Project Title:

Auxiliary Power Consumption Reduction for Aditya CPP.

Unit :

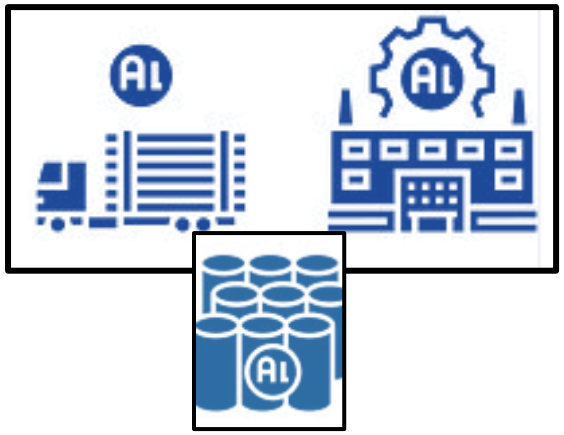
Aditya Aluminum

BUSINESS CONTEXT :WHY REDUCE APC???

Energy Intensive Processes (India)

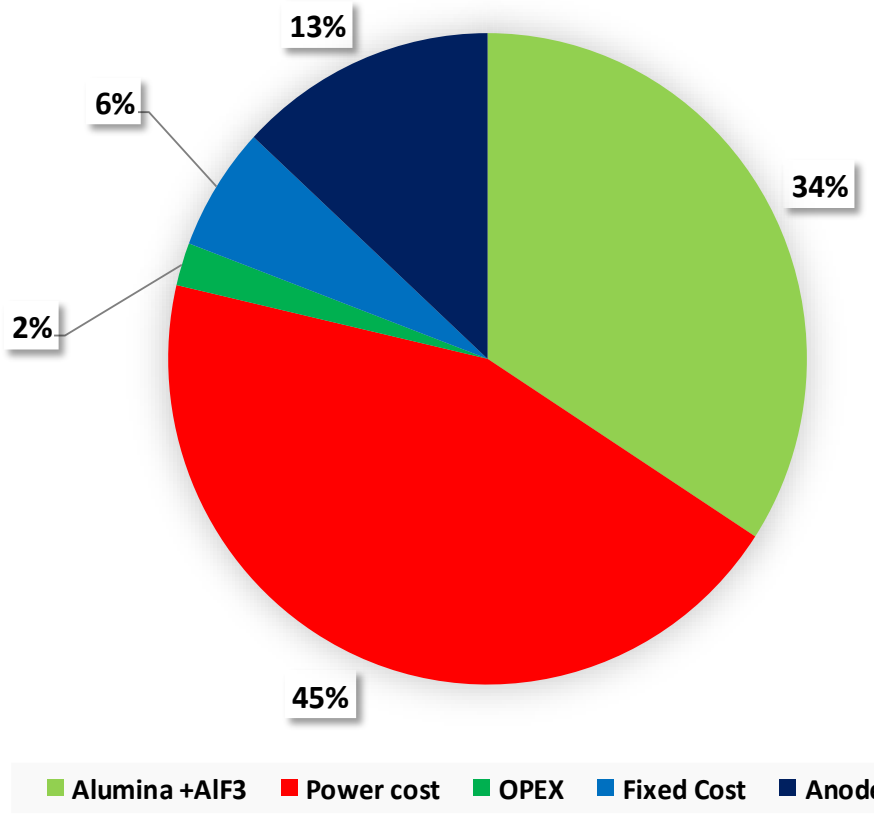
Cement
2.1 GJ/T to 3.4 GJ/T

Iron and steel
16 GJ/T to 19 GJ/T



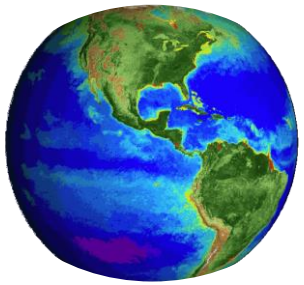
Aluminium Smelting
160 GJ/T to 170 GJ/T

Cost Components : Metal



- Power Cost contributes 40-45% of metal cost.
- 1 paisa increase of power cost = 157 Rs of Metal cost.

BUSINESS CONTEXT :WHY REDUCE APC???



