Energy Excellence Journey of
Delhi International Airport Limited (DIAL)

2023

GMR

Presenters

**Vipin Purohit,
AGM (Specialist), Mechanical**

**Atul Kumar Singh,
AGM (Specialist), Electrical**

Best Airport in India and South Asia for the fifth consecutive year in Skytrax World Airport Awards- 2023

Best Airport by Size and Region (over 40 MPPA) in Asia Pacific under ACI ASQ for 2022 and adjudged the cleanest airport in the region.

First Level 4+ Certified Airport in Asia Pacific Region under ACI's Airport Carbon Accreditation Program

Running on 100% Renewable Energy

Working towards achieving "Net Zero" by 2030

Humility | Entrepreneurship | Teamwork and Relationships | Deliver the Promise | Learning | Social Responsibility | Respect for Individual

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DELHI INDIRA GANDHI INTERNATIONAL AIRPORT | **GMR**

DIAL operate, manage and develop the Delhi Airport, the largest airport in India and as of 2022, it is the seventh busiest airport in the world.

Key activities

Airport Operations

Aero & Non Aero Development

Commercial Property Development

Maintenance & Utility Services

Numbers for 2022-23

65 Million Passengers

443 Thousand ATMs

52 International Airlines

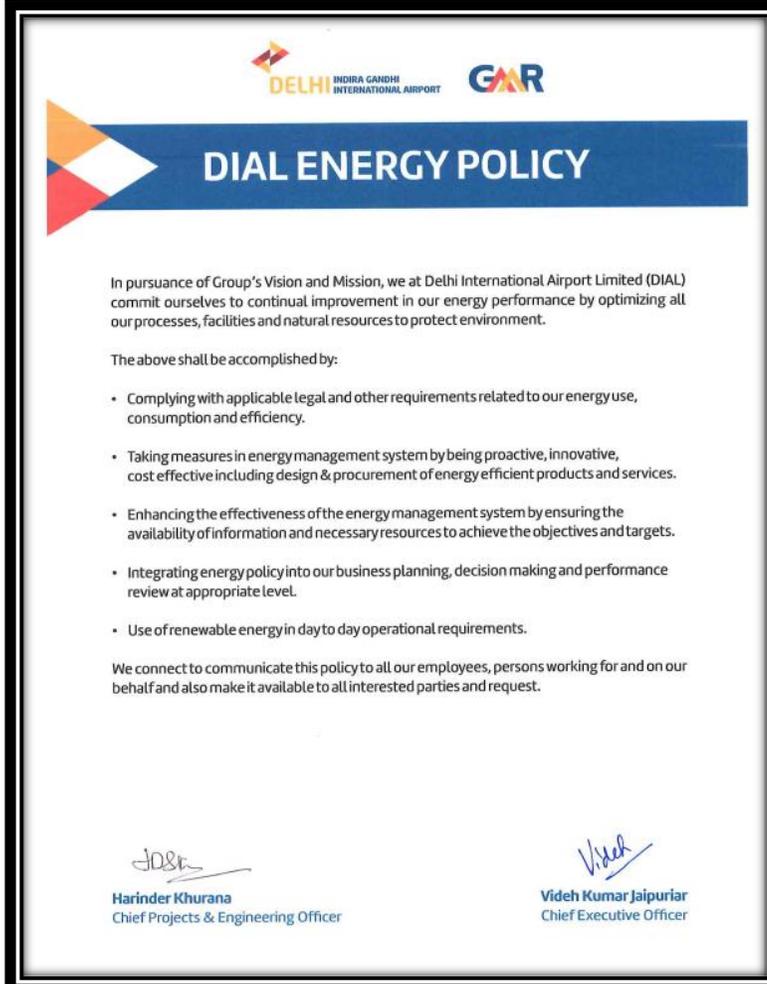**08** Domestic Airlines

64 International Destinations

80 Domestic Destinations

Humility | Entrepreneurship | Teamwork and Relationships | Deliver the Promise | Learning | Social Responsibility | Respect for Individual

3

Mission Statement

To be amongst **the world's top 3 airports**

by providing superior customer experience

through **operational excellence** and innovation,

while ensuring **profitability**

with care for **safety** & environment

and

being a great place to work

Energy Policy

DIAL ENERGY POLICY

In pursuance of Group's Vision and Mission, we at Delhi International Airport Limited (DIAL) commit ourselves to continual improvement in our energy performance by optimizing all our processes, facilities and natural resources to protect environment.

The above shall be accomplished by:

- Complying with applicable legal and other requirements related to our energy use, consumption and efficiency.
- Taking measures in energy management system by being proactive, innovative, cost effective including design & procurement of energy efficient products and services.
- Enhancing the effectiveness of the energy management system by ensuring the availability of information and necessary resources to achieve the objectives and targets.
- Integrating energy policy into our business planning, decision making and performance review at appropriate level.
- Use of renewable energy in day to day operational requirements.

We connect to communicate this policy to all our employees, persons working for and on our behalf and also make it available to all interested parties and request.

Harinder Khurana
Chief Projects & Engineering Officer

Videh Kumar Jaipuriar
Chief Executive Officer

ENMS Certificate

bsi.

Certificate of Registration

ENERGY MANAGEMENT SYSTEM - ISO 50001:2018

This is to certify that:
Delhi International Airport Ltd.
New Udaan Bhawan,
Opposite Terminal 3
Indira Gandhi International Airport
New Delhi 110 037
India

Holds Certificate No: **ENMS 570813**

and operates an Energy Management System which complies with the requirements of ISO 50001:2018 for the following scope:

The Operation and Maintenance of Domestic and International Passenger Terminals, Airside Operations of Indira Gandhi International Airport.

For and on behalf of BSI:

Theuns Kotze, Managing Director Assurance - IMETA

Original Registration Date: 2011-09-05
Latest Revision Date: 2023-08-04
Effective Date: 2023-09-05
Expiry Date: 2026-09-04
Page: 1 of 1

...making excellence a habit.™

LEED India NC Gold (2011)

IGBC EB Platinum (2016)

LEED O&M Platinum via Arc (2018)

PXER
Delhi International Airport Ltd. Terminal 3 and MRSS
New Delhi, India
PLATINUM
July 2018

High SRI roof material (more than 78)

High SR roof material (more than 0.8)

Heat Island reduction (shaded structure)

Roof insulation with low U-value of 0.261 W/m2-K

Double glassed façade

Heat Island reduction with landscaping

Use of daylighting concept

16% more efficient than the baseline building (as per ASHRAE 90.1-2010 design parameters)
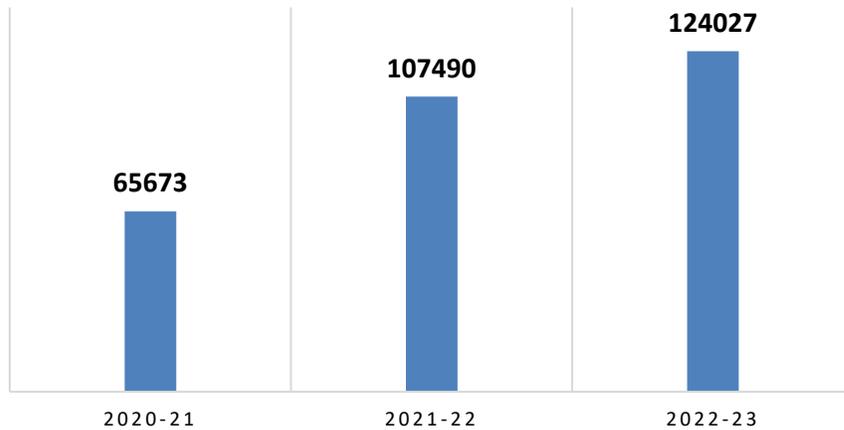
Climate Zone: Composite

- Terminal 1 has received **Leadership in Energy and Environmental Design (LEED) Platinum Level Pre-certification** from USGBC/GBCI.

