Global Green Growth Institute

Stakeholders Roundtable Discussion

on

Accelerating Green Economy in India

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Background Paper

Inputs Provided By

Reserve Bank of India (RBI) & Global Green Growth Institute (GGGI)

FICCI Roundtable Discussion

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1. Green Economy: Issues and Way Forward

United Nations Environment Programme (UNEP) defines **green economy as**: "*one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one, which is low carbon, resource efficient and socially inclusive*"[1]. It encompasses a range of sectors, including renewable energy, sustainable agriculture, green infrastructure, nature-based solutions, eco-friendly transportation, circular waste management, and more.

a. **Issues and Challenges Related to the Green Economy:** One of the primary issues is **transitioning away** from traditional, linear and resource-intensive industries towards green technologies and practices which often require significant investment, re-skilling of the workforce, and policy support.

b. Green technologies and practices are found to be **costlier** compared to conventional ones. The upfront installation costs of installation of renewable energy plants for example can be high although the long-term benefits, in terms of cost of energy, avoided cost of air and water pollution, often offset them.

c. Ensuring access of green technologies for all to all segments of society, and addressing **social impact,** such that there is **equity** and no community is left behind or affected disproportionately by the transition, are critical aspects.

d. Continued **innovation** through research and development in alternative sources of renewable energy, energy storage, sustainable agriculture, circular economy practices, is essential for driving the green economy forward. These have to be borne keeping close considerations of improved energy efficiency technologies, reduced purchase and O&M costs, and an expanded range of green technologies and practices.

Emerging market economies (EMEs) like India, find themselves at a disadvantage in transitioning to environment-friendly sustainable practices due to the overpowering need for basic development priorities and lack of financial support from developed nations/ international agencies for mitigation and adaptation purposes. Furthermore, as high growth sectors like electricity generation, transportation, and industrialisation often entail costs to the environment, balancing economic growth with environmental sustainability remains a challenge for the EMEs.

The G20 has been engaging with issue of environmental and climate sustainability since 2017. Energy and climate change mitigation received a significant boost during G20 India presidency in 2023 on the theme "Vasudhaiva Kutumbakam" or "One Earth · One Family · One Future". India's Mission LiFE (Lifestyle for Environment) and the five nectar elements (Panchamrit) of India's climate action have been particularly lauded for advocating sustainable lifestyles, echoing global consensus at COP27 and G20 forums. India has committed to intensifying its climate action by announcing globally . The updated Nationally Determined Contributions (NDCs) [2] by India to the United Nations Framework Convention on Climate Change (UNFCCC) announced at the 26th session of the Conference of the Parties (COP26) held in Glasgow, United Kingdom, is also a step towards achieving India's long term goal of reaching net-zero by 2070.

2. Green GDP Accounting and Framework: Challenges and Solutions

[1] Green economy | UNECE (https://unece.org/green-economy-3)

[2] India's Updated1st Nationally Determined Contributions

Measurement of Green Economy – Initiatives in India:

Green GDP, which integrates environmental costs and benefits into traditional GDP calculations, is currently not officially measured or reported in most of the AEs (advanced economies) and EMES (emerging market economies), including in India. Scholars and researchers have attempted to estimate it, highlighting the challenges in quantifying the environmental impact of economic activities.

- One of the earlier initiatives in India to build a framework for environmentally-adjusted national income accounts goes back to 2003 with the ***Green Accounting for Indian States & Union Territories Project (GAISP)*** by the Green Indian States Trust (GIST). The first phase of the project produced eight reports, covering estimates for India's natural resources such as, forest and forest products, agricultural cropland, sub-soil assets, ecotourism, freshwater resources, *etc*., and finally the annual estimates of adjusted state national income.
- A similar initiative, by the Indian Institute of Forest Management (IIFM) provided ***economic valuation of six major tiger reserves*** in India: Jim Corbett, Kanha Tiger Reserve, Kaziranga National Park and Tiger Reserve, Periyar Tiger Reserve, Ranthambore National Park and Sundarbans[3].
- More recently, in 2017, the ***Natural Capital Accounting and Valuation of Ecosystem Services (NCAVES) project*** was launched by the United Nations (UN) and the European Union to enhance knowledge and process for ecosystem accounting as per the UN System of Environmental-Economic Accounting (SEEA) framework for five countries - Brazil, China, India, Mexico and South Africa. The Ministry of Statistics and Programme Implementation (MOSPI) initiated compilation of environmental accounting under the NCAVES[4].
- A similar project was carried out by the Directorate of Economics and Statistics (DES), Government of Uttarakhand with collaboration of the Indian Institute of Forest Management (IIFM) in 2018[5]. The project developed a ***green accounting framework*** for land, water, minerals and forests for the state of Uttarakhand and aimed to estimate the economic value of the state's forest resources and their contribution to its GDP.

