AFR Mapping study

ACCELERATING TSR LEVELS IN INDIAN CEMENT PLANTS

AFR Conference 2024

23 & 24 Oct 2024, Raipur

Confederation of Indian Industry

Confederation of Indian Industry
CII - Sohrabji Godrej Green Business Centre
Hyderabad, India

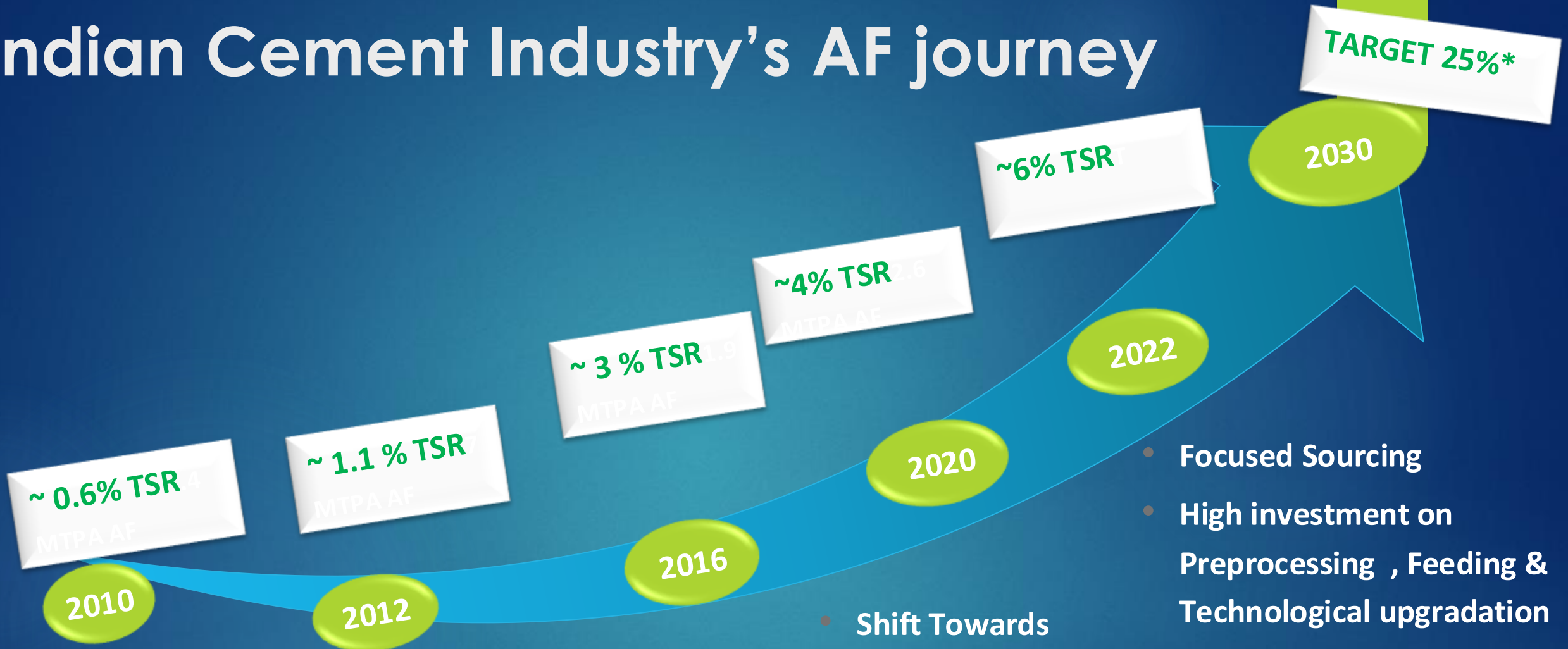
AFR Co-processing

- Indian cement industry
  - ~ 7 - 8% of National emissions
- Manufacturing cost – Fuel
- Driven by sustainability goals
  - Sector
    - 45% GHG intensity by 2050 of 2010 levels - Progressing well
  - Country
    - 2070 Net zero targets & Indian Carbon markets

- Solid waste
  - 1.60 Lakhs TPD
  - Per capita – 119 g/day
  - 3184 dump sites
- HW
  - 10.92 million tons/ annum
  - 76,235 HW generating units
- Agricultural Waste
  - Estimated – 500-Million-tons of crop residue

66,000 ha – 3000 cricket grounds !!!!!!!!

