



LIBRARY of PARLIAMENT
BIBLIOTHÈQUE du PARLEMENT

BACKGROUND PAPER



The Canadian Aerospace Industry and the Role of the Federal Government

Publication No. 2013-21-E
25 April 2013

Dillan Theckedath

Economics, Resources and International Affairs Division
Parliamentary Information and Research Service

Library of Parliament ***Background Papers*** provide in-depth studies of policy issues. They feature historical background, current information and references, and many anticipate the emergence of the issues they examine. They are prepared by the Parliamentary Information and Research Service, which carries out research for and provides information and analysis to parliamentarians and Senate and House of Commons committees and parliamentary associations in an objective, impartial manner.

© Library of Parliament, Ottawa, Canada, 2013

*The Canadian Aerospace Industry and
the Role of the Federal Government*
(Background Paper)

Publication No. 2013-21-E

Ce document est également publié en français.

CONTENTS

1	INTRODUCTION.....	1
2	THE CANADIAN AEROSPACE INDUSTRY.....	1
2.1	Background.....	1
2.2	Performance.....	1
2.3	Analysis.....	2
3	THE ROLE OF THE GOVERNMENT OF CANADA IN THE AEROSPACE INDUSTRY.....	4
3.1	Government of Canada Programs.....	4
4	THE 2012 AEROSPACE REVIEW	6
5	CONCLUSION	8

THE CANADIAN AEROSPACE INDUSTRY AND THE ROLE OF THE FEDERAL GOVERNMENT

1 INTRODUCTION

The Canadian aerospace industry is a world leader in several areas and an important contributor to Canada's economy. The November 2012 report of the federal Review of Aerospace and Space Programs and Policies (also known as the Aerospace Review) has put a spotlight on this industry and its related federal government support. This paper examines the Canadian aerospace industry and the role of the support it receives from the Government of Canada.

2 THE CANADIAN AEROSPACE INDUSTRY

2.1 BACKGROUND

Canada's aerospace industry can trace its roots to the very beginning of the aviation era, starting with the early experimental work of Alexander Graham Bell during the 1890s.¹ By the late 1930s, the industry was employing some 4,000 workers. Upon Canada's involvement in the Second World War and continuing afterwards, this workforce grew rapidly, along with domestic production capacity and expertise. Eventually, this capacity and expertise was extended to space technologies, such as satellites and the famous Canadarm robotic manipulator.

Today, the Canadian aerospace industry is the world's fifth largest by revenue,² and is a leader in the production of aircraft, helicopters, engines and aerostructures, along with maintenance and repair services.³ Canada is particularly strong in the areas of simulators, landing gear and aircraft environmental systems.⁴ Furthermore, Canada continues to be a leader in space technologies such as satellites and earth-based satellite control systems.⁵

Many of the world's top aerospace companies conduct a portion of their manufacturing as well as research and development (R&D) activities in Canada;⁶ this phenomenon, in part, has also resulted in the creation of clusters of aerospace firms in the Montréal and Toronto regions. This industry is Canada's second-most research-intensive (R&D as a percentage of industry gross domestic product).⁷ Moreover, many advanced production practices and engineering procedures developed in the aerospace sector have been successfully implemented in other Canadian industries.⁸

2.2 PERFORMANCE

A snapshot of the Canadian aerospace industry in 2011 revealed a strong industry with growing direct employment and investment, and revenues buoyed largely by civilian sales. In that year, the industry:⁹

- earned \$22.4 billion in revenues;

- furnished industry output equal to 1.3% of Canada's gross domestic product;¹⁰
- saw a tripling of revenue in the space-related segments from \$1 billion in 1996 to \$3 billion;¹¹
- earned 77% of revenue from civilian sales and 23% from military contracts;
- derived 76% of revenue from exports;
- directly employed over 87,000 workers, up 7.6% from the previous year;
- had total (direct, indirect and induced) Canadian employment of 160,000 persons;
- paid an average wage in aerospace manufacturing that is 50% higher than the average manufacturing wage;¹²
- employed 75% of its workforce in high-skill positions (22% were scientific staff and engineers); and
- invested more than \$2.7 billion, of which \$2 billion went to R&D.

