Energy Excellence Journey of Delhi International Airport Limited (DIAL)

2022

Delhi International Airport Limited (DIAL)

DELHI INDIRA GANDHI INTERNATIONAL AIRPORT | GMR

Presenters

Rekib Ahmed,
Manager, Sustainability

Vipin Purohit,
AGM (Specialist), Mechanical

Atul Kumar Singh,
AGM (Specialist), Electrical

Best Airport in India and Central Asia for the third consecutive year in Skytrax World Airport Awards- 2022

Best Airport by Size and Region (over 40 MPPA) in Asia Pacific under ACI ASQ for 2021

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

Running on 100% Renewable Energy

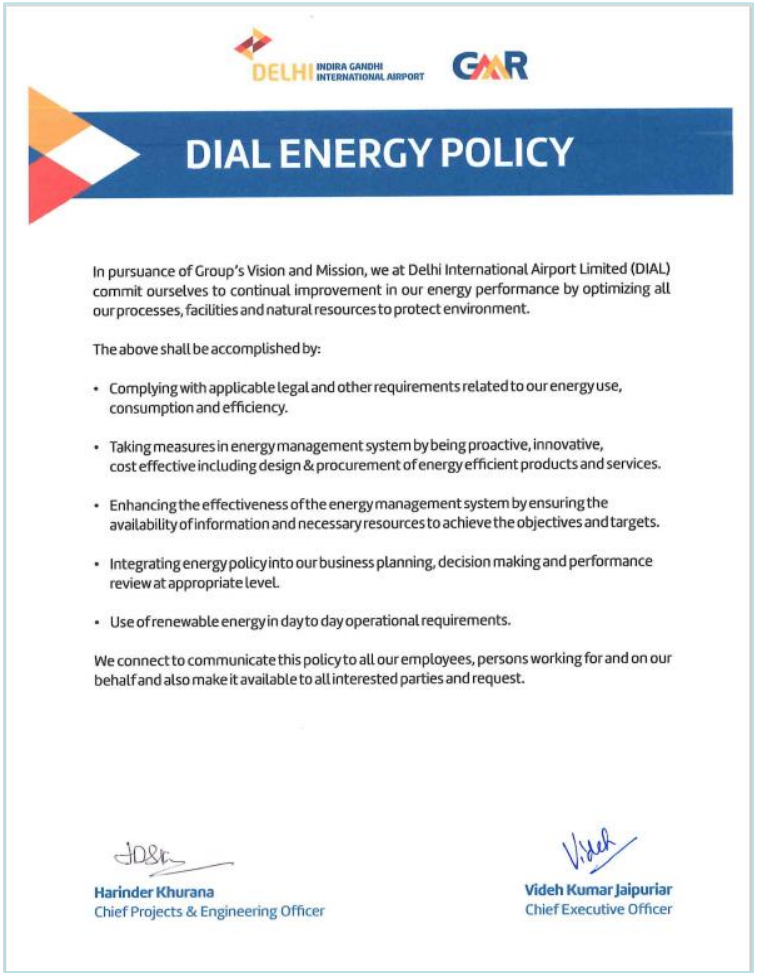
Working towards achieving "Net Zero" by 2030

Energy Management System (ISO 50001:2018)

Energy Excellence Way

- **Formation of Energy Management Cell**
- Energy budget, Energy review, Equipment Performance control Plan & Calibration
- **Green Procurement Policies**
- **Benchmarking/Baseline Setting**
- Deviation & Incident, Corrective Actions & Preventive Actions (CAPA)
- Audit & Review up to Top Management
- **Training & Stakeholder Engagement**

Energy Policy



DELHI INDIRA GANDHI INTERNATIONAL AIRPORT GMR

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 Limited
New Udaan Bhawan, Terminal 3,
Opp. ATS Complex, International Terminal
IGI Airport
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:
Chris Cheung, Head of Compliance & Risk - Asia Pacific

Original Registration Date: 2011-09-05
Latest Revision Date: 2020-12-19
Effective Date: 2020-09-01
Expiry Date: 2023-08-31

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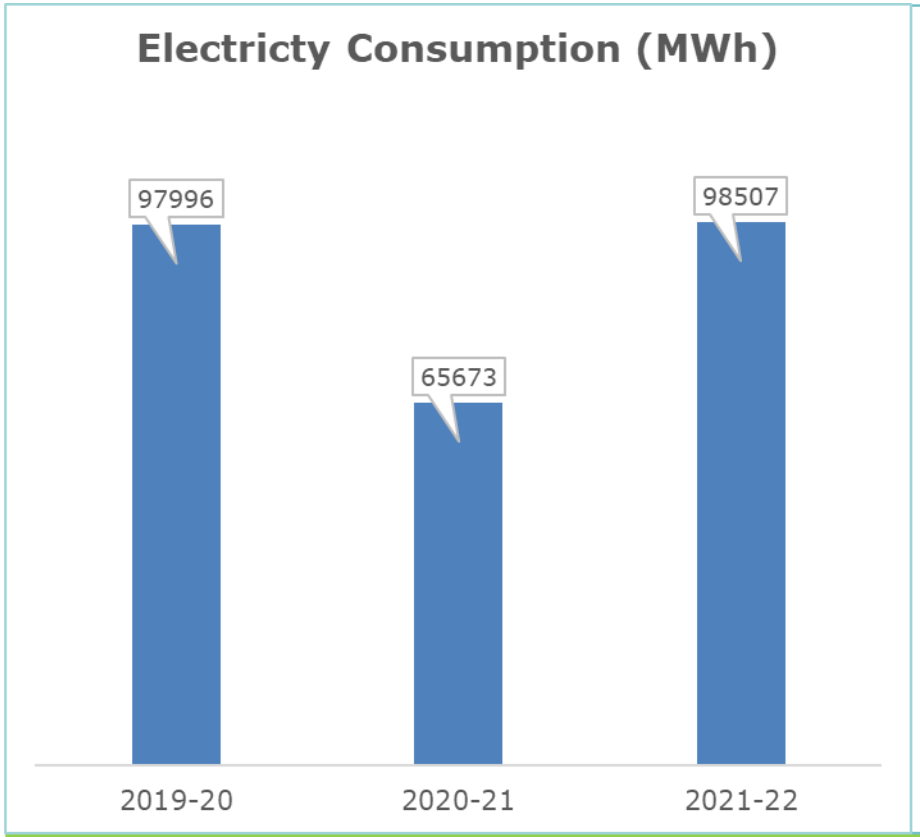
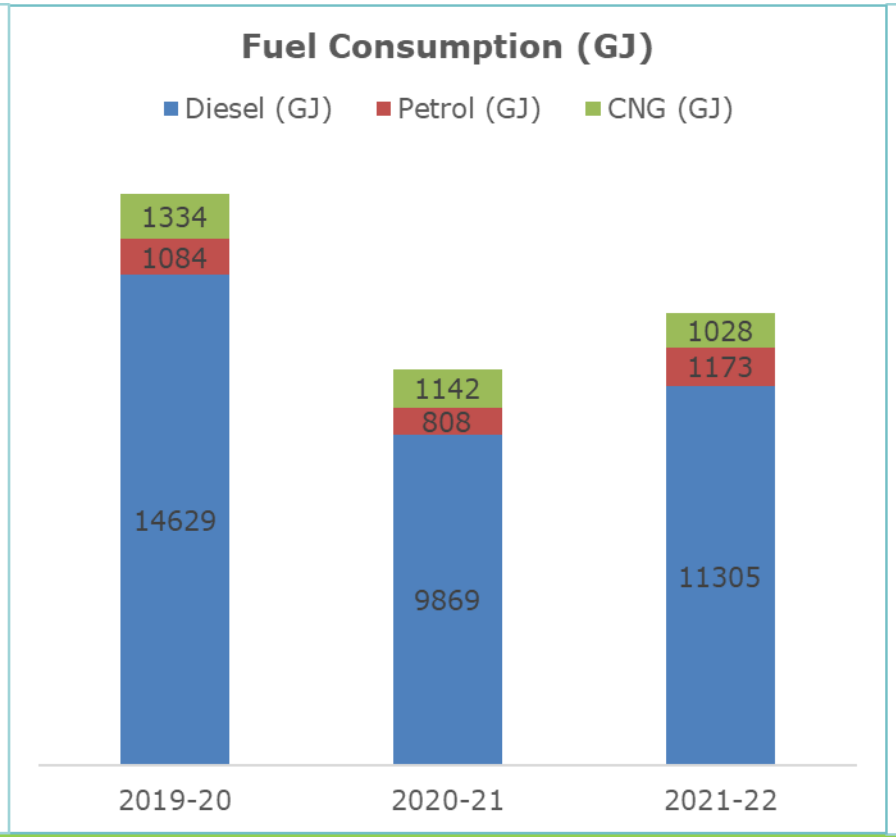
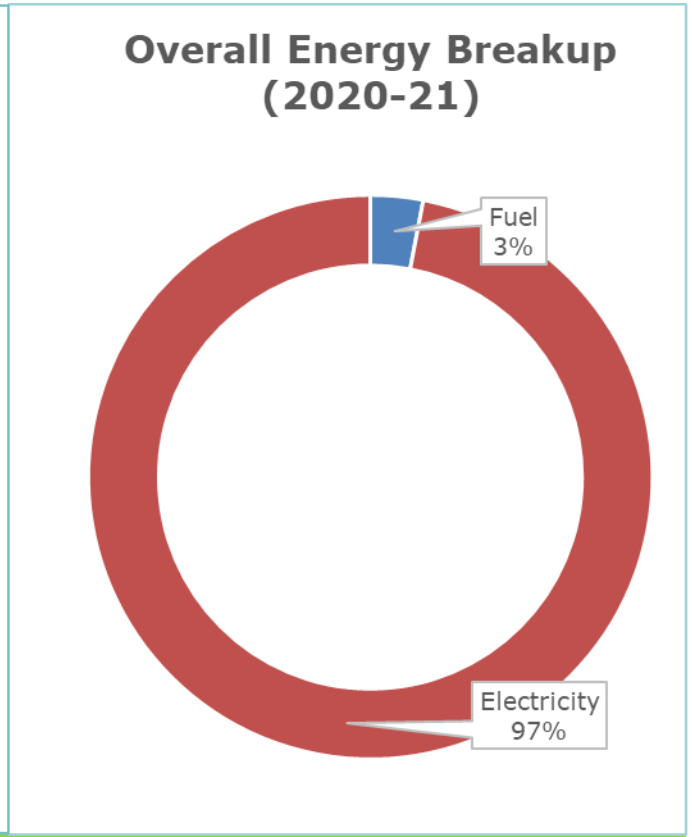
...making excellence a habit.™