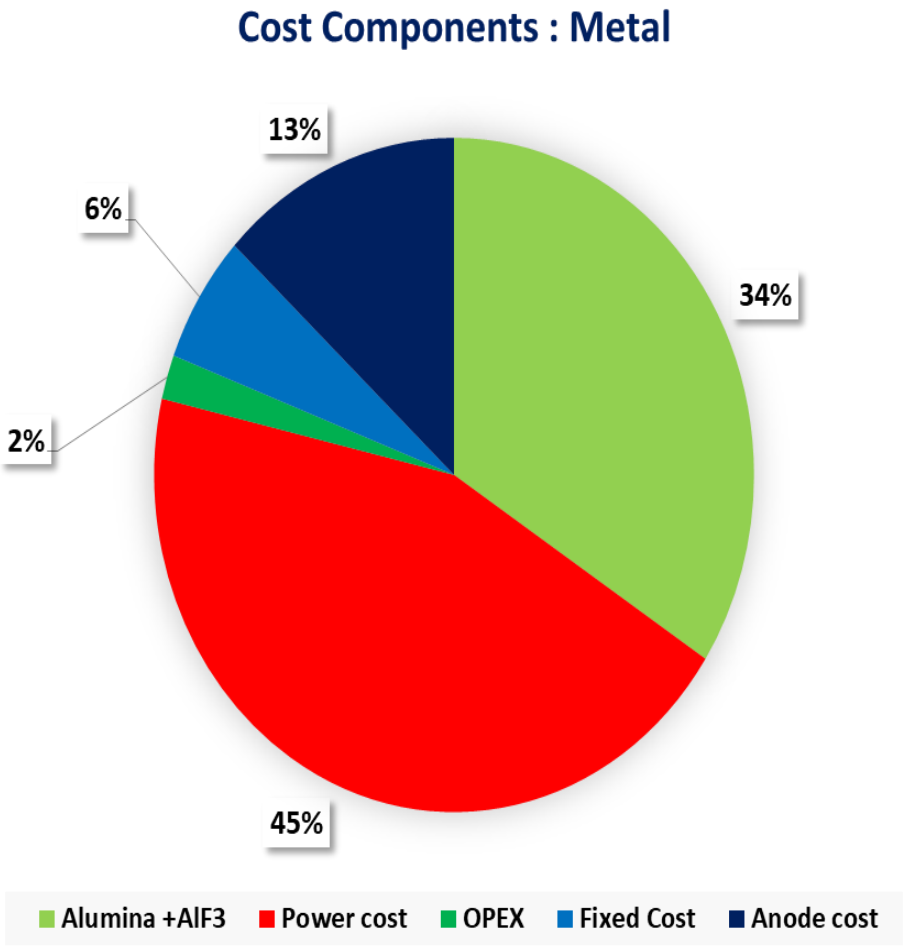
VUCA WORLD

+

RAW MATERIAL COST

COST COMPETITIVENESS

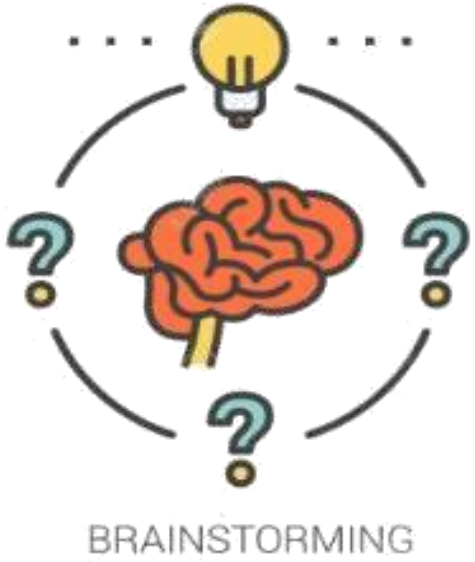
ENERGY CONSUMPTION REDUCTION



APPROACH : PROCESS ADOPTED

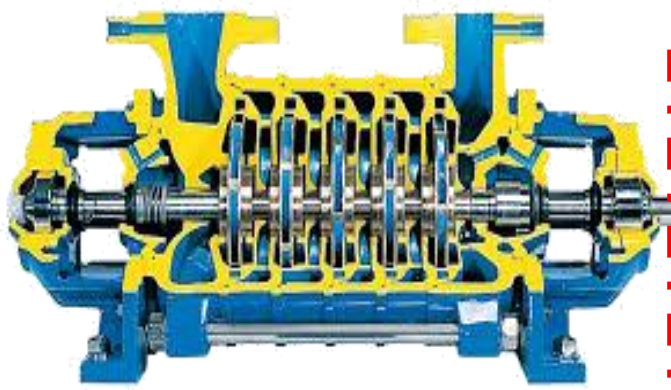
“APNI ZIMMEDARI”

Efficiency Study for all major energy consumption drive → **Loss Identification** → **Improvement for loss reduction. 12 initiatives**



- **Major energy consumption equipment**
  - **Boiler Feed pump : 4900 KW**
  - **Condensate extraction pump : 400 KW**
  - **Coal mill : 380 KW**

Project 1: BFP De-staging

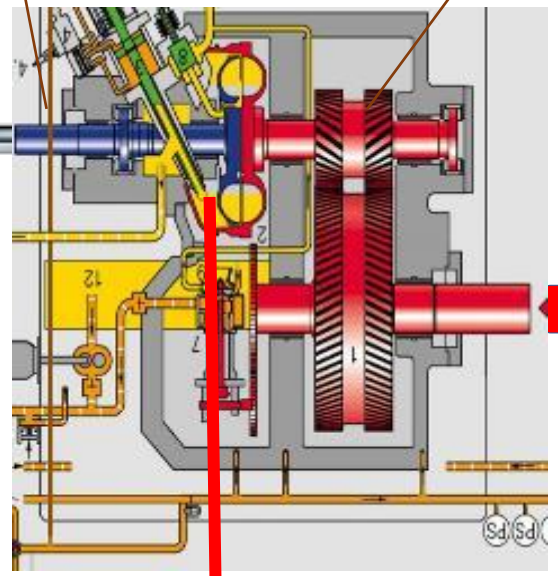


Boiler Feed Pump

Output Speed 4248 RPM

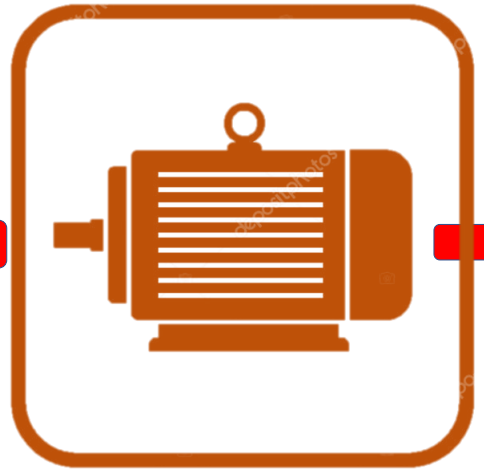
Primary Speed 5309 RPM

Hydraulic Coupling

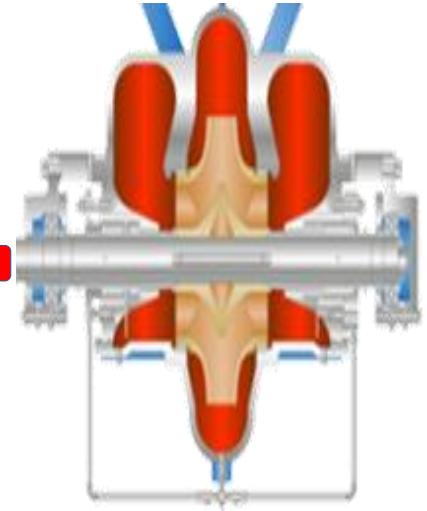


SLIP LOSSES

Motor



Booster Pump



Challenge: Estimation of fluid coupling losses.

LOSS : 38 LAKHS/ MONTHS

Slip Loss at operating point = 15- 17 %

Power Loss Due to slip loss = 280-300 KW(Approx.)

