IL's 5 TPD CBG Plant at Ranchi (MSW Based): Experience Sha on Construction, Commissioning & Operational Readiness

- by Kishore Kumar, GM (CBG), GAIL

11.09.2026

L 5 TPD CBG Plant

	Jhiri, Ranchi , Jharkhand
n	**5 MT of CBG per Day**
	7.86 Acres

Raw Material		
C will be supplying e Agreement)	**150**	**MT/Day**
	15	MT/Day

Production		
Raw Biogas)	**12500**	**Cum/Day**
ed Biogas	5000	KG/Day
	24900	KG/Day
	33200	Ltr/Day

ect Genesis & Investment Approval

- Investment approval accorded by CMD, GAIL on 14.01.2020
- Approved Project Capex: ₹28.19 Crore
- Project conceived to process MSW and produce compressed biogas for commercial utilization
- **Strategic Objective:** convert municipal organic waste into clean gaseous fuel while supporting waste-management objectives

& EPCO Award

roject Management Consultancy (PMC)

M/s Airox Nigen Equipment Pvt. Ltd., Ahmedabad

FOA: 11.07.2020

WO: 11.08.2020

Project management, coordination, engineering and execution support

EPCOM Package

- M/s CEID Consultants & Engineering Pv Ltd., Abohar
- FOA: 03.06.2021
- WO: 30.07.2021
- Engineering, Procurement, Constructio and associated execution activities
- O&M for 5 years after commissioning

ect Execution Timeline

14.01.2020 – Investment approval by CMD, ₹28.19 Cr

11.07.2020 – PMC FOA: Airox Nigen

18.03.2021 – Concession Agreement with RMC

03.06.2021 – EPCOM FOA: CEID

2022–24 – Construction, Erection Installation and system integration

02.10.2024 – Plant inauguration by Hon'ble PM

14.01.2025 – Commissioning Milestone

17.01.2025 – Commercial Sale commenced

2025–26 – Operational stabilization & PGTR readiness

ect Phase: Key Issues & Challenges

te & Execution Constraints

Approach road constrained movement of heavy equipment, machinery and materials.

Rocky terrain increased effort/time for excavation, grading, foundations and underground works.

