



Green Agenda 2019

Sustainability imperatives
for India's next government





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India is constantly dealing with the challenge of balancing its economic growth and environmental sustainability. While it has begun the transitional process towards larger uptake of renewable energy and energy efficiency, several other challenges – air pollution, water and waste management to name a few – remain to be resolved. As India prepares to welcome its next government, TERI puts forward a Green Agenda, highlighting the choices and decisions that should be prioritized to ensure that India's growth story is rooted in sustainability.

This Green Agenda covers five thematic areas



Air



Energy



Resource
Efficiency



Waste



Water

Clearing India's air

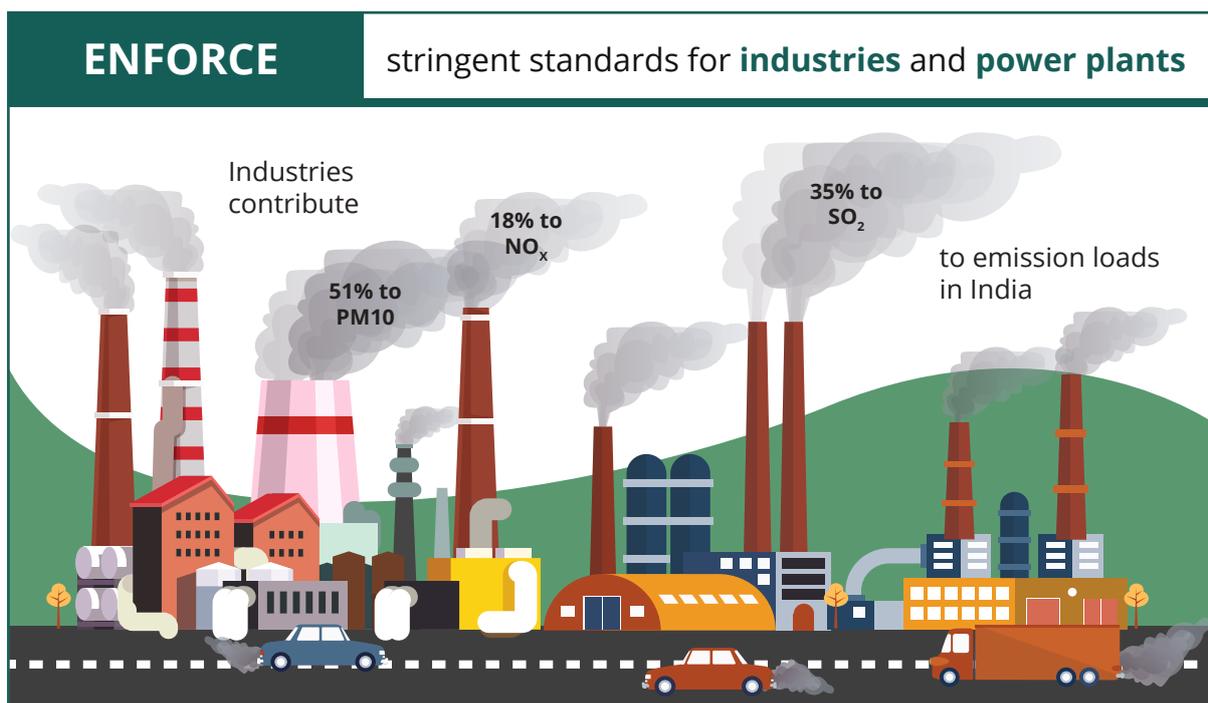
Air pollution has emerged as a major concern for India, with more than 75% of cities where air quality monitoring is carried out violating prescribed standards. The true extent of the problem may become more evident when air quality monitoring is expanded to cities where it isn't yet conducted. The MoEFCC has taken a step forward in launching the National Clean Air Programme (NCAP) to address this issue at a larger scale. The program focuses on tackling the issue at both urban and regional scale air pollution, with significant measures taken for control of emissions from transport (introduction of BS-VI norms), biomass (enhanced LPG penetration) and power (introduction of stringent emission norms) sectors. Actions have been initiated in a number of areas, and our analyses suggests that two key sources of pollution now need to be focused on – a) the industrial sector and b) secondary particulates.

