CII Energy Efficiency Award-2021

JK CEMENT WORKS-Nimbahera, Rajasthan
Presentation by
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JK CEMENT WORKS- PLANT PROFILE

JK CEMENT LTD operating Cement Plants :

- Integrated Plant – JK cement works Nimbahera, Rajasthan
- Integrated Plant – JK cement works Mangrol, Rajasthan
- Integrated Plant – JK cement works Gotan, Rajasthan
- Integrated Plant – JK cement works Mudhol, Karnataka
- Integrated Plant – JK cement works, Katni (MP)
- Integrated Plant – JK cement works, (Fujairah) FZC
- Cement Grinding Unit- JK cement works Aligarh, UP
- Cement Grinding Unit-JK cement works Balasinor, Gujrat
- Cement Grinding Unit-JK cement works Jhajjar, Haryana

Salient Features

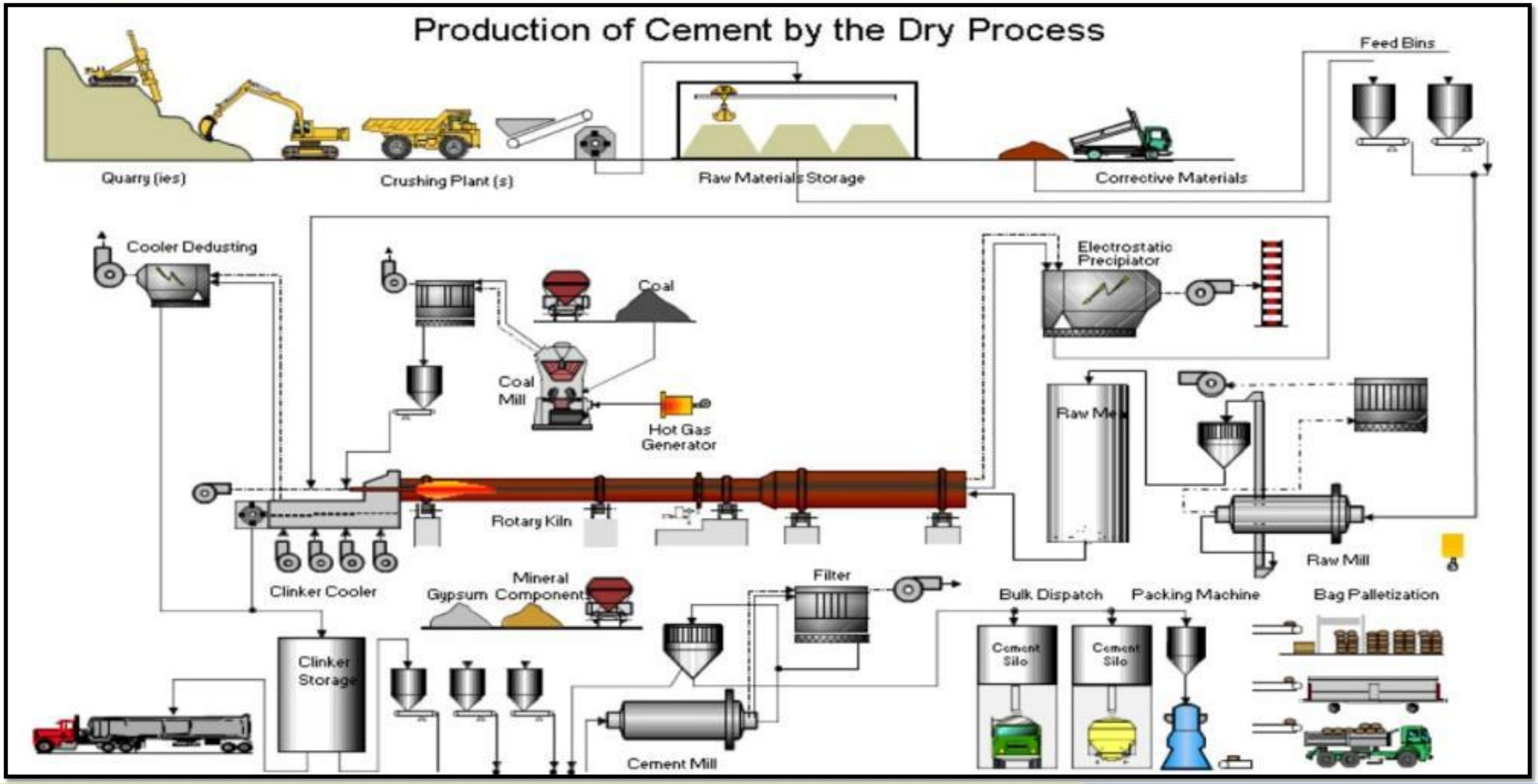
Plant location:-
Nimbahera chittorgarh dist., Rajasthan

Commercial Production:-
May-1975

Capacity:-
Clinker- 2.8 MTPA
Cement- 4.9 MTPA
CPP- 22 MW
WHR- 13.2 MW

Maximum Temp : 48°C
Minimum Temp : 5°C
MSL : 440.9 meter

Cement Manufacturing Process



Energy saving projects implemented during FY 2018-19

Description of Energy Saving Projects implemented	Investment	Annual electrical savings		Annual Thermal savings tones		Total annual savings
	Rs Lakh	Units in lakh	Rs Lakh	Tones fuel	Rs Lakh	Rs Lakh
04 no's 11 kW packer bag cleaning blower Replaced by 2.2 kW blower.	0.64	0.53	2.67	0	0	2.67
Installation of screw compressor in place of reciprocating at coal mill section	9.71	0.88	4.40	0	0	4.40
Energy Efficient Cooling Tower Fan (Cell No.-1)-WHR	3.21	0.99	4.98	0	0	4.98
Power saving through replacement of GRR to MVD of Kiln-3 Cooler ESP Fan P22 (Gearbox removed)	**125.0**	**33.17**	**166.20**	**0**	**0**	**166.20**
Installation of Flow control Diaphragm in Cement Mill-3	**59.4**	**7.85**	**39.35**	**0**	**0**	**39.35**
Motor Replacement of Z2X02 (102) Compressor from 450kW to 340kW	12.9	0.65	3.24	0	0	3.24
Replacement of 40Nos. 125Watt HPMV by 30/45Watt LED , 20 Nos. 150Watt HPSV by 60Watt LED & 25 Nos. 250Watt HPSV by 90Watt LED	0.58	0.33	1.65	0	0	1.65
Packer no-1,2,3,4,5 &6 RBC no 5 merged with bag cleaning belt , reduction in one drive 0.75 kW	0.29	0.28	1.4	0	0	1.4
Total	**211.63**	**44.68**	**233.9**	**0**	**0**	**233.9**

Energy saving projects implemented during FY 2019-20

Description of Energy Saving Projects implemented	Investment	Annual electrical savings		Annual Thermal savings tones		Total annual savings
	Rs Lakh	Units in lakh	Rs Lakh	Tones fuel	Rs Lakh	Rs Lakh
Energy Efficient Cooling Tower Fan (Cell No.-2)-WHR	3.1	0.78	4.28	0	0	4.28
Power saving in Line 3 compressor by high efficiency blasters from 150 liter to 75 liters and optimize the blasting	**0.0**	**3.97**	**21.88**	**0**	**0**	**21.88**
Compressed air power saving by reducing pressure setting from 6.6 bar to 5.5 bar in cooler and coal mills compressor K3X26.& connected to common header	0.0	2.54	13.97	0	0	13.97
Replacement of 125W HPMV/HPSV light by 35W & 70W LED light,250W HPMV/HPSV light by 90W, 135W & 200W LED light &80W, 72W & 36W Tube light by 24W & 18W LED light &15W CFL light by 250 Number 9W LED light	1.03	0.79	4.34	0	0	4.34
Power saving in pumps of Line-1 & 2 water optimization by replacing new pumps	0.0	0.97	5.35	0	0	5.35
Kiln-3 Cooler ESP 2nd & 3rd filed Current optimization	0.0	1.15	6.35	0	0	6.35

Energy saving projects implemented during FY 2019-20

Description of Energy Saving Projects implemented	Investment	Annual electrical savings		Annual Thermal savings tones		Total annual savings
	Rs Lakh	Units in lakh	Rs Lakh	Tones fuel	Rs Lakh	Rs Lakh
Coal Mill-1 & 2 optimization by grinding media degradation, folaphone and auxiliary furnace.	**0.0**	**7.27**	**40.05**	**0**	**0**	**40.05**
Optimization of Kiln 1 & 2 bag house fan power by reducing SG gas fan outlet draught with PID logic (-25 mmwg to -10 mmwg)	0.0	1.84	10.13	0	0	10.13
Coal Mill 3 & 4 optimization of Auxiliary equipment auto stop time (15 min to 5 min after MD stoppage)	0.0	1.03	5.65	0	0	5.65
WHRS power generation saving by increasing speed of mid cooler fans & optimizing last fans	**0.0**	**59.45**	**327.59**	**0**	**0**	**327.59**
Cooler Fan-1,2 & 3 Silencer removal to reduce pressure drop	**0.0**	**6.10**	**33.60**	**0**	**0**	**33.60**
Installation of Roller press with CM-4 in combo circuit for Cement grinding	**1045**	**293.49**	**1617.11**	**0**	**0**	**1617.11**
Total	**1049**	**379**	**2090**	**0**	**0**	**2090**

Energy saving projects implemented during FY 2020-21

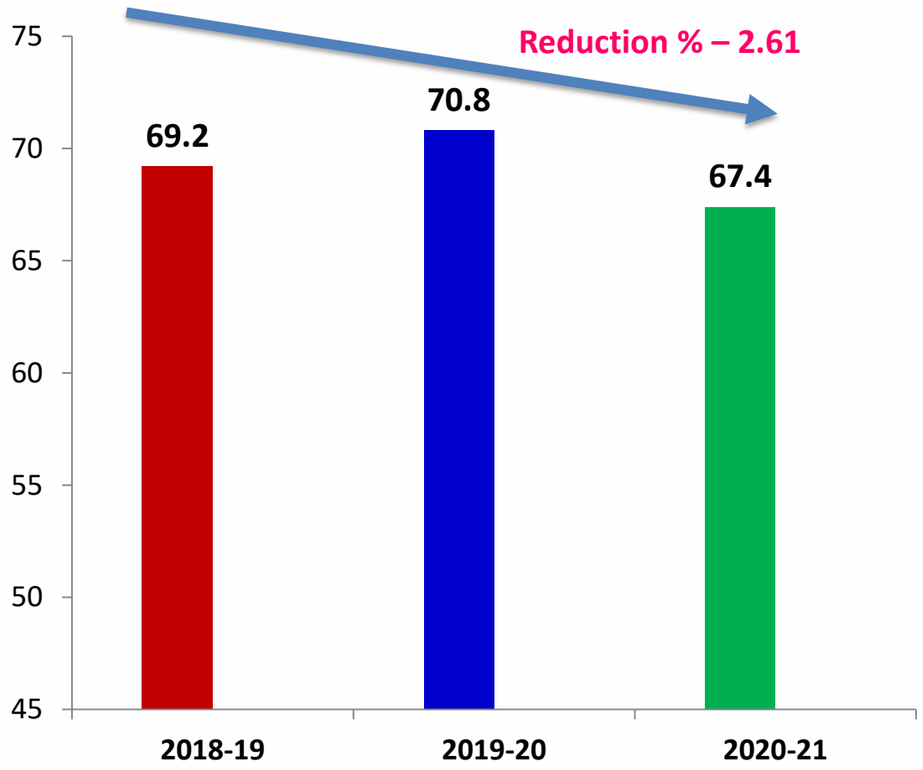
Description of Energy Saving Projects implemented	Investment	Annual electrical savings		Annual Thermal savings tones		Total annual savings
	Rs Lakh	Units in lakh	Rs Lakh	Tones fuel	Rs Lakh	Rs Lakh
Kiln-3 Cooler Fans (8,9,10) 3 no's pressure drop reduction by removing silencer	0.0	0.86	18.0	0	0	18.0
Compressor power saving through reduction in pressure of control air for dust filters,CF silo and preheater from 6.5 to 5.5 bar	0.0	2.92	14.6	0	0	14.6
Maliyakhera Crusher , Transportation Group Interlock with timer & Made bag filters into DP mode	**0.0**	**4.96**	**24.8**	**0**	**0**	**24.8**
Packing Plant S/C P1J01 Motor replacement (110 KW to 55 KW)	**0.5**	1.95	9.76	0	0	9.76
Cooler fan 09 & 10 replacement with high efficiency impeller		2.76	13.8	0	0	13.8
HRP Bag filter FN188 and FN183 VFD installation done	**8.0**	0.86	4.30	0	0	4.30
Separator sealing gap reduced & productivity increase in RM-4(Oct'20).	**0.0**	**4.58**	**22.9**	**0**	**0**	**22.9**
Total	**8.5**	**18.9**	**108.2**	**0**	**0**	**108.2**

