



NAYARA ENERGY LIMITED

CII National Award for Excellence
in Energy Management 2023



Mr. Sanjaykumar Shah,
General Manager, Sustainability



Mr. Mohamed Uwais ,
Deputy Manager, Energy Cell



1.Nayara Energy Executive Summary



India's second largest single location modern and complex refinery

Fully integrated with captive infrastructure for crude receipt, product movement with self sufficient steam/power and utility generation

Commercial production
10.5 MMTPA started
1st May'08

2008

Revamp of CDU to
14 MMTPA

2009

2011-12

Capacity increase to **20 MMTPA**
➤ Train-01 Units & Coal based
Power plant Commissioned

2018

- NHT/CCR & ISOM Revamp
- SRU Block Expansion

2022-23

FCCU Revamp, PRU
Commissioned

Entry into
Petrochemicals

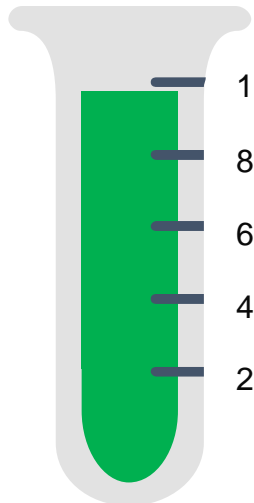
Polypropylene
under Construction

11.8
Nelson
Complexity Index

>99.95%

Consistent Refinery Reliability

100%
80%
60%
40%
20%



2.Process Block Flow Diagram

CDU-01 (18 MMTPA)
CDU-02 (2 MMTPA)

SAT gas Unit

SAT LPG
Merichem



LPG Sphere

NHT (2.3 MMTPA)

ISOM (1.9MMTPA)

Gasoline Tank

KMU (0.6 MMTPA)

CCR (1.3MMTPA)

ATF Tank

DHDT (4.5 MMTPA)
DHDS (5.3 MMTPA)

VGOMHC
(6.5 MMTPA)

FCCU (3.7MMTPA)

Gasoline Merichem

Diesel Tank

Bottom barrels

Sour gas from Units

DCU (6 MMTPA)

Unsat LPG
Merichem

PRU

Pet coke

Sulphur

Claus unit



Product Slate

52%

Diesel

19%

Motor Spirit

13%

Pet coke

5%

LPG

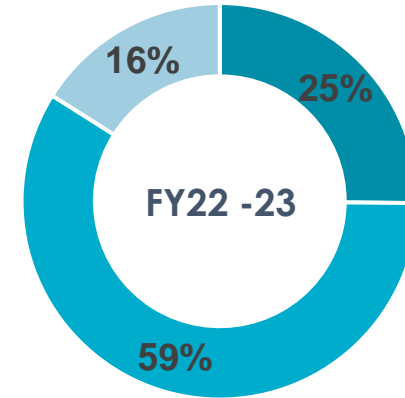
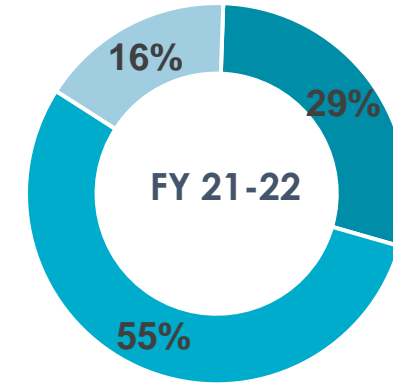
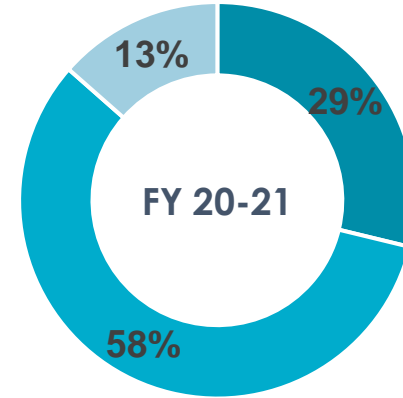
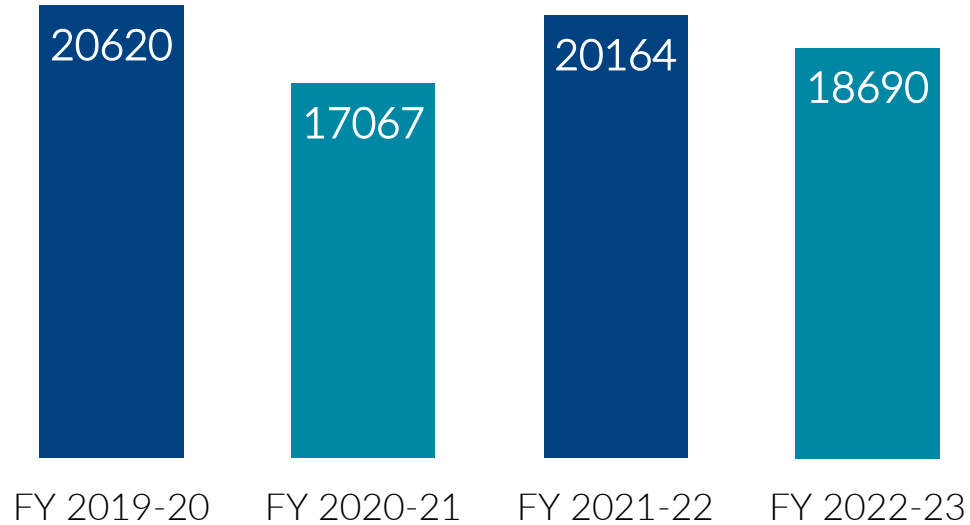
5%

