Aditya Aluminium

Energy Analytic Platform using Power BI with AI and energy saving using Copper Insert

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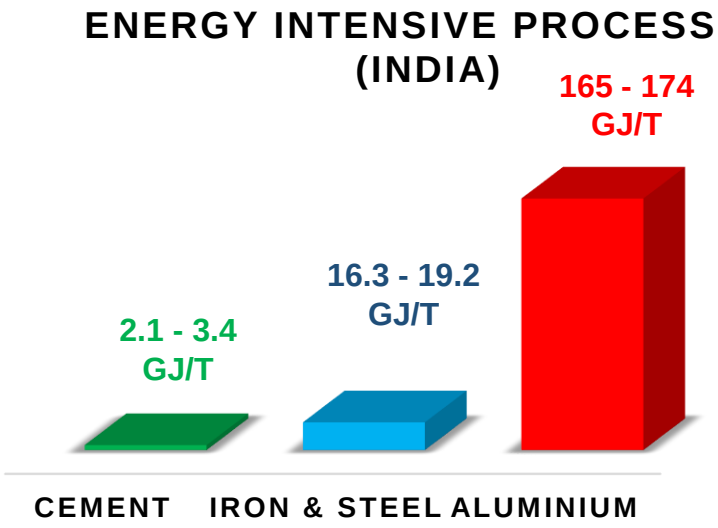
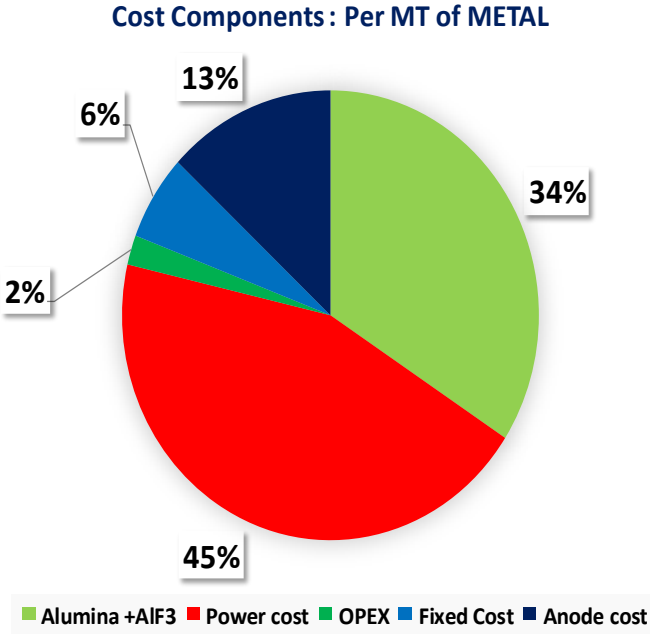
- Our Machines & Processes

Hall – Heroult Process
$Al_2O_3 + 3\,C = 4\,Al + 3\,CO_2$

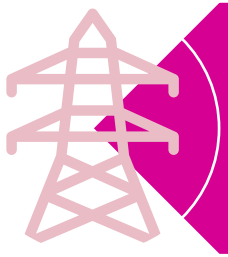
Challenges

- Difficulties in managing and processing bulk energy data
- Inefficiencies due to lack of proper decision making
- Lack of awareness led to energy wastage
- Higher Energy impacting the overall cost of Metal
- Future readiness for capacity enhancement for increasing productivity (Current Ramp up)





Approach



To leverage industry 4.0 using any analytics platform.

To monitor the energy consumption by facilitating intelligent actions and insights from the energy data.

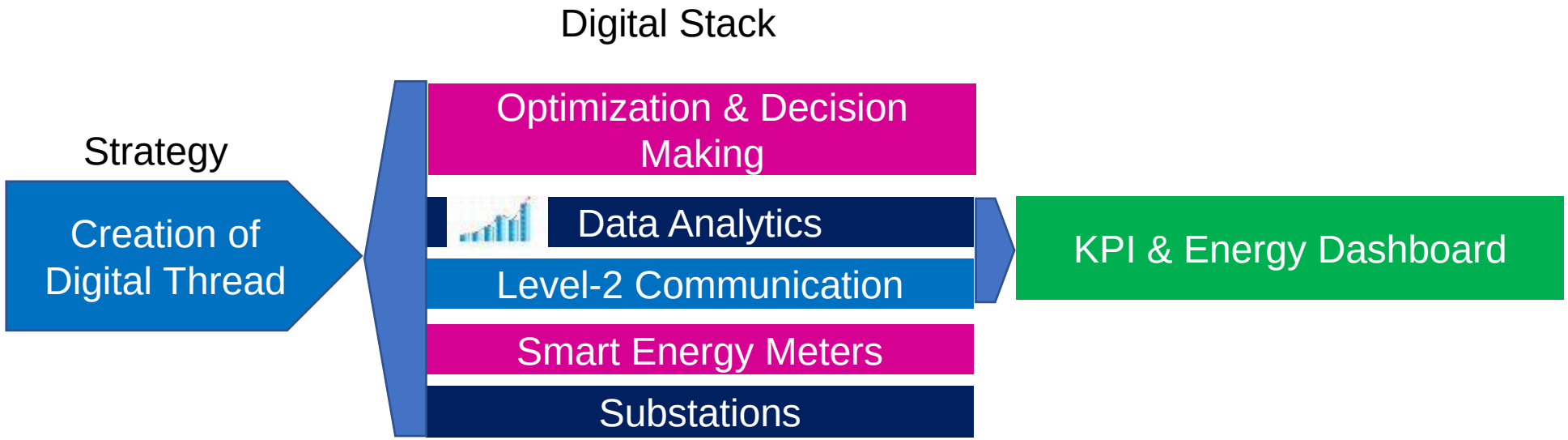
To collaborate and create awareness among different users and enabling them in faster decision-making to save energy

WHY Microsoft Power BI?

