



Confederation of Indian Industry

DECARBONIZATION ROADMAP DEVELOPMENT METHODOLOGY AND FEW STRATEGIES



CII Net zero carbon guidelines and certification

VOLUNTARY STANDARDS AND CERTIFICATIONS

CII – GBC’S RATINGS & CERTIFICATIONS

- Indian Green Building Council rating
- IGBC net zero building rating
- GreenCo rating system
- GreenPro rating system
- Zero waste to landfill certification
- Water neutrality certification
- IGBC net zero carbon rating for building

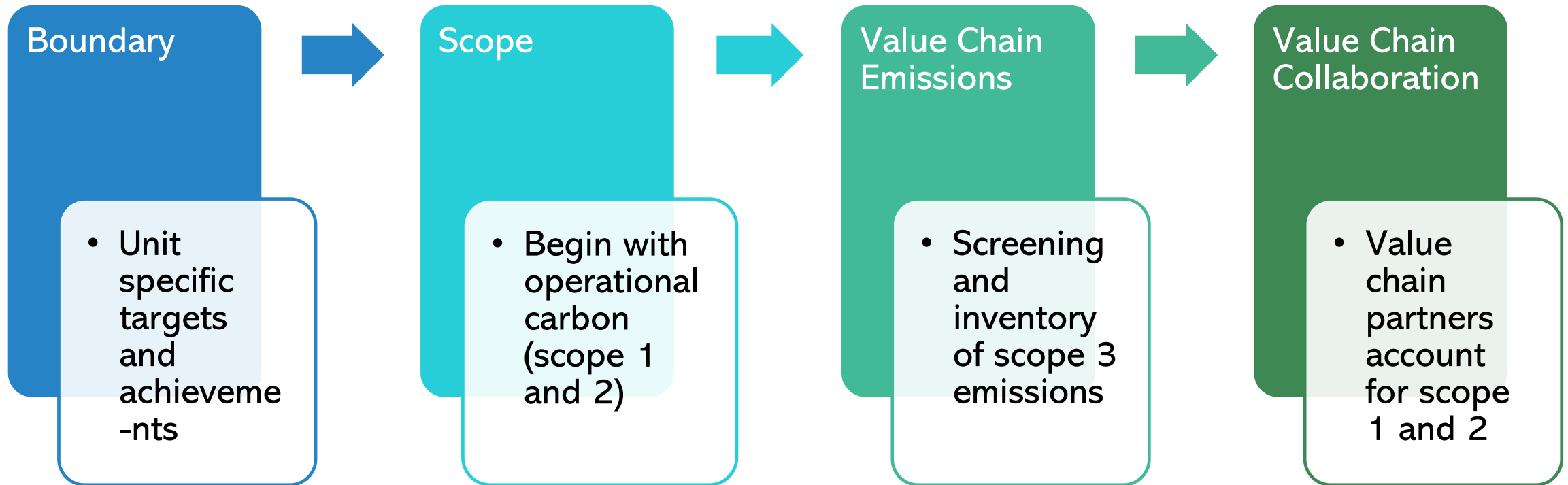
EXISTING NZ STANDARDS / GUIDELINES

- Airport Carbon Accreditation
- PAS 2060 & ISO 14068-1 - Carbon Neutral
- ISO Net Zero Guidelines
- SBTi Corporate Net Zero Standard

NEED FOR THIS CERTIFICATION

- Standards such as SBTi
 - Followed by few large Indian companies
 - Corporate level standard for setting target
- India specific industry guidelines
 - To be adopted by large number of companies
 - Percolate across the value chain including Tier-1,2,3 companies
 - Transparency and third-party validation
- Phase-wise achievement of targets
 - Long term target of net zero by 2050 can be achieved through a combination of interim targets

SUGGESTED APPROACH – NET ZERO CARBON



To facilitate Net Zero Operational carbon throughout the Supply Chain – With short and medium term
Parallely address Scope-3 emission inventory and reduction