ATF

6%

Sulphur + Other

2b.Production Data



Products(KT)	2020-21	2021-22	2022-23
MS	3265	4019	3521
Naphtha	572	574	97
LPG	922	1006	875
Diesel	8734	9783	9414
ATF	808	801	1093
Fuel Oil + VGO	269	555	477
Bitumen	141	136	85
Pet Coke	1553	2181	1962
Sulphur	280	328	342

3. Energy Consumption



Contributors

Fuel Type	MTOE/Hr		
	2020-21	2021-22	2022-23
CPP Fuel	88	87	80
Refinery Fuel	63	74	68
FCCU coke	16	17	15
PSA off Gas	8	9	10
Total	175	187	173

CPP Fuel

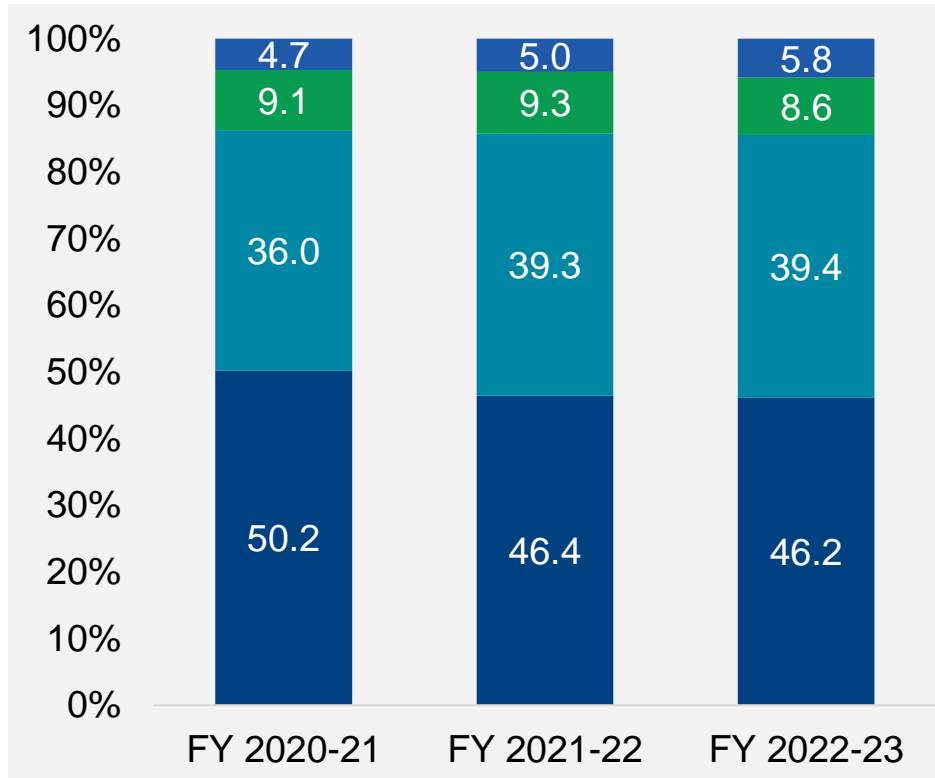
Coal, Wash oil, Naphtha & HSD

Refinery Fuel

FG, FO & VDU off gas

%

Energy Share



CPP Fuel



FCCU Coke



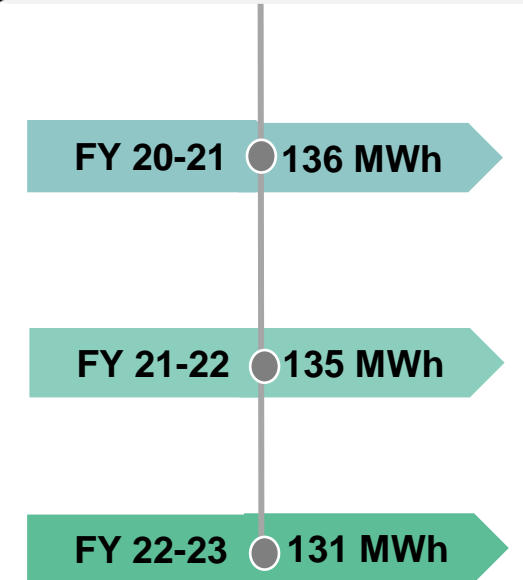
Refinery Fuel



PSA Off gas



Refinery Power demand



4. Specific Energy Consumption



Refinery's SEC in terms of MBN
(MBTU/BBL/NRGF)

FY 20-21

- ❖ MBN higher side in lieu of Covid 19 Pandemic
- ❖ Lower Crude T'put
- ❖ Low market demand and Short Shutdown

FY 21-22

Improved crude unit utilization post covid

FY 22-23

- ❖ FCCU Revamp.
- ❖ Major schemes like CFB modification, FCCU FGC Modification carried out.

