# NDC AND UNFSS PATHWAY ANALYSES – HIGHLIGHTING SYNERGIES & ACCELERATING DIALOGUE

# INDIA

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# 1. INTRODUCTION

The agrifood sector plays a dual role in the climate change narrative, serving both as a significant source of greenhouse gas emissions and as one of the sectors most vulnerable to the adverse effects of climate change. Therefore, aligning the transformation of agrifood systems with climate action is vital to advancing progress on these interconnected challenges. Achieving this requires a comprehensive integration of agrifood systems, agriculture, nutrition, and climate initiatives across global, continental, and, crucially, national levels.

Key frameworks guiding this alignment include Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs), the UN Food Systems Summit (UNFSS) Pathways, and country-specific implementation strategies under the Comprehensive Africa Agriculture Development Programme (CAADP). The Center for Development Research (ZEF) conducted a rapid country-level analysis to further support this integration by evaluating how effectively NDCs and UNFSS Pathways are aligned in select countries. The aim was to identify potential synergies between these frameworks, fostering coherence and mutual reinforcement in efforts to build climate-resilient and sustainable agrifood systems.

This analysis is particularly timely given recent and upcoming international conferences and initiatives between 2023 and 2025, including the UNFSS+2 Stocktaking Moment and UNFCCC COP28 in 2023; the SB60 meetings in Bonn in 2024 with a breakthrough on the Sharm el Sheikh Joint Work on Implementation of Climate Action on Agriculture and Food Security; the 2024 Summit of the Future; the 2025 renewal of NDCs under the Paris Agreement, and the adoption of the post-Malabo Agenda by African nations in 2025. Collectively, these milestones offer critical opportunities for countries to harmonize and converge their policy frameworks, ensuring that agrifood systems and climate action are mutually supportive and reinforcing.

# 2. OVERVIEW

To better assess the alignment and convergence of food systems transformation and climate policies, an analysis of India's NDC and UNFSS Pathway was conducted. Both documents were examined regarding possible synergies and cross-cutting themes. As only a few synergies between the NDC and the Pathway were identified and India has not submitted a National Adaptation Plan (NAP), the National Plan on Climate Change (NAPCC; first released in 2008) was analyzed. The NAPCC outlines several steps to simultaneously advance India's development and climate change-related objectives of adaptation and mitigation. The NAPCC is accompanied by State Action Plans on Climate Change (SAPCCs) which all of India's states and territories are required to compile and submit. Concrete political targets and strategies were identified in the three documents across several thematic categories:

- GHG emissions
- Dietary diversity
- Crop diversity and biodiversity
- Technology and investments
- Water management
- Irrigation
- Sustainable agriculture and alternative farming systems

## 2.1. INDIA'S NDC AND NAPCC

### 2.1.1. NDC

India's current NDC is an updated version[1] of the first version and was submitted to the UNFCCC in August 2022. It describes the country's mitigation and adaptation contribution towards implementing the Paris Agreement for the period 2021-2030. The country formulates eight contributions as an update to the first NDC from 2015.

According to the updated NDC, India aims to reduce the emission intensity of its GDP by 45 percent by 2030 (from 2005 levels) as an unconditional target. This is an update of the earlier INDC (later NDC), which stated a "0-25% reduction in emission intensity of GDP by 2020 compared to 2005 levels".[2]

India's long-term goal is to reach net zero by 2070. According to the updated NDC, 18% of the GHGs derive from the agriculture sector but it does not identify specific action on how to reduce emissions in the sector; further, the NDC aims to create an additional forest cover and to provide a carbon sink of 2.5 billion tons. Another target is to achieve 50% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030.

The NDC highlights the **contributions to be made in technology and investments** to better adapt to climate change by enhancing investments in sectors vulnerable to climate change (agriculture, water resources, etc.) and mobilizing domestic and new and additional funds to implement the necessary mitigation and adaptation actions. Furthermore, in the document, India commits to building capacities "for quick diffusion of cutting edge climate technology" (p. 2).