DRAFT GUIDELINES UNDER DISCUSSION

	Category Title	Description	Terms of Measurement
Category I	Achievable	This category includes those sectors that can attempt to achieve net zero in their scope 1 and 2 emissions earlier with the right mitigation efforts. (Units/plants can opt for Net Zero operational Carbon certificate)	Absolute
Category II	Approachable / Moderate	This category includes those sectors that can attempt to achieve net zero in their scope 2 emissions earlier on and with focused efforts can achieve net zero in their scope 1 emissions. (Provides guidelines and target setting approach based on energy efficiency, adoption of RE technologies, commercialization of Green Hydrogen etc.)	Intensity
Category III	Difficult	This category includes those sectors that have difficult to remove scope 1 and 2 emissions and can attempt to approach net zero over years through continual efforts including technology upgrades, etc. eventually progressing towards net zero. (provides guidelines on short-, medium- and long-term approach)	Intensity

OUTLINE OF THE GUIDELINES

Title	Requirement
Policy and commitment	Policy, leadership involvement, net zero team
Inventory	Scope 1 and 2 emissions inventory and third-party verification
Baseline	Base year calculation, recalculation policy, third-party validation
Targets	Overall guidelines, scope 1 and 2 targets, total targets
Reduction	Reduction in scope 1 and 2 emissions
Mitigation	Overall guidelines, scope 1 and 2 mitigation projects, residual emissions
Sustenance	General guidelines and indicators / tools
Scope 3 emissions	Screening, inventorization action plan

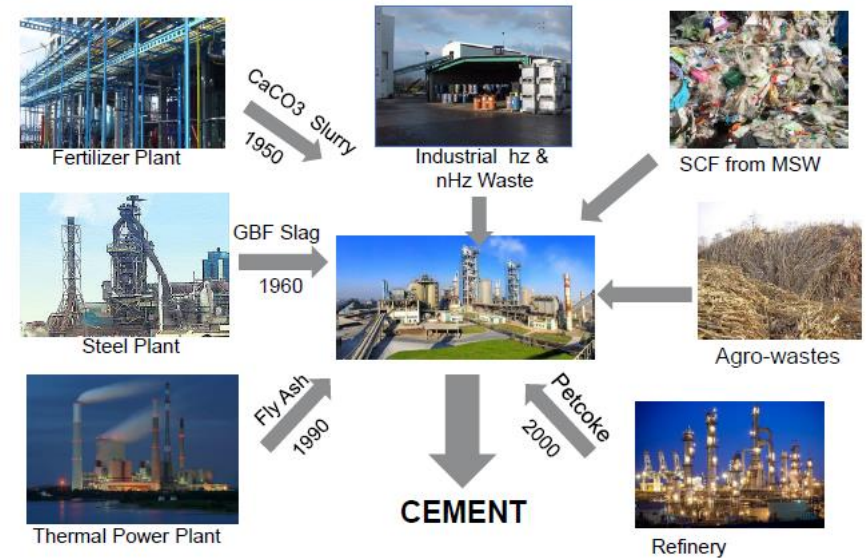
Draft Certification guidelines will be launched during the 13th Edition of GreenCo summit - 26 & 27 June @ Chennai



METHODOLOGY:-

1. Baseline year to be considered.
2. Projections can be done on production volume growth or road map can be prepared on fixed market share fixed volume basis
3. Emission intensity projections to be calculated. The reduction % is calculated over baseline year.

Cement Industry & Management of Wastes as Resources



METHODOLOGY:-

4. Plant wise projections in each reduction lever can be done for three scenarios
 - i. Business as usual (BAU)
 - ii. Deep Decarbonization
 - iii. Net Zero scenario
5. Projections for Near term (2030) & Long term (2040 , 2050) to be done.