Summary of Energy saving during FY 2018-21

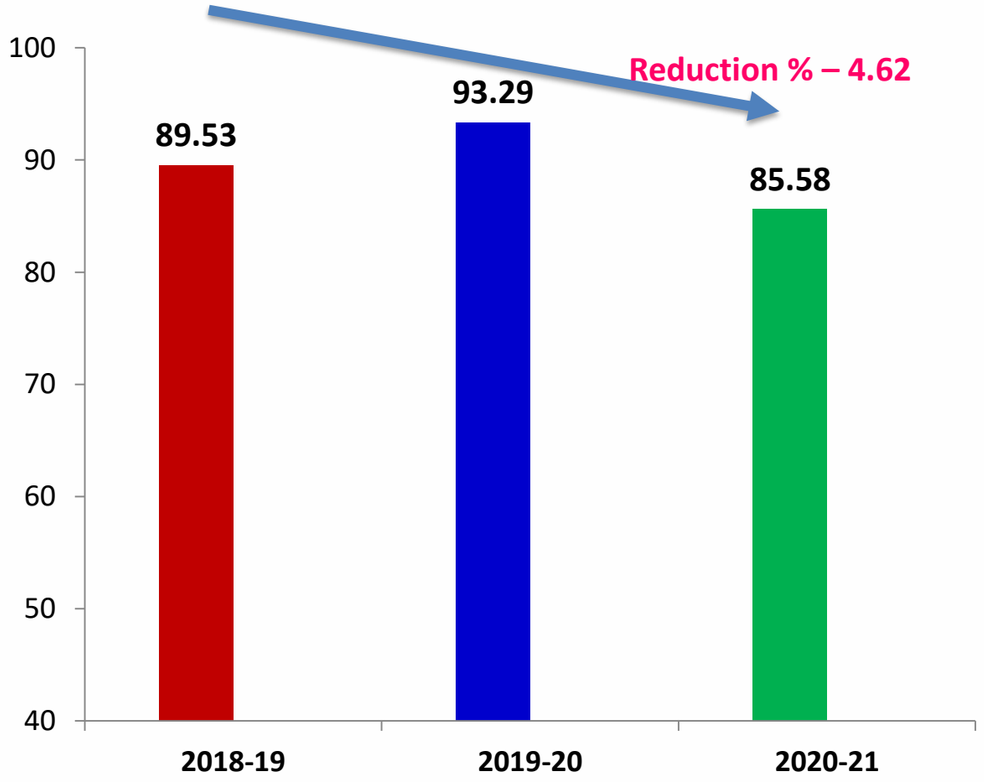
Year	Investment	Annual electrical savings		Annual Thermal savings tones		Total annual savings
	Rs Lakh	Units in lakh	Rs Lakh	Tones fuel	Rs Lakh	Rs Lakh
2018-19	211.6	44.68	233.9	0	0	233.9
2019-20	1049	379	2090	0	0	2090
2020-21	8.5	18.90	108.2	0	0	108.2
Total	**1269.1**	**442.6**	**2432.1**	**0**	**0**	**2432.1**

Specific power consumption

Specific power consumption
kWh/T of Clinker



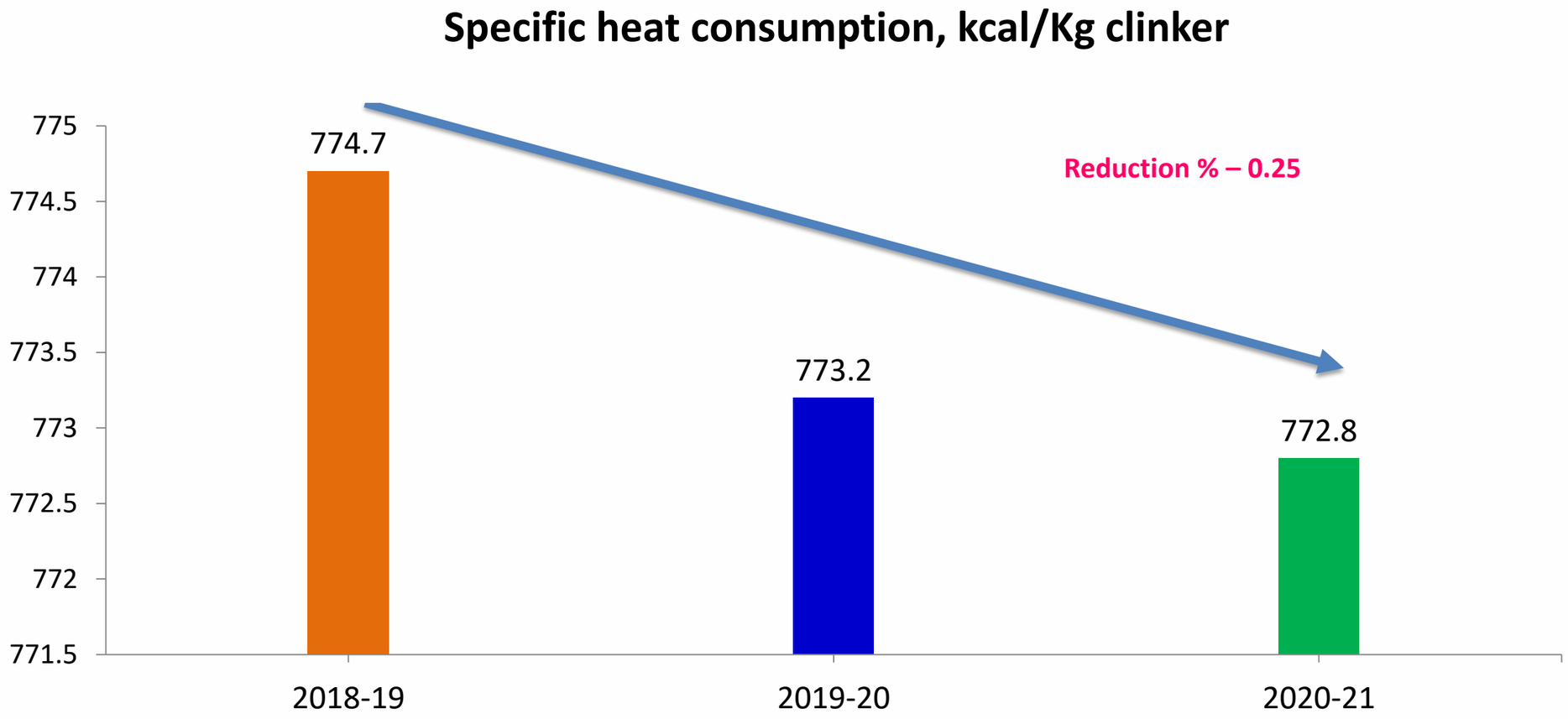
Specific power consumption
kWh/T of Cement



- **The power consumption includes idle power of the plant due to COVID-19 & Pollution control equipment's. (3775000 units)**

  Target by 2021-22 : 52 kWh/T of cement after K-3 upgradation.

Specific Heat Consumption



- The includes number of heat up ,light up fuel, Alternative fuel utilization & pet coke fuel.
- K-1 & K-2 Number of startups due to market demand
- Thermal energy higher side due to kiln-1 & kiln-2 suspension type preheater planetry type cooler kilns.
- Target by 2021-22 : 700 kcal/Kg clinker after K-3 upgradation.

Global norms/Bench mark Data & Competitors

Comparison with Global Benchmark Data

Specific energy consumption	JK NBH Achieved	National bench mark	International bench mark
Thermal - Kcal/Kg clinker	772	675	660
Electrical-kWh/T of cement	85.6	61.5	59.5

Comparison with nearest competitors

Specific energy consumption			
Thermal - Kcal/Kg clinker	675 (UTCL-Kotputli)	685 (JK-Mangrol)	691(JK-Muddapur)
Electrical-kWh/T of cement	61.5 (OCL-Chittapur)	66.3(JK-Mangrol)	65.6(JK-Muddapur)

Energy Conservation Project to Achieve Bench Mark In Next Two Years

Energy Conservation Projects planned 2021-22 & 2022-23

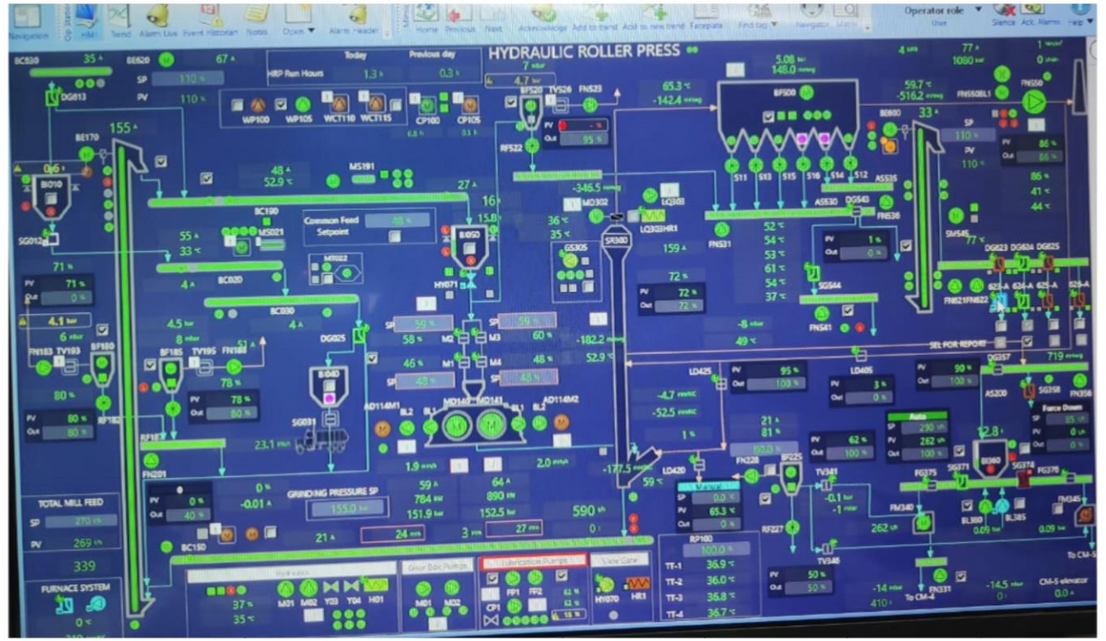
S.No	Description of project	Annual Electrical energy saving, million kWh	Annual Thermal energy saving, million kcal	Investment in Million Rs
1	Kiln-3 Upgradation	7.92	41.0	2000
2	Raw mill-3 upgradation	15.25	0	800
3	Coal mill-3 upgradation	3.00	0	300
4	Compressor upgradation	1.65	0	15
5	Cement mill-4 fan speed optimization	3.92	0	0
6	Cement mill-3 grinding media & fan speed optimization	1.21	0	0
7	Cement mill-2 grinding media & separator fan speed optimization	0.26	0	0
8	Cement mill-3 & 4 conveying system modification to Mechanical	0.84	0	120
9	Stacker & reclaimer for Fuel feeding system	0.49	42.47	150
10	Stacker & reclaimer for Additives feeding	0.98	0.00	250
	Total savings in units	**35.5**	**83.5**	**3635**
	Total savings in Rs (Crore)	**195.3**	**108.5**	