Addressing industrial pollution

TERI in its emission inventories estimated that industries contribute 51% to PM₁₀, 35% to SO₂ and 18% to NO_x emission loads in India. Latest source apportionment study for Delhi conducted by TERI shows that industries contribute to 30% in PM_{2.5} concentrations during winters, highlighting the need to regulate emissions from this sector. Some of the issues around industrial pollution relate to siting of industries, use of solids fuels with high ash and sulphur content, inefficient technologies of combustion, limited use of efficient tail pipe control devices, and inadequate vigilance and enforcement.

To address this issue, the following steps can be implemented –

- Developing regulatory frameworks for penetrating gaseous fuels in the industrial clusters and power plants;
- Strengthening the capacities (manpower, technical, and financial) of pollution control boards for improved enforcement;



- Introducing and strengthening emission norms for PM2.5, NOx and SO₂

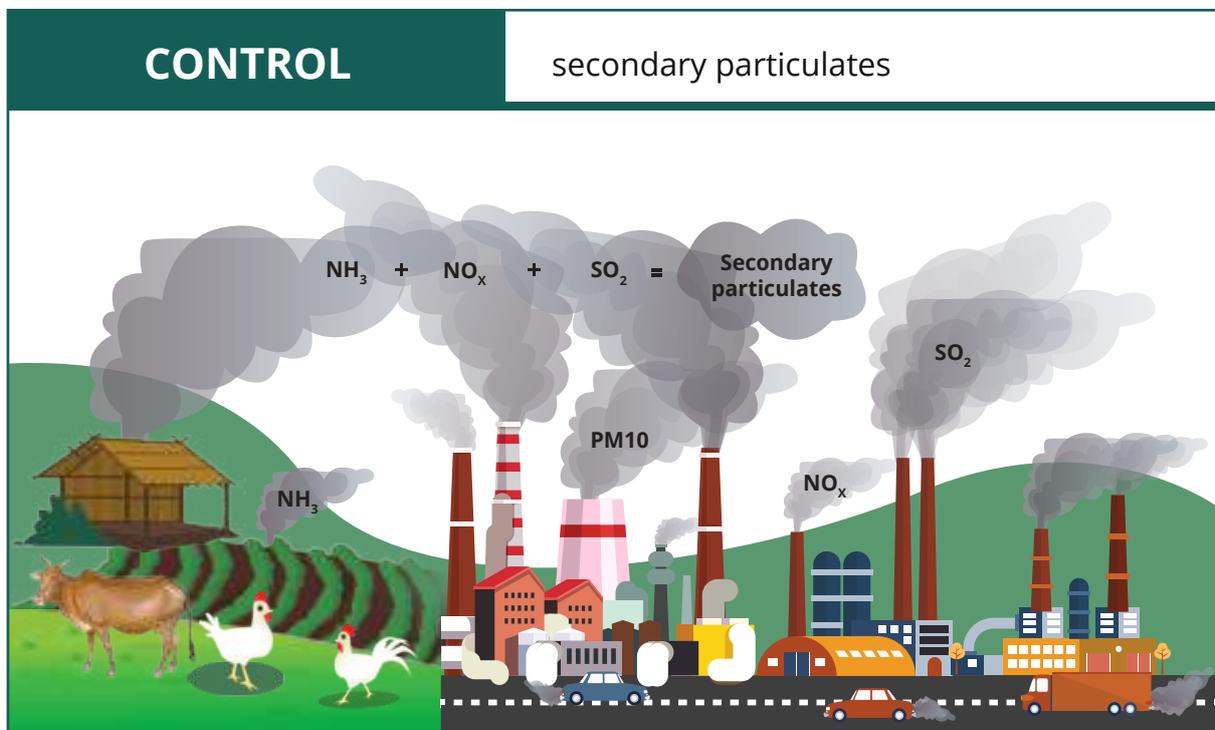
Focus on reducing secondary particulates

TERI's assessment studies show that industries, power plants and transport sectors have sensitivities of about 34%, 31% and 19% towards secondary particulates formation in India.