STEPS:-

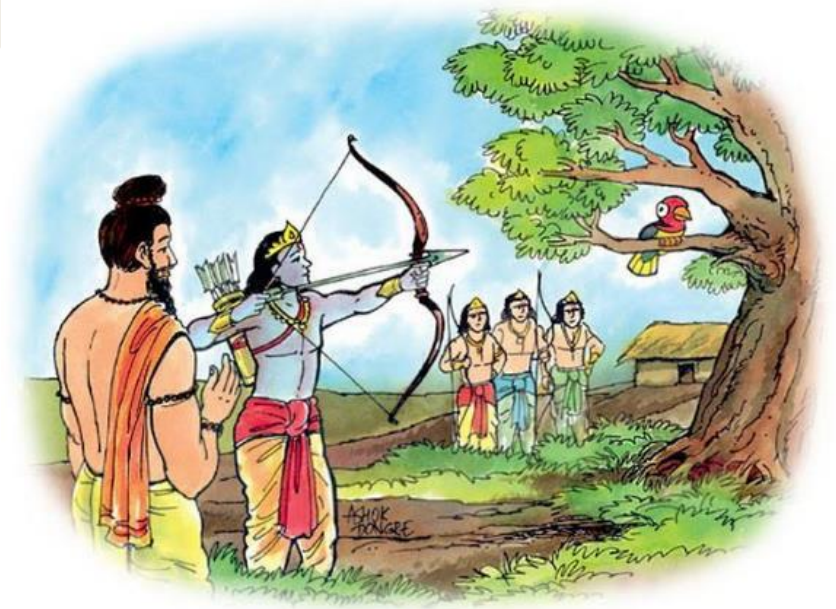
1. Plant wise calculation tool development & final GHG no calculation (break down of several GHG levers contribution)
2. Group wise GHG nos calculation & validation
3. Development of plant wise road map tool
4. Analysis of all GHG reduction lever KPIs
5. Projection of nos by target setting & estimation of GHG lever KPIs through:
 - i) Intra-Group benchmarking - last 3 years' BAU scenario / Group Avg/ Group best nos.
 - ii) Group target , existing infrastructure & available technologies
 - iii) Intergroup benchmarking
 - iv) International benchmarking & BAT nos.
 - v) GCCA, IEA & other cement groups roadmap

STEPS:-

6. Approach for Group KPIs target setting :

- i) Bottom up approach : Plant KPIs target setting -----
- Group KPI target
- ii) Top Down approach : Group KPIs & Action plan --
-----cascading the same KPIs & Action to plants

7. Lever wise macro/micro level opportunities to be identified for all plants



ROADMAP – ABC plant : REDUCTION LEVERS & KPIS

BAU scenario KPIS						
Sr.No	Levers	UoM				
			Existing	Near term 2030	Long term 2040	Long term 2050
1.1	Up to clinkerisation	kWh/T Clk	58	54	51	48
1.2	cement grinding	kWh/T cement	36	32	29	26
2	Thermal SEC	MJ/T Clk	3,400	3,400	3,300	3,200
3	TSR	%	6%	15%	25%	33%
4	Clinker factor	%	0.75	0.73	0.70	0.68
5	WHR	%	0	10%	25%	25%
6	RE	%	0	15%	25%	40%
7	Grid		33%	33%	33%	35%
8	Own Generation		67%	42%	17%	0%

BAU scenario :

Advantage/Easiness :

1. Easy to achieve
2. No additional investment

Disadvantage/Challenges:

1. Marginal or less reduction in emission intensity
2. Will not support upcoming carbon market/carbon tax
3. Deprived of upgraded/breakthrough technologies benefits
4. No significant commitment towards sustainability
5. High Risk

ROADMAP – ABC plant: REDUCTION LEVERS & KPIS

Deep Decarbonization KPIS						
Sr.No	Levers	UoM				
			Existing	Near term 2030	Long term 2040	Long term 2050
	1.1Up to clinkerisation	kWh/T Clk	58	51	48	48
	1.2cement grinding	kWh/T cement	36	29	27	26
2	Thermal SEC	MJ/T Clk	3,400	3,400	3,300	3,200
3	TSR	%	6%	18%	33%	45%
4	Clinker factor	%	0.75	0.70	0.68	0.65
5	WHR	%	0	25%	25%	25%
6	RE	%	0	40%	50%	60%
7	Grid		33%	35%	25%	15%
8	Own Generation		67%	0%	0%	0%
10	EV deployment	%		20%	50%	80%