2.3 ANALYSIS

The strength of Canada's aerospace industry is attributable to many factors. These include:

- continued direct federal government assistance – from the National Research Council (NRC) Canada's involvement in the 1940s, the Defence Industries Productivity Program in the 1970s and 1980s, the Technology Partnerships Program of the 1990s,¹³ to the Strategic Aerospace and Defence Initiative (SADI) program of today – which has helped advance aerospace R&D;
- additional indirect federal government support through tax credits for eligible R&D;
- high levels of investment relative to revenue, often indicative of an industry building its competitive advantage through time;
- world-class post-secondary institutions, which provide both research expertise and research facilities, and help develop the skilled and knowledge workers critical to R&D-intensive industries such as the aerospace industry; and
- geographic proximity to established trade partners in the United States and Western Europe, as well as to new markets in Asia, which is extremely important in industries with long production cycles like those experienced in the aerospace industry.¹⁴

According to the Aerospace Industries Association of Canada, a key characteristic of this industry is its high level of global integration. Producers are very involved with their subsidiaries and suppliers, who operate in whatever jurisdiction is most suitable for their requirements. Thus, trade agreements that allow for the free flow of parts, components and human resources among countries are very important for the aerospace industry.¹⁵

Lastly, the very long research and product development cycles, combined with the incremental nature of innovation, make early stage funding for R&D – provided in part through government assistance – particularly important.

Table 1 provides selected information about the industry’s performance over the period 2005 to 2011.

Table 1 – Selected Performance Indicators of the Canadian Aerospace Industry, 2005–2011

Year	2005	2006	2007	2008	2009	2010	2011
Revenue (\$ billions)	21.8	22.1	22.7	23.6	22.2	21.0	22.4
Employment (thousands of persons)	75.0	79.0	82.0	83.0	79.0	81.0	87.0
Investment (\$ billions)	1.4	1.7	1.6	2.0	1.9	2.2	2.7
Exports (\$ billions)	18.5	17.7	18.6	19.3	17.3	15.3	16.4

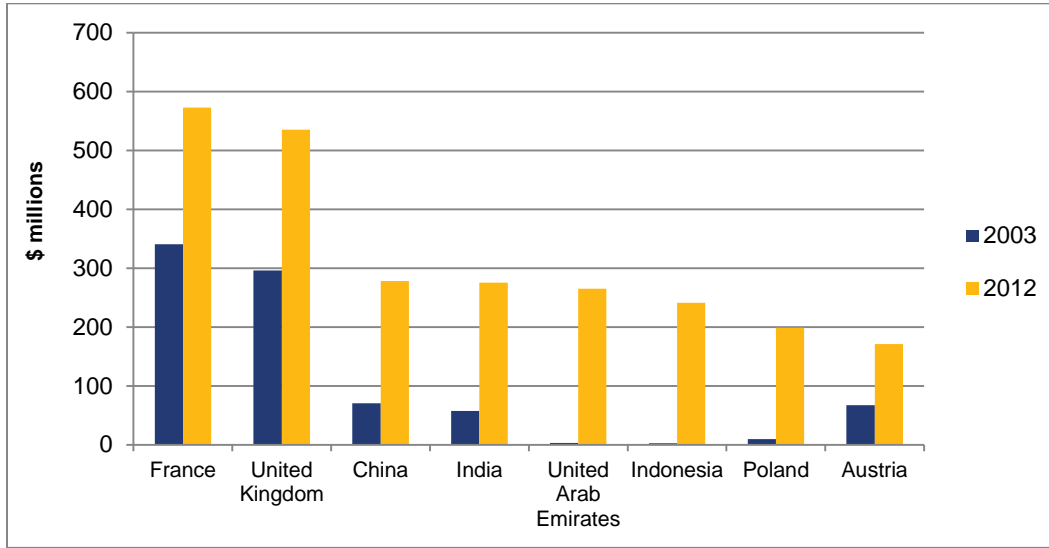
Source: Table prepared by the author using data obtained from Aerospace Industries Association of Canada, “[Slide 11: Comparative Annual Performance](#),” *The State of the Canadian Aerospace Industry: Performance 2011, July 2012*.

