Coromandel

FUTURE POSITIVE

Coromandel International Ltd

Visakhapatnam Plant

Mayankar Singh – DGM – Power Electrical Instrumentation
R N V Chandra Sekhar– Sr Manager – Operations
R Bhanu Prasad – Dy Manager – Technical Services

murugappa

- Commissioned in 1967
- Fertiliser Products 1.1 MMTPA
- Captive Raw Material Generation - 0.4 Phosphoric Acid & 0.6 MMTPA Sulfuric Acid
- 0.025 MMTPA Specialty Nutrients Plants
- 5MW Captive Turbo Generator from Waste Steam
- 7.8% Power share of APGPCL gas based power plant
- Connected Power Load 19 MVA
- 22 LIGPD Water from Tatipudi & Meghadrigedda Reservoirs
- DSIR approved R & D facility

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Company Profile

Process	Phosphatic Fertiliser with captive Sulphuric acid & Phosphoric acid plants	
Ownership	Public - Private	
Year of Establishment	1967	
Turnover of the Unit	45135	(FY 2021-22) (INR Million)
Thermal Cost as % of Manufacturing Cost	0.80	%
Electrical Cost as % of Manufacturing Cost	1.44	%
Total Energy Cost as % of Manufacturing Cost	2.24	%
Thermal Energy Cost	48924	(INR / million kcal)
Electrical Energy Cost	5.46	(INR / kWh)