Deep Decarbonization scenario :

Advantage/Easiness :

1. Significant reduction in emission intensity aligned to peer industries
2. Operation cost will also come down with efficiency enhancement & upgraded technologies adoption
3. Dependency on grid & fossil fuel will come down up to a significant extent

Disadvantage/Challenges:

1. Expenses/ investment involvement
2. Comparatively difficult target
3. Significant reduction in emission intensity aligned to peer industries
4. Upcoming carbon market/carbon tax may support the target up to some extent but 2050 intensity targets are only 41% compared to 2021 intensity.
5. The breakthrough technologies impact is not considered .

ROADMAP - ABC plant: REDUCTION LEVERS & KPIS

NetZero Scenario KPIS						
Sr.No	Levers	UoM	Baseline			
			2021	2030	2040	2050
1.1	Up to clinkerisation	kWh/tn Clk	58	50	48	48
1.2	cement grinding	kWh/tn cement	36.00	28	26	26
2	Thermal SEC	MJ/Tn Clk	3,400	3,400	3,300	3,200
3	AFR	%	6	25%	45%	55%
4	Clinker factor	%	0.75	0.70	0.65	0.57
5	WHR	%	0.00	25%	25%	25%
6	RE	%	0.00	45%	75%	75%
7	Grid	%	33	30%	0%	0%
8	Own Generation	%	67	0%	0%	0%
9	EV deployment	Reduction %		30%	60%	100%
10	LC3/ Belite / Novel Cement	Reduction %		0%	8%	10%
11	Advance Technology	Reduction %		0%	10%	33%
12	carbon offset	Reduction %		0%	2%	5%



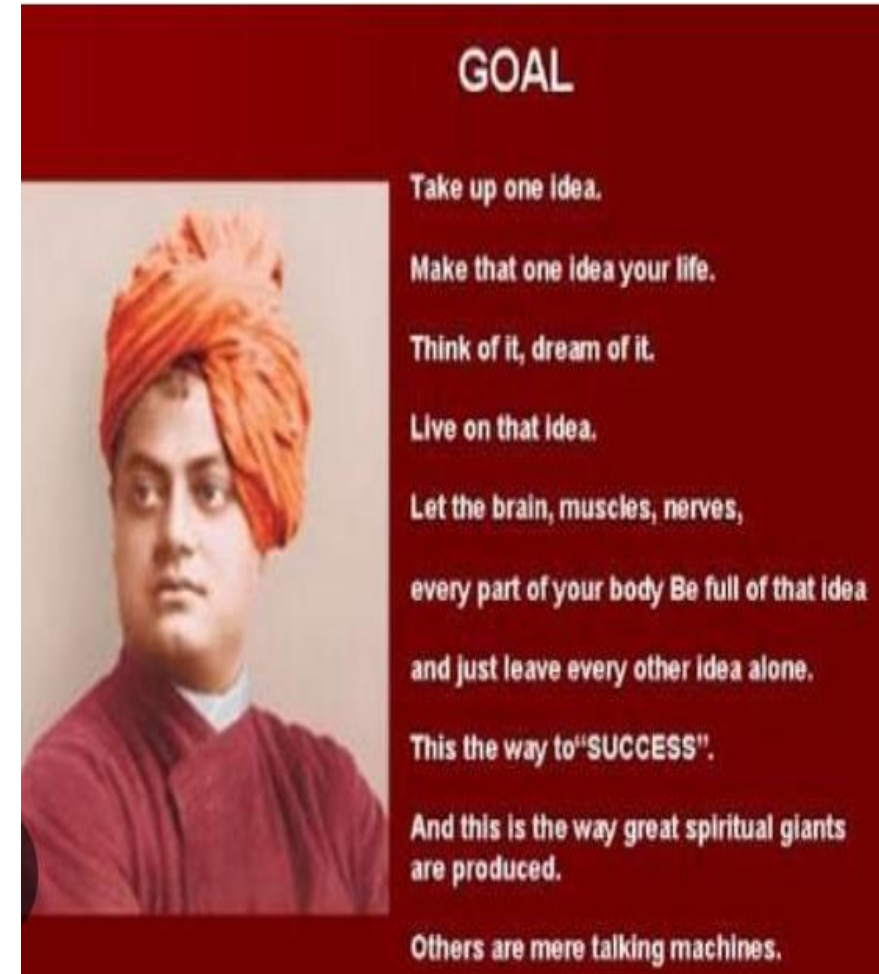
NetZero scenario :