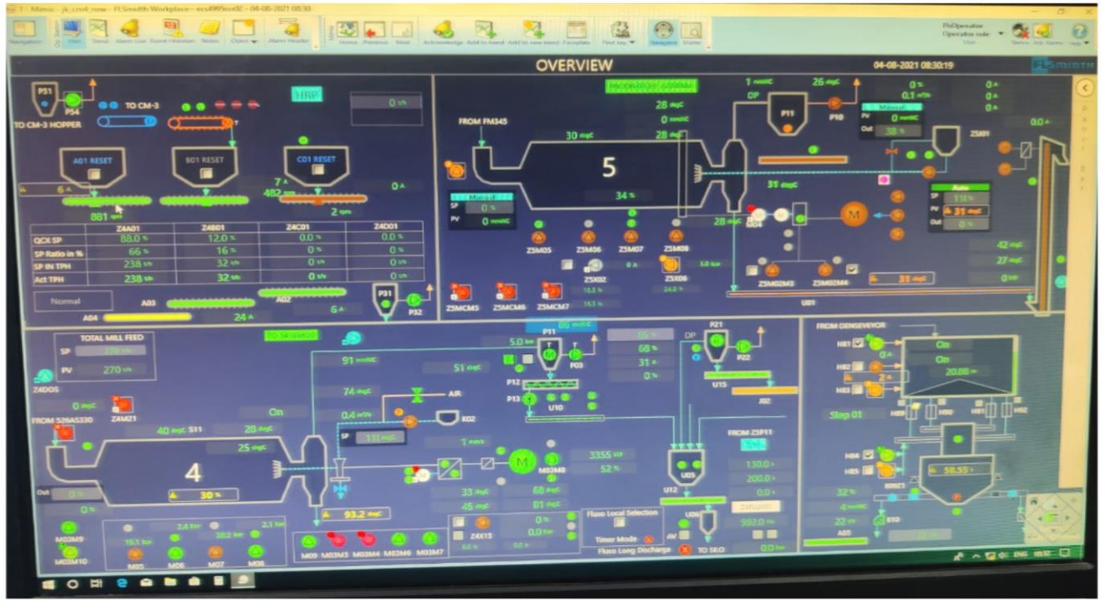
Innovative projects

Cement Mill-4 B.E VFD : Innovative project-1

Need for the project:-

- ✓ Mill having complex combo circuit with total 5 B.E with two ball mills in combo.
- ✓ Mill stoppage frequent due to B.E load high.
- ✓ Mill reliability not up to the level.
- ✓ Mill operation not able to optimize due to frequent stoppages
- ✓ Mill specific power consumption was high.
- ✓ Dispatch hampering as the mill capacity is high @ 290 TPH in OPC & 320 TPH in PPC





Cement Mill-4 B.E VFD : Innovative project-1

Particulars	Advantages	Saving
Elevator BE170	More reject from HRP static separator can be handle hence fresh feed can be increased and during flashing tripping can be avoided	Approx. 5.0 Lac saving after VFD installation Saving of approx. 0.20 Kw/MT of cement (PPC)
Elevator BE600	Avoid any tripping due to sudden material flashing from bag house (MTBF increase)	
Elevator BE240	Mill feed increased up to certain level (2-4 TPH) in case of PPC grinding and frequent tripping reduced of overload	Approx. 4.0 Lac saving after VFD installation Saving of approx. 0.20 Kw/MT of cement (PPC)
DBC U4J07	CM-4 (HRP) clinker hopper empty stoppage avoided	Running load 55-60 amp Saving = 70.26 KW/day Saving (INR) = 386.43 Rs/day Saving = 127521 Rs/annum Basis:- Approx. 2 hrs. per day running of DBC reduced, 5.5 Rs/Kw and 330 day running

Cement Mill-4 B.E VFD : Innovative project-1

Advantage after modification:-

- Mill stoppage due to bucket elevator was reduced from 103 to 11 .
- Mill production increase after installation VFD in bucket elevators.

- **Results achieved:-**

- Mill Output increased approx. 5 TPH.
- Reliability of Cement mill (HRP) increased.
- Specific power reduced 0.5 to 0.8 Kwh/T PPC cement.

Saving due to increase productivity =**0.2*300*24*5.5*330=19.96 lakhs**

Saving due to reduce stoppage = 92*1648*5.5= 8.34

Total saving achieved in a year =28.3 Lakh/year

Red mud Mixing in LS pile :Innovative project-2

RED MUD MIXING IN LIME STONE PILE TO USE HIGH SULPHUR PET COKE

Need for the project:-

- Started using high sulfur pet coke.
- Facing problem of coating in smoke chamber & raiser ducts.
- To neutralize the Sulphur content in pet coke need red mud (rich in alkali).
- Kiln not in stable operation.
- Cyclone jamming issue
- Silica content in lime stone is higher.
- Only one hopper available for additives cause jamming issue due to fine &high moisture.

Red mud Mixing in LS pile :Innovative project-2

Additive spreading on stock pile

Advantage of using Red mud in raw mix

- High sulfur pet coke consumption.
- Low grade limestone utilization.
- Kiln stable operation with increase in production.
- Reduced raw mix and fuel cost.
- With mixing in lime stone pile, there is no jamming in chutes/hopper.
- Quality of raw mix & Clinker is consistence.
- Increase in mines life by using low grade LS

Savings achieved (2020-21)

Clinker realization cost 650 Rs/T clinker

Benefits in clinker production 100 MTD

Savings : 100*330*650= 214.5 Lacs

Specific heat savings =1 *330*5000*1.35=22.28 Lacs

Total savings=236.78 Lacs

WS PPC CEMENT MANUFACTURE

Need fir the project

- New technology development.
- Water Repellent Hydraulic Cement (resistance to water permeation/seepage in mortar and concrete).
- Uses less clinker for cement manufacturing.

Challenges faced

- Product launch & market response.
- Storage in separate silo.

PPC-WS Innovative project-3

S.NO	SAMPLE TEST TYPE	[UOM]	TEST RESULTS	REQUIRMENT as per IS 1489:2015	IS METHOD
1	LOI (% by mass)	[%]	1.98	Max. 5.0	IS: 4032:1985
2	Insoluble Residue (% by mass)	[%]	25.80	X+4.0(100- X)/100 Max. & 0.6X Min	IS: 4032:1985
3	SO3 (% by mass)	[%]	2.17	Max. 3.5	IS: 4032:1985
4	MgO (% by mass)	[%]	0.81	Max. 6.0	IS: 4032:1985
5	Na2O** (%)	[%]	0.12	-	IS: 4032:1985
6	K2O** (%)	[%]	0.45	-	IS: 4032:1985
7	Chloride (% by mass)	[%]	0.027	Max. 0.1	IS: 4032:1985
8	Pozzolana Mixing ** (%)	[%]	28.00	Min. 15 & Max. 35	IS: 4032:1985
1	Fineness (M2/Kg)	[M2/Kg]	385.00	Min. 300	IS: 4031 P-2: 1999
2	Standard Consistency (%)	[%]	31.00	-	IS: 4031 P-4: 1988
3	Soundness				
	a Le-Chatelier (mm)	[mm]	1.00	Max. 10.0	IS: 4031 P-3: 1988
	b Autoclave Expansion (%)	[%]	0.02	Max. 0.8	IS: 4031 P-3: 1988
4	Setting time				
	a Initial Setting Time	[Minute]	150.00	Min. 30	IS: 4031 P-5: 1988
	b Final Setting Time	[Minute]	185.00	Max. 600	IS: 4031 P-5: 1988
5	Compressive Strength				
	a 3 Days (72 ± 1 Hrs.)	[Mpa]	26.00	Min. 16.0	IS: 4031 P-6: 1988
	b 7 Days (168 ± 2 Hrs.)	[Mpa]	35.50	Min. 22.0	IS: 4031 P-6: 1988
	c 28 Days (672 ± 4 Hrs.)	[Mpa]	53.00	Min. 33.0	IS: 4031 P-6: 1988
6	Drying Shrinkage ** (%)	[%]	U/T	Max. 0.15	IS: 4031 P-10: 1988

PPC-WS Innovative project-3

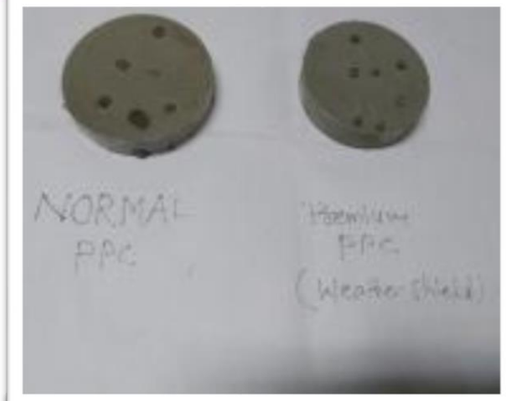
NEW PRODUCT DEVELOPMENTJK SUPER STRONG “Weather Shield”

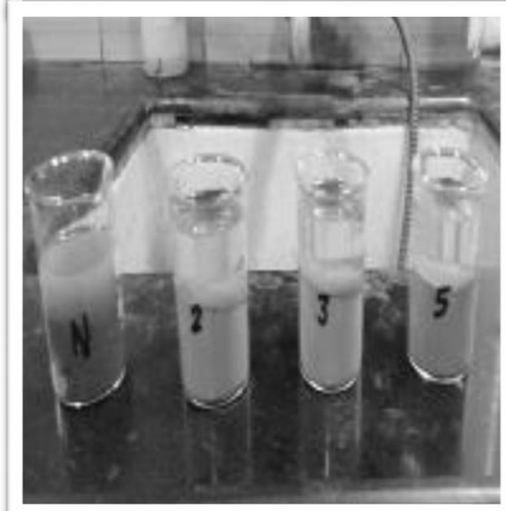
JK Super Strong- Weather Shield is a **Water Repellent Hydraulic Cement having** an **integral Water repellent property at the cement particle level, PWRT (P**article level **W**ater **R**epellent **T**echnology), due to which it **exhibits resistance to penetration of water in a mortar, plaster & Concrete .**

This property is incorporated on the Cement Particles during its manufacturing process through in house developed technology by improving the particle size distribution and fineness. The Cement particles react with water and subsequently repel water resulting in resistance to water permeation/seepage in mortar and concrete

The JKSS-Weather Shield, Cement developed is unique. The cement has intrinsic properties to **resist** water seepage. It is an Innovative solution to all problems of water seepage problems in wall masonry , foundations and walls .

It significantly reduces water permeation to concrete, which results in dry walls and healthy indoor climate, The Cement can be used in all applications like foundations, Masonry & Concrete making etc.