Table 1 reveals that, in general, the Canadian aerospace industry showed steady growth from 2005 to 2008. Then, with the effects of the financial crisis, the industry’s performance dipped in 2009, but began to recover in 2010 and grew in 2011. Although revenue and exports did not return to their peak 2008 levels, investment grew 35% from \$2.0 billion to \$2.7 billion over the recovery years. However, perhaps more relevant is an examination of the entire seven-year period between 2005 and 2011, which shows that industry employment grew by 16% and investment grew by 93%.

During the longer period of 2001 to 2010, the aerospace products and parts (APP) subsector (i.e., aircraft, components and missiles) generally outperformed the transportation equipment manufacturing sector as a whole. For example, APP manufacturing value-added per production employee grew at an annual rate of 1.8%, compared to almost no growth for the overall transportation equipment sector.¹⁶ In addition to the other factors cited earlier, many of these gains stemmed from increased exports to China, India, France and the United Arab Emirates.

The changes in the destination of Canadian exports of APP from 2003 to 2012 are noteworthy. Although the majority of these exports continued to head for the United States, the percentage of U.S.-bound exports diminished, going from 80% of total APP exports in 2003 to 56% in 2012. Conversely, APP exports to the United Kingdom, China and India rose by 81%, 295% and 380%, respectively. These data suggest that the aerospace industry is diversifying its export market, and appears to be less reliant upon the United States for its revenue than it has been in the past. Figure 1 shows the growth in aerospace exports to selected destinations between 2003 and 2012.

Figure 1 – Value of Aerospace Products and Parts Exports to Selected Destinations, 2003 and 2012



Source: Figure prepared by the author using data obtained from Industry Canada, “[NAICS 3364 – Aerospace Products and Parts Manufacturing](#),” *Trade Data Online*.

On the international stage, Canada ranked third of six countries studied by the federal Aerospace Review – behind France and the United States, but ahead of Germany, the United Kingdom and Japan – with regard to aerospace R&D intensity.¹⁷ This performance has been consistent for Canada over the past few years.

Conversely, the Aerospace Review found that Canada ranked fifth of five countries studied – behind the United States, Germany, France and the United Kingdom – for the share of total aerospace R&D funded by government. For example, in 2009, 62% of aerospace R&D in the United States was funded by government, whereas in Canada, the share was only 16%.¹⁸ This high level of American government R&D investment has been consistent since the 1950s, with the creation and funding of both military and non-military (e.g., NASA) research organizations.¹⁹

3 THE ROLE OF THE GOVERNMENT OF CANADA IN THE AEROSPACE INDUSTRY

3.1 GOVERNMENT OF CANADA PROGRAMS

Most of the world’s aerospace industries are supported to varying degrees by their national governments. States around the world give various reasons to justify government involvement in the aerospace industry. These include:

- the support of defence and national security requirements;
- interests concerning sovereignty and national pride;

- high R&D costs, high risks and long payback periods associated with the industry; and
- the development of leading-edge technologies and skilled employees that also benefit other industries.

Policy instruments used by governments to support the aerospace industry include:

- the provision of R&D funding;
- the financing of R&D infrastructure, education and training;
- defence program funding;
- government procurement; and
- financing for aircraft development and production.²⁰

Such government support of the aerospace industry often faces criticism as well as international challenges in certain circumstances for allegedly creating unfair subsidies that contravene existing trade agreements. In fact, the Aerospace Review noted that government support “provided to four of the world’s largest OEMs [Original Equipment Manufacturers] – Boeing, Airbus, Bombardier, and Embraer – has been challenged at one time or another through WTO [World Trade Organization] processes.”²¹

Much like those of other nations, the Canadian federal government is a major stakeholder/supporter of Canada’s aerospace industry, and has consistently been so since the Second World War. Moreover, over the past four decades, this support has come in the form of tax credits, direct funding or various types of contribution agreements through the aerospace-related programs listed earlier in this paper. The following is a list of key Government of Canada programs and initiatives that can be used by the aerospace industry.