The Climate Action Tracker ranked India's contributions to the Paris Agreement as "highly insufficient" and points out the country's domestic target gap and an international support gap.

### 2.1.2. NAPCC [3]

The NAPCC was released by the Prime Minister on 30th June 2008. In 2007, an Expert Committee on the Impact of Climate Change set up by the Ministry of Environment & Forests assessed the impacts of climate change on six areas, namely water resources, agriculture, natural ecosystem, health, coastal zone management, and climate modeling. Based on the assessment, the Expert Committee prepared recommendations for policies and programs addressing climate change, expressed in the so-called National Missions on Climate Change. In total, there are eight missions:

- National Solar Mission
- National Mission for Enhanced Energy Efficiency
- ***National Mission on Sustainable Habitat***
- ***National Water Mission***

[1] India's Updated First Nationally Determined Contribution, Government of India; https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20Nationally%20Determined%20Contrib.pdf

[2] India's Intended Nationally Determined Contributions; Government of India, Ministry of Environment, Forest and Climate Change; https://moef.gov.in/wp-content/uploads/2018/04/revised-PPT-Press-Conference-INDC-v5.pdf

[3] National Action Plan on Climate Change; Prime Minister's Council on Climate Change; website: Climate Change Laws (https://climate-laws.org/documents/national-action-plan-on-climate-change_88a8?r=&sf=date&so=asc&l=india&o=0&id=national-action-plan-on-climate-change_9821)

- ***National Mission for Sustaining the Himalayan Eco-system***
- ***National Mission for a Green India***
- ***National Mission for Sustainable Agriculture***[4]
- National Mission on Strategic Knowledge for Climate Change.

The five highlighted Missions are directly relevant to the assessment of climate and agrifood system policies and are focused on adaptation efforts. The overarching goals of all missions are to protect the poor, to alleviate national growth and poverty, and to deploy technologies for adaptation and mitigation of climate change.

## 2.2. INDIA'S UNFSS NATIONAL PATHWAY

The **UN Food Systems Summit** was held in September 2021. It addressed the need to transform food systems and make them more sustainable. Following several national dialogues, India developed its National Pathway[5] ("Advance Equitable Livelihoods"), prepared by the National UNFSS Convenor (and Member of the National Institution for Transforming India, NITI Aayog) Prof. Ramesh Chand. The Pathway highlights that although the country's food production increased since the 1970s, the challenges of hunger and malnutrition remain unresolved. To improve food security and nutrition towards a healthier and more sustainable diet, the Pathway specifies the number of entry points and also explicitly mentions the environmental risks associated with the use of agrochemicals in agriculture, as well as the lack of efficient use of the country's own water resources. Across three chapters, the Pathway provides:

- an overview of the Indian experience related to sustainable development agenda and food system;
- provides suggestions for game-changing ideas at the regional level;
- and outlines pathways and ideas for achieving food system transformation.

Recommended actions include the following aspects (focusing on measures with climate policy relevance):[6]

- **Irrigation Expansion and Efficiency**; with the vision to extend the coverage of areas by irrigation in the country and increase the water use efficiency. Therefore the government invented the project Pradhan Mantri Krishi Sinchayee Yojana (PMKSY). An integral component of PMKSY is micro irrigation, ensuring 'Per Drop-More Crop".
- **Sustainable Growth**; with the incentive to enhance sustainable and regenerative agriculture practices such as direct seeded rice, zero tillage, residue management, organic farming, etc. for the mitigation of GHGs derived from agriculture.
- **Healthy and Safe Food**; emphasizing the necessity to reverse the impact of indiscriminate use of agrochemicals on food quality, soil, environment, and human and livestock health.