2 Energy Consumption (Electricity & Fuel)







What changed during the last 3 years ?

- ↗ Electricity consumption increased by 0.52%
- ↗ Overall fuel consumption decreased by 21%

There is no thermal energy use in the Airport

Architectural Feature of Terminal 3

LEED India NC Gold (2011)

IGBC EB Platinum (2016)

LEED O&M Platinum via Arc (2018)

16% more efficient than the baseline building

- 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

- Roof insulation R value = 4.09 sqmK/W
- Lighting Control and Monitoring System
- Water cooled centrifugal chiller with a full load efficiency of 0.665 Kw/Ton (a COP of 5.4 at ARI conditions)
- Cooling tower with VFD
- A Variable Air Volume (VAV) system with 4 inches of static Fan

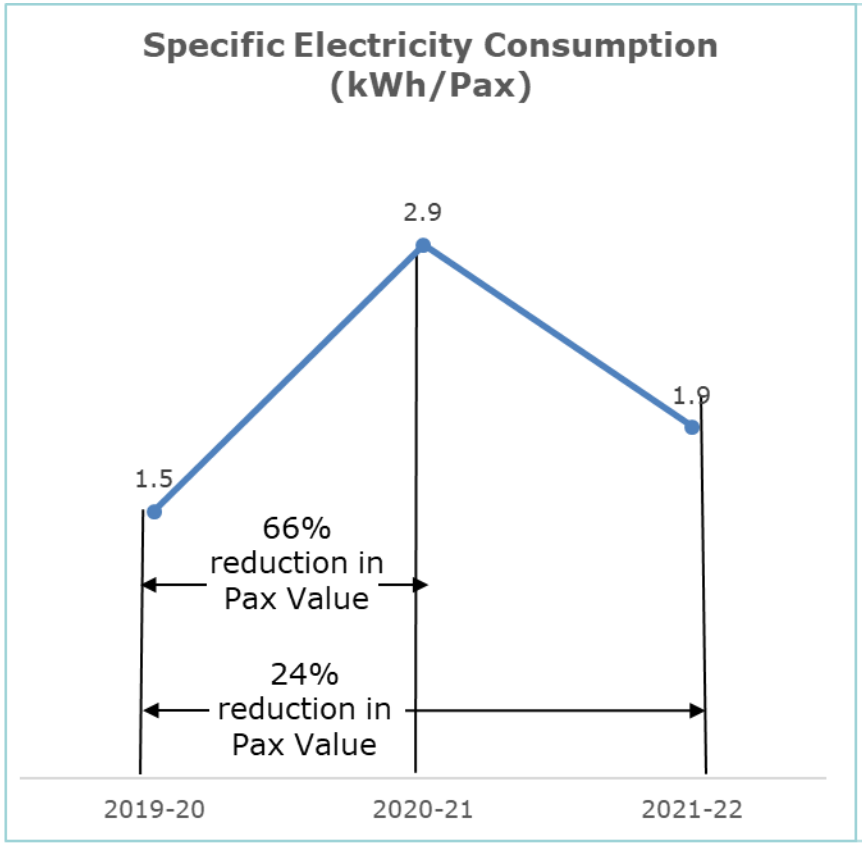
Terminal 1 Green Building Pre Certification- LEED Platinum

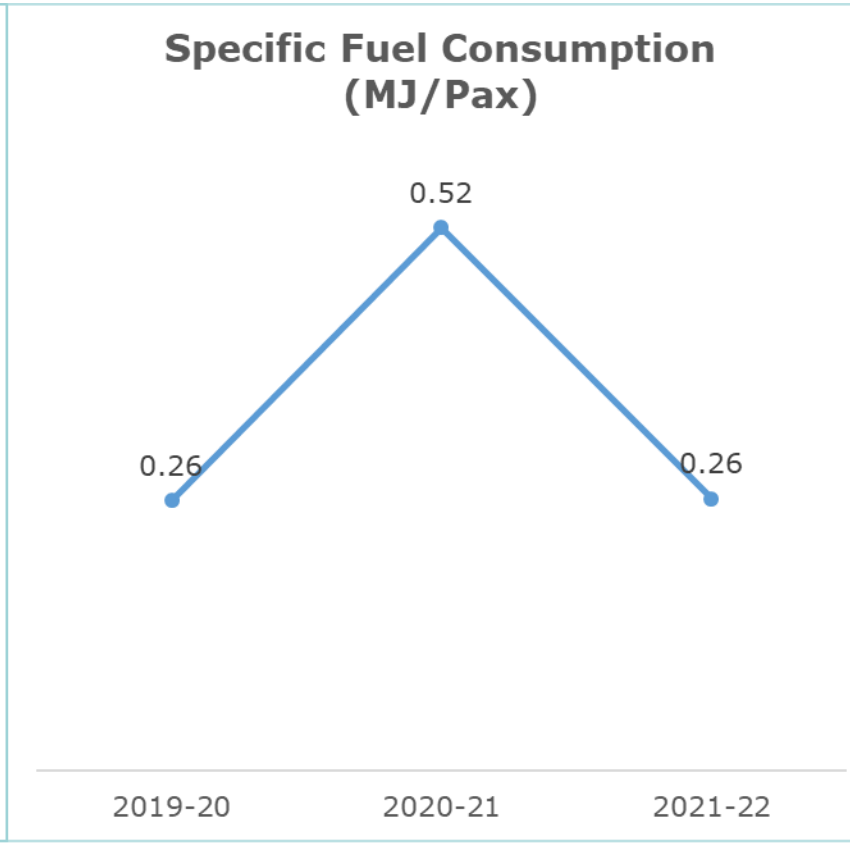
- Terminal 1 has received **Leadership in Energy and Environmental Design (LEED) Platinum Level Pre-certification** from USGBC/GBCI.
- The project has achieved **80 points out of 110 on the LEED Version 4.0 Standard.**
- Out of 9 LEED categories, we got 100% in 4 categories of Integrative Process, Water Efficiency, Innovation & Regional Priorities.

