



GARDN

Sylvain Cofsky, Executive Director

Western Aerospace Expo: Green Growing Global

May 7, 2013

1. The importance of aviation in the world

2.7 billion
passengers
(2011)

3.5x = Value
added per
aviation
employee

An annual
traffic growth
of 5%

5,1 trillion
kilometres
flown by
passangers
(2011)



The Importance of Aviation in Canada

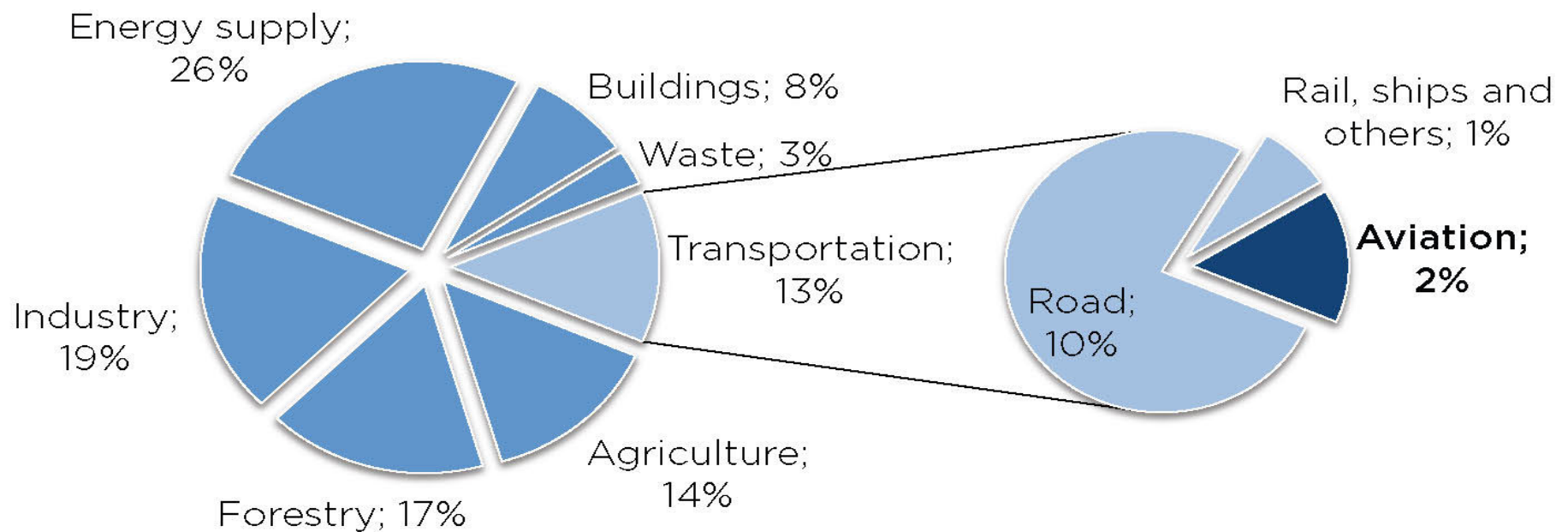
- **5th** largest aerospace industry in the World
- **160,000**= Jobs (direct, indirect and induced)
- **700** aerospace companies (top 19 firms representing 87% of sales)
- **\$22 billion** = Sales (2012)
- **77%** = civil use
- **80%** = Exportation of aerospace output
- **\$1.6 billion** = R&D spending / year

A success that comes with challenges

- Over **20 years** = **34,000** new aircrafts
- NEW markets / clients / partners / competitors
- Demographic profile of the workforce
- Energy costs
- **Climate change and Environmental concerns**



Aerospace Industry Contribution to Climate Change



Aviation Industry Commitment to Action on Climate Change



- Aviation is responsibly reducing its environmental impact... but the industry must maintain their efforts
- Effective instruments for public research and technology funding in aeronautics and related fields:
 - **based on close cooperation between research and industry partners**

Collaborative Research Projects Network



Airlines



change
is in the
air!

