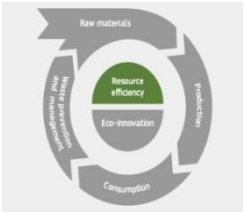


Summary of Findings

Reference Report on

'Resource Efficiency for India'

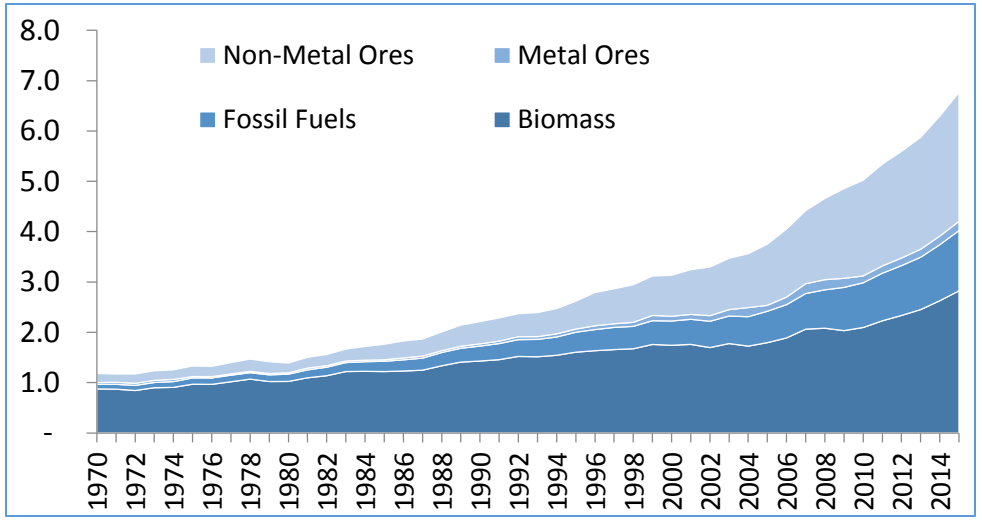
Rationale for a resource efficient Indian economy

Economic Growth And Demographic Changes

- One of the fastest growing economies in the world: *GDP growth avg. 7.5% in decade*
- Per capita income more than doubled between 2005 and 2017
- Incidence of multidimensional poverty has come down to 27.5 per cent from 54.7 per cent
- Rising middle class population: 604.3 million in 2012 from 304.2 mn in 2005
- Rapid increase in penetration of several consumer durables over the past decade
- Rapid urbanization in recent decades- *expected to rise to 50% from its current level of 34% by 2030*

Changing Resource Landscape:

- India second largest consumer of materials after China
- Material consumption in India has increased from 1.18 billion tonnes in 1970 to 7 billion tonnes in 2015
- India's resource extraction 1580 tonnes/acre; is much higher than the world average of 450 tonnes/acre



Where India stands with regard to material consumption

	China	Germany	India	Japan	United States of America	World
DMC (Bn Tonnes)	35.19	1.21	7.42	1.14	6.58	91.88
Per capita DMC (TCapita)	25.19	14.75	5.67	8.92	20.58	12.44
Material Productivity (% improvement from 1970)	311	287	256	301	276	115

- India's material productivity is low than the global average
- Recycling rates much lower than developed countries (25% vis-à-vis more than 60%)
- Low efficiency of recovery; largely handled in the informal sector and processes is still primitive; fragmented reverse logistics mechanism
- Limited technology knowhow, access to finance and availability of technologies.
- India's average material cost in total production cost is estimated at more than 70% vis-à-vis 40 to 50 % in developed economies