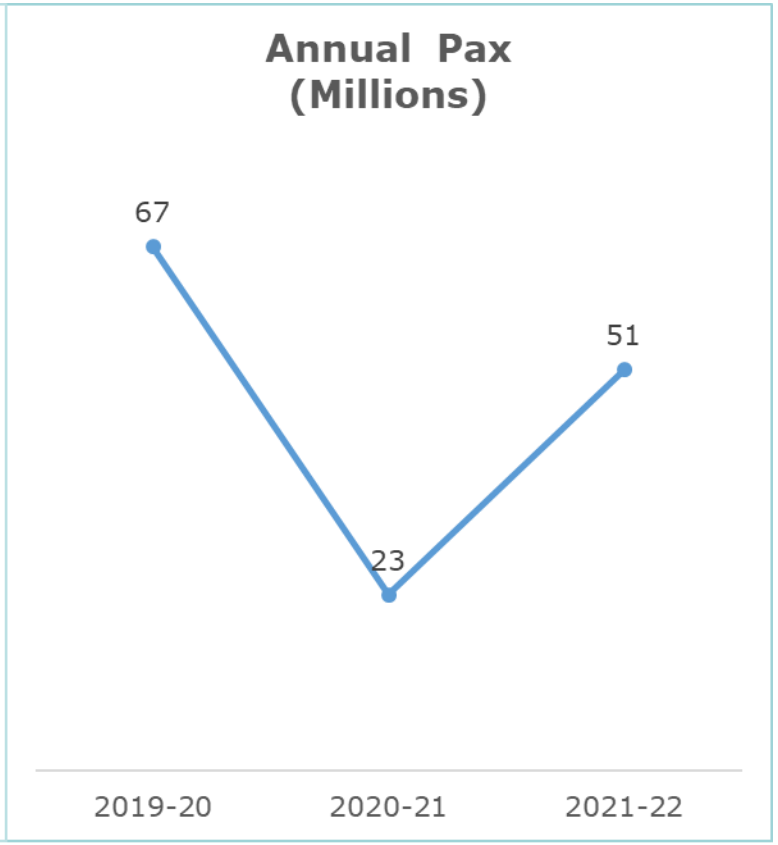
13% more efficient than a baseline building

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%

Sp. Energy Consumption (Fuel & Electricity)



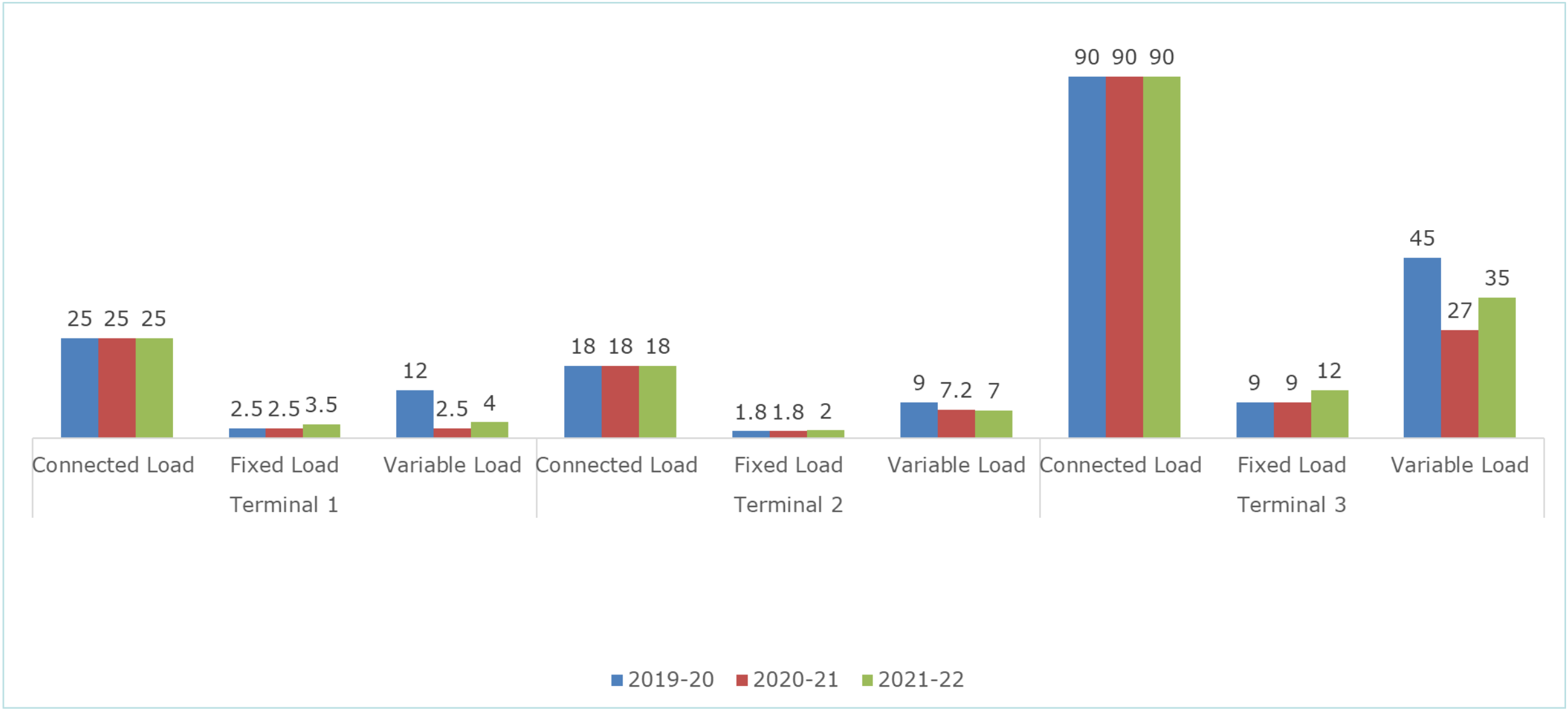




What changed during the last 3 years ?

- ↗ Specific electricity consumption (kWh/pax) has increased by 32% (kWh/Pax)
- ↗ Reduction in passenger throughput is 24% in 2021-22 as compared to 2019-20

Connected Load (MW) Vs Variable load (MW)



