

# ICAO Symposium on Non-CO<sub>2</sub> Aviation Emissions

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Speaker

Session 3: Mitigating Non-CO<sub>2</sub> Aviation Emissions –  
What is possible  
**Part II - Innovative Operations**

# Innovative Operations – what is possible?

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**01** **NAV CANADA airspace**  
An overview of Flight Information Regions (FIR) and infrastructure

**04** **Partnerships**  
Collaboration with industry partners

**02** **Innovation at NAV CANADA**  
Modernization initiatives to enable system predictability and flexibility

**05** **Conclusions**  
Closing statements

**03** **Measuring performance**  
Analytics for ATM and environmental performance



NAV CANADA Facility Map

ACC	7	○
Control Tower	42	●
FSS	53	●
FIC	5	●
Technology Work Centre	28	●
CARS	51	●
Designated FIC for CARS	3	●




USE FOR REFERENCE PURPOSES ONLY

0 100 200 300 400 500 Nautical Miles


— Flight Information Region (FIR) boundaries

— Gander Oceanic Delegated Control Airspace (ODCA)

# Staffed sites across Canada


7 Area Control Centres 

42 Control Towers 

53 Flight Service Stations 

5 Flight Information Centres 

28 Technology Work Centres 

51 Community Aerodrome Radio Stations 

# Keeping Canada's skies safe:

Shaping the future of air navigation services

Our Shared Purpose is supported by four pillars



**Safety is at  
the core**

It is integral to everything we do and continues to mature as the industry evolves.



**Innovation  
is key**

We are passionate about modernizing Canada's air navigation system to deliver value to our customers.



**Expertise  
is the cornerstone**

The skill, agility, leadership, and collaboration of our people make the difference.



**Partnerships  
are essential**

Our partnerships help the aviation industry improve efficiency and support an environmentally sustainable future.

# What does innovation look like at NAV CANADA?

Enabling flexibility and predictability of air traffic management



**Innovation  
is key**

We are passionate about modernizing Canada's air navigation system to deliver value to our customers.

Our strategic direction is guided by three interconnected initiatives:

- Airspace Modernization
- Digital Facilities
- Trajectory Based Operations (TBO)

# Digital Facilities

Moving beyond traditional human line-of-sight to rethink how we deliver service and where we deliver it from.

- Progressive adoption of digital and location-independent solutions
- Enabling service enhancements such as runway occupancy checks, confirmation of weather conditions short-term conflict detection
- Enhanced vision in low visibility conditions
- Elimination of blind spots due to physical structures
- Greater resilience through improved disaster recovery and operational agility

# Airspace Modernization (ASM)

Leveraging technology to re-think our airspace holistically, while accounting for our customers' desired routes.

- Continued prioritization of safety
- Preferred routes for airlines
- More seamless interaction with air traffic services
- Opportunity to leverage the full capabilities of fleet
- Effective integration of new entrants
- Enablement of trajectory-based operations

# Trajectory-based Operations (TBO)

Building air traffic services that take into account the full picture of a flight, from takeoff to landing.

- Preferred routes for airlines
- Reduced fuel use and greenhouse gas emissions
- Minimized enroute delays
- Increase predictability
- Integration of new entrants through RPAS traffic management (RTM)

# Indra's ITEC Technology

Contributing to the evolution of our air traffic management systems

- Offers a more comprehensive picture of a flight from take-off to landing
- Can calculate flight routes with greater accuracy and predict the evolution of air traffic over an extended horizon, supporting greater planning and coordination
- Integrate information processing from our seven area control centres, automatically notifying any changes in flight plans between each of their respective airspaces.



# Measuring ATM and Environmental Performance

Next day gate-to-gate efficiency KPIs by phase of flight in collaboration with Envirosuite

## Departure

- Departure On-Time Performance (OTP)
- Taxi-out Time
- Runway Occupancy Time (ROT)

## Climb

- Terminal Departure Flight Efficiency
- Terminal Departure Level Flight Efficiency / CCO

## Cruise

- Horizontal Flight Efficiency
- Vertical Flight Efficiency

## Descent

- Arrival Flight Distance / Time Efficiency
- Arrival Level Flight Efficiency / CDO