- The project has achieved **80 points out of 110 on the LEED Version 4.0 Standard.**

- Out of 9 LEED categories, we got 100% in 4 categories of Integrative Process, Water Efficiency, Innovation & Regional Priorities.

13% more efficient than a baseline building (ASHRAE 90.1-2010 design parameters)

Total Points	Category	LEED v4 BD+C	
		Awarded	% Awarded
1	Integrative Process	1	100%
16	Location and Transportation	13	81%
10	Sustainable Site	5	50%
11	Water Efficiency	11	100%
33	Energy and Atmosphere	22	67%
13	Material and Resources	7	54%
16	Indoor Environmental Quality	11	69%
6	Innovation	6	100%
4	Regional Priority	4	100%
110	Total	80	73%

INDIRA GANDHI INTERNATIONAL AIRPORT – TERMINAL 1

New Delhi, India

HAS FULFILLED THE REQUIREMENTS OF

LEED v4
LEED BUILDING DESIGN AND CONSTRUCTION:
NEW CONSTRUCTION AND MAJOR RENOVATIONS

PLATINUM

MAY 2022

BY TAKING THESE INITIAL STEPS, THIS PROJECT IS ON THE PATH
TOWARDS LEADERSHIP AS A LEED-CERTIFIED, HIGH-PERFORMANCE, GREEN BUILDING

PETER TEMPLETON, PRESIDENT & CEO
U.S. GREEN BUILDING COUNCIL & GREEN BUSINESS CERTIFICATION INC.

ANNUAL ELECTRICAL ENERGY CONSUMPTION (MWH)

- 2020-21: 65673
- 2021-22: 107490
- 2022-23: 124027

Fuel Consumption (GJ)

Legend: ■ Diesel (GJ) ■ Petrol (GJ) ■ CNG (GJ)

	Diesel	Petrol	CNG
2020-21	9869	808	1142
2021-22	11305	1173	1028
2022-23	13800.15	1226.24	1378.56
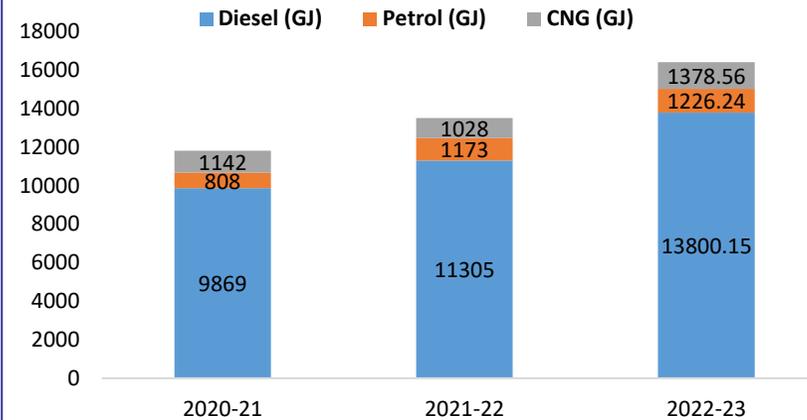
Overall Energy Breakup (2022-23)

- Fuel 3%
- Electricity 97%
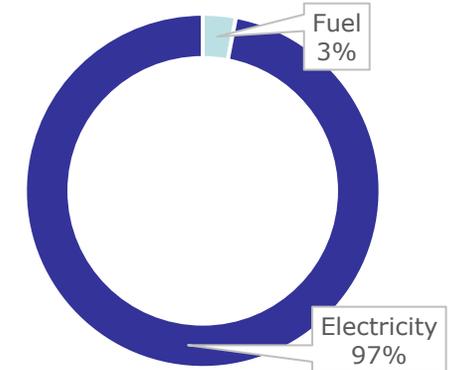
What changed during the last 3 years ?

↗ Electricity consumption increased by 15% YoY (Consumption was reduced due to covid in FY 2020-21-22)

  ↗ Overall area has increased as compared to previous years (3%). Traffic recovery from Covid also a factor for increase.

  ↗ Renovation of Terminal 1, parking facility in Terminal 2, pick and drop facilities in T3

↗ Overall fuel consumption increased by 21% YoY (Consumption was reduced due to covid in FY 2020-21-22)

  ↗ Route optimization

  ↗ Retiring of old vehicles

  ↗ Shifting to EV

SPECIFIC ELECTRICITY CONSUMPTION (KWH/PAX)

	2020-21	2021-22	2022-23
kWh/Pax	2.91	2.73	1.90
	Covid Period	Covid Period	

Specific Fuel Consumption (MJ/Pax)

	2020-21	2021-22	2022-23
MJ/Pax	0.52	0.33	0.25
	Covid Period	Covid Period	

Pax Trend In MU

	2020-21	2021-22	2022-23
MU	22.5	41.3	65.3
	Covid Period	Covid Period	
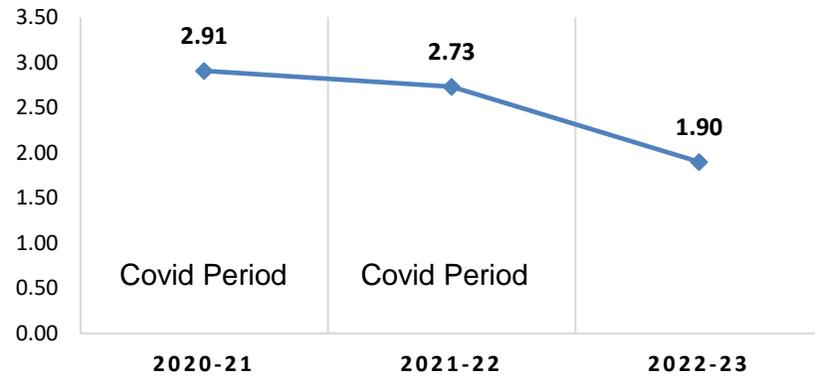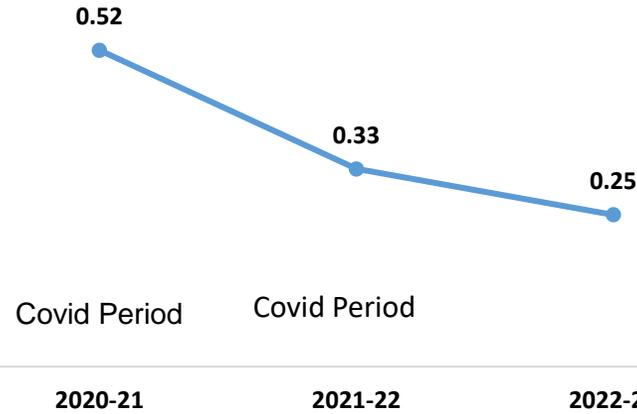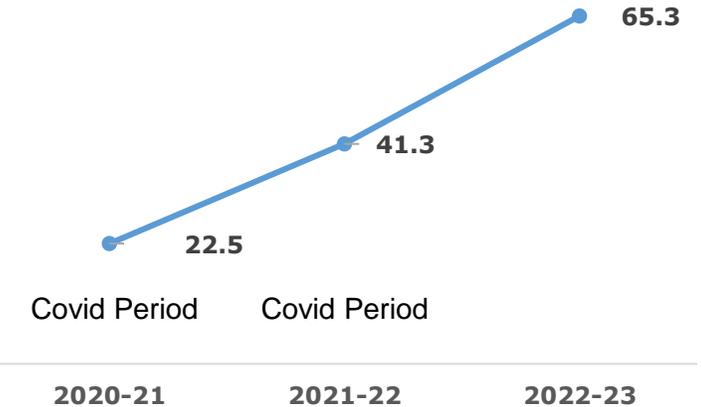
What changed during the last 3 years ?