The accounting framework and methodology prepared by the different institutions and committees have been useful in providing a better understanding about the valuation of natural resources in India. However, due to the mammoth size of such accounting exercises for a huge country like India, preparation of a continuous macroeconomic data series on valuation of natural capital for India has not been possible. As a result, for long-term macroeconomic data for India, and in order to make it comparable to other countries, one has to take recourse to estimations provide by international institutions like the World Bank and OECD, following the standard international methodology by SEEA.

Measuring Green GDP – Standard International Methodology

The System of Environmental-Economic Accounting (SEEA) provides guidance for accounting of green GDP by incorporating the following into its framework:

1. Physical flows of natural resources and related assets within the economy
2. The expenditure incurred to protect the environment
3. The stock of natural and non-renewable resources which are unutilized

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[3] Verma, M., Verma, D. Negandhi, C. Khanna, A. Edgaonkar, A. David, G. Kadekodi, R. Costanza and R. Singh. (2015), "Economic Valuation of Tiger Reserves in India: A Value+ Approach," Indian Institute of Forest Management, Bhopal, India (2015).

[4] Government of India (2021), Ecosystem Accounts for India - Report of the NCAVES Project. MoSPI, 2021.

[5] Verma, Madhu, Advait Edgaonkar, Swapan Mehra, Chandan Khanna, Prabhakar Panda and Kunal Bharat (2018), Green Accounting of Forest Resources, Framework for Other Natural Resources and Index for Sustainable Environmental Performance for Uttarakhand State and Capacity Building on Environmental Statistics and Green Accounting. Indian Institute of Forest Management and IORA Ecological Services, October 2018.

However, the scope and usage of SEEA for emerging market economies is severely constrained by lack of data availability.

Green GDP Calculation:

A general approach to Green GDP calculation involves the subtraction of carbon emission costs, opportunity costs of waste generated and adjusted savings of natural resource depletion from GDP, and addition of any other related expenditure incurred.

Thus, a general outline of estimation may be given as below:

Green GDP *= GDP - (Carbon dioxide damage + Particulate emission damage) -(Opportunity cost of energy depletion + Mineral depletion + Net forest depletion) + Expenditure on environmental protection*

Based on the availability of data, an RBI Bulletin article titled "Estimation of Green GDP in India"[6], published in October 2022, estimated three measures of Green GDPs – *G1*, *G2* and *G3*. These measures are defined as below:

1. ***G1*** = GDP - (Carbon dioxide damage) - (Opportunity cost of energy depletion + Mineral depletion + Net forest depletion) – *Data availability: 1971-2019*.
2. ***G2*** = ***G1*** - Particulate emission damage – *Data availability: 1990-2019*.
3. ***G3*** = ***G2*** + Expenditure on environmental protection – *Data availability: 2006-2019*.

The Green GDP *G3* is the most comprehensive measure at this stage and includes all available information, whereas *G1* is least comprehensive. Furthermore, to help us analyse the trajectory of green GDP with respect to the traditional measure of economic activities *i.e.*, GDP, we have computed green GDP ratios ***GR1***, ***GR2*** and ***GR3*** by dividing *G1*, *G2* and *G3* by GDP. These ratios will help analyse the trajectory of Green GDP with respect to traditional measure of economic activities *i.e.*, GDP and how it changes over time

The Green GDPs (G3, G2 and G1) show a rising trend.

- Green GDP G1 increased from ₹13.2 lakh crore in 1971 to ₹167.7 lakh crore in 2019
- Green GDP G2 increased from ₹28.1 lakh crore in 1990 to ₹165.8 lakh crore in 2019, and
- Green GDP G3 increased from ₹72.1 lakh crore in 2006 to ₹165.9 lakh crore in 2019.