Indian Cement Industry's AF journey



- CBCB guidelines on Coprocessing
- Only Industrial wastes utilized

- Limited cement plant with waste co processing

- Hazardous and Other Wastes Rules, 2016

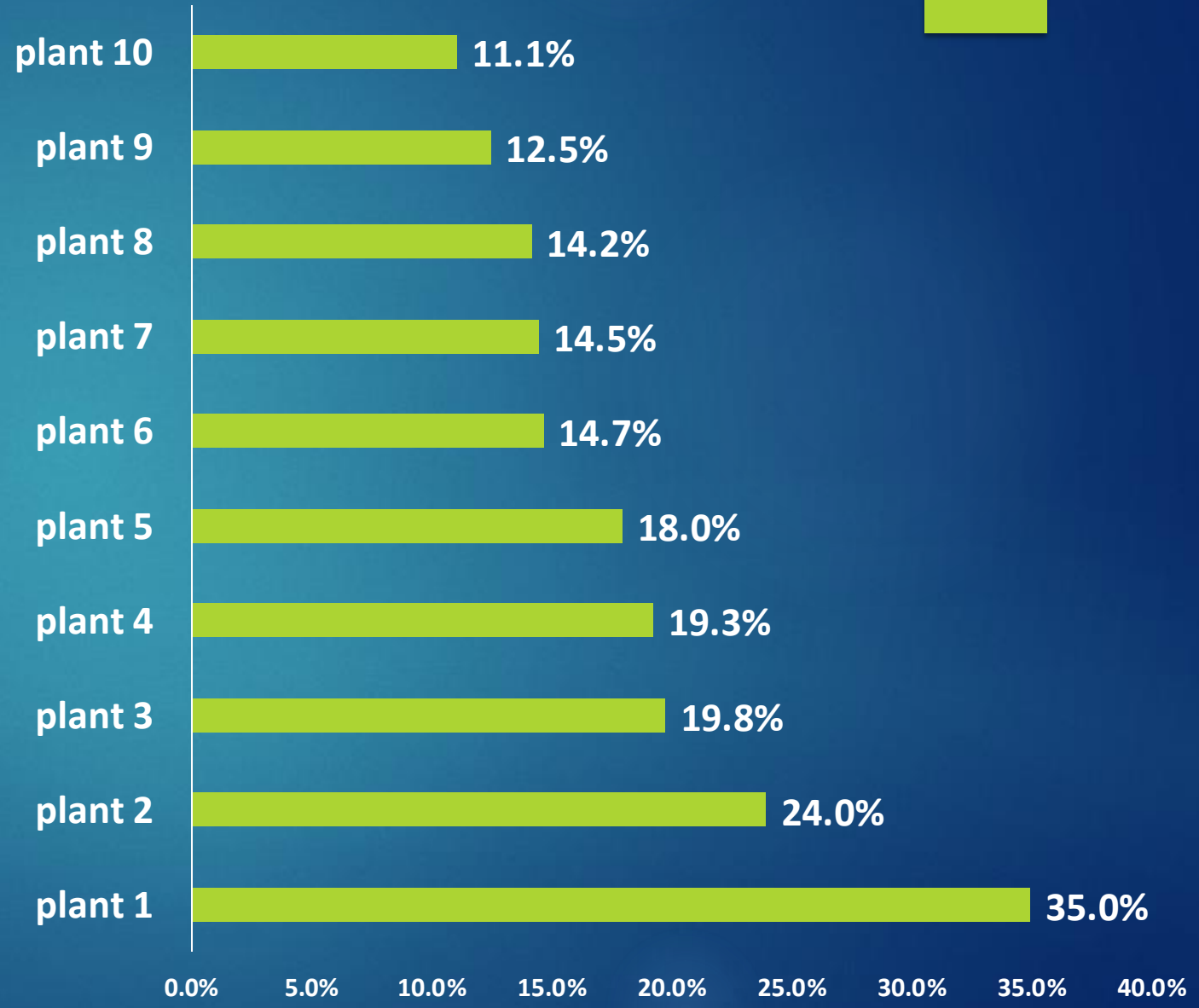
- Shift Towards Biomass , MSW & other wastes

- Focused Sourcing
- High investment on Preprocessing , Feeding & Technological upgradation
- Department – AFR Coprocessing

