22nd National Award for Excellence in Energy Management -2021

Presented by

B.MAHESH-AGM(Paper Machine)
K.CHANDRA KUMAR-SM (ENERGY)
G.SELVARAJ-SM (ENERGY)

Company Profile

TNPL ROAD MAP

2016 — Commissioning of Board Machine BM$4

2012 — Commissioning of Cement Plant

2011 — Commissioning of PM#3

2002 — Rebuild of PM#1 & PM#2

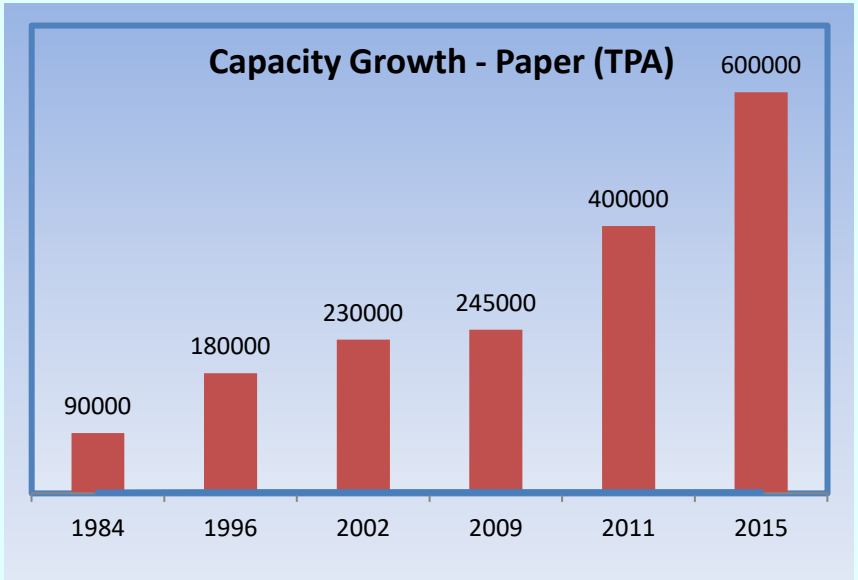
1995 — Comm. of PM#2

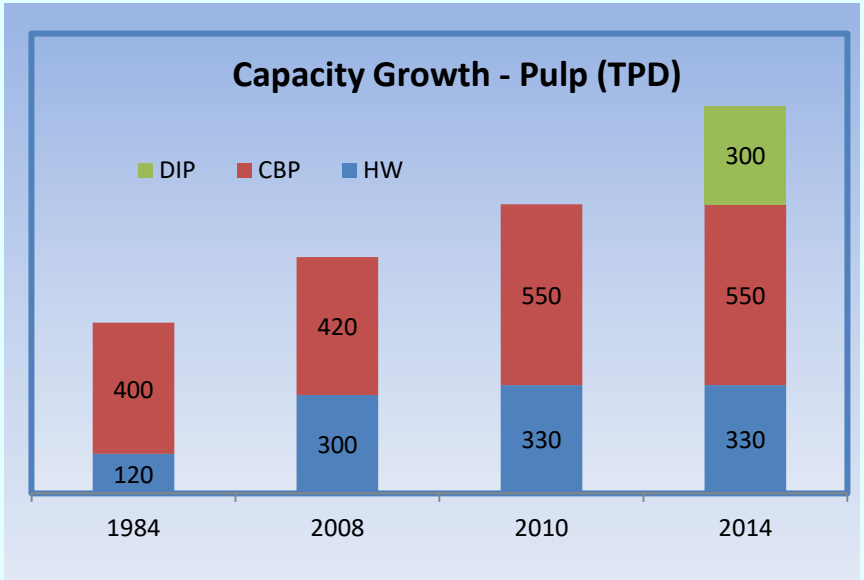
1985 — Comm. of PM#1

In Pipeline

2021 – Commissioning of HW pulp line in Board Mill

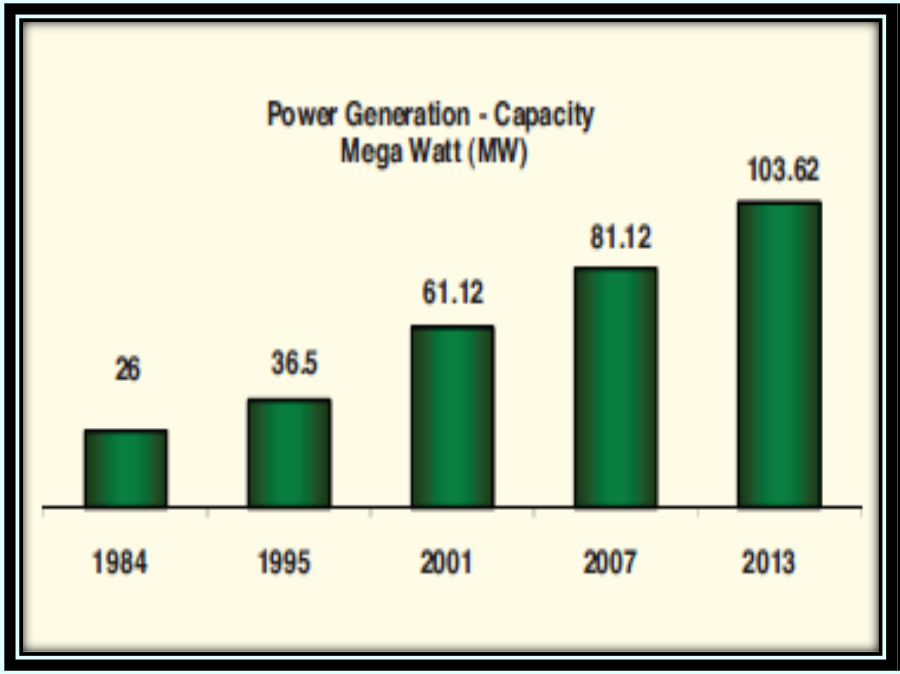
Capacity Growth

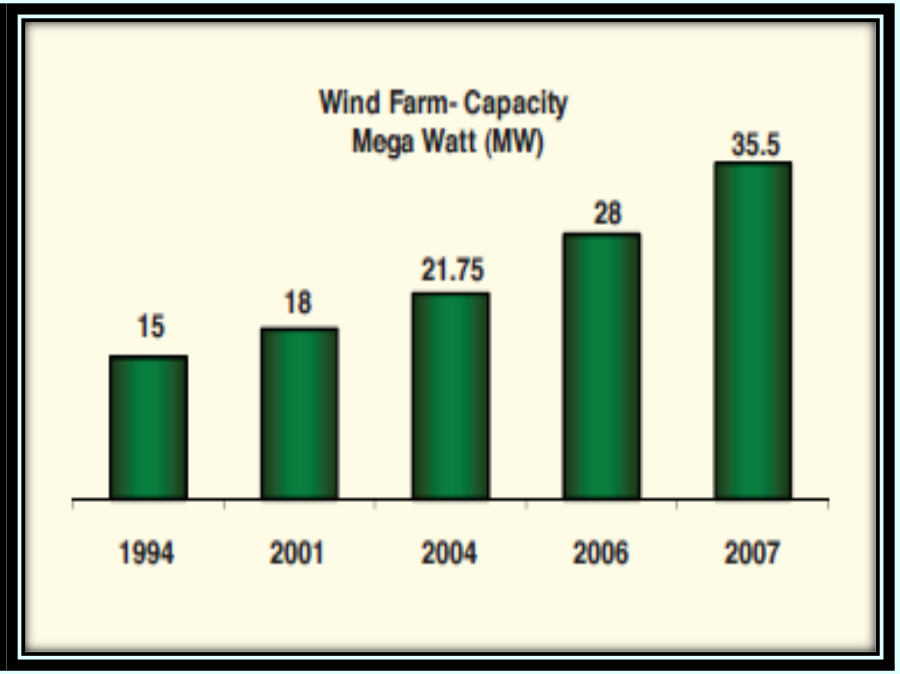




Power Scenario

*TNPL **is 100% self sufficient** in power*





*About **2.0MW** of surplus power generated from TGs is exported to TANGEDCO*

Generated Power from Wind Farm is exported to the grid

TNPL in brief

- *World's largest bagasse based paper plant Promoted by Govt. of Tamil Nadu*
- *ISO 14001:2015, ISO 9001:2015 , ISO 27001:2013*
- *FSC FM/COC & CW/COC Certified*
- *ISO 50001:2018*
- *CII Green Co–2019 Gold rating*

Plants

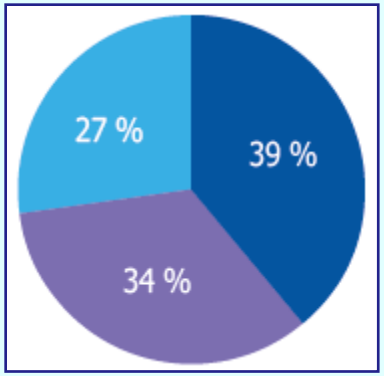
TNPL Paper (Unit I)
(Kagithapuram, Tamil Nadu)
Self sufficient interms of Power and Pulp requirement

TNPL Paper Board (Unit II)
(Mondipatti Village, Tamil Nadu)

TNPL Cement
(Kagithapuram, Tamil Nadu)

4,00,000 MT of printing and writing paper

2,00,000 MT of multi layer packaging board



Pulp Production as per fibre source (%)

- Bagasse Pulp
- Hardwood Pulp
- Waste Paper Pulp

25,000 m3/day biogas generated From bagasse wash water

Schemes implemented over
1,46,436 acres

1,30,561 acres
are under the Farm Forestry scheme

15,875 acres
under Captive Plantation Scheme

Benefitting
27,000+ farmers

TNPL - Highlights

Bagasse Based Pulp & Biogas

TNPL employs Bagasse-a sugar cane residue, as one of its major raw material. Its depithed form is used in making pulp while Biogas is produced from its wash effluents.

Carbon Control

Ensures that wood is used in a sustainable manner. Implement measures to reduce CO2 emissions in the atmosphere.

The trees are a major sequester of atmospheric carbon. The Plantations and Forests sustained by TNPL help sequester of CO2

Absolute Use of Biofuel

TNPL ensures that the wood being used in process is utilized completely in an array of different processes. Even the waste generated during logging process, namely wood dust and pith generated rom bagasse, are used as an agro fuels in operations.

Solid Waste Management

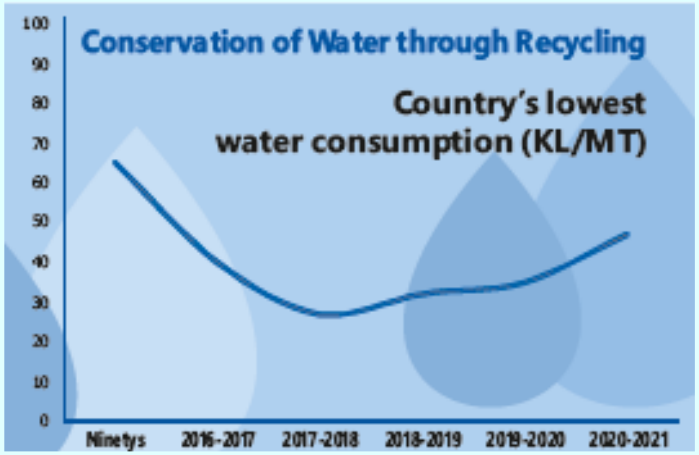
TNPL has set up a Cement plant to produce industry-grade cement using wastes generated during pulp production. The cement factory uses lime sludge, De-inked pulp sludge, fly ash, lime grit and dip sludge, etc.

Sustainable Forest Management

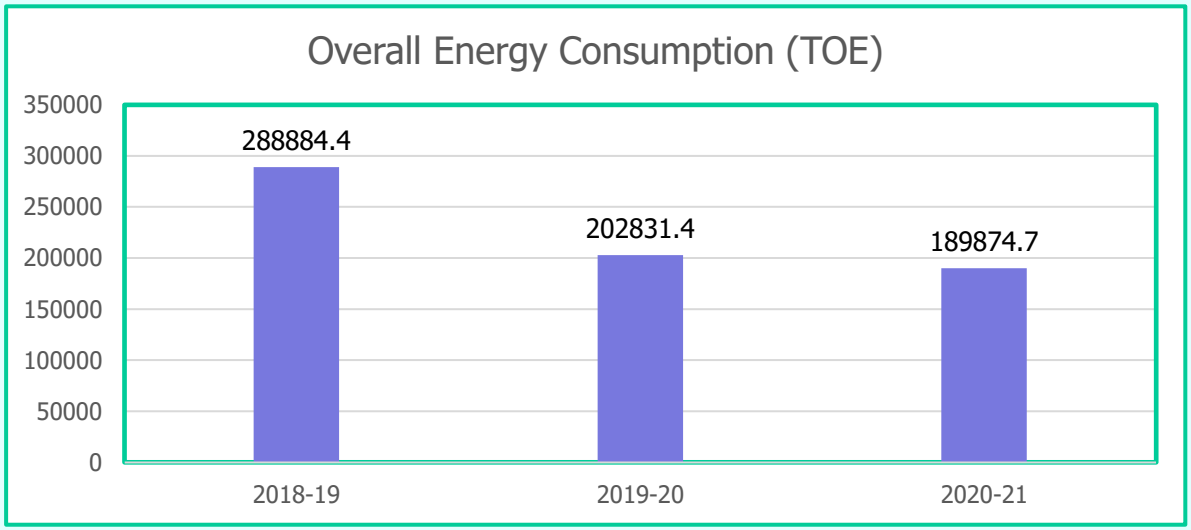
FSC-FM and FSC-COC certified captive plantation and farm forestry for pulpwood.

Land across Tamil Nadu is utilized to raise pulpwood.