New HRP commissioning done with existing ball mill

Projects & Development

External clinker feeding system with covered shed & de-dusting system

Month	Clinker quantity	Saving in Lacs (35 rs@MT)
Feb-21	0	0
Mar-21	14123	4.94
Apr-21	14807	5.18
May-21	22986	8.05
Jun-21	26376	9.23
Jul-21	30170	10.56
TOTAL	108462	37.96

Projects & Development

Burner pipe Castable work Vertically

Burner pipe Tip ring & expansion gap provided to enhance refractory life

KILN-3 BURNER PIPE

Tip Ring Hard facing done to enhance life

New technologies adopted

CCX cyclone installed at preheater top cyclone-Latest Technology by FLS

SLC to ILC on ongoing modification with CCX cyclone & Specially design Calciner for AFR utilization

Fully automated PH1 Liquid AFR feeding system

Environmental Projects

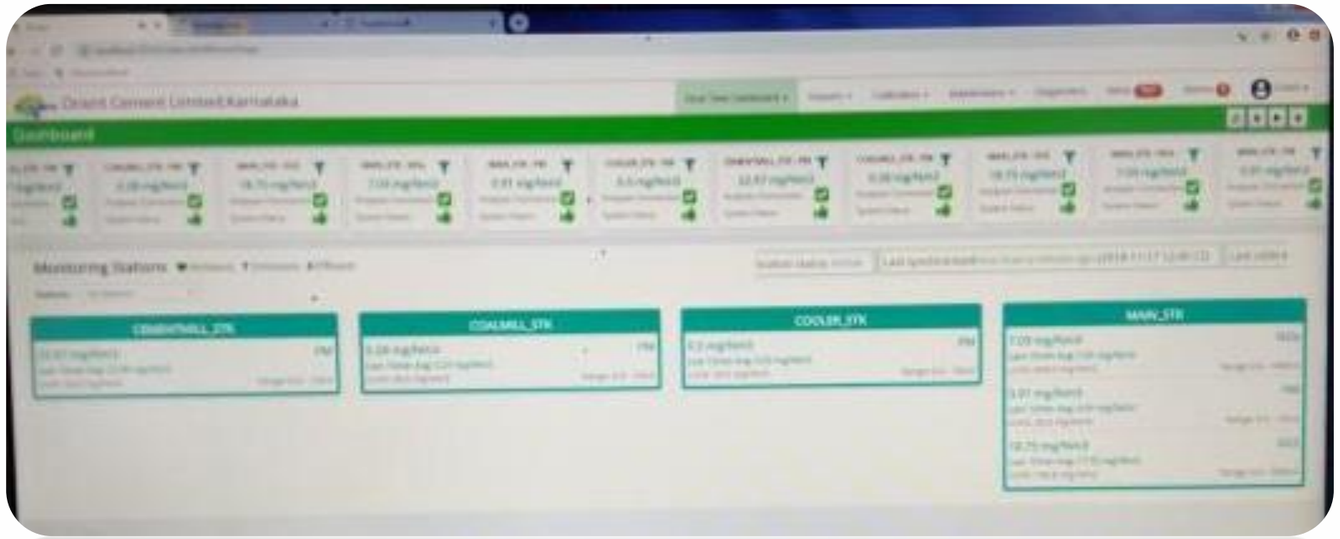
Location	Air pollution Control Device	Emission
Kilns + Raw mills	Bag house	< 30 mg/Nm3
Cooler	ESP	< 30mg/Nm3
Coal mill	Bag house	< 30mg/Nm3
Cement mills	Bag house	< 30 mg/Nm3
SNCR Project	Pyro process	< 800 mg/Nm3
No of small bag filter		73

Clean Technologies adopted

Location	Air pollution Control Device	Emission
Kilns + Raw mills	Bag house	< 30 mg/Nm3
Cooler	ESP	< 30mg/Nm3
Coal mill	Bag house	< 30mg/Nm3
Cement mills	Bag house	< 30 mg/Nm3
SNCR Project	Pyro process	< 800 mg/Nm3
No of small bag filter		73

Continuous Emission monitoring System in Main stack

Measuring analyzer



Control Room Display

Clean Technologies adopted

Kiln+RM bag house & Coal mill

Cooler ESP

SNCR SYSTEM

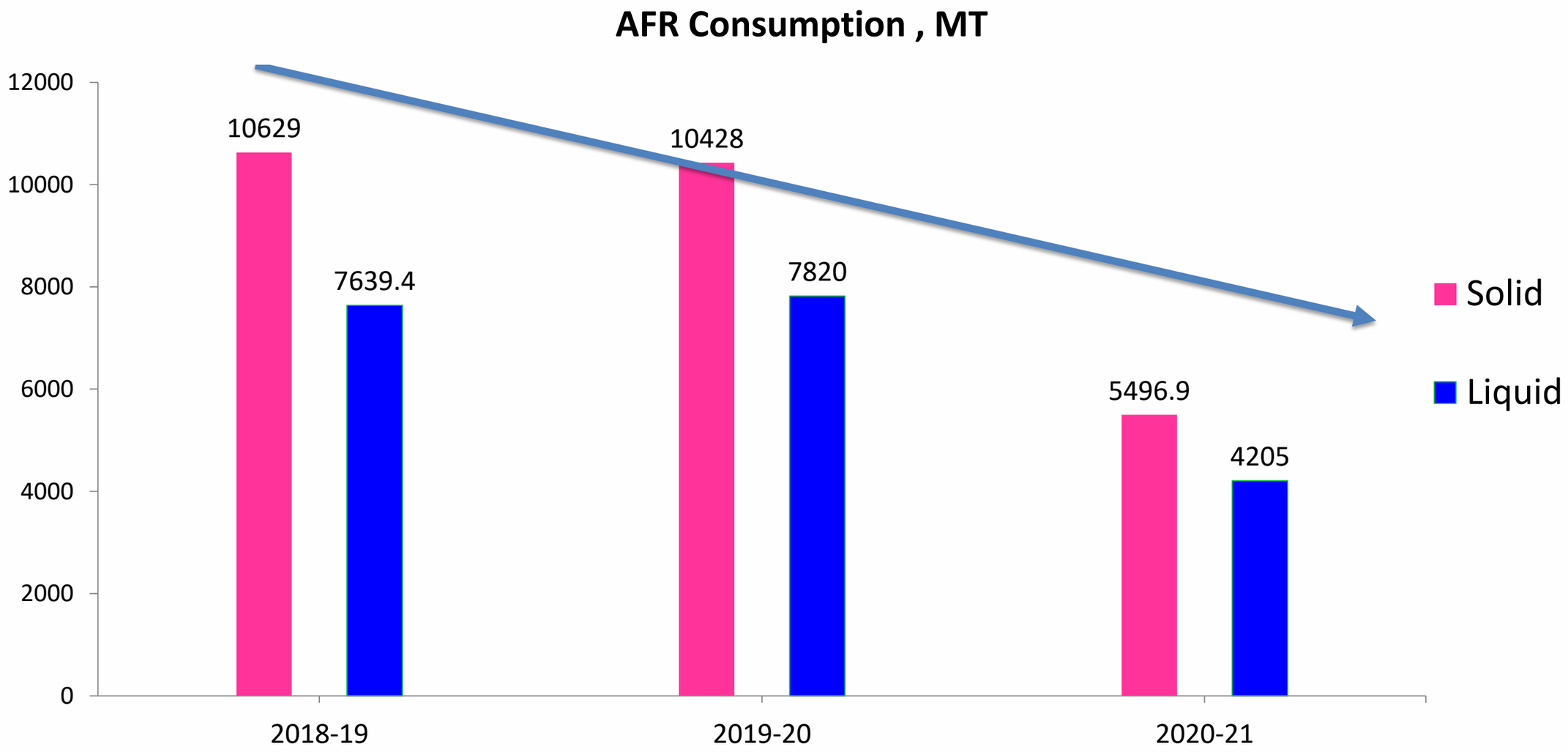
Cement mills-1,2&3

Cement Mill - 4

Alternative fuels uses

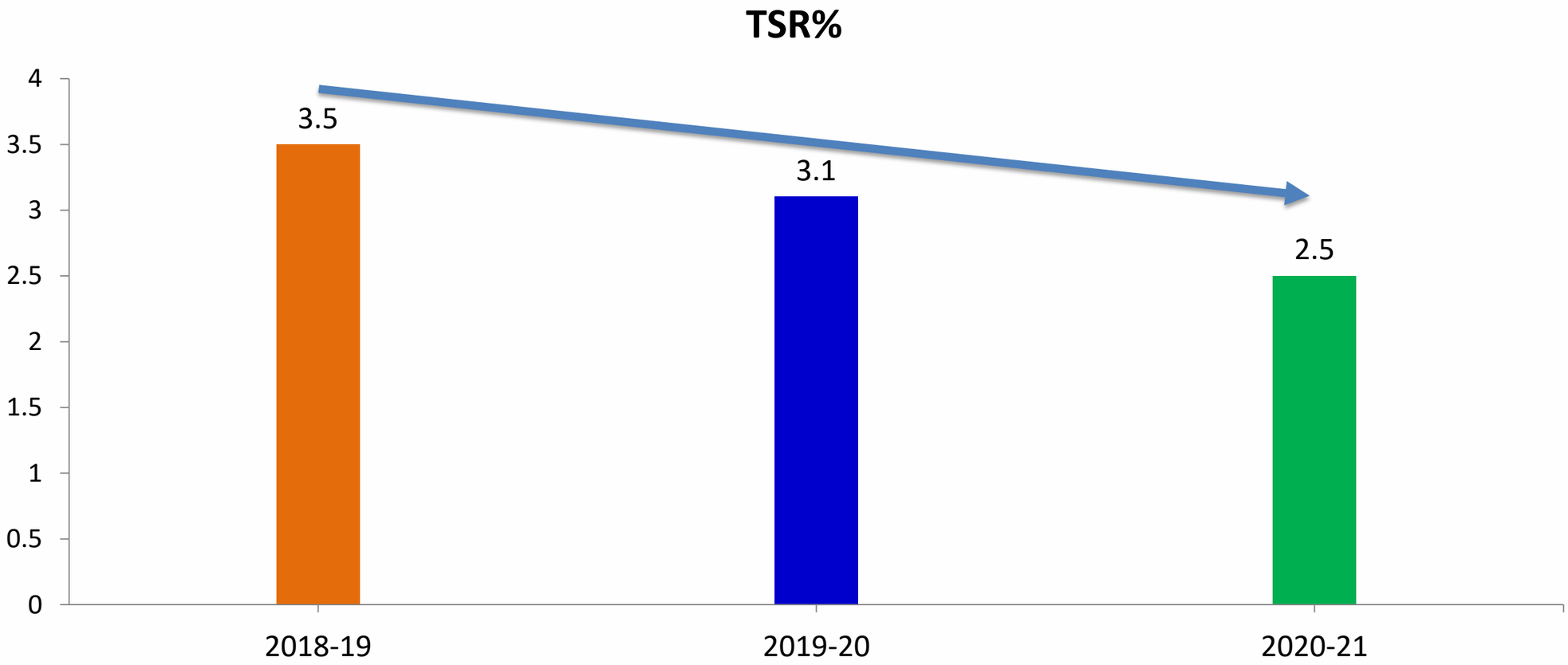
Alternate Fuel	FY 18-19	FY 19-20	FY 20-21
WASTE MIX LIQUID-HCV	1842	923	1902
WASTE MIX LIQUID-LCV	5978	3283	7340
Liquid AF (A)	**7820**	**4206**	**9242**
RDF	6297	737	138
FIBER MASS	0	170	70
WASTE MIX SOLID	168	3310	2601
PLASTIC WASTE	106	1182	1353
RDF-II	132	101	0
AGROWASTE	3926	3858	29
FMCG	0	266	370
CONTAMINATED PLASTIC WASTE	0	758	195
Cotton Waste	0	62	51
MSW	0	0	64
WASTE/RESIDUE	0	0	240
RUBBER DUST	0	0	153
EXPIRED PRODUCTS	0	0	7
INHOUSE COLLECTION	0	0	15
CHEMICAL SLUDGE	0	0	21
DISTILLATION RESIDUE	0	0	187
Solid AF (B)	**10629**	**10382**	**5497**
Total AF (A+B)	**18449**	**14588**	**14739**