This trajectory of Green GDP for India indicates visible improvements since 2012. Furthermore, resource depletion, CO2 emission and material footprint, especially in the case of biomass and non-metallic minerals, are showing signs of considerable improvements, further supporting our findings. Based on the broad observations from the estimation, it may be concluded that India is making great progress in green growth, which if continued, should contribute to improvements in general well- being of its population.

Challenges in Measuring the Green Economy -

i. **Indicator Selection**: Selecting appropriate indicators to measure the green economy is crucial but challenging. Indicators should capture environmental sustainability, economic viability, and social inclusivity. However, finding indicators that adequately represent these dimensions and are measurable consistently over time and across regions can be difficult.

ii. **Data Availability and Quality**: Gathering data on green economy activities and their impacts requires comprehensive and reliable datasets. However, data on environmental factors, such as pollution levels or natural resource depletion, may be incomplete or lacking, particularly in developing countries. Moreover, ensuring the quality and consistency of data across different sources and time periods is essential for meaningful analysis.

iii. **Monetary Valuation of Environmental Assets**: A significant aspect of the green economy is the valuation of environmental assets such as clean air, water, and biodiversity. However, assigning monetary values to these assets is inherently challenging due to their nature as

[6] RBI Bulletin- Oct 2022

public goods and the complex interrelationships within ecosystems. Different valuation methods may yield varying results, leading to uncertainty in economic assessments.

> The Green Growth Index[7], by Global Green Growth Institute (GGGI), measures a country's performance in achieving sustainability targets, including Sustainable Development Goals (SDGs), the Paris Climate Agreement, and Aichi Biodiversity Targets. Its framework, which GGGI developed with over 300 international experts from 2017 to 2019, consists of four green growth dimensions, including efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. The Green Growth Index scores range from 1 to 100, classifying 1-20 as very low, 21-40 as low, 41-60 as moderate, 61-80 as high, and 81-100 as very high green growth performance. The highest score of 100 indicates that sustainability targets were achieved because the green growth indicators are benchmarked against these targets. The four green growth dimensions are equally important, so the Green Growth Index scores are not computed for countries with missing scores for at least one dimension.

The unavailability of data related to environmental indicators of India poses a major challenge for engaging in research work in the area. Although India has a dedicated Open Government Data (OGD) platform for data dissemination[8], it needs revamping to smoothen its use. In this context, the Organization for Economic Co-operation and Development (OECD)[9] and the Eurostat[10] platform can guide any further improvements. It is also recommended that a dedicated in-house group in the Ministry of Environment, Forest and Climate Change (MoEFCC) may be formed for:

i. Providing time-series database required for the estimation of Green GDP;
ii. Release estimates of Green GDP for India periodically on a regular basis; and
iii. User-friendly data dissemination platform on the lines of the OECD and the Eurostat.

3. Industrial Transitioning towards Green Growth

A new study by the World Economic Forum 'Mission 2070: A Green New Deal for a Net Zero India'[11] presents a sectoral roadmap for India to accelerate decarbonization and drive global climate action efforts. According to the report, India's transition to a net-zero economy could create over 50 million jobs and contribute more than $1 trillion in economic impact by 2030. As the economy transitions from agrarian and service-led towards manufacturing-led growth, India has an opportunity to accelerate its transition to a net-zero and green economy.

India's updated NDC will be implemented over the period 2021-2030 The Government has launched many schemes and programs to scale up India's actions on both adaptation and mitigation through programmes and schemes of relevant Ministries /departments and with due support from States and Union Territories.

- The Union Cabinet has approved '*PM-Surya Ghar: Muft Bijli Yojana'* with a total outlay of Rs.75,021 crore for installing rooftop solar and providing free electricity up to 300 units every month for one crore households. The scheme was launched on February 13th, 2024. The proposed scheme will result of 30 GW of solar capacity through rooftop solar in the residential sector, generating 1000 billion units (BUs) of electricity and resulting in reduction of 720 million tonnes of CO_2 equivalent emissions over the 25-year lifetime of rooftop systems.
- India Cooling Action Plan (ICAP) by Government of India provides an integrated vision across the sector, targeting reduction of cooling demand, refrigerant transition and enhancing energy efficiency by 2038. Globally, India accounts for the largest increase in

[7] https://greengrowthindex.gggi.org/?page_id=3126
[8] https://data.gov.in/
[9] https://stats.oecd.org/
[10] https://ec.europa.eu/eurostat/web/main/home
[11] WEF_Mission_2070_A_Green_New_Deal_for_a_Net_Zero_India_2021.pdf (weforum.org)

peak electricity load, mostly due to cooling demand. The highest potential for substantial carbon savings is in buildings that are yet to be built, which account for 70% of the country's urban infrastructure in 2030.