Sustainability challenges from growing material consumption

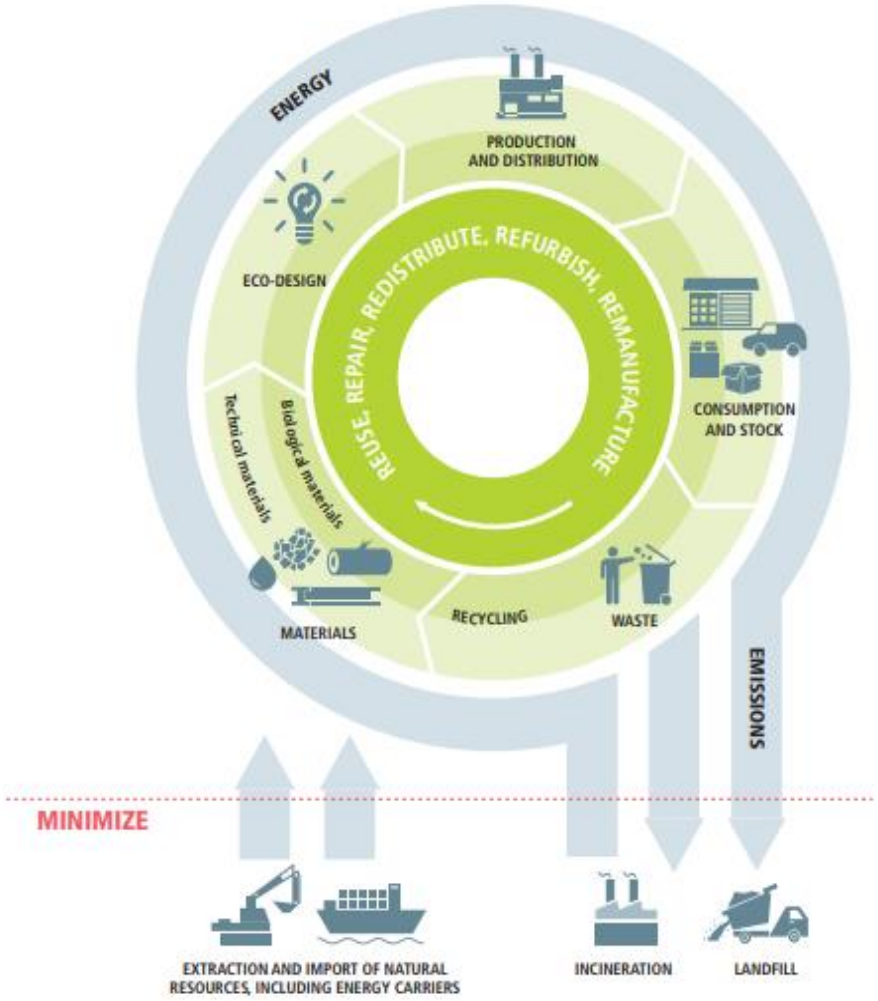
Material consumption: Vicennial comparison (bn tonnes)

	Biomass	Metallic minerals	Non-metallic minerals
1990-2010	37	2.6	18
2010-2030	51	11	81

With an assumption that India's economy will grow at an average rate of 8% till 2030, the material consumption by then can reach 15 billion tonnes

- Import dependency is nearly 100% for majority of the 'most critical' materials
- Growing import of scrap (e.g. 90% of Al scrap processed is imported in India, 40% steel scrap)
- GHG emission due to industry energy use has grown upwards at a rate of 10%, rising from ~217 MT in 2005, to ~ 467 MT in 2013.
- Iron and steel largest share of emissions (38%) (outside power sector), followed by (predominantly, cement) with a share of 29% in overall industrial emissions.
- Recent concerns regarding the potential conflicts between mining and other land uses (sand mining in AP and conflicts with fishermen)

Circular economy and waste minimization



- The circular economy aims to fundamentally change how we think about waste: treating it as a resource rather than something we just want to get rid of.
- Environmental organisations argue that the circular economy bears the potential for us to live resource efficient while enjoying a "low-carbon prosperity".
- A **Integrated Resource Efficiency Approach** is an ideal strategy towards realizing the larger goal of circular economy
- This is based on the 6R principle that optimizes material consumption at every stage of the value change make it circular than linear
- 6R: Reduce, Reuse, Recycle, Redesign, Remanufacture, Refurbish

What other countries have achieved

Strategies	Asia-Pacific			Europe					USA
	CH	JA	SK	AU	DE	FI	GE	NE	
Waste prevention/management	X	X	X	X	X	X	X	X	X
Recycling	X	X	X	X	X	X	X	X	X
Green Public Procurement	X			X	X	X	X	X	X
Eco-label	X			X	X	X	X	X	X
Green growth/sustainable development	X			X	X	X	X	X	
Ban/restriction on landfill					X		X		
Food waste				X			X		
Biomass/Bio-economy						X	X		
Industrial symbiosis	X				X				
Others (eg. energy, innovation, etc.)	X	X	X	X	X	X	X	X	X

Action areas (1/2)

