

TATA STEEL

#WeAlsoMakeTomorrow



Sustainable usage of waste LD Sludge in Pellet

10th Edition of CII National Award for Environmental Best Practices

June 21 - 23, 2023



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Legacy stock of ~ 3 Lac tonnes of hazardous LD Sludge posed risk to continuity of operations...



Adversity

LD Sludge stock accumulated over years

- LD sludge accumulated since 2013 inside Tata Steel Meramandali plant
- High Zinc content Sludge, Hazardous waste declared by OSPCB in 2020
- Limited internal utilization in Sinter making due to its ill effect on productivity and emission



Sustainable Development Goal

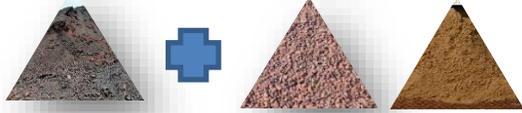


Opportunity

Pellets made from LD Sludge

- First ever conversion of LD Sludge to pellet to utilize the Legacy stocks
- Better Quality Pellets with Higher CCS and lower solid fuel consumption
- Ensure 100% Solid Waste Utilization, an example for the Industry

First time ever the LD Sludge has been converted into Pellets...



35%: LD Sludge

65%: Iron Ore, Bentonite

Raw material mixing



Grinding



Green balling

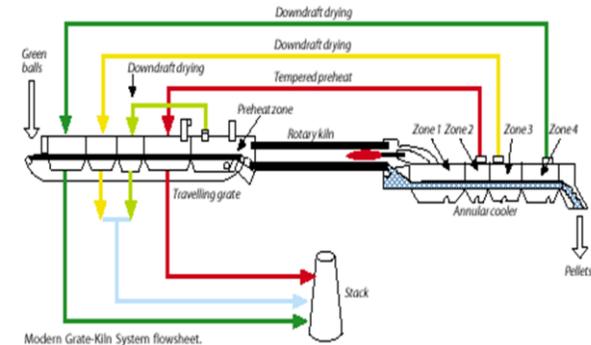


Uniqueness

- ❖ No additional Solid fuel consumption
- ❖ Lower Dolomite (Flux) consumption
- ❖ Improvement in pellet strength (CCS: 260-270 kg as against 220 kg typically)



LD Sludge pellets



Induration (1200 -1250°C)

Vendor Partner: M/s. Ardent Steel, operations approved by CPCB/OSPCB

Optimal utilization of LD Sludge up to 35% established through phased trials...



Proof of Concept: Mar'21

Engagement with IMMT, Bhubaneswar

- Lab scale trials done successfully.
- Being a CSIR Lab, the analysis & reports were well accepted by the statutory bodies



Feasibility Trials: Sep'21

1st Trial conducted at M/s. Ardent Steel

- Successful trials, ~8KT LD Sludge converted to ~20KT pellets which was consumed by Iron making
- CPCB had concerns of higher percentage of stack emission



