.

With increase in the awareness about climate action we can come up with less emission of CO<sub>2</sub>.

#### **Conclusion**

This overall analysis of the green house gas emission in the Indian context has been presented here.

There are several factors responsible for the GHG emissions.

Due to the increase in the industrialization and allied activities the undesired changes has been taking place in the ecosystem.

The goal is to identify the factors those can retaliate the undesired climate action.

This presentation represents the pillars and enablers for a green transition for new India, it depend on the continuous development of the three drivers of Indian growth like

- 1) Technological development
- 2) Financial innovation
- 3) Strong political leadership.

These three drivers have put India in a position where it can put together two challenges,

- 4) Development aspirations
- 5) Climate crisis and emerge with a solution.

The strategic plan and its execution in the respective field will help to battle the climate change.

Thus, by preparedness and appropriate substitutes will enhance the lifestyle and cope-up with environment deterioration.

The suggested pathway not only helps in local context but also leads in global context.

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