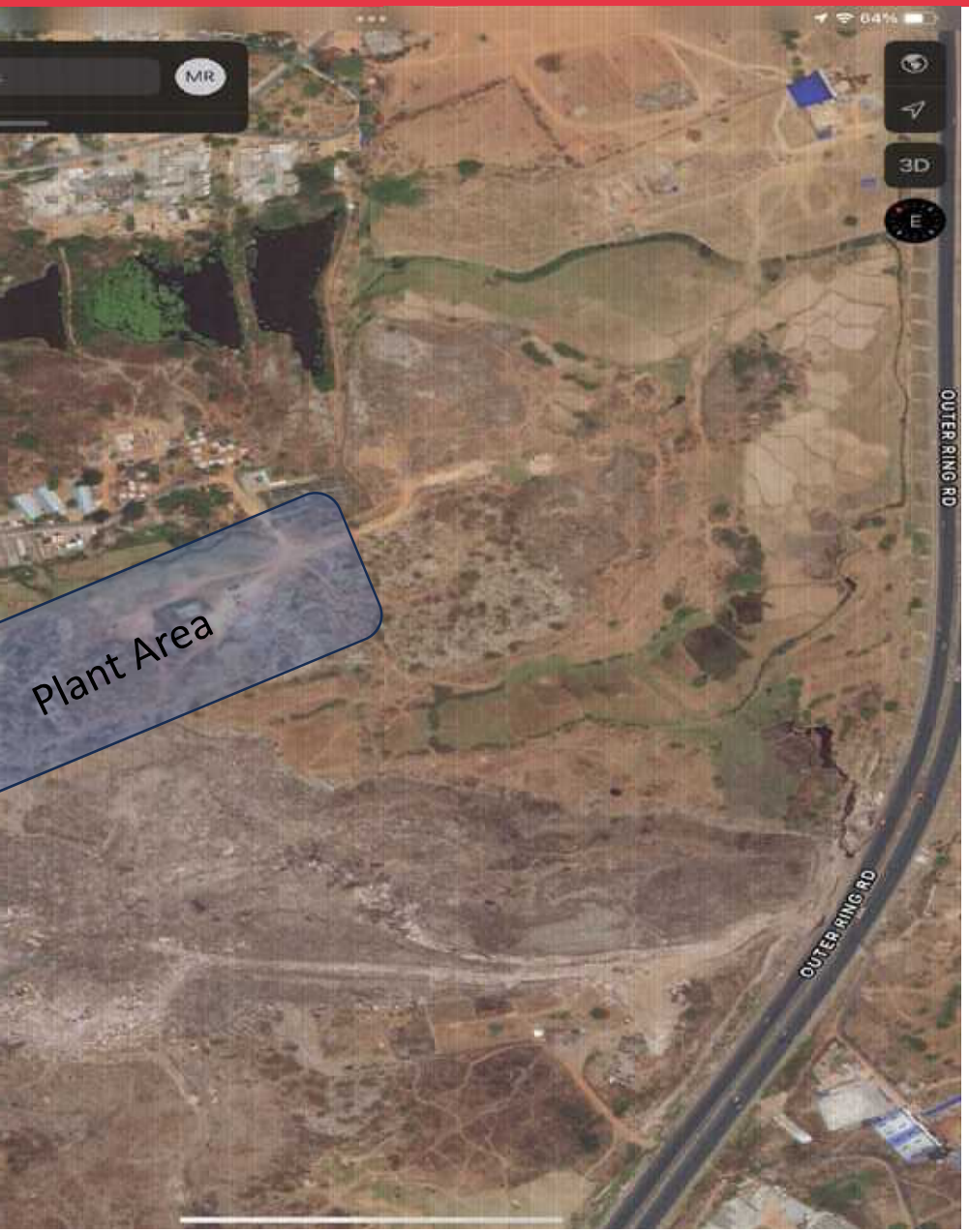
Approximately six-month rainy season reduced productive working days and affected civil activities.

Inadequate manpower/resources restricted simultaneous working on multiple fronts.

Commercial & Procurement Constraints

- Improper cash flow against physica progress affected mobilization an execution momentum.
- Delay in supply of the purification uni affected the critical gas-upgradatio chain.
- Multiple constraints acted togethe rather than independently.
- **Overall impact:** slower constructio progress, extended execution an delayed commissioning/stabilization.

enge 1: Approach Road



1st Attempt
Construction of Approach Road

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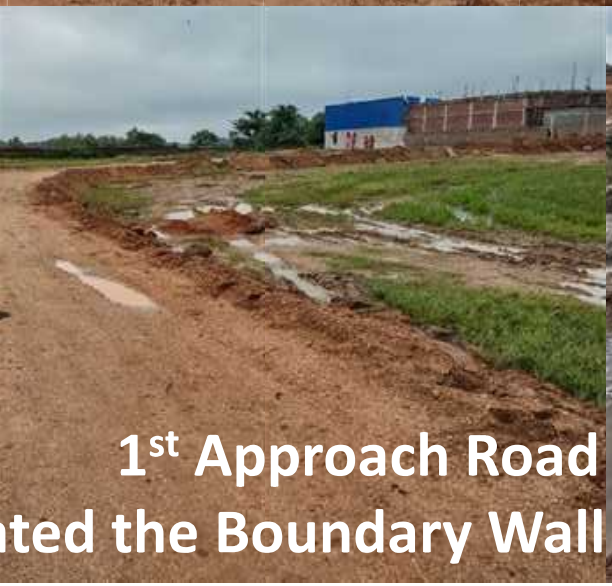
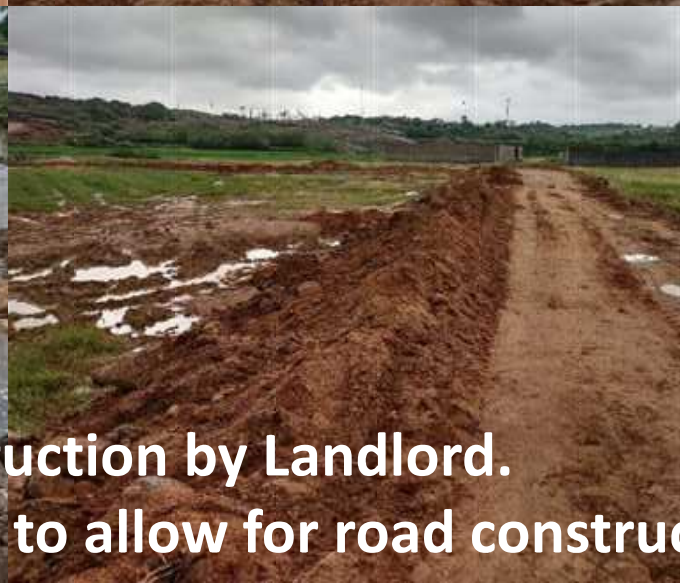
Construction of Approach Road