India's Top 10 plants TSR%

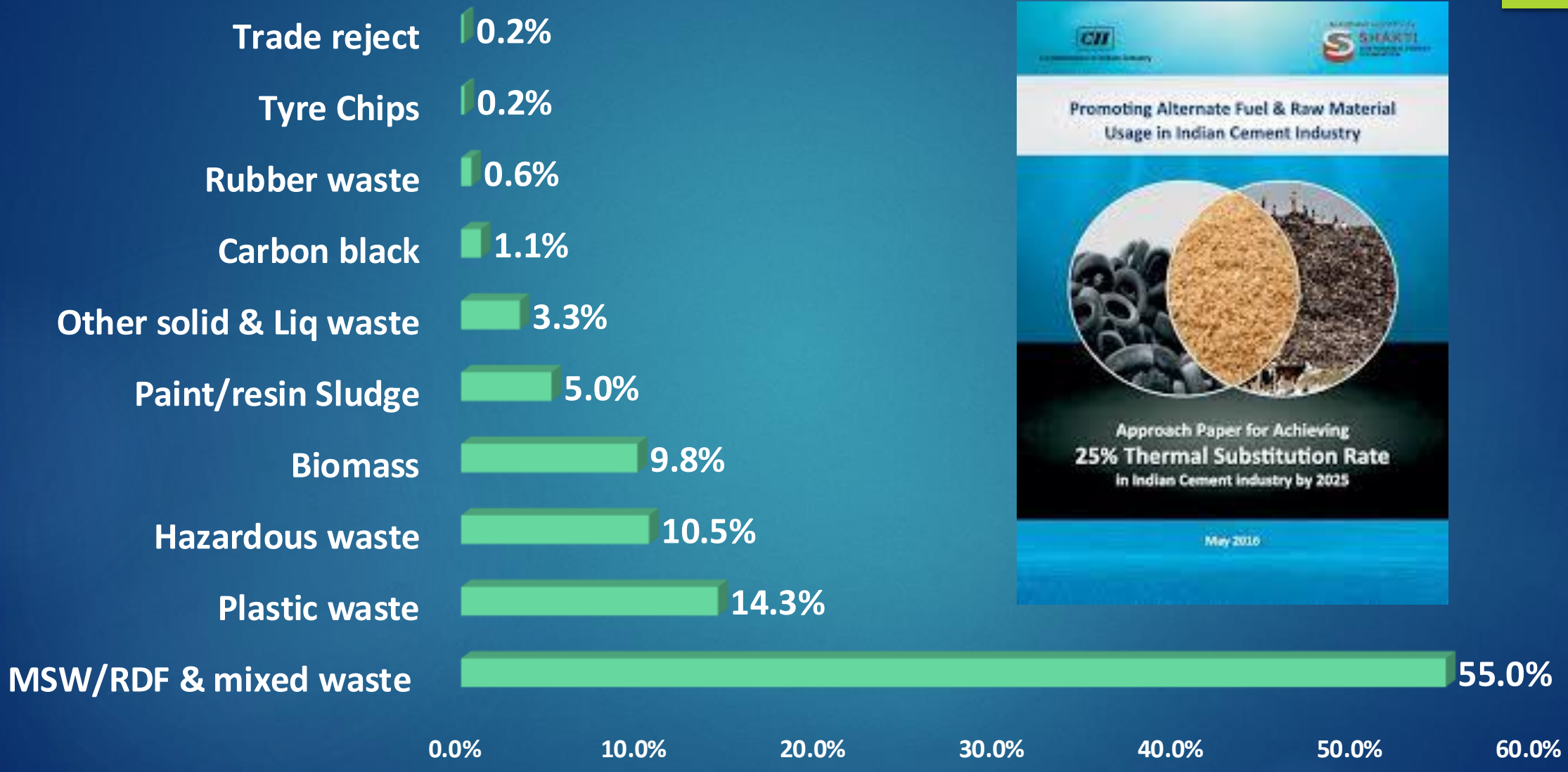
Technological upgradation

- Calciner height & Chlorine bypass system
- Solid & liquid waste feeding system
- Preprocessing unit with shredder, screener & extractor
- Advanced AFR lab
- Corrugated feeding belts & Ballistic separator to remove foreign material from RDF
- INR 25-30 Cr/MTPA clinker (12-15% TSR)



Source: CII national Energy award application portal

Alternate fuels used by top 10 plants



Source: CII national Energy award application portal

Challenges in accelerating AFR in Indian cement industry

- **Data** on waste generation & generator
- Material **mapping & availability**
- Viable **business models**
- **Technology upgradation** – Processing platforms & by-pass systems

- **Bottlenecks in various areas of manufacturing**
  - Process, quality, emissions, SEC
- AFR professionals & Capacity building
- Policy implementation & collaboration among stakeholders

Alternative fuel & Raw material mapping study

- Initiative by CII - GBC
- Offer holistic solution for improving AF
- Focused approach - Group level, unit level
- Strategies to eliminate / reduce bottlenecks cement manufacturing

Methodology

- Baseline assessment and goal setting
- Identification & Mapping of AFR material and generator
- Assessment (Technical & Economical) and shortlisting
- Facilitating long term engagements
- Technology evaluation & upgradation

Alternate fuel mapping study

- Working with cement plants & stakeholders in various States
  - Telangana
  - Odisha
  - Andhra Pradesh
  - Gujarat
  - Tamil Nadu
- CII in past facilitated material exchange
  - Industrial waste in Gujarat & Tamil Nadu
  - Railway waste in TN
  - Urban waste in Odisha, TN

Objective : Identify & Map potential waste generators & waste streams to be utilized in a cement plant

Identification & mapping potential waste generators within specific radius

Assessment and shortlisting potential waste streams for co-processing

Facilitating partnerships among stakeholders (Co-processor, waste generators/ processors/ aggregators)

Baseline assessment & Goal setting

Team formation

- Cross functional team
- Led by senior management

Business needs

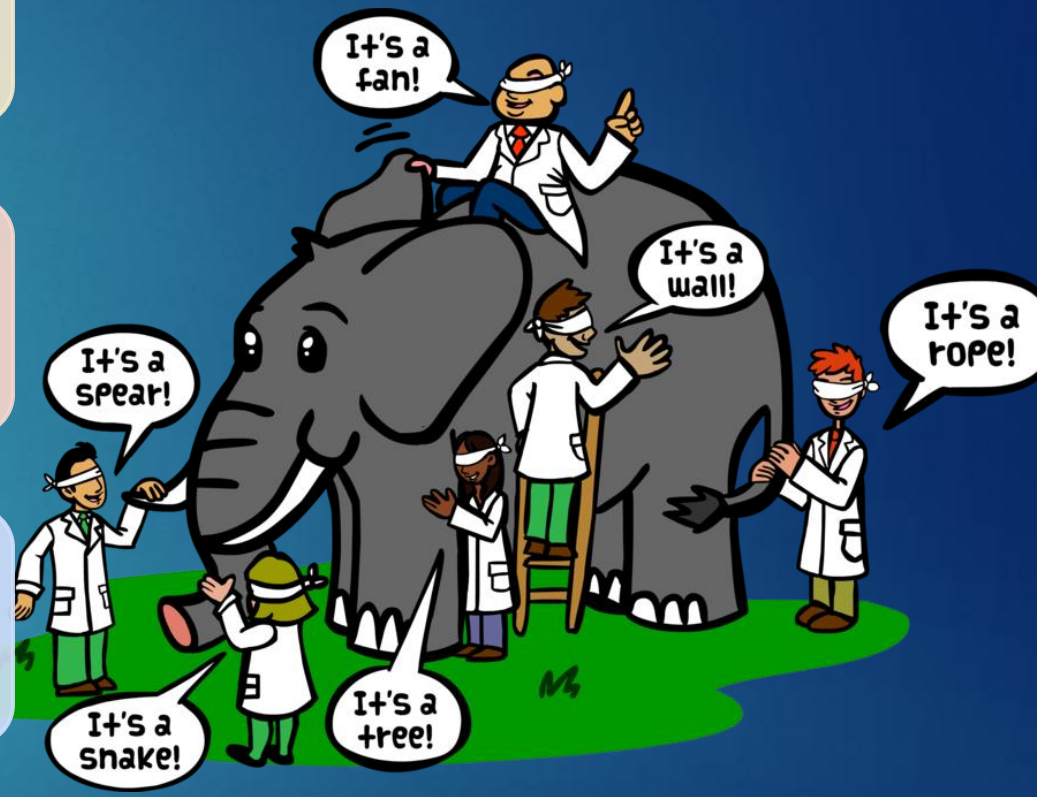
- Low carbon cement - Decarbonisation
- Manufacturing cost
- ESG - Image, investors, customers