Advantage/Easiness :

1. Operation cost will come down with efficiency enhancement & upgraded technologies adoption, but breakthrough technologies are considered based on projected nos only.
2. Dependency on grid & fossil fuel as well as mines reserve will come down
3. Advantage of Carbon market /carbon tax
4. Coherent to global NetZero roadmap

Disadvantage/Challenges:

1. Very stringent target .
2. Expenses/ investment involvement is very high



MACRO LEVEL OPPORTUNITIES – X cement

Sl no	Reduction Lever	
1	Clinker Factor	<ol style="list-style-type: none"> 1. Clinker factor improvement - by using suitable grinding aid Product mix optimization - Enhancing product mix share of low clinker factor cement 2. Exploration of Alternate SCMs /LC3 3. Development of policy & amendment of standards by sectoral involvement 4. Transition to low Clinker blended Cement
2	Reduction of SEC (KWH/T)	<ol style="list-style-type: none"> 1. High Pressure Grinding Roller (HPGR) for material grinding- Higher throughput, 15% less energy consumption 2. 4th Generation Separators- High Efficiency separators 3. Vortex rectifier for classifiers in vertical roller mills - 10 % reduction in SEC possible 4. Installation of Secondary crusher – 2% SEC saving in raw mill 5. Expert optimizer with Online PSD analyzer for Grinding mills – 2-3% reduction in SEC 6. Smart monitoring & intelligent control for compressors- up to 5-10% Compressor SEC saving 7. Energy efficient compressor installation 8. Major Process Fans Study & efficiency enhance 9. Conduct Detail Energy audit

MACRO LEVEL OPPORTUNITIES– X cement

Sl no	Reduction Lever	
3	Reduction of SHC (MJ/T clinker)	<ol style="list-style-type: none"> 1.PH Top Cyclone Modification to improve the separation efficiency 2.Detail Heat balance, Temp & pressure profile to assess all Cyclone performance 3. Addition of one more stage 4. Reduction of Preheater & cooler exhaust loss 5. Explore burner upgradation -2-3 Kcal/Kg reduction 6. Detail Energy audit 7.Upgradation of Cooler > 75% recuperation & heat loss <100 Kcal/Kg clinker 8. Upgradation of Calciner & Preheater
4	Alternate Fuel usage (TSR%)	<ol style="list-style-type: none"> 1 Preprocessing & Co processing infrastructure 2. Eco system ensure supply of quality and quantity AF 3. Calciner upgradation 4. Upgradation & retrofit of new technologies - (ex: Pyro rotor) 5.AFR mapping study 6.Policy development & MOU with local bodies to ensure AF sourcing 7.Encouraging incentives/ Govt rule for waste & biomass coprocessing

