



Unlocking the Potential of Green Public Procurement in the Indian Economy



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RMI is an independent nonprofit, founded as Rocky Mountain Institute in 1982, that transforms global energy systems through market-driven solutions to align with a 1.5°C future and secure a clean, prosperous, zero-carbon future for all. We work in the world's most critical geographies and engage businesses, policymakers, communities, and NGOs to identify and scale energy system interventions that will cut greenhouse gas emissions by at least 50 percent by 2030. RMI has offices in Basalt and Boulder, Colorado; New York City; Oakland, California; Washington, D.C.; and Beijing. RMI has been supporting India's mobility and energy transformation since 2016.

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Executive Summary

Market creation is critical to decarbonising hard-to-abate sectors. Green public procurement (GPP) is emerging as a critical policy tool in discussions on demand creation for low-carbon steel and cement. It has the potential to offer offtake assurance to producers as they transition towards low-carbon materials.

Although GPP definitions may vary across countries, the core principle of integrating carbon emissions into procurement processes remains consistent. It is not a new concept. It has been adopted by economies like Canada, Japan, the Netherlands, the United States, and others. Although developed economies currently lead the ecosystem, developing nations like India are poised to play a pivotal role in scaling GPP in the future.

Public procurement accounts for at least 20% of India's gross domestic product (GDP).¹ This presents a significant market size for producers to leverage. To create synergies between sustainability and procurement, India has already implemented measures such as the Ecomark Scheme and the Standards and Labelling Scheme. A majority of these initiatives have a limited scope focusing on white goods like large home appliances. GPP has the potential to align the producer and consumer expectations for low-carbon materials, especially considering the green premium associated with the transition.ⁱ

Despite these potentials, there are still gaps in the collective understanding of GPP and its applicability in the current ecosystem in India. The implications for actual infrastructure projects in terms of emissions reductions and the green premium have yet to be fully assessed. Fundamental principles for integrating GPP into India's procurement framework and developing an action plan for its implementation remain unexplored.

This report aims to bridge the identified gaps and contribute to the ongoing discussion about GPP in India for low-carbon cement and steel. The study unpacks global case studies and analyses the implications of GPP on public housing, railway, and highway construction in India. It also unbundles the nuances of India's current procurement framework to propose fundamental principles and an actionable plan for integrating GPP characteristics.

The Case for GPP in India

Nearly 70% of steel and cement in India is consumed in housing and infrastructure development projects.² The construction sector also accounts for nearly 11% of the national GDP.³ It thus becomes imperative to look at such projects to examine the business case for GPP in India with respect to metrics around emissions reduction, market creation, and economic development.

This study looks at one Pradhan Mantri Awas Yojana (PMAY) urban home unit [32.5 m²], 1 km of railway track, and 1 km of highway as sample case studies to gather insights related to material consumption, emissions reduction, and green premium. Further, the study also considers three levels of sectoral

ⁱ The green premium is the additional cost of choosing a clean technology over one that emits more greenhouse gases.

emissions intensity reduction as GPP commitment scenarios: baseline/current intensity, moderate (25% reduction), and ambitious (45% reduction).

Our baseline benchmarks indicate that constructing 1 km of highway emits more than 1000 tonnes CO₂, whereas building 1 km of railway track emits 195 tonnes CO₂, and constructing one unit under the PMAY home (urban) emits approximately 7.8 tonnes CO₂ (details in Exhibit ES1). In the case of 1 km of highway, moderate GPP measures would reduce emissions to 767 tonnes CO₂, and in the ambitious scenario, further to 562 tonnes CO₂. Similarly, for 1 km of railway track, moderate GPP measures could cut emissions from 195 to 146 tonnes CO₂, and in an ambitious scenario to 107 tonnes CO₂. By adopting moderate GPP measures, emissions related to steel and cement in a PMAY urban home unit can be reduced from 7.8 to 5.8 tonnes CO₂, while in an ambitious scenario, emissions intensity can be further reduced to 4.3 tonnes CO₂.

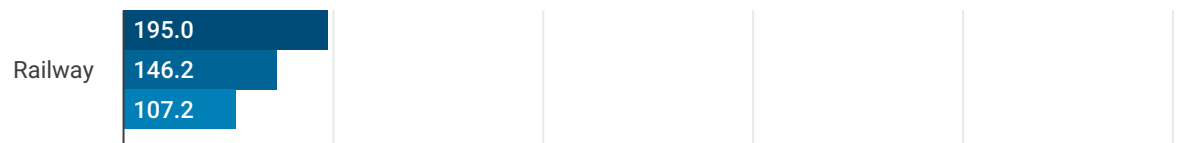
Exhibit ES1 Scenario analysis: Emission implications of adopting GPP on Indian infrastructure projects (tonnes CO₂)

■ Baseline ■ Moderate GPP Commitments ■ Ambitious GPP Commitments

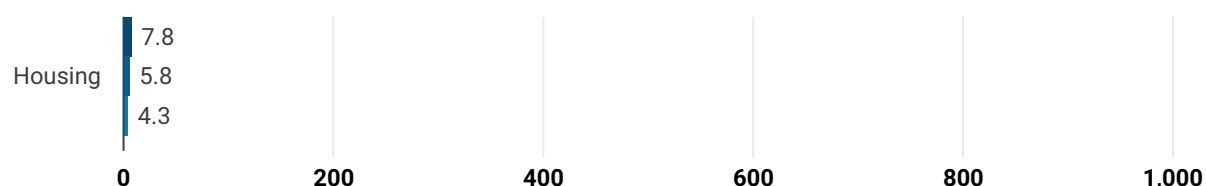
Materials-Associated Emissions from 1 km of Highway Construction



Materials-Associated Emissions from 1 km Railway Track Construction



Materials-Associated Emissions from One Unit of PMAY Home



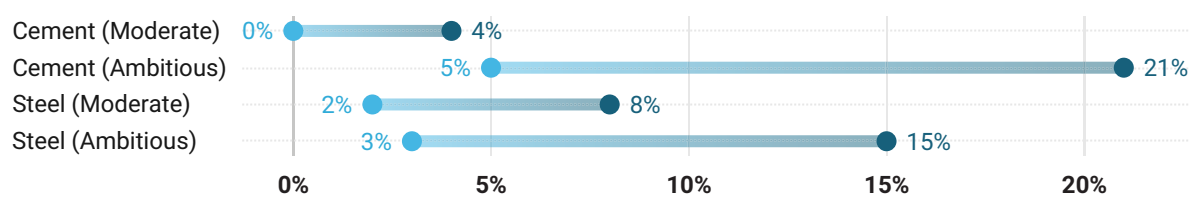
RMI Graphic. Source: RMI analysis

However, although moderate GPP measures can significantly reduce emissions with minimal additional cost for steel and cement, achieving ambitious targets may require higher investment, necessitating support mechanisms like carbon pricing or Viability Gap Funding (VGF) (see Exhibit ES2).

The additional cost, or green premium, for steel and cement resulting from moderate or ambitious GPP commitments will ultimately lead to increased public spending on construction projects. Our

estimates suggest that to offset the increased material costs due to moderate GPP commitments, a price of INR 2158–INR 8798/tonne CO₂ (US\$26–US\$106/tonne CO₂) for steel and INR 0–INR 1162/tonne CO₂ (US\$0–US\$14/tonne CO₂) for cement would be needed. For ambitious GPP commitments, a price of INR 1826–INR 9130/tonne CO₂ (US\$22–US\$110/tonne CO₂) for steel and INR 830–INR 3403/tonne CO₂ (US\$10–US\$41/tonne CO₂) for cement would be necessary.ⁱⁱ As per Exhibit ES2 and Exhibit 9, the implementation of GPP targets would lead to a less than 4% green premium for cement and approximate 2%–8% green premium for steel in a moderate GPP scenario of 25% emissions intensity reduction. In an ambitious GPP scenario of 45% emissions intensity reduction, the price premium translates to an approximate 5%–21% green premium for cement and approximate 3%–15% green premium for steel in India. The significantly lower price premium in the moderate GPP scenario compared to the ambitious scenario is attributed to existing low-cost decarbonisation options in the market (e.g., increasing scrap uptake for steel, using supplementary cementitious materials in cement, adopting renewable energy for steel, and improving energy efficiency for cement).

Exhibit ES2 Scenario analysis: Green premium implications of adopting GPP on Indian infrastructure projects



RMI Graphic. Source: RMI analysis

These estimates are based on the case studies presented in this report and are influenced by the quantity of material consumption in these projects.

Pathway for Implementing GPP in India

The Indian public procurement landscape offers a well-established foundation for the adoption of GPP. Adopting GPP requires a structured framework to ensure consistency, clarity, and efficiency. Transparency, accountability, fairness, integrity, legality, economic transformation, and climate commitment are pivotal underlying values to such a framework. GPP's success relies on producers innovating around the development of low-carbon materials, consumers prioritising their adoption, and policymakers enacting supportive policies. Three pillars — People, Process, and Policy — are essential for GPP implementation in steel and cement procurement, emphasising affordability, seamless integration, and policy prioritisation.

To enable GPP in India, we need to overcome multiple bottlenecks through adequate change levers. To better inform the recommendations, the study also captures inputs from different stakeholders such as real estate developers, automobile manufacturers, global research institutions, cement producers, and steel producers. These have been integrated into enabling change levers included in Exhibit ES3.

ⁱⁱ US\$1 = INR 83.

Primary challenges in integrating GPP include the absence of dedicated oversight, limited usage of environmental product declarations (EPDs), lack of GPP trials, low awareness, and weak monitoring mechanisms. Proposed changes include forming an inter-ministerial group, mandating EPDs for steel and cement procurement, conducting on-the-ground GPP pilots, fostering awareness, engaging suppliers actively, and establishing comprehensive monitoring and evaluation frameworks.

Exhibit ES3 Key change enablers for advancing GPP in India

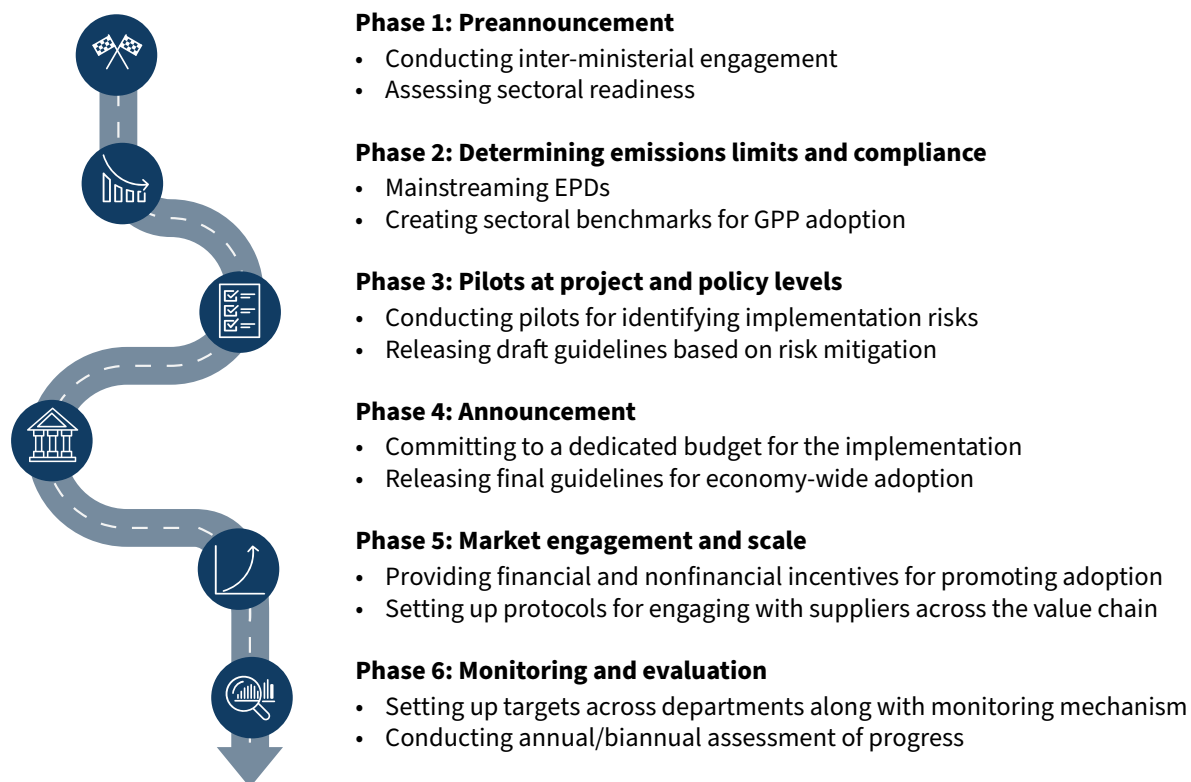
Key action	Current state	Desired state	Change lever
Incorporate GPP features in current policies	Lack of a dedicated inter-ministerial group overseeing the GPP landscape in India	An inter-ministerial group to integrate GPP features into existing policies and oversee sectoral assessments	Formally recognise GPP as a pivotal lever for a decarbonised economy and create an inter-ministerial group to integrate into current procurement practices
Scale usage of Environmental Product Declarations (EPDs)*	EPDs are not widely adopted within the steel and cement industries in India	Environmental impact of procured steel and cement is assessed through robust EPDs	Mandate EPDs for all public procurement of steel and cement
Promote on-the-ground pilot initiatives of GPP	Dearth of guidelines, best practices, and insights for improvement due to lack of GPP trials in India	Pilots test and refine GPP policies on a small scale to inform broader implementation	Identify and implement policy- and project-level GPP pilot projects, such as phased GPP implementation and project life-cycle integration, using them as demonstration projects to garner stakeholder interest
Adopt globally successful GPP practices	GPP practices have not gained widespread adoption due to a lack of awareness of international best practices	Foster countrywide awareness and adoption of GPP practices	Allocate dedicated budgets and financial commitments for awareness campaigns, engagement of suppliers to support capacity building, technical assistance, and monitoring and evaluation
Active supplier engagement and market engagement strategies	In the current procurement ecosystem in India, suppliers lack clear guidelines and resources, leading to a lack of understanding of GPP and eco-friendly practices	Proactively engage suppliers and enhance competitiveness in global markets	Implement structured protocols, formal communication channels, feedback mechanisms, fiscal incentives, and preferential treatment for products meeting GPP criteria to stimulate market demand, engage suppliers, and foster sustainable economic growth
Strengthen monitoring and evaluation mechanisms	Currently, there is no effective means to ensure the efficacy of GPP policies and practices in India	Establish a countrywide systematic and comprehensive monitoring and evaluation framework	Develop a robust mechanism, assessment schedule, and findings for policymakers to evaluate the progress and impact of policy measures

*An Environmental Product Declaration (EPD) is defined by International Organization for Standardization (ISO) 14025 as a Type III declaration that “quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.” (ISO 14025:2006, *Environmental Labels and Declarations*, International Organization for Standardization, <https://www.iso.org/standard/38131.html>).

