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**Energy Excellence Journey of Delhi International Airport Limited (DIAL)** 

September 2024

**ASIA's 1<sup>st</sup> Net Zero Carbon Emission Airport** 

#### **Delhi International Airport Limited (DIAL)**





GAR



#### **Delhi International Airport Limited (DIAL)**

#### Overview

- DIAL is a Joint Venture Consortium between GMR, AAI and Fraport
- Under Operations, Management & Development Agreement
   [OMDA] signed between DIAL and the Airports Authority of India
   [AAI] in April, 2006; DIAL is responsible for the operations,
   maintenance, development and management of Delhi Airport

#### **Key activities**

#### **Airport Operations**

Aero & Non-Aero Development

**Commercial Property Development** 

#### **Maintenance & Utility Services**





#### Energy Management System (ISO 50001:2018)



Energy Policy	ENMS Certificate	Climate Resilience Program
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DIAL ENERGY POLICY	Certificate of Registration ENERGY MANAGEMENT SYSTEM - ISO 50001:2018	CLIMATE RESILIENCE PROGRAM
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.	This is to owrify that: Delh's Enternational Airport Ltd. New Udaan Ehrman 3 Enternational Airport Mew Delhi 110 037 Endia	Delhi International Airport (DIAL) strives to make Delhi Airport a "Climate Resilient Airport" by implementing climate change mitigation and adaptation measures as part of our business strategy. This Climate Resilience Program is derived from DIAL's Environment and Sustainability Policy, published in 2022 and outlines the commitment and actions as given below: DIAL's will strive to:
<ul> <li>Complying with applicable legal and other requirements related to our energy use, consumption and efficiency.</li> <li>Taking measures in energy management system by being proactive, innovative, cost effective including design &amp; procurement of energy efficient products and services.</li> </ul>	Holds Certificate No: ENMS 570813 and operates an Energy Management System which complies with the requirements of IEO 50001:2018 for the following acops: The Operation and Maintenance of Domestic and International Passenger Terminale, Athlide	<ul> <li>Implement and maintain Greenhouse Gas (GHG) management system in line with globally recognized standards to achieve the targets.</li> <li>Assess and address climate change risk and opportunities periodically.</li> </ul>
<ul> <li>Enhancing the effectiveness of the energy management system by ensuring the availability of information and necessary resources to achieve the objectives and targets.</li> <li>Integrating energy policy into our business planning, decision making and performance review at appropriate level.</li> </ul>	Operations of India Gandhi International Arport.	Apply Undernission reductions measures such as energy encoding and energy conservation, renewable energy, green building concepts, green transportation program, operational efficiency, competency development together with Airport stakeholders.     Collaborate with Airport stakeholders to reduce the Scope 3 GHG emission from their activities and facilitate the use of Sustainable Aviation Fuel (SAF) at the Airport.
<ul> <li>Use of renewable energy in day to day operational requirements.</li> <li>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.</li> </ul>	For and on behalf of EC: Theurs Kotow, Managing Director Assumence - IMETA	<ul> <li>Achieve the target of "Net Zero Carbon Emission Airport" by 2030 by reducing absolute GHG emissions (Scope 1&amp; 2) of Airport in line globally recognized programs.</li> <li>Adopt climate resilience actions at the Airport taking account of climate change risk &amp;</li> </ul>
	Crighel Registration Date: 2011-09-05 Latent Revision Date: 2012-09-05 Latent Revision Date: 2022-09-05 Date: 2022-09-05 Page: 1 of 1 Imaking excellence a habit."	opportunities, innovation & technology, national & global commitments and requirements.  Communicate and promote climate resilience actions needed with Airport stakeholders.
Harinder Khurana Chief Projects & Engineering Officer Videh Kumar Jaipuriar Chief Executive Officer	This certificate was based declosionally and remains the property of 901 and inclusion by the conditions of uncleast, An exclusion with take on the sublectional option Printed copes can be estimated at even the plateautory(CAMEChardon and State 1000 2000). This certificate is with only provided copes are to comparison to proper take the comparison may be collared by consulting the expendedors. This certificate is with only provided copes are to comparison. This certificate is with only provided copes are to comparison. This certificate is with only provided copies are to comparison. This certificate is with only provided copies are to comparison. This certificate is with only provided copies are to comparison. This comparison of Cardinal State. Charact Cancil, Cardon States, Cancillo State, Lapone MCI Still The 441 MIC 2000 2000 States and Cardinal Cardon. Registered in England under number 2000021 at 389 Calenda Right Statel, Landon MM 645, UK.	Videh Kumar Jaipuriar Chief Executive Officer 1 <sup>e</sup> May, 2023