AFR Consumption –Solid + Liquid



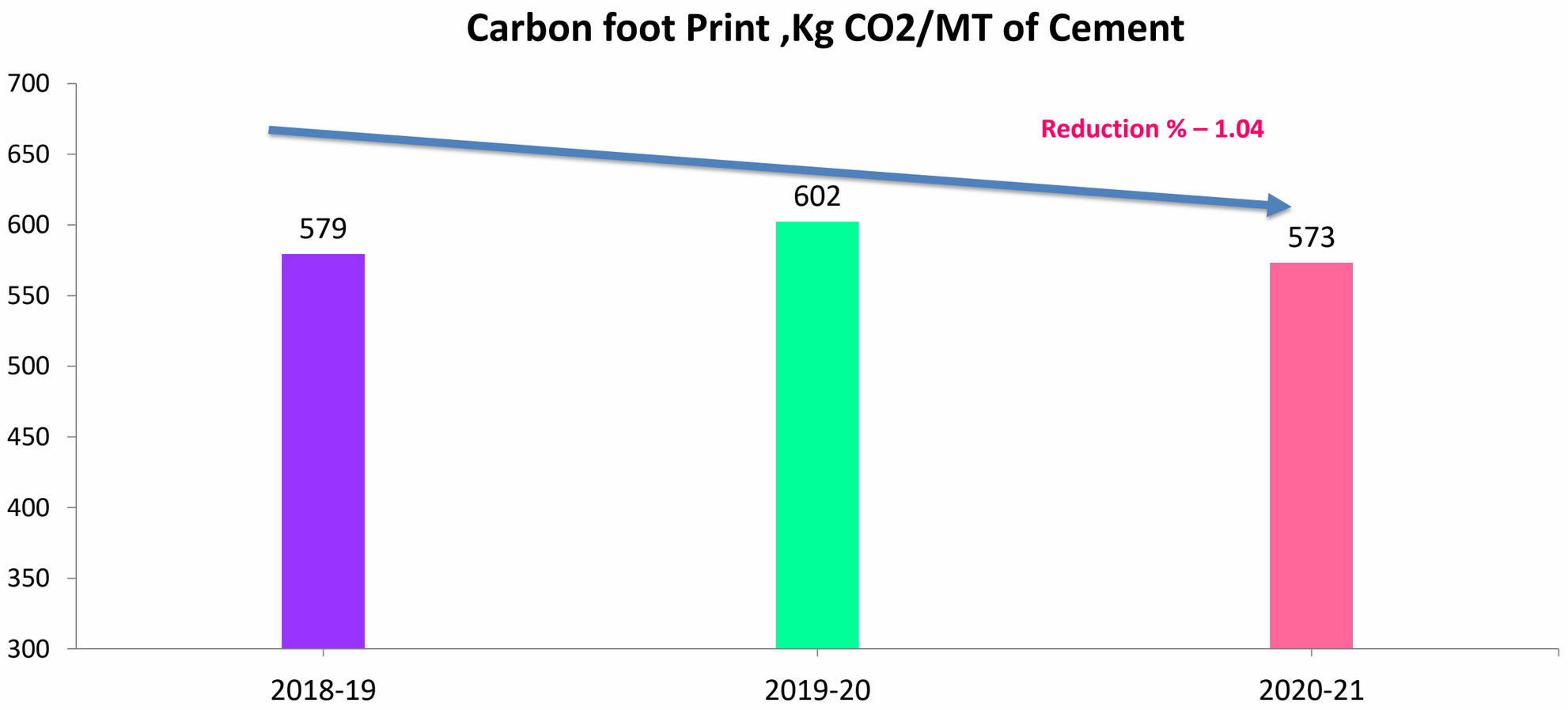
- **AFR consumption is equal in 2018-19 & 2019-20**
- **In 2020-21 AFR consumption low due to availability issue (COVID-19)**

Thermal Substitution Rate



- TSR consumption is less due to system constraint & LCV AFR consumption
- Kiln-3 project upgradation activities going on (May-21 to Sep-21)
- Kiln-1 & 2 there is no Provision for Solid AFR.
- Kiln-3 upgradation our TSR target is 25%.

Carbon foot print



- The includes number of heat up ,light up fuel, Alternative fuel utilization & pet coke fuel.
- Carbon foot print high in 2019-20 due to Kiln start & stop with COVID-Crisis
- Target of Carbon Foot print by 2024-25 : 500 with 20% TSR
- To maximize Blended & composite Cement.

Environmental Projects

Clinker Storage Shed

Limestone shed

Coal Shed

Covered belt conveyor

Pollution Abatement Measures

Rain Water Conservation / Harvesting

Mines Pit for Water harvesting Capacity: 500000 m3

Plant Water harvesting Capacity: 100000 m3

Green Belt Details

JK NBH has taken up green belt development plan as Shown Below.

Year	Factory & including colony plantation number (Area)	Mines plantation number (Area)	Total	Area Covered in Ha
2018-19	6483 (2.60 ha.)	3860 (2.71 ha.)	10343	5.31
2019-20	5382 (2.85 ha.)	3900 (2.8 ha.)	9282	5.65
2020-21	17684 (gap filling)	87992 (16.19 ha.)	105676	16.19

Total area covered under plantation in plant & colony is 34.92 %

The following species are being used for plantation:

Acacia, Neem, Tamarind, Honge trees, Eucalyptus, Ashok, Peepal tree, Hercules fermi, Gilmore tree, Subabul tree, Hatti tree, Concorpus(Dubai Tree) Feltoform, Bamboo, matti, badam, alstonia, keshiaseema, keshiya-java, mango, kaaljamun, amla, guava, cesalpinnia and others.

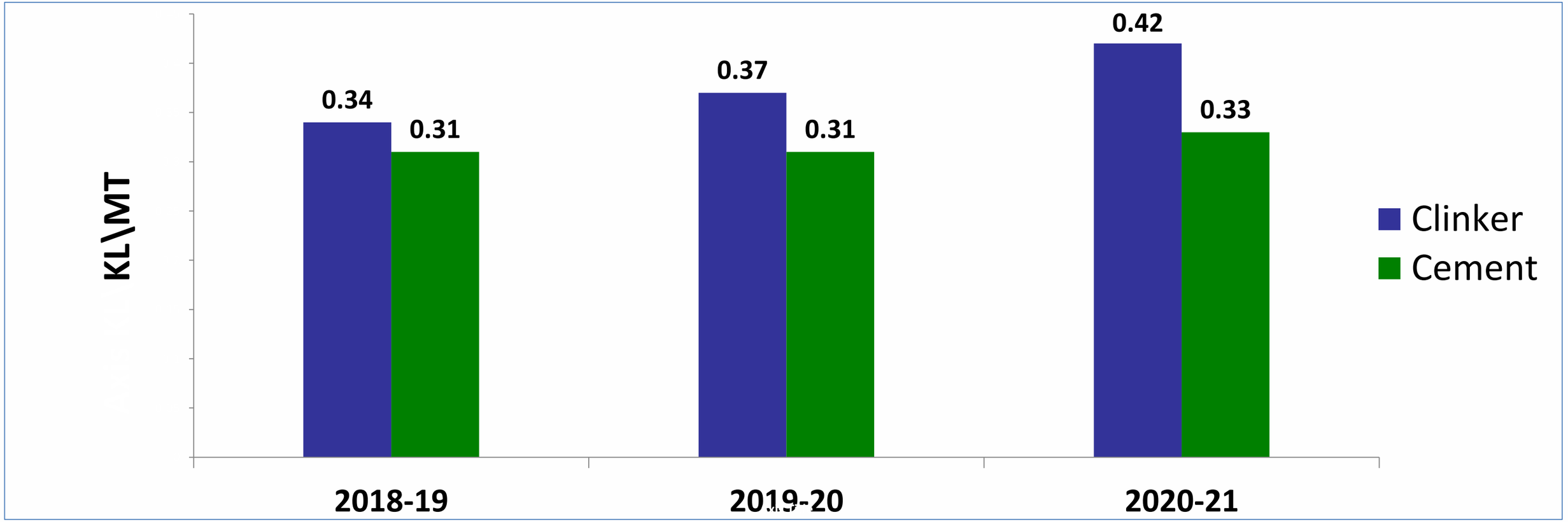
Green belt

Pollution Abatement Measures

6 No’s Sweeping vehicle deployment for plant road & colony cleaning.

Water Consumption

Name of the products	Process water consumption per unit of products (KL/MT) including water used for plantation & dust suppression		
	2018-19	2019-20	2020-21
Clinker	0.34	0.37	0.42
Cement	0.31	0.31	0.33



Water consumption target for FY 2022-23 : 0.15 KL/MT

Water Conservation Initiatives

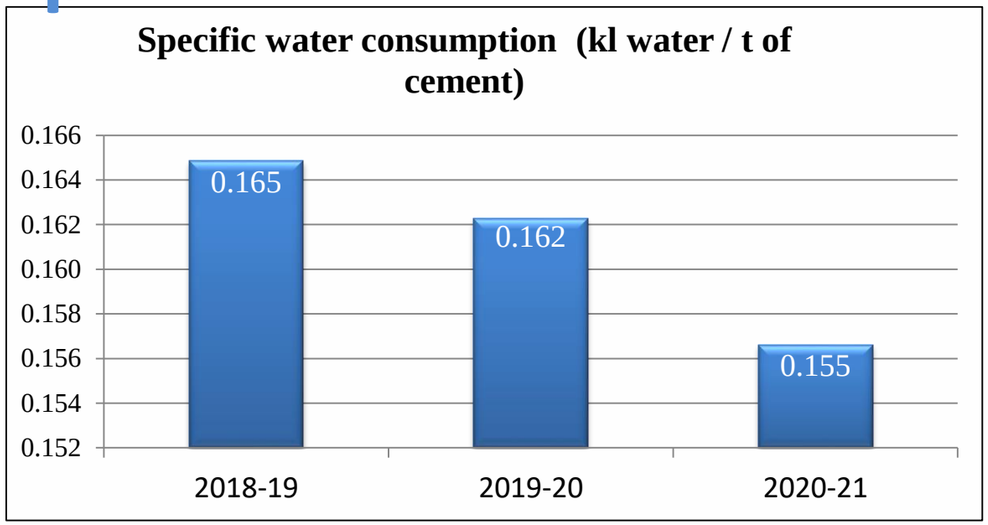
- Replacement of WHR Cooling tower WCC to ACC to reduce water consumption by 1600 KL/Day (Investment – 23 Cr)
- Rainwater collection in ponds and mine pits and use for plant activities to reduce ground water consumption
- STP for Plant and Colony
- Collection of rooftop and storm water to recharge the ground water through injection wells.
- Replacement of underground pipes with overhead pipes to deduct leakage easily and ensure leakage proof water storage tank.
- Drip irrigation system for plantation
- Auto sensors for wash basins at commercial buildings
- Digital water flow meter with telemetry system at each ground water withdrawal structure
- Ground water level measurement (piezometer)

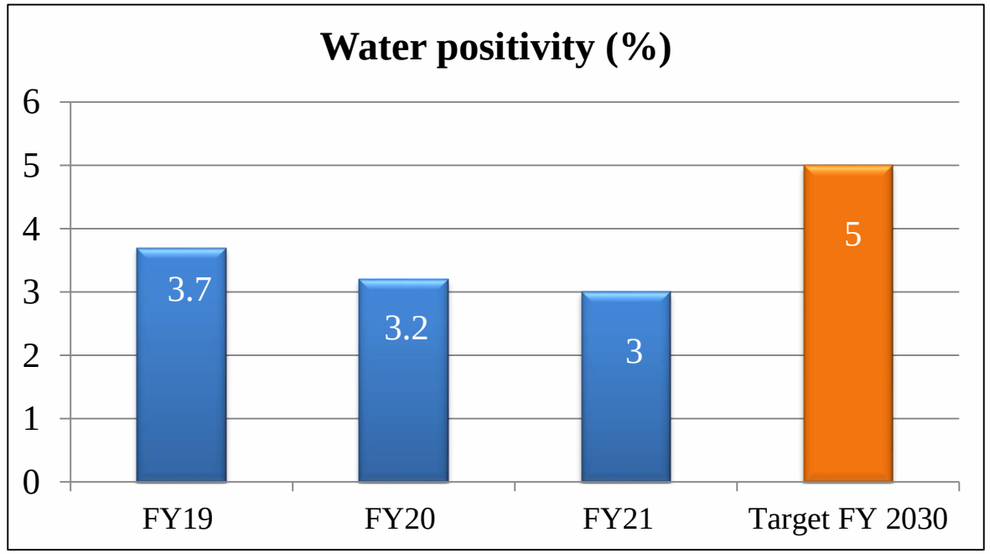
Natural Resources Management

Water Stewardship

FY'21 Initiatives

- Laid pipeline to lift rainwater collected in mines pits to reduce use of ground water.
- Installed additional Reed Bed Technology based STP of 90 KLD (55 + 35 KLD) at Nimbahera Colony.
- Canalised storm water to pond at Nimbahera Plant
- Replaced ball valves with push type taps to reduce leakage
- Arrested leakages across the plant and closed unwanted water points.
- Repaired and replaced all water storage tanks and pipelines to arrest the leakage/seepage.





