eagar®

EUROPEAN ASSESSMENT OF GLOBAL PUBLICLY FUNDED AUTOMOTIVE RESEARCH

Publicly funded automotive research in Canada

SEVENTH FRAMEWORK PROGRAMME

Authors:
Yue Hou, Alexander Holleis, Werner Hofegger, AVL List GmbH
Fabian Schmitt, IKA-RWTH

This report is a deliverable from the Project EAGAR, "European Assessment of Global Publicly Funded Automotive Research, Targets and Approaches", supported by the Seventh Framework Programme.
Project Number: 218529
Duration: September 2008 until October 2010.
EAGAR Partner Organisations:

- AVL LIST GmbH, AUSTRIA
- RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN, GERMANY
- RICARDO UK LIMITED, UNITED KINGDOM
- FRAUNHOFER-GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V, GERMANY
- IFP-INSTITUT FRANCAIS DU PETROLE, FRANCE
- IDIADA AUTOMOTIVE TECHNOLOGY SA, SPAIN
- NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK – TNO, NETHERLANDS

Website: www.eagar.eu

Graz, Aachen, April 2010

TABLE OF CONTENTS

INTRODUCTION 3

1.1 Background 3

1.2 Objectives 3

1.3 Methodologies 3

1.4 General Information and Automotive Data 5

1.5 National Funding Organisations and Hierarchies for Automotive Research 6

1.6 The efficiency, flexibility, and experienced bureaucracy of the funding process 23

DISCUSSION AND CONCLUSION 25

REFERENCES 26

ABBREVIATIONS 27

ANNEX 28

Introduction

1.1 Background

The FP7 project EAGAR benchmarks the current public automotive research activities at international level, in particular the European Union with Brazil, Canada, China, India, Japan, Malaysia, Russia, South Korea, the United States and 13 EU Member States.
EAGAR identifies the national road transport visions and roadmaps, research priorities, supported key topics, technology pathway, as well as the level of investment. This enables a direct comparison of national automotive R&D policies relating to the environment, safety and congestion.
The EAGAR study provides a key perspective on global investments designed to improve automotive vehicle technologies for a greener, safer and smarter road transport system.

1.2 Objectives

This deliverable report summarises the situation of the research and technical development (RTD) funding system in Canada with respect to published vision statements, research targets and roadmaps, the national funding programmes of the last years and the governance of automotive RTD funding in Canada.
The report is basis for the subsequent benchmarking analysis, which delivers the key results of EAGAR addressing the following issues:

- Overview of national road transport visions, research agendas and roadmaps
- Comparison of automotive research priorities and investments focused on vehicle technologies
- Characteristics of national automotive research funding systems and approaches
- Potential international cooperation areas from a European perspective

This study benefits the competitiveness of Europe and enables the stakeholders to adjust its visions & plans for the future. Date of publication: September 2010. It is available from the EAGAR website WWW.EAGAR.EU as deliverable D.2.2.B

1.3 Methodologies

This country report is based on comprehensive investigations via desk research and individual feedback from experienced project managers and researchers. The methodology used was developed in the first months of the project. It is consistent for all target countries. The data collection was mainly done from May to November 2009.
The four main categories are:

- General and automotive data about the country
- Published challenges, visions, targets for automotive research
- Funding organisations and hierarchies for automotive research
- National public funding programmes with dedicated calls or permanently open between in the years 2006 to 2009.

Disclaimer: This document presents quantitative and qualitative data from various sources. Due to the complexity of the project and the large amount of sources of data, regularly changing during the duration of the project, it was not possible to thoroughly validate all details. The EAGAR project partners cannot guarantee that the data presented is either complete or correct. The value of some of these data is mainly explorative, as a first step in an indicators development process. In conclusion, the data provided here may be difficult to interpret, are not exhaustive and may need further development. Comments by stakeholders on the coverage, relevance and interpretation of the indicators provided, as well as observations on new indicators that could be employed to improve the analysis of publicly funded automotive research are welcomed by the EAGAR project consortium.

Any quotation of the data in this document should make reference to the above disclaimer. The EAGAR project partners and EC accept no liability for any issues that arise from actions that may be taken as a result of reading this report.

