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Presented By :

Dr.S.Subramanian

GM (R&D and QC)

Team Members

Mr. T. Vijayakumar, SM (Lab)

Mr. R. Ragunathan, SM (SRP- Process)

Dr. S. Asokan, SM (SRP-Mech)

Dr. K. Sudarshan, AM (R&D)

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TNPL – "The Environment loving unit"

- Promoted by Government of Tamil Nadu in 1984.
- World's largest bagasse based paper plant at single location & Largest exporter of the country. Largest exporter of Writing & Printing Paper from the country.
- ISO 9001:2015, ISO 14001:2015, ISO 50001:2018 & ISO 27001:2013 Certified.
- FSC FM-COC, COC –CW Certified.
- Green Co Gold Rated from CII, Hyderabad.
- Uses "One million MTA of Bagasse" which conserves 6.5 lakh MTA of wood.
- 1.7 lakh MTA of wood is being conserved by using 0.6 lakh MTA of waste paper.
- Sequestering about 45,000 tCO2e GHG emission through 35.5 MW Wind Power.
- Reuse 80, 000 MT A of lime sludge & 50,000 MT A of fly ash to produce 'CEMENT" thereby conserves 93,000 MT A of lime sludge.
- Utilize entire treated effluent to irrigate 1600 acres of land benefiting 430 farmers.
- Conserves 15KLD of furnace oil utilizing 25,000 m^3 of biogas generated by treating Bagasse wash water .
- Achieved 1,66,899 acres of Pulp wood plantation sequestering about 49.2 Lakh MT CO2e emission.
- Utilize1.8 Lakh MT of Internally generated Agro waste as fuel in Boiler to conserve 45,000 MTA of imported coal.

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Slide – 1

Project title	**Reduction of Green House Gas emission and Sodium sulphate consumption by In-House modified liquor gun firing system for Agro Based Chemical Recovery Boiler**
Trigger of the project	***The project was conceived at the middle management level while analyzing the root causes affecting the performance of agro-based black liquor firing process in recovery boiler. Since, the combustion process did not takes place effectively, which was leads to 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 for firing the black liquor is unique for firing the black liquor and this project is *"First time in Agro Based Integrated Pulp and Paper Mill"* in Globally.**

Date of commencement	***Sep'2019***
Planned Date of Completion	***Nov'2019***
Actual Date of Completion	***Dec'2019***

Major milestones of project:

Design	**Analysis of Black liquor properties**	***Sep'2019***
Phase 1	**Installation of TNPL's Modified Liquor gun**	***Oct - Nov'2019***
Phase 2	**Optimizing the firing pattern**	***Mid of Nov'2019***
Performance	**Trial Run**	***Dec'2019***

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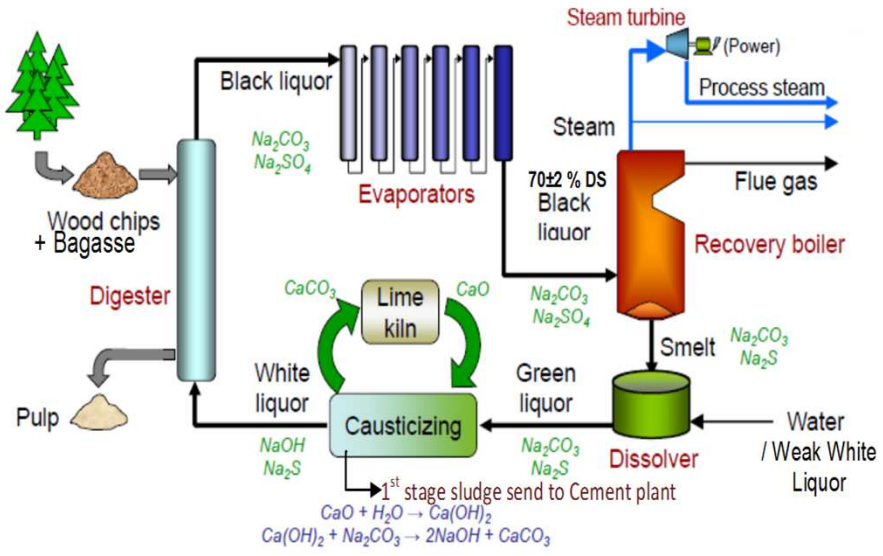
Slide – 1 A