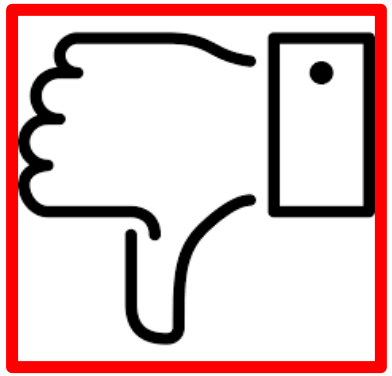
Project 1: BFP De-staging

SLIP LOSS REDUCTION

OPTION 1

Fluid coupling optimization

- **Expected Saving : 150 kwh**
- **Reversal: Not possible**
- **Investment : 75 lakh/ pump**

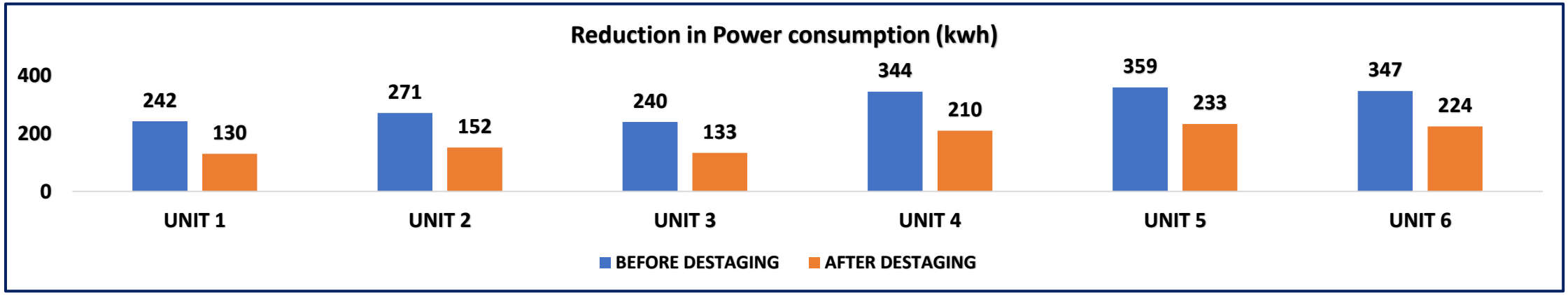


OPTION 2

Impeller de-staging

- **Expected Saving : 150 kwh**
- **Reversal: Possible**
- **Investment : 12 lakh/ pump**

Project 1: BFP De-staging



Investment : 12 lakhs/pump
Total pumps : 12 nos.
Net investment : 1.44 crore

Power savings for 5 units = 600 kwh

Monetary saving: 15 lakhs/month

Payback period: 1.16 year

SAVINGS : 1.8 crore /annum

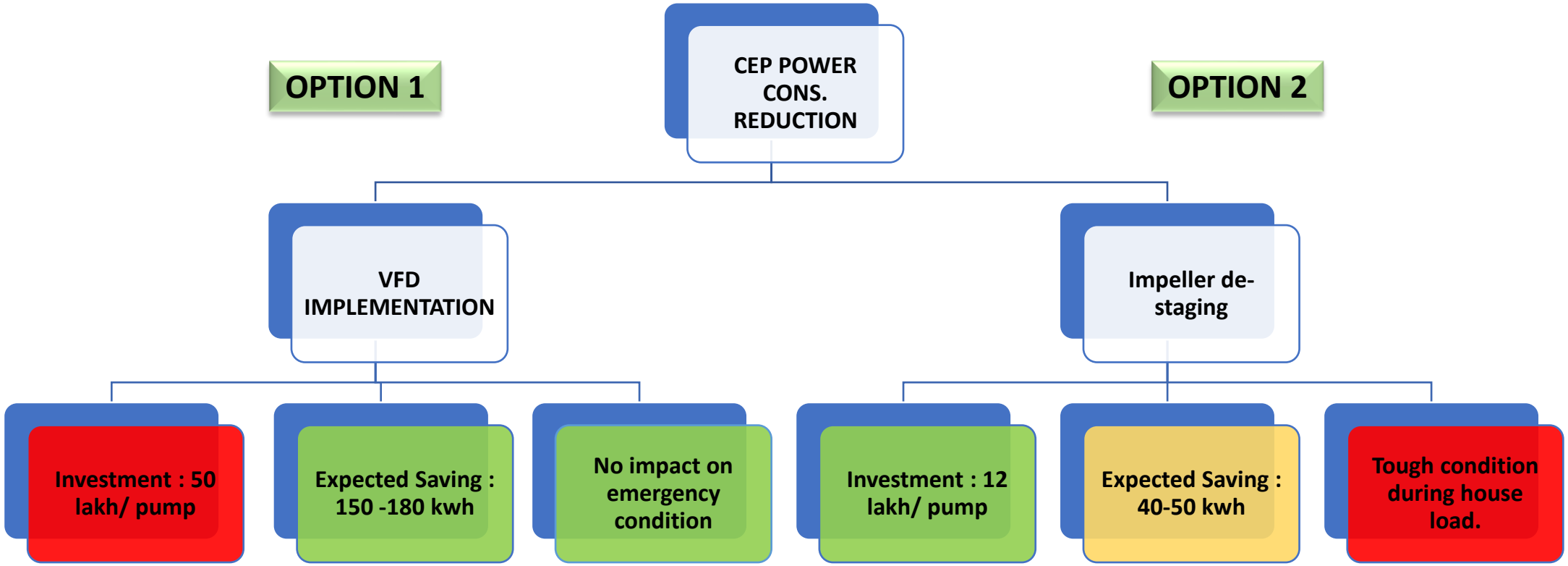
Collaboration & sharing : Mahan is planning to implement the same.

Project 2: CEP VFD and De-staging

ADITYA BIRLA
HINDALCO

Learning from Mahan Team.

Challenge: Meeting flow and pressure demand during house load conditions.