1.4 General Information and Automotive Data

General Information

Canada has the second-largest national territory in the world (9.97 million km²), it covers most of North America. Its population of 33.4 million people lives mainly in urban regions along the southern border of the country. Canada's economy is the eight largest in the world. Canada is a federation comprising ten provinces and three territories. It is a parliamentary democracy, with a constitutional monarchy. Canada is one of the world's wealthiest nations, and it is a member of the Organisation for Economic Co-operation and Development (OECD) as well as the G8. Moreover, it is one of the world's top ten trading nations as well as a member of the North American Free Trade Agreement (NAFTA) signed by the governments of the United States, Canada, and Mexico creating a trilateral trade agreement in North America. The sizeable Canadian manufacturing sector is located mainly in southern Ontario and Quebec. The automotive and aeronautic sectors are the most important industries in this area.

The role and importance of road transport in Canada and significance of domestic automotive industry

Canada has nearly 900,000 kilometres of road and its national highway system covers over 38,000 kilometres. Therefore, road transport is an important aspect of the national economy. In 2007, over 513 billion passenger km were travelled by road and national haulage of goods by road equated to 519 billion tonne-km. Due to the low population density the road transportation is essential to the Canadians. There are 576 vehicles per thousand inhabitants in the Canada with over 894 thousand new cars sold in 2008, along with 80 thousand two-wheelers and about 780 thousand commercial vehicles.[1]

Canada has grown steadily into one of the largest automotive producers in the world. Industry shipments have been CAN 58.2 billion in vehicles and CAN 28.6 billion in automotive parts in 2007. [2] The automotive industry is Canada's largest manufacturing sector, accounting for 12 % of the manufacturing GDP and 24 % of the manufacturing trade. Capital investment in Canada's auto industry has averaged CAN 3.5 billion annually over the past 10 years. Regarding the R&D Canada is expanding its capacity for automotive R&D and innovation, and invests heavily in skills and highly qualified personnel. Canada is home to 22 passenger and commercial vehicle plants producing 2.6 million units annually. Leading multinational companies are: Chrysler, Ford, Freightliner, GM, Hino, Honda, PACCAR, Suzuki and Toyota. Leading Canadian companies: Linamar and Magna.[3]

1 Statistic Canada, 2009
2 Government of Canada, 2009
3 Canadian Industry Statistics, 2008

National spending and funding for research and technological development

In 2007 the domestic RTD spending was CAN 29.7 billion (about EUR 21 billion), which is 2.2 % of the GDP. The total public research funding is 37 % of the total domestic RTD.
In 2007 the automotive industry turnover was CAN 91.6 billion, which is 6.8 % of total GDP.
CAN 524 million (about EUR 372.33 million) were spend in automotive RTD in 2007 representing 1.7 % of the total RTD spendings.

Business, government, higher education sector, and non-profit organizations play an important part in the system of research and development. While their activities overlap, their roles are distinct. University research is inspired by the spirit of inquiry: businesses to integrate research findings into applications to create new products and processes. The Government and private-non-profit organizations perform and support research for the public good.
Business is the main R&D performing sector of the economy. Its research is usually targeted at proprietary product development. Even if most of the business research is performed by the sector itself, it also joins collaborative arrangements with other parties from different fields of interest. Partnerships with universities and colleges are particularly beneficial because they specialize in knowledge creation, offer economies of scale, and can quickly pool multidisciplinary research teams. These arrangements enable the industry to license technologies which incorporate not only the sponsored work, but also the accumulated knowledge of researchers partly supported by governmental funded projects. Since the industry is the leading R&D performer, institutions of higher education are becoming increasingly important. University research is the fastest growing component. [4] [5]

