27. Canada

Institutional framework

Canada's history in space goes back to the 1960s when it was the third country to send an artificial satellite into space (Alouette 1). Canada has over the years developed a dynamic space programme, positioning its space industry in several niche areas, including robotics, satellite communications and satellite radar imagery. Canadian space policy has been the subject of review during the last couple of years, with the publication of *the Aerospace Review* at the end of 2012, and the launch of the new space policy framework in February 2014. The new policy puts a strong emphasis on space applications to support national interests and also envisages increased private sector participation in space and an increased commercialisation of Canadian space activities. There will also be a continued emphasis on international collaboration and R&D.

Under the authority of the Ministry of Industry, the Canadian Space Agency (CSA) is responsible for the implementation of space policies in Canada. It had a budget of some CAD 462.4 million (USD 442.3 million) for the 2014-15 fiscal year. The Department of National Defence also supports dedicated military space activities, with Sapphire, Canada's first military satellite launched in February 2013. Canadian military space activities are co-ordinated by Director General Space, on behalf of the Minister of National Defence, within the Chief of Force Development organization. Current projects include satellite communications systems (Mercury Global, Protected MILSATCOM); Search and Rescue Satellite Aided Tracking System (SARSAT); Surveillance of Space; Polar Epsilon; Joint Space Support Project (JSSP); and Navigation Warfare (NAVWAR). Despite some years of decline, the Canadian space budget saw a 20% increase in funding over six years, when adjusting for inflation between 2007 and 2013. The earth observation and satellite communications programme funding (now the space data, information and services) almost doubled during the period, mainly due to Radarsat constellation investment needs. The science programme (space exploration), on the other hand, saw a budget cut of almost 40%.

The main programme of the Canadian Space Agency in 2013 was the earth observation and satellite communications programme (space data, information and services) which received CAD 288 million (USD 281 million) in funding. The main priorities of the programme are the Radarsat constellation mission, scheduled to be launched in 2018, and the development of microsatellites. Some CAD 95 million (USD 93 million) were allocated to the science programme (space exploration), which is responsible for the International Space Station (ISS) and other manned space operations as well as other science missions. The future Canadian space capacity activity aims to ensure future availability of skilled manpower in the space sector and industrial questions. ESA participation falls under this programme, and approximately CAD 30 million was allocated to ESA, mainly to earth observation.

Canadian space industry

Canada has a well-developed space industry, including about 200 private companies, in addition to research institutions and universities, some of which have some commercial activities. The ten biggest companies accounted for almost 88% of revenues and 64% of employment (Canadian Space Agency, 2013). Space manufacturing is mainly located in Ontario (more than half of the workforce) and in Quebec (19% of workforce). Some 7 993 people were employed in the space sector in 2012, an increase compared to 2011, with more than half defined as "highly" qualified' (engineers, scientists and technicians). Total Canadian space sector revenues amounted in 2012 to CAD 3.3 billion (USD 3.3 billion), a 4.5% decrease as compared to 2011 (Canadian Space Agency, 2013). Satellite communications applications and services generated the largest revenue share, followed by the earth observation sector. The applications and services segment generated two thirds of total revenues.

Key facts for Canada

Space budget as a share of GDP (2013): 0.026%.

Space budget per capita (2013): USD 11.7 (PPP).

Number of regional clusters including space industry: 2 (Ontario, Quebec).

Share in scientific production in satellite technologies (2013): 4.18%.

Share of space-related patent applications filed under PCT (2009-11): 2.43%.

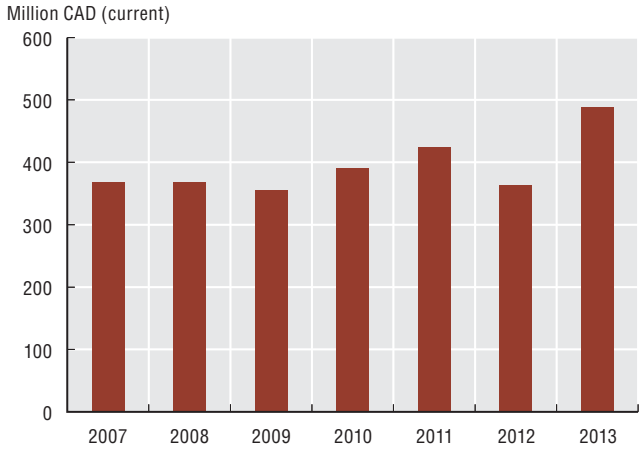
Subscribers of Direct-to-home (DTH) satellite services (2011): 2.9 million (21.60% of television households).

Number of operational satellites: 20.

Student performance in science (PISA 2012 mean score): 525 (above the OECD average).