RMI Graphic. Source: RMI analysis

Implementing GPP in India would require a detailed action plan or roadmap centred around the fundamental principles and identified change levers highlighting key priorities in a phased manner, as described in Exhibit ES4.

Exhibit ES4 Roadmap to implement GPP in India



RMI Graphic. Source: RMI analysis

Way Forward

This report is an attempt at elevating the GPP discussion in India and directing it towards a framework for implementation. However, there still exist multiple aspects that require deeper assessment.

Moving forward, a systematic approach is proposed to advance construction projects through targeted initiatives. Initially, detailed construction project deep dives and assessments are recommended, involving comprehensive analysis of the procurement process, identification of challenges, assessment of opportunities, and development of strategies to integrate GPP principles. Concurrently, efforts should focus on devising innovative business models to promote GPP adoption, exploring implications of associated green premiums, and formulating policy frameworks to mainstream these models effectively. Additionally, establishing an expert working group comprising key state officials and stakeholders will facilitate ongoing deliberation to drive sustainable practices. Furthermore, emphasis should be on subnational policy deep dives and implementation, suggesting enhancements to existing policies and institutional mechanisms to actively promote GPP initiatives.

1. Introduction

GPP is an increasingly discussed, demand-oriented policy tool focusing on not only establishing needed mechanisms to procure low-carbon and sustainable goods and services but also stimulating offtake markets for such commodities.⁴ GPP utilises the economic and regulatory strength of procurement to influence market creation of low-carbon materials, thus shaping future strategy decision and investments.

The definitions of GPP may vary across organisations and countries. Still, the core principle remains consistent: the integration of environmental criteria (with greater emphasis on carbon emissions) into the procurement process to champion sustainability. Notably, the European Union's, United Nations', and World Bank's definitions converge on several aspects that define the essence of GPP:

Involvement of public authorities, organisations, and entities: GPP operates as a collaborative effort involving public entities. The engagement of governmental bodies, organisations, and entities is fundamental to green procurement practices.

Procurement of low-carbon and sustainable materials, services, and utilities: At its core, GPP is about sourcing goods and services that exhibit a reduced environmental impact. This includes sourcing low-carbon and sustainable materials, services, utilities, and other commodities, aligning with the overarching goal of environmental responsibility.

Accounting for emissions throughout the life cycle: GPP extends its focus across the entire life cycle of a product, which implies not only considering the immediate impact but also accounting for emissions and environmental consequences from production to disposal, ensuring a comprehensive approach to sustainability.

Purchasing capacity and capability of public enterprises to bear transition costs: Transition to green procurement often incurs additional costs, or green premiums. Public entities play a crucial role in shouldering the associated costs because of their financial capacity and political-economic motivations.

The implementation and adoption of GPP vary significantly across different regions, with countries employing diverse strategies. GPP initiatives may take the form of voluntary measures, mandatory regulations, or a combination, applied either on a broad, economy-wide scale or tailored to specific product categories. Canada, Japan, the Netherlands, and the United States have formally mandated GPP, establishing legal requirements that require public authorities to integrate environmental considerations into their procurement processes. In contrast, the majority of the European Union, Brazil, and other countries have embraced a voluntary approach to GPP.

The governance models facilitating the effective implementation of GPP exhibit variations across different countries. These diverse implementation styles can be characterised by three governance arrangements, termed models.⁵ Model 1 emphasises decentralised sharing of power across various government bodies, where different entities assume responsibility for distinct action items. Conversely, model 2 is characterised by centralisation, with a single entity overseeing procurement legislation and setting environmental guidelines for GPP. Model 3 is typically driven by task forces composed of representatives from different departments collaborating to establish guidelines and future steps within a given economy.⁶

Primary examples of model 1 adoption include Brazil, Canada, France, and Japan. Model 2 is exemplified by China and the European Union, where GPP is governed through a centralised entity. Model 3 is observed in India, Indonesia, and the United States, where task forces with representatives from various departments play a pivotal role in shaping the procurement structure.⁷

Regardless of the form taken by GPP governance mechanisms, its role is crucial in ensuring the offtake of low-carbon and sustainable products, mitigating Scope 3 emissions, and driving producers to adopt emissions mitigation measures.

While the GPP discussion in India has only recently commenced, the nation stands out for its significant scale of procurement. Although developed countries have dominated the discussion so far, India's immense procurement potential could revolutionise the global landscape for producers. India is among the developed nations spending more than INR 8.3 trillion (US\$100 billion) on public procurement.⁸ The World Bank's assessment, considering both procurement via the Central Public Procurement Portal (CPPP) and transactions outside e-procurement systems, estimated the value of public procurement in India to be about INR 45.65 trillion (US\$550 billion) (approximately 20% of the national GDP).⁹

Guided by the General Financial Rules (GFR), India's procurement landscape aims for transparency and efficiency through mechanisms like the Preferential Market Access (PMA) policy and portals like CPPP and Government e Marketplace (GeM). There have already been multiple initiatives by the Ministry of Environment, Forests and Climate Change, Bureau of Energy Efficiency (BEE), and others who have tried to prioritise sustainability in their procurement ecosystem.

The Ecomark Scheme encourages eco-conscious consumer choices and industry sustainability.¹⁰ The Standards and Labelling Scheme promotes energy-efficient products, aided by BEE Star Labels.¹¹ Rating systems like Leadership in Energy and Environmental Design (LEED) and Green Rating for Integrated Habitat Assessment (GRIHA) push for low-carbon materials in construction, fostering a market for sustainable options like recycled steel and low-carbon concrete, which is poised for significant growth.¹²

India's emerging role as a champion in the global clean energy transition needs revamped production methods and a market for low-carbon goods to align with global climate goals. As a leader of the Clean Energy Ministerial's Industrial Deep Decarbonisation Initiative (IDDI), India is actively collaborating with global public and private organisations to drive the demand for low-carbon industrial materials.¹³ The IDDI, co-led by the India and United Kingdom, focuses on addressing carbon-intensive construction materials like steel and cement, aligning with India's commitments to GPP.¹⁴

However, it is crucial to recognise that the transformative actions required to address sectoral challenges extend beyond the scope of general discussion. In India, there is an increasing momentum towards decarbonisation, driven by a growing awareness of environmental sustainability and the imperative to mitigate climate change. Within this context, GPP emerges as a strategic and timely initiative. When implemented with attention to detail and comprehensive consideration of environmental factors, social impacts, and economic viability, GPP seamlessly aligns with India's broader objectives of transitioning towards a greener and more sustainable future.

In this context, this report endeavours to unravel the primary concerns associated with the impact of the GPP initiative on the Indian economy, at both the macro and micro levels, particularly within specific infrastructure projects. Delving into India's current procurement framework, this report seeks to establish a robust foundation, imperative for discerning segments that can seamlessly integrate GPP characteristics.

Furthermore, this study incorporates an in-depth examination of global success stories and business models, aiming to glean insights that are essential for the Indian context. Additionally, this report goes beyond a cursory overview, presenting a conceptual framework and an actionable plan. These components are instrumental in fostering a comprehensive understanding and facilitating the effective implementation of GPP policies within the Indian economic landscape.

A balanced combination of analytical assessment and stakeholder engagement informed the report's insights presented in the forthcoming chapters. Between February 2023 to February 2024, a diverse set of stakeholders was consulted based on a two-pronged approach. First, an expert advisory committee was constituted to meet frequently and discuss the interim insights from this work. Second, multiple one-on-one expert consultations with real estate developers, automobile manufacturers, global research institutions, cement producers, steel producers, and more were conducted to engage with experienced public and private officials and seek their guidance about challenges, opportunities, and a path forward.

2. The Steel and Cement Industries in India

The steel and cement sectors play a pivotal role in shaping the economic landscape of India, serving as the sturdy backbone upon which the nation's growth and development stand. These two industries are not only crucial for the construction and infrastructure sectors but also have far-reaching impacts on various facets of the economy. Steel, with its versatility and strength, forms the structural framework for buildings, bridges, and myriad industrial applications. On the other hand, cement, as the binding agent of concrete, is essential for the construction of roads, homes, and vital infrastructure projects. Together, these sectors contribute significantly to employment generation, foreign earnings, and overall economic resilience. The symbiotic relationship between the steel and cement industries and the broader economy underscores their status as indispensable pillars supporting India's journey towards prosperity and sustainable development.

Steel

Overview

India stands as the world's second-largest steel producer, churning out a substantial 118 million tonnes in 2022. There is a nearly fivefold projected surge in production by 2050, propelled by demands in construction and infrastructure projects, which constitute almost 70% of steel consumption.¹⁵ As of 2024, India's steel production exhibits a relatively higher emissions intensity due to legacy plants relying predominantly on conventional fossil technologies. Although strides have been made in transforming the steel production landscape, the absence of dedicated deep decarbonisation initiatives often due to technical and economic limitations, such as embracing renewable energy, promoting green hydrogen-based steel production, and augmenting the use of scrap, could result in a tripling of emissions from the sector by 2050.¹⁶

Consumption Outlook

Steel consumption in India spans various sectors, showcasing the adaptability of this versatile material within the nation's growing economy. The demand for steel exhibits a robust correlation with GDP, particularly during phases focused on national development. Key sectors driving growth in steel consumption in India include housing and construction (43%), infrastructure development (25%), engineering and packaging (22%), automotives (8%–9%), and defence and Jal Shakti (1%–2%).^{17,iii}

As of FY22, the total steel consumption in India reached 106 million tonnes. Despite this substantial volume, India's annual per capita steel consumption stands at 77 kg per annum, significantly lagging behind the global average of 233 kg.¹⁸ Notably, this places India's per capita steel consumption at only one-third of the world average, reflecting growth potential for the future.

iii The Ministry of Jal Shakti (literally, Ministry of Water Resources) is a ministry under the Government of India and was formed by merging two ministries: the Ministry of Water Resources, River Development and Ganga Rejuvenation and the Ministry of Drinking Water and Sanitation.

Decarbonisation Pathways

The Indian steel sector harbours the potential for both short- and long-term advancements towards decarbonisation. In the short term, brownfield steel plants could realise up to a 40% reduction in emissions through hydrogen blending, integrating renewable energy sources, enhancing scrap utilisation, and implementing energy efficiency enhancements.¹⁹ These short-term emissions mitigation measures do not necessitate significant investments in infrastructure but system-wide changes to ensure adoption of the identified mitigation measures. For instance, hydrogen blending beyond a specified threshold would need modifications to steel plants, the expansion of renewable energy infrastructure to alleviate grid intensity, and the establishment of formalised regulations for scrap uptake. Utilising scrap in steelmaking is hindered by its low availability. However, the scrap availability will improve with INR 143 trillion (US\$ 1.73 trillion) worth of new infrastructure in India yet to be constructed between 2024 to 2030.²⁰

Long-term decarbonisation hinges on low-emissions primary steelmaking. Existing or relatively newer assets could continue to be productive by embracing carbon capture technologies. Cleaner steelmaking processes must gain traction by 2030 and dominate by 2050: hydrogen-based direct reduced iron electric arc furnace (DRI-EAF) and the integration of carbon capture technology into existing blast furnace–basic oxygen furnace and DRI-EAF processes. Hydrogen-based DRI-EAF has the potential to enable nearly zero-emissions steelmaking, supplanting conventional reducing agents in the ironmaking process, notorious for their emissions intensity. By 2050, hydrogen-based steelmaking can cater to over 60% of demand, with carbon capture contributing an additional 20% in a net-zero scenario.²¹ Scrap recycling remains pivotal for long-term decarbonisation, presenting a cost-efficient, low-emissions steelmaking alternative as steel products in India reach the end of their life in the coming decades and scrap-based EAF steelmaking utilising renewable energy sources emerges as a viable option.

Cement and Concrete

Overview

The Indian cement industry holds a noteworthy position on the global stage as the world's second largest producer of cement, contributing over 8% of installed capacity and approximately 7% of the world's total cement production.²² Boasting a current production rate exceeding 270 million tonnes per year, India has a total of 210 large-scale cement plants complemented by more than 350 miniature cement plants. Among the 210 large cement plants scattered across India, a significant concentration is observed in key states such as Andhra Pradesh, Rajasthan, and Tamil Nadu, with a total of 77 strategically situated in these regions. This geographical distribution underscores the regional importance and strategic positioning of these states within the broader landscape of India's cement production.

Consumption Outlook

Population growth and escalating urbanisation in India underscore a pressing need for increased infrastructure investment, thereby catalysing a surge in the demand for cement in the forthcoming decades. Concurrently, government initiatives such as Make in India further amplify this demand by driving the need for augmented construction materials in endeavours ranging from housing developments to the construction of robust road networks and other essential infrastructure projects. Projections unveil a substantial surge in the demand for cement, slated to amplify by three to six times the levels observed in 2022 to the envisioned landscape of 2050. This surge is intricately interwoven with the rapid pace of development and the execution of ambitious government programmes aimed at fortifying the nation's

economic and structural foundations. Cement usage varies across diverse sectors: approximately 20%–25% in pivotal infrastructure projects, 10%–15% in nonresidential buildings, another 10%–15% in multifamily residential structures, and the majority share of 45%–60% directed towards single-family residential homes.²³

Decarbonisation Pathways

India's cement sector has achieved remarkable progress in enhancing energy efficiency and reducing emissions. From 1960 to 2018, the energy requirement of clinker-making has reduced by 46%, driven by a series of factors including wet to dry kiln conversion, process optimisation, and high-efficiency coolers.²⁴ Dry process kilns now constitute over 99% of the cement manufacturing facilities in India. The dry process has been proven to reduce energy consumption by 40% compared with the wet process. This is because extra energy is needed in the wet process to remove the moisture in wet slurry.²⁵

To further decarbonise the Indian cement sector, strategic measures and the adoption of mitigation technologies are imperative. These include reducing the clinker factor, electrifying kilns, utilising alternative fuels and raw materials, enhancing energy efficiency through initiatives like waste heat recovery, optimising design to minimise concrete and cement waste, transitioning to ready-mix concrete production, and adopting carbon capture, utilisation, and storage (CCUS) technologies. While acknowledging that certain technologies, particularly CCUS, entail higher costs, projections indicate that 32% of emissions can be curtailed without adopting CCUS and thus avoid escalating cement costs. However, for complete decarbonisation, involving more expensive technologies like CCUS, costs escalate, ranging from a 34% increase to a substantial 107%, contingent on factors such as infrastructure accessibility and technology costs.²⁶

3. Public Procurement Landscape in India

Public procurement, a pivotal process through which governmental bodies and state-owned enterprises procure goods and services from the producer industry, adheres to a structured set of regulations. Consequently, governments are held to stringent standards, necessitating the incorporation of procedures that ensure fairness, efficiency, transparency, and the minimisation of wastage of public resources in the procurement process.