TNPL is the most environmentally conscious and eco-friendly mill in the country with least water consumption

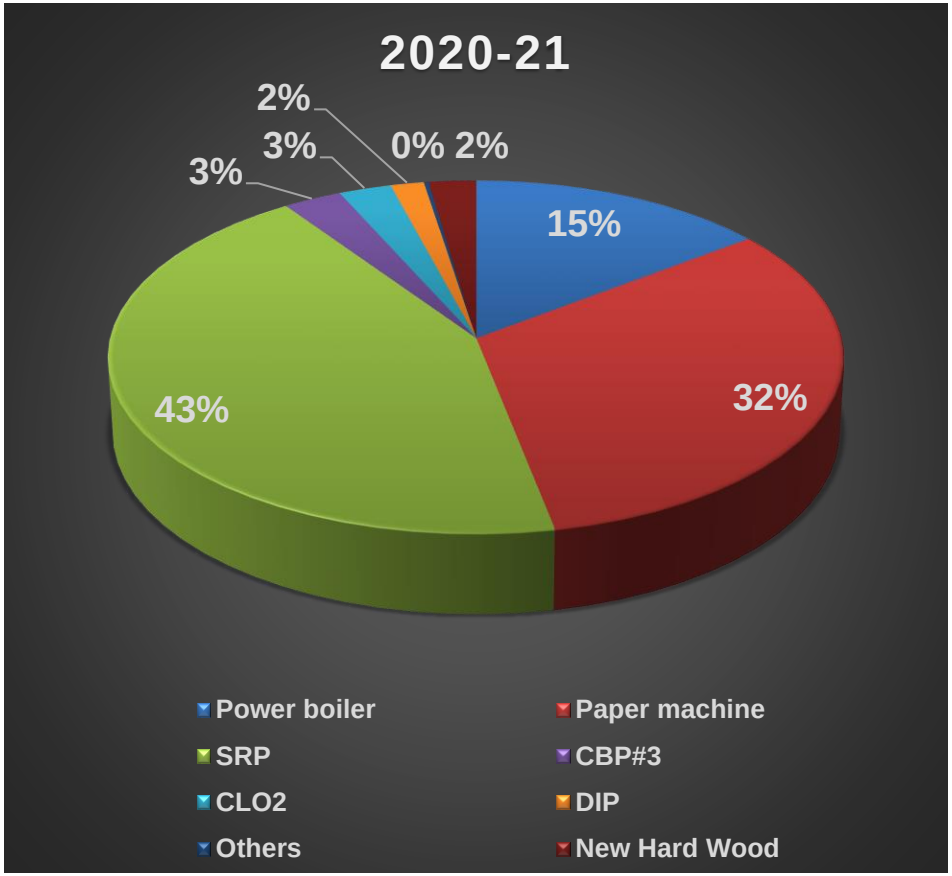


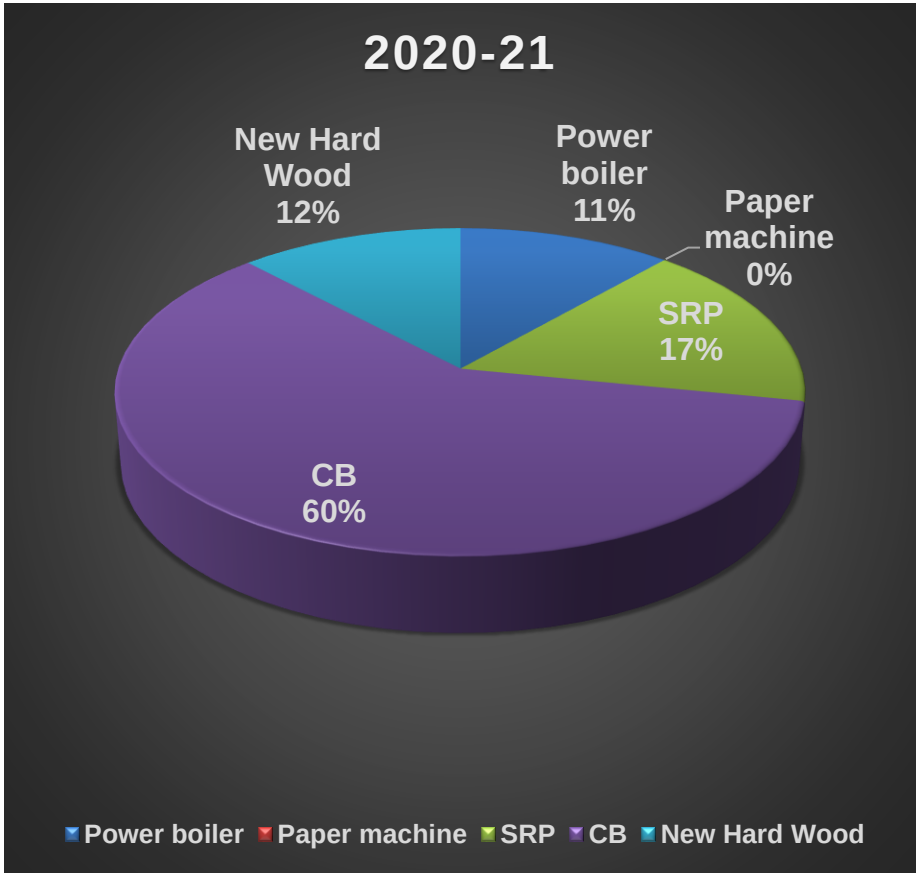
ENERGY CONSUMPTION



	UOM	2018-19	2019-20	2020-21
Total Thermal Energy consumption	Million Kcal	2989188.16	2201026.28	2107199.75
Total Electrical Energy Consumption	MILLION kWH	601.55	525.7	450.19
Overall Energy Consumption	**TOE**	**288884.4**	**202831.4**	**189874.7**

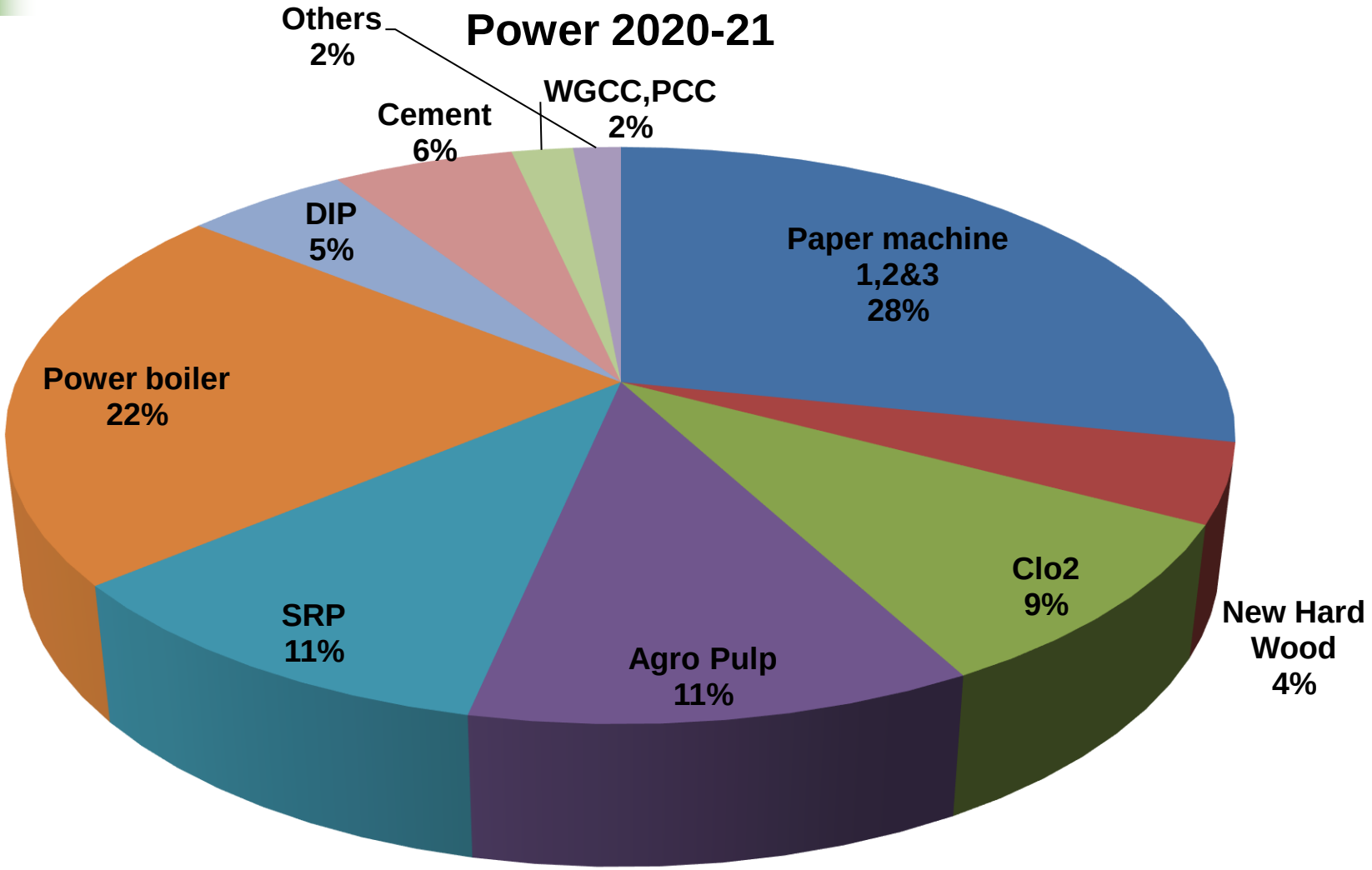
THERMAL ENERGY CONSUMPTION(2020-21)



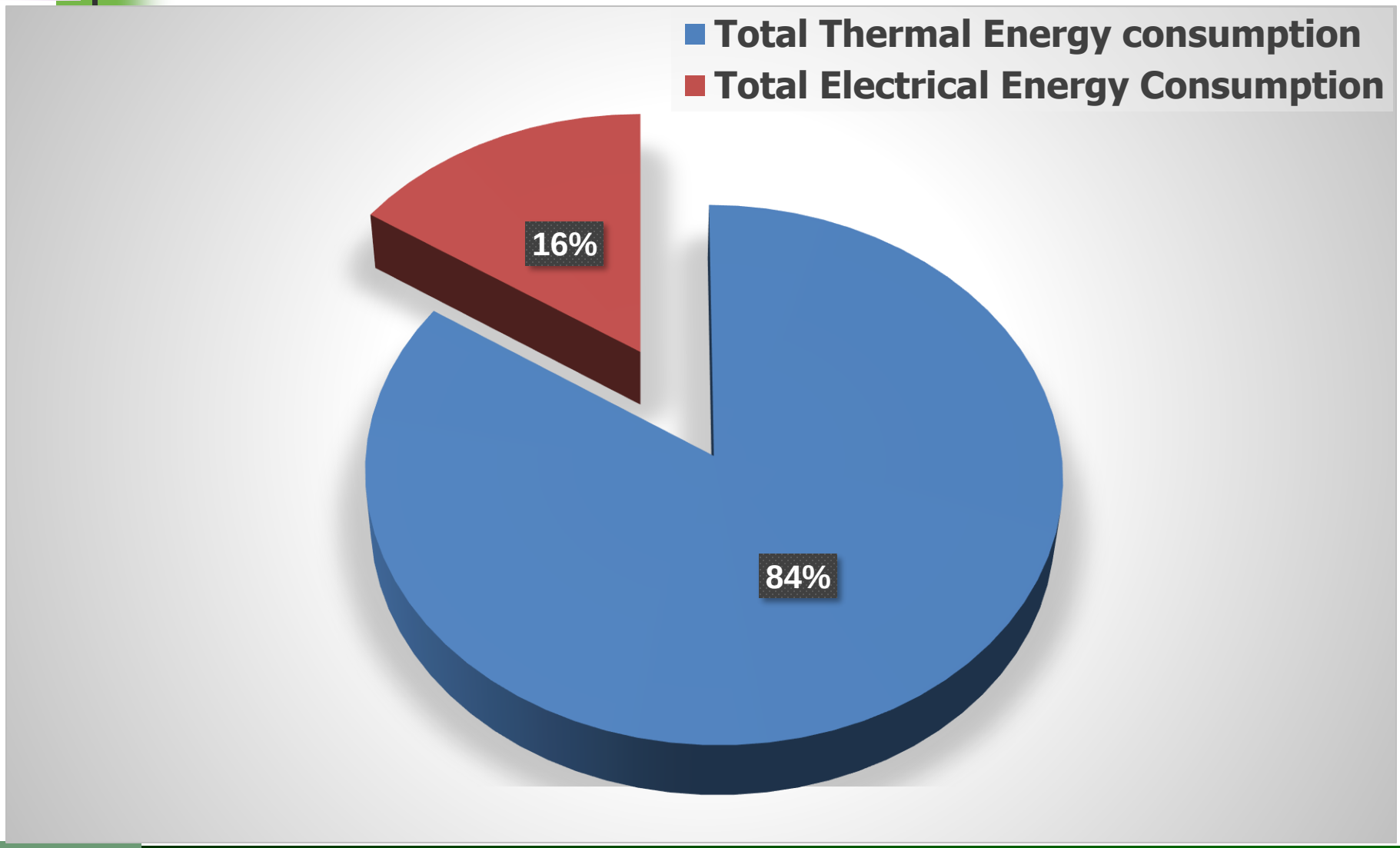


LP STEAM DISTRIBUTION ***MP STEAM DISTRIBUTION***

ELECTRICAL ENERGY CONSUMPTION(2020-21)