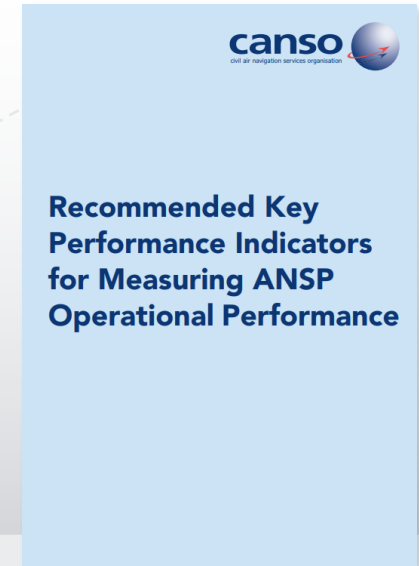
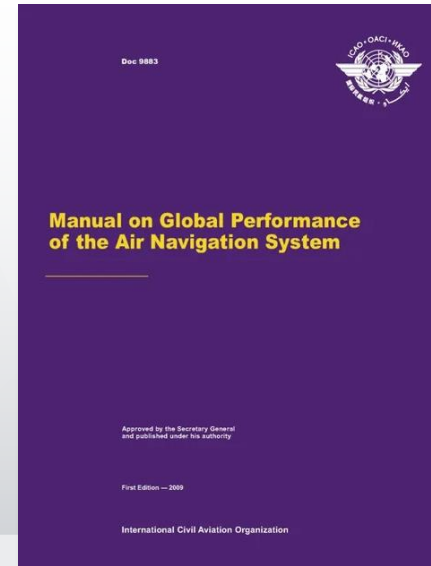
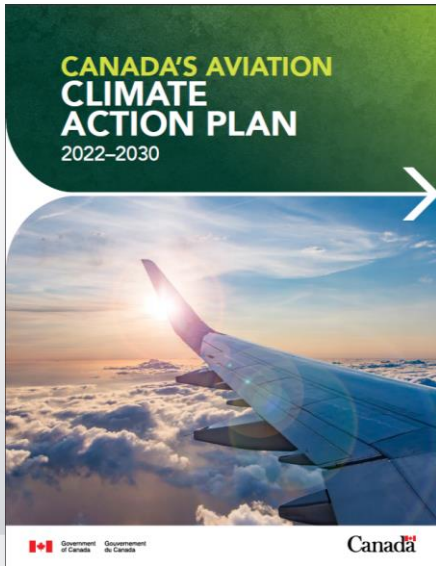
## Arrival

- Runway Occupancy Time (ROT)
- Taxi-in Time
- Arrival On-Time Performance



Emissions  
Procedure Utilization  
Demographics Overflown





## Alignment, collaboration and partnerships

Data sharing via collaborative data analytics agreements

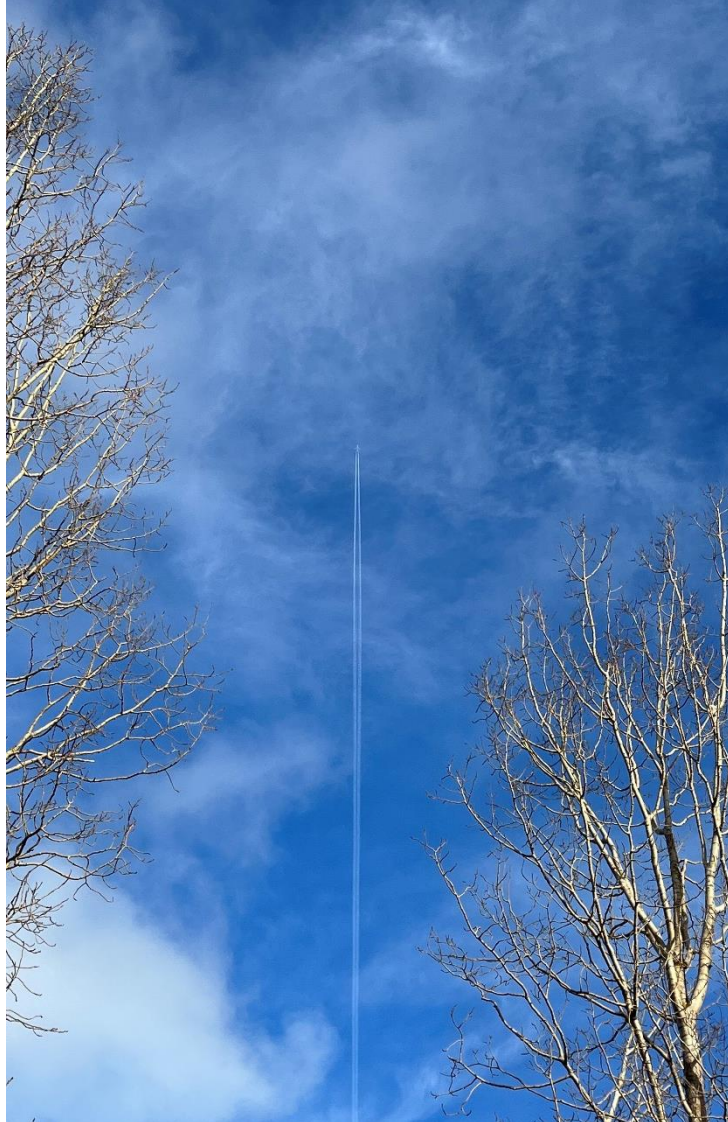
### Industry collaboration:

- Canada's Sustainable Aviation Task Force
- ICAO Global Air Navigation Plan Performance Expert Working Group
- ICAO Committee on Aviation Environmental Protection
- ECCC Contrail Avoidance Tool
- CANSO GBWG and Recommended KPIs for Measuring ANSP Operational Performance
- CANSO Environmental Working Group and Green ATM trial
- CANSO Contrails Task Force
- CICONIA Stakeholders Outreach Body

# Conclusions

## Innovative Operations – what is possible?

- Understand the role of the ANSP as an enabler of flexibility, predictability
  - To enable airlines to choose flight paths for any benefit, including mitigating non-CO2 impacts.
- Evolve the airspace to modernize for TBO and optimal flight path planning
- Partner with airlines for performance data to advance analytics and measurement of environmental performance
- Collaborate to determine the role of the ANSP in mitigating non-CO2 impacts
  - How will our participation change as the science evolves?
  - How can we facilitate efficient collaboration across multiple focus groups?



*photo: Asuka Boehm, 2023*

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# Thank You