Reduced because of low Rainfall

FY'22 Targets

- Conversion of water to air cooled system for WHRS at Nimbahera
- Use of City Sewage Water
- Installation of drip irrigation system

JKCement

The Solid Legacy of Trust

Bio-Sewage treatment plant for plant & Colony

Capacity : 35 KLD Plant & 55 KLD Colony

Environmental Projects

Environment Protection Expenses

S.NO	Description	Status	Investment In Lakhs
1	**SNCR system for NOx reduction**	Project completed FY 2017-18	200
2	**Alternative fuel feeding system - liquid**	Under commissioning	750
3	**Alternative fuel feeding system - solid**	Commercial offer received	1300
4	**Lime stone shed**	Project completed FY 2021-22	1200
5	**Solar power plant**	Project in progress & in operation by 2022	280
Total			**3730**

World Environment day Celebrations 2017-18

Plantation By Chief Guest Unit Head-Shri Rathore sir

World Environment day Awareness program

TEAM WORK EFFORTS MADE IN ENCON PROJECTS

Teamwork Efforts made in Encon Projects

S.No	Name of the Project	Source of En-Con Idea	Idea originated year	Extent of man power involved	Progress of implementation
1	Installation of screw compressor in place of reciprocating	Engineer	2018-2019	Engineers & team	Completed & section engineer
2	Energy Efficient Cooling Tower Fan (Cell No.-1)	Engineer	2018-2019	Manager, Engineer & team	Completed & section engineer
3	Installation of Flow control Diaphragm in Cement Mill-3	Engineer	2018-2019	Engineers & team	Completed & section engineer
4	Coal Mill-4 Oil Pump K4S04 (Motor replaced by IE3Motor, 3.7 KW)	Engineer	2018-2019	Engineers & team	Completed & section engineer
5	POWER SAVING IN MVD of Kiln-3 Cooler ESP Fan P22	Manager	2018-2019	Manager, Engineer & team	Completed & section engineer
6	De-rated Motor Replacement of Z2X02 (102) Compressor with VFD	Engineer	2018-2019	Engineers & team	Completed & section engineer
7	MCWP-3 Impeller ceramic Coating	Foremen	2018-2019	Engineers & team	Completed & section engineer

Teamwork Efforts made in Encon Projects

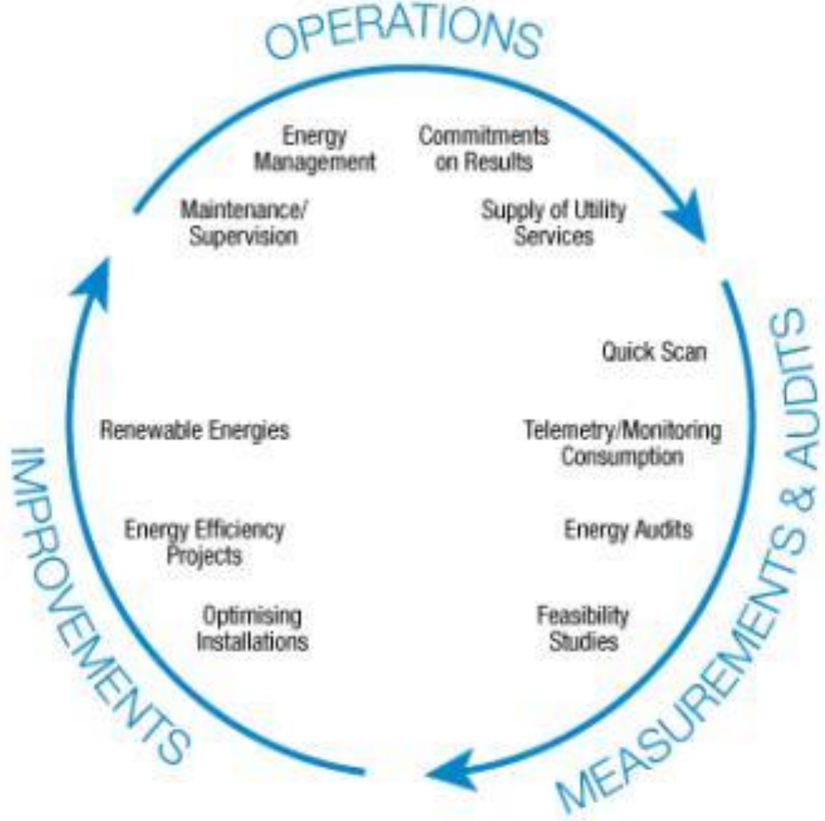
S.No	Name of the Project	Source of En-Con Idea	Idea originated year	Extent of man power involved	Progress of implementation
1	WHRS power generation saving	Manager	2019-2020	Manager,Engineers & team	Completed & section engineer
2	Replacement of 125W HPMV/HPSV light by 35W & 70W LED light,250W HPMV/HPSV light by 90W, 135W & 200W LED light &80W, 72W & 36W Tube light by 24W & 18W LED light &15W CFL light by 250 Number 9W LED light	Engineer	2019-2020	Engineers & team	Completed & section engineer
3	Energy Efficient Cooling Tower Fan (Cell No.-2)	Engineer	2019-2020	Manager, Engineer & team	Completed & section engineer
4	Cooler Fan-1,2,3 & 10 Silencer removal.	Engineer	2019-2020	Engineers & team	Completed & section engineer
5	Compressed air power saving by reducing pressure setting from 6.6 bat to 5.5 bar in cooler and coal mills compressor K3X26.& connected to common header	Engineer	2019-2020	Engineers & team	Completed & section engineer

Teamwork Efforts made in Encon Projects

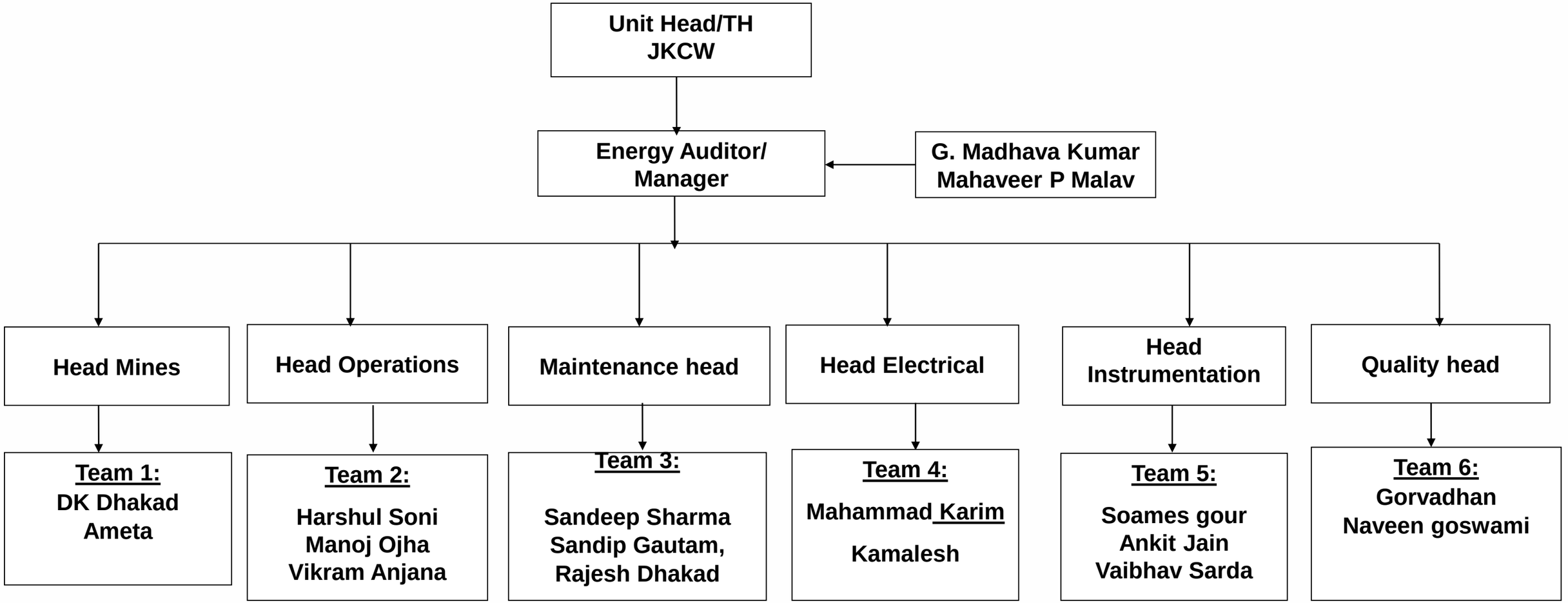
S.No	Name of the Project	Source of En-Con Idea	Idea originated year	Extent of man power involved	Progress of implementation
1	Reduce idle running of Coal mill -3 & 4 auxiliary by group start of equipment's	Operator	2020-21	Engineers & team	Completed & section engineer
2	Kiln-3 Cooler Fans 3 nos pressure drop reduction	Engineer	2020-21	Engineers & team	Completed & section engineer
3	LS crusher implementing single start logic	Operator	2020-21	Engineers & team	Completed & section engineer
4	HRP Bag filter FN188 and FN183 VFD installation done	Engineer	2020-21	Engineers & team	Completed & section engineer
5	Through Separator sealing work completed in RM-4(Oct'20)	Process Engineer	2020-21	Engineers & team	Completed & section engineer
6	Maliyakhera Crusher , Transportation Group Interlock with timer & Made bag filters Dp mode	Engineer	2020-21	Engineers & team	Completed & section engineer

Elements of Energy Management System

- Plant has equipped with Knowledge management system supplied by FLS.
- Each section has individual equipment specific energy report.
- Data used for study of energy performance.
- Report will send to concern section in charges & UH.
- The daily specific power & heat reviewed by HOD,TH & UH.
- Daily basis cost impact also reviewed TH,UH & MH



Energy Management Cell



Energy Management Activities of Plan

- Plant had a team of Energy management activities in the plant called “Energy Management Cell”
- The coordinator for the Energy management cell is Energy Manager.
- The team is chaired by Unit head/TH.
- Ideas generation from the all the employees through **“Vishwakarma project “**
- The members in the team will continuously monitor the day to day energy consumption of all major energy consuming equipment's in the plant.
- **‘Vishwakarma project’** weekly review by Unit head and Technical head followed by action plan.

Energy Management Activities of Plan

Review in the Dept wise

Review in Production meeting

Energy Management Policy

ENERGY MANAGEMENT POLICY

We, at JK Cement Works, Nimbahera are Committed to Demonstrate the Excellence in Energy Management in all our activities of Cement Manufacturing on Continual basis so as to make our Operations Environmentally Sustainable.

We are improving energy efficiency & conservation By:-

- *We have implemented ISO 9001:50001, Energy Management System in our Organization.*
- *Establishing a framework for setting energy objectives and targets through effective energy management cell with certified energy managers*
- *Reviewing, Monitoring and Analyzing Energy consumption and Bench marking Performances and set new targets*
- *Conducting audits for improvement of overall Energy Efficiency of the plant.*
- *Purchasing equipment and appliances with consideration of the Bureau of Energy Efficiency Star Ratings and Energy Efficiency.*
- *Using alternative fuels which helps the Environment also directly / indirectly to protect natural resources.*
- *Ensuring Energy Conservation, Management and Awareness throughout the Organization.*
- *Always complying with relevant and applicable Laws and Regulations.*
- *Maximizing Generation of Waste Heat Recovery Power & Solar Power in our Organization.*
- *We have collaborated with EESL (Energy Efficiency Service Limited), Govt. of India for improving Energy Efficiency in our Organization.*

To Promote Energy Conservation & Energy Savings Propagate Awareness amongst all employees and Stack Holders

21st November 2019

S.K. Rathore
President (Operation & Unit Head)

JK Cement LTD.