↗ Specific electricity consumption (kWh/pax) in the year 2022-23 has decreased as compared to 2020-21 by 35%.
  ↗ As Airport is yet to operate its full capacity of passenger and cargo

↗ Specific fuel consumption (MJ/Pax) in the year 2022-23 has decreased as compared to 2020-21 by 52%.
  ↗ Airport driven efforts have resulted in gradual reduction

↗ Increase in passenger throughput has almost doubled as compared to 2020-21.
  ↗ Full recovery to covid passenger fall.

IGIA Load Profile in Mw

Terminal 1
- Connected Load: 25, 25, 18
- Fixed Load: 2.5, 3.5, 3.5
- Variable Load: 2.5, 4, 5

Terminal 2
- Connected Load: 18, 18, 16
- Fixed Load: 1.8, 2, 2.5
- Variable Load: 7.2, 7, 6

Terminal 3
- Connected Load: 90, 90, 90
- Fixed Load: 9, 12, 12
- Variable Load: 27, 35, 35

Legend: 2020-21, 2021-22, 2022-23
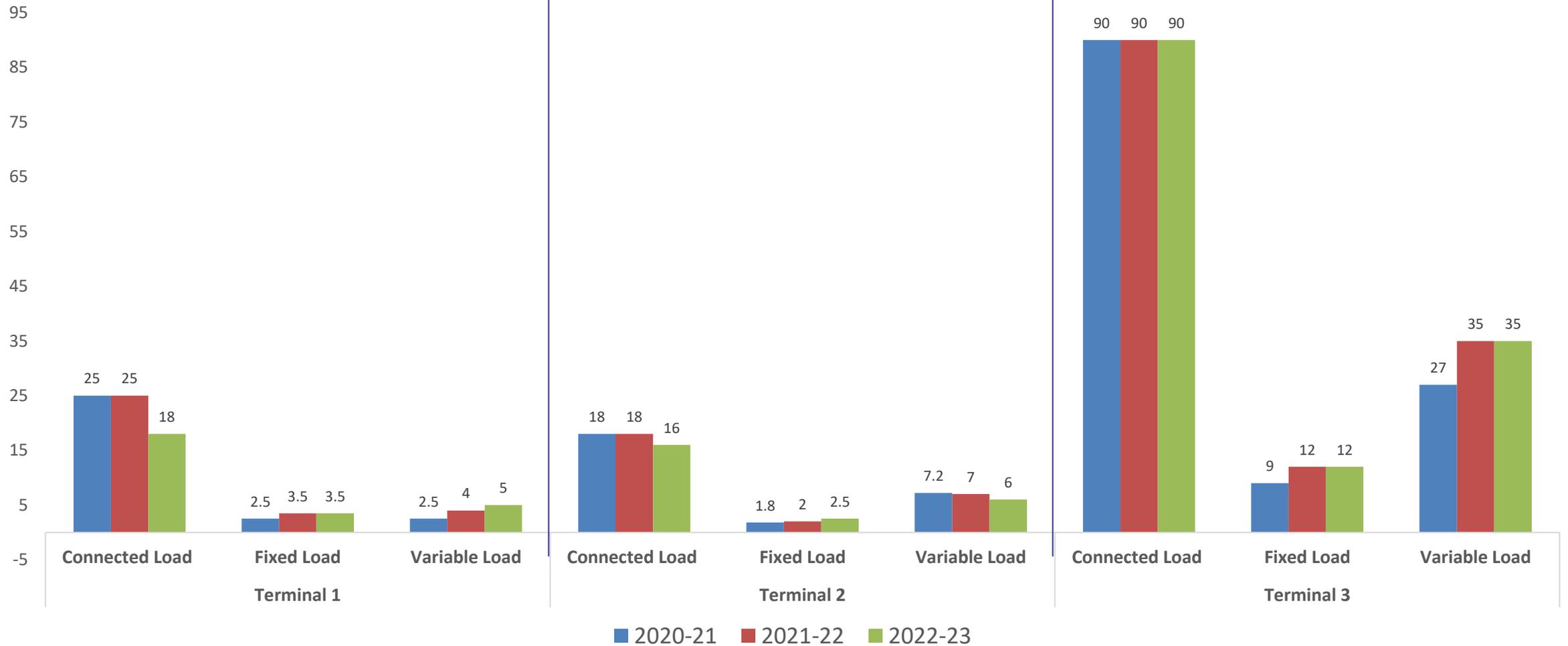
Benchmarking of Specific Energy Consumption (kWh/Pax)

■ 2018-19 ■ 2019-20 ■ 2020-21 ■ 2021-22 ■ 2022-2023

	2018-19	2019-20	2020-21	2021-22	2022-2023
Incheon	16.63	12.92			
Mumbai	2.24	2.31	6.22		
Hong kong	3.95	5.04			
Malaysia Airport	5.30	5.15			
Delhi	1.54	1.45	2.91	2.73	1.90
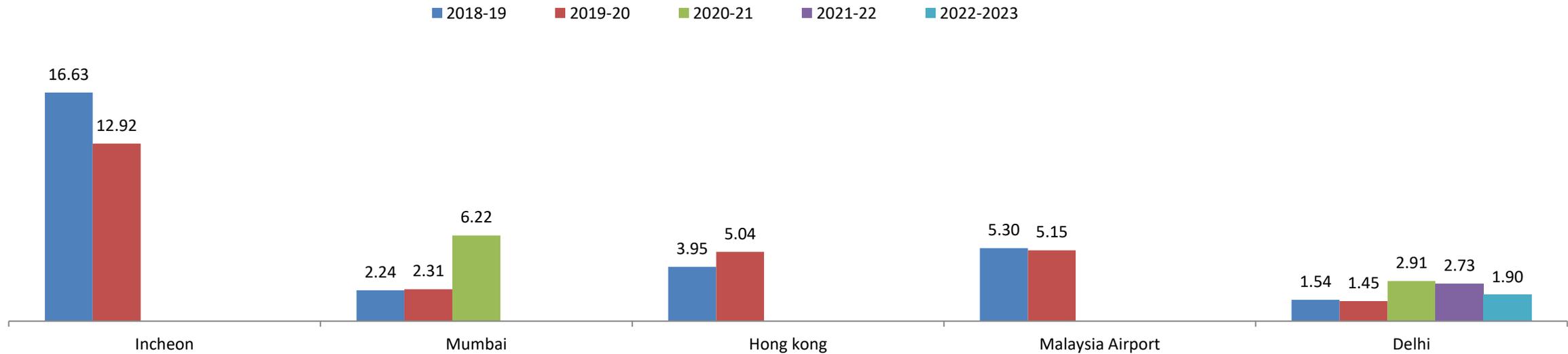
Table 3. Parameters that determine terminal building energy consumption.