Pulp mill Soda Recovery close loop process



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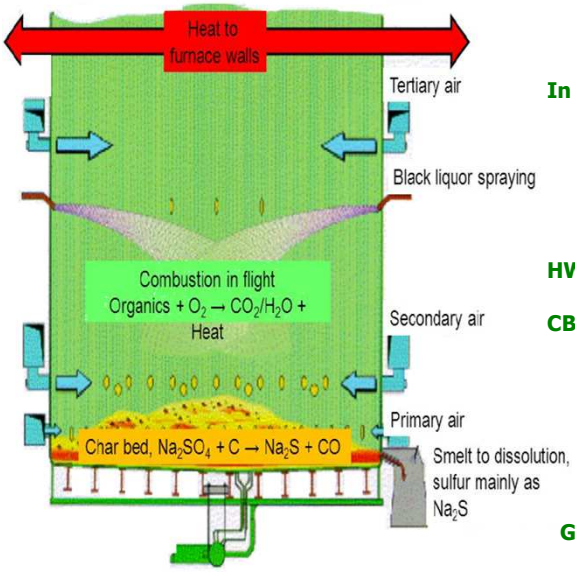
Slide – 1 B

Soda Recovery Boiler process



Capacity : 1300 MT BLDS

In India, in the year of 2008, this recovery boiler was commissioned with the highest capacity of dry solids and handling and "Green power" generation.

HW Black liquor handling: 34 %

CB Black liquor handling: 66 %

Boiler Air system: 3 level

Single drum Boiler

Green Power Generation: 18 MW

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Slide – 1 D : Before Implementation of the Project

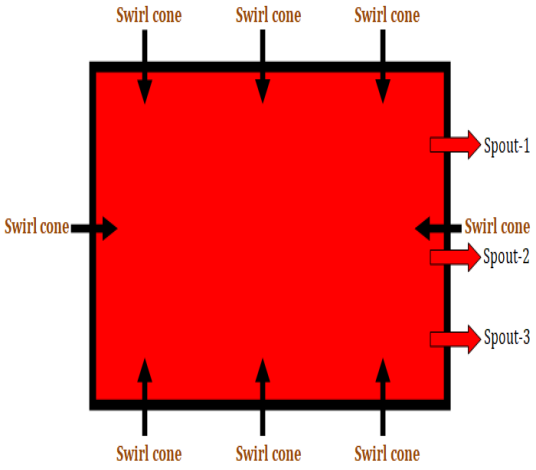

Fig 1. Swirl cone liquor gun (trajectory went towards the upper furnace) and firing pattern in TNPL's Recovery furnace

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Slide – 1 E : After Implementation of the Project

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

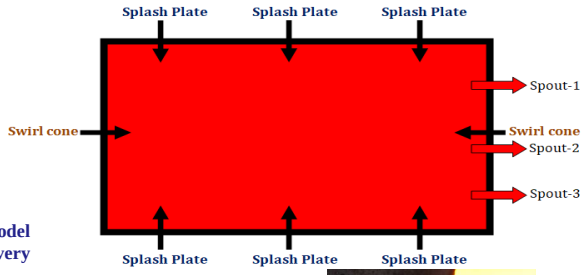

Fig Splash plate liquor gun nozzle model and its firing pattern in TNPL's recovery furnace

- Material used : SS 310 Sch 160
- Length of the splash plate gun reduced to : 100 mm
- Liquor gun angle at the bend portion : 35°±1
- Gun position in the furnace : 10°±1 downward
- Liquor firing pressure : 0.96 – 1.2 bar
- Total numbers of splash plate gun used : 6 (right & left hand sides of the furnace)
- Total numbers of swirl cone gun used : 2 (front and rear sides of the furnace)

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Slide - 2: Challenges faced and brief on countering

Technical and Maintenance related :

The project developed by in-house.

- Breakage of the liquor guns due to Thermal attack
- Carryover and smelt flow down onto the liquor nozzles
- Uneven and unburned char bed formation towards right hand side and front side of the boiler.
- Carryover in the upper furnace
- Plugging problems in upper furnace (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 downward
- The proportionate air ratio of Primary: Secondary: Tertiary has been changed from 30%, 55% and 15% to 28%, 52% and 20% respectively.

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Slide – 3 : 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	199326
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	1980
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

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Slide – 4 : Intangible Benefits

- **Recovery Boiler flue gas path Water wash frequency is increased from every 60 days to 90 days**
- **As the liquor firing gun is developed by in-house team, fabrication of liquor firing gun is carried out by nearby indigenous fabricator. Hence depend on OEM supplier is eliminated resulting in Scope#3 emission.**
- **Reduction of dead load in the Soda recovery – Pulp mill close loop cycle.**

