



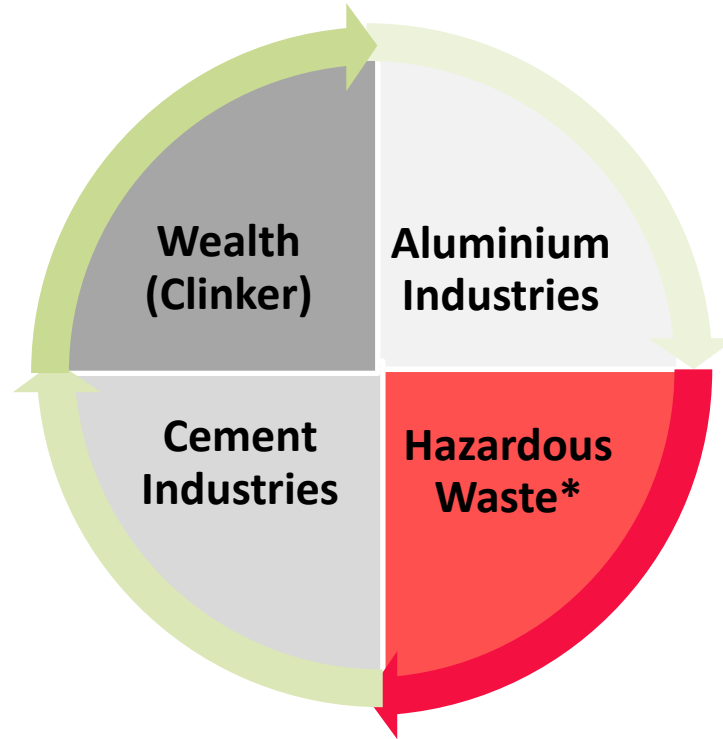
Co-processing of SPL-MF in Cement Plants

*A Sustainable
Solution*

(9th Jun 2023)

- Circular Economy
- Generation and Consumption
- Particulars
- Challenges & Mitigation
- Conclusion

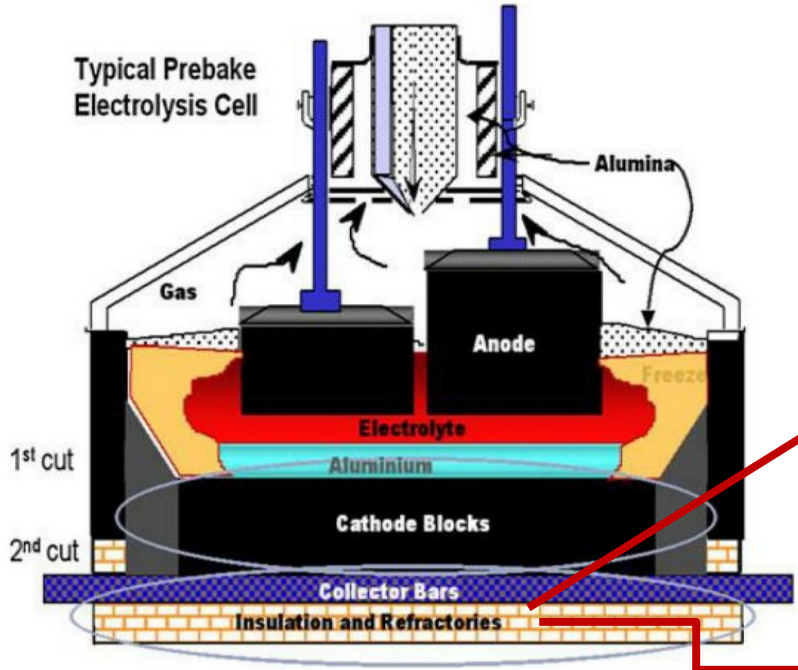
Circular Economy: A New Pathway to Sustainability



*[*CPCB Utilization of SPL generated from Aluminium smelting Industries Mar'2021]*