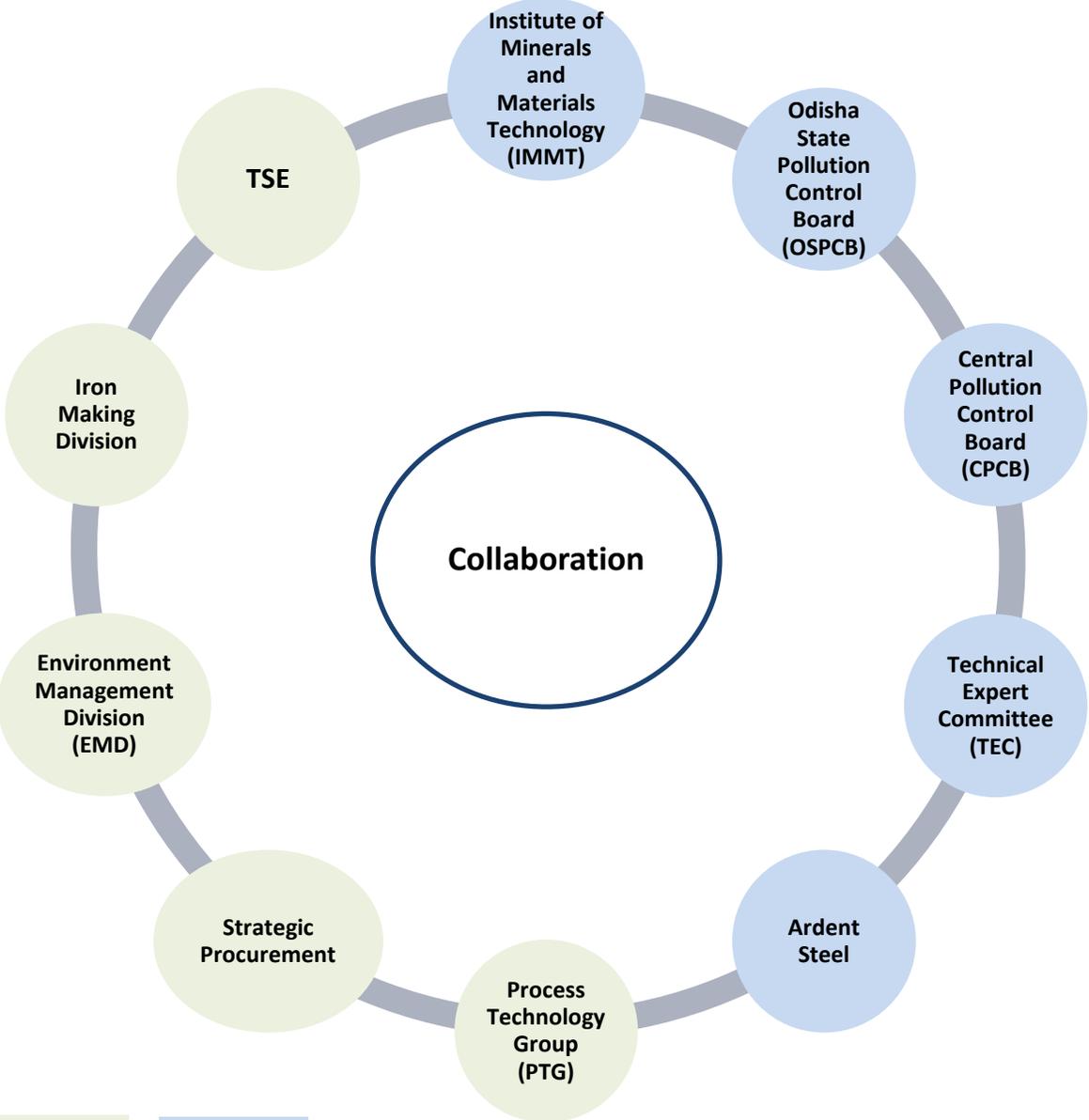
Industrial Scale Production: Nov'22

2nd Phase continuous production

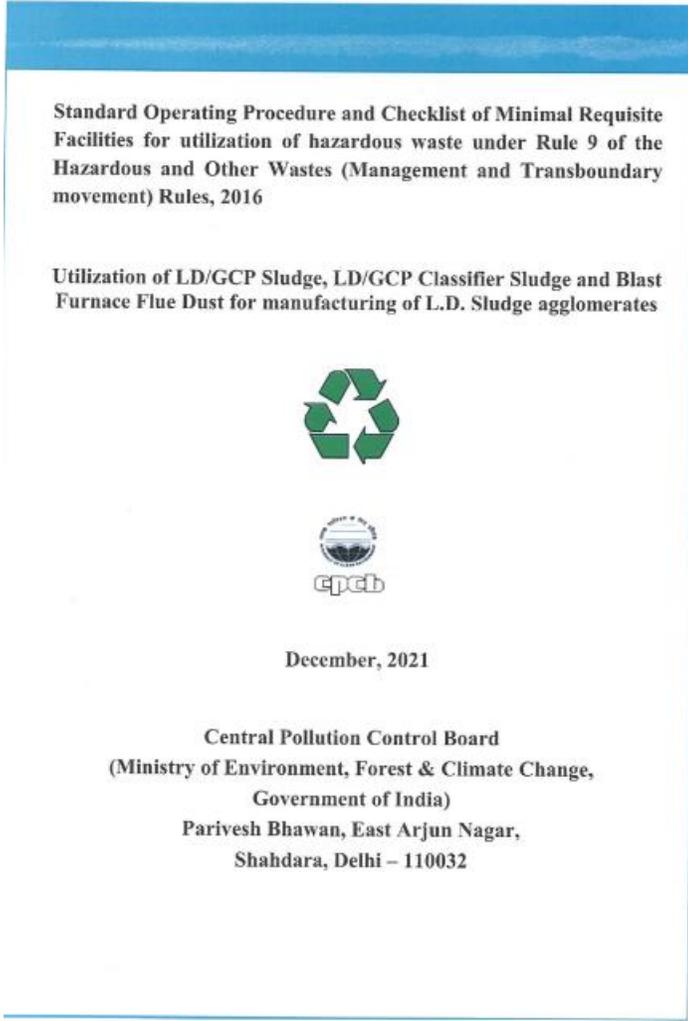
- Observations of CPCB Technical Expert Committee implemented to reduce Stack emissions at M/s. Ardent Steel
- Optimal utilization of 35% of LD Sludge in Raw material mix, **~96 KT utilized till date.**



Technical collaboration & Advocacy with multiple stakeholders....



Internal External



SOP formulated for Utilization of LD Sludge for LD Sludge Agglomeration

SOP- Standard operating procedure

Performance at Blast Furnace...



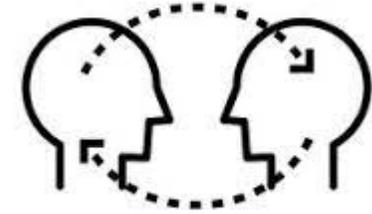
First Trial



ZnO deposition in BLT gear box



How to handle pellet with ZnO



Knowledge exchange Tata Steel Europe

Second Trial

Quality

Better quality of pellet

- High CCS
- Low return fines
- High Flux

Performance

- Improvement in permeability
- Lower heat loss
- Lower external flux

Benefit

**Hot metal production
increased by 70-80 tpd**

Specifications of Pellet at 35% LD Sludge produced at M/s Ardent Steel...



CHEMICAL

Properties	UoM	Iron ore Fines	LD sludge	Filter Cake	Product Pellet	Standard Pellet