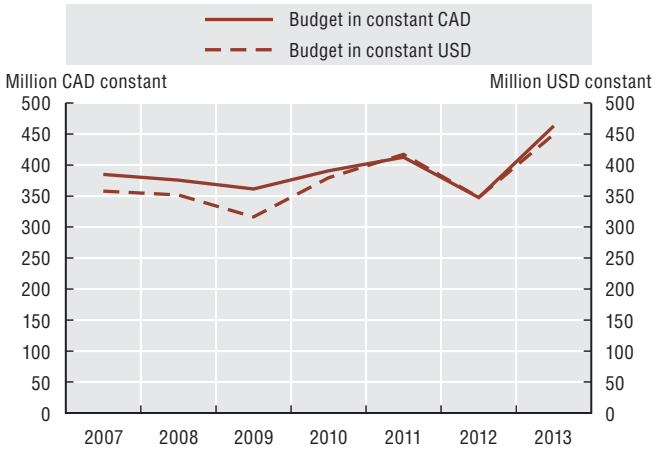
27.1. Canada's space budget

In CAD million (current), 2007-13



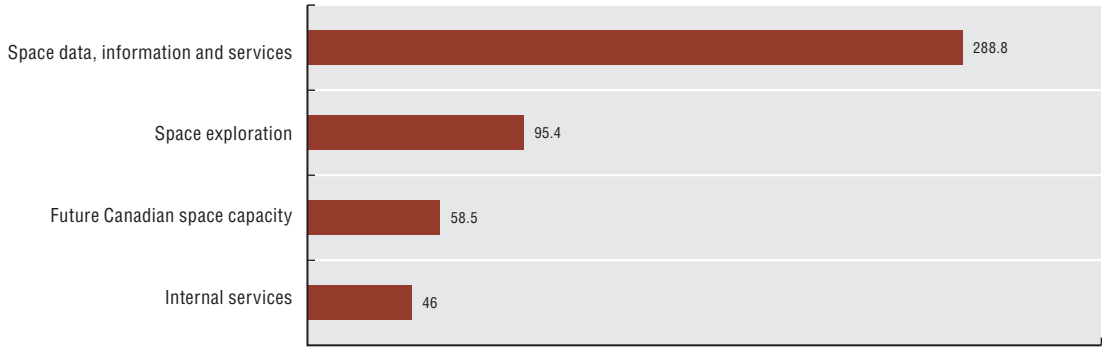
27.2. Canada's inflation-adjusted space budget

In constant CAD and USD million, 2007-13



27.3. Canadian Space Agency's budget by main programmes

In CAD million (current), 2013



Sources: OECD calculations based on Canada Treasury Board Secretariat, 2014a and 2014b.

Canadian aerospace industry

The Canadian aerospace industry comprised in 2012 more than 700 firms located in every region of the country according to the biggest industry association in the sector (Aerospace Industries Association of Canada, 2013). Collectively, these aerospace companies (manufacturing and MRO) employ 73 000 employees. If indirect (Canadian suppliers to firms where aerospace is their main activity) and "induced" (offset economic impact of direct and indirect) employment are included, an estimated 170 000 employees work in the extended aerospace sector in Canada (Aerospace Industries Association of Canada, 2013). Canadian aerospace industry revenues reached CAD 22.8 billion (USD 22.8 billion) in 2012, with nearly 80% in exports. Taking into account indirect and induced revenues, the total amount was CAD 42 billion (USD 42 billion). In terms of aerospace trade, Canadian aerospace industry exports amounted to USD 13.7 billion, with total imports amounting to USD 8.9 billion. Main trading partners were the United States, France, United Kingdom, Germany and China. Exports to the United States accounted for more than half of total exports (OECD, 2014).

Methodological notes

The Treasury Board Secretariat of Canada provides an official annual government expense plan which gives an overview of main estimates for the forthcoming year. Industry Canada and the Canadian Space Agency put together an annual report on plans and priorities, indicating planned spending for the different programmes. These are the data that are used in OECD calculations. The Canadian Space Agency conducts annual industry surveys sent to some 200 organisations (including private entities, research organizations and universities) with strategic interests in the space industry, while the Aerospace Industries Association of Canada reports and aggregates data from the different provincial industry associations. Differing industry surveying methods may account for differences in data. For the trade statistics the classification code HS88 (Harmonised System, 2007) for Aircraft, spacecraft and parts thereof has been used, with Canada as reporting country.

Sources

Aerospace Industries Association of Canada (AIAC), *www.aiac.ca*.

Canada Treasury Board of Canada (2014a), 2014–15 Estimates, Parts I and II: The Government Expenditure Plan and Main Estimates,Ottawa.

Canada Treasury Board of Canada (2014b), Reports on Plans and Priorities (RPP): The Canadian Space Agency 2010-11, Ottawa.