Baseline assessment

- Current performance
- Technology & infrastructure gap analysis
- Location

Target fixation

- TSR%
- Typical AFR materials
- Business models & Timelines



Estimate of alternative fuel requirement

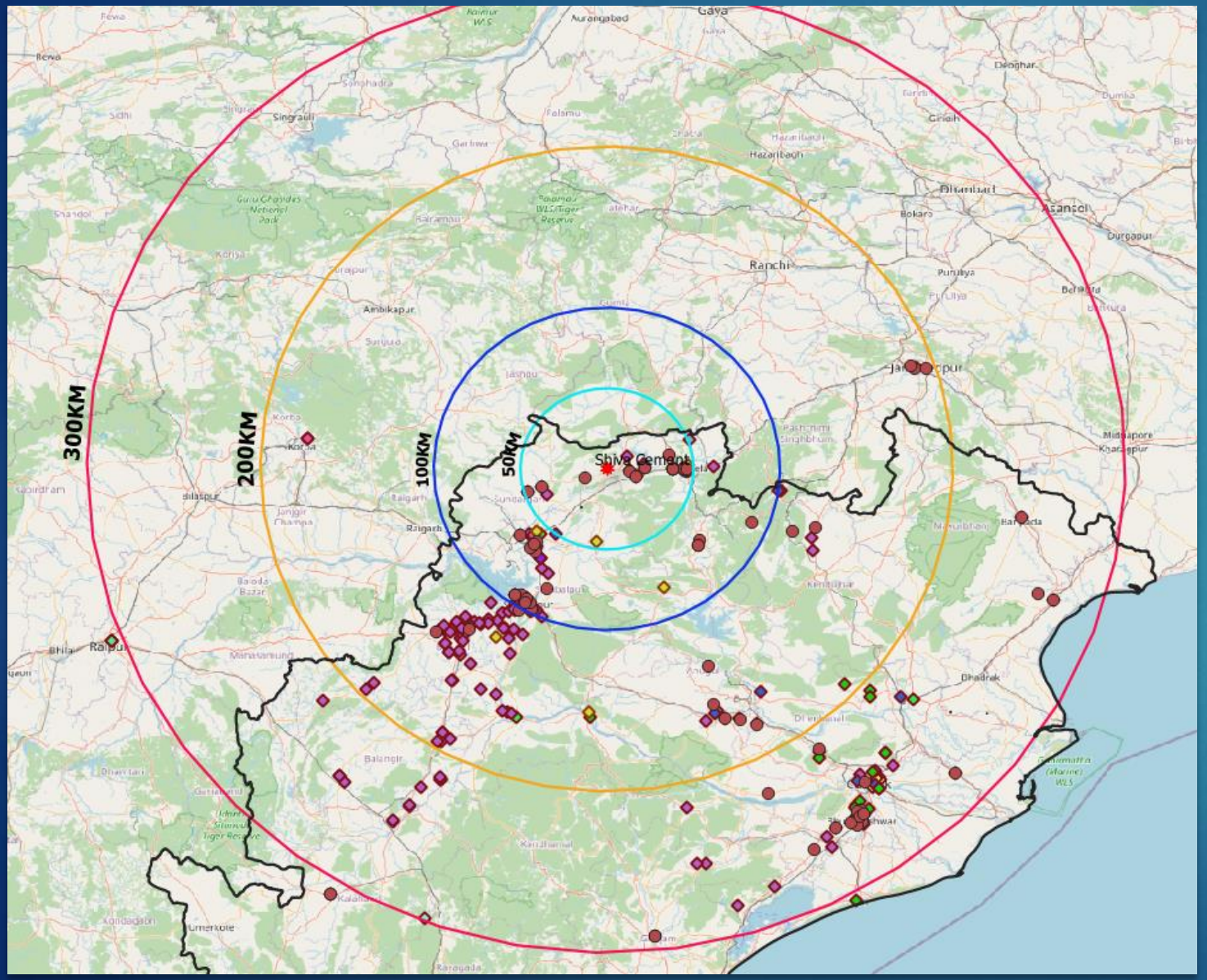
Parameters	Unit	Values	Remarks
Clinker production	Million tons/ annum	2.1	
Specific heat consumption	Kcal/ kg clinker	690	
Energy required	Million Kcals/ annum	14,49,000	
Fuel requirement	Tons of coal / annum	2,41,500	@6000 Kcals/ kg
Fuel (Coal) rquirement	Tons of coal / Day	732	@330 days operation/ annum

TSR %	Dry quantity Tons/ annum	Dry quantity Tons/ day	Wet quantity (Tons/ day)	Remarks
5	28,980	88	110	Calorific value 2500 Kcals/ kg 25% moisture @330 days/ annum operation
10	57,960	176	220	
15	86,940	263	329	
20	1,15,920	351	439	
25	1,44,900	439	549	
30	1,73,880	527	659	