Process Plants – Technology & Specification

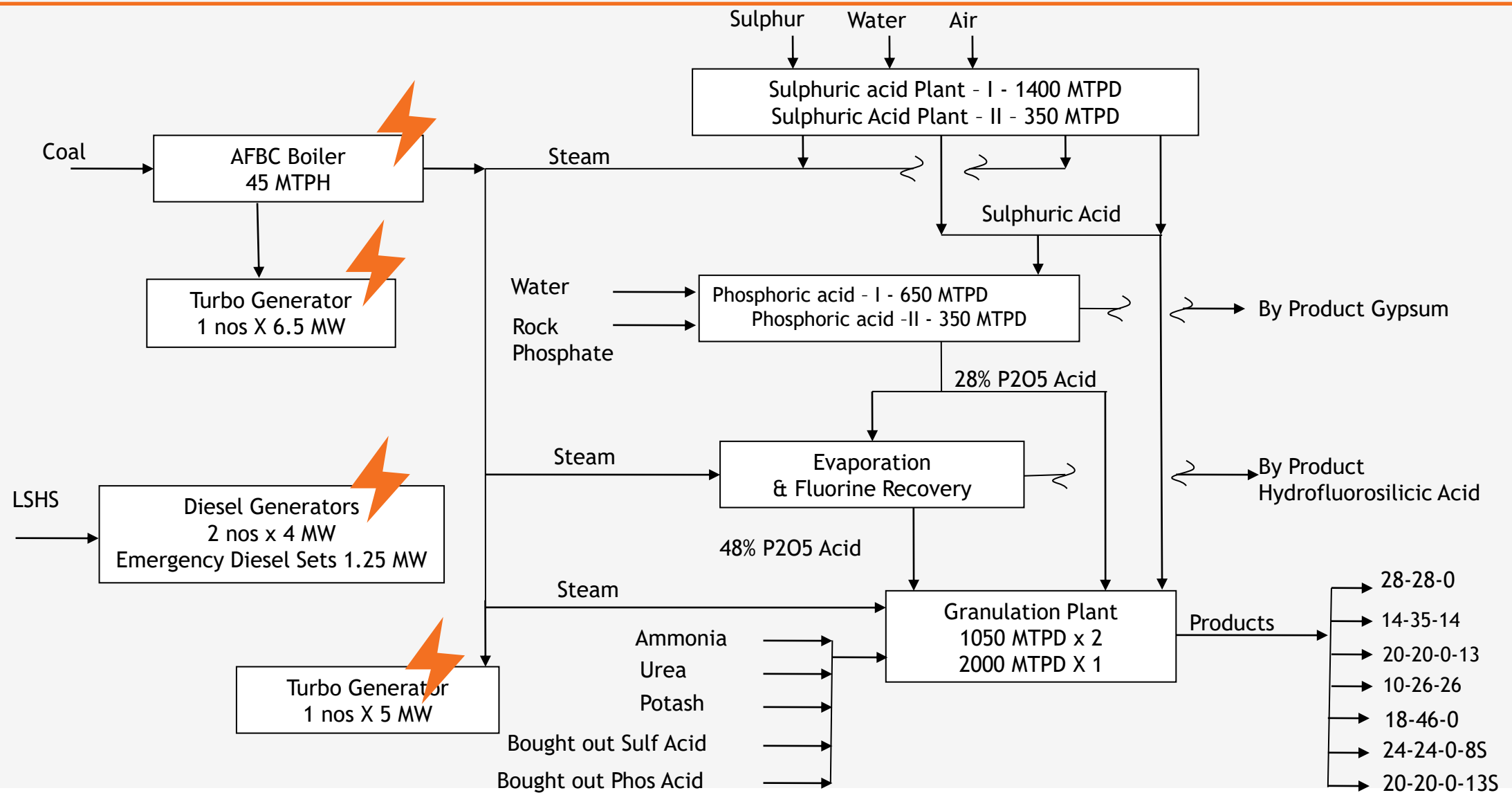



Sulphuric Acid Plant I	Sulphuric Acid Plant II	Phosphoric Acid Plant I	Phosphoric Acid Plant II
1400 MTPD	400 MTPD	700 MTPD	700 MTPD
Monsanto Enviro Chem	Monsanto Enviro Chem	Dorr Oliver	Prayon Technologies




Train A & B	Train C	Turbo Generator	Boiler	Turbo Generator II
2100 MTPD	2000 MTPD	5 MW	45 MTPH	6.5 MW
Wellman Lord - TVA	Incro	Condensing	Atm Fluidised Bed	Non Condensing

Process Flow Diagram



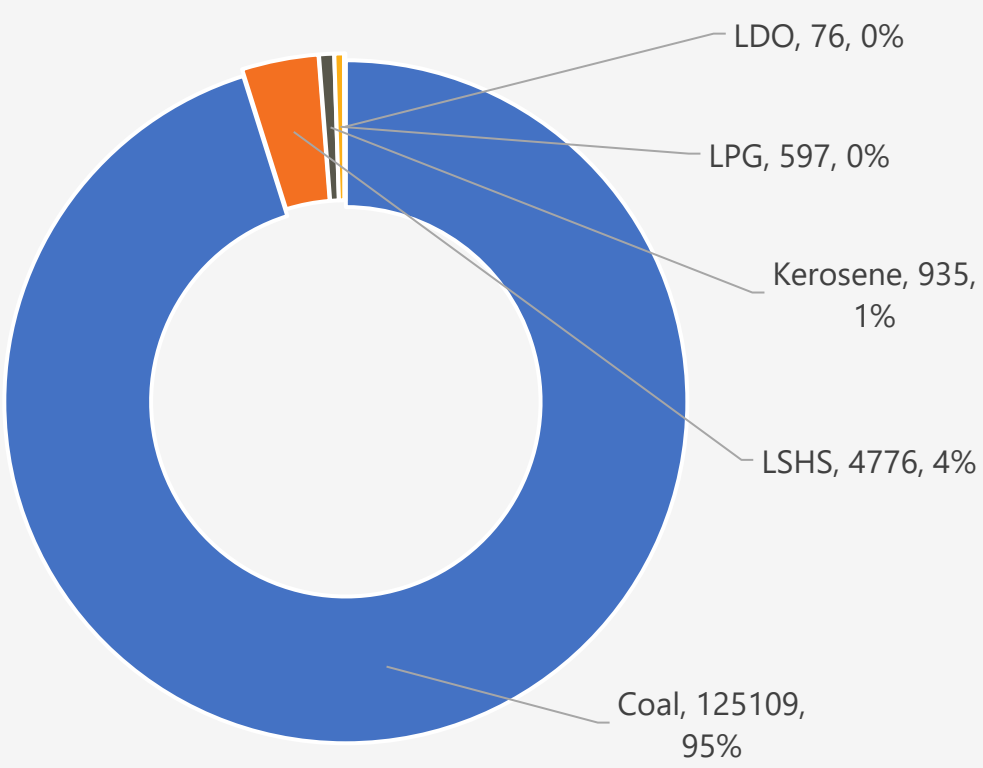
Production & Energy Consumption

Parameters	Unit of Measurements	2019-2020	2020-2021	2021-2022
Production				
Complex Fertiliser	MT	1079187	981237	1070858
Phosphoric Acid	MT	243488	251996	338697
Sulphuric Acid	MT	581081	466576	532779
Energy				
Annual Electrical Energy Consumption	million kWh	112.32	94.05	108.75
Annual Cost of Electricity Consumed	million INR	471.31	415.83	422.53
Annual Thermal Energy Consumption	million kcal	30,833	21,449	93,800
Annual Cost of Thermal Energy Consumed	million INR	54.55	38.06	242.36
Specific Electrical Energy Consumption	kWh/Ton of production	104.08	95.85	101.55
Specific Thermal Energy Consumption	Kcal/Ton of production	28570	21859	87593
Total Energy Consumption	MTOE	23949	21415	29324