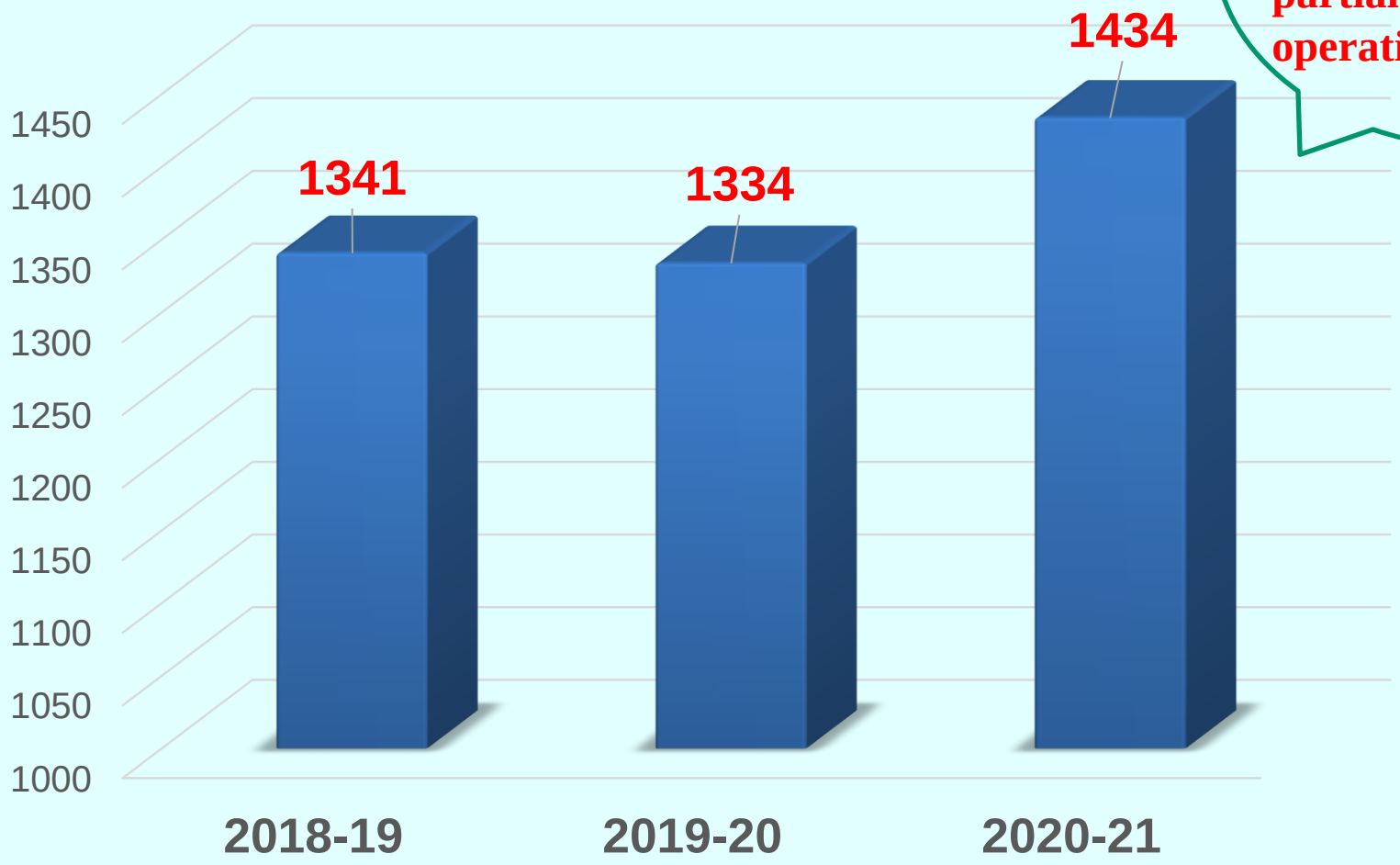


OVERALL ENERGY CONSUMPTION (2020-21)



SEC IN THE PAST 3 YEARS

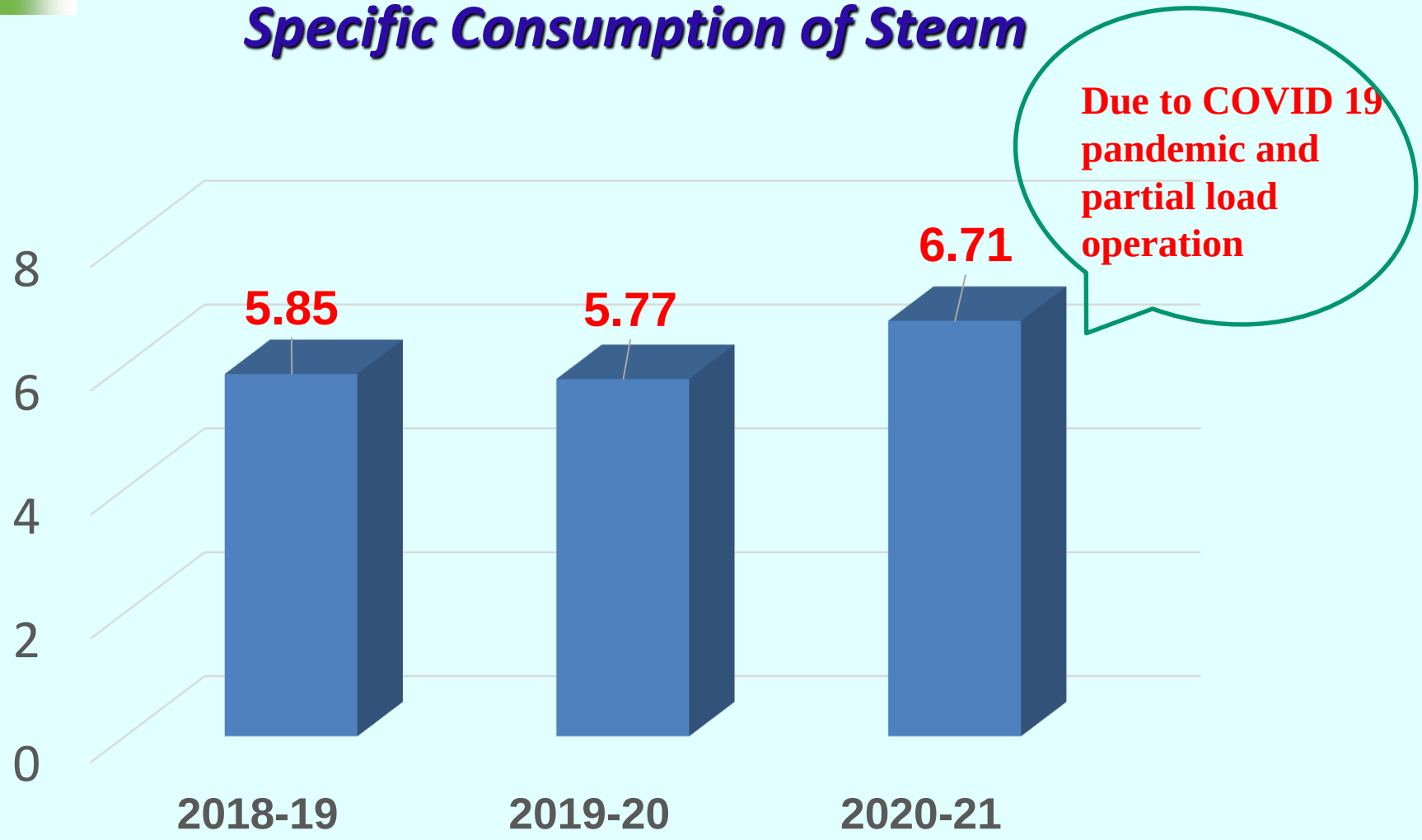
Specific Consumption of Power



Due to COVID 19 pandemic and partial load operation

SEC IN THE PAST 3 YEARS

Specific Consumption of Steam



HOW CLOSE TO GLOBAL BEST IN SEC

TERI Energy and Environment Data Diary and Yearbook (TEDDY) 2014/15:

" Energy Consumption
The pulp and paper industry is also highly energy intensive, where energy cost accounts for about 16%–25% of the cost of production of paper. The consumption of steam and electricity per tonne of paper production in India are about 11-15 tonnes and 1500-1700 kWh respectively."

	Total Energy Cost as % of Manufacturing Cost
Global Average	16 - 25
TNPL	27.94

SEC	Steam	Electricity
India Average	11-15	1500-1700
TNPL	6.71	1434

HOW CLOSE TO GLOBAL BEST IN SEC . . .

S.No	Particulars	Power	Steam	water	Source
1	Global	1200	5.1	25	Industrial Efficiency Technology Data Base
2	National	1300	6.5	40	CPPRI
3	**TNPL ***	**1434**	**6.71**	**49**	

Perform Achieve Trade (PAT-II)	Unit	Baseline Avg.
Notified SEC	toe/tonne	0.7680
Targetted SEC	toe/tonne	0.7234
Achieved SEC	toe/tonne	0.6528

- SEC reduction achieved for Pat cycle II : **7.3%**
- Specific Energy Consumption reduction achieved : **9.76%**
- Achieved SEC for 2018-19 : **0.6528 MTOE**
- Escerts to be received : **26352 Nos.**

TARGETS

- SEC Reduction planned for **short term** (2021-22) : 2%
- SEC Reduction planned for **Medium term** (2022-23) : 6%
- SEC Reduction planned for **Long term** (2023-24) : 10%

- Based on the future expansion we have planned for 10% reduction in SEC for long term

Short Term Targets (2021-22)

ELECTRICAL ENERGY SAVINGS	**5.37 Million KWH**
THERMAL ENERGY SAVINGS	**8541 Million Kcal**
TOTAL COST SAVING	**Rs. 276.6 Lakhs**

Short Term Projects (2021-22)

S.NO	PROJECT NAME	ENERGY SAVING / Year	COST SAVING (Rs. in Lakhs)
1	Arresting of air leakages in SRB#3 ESP flue gas passes resulted in power saving of 21 Lakhs units and the cost saving is Rs.77 Lakhs	21 lakhs Kwh	77
2	Replacement of 5cal recirculation cum transfer pump#3 by appropriately sized and efficient pump resulted in power saving of 0.88714Lakhs units and the cost saving is Rs.3.24 Lakhs	0.888 lakhs Kwh	3.24
3	Stopping of Broke chest pump and agitator in PM#2 resulted in power savings of 2.37Lakhs and the cost saving is Rs.8.69Lakhs	2.37 lakhs Kwh	8.69
4	Introduction of VFD for sweetener stock pump in PM#2 resulted in power savings of 1.19Lakhs units and the cost saving is Rs.4.35Lakhs	1.19 lakhs Kwh	4.35

Short Term Projects (2021-22) . . .

S.NO	PROJECT NAME	ENERGY SAVING / Year	COST SAVING (Rs. in Lakhs)
5	Introduction of VFD in WBL feed pump in SRP	0.792 lakhs Kwh	2.90
★ 6	Generation of hot water at cement plant itself by using pyro plant flue gas resulted in saving of 6334 MT of LP steam in SRP and the cost saving is 69.67 Lakhs	6334 MT of LP Steam	69.67
★ 7	Conversion of Heavy Black Liquor open tank into pressurized tank resulted in saving of 6159MT of LP steam and the cost saving is 67.75 Lakhs	6159 MT of LP Steam	67.75
★ 8	Stopping of three aerators by modifying the outlet channel in Activated Sludge Lagoon resulted in savings of 12.35Lakhs units of power and the cost saving is Rs.43 Lakhs per annum.	12.35 lakhs Kwh	43
9	Reducing air pressure from 7 ksc to 6 ksc at Mayanur site	0.11 lakhs Kwh	0.73

Medium Term Targets (2022-23)

POWER SAVING	**12.80 Lakh KWH**
COST SAVING	**Rs.46.31 Lakhs**

Medium Term Projects(2022-23)

S.NO	PROJECT NAME	COST SAVING Rs.	ENERGY SAVING KWH/Year
1	Replacement of Evaporator Cooling Water pump #7 with high efficiency pump	18.1 Lakhs	5.02 Lakhs KWH
2	Replacement of Cooling Water pump # 1 for air compressor with high efficiency pump	6.13 Lakhs	1.69 Lakhs KWH
3	Replacement of LP Shower pump in PMC # 1 with 2 stage high efficiency pump	2.53 Lakhs	0.70 Lakhs KWH
4	Replacement of LP Shower pump in PMC # 2 with 2 stage high efficiency pump	3.85 Lakhs	1.06 Lakhs KWH
5	Replacement of Edge knock off pump A in PMC # 2 with high efficiency pump	10.95 Lakhs	3.02 Lakhs KWH
6	Replacement of cloudy water to save all pump in PMC # 2 with high efficiency pump	4.75 Lakhs	1.31 Lakhs KWH

Long Term Targets (2023-24)

POWER SAVING	**130.68 Lakh KWH**
FUEL SAVING	**12009 MT OF COAL**
COST SAVING	**Rs.2292.23 Lakhs**

Long Term Vision

- *Replacing water ring vacuum pumps into turb-air vacuum blowers*
- *Revamping of steam and power system - II*

POWER SAVING	**130.68 Lakh KWH**
FUEL SAVING	12009 MT OF COAL

Long Term Projects(2023-24)

S.NO	PROJECT NAME	COST SAVING Rs.	ENERGY SAVING per year
★1	Replacing water ring vacuum pumps into turb-air vacuum blowers	309 Lakhs	84.21 Lakhs KWH
★2	Revamping of steam and power system - II	1814 Lakhs	12009 MT of coal
3	Installation new cooling tower for PMC # 1 for supply of seal water to vacuum pumps	66.4 Lakhs	18.35 Lakhs KWH
4	Installation new cooling tower for PMC # 2 for supply of seal water to vacuum pumps	17 Lakhs	4.69 Lakhs KWH
5	Replacement of 2nd Stage centri feed pump in PMC # 3 with high efficiency pump	8.83 Lakhs	2.43 Lakhs KWH
6	Arresting of air leakage in RB # 3 ESP duct	77 Lakhs	21 Lakhs KWH

Innovative Technologies Implemented

Business Process Automation:

- ERP Interface workflow from Machine to Godown

- Automation at Winders for Automatic Size Change, Automatic Set Change and Automatic Core Feeding

- Automation of Shrink Bundling and Automatic Storage and Retrieval System for Paper bundles

IoT – Remote Control Systems:

- Live Machine condition monitoring for Roll Grinding Machine and Core Making Machine with OEMs

- Virtual web based meetings with in TNPL and also with Vendors

Cloud Computing :

- *Cloud based Document Management System*

ENERGY SAVING PROJECTS IN LAST THREE YEARS

Year	Total Encon Projects	Annual Electrical savings Achieved		Annual Thermal Savings			Total Annual savings	Investment made
	Nos.	Units Lakhs	Rs. Lakhs	Tons of Fuel - Imp.Coal	Furnace Oil in KL	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
2018-19	28	55.69	201.61	4236	3848	1634.85	1836.46	238.48
2019-20	18	47.88	174.28	4736	3593	1347.26	1521.54	74.76
2020-21	27	27.59	105.12	3900	3864	1295.32	1400.44	43.37