National & Global Benchmark

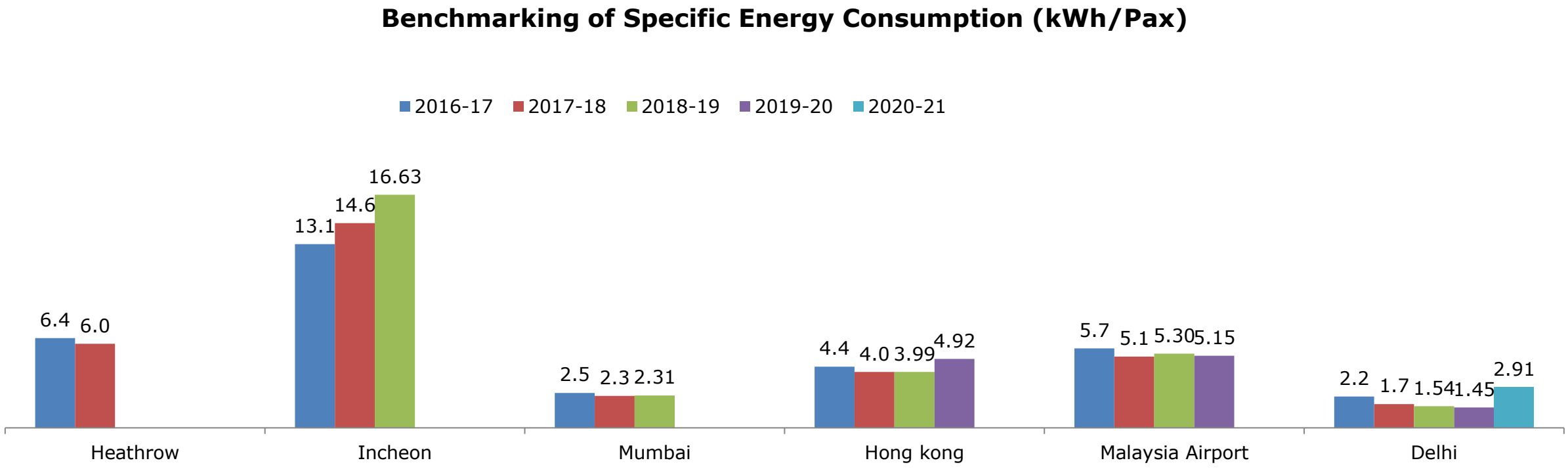


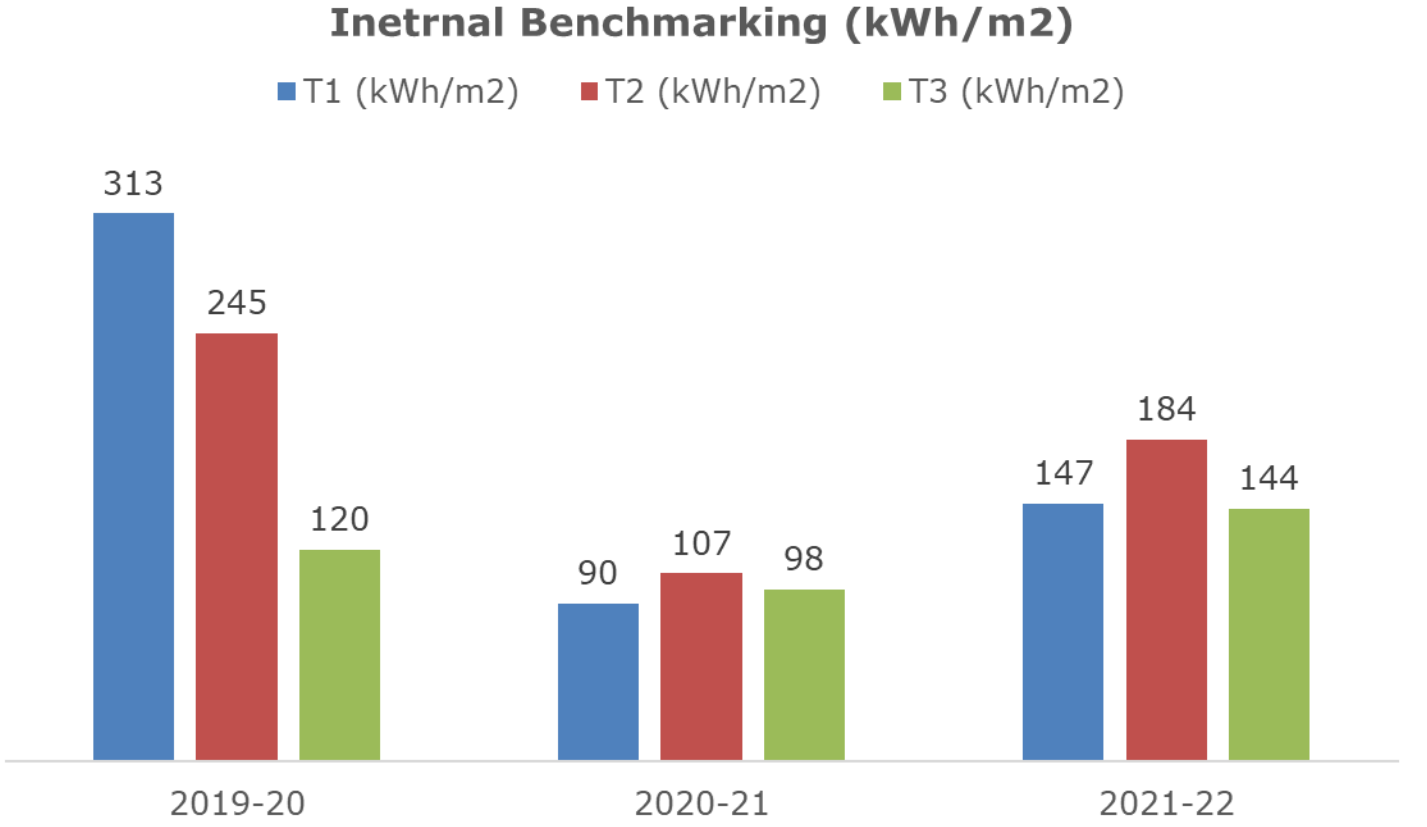
Table 3. Parameters that determine terminal building energy consumption.

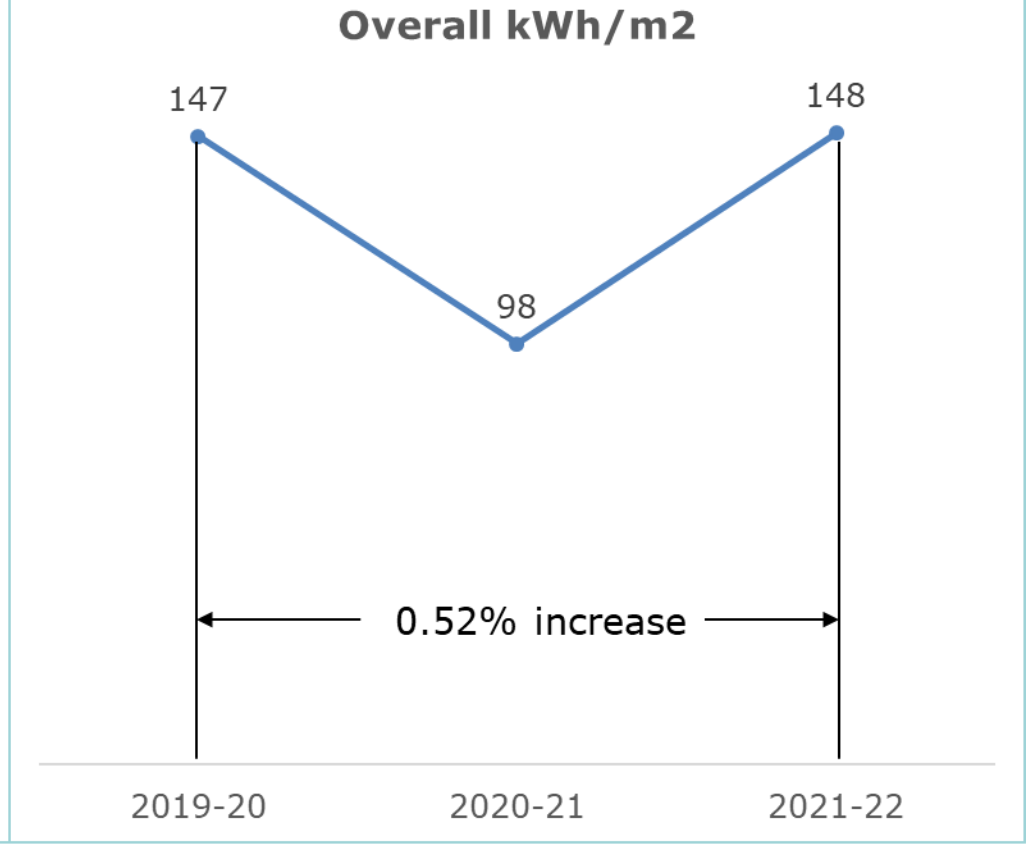
Building Characteristics	Climate	Comfort	Building Services
Shape factor Compactness Transparent surface Orientation Building materials Passive systems	Temperature Solar radiation Wind Pluviometry Humidity	Thermal comfort Visual comfort Indoor air quality	Operation hours Energy management (BEMS) Occupants'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

BEMS, building energy management systems.

Source: Energy Research in Airports: A Review
https://www.researchgate.net/publication/302776327_Energy_Research_in_Airports_A_Review

Internal Benchmark





- Different Utilization has led to different kWh/m2 of the buildings
- Average kWh/m2 has increased by 0.52%

5 Energy Saving Project Implemented in Last 3 Years

Year	No. of energy saving projects	Investment (INR Million)	Electrical Saving (Million kWh)	Savings (INR Million)	Impact on SEC
FY 2019-20	4	160	7.8	72.1	SEC reduction of 5.84% realized.
FY 2020-21	6	33.47	1.9	17.4	-
FY 2021-22	3	58.6	8.3	13.8	-

Innovative Project

Project Description: Solar radiation reflective coating over glasses and roof of Passenger Boarding Bridges (78 nos.) at T-3 to minimized solar heat gain.

Before

After

Highlight of Solar radiation control Film & Coating over roof

- 3439 sqm of Sun control Film installed on Passenger Boarding Bridges at Terminal 3
- Sun control Film ensure total solar energy rejection up to 49% .
- Thermal coating of approx. 4302 Sq. M of area done on PBB Rooftop.
- Thermal coating provide good insulation properties by reducing temperature up to 6 degree.
- Thermal coating installed has various features such as UV resistance ,Corrosion Resistance , water proof , moisture resistance.

6

Innovative Project

Project Description: Solar radiation reflective coating over glasses and roof of Passenger Boarding Bridges (78 nos.) at T-3 to minimized solar heat gain.

Cost- Thermal coating 54 lakh, Sun film 53 lakh

Rational of the project:

- Thermal coating of approx. 4302 Sq. M of area done on PBB Rooftop.
- Screen over glasses of approx. 3440 Sq. M of area done.

Capital Cost: INR 107 lakh

Annual savings: INR 19.1 lakh

Innovative Project

Installation of IOT device on vehicles

DIAL has started installing internet-of-things (IoT) devices on its vehicles used at Indira Gandhi International Airport.

DIAL will install IoT devices in a phased manner on all its vehicles by the end of this month, its statement noted.