In India, public procurement is the backbone of project execution, driving all key processes such as tendering, onboarding, and executing. Particularly in the case of government projects, procurement processes ensure proper execution, fairness, transparency, cost efficiency, and timely completion of projects. In the realm of public procurement, India operates within a comprehensive legal and institutional framework.²⁷ This framework outlines the rules, procedures, and guidelines governing the acquisition of goods, services, and works by government entities. The two main rules in India are GFR, which provides the overall framework for public procurement, and Delegation of Financial Powers Rules (DFPR), which supplement the GFR and sanction expenditure for contracts.²⁸

3.1. Legal and Constitutional Framework of Procurement in India

The GFR, under the Ministry of Finance, act as a comprehensive guide for government entities in India dealing with public financial management.²⁹ Established in 1947, the GFR has undergone multiple revisions and updates, including in 1963, 2005, and 2017, with the primary objective of enhancing efficiency in government operations while upholding financial accountability and discipline.³⁰

Primarily, the GFR outlines the definition of works, goods, and services to be procured, establishing the scope of public procurement. The rules set monetary thresholds for utilising specific procurement methods within these categories. Additionally, the GFR outlines general principles and rules governing contract management, contributing to a standardised and accountable financial framework for government entities in India.³¹

On the other hand, the DFPR delegates the government's financial powers to various ministries and subordinate authorities.³² This decentralisation of powers authorises delegated ministries or departments with the financial powers to procure goods in the public interest while ensuring efficiency, transparency, fair and equitable treatment of suppliers, and the promotion of competition in public procurement.

Procurement varies across states depending on the concerned government and department while keeping key fundamental principles intact. Rule 108 of the GFR allows such adjustments with state government departments. Additionally, the Ministry of Finance's Department of Expenditure provides guidelines on public procurement in its *Manual for Procurement of Goods*, *Manual for Procurement of Works*, and *Manual for Procurement of Consultancy and Other Services*. In the *Manual for Procurement of Goods*, the term *goods* can include tangible products like furniture, fixture, raw materials, and others, and intangible products like software and licences.³³ In the *Manual for Procurement of Works*, the term *works* includes civil works like roads, railways, airports, and others, and mechanical and electrical works involving fabrication,

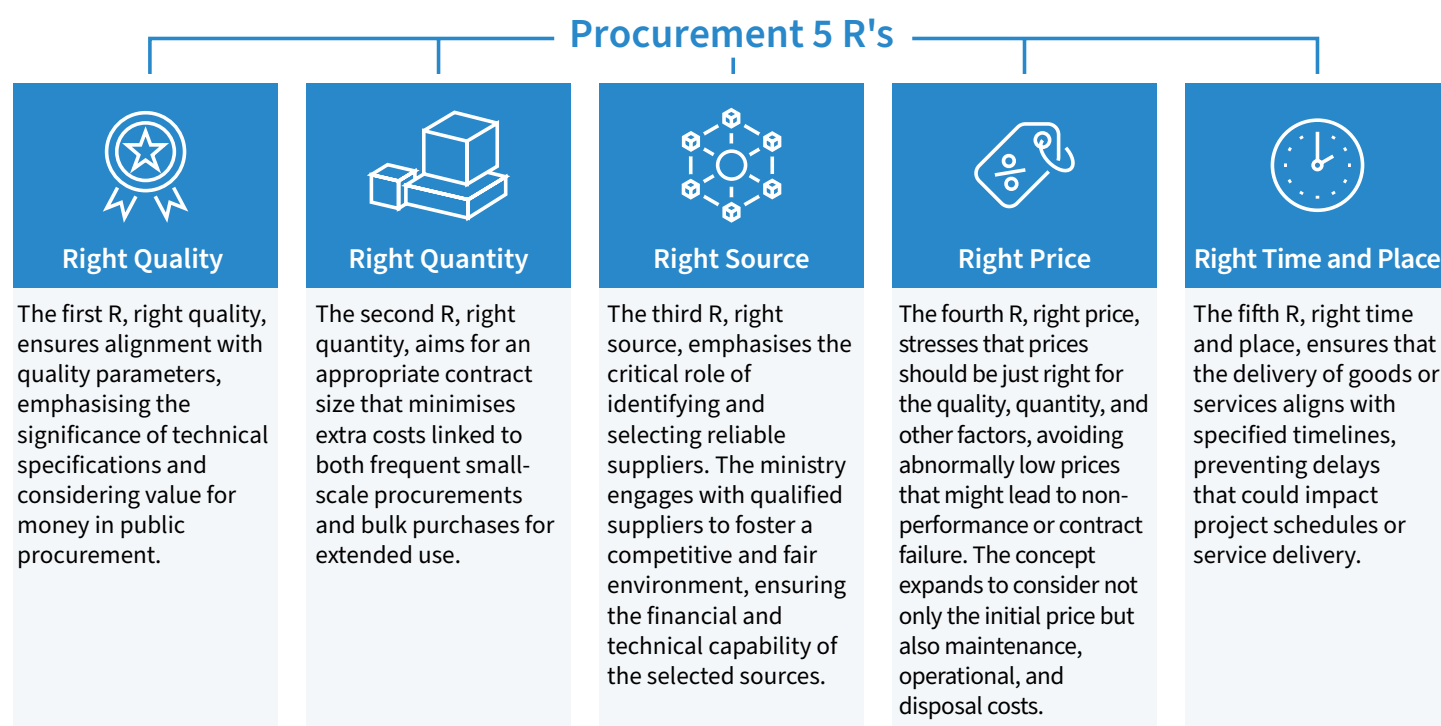
installation, and others.³⁴ In the *Manual of Procurement of Consultancy and Other Services*, the term *consultancy services* includes professional, intellectual, training, advisory services, and others. These services typically involve providing expert or strategic advice.³⁵

Specific ministries and departments — such as the Public Works Department and the National Highways Authority of India — often follow their own specific guidelines, which are often manuals describing the process of procuring goods and services issued by some ministries and departments like defence.

3.2. Aim, Principles, and Procedure of Procurement in India

The Ministry of Finance’s Department of Expenditure holds a central role in overseeing and regulating the procurement landscape in India. The ministry shapes the procurement process based on five fundamental aims known as the 5 R’s: right quality, right quantity, right source, right price, and right time and place. These aims are outlined in Exhibit 1. This entire procurement journey, starting from identifying the need for an item, facility, or service until that need is fulfilled, is arranged to strike the right balance, with ‘right’ here implying an optimal balance.

Exhibit 1 The five aims of procurement in India



RMI Graphic. Source: RMI’s compilation based on *Manual for Procurement of Goods*, 2022

Additionally, the Ministry of Finance’s Department of Expenditure has also crafted a comprehensive set of five guiding principles to steer the procurement process, emphasising the significance of ethical, legal, and accountable practices.³⁶ These principles, detailed in Exhibit 4, form the foundation of a framework that shapes conduct and decision-making throughout the entire procurement life cycle.

Exhibit 2

Five principles of procurement in India

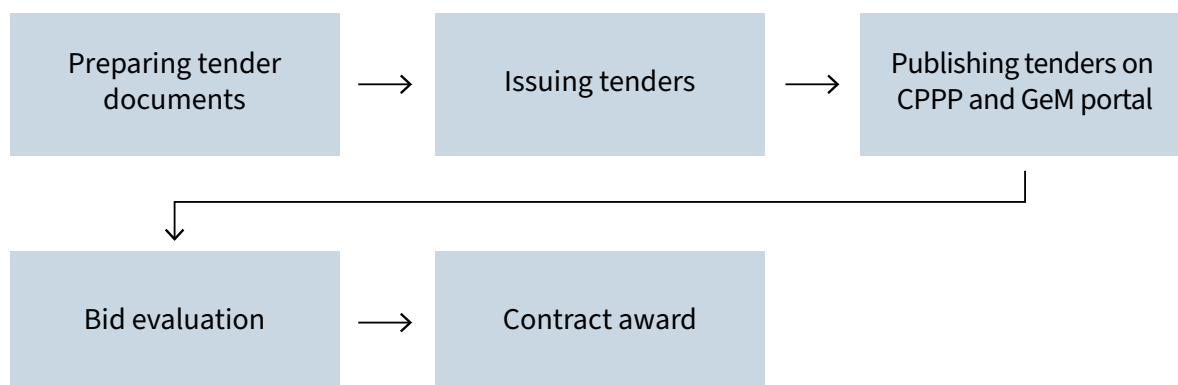
Principle	Description
Transparency	The first principle requires procuring authorities to ensure transparency, fairness, equality, competition, and appeal rights. This involves the open dissemination of information to all potential bidders, enabling them to understand the bidding opportunities, means, processes, and time limits. This principle also mandates that procuring entities follow a fair and transparent procedure, with relevant information published on the CPPP.
Professionalism	The second principle underlines the need for expertise and adherence to established norms in the procurement process. Procuring authorities are responsible for ensuring professionalism, economy, efficiency, effectiveness, and integrity while avoiding wasteful and improper practices that violate the Code of Integrity for Public Procurement.
Broader Obligations	The third principle extends beyond transparency and professionalism. Procuring authorities bear the responsibility to conduct public procurement in a manner that aligns with broader government objectives. This includes preferential procurement from backward regions; support for weaker sections and micro, small, and medium enterprises; and the reservation of procurement for specified goods through nominated entities.
Extrinsic Legal	The fourth principle emphasises the paramount importance of adherence to legal frameworks in the procurement process. Compliance with all relevant laws, regulations, and statutory requirements is highlighted, along with robust contract management and risk mitigation strategies to ensure both legal soundness and the mitigation of potential risks associated with noncompliance.
Public Accountability	The fifth and final principle recognises the public nature of government procurement. Procuring authorities are held accountable for compliance with rules and procedures in each individual procurement transaction, documenting considerations at each stage from need assessment to fulfilment.

RMI Graphic. Source: RMI’s compilation based on *Manual for Procurement of Goods*, 2022

The tendering process in India, visually depicted in Exhibit 3, is a sequence of steps aimed at ensuring fairness and efficiency. It starts with the meticulous preparation of tender documents, followed by the issuance of tenders and the advertisement of procurement opportunities.³⁷ The GFR binds all ministries and departments of the central government, along with their attached and subordinate offices, and autonomous/statutory bodies.³⁸ They are required to publish their tender inquiries, any corrections or updates, and specifics about awarded bids on the CPPP and GeM.

The bid evaluation phase scrutinises the tenders submitted, assessing them against predetermined criteria outlined in the tender documentation. Factors such as price, methodology, and delivery time take centre stage in this evaluation. Commonly employed processes include least-cost-based selection, quality-cum-cost-based selection, and quality-based selection. The conclusion of this intricate process is the contract award, where successful bidders are granted contracts based on the thorough evaluation conducted earlier. This final step not only marks the conclusion of the procurement journey but also underscores the significance of a rigorous and objective assessment in ensuring that contracts are awarded to deserving candidates.³⁹

Exhibit 3 The tendering process in India



RMI Graphic. Source: RMI’s compilation based on *Manual for Procurement of Goods*, 2022

3.3. Public Procurement System in India

The process of procurement in India takes place on two distinct levels: the central and the state as described in Exhibit 4.

The central tier houses the Procurement Policy Division (PPD), a critical entity under the Ministry of Finance’s Department of Expenditure. The PPD plays a pivotal role in supervising the operations of the CPPP. Additionally, the Centre houses the Directorate General of Supplies and Disposals (DGS&D), which has evolved into the digital frontier known as the GeM, discussed in the upcoming sections.

The PPD was established to instill uniformity and harmonisation in public procurement processes. Its mandate includes disseminating best practices, providing guidance and oversight, building capacity, and issuing procurement manuals.⁴⁰

The DGS&D, functioning as the central purchase organisation under the Ministry of Commerce and Industry, serves as a procuring entity authorised by the Government of India. Although decentralisation has occurred, DGS&D still conducts procurement for select departments and organisations upon request.

The State Procurement Facilitation Cell (SPFC) and the State Public Procurement Portal (SPPP) are instrumental at the state level.⁴¹ The SPFC maintains and updates the SPPP to ensure transparency, fair treatment of bidders, competition promotion, efficiency enhancement, and integrity safeguarding in the procurement process. The SPPP's primary objective is to provide a centralised access point for information on procurements across various state government departments and state public-sector enterprises, ensuring transparency in public procurement matters.

Exhibit 4 Public procurement system in India

Central Level		State Level
<p>Procurement Policy Division</p> <p>Established to instill uniformity and harmonisation in public procurement processes</p>	<p>Central Public Procurement Portal</p> <p>Serves as a centralised online platform for electronic tendering and procuring requirements</p>	<p>State Procurement Facilitation Cell</p> <p>Maintains and updates the state public procurement portal to ensure transparency, efficiency, and integrity and safeguard the procurement process</p>
<p>Directorate General of Supplies and Disposals</p> <p>Functions as the central purchase organisation and serves as a procuring entity</p>	<p>Government e-Marketplace</p> <p>As an online marketplace, it facilitates the procurement of goods and services by government departments and PSUs</p>	<p>State Public Procurement Portal</p> <p>Provides a centralised access point for information on procurement across various state government departments and PSUs and ensures transparency in the procurement process</p>

RMI Graphic. Source: RMI's compilation based on *Manual for Procurement of Goods*, 2022

Each state has its own e-procurement system portal that enables tenderers to download the tender schedule free of cost and then submit bids online through the portals.

3.4. Digital Transformation of Public Procurement in India

The CPPP, developed by the National Informatics Centre in collaboration with the Ministry of Finance's Department of Expenditure, serves as a platform for electronic procurement and tendering requirements.⁴² This portal aims to provide a centralised hub for information on procurements across various ministries and line departments.

The GeM, hosted by DGS&D and launched in 2016 by the Ministry of Commerce and Industry, has revolutionised and digitised the procurement process for government entities.⁴³ Serving as an online marketplace, GeM facilitates the procurement of goods and services by government departments, organisations, and public-sector undertakings.

In terms of other procurement initiatives, the unified procurement system presents a single user experience to customers and sellers with the tenders of both GeM and CPPP, which further connects the user to focused portals to other government organisations, such as the Ministry of Defence, the National Rural Infrastructure Development Agency, and central public-sector enterprises and states.

The implementation of e-procurement in India has led to a notable increase in the number of tenders awarded annually. This trend not only enhances the overall efficiency of public procurement but also aligns with global best practices, positioning India as a leader in adopting innovative solutions for its procurement processes.