Power Saving & Reliability -Projects

- Up gradation of motor with High efficiency motor like IE3 & IE4.
- VFD for various drive in cement mill section.
- Optimization of cooler for increase in WHR power generation.
- Increasing fly ash from 30% to 33% in PPC with optimized clinker quality.
- For better understanding of operators thermal energy consumption incorporated in CCR mimic and same type for SPC will implemented for mills section and pyro section.
- Implementing single start logic in mill sections for power saving.
- Cement mill section running planned in night shift to consume low cost power.
- Various conveyor start stop time optimization logic implemented for power saving.
- Replacement of low efficiency fan to higher efficiency fan

TECHNOLOGY ADOPTION IN NEW PROJECT

We at JK cement are also adapting the new technology. Our last commissioned as well as upcoming plant is equipped with

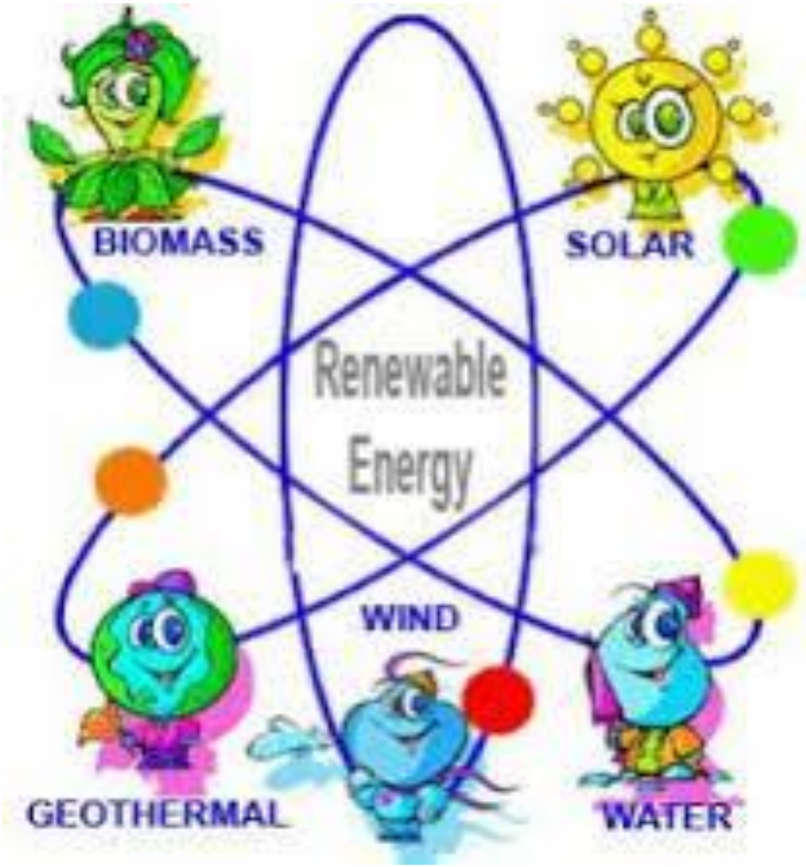
- Raw mill - Roller Press in finished Mode technology

- Pyro process- Inline Calciner, 5 stage PH with Counter current cyclone – CCX (expected to give advantage of almost 6 stage PH. NOx values expected to be below 800 mg/Nm3. Up to clinker SPC 51 kWh/t.

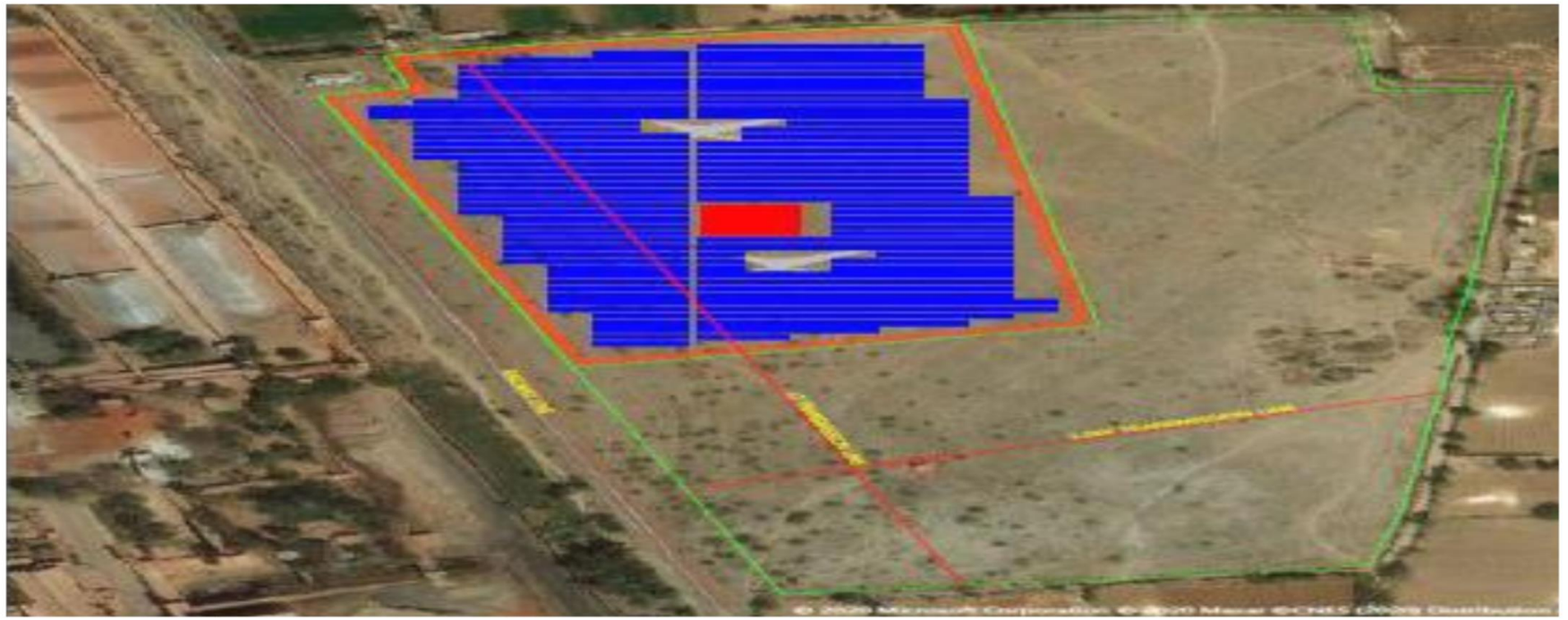
- Coal Mill – VRM (ATOX)
- Cement Grinding – Roller press Combo Circuit, 26.4 kWh/t OPC 43 G.
- Grinding Units: - VRM for cement grinding

- OLBC (Over land belt Conveyor) for limestone transportation from Mines to NBH after Mangrol plant work done.

REPLACEMENT OF THERMAL & ELECTRICAL ENERGY WITH RENEWABLE ENERGY



Proposed Nimbahera Solar Power Plant



Capacity Layout: Nimbahera, Chittorgarh Dist, Rajasthan

-Plant Capacity (kWp)- 7,011.5

Area required -19.5 acres Evacuation Voltage-11 kV

SAVING FROM SOLAR PROJECT

TARIFF STRUCTURE	CAPACITY (MWp)	Estimated Generation 1 Year(KWh)	Grid Tariff Rs./KWh	Saving Per Unit Rs./KWh	Estimated Saving in One Year with 11.096 MWp	Estimated Saving in One Year with Plant Load in PPA	Investment	Pay Back(Yrs.)
Option-1(OPEX)	11.096	1.945 Cr	6.30 2020-21	3.13	6.088 Cr	2.8 Cr	2.3 Cr	0.8
Option-2 (26 % Equity)				3.32	6.458 Cr			

NIMBAHERA: Post up-gradation, opportunity exists to set up 7 MW (DC) Solar Power Plant in behind the meter arrangement

Current scenario: Power Demand & Generation in NBH

- Total Demand (MW): 30.2
- In-house generation (MW): 28.2
- Power Deficit (MW): 2

Opportunity to setup Solar Power Plant

- Solar Capacity in DC (MW)[1]: 7
- Savings (Rs. Cr.): 2.8
- Investment (Rs. Cr.): 2.3
- Payback (Yrs): 0.8

Land near railway track finalized for the Nimbahera Solar Power Plant

Renewable Energy

- ✓ JK Cement committed & believed in suitable development in each & every aspect.

- ✓ At present we have Solar lighting in JK RTC of 30 kWh capacity , Car shed parking roof
  & Solar water heaters in company guest house.

Energy generated by JK RTC

FY 19-20	18190
FY 20-21	49710
Total	67900

- ✓ We have Waste heat recovery from PH & AQC with total capacity 13.2 MW after upgradation in will be 16.5 MW.

The 2030 Plan-Green Co

At JK Cement we believe that key to achieve the Millennium Sustainable Development Goals is to shift from present linear model to a climate-neutral circular economy and that Green innovation, awareness, responsible consumption, waste management and use of limited natural resources can create long-term prosperity. To do this, we have aligned our business model with UN's 2030 Agenda for Sustainable Development and committed SBTi for business ambitions which will help our business model to make net positive contributions to People, Planet and Stakeholders.

JKCement

Green Economy

&

Sustainable Growth

JKCL Journey of Sustainable Development

Consents

JKCL Sustainability Journey

At JK Cement, we have always integrated sustainability in our business strategy.

We are committed towards becoming a leader in sustainable work culture.

Our focus is to produce more with less.

We have recently aligned our business model with UN's 2030 agenda for Sustainable Development

We have committed SBTi for business ambitions for well below 2degC.

For 2030, our three-point sustainability goals are:

1. We will reduce specific direct net CO_2 emission from 593 to 465 kg CO_2/t of cement by 2030.
2. To improve water positivity from 3.2 to 5 times by 2030.
3. Increase 25% CSR beneficiaries by 2025

Renewable Energy & Climate Performance

- Green Power Targets
- RE/solar of 5 MWh Cap to install at Nimbahera in FY 2021-22.
- RE/solar of 13MWh Cap to install at Mangrol in FY 2021-22.
- 16MW WHRS to install at Muddapur in FY 2021-23
- RE power purchase/captive installation in energy mix to increase by minimum 5% annually to meet the 75% target by 2030.

Memberships & Associations

- Global Cement and Concrete Association (GCCA)
- Science Based Targets Initiative (SBTI)
- Carbon Disclosure Project (CDP)
- Cement Manufacturer's Association (CMA)
- Federation of Indian Chambers of Commerce and Industry (FICCI)

Certifications

Lloyd's Register

Current issue date: 9 October 2020
Expiry date: 1 August [illegible]
Certificate identity number: 10297535

Original approval(s):
ISO 14001 - 17 March 1999
ISO 45001 - 28 August 2018
ISO 50001 - 1 April 2016
ISO 9001 - 13 February 1995

Certificate of Approval

This is to certify that the Management System of:

J K Cement Works

(Unit of J K Cement Limited), Nimbahera, District - Chittorgarh, Rajasthan, 312617, India

has been approved by Lloyd's Register to the following standards:

ISO 14001:2015, ISO 45001:2018, ISO 50001:2018, ISO 9001:2015

Approval number(s): ISO 14001 – 0094438, ISO 45001 – 0062669, ISO 50001 – 00015281, ISO 9001 – 0094437

This certificate is valid only in association with the certificate schedule bearing the same number on which the locations applicable to this approval are listed.

The scope of this approval is applicable to:

Manufacture of ordinary Portland cements and blended cements. Mining operations at Ahirpura, Mallakhera and Karunda.