#### **Architectural Feature of Terminal 3**







Humility | Entrepreneurship | Teamwork & Respect for Individual | Deliver the Promise | Learning & Inner Excellence | Social Responsibility | Financial Prudence - Frugality

#### AS FULFILLED THE REQUIREMENTS O

#### **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.

Total Dainta	Catalogue	LEED v4 BD+C		
Iotal Points	Category	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%	







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

#### **Energy Consumption (Electricity & Fuel)**





#### What changed during the last 3 years ?

- Electricity consumption increased by 4% YoY (New Infrastructure added)
  - ↗ Overall area has increased as compared to previous years (2%). 11% growth in passenger traffic.
  - New integrated Terminal 1, parking facility in Terminal 2, pick and drop facilities in T2 and T1.
- Overall fuel consumption decreased by 42% YoY (Electric Vehicle Induction)
  - ↗ GPS Route Tracker optimization
  - ↗ 100% shift to EV cars

#### **Sp. Energy Consumption (Fuel & Electricity)**



INDIRA GANDHI

#### What changed during the last 3 years ?

- ↗ Specific electricity consumption (kWh/pax) in the year 2023-24 has decreased as compared to 2021-22 by 33%. Energy efficiency measures and replacement of older assets
- ↗ Specific fuel consumption (MJ/Pax) in the year 2023-24 has decreased as compared to 2021-22 by 60%. Airport driven efforts have resulted in gradual reduction
- Increase in passenger throughput has almost doubled as compared to 2021-22.
  - Rapid growth in aviation sector



#### **BENCHMARKING FOR ELECTRICITY CONSUMPTION (KWH/PAX)** $\mathbf{m}$ 2021-22 2022-23 2023-24 276.3 55.8 $\sim$ $\infty$ 9.6 32. 16. 00 82 20 0 3.4 T σ 00 $\sim$ **INCHEON MUMBAI** HONG KONG MALAYSIA AIRPORT DELHI Source: Energy Research in Airports: A Review Table 3. Parameters that determine terminal building energy consumption. https://energy.greenbusinesscentre.com/ener gyawards/enepresent20.php **Building Characteristics** Climate Comfort **Building Services** Thermal comfort **Operation hours** Shape factor Temperature 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.

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#### **Internal Benchmark**







- Different Utilization has led to different kWh/m2 of the buildings •
- Average kWh/m2 has increased in 2023-24 by 3.5% when compared to 2022-23 •
- Terminal 1 operations started partially



Year	No. of energy saving projects	Investment (INR Million)	Electrical Saving (Million kWh)	Savings (INR Million)	Impact on SEC
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.
FY 2023-24	2	20.95	0.92	9.79	
Total	8	176.05	4.67	45.69	-

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

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

High efficient modular UPS installation.

RCL Fitting software Updation for unidirectional mode activation.

Conversion of halogen lamp with LED lamp at Taxi lane and taxi stand.

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#### **Energy Saving Projects** CONVERSION OF HALOGEN LIGHT FITTING OVER LED LIGHT FITTINGS ON RUNWAY







Replacement of old non inverter ductable AC unit with high efficient inverter units.