3.5. Public Procurement within the Government of India's Housing, Railway, and Highway Ministries

Ministry of Housing and Urban Affairs

The Ministry of Housing and Urban Affairs in India executes public procurement through a strategic process, contributing significantly to the development and enhancement of urban infrastructure. The ministry places a strong emphasis on incorporating technology and innovation to streamline procurement operations. The aim is to attract qualified and competitive bidders, ultimately leading to the selection of providers who can contribute effectively to the realisation of urban development goals. There are four organisations under the ministry: Attached, Subordinate, Statutory and Autonomous, and Public Sector Undertakings. The divisions under these organisations that engage in public procurement, especially in building materials like steel and cement, directly or indirectly, are detailed in Exhibit 5 and highlighted in blue in Appendix 1.

Exhibit 5 Organisations under Ministry of Housing and Urban Affairs engaged in public procurement of building materials such as cement and steel

Organisation	Role In The Ministry	Role In Public Procurement
Attached		
Central Public Works Department (CPWD)	CPWD offers professional expertise in disciplines including architecture, engineering, and project management coupled with comprehensive experience in building construction and maintenance.	CPWD specifications are vital standards for materials and construction methods, integrated into the Delhi Schedule of Rates (DSR), ensuring quality standards by linking procurement specifications to construction pricing.
National Buildings Organisation	The organisation collects, validates, analyses, and publishes building construction statistics while also conducting training programmes for state government officers and staff involved in data collection and dissemination.	The Technical Advisory Committee on Construction Statistics plays a crucial role in reviewing and improving data collection processes related to building material procurement , particularly steel and cement, enhancing monitoring and reporting in the construction industry.
Subordinate		
Town and Country Planning Organisation (TCPO)	TCPO aims to promote sustainable and inclusive human settlement planning in India by fostering innovative and responsive urban and regional development policies and practices for planned development.	Although TCPO does not directly procure building materials, its influence on urban development and planning can indirectly affect the procurement practices of construction entities.
Statutory and Autonomous		
Delhi Urban Art Commission (DUAC)	DUAC advises the Government of India on preserving, developing, and maintaining the aesthetic quality of urban and environmental design in Delhi.	DUAC assesses projects for their environmental impact and has issued guidelines and recommendations for sustainable residential and commercial development , particularly focusing on procurement of materials like cement and steel, thereby increasing their usage.
Delhi Development Authority (DDA)	The DDA is responsible for planning, development, and construction of housing projects, commercial lands, land management, land disposal, land pooling, land costing, and so on.	Residential and commercial construction activity drives up the demand for building materials, especially steel and cement, and DDA engages in the procurement process through the CPPP or the GeM portal.
National Institute Of Urban Affairs (NIUA)	NIUA serves as India's premier urban planning and development think tank, specialising in cutting-edge research and offering innovative solutions to address challenges of rapid urbanisation for creating inclusive and sustainable cities.	NIUA, although not directly involved in procurement, influences construction sector practices through initiatives like ClimateSmart Cities, providing toolkits and frameworks that indirectly affect procurement for building materials.
National Capital Region Planning Board	The organisation's primary duty is to prepare, coordinate, and enforce regional, functional, subregional, and project plans across participating states and the National Capital Territory, Delhi.	Though not directly involved in procurement, the organisation's influence on urban development and adherence to strict guidelines can indirectly affect the procurement of building materials.

Exhibit 5 Organisations under Ministry of Housing and Urban Affairs engaged in public procurement of building materials such as cement and steel, continued

Organisation	Role In The Ministry	Role In Public Procurement
Statutory and Autonomous, continued		
Building Materials and Technology Promotion Council (BMTPC)	BMTPC has focused on facilitating the transfer of cost-effective, innovative, energy-efficient, environmentally friendly, and disaster-resistant building materials and construction technologies from laboratory to field.	BMTPC conducts R&D, showcases best practices, and undertakes demonstration projects that promote innovative construction systems such as precast concrete, pre-engineered steel, and monolithic concrete, influencing the demand for materials like steel and cement.
National Cooperative Housing Federation of India	The federation's primary objective is to promote, coordinate, and facilitate the operations of member organisations and housing cooperatives to enable them to provide affordable houses for their members.	Cooperatives facilitate sustainable community development by advising housing cooperatives on aspects like planning and construction, thereby enhancing awareness about innovative construction technologies and materials procurement.
Central Government Employees Welfare Housing Organisation (CGEWHO)	CGEWHO's objective is to promote, control, and coordinate the development of housing schemes for central government employees and other eligible categories across India, following CGEWHO rules, on a no-profit-no-loss basis for welfare.	CGEWHO adheres to centralised procurement solely for cement and steel, focusing on streamlining and optimising sourcing processes for these critical construction materials.
Public-Sector Undertakings		
NBCC (India) Limited, formerly known as National Buildings Construction Corporation Limited	NBCC focuses on project management consultancy, engineering procurement and construction, and real estate development in the institutional, housing, industrial, environmental, transportation, and power sectors.	NBCC focuses on sustainable building materials, with recent projects incorporating innovations like recycled aggregate concrete and self-healing concrete using bacteria, enabling efficient technology.
Housing And Urban Development Corporation Limited (HUDCO)	HUDCO plays a key role in developing the Indian housing and urban infrastructure sectors, such as PMAY Housing for All (Urban) under which HUDCO has been appointed as an appraisal agency.	HUDCO has established 655 building centres nationwide, servicing as an efficient construction delivery system for affordable housing by producing innovative and sustainable building materials , extending financial support, thereby enhancing their availability.
Hindustan Prefab Limited (HPL)	HPL manages turnkey projects from concept to completion, ensuring quality and timely delivery through the utilisation of prefab, partial prefab, conventional technology, and fast-track technologies.	HPL has constructed numerous residential, industrial, and institutional structures using precast concrete and prefabrication techniques, emphasising the importance of procuring cement and steel for quality and timely completion.

RMI Graphic. Source: RMI's compilation based on Ministry of Housing and Urban Affairs portal, 2023, <https://mohua.gov.in/>

Ministry of Railways

The Stores Department of the Indian Railways engages in procurement of goods needed by various departments. This procurement process is typically conducted through the Indian Railways E-Procurement System or the GeM, with occasional instances of spot purchases.⁴⁴ The department is steadfast in its commitment to delivering materials directly to the consignee's doorstep. The department's procurement activities encompass both stock and nonstock items essential for the safe operation of trains, proper maintenance of rolling stock (including locomotives, coaches, and wagons), infrastructure upkeep (such as tracks, signalling systems, and buildings), asset operation (including lubricating oils), and support for production and repairs in workshops.⁴⁵

The Stores Department plays an essential role in determining the material needs of all railway departments and ensuring the efficient, economical, and prompt supply of these materials. This multifaceted function involves recoument, procurement, transit, receipt, handling, inspection, accounting, warehousing, and distribution to various Stores depots, and the final issuance to consuming departments. In addition to its primary functions, the Stores Department also undertakes a secondary yet crucial role: the disposal of returned or scrap stores generated through diverse activities across the entire zone.⁴⁶

Ministry of Road Transport and Highways

The ministry oversees the planning, development, and maintenance of the national highways. It bears the responsibility to increase the mobility and efficiency of the road transport system. It is involved in the administration of the National Highways Act, 1956; Motor Vehicles Act, 1988; National Highways Authority of India Act, 1988; Central Motor Vehicles Rules, 1989; and National Highways Fee Rules, 2008, and formulates broad policies relating to road transport and automotive norms.⁴⁷ The ministry identifies infrastructure projects related to roads and highways that require procurement of goods, services, and works and publishes its tenders on the CPPP, which streamlines the procurement process for the ministry and enhances efficiency. There are four organisations under the ministry: Autonomous, Registered Society, Public Sector Undertakings, and Related Organisations. The divisions under these organisations that engage in public procurement of building materials like steel and cement, directly or indirectly, are detailed in Exhibit 6 and highlighted in blue in Appendix 2.

Exhibit 6 Organisations under Ministry of Road Transport and Highways engaged in public procurement of building materials such as cement and steel

Organisation	Role in the Ministry	Role in Public Procurement
Autonomous		
National Highways Authority of India (NHA)	NHA is tasked with executing India's largest ever highways project, the National Highways Development Project, while conducting research activities related to highway development, maintenance, and management both domestically and internationally.	NHA's vital role in public procurement for infrastructure projects, especially in national highway construction and maintenance, emphasises industry best practices, significantly contributing to the demand for steel and cement driven by extensive infrastructure development projects in India.
Registered Society		
Indian Academy of Highway Engineers (IAHE)	IAHE is a leading national training institute specialising in disseminating knowledge and experiences across various fields including construction, maintenance, and transportation infrastructure.	IAHE indirectly impacts public procurement processes by training professionals and engineers engaged in the decision-making, planning, and execution of infrastructure projects, including roads and highways.
Public Sector Undertakings		
National Highways and Infrastructure Development Corporation Ltd. (NHIDCL)	NHIDCL promotes, surveys, establishes, designs, constructs, operates, maintains, and upgrades national highways and strategic roads , including interconnecting roads in border regions.	NHIDCL's emphasis on expanding and upgrading India's highway network necessitates significant quantities of steel and cement , with the organisation playing a crucial role in procuring these materials.
Related Organisations		
Indian Roads Congress (IRC)	IRC serves as a professional body offering a platform for experts engaged in planning, designing, constructing, and maintaining roads and highways and developing technical guidelines, specifications, and standards.	IRC serves an advisory and regulatory function in the development and maintenance of road infrastructure , while the procurement of building materials for road construction is typically managed by implementing agencies, contractors, and government departments, which may reference IRC guidelines to ensure materials meet recommended specifications.
Central Road Research Institute (CRRI)	CRRI conducts research and development projects on various aspects including road and runway design, traffic planning, road management, utilisation of industrial waste, landslide control, environmental pollution, road safety, and bridge rehabilitation.	CRRI conducts R&D studies on various innovative materials , including cement and steel, such as water harvesting using porous flexible pavements and self-healing technology of bituminous pavements. Findings influence material selection and procurement by agencies implementing projects, facilitate technology transfer, and impact the availability and adoption of such materials in the market.

RMI Graphic. Source: RMI's compilation based on Ministry of Road Transport and Highways portal, 2023, <https://morth.nic.in/>

4. GPP across the Globe and Takeaways for India

Numerous countries worldwide have actively adopted GPP as a strategic tool to foster both demand for and innovation of low-carbon materials. A subset of GPP initiatives adopt a more expansive and inclusive approach to sustainability by incorporating social criteria. These criteria promote businesses owned by minorities or small enterprises by emphasising a holistic and socially responsible dimension in addition to the environmental aspects of procurement practices. This dual emphasis underscores the multifaceted commitment of GPP programmes towards fostering a sustainable and socially equitable marketplace.

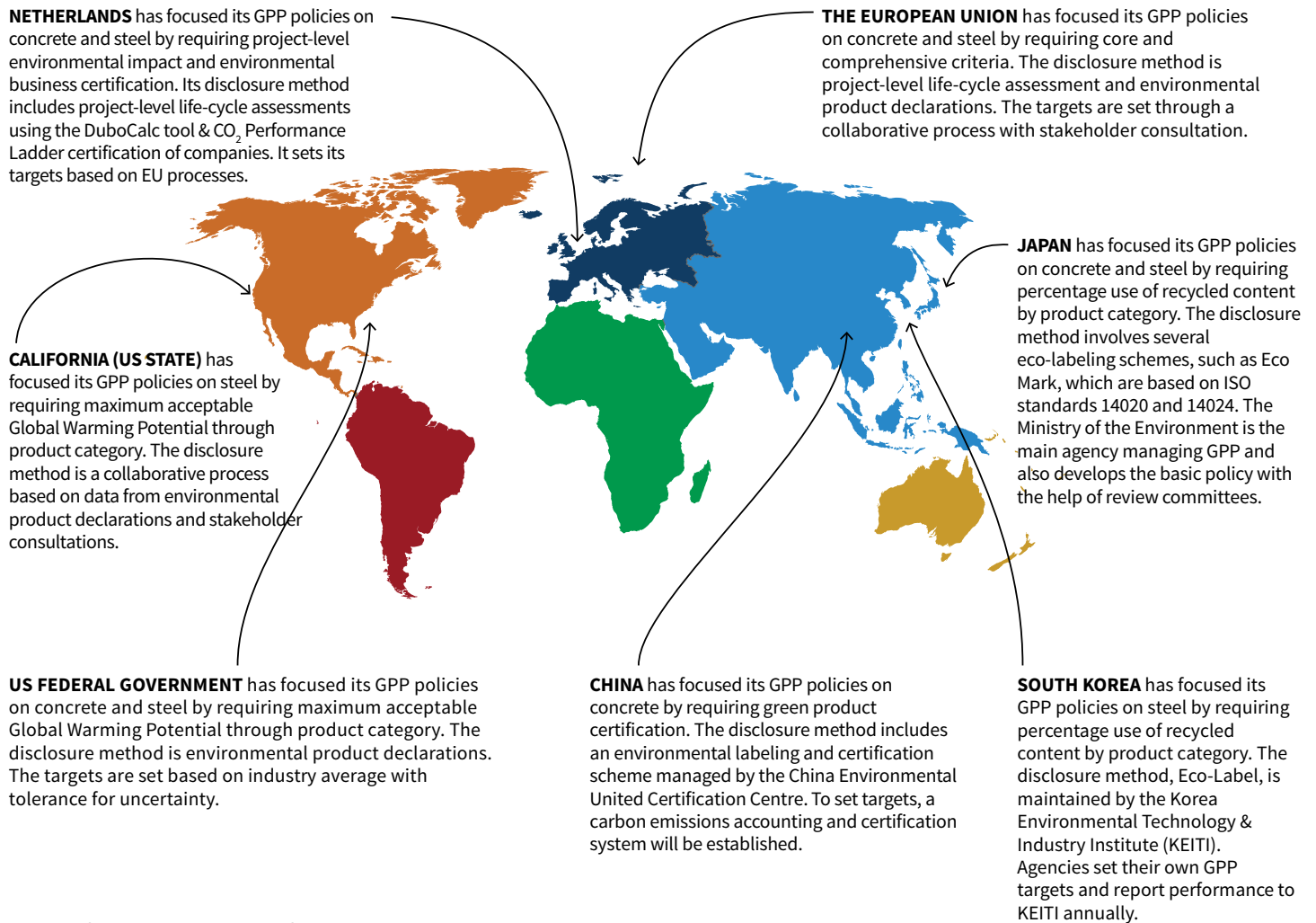
Exhibit 7 encapsulates findings from a comprehensive global survey detailing existing GPP programmes specifically directed towards cement, concrete, and steel. Appendix 6 presents an overview of these programmes, encompassing their distinct requirements, disclosure methods, target-setting processes, and verification procedures. A notable degree of variability is discernible among the programmes in terms of their requisites.