ENERGY SAVING PROJECTS WITH ZERO COST INVESTMENT

Year	Total Encon Projects	Total No. of Zero Investment projects	Total savings from zero investment projects in Rs. Lakhs
2018-19	28	19	404.09
2019-20	18	14	1394.10
2020-21	27	18	1349.63

ENCON PROJECTS FOR FY 2020-21
(ELECTRICAL ENERGY SAVINGS)

S.No	Description	Electrical savings		Total Savings	Investment
		Lakh kwh	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
1	Downsizing of PM#2 filter water pump from 110 KW to 37KW in WTP resulted in power savings of 1,66,320 units and the cost saving is Rs.6.32 Lakhs	1.66	6.34	6.34	4.00
2	By isolating one no.of first stage causticizing unit in SRP resulted inpower saving of 1,57,608 units and cost savings is Rs.5.99 Lakhs	1.58	6.00	6.00	0.00
3	Air cooled condenser fans stoppage by utilizing seasonal effects resulted in savings of 2,16,000 Units of Power and cost savings is Rs. 8.21 Lakhs.	2.16	8.23	8.23	0.00
4	Stopping of one air drier permanantly resulted in power savings of 1,05,000 units and the cost saving is Rs.3.99 Lakhs	1.05	4.00	4.00	0.00
5	By modification of broke pulper operation sequence from 400 seconds to 200 seconds to reduce operation time in PM#3 resulted in 1,08,000 units of power and the cost saving is Rs.4.10 Lakhs	1.08	4.11	4.11	0.00

ENCON PROJECTS FOR FY 2020-21
(ELECTRICAL ENERGY SAVINGS)

S.No	Description	Electrical savings		Total Savings	Investment
		Lakh kwh	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
6	Stopping the operation of one agitator and one pump by suitable modification of Broke preparation system in PM#2 resulted in 1,00,800 units of power and the cost saving is Rs.3.83 Lakhs	1.01	3.84	3.84	1.00
7	Replacing high capacity vaccum pump by low capacity vaccuum pump in New Evaporator#2 resulted in power saving of 2,11,680 units and cost savings is Rs.8.04 Lakhs	2.12	8.07	8.07	0.00
8	Installation of VFD for sweetener stock pump in PM#2 resulted in 40,320 units of power and the cost saving is Rs.1.53 Lakhs	0.40	1.54	1.54	2.00
9	Elimination of Bagasse collection conveyor in CBP#3 wet washing area by providing a chute resulted in power saving of 39,247 units and the cost saving is RS.1.49 Lakhs	0.39	1.50	1.50	0.99

ENCON PROJECTS FOR FY 2020-21
(ELECTRICAL ENERGY SAVINGS)

S.No	Description	Electrical savings		Total Savings	Investment
		Lakh kwh	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
10	Replacement of 52 Nos of 400W into 150W LED lamp, 119 Nos of 250W into 150W LED lamp, 23 Nos of 150W into 90W LED lamp, 102Nos of 150W into 40W LED lamp, 18 Nos of 108W into 36W LED lamp, 67 Nos of 72W into 40W LED lamp and 104 Nos of 36W into 18W LED lamp in pulp mill and offices resulted in power saving of 199237 units and cost savings is Rs.7.57 Lakhs	1.99	7.59	7.59	6.73
11	Replacement of conventional light fittings with LED fittings in Paper Machine and DIP area resulted in power saving of 1,22,213 units and cost savings is Rs.4.64 Lakhs	1.22	4.66	4.66	19.50
12	Replacement of 160Nos of 150W into 40W LED lamp, 30 Nos of 150W into 90W LED lamp in Energy Department resulted in power saving of 84972 units and cost savings is Rs.3.23 Lakhs	0.85	3.24	3.24	3.60

ENCON PROJECTS FOR FY 2020-21
(ELECTRICAL ENERGY SAVINGS)

S.No	Description	Electrical savings		Total Savings	Investment
		Lakh kwh	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
13	Stopping of broke dilution pump in PM#3 by modification of pipe line resulted in 17,280 units of power and the cost saving is Rs.0.66 Lakhs	0.17	0.66	0.66	0.00
14	Installation of 10KW solar power plant at the terrace of staff club in colony resulted in power saving of 17885 units and the cost saving is Rs.0.68 Lakhs.	0.18	0.68	0.68	5.30
15	Downsizing the LMCD feed pump in Soda Recovery Plant resulted in power savings of 2,05,920 units and the cost saving is Rs.7.82 Lakhs	2.06	7.85	7.85	0.00
16	Stopping of soft wood refiners street in Paper Machine#3 resulted in saving of 5,62,464 Units of Power and cost savings is Rs. 21.40 Lakhs.	5.62	21.43	21.43	0.25
17	Elimination of Lime Kiln # 2 LMCD 11 Kw filtrate pump resulted in savings of 69,696 Units of Power and cost savings is Rs. 2.65 Lakhs.	0.70	2.66	2.66	0.00

ENCON PROJECTS FOR FY 2020-21
(ELECTRICAL ENERGY SAVINGS)

S.No	Description	Electrical savings		Total Savings	Investment
		Lakh kwh	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
18	Optimisation of Co-gen cooling Tower fan operation by utilising seasonal effect resulted in 1,30,654 units of power and cost savings is Rs.4.96 Lakhs	1.31	4.98	4.98	0.00
19	Optimisation of Paltech Cooling Tower fan operation by utilising seasonal effect resulted in 2,03,634 units of power and cost savings is Rs.7.74 Lakhs	2.04	7.76	7.76	0.00

ENCON PROJECTS FOR FY 2020-21
(THERMAL ENERGY SAVINGS)

S.No	Description	Thermal savings			Total Savings	Investment
		Imp. Coal (MT)	F.Oil (KL)	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
1	Modification of cooling water media in CB-ECF Bleach plant alkaline heat exchanger resulted in reduction of 521.4 MT of LP steam and the equivalent Imported coal saving is 98.76 MT and the cost savings is Rs. 5.27 Lakhs.	98.76		5.27	5.27	0.00
2	By increasing the cooling media flow in CB-ECF Bleach plant heat exchanger resulted in savings of 5201.36 MT of LP steam and the equivalent Imported coal saving is 985.21 MT and the cost savings is Rs. 52.61 Lakhs.	985.21		52.61	52.61	0.00
3	Increasing the D1 Filtrate recycling ratio from 30% to 50% by introducing ring dilution spray nozzles at D1 Tower feed MC Pump stand pipe resulted in savings of 1298.76 MT of LP steam (Equivalent Imported coal saving 246 MT) and the cost savings works out to Rs 13.14 Lakhs.	246		13.14	13.14	0.00

ENCON PROJECTS FOR FY 2020-21
(THERMAL ENERGY SAVINGS)

S.No	Description	Thermal savings			Total Savings	Investment
		Imp. Coal (MT)	F.Oil (KL)	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
4	Paper Machine # 1 flash steam recovery by using TG condensate resulted in 4871.55 MT of LP steam saving equivalent imported coal saving is 922.74 MT and the cost saving is Rs. 53.63 Lakhs	922.74		49.27	49.27	0.00
5	Implementation of condensate collection system at 104/64 PRDS area near TG # 6 resulted in 511.73 MT of LP steam saving and equivalent Imported coal saving is 96.93 MT and the cost savings is Rs 5.18 Lakhs	96.93		5.18	5.18	0.00
6	Usage of 2519 MT of Wood Dust/ Bark in Power Boilers resulted in saving of 831 MT of Imported coal and the cost savings is Rs 44.38 Lakhs.	831		44.38	44.38	0.00

ENCON PROJECTS FOR FY 2020-21
(THERMAL ENERGY SAVINGS)

S.No	Description	Thermal savings			Total Savings	Investment
		Imp. Coal (MT)	F.Oil (KL)	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
7	4,44,599 M^3 of Bio gas consumption in Power Boilers resulted in saving of 719 MT of Imported coal and the net cost saving is Rs. 38.39 Lakhs.	719		38.39	38.39	0.00
8	64,40,597$M^3$of Bio gas consumption in Lime Kiln resulted in saving of 3864.36 KL Furnace oil and the net cost saving is Rs. 1087.08 Lakhs.		3864.36	1087.08	1087.08	0.00

Innovative Project-I

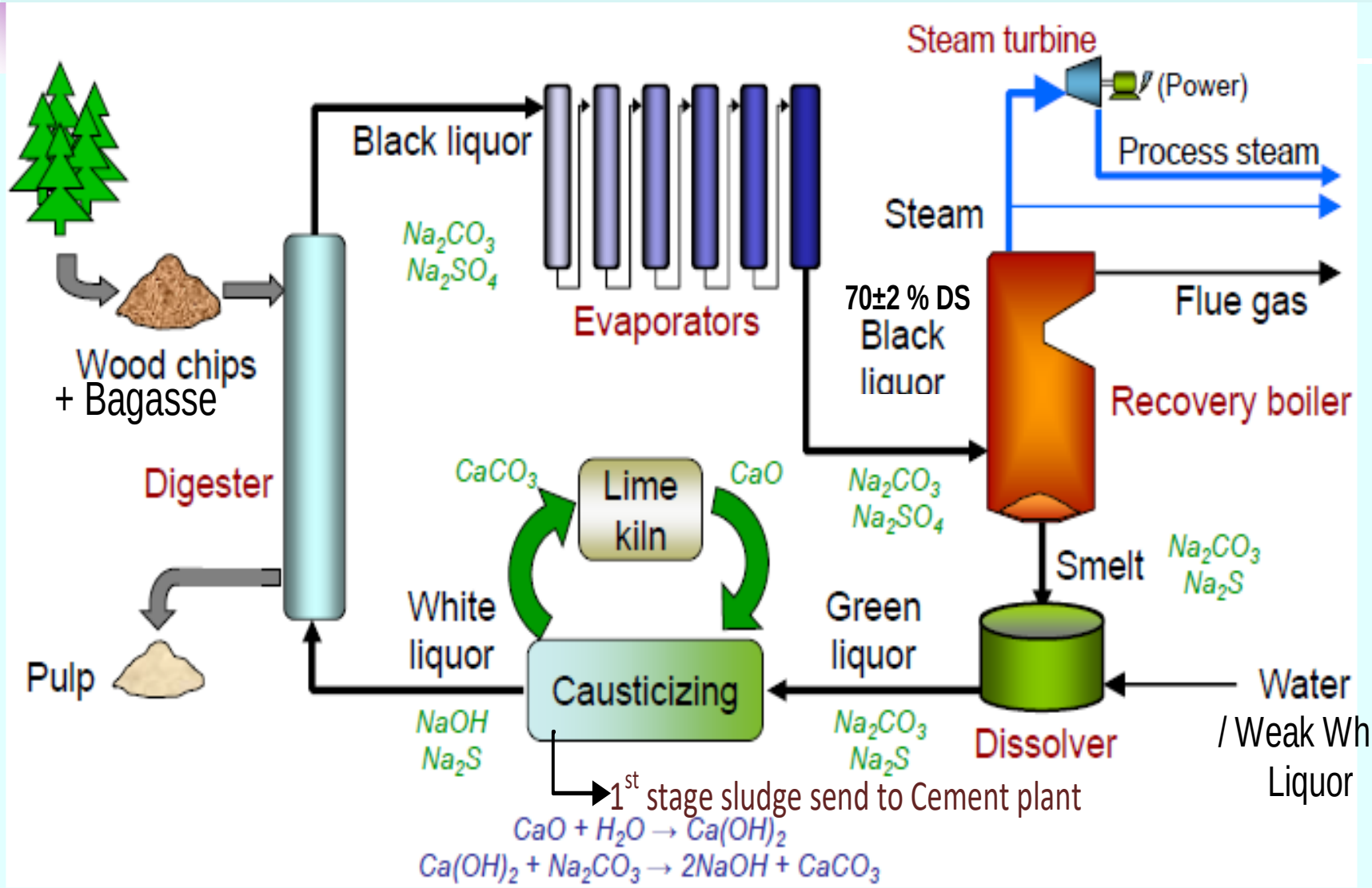
Increasing Specific Steam generation in Recovery Boiler

Trigger of the Project:	***The project was conceived to analyze the root causes for lower smelt reduction efficiency, lower steam generation and higher dead load in the Soda recovery – Pulp mill close loop cycle.***
Uniqueness of the project; is it a new concept?	**Combination of splash plate nozzle liquor gun and swirl cone nozzle liquor gun is unique for firing the black liquor and this project is *"First time in Agro Based Integrated Pulp and Paper Mill"* in Globally.**

Major milestones of project:

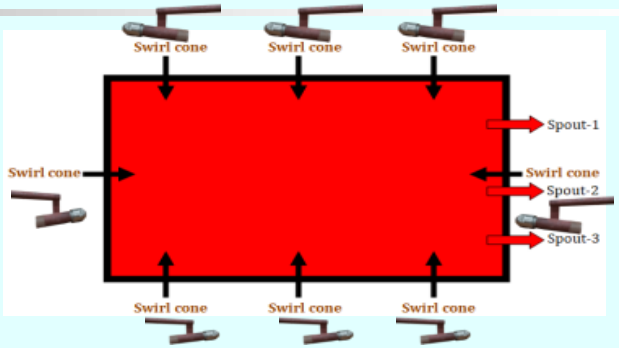
Design	**Analysis of Black liquor properties**	***Sep'2020***
Phase 1	**Installation of TNPL's Modified Liquor gun**	***Oct - Nov'2020***
Phase 2	**Optimizing the firing pattern**	***Mid of Nov'2020***
Performance	**Trial Run**	***Dec'2020***

Innovative Project-I :Pulp mill Soda Recovery close loop process …



Innovative Project-I :Pulp mill Soda Recovery close loop process …

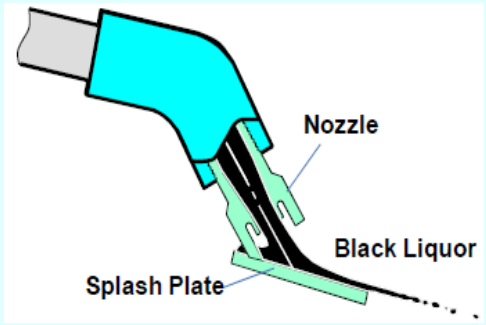
Before :

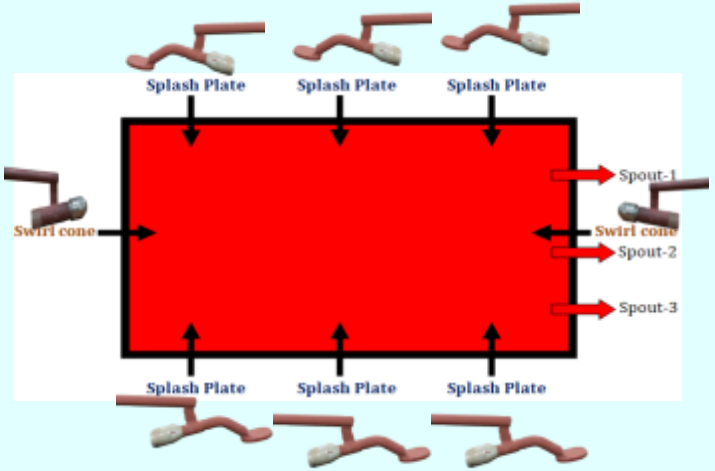


Swirl cone liquor gun and firing Pattern

After :

TNPL'S modified Liquor gun design and the combination of firing pattern details





Combination of Swirl cone & Splash plate liquor gun positions and its firing pattern in TNPL's recovery furnace

Innovative Project-I :Pulp mill Soda Recovery close loop process …

- Breakage of the liquor guns due to Thermal attack
- Carryover and smelt flow down onto the liquor nozzles
- Uneven and unburned char bed formation
- Carryover in the upper furnace
- Plugging problems in superheater area
- Char bed black out / air port jamming
- Uneven smelt flow in all the three spouts

- Material of the liquor gun changed from SS 304 to SS 310 Sch 160 and the length of the gun inside the furnace is modified from 150 mm to 100 mm.
- The splash plate guns are placed not too far away and not too close to the furnace wall and position of the liquor guns at the centre of the port to achieve even air flow around the gun.
- The position of splash plate gun angles are modified 10°±1 downward angle
- The proportionate air ratio of Primary: Secondary: Tertiary has been changed from 30%, 55% and 15% to 28%, 52% and 20% respectively.