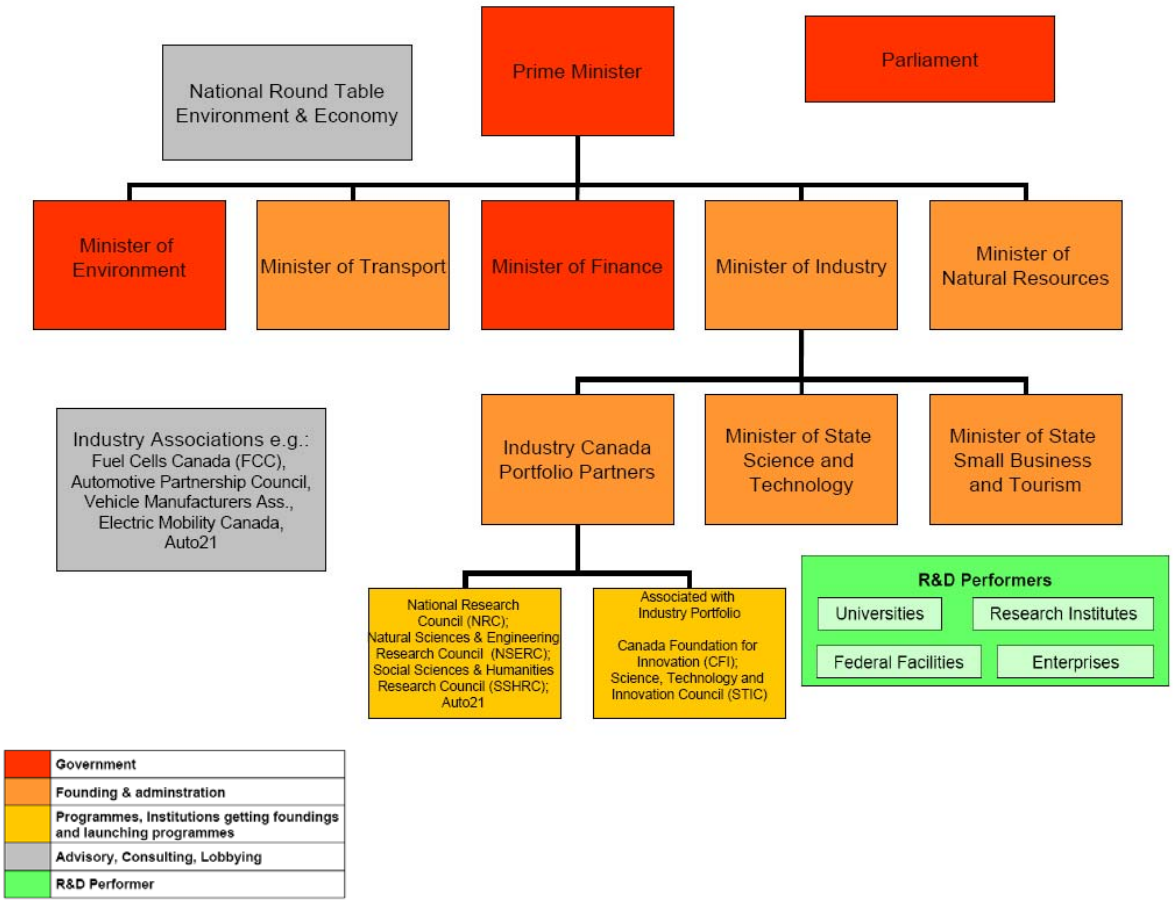
1.5 National Funding Organisations and Hierarchies for Automotive Research

The structure and governance of the national funding system

Government Canada is founding most of the related programmes. Relevant ministries are the Industry Canada and Transport Canada.

4 Invest in Ontario, 2009
5 Statistic Canada, 2009

Figure: Simplified overview of automotive research organisation structure and relationship in Canada covering organisations most relevant for EAGAR



Source: EAGAR

In general most of the automotive research funding and activities are financed and coordinated by the ministry of Industry and its related agencies and organisations.

The Industry Portfolio consists of federal departments and agencies. These organizations are uniquely positioned to support the government's goal of building a knowledge-based economy in all regions of Canada.
Industry Canada works in a partnership with the members of the Industry Portfolio to leverage resources and exploit synergies in numerous specific areas, e.g. innovation through science and technology.
This agencies are active in the research areas by themselves and in cooperation with different partners (universities, industry, ...). They also establish programmes and grant funding. This agencies advice the government in research related topics as well.

The National Round Table Environment & Economy has the goal to enhance the understanding and adoption of sustainable ways of life. It develops and promotes viable policy recommendations for all sectors of the society and for all regions of Canada.

Industry Associations like the Automotive Partnership Council, the Vehicle Manufacturer Association as well as Auto21 advice and influence the Canadian Government in its funding policy.
Transport Canada has for instance established ecoAction programmes and road safety targets.

Funding organisations and key players

Minister of Industry
http://www.ic.gc.ca/eic/site/ic1.nsf/eng/home

The "Industry Canada" launched, funded, and coordinated most of the EAGAR related research programmes.