1st Approach Road could not be used due to Obstruction by Landlord.
nted the Boundary Wall on the which he earlier agreed to allow for road construc

2nd Attempt
Construction of Approach Road

pproach Road could not be used due to Obstruction by High Tension Power Cable

nstruction of Approach
ad through Dump Yard

enge 2: Rocky Terrain

Photographs

enge 3: Inadequate Manpower & Resources

nadequate manpower/resources restricted simultaneous working on mult
ronts.

lenge 4: Cash Flow Against Progress

Jan -23

- PHYSICAL PROGRESS –7%
- FINANCIAL PROGRESS – 0%

Jun-23

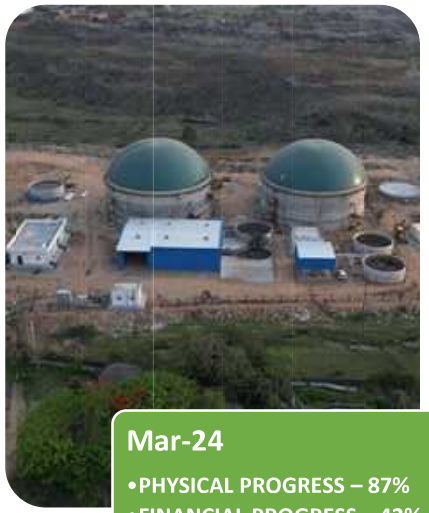
- PHYSICAL PROGRESS – 32%
- FINANCIAL PROGRESS – 10%