These particulates are formed by reactions of

ammonia released from agricultural fertilizer use and livestock with SO₂ and NOx released mainly from industrial, power and transport sources. Control of secondary particulates can be strengthened through the following measures –

- Implementing new stringent standards for NOx, and SO₂ control for industries and power plants
- Installing technologies like FGDs and SCRs
- Reducing ammonia emissions from fertilizers and livestock.



Accelerating transition to clean energy

Energy is the lifeblood of the economy, powering industrial processes and enabling increased living standards of households. India's energy consumption per capita is very low, about 30% of the global average. Thus, energy consumption will have to grow as India grows its economy and provides improved livelihoods to its people.

However, this is a challenge. India is resource-poor in fossil fuels, having just 0.3% of world proved oil reserves and 0.6% of world proved natural gas reserves. India's net fuel imports have averaged 3-4% of GDP over the last 20 years, and reached up to 6-8% during times of high oil prices. This is a significant macroeconomic vulnerability. India is already the 3rd largest global emitter of energy-related CO₂, and increasingly under the microscope in global efforts to limit climate change. Domestically, air pollution and other environmental externalities have reached

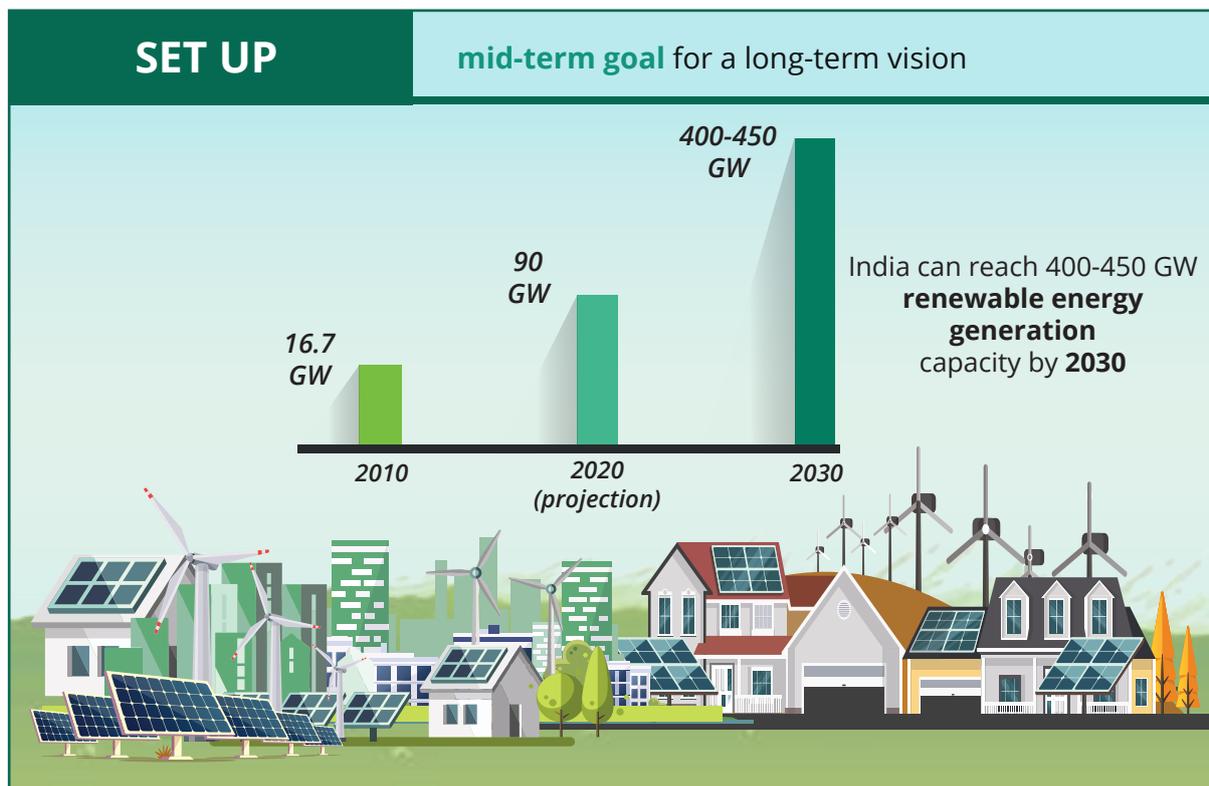
alarming levels, even at India's relatively low level of economic development and per capita energy consumption. How India solves its energy challenges will thus be crucial to its socio-economic development.