Building Characteristics	Climate	Comfort	Building Services
Shape factor	Temperature	Thermal comfort	Operation hours
Compactness	Solar radiation	Visual comfort	Energy management (BEMS)
Transparent surface	Wind	Indoor air quality	Occupants' behavior
Orientation	Pluviometry		
Building materials	Humidity		
Passive systems			

BEMS, building energy management systems.

Source: Energy Research in Airports: A Review
https://energy.greenbusinesscentre.com/energyawards/enepresent20.php

Internal Benchmarking (kWh/m2)

■ Terminal 1 ■ Terminal 2 ■ Terminal 3
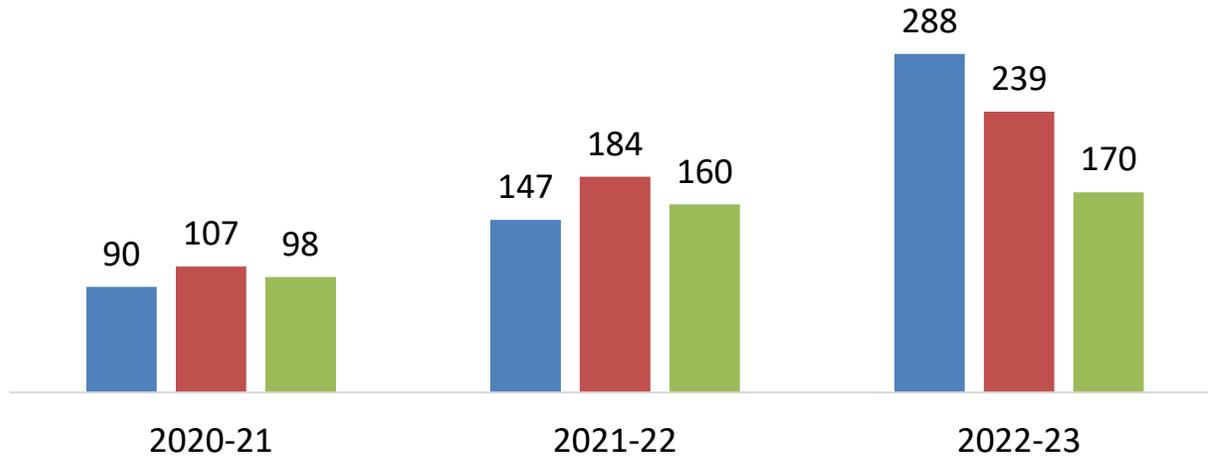
Overall kWh/m2

- Different Utilization has led to different kWh/m2 of the buildings

- Average kWh/m2 has increased by by 5.59%

- T1 was fully closed during FY 2020-21 & FY 2021-22 for 3 months due to covid.

- T2 was fully closed during FY 2020-21 and for 2 months in FY21-22.

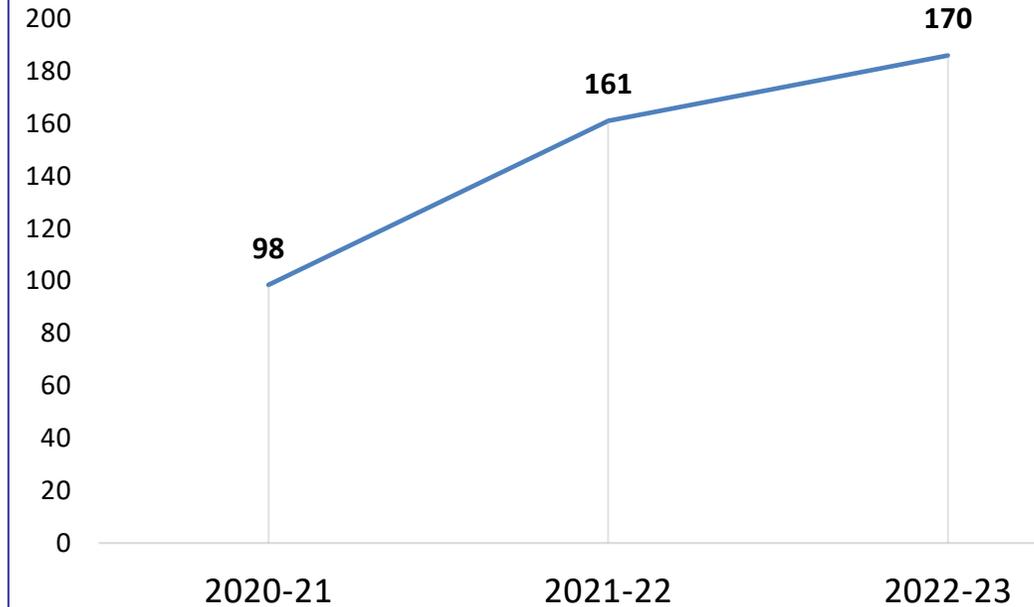| Year	No. of energy saving projects	Investment (INR Million)	Electrical Saving (Million kWh)	Savings (INR Million)	Impact on SEC
FY 2020-21	6	33.47	1.9	17.4	
FY 2021-22	3	58.6	1.5	13.8	SEC reduction of 6.2% realized.
FY 2022-23	3	96.5	2.25	22.1	SEC reduction of 30.4% realized.
Total	**12**	**188.57**	**5.65**	**53.3**	**-**

Advanced high efficiency VFD driven centrifugal chillers installed at T-1.

Belt driven AHUs were replaced by direct coupled plug fan at T-1.