Sep-23

- PHYSICAL PROGRESS
- FINANCIAL PROGRESS

-23

- SICAL PROGRESS - 76%
- NCIAL PROGRESS – 33%



Mar-24

- PHYSICAL PROGRESS – 87%
- FINANCIAL PROGRESS – 42%

Jun-24

- PHYSICAL PROGRESS – 91%
- FINANCIAL PROGRESS – 44%

Sep-24

- PHYSICAL PROGRES
- FINANCIAL PROGRE

enge 5: Hydrotesting of Digesters

- **Water arranged from alterr sources through tankers**

enge 6: Delay in Supply of Purification Unit

enge 7: Six-Month Rainy Season

ovement 1: SS 304 Piping

- **Carbon Steel pipes replaced with SS pipes to make it corrosion resistant**

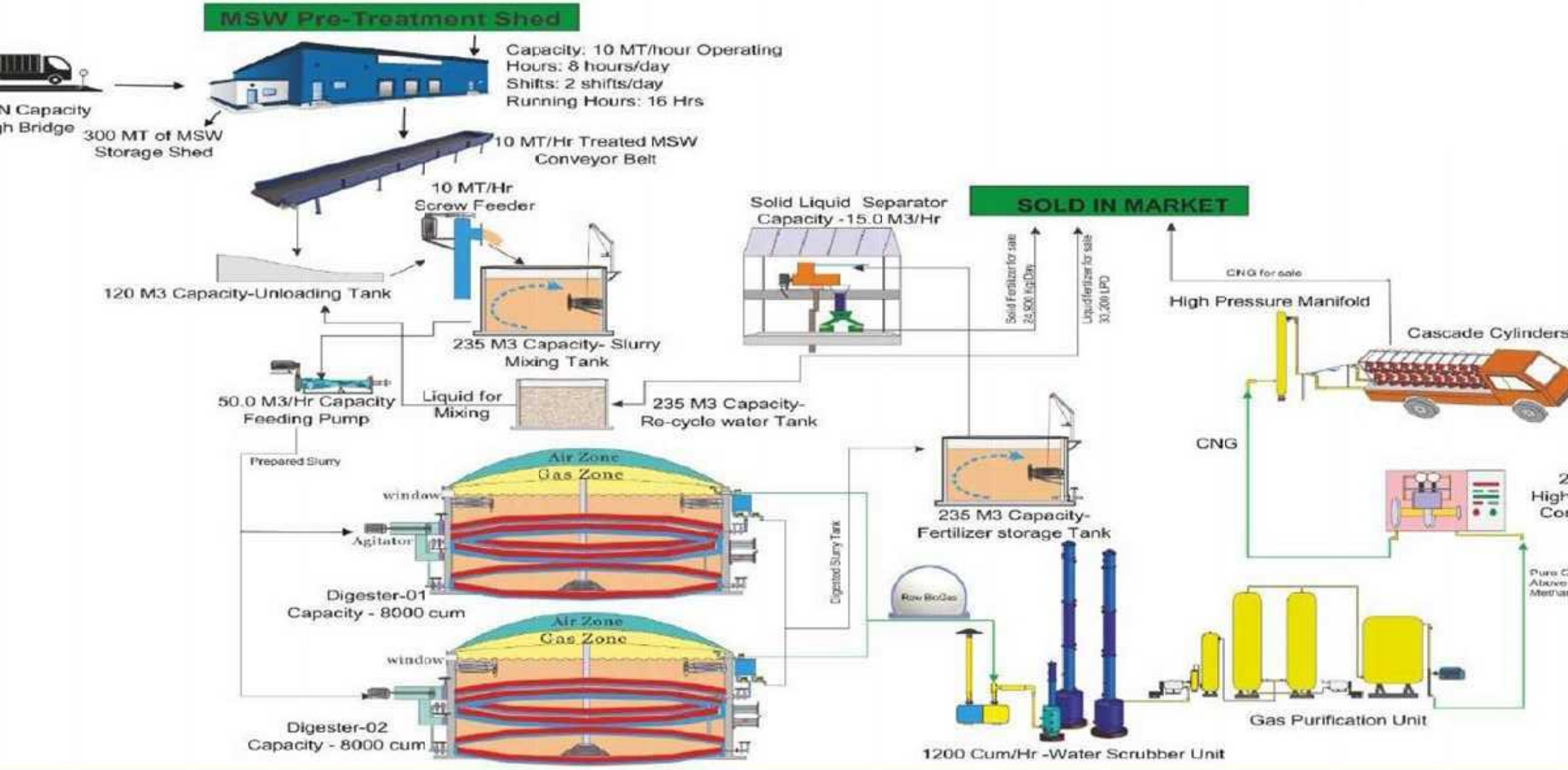
ovement 2: Bio Grinder

- **Bio Grinder add**
  for better fe
  preparation
  enhanced
  digestibility a
  higher yields

ovement 3: Screen Mesh Separator

- **Screen Me Separator add for removal inerts a inorganics**

PLANT – PROCESS



SALIENT FEATURES

Material

- Organic MSW - 150 Tons Per Day
- Cowdung - 15 Tons Per Day

Location: Water Scrubbing Technology

Production

Raw Biogas	- 12,500 Cum per Day
Compressed Bio Gas (Bio-CNG)	- 5,000 Kg per Day
Bio - Fertilizer (Dry)	- 24,900 Kg per Day
Bio - Fertilizer (Liquid)	- 33,200 Liters per Day

Plant - 7.86 Acres
Location - Ranchi, Jharkhand, Plot No 260, 261, 262 Khata No 77, 54, 2
Dumping Site Mouza Jhiri 145
Consultant - M/s Airox Nigen Equipment Pvt. Ltd.
Contractor - M/s CEID Consultant and Engineering Pvt. Ltd.