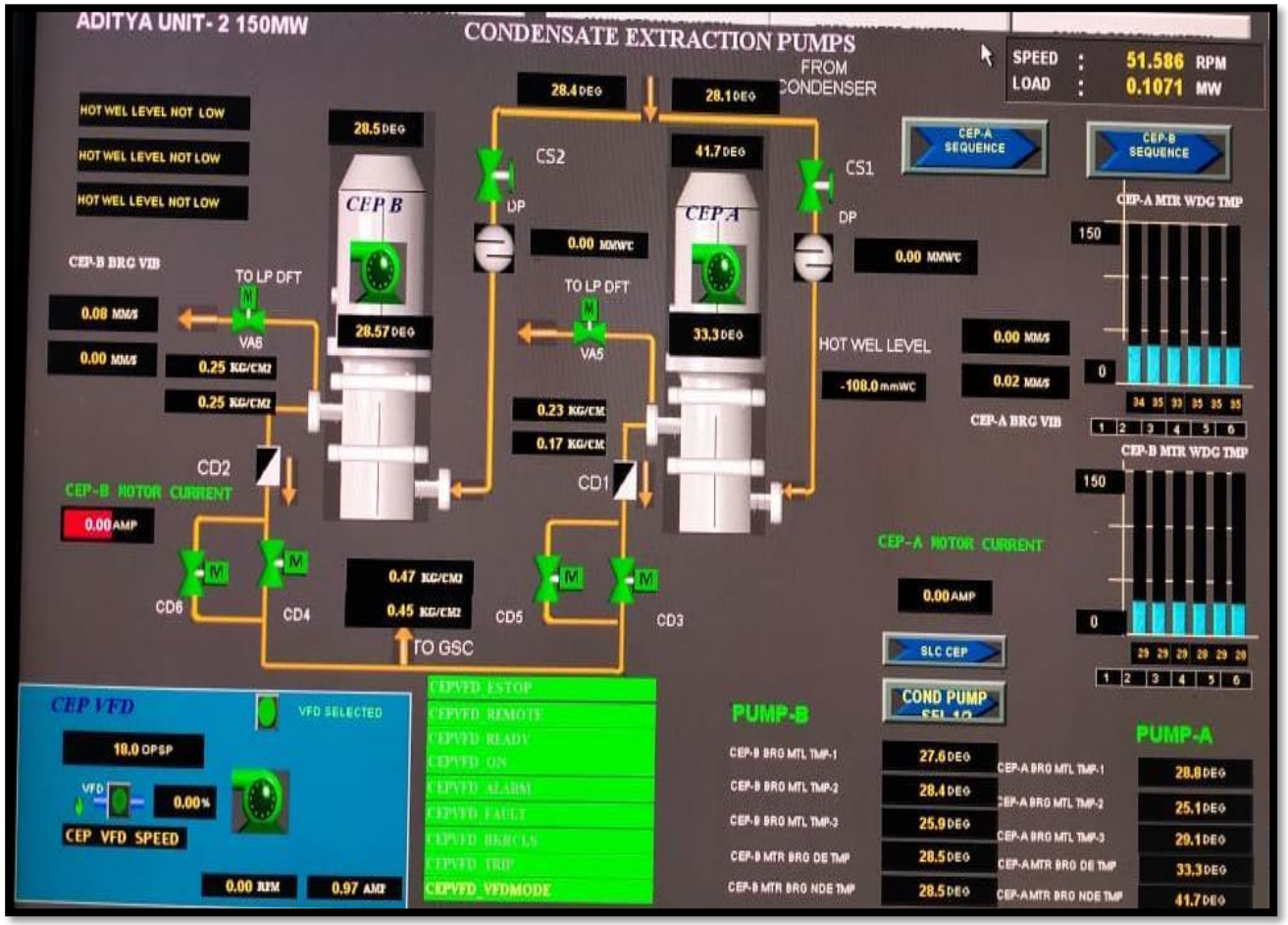


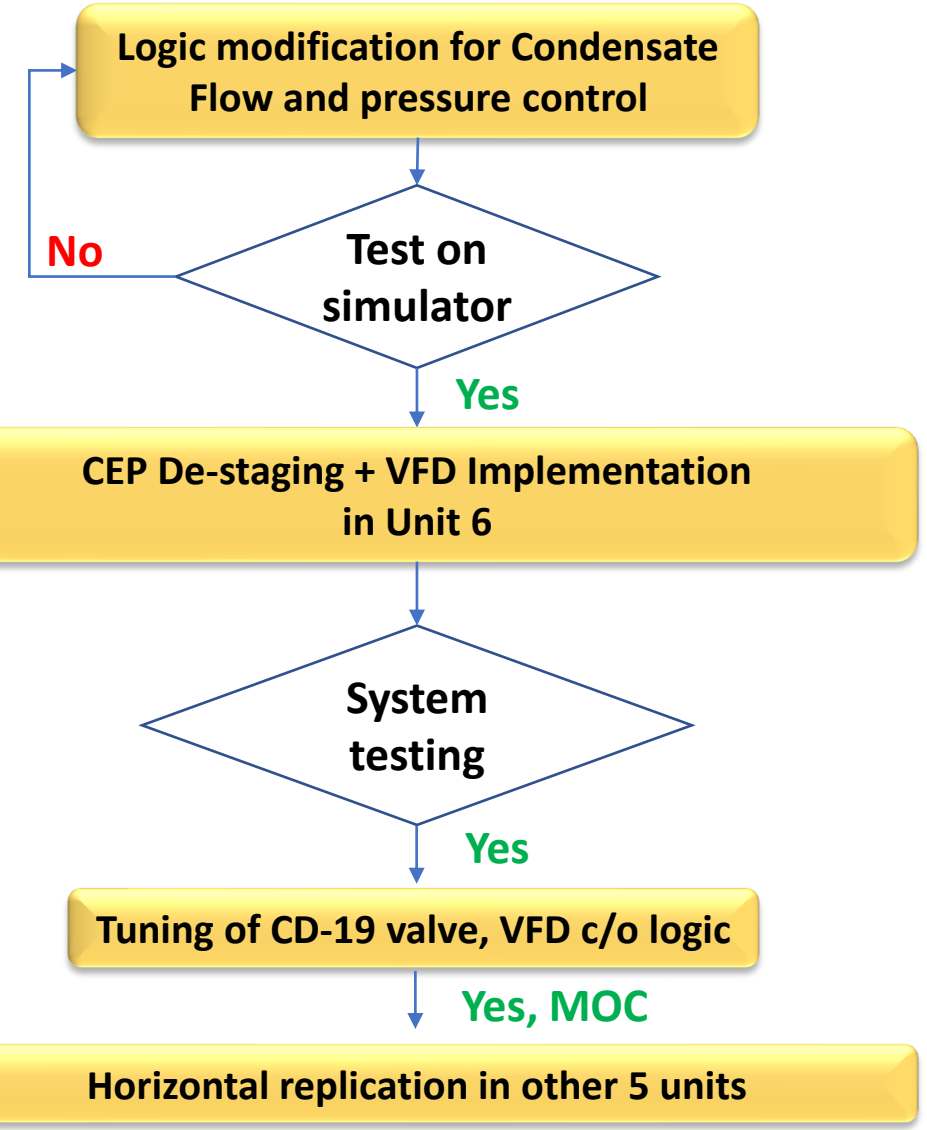
OPTION 1 + OPTION 2 = ONE CEP WITH VFD, ONE CEP WITH DE-STAGING

Project 2: CEP VFD and De-staging

MIXED METHOD

CEP A	: Impeller De-staging	: Low project cost.
CEP B	: VFD installation	: Flexible operation





Project 2: CEP VFD and De-staging

SUCCESSFUL HOUSE LOAD OPERATION

The setup worked well in event of potential black out on 25th Dec 2021 and 15th May 2022.