- **SADI** – Through Industry Canada, this program has committed over \$800 million in repayable contributions for 25 aerospace R&D projects since 2007.²² This, together with its contribution to the Bombardier CSeries Program, brings the department’s commitment to the aerospace industry to more than \$1.2 billion over the same period.²³
- **Canadian Space Agency** – The Agency’s annual budget in 2011–2012 was \$425 million, a third of which was short-term funding from *Canada’s Economic Action Plan*.²⁴ This included funding for grants and contributions programs related to space science and technologies.
- **NRC Aerospace** – This program works with Canadian businesses and governments that conduct R&D. Its annual budget is \$58 million (59% of which is provided through federal funding; the remainder comes from industry partners). It works in concert with NRC’s Industrial Research Assistance Program, which provides \$24 million in funding for aerospace projects conducted by Canadian small and medium-sized enterprises (SMEs).²⁵
- **Green Aviation Research and Development Network** – This initiative was established through the Business-Led Networks of Centres of Excellence,²⁶ and

has had annual funding of over \$3 million per year from 2009 to 2013, with matching funds from the private sector.²⁷

- **Industrial Research Chairs initiative** and **Collaborative Research and Development Grants** – Administered by the Natural Sciences and Engineering Research Council, this initiative and these grants allow Canadian industry to harness the country’s research expertise and equipment. Federal funding of \$20 million (2011–2012) supports these endeavours.²⁸
- **Sustainable Development Technology Canada** – This organization, which operates at arm’s length from the Government of Canada and primarily provides funding for SMEs conducting R&D in clean technologies, contributes \$9.5 million to aerospace research each year.²⁹
- **Defence Research and Development Canada** – This special operating agency of the Department of National Defence is responsible for many defence-themed R&D projects, including those related to aerospace, such as radar navigation and space systems.³⁰
- **Government procurement** – The Government of Canada purchases many aerospace-related goods and services to address operational requirements across numerous departments.³¹
- **Scientific Research and Experimental Development Tax Credit Program** – This program, which is available to all Canadian business, provides a tax credit for a portion of eligible R&D expenses.

At several hundreds of millions of dollars per year, the federal government’s recent investments in the aerospace industry are of relatively high value. For example, in comparison, the two-year average for the forestry industry (2009–2011) was \$81 million; for tourism, it was \$140 million.³² Some commentators have questioned the Government of Canada’s substantial investments in the aerospace industry, citing, amongst other things, value-for-money concerns and the risk of creating inefficient industries.³³ In contrast, some researchers have argued that the industry’s success “depends on rapid technological progress,” thus “government support for corporate R&D is essential.”³⁴ Commentators also contend that governments have had to intervene in order for their aerospace industries to remain competitive with those of such countries as the United States.³⁵

4 THE 2012 AEROSPACE REVIEW

On 27 February 2012, the Government of Canada launched the independent Aerospace Review to examine how federal policies and programs can maximize the performance of the already strong Canadian aerospace industry, given its importance to economic prosperity and national security.³⁶ Headed by David Emerson, a former Minister of Industry, the review panel was tasked with developing fiscally neutral recommendations that would help address improving the areas of “innovation, market access and development, skills development, procurement, and supplier development.”³⁷ Notwithstanding the Canadian industry’s past successes, the Aerospace Review also aimed to ensure that current and future federal aerospace policies continue to support and strengthen the industry’s global competitiveness.³⁸

The aerospace industry, like others, faces many challenges. The following are its primary hurdles.

- **Increased competition from emerging economies** – No longer just the suppliers of early stage aerospace components, rising economic powers such as Brazil and India are aiming to improve their aerospace industries by producing and exporting more products higher up the value chain, including finished products such as aircraft.
- **New threats to national security and sovereignty** – To address global terrorism and other non-traditional armed conflict, governments are relying less on traditional military aircraft to support defence and national security policies.
- **An aging workforce** – As Canada's workforce continues to age, its pool of skilled labour (vital to high-tech industries) is shrinking.

During the review, many stakeholders were consulted. Subsequently, the Aerospace Review's two-volume final report was made public on 29 November 2012 and recommended that the federal government:³⁹

- include aerospace and space as strategic sectors in the Science and Technology Strategy;⁴⁰
- prioritize key aerospace technologies to help develop and implement improved aerospace-related policies and programs;⁴¹
- promote Canada's space policies at the Cabinet level, with the Minister of Industry providing annual updates about Canada's role, capacity and progress in space;
- create a large-scale aerospace technology demonstration program to encourage new technology adoption and to help support aerospace industry commercialization efforts;
- maintain current levels of SADI funding and help ensure the program is more effective at spurring the development of next-generation aerospace and space technologies, and generally help make aerospace programs easier for SMEs to use;
- co-fund a Canada-wide program to help improve collaboration among aerospace firms, researchers and academics;
- help make Canada more internationally competitive by negotiating multilateral trade agreements that create consistent and competitive conditions for Canadian aerospace firms, with clear regulations regarding government support for domestic aerospace industries; and
- stabilize the Canadian Space Agency's base funding for 10 years, seek multiple funding sources for major space projects, and assist in promoting increased international cooperation to help share in the risks, costs and rewards of such projects.