Estimate of alternative Raw material requirement

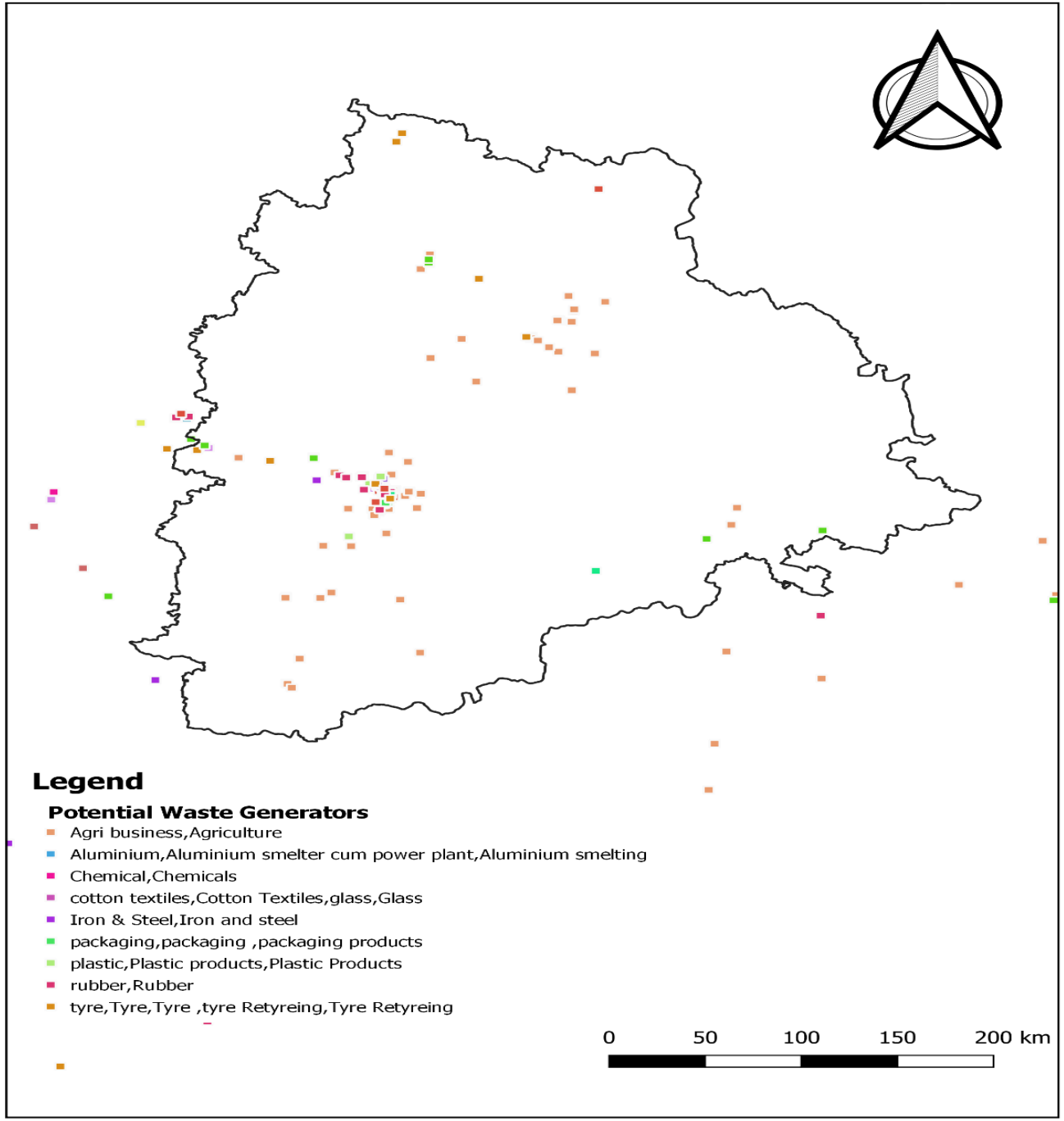
Parameters	Unit	Values
Clinker production	Million tons/ annum	2.1
Raw material requirement	Million tons / annum	1.65
Laterite requirement	%	5
Laterite potentially substituted with other material	Tons/ annum	1,73,250
	Tons/ day	525