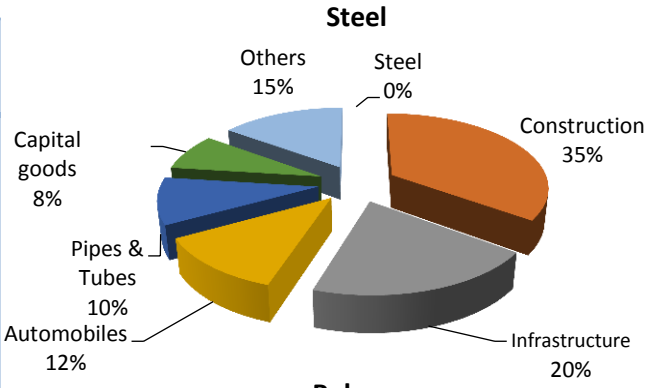
- **Addressing regulatory gaps**
  - Regulatory framework to foster resource efficient and circular design, enhancing implementation of waste management laws, quality standards for the use of secondary materials , certification of circular products, resource efficient packaging, strengthen environmental liability*; integrate lifecycle thinking*
- **Design of innovative market based instruments**
  - Targeted tax and other financial incentives for use of secondary raw material and remanufactured/refurbished/recycled products ; penalize resource inefficiency and wastage
- **Integrating Resource Efficiency in Public Procurement**
  - Include provisions for procurement of resource efficient products and eco-labelled products in public procurement through green procurement guidelines, training workshop for procurement staff, circular procurement through take-back options and third-party arrangements; public tenders to include RE related quotas and bonus points
- **Creation of resource efficient business models**
  - Government support through direct subsidies, viability gap funding, mandatory public procurement, networking and dissemination of solutions as well as regulation to accelerate adoption of certain technologies and/or practices.
- **Integrating the informal sector with the formal sector**
  - Aid their access to technology and funding for improving their operations, ensuring safe working environment and health for the workers employed in the sector; help create GIS based platforms for resource recovery and recycling, providing access to requisite technology and providing skill development to use this technology , organize cooperatives, public private partnerships

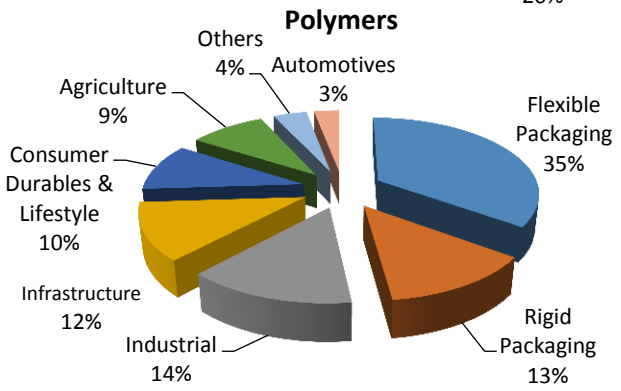
Action areas (2/2)

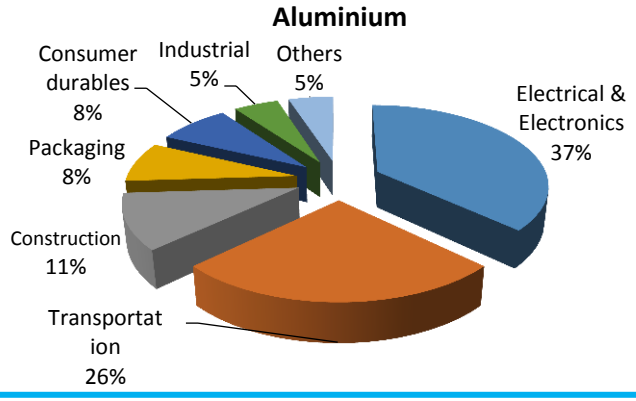
- **Creating a dedicated institution for promoting Resource Efficiency**
  - Establish Central Resource Efficiency Authority (CREA) housed in the MoEFCC
- **Fostering Partnerships and Collaborations**
  - Industry partnership with governments, investors, research institutions, local communities, nongovernmental organizations (NGOs), carry out waste audits, and identify opportunities for closed-loop recycling.
- **Capacity development of Stakeholders**
  - Capacity building of local administration, particularly the institutions of the municipality to support informed public policies and well-designed on ground initiatives , for students and entrepreneurs to conceptualize, design and develop new Resource Efficiency and circular economy related services, and products
- **Strengthening Research and Knowledge data base**
  - R&D to improve process efficiency and for introducing new processes , improve the recyclability and resource recovery potential of materials at the end of life, finding substitutes, develop sound methodologies to carry out the inventorization and characterization of major waste streams
- **Strengthening product responsibility –EPR and Shared Responsibility**
  - EPR systems with reporting and monitoring mechanisms, innovative collection jointly with PROs
- **Supporting recycling and recovery structures**
  - Setting up Material Recovery Facilities (MRF) , Material Recycling Zones,