JAL participates in Team -6% with our Eco-Sky project.
Let's stop global warming together
Team -6%

Airports



HKIA Carbon Reduction |



ANSPs



Manufacturers



SUSTAINABLE
AVIATION

Global industry targets



2010

1.5% p/a fuel efficiency

Working towards CNG

2020

CNG from 2020

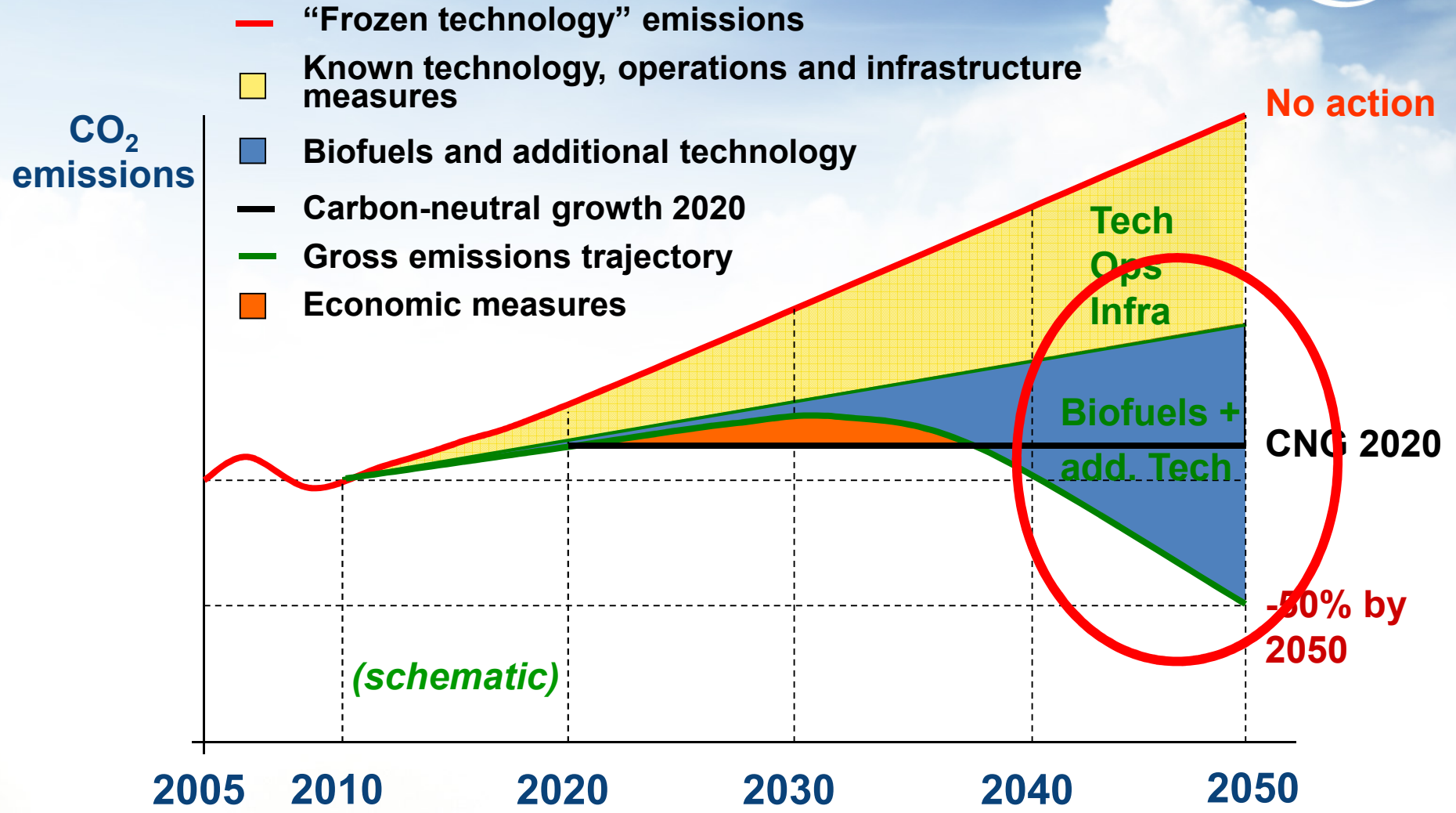
Implementation of global sectoral approach

2050

50% reduction in net CO₂ emissions over 2005 levels

- Goals are at the **global** level – not States or operators
- Goals do **not** mean slowing down the growth of aviation

Emissions reduction roadmap



A Vision for the Canadian Industry



Canadian
commitment
2008



CAETRM



Canada 1st
Green R&D
initiative /
2009

Green Aviation Research and Development Network (GARDN)

- **GARDN** is part of the Canadian Federal Program « Business-Led Network of Centres of Excellence » (BL-NCE)
- **Objective**
 - Increase competitiveness of Canada Aerospace Industry through the reduction of its environmental footprint
- **A 2-pillar strategy**
 1. Funding of precompetitive collaborative industrial R&D projects (**17 projets from TRL 3 to 7**)
 2. Focal point for reflection on environmental aviation in Canada