64.97



FY 2020-21

61.46



FY 2021-22

58.18



FY 2022-23*

*FY 22-23 MBN With Normalization

5. Major ENCON Projects Planned FY 2023-24

 Title of Project	 Saving Potential	 Investment Mn ₹	 Benefit Mn ₹	 Payback
CPP Fuel Oil Area- LP steam & condensate recovery from HP/MP/LP condensate by flash vessel system	10.9 Mn. Kcal	27.6	12.5	2.2 Years
Motor Conversion PCT Turbine driven pump conversion to motor driven pump	8.4 Mn. KW	22.7	21.7	1.1 Years
Direct blending of MS components rundown (GMU Gasoline and Reformate) to product Tanks.	1.8 Mn. KW	4.4	5.4	0.8 Years
Replacement of CDU-1 Fin Fans with High Efficiency Energy Saving E-glass Epoxy FRP Fan.	0.2 Mn. KW	2.1	0.7	2.9 Years
 Total	10 Mn. KW 11 Mn. Kcal	57	40	1.4 Years







5a. ENCON Projects in last 3 years FY 2022-23

 Title of Project	 Saving Potential	 Investment Mn ₹	 Benefit Mn ₹	 Payback
CFB-1 modification for efficiency improvement	61053 Mn.Kcal	488.0	146.9	3.3 Years
Removal of one impeller of 2 Nos. Of Refinery Sea water supply pumps	3.3 Mn. KW	0.8	21.6	0.5 Months
CDU-1 LP Flash steam generation from MP condensate before Atmospheric flash drum	4640 Mn. Kcal	7.6	11.2	8.2 Months
CDU-02 Mangala feed pump impeller trimming	1.0 Mn. KW	1.6	1.9	3.3 Months
DHDS Rich amine pumps Impeller replacement	0.3 Mn. KW	1.6	1.9	9.6 Months
FCCU – Flue gas cooler Installation of additional sets of coil in economizer & evaporator	131400 Mn.Kcal	Project Capex	113.0	Part of Revamp
 Total	4.6 Mn. KW 22.5 Mn. Kcal/hr	498	297	2.7 Years

5b. ENCON Projects in last 3 years FY 2021-22

 Title of Project	 Saving Potential	 Investment Mn ₹	 Benefit Mn ₹	 Payback
ISOM: Replacement of inefficient refrigeration Screw Chiller by new Screw compressor.	0.9 Mn. KW	22.3	4.9	4.5 Years
ISOM : Trimming of impeller of DIH Overhead pump to reduce throttling losses.	0.5 Mn. KW	2.3	2.7	1.0 Year
DHDT : Replacement of 8 nos. Fin fans blade by efficient FRP Blades	0.1 Mn. KW	1.7	0.7	2.3 Years
Replacement of 1 nos. CT fans blade by efficient aerodynamic FRP Blades	0.2 Mn. KW	0.5	0.9	0.5 Year
CPP : Power optimization in Ash handling electrical devices.	0.6 Mn. KW	Quick win	3.1	Quick Win
 Total	1.5 Mn. KW	27	12	2.1 Years

5c. Major ENCON Projects Planned FY 2020-21

 Title of Project	 Saving Potential	 Investment Mn ₹	 Benefit Mn ₹	 Payback
Replacement of faulty steam traps	47362 Mn. Kcal	20.0	46.2	5.2 Months
Cooling Tower :Use of Low capacity standby pump in place of high capacity pumps for filter water make up	0.4 Mn. KW	Quick win	1.5	Quick win
Power saving by running only one air dryer after adsorbent replacement	0.3 Mn. KW	Quick win	0.9	Quick win
 Total	0.7 Mn. KW 47362 Mn. Kcal	20	49	0.4 Years

6a.Heat recovery from LCO PA loop by routing to PRU reboiler



Trigger

- ❖ FCCU's LCO stream potential was long identified but was kept on HOLD for want of alternate heat sink.
- ❖ The proposed PRU unit provided the avenue to utilize this heat and was made the part of the project



Challenges

- FCCU heat integration with PRU (since major heat media is from LCO loop)
- To address this challenge parallel, reboiler is provided to maintain the reliability



Benefit

- ✓ Around **11 Gcal/hr** of heat is being recovered in Auxiliary reboilers of PRU's C3/C4 Splitter & De-Ethimizer.
- ✓ Major Energy saving : Equivalent~**17 TPH LPS demand** to reboilers

6b. Enrich air supply to FCCU



Trigger

- ❖ Post FCCU Revamp the air demand was exceeding the max. capacity of Main Air Blower(MAB).
- ❖ It was economically viable to utilize NGU vent air having ~28% Oxygen rather than going with MAB Modification
- ❖ Improved energy performance