- Reduced capex cost by 60%.
- With 6 VFDs: 3.4 crores

- Medium voltage VFDs to reduce power loss in VFD operations.
- First in Aditya.

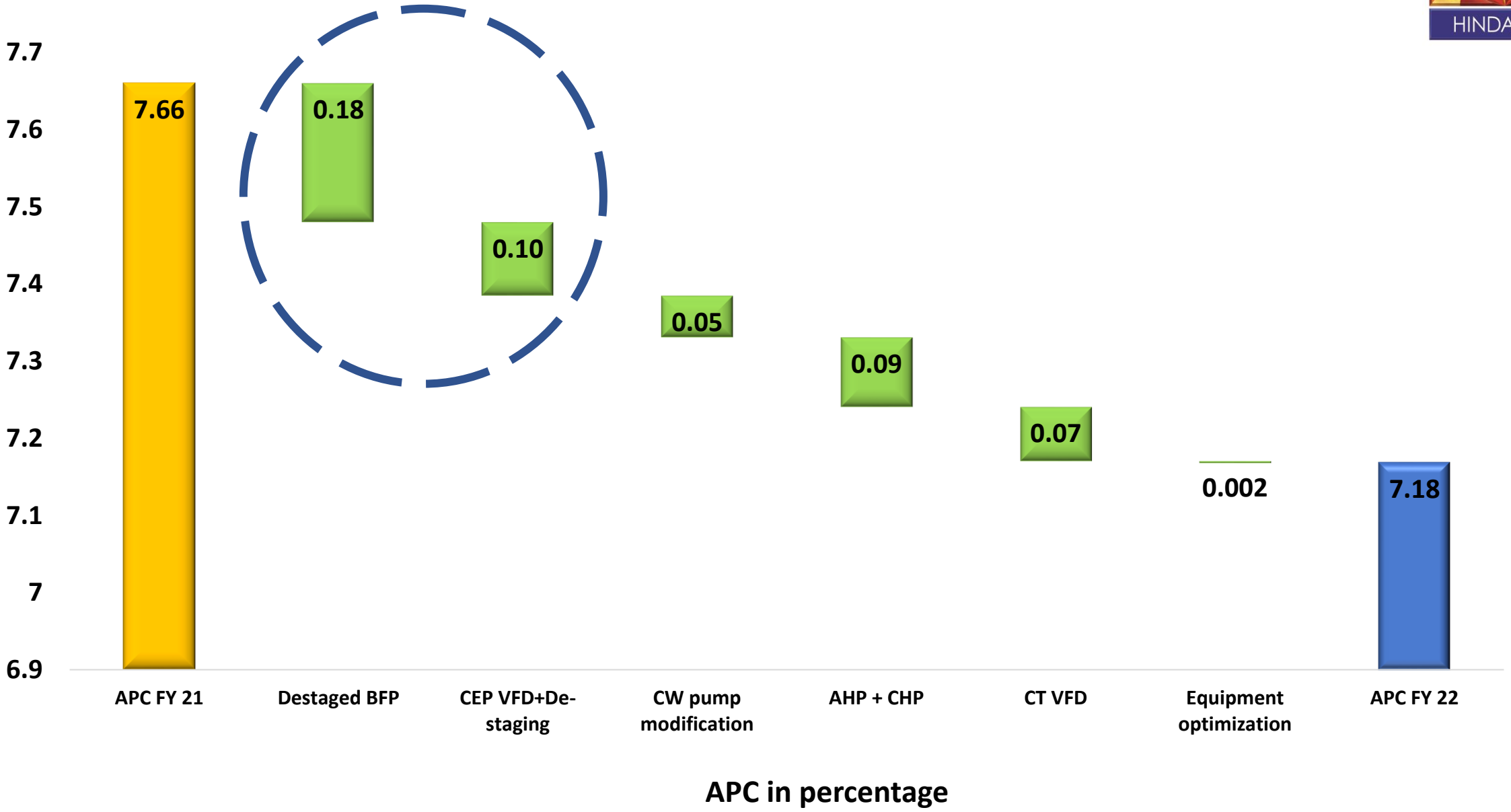
Power savings for 5 units = 500 kwh
Monetary saving: 12.8 lakhs/month