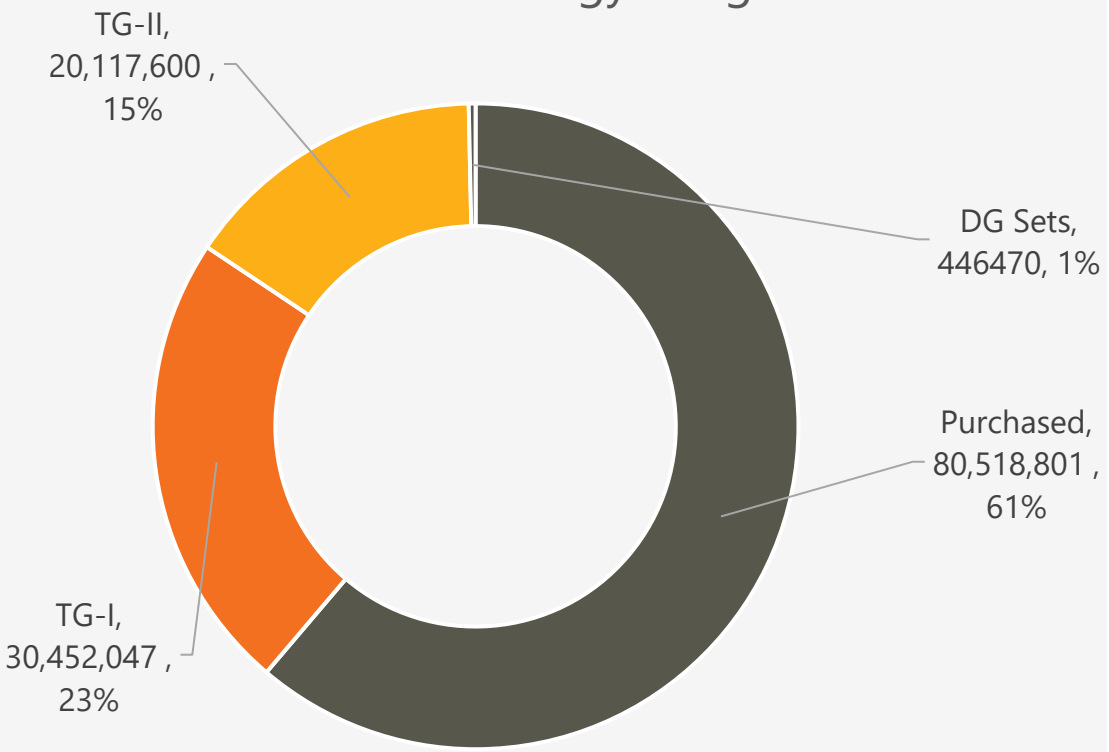
Reason for increase in Specific Energy : **Installation of New captive raw material Phosphoric Acid Plant – II in 2019-20 and increase in its capacity utilisation by 39% resulted in an increase of SEC of products by 22%**