[4] Website of National Mission for Sustainable Agriculture (https://nmsa.dac.gov.in/frmDocCirculers.aspx)

[5] Food System Summit, National Dialogue on Action Track 4, Advanced Equitable Livelihoods; Prepared by the National Covenor Prof. Ramesh Chand, Member of NITI Aayog (https://www.unfoodsystemshub.org/docs/unfoodsystemslibraries/national-pathways/india/2021-09-22-en-fss_dialogue_convener_report-prepared-by-prof-ramesh-chand-member-niti-aayog.pdf?sfvrsn=c9580ca7_1)

[6] A summary can be found in the document: "India's Pathway to Food Systems Transformation; published by the Global Alliance for Improved Nutrition" (https://www.gainhealth.org/sites/default/files/publications/documents/Indias-Pathway-To-Food-Systems-Transformation.pdf)

- **Agro Climatic Based Crop Planning**; created by research institutes to tailor crops/varieties for various agro-climatic regions.
- **Contingency Planning**, enabling the farmers to react to weather uncertainties and risks by sowing under various time, moisture, and temperature regimes.
- **Farm Producers Organizations and Cooperatives**, for which purpose the Ministry of Cooperation at the Federal level was created. Furthermore, a law was adopted enabling farmers' producers organizations (FPOs) to register as farmers' producer companies. The country aims to create 10 thousand more FPOs in the next five years (stated 2021).
- **Better Infrastructure and Markets**
- **Women's Empowerment for Gender Equality**
- **Improved Access and Better Nutrition, addressing iron deficiency**
- **Market Liberalisation and e-Commerce in Agri[culture]**
- **Alternative Farming System**; pointing out high-tech farming and precision farming to combat the significant yield penalty due to the shift from chemical-based farming to organic farming, as a solution approach to reverse the effect of chemical-based farming on human health, fauna and flora, soil, environment and ecology.
- **Technology and R&D** are crucial for the transformation of agrifood systems (for example genome editing) to improve the productivity of minor neglected crops, and digital tools or apps based on AI.
- **Trade Related Issues**.

## 3. CONVERGING THEMATIC AREAS

Both, the NDC and the UNFSS pathway, state that the share of GHGs derived from agriculture (18%) is to be addressed. The UNFSS pathway highlights that there is significant emphasis on sustainable and regenerative agricultural practices for the mitigation of agricultural GHGs.

A converging thematic focus of both documents is to embrace aspirations **on technology and investments**. The UNFSS stresses the critical role of technologies for agrifood systems transformation, while the NDC emphasizes the necessity of capacity building for quick diffusion of “cutting edge climate technology” and for “joint collaborative R&D for such future technologies”. It further commits to mobilizing domestic and new and additional funds from developed countries to implement mitigation and adaptation actions. Investments should be enhanced in programs and regions particularly vulnerable to climate change, such as agriculture, coastal regions, and the Himalayan region. The UNFSS Pathway also shows how carbon-positive **regenerative agriculture** could be implemented: through incentivizing farmers for the adoption of regenerative agriculture and by the creation of business models and private investments in regenerative agriculture.

Both, the NAPCC (in the Mission for sustaining Himalayan ecosystems) and the UNFSS pathway (but not the NDC) point out the need to raise **awareness on agri-biodiversity, forgotten or neglected crops,** and to increase **research** on these.

**Water management** is a recurring theme but finds no mention in the NDC. The NAPCC and the UNFSS Pathway both highlight the necessity to improve the water use efficiency

in agriculture, as 80-90% of the national water use is for agricultural irrigation[7]. Two missions of the NAP deal with this topic, the "National Water Mission" and the "Mission on Sustainable Agriculture", for example with the PDMC (Per Drop More Crop) Program (part of the national mission "Pradhan Mantri Krishi Sinchayee Yojana" (PMKSY)).

What a **sustainable agriculture** sector could look like is further described in the NAPCC and the UNFSS pathway, but not in the NDC. However, the analysis revealed differences in the formulation of concrete measures. In the Mission on Sustainable Agriculture, the NAPCC names Soil Health Management (SHM), including the Integrated Nutrient Management (INM), and the implementation of a "Soil Health Card" as a concrete measure to be taken. Furthermore, an Integrated Farming System would maximize farm returns and mitigate the risks of droughts and floods. In contrast, the UNFSS Pathway calls for an expansion of organic farming and conservation agriculture, including residue management and zero tillage. Moreover, it points out the importance of **high-tech farming**, for example, precision and sensor-based farming practices to increase the productivity of the land.