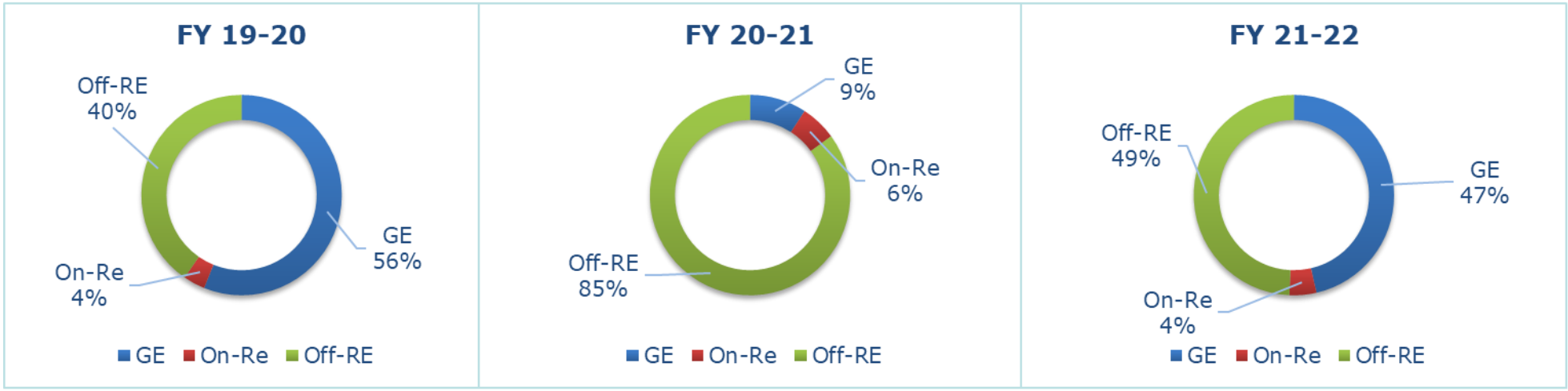
Benefits

- save fuel,
- Reduce emissions
- enhance safety,
- track their locations and
- schedule their maintenance,

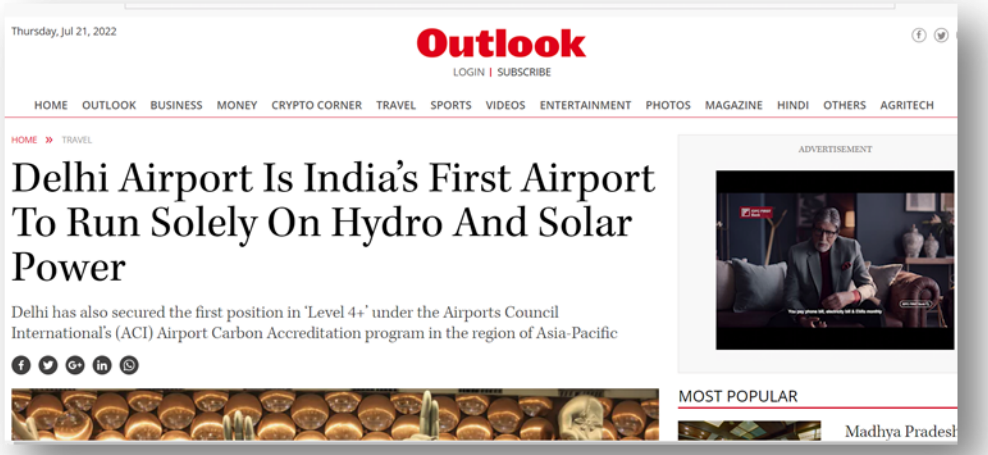
- These devices help in saving 23% fuel in the utility vehicles
- Total number of vehicles to be covered is 1500

Renewable Energy

Currently running on 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

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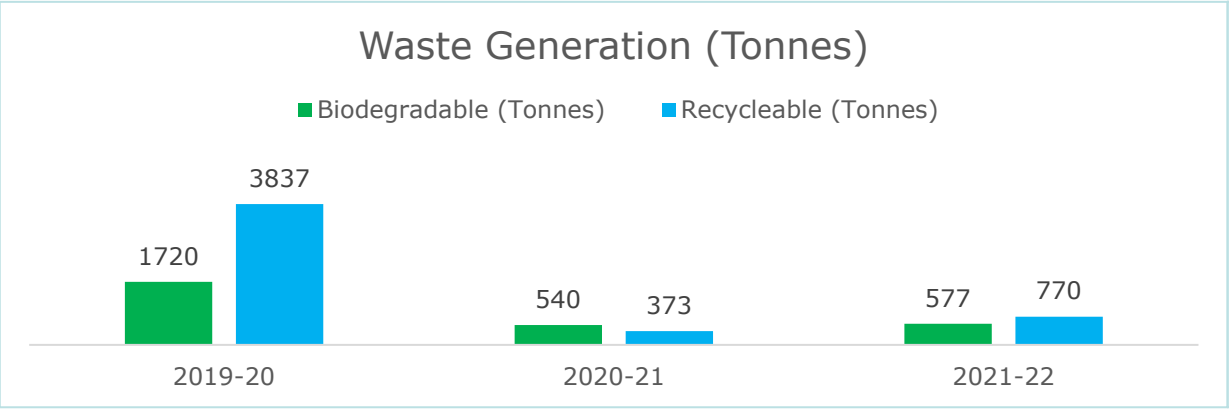
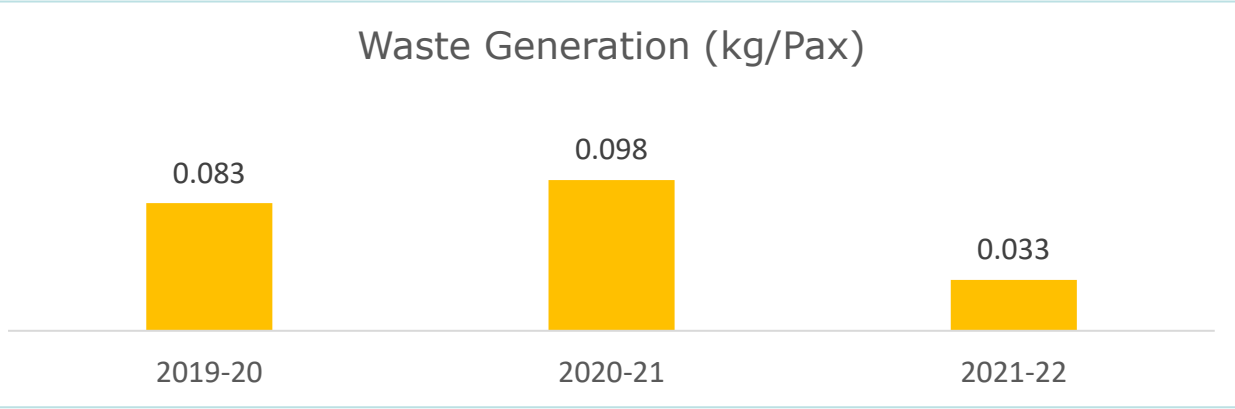
Waste Management





- Overall waste generation decreased by 76%
- Specific waste generation decreased by 60%

- 15 TPD Solid Waste Management Facility under implementation at IGIA with provision of **biogas generation and grass palletization**.
- **The completion timeline is Nov, 2022**

MRF under construction

Bio digester under construction

Biogas plant components

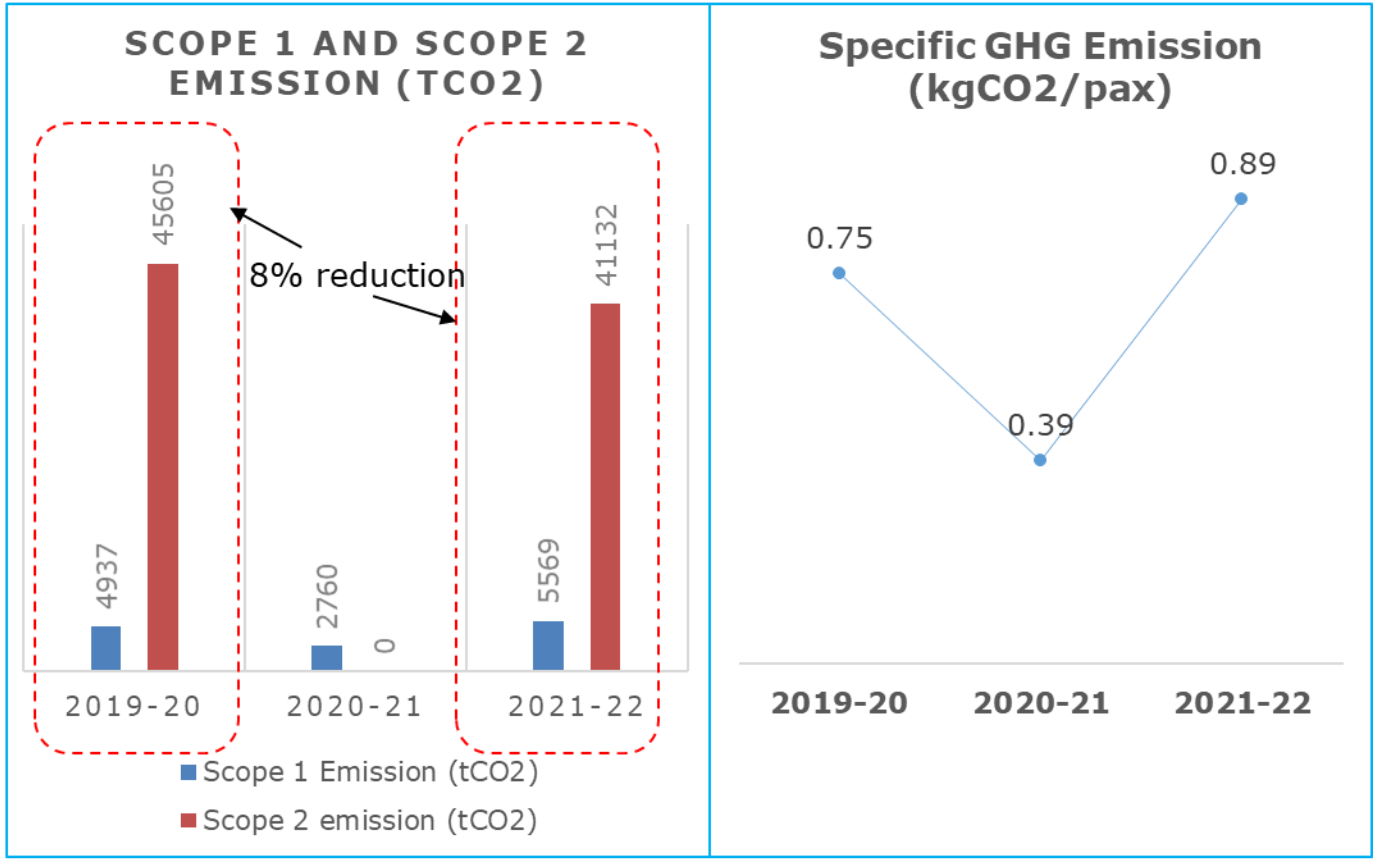
GHG Emission Data (Scope 1& 2)

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



What changed in 3 years ?