SAVINGS : 1.5 crore /annum

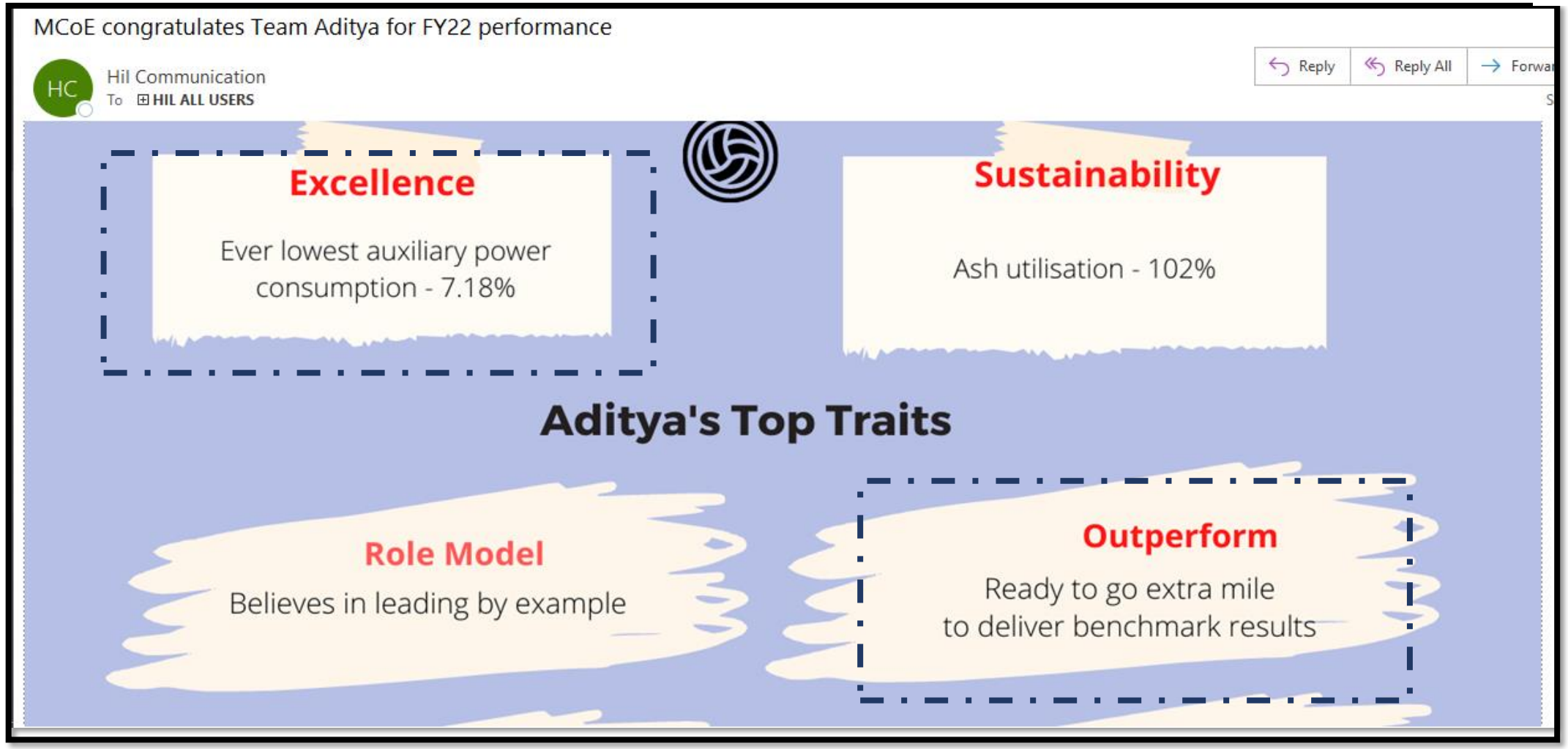
Investment : 12 lakhs/pump
Total pumps : 12 nos
Modification setup : 6 VFD +6 De-staging.
Net investment : 4.44 crore

Payback period: 2.9 years

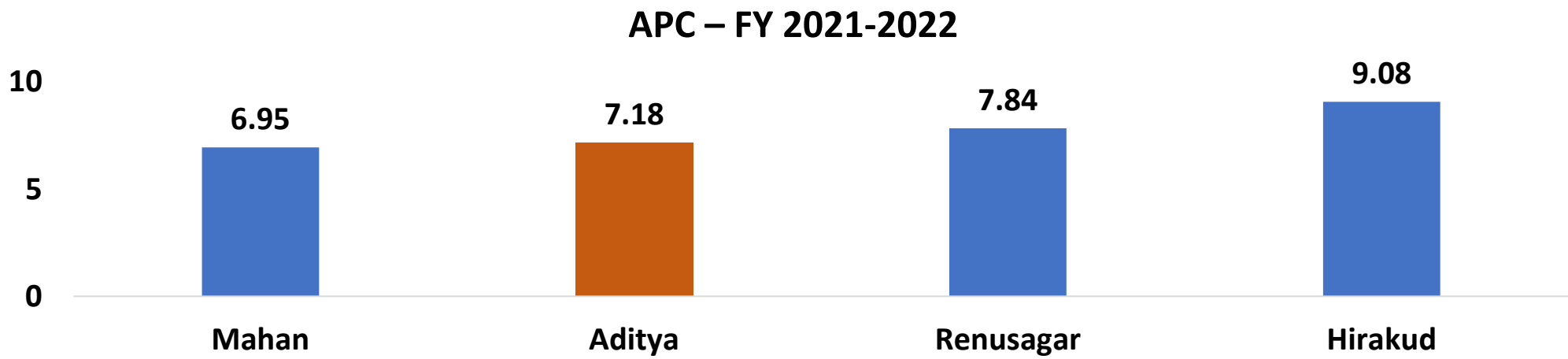
Result Obtained-Reduced APC for Aditya CPP



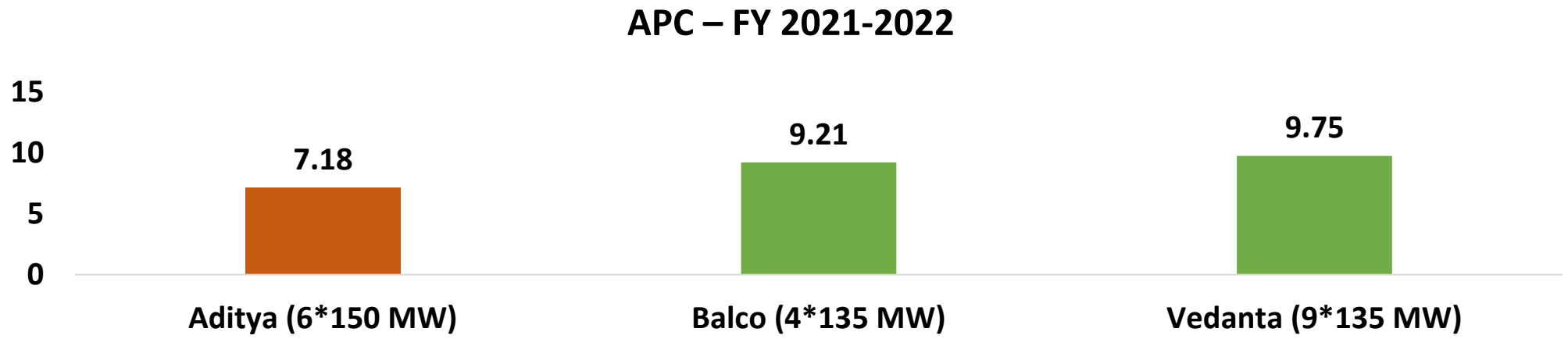
APPRECIATION



BENCHMARKING



2nd best APC in Hindalco.