Challenges

- Safe routing Enrich air from Utility section to FCCU block with minimum pressure drop



Benefit

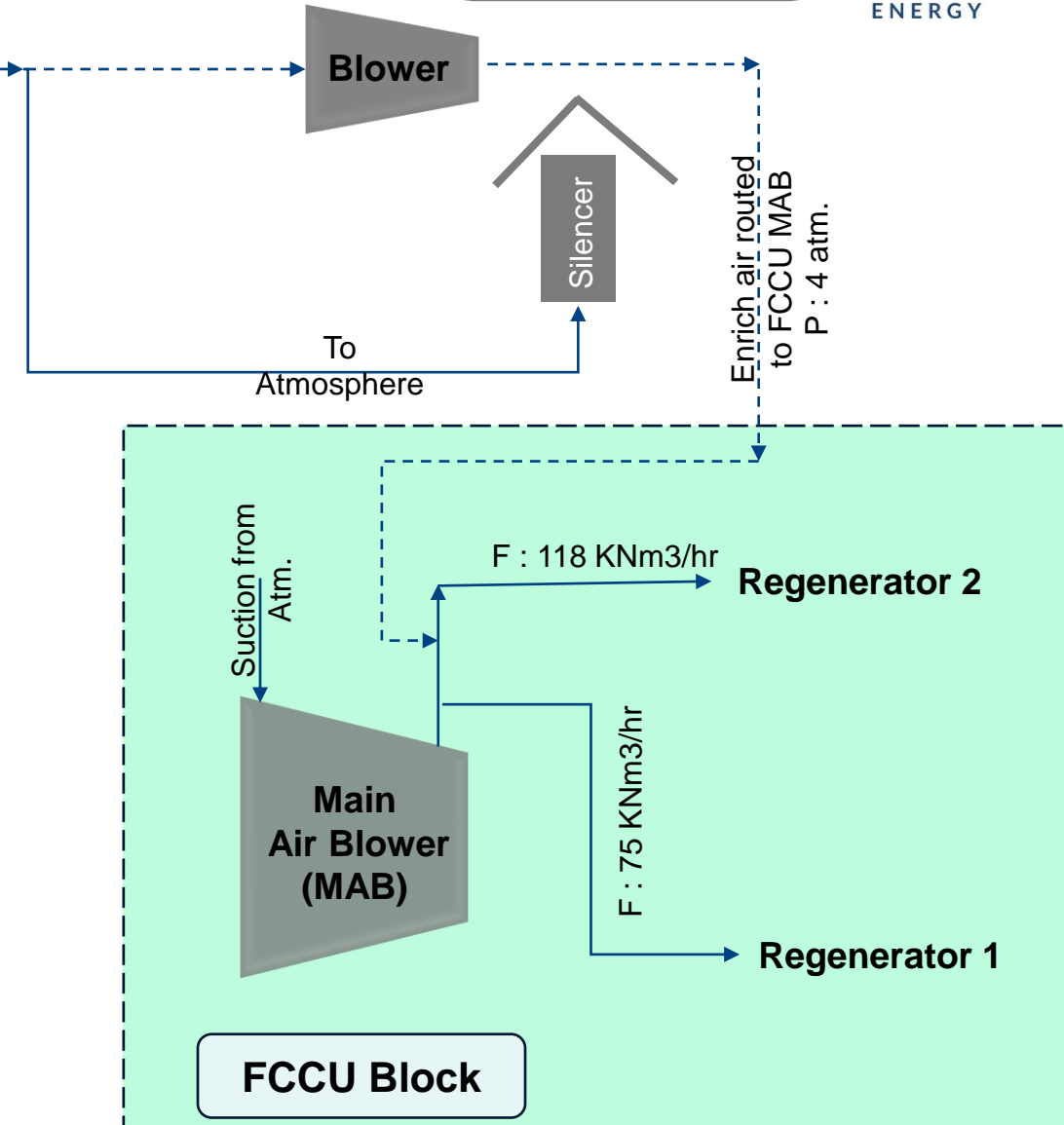
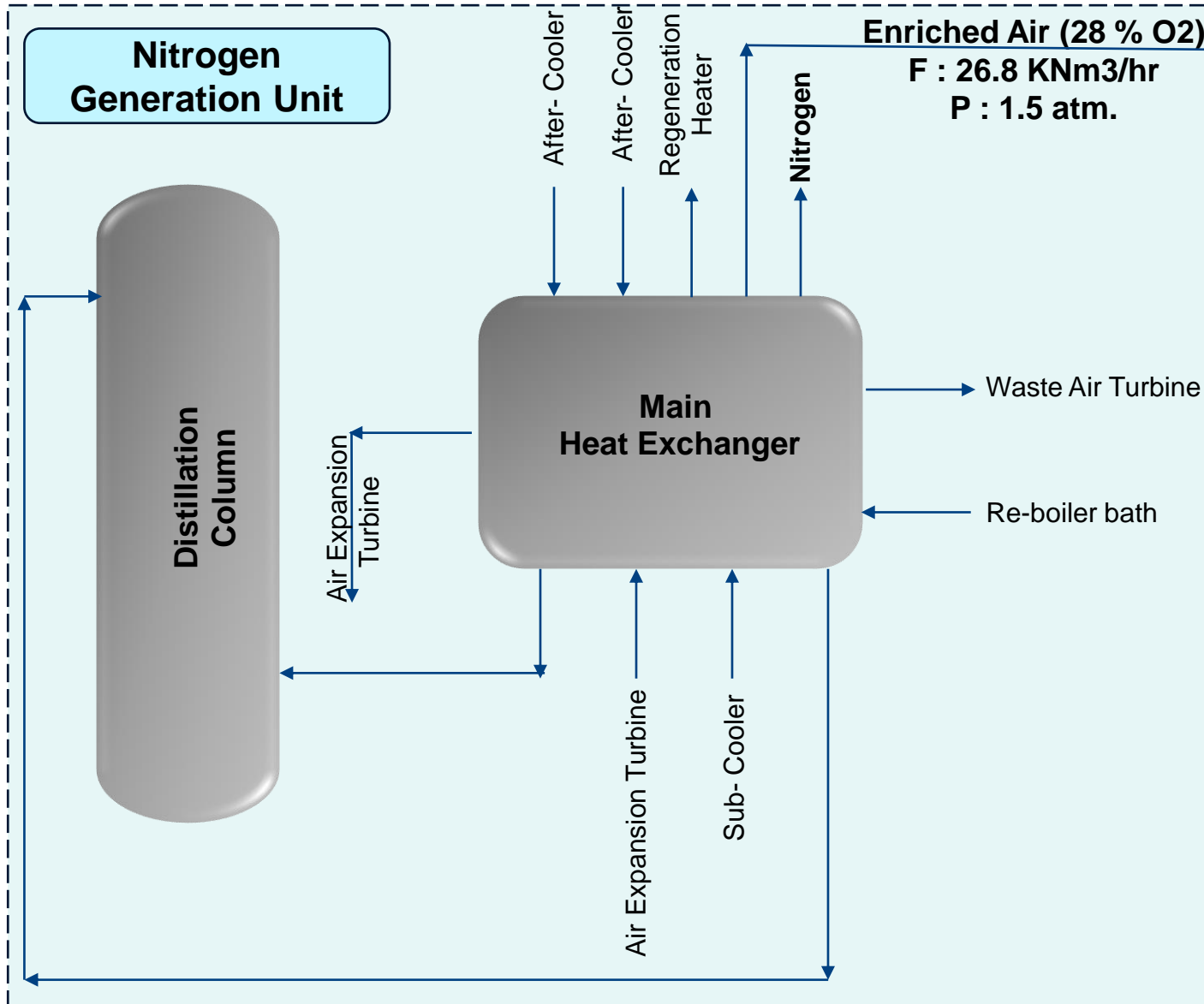
- ✓ Additional capex for new air Compressor(MAB) procurement was avoided
- ✓ Enrich air that was being vented was utilization in FCCU Regenerator.
- ✓ It also helped in avoiding expensive modification in regenerator.
- ✓ Air quantity reduced which in turn helped reducing the flue gas loss.