Energy Consumption 2021-22

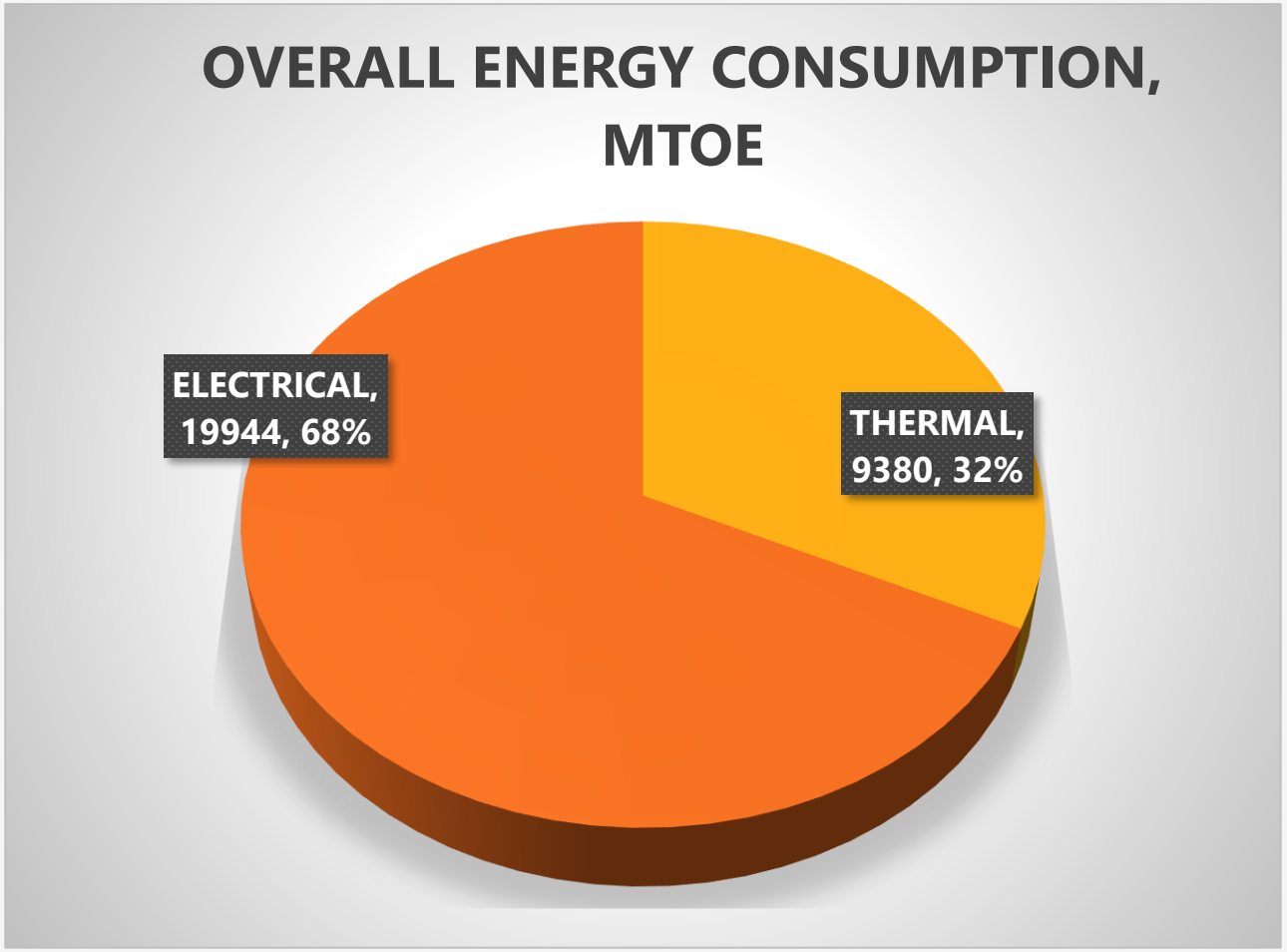
Thermal Energy Consumption Mkcal



Electrical Energy Usage kWh



Energy Consumption 2021-22



Benchmarking

	Electrical	Thermal	Total
Unit of measurement	kWh/MT	Kcal / MT	MTOE/MT
Coromandel Specific Energy	101.55	87593	0.0274
Global Benchmark	102	870740	0.1161
Location of Unit	Europe	Europe	Europe
Difference with Global Benchmark	0.45	783147	0.0887
Internal Target Specific Energy	101	85000	0.027

Comments

Derived benchmark being sum total energy of Sulphuric acid, Phosphoric acid & NPK complex plant