The Minister of Industry is responsible for "Industry Canada's" mandate of making Canadians more productive and competitive in the knowledge-based economy, and promoting growth in employment and income as well as advancing sustainable development.

Through its agencies, sectors, branches, and directorates, as well as the Industry Portfolio, the Minister of Industry has jurisdiction over policy issues regarding: industry; trade, and commerce; science; consumer affairs; corporations, and corporate securities; competition and restraint of trade, including mergers and monopolies; bankruptcy and insolvency; intellectual property; telecommunications; investment; small businesses; and regional economic development across Canada.

Industry Portfolio
http://www.ic.gc.ca/eic/site/ic1.nsf/eng/h_00022.html

The "Industry Portfolio" consists of twelve federal departments and agencies. These organizations are uniquely positioned to support the government's goal of building a knowledge-based economy in all regions of Canada and to advance the government's job and growth agenda.
Industry Canada works has a partnership with the members of the Industry Portfolio to leverage resources and exploit synergies in numerous fields of interest, e.g. innovation through science and technology growth of small and medium-sized enterprises

Important for EAGAR related topics the Industry Portfolio includes among others the following associations:

Industry Canada (IC)
http://www.ic.gc.ca/eic/site/ic1.nsf/eng/h_00247.html

The Department has the mission to foster a growing, competitive, and more knowledge-based Canadian economy. The Department works with Canadians throughout the industry and in all parts of the country to improve conditions for investments, to improve Canada's innovation performance, to increase Canada's share of global trade, and to build a fair, efficient, and competitive marketplace. Programme areas include development of the industry and technology capability, fostering scientific research, evaluating and controlling telecommunication policies, promoting investment and trade, promoting tourism and small business development, and providing rules and services supporting the effective operation of the marketplace. "Industry Canada" aims at helping Canadians to contribute to the knowledge economy and to improve productivity and innovation performance through its three strategic objectives: a fair, efficient, and competitive marketplace; an innovative economy; a competitive industry and sustainable communities. IC is the responsible funding organisation for the Automotive Innovation Fund (AIF) established for providing automotive firms CAN 250 million over five years to support strategic, large-scale research and development (R&D) projects to build innovative, greener, more fuel-efficient vehicles. The AIF will support Canada's environmental agenda in advancing Canadian capabilities in fuel-efficient automotive technologies and greenhouse gas reduction.

National Research Council of Canada (NRC)
http://www.nrc-cnrc.gc.ca/eng/index.html

NRC helps Canadian companies to bring new technologies on the market. Through research collaborations and partnerships, community innovations, industry support, and commercialization opportunities, Canadian companies benefit from its expertise and technologies while increasing their own innovative potential.
NRC is the leading resource for research, development, and technology-based innovation of the Canadian Government. It comprises some 20 institutes and national programmes, covering a wide variety of disciplines and offering a broad array of services.
Services: NRC offers a comprehensive platform for research, technology testing, and business support services.

Facilities: From St. John's to Victoria, NRC operates hundreds of state-of-the-art R&D facilities.
Industrial Research Assistance:
NRC Industrial Research Assistance Program (NRC-IRAP) supports innovative Canadian SME's: Grow stronger, grow faster, and grow bigger through technology.

International: NRC's Global Reach:
NRC plays a leading role in providing Canada with strategic S&T information, intelligence, and connections to centres of advanced S&T around the world.