Proposal

Post installation of new Nitrogen Generation Unit(NGU) Enrich air was vented to atmosphere containing ~28% Oxygen

It was innovatively conceptualized to utilize this enrich air from NGU in FCCU Regenerator to meet its air demand

Proposal



7. Utilization of Renewable Energy Source



Bio -gas plant

- ✓ Capacity : 500 kg/Day kitchen waste
- ✓ Bio- Gas generation about 50 m³ / day equivalent to 20 Kg of LPG.
- ✓ Bio- gas is utilized as fuel in Kitchen and manure in Greenbelt.



Greening Power

- ✓ Solar photovoltaic cell in security watch tower in remote location.
- ✓ Solar Operated Traffic Flasher Lights installed near Refinery Main gate & Township gate.
- ✓ Solar Heater provided at Oil Club. .



Future Plan for Solar

- ✓ 10 MW installation capacity – Initiated required approval from GEDA
- ✓ Site available to scale up 80 MW Solar power.

8.Utilization of Waste Material as Fuel



Oily Sludge reprocessing at Delayed Coker Unit

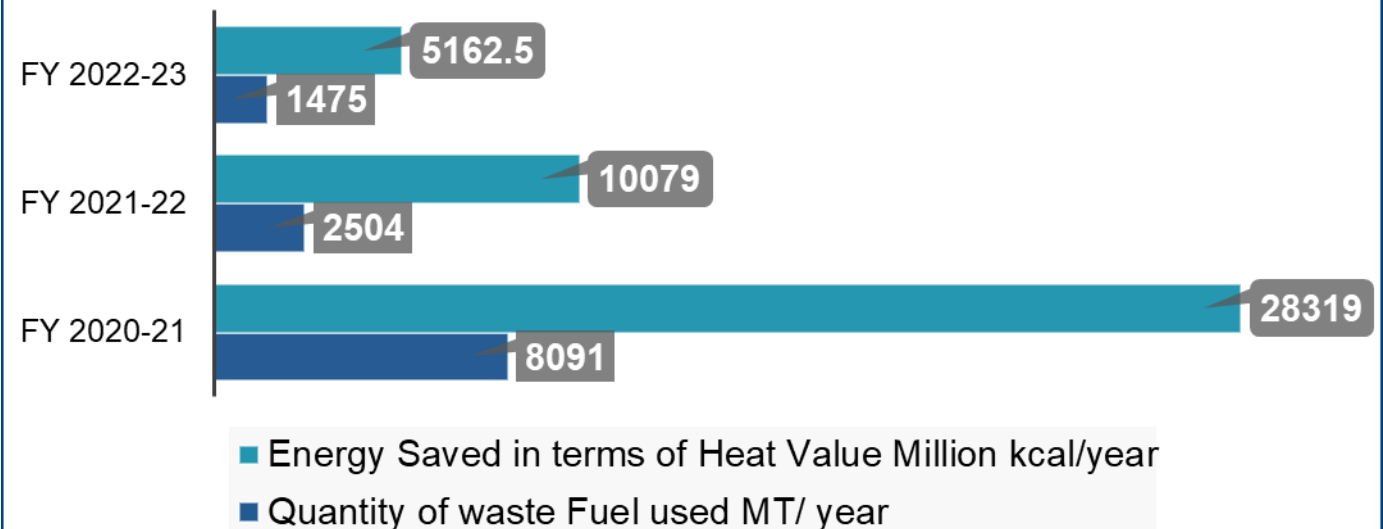
Oil Sludge		
Year	Quantity of waste Fuel used	Energy Saved in terms of Heat Value
	MT/ year	Million kcal/year
FY 2020-21	8091	28319
FY 2021-22	2504	10079
FY 2022-23	1475	5163

Reusing 100% Spent Carbon in Captive Power Plant Boilers



Co-processing of Oily Sludge, Oily Cotton Rags, Spent Resin and Heater Deposits at Cement Industry as Alternate Fuel

Energy Saving by Waste Utilization



9. Water Conservation Measures

Six reservoirs / ponds have been created within refinery

Total capacity of **6,25,000 m3**.

Three rainwater harvesting pond in COT area of total capacity **3, 60, 000 m3**

Fire water reservoir of **84,000 m3** capacity



**Ground water
Recharge well**



**Pond Near sea
water return**



**Rainwater Pond
Near COT area**



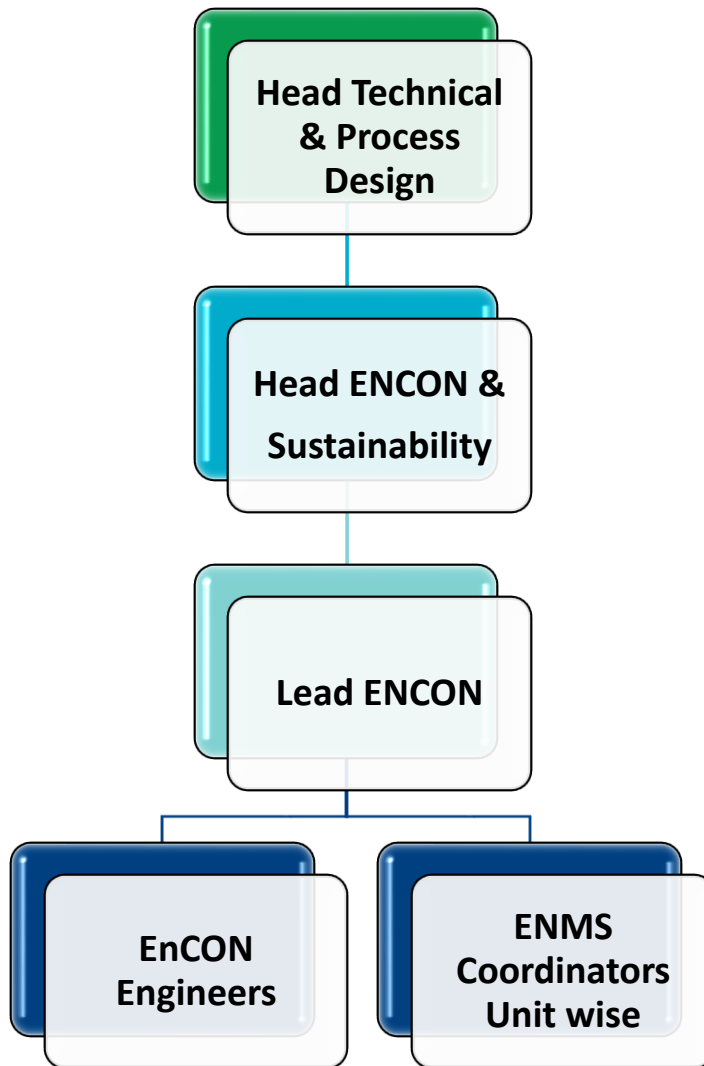
**Rainwater Pond
Near Pet coke area**

10. Green Belt at NAYARA

Area Name	Maintenance Area :Acre	Area Sq. m	Plants nos.
Fruit orchards at Refinery inside area	379	1533760	74,190
Orchards plants - Petrochemical	82.0	331843	15,217
Forest Species Greenbelt	245.3	992614	1,65,482
Avenue area at Refinery	99.3	401740	69,239
Landscape area at Refinery	76.5	309856	
Landscape area at NNT and Meera	31.2	126308	
Avenue area at NNT and Meera	10.8	43640	4,645
Total	924.5	3739760	3,28,773



11. Teamwork, Employee Involvement & Energy Monitoring



Daily monitoring system

- Daily energy performance report.
- Performance tracking of Energy intensive equipment.
- Online information through dash-board application.