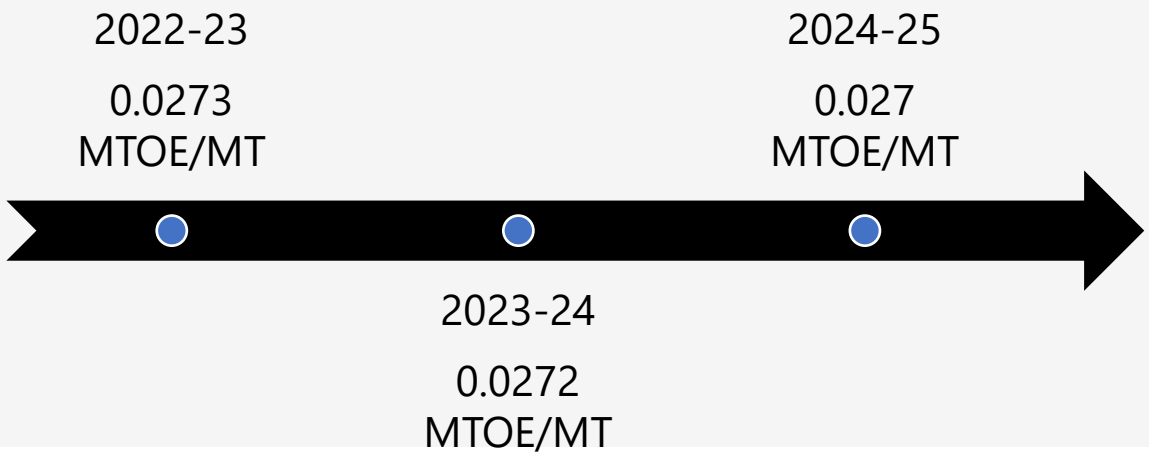
Source of Information

1. Page 58 Table A2, Best Available Techniques for Production of Sulphuric Acid, Booklet No 3 of 8, Year 2000
2. EU IPPC - Reference Document on Best Available Techniques in Large Volume Inorganic Chemicals – Ammonia, Acids and Fertilizers Industries. December 2006
3. Roger Heath, John Mulckhuyse and Subrahmanyan Venkataraman, Page 16, The Potential for Energy Efficiency in the Fertilizer Industry. World Bank Technical paper No 35, 1985

Benchmarking

Action Plans to Achieve Benchmark

- Annual Specific energy consumption targets
- Annual Energy efficiency improvement projects with specific targets and allocated budget
- Maximise Rail transport. Deployment of 35 MT replacing 10 – 20 MT trucks for product despatch
- Institutionalization of energy efficiency & conservation awareness programs.
- Institutionalization of internal incentive system to promote & reward energy efficiency behaviors
- Support technical training



Activities:

- ✓ Installation of capacitor banks at motor control centers
- ✓ SCADA & IIOT for real time monitoring
- ✓ Installation of LED lights for general illumination
- ✓ Installation of Variable Frequency drives
- ✓ Installation of Roof top solar plant
- ✓ Modernisation of age-old electrical drives & switchgear
- ✓ Maximise day light savings using translucent roof sheets and optimization of auto light sensors
- ✓ Optimisation of process plant loads
- ✓ Maximise Planned shutdown
- ✓ Maximise utilisation of waste heat
- ✓ Avoid Diesel Power & Coal Fired Boiler Generation,
- ✓ Maximize internal storage & avoid multiple material handling
- ✓ Deploy best available technologies in manufacturing

Planned ENCON 2021-22

	Title of Project	Annual Electrical Saving	Annual Thermal Saving	Investment
		(Million kWh)	(Million Kcal)	Rs Million
1	Installation of 11KV Automatic Power Factor controlling system	1.08		29.5
2	Upgradation of Wharf Boiler Burner Management system with servo controllers	0	34.5	2.0
3	Replacement of age old window AC units with 3 star rating units	0.07		2
4	Power Plant Scada upgradation	0.1		3
5	Replacement of age old rewound motors by IE3 motors	0.2		6

ENCON 2019-22

Year	No of Proposals	Investment	Electrical Savings	Thermal Savings	Savings Rs Million	Impact on Specific Energy Consumption	
		Rs Million	Million kWh	Million kcals		Electrical kWh / MT	Thermal mkcal / MT
2019-20	7	579	22.38		122	20.7	
2020-21	6	98	0	1749	14	0.0	0.002
2021-22	4	10	0.426	439	7	0.4	0.000

Innovative Projects 2020-21

Trucks loading with Excavators

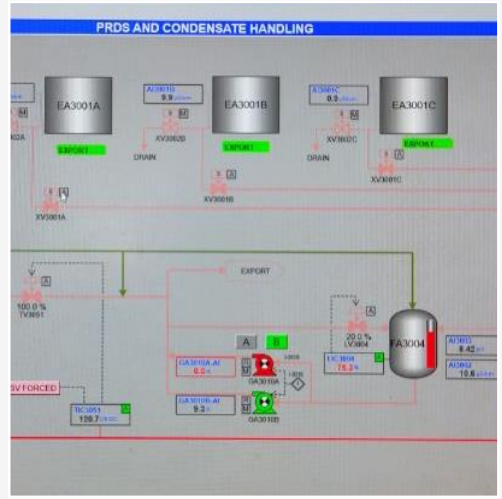
Direct Loading of trucks through feed chutes