- Cost Effective Business Tool
- Integration with any kind of data source
- Mobility features / On spot accessibility
- Data security (ABG IT policy approved)

Solution - Energy Analytics Platform

Enhancing Smelter Energy Management - The Digital Way



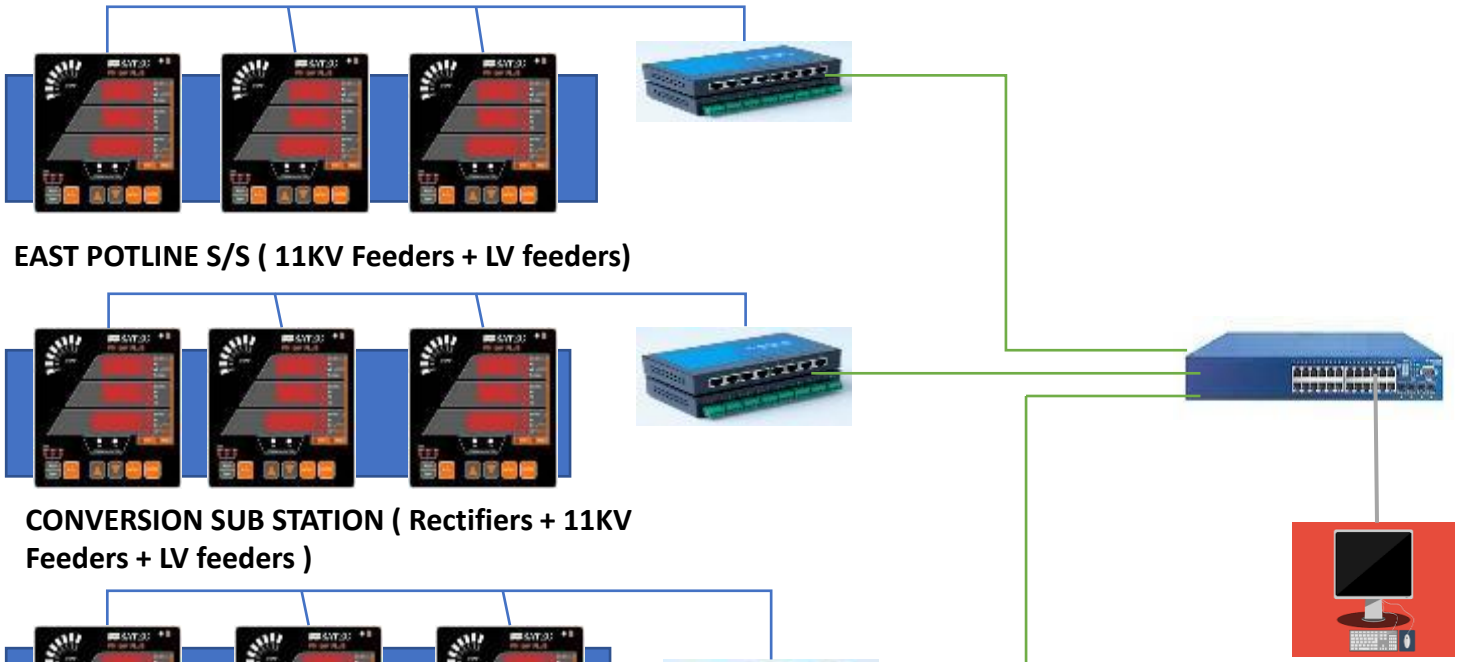