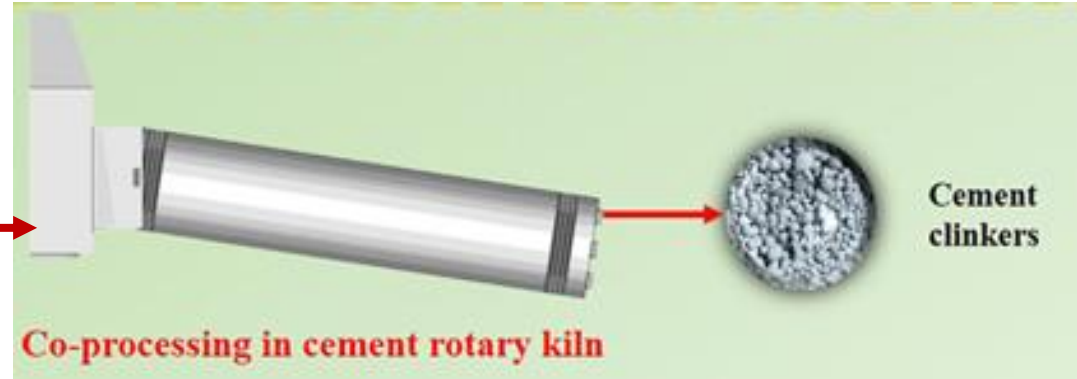
Generation & Consumption - SPL Mixed Fines



SPL- Mixed Fines (2nd Cut)



1st Cut – Carbon rich fraction
2nd Cut – Refractories rich fraction



Co-processing in cement rotary kiln

- Mixed Fines of Refractory and Carbon from Alumina Smelting Industries,
- **Categorized as Hazardous waste** (*Schedule-I, Stream 11.2 of HOWM Rules 2016*)
- Required to be disposed in authorized disposal facility, *when not utilized as energy/ resource recovery,*
- **No energy Value,**
- Few components to be used for specific purpose,
- Ideally, generation is about 16 -18 kg/ MT of Aluminium metal



Storage Condition

CPCB March 2021

(Schedule-I, Stream 11.2 of HOWM Rules 2016)

Mandatory Requirement (mg/l)	Obtained
Cyanide (TCPL) 20 (max)	< 3.5 mg/l
Fluoride (STLC) 180 (max)	< 5.5 mg/l

Chemical Composition

LOI	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	K ₂ O	Na ₂ O	SO ₃
10 – 12 %	30 – 50 %	20 – 35 %	2 – 5 %	2 – 6 %	3 – 6 %	1 – 4 %	2 – 6 %	0.2 -1 %

*Toxicity Characteristic Leaching Procedure (TCLP)
Soluble Threshold Limit Concentration (STLC)*

Fugitive Emission in the Work Zone

	Mandatory Requirement	Obtained
PM10	5.0 mg/m ³ TWA	<5 mg/m ³ TWA
Cyanide as CN	5.0 mg/m ³ TWA	<5 mg/m ³ TWA
Fluoride as F	2.5 mg/m ³ TWA	<2.5 mg/m ³ TWA
Ammonia	18 mg/m ³ TWA	< 18 mg/m ³ TWA
	27 mg/m ³ STEL	< 27 mg/m ³ STEL

Emission from Stack connected to Rotary kiln followed by Bag filter

PM	50 mg/Nm ³	< 50 mg/Nm ³
Total Fluoride	25 mg/Nm ³	< 25 mg/Nm ³
Hydrogen Fluoride	4 mg/Nm ³	< 4 mg/Nm ³
Ammonia	75 mg/Nm ³	< 75 mg/Nm ³
Hydrogen Cyanide	10 mg/Nm ³	< 10 mg/Nm ³

TWA = Time Weighted Average (8 hours, Max)

STEL = Short Term Exposure Limit (15 minutes, Max)

Ref.: Occupational Safety and Health Standard 1910: 1000

Challenges & Mitigation

Challenges

- Categorized as Hazardous waste (*Schedule-I, Stream 11.2 of HOWM Rules 2016*)
- Failure of grinding process in Raw Mill,
- Restriction in production, due to larger size and wide variation in the composition.

Mitigations

- Proper pre-processing to segregate contaminants and to reduce size <10 mm,
- Separate feeding system with controlled dosing at kiln inlet,
- Appropriate sampling during operation,
- Additional requirement of additives to maintain clinker quality,
- Replacement of existing Hazardous Waste to maintain mandatory Norms specified by SPCB.

Judicious usage of **SPL-MF to co-process in cement kiln** as a raw mix component is possible provided it should be **used as per the guidelines of CPCB/ SPCB** and to **fulfill** the prime **requirements to mitigate challenges**.

Trial has resulted in up to **1.0% absorption of SPL-MF in clinker production** based on the quality of SPL-MF received from Aluminium Industry.

Dalmia Cement Bharat Limited; Trial Run Ref. No. 10943/IND-IV-HW-1361; dtd. 24-06-2022



Thank You

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