Set up mid-term goals under long term vision

India has already set out a near-term vision for the transformation of its electricity sector towards the goals of 175 GW of renewable energy generation capacity by 2022.

The future government could, while reaffirming and strengthening efforts to achieve the 175 GW target, establish a mid-term target for renewable energy capacities by 2030.

This will give enhanced visibility and certainty



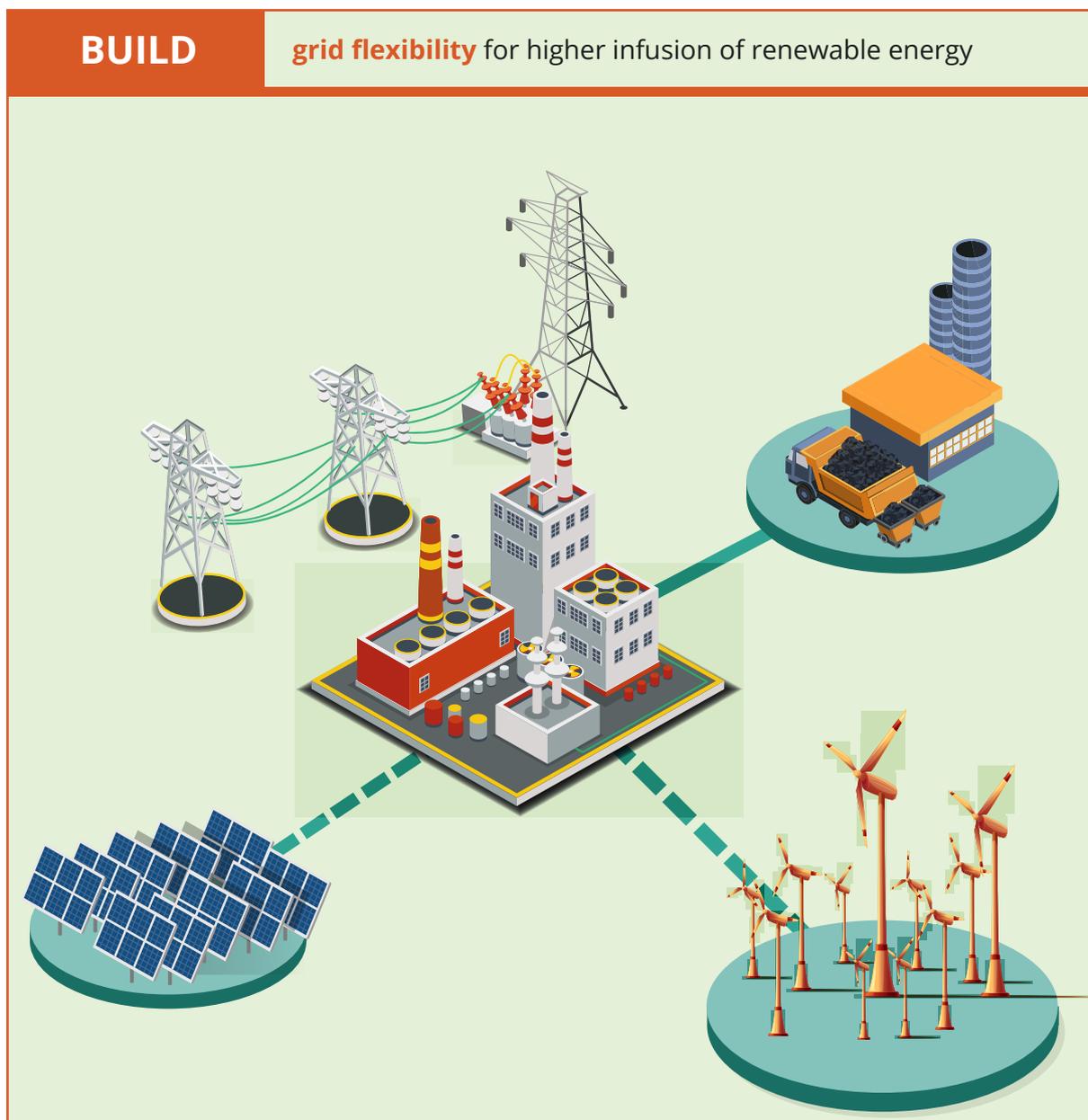
to the sector and spur focused investments. For instance, TERI's research suggests that a capacity target in the order of 400-450 GW of renewable energy, excluding large hydro, would be technically and economically feasible by 2030.