Objective	energy Units Savings	Intangible Benefit
Installation of Inverter Ductable AC units to maintain temperature at MRSS HT Panel Building	15.94 Lakhs (156744 Units)	<ul> <li>Better Humidity control</li> <li>Improve system serviceability.</li> </ul>

Year	Investment (INR Million)	Electrical saving (Million KWH)	Saving (INR Million)	Impact on SEC
FY 23-24	3.905	0.156	1.59	SEC Reduction by 30.07 %

#### **Initiative Description:**

Earlier MRSS HT Building Temp controlled by Old Non Inverter Ductable AC units which are approx. 15 Yr. old and not maintaining required temperature.

Now we have replaced the Old Non Inverter Ductable AC units (Total Installed capacity - 85 Tr.) with Inverter Ductable AC units (Total Installed capacity - 73 Tr.).

#### Action:

- 1. Planned & finalized the location for installation
- 2. Coordinate with stake holder for completing the work
- 3. Installation work completed timely.

#### **Energy Saving Projects**

Replacement of belt drive AHU blowers with direct coupled plug fans.





**Belt Drive AHUs** 



AHU With Direct Coupled Plug Fan

## Conversion of an RCL (reconfigurable logic circuit) bi-directional fitting into a unidirectional operation

- Up to date the software or firmware controlling the logic circuit.



#### **Innovative Project** RCL FITTING SOFTWARE UPDATION FOR UNIDIRECTIONAL MODE ACTIVATION



#### **Innovative Project**

#### RCL FITTING SOFTWARE UPDATION FOR UNIDIRECTIONAL MODE ACTIVATION





<b>S. N</b>	o. AGL System	Total Quantity	Halogen Light Wattage	Total Halogen Wattage (Kw)	LED Light Wattage When select unidirectional mode of operation	Total LED Wattage (Kw)	Load Reduction (Kw)	CCR Rating Reduction (Kw)
1	09-27 RWY	187	90W	16.83 Kw	19W	3.55 Kw	13.28 Kw	5 Kw
2	10-28 RWY	255	90W	22.95 Kw	19W	4.84 Kw	18.11 Kw	5 Kw
3	11R-29L RWY	278	90W	25.02 Kw	19W	5.28 Kw	19.74 Kw	10 Kw
4	11L-29R RWY	299	90W	26.91 Kw	19W	5.68 Kw	21.23 Kw	10 Kw
	Total	1,019	360W	91.71 Kw (0.8MU/Ye ar)	76W	19.35Kw	72.36 Kw (0.63MU/Year)	40Kw



#### **Currently running on 100% renewable net electricity**



**Overall, Delhi Airport operates at 92% renewable energy** 

GE= Grid ElectricityOn-RE= Onsite Renewable EnergyOff-RE= Offsite Renewable Energy

#### GHG Emission Data (Scope 1& 2)







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#### **BMS Certification**





#### ISO 50001:2018



#### ISO 14001:2015



#### IGBC Platinum

![](_page_18_Figure_8.jpeg)

Level 5 under ACI's ACA

![](_page_18_Figure_9.jpeg)

#### ISO 14064:2006

![](_page_18_Picture_11.jpeg)

#### **GreenCo Platinum**

![](_page_18_Picture_13.jpeg)

#### **Energy Monitoring & Review**

![](_page_19_Picture_1.jpeg)

![](_page_19_Picture_2.jpeg)

![](_page_19_Figure_3.jpeg)

**Energy Performance Review** 

![](_page_19_Figure_5.jpeg)

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#### DELHI INDIRA GANDHI INTERNATIONAL AIRPORT

#### ACA Level 5 – Definition to Net Zero

Airports demonstrate that they have reduced their Scope 1 and 2 GHG

emissions by >90 + % and any remaining residual emissions in Scope 1

and 2 have been addressed using approved/certified offset removals and

committed to achieve Net Zero in Scope 3 emissions by 2050

![](_page_20_Picture_7.jpeg)

![](_page_20_Figure_8.jpeg)

![](_page_21_Picture_1.jpeg)

# Delhi Airport becomes first Indian airport to achieve net zero carbon emission status

O August 16, 2024

The Indira Gandhi International Airport in Delhi has reportedly achieved the Net Zero Carbon Emission Airport status or Level 5 certification under the Airport Council International's Airport Carbon Accreditation programme, being the first Indian airport to achieve the milestone.