1. Installation of Direct Loading Chutes for Gypsum Trucks Loading
2. Avoided Utilisation of Excavators
3. **Replication** Successful operation of Project, Hence finds wide replicability
4. **Impact** Lower cost of Trucks loading

Innovative Projects 2020-21 - Automation

1. Installation of Individual Heat Exchanger Steam Condensate conductivity meters with auto drain system
2. Automation – Real time process control
3. **Replication** Successful operation of Project, Hence finds wide replicability
4. **Impact** Higher Steam condensate recovery

Control valves for condensate export and drain lines



Steam condensate – DCS control

Innovative Projects 2021-22

1. Deployment of 35 MT capacity trucks, for product despatch based on availability

2. Advantages – Lower truck turnaround time and lower transport fuel oil consumption

3. **Replication** Maximise deployment of 35 MT when & wherever available

4. **Impact** Lower transport fuel oil consumption

Utilisation of renewable energy sources

Replacement of Electrical Energy with Renewable Energy	Installed Capacity (MW)	Annual Energy Generated in 2019-20 (Million kWh)	% Share	Annual Energy Generated in 2020-21 (Million kWh)	% Share	Annual Energy Generated in 2021-22 (Million kWh)	% Share
Solar (PV) - Offsite Gen.	0	0.945	0.81				
Others – Offsite Gen.	0	1.512	1.29				

Due to Covid-19, unable to procure renewable energy certificates, backlog purchase planned during the year 2022-23

Waste Utilisation

	2019-2020	2020-2021	2021-2022
Generation, MT			
Waste Steam from Sulphuric acid Plant, MT	696965	540954	608961
Heat Value (GCV 634 kcals/kg) mkcal	441876	342965	386081
Disposal, MT			
Utilised for Process Heating	488095	398983	422619
Balance for Power Generation	208870	141970	180699

GHG Inventorisation

Absolute Emissions	2019-20	2020-21	2021-22	
Thermal (Scope 1 - Direct)	6976	2037	28621	Ton CO2
Power (Scope 2 - bought out power)	62452	65838	66025	Ton CO2
Scope III - Employee commuting	3177	3177	3524	Ton CO2
Total	72604	71052	98170	Ton CO2

Emission Intensity	2019-20	2020-21	2021-22	
Production	1079187	981237	1070858	MT
Carbon Intensity	67.3	72.4	91.7	kg CO2 / MT

Disclosure of Emission data Publicly – Yes Full disclosure

GHG Inventorisation

	Emission kg CO2/MT
Target Short Term	90
Target Long Term	63

Action Plan

1. Replace age old motors with IE3 motors
2. Maximise turbo power generation from waste Steam
3. Install energy efficient lighting using LED bulb
4. Install Rooftop solar power plant of 95 kWp capacity
5. Modernisation of age-old low-tension switchgear
6. Power factor improvement by installing capacitor banks
7. Minimising Thermal energy consumption
8. Replacement of defective insulation
9. Improve condensate recovery

Green Supply Chain Management

Green purchase policy (if, any) : Yes

1. *In all purchases, preference to local suppliers*
2. *All packaging materials used to be made of recyclable materials*
3. *Transport charges determined considering fuel efficiency*
4. *Deployment of 35 MT Trucks replacing 10 – 20 MT*
5. *Registered under Plastic Waste Management Rules 2016. 5462 MT of plastic waste was recycled during 2021-22*

Captive Raw Material Generation & supply to other units of Coromandel

Projects Implemented	Investment Made (Rs In Million)	Description
Captive Generated Raw Material Phosphoric acid supply to sister concerns	65	Captive Generated Raw material phosphoric acid plant capacity augmented, resulting in self-sufficiency. Excess raw material produced is supplied to sister concerns through truck transport, limiting import & saving in transport fuel costs

Monitoring

Daily Monitoring – Daily Target Vs Actual Specific Energy Consumption compared & corrective actions undertaken