Focus on flexibility

As more renewable energy assets come online, lack of grid flexibility can become a hurdle in integrating more green energy into the grid.

In order to address flexibility issues, the government should establish an inter-ministerial, whole-of-government 'flexibility mission' in order to set out the near and mid-term actions necessary to increase the flexibility of the power system to integrate a high share of variable renewables. The focus areas should be –

- Making demand more flexible and responsive to supply
- Promoting cross border energy transactions
- Giving thrust to pumped storage hydro stations



- Piloting battery storage at scale and developing additional pumped storage capability; making the existing power plants more flexible
- Establishing the necessary regulatory and market signals to incentivize flexible investment and operation of the power system

Enhance stable and enabling policy frameworks

India can capitalize on the declining costs of wind and solar to become the first country to significantly power its industrialization from renewable energy sources. There is no question that that renewables are now cheaper than new coal, and indeed cheaper than much of the existing coal fleet.

However, the transition to a largely renewable power system will require clear, long-term and stable policy, in order to ensure that it happens in an orderly and beneficial manner.

The following aspects should be focused on –

- Ensuring that policy provides incentives for the flexible operation of the existing assets, allowing them to play a valuable role in the power system and avoiding the risk of further stranded assets
- Improving the financial conditions of discoms; renewables can play a key role in removing the subsidy burden from supplying low tariff consumers
- If the flexibility of the power system can be increased to keep the grid integration costs of renewables low, then the total social costs of the electricity sector can be lowered, representing a win for consumers, businesses and India's economy

Converting waste to wealth

A fast developing country like India generates various kinds of urban and industrial waste. The waste streams include - municipal waste, construction and demolition debris, plastic packaging waste, e-waste, industrial hazardous, non-hazardous and biomedical waste. These waste streams provide a unique challenge in terms of their management. To address these, Ministry of Environment, Forests and Climate Change (MoEFCC) released a set of six rules in 2016. These are focused on extended producer responsibility (EPR) to make manufacturers responsible for collecting and processing the waste generated out of their products.

Institutional structure for urban waste management

Though there has been an improvement in some aspects of mandates to implementation of Solid Waste Management Rules, in case of municipal solid waste especially for collection, processing and transport, cities still have to ensure establishment of scientific waste disposal sites. In addition, the rules require framing of national policy on waste management and subsequent framing of respective state level policies and city level action plans to implement the national policy. However, most states and cities in India have not been able to follow this through. The below suggestions should be focused on –

- Setting up a Technical Cell at the national level, preferably with Ministry of Housing and Urban Affairs to assist State Urban Development Department and Local Bodies to implement SWM Rules, 2016. Forming similar type of cell at the State level to support local bodies, and the

- state governments may evolve plans and policy to provide technical and financial assistance to them.

