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BASICS OF AIRPORT ENERGY MANAGEMENT
ONLINE TRAINING BY KRISHNAJI PAWAR
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MODULE
L2

Airports- Energy and Sustainability Perspectives

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BASICS OF AIRPORT ENERGY MANAGEMENT

Aviation and airports are interdependent for global air travel, with aviation encompassing aircraft operations and related industries, while airports provide essential infrastructure and services. This relationship improves connectivity but faces challenges like sustainability and technological integration, highlighted by organizations such as ICAO and GACA.

Learning Objectives

- Course Overview and Introduction
- Airports- Energy & Sustainability Perspectives
- Overview of energy use in airport environments
- Importance of conservation in aviation sustainability.
- Key energy consumption areas in airports
- Global trends in energy efficiency
- Energy Consumption Reduction Plan
- Benefits of energy management
- Summary and resources

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INTRODUCTION

- Aviation and airports are integral components of air travel, with aviation involving aircraft operation and the industry, while airports serve as essential hubs for takeoffs, landings, and passenger services.
- Both sectors contribute to global connectivity but encounter challenges related to sustainability and technology integration, as noted by ICAO and the Saudi GACA.
- Recent advancements emphasize smart technologies, digital transformation, and eco-friendly initiatives aimed at improving passenger experience, safety, and operational efficiency.
- A significant research gap exists regarding greener airports, necessitating collaboration among member states and organizations like ICAO, IATA, and the UN to promote sustainable airport development in alignment with the Sustainable Development Goals (SDGs).



AIRPORTS AND AVIATION



- Airports and aviation are crucial for facilitating rapid travel and efficient goods transportation globally.
- "Aviation" includes activities related to flying aircraft, with key components being airlines, airports, and air traffic control.
- Airports are critical infrastructures where planes take off and land, comprising essential elements such as:

- Runways: Long, flat surfaces for aircraft landings and departures, designed for safety.
- Taxiways: Pathways connecting runways to terminals, allowing aircraft to maneuver post-landing.
- Terminals: Passenger service buildings with waiting areas, ticket counters, and shops; larger airports may have multiple terminals.
- Control Towers: Structures equipped with air traffic control technology to guide aircraft and ensure airspace safety.

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AIRPORTS AND AVIATION +

- Airports are organized into specific areas for operational efficiency:
  - Passenger Area: Zone for ticket purchasing, check-in, and waiting for flights.
  - Baggage Area: Restricted zone for luggage handling, separate from passengers.
  - Maintenance Area: Dedicated to aircraft repair and servicing by qualified mechanics.
  - Security Area: Conducts checks to ensure traveler safety and prevent prohibited items onboard.

- Air Traffic Control (ATC) ensures safe and orderly air traffic flow, especially during peak times, by communicating with pilots.
- Understanding the complex organizational structure of airports highlights their importance in global connectivity and transportation safety, particularly the role of ATC in aviation operations.





INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) AND IATA



- The International Civil Aviation Organization (ICAO) was established in 1944 as a specialized UN agency to promote safety and orderly development in international civil aviation.
- ICAO's coordinated efforts focus on:
  - Policy and standardization
  - Monitoring safety trends and indicators
  - Safety analysis
  - Implementing programs to address safety issues
- The International Air Transport Association (IATA) is a key trade association representing around 290 airlines, making up 82% of total air traffic.
- IATA supports airline interests globally and promotes the economic benefits of aviation.
- Its initiatives include improving border crossing through advanced technologies and processes, which enhance trade, travel, and tourism while benefiting national economies.

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CARBON DIOXIDE (CO2)

- Carbon dioxide (CO2) is the main greenhouse gas from human activities, disrupting Earth's radiative balance and causing climate change.
- Commercial aviation, while carbon-intensive, accounts for only 2.5% of global emissions due to low flying participation (10% of global population).
- Aviation sector emissions require analysis of three metrics: aviation demand (passengers and freight), energy efficiency (energy per kilometer), and carbon intensity (emissions from fuels).
- CO2 emissions are calculated by multiplying aviation demand, energy efficiency, and carbon intensity; increases in any metric raise emissions.
- Between 1990 and 2019, passenger and freight demand quadrupled, while aviation technology improved energy efficiency by over two times



CARBON DIOXIDE (CO_2) +





- Carbon intensity has remained stable due to reliance on similar fuels as in the 1990s, with alternative fuels having minimal market impact.
- The combination of increased demand and unchanged carbon intensity has led to a doubling of CO_2 emissions.
- The aviation sector faces significant challenges in meeting climate strategy goals, as demand grows faster than decarbonization efforts in fuels.

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SUSTAINABLE AVIATION FUEL (SAF)

- Sustainable Aviation Fuel (SAF) is a key pathway for CORSIA but is underutilized, with less than 1% of European flights using it as of 2022.
- Limited use is due to availability and high costs.
- SAF production can be categorized into biogenic sources (crops, oils, residues) and non-biogenic sources (waste gases, hydrogen).
- Effective SAF types must be competitive technically, economically, and environmentally, while being abundantly available.
- The significance of SAF lies in its potential for CO2 savings, although its combustion levels are comparable to conventional jet fuels.
- Production costs of SAF remain higher than those of fossil-based jet fuel.
- Current SAF supply chains and infrastructure are still developing.
- Challenges identified by EASA include lengthy approval processes for fuel and ensuring a sustainable long-term feedstock supply.
- The “drop in fuels” approach allows SAFs to be blended with kerosine, making it compatible with existing aircraft engines and more cost-effective.





UN SUSTAINABLE DEVELOPMENT GOALS AND AVIATION SECTOR



- The UN Sustainable Development Goals (UNSDGs) aim to limit and reduce global carbon emissions.
- ICAO's Strategic Objectives are linked to 15 of the 17 UNSDGs.
- ICAO collaborates with States and UN Bodies to achieve related targets.
- ICAO serves as an official observer on the Inter-agency and Expert Group for Sustainable Development Goal Indicators.
- The organization is the custodian of global indicator 9.1.2 regarding Passenger and Freight Volumes by Mode of Transport.
- ICAO actively contributes to the monitoring of the 2030 Agenda and pertinent development frameworks.

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