Environmental Performance Evaluation (EPE)

Management performance indicator (MPI) of the plant : Steam generation in MT per MT of BLDS fired

Parameter	UOM	Value
Before Project Implementation	MT/MT of BLDS fired	2.90
After Project Implementation	MT/MT of BLDS fired	3.05
Increase in Steam generation	MT/MT of BLDS fired	0.15
Increase in Steam generation per year	MT	60,000
Heat Value saved per year	GJ	1,99,326

Innovative Project-I : Tangible Benefits …

Sl. No.	Parameter	UOM	Value
1	Increase in Steam generation per MT of BLDS fired	MT	0.15
2	Quantity of Black Liquor Dry Solids fired per year	MT	400000
3	Heat Value saved per year	GJ	1,99,326
4	Cost Savings of Steam per Year	Rs in lakh	598
5	Savings of Sodium Sulphate per Day	MT	6
6	Savings of Sodium Sulphate per Year	MT	1,980
7	Cost Of Sodium Sulphate	Rs /MT	9000
8	Cost Savings of Sodium Sulphate per Year	Rs in Lakh	178.2
9	Recondition cost of gun per year	Rs in lakh	6.0
10	Increase in Energy Cost per year	Rs in lakh	8.0
11	Total Expenses	Rs in lakh	14.0
12	Net Cost savings per year	Rs in lakh	762
13	Investment Cost	Rs in lakh	8.0
14	Payback period	months	<1

Innovative Project-I : In Tangible Benefits …

- Recovery Boiler flue gas path Water wash interval increased from every 60 days to 90 days.
- 35 % Reduction of dead load in the Soda recovery – Pulp mill close loop cycle.

Suspended Particulate emission (SPM) for recovery boiler

National	TNPL (After Implementation of the Project)
Max 150 mg/nm^3	100±10 mg/nm^3

Sulphur dioxide emission for Recovery Boiler

National	TNPL (After Implementation of the Project)
Max 600 mg/nm^3	140±10 mg/nm^3

Replication Potential

Replication potential and progress of project assimilation cross functional / within group companies: This Project can be replicated in any Integrated Agro based Pulp and Paper Industry in India as well as across the globe.

Innovative Project-II

Improving the Steam generation by cleaning the hard scale deposits in Bed Coil of Power Boiler # 6

Trigger of the Project:	***Hard scale deposits has formed over the bed coil which resulted in reduction in steam generation of Power Boiler # 6. To cater steam demand due to reduction in steam generation resulted in operating low pressure ,less efficient power boiler.***
Date of commencement	***April '2020***
Planned Date of Completion	***Nov'2020***
Actual Date of Completion	***Nov'2020***


Boiler # 6 Bed coil
before cleaning


Boiler # 6 bed Coil
Before Water Washing

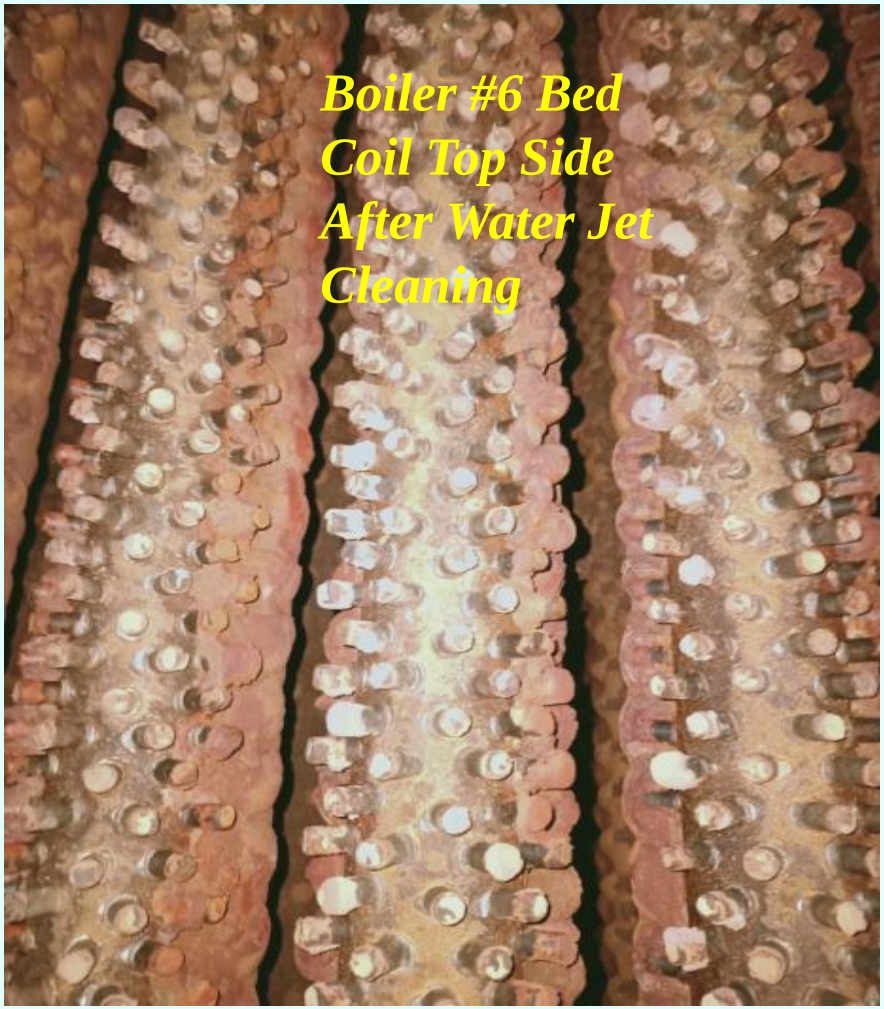

Boiler 6 bed coil
before cleaning


boiler 6 bed coil bottom
before water cleaning

Innovative Project-II ...

- Bed coils (238 nos) were replaced in August 2019 at the cost of Rs 104.72 Lakhs.
- Normally bed coils are replaced every 5 years.
- Hard scale deposits formed over the bed coils and hence heat transfer got affected. It resulted in reduction in average steam generation from 110 TPH to 80 TPH.
- Less efficient boiler was operated to cater the steam demand.
- Hard scale deposits were tried to clean by high pressure jet cleaning but it was a failure.
- Manual cleaning by chipping was tried but it was a failure.
- Caustic lye was sprayed over the deposits, tried to clean the deposits and it was an failure.
- Proposal of cleaning by grit blasting was tried by erecting a prototype bed coil assembly outside the furnace and tried it was successful.
- 238 Nos of bed coils were cleaned by grit blasting and Boiler average laod increased to 110 TPH after cleaning.

Innovative Project-II ...



Innovative Project-II ...

Bed coils cleaned by Grit blasting

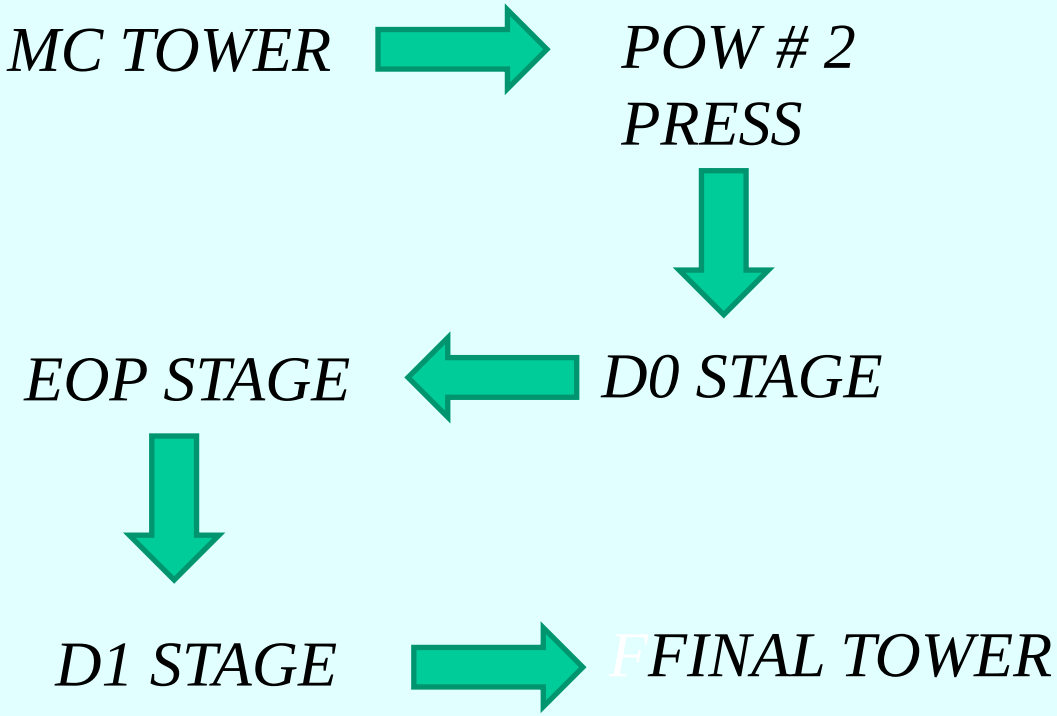
Innovative Project-II : Cost Savings

Sl. No.	Parameter	UOM	Value
1	Steam cost of Boiler # 6	Rs/MT	1316
2	Steam cost of Boiler # 1	Rs/MT	1276
3	Average Boiler # 6 load before cleaning	TPH	80
4	Average load per hour after cleaning	TPH	110
5	Specific power of Boiler # 6	Units /MT	21
6	Specific power of Boiler # 1	Units /MT	25
7	Cost savings by increasing the steam generation after cleaning (1316-1276)*(110-80)*24*330	Rs in Lakhs /Annum	95.04
8	Power savings in terms of reduction in specific power (25-21)*(1316-1276)*24*330	Rs in Lakhs /Annum	9.50
9	Total cost savings	Rs in lakhs /Annum	104.54
10	Total no of Bed coils	Nos	238
11	Cost of spare bed coils (238*40000)	Rs in lakhs	95.20
12	Cost of replacement (238*4000)	Rs in lakhs	9.52
13	Cost for cleaning the Bed coils	Rs in lakhs	6.4

INNOVATIVE PROJECT # 3

CONSERVATION OF LP STEAM BY D1 FILTRATE RECYCLING

Infeed Process Flow Chart



INNOVATIVE PROJECT # 3 ...

Before :

EOP PRESS (20%Cy)

HOT WATER (70%)

D1 FILTRATE (30%)

D1 TOWER (10% Cy)

INNOVATIVE PROJECT # 3 ...