ENERGY DATA ACQUISITION

DATA MODELLING

DAX AND VISUALIZATION

REAL TIME DATA ANALYSIS, OPTIMIZATION & DECISION MAKING

Data Acquisition

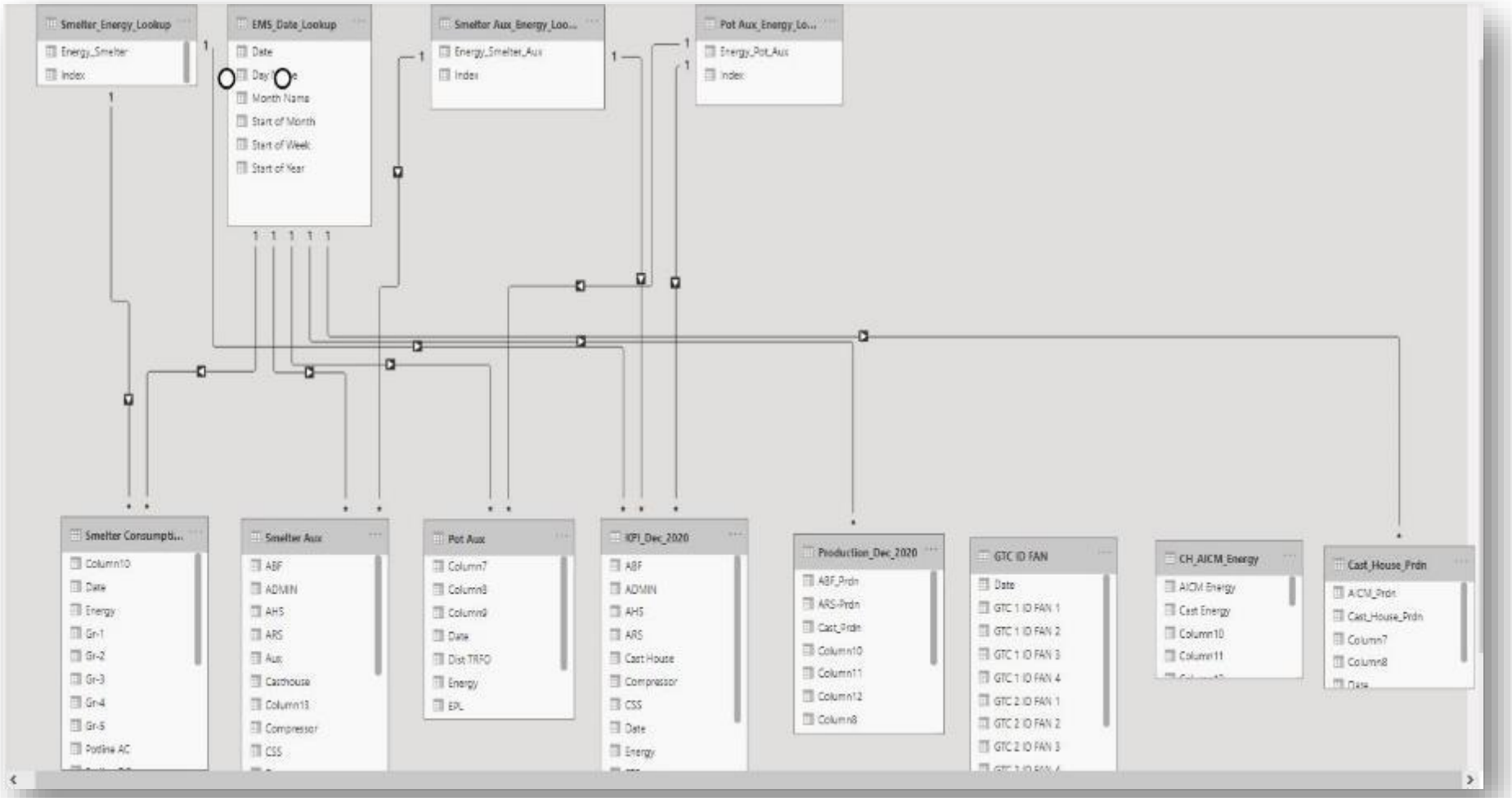


Conventional Energy Reading

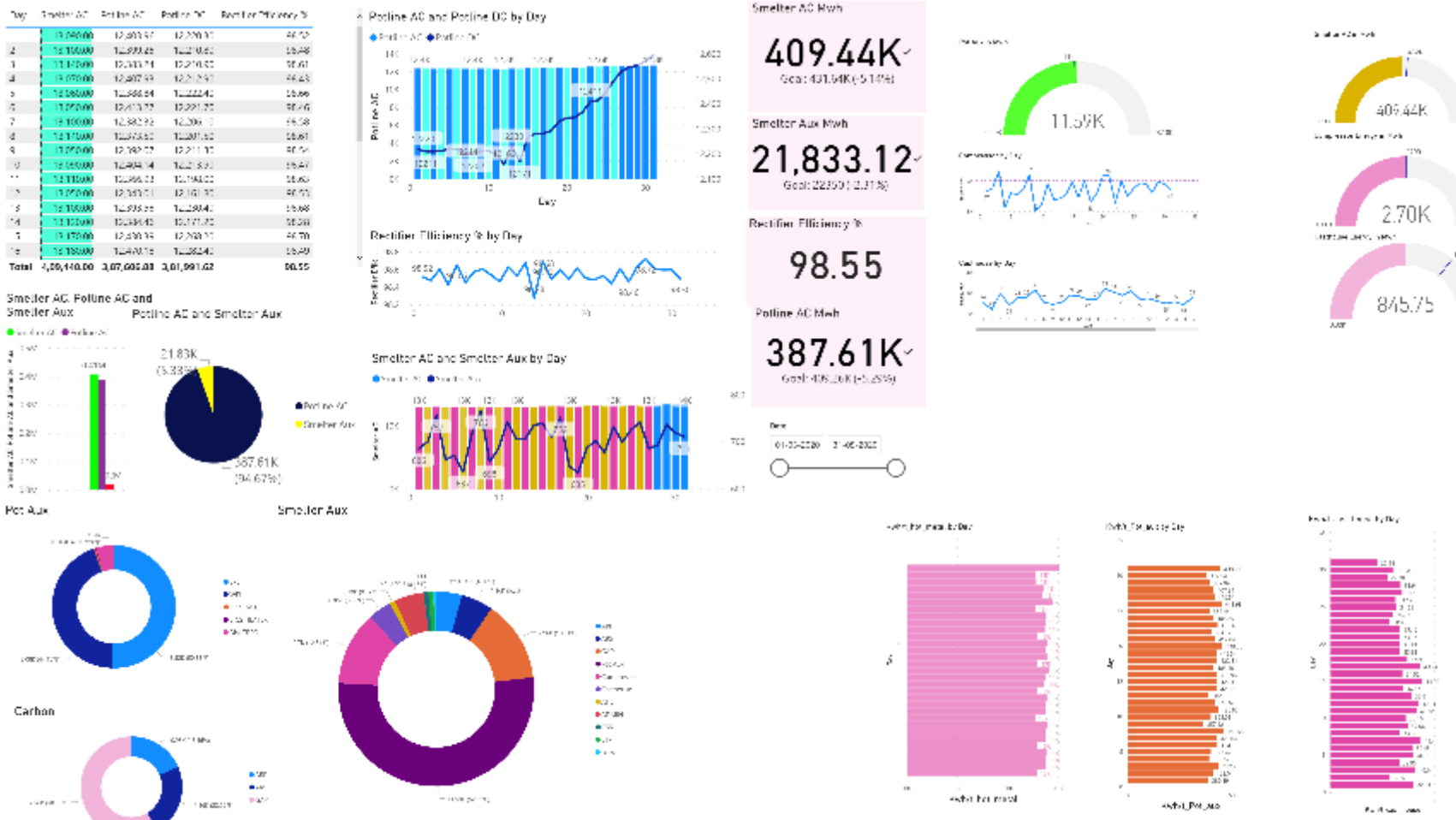
Smart Energy Meters

Smart Energy Meters

Data Modelling