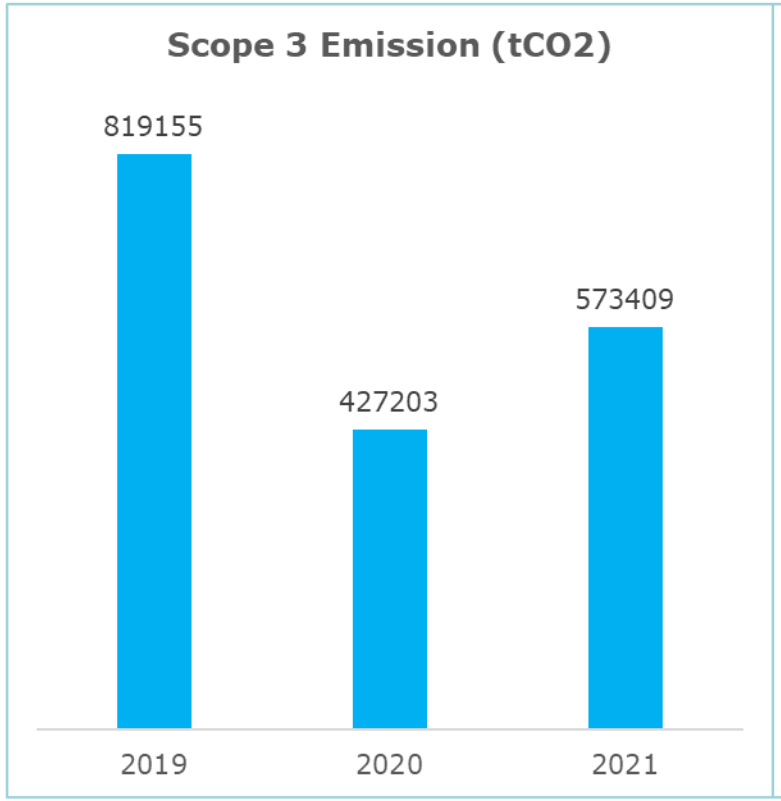
8% reduction in absolute GHG emission
24% drop in passenger numbers

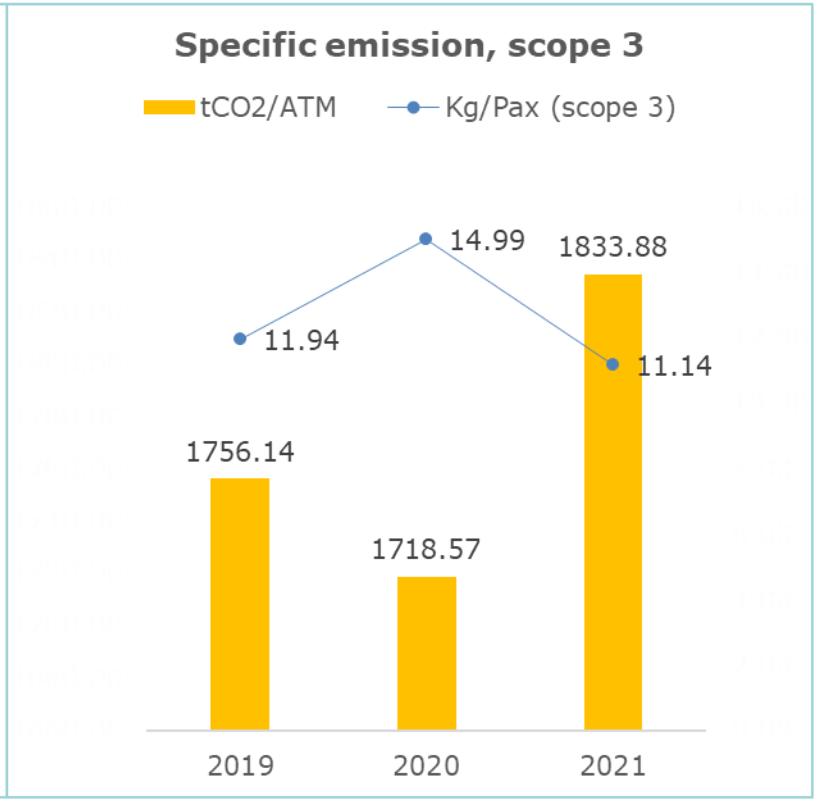
19% increase in Specific GHG emission, where as passenger dropped by 24% during this period

GHG Emission Data (Scope 3)

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





What changed in 3 years ?

30% decrease in absolute scope 3 emission
As Airports are still recovering from Covid impact, hence there was lower Pax & ATM and overall scope 3 emission was less

7% decrease in kgCO2/Pax
4% increase in kgCO2/ATM

Asia Pacific's first Level 4+ Certified Airport

First Level 4+ Airport in Asia Pacific, 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.**


CERTIFICATE
of ACCREDITATION

airport carbon accredited
TRANSITION

14 Nov 2020 - 3 July 2024

This is to certify that *Airport Carbon Accreditation*, under the administration of WSP, confirms that the carbon management processes at

INDIRA GANDHI INTL AIRPORT

implemented by Delhi International Airport Ltd

have earned the accreditation level of TRANSITION, in recognition of the airport's exceptional work in aligning its carbon management with global climate goals to reach absolute emissions reductions, establishing related partnerships with its business partners and compensating responsibly the residual CO_2 emissions under its control, as part of the Global airport industry's response to the challenge of Climate Change.

airport carbon accreditation
www.airportCO2.org

Stefano Baronci
Director General
ACI Asia-Pacific

Simon Clouston
Director
WSP

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

- Energy Conservation & Efficiency
- Develop Green Infrastructures
- Use of renewable energy
- Operational Excellence
- Airlines Programs
- Low Carbon Transport
- Increased Sink
- GHG Management & ACA

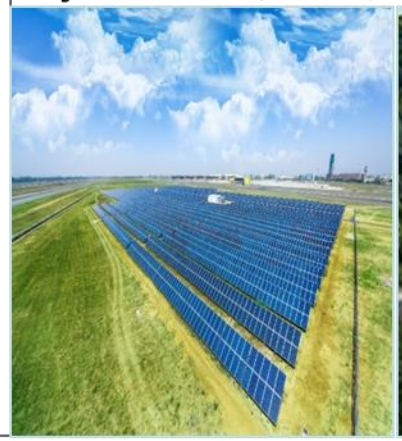
Update on Net Zero Airport Plan

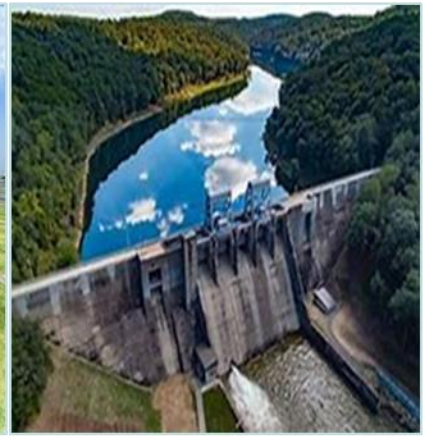
Energy Conservation & Efficiency	Continuous focus on conservation & efficiency through System based approach, Life cycle cost approach, DIAL is ISO 50001 certified
Develop Green Infrastructures	Terminal 1 renovation has achieved, LEED Platinum Pre-certification DIAL has developed green building policy 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 62 EVs, order is already placed with OEMs DIAL has installed IoT devices on ground vehicles to optimize fuel consumptions
Increased Sink	Close to 6000 trees planed since June 2020 in Airport premises. DIAL is in consultation with Govt. agencies to do plantation outside airport premises.
GHG Management & ACA	DIAL continues to retain its Level 4+ accreditation Working with ACI on various initiatives related to decarbonization