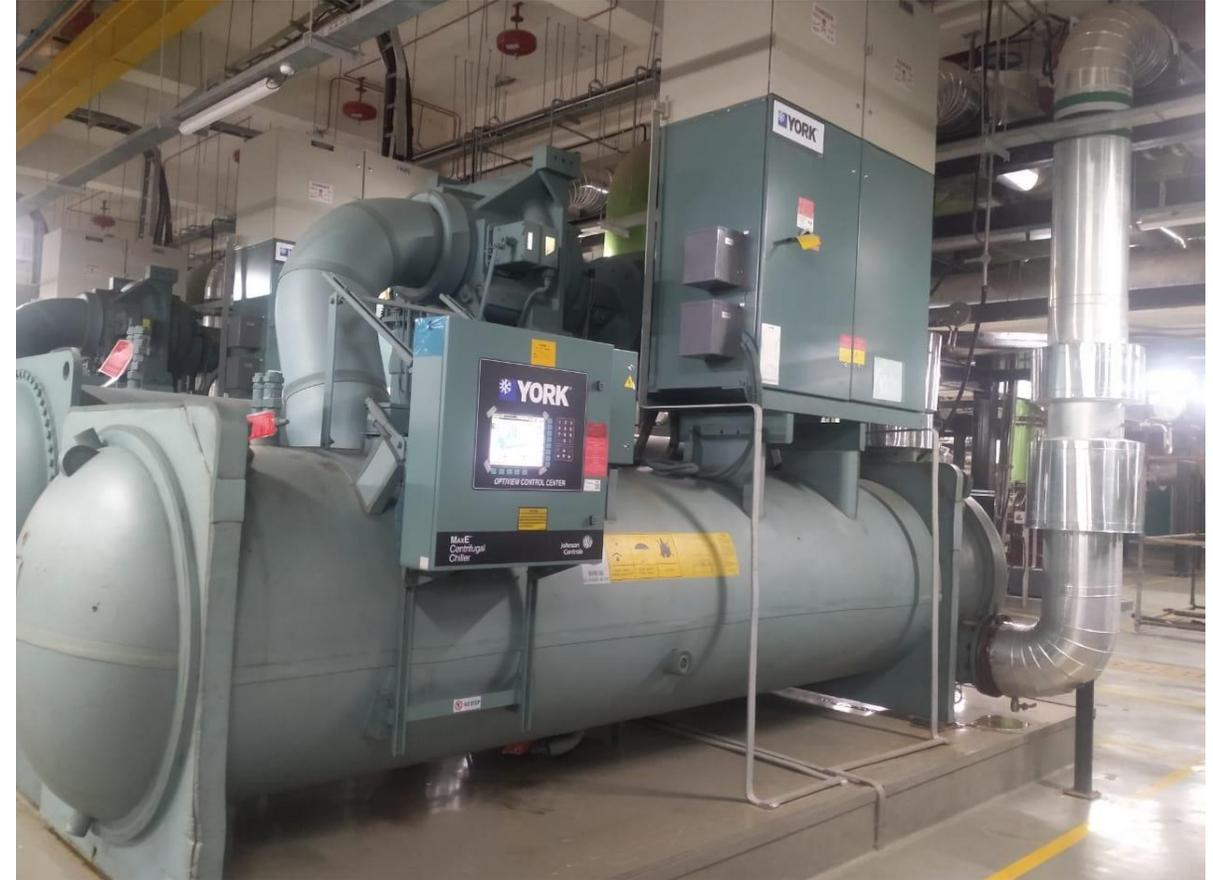100% LED replacement in IGIA

IOT system for apron area high mast & astronomical high mast for city side

High efficient modular UPS installation

Thermal coating over PBB roof to minimize losses.

Old Centrifugal Chillers

Energy Efficient VFD Operated Centrifugal Chillers

Belt Drive AHUs

AHU With Direct Coupled Plug Fan

Innovative Project (1/3)

Project Description: A long-term power purchase agreement (PPA) with a hydropower producing company for the supply of hydroelectricity to the airport until 2036

6% of the airport's electricity requirement is met from the onsite solar power plants and remaining 94% from the hydropower plant. Thus eliminating the dependency on non-renewable power.	This move will help Delhi Airport in the reduction of indirect energy emissions whopping 200,000 tonnes of CO_2 every year	Supports our target in achieving the ambitious goal of becoming a Net Zero Carbon Emission Airport by 2030.

The Voice of **Asia-Pacific** Airports

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Delhi Airport Switches to Renewable Sources for Its Energy Needs; Becomes India's First Airport to Run Entirely On Hydro And Solar Power

2022-06-22

Delhi Airport - India's busiest airport - has moved to green energy and uses only hydro and solar power for all its energy needs since June 1, 2022. With this, Delhi Airport becomes the first airport in India to run entirely on hydro and solar power.

This is a major step by the airport toward achieving the ambitious goal of becoming a Net Zero Carbon Emission Airport by 2030.

CATEGORY

Airport Development

Sustainability

ACI recognised the efforts towards adopting renewable sources and published an article for knowledge sharing,

Project Description: Airport operation power demand is dynamic in nature. It requires stringent monitoring, effective planning and predictive capability to manage and ensure continuity in supply of renewable energy source.

- To maximize the utilization on renewable energy, an in-house remote online platform was developed.
- The platform helps in tracking real time energy demand and share with internal team via whatsapp for proactive planning.
- Further, it has capability to forecast the energy demand which assist in planning and scheduling the renewable energy in grid as per forecasted requirement.
- This ensure that the supply of energy is constantly from renewable source.

Dynamic online dashboard for tracking power demand.

Tracking has helped in increasing the RE consumption from 49% to 100%

Project Description: Integrated cart system for baggage handling

- **New state of art Integrated Cart System (ICS)** for baggage handling has been **introduced in Terminal 1 of Delhi Airport as first of its kind in India.**

- The new baggage handling system will bring in uniformity to the baggage handling process and help enabling a more reliable operation at higher speed with better throughput.

- The new hi-tech system will **operate at a speed of 0.5 m/s to 5 m/s and sort up to 6,000 bags per hour**.

- This enhances the operational capacity of baggage handling system as compared with traditional system. ICS technologies can deliver **energy savings up to 60 percent compared to conventional belt technology.**

15% energy saving from conventional system

Renewable Energy

Currently running on 100% renewable energy

| FY 19-20 | FY 20-21 | FY 21-22 | FY 22-23 |

FY 19-20
- Off-RE 40%
- On-Re 4%
- GE 56%
- GE ■ On-Re ■ Off-RE

FY 20-21
- GE 9%
- On-Re 6%
- Off-RE 85%
- GE ■ On-Re ■ Off-RE

FY 21-22
- Off-RE 49%
- On-Re 4%
- GE 47%
- GE ■ On-Re ■ Off-RE

FY 22-23
- On-RE, 0%
- GE, 0%
- Off-RE, 100%
- 100% Renewable Energy
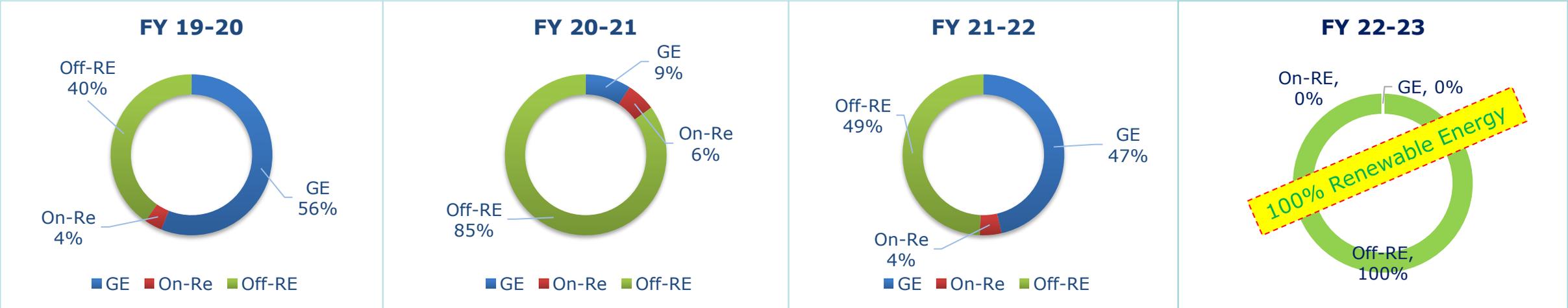
GE   = Grid Electricity
On-RE   = Onsite Renewable Energy
Off-RE = Offsite Renewable Energy

Thursday, Jul 21, 2022

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Delhi Airport Is India's First Airport To Run Solely On Hydro And Solar Power

Delhi has also secured the first position in 'Level 4+' under the Airports Council International's (ACI) Airport Carbon Accreditation program in the region of Asia-Pacific

MOST POPULAR

Madhya Pradesh

Humility | Entrepreneurship | Teamwork and Relationships | Deliver the Promise | Learning | Social Responsibility | Respect for Individual

18

Scope 1
- Fuel emission from vehicles
- Fuel emission from DG set
- Fuel emission from Fire drill
- Emission from Fire extinguishers
- Emission from refrigerants
- Emission from fire crackers in airside

Scope 2
- Emission from Electricity usage

Scope 3
- Airlines emission (LTO, APU, Ground run up)
- Aircraft full flight emission
- Ground handlers vehicles & equipment
- Passengers airport access
- Employee daily commute
- Employee business travel
- Security forces
- Electricity emission by concessionaires