Review Meeting Chaired By - Unit Head

Typical Report

Apr - May 21			with pap-2											
145102			Apr'22 to		May-22		Prodn	192500		209712		17212	Rs./MT	Rs./MT
Norm	Rs./MT			Norm		Rate		Rs/MT				Diff	Usage	Price
Actual	Actual	Head		Budget	Actual	Budget	Actual	Budget	Budget - exlcludes p205 transfers	Actual	Actuals - exlcludes p205 transfers	Rs/MT	Varianc	Variance
127	595	Power	Kwh	124	115	2.8	4.9	351	291	560	486	(209)	*26*	*(234)*
3	203	Water	M3	3.3	3.1	63	65	206	157	204	168	1	*9*	*(7)*
1	20	Fuel (Ishs)	Kgs	0.4	0.4	46	60	21	21	23	23	(3)	*2*	*(5)*
0	29	Fuel - Others						9	9	12	12	(3)	*(2)*	*(2)*
27	138	Coal	Kgs	70.4	48.9	7.3	10.0	517	326	490	351	27	*158*	*(132)*
0	0	**Chemicals & Mos.**												
1	54	Defoamer	Kgs	1.9	1.8	48.5	70.2	90	65	124	92	(34)	*4*	*(38)*
0	0	Granulation Aid	Kgs	0.0	0.0	0.0	0.0	0	0	0	0	0	*0*	*0*
0	17	Anti Caking Agent	Kgs	0.5	0.1	38.0	38.0	18	18	2	2	16	*16*	*0*
1	38	Caustic Lye	Kgs	1.0	1.0	40.0	61.9	41	41	64	64	(23)	*(0)*	*(23)*
0	0	Catalyst	Kgs	0.0	0.0	0.0	0.0	0	0	0	0	0	*0*	*0*
0.38	3	Hydrated Lime		2.1	0.7	8.0	9.1	17	11	6	4	11	*11*	*(1)*
0	0	Lime Stone		1.7	0.0	6.0	0.0	10	10	0	0	10	*10*	*0*
	19	Other Chemicals						23	16	13	11	10	*5*	*5*
	1115	**Total**						**1303**	**965**	**1499**	**1215**	**(196)**	**240**	**(437)**

Monitoring by IOT measures implemented

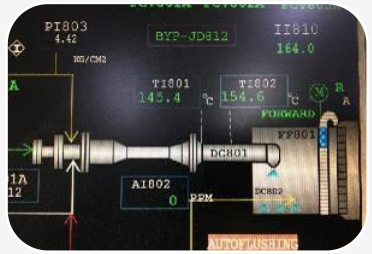
a. Automation projects

1) Document Digitisation
2) Soft Sensor Project for % P2O5 prediction
3) Online moisture analyser Gypsum
4) Online Level Sensors for reservoirs
5) Process Automation Bag counters in Old Bagging, Pipe reactor skin temperature, Compressed air flowmeters installation completed
6) Reliability Monitoring: Installation of Vibration sensors in identified critical equipment