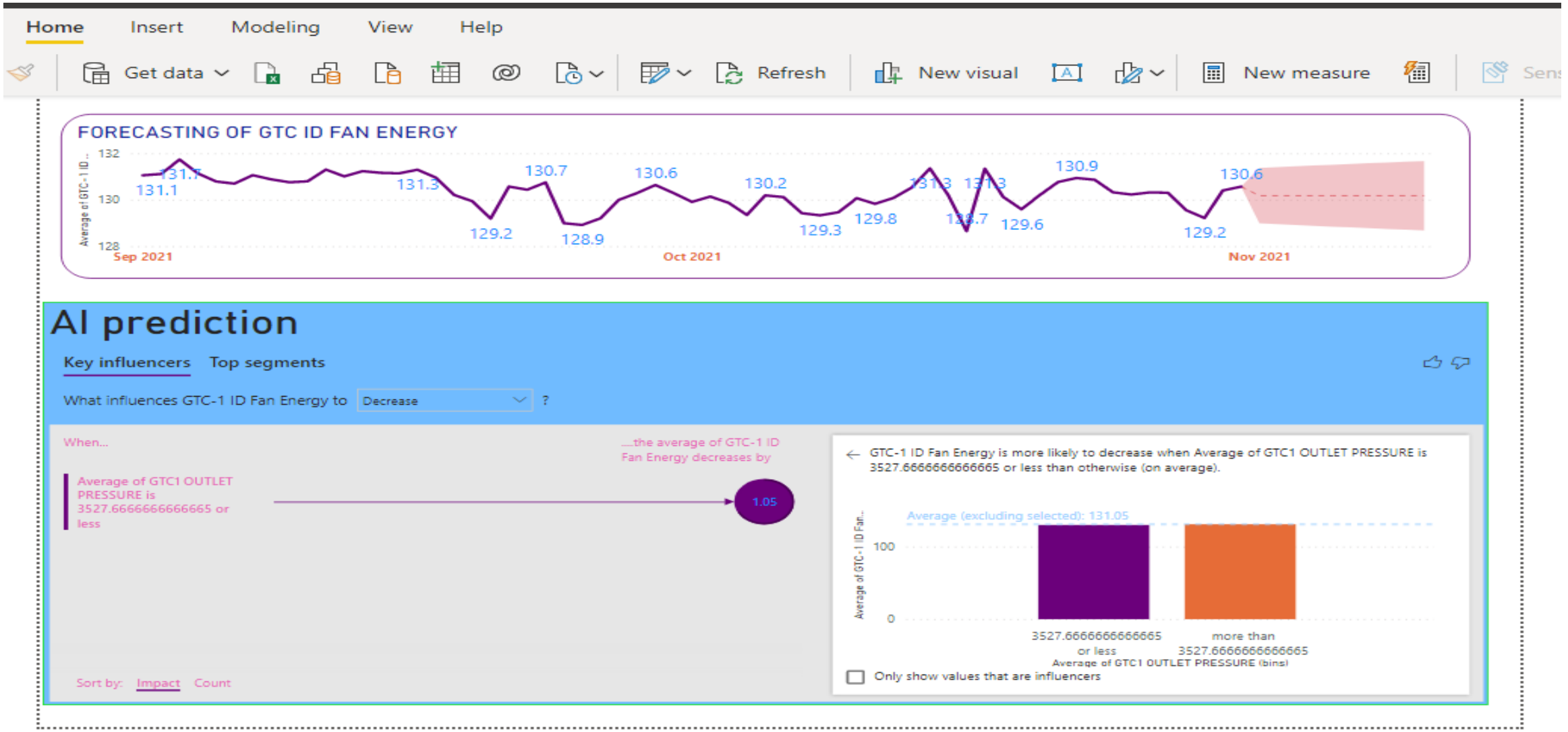


Data Visualization



Mobile View

Data Visualization

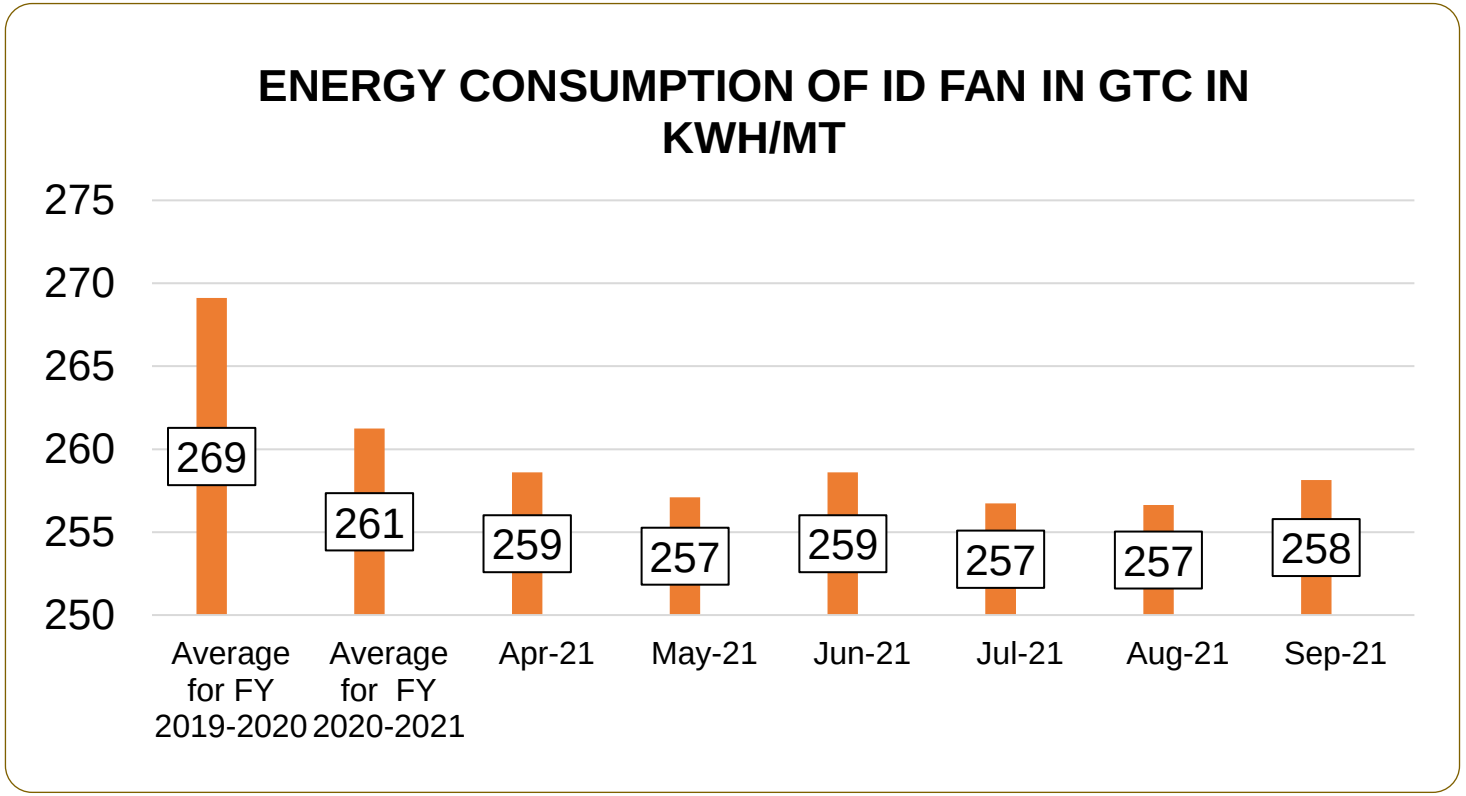


Result – Energy saving

Opportunity to save energy - Gas Treatment Center ID Fans

- BI helped in predicting the excess energy usage among the running ID fans with different combinations (3 W + 1 S)
- Insights helped in saving Auxiliary energy consumption in GTC – 10 kWh/t*

Reduction in smelter auxiliary energy to the tune of 10 kWh/t* in the Gas treatment centre ID Fans. Apart from this, there is a reduction of energy consumption in compressed air system.