Generating data

One of the key challenges in management of urban waste streams is to generate reliable data on waste inventory and to assure that there is a structured flow of data on collection and processing to various stakeholders for informed decision making. For instance, analysis of MSW management data in annual reports of CPCB for the last few years reveals that the waste generated, instead of increasing owing to rising urban population, actually shows decline as the total number of cities reporting the data is unchanged each year. This makes trend assessment and hence long-term planning difficult. To overcome this, following areas need to be focused on –

- Developing uniform data collection formats for cities and towns, which can be transmitted to CPCB for analysis. The format should include information on daily waste generation, collection, processing, recycling, and waste diverted from landfills.
- The information collected should flow from say, sanitary inspectors to higher officials via suitably designed Management Information System.

Similarly, in the case of e-waste, one can estimate the quantity generated through data collected on the quantum of electronic items made available in the market and the consumer behaviour. It is therefore necessary that for each of these waste streams real time data collection is carried out regularly by involving all stakeholders including urban local bodies. The manufacturers have to arrive at an identified trend and do long-term planning

for waste management. This is important as the infrastructure for collection and processing has to be designed based on capture rate for these waste streams at present as well as in future.

Demand for plastics has outpaced all other bulk materials such as steel, aluminium and cement, nearly doubling since 2000. Packaging constitutes of around one third of the global plastic demand. In India, it forms around 43% of plastic demand, with annual recycling of only 60% of the waste collected. However, the concern here is the plastic waste that remains uncollected. Most of this is single use that is

Addressing transboundary issues



unattractive to waste collectors. These reach either landfills or water bodies, entering the waters of India's large coastline, contributing to marine litter. Following are suggested ways of tackling this -

- Incentivising collection of single use, low value plastics by improving collection rates;

- Ensuring that the material not recycled is either processed from waste to energy including pyrolysis or co-processed in cement kilns as alternate fuel. This will not only have a national impact, but also globally influence regulators to address the issue of marine litter.

INCENTIVISE

collection and processing of single use plastic



Plastic is shredded and processed into bales

Single use plastic can be used to make PVC pipes



Plastic bales are used in road construction and cements factories



Realising gains from resource efficiency

Sustained high economic growth rates over the last two decades, growing population, and aspirations of a growing middle class are driving the demand for various natural resources in India. This is exerting increasing pressures on the environment and raising sustainability concerns. It is estimated that demand for natural resources such as mineral ores increased from 1.18 billion tonnes to 7.4 billion between 1970 and 2017, making India the second largest consumer of materials after China. India's resource extraction per unit area is one of the highest in the world at 1,579 tonnes/acre compared to the global average of 454 tonnes/acre.

With future economic growth, consumption of natural resources is bound to rise and may even reach 15 billion tonnes by 2030. Meeting this growing demand will be a challenge.

Rising costs of accessing resources, shrinking geological availability, the risk of material exhaustion, uncertainty about long-term abundance and the social license to operate that arises from equity and distributional challenges, and the associated uneven and unfair access to natural resources will pose hurdles in meeting demand. Moreover, increased extraction of resource will have a detrimental impact on the environment and biotic resources. With India already a net importer of resources, dominated by fossil fuel imports and critical materials, import

dependence can increase the economy's vulnerability to global geopolitical and economic risks, apart from affecting the trade balance.

An Integrated Resource Efficiency Approach is an ideal strategy to realise the larger goal of circular economy. This is based on the 6R principle that optimises material consumption at every stage of the value chain to make it circular. The 6Rs stand for Reduce, Reuse, Recycle, Redesign, Remanufacture, and Refurbish. It is estimated that by 2025, India would be able to generate over 15 to 20 million tonnes of steel scrap and over nearly 1.5 million tonnes of aluminium scrap from the automotive sector alone. This is more than the current steel and aluminium scrap imported by India. Using the 6R principle, India's import dependence on these two can become zero, apart from saving a large amount of materials such as limestone, iron ore, etc.