In the case of steel, Japan and South Korea place a prominent emphasis on the recycled content of the material. In contrast, the United States pivots its focus towards evaluating the global warming potential (GWP) (measured as carbon dioxide equivalent, or CO₂e) associated with products. Meanwhile, the European Union takes a comprehensive approach, mandating an assessment of greenhouse gas (GHG) emissions not only during production but also encompassing transport, end-of-life demolition, and disposal phases. In Japan and South Korea, purchasing agencies annually report their acquisitions to a central entity. They analyse the data, estimating GHG emissions reduction based on the proportion of green products purchased and the difference in average emissions between green and conventional products. Sweden, on the other hand, created a procurement agency in 2015 to develop procurement guidelines and monitor public procurement.⁴⁸

In addition to these government-led GPP policies, there are also international and regional GPP initiatives, which are usually led by nongovernmental organisations and not legally binding. One of the most prominent examples is the concrete and steel GPP pledge under the IDDI. The pledge includes four levels of commitments, including emissions disclosure, life-cycle emissions assessments, procurement requirements, and net-zero targets.

As of December 2023, the governments of Canada, Germany, the United Kingdom, and the United States have committed to the IDDI GPP Pledge. By 2025, the initiative aims to have at least 10 governments committed to its public procurement pledge for low-carbon steel and cement. IDDI provides a platform for governments to increase ambitions and share learnings on GPP commitments. As one of the two countries co-leading IDDI, India is well positioned to demonstrate its global leadership in sustainability and economic resilience through signing the IDDI pledge and initiating domestic GPP policies. Although the Government of India has not signed the GPP Pledge, it has pledged to buy more low-carbon industrial materials to expand the market.⁴⁹

Exhibit 7 Summary of globally implemented GPP approaches



RMI Graphic. Source: RMI compilation

At its core, every national and international programme necessitates a certain level of GHG emissions calculation linked to concrete, cement, or steel products. This computation typically employs a globally standardised approach known as life-cycle assessment (LCA), wherein emissions and other environmental considerations across different phases of a product's life cycle are thoroughly evaluated. These LCAs are categorised into stages A, B, and C, effectively capturing the up-front, operational, and end-of-life environmental impacts, respectively. LCAs serve as the bedrock for various GPP disclosure methods, including ecolabels and EPDs. These methods play a pivotal role in transparently communicating the environmental performance of products and are integral to the diverse GPP initiatives targeting concrete, cement, and steel. A summary of strategies adopted by the mentioned nations is given in Appendix 6.

These global case studies provide valuable insights for India. Given the unique demographic, economic, and environmental characteristics of developing nations, particularly India, it is crucial to acknowledge that direct implementation of these learnings may not be feasible. However, they serve as excellent references for formulating country-specific strategies, frameworks, and action plans tailored to India's distinct context. Key learnings for India from global GPP programmes include:

Diversification of GPP programmes: Global examples reveal a diverse array of GPP programmes, each tailored to the environmental priorities and strategies of different regions. India can benefit from adopting a diversified approach that considers its unique environmental challenges, such as air quality, resource depletion, and climate change impacts.

Integration of social criteria: Some GPP initiatives globally incorporate social criteria, promoting businesses owned by minorities or small enterprises. India can explore integrating such inclusive criteria to foster a socially equitable marketplace in addition to addressing environmental concerns.

Product-centric approaches with EPDs: The utilisation of product-specific EPDs for disclosure provides a clear and standardised method for communicating the environmental performance of building materials. India can consider implementing similar approaches, ensuring transparency and facilitating informed decision-making.

Global benchmarking and collaboration: Understanding the diverse requirements of GPP programmes globally can aid India in benchmarking its own initiatives. Collaboration with global partners can provide insights into best practices, technological advancements, and evolving standards in sustainable procurement.

Flexibility in setting targets: The global survey indicates flexibility in target-setting processes, including collaborative processes with stakeholder consultation. India can adopt a flexible and adaptive approach in setting GPP targets, ensuring that they align with evolving environmental goals and technological advancements.

Consideration of ecolabels: The adoption of ecolabels, as seen in China, Japan, and South Korea, can enhance marketing strategies and consumer awareness. However, India should carefully consider the criteria included in these labels to ensure alignment with its emissions reduction goals.

Need for clear verification processes: Verification processes are crucial for ensuring the credibility of disclosed information. India should establish clear and standardised verification processes for GPP programmes to maintain transparency and build trust among stakeholders.

Continuous monitoring and review: GPP programmes globally are subject to continuous monitoring and review. India should implement mechanisms for regular assessment, adjustments, and improvements to its GPP initiatives based on evolving environmental priorities and technological advancements.

A product-level approach validated through EPDs could be a foundational step for India. This method provides the most direct means of addressing the embodied carbon content of specific cement, concrete, and steel products procured for government-owned projects. It actively promotes the decarbonisation of supply chains within these industries and contributes to expanding the availability of EPDs for purchasers. Furthermore, this approach offers a clear and uncomplicated methodology for establishing emissions benchmarks, setting India on a trajectory to potentially incorporate project-level requirements in the future.

5. Establishing a Business Case for Public Procurement

This chapter discusses the benefits and costs associated with adopting GPP in India to demonstrate the business case of the initiative. It dives deep into three common government-led infrastructure projects — housing, railway, and highway — to quantify the impacts of GPP on these primary use cases of steel and cement in the Indian economy. Without a comprehensive understanding of the climate, social, and economic benefits, as well as costs (or green premium) associated with GPP, the formulation of recommendations, roadmaps, or implementation frameworks becomes a challenging endeavour.

Environmental, Social, and Economic Benefits of Adopting GPP

Integrating GPP characteristics into India's existing procurement framework is strategically imperative, potentially positioning the nation as a global leader in the production and consumption of low-carbon materials. The adoption of GPP offers several advantages:

Emissions and climate change mitigation: GPP reduces carbon emissions by ensuring the uptake of low-carbon materials. This in turn promotes energy-efficient technologies and products on the production side, leading to the adoption of cleaner fuels, best available technologies, and so on, aligning with India's national climate commitments and mitigating climate change risks.

Construction of green infrastructure: GPP drives the construction and maintenance of green infrastructure, including energy-efficient buildings. This approach substantially reduces energy consumption and emissions. Additionally, by encouraging the procurement of clean and renewable energy sources, GPP accelerates India's transition to a greener and more sustainable energy mix, diminishing reliance on fossil fuels and enhancing energy security.

Offtake risk mitigation through market creation: GPP establishes a robust and consistent demand for green products and services, fostering innovation in the private sector. It provides companies with a clear incentive to invest in sustainable technologies. Simultaneously, GPP offers a stable and predictable market for green businesses, minimising investment risks and attracting private capital to sustainable ventures, such as low-carbon materials production.

In addition, the implementation of GPP also brings about multiple economic co-benefits. GPP unlocks a market that fuels deep decarbonisation, which could improve India's GDP, green jobs potential, export competitiveness, and energy security. Various studies have explored these co-benefits. Deep decarbonisation in India's energy sector will boost GDP by 1%–1.5% and add 29–39 million green jobs relative to business as usual by 2050.⁵⁰ The growth of the green economy driven by GPP could foster job creation, benefitting both urban and rural communities and contributing to overall economy-wide sustainability goals. Furthermore, GPP fuels decarbonisation, which builds export competitiveness that could result in foreign exchange savings of INR 199.2–249 trillion (US\$2.4–US\$3 trillion) by 2070.⁵¹

Decarbonisation also reduces energy import dependence by localising energy requirements — shifting to renewable energy, green hydrogen, and biomass — thus strengthening energy security. For instance, Indian steelmaking primarily depends on conventional blast-furnace routes, which are known for imports of fuels. However, cleaner production routes such as green hydrogen-based steelmaking or increasing scrap utilisation could help mitigate emissions while ensuring a reduction in imports of fuel as well as materials.

Yet implementing GPP in India could potentially lead to an increase in the cost of materials, commonly known as the green premium, as discussed in the following chapter. However, these cost increases should not be viewed separately from the environmental, social, and economic benefits of GPP. Quantifying these benefits during the policy-making process is essential for policymakers to systematically understand the impacts of GPP initiatives in India.

Understanding the Business Case of GPP: Examples of Government-Led Infrastructure Projects

Implementing GPP can yield diverse outcomes for on-the-ground infrastructure projects. Although the adoption of such policies plays a pivotal role in catalysing the initial demand for low-carbon steel and cement, it is crucial to comprehensively assess the emissions reduction benefits. It is equally crucial to assess the associated additional costs, also referred to as the green premium, necessary for realising these ventures.

For economies like India, which are gaining momentum in providing essential infrastructure like railways, roads, highways, and housing to their citizens, it becomes imperative to navigate a path that balances the need for rapid development with achieving India's climate commitments. This balancing act requires making informed decisions, which entail taking calculated risks and having a deep understanding of the implications. In doing so, India can ensure that it not only meets its infrastructure goals but also adheres to its sustainability vision.

To better understand the impacts and outcomes of implementing GPP, we analyse the cost implications and emissions reductions associated with a material-based GPP in three distinct use cases: (1) highway construction, (2) railway development, and (3) a housing project.^{iv} These three use cases collectively consume more than 70% of the steel and almost 90% of the cement in India.⁵² The case studies offer insights into how GPP can influence material prices, and thus the project cost, and reduce material-related emissions.

For the specificity of understanding the projects in functional units, we consider 1 km of highway, 1 km of railway track, and 1 unit of a PMAY urban home. The analysis includes estimating material (steel and cement) consumption, emissions, and costs across these projects based on publicly available data and information. A simplified flow diagram of methodology is provided in Appendix 7.

We first derived the material-related baseline emissions and costs for each of these three projects based on a literature review and stakeholder consultations. Subsequently, by considering the emissions reduction goals outlined in moderate and ambitious GPP policies, we calculated the potential emissions reductions and the corresponding green premium associated with low-carbon materials.

iv The highway considered here is a 1-km-long, 7-m-wide concrete road with high traffic volume. The railway considered here is the average of the three types of tracks, namely, broad gauge, meter gauge, and narrow gauge. PMAY provides affordable houses in both rural and urban areas. For the estimates in this section, an urban PMAY home is considered.

Finally, we recommended a minimum price, which potentially could be carbon price or emissions mitigation-related viability gap funding, that should be considered to offset the green premium for steel and cement.

India has already laid out plans for launching a national carbon market that covers the steel and cement sectors, which provides a viable pathway to mitigate increased material and project costs associated with the GPP policy.⁵³

Our estimates show:

- For a 1-km stretch of highway construction, the current carbon footprint associated with steel and cement materials amounts to 1,023 tonnes CO₂. A moderate GPP commitment will reduce the emissions to 767 tonnes CO₂, and in the ambitious scenario it further drops to 562 tonnes CO₂.
- For a 1-km railway track construction, the moderate and ambitious GPP commitments result in a reduction of steel- and cement-related emissions from 195 tonnes CO₂ to 146 tonnes CO₂ and 107 tonnes CO₂, respectively.
- Finally, the 7.8 tonnes CO₂ of emissions related to the steel and cement materials in one unit of PMAY urban home can be reduced to 5.8 tonnes CO₂ in the moderate scenario and 4.3 tonnes CO₂ in the ambitious scenario.

These results are depicted in Exhibit 8.

Exhibit 8

Steel- and cement-related emissions across projects (tonne CO₂)

■ Baseline ■ Moderate GPP Commitments ■ Ambitious GPP Commitments

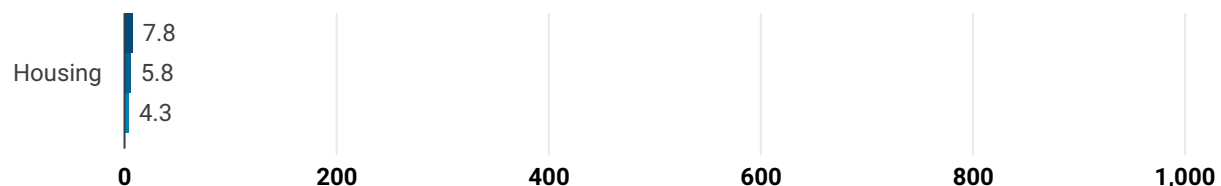
Materials-Associated Emissions from 1 km of Highway Construction



Materials-Associated Emissions from 1 km Railway Track Construction



Materials-Associated Emissions from One Unit of PMAY Home



RMI Graphic. Source: RMI analysis

A key component of this analysis is determining the green premium associated with low-carbon steel and cement materials, which is essential in building a business case for the GPP policy. Exhibit 9 summarises the estimated green premium of steel and cement under moderate (25% emissions intensity reductions) and ambitious (45% emissions intensity reductions) GPP commitments.

Exhibit 9 Considered emissions reduction and associated green premium across scenarios

Scenario	Steel			Cement		
	Emissions Intensity	Cost (Green Premium)	VGF/Offset Carbon Price	Emissions Intensity	Cost (Green Premium)	VGF/Offset Carbon Price
Baseline	2.46 tonnes CO ₂ /tonne steel	INR 67500/tonne steel (US\$813/tonne steel)	–	0.86 tonnes CO ₂ /tonne cement	INR 6230/tonne cement (US\$75/tonne cement)	–
Moderate commitment (25% reduction)	-25%	+ 2%–8%	INR 2158–INR 8798/tonne CO ₂ (US\$26–US\$106/tonne CO ₂)	-25%	+ 0%–4%	INR 0–INR 1162/tonne CO ₂ (US\$0–US\$14/tonne CO ₂)
Ambitious commitment (45% reduction)	-45%	+ 3%–15%	INR 1826 –INR 9130/tonne CO ₂ (US\$22–US\$110/tonne CO ₂)	-45%	+ 5%–21%	INR 830–INR 3403/tonne CO ₂ (US\$10–US\$41/tonne CO ₂)

Note: US\$1 = 83 INR.

RMI Graphic. Source: RMI analysis based on Council on Energy, Environment and Water, <https://www.ceew.in/publications/how-can-india-decarbonise-for-net-zero-cement-industry>; Bataille et al., <https://doi.org/10.1080/14693062.2023.2187750>; RMI, <https://rmi.org/insight/decarbonising-the-indian-steel-industry/>; and Mission Possible Partnership, <https://missionpossiblepartnership.org/making-net-zero-concrete-and-cement-possible-report/>.

For both steel and cement, we provided ranges instead of fixed values for the green premium estimates. This is mainly because the same emissions reduction target can be achieved by leveraging different combinations of technologies with various costs. The specific combinations are largely determined by the local conditions of specific concrete and steel manufacturing plants, including access to affordable clean energy and access to carbon storage sites. In addition, given the changes in fuel costs and technology readiness, deploying the same technology in different years also has major impacts on the final cost figure.