Membership

BOMBARDIER
the evolution of mobility



Pratt & Whitney Canada

Une société de United Technologies / A United Technologies Company

Bell Helicopter

A Textron Company

Esterline
CMC Électronique

HÉROUX DEVTEK

aercoustics
engineering limited



porter

Mecanum

MDS
Measured by the Power of Precision

MARQUEZ

COMTEK
Advanced Structures

AGRISOMA
Sustainable Energy Founded in Agriculture

FLUOREM
Experts in CFD

I. THIBAUT

Mastering Innovation
DELASTEK
L'innovation en tête

Quantis

CIRAIG
Centre interuniversitaire de recherche sur le cycle de vie des produits, procédés et services

McGill

UNIVERSITÉ Concordia
UNIVERSITY

ÉTS

POLYTECHNIQUE MONTRÉAL

RYERSON UNIVERSITY

UNB
UNIVERSITY OF NEW BRUNSWICK

University of **Waterloo**

Western

UNIVERSITY OF CALGARY

UNIVERSITY OF ALBERTA

uOttawa

Institute for Aerospace Studies
UNIVERSITY OF TORONTO



a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA



Government of Canada
Networks of Centres of Excellence

Gouvernement du Canada
Réseaux de centres d'excellence

CMRC - NRC

CRIAQ

AIAC

GARDN's Governance



Executive Committee

6-8 meetings / year

Board of Directors

3-4 meetings / year

18 members (aerospace industry, academia and research centers)

Scientific Committee

2-3 meetings / year

17 members (aerospace industry, academia and research centers)

Elaborates Corporation's scientific program

Evaluates projects according to relevance and quality / Recommends projects to Board of Directors

Research Committee (CAEWG)

2 meetings / year

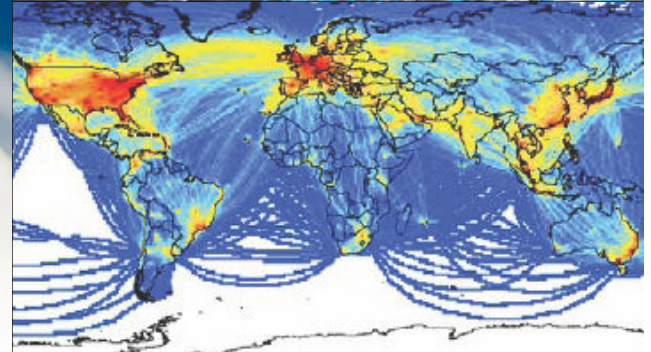
60+ members of CAEWG (Canadian Aviation Environmental Working Group)

Evaluates relevance of LOIs

Recommends new projects and funding opportunities to the Scientific Committee

GARDN 7 Research Themes

- Source Emissions Reduction (33%)
- Source Noise Reduction (40%)
- Aircraft Operations (11%)
- Alternative Fuels (6%)
- Materials/Manufacturing (4%)
- Lifecycle Management (6%)
- Airport Operations



1st Pillar: R&D Projects



- Selection criteria
 - Eligibility
 - Source of funding (50% from industry)
 - At least 2 collaborators (including an industrial partner)
 - Evaluation:
 - Impact on the Canadian aerospace sector
 - Environmental theme
 - TRL progression
 - Feasibility and technical merit
- Selection Process
 - LOI evaluated by Research Committee for relevance to GARDN research themes
 - Detailed proposal evaluated by Scientific Committee for research and economic impact
 - Final selection by Board of Directors



3 Rounds of Funding

- 17 collaborative projects that involve 37 partners:
 - ▶ 4 OEMs
 - ▶ 17 SMEs
 - ▶ 1 Airline
 - ▶ 3 Research Centers
 - ▶ 12 Canadian Universities

Source Noise Reduction Projects



4 Research Projects:

- Forced Mixer & Nozzle Noise Reduction
- High Speed Fan Noise Reduction
- Airframe Noise Reduction
- Landing Gear Noise Diagnostics and Prediction

Source Emissions Reduction Projects



6 Research Projects:

- Developing Particulate Measuring Methods
- Altitude Emissions Control for Aviation
- Environmentally-Focused Regional Aircraft
- Environmentally-focused Business Jet
- Engine Core Technologies – Combustion System and Compressor
- New Core Technology for Aircraft Interior Panels

Materials and Manufacturing Processes Projects



2 Research Projects:

- Out-of-autoclave manufacturing process
- Efficient Manufacturing of Aerospace Thermoplastic Composite Components