After :

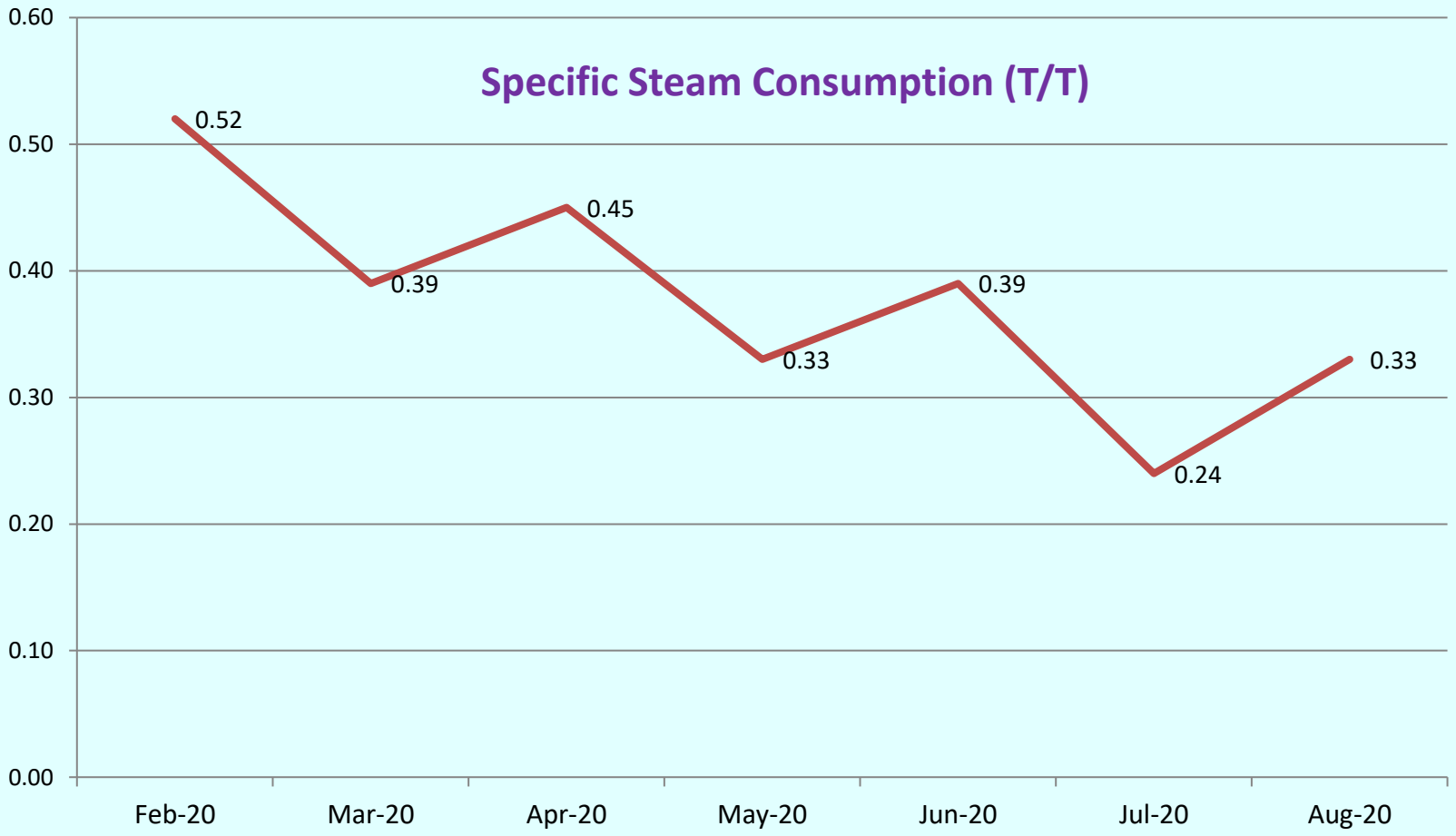
EOP PRESS (20%Cy)

HOT WATER (50%)

D1 FILTRATE (50%)

D1 TOWER (10% Cy)

INNOVATIVE PROJECT # 3 ...



INNOVATIVE PROJECT # 3 …

- 1,650 T LP steam savings per annum.
- 1,65,000 cubic meter Fresh water savings per annum.
- Effluent hydraulic load reduction in ETP.
- MC pump to D1 tower feed very steady state operation.

Monthly Savings — ***Rs. 2,96,175 INR***

Yearly Savings — ***Rs. 35,54,100 INR***

UTILISATION OF RENEWABLE ENERGY SOURCES

	2018-19		2019-20		2020-21	
Types of RE Sources	Energy Generated (Lakh kwh)	Annual savings Rs. Million	Energy Generated (Lakh kwh)	Annual savings Rs. Million	Energy Generated (Lakh kwh)	Annual savings Rs. Million
Wind	412.45	149.31	369.50	135.24	361.18	137.61
Solar	0.0627	0.0227	0.0635	0.0232	0.0697	0.0266
BL Solids	1415.5	518.07	1334	488.24	1344	512.06

Solar Panel & LED Light Fitting Details

1 No of 10 Kw Solar Panel installed in TNPL Staff Club

160 Nos of 150 W LED
53 Nos of 90 W LED
29 Nos of 40 W LED
122 Nos of 36 W LED
104 Nos of 180 W LED

Installed Mill wide (35.13Lakhs have been invested for RE projects)

UTILISATION OF WASTE MATERIAL AS FUEL

Type of waste material used	Quantity of waste material used (MT)			Equivalent qty. of conventional energy of fuel used (tons or KL of fuel)		
	2018-19	2019-20	2020-21	2018-19	2019-20	2020-21
Bio mass	196812	179462	100147	74051 MT	42568 MT	39061 MT
Bio gas-'000m3	6496	6190	6885	3848 KL	3714KL	4131KL
BL solids	492115	459247	388143	337791 MT	326995 MT	322431 MT

UTILISATION OF WASTE MATERIAL AS FUEL . . .

Type of waste material used	Annual savings Rs. (Million)			Waste fuel as a percentage of total energy		
	2018-19	2019-20	2020-21	2018-19	2019-20	2020-21
Bio mass	464.30	230.0	205.9	7.4	7.3	4.2
Bio gas-'000m3	113.17	121.0	118.4	1.0	1.1	1.2
Black liquor solids	2117.95	1233.7	1699.2	33.9	34.4	33.9
TOTAL	2719.71	1584.7	2023.5	42.25	42.70	39.31

WASTE UTILIZATION AND MANAGEMENT

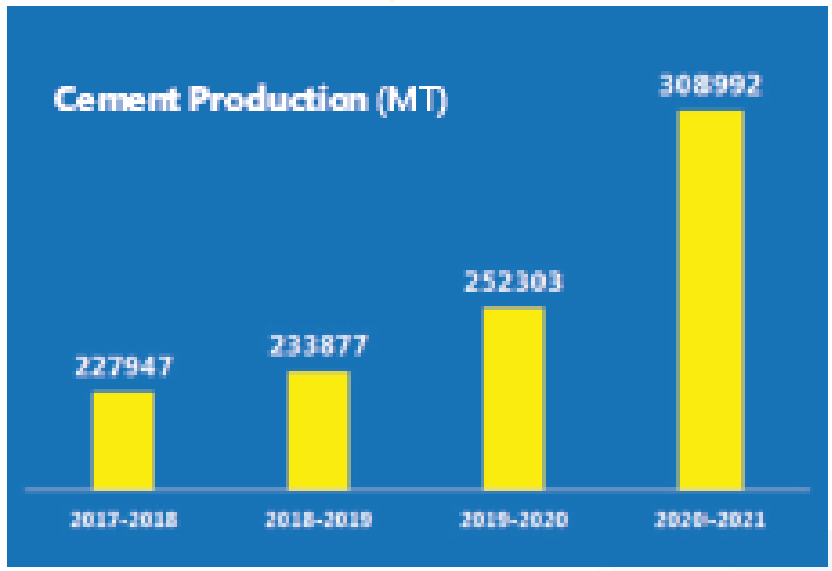
FLY ASH UTILISATION

- **TNPL is the first in paper industry to install cement plant as a circular economy.**
- **The lime sludge from SRP and fly ash generated from power boilers**

YEAR	2018-19	2019-20	2020-21
QTY.OF FLY ASH DESPATCHED TO TNPL CEMENT	20155.78	25192.62	24536.42

WASTE UTILIZATION AND MANAGEMENT

Solid Waste, MT	2017-2018	2018-2019	2019-2020	2020-2021
Lime sludge	19772	52635	59963	56322
Flyash	85674	119646	135032	150105
Deinking Plant Sludge	0	9090	16613	14735
Lime Grits & Sludge from Paper Machine Coating	6706	11373	8248	7505



GHG INVENTORISATION

Sources of GHG Emission in TNPL

Scope 1	Sources
Stationary Fuel Combustion using fossil fuels	Seven Power Boilers, two Lime Kilns and two recovery boilers
Emission from Makeup Carbonates	Lime Kiln Process
Automobile Fuel Combustion	Automobiles owned by TNPL in factory
Emission from Waste water Treatment	Anaerobic Lagoon

Scope 2	Sources
Purchased energy	Electricity imported,

Sources of GHG Emission in TNPL . . .

Scope 3	Sources
Fossil fuel usage	Employees Travel
Emission from Raw Material Transport	Wood, Bagasse , Coal and Waste Paper
Emission from product Transport	Product transport

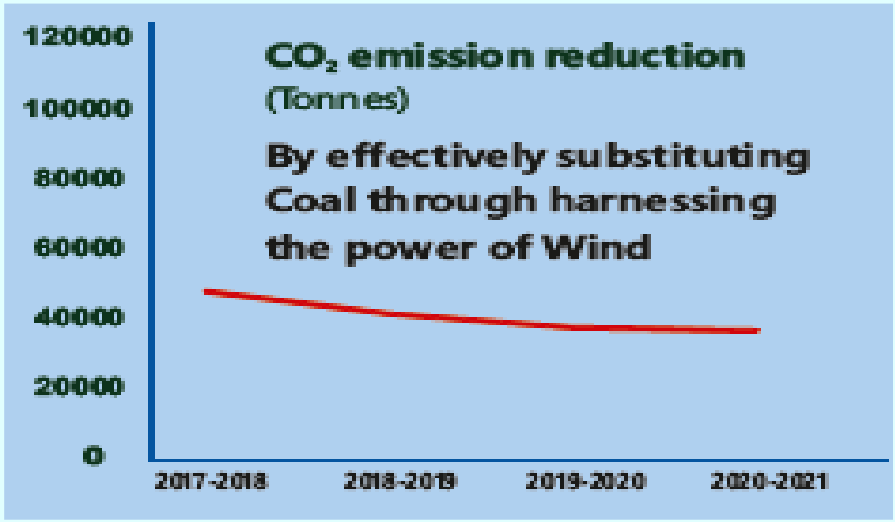
Carbon Neutral	Sources
Stationary Fuel Combustion using biomass fuels	Seven Power Boilers, two Lime Kilns and two recovery boilers

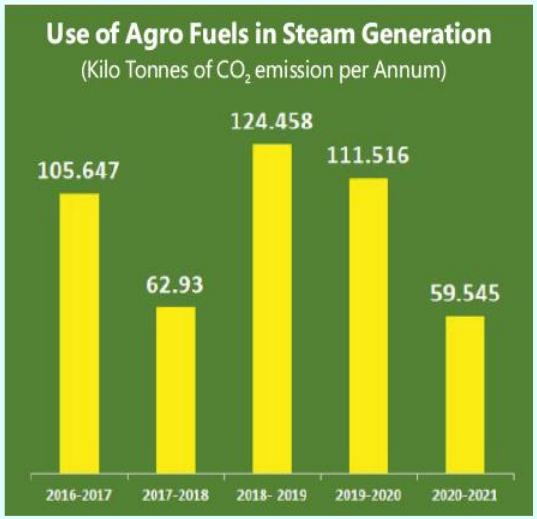
Carbon Sequestration	Sources
Carbon offset due to Plantation Activities	Plantation Activities

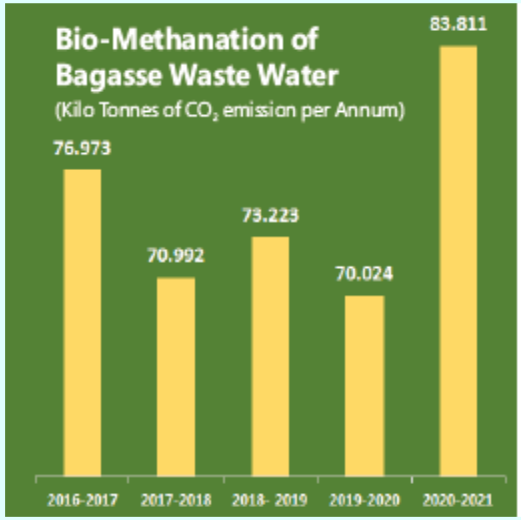
GHG Emission Intensity Reduction

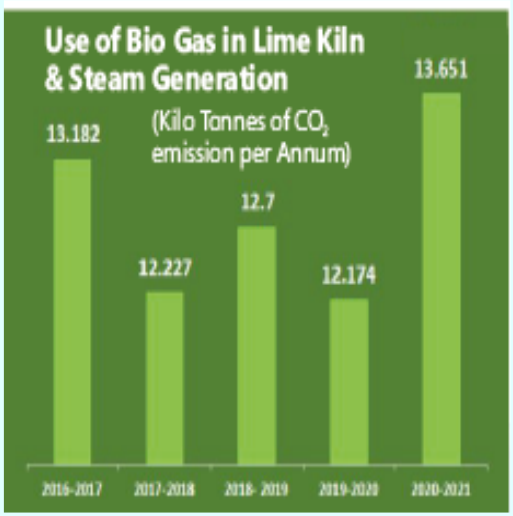
Sl.No	Description	2018-19	2019-20	2020-21
1	Carbon Sequestration by TNPL Plantation (tCO_2e)	339172	443438	526200
2	Avoided Emission due to exported electricity in Wind Farms (tCO_2e)	41820	37697	35362
3	Total Emission under Scope 1 and Scope 2	1231388	1121509	1080713
4	CO_2 Offset by Plantation & Windfarms (1) + (2)	380992	481135	561562
5	Net Emission (3) - (4)	850396	640374	519151
6	Paper production in MT	432572	392250	323588
7	Net Emission per MT of paper production	1.97	1.63	1.60

GHG EMISSION REDUCTION



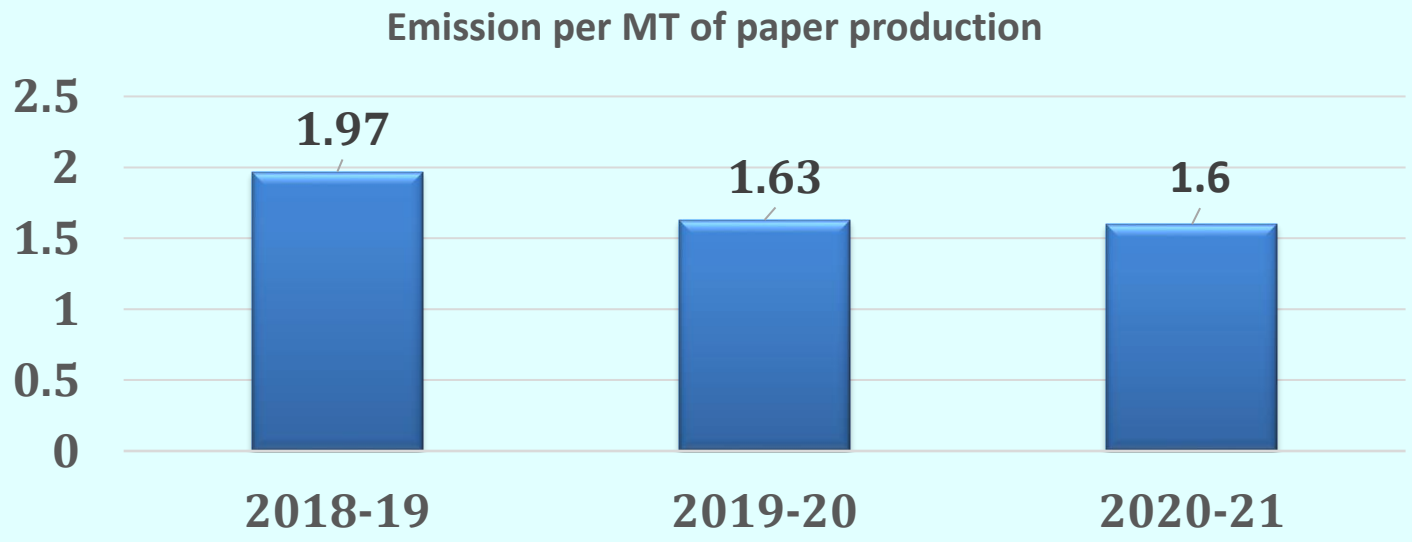






GHG EMISSION TREND

S.No.	Year	Total Emission CO_2 e MT
1	2018-19	1231388
2	2019-20	1121509
3	2020-21	1080831