Key Emission Reduction Projects

Green Energy (Onsite & Offsite)

7.84 MW Solar PV (onsite) & PPA with Hydro Plant (offsite)





TaxiBot Operation

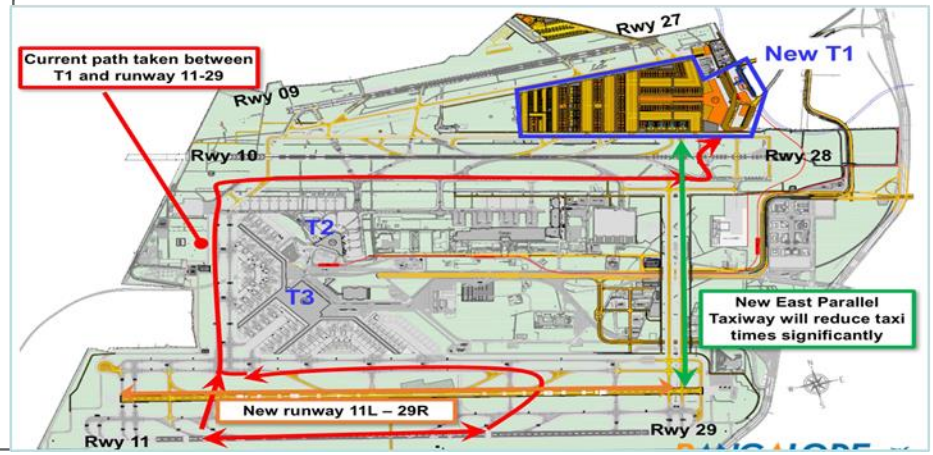
Approx 469 t of ATF and ~1482 tCO2 reduced

Sustainable Aviation Fuel

MoU signed for SAF Study

Eastern Cross Taxiway

~55000 tCO2 will be reduced annually

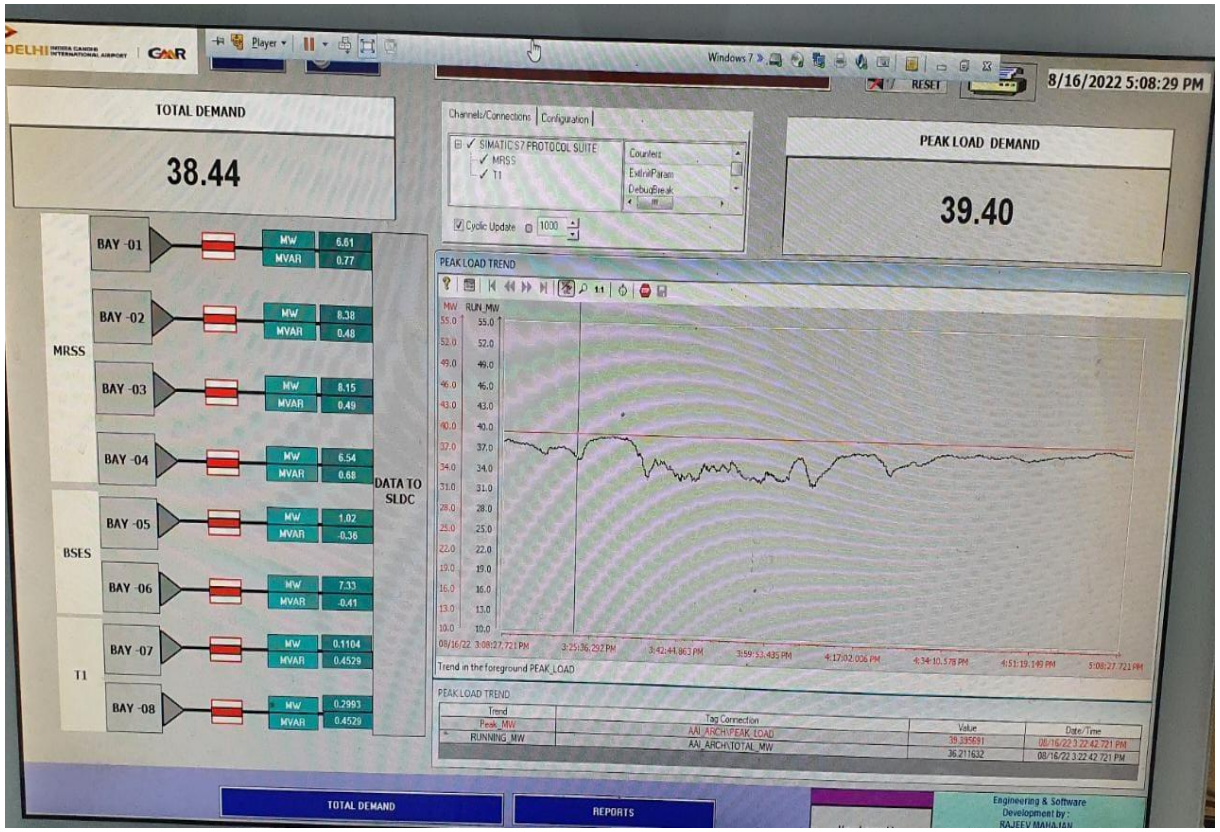


Terminal 1 Redevelopment

Targeting for LEED Platinum (Platinum Pre-Certification received)

Description	Area in m²
LEED Area	214325
Roof Area	102007
Landscape area	7429
Paver area	11259
Road & Other hardscaped areas	93629

Energy Monitoring & Review

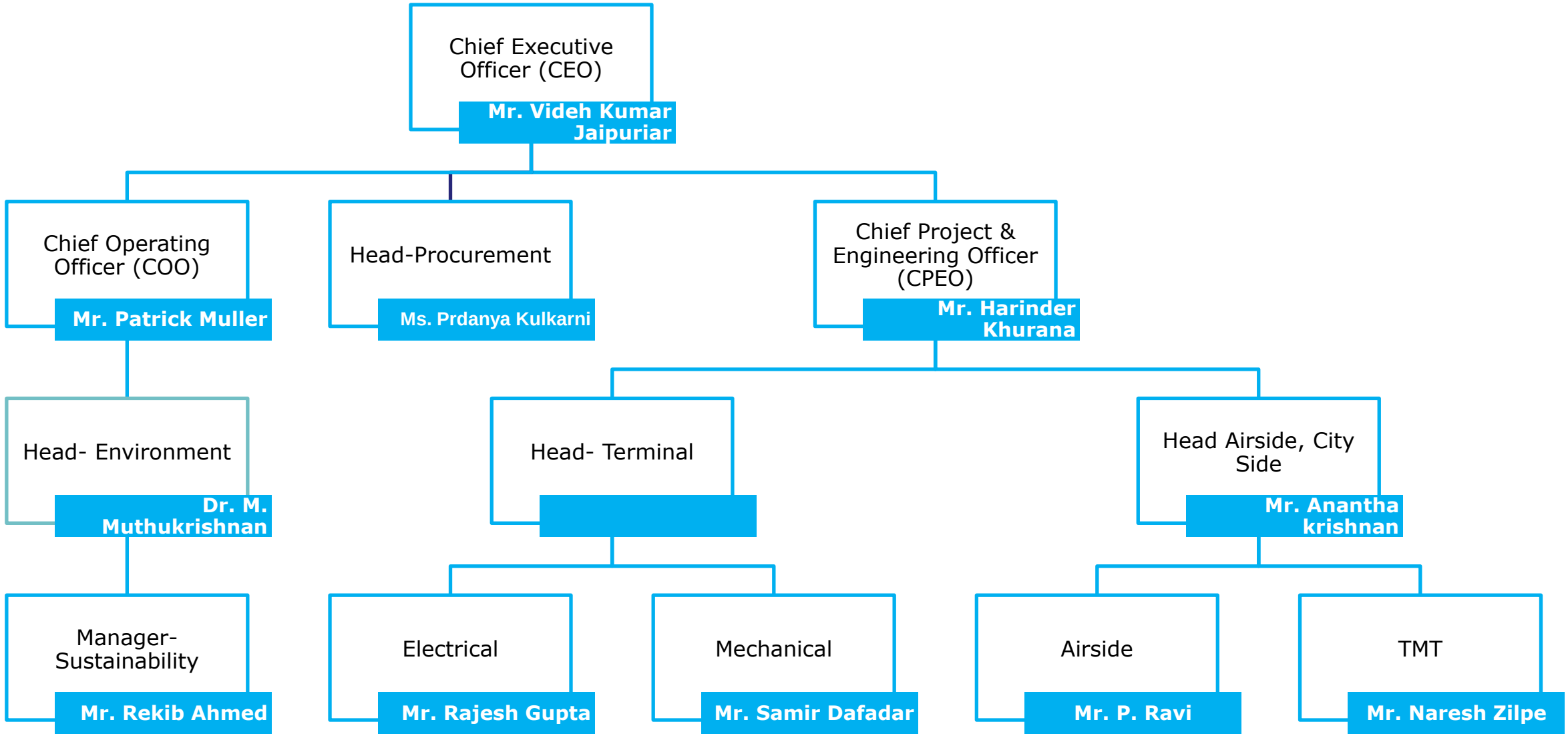


CPEO PDM (FY 23)					
8	Implementation of APOC	% completion	15%	NA	100%
7	Timely completion of Capex Projects	% completion	20%	NA	CF by Q2 and New by Q3
6	Stakeholder Engagement a. C-SAT Survey b. Vendor Satisfaction Survey	a & b. Score	10% (5%+5%)	4.38 3.9	4.48 4.2
5	Talent Review a. Retention of critical 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

Energy & Emission Management Team



Water Management

- Apply fresh water use reduction measures at airport infrastructures
- Improve water use performance
- Implement/manage water efficient landscaping systems
- Improve cooling tower water management performance
- Implement innovative water technologies for water efficiency improvement.