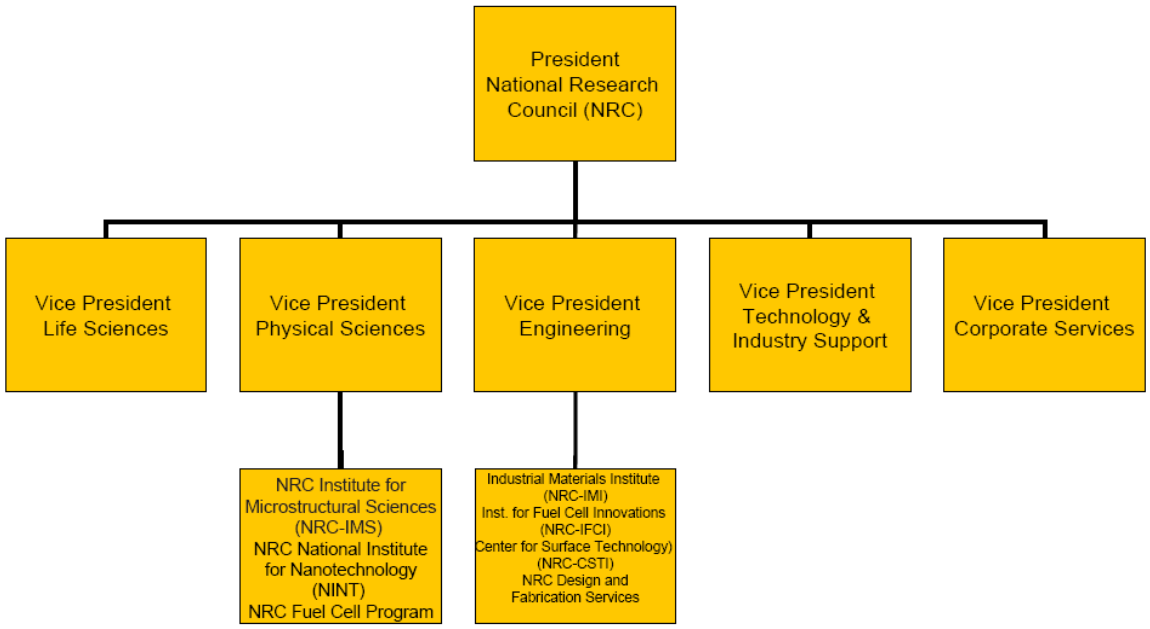
NRC Industry Partnership Facilities:
NRC gives companies the chance to co-locate at world-class NRC research places located across the country. Known as Industry Partnership Facilities, they offer unique services to innovative technology-driven companies.

Technology Platforms:
Lightweight Materials (aluminium and magnesium, polymer composites, and nano-composites, hybrid materials - metal and polymers, recycling and waste management)
Alternative Propulsion / Plug-In Hybrid Electric Vehicle – with focus on components (batteries; capacitors; sensors)
Testing Centre for Manufacturing Processes (scaling up and prototyping, low cost manufacturing, bonding and joining technologies, surface coatings)

Innovation Platforms:
NRC Automotive will support innovations by providing automotive companies coordinated access to NRC's research leaders and state-of-the-art facilities and expertise across science and engineering disciplines, industry advice, and support through NRC-IRAP and competitive intelligence by NRC-CISTI.

Automotive related institutes and programmes:
NRC Centre for Surface Transportation Technology
NRC Industrial Materials Institute
NRC Institute for Chemical Process and Environmental Technology
NRC Institute for Fuel Cell Innovation
NRC Institute for Information Technology
NRC Institute for Microstructural Sciences

Figure: Simplified organisation structure of the National Research Council Canada



Source: EAGAR

Natural Sciences and Engineering Research Council Canada (NSERC)
http://www.nserc-crsng.gc.ca/index_eng.asp

NSERC is a federal agency pursuing the vision to help Canada becoming a country of scientists and innovators for the benefit of all Canadians. The agency supports more than 26,500 university students and post-doctoral fellows in their advanced studies.

Social Sciences and Humanities Research Council of Canada (SSHRC)
http://www.sshrc.ca/site/home-accueil-eng.aspx

The Social Sciences and Humanities Research Council (SSHRC) is the federal agency that promotes and supports academic-based research and training in the humanities and social sciences. Through its programmes and policies, the Council enables the highest levels of research excellence in Canada, and facilitates knowledge sharing and collaboration across research disciplines, universities and all sectors of society. Founded 1977 SSHRC is governed by a Council that reports to the Parliament through the Minister of Industry. E.g. SSHRC is founding Auto21 and Canada Research Chairs.

The Canada Foundation for Innovation (CFI) is also associated with the Industry Portfolio.
http://www.innovation.ca/en/

The Canada Foundation for Innovation (CFI) is an independent corporation established by the Government of Canada in 1997. The Foundation's goal is to strengthen the capability of Canadian universities, colleges, research hospitals, and other non-profit institutions to carry out world-class research and technology development. By investing in research infrastructure projects, the CFI supports research excellence, and helps strengthen research training at institutions across Canada