The results show that for both concrete and steel, a GPP policy that requires 25% emissions reduction can be achieved with zero to low green premium, driven by the fact that there are already commercially available low-cost decarbonisation options in the market. This low-cost transition can be accomplished through energy-efficient technologies along with adoption of renewable energy and increasing scrap uptake in the steel sector.⁵⁴ In the cement sector, using more supplementary cementitious materials, switching to alternative fuels such as biomass, as well as further improving energy efficiency are low-cost levers with minimal green premium.

However, for a more ambitious GPP target of 45% emissions reduction, the green premium has higher uncertainty and could potentially reach 20%. In this analysis, we assume that manufacturers opt for the cheapest available technology to achieve the emissions reduction target. If, under certain circumstances, CCUS must be deployed to achieve the 45% emissions reduction target, the green premium of steel and cement will be even higher than the upper limits provided in Exhibit 11. For the ambitious GPP target, a low green premium is also possible in the steel sector if cheaper scrap availability is ensured, green hydrogen production cost reaches the ambitious goal of INR 83/kg (US\$1/kg), or delivered cost of renewable power is competitive with the industry tariffs provided by the electricity distribution companies (DISCOMs), among other actions. For the cement sector, the widespread adoption of limestone calcined clay cement (LC3) along with efficiency improvements can help meet the ambitious GPP target with a lower green premium.

The green premium of steel and cement related to a moderate or ambitious GPP commitment will be passed along to government consumers and thus increase public spending on these construction projects. Our estimates suggest that to offset the increased material costs arising from the moderate GPP policy requirement, a carbon price of INR 2158–INR 8798/tonne CO₂ (US\$26–US\$106/tonne CO₂) for steel and INR 0–INR 1162/tonne CO₂ (US\$0–US\$14/tonne CO₂) for cement would be required. For the ambitious GPP commitment, an offset price of INR 1826–INR 9130/tonne CO₂ (US\$22–US\$110/tonne CO₂) would be needed for steel and INR 830–INR 3403/tonne CO₂ (US\$10–US\$41/tonne CO₂) for cement. These estimated figures are relative to the case studies being developed in this section and thus are influenced by the quantity of material consumption across these scenarios.

These case studies show how a material-based GPP initiative affects the cost and emissions of different highway, railway, and housing projects. These particulars serve as broad representations. A more thorough analysis would be needed to account for potential variations stemming from technology choices and costs. Nevertheless, these estimates effectively underscore the potential presented by the implementation of such a policy, dispelling uncertainties surrounding the green premium and offset costs.

GPP in India can be project based or require a certain percentage of the material to be low carbon as well. The cost and emissions implications related to these two kinds of green procurement policies will be different from what is shown in our current analysis. For example, a project-based emissions reduction target encourages more efficient use of steel and cement at the construction level and thus can achieve similar emissions reduction targets with lower costs.

6. Framework and Roadmap for GPP

6.1. Framework for GPP in India

As described in chapter 3, the public procurement landscape in India is well developed, efficient, and continuously evolving. Although public procurement is a well-established concept and process in India, embracing the characteristics of GPP requires a deeper understanding of its fundamental values and actors.

These elements collectively constitute conceptual principles that form a framework (described in Exhibit 10) to effectively guide the adoption and implementation of GPP in India. Without a structured framework in place, there is a risk of inconsistent practices, lack of clarity, and potential inefficiencies in the procurement process. A structured framework helps align the efforts of producers, consumers, policymakers, and other stakeholders towards common goals related to sustainability, environmental protection, and climate action.

The fundamental principles that provide the basis for GPP include transparency, accountability, healthy competition, fairness, integrity, legality, economic transformation, and climate commitment.

In this context, transparency ensures openness and accessibility of procurement processes; accountability holds stakeholders responsible for their actions and decisions; healthy competition fosters an environment where multiple suppliers can compete fairly; fairness ensures impartial treatment of all bidders; integrity maintains ethical standards throughout the procurement process; legality ensures adhering to laws and regulations governing procurement activities; economic transformation promotes sustainable economic growth and development; and climate commitment emphasises the need for environmentally responsible procurement practices to mitigate climate change impacts.

The successful implementation of GPP relies on a finely tuned interplay of three essential actors:

- Producers must not only adapt but innovate their technology and processes to ensure the production of low-carbon materials, with a specific emphasis on steel and cement, two industries known for their significant carbon footprints.
- Consumers, including government agencies and private-sector entities, bear the responsibility of ensuring that projects under consideration prioritise the use of low-carbon materials. This proactive approach addresses the offtake risks inherent in the procurement of steel and cement, driving market demand towards greener alternatives.
- Policymakers play a vital role in setting the stage for GPP adoption by establishing the right mix of policy levers, mechanisms, and incentives. These measures are crucial for creating an enabling environment that fosters the widespread adoption of GPP principles within the context of steel and cement procurement.

These actors focus on deriving their efficacy from the core values of GPP, which evolve dynamically within the ecosystem for effective implementation. Within the realm of steel and cement procurement in India, three pillars emerge as indispensable for the successful execution of GPP initiatives:

- The people pillar emphasises a people-centric approach to GPP, ensuring that the adoption of green procurement practices does not impose undue financial burdens on the public. The promotion of green infrastructure within steel and cement procurement must align seamlessly with principles of sustainable and affordable development, fostering community engagement and buy-in.
- The process pillar mandates that GPP implementation within the procurement of steel and cement must be process driven. Integration into existing procurement processes is essential to avoid disruptions while ensuring a smooth transition towards greener practices.
- The policy pillar underscores the critical importance of making GPP a political and policy priority across various government levels. Given the significant involvement of public funds in steel and cement procurement, policymakers must prioritise the development and enforcement of robust regulatory frameworks that incentivise and mandate the adoption of green procurement practices.

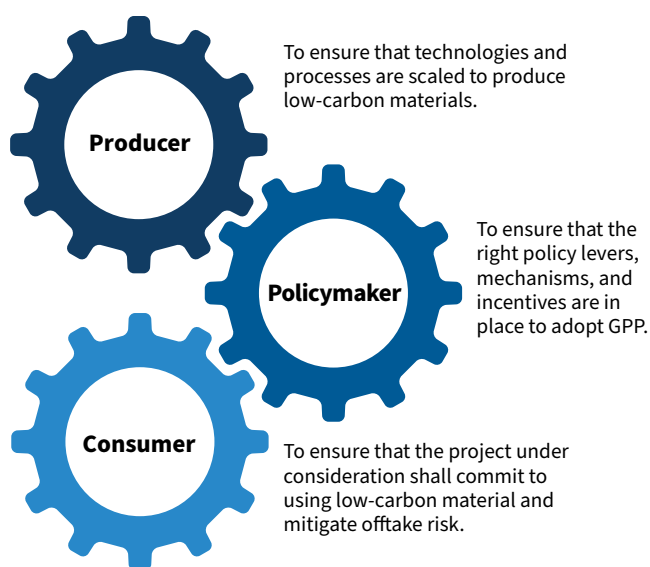
Exhibit 10

Framework for GPP

Fundamental principles of public procurement

Transparency	Healthy Competition	Integrity	Economic Transformation
Accountability	Fairness	Legality	Climate Commitment

Three Gears of Successful GPP Implementation



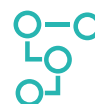
Three Pillars of Successful GPP Implementation



People

Shall be promoted to keep a people-centric approach

Adopting GPP shall not emerge as a cost to the people. Green infrastructure should not mean expensive infrastructure.



Process

Shall be process driven, ideally to be incorporated into existing processes

Existing processes shall be leveraged to provide a strong foundation. GPP shall not disrupt the running mechanism but rather strengthen it.



Policy

Shall be part of the political and policy priority across levels of government

The involvement of public money necessitates GPP to be a political and policy priority for successful implementation. Private actors need policy signals to act.



RMI Graphic. Source: RMI's compilation

Role of Private Sector in Ensuring Successful Implementation of GPP

The private sector plays a significant role in GPP by serving as both suppliers and consumers within the procurement ecosystem. Its involvement is crucial for driving innovation, promoting sustainable practices, and accelerating the transition towards a greener economy. The following are the key roles private entities can play in GPP implementation:

Innovation and technology development: Private-sector entities are often at the forefront of innovation and technology development. They have the capacity to invest in research and development to create new products, materials, and technologies that align with the principles of GPP. By introducing eco-friendly alternatives and sustainable solutions, the private sector contributes to expanding the market for green products and services.

Supply chain management: Private-sector suppliers play a vital role in ensuring the availability of environmentally sustainable products and materials for procurement. They are responsible for sourcing, manufacturing, and delivering goods and services in accordance with GPP requirements. Through effective supply chain management practices, private-sector suppliers can minimise environmental impacts, reduce carbon emissions, and optimise resource utilisation throughout the procurement process.

Collaboration and partnership: Collaboration between the public and private sectors is essential for the successful implementation of GPP initiatives. Private-sector entities can collaborate with government agencies, nonprofit organisations, and other stakeholders to develop and implement sustainable procurement policies, standards, and guidelines. By sharing expertise, resources, and best practices, these partnerships can foster innovation, enhance capacity building, and drive collective action towards achieving sustainability goals.

Market demand and consumer choice: Private-sector consumers, including businesses and individuals, have the power to influence market demand and consumer choice. By preferring and purchasing green products and services, they create incentives for suppliers to adopt sustainable practices and offer environmentally friendly alternatives. Through informed purchasing decisions and support for GPP initiatives, private-sector consumers can drive market transformation, encourage sustainability, and promote corporate social responsibility.

Advocacy and leadership: Private-sector entities can also play a role in advocating for policy changes, regulatory reforms, and market incentives that support the adoption of GPP. By engaging in advocacy efforts, corporate sustainability initiatives, and industry associations, they can demonstrate leadership, raise awareness, and mobilise support for sustainable procurement practices. Through proactive engagement with policymakers, private-sector leaders can contribute to shaping a conducive policy environment that promotes sustainability, innovation, and economic growth.

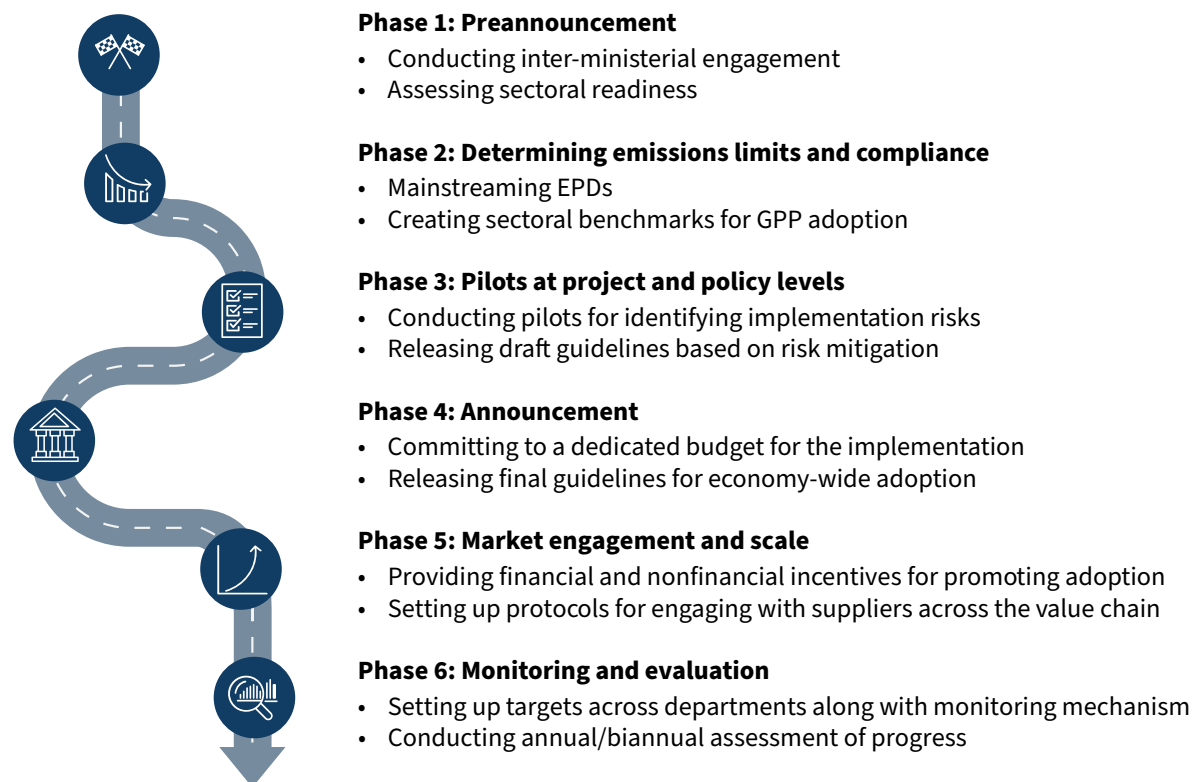
6.2. Roadmap for GPP in India

To execute GPP in India, a comprehensive roadmap delineated in Exhibit 13 is imperative. Each stage of the development and implementation process entails meticulous steps and activities, ensuring efficiency and thoroughness. Across these phases, three distinct groups are tasked with executing activities according to their respective capacities:

- The Inter-Ministerial Group, led by the Ministry of Finance, is composed of members from the Ministry of Commerce and Industry and the Ministry of Environment, Forest, and Climate Change, along with the Ministry of Housing and Urban Affairs, Ministry of Railways, Ministry of Steel, and Ministry of Road Transport and Highways, emphasising their significant role in GPP.
- The Advisory Group encompasses civil society organisations; representatives from associations of the steel, cement, and concrete industries; financial institutions; practitioners; and universities.
- The Industry Group encompasses manufacturers as producers and developers as consumers of the product. These groups serve as the driving forces behind GPP, as delineated in the framework of Exhibit 13.

By adhering to the roadmap detailed in Exhibit 11, these groups effectively address the three pillars and eight fundamental principles of procurement, as demonstrated in Exhibit 10.

Exhibit 11 Overview of phase-by-phase roadmap to implement GPP in India



RMI Graphic. Source: RMI analysis

Phase 1: Preannouncement

During the preliminary phase of the GPP roadmap in India, it is imperative to establish an inter-ministerial group. As emphasised in this report, established initiatives, policies, guidelines, and regulations (see Appendix 3) facilitating the procurement process within the country exist. Therefore, it is crucial to integrate the GPP framework into this existing ecosystem rather than establishing a separate procurement system that could potentially disrupt the overall machinery. This group will assume a crucial role in shaping and integrating GPP features into these policies by conducting extensive research, engaging stakeholders, and devising comprehensive strategies in accordance with the nation's GPP objectives. Moreover, the group will delineate the economic advantages of GPP, encompassing job creation, bolstering local Indian-made products, promoting clean manufacturing, mitigating pollution and associated health risks, and combatting climate change impacts.