Mapping alternative Materials & Generators

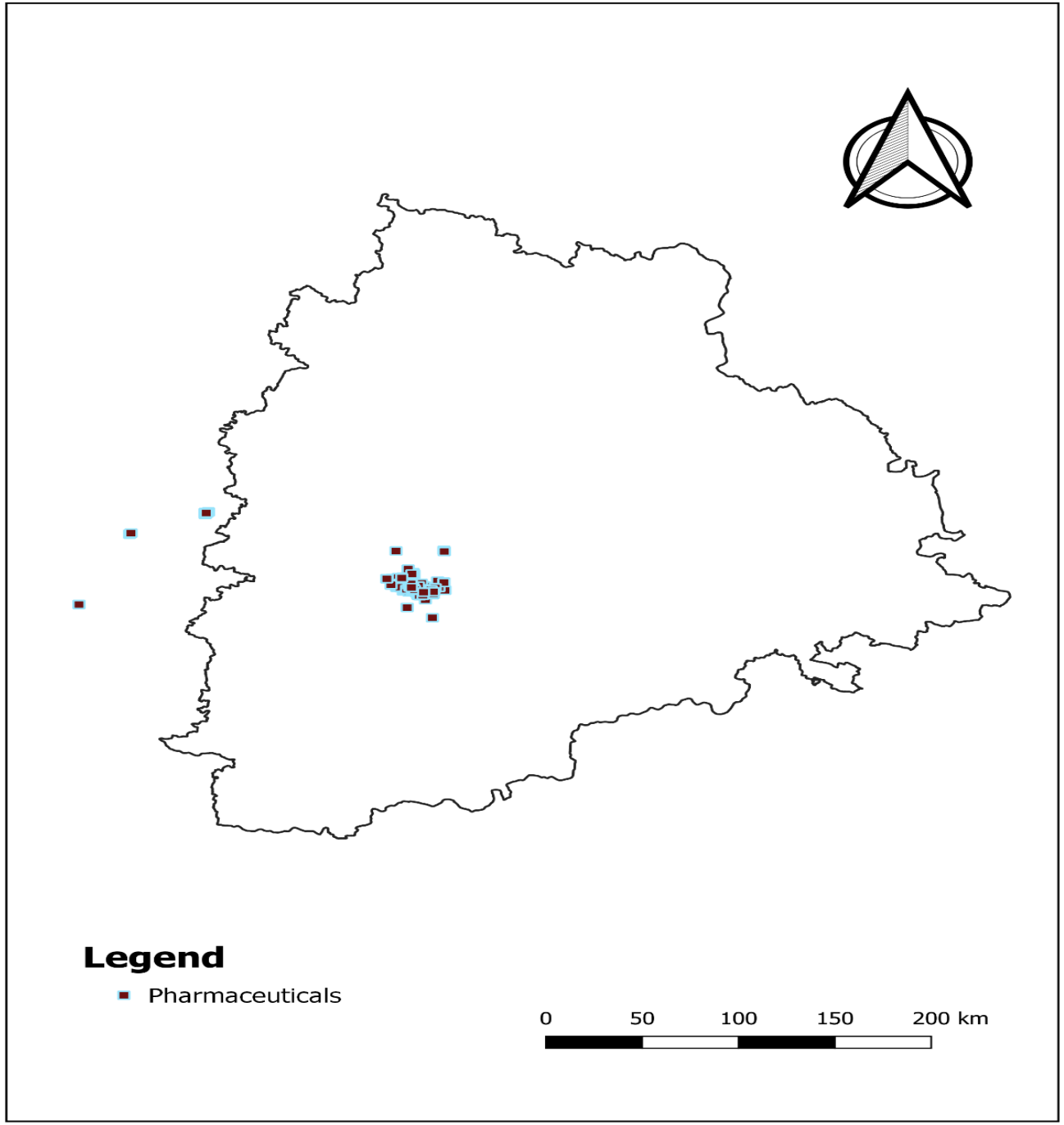


- Utilising QGIS (Quantum Geographic Information System application)
- Waste mapping at a multi layered manner (50kms, 150kms, 300kms)

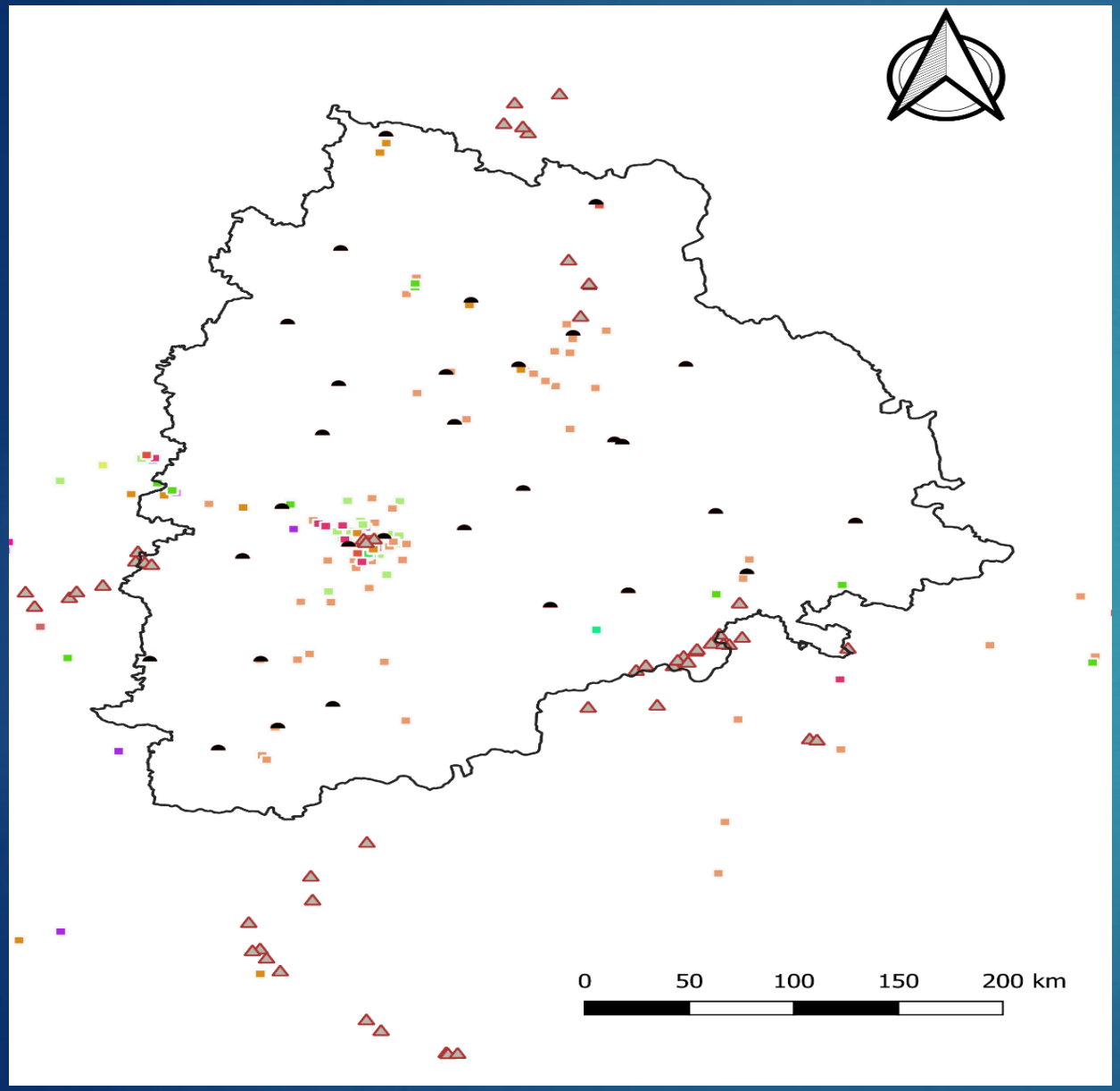
Major waste generators in the State of Telangana



Pharma industry/ cluster in the State of Telangana



Cement plants & potential waste generators in the State of Telangana



- Cement Industries [178]
- Municipal Solid Waste

Potential Waste Generators [454]

- Agri business,Agriculture [84]
- Aluminium,Aluminium smelter cum power plant,Aluminium smelting [4]
- Bio-mass [1]
- Chemical,Chemicals [3]
- cotton textiles,Cotton Textiles,glass,Glass [6]
- FMCG,Food and Beverages,Food processing [17]
- hospital [2]
- Iron & Steel,Iron and steel [23]
- Minerals [3]
- Others (wood borad),Wood [2]
- packaging,packaging ,packaging products [7]
- Paper products,paper,Paper [23]
- Pharmaceuticals [131]
- plastic,Plastic products,Plastic Products [10]
- polymers [1]
- Power plant [2]
- Railway workshop [1]
- Rice [1]
- rubber,Rubber [15]
- solar [2]
- Sugar,sugar ,Sugar [42]
- Textile [1]
- Trading Unit [4]
- tyre,Tyre,Tyre ,tyre Retyreing,Tyre Retyreing [65]
- Waste management [3]