G PLANT – MSW Receipt, Storage & Pre-Treatment

Bridge
capacity
ng waste
recorded

Storage & Inspection

- 300-ton MSW Storage Shed
- Quality inspection
- Non-conforming MSW returned to RMC

Pre-Treatment

- Hopper receives accepted MSW
- Vibrator provides even distribution
- Conveyor transfers material

Bio-Grinder

- Shredded MSW converted into a paste

PLANT – Slurry Preparation & Anaerobic Digestion

ocessed MSW slurry
120 m³ unloading
nk
ow dung added at
10 ratio for
oculation and
icrobial balance

Slurry Preparation

Intermediate Filtration

- Wire mesh filter removes large, undigested particles
- Filtered slurry transferred to intermediate tank

- 235 m³ slurry mixing tank
- Screw feeder pump for homogenization

Slurry Mixing

Two Anaerobi Digesters

- Each: 8,000 m³ capacity
- 30 m diameter × 12 m height
- 5 high-flow agitators
- Water heating maintains 35–38°C
- Anaerobic digestion occurs in absenc oxygen
- Raw biogas is generated

G PLANT – Raw Biogas Generation and Collection

Generation

Biogas generation typically begins after 35–45 days retention period.

Raw gas: 60–65% CH_4, 30–35% CO_2, with traces of H_2S, moisture and inert gases.

Digester Gas Holding

- Each digester has 3,000 m^3 gas holding capacity.
- Gas accumulates at the top and is pushed out for further processing.

Raw Biogas Balloon

- Capacity: 1,500 m^3
- Acts as a buffer/storage unit to balance fluctuations in generation and feed to purification.

Transfer to Purification

Raw biogas pressure ≈ 50 mbar → conveyed to Raw Biogas Purification Unit

G PLANT – Purification Process

G PLANT – Compression Filling and Distribution

G PLANT – JOURNEY

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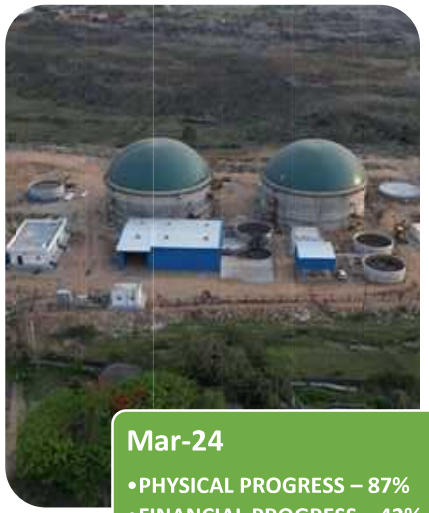