Share in income and material use across selected sectors

Sl. No	Economic Sectors	Share in GDP	Selected raw materials	Imports
1.	Automobile sector (incl electric vehicles)	7.1%	**ICE**: Steel, Copper, Aluminium, Zinc, nickel, lead, glass, rubber, various plastics/synthetics **E-vehicles**: Lithium, Cobalt, Nickel, Rare Earths, various plastics/synthetics, Steel, Copper, Aluminium,	Copper (50-60%) Lithium (100%) Co (100%) Aluminium scrap (90%) Steel scrap (20%-25%) Lead (75%) Rare Earths (100%)
2.	Chemicals (plastics)	2% (0.5 % -0.8%)	Crude oil	Oil (80 %)
3.	Constructio n& Demolition	9%	Cement, Limestone, clay bricks, steel, aluminium, Copper,	Aluminium scrap (90%) Steel scrap (20%-25%), Copper (50-60%)
4.	Electronics (including E-waste)	1.8%	Gold, Silver, Rare Earths, Plastics, Platinum, Copper	Silver (75%), Rare Earths (100%), Gold (90%), Platinum (95%), Copper (50-60%)
5.	Steel	2%	Iron ore, Molybdenum, Nickel, Tugsten	Steel scrap (20%-25%), Molybdenum (100%), Nickel (100%), Tugsten (100%)
6	Aluminium	0.8%	Bauxite, Al Scrap	Aluminium scrap (90%)
7	Solar PV	2.1%	Aluminium, Silver, Copper, Silicon	Aluminium scrap (90%), Silver (75%), Copper (50-60%)







Benefits of RE approach

- This approach has the potential to stabilize raw material supply for industry, reduce pressures on the ecosystem and create many green jobs
- Meet SDGs (e.g. SCP goal 12, Goal 2, Goal 6 , Goal 7, Goal 9, Goal 11)
- Assess progress and facilitate in reporting

Other sector specific benefits

- Creating financial resources for waste management (e.g. landfill tax)
- By 2025, India would be able to generate more than 15 to 20 million tonne of steel scrap from automotive sector which is more than the current scrap imported by India.
- Use of 6R principle can make steel import dependence nil; Further it can save, ***21 mn tons of iron ore, 8.25 mn tons of import of coking coal, 3.75 mn tons of Limestone, 4.5 mn tons of Slag generation and 31.5 mn tons of CO2.***
- By 2025, India would be able to generate more than nearly 1.5 million tonne of Al scrap from automotive sector which is more than the current scrap imported by India.
- Use of 6R principle can make Al import dependence nil; Further it can save, ***36 Barrels of Crude oil equivalent consumption of energy, 22.5 mn tons of water, 13.5 mn tons of CO2, and 3.75 mn tons of Solid waste.***

Role of Stakeholders (1/2)

Civil society organizations-

- awareness generation, push for targets and help meet those, design and initiate innovative mechanisms for behavioural change in consumption

Consumers-

- create demand for resource efficient products and services, engage in shared use of products and environmentally safe disposal , responsible consumption

Manufacturers-

- design for sustainability, recyclability of packaging materials , formulate end of life management policy , minimise waste generation though more responsible and efficient production processes and technology use, act on their EPR, training and skill development

Informal sector managing waste-

- follow the protocols related to end of life management , undergo capacity building and training activities on Health, Safety and Environmental aspects of their activities

Role of stakeholders (2/2)

Formal recyclers-

- maintain required statutory norms and standards for occupational Health, Safety and Environment at their premises, engage in training, skill development and R&D, create public awareness on recycling, provide opportunities for formal-informal sector integration

Academia-

- Incorporate CE and RE in school and college/university curriculum, offer certification and /or degree courses on or related to Resource Efficiency and circular economy, provide a platform for exchange of research and industry application for designing innovative solutions