Mapping alternative materials & generators

- CII network
  - 9000 organizations
- GreenCo rated companies
  - 600+
- Waste exchange platform
  - 100+ members
- FMCG - EPR requirements
- Waste management companies
  - Industrial & Domestic waste processors, Startups
  - Producer Responsibility Organisation (PROs)

Typical Mapping results of the cement plant

S.no	Type	Name of the waste	Nature of waste	Source	No of units
1	Alternative fuel	Industrial wastes	Hazardous waste	Aluminium	10
2		MSW & SCF	Non - hazardous	Urban local body/ processing company	18
3		RDF & Paper	Non - hazardous	Waste processors	8
4		Pharma waste	Hazardous waste	Pharmaceutical	5
5		Plastic waste	Non - hazardous	FMCG/ PROs/ others	4
6		Agrowaste	Non - hazardous	Agro waste	85
7		Carbon black	Hazardous waste	Tyre	10
8		used tyre/ tyre chips	Non - hazardous	Tyre	8
9		Dolachar	Non – hazardous	Sponge Iron	12
		Total			**160**
10	Alternative material	Fly ash	Non - hazardous	TPP	12
11		Red mud	Non - hazardous	Aluminium	9
		Total			21

Potential AFRs based on mapping study

- Industrial waste – Carbon black, Spent pot liner, Waste from tyres, Pharma, Dolachar
- MSW & Bio mining waste
- Refuse Derived fuel
- Paper & plastic waste
- Segregated SCF
- Agricultural waste

Alternate fuel

- Red mud
- Fly ash

Alternate raw material

Assessment and shortlisting for co-processing

- Generation & availability
- Nature & characteristics of waste
- Logistics
- Viability for long term engagement
- Current management practices
- Viable Business models
- Business continuity options for range of scenarios
- Multi sourcing opportunities for critical AFR

Facilitation of discussion between stakeholders

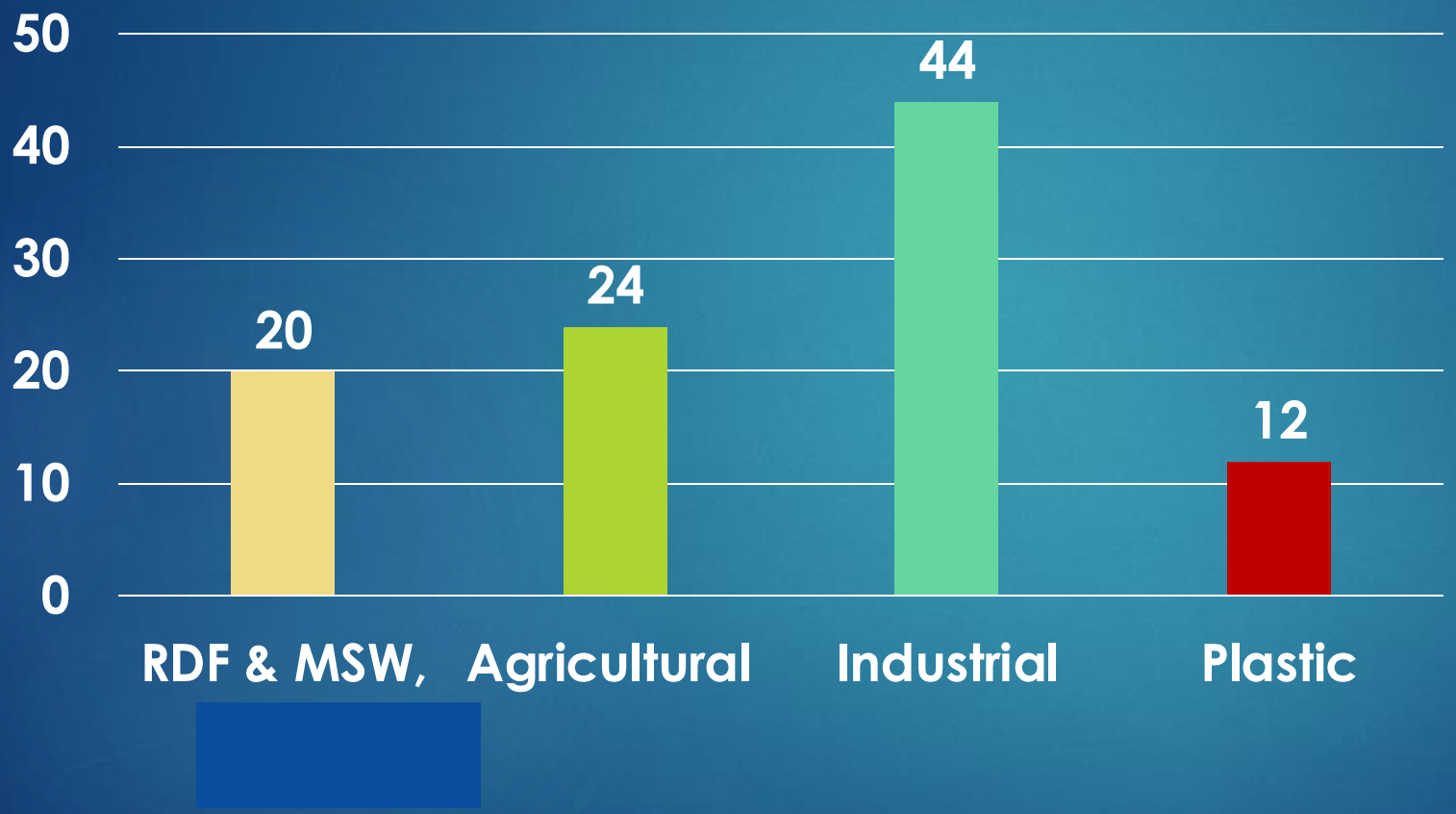
- Introduction & POC
- Quantity and quality of material
  - Understand demand & supply
- Physical site visits
- Logistics facilitation
- To understand specific opportunities and challenges for all stakeholders
- Co-innovate services & business models - Sourcing events, Certificates, awards etc