BENEFITS & IMPACT ON BUSINESS

TANGIBLE BENEFITS : REDUCTION IN APC BY 0.5%

Power Saving:
- 1.7 MW to 2 MW /day
- 16 MU YoY basis

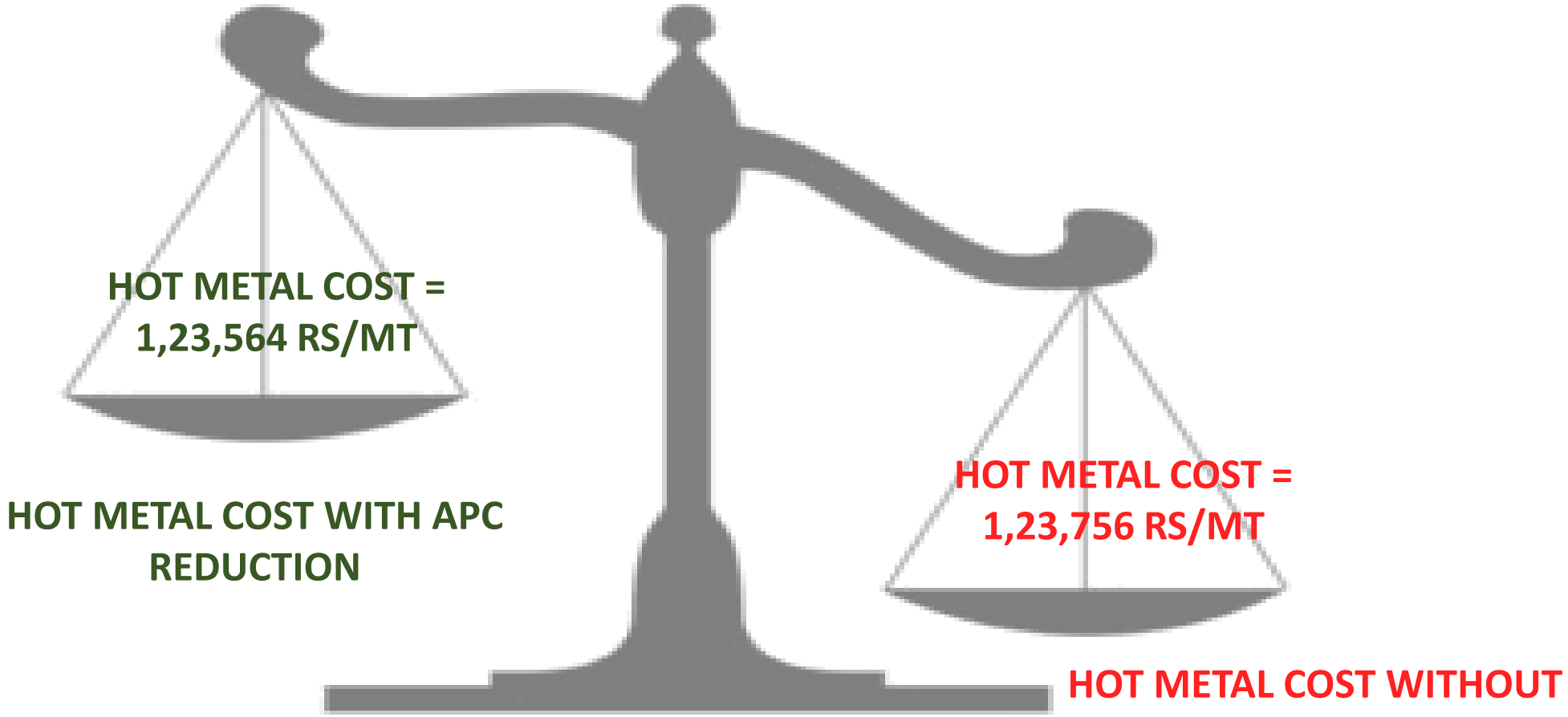
Coal Saving:
- 30 MT/day
- 11,000 MT annually

Cost Impact:
- 1.92 lakhs /day
- **7 crore annually**

S no	Parameter	UOM	Actuals
1	Average CPP Generation- FY 20-21	MW	631.66
2	APC @ 7.66% in FY 21	MW	48.36
3	Average CPP Generation- FY 21-22- YTD	MW	641.97
4	APC @ 7.18% in FY 22	MW	46.12
5	Saving in terms of power/day	MWH	41.1
6	Saving in terms of coal/day	MT	31
7	Monetary saving/day	Rs lakhs	1.92
8	Monetary saving/annum	Rs lakhs	699