SCOPE 1 AND SCOPE 2 EMISSION (TCO2)

	Scope 1	Scope 2
2020-21	1934	0
2021-22	5534	41132
2022-23	3159	37436

Specific GHG Emission (kgCO2/pax)

	Value
2020-21	0.40
2021-22	0.94
2022-23	0.77

Scope 3 Emission (tCO2)

	Scope 3
2020	421524
2021	530000
2022	850454
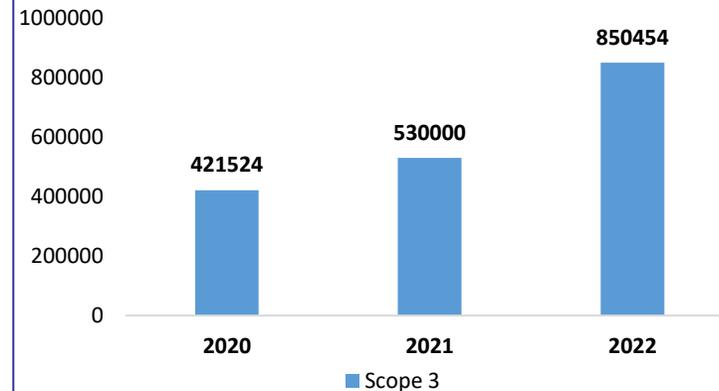
Specific emission, scope 3

	tCO2/ATM	Kg/Pax (scope 3)
	1718.57	14.99
	1833.88	13.88
	2043.87	14.30
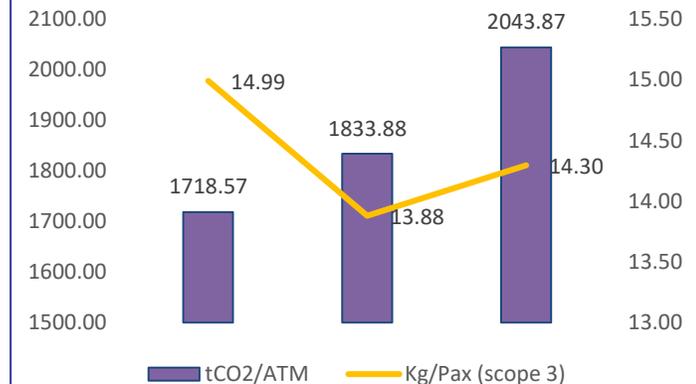
First Level 4+ Airport in Asia Pacific Since 2020

Only the Second Airport globally to achieve this Level

Level 4+ achievement demonstrates DIAL's emission reduction target in line the **IPCC 1.5°C pathways.**

Our Target

Achieve "net zero carbon emission Airport" by 2030 and Continue Level 4+ (Transition) Accreditation under ACI's Airport Carbon Accreditation program

Net Zero Carbon Emission Airport by 2030

Anticipated % Emission Reduction from Various Initiatives

- 5% Energy Conservation
- 10% Green Infrastructure
- 5% Improved Efficiency
- 2% Water Conservation
- 75% Renewable Energy
- 1% Green Transportation
- 3% Removal requirements
- 100% Total emission

Humility | Entrepreneurship | Teamwork and Relationships | Deliver the Promise | Learning | Social Responsibility | Respect for Individual