The certification recognises the airport's efforts towards attaining and maintaining a net zero carbon balance for emissions under its control. The airport has achieved notable progress in reducing Scope 1 and Scope 2 carbon emissions by around 90 per cent, with the remaining emissions being addressed using offset removals.

The airport, which had an initial goal of becoming a net zero carbon emission airport by 2030, has met the target much earlier through various efforts including the use of renewable energy, promoting electric vehicles, implementing zero waste to landfill programs, and developing green airport infrastructure among others. The airport targets to attain net zero in Scope 3 emissions by 2050.

![](_page_21_Picture_7.jpeg)

#### **Waste Management**

![](_page_22_Picture_1.jpeg)

- First of its kind Integrated solid waste management facility within the Airport premises.
- Integrated Solid Waste Management Centre (ISWMC) comprising of -
  - Material Recovery Facility (MRF)- 10 Tons/Day
  - Composter 2 Tons/Day
- Approx 1% of total waste is diverted to Landfill.

![](_page_22_Picture_7.jpeg)

![](_page_22_Figure_8.jpeg)

#### **CII Energy Award**

Learning from CII Energy Excellence Award

![](_page_23_Picture_2.jpeg)

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

![](_page_24_Picture_0.jpeg)

DEPARTMENT NAME : DIAL/P&E/Mechanical

PROCESS OWNER: Vipin Purohit TEAM LEADER: Zirgham khan MEMBERS: Brady's Team

![](_page_24_Picture_3.jpeg)

![](_page_24_Picture_4.jpeg)

**AREA OF IMPROVEMENT:** Process improvement through chilled water line modification at T1 MSB plant.

![](_page_24_Picture_6.jpeg)

**DESCRIPTION:** G+5 building Air-conditioning was through MSB Chiller plant. Apart from significant loss of electrical units & water consumption, additional resources were deployed to operate the plant.

Overproduction

Defects

![](_page_24_Picture_9.jpeg)

**DESCRIPTION:** Process improvement done and connected G+5 HVAC with new utility chiller plant. By this we have achieved electricity & water conservation. Aside, manpower optimization done.

Waiting

#### KAIZEN SI. No: 112

Identified Date : <u>25/01/2024</u> Completion Date : <u>05/02/2024</u>

![](_page_24_Figure_13.jpeg)

### INTANGIBLE BENEFITS

Reduction in Carbon footprint Assets optimization.

#### HORIZONTAL DEPLOYMENT

Transportation Inventory

Inventory

Motion Extra -Processing

**Non-Utilized Talent** 

![](_page_25_Picture_0.jpeg)

![](_page_26_Figure_0.jpeg)

![](_page_27_Picture_0.jpeg)

#### **DEPARTMENT NAME :** DIAL/P&E/Mechanical

**PROCESS OWNER:** Samir Dafadar, Manish Singh **TEAM LEADER:** Gopabandhu Das MEMBERS: M. Mohanty & Brady's Team

![](_page_27_Picture_3.jpeg)

![](_page_27_Picture_4.jpeg)

**AREA OF IMPROVEMENT:** Refrigerant cylinder Rotator for easy operation at chiller plant during refrigerant charging

![](_page_27_Picture_6.jpeg)

![](_page_27_Picture_7.jpeg)

#### Slipping chances during handling

Overproduction Defects

![](_page_27_Picture_10.jpeg)

**Describe the After condition (in short)** Refrigerant cylinder rotator rotate the cylinder up to 180 degree

- Can carry 3 cylinders at a time of weight 450 KG
- Single person can execute this job ٠
- 10 inch clearance between knob & floor, to prevents accident/hazard

Waiting

Eliminates cylinder slipping ٠

#### KAIZEN SI. No: 74

Identified Date : 01/10/2023 **Completion Date : 15/11/2023** 

#### **SECQuRE**

![](_page_27_Picture_19.jpeg)