Fe(T)	%	61.81	53.32	58.84	62.37	62-63
LOI	%	3.41	3.21	3.5	0.22	-
SiO ₂	%	3.73	4	3.8	4.34	4.5 Max
Al ₂ O ₃	%	3.52	2.79	3.32	3.64	3.25 Max
CaO	%	0.1	6.86	2.43	1.58	-
MgO	%	0.07	1.83	0.7	0.7	-
FeO	%	-	22	8.42	0.88	1 Max
ZnO	%		0.5	0.3	0.3	

PHYSICAL

Properties	UoM	Product Pellet	Standard Pellet
Tumbler Index	%	94.66	92-93
Abrasion Index	%	3	5-6
CCS	kg/p	253	220
Mean size	mm	10.93	11-12
-5	mm	1.92	5
+18	mm	0.83	5

Key Benefits ...



Market linked Costing (As per Nov'22)

All figs in Rs./MT

Iron Ore Cost (@65% of RM, includes transportation)	2905
LD Sludge Cost (@35% of RM, includes transportation)	510
Total Cost	3415
Ratio 1:1.15 (Conversion Factor 1.15)	3927
Conversion Cost	2750
Pellet Cost (includes loading on to rakes)	7052

LD Sludge Pellets are attractive by Rs. 400-500/MT as against market price

People



- **Partnership with MSME**, creating indirect employment
- Advocacy for SOP/regulations for sustainable tomorrow

Planet



- **Lower CO2 Footprint (35Kg/t of pellet)**, No additional Solid fuel consumption due to high FeO in LD Sludge.
- **Lower Dolomite (Flux) consumption** Conservation of minerals.