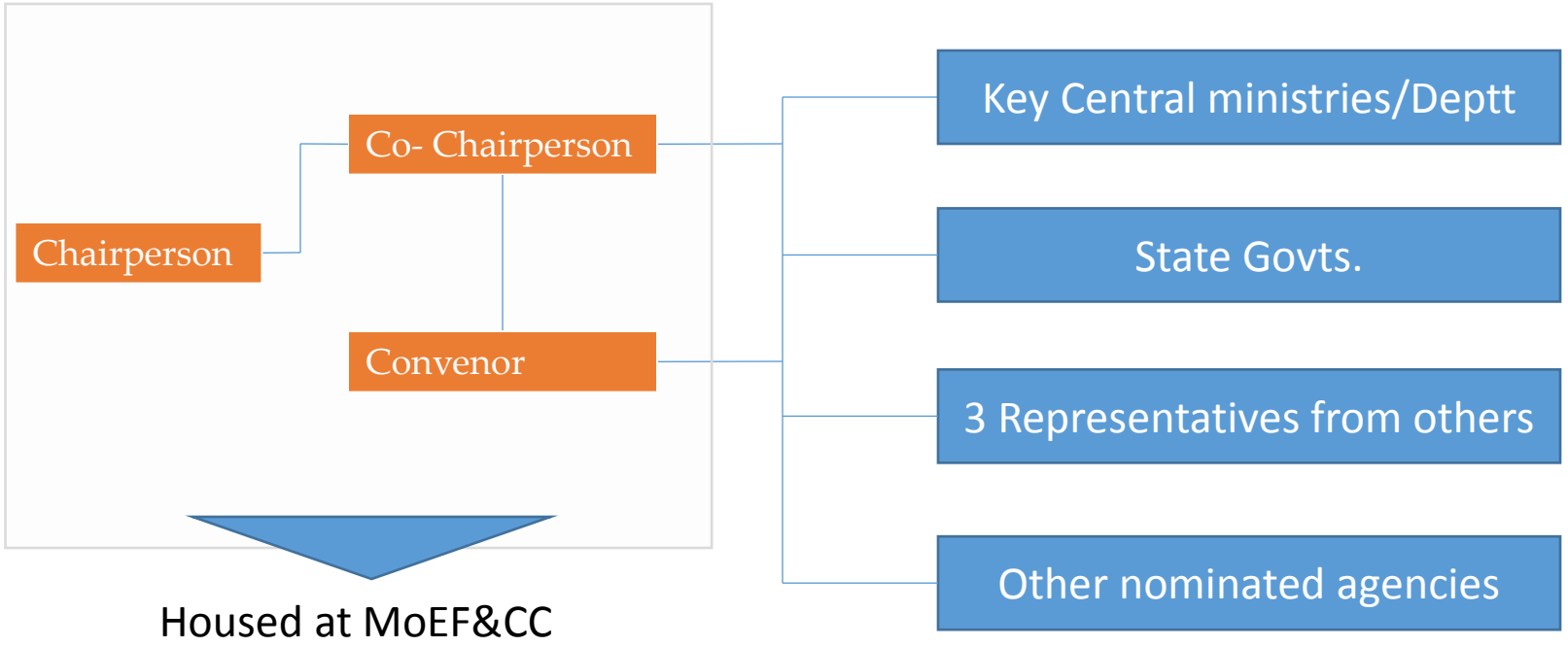
Government-

- set up recovery and recycling infrastructure, facilitate industrial symbiosis , develop quality standards, certification schemes and testing and research laboratories to assess quality standards of secondary raw materials and circular products, Alignment of public procurement criteria to promote circular activities,

Central Resource Efficiency Authority CREA- A proposal

Section 3.3 of the Environment Protection Act refers that '*The Central Government may, if it considers it necessary or expedient so to do for the purposes of this Act, by order, published in the Official Gazette, constitute an authority or authorities by such name or names …'*.

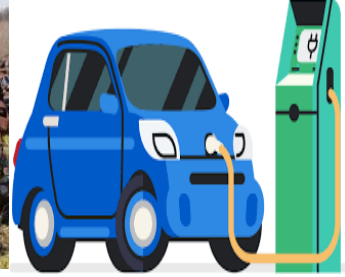
It is proposed that a institutional mechanism is created as presented below

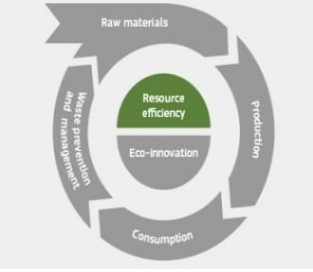


Tracking progress towards RE

- Data collection on material use, inventorization of waste streams: analysis and reporting
- Indicator and Targets- Setting, Achievements and revisions
- Further Development of the RE policy




Raw materials
Production
Consumption
Waste prevention and management
Resource efficiency
Eco-innovation

Thank You