The Aerospace Review's report recommended that federal government aerospace policy should be raised to a more prominent position, and that related programs should be modified to make them easier to use and more effective. The report also

suggested that increased stakeholder involvement, through increased public/private/academic collaboration and a technology demonstration program, for example, might improve the industry's performance.

The Aerospace Industries Association of Canada strongly supported the Aerospace Review panel's recommendations and its "fiscally neutral public policy changes designed to boost the sector's competitiveness and its long-term benefits for Canada."⁴²

Upon its release, the Minister of Industry welcomed the Aerospace Review's final report and committed to examining its recommendations.⁴³ Later, in Budget 2013, the federal government announced the following measures, which appear to be linked to the recommendations of the Aerospace Review:⁴⁴

- stable funding of \$1 billion over five years for SADI, as well as a review of the program to ensure it meets the needs of industry;
- the creation of an Aerospace Technology Demonstration Program worth \$110 million over its first four years and \$55 million per year thereafter; and
- the start of consultations on the creation of a National Aerospace Research and Technology Network that "would engage stakeholders in sector, post-secondary institutions and government laboratories to identify strategic technology areas and facilitate collaborative research and development."

5 CONCLUSION

With its high level of high-skill employment, revenue, R&D investment, leading-edge technology and exports, the aerospace industry is an important contributor to Canada's economic well-being. By diversifying its export clientele, the industry is reducing its dependency upon a small pool of established economies, in addition to increasing its level of global integration. The Aerospace Review found the industry to be in a good position to meet its current and future challenges, including increased competition from emerging economies, provided it has suitable stakeholder support. Consequently, the Government of Canada has committed to continue its support of the aerospace industry and to help ensure its global competitiveness for the future.

NOTES

1. Aerospace Review, "[Review mandate and process](#)," Part 1 in *Volume 1: Beyond the Horizon: Canada's Interests and Future in Aerospace*, Industry Canada, Ottawa, November 2012.
2. Ibid. The report indicates that Canada ranks behind the United States, France, Germany and Britain, but ahead of Japan, Russia, Brazil and China.
3. Ibid.
4. Industry Canada, "[Strategic Aerospace and Defence Initiative \(SADI\)](#)," *Industrial Technologies Office*.

5. Aerospace Review, "[Executive summary](#)," *Volume 2: Reaching Higher: Canada's Interests and Future in Space*, Industry Canada, Ottawa, November 2012.
6. Ibid.
7. Aerospace Review (November 2012), "[Analysis and recommendations](#)," Part 3 in *Volume 1*. Please note that gross domestic product is a measure of the total final value of all goods and services in an economy or some division thereof.
8. Pravco Aviation Review L.L.C., [Brazil, Russia, India and China Governments' Aerospace Strategies and National Policies: Implications to Canada's Aerospace Industry](#), Submission to the Aerospace Review, July 2012.
9. Aerospace Industries Association of Canada, [The State of the Canadian Aerospace Industry: Performance 2011](#), July 2012
10. Statistics Canada, [Gross domestic product, expenditure-based](#). According to Statistics Canada, Canada's gross domestic product for 2011 was \$1.76 trillion.
11. Organisation for Economic Co-operation and Development, "[19. Canada](#)," "5. National Spotlights on Selected Countries," in *The Space Economy at a Glance 2011*, 22 July 2011.
12. Aerospace Industries Association of Canada, [The Aerospace Industries Association of Canada \(AIAC\) Submission to the Standing Committee on Finance's Pre-budget Consultations: Immediate Measures to Maintain and Increase our Global Aerospace Market Share](#), August 2011.
13. Industry Canada, "[Evaluation of the Technology Partnerships Canada Program](#)," *Industrial Technologies Office*, October 2003.
14. Vinod Rajasekaran and Aaron Good, [Attracting Global Mandates and Investment in Canada: Synthesis Report](#), Public Policy Forum, Ottawa, 2011.
15. AeroStrategy Management Consulting, [Aerospace Globalization 2.0: Implications for Canada's Aerospace Industry: A Discussion Paper](#), November 2009.
16. Industry Canada, "[Definition: Transportation Equipment Manufacturing \(NAICS 336\)](#)," *Canadian Industry Statistics (CIS)*.
17. Aerospace Review (November 2012), Part 3 in *Volume 1*.
18. Ibid.
19. Jorge Niosi (UQAM/Canada Research Chair on the Management of Technology), [R&D Support for the Aerospace Industry: A Study of Eight countries and One Region: A Report](#), Submission to the Aerospace Review, 13 July 2012.
20. Industry Canada, [National Aerospace and Defence Strategic Framework: 2005–2025](#), 2005.
21. Aerospace Review (November 2012), Part 3 in *Volume 1*.
22. Industry Canada, "Strategic Aerospace and Defence Initiative," *Industrial Technologies Office*.
23. Office of the Auditor General of Canada, "[Transfer Payments to the Aerospace Sector – Industry Canada](#)," Chapter 6 in *2012 Fall Report of the Auditor General of Canada*.
24. Aerospace Review (November 2012), "[Canada in space](#)," Chapter 2.2 in *Volume 2*. For more information, see the website of the [Canadian Space Agency](#).
25. For more information, see National Research Council Canada, "[Aerospace](#)."
26. For more information, see Government of Canada, Networks of Centres of Excellence of Canada, [Business-Led Networks of Centres of Excellence Program](#).