More than 600 RWHS

16.6 MLD Sewage treatment plant

Water use reduction by efficient fixtures

System level Water Metering facility

Rain Water Storage of 9 ML capacity

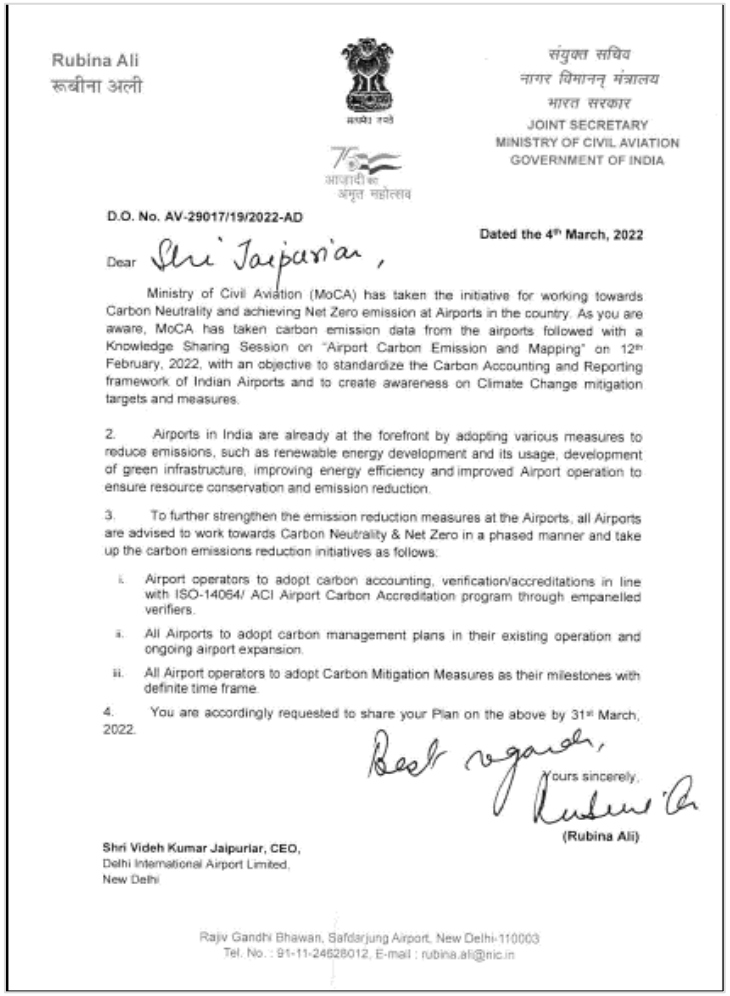
10 Knowledge Sharing by DIAL on Climate Change Mitigations at Airports

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

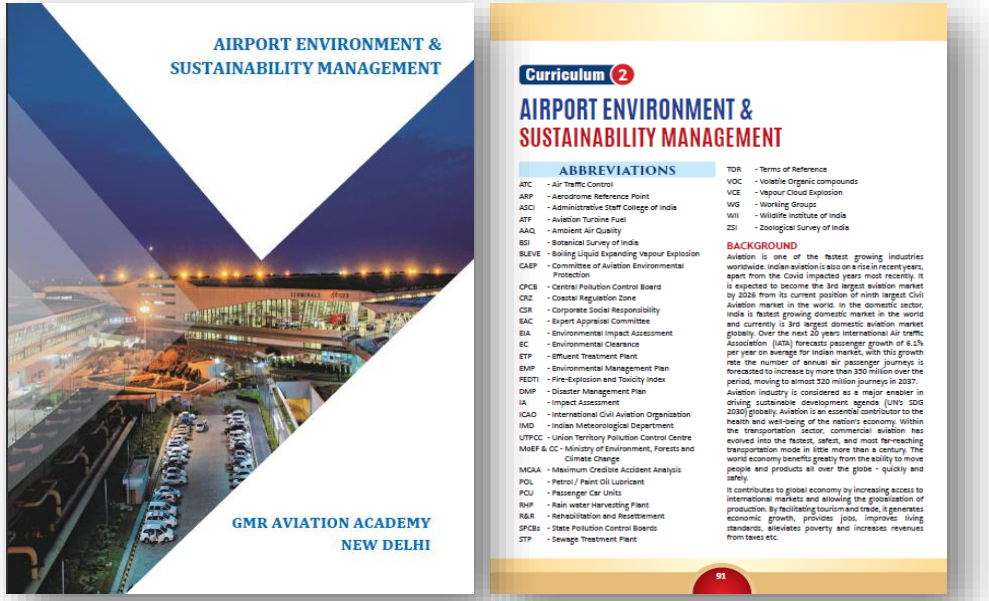
Training and Competency Development

Year	Training
2021-22	❑ Awareness session on Energy Conservation ❑ Awareness session on Net Zero Road Map ❑ GHG management session with MoCA
2020-21	❑ Knowledge Sharing on Energy Management by DIAL team to ADP Group, Cebu Airport, Goa Airport, Crete Airport Team ❑ Training Program on Sustainability Management by CII-CESD ❑ Knowledge sharing session with Stakeholders involving international aviation and sustainability experts
2019-20	❑ Knowledge sharing with AAI on Airport Carbon Accreditation & Sustainability ❑ Training on Environment Protection & Sustainable Development in GMR Aviation Academy ❑ Training on ISO 50001 Internal Auditor ❑ Training on Energy Efficiency best practices

Students Awareness Program at RGNAU

DIAL has developed a training module on Environment and sustainability management at Airports, which is taught at Rajiv Gandhi National Aviation University, UP by DIAL representatives.

This module aims to enhance the knowledge, skills and attitude of budding aviation professionals.



Key Certifications

ISO 50001:2018

bsi.

Certificate of Registration

ENERGY MANAGEMENT SYSTEM - ISO 50001:2018

This is to certify that: Delhi International Airport Limited, New Udaan Bhawan, Terminal 3, Opp. ATS Complex, International Terminal IGI Airport, 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: Chris Cheung, Head of Compliance & Risk - Asia Pacific

Original Registration Date: 2011-09-05 Effective Date: 2020-09-01

Latest Revision Date: 2020-12-19 Expiry Date: 2023-08-31

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...making excellence a habit.

ISO 14001:2015

DNV

MANAGEMENT SYSTEM CERTIFICATE

This is to certify that the management system of Delhi International Airport Ltd. New Udaan Bhawan, Opposite Terminal - 3, Indira Gandhi International Airport, New Delhi – 110 037, India

has been found to conform to the Environmental Management System standard: ISO 14001:2015

This certificate is valid for the following scope: Operation and maintenance of domestic & international passenger terminals, airside operational areas and cargo operations of Indira Gandhi International Airport

ISO 14064:2006

Bureau Veritas Certification

Certificate of Verification

For

DELHI INTERNATIONAL AIRPORT LTD.

New Udaan Bhawan Opp. Terminal 3, IGI Airport, New Delhi – 110 037, India.

Covering operations and management at Delhi International Airport Ltd.

Reporting year: 1st January 2019 to 31st December 2019

VERIFICATION REPORT REFERENCE: INDIA-VER/06.60/2020 rev. 1.1

Jagdheesh N. MANIAN, Head – CERTIFICATION, South Asia Commodities, Industry & Facilities Division

Level 4+ under ACI's ACA

airport carbon accredited TRANSITION

IGBC Platinum

IGBC GREEN EXISTING BUILDING

INDIAN GREEN BUILDING COUNCIL

Indira Gandhi International Airport New Delhi

PLATINUM 2016

GreenCo Platinum

GREEN COMPANY RATING SYSTEM

CII - SOHRABJI GODREJ GREEN BUSINESS CENTRE INDIA

GreenCo

PLATINUM

2016

CII National Award for Excellence in Energy Efficiency- 2021

Excellent Energy Efficient Unit – 4th year consecutively

"National Energy Leader" in Building sector, 2nd year in a row

"**Wings India Awards 2022"** for Aviation Sustainability & Environment

Thank you