BENEFITS & IMPACT ON BUSINESS

IMPACT ON METAL COST= 192 RS/MT

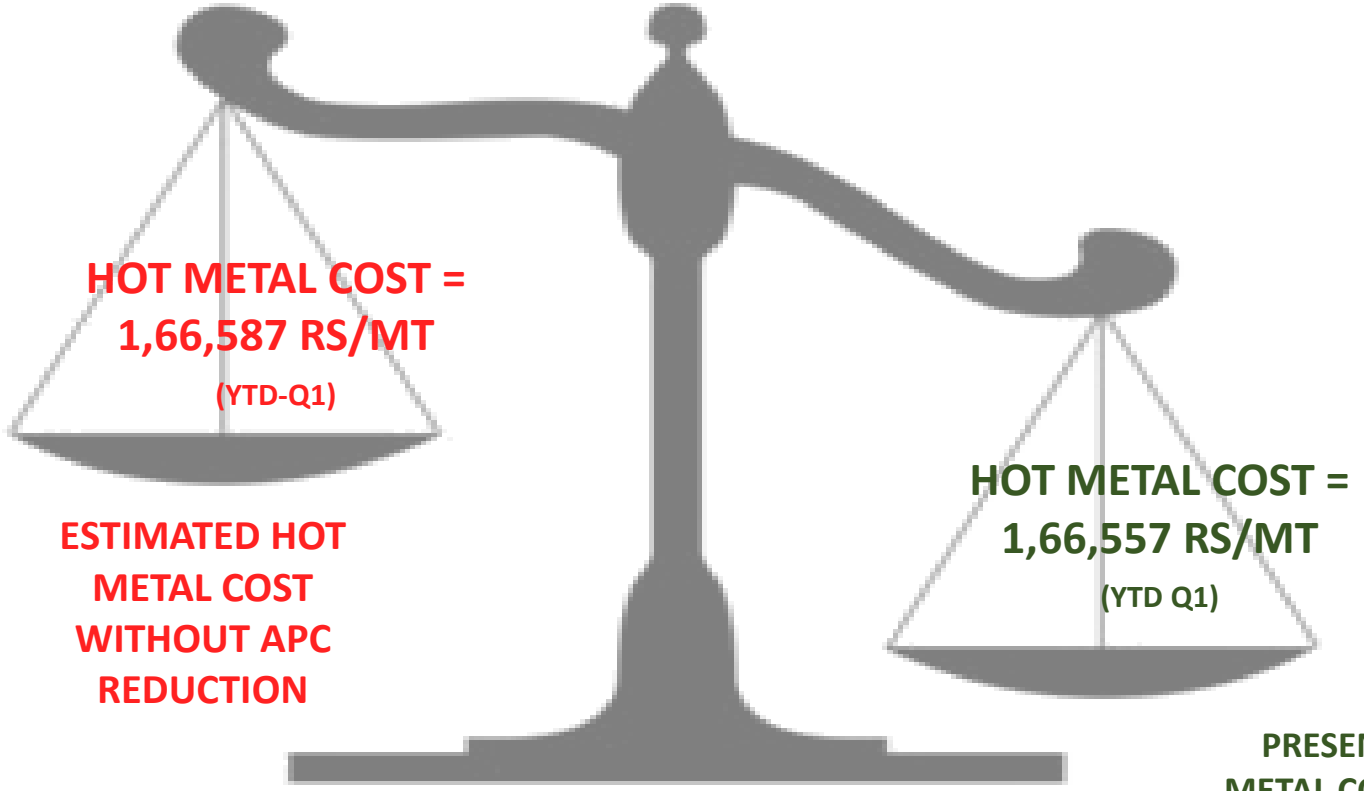


BENEFITS & IMPACT ON BUSINESS

PRESENT IMPACT ON POWER COST

COAL COST (RS/MKCAL)	
FY 21-22	918
FY 22-23 (YTD)	1547

POWER COST(RS/KWH)	
FY 21-22	3.55
FY 22-23 (YTD)	5.04



BENEFITS & IMPACT ON BUSINESS

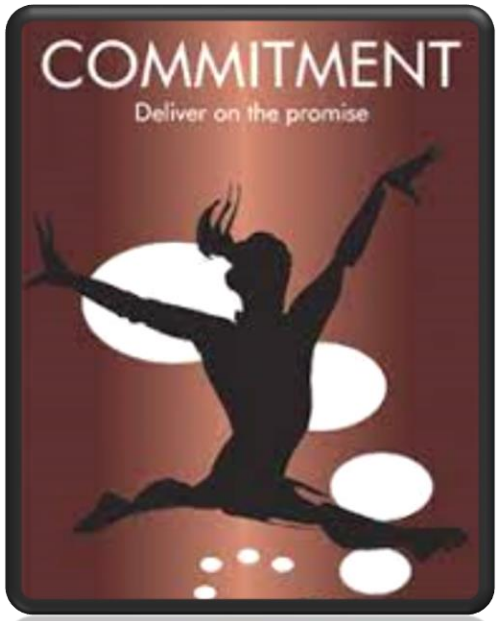
INTANGIBLE BENEFITS : SUSTAINABILITY, TEAM BUILDING

- ✓ Reduction in Carbon footprints.
- ✓ CO2 emission reduction: 15,000 MT/ year

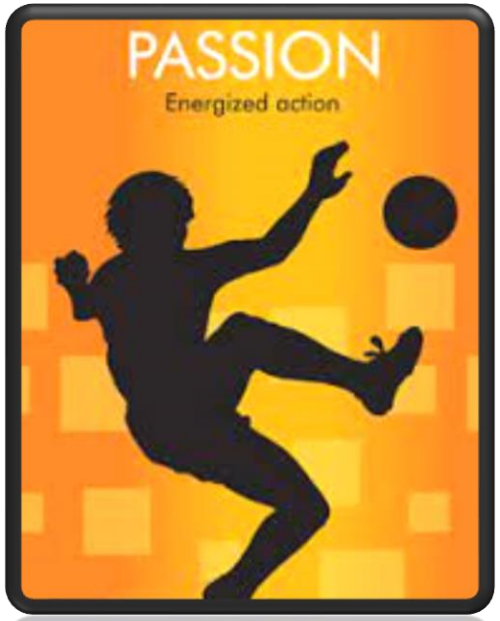
- ✓ Reduction in ash generation : 4000 MT

- ✓ Team synergy.
- ✓ Cross functional learning opportunity.

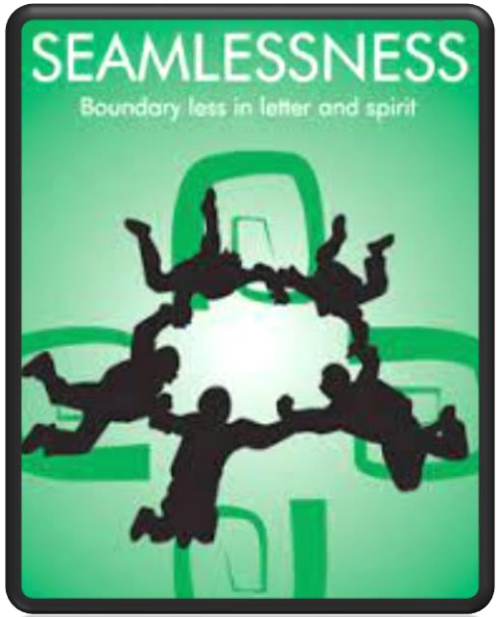
LIVING GROUP VALUES



- ✓ Committed towards low cost power generation.
- ✓ Challenging the status quo.



- ✓ Setting new benchmarks.
- ✓ Hunger to achieve the unachieved.



- ✓ Cross functional team.
- ✓ Inter unit sharing of initiatives and learning.

LEARNINGS ACCRUED BY THE TEAM

LOOKING BEYOND LIMITS

- Expanding limits in terms of operational efficiency.
- Process reliability vs power consumption

TEAM EMPOWERMENT

- Stretched goals.
- Expanded responsibility horizon.

RISK MITIGATION

- System & Process Study
- Envisaging the impact on process parameters.

PROCESS KNOWLEDGE

- Cross functional knowledge sharing.
- Wholistic approach on power process.

WAY FORWARD

APC SAVING PROJECTS

S No	Projects	Target date of implementation
1	CFD study and flue gas path correction implementation in rest 4 boilers.	Mar-2023
2	Coal feed rate enhancement :1000 TPH.	Dec-2023
3	CT fan VFD installation in all units.	Mar-2024

GREEN PROJECTS

S No	Projects	Target date of implementation
1	100 MW Green energy in power mix	Apr-2024
2	Dual firing arrangement in one boiler: 50% gas and 50% coal firing.	Mar-2024
3	10 MW floating solar installation.	Sep 2023

THANK YOU!!

"When there is a will, there is a way"


QUESTIONS ??