Transportation **Extra** - Processing Inventory Motion Humility | Entrepreneurship | Teamwork and Relationships | Deliver the Promise | Learning and Inner Excellence | Social Doc. No.+DIAL/QSD/KAIZEN/02/001ual

DOWNTIME

![](_page_28_Picture_0.jpeg)

#### DEPARTMENT NAME : DIAL/P&E/Mechanical

PROCESS OWNER: Samir Dafadar, Manish Singh TEAM LEADER: Gopabandhu Das MEMBERS: Mr. Rajesh & Brady's Team

#### BEFORE

![](_page_28_Picture_4.jpeg)

**AREA OF IMPROVEMENT: :** In-house development of the HVAC Plant Operation Module using waste to health concept

# <image>

#### Describe the Before condition (in short )

- Complex HVAC system at Terminal 3 is critical to get through
- Difficult to explain due to large area of 20k TR chiller plant

Defects

**Transportation** 

Challenge during orientation for GETs and visitors

Overproduction

Inventory

![](_page_28_Picture_11.jpeg)

![](_page_28_Picture_12.jpeg)

#### Describe the After condition (in short )

- Easily comprehend via a live working model
- Great insight in operations and maintenance for workmen
- Improved training /orientation process with live model

Waiting

Motion

**Non-Utilized Talent** 

Extra -Processing

#### KAIZEN SI. No: 133

**Identified Date** : 20/02/2024 **Completion Date** :03/03/2024

#### SECQuRE

![](_page_28_Figure_20.jpeg)

#### TANGIBLE BENEFITS

Scrap material utilized in waste to wealth project costing ₹80,000/-(approx.)

#### INTANGIBLE BENEFITS

- 1. Training
- 2. Reliability. Safety
- 3. Utilizing scrap material.
- 4. Easy to use educate.

![](_page_28_Picture_28.jpeg)

Humility I Entrepreneurship I Teamwork and Relationships I Deliver the Promise I Learning and Inner Excellence I Social Doc No.: DIAL/QSD/KAIZEN/02/001ual

DOWNTIME

#### **DIAL Won CII Business Excellence Award**

![](_page_29_Picture_1.jpeg)

threshold of 600+ in Emerging Industry Leader Band.

During the dip-stick assessment which included 2 days' site visit, Assessors interacted with key personnel of the organization to understand processes and performance maturity. The assessment consisted walkthrough of Business, Support and Management processes with the associated results based on GMR Business Excellence framework requirements.

On behalf of entire DIAL Senior Leadership Team, I would like to convey deep appreciation to each one of you for taking DIAL's Business Excellence journey to the next level.

With this momentum, I am sure DIAL will achieve "Industry Leader" Band [700+ score] in near future with your contributions.

Best Regards, Videh Kumar Jaipuriar Chief Executive Officer - DIAL

![](_page_29_Picture_7.jpeg)

![](_page_29_Picture_8.jpeg)

![](_page_29_Picture_9.jpeg)

5S Certification

![](_page_29_Picture_11.jpeg)

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DELHI INDIRA GANDHI

![](_page_30_Picture_0.jpeg)

#### **Energy Consumption (Electricity)**

Terminal wise and System wise consumption

![](_page_31_Picture_2.jpeg)

![](_page_31_Figure_3.jpeg)

#### Water Management

Working towards water positive airport

- 625 Rainwater harvesting structures
- 9 million liters rainwater storage reservoir
- 16.6 MLD Sewage treatment plant
- 5 MLD water treatment plant
- Automatic landscape drip irrigation system
- 100% usage of treated water for flushing, horticulture and HVAC systems

![](_page_32_Figure_8.jpeg)

![](_page_32_Figure_9.jpeg)

60% reduction in water consumption per pax from 2010-11 (74 L/pax) to 2023-24 (29 L/pax)

#### Working towards becoming Net Zero Water Positive Airport by 2025