In addition to the establishment of this group, sectoral assessments will be conducted to gauge the preparedness of specific industries for GPP integration. Industries such as steel and cement, extensively utilised by government entities like the Ministry of Housing and Urban Affairs, Ministry of Railways, and Ministry of Road Transport and Highways, will undergo meticulous evaluations. These assessments will encompass sectoral readiness, identification of financial requisites, skills and safety prerequisites, and environmental impact evaluations.

During this phase, various options such as EPDs to baseline and benchmark the emissions intensities of steel and cement at the end consumer level will be evaluated. Consultations will be organised with national and international experts to gather their know-how about the baseline and benchmarking process of building materials.

Phase 2: Determining Emissions Limits and Compliance

In the context of GPP in India, the incorporation of EPDs is imperative for the government to establish emissions limits and ensure compliance. EPDs serve as comprehensive documents that transparently communicate a product's environmental impact throughout its entire life cycle. They provide consumers, businesses, and policymakers with essential information to make informed decisions, offering a holistic view of a product's sustainability performance from raw material acquisition to disposal. By integrating EPDs into procurement practices, the Government of India can promote environmentally conscious purchasing, thereby advancing sustainability objectives across various sectors.

The widespread adoption of EPDs in India necessitates collaborative efforts between the Government of India and diverse stakeholders. EPDs are typically developed by specialised third-party organisations, often commissioned by product manufacturers. These organisations employ experts skilled in LCA methodologies, ensuring the accurate analysis of a product's environmental impact. The collaborative efforts between manufacturers and these organisations lead to credible and standardised EPDs that offer transparency about a product's sustainability, facilitating informed consumer choices.

Building capability and capacity within the country is crucial to effectively implement EPD frameworks and practices. Engaging stakeholders from government agencies, industries, and academia is vital for garnering support and fostering an environment conducive to EPD adoption. Building up third-party independent entities to verify EPDs will also be critical for their successful uptake by the industry. This process also entails conducting training programmes and awareness campaigns to educate stakeholders about the importance of EPDs and their role in supporting GPP.

Similar to the BEE labelling programme in India, the introduction of a labelling programme for EPDs can further encourage their adoption and utilisation. This labelling scheme may involve issuing standardised labels that indicate a product's environmental performance based on its EPD. These labels could display key environmental metrics, such as GWP and carbon footprint resource consumption, thereby empowering consumers and procurers to make informed choices.

EPDs generally are not universally mandatory for all products. The requirement for EPDs varies by region, industry, and product type. While some sectors or certifications, like certain green building standards such as the LEED certification, Building Research Establishment Environmental Assessment Method (BREEAM), WELL Building Standard, Excellence in Design for Greater Efficiencies (EDGE) Certification, and Mostadam, necessitate EPDs, others may not. Voluntary adoption is common, driven by a commitment to transparency and sustainability.

Phase 3: Pilots at Project and Policy Levels

Pilots are recommended at two levels: (1) policy and (2) ground execution. A policy pilot initiative entails the testing and refinement of GPP policies on a small scale before broader implementation. During this phase, selected sectors or government agencies are enlisted to participate in the pilot programme. Evaluating the effectiveness of proposed GPP policies and identifying potential challenges and opportunities constitutes a pivotal aspect of this process. A typical example of a policy pilot could focus on the inclusion of identified materials in the process followed by the CPWD for the construction of buildings at the national level. Feedback from stakeholders involved in the pilot programme, including government officials, procurement professionals, suppliers, and end-users, is indispensable for informing policy adjustments and refinements. Subsequently, guidelines and best practices are developed based on the outcomes of the policy pilot, serving as a blueprint for broader GPP implementation.

An on-the-ground execution pilot initiative focuses on implementing GPP practices in real-world projects or procurements. This entails selecting specific projects or contracts within chosen sectors to serve as pilot initiatives. The process involves demonstrating the feasibility and practicality of identified building materials to instill confidence about the safety and performance amongst various stakeholders. A typical example of an on-the-ground pilot is deployment of the identified low-embodied-carbon material in various projects to demonstrate the structural stability as well as energy performance of the material. Evaluating the environmental, social, and economic impact of GPP practices deployed in pilot projects is a critical step. Utilising insights gained from pilot projects, areas for improvement and optimisation can be identified, providing valuable guidance for comprehensive GPP implementation nationwide.

Phase 4: Announcement

Following extensive consultation and meticulous preparation, the Government of India is poised to unveil final policies and guidelines aimed at facilitating the widespread adoption of GPP practices across diverse sectors. These policies are expected to delineate specific criteria, standards, and procedures to be adhered to by government agencies and entities throughout the procurement process. Emphasising environmental considerations, these concise GPP criteria will serve as benchmarks for the procurement of goods and services. Additionally, the policies will establish standardised procurement procedures, ensuring uniformity and transparency in the implementation of GPP initiatives.

Furthermore, a crucial aspect of successful GPP policy implementation entails a firm commitment to allocate dedicated budgets. Such allocations are essential to support a variety of activities, including but not limited

to awareness campaigns, capacity-building initiatives, technical assistance programmes, and monitoring and evaluation efforts. By earmarking funds for these purposes, the Government of India can demonstrate its unwavering commitment to the effective implementation and sustainability of GPP practices nationwide. This financial commitment underscores the importance of investing in initiatives that promote sustainability, foster innovation, and drive positive environmental outcomes across India's procurement landscape.

Phase 5: Market Engagement and Scale

Engaging suppliers actively is crucial for the success of GPP initiatives in India, fostering sustainable practices throughout the procurement process and beyond. To accomplish this goal, it is imperative to establish a structured protocol for supplier engagement. This protocol should delineate clear guidelines for interactions that prioritise environmental considerations. Creating formal communication channels, such as meetings, workshops, or online platforms, facilitates consistent and effective engagement with suppliers. Moreover, providing training and resources to suppliers enhances their understanding of the significance of GPP and equips them with the knowledge and tools to implement eco-friendly practices. Implementing feedback mechanisms allows for continuous improvement and refinement of GPP initiatives, enabling suppliers to contribute input, share challenges, and propose enhancements to bolster the effectiveness of green procurement efforts.

In addition to proactive supplier engagement, the government can spur investments in sustainable manufacturing processes by providing fiscal incentives. Offering financial incentives, such as subsidies, grants, or low-interest loans, encourages manufacturers to invest in technologies, equipment, and practices that mitigate environmental impact, reduce energy consumption, and lower the carbon footprint associated with manufacturing activities. Moreover, granting preferential treatment to products and services meeting green procurement criteria in government procurement contracts stimulates market demand for sustainable goods.

By combining effective market engagement strategies with targeted fiscal incentives, India can propel the widespread adoption of green procurement practices. This holistic approach not only generates positive environmental impacts but also fosters sustainable economic growth and enhances competitiveness in global markets.

Phase 6: Monitoring and Evaluation

To ensure the efficacy of GPP policies in India, it is imperative to establish comprehensive monitoring and evaluation mechanisms. These mechanisms serve as vital tools for policymakers to assess the progress of policy measures at various governmental levels. Implementing a biannual assessment schedule, which encompasses compliance with GPP criteria, emissions reductions, and barriers to adoption, facilitates regular tracking of progress and impact. The Inter-Ministerial Group will utilise assessment findings to quantify emissions reductions achieved through GPP policy implementation. This data will be instrumental in setting targets for emissions reductions and adjusting policy measures accordingly. Additionally, assessment findings will provide insights to policymakers regarding the feasibility of existing GHG emissions limits and the necessity for adjustments based on progress and technological advancements. As technologies evolve and innovative materials emerge, the Inter-Ministerial Group will assess the feasibility and environmental benefits of integrating new materials and subcategories into the GPP framework, guided by emerging trends and advancements in green technology.

By establishing a comprehensive monitoring and evaluation framework, India can systematically evaluate the effectiveness of its GPP policies, pinpoint areas for enhancement, and drive continuous progress towards green procurement practices across all governmental levels.

7. Conclusion and Way Forward

Implementing GPP in India holds immense potential, offering both economic and environmental benefits. Given the purchasing power of governments and commitment, GPP can catalyse demand for low-carbon steel and cement. GPP can mitigate risks associated with aggregating market demand and the associated green premium. It is pivotal for achieving deep decarbonisation, which not only enhances India's GDP but also creates job opportunities, improves export competitiveness, and strengthens energy and material security.

In India's context, the projected increase in demand for concrete and steel underscores the urgency and importance of implementing GPP policies. Moreover, GPP aligns seamlessly with India's national goals and policies, reflecting strong demand for low-carbon materials from both the public and private sectors. Collaborative initiatives such as India's participation in IDDI and the collective efforts of industrial companies within the FMC further underscore the momentum towards sustainable procurement practices.

Building on existing state and government initiatives and leveraging international best practices, policymakers can craft GPP policies that unlock economic benefits, curb emissions, and support national objectives. A product-level approach to GPP, verified through EPDs, is recommended for India. EPDs serve as the gold standard in disclosing GWP and offer a straightforward means to address the embodied carbon content of materials procured for government-owned projects. Alongside EPDs, establishing emissions standards and providing incentives for innovation and emissions reductions are essential components of a robust GPP policy.

The step-by-step roadmap outlined in this report provides a comprehensive framework for India to develop and implement a successful GPP policy. By embracing GPP initiatives, India can not only advance its environmental sustainability goals but also foster economic growth, innovation, and competitiveness on the global stage.

Moving forward, a systematic approach is proposed to advance construction projects through various targeted initiatives. First, it is recommended to conduct detailed construction project deep dives and assessments. This involves thorough analysis of the procurement process, identification of challenges, assessment of opportunities, and development of strategies to incorporate GPP principles. Concurrently, efforts should be directed towards developing an innovative business model to promote GPP adoption. This entails exploring the implications of GPP-associated premiums on projects and devising innovative business models to mitigate these costs, alongside the formulation of necessary policy frameworks to mainstream these models effectively.

Additionally, it is advised to establish an expert working group composed of key state officials and stakeholders such as urban local bodies, urban development departments, and public works departments. This group will facilitate continuous deliberation and exchange of insights to drive sustainable practices forward. Furthermore, emphasis should be placed on subnational policy deep dives and implementation, suggesting enhancements to existing policies and institutional mechanisms at the city and state level to actively promote GPP initiatives and create an enabling environment for sustainable construction practices. Through these concerted efforts, the construction sector can evolve towards greater environmental consciousness and social responsibility.

Appendices

Appendix 1 Organisations under the Ministry of Housing and Urban Affairs

Ministry of Housing and Urban Affairs			
Attached	Subordinate	Statutory and Autonomous	Public-Sector Undertakings
Central Public Works Department	Town and Country Planning Organisation	Delhi Urban Art Commission	NBCC (India) Limited, formerly National Buildings Construction Corporation Ltd.
Directorate of Estates	Government of India Stationery Office	Delhi Development Authority	Housing and Urban Development Corporation Ltd.
Directorate of Printing	Department of Publication	National Institute of Urban Affairs	Hindustan Prefab Ltd.
Land and Development Office		National Capital Region Planning Board	
National Buildings Organisation		Rajghat Samadhi Committee	
		Building Materials and Technology Promotion Council	
		National Cooperative Housing Federation of India	
		Central Government Employees Welfare Housing Organisation	

RMI Graphic. Source: RMI's compilation based on [Ministry of Housing and Urban Affairs portal](https://mohua.gov.in/), 2023, <https://mohua.gov.in/>

Appendix 2 Organisations under the Ministry of Road Transport and Highways

Ministry of Road Transport and Highways			
Autonomous	Registered Society	Public-Sector Undertakings	Related Organisation
National Highways Authority of India	Indian Academy of Highway Engineers	National Highways and Infrastructure Development Corporation Ltd.	Indian Roads Congress
			Central Road Research Institute
			Central Institute of Road Transport
			Automotive Research Association of India

RMI Graphic. Source: RMI's compilation based on [Ministry of Road Transport and Highways portal](https://morth.nic.in/), 2023, <https://morth.nic.in/>

Appendix 3 Key Policies and Initiatives Driving GPP in India

India has been making efforts to promote sustainable and environmentally responsible practices, including GPP. The following table puts forward the active policies and initiatives, their purpose, and the way they are facilitating GPP in India.

Name of the existing policy/initiative/other	Objective/purpose of this document	How it is already driving/facilitating/linked with the GPP in India	How it can possibly drive GPP in India
India's Nationally Determined Contributions (NDCs)	NDCs are commitments made by countries under the United Nations Framework Convention on Climate Change to address climate change and reduce GHG emissions , serving as a primary method for governments to communicate their intended actions to combat climate change globally.	NDCs emphasise transitioning to a circular economy , which can be supported by public procurement favouring products with longer life spans, recyclability, and reduced waste generation.	—
Model Building Bye-Laws	Model Building Bye-Laws provide standardised guidelines and regulations for construction projects to ensure orderly development of an area.	Model Building Bye-Laws become a prerequisite for participating in public construction projects , ensuring projects are executed in compliance with safety and environmental standards.	—
GeM	GeM, in collaboration with the United Nations Environment Programme, is promoting GPP by enhancing transparency, efficiency, and speed in public procurement.	GeM has introduced marketplace filters enabling government buyers to identify products such as green room air conditioners, facilitating realisation of NDCs and Sustainable Development Goals commitments, with plans to launch a green transition service for buyers seeking to achieve carbon neutrality and net-zero carbon emissions.	—
Perform, Achieve, Trade (PAT) scheme and Energy Conservation (Amendment) Bill	The PAT scheme and other energy conservation bills are regulatory instruments designed to reduce specific energy consumption in India's energy-intensive industries.	The PAT scheme drives market transformation by incentivising suppliers to offer energy-efficient products , expanding options for public procurement while also including provisions for capacity building and skill development.	—