- BEE's Energy Conservation Building Code (ECBC) sets minimum energy standards for new commercial buildings having a connected load of 100 kW or contract demand of 120 kVA or more. The uneven implementation of building energy efficiency standards across the country could see a sevenfold increase in CO2 emissions by 2050.
- ECBC read together with the proposed amendments to incorporate embodied carbon as a metric for compliance places huge emphasis on reducing lifecycle emissions from buildings. This requires decarbonization of all materials across the buildings value chain i.e. Steel, Cement, Glass, Concrete etc., in addition to building design interventions and usage of efficient appliances throughout the useful life.
- Bureau of Energy Efficiency's (BEE) Perform, Achieve and Trade (PAT) scheme mandates and promotes energy efficiency in energy intensive sectors such as Steel and Cement that collectively account for 45% of India's industrial emissions. Both sectors are critical components of India's buildings footprint, which in turn is one of the largest consumers of resources. PAT scheme will be subsumed into BEE's India Carbon Market (ICM) initiative established in 2023.

GGGI's Asia Low Carbon Buildings Transition (ALCBT) Project is a 5-year (2023-28) aims to promote low-carbon (embodied) production of Steel, Cement and other value chains relevant to buildings to exploit the huge EE potential of India by 2030.

One of the key challenges that we have identified so far for transition to low-carbon materials ecosystem is the lack of Environmental Product Declarations (EPDs) for the Indian context. EC3's EPD Database has just 42 concrete EPDs and 1 non-concrete EPD from India, as opposed to 4,000+ concrete EPDs and 89,000+ non-concrete EPDs from USA.

While BEE signalled intent to kickstart the embodied carbon accounting based on good faith on voluntary efforts of the industry in the proposed draft Energy Conservation & Sustainability Business Codes (ECSBC), it is essential to invest in a domestic government verified EPD database that is frequently reviewed and updated, for a robust buildings-based carbon market creation.

GGGI, through the ALCBT Project will extend support to mainstreaming these low-carbon building materials with policy advocacy, capacity building, sharing of techno-commercial best practices etc.

- The Ministry of New & Renewable Energy and Power has informed that the main objectives of the *Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan* (PM-KUSUM) include de-dieselisation of the farm sector, providing water and energy security to farmers, increasing the income of farmers, and curbing environmental pollution. The Scheme has three components targeted to achieve solar power capacity addition of 34.8 GW by 31.3.2026 with total central financial support of Rs. 34,422 Crore.
- The Union Minister for New & Renewable Energy and Power indicated that the *draft National Electricity Plan* (May 31, 2023) prepared by Central Electricity Authority (CEA) has estimated the fund requirement for solar and wind generation projects during FY 2022 – 2032 as Rs.20.67 lakh crore.
- The *Solar & Wind power projects* are developed by Independent Power Producers (IPPs). Most of the Renewable Energy projects in the country are being set up by private sector developers selected through a transparent bidding process. Private sector developers identify locations for setting up the renewable energy projects and arrange financing of these projects. The sources available for Equity Funding include Private Equity Capital, Own Funds of the developers, Venture Capital, etc.

4. Reshaping Financing Mechanism for Fostering Green Economy

To encourage green investments, some of the steps taken by Government are as under:

a) Inclusion of Renewable Energy, Housing, Micro, Small and Medium Enterprises Social Infrastructure in Reserve Bank of India's priority lending sector list[12] in addition to Agriculture, Export Credit, Education.
b) Permitting Foreign Direct Investment (FDI) up to 100 percent under the automatic route for renewables.[13]
c) Waiver of Inter State Transmission System (ISTS) charges for inter-state sale of solar and wind power for projects to be commissioned by 30th June 2025.[14]
d) Declared plan to add 50 GW of renewable energy capacity annually for next 5 years.[15]
e) Declaration of trajectory for Renewable Purchase Obligation (RPO) up to the year 2029-30.[16]
f) Standardization Bidding Guidelines for tariff based competitive bidding process.[17]
g) Implementation of Production Linked Incentive (PLI) scheme for solar PV manufacturers[18] and Green Hydrogen.[19]
h) Reducing Power Purchase Agreement (PPA) counterparty risk by sourcing energy purchases through highly rated Central Public Sector Enterprises;[20]
i) Increasing overall health of the electricity sector through various schemes as Liquidity Infusion Scheme to help Distribution Companies settle their debt[21] and Electricity (Late Payment Surcharge & related matters) Rules, 2022[22] to encourage timely payment of dues, apart from the Revamped Distribution Sector Scheme[23];
j) Facilitating support through its dedicated agencies such as National Institute of Wind Energy (NIWE) and National Institute of Solar Energy.

- The sources available for debt financing include commercial banks financial institutions (like IREDA, PFC, REC), external commercial borrowings and foreign currency loans from multilateral and bilateral agencies like the World Bank, ADB, KfW, Exim Bank, AfD, and others. Financial Institutions employ hedging policies to mitigate the foreign currency risks and often hedge foreign currency loans for exchange and and interest rate risks arising in the future.
- To ensure availability of low-cost funds for renewable energy projects, the Government of India is raising Sovereign Green Bonds (SGrB) (Rs.20,000 crore during FY 23-24)[24]. Reserve Bank of India, in consultation with the Government of India, notified on September 26,

[12] https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=11959&Mode=0
[13] https://pib.gov.in/PressReleseDetailm.aspx?PRID=1909955
[14] https://powermin.gov.in/sites/default/files/Waiver_of_inter_state_transmission_charges_Order_dated_21_June_2021.pdf
[15] https://pib.gov.in/PressReleasePage.aspx?PRID=1992732#:~:text=Bids%20for%2050%20GW%20per,2023.
[16] https://pib.gov.in/PressReleasePage.aspx?PRID=1992732#:~:text=Bids%20for%2050%20GW%20per,2023.
[17] https://mnre.gov.in/policies-and-regulations/schemes-and-guidelines/guidelines/
[18] https://mnre.gov.in/production-linked-incentive-pli/#:~:text=Overview,24%2C000%20crore.
[19] https://www.nsws.gov.in/portal/scheme/greenhydrogenpolicy
[20] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1983770
[21] https://pib.gov.in/PressReleseDetailm.aspx?PRID=1985549#:~:text=To%20tide%20over%20the%20liquidity,Producers%2C%20as%20existing%20on%2030.06.
[22] https://static.pib.gov.in/WriteReadData/specificdocs/documents/2024/mar/doc202431317601.pdf
[23] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1897764#:~:text=Government%20of%20India%20launched%20the,to%20FY%202025%2D26).
[24] pib.gov.in/PressReleaseIframePage.aspx?PRID=1896724

2023 the indicative calendar for issuance of Government dated securities, which included SGrB. In response to market demand for ultra-long duration securities, it has been decided to introduce a new dated security of 50-yr tenor. SGrB have been put on 'Fully Accessible Route' for investment by non-residents on November 8, 2023. Green Bonds can also be used for that promote green infrastructure, such as projects that protect natural resources and ecosystems.

Thematic bonds, including green, social, and sustainability bonds, offer a pivotal avenue for financing projects with significant environmental and social impacts. Global Green Growth Institute (GGGI) supports emerging economies in leveraging this market, having facilitated over $8.5 billion in green investments since 2015.

- India being the second largest green bond market among the emerging markets after China, SEBI issued guidelines on green bonds including listing of green bonds on the Indian stock exchanges in 2017, and in March 2023 announced a set of regulatory requirements on ESG disclosures, ratings, and investing. As of 2023, nine ESG mutual funds have been launched in India.
- Indian Renewable Energy Development Agency Limited (IREDA), the largest pure-play green financing NBFC in the country, has achieved its highest-ever annual loan sanctions and disbursements in the financial year 2023-24. The company has sanctioned loans amounting to Rs.37,354 crores and disbursed loans worth Rs.25,089 crores during the fiscal year. This has led to a significant growth of 26.71 per cent in the loan book, which now stands at Rs.59,650 crores.

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