MACRO LEVEL OPPORTUNITIES– X cement

Sl no	Reduction Lever	
5	Energy mix	
	CPP	<ol style="list-style-type: none"> 1. Alternate fuel usage - Biomass available in country & boiler type : AFBC 2. Stop expansion /installation of Fossil fuel CPP 3. Transition from fossil based CPP to RE
	RE	<ol style="list-style-type: none"> 1. Installation of onsite & offsite solar plant 2. Govt policy support & collaboration 3. Installation of Wind energy
	WHR	<ol style="list-style-type: none"> 1. Installation of WHR as potential exist in both Cooler & PH-(25-30 % of plant's requirement) can be generated – 90 MW/Hr generation potential in 10 IUs 2. Installation of WHR on expanded production line
6	Fuel Consumption by own vehicle	Phase wise deployment of EV & utilization of solar power
7	Low carbon Cement	Explore further potential for LC3 & Belite cement
8	Breakthrough Technology	CCUS/Green Hydrogen/oxi fuel combustion- Pilot

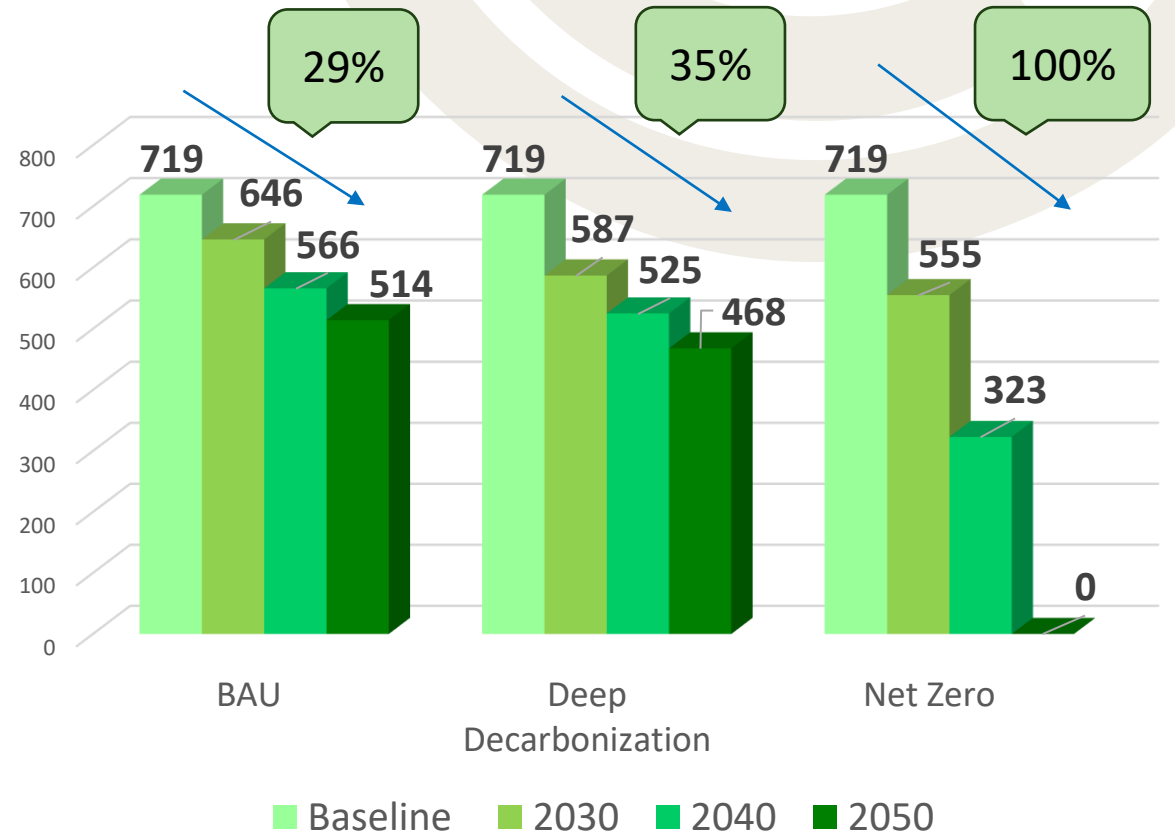
REDUCTION LEVERS- 3 SCENARIO'S

		Baseline Year	BAU			Deep Decarbonization			NetZero		
Levers	UoM		2030	2040	2050	2030	2040	2050	2030	2040	2050
Electrical SEC											
Up to Clinkerization	kWh/tn clk	58	54	51	48	51	48	48	50	48	48
Cement Grinding	kWh/tn cem	36	32	29	26	29	27	26	28	26	26
Thermal SEC	MJ/Tn Clk	3,400	3,400	3,300	3,200	3,400	3,300	3,200	3,400	3,300	3,200