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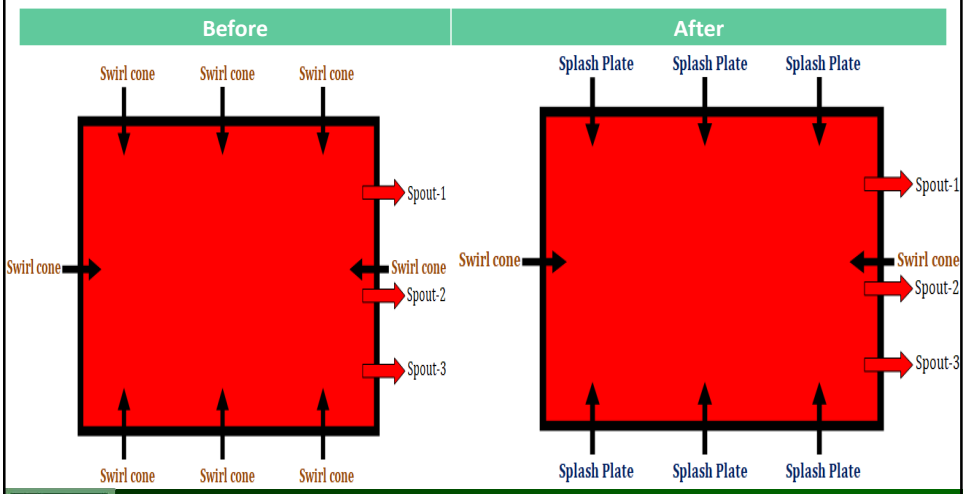
Slide – 5 : Replication Potential

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.

Evidence on where and when implemented with photos.



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Slide – 5 – A : Replication Potential- What next for spreading benefits?

- Government of Tamil Nadu sanctioned a scheme called Chief Minister Best Practice award. The best efforts of TNPL are submitted to Chairman and Managing Director of TNPL for onward submission to Government of Tamil Nadu. The highlights of this In-house Innovative Project is one of the best efforts submitted to them.

- Demonstrated this project to TNPCB official during their plant visit. They appreciated this project on the reduction of Green House Gas & Sodium Sulphate consumption and instructed TNPL to submit this project to TNPCB so that it can be forwarded to other industries.

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Slide – 5 B OR 6 : Achievement sharing mode: demo/forum/seminars),Other knowledge sharing platforms

- Transfer the knowledge and the work carried out to all the employees of TNPL,
- Availability of Hard and Soft copy of projects in Technical Library, TNPL.
- Availability of Soft copy of projects is made available in TNPL Intranet http://dms.tnpl.com:8080/share/page/
- Publishing the project in the Compilation of Continual Improvement Projects of TNPL.

Transfer the knowledge and the work carried out to other Industries

- Approval accorded from Top Management to submit this project as a Technical Paper in
- *The forthcoming Indian Pulp and Paper Industry Technical Association (IPPTA) Journal,*
- *Environment Best Practise manual by CII-GBC*

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Slide - 7: National Standard

Data summary pertaining to two competitors above you and two competitors below you

Suspended Particulate emission (SPM) for recovery boiler

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

http://www.indiaenvironmentportal.org.in/files/file/Pulp%20&%20Paper%20Industry.pdf

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Slide - 8: Priority plans on fast track for +1 year and +2 year, including resource requirement

Plans	Resources Required in Lakh
Usage of Chemical Bagasse plant screen rejects of Unit#1 to UNIT II after removal of the residual alkali in the rejects	10
Replace Soda ash with carbon di oxide purchased in cylinders from open market /CO_2 from our flue gas emissions from lime kiln, recovery boiler, power boilers etc., for the Pretreatment of Bleach Plant Effluents	10
Chloride and Sulphate removal system from the recovery boiler ESP ash to reduce the NPE's in the Soda recovery – Pulp mill close loop cycle	400
Oxidizing biocide programme instead of non oxidizing programme across all the three machines.	45
Reduce colorant dye in paper and thus produced new product with natural shade with good appealing.	5
Mixing of purified hydrogen gas extracted from Chlorine dioxide plant with biogas for firing at lime kilns to replace the furnace oil.	50
Bottling of Biogas	100
Recovery of process water from the discharge effluent using MVR Technology	200

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Slide - 9: Major learning's from the project implementation.

- Ensuring of Clean environment with less cost of investment.
- Trouble shooting are made easier without the support of External Agency.
- Enhancing the Confidence Level of all the employees of TNPL towards achieving minimum impact to the environment.
- Operating crew was educated about the importance of newly modified gun operation with respect to bagasse black liquor.

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Slide - 10: 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	60000
Heat Value saved per year	GJ	199326

Slide – 10 A: Environmental Performance Evaluation (EPE)

Operational Performance indicator (OPI) :
Sodium sulphate Consumption, MT per day

Parameter	UOM	Value
Before Project Implementation	MT/day	13
After Project Implementation	MT/day	7
Savings of Sodium sulphate	MT/day	6
Savings of Sodium sulphate per Year	MT/year	1980

Environmental condition indicator (ECI) :
Suspended Particulate emission for recovery boiler

Parameter	UOM	Value
Before Project Implementation	mg/nm^3	130±10
After Project Implementation	mg/nm^3	100±10
Emission Reduction in CO_2 equivalents	t CO_2e	19525

VIDEO on
TNPL COVID CARE CENTER

021_TNPL Covid Care centre.mp4

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Thanking You

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