Developing action plan for achieving the Co_2 Emission targets

- Energy Efficiency improvement in all the possible areas of mill
- Increase Renewable energy fuel sources
- Decrease distance of transportation for raw materials, products, byproducts and in-process wastes like sludge, wood dust, etc.
- Installation of solar electricity panel
- Installation of solar lights in colony streets
- Increase carbon sequestration through pulp wood

GREEN SUPPLY CHAIN MANAGEMENT

Green Supply Chain Policy

TNPL

Tamil Nadu Newsprint and Papers Limited

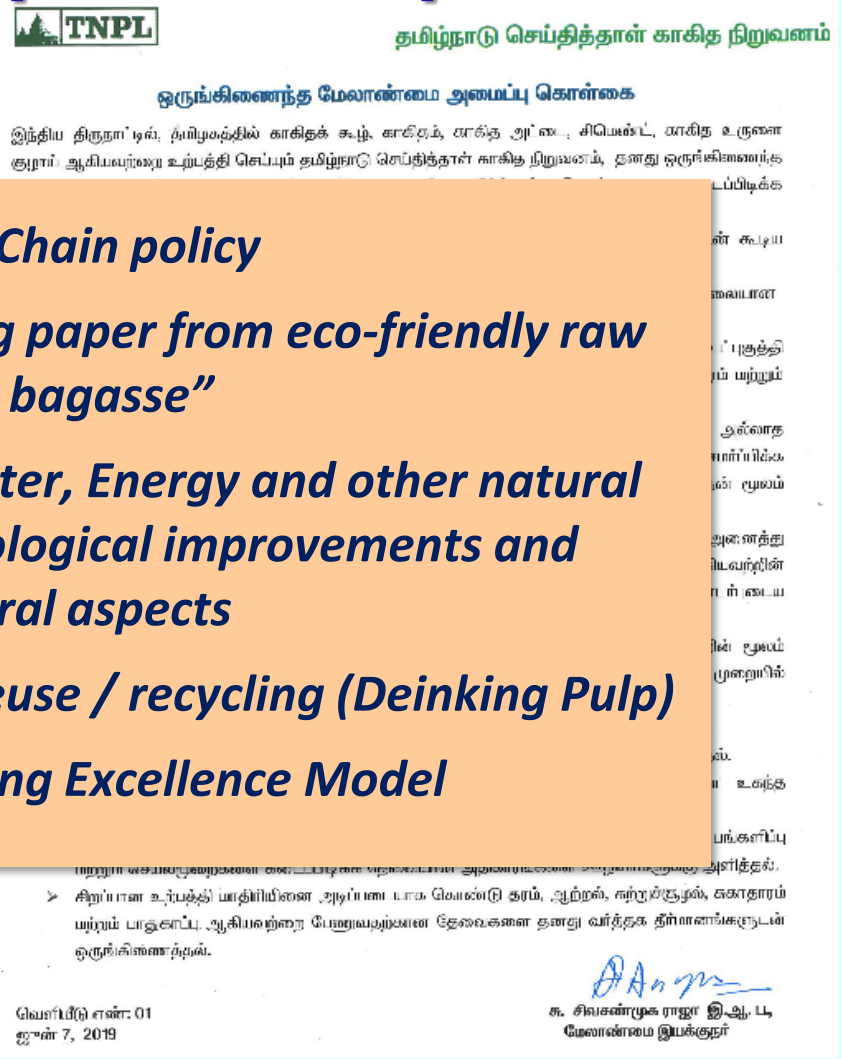
INTEGRATED MANAGEMENT SYSTEM POLICY

Tamil Nadu Newsprint and Papers Limited (TNPL), Tamil Nadu, India, manufacturers of Pulp, Paper, Paper Board, Come... committed to...

- Desig... the o...
- Achie... effort...
- Ensu... optim... Safet...
- Comp... Envir... to th...
- Repo... requi... basis...
- Stimu... impro...
- Mini...
- Ensu...
- Enha...
- Empo... Mana...
- Integrate Quality, Energy, Environment, Health and Safety requirements with business decisions by adopting the Manufacturing Excellence Model.

Issue No: 01
June 7, 2019

S. Sivashanmugaraja, I.A.S.,
Managing Director



TNPL

தமிழ்நாடு செய்தித்தாள் காகித நிறுவனம்

ஒருங்கிணைந்த மேலாண்மை அமைப்பு கொள்கை

இந்திய திருநாட்டில், தமிழகத்தில் காகிதக் கூழ், காகிதம், காகித அட்டை, சிமெண்ட், காகித உருளை குழாய் ஆகியவற்றை உற்பத்தி செய்யும் தமிழ்நாடு செய்தித்தாள் காகித நிறுவனம், தனது ஒருங்கிணைந்த...

- சிறப்பான உற்பத்தி பாதிப்பினை அடிப்படை மாசு கொண்டு தரம், ஆற்றல், சுற்றுச்சூழல், சுகாதாரம் மற்றும் பாதுகாப்பு ஆகியவற்றை பேணுவதற்கான தேவைகளை தனது வர்த்தக தீர்மானங்களுடன் ஒருங்கிணைத்தல்.

வெளியீடு எண்: 01
ஜூன் 7, 2019

சு. சிவசண்முக ராஜா இ.ஆ.ப.
மேலாண்மை இயக்குநர்

Green Supply Chain policy

"The Company is manufacturing paper from eco-friendly raw material bagasse"

Stimulate rational usage of Water, Energy and other natural resources through technological improvements and behavioural aspects

Minimise waste and Maximise reuse / recycling (Deinking Pulp)

Adopting Manufacturing Excellence Model

GREEN SUPPLY CHAIN MANAGEMENT . . .

Projects Implemented:

Elimination of Environtal, Health & Safety issues by procuring Poly Aluminium Chloride (PAC) in Liquid form instead of Powder form.

Investment Made (Rs. in million)

0.5 Million (one time investment made on installation of PAC storage tank with Agitator)

Benefits Achieved

1. Environmental issues and Health and Safety related issues are eliminated.
2. Eye irritation, suffocation and throat irritation in handling powder /granular form are completely eliminated.
3. Labour and Energy involvement in preparation of Slurry PAC with powder was reduced.
4. Using of Liquid PAC reduces about 40 – 45% of the **consumption cost** when compared to the powder/granular form of PAC, the value of which is about R**s.1.5 Cr per annum**.

GREEN SUPPLY CHAIN MANAGEMENT . . .

Description:

Poly Aluminium Chloride (PAC) is a chemical used in all the three Paper Machines at TNPL Unit I for charge neutralization so as to improve the machine runnability with elevated retention levels of fibre and filler.

Poly Aluminium Chloride has been initially procured in granular/powder form. During the preparation process of the chemical, there were many problems encountered by users such as suffocation, Eye irritation etc., due to powder fly off, in addition to Spillage problem while handling the Powder.

To overcome the above, we explored the possibility of using Liquid Poly Aluminium Chloride (which is a much safer form of the product). Since, Liquid PAC worked out much cheaper than power form, savings to the extent of R**s.1.5 Cr per annum was achieved.**

GSC : Logistics

- Precipitated Calcium Carbonate (PCC) and Wet Ground Calcium Carbonate (WGCC) are used as fillers.
- Initially, it was procured in powder form in 50 kg bags and later in jumbo bags.
- TNPL entered into an agreement with M/s OMYA to set up PCC & WGCC plant on BOO basis at a site near the TNPL LSFM Plant.
- OMYA is supplying PCC & WGCC in liquid form since 2014. This has resulted in reduction of Transportation.
- In Future, TNPL is planning to expand the procurement of "Green certified products" especially for high spend materials. Through this, procurement can be emphasized on low-impact materials through the low-impact manufacturing process by environmentally conscious suppliers.

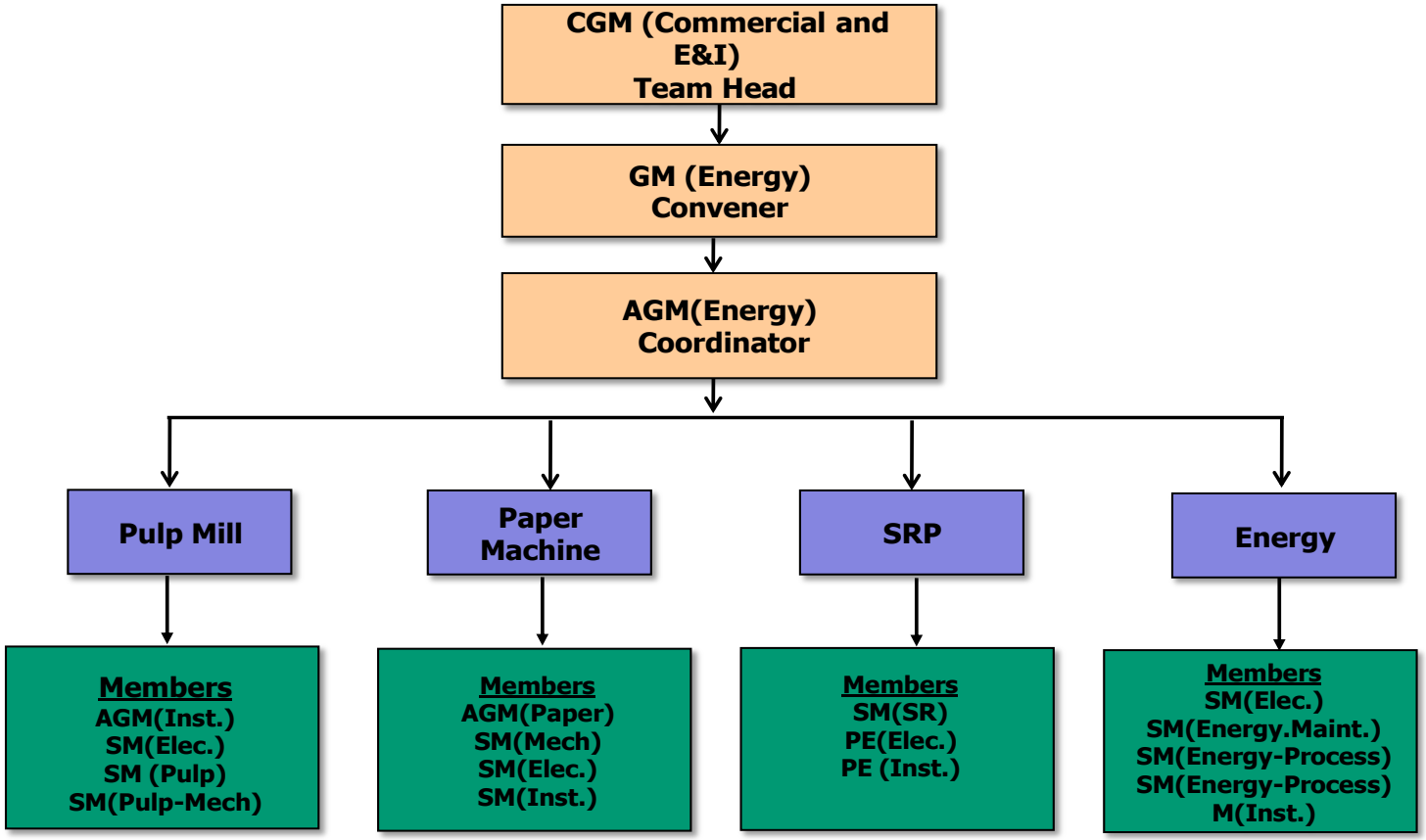
Specific Intensity reduction in Logistics - Procurement of PCC & WGCC