Facilitation of partnerships

- 25+ organisations shortlisted
  - Waste generators
  - Waste processing companies
  - EPR organizations
  - Companies tied up with ULBs
  - Logistics arrangements

Potential material identified through mapping study - 20% TSR			
Nature	Potential generators	Type of waste	Potential quantity (TPA)
Domestic	X, Y Z	Refuse derived fuel, Plastic waste, Agro Waste, MSW	70,000
Industrial	X, Y Z	Pharma waste, Carbon black, Dolachar	55,000
		Total quantity (Tons/ annum)	1,25,000
	Quantity (Tons/ Day) @ 330 days of annual operation		378
	Alternative material		2 million TPA

Type of materials and potential availability



- Total of 25+ organizations
- 7 major types of Alternative materials
- 1.25 Lakh tons per annum of alternative fuel supply
- 2 million tons of alternative material supply

Roadmap for enhanced AFR usage

Phase 1
2 -4 months

- Baseline assessment & goal setting
- Developing roadmaps for increased use of AFR
- Mapping, assessment & shortlisting

Phase 2
4- 6 Months

- Technology upgradations
- Implementation of infrastructure for AFR co-processing
- Developing roadmaps & facilitating long-term engagements

Phase 3
1 Month

- Assessment of Impacts on increased used of AFR
- Production, energy, quality, emissions & manufacturing cost

CII-GBC initiative on AFR Co-processing

COLLABORATING WITH STAKEHOLDERS

POLICY ADVOCACY

RESEARCH & DEVELOPMENT

MATERIAL MAPPING & SOURCING

TECHNOLOGICAL INNOVATIONS & ADVANCEMENTS

CAPACITY BUILDING

PILOT TRAILS

BUSINESS MODELS

Pilot AF studies with cement plants & ULBs

- Increase the use of MSW as fuel in cement plants
- Capacity building programs, missions
- Partnership among cement plants & ULBs
- Developing Business models : WIN – WIN
- Long term contract/ tender document development
- Pilot implementation studies (Cement plant & ULBs)
- Case study & replication potential

Way forward

- Use the **latest tools** to identify the waste availability
- **Long term supply** - Collaborate stockholders like processors, ULBs, and Waste generators
- **Technology upgradation** for large scale use of waste material
- Develop the **business model** considering **Carbon markets**
- Separate **AFR department**/ wing with cross functional team

CII will work closely with industry in accelerating TSR levels

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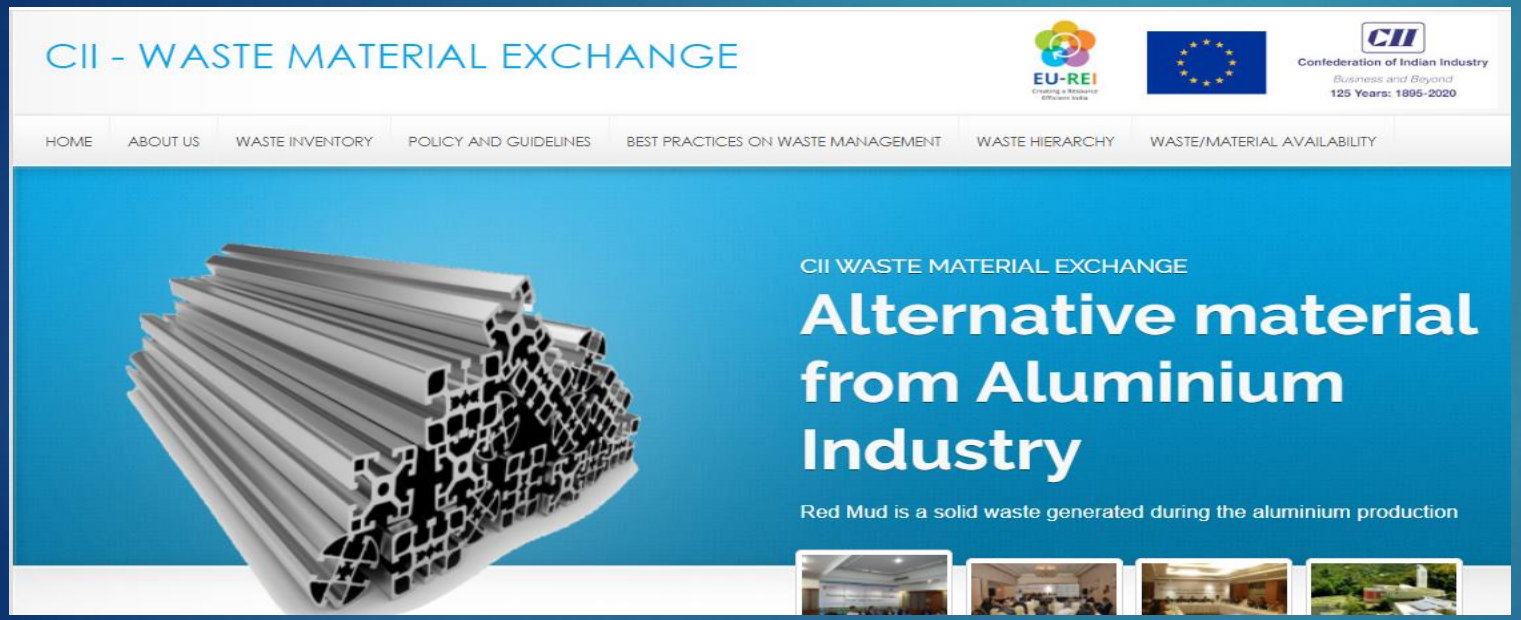
Thank You



India's first online material exchange platform
www.ciiwasteexchange.org