Review meeting chaired by Director and Head of Refinery

- Monthly performance review meeting (MPR)
- Quarterly Management Review Meeting (MRM)

Employee Involvement:

- Energy Management System (ENMS Co-ordinators in each Units).
- On line portal for submission of improvement ideas.
- Training and encouragement programmes .

Energy Saving Campaign:

- “Inter Unit Energy Optimization Competition” - continuous operational excellence in energy and promote a healthy competition amongst different Units for enhanced energy efficiency.

Energy efficiency / awareness training program

- Quarterly ENMS 50001:2018 training.
- Unit wise Brain storming sessions.

ENMS AMS Portal:

- Separate Portal has been developed for ENMS Internal Audit Management

12. Implementation of ISO 50001:2018-EnMS

**ENMS 50001:2018
final certificate
received from
M/s IR Class**



IRCLASS
SYSTEMS AND SOLUTIONS PRIVATE LIMITED

CERTIFICATE OF APPROVAL
Issued by Indian Register Quality Systems
(A Division of IRCLASS Systems and Solutions Private Limited)

This is to certify that the Energy Management Systems of

Organisation: Nayara Energy Limited

Address: 39 KM, Jamnagar-Okha Highway,
Vadinar, Dist. Devbhumi Dwarka - 361305,
Gujarat, India

has been assessed and found conforming to the following requirement

Standard: ISO 50001:2018

Scope: Production and Supply of Petroleum
Products including Captive Power
Generation and Marine Operations

Certificate No.: IRQS/221000973

Current Date of Granting : 23/09/2022

Expiry Date : 22/09/2025

* Note: Certified Since 16th May 2014


Indian Register Quality Systems


NABCB
EN 001


IAF


Shashi Nath Mishra
Head IRQS

This approval is subject to continued satisfactory maintenance of the Energy Management Systems of the organization to the above standard which will be monitored by IRQS. The use of the Accreditation Mark indicates accreditation with respect to activities covered by the certificate with accreditation no. EN 001. Condition Overleaf


COA/IRQS/NABCB/ENMS/Rev 00

Head Office: 52A, Adi Shankaracharya Marg, Opp. Powai Lake, Powai, Mumbai - 400 072, India.



- Certificate is valid up to 22nd Sept'25
- Certificate since 14th May'14

13.Learning from CII Award 2022



Confederation of Indian Industry

23rd National Award for Excellence in Energy Management 2022

This is to certify that

Nayara Energy Limited, Vadinar

has been recognized as

"Excellent Energy Efficient Unit"

*This acknowledgement is based on the evaluation by the panel of judges at the
"National Award for Excellence in Energy Management" held during 23 - 25 August 2022*


K S Venkatagiri
Executive Director
CII - Godrej GBC


Ravichandran Purushothaman
Chairman, Energy Efficiency Council
CII - Godrej GBC

"Excellent Energy Efficient Unit"

Nayara Energy Limited, Vadinar has received prestigious award "Excellent Energy Efficient Unit" for the best performance in 2020-21 at National Energy Efficiency Summit organized by CII Hyderabad on Sep'22



Take away

Heat recovery from Fin fan loops and proper Utilization



Path Forward

✓ Potential study initiated for Low grade Heat recovery



14.Other Awards Received

“International Safety Award ” from -British Safety Council

Nayara Energy has received International Safety Award -From British Safety Council for demonstrating strong commitment to good Health and Safety management during 2021.



15 .CSR - Reach and Impact

Project Excel

- ❑ 3,500 youth trained in 21st century employability skills
- ❑ 1,000 youth attended awareness sessions

Project Tushti

- ❑ 74 out of 600 under weight children were brought to safe zone through Child Malnutrition Treatment Centres.
- ❑ ~ 2,800 pregnant and lactating mothers counselled on child and maternal health.

Swachh Halar

- ❑ Over 1300 tones of wet and dry plastic waste segregated in 17 wards of Jamnagar and Khambhalia Municipal Corporations

Continuing Education Through NIOS

- ❑ More than 200 School dropout students enrolled and appeared for the exams in the year 2022-23.