TSR	%	6%	15%	25%	33%	18%	33%	45%	25%	45%	55%
Clinker Factor		0.75	0.73	0.70	0.68	0.70	0.68	0.65	0.70	0.65	0.57
WHRS	%	0	10%	25%	25%	25%	25%	25%	25%	25%	25%
RE	%	0	15%	25%	40%	40%	50%	60%	45%	75%	75%
Grid	%	33%	33%	33%	35%	35%	25%	15%	30%	0%	0%
CPP	%	67%	42%	17%	0%	0%	0%	0%	0%	0%	0%
EV deployment	%	0%	-	-	-	20%	50%	80%	30%	60%	100%
LC3/ Belite / Novel Cement	%	0%	-	-	-				0%	8%	10%
Advance Technology	%	0%	-	-	-				0%	10%	33%
Carbon Offset	%	0%	-	-	-				0%	2%	5%



OVERALL EMISSION INTENSITY-

kg CO ₂ / Eq. Cement				
	Baseline	2030	2040	2050
BAU	719	646	566	514
		10%	21%	29%
Deep Decarbonization	719	587	525	468
		18%	27%	35%
Net Zero	719	555	323	0
		23%	51%	100%



ROADMAPS OF OTHER CEMENT GROUPS- GLOBAL

Reduction Lever/Scope	Heidelberg Cement	Brazil Cement Industry	Dalmia Cement	ABC Cement – BAU	ABC – Deep Decarb	ABC – NetZero
Reduction in Scope1 & scope 2 by 2030	27%	10%	22%	10%	18%	23%
Emission Intensity target for 2030	400	480	365	646	587	555
TSR% by 2030	45%	35%	100% by 2035	15%	18%	25%
Renewable Energy/Non fossil fuel power	100 MW RE project		100% by 2030	15% by 2030 45% by 2050	40% by 2030 60% by 2050	45% by 2030 100% by 2050
Clinker factor	0.68 by 2030	0.59 by 2030 0.52 by 2050	0.58 in 2023	0.73 by 2030 0.68 by 2050	0.70 by 2030 0.65 by 2050	0.70 by 2030 0.57 by 2050