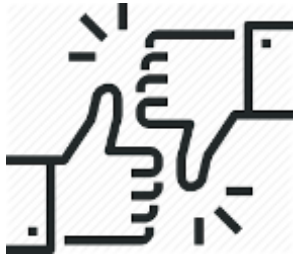


* excl. Apr-Jul'21 due to Covid, Aug'20 – Jul'21

Copper Insert Pots

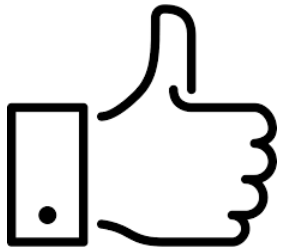
Proposed by Tech. supplier

- ❖ Energy reduction ✓
- ❖ Huge investment ×
- ❖ Poor performance during power outage ×



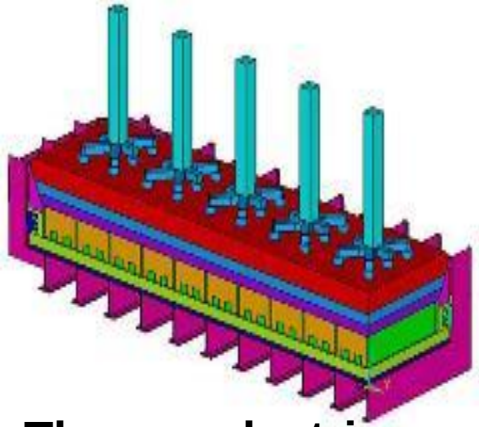
Own tech with ABSTC

- ❖ Energy reduction ✓
- ❖ Optimum investment ✓
- ❖ Robustness towards power outages ✓
- ❖ Extended cell life ✓
- ❖ Increased current efficiency ✓

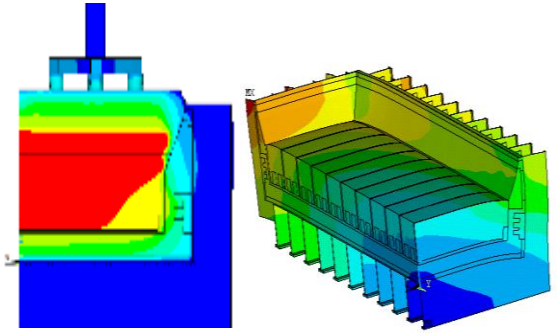


Hindalco -ABSTC Developmental Work

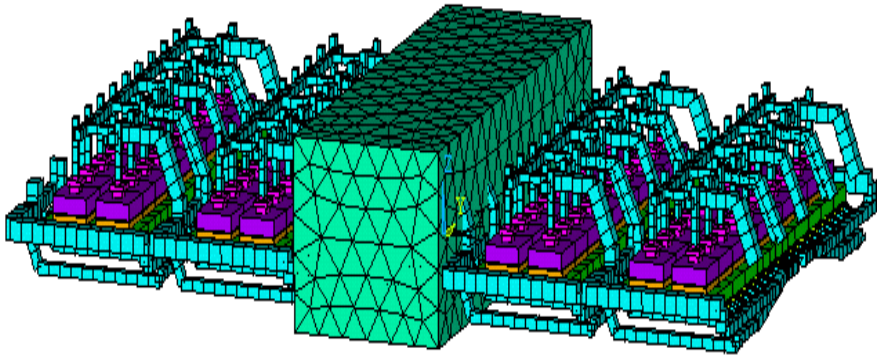
3D models using APDL & Phoenics-Ester, validated through plant measurements