Major consumption of Paper is Filler – PCC & WGCC

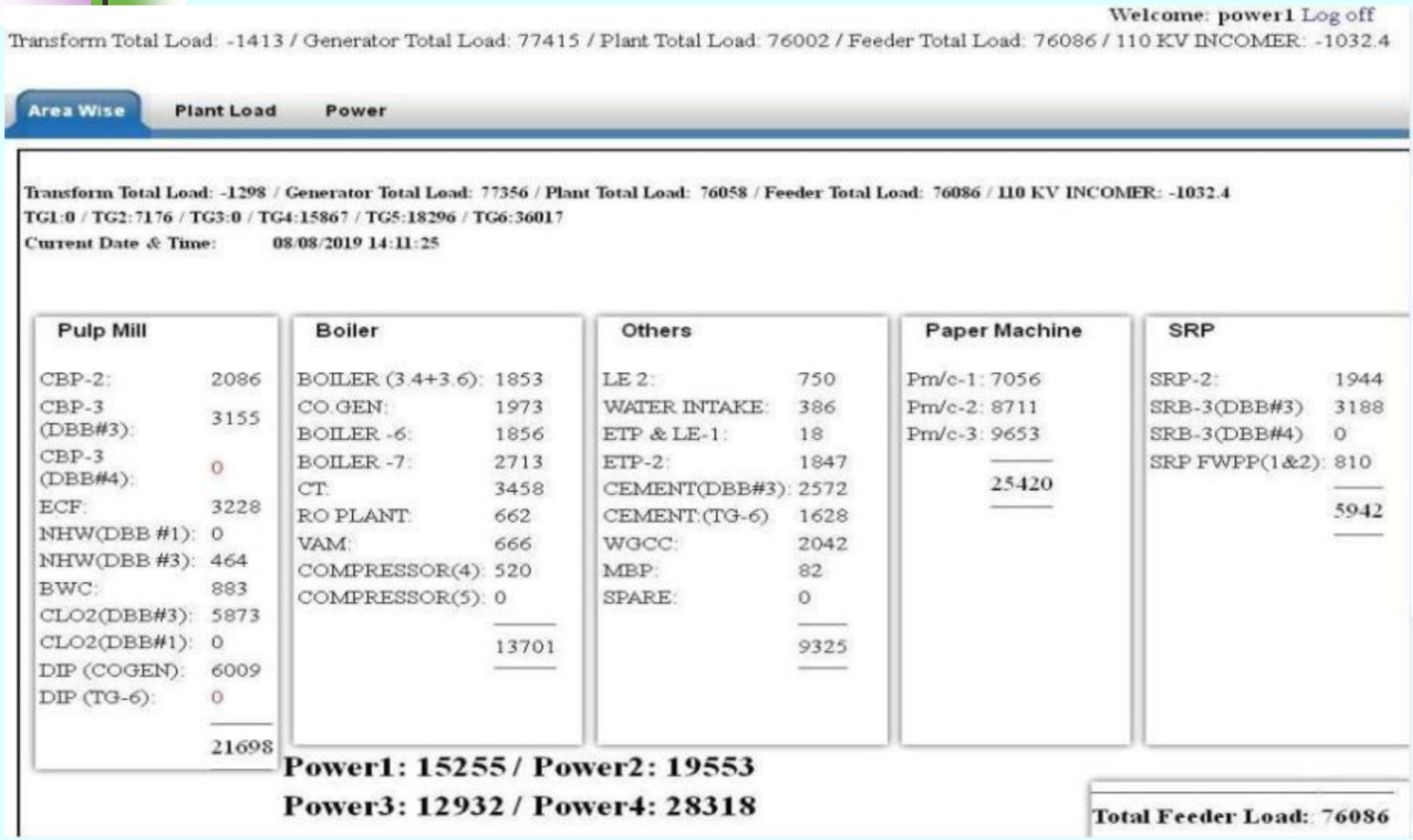
Sl.No	Variety	UOM	Period		
			2018-19	2019-20	2020-21
1	Purchased PCC +WGCC	MT	1964	1519	1000
2	Paper Production	MT	432572	392250	323588
3	Specific consumption of Purchased PCC +WGCC	Kg/MT of Paper	4.5	3.9	3.09
4	Specific intensity reduction from the year 2018-19 to 2020-21	%	**31**		

TEAM WORK , EMPLOYEE INVOLVEMENT AND MONITORING

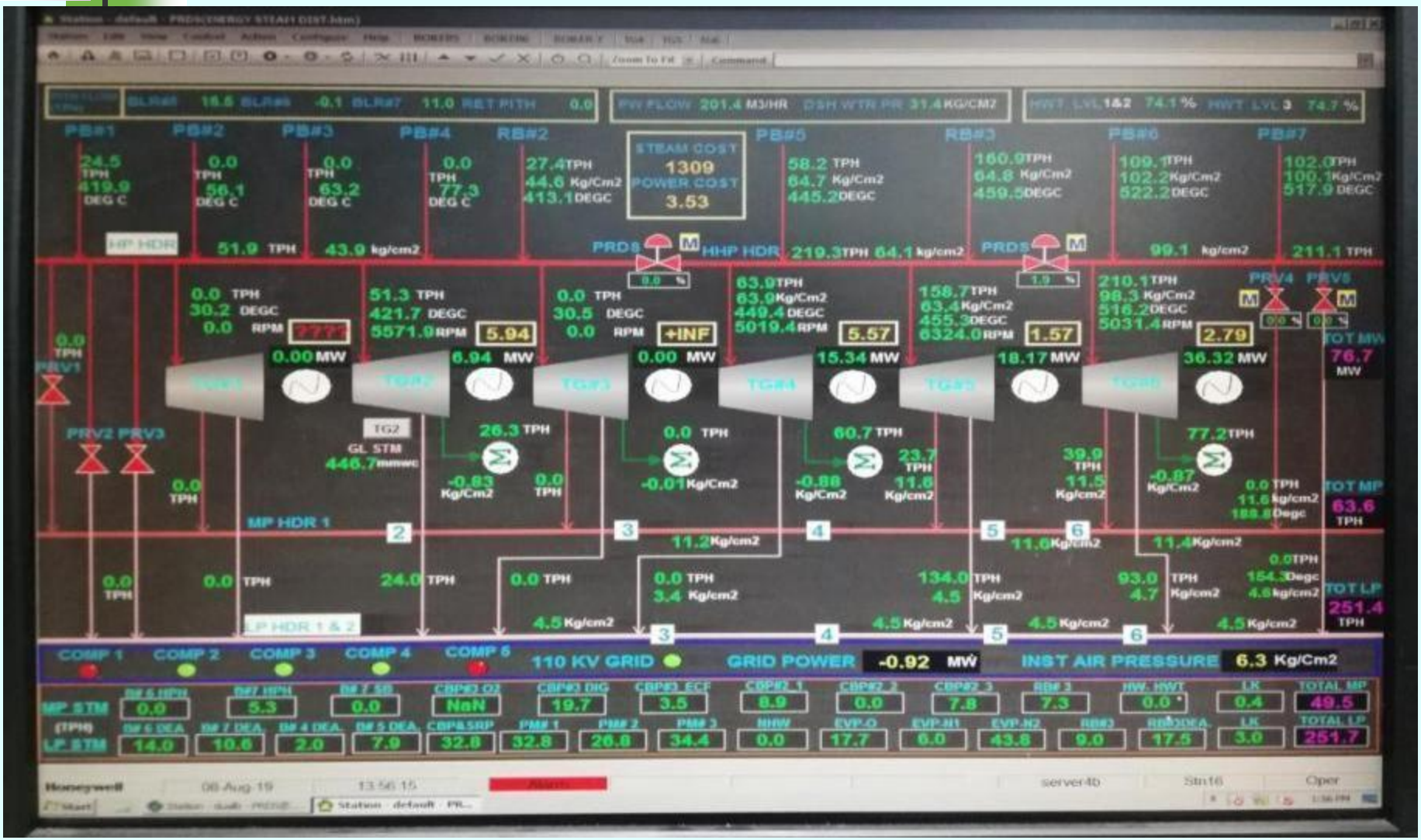
ENERGY CONSERVATION TEAM



Energy Monitoring System(Electrical)



Energy Monitoring System(Thermal)



MANUFACTURING EXCELLENCE (ME)

Why ME?

Started with following objectives :

- *Become first choice of customers*
- *To be cost competitive*
- To create a culture of safety and sustainability

Goals of ME:

- *Zero accidents*
- Zero defect
- *100% on time*
- Control on cost

> *Coming together is a beginning;*
> *keeping together is progress;*
> *working together is success.*
>
> *Driving Force from our MD*

WebDevelopersNotes.com/quotes

MANUFACTURING EXCELLENCE (ME) . . .

Enablers:

* *5S*

* Lean

* 6 Sigma

* *7 Step*

Department/Concept	6 sigma	Lean	Safety	5 S	Total
Energy	6	16		9	31
Paper	18	20	11	27	76
Pulp	25	35	15	10	85
Services		4	1	9	14
SRP	5	7	5	5	22
Total	**54**	**82**	**32**	**60**	**228**

Project Status:

- **Rs.100 Lakhs allotted for ENCON projects every year**
- **152 projects completed**
- **Safety projects taken up on top priority**
- **Likely savings for the year 2020-21 = Rs. 216 lakhs**

MERIT AWARD 2020-21

Impact of Wastewater Irrigation

View of TEWLIS Irrigated Lands

ISO 9001 & ISO 14001 CERTIFICATE

TÜV NORD

CERTIFICATE

Management system as per

ISO 9001 : 2015

In accordance with TÜV NORD CERT procedures, it is hereby certified that

TAMIL NADU NEWSPRINT AND PAPERS LIMITED
HEAD OFFICE : 67, Mount Road, Guindy,
Chennai - 600 032, Tamilnadu,
India
and other location as per annexure

TNPL

applies a management system in line with the above standard for the following scope

Design, Manufacture and Supply of Printing and Writing Paper

Certificate Registration No. **04 100 980539**
Audit Report No. **2.5-2720/2001**

Valid from **21.02.2020**
Valid until **20.02.2023**
Initial Certification **18.08.1998**

Certification Body
at TÜV NORD CERT GmbH

Mumbai, **18.02.2020**

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen www.tuev-nord-cert.com

TUV India Pvt. Ltd., 601, Raheja Plaza – 1, L.B.S. Marg, Ghatkopar (W), Mumbai - 400 086, India www.tuv-nord.com/in

IAF DAkkS Deutsche Akkreditierungsstelle D-ZM-12097-01-00

TÜV NORD

CERTIFICATE

Management system as per

ISO 14001 : 2015

In accordance with TÜV NORD CERT procedures, it is hereby certified that

TAMIL NADU NEWSPRINT AND PAPERS LIMITED
Kagithapuram (PO), Karur District - 639 136,
Tamilnadu,
India

TNPL

applies a management system in line with the above standard for the following scope

Development and Manufacture of Printing and Writing Paper

Certificate Registration No. **04 104 020340**
Audit Report No. **2.5-2720/2001**

Valid from **21.02.2020**
Valid until **20.02.2023**
Initial Certification **07.02.2002**

Certification Body
at TÜV NORD CERT GmbH

Mumbai, **18.02.2020**

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen www.tuev-nord-cert.com

TUV India Pvt. Ltd., 601, Raheja Plaza – 1, L.B.S. Marg, Ghatkopar (W), Mumbai - 400 086, India www.tuv-nord.com/in

IAF DAkkS Deutsche Akkreditierungsstelle D-ZM-12097-01-00

ISO 50001 & GreenCo Gold CERTIFICATE

TÜV NORD

CERTIFICATE

Management System as per

ISO 50001 : 2018

The Certification Body TÜV NORD CERT GmbH hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

TAMIL NADU NEWSPRINT AND PAPERS LTD.
Kagithapuram (PO), Karur District,
Karur - 639 136, Tamilnadu,
India

TNPL

operates a management system in accordance with the requirements of ISO 50001 : 2018 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope -

Design and Manufacture of Pulp and Paper.

Certificate Registration No. **44 764 21393138**
Audit Report No. **2.5-2720/2001**

Valid from **25.03.2021**
Valid until **24.03.2024**

Certification Body
at TÜV NORD CERT GmbH

Mumbai, **25.03.2021**

TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen www.tuev-nord-cert.com

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GreenCo

CII
Confederation of Indian Industry
125 Years: 1895-2020

CII - Sohrabji Godrej Green Business Centre

hereby certifies that

Tamil Nadu Newsprint and Papers Limited, Kagithapuram

has successfully achieved the standards as required for the following level of certification under the GreenCo - Green Company Rating System which is valid for a period of 3 years

GreenCo Gold

Issue Date: 29-11-2019 Expiry Date: 29-11-2022

Jamshyd N Godrej	Pradeep Bhargava	L S Ganapati	K S Venkatagiri
Chairman	Chairman	Chairman	Executive Director
CII-Godrej GBC	GreenCo Rating System	GreenCo Assessor Panel	CII-Godrej GBC

AWARDS & ACCOLADES

S.No.	Description of Awards	Year	Given by
1	Energy Efficient Unit Award	2020	CII
2	Environmental Best Practices Award	2020	CII
3	Water Stewardship Award	2020	ICC
4	D.L.Shah Quality Award	2020	QCI
5	National Award for Excellence in Water Management	2020	CII
6	Golden Peacock Award	2020	Institute of Directors
7	CSR-INDIA Award	2020	Greentech Foundation
8	Best E-Poster	2020	CII

ENERGY EFFICIENT UNIT AWARD 2020

CII

Confederation of Indian Industry
125 Years - Since 1895

21st National Award for
Excellence in Energy Management 2020

This is to certify that

Tamilnadu Newsprint and Papers Limited, Karur

has been recognized as

"Energy Efficient Unit"

This acknowledgement is based on the evaluation by panel of judges at the "National Award for Excellence in Energy Management" held during 25 - 28 August 2020.

K S Venkatagiri
Executive Director
CII - Godrej GBC

Ravichandran Purushothaman
Chairman, Energy Efficiency Council
CII - Godrej GBC

ENVIRONMENTAL BEST PRACTICES AWARD 2020

CII

Confederation of Indian Industry

125 Years - Since 1895

7th CII Environmental Best Practices Award 2020

This is to certify that

Tamil Nadu Newsprint and Papers Limited, Karur

is a "Most Innovative Environmental Project"

This is being given on completion of the National Competition for CII Environmental Best Practices Award held on 29 - 31 July 2020 over Virtual Platform.

K S Venkatagiri
Executive Director
CII - Godrej GBC

Pradeep Bhargava
Chairman
GreenCo & Environmental Council
CII - Godrej GBC

L S Ganapati
Chairman
CII Environmental Best Practices Award
CII - Godrej GBC

WATER STEWARDSHIP AWARD 2020

D.L.SHAH QUALITY AWARD 2020

EXCELLENCE IN WATER MANAGEMENT AWARD 2020

GOLDEN PEACOCK AWARD 2020

CSR-INDIA-2020 AWARD

Confederation of Indian Industry

Certificate of Achievement

This is to certify that the poster submitted by

Tamil Nadu Newsprint and Papers Limited

has been chosen as the

'Best Poster'

in the E-Poster Competition under the Category

'Best Practices in Energy Efficiency'

This acknowledgement is based on the evaluation by the panel of Judges at 'EnerCon 2020' held during 7 – 12 December, 2020.

K S Venkatagiri
Executive Director
CII - Godrej GBC

Ravichandran Purushothaman
Chairman, Energy Efficiency Council
CII - Godrej GBC

THANK YOU