TRACK RECORD

Aircraft Operations Projects



1 Research Project:

- Optimized Descents and Cruise

TRACK RECORD

Airport Operations Projects



On-going discussions with different stakeholders
but **No project yet**

Product Lifecycle Management Projects



2 Research Projects:

- Lifecycle Improvements (MOC)
- Environmental Impact Evaluation Methodology and Database of Aeronautical Products

Alternative Fuels Projects



2 Research Projects:

- Biologic and Process Technologies for Renewable Jet Fuel
- Evaluation of Bio-SPK Production from a New Canadian Feedstock Crop, Carinata

Technologies biologiques et de traitement pour carburant renouvelable

Biologic and Process Technologies for Renewable Jet Fuel

Un projet de
A project from



Partenaires | Partners

OBJECTIFS

Développer et améliorer des technologies permettant la production à grande échelle au Canada de carburant hydrotraité à base de caméline et une utilisation optimale du carburant dans les produits canadiens de l'industrie aérospatiale.

OBJECTIVES

To develop and improve technologies that will enable large scale production of camelina-based hydrotreated jet fuel (HRJ) in Canada and allow optimized use of the fuel in Canadian aerospace products.

TGCI



Pratt & Whitney Canada

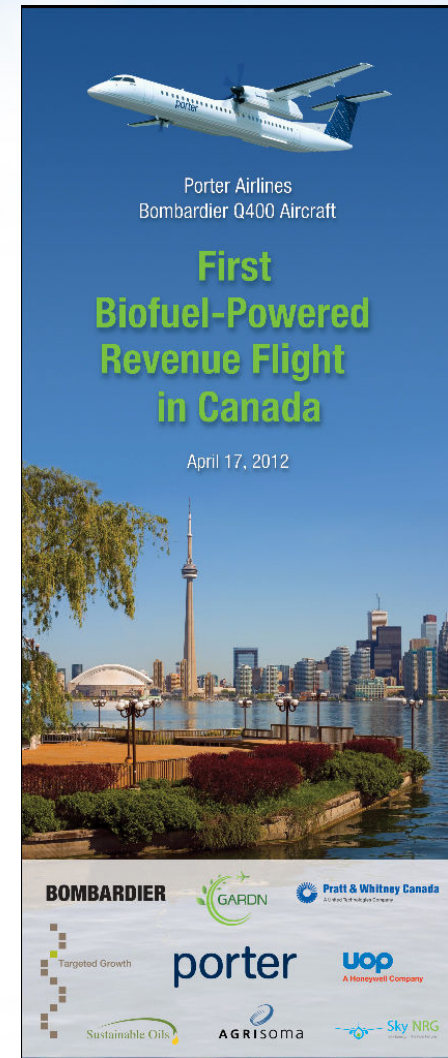
Une société de United Technologies / A United Technologies Company

2.GARDN Projects Tangible Results

- Porter Flight – April 17, 2012
- 1st Bio-fuel revenue flight in Canada
- One wing on 50/50 fuel
 - 49% Camelina, 1% Carinata



- Hélène V. Gagnon, VP, CSR, Bombardier Aerospace;
- Robert J. Deluce, CEO, Porter Airlines;
- Hon. Glen Murray, Minister of Training, Colleges and Universities, Ontario;
- Sylvain Cofsky, Executive Director, GARDN



3. Biofuels projects

1. Evaluation of Bio-SPK Production from a New Canadian Feedstock Crop, Carinata

A project from:



Objectives

Qualify an alternative and sustainable fuel source; reduce impact of fuel cost on aviation industry through reduction of feedstock and processing cost; expedite and promote commercialization of Canadian biojet fuel source, namely Carinata.

Partner

CRRC · NRC

2nd Pillar: Networking Activities



- Active presence on local, national, international tribunes and structuring environmental aviation events (Farnborough / Paris Air Show / Geneva / Washington DC)
- GARDN's Annual Conferences (Ottawa in 2011 / Toronto in 2012)
- GARDN's AGMs (Montreal / Ottawa / Toronto) and other instances
- MOU with Air Transport Action group (ATAG)
- Technology Workshops
- www.gardn.org and LinkedIn
- GARDN's Student Green Award 2011 / 2012
- GARDN's Recognition Award 2011 / 2012

In Conclusion



- One of the very few Canadian initiatives to enable a non-refundable funding companies.
- The first Canadian initiative on green aviation.
- A response to a real need: the funding of industry projects of TRL 3 to 7.
- Now well recognized internationally as a Canadian voice on green aviation.

GARDN: the focal point for environmental research



Thank You!

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