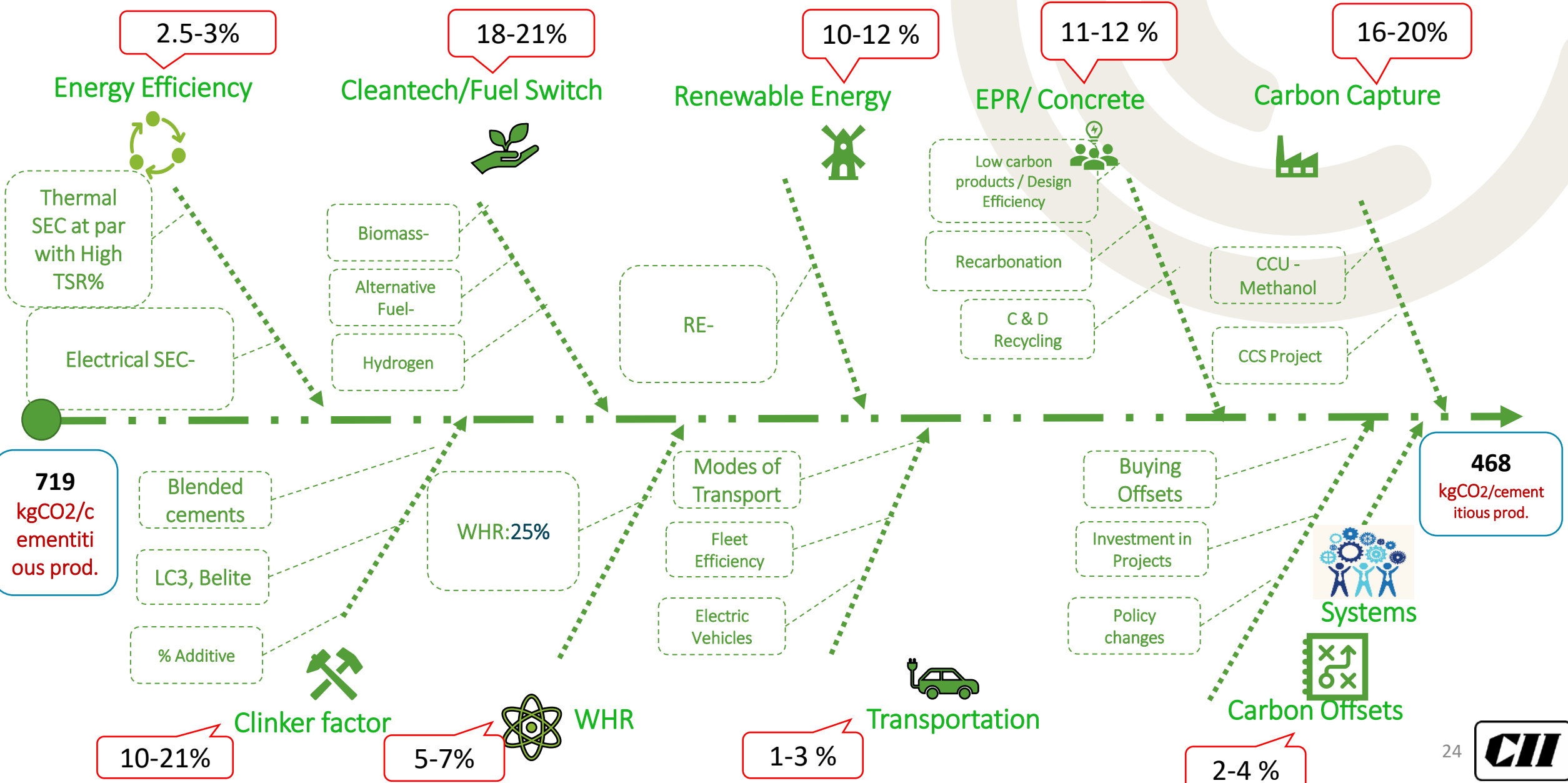
- GCCA roadmap suggests
- ❖ 36% reduction in emission intensity by 2050 through CCUS/other breakthrough technologies
- ❖ Savings in Cement & binders & clinker production – 20%



Decarbonization Commitments by Cement Organizations

Reduction Lever/Scope	Heidelberg Cement	Adani Cement	Dalmia Cement	JK Cement	JSW Cement	Shree Cement	Ultratech Cement
Reduction in Scope1 & scope 2 by 2030	27%	21.3% by 2030	32% by FY'34	22% by FY'30	15% by FY'26	12.7% by 2030	27% by 2032
TSR% by 2030	45%	18% by 2024	100% by 2035	35% 2030	30% by 2030	15% by 2024	-
Renewable Energy/Non fossil fuel power	100 MW RE project	50% by 2030	100% by 2030	75% by 2030	60% by 2030	55% by 2025	34% by 2024
Clinker factor	0.68 by 2030	0.54	0.58	0.65	0.44	0.62	0.69

Deep Decarbonization Roadmap- 2 MnTPA model Cement Plant



THANK YOU !

How CII can support

- ❖ Validate your emissions
- ❖ Support in developing Road map
- ❖ Identify, Quantify the impact, support in implementation
- ❖ Review the progress and suggest further measures



<http://www.energy.greenbusinesscentre.com/>