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- FINANCIAL PROGRE

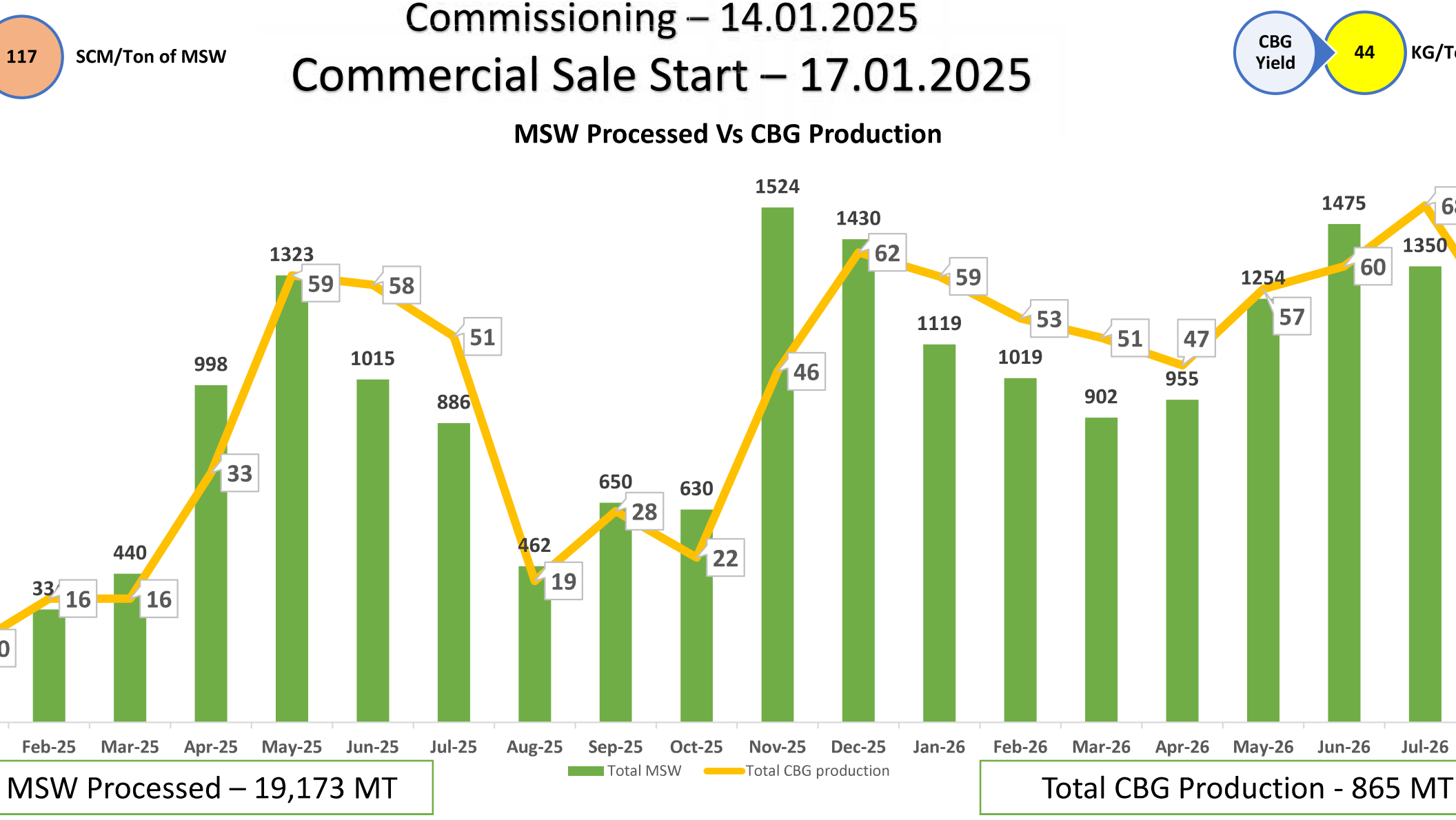
G PLANT – PRODUCTION

117 SCM/Ton of MSW

Commissioning – 14.01.2025

Commercial Sale Start – 17.01.2025

CBG Yield 44 KG/T



MSW Processed – 19,173 MT

Total CBG Production - 865 MT

G Plant – Subsidy And Financial Assistance

MNRE
Waste to Energy

- Central Financial Assistance (CFA): ₹4.16 crore sanctioned
- PGTR Status: Planned to commence in the first week of August 2026.

MoPNG
DPI

- Development of Pipeline Infrastructure for Injection of CBG into CGD N
- Financial Assistance Sanctioned: ₹82.50 lakh
- Pipeline Commissioned: 14 February 2026.
- CFA Received: 50% of the sanctioned assistance received on 31 March

rational Challenges

adequate supply of MSW by RMC leading to less capacity utilization of CBG plant

otment & handover of land for CNG stations by RMC

Thank you