Appendix 3, continued

Name of the existing policy/initiative/other	Objective/purpose of this document	How it is already driving/facilitating/linked with the GPP in India	How it can possibly drive GPP in India
Udgam Summit	Udgam is a programme facilitating Indian innovators and entrepreneurs to develop, validate proof of concept, and support commercialisation of promising ideas.	Strategic use of public procurement can leverage an enormous market for innovative products and services. Adopting innovation can reduce costs, increase productivity, solve business problems, and provide a competitive edge.	—
CPWD Delhi Schedule of Rates (DSR)	CPWD DSR standardises rates across various construction and infrastructure activities, serving as a comprehensive and essential technical document for executing civil works.	Standardising rates brings uniformity and transparency to pricing in public procurement, simplifying the tendering process for contractors, preventing overpricing or underpricing in bids and ensuring rates remain relevant to current market conditions through regular updates, crucial for accurate cost estimation.	—
State government schedule of rates	The schedule serves as a reference for government departments and agencies in public procurement, providing a standardised framework for cost estimation and contract awarding.	The schedule ensures consistency, transparency, and fairness in public procurement, serving as a benchmark for contractors to prevent overpricing and underpricing in bids, and reducing project approval timelines for quicker project commencement.	—
IDDI	IDDI standardises carbon assessments, sets procurement targets, incentivises investment in low-carbon product development, and establishes industry guidelines for design.	IDDI sets globally recognised targets for public procurement of low- and near-zero-emissions steel, cement, and concrete, facilitated by publicly accessible data and tailored digital tools.	—
Global Housing Technology Challenge (GHTC)	GHTC aims to offer accessible, affordable, and comfortable housing solutions for all societal segments, with a focus on innovative housing technologies that enhance construction efficiency and speed.	GHTC implements demonstration projects to showcase innovative technologies, supported by the procurement process, thereby promoting widespread adoption in government-funded housing initiatives.	—

Appendix 3, continued

Name of the existing policy/initiative/other	Objective/purpose of this document	How it is already driving/facilitating/linked with the GPP in India	How it can possibly drive GPP in India
First Movers Coalition (FMC), World Economic Forum	This initiative leverages collective purchasing power to decarbonise heavy-emitting sectors worldwide , including aluminium, aviation, cement and concrete, shipping, steel, trucking, and carbon dioxide removal.	—	The commitments aim to commercialise decarbonisation technologies , and the FMC plans to achieve significant milestones by investing in these technological solutions to create long-term impact.
SteelZero	SteelZero is a global initiative uniting leading organisations to accelerate the transition to a net-zero steel industry, with members committing to procure 100% net-zero steel by 2050 at the latest.	—	By harnessing purchasing power and influence, SteelZero sends a strong demand signal to steer global markets and policies towards responsible production and procurement of steel .
ConcreteZero	ConcreteZero aims to transition to 30% low-emissions concrete by 2025 and 50% by 2030 , setting a clear pathway to using 100% net-zero concrete by 2050.	—	ConcreteZero utilises purchasing power and influence to send a strong demand signal, guiding global markets and policies towards responsible production and procurement of concrete .
GRIHA, LEED, Indian Green Building Council (IGBC), EDGE	The objective is to encourage the creation of environmentally friendly buildings through architectural design, water efficiency, efficient waste disposal, energy efficiency, sustainable buildings, and occupant comfort.	—	Public procurement may favour vendors or contractors with experience or commitments to GRIHA, LEED, IGBC, and EDGE standards while showcasing successful certified projects as examples for future endeavours, highlighting the feasibility and benefits of adopting such standards.
Energy Conservation Building Code (ECBC)/ Eco Niwas Samhita (ENS)	ECBC/ENS sets minimum requirements for energy-efficient buildings , including standards for building envelope performance to limit heat gains or heat loss, alongside provisions for natural ventilation, daylighting potential, and occupant comfort.	—	Public procurement for construction projects can integrate ECBC requirements into design specifications , requiring contractors and architects to comply with energy efficiency standards for constructed buildings.

RMI Graphic. Source: RMI analysis based on Bureau of Energy Efficiency, <https://beeindia.gov.in/en/eco-niwas-samhita-ens>; Indian Green Building Council, <https://igbc.in/>; GRIHA, <https://www.grihaindia.org/>; LEED, <https://www.usgbc.org/leed>; ConcreteZero, <https://www.theclimategroup.org/concretezero>; SteelZero, <https://www.responsiblesteel.org/our-partners>; First Movers Coalition, <https://initiatives.weforum.org/first-movers-coalition/home>; EDGE, <https://edge.gbci.org/>.

Transparency and Accountability

The Central Vigilance Commission holds significant authority in the context of procurement in India. Empowered with the ability to initiate or oversee inquiries, the commission delves into alleged offences under the Prevention of Corruption Act, 1988. This jurisdiction extends to specific categories of public servants within the central government, corporations established by or under any central act, government companies, as well as societies and local authorities owned or controlled by the central government. Highlighting the importance of transparency and accountability in the procurement landscape, the emphasis is on conducting public buying in a manner that is clear and open. This approach is aimed at fostering competition, ensuring fairness, and eliminating arbitrariness within the system. The goal is to create an environment where prospective tenderers can confidently formulate competitive tenders. Upholding exemplary norms of best practices in public procurement procedures is crucial to ensuring the overall efficiency, economy, and accountability of the system.

Challenges of Public Procurement in India

Public procurement in India grapples with numerous challenges that cast shadows on the efficiency, transparency, and fairness of the entire process:

Complexity in process due to multiple guidelines: There are multiple procurement guidelines and procedures in the procurement ecosystem, which creates complexity. The provisions across these guidelines are not always aligned, leading to varied interpretations. For example, the GFR is the sole nationwide rulebook when it comes to public procurement in India, but there are also guidelines put out by several ministry divisions, such as the CPWD manual. There is also a disparity in the implementation of procurement rules and practices among different states that creates a lack of uniformity. This lack of consistency poses a challenge for business operations on a national scale.

Financial leakages across process stages: Although there are stringent guidelines and legislations governing public procurement in India, financial leakages stand out as a significant challenge that can impact the integrity of the process. The direct costs of financial leakage include loss of public funds due to misallocations, higher expenses, and lower quality of goods, services, and works. In terms of indirect costs, financial leakages in procurement can hinder economic development and market mechanisms, which reduces competitiveness, trade, and foreign direct investment.

Lag in decision-making: Decision-making in public procurement can be slow, resulting in project implementation delays. There may be delays in preparing technical specifications, failure to start the procurement process on time, and delays in bids, proposals, evaluation, and the approval process, and there might also be a delay due to the contractor or the service provider.

Skills gap: The procurement workforce may face challenges due to a lack of necessary skills and training, which can hinder the procurement processes.

Integrating sustainability: There is a huge need for the adoption of procurement practices that align with broader environmental and social goals, but incorporating sustainability criteria and encompassing environmental and social considerations may pose a challenge.

Appendix 6 Global GPP Examples for Steel and Cement (and Concrete)

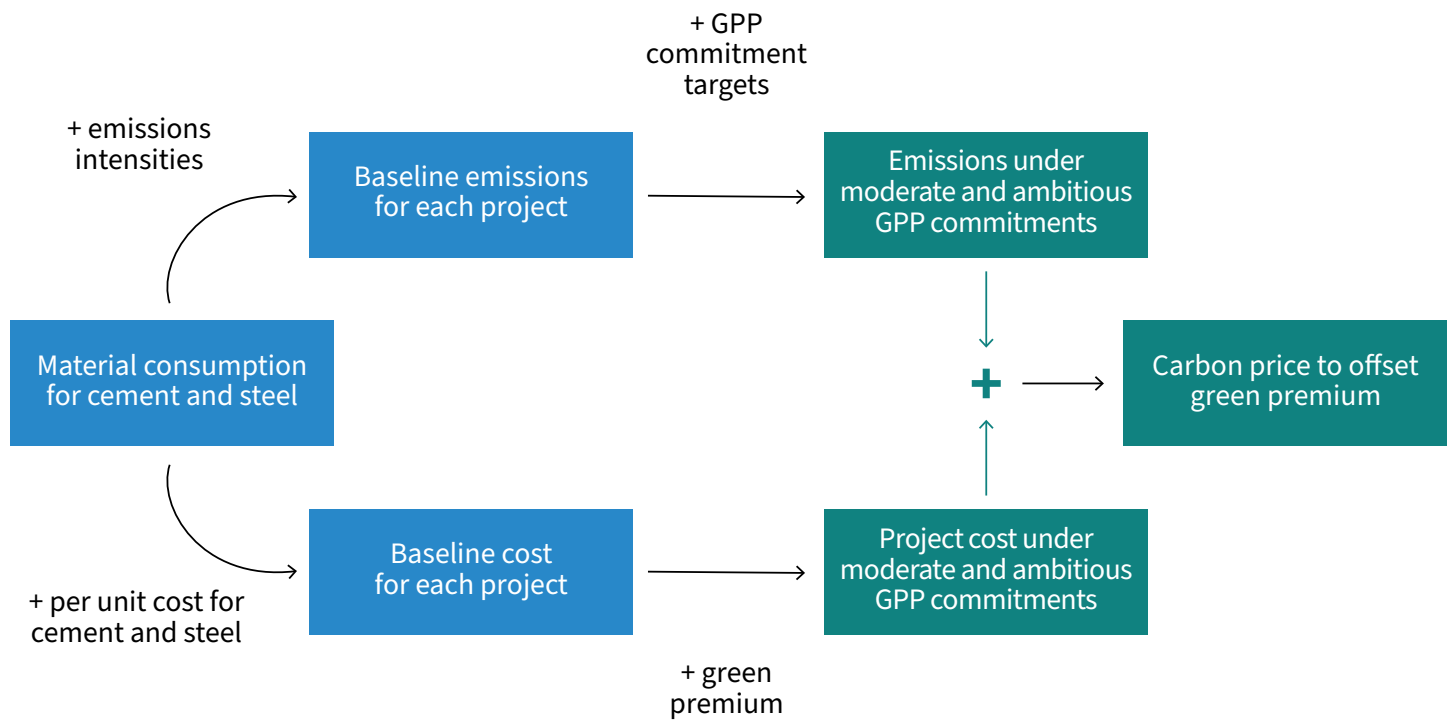
Region or Country	Scope	Requirement	Disclosure Method	Target-Setting Process	Verification Method
California (US state)	Steel	Maximum acceptable GWP by product category.	EPDs.	Industry average with tolerance for uncertainty. Reviewed every three years to lower limits.	Contractors submit EPDs for verification.
China	Concrete	Green product certification considers various factors ranging from energy saving, water saving, environmental protection, and recycling to renewables, with carbon as optional.	Environmental labeling and certification scheme managed by China Environmental United Certification Centre.	Carbon emissions accounting and certification system will be established.	Require all levels of government to give priority to purchasing environmental labelling products and prohibit from purchasing any products that harm the environment or human health.
European Union	Concrete, steel	Split into two types: core criteria and more ambitious comprehensive criteria. Both sets include criteria in project-level LCA, percentage use of recycled content, reduction of CO ₂ emissions from transport, and recycling of demolition waste.	Project-level LCA and EPDs.	Collaborative process with stakeholder consultation.	Contract performance clauses defined on a per-project basis.
Japan	Concrete, steel	Percentage use of recycled content by product category.	Ecolabel based on ISO 14020 and 14024.	Ministry of the Environment develops the basic policy with the help of review committees. Agencies set their own targets with reference to the basic policy that are reviewed annually.	Reduced emissions are estimated based on reduced emissions from a chosen average green product. Ratio compared with baseline from 2000.

Appendix 6, continued

Region or Country	Scope	Requirement	Disclosure Method	Target-Setting Process	Verification Method
Netherlands	Concrete, steel	Project-level environmental impact and environmental business certification.	Project-level LCA using the DuboCalc tool and CO ₂ Performance Ladder certification of companies.	Based on EU processes.	Contractors must demonstrate proposed reduction is achieved. Monetary sanctions are imposed for not meeting the reduction targets proposed in bid.
South Korea	Steel	Percentage use of recycled content by product category.	Ecolabel maintained by the Korea Environmental Technology & Industry Institute (KEITI).	Agencies set their own GPP targets and report performance to KEITI annually.	Reduced emissions estimated based on comparison with conventional products using LCA data.
US federal government	Concrete, Steel	Maximum acceptable GWP by product category.	EPDs.	Collaborative process with stakeholder consultation. Based on EPD data.	Contractors submit EPDs for verification.

RMI Graphic. Source: RMI compilation based on Ali Hasanbeigi, Renilde Becqué, and Cecilia Springer, “Curbing Carbon from Consumption: The Role of Green Public Procurement,” Global Efficiency Intelligence, August 2019, <https://www.climateworks.org/wp-content/uploads/2019/09/Green-Public-Procurement-Final-28Aug2019.pdf>

Appendix 7 Method of Estimation for Implications of GPP on Emissions and Cost across Infrastructure Projects



RMI Graphic. Source: RMI's Compilation

Global Approaches for GPP Implementation

Based on the GPP programmes highlighted in chapter 4, the strategies for adopting GPP can be classified into four types:

Approach focused on individual products validated by EPDs: This methodology necessitates the divulgence of GHG emissions linked to the production of building materials, encompassing stages such as raw material extraction, transportation, and manufacturing life cycles (commonly referred to as stage A or cradle-to-gate). This disclosure is facilitated through product-specific EPDs, which are rigorously vetted documents adhering to international standards. EPDs provide a third-party verified account of a product's environmental impacts, inclusive of its GWP. The inherent advantage of this approach lies in its ability to target individual products, employing a straightforward disclosure method. Furthermore, it enables the facile determination of benchmarks using the data outlined in EPDs.

Product-centric strategy validated via type I ecolabels: This methodology mandates revealing GHG emissions alongside other environmental and social impacts associated with building materials throughout various life-cycle stages (specifically, stages A to C, often denoted as cradle-to-grave). Type I ecolabels, constituting multicriteria, third-party validated assessment programmes aligned with international standards, serve as the mechanism for this disclosure. These ecolabels play a pivotal role in enhancing marketing strategies and fostering consumer awareness. However, they encompass criteria beyond GWP, potentially diverting attention from a product's emissions performance. This multicriteria approach can pose a challenge when attempting to establish benchmarks solely based on emissions.

Project-oriented strategy confirmed through LCA: This approach necessitates the disclosure of the overall GHG emissions impact stemming from the aggregate use of concrete, cement, or steel within a project. This information is unveiled through a comprehensive LCA that encompasses emissions associated across all life cycles of a product (stages A to C, colloquially referred to as cradle-to-grave). In contrast to the preceding approaches, which concentrate on decarbonising specific material supply chains, this strategy encompasses the broader spectrum of initiatives implemented by design and construction teams to achieve carbon reductions. These may include adopting material-efficient designs that utilise fewer resources or incorporating the reuse of building components. Additionally, it accommodates GWP trade-offs between materials employed in a project. However, it is essential to acknowledge that this approach is inherently more intricate than the first two. Notably, fewer guidelines are available for conducting and verifying these LCAs, and establishing baseline performance thresholds presents a unique set of challenges.

Business certification approach: This strategy accords preferential purchasing considerations to businesses attaining certification within a nationally formulated certification scheme, often featuring multiple certification levels that typically correspond to the management of Scope 1, 2, and 3 emissions. Similar to ecolabels, this approach enhances marketing endeavours and fosters competition within the industry. However, the certification is predominantly influenced by economic activities and does not directly mirror the emissions performance of the products procured.

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