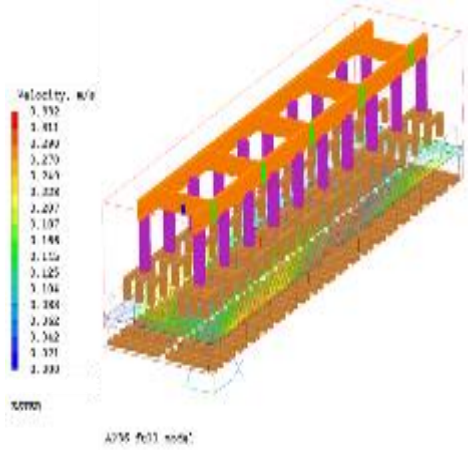
Thermo-electric



Thermo-mechanical

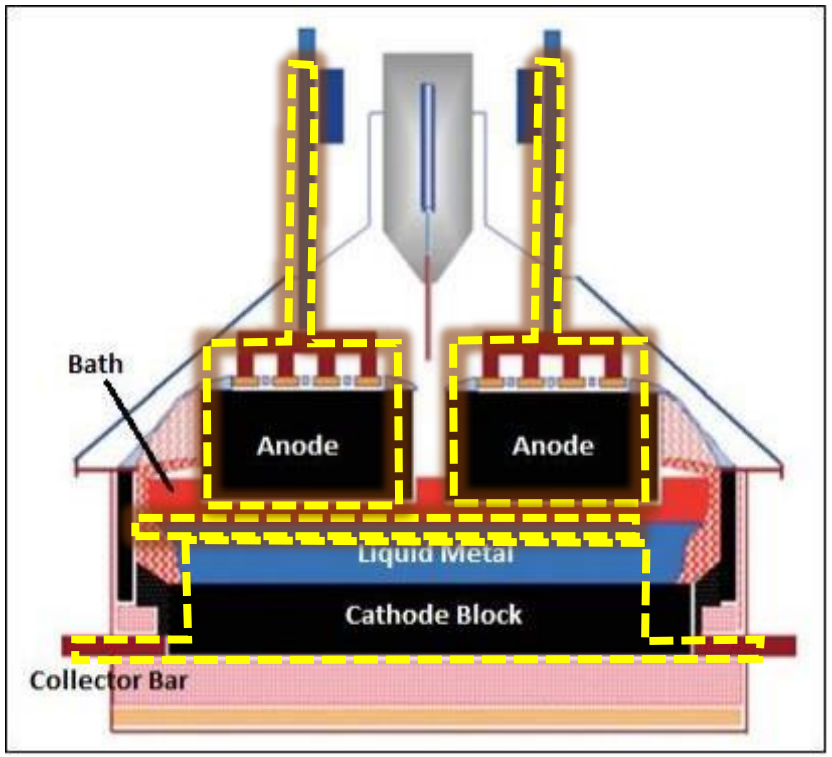


Electromagnetic

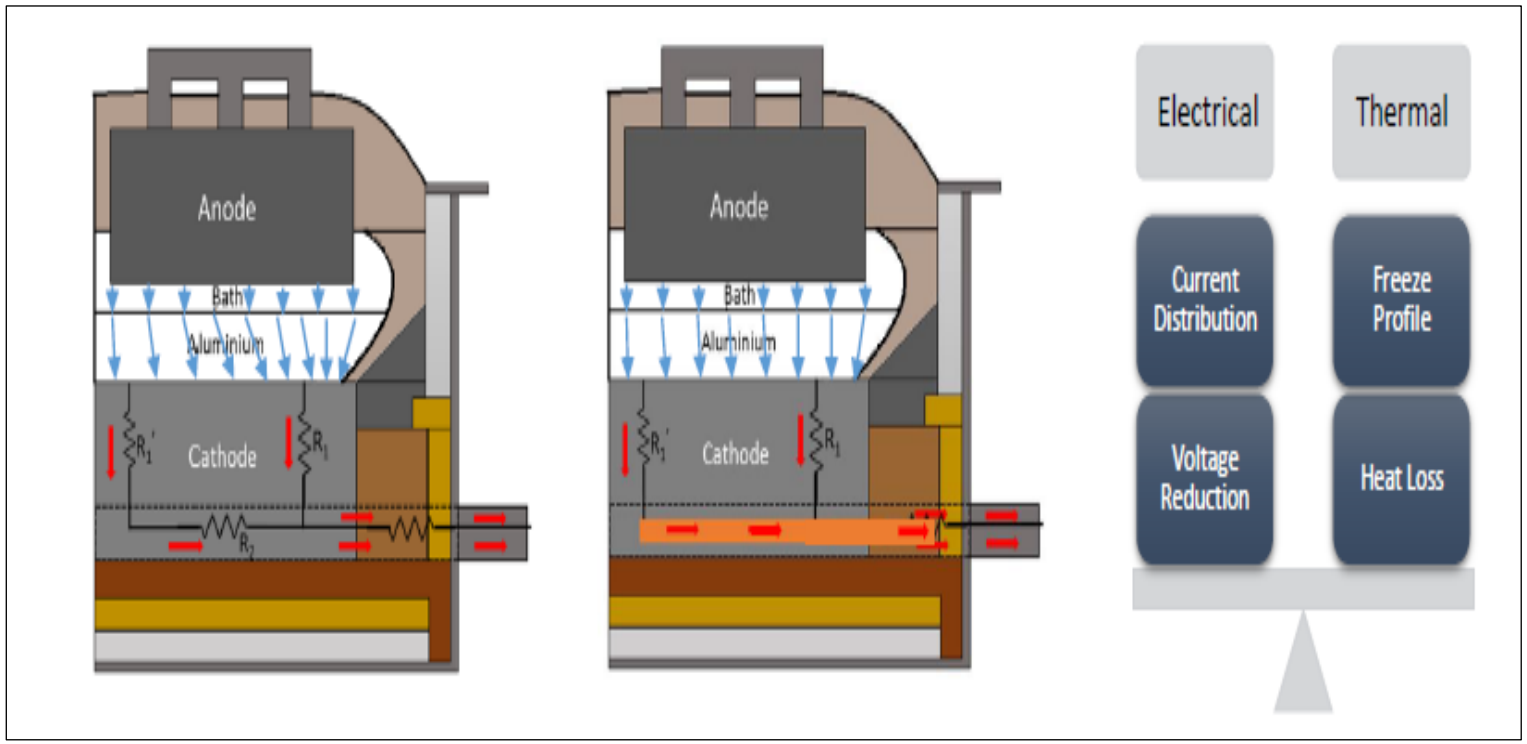


Magnetohydrodynamics

Copper Insert Pots

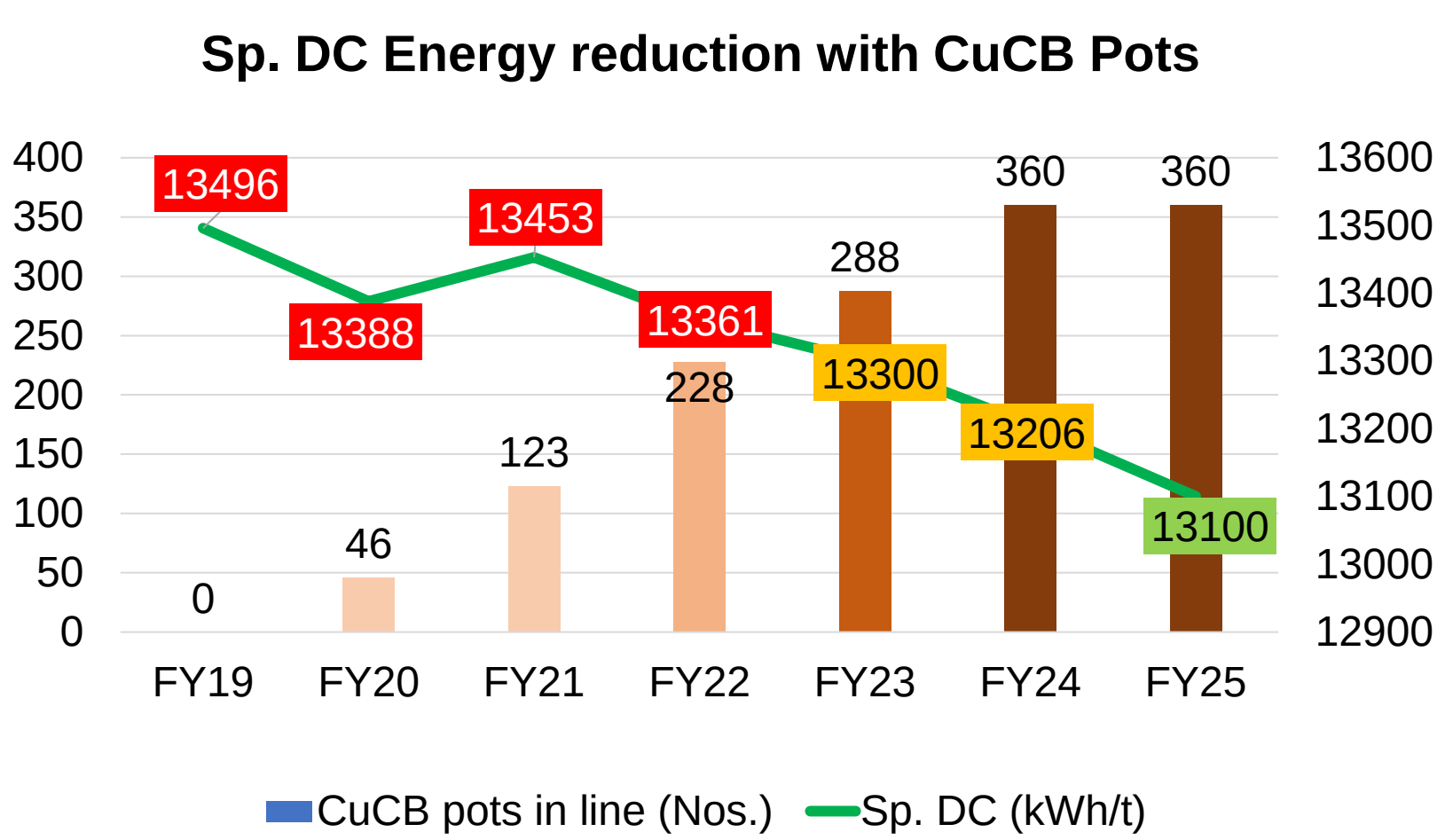


- Anode Voltage – 0.365 V
- Electrolyte Voltage – 1.470+1.850 V
- Cathode Voltage – 0.295 V
- Fixed drops – 0.270 V



Copper Insert Pots

Energy Saving - >150 kWh/t in CuCB Pots and >0.5% higher efficiency*



* Results are encouraging in FY22 resulting in ~250+ kWh/t saving and efficiency gain of ~0.80%

Final Result / Outcome

Parameter	Result
Finance (report both in Cr INR and Mn USD)	
CAPEX employed*	INR 18.99 Cr
Overall Rupee/Dollar Value Saved*	INR 2.14 Cr with increasing benefit annually (IRR 26%)
Timeline	July'19 to Mar'21
Operational Efficiency	
Reduction in energy consumption (in kWh)	15.12 Million
Environment	
Reduction in CO2 emission (t CO2)	13910 t CO2 (equivalent)
Waste Reduction (Ash Generation Equivalent)	3600 t Ash reduction (equivalent)
Learning / Growth	
Scalability across units (Y/N)	Yes
Presented at any other forums internally / externally? If yes, please specify	External - Presented at TMS-2019 (CuCB Pots), CII, IIM Internal – Peer units / ABG Stride
Have you filed a patent / initiated any IPR related proceedings in any geography? (Please provide details)	**Applied (MUM/2700/2014) for CuCB pots design** **Granted – 2020/04199 (South Africa)**

Key Learnings

Learnt the basics of innovating a process of computing large amounts of data.

Data Analysis Expressions (DAX)	Modelling and Simulation of Data	Data Visualization for Decision Making

Deepen data insights that can help discover ways to reduce carbon emissions.

Transforming reactive decisions to formulate predictive and preventive strategies to enhance critical equipment and resource management.

Empowering employees to easily gather and share actionable insights at the point of impact using interactive data visualizations, live reports, and dashboards on the go and across functions.

We manufacture the materials that make the world

Greener

Stronger

Smarter