Adopting a resource efficiency policy

Improving resource use through a resource efficiency strategy will be key to India's sustained high growth. Resource efficiency encompasses a wide variety of technology, process, policy and institutional interventions along the product and service life cycle stages that typically include mining, design, manufacturing, consumption, and end-of-life. An absence of life-cycle thinking at policy level impedes exploring inter-linkages that can make India utilise resources more efficiently. Resource efficiency is a cross-cutting issue involving several domains and policy levels. In such a political set-up, an institutional mechanism is important to facilitate, monitor and review implementation of various policies and programmes across sectors and product life cycles and periodically propose necessary course correction measures.

An integrated resource efficiency policy will help establish the right public thinking, reflecting the government's commitment to

facilitate the transition. Some of the elements of such a policy include –

- Prioritisation of sectors/materials to bring about resource efficiency improvements
- Measuring improvements based on suitable indicators across various sectors
- A target-based approach across selected stages of life cycle to achieve productivity, recyclability, specificity of content of recycled materials in newer products, standards for recycled, reused, refurbished and remanufactured products, etc.
- Creating an enabling regulatory framework and innovative policy instruments that can attract interest from different industries and geographies
- Putting in place policies and economic instruments that can strengthen

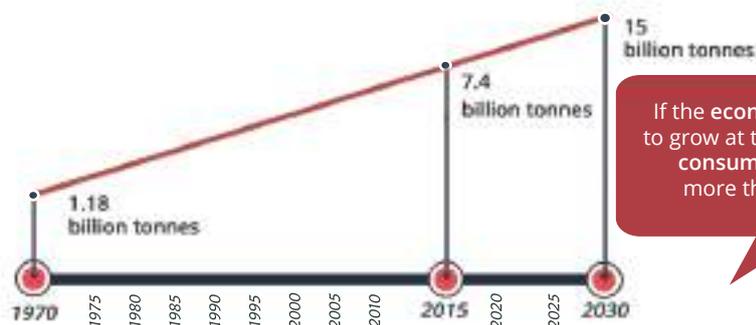
facilitation of the resource efficiency transition and reduce transition cost

- Creating platforms for multi-stakeholder collaboration that will result in the exchange of ideas and putting them into practice

These interventions should enable the creation of new business models that can bring resource efficient products and services and ultimately create higher employment opportunities. Increased demand and consumer acceptance will provide economies of scale, reducing prices and facilitating the desired transition. Further, setting up of mandatory targets for recycled content and an effective monitoring network will help achieve the desired performance level within set timelines.

IMPLEMENT

resource efficiency policy with **life-cycle approach**



India is the second largest consumer of materials in the world



Using the **6R principle**, by **2025** the automotive sector alone can meet India's **steel** and **aluminium scrap requirements**

Destressing India's water situation

Over the years, India's water supply has been under severe stress, with deteriorating water quality, declining water levels and over-exploited groundwater reserves pointing towards a grave future. It is imperative to sustainably manage water resources – conserve resources, and minimize wastage – to ensure that everyone has continued access to water.

The Government of India brought out the final draft of National Water Framework (NWF) Bill, 2016 to provide uniform national legal framework to manage water in an efficient way. However, water being state subject, the law will be not binding on States for adoption. However, it is now time to adopt the bill and ensure proper implementation of the regulations, which also suggests “establishing River Basin Authority (RBA) for each inter-state basin to ensure optimum and sustainable development of rivers and valleys”. The states should come forward and plan sustainable

management of water by using this as a model bill that provides a framework to develop laws for water use and conservation.

Enhance water use efficiency in key sectors

The Framework bill also mentions about developing standards for water footprint, which is essential as what gets measured gets managed. For the three sectors with high water demand - agriculture, domestic and industries - there is a focus on enhancing water use efficiency. The National Water Mission formed under the National Action Plan on Climate Change mentions increasing the water use efficiency by 20% in all the sectors. However, the scope of improvement varies from sector to sector and for that it is



important to understand the water used by not only a particular sector, but also specific entities. The following measures can be considered to effectively implement the NWF –