Profit



- **Revenue from Sludge sales:** 1 Cr till date (Potential ~5 Cr)
- **Savings** of ~Rs. 6.8 Cr till date (Potential 34 Cr)

Way Forward...



LD Sludge pellet can utilize lower grade Iron Ore → **Beneficial for entire Steel Industry**
(LD Sludge has very high Fe content)



Propagating the knowledge through TSIC & *extend services to the other Steel companies*
(Most of the SAIL plants are not able to utilize the LD Sludge which is accumulated for yrs.)



Scale up the utilization to liquidate 300 KT of inventory at TSM
(Check the feasibility to replicate to TSJ & TSK)

Key Learnings!



Benchmarking & Technological interventions



Policy Advocacy

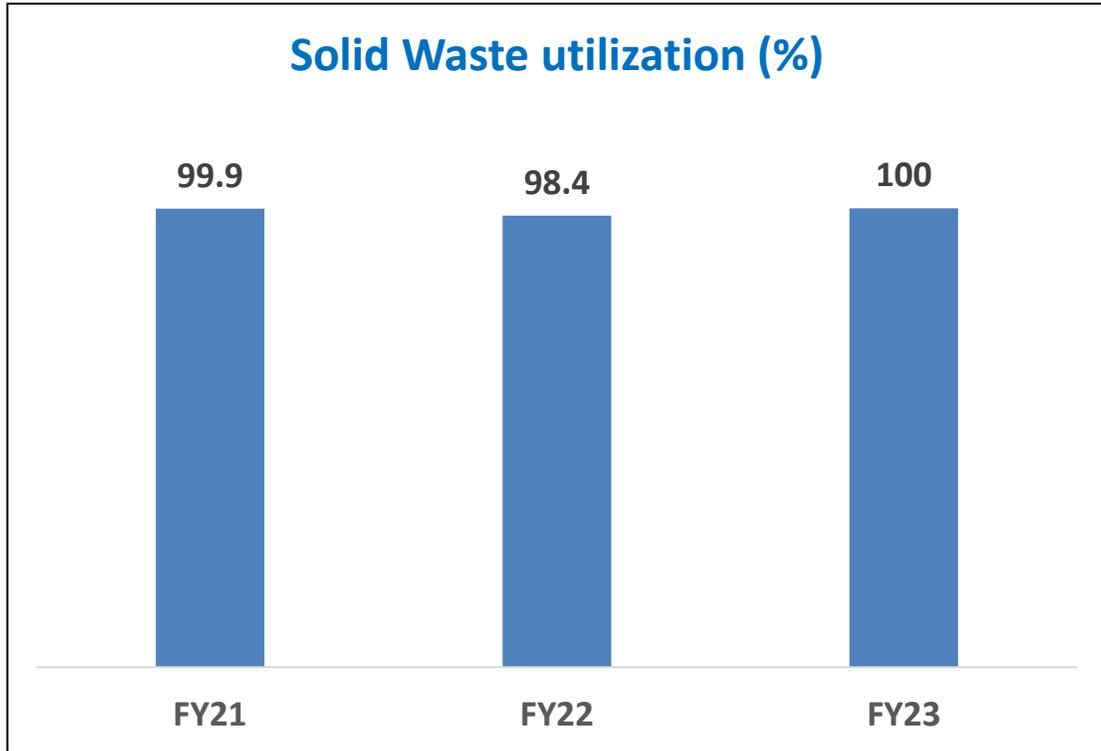


Collaborating with multiple stakeholders, co-creation & value sharing



Credence to the Product & process through joint trials with CSIR lab

Achieved Benchmark Solid Waste Utilization...



2022

CII 3R AWARDS
Recognizing Exemplary 3R Practices of Industry and to set a Benchmark of 3R Excellence

2023

Apex Recognition at Tata Steel Innovista
One of the top 3 projects at Company level

Thank You!