27. For more information, see the website of the [Green Aviation Research & Development Network](#).
28. For more information, see Natural Sciences and Engineering Research Council of Canada [NSERC], [Industrial Research Chairs](#); and NSERC, [Collaborative Research and Development Grants](#).
29. For more information, see the website of [Sustainable Technology Development Canada](#).
30. Defence Research and Development Canada, [Defence R&D Canada Research Centres](#). The value and number of the agency's aerospace projects can vary from year to year.
31. The variability and scope of aerospace procurement makes it difficult to determine the value for the total annual amount purchased by the federal government.
32. Government of Canada, Table A2.11, "Supporting Industries and Communities (millions of dollars)," in [The Stimulus Phase of Canada's Economic Action Plan: A Final Report to Canadians](#), March 2012. It should also be noted that the Canadian automotive sector receives government support as well (e.g., the \$250-million Automotive Innovation Fund). However, given the large federal investments in the automotive industry to offset the effects of the financial crisis of 2008, recent year averages were not considered to be "in scope," and thus, were not used for comparison.
33. See this commentary as an example: Fraser Institute, "[Industry Canada provides \\$13.7 billion in corporate welfare – and expects barely half back](#)," News release, 10 September 2012.
34. Jorge Niosi and Majlinda Zhegu, "[Aerospace Clusters: Local or Global Knowledge Spillovers?](#)," *Industry and Innovation*, Vol. 12, No. 1, March 2005, pp. 1–25.
35. Geoffrey Owen, "[Industrial Policy in Europe Since the Second World War: What Has Been Learnt?](#)," *ECIPE Occasional Paper*, No. 1/2012, p. 2.
36. Aerospace Review, "[Objective and Scope of the Review](#)" and "[Key Facts and Trends](#)," in *Discussion Paper*, February 2012.
37. Industry Canada, "[Launch of the Aerospace Review: Press Release](#)," News release, 27 February 2012.
38. Aerospace Review (February 2012), "[Objective and Scope of the Review](#)."
39. Ibid.
40. For more information about the Government of Canada's science and technology policy, please refer to Industry Canada, [Mobilizing Science and Technology to Canada's Advantage](#), Ottawa, 2007.
41. Ibid.
42. Aerospace Industries Association of Canada, "[Aerospace Industries Association of Canada welcomes Aerospace Review findings](#)," News release, 29 November 2012.
43. Industry Canada, "[Minister Paradis Welcomes the Aerospace Review Report](#)," News release, 29 November 2012.
44. Government of Canada, "[Helping Manufacturers and Businesses Succeed in the Global Economy: Aerospace and Space Sectors](#)," Chapter 3.2 in *Budget Plan: Jobs, Growth and Long-term Prosperity – Economic Action Plan 2013*, 2013.