Moisture Analyser AB Trains

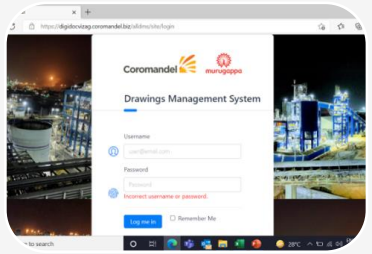
Moisture Analyser Gypsum

Moisture Analyser Trains A & B



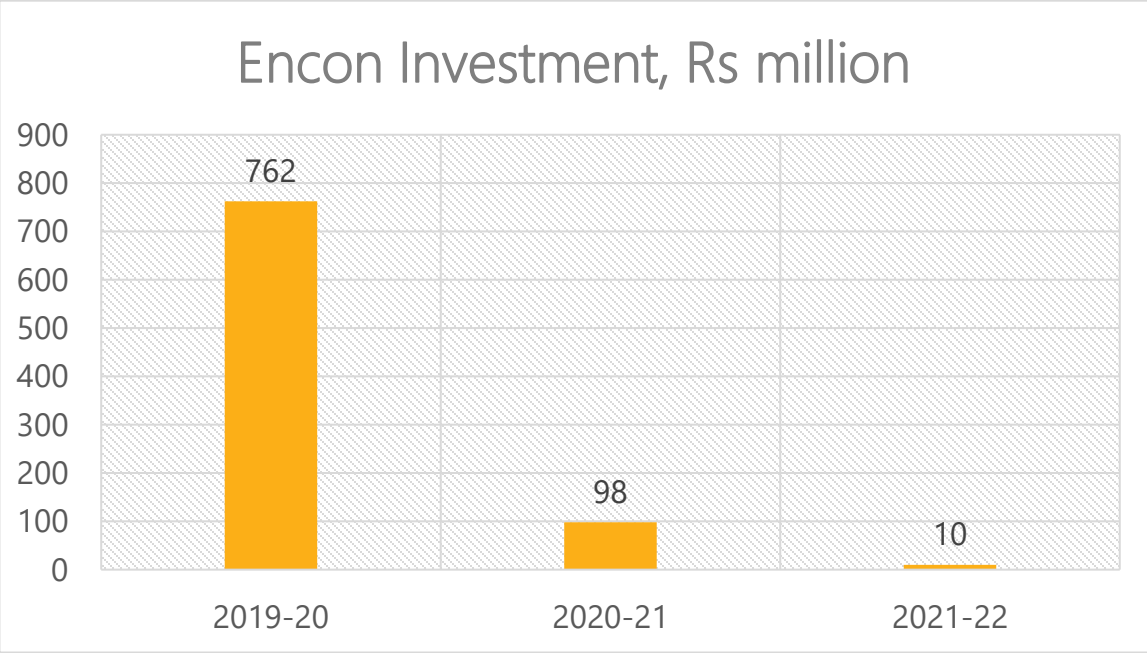
Skin temperature sensors Train A

Skin temperature sensors Train C



Engineering document digital portal inaugurated

Encon budget & Training



All proposals are evaluated for performance and economic viability and then implemented. Proposals with quick payback are prioritised. There is no limit of funds for taking up energy conservation activities

Training

1. Plant personnel regularly participate in CII Webinars, Encon training programs conducted by CII and Other Institutions & Internal training programs
2. Walkathon conducted on the beach on world environment day, world earth day, world water day etc. to raise public awareness on conservation of resources
3. Plant Underwent CII Energy Audit of Visak Unit in 2014
4. Baseline verification audit was carried on 8th August 2016 as per guidelines issued by Bureau of Energy Efficiency, Ministry of Power, Govt of India.

Encon Kaizens & Team work

Modernisation of Air conditioners with Energy Efficient 3 Star units

LSHS Tank Fuel Oil Temperature Control Valve

Projects taken up by workers & supervisors

Implementation of ISO 50001 / Green Co / IGBC rating

Ours integrated management system encompasses standards of Quality - ISO 9001:2015, Environment - ISO 14001 : 2015 & Occupational Health & Safety - ISO 45001:2018.

The level of integration with energy management is

- ISO14001:
  - Cost savings through improved efficiency and productivity.
  - Minimize waste and improve energy efficiency in order to reduce operating costs.
  - Continual improvement based on Plan – Do –Check-Act

We are not a designated consumer as our energy consumption is less than 30000 MTOE for fertiliser sector.

Hence we have not opted for ISO50001 additional certification

	2019-20	2020-21	2021-22	
Investment in Encon	579	98	10	Rs million
Turnover	33863	30312	45135	Rs million
% Investment for Encon on Turnover	1.71%	0.32%	0.02%	%

Learning from CII / BEE Award Programs

1. Competitive Spirit among participating companies
2. Advice by Judges on implementing energy efficient technologies
3. Knowledge on Energy efficient technologies under implementation among Industries
4. Sense of recognition for energy conservation efforts undertaken

Energy Management Awards

2014

2015

2016

2017

2018

2019

2020

Accolades

Award	Awarded By	Year
SAFETY & ENVIRONMENT		
"One of the Top 10 Greenest Companies in India"	TERI & Business Today	2001
Safety, Health & Environment Performance Award	CII - SR	2003, 2004
Environment Protection Award	FAI	1996, 2009, 2017
5 Star Rating	British Safety Council	1999, 2011
Safety Award	National Safety Council	1998
WATER & ENERGY CONSERVATION		
Excellence in Energy Conservation & Management	CII	2000,2001,2002,2014,2015,2016,2017,2018, 2019, 2020
Certificate of Merit Energy Conservation	BEE	2002-03, 2003-04, 2005-06 & 2006-07, 2011-12
Excellence in Energy Conservation	NREDCAP –Govt of AP	2009-10,2011-12,2012-13
Excellence in Energy Conservation	AP Productivity council	2006-07
Excellence in Water Management	CII	2009-10, 2010-11, 2011-12
PRODUCTION		
Best overall performance of Fertiliser Plant	FAI	1994-95
Best Operating Phosphoric Acid Plant	FAI	1994-95,1995-96,1996-97,97-98,2000-01,2001-02, 2003-04,2004-05,2005-06,2006-07,2009-10, 2011-12,2013-14,2014-15,2015-16,2016-17, 2017-18
INDUSTRIAL RELATIONS		
Best Management Award	Labour Dept – AP Govt	2000, 2005, 2013, 2015,2016,2017

Energy Management

For further information please contact

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Vice president - Manufacturing

Thank you