20

9
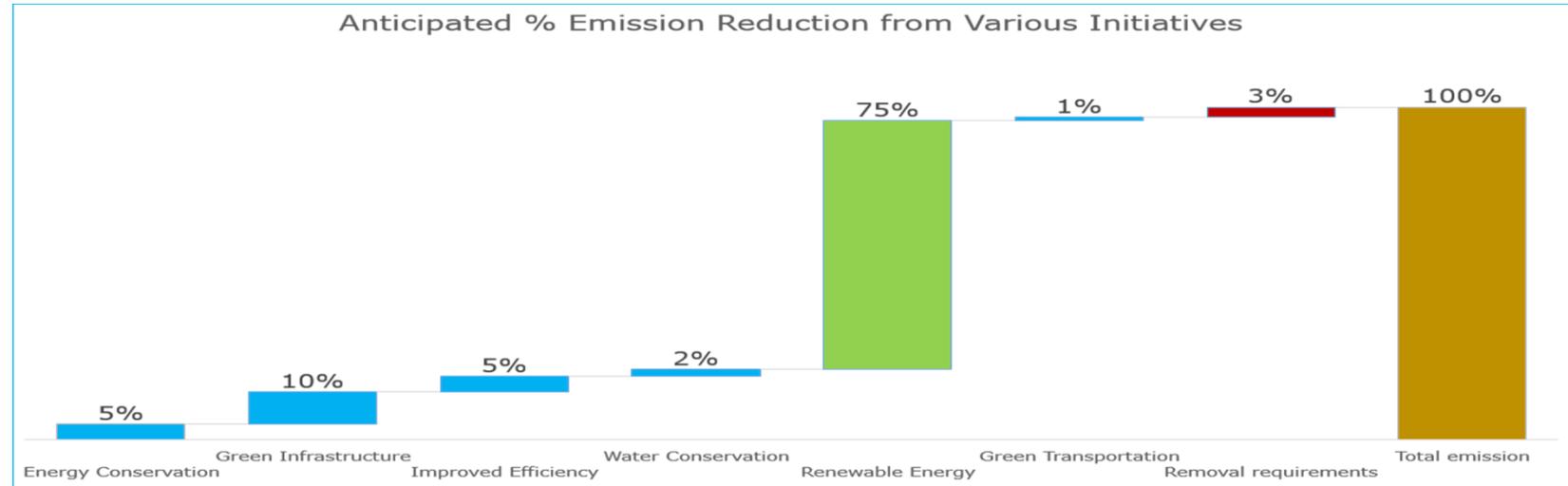
ISO 50001:2018

ISO 14001:2015

ISO 14064:2006
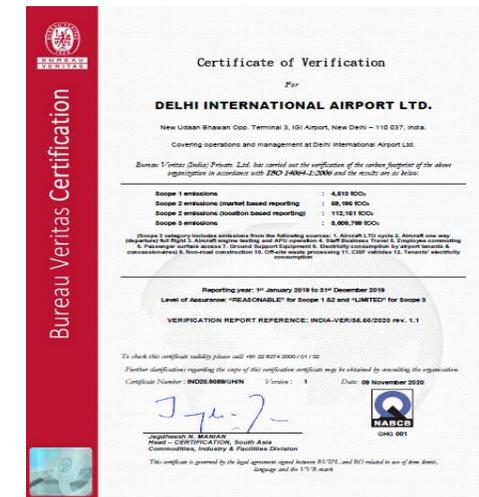
Level 4+ under ACI's ACA

IGBC Platinum

GreenCo Platinum
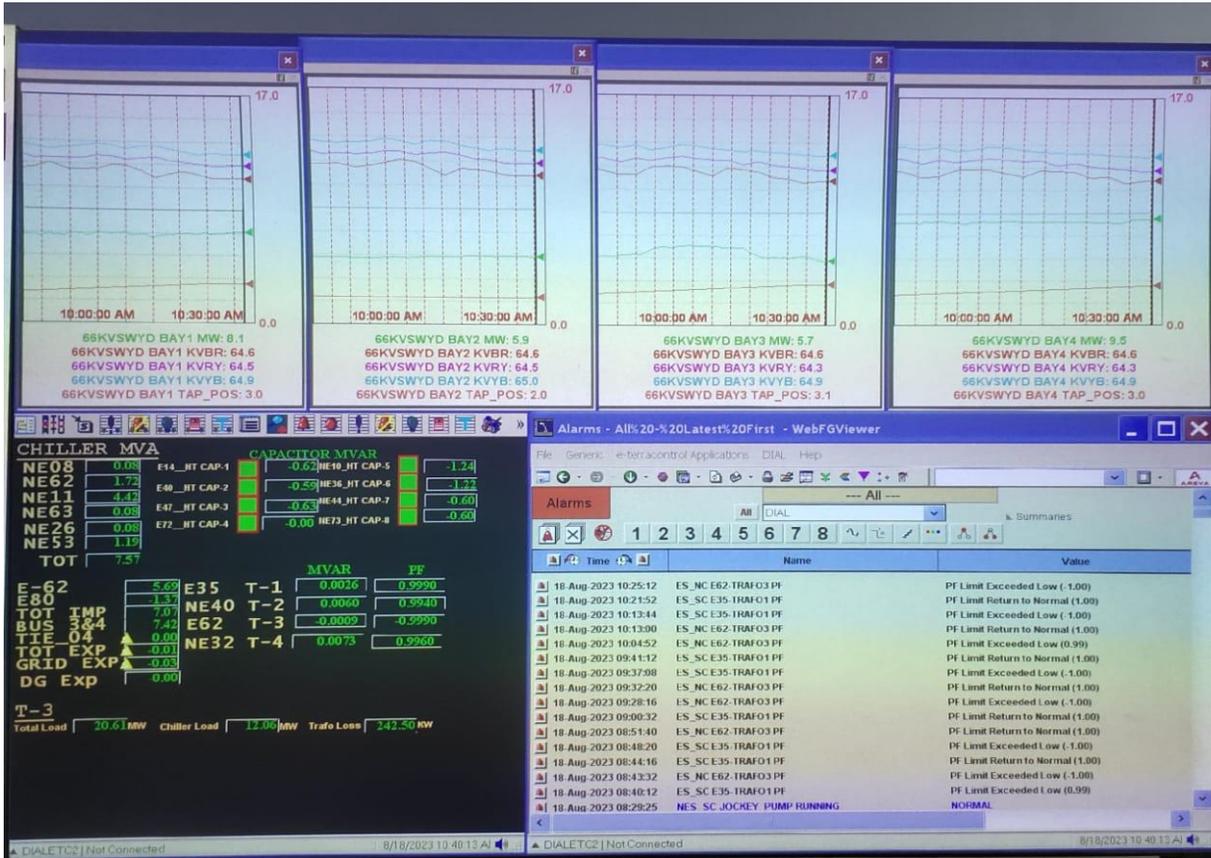
8	Implementation of APOC	% completion	15%	NA	100%
7	Timely completion of Capex Projects	% completion	20%	NA	CF by Q2 and New by Q3
6	Stakeholder Engagement a. C-SAT Survey b. Vendor Satisfaction Survey	a & b. Score	10% (5%+5%)	4.38 3.9	4.48 4.2
5	Talent Review a. Retention of critical talent- 5 positions b. Succession planning upto AGM c. Employee Engagement Score	a & b. % c. Score	5%	95% / 100%/ 89	95% / 100%/ 85
4	Advanced Technology Deployment to improve operational efficiency	No. of schemes deployed on time	10%	5	7
3	Servicability & Availability of Engineering Equipment and Infrastructure	%	15%	>99%	>99.5%
2	Passenger Experience- Interventions	No. of initiatives deployed on time	15%	3	10
1	Control on Operating Expense	INR Cr	10%	281.35	306.73

Energy Performance Review

Continuous Monitoring	→	Daily Report Generation	→	Weekly review by CPEO	→	Monthly Review by CEO	→	Six Monthly Review by Board of Directors

Initiatives of Delhi Airport was demonstrated in COP 26 by ACI

ACI — The Voice of **Asia-Pacific** Airports

ASIA-PACIFIC AIRPORTS COUNCIL INTERNATIONAL

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Announcement At COP26: Delhi's IGI Airport to Become 'Net Zero Carbon Emission Airport' By 2030

2021-11-24

Delhi's Indira Gandhi International Airport (IGIA), operated by Delhi International Airport Limited (DIAL) - a GMR-led consortium, is set to become Net Zero Carbon Emission Airport by 2030, much ahead of the IPCC's 2050 target adopted by all major industries all over the world. Mr. Videh Kumar Jaipuriar, CEO-DIAL announced this in a video message displayed by Airport Council International (ACI) in an event during COP26, titled, "**Delivering the Net Zero Airport of the Future**".