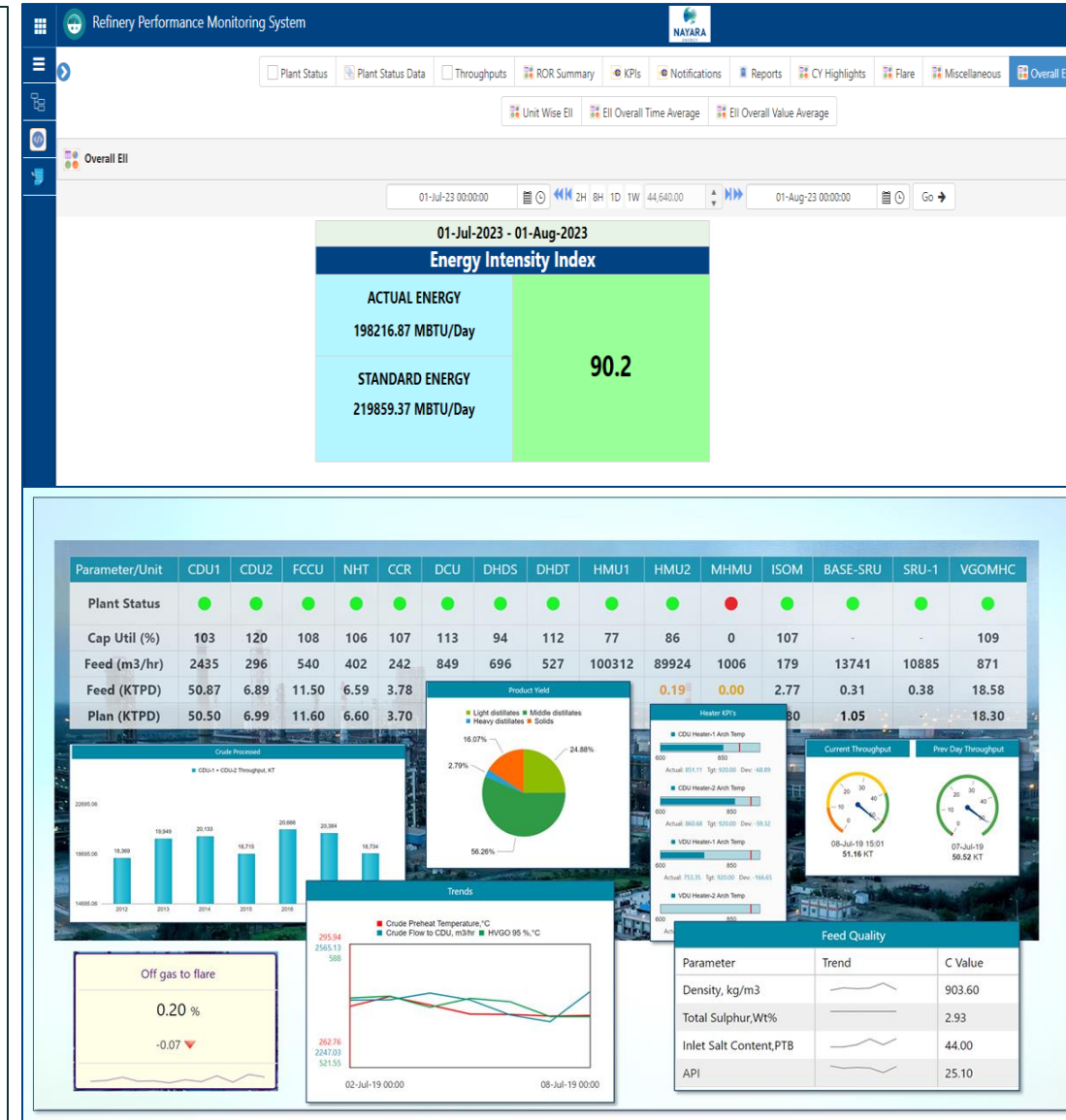
Community Health Program

- ❑ Over 57,000 consultations conducted through Mobile Health Clinic (MHC or MHV)
- ❑ Community Health Centre, across 15 villages of Jamnagar and Devbhumi Dwarka.



16. Best Practices Implemented on Energy Front

- ✓ **Top Management** commitment and consistent achievement in **ENCON**, Safety, Reliability & Plant Performance
- ✓ Refinery Performance Monitoring System (**RPMS**) for real time monitoring and immediate actions.
- ✓ Advance Process Control (**APC**) for real time process optimization
- ✓ Well defined methodology and **daily follow up on ENCON, F&L reduction**
- ✓ **CEO and Director monthly performance review** meetings
- ✓ Implementation of **ENCON schemes on priority**.
- ✓ **Unit Flare Flow meters** provided for monitoring of flare loss and periodic PSV checking
- ✓ Proven Online System for **Management of Change (MOC)**
- ✓ **Adopted best Turn Around Management** system
- ✓ **Monthly Safety time out** attended by senior executives covering all plant areas
- ✓ Integrated Refinery Management System.
- ✓ Online Training Simulators (**OTS**) for all Units .



THANK YOU



Mr. Sanjaykumar Shah

General Manager Sustainability,

(M) +91 9925240849

sanjay.shah3@nayaraenergy.com

Mr. Mohamed Uwais M

Deputy Manager - EnCON

(M) +91 9726419935

mohamad.uwais@nayaraenergy.com