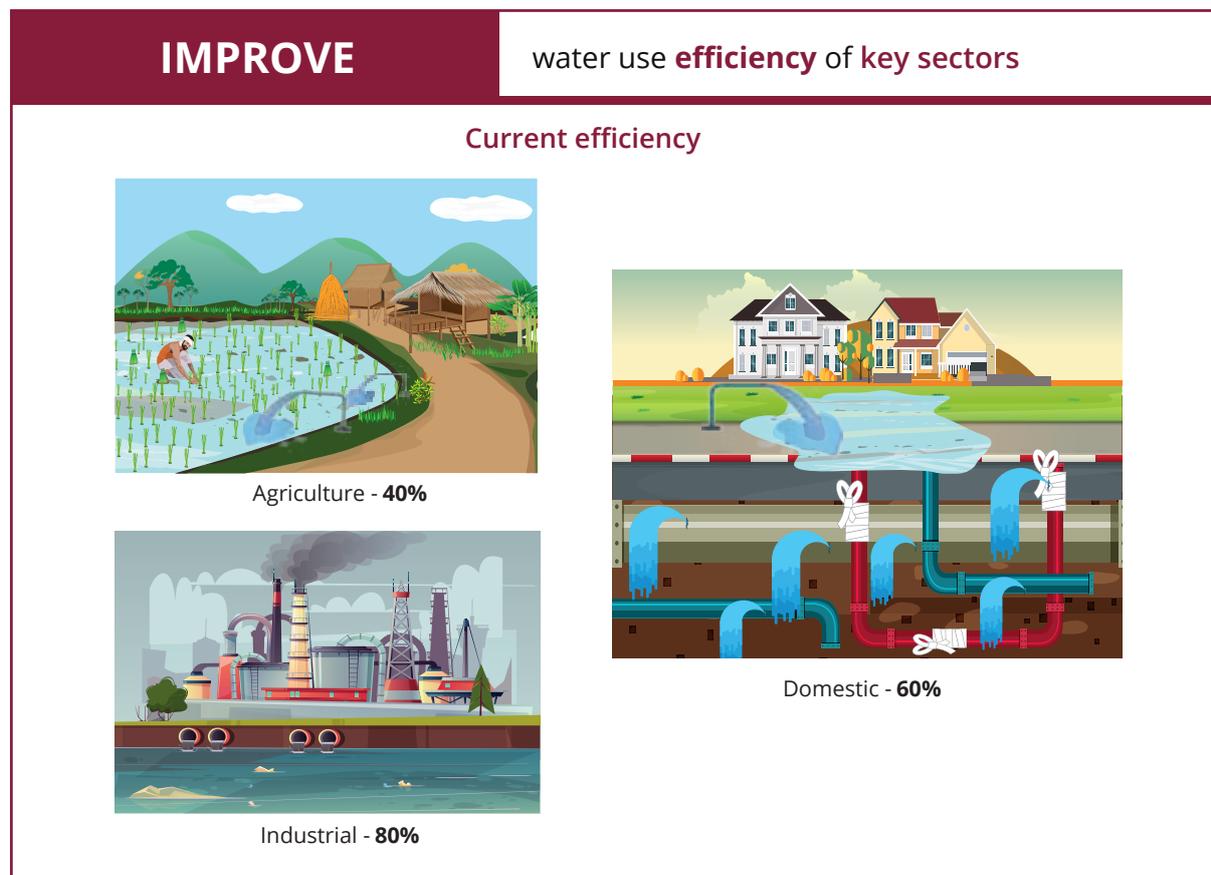
- Undertaking exercises like water audit, estimating water footprint of the products, etc. for industries and at city scale
- Sectoral focus on water use efficiency - in the agricultural sector efficiency is as low as 40% while in the domestic sector it is about 60%, and for the industrial sector about 80%

Restructure institutions at central and state levels

In the water sector, the challenge is the

multitude of organizations dealing with the subject without addressing the overlaps. The institutions created in 20th century may not be working well for the 21st century as regards to sustainable water management. In order to streamline the functioning of these institutions, the following measures are recommended -

- Create water regulatory bodies for each state, rather than single independent water regulatory at the central level, to regulate water management in the state, and ensure its sustainable development
- Create an independent authority to remove overlaps and enhance effective management of water resources in the country





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