Luis Cunha

Area Operations Manager - SAMEA

Issued by: Lloyd's Register Quality Assurance Limited

Lloyd's Register

Certificate identity number: 10297535

Certificate Schedule

Location	Activities
(Unit of J K Cement Limited), Nimbahera, District - Chittorgarh, Rajasthan, 312617, India	ISO 14001:2015 Manufacture of ordinary Portland cements and blended cements. Mining operations at Ahirpura, Mallakhera and Karunda. ISO 45001:2018 Manufacture of ordinary Portland cements and blended cements. Mining operations at Ahirpura, Mallakhera and Karunda. ISO 50001:2018 Manufacture of ordinary Portland cements and blended cements. Mining operations at Ahirpura, Mallakhera and Karunda. ISO 9001:2015 Manufacture of ordinary Portland cements and blended cements. Mining operations at Ahirpura, Mallakhera and Karunda.
J.K. Cement Nimbahera, Limestone Mines, (Ahirpura Block), PO-Kailash Nagar, Tehsil- Nimbahera, Dist.-Chittorgarh, Rajasthan, 312 617, India	ISO 14001:2015 Open cast mining operations – Mechanised ISO 45001:2018 Open cast mining operations – Mechanised ISO 50001:2018 Open cast mining operations – Mechanised ISO 9001:2015 Open cast mining operations – Mechanised

Lloyd's Register

Certificate identity number: 10297535

Certificate Schedule

Location	Activities
JK Cement Works, Mallakhera Limestone Mines, Village - Mallakhera, PO-Pitalwas, Tehsil -Nimbahera, Distt. – Chittorgarh, Rajasthan, 312601, India	ISO 14001:2015 Open cast mining operations – Mechanised ISO 45001:2018 Open cast mining operations – Mechanised ISO 50001:2018 Open cast mining operations – Mechanised ISO 9001:2015 Open cast mining operations – Mechanised
J K Cement Works, Karunda Limestone Mines, Village & PO-Karunda, Tehsil- Nimbahera, Distt- Chittorgarh, Rajasthan, India	ISO 14001:2015 Open cast mining operations – Mechanised ISO 45001:2018 Open cast mining operations – Mechanised ISO 50001:2018 Open cast mining operations – Mechanised ISO 9001:2015 Open cast mining operations – Mechanised
J K Cement Works, Regional Training Centre (North), Kailash Nagar, Nimbahera, District Chittorgarh, Rajasthan, 312617, India	ISO 9001:2015 Delivery and Administration of Technical & Management training to industry professionals.

Trainings

2019-20

SNO	TITLE	NO. OF PARTICIPANT	VENUE	FACULTY	CATEGORY
1	LIFE MANAGEMENT AND MIND POWER	9	RTC	RTC FACULTY	MANAGEMENT
2	CREATIVITY & INNOVATIONS FOR LEADERS & MANAGERS OF CEMENT INDUSTRY	8	RTC	Mr.R.N KRISHNIA	MANAGEMENT
3	ADVANCED TRAINING PROGRAM ON ENERGY EFFEICIENCY	8	VIZAG	CII-HYD	MANAGEMENT
4	SAFETY IN SCAFOLFING	7	RTC	Mr. PAWAN SHARMA	OHS
5	AN ORIENTATION TO CEMENT MANUFACTURING PROCESS	7	RTC	RTC FACULTY	TECHNICAL
6	EMOTIONAL INTELLIGENCE	10	RTC	Mr. PRANAY KARNIK	MANAGEMENT
7	MANAGERIAL EFFECTIVENESS FOR SUPERIOR PERFORMANCE	7	RTC	Mr. J.K NAIR	MANAGEMENT
8	TRANSFORMING PEOPLE & BUSINESS	11	RTC	RTC FACULTY	MANAGEMENT
9	INTEGRATED MANAGEMENT FOR OPERATIONS/SAFETY MANAGERS	13	RTC	RTC FACULTY	OHS
10	AN ORIENTATION TO MANUFACTURING PROCESS	9	RTC	RTC FACULTY	TECHNICAL
11	TRAINING ON ISO 45001- HEALTH & SAFETY	14	RTC	RTC FACULTY	TECHNICAL
12	DISASTER & EMERGENCY RESPONSE PREPAREDNESS	15	RTC	RTC FACULTY	OHS
13	EFFECTIVE INTERVIEWING SKILLS	8	RTC	RTC FACULTY	MANAGEMENT
14	UNDERSTANDING SELF & ORGANISATION FOR MANAGERIAL EXCELLENCE	8	RTC	RTC FACULTY	MANAGEMENT

2020-21

S.NO	TITLE	NO. OF PARTICIPNTS	VENUE	FACULTY	CATEGORY
1	INCIDENT REPORTING, INVESTIGATION & CAPA	14	ONLINE	SHRI CHUN CHUN KUMAR	OHS
2	SAFE WORKING IN CORONA (COVID-19) RISK PERIOD	10	ONLINE	SHRI CHUN CHUN KUMAR	OHS
3	IMPACT OF RAW MIX DESIGN AND BURNABILTY ON CEMENT QUALITY	8	ONLINE	RTC FACULTY	TECHNICAL
4	ELECTRIC CIRCUIT BREAKER	10	ONLINE	RTC FACULTY	TECHNICAL
5	REFRESHER RAINING ON FIRST AID	12	ONLINE	Dr. S.K CHOUDHARY	OHS
6	TRAINING PROGRAM ON SNAKE BITE	17	ONLINE	Dr. S.K CHOUDHARY	OHS
7	TRAINING ON FIRST AID	16	ONLINE	Dr. S.K CHOUDHARY	OHS
8	TRAINING ON FIRST AID	19	ONLINE	Dr. S.K CHOUDHARY	OHS
9	SELECTION, USE, MAINTENANCE, REJECTION AND CARE OF PPEs	10	ONLINE	SHRI CHUN CHUN KUMAR	OHS
10	OPERATION & MAINTENANCE OF GEARBOX	10	ONLINE	RTC FACULTY	TECHNICAL
11	FIRST AID & FIRE SAFETY	12	RTC	REDCROSS SOCIETY-KOTA CHAPTER/ Dr. S.K CHOUDHARY	OHS
12	**FIRE WARDEN/ ERT TRAINING**	**11**	**RTC**	**RAMANUJ RAMAN TAHKUR / AJAY SRIVASTAVA**	**OHS**

CSR Activities (2019-20)

S.No.	CSR Project or activity identified (60-75 words)	Section in which the project is covered	Specify State and other	Amount Outlay
1	Construction of structures of Community interest like Community hall in Rural areas.	Community Welfare	Nimbahera,Rajasthan	741000
	Manpower hired for smooth working of CSR activities, Consutruction of Community Center, Providing Infrastructure at Railway Station & Public places. Weedicide spray, Organizing events for Swachta Abhiyan.	Community Welfare	Rajasthan,M.P	1940002
2	Providing Drinking water facilities for nearby villages. Activities like providing water by Water Tankers to nearby villages.	Drinking Water Arrangement	Rajasthan	1440590
3	Donation of Books to Educational institutions & Coaching classes in nearby villages for students of Rural areas.Setting up CCTV cameras at schools, Sponsorships & reimbursement of expenses on Coaching of students of rural areas at near by villages	Educational Charity	Rajasthan	2721965
4	Medical Checkup camps in nearby villages, distributed medicines & organised health awareness programs. Organising Eye camps, providing medicines & arrangement for surgical procedures. Providing facilities as well as maintenance of Aganbadi Kendra. Campaign for Freedom from Plastic. Pest control at various areas. COVID-19 related expenses for awareness & sanitization.	Health	Rajasthan	2431479
5	Sparsh Sanitary Pad Project for Women self help groups and providing structured setups & training for earning through production and sell of low cost sanitory pads. Organising training programs for Woman Skill development.	Livelihood Promotion	Rajasthan	5199355
6	Development of Infrastructure in rural area like Construction of CC Road Pathways connected to schools, Repair of Roads etc.	Rural Development	Rajasthan	15152468
7	Activities and events for Promotion & awareness about Environment like Van Mahotsav, Providing tree gurads etc.	Environment	Rajasthan	355825
8	Maintenance of Football Grass Ground, Supporting in organizing Tournaments like 33rd Federation Cup Volleyball Tournament & Sports camps like Youth Soccer Camp	Sports Promotion	Nimbahera,Rajasthan	850353
9	Arrangement for Election, organising activities under SVEEP program. Expenses for Independence Day celebration. Hoisting of 150 ft. National flag at Mukahrji Square, Nimbahera.	National Functions	Rajasthan	716205
10	Various activities and promotions for preserving and encouraging Cultural heritage and Art like Srajan the spark (Mushaira by Bhartiya Lok Kala Mandal), Chittorgarh Fort Festival 2020	Art & Culture	Rajasthan	790327
		Grand Total		31598569

CSR Activities (2020-21)

S.No.	CSR Project or activity identified (60-75 words)	Section in which the project is covered	Specify State and other	Expenditure for the Year 2020-21
1	Contribution for preserving & encouraging Art & Cultural Heritage like Chittorgarh Fort Festival.	Art & Culture	Rajasthan	3,23,256
2	Construction of Bio Toilets in nearby school in rural area, Infrasturucture development & Renovation work for community welfare like Renovation at Aganbari Centre, Contruction of Community Hall. Contribution for Nandghar Yojana in nearby villages.	Community Welfare	Rajasthan	35,44,168
3	Distribution of food packets and essential grocery items in near by villages. Contribution in Fooding, Distribution of Mask, Sanitizers & other PPEs, Sanitizers & Direct Contribution to Govt.	Disaster Relief	Rajasthan	30,62,490
4	Contribution for Ground Water Survey in Chittaurghar District to Third party. Pump set to PHED for drinking water arrangement.	Drinking Water Arrangement	Rajasthan	14,18,976
5	Construction & Renovation of school buildings, class rooms. Reimbursement of expenses on Coaching of students of rural areas at near by villages.	Educational Charity	Rajasthan	37,12,947
6	Providing Tree guards & other facilities for plantation.	Environment	Rajasthan	1,71,630
7	Sanitation work in entire Nimbahera City as well as nearby Villages for Covid 19 prevention. Regular Pest Control Activity in nearby villages. Contribution for Renovation/Extension of Govt. Hospital building.	Health	Rajasthan	45,69,947
8	Sparsh Sanitary Pad Project for Women self help groups and providing structured setups & training for earning through production and sell of low cost sanitory pads. Organising training programs for Woman Skill development.	Livelihood Promotion	Rajasthan	23,70,383
9	Distribution of Silver medals for bright students based on performance for motivation at various schools.	National Functions	Rajasthan	5,02,759
10	CC Road Construction in nearby villages. Financial Aid to Panchayat for Rural Development. Drainage system construction at Karunda Village for better health & Hygiene. Construction of Rest rooms in village for travellors.	Rural Development	Rajasthan	2,13,91,406
11	Contribution for Sport promotions like Lighting at Community Sports Ground. Providing sports equipments in nearby areas.	Sports Promotion	Rajasthan	27,220
		Grand Total		**4,10,95,183**

Awards & Certifications

- **JK Cement Works, Nimbahera won Manufacturing Award – Large Scale Industry at Udaipur Chamber of Commerce, Udaipur (Rajasthan) for Manufacturing Excellence.**
- ***Position :- 2nd Rank***

- **Mines of JK Cement Works, Nimbahera and Mangrol won total 15 Prizes in different category during 30th Mines Environment & Mineral Conservation Week 2019-20” was celebrated under the auspices of Indian Bureau of Mines, Ajmer.**

Awards & Accolades

- JK Cement Works, Nimbahera has been awarded with the Rajasthan Bhamashah Award 2019 for great contribution in education sector.

- JK Cement Works, Nimbahera has been conferred with the Golden Peacock Environment Management Award 2019 at the 21st Annual World Congress on Environment Management and Climate Change.

JK Cement recently won "CII - National Energy Efficiency Circle (EC)Competition" on 18-19 May'2017 in New Delhi and awarded the Second Best prize for "Best Energy Efficiency Organization" by Confederation of Indian Industry.

Awards & Accolades

❖**J.K. I.T.I. Building awarded –**
“ Energy & Environment Foundation Global Green Building Award -2016 “

JKC

Great Place To Work. Certified FEB 2021–JAN 2022 INDIA

Thank you