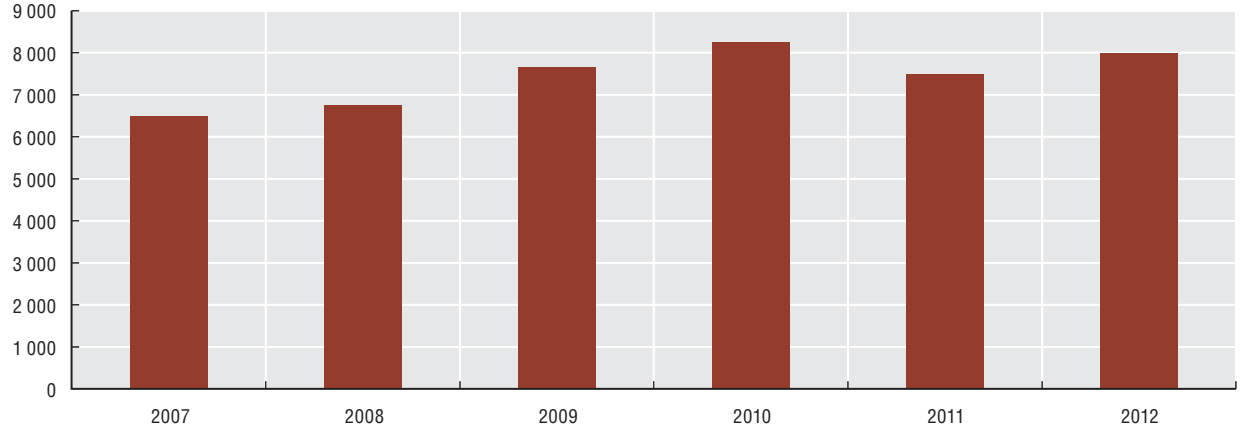
Canadian Space Agency,*www.asc-csa.gc.ca*.

OECD *STAN Bilateral Trade Database by Industry and End-use (BTDIxE)*, data extracted April 2014, *www.oecd.org/sti/btd*.

OECD, *Main Science and Technology Indicators database, www.oecd.org/sti/msti*.

27.4. Canadian space sector employment

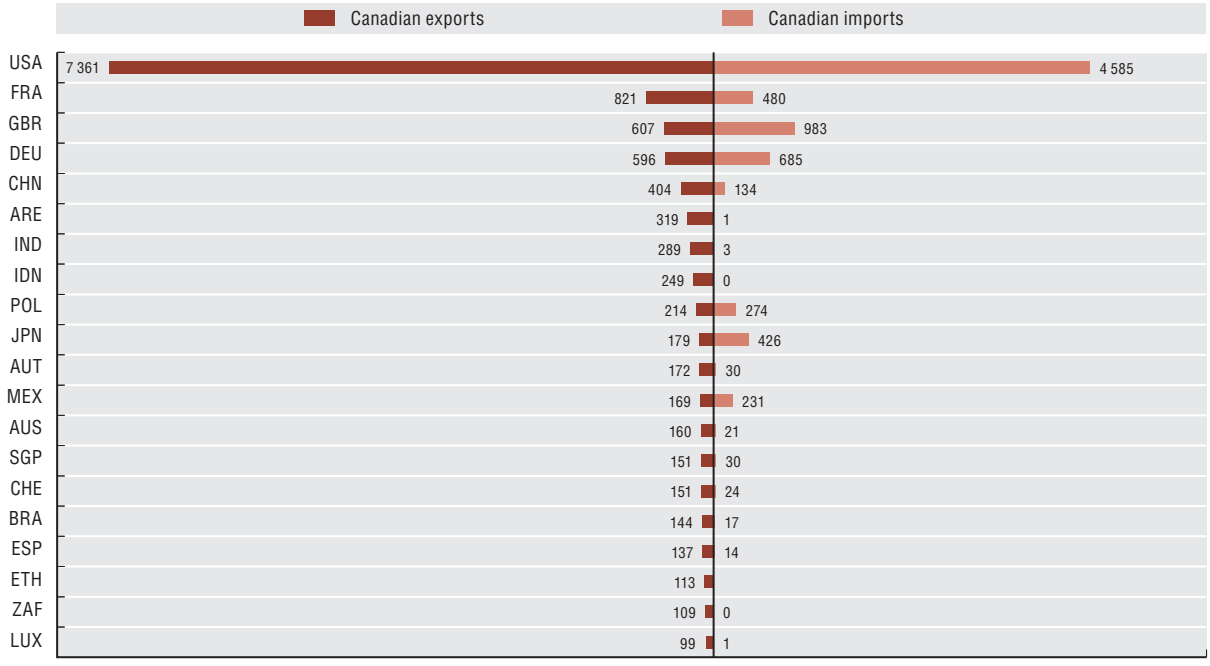
Number of employees, 2007-12



Source: Canadian Space Agency, 2013.

27.5. Canada's main aerospace trade partners

In USD million (current), 2012



Source: OECD STAN Database, 2014,*www.oecd.org/sti/btd*.

StatLink http://dx.doi.org/10.1787/888933142045