CATEGORY

Sustainability

Net Zero Airport Plan

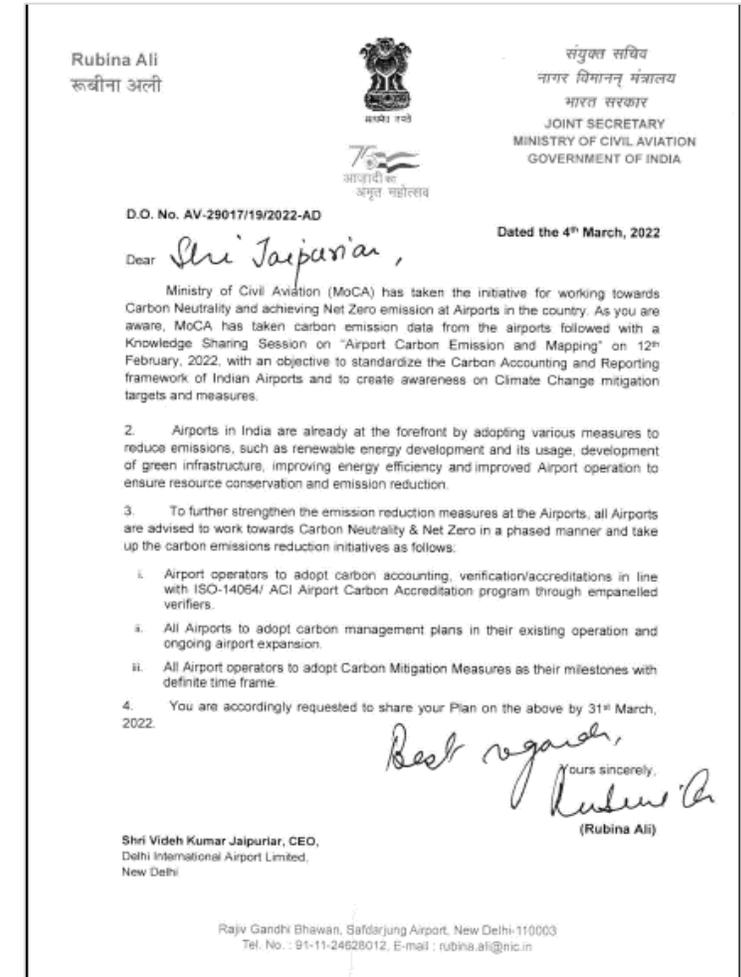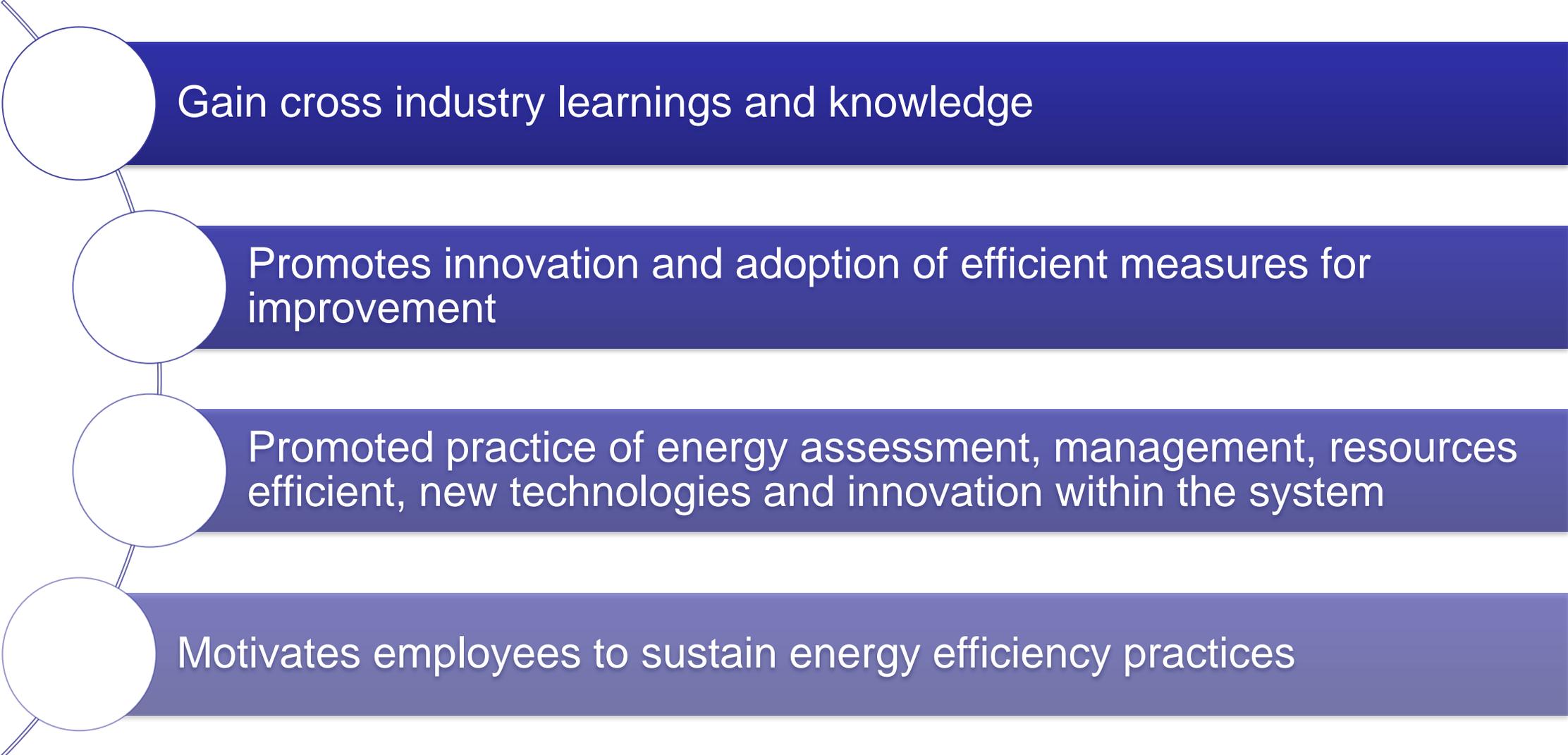|	
Energy Conservation & Efficiency	Continuous focus on conservation & efficiency Life cycle cost approach DIAL is ISO 50001 certified
Develop Green Infrastructures	Terminal 1 renovation has achieved **LEED Platinum Pre-certification** DIAL has developed **green building policy and framework for IGI Airport**
Use of renewable energy	DIAL is currently running on **100% RE** Onsite solar provides 6% RE and remaining comes from offsite hydro power plant
Operational Excellence	Focusing on **Airport Collaborative Decision Making (A-CDM)** Regularly monitoring **Runway Occupancy Time (ROT)**
Airlines Programs	Adding **22 Bridge Mounted Equipment (BME)** in addition to the existing 78 BMEs DIAL is the first **Airport globally to deploy commercial operation of TaxiBots** DIAL is now working on **Sustainable Aviation Fuel (SAF)**
Low Carbon Transport	DIAL is in the process of acquiring services of **65 EVs,** **10 charging stations** are already installed DIAL has installed **IoT devices on ground vehicles** to optimize fuel consumptions
Increased Sink	**Close to 6000 trees planted** since June 2020 in Airport premises. DIAL is in consultation with Govt. agencies to do plantation outside airport premises.

MoCA is working towards making Indian Airports achieve **carbon neutrality and net zero targets** and issued communication to all Airports i.e.

- *Airport operators to adopt carbon accounting, verification/accreditations in line with ISO-14064/ ACI Airport Carbon Accreditation program through empaneled verifiers.*
- *All airports to adopt carbon management plans in their existing operation and ongoing expansion project.*
- *All Airport operators to adopt Carbon Mitigation measures as their mile stones with definite timeframe.*

DIAL complied with all the requirements.

DIAL conduced **multiple knowledge sharing workshops with MoCA** and helping in developing Comprehensive Airport emission Inventory & Accreditations.

Rubina Ali
रूबीना अली

संयुक्त सचिव
नागर विमानन मंत्रालय
भारत सरकार
JOINT SECRETARY
MINISTRY OF CIVIL AVIATION
GOVERNMENT OF INDIA

D.O. No. AV-29017/19/2022-AD

Dated the 4th March, 2022

Dear Shri Jaipuriar,

Ministry of Civil Aviation (MoCA) has taken the initiative for working towards Carbon Neutrality and achieving Net Zero emission at Airports in the country. As you are aware, MoCA has taken carbon emission data from the airports followed with a Knowledge Sharing Session on "Airport Carbon Emission and Mapping" on 12th February, 2022, with an objective to standardize the Carbon Accounting and Reporting framework of Indian Airports and to create awareness on Climate Change mitigation targets and measures.

2. Airports in India are already at the forefront by adopting various measures to reduce emissions, such as renewable energy development and its usage, development of green infrastructure, improving energy efficiency and improved Airport operation to ensure resource conservation and emission reduction.

3. To further strengthen the emission reduction measures at the Airports, all Airports are advised to work towards Carbon Neutrality & Net Zero in a phased manner and take up the carbon emissions reduction initiatives as follows:

i. Airport operators to adopt carbon accounting, verification/accreditations in line with ISO-14064/ ACI Airport Carbon Accreditation program through empanelled verifiers.

ii. All Airports to adopt carbon management plans in their existing operation and ongoing airport expansion.

iii. All Airport operators to adopt Carbon Mitigation Measures as their milestones with definite time frame.

4. You are accordingly requested to share your Plan on the above by 31st March, 2022.

Best regards,
Yours sincerely,

(Rubina Ali)

Shri Videh Kumar Jaipuriar, CEO,
Delhi International Airport Limited,
New Delhi

Rajiv Gandhi Bhawan, Safdarjung Airport, New Delhi-110003
Tel. No. : 91-11-24628012, E-mail : rubina.ali@nic.in

Gain cross industry learnings and knowledge

Promotes innovation and adoption of efficient measures for improvement

Promoted practice of energy assessment, management, resources efficient, new technologies and innovation within the system

Motivates employees to sustain energy efficiency practices

Thank you