## 4. GHG EMISSIONS BY SECTOR

According to the India Climate and Energy Dashboard (ICED)[8], a government-supported platform, agriculture emissions (excluding LULUCF) increased by 157,9% between 1994 (1,214 MT CO2eq) and 2019 (3,132 MT CO2eq). The World Emissions Clock platform estimates an increase of total GHG emissions to 5,000 MT CO2eq in 2030, based on a business-as-usual (BAU) scenario.[9]

In 2024, the energy sector is estimated to account for 40% of the country's total GHG emissions, followed by industry (28%, including waste) and agriculture (18%) (figure 1). Another 10% of the national total is contributed by transport and 4% by building. A large share of GHGs in the energy sector is constituted of coal production amounting to 33%. The calculations for 2024 are based on a BAU scenario, estimated by the World Emissions Clock by the World Data Lab.

[7] UNFSS pathway of the country

[8] https://iced.niti.gov.in/ The dashboard is developed by NITI Aayog (resource centre of the Government of India) and Vasudha Foundation (a prominent Think Tank for green pathways) (accessed 17/05/2024).

[9] https://worldemissions.io/ , accessed 17/05/2024

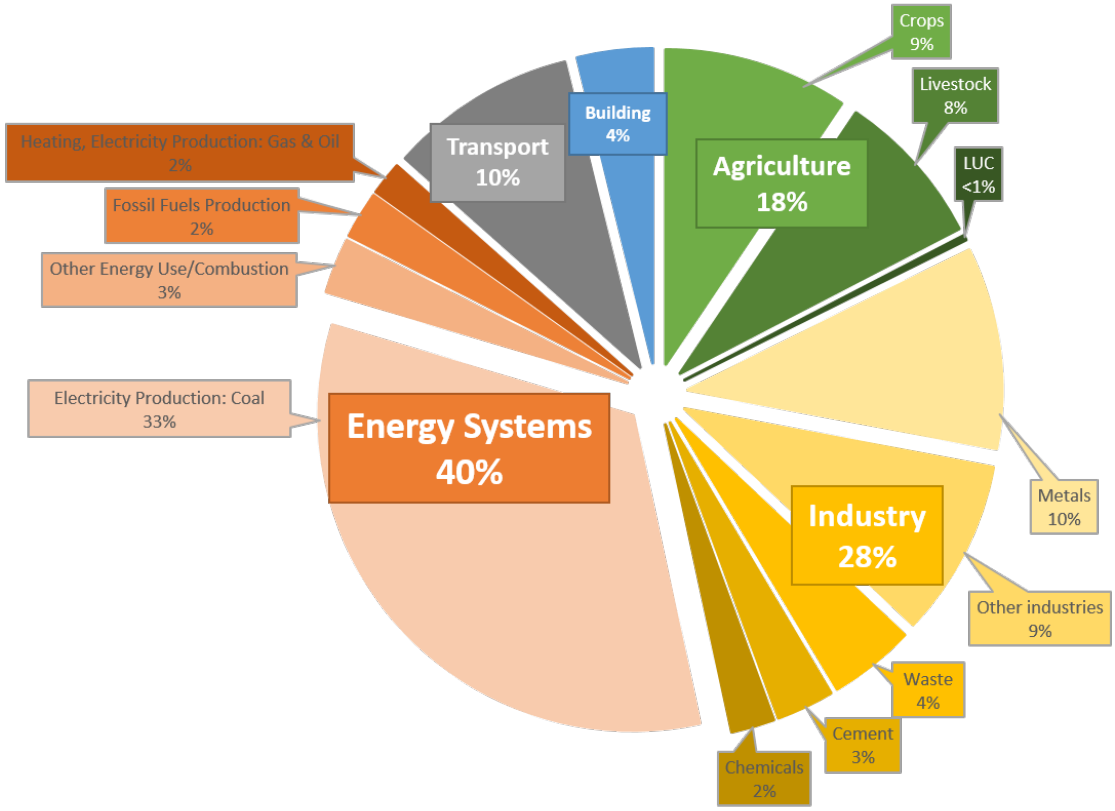


Figure 1: Estimated GHG emissions in India by sector in percent (%) (2024). Rounded figures.[10]

## 5. KEY POLICIES, STRATEGIES, AND INSTITUTIONS UNDERPINNING THE SUCCESSFUL IMPLEMENTATION OF INDIA'S NDC AND UNFSS NATIONAL PATHWAY

In a final step, research was conducted to generate an overview of the policy frameworks and institutional arrangements[11] on climate change and agrifood systems transformation in India that form the basis/complement the country's NDC, NAPCC, and UNFSS national Pathway. Table 1 presents an overview of some key policies and strategies; given the number of policies and institutions, this presents an overview and is not an exhaustive list. A more detailed description of each policy can be found on the Climate Policy Database: https://climatepolicydatabase.org/policies?country%5B0%5D=437

[10] Source: authors calculations based on World Emissions Clock by World Data Lab https://worldemissions.io/ , accessed 17 May 2024

[11] An overview of important strategies and policies can be found at https://climate-laws.org/search?r=&l=india&sf=date&so=asc

Table 1: India's institutional and policy frameworks guiding climate policy and agrifood systems transformation[12]

| Policies, strategies, and political frameworks | |
|---|---|
| **CLIMATE CHANGE** | **FOOD SYSTEMS** |
| • Agricultural Demand Side Management Programme(AgDSM) India (2023)<br>• Viability Gap Funding for the development of Battery Energy Storage Systems (BESS) India (2023)<br>• National Electricity Plan India (2022)<br>• Vehicle scrappage policy India (2022)<br>• Green Hydrogen Policy India (2022)<br>• Other low-carbon technologies and fuel switch<br>• Energy Storage Obligation India (2022)<br>• Urban infrastructure investment India (2022)<br>• Council on Climate Change Act (2021)<br>• National REDD+ Strategy India (2018) | • Agricultural Demand Side Management (AgDSM) Programme India (2007)<br>• Mission for Integrated Development of Horticulture India (2005)<br>• National Initiative on Climate Resilient Agriculture India (2011)<br>• National Mission on Agricultural Extension & Technology India (2010)<br>• National Policy for Farmers India (2007)<br>• Special Additional Excise Duty (SAED) India (2019)<br>• Agricultural Demand Side Management Programme(AgDSM) India (2023)<br>• Kisan Urja Suraksha evam Utthaan Mahabhiyan (KUSUM) India (2019)<br>• National Food Security Mission India (2013)<br>• National Policy on Biofuels (2015)National Agroforestry Policy (2014)<br>• National Food Security Act (NFSA) (2013)<br>• Twelfth Five-Year Plan 2012-17 (2012) on Faster, More Inclusive and Sustainable Growth |

| Institutions and coordination mechanisms on climate change and agrifood systems |
|---|
| Ministry of Environment, Forest and Climate Change India |
| Ministry of Agriculture and Farmers' Welfare (MAFW) |
| Council on Climate Change |
| The Apex Committee for Implementation of Paris Agreement India |

[12] Excluding the documents mentioned above (NDC, NAPCC, UNFSS Pathway, National Mission on Sustainable Agriculture)

## 6. CONCLUSION

While not assessed for policy coherence, the three main documents consulted for this rapid analysis – India's NDC, NAPCC, and UNFSS Pathway – show several converging thematic areas that could deserve more in-depth analysis: **investments in new technologies and technology development**; **regenerative agriculture; agri-biodiversity, with an emphasis on underutilized crops; sustainable water management; and sustainable agriculture practices.**

In terms of governance, India has a comprehensive set of policies and strategies aimed at transforming its climate and agrifood systems. These are developed and implemented by institutions at the national and state levels.

An in-depth analysis of India's policy coherence across the climate and agrifood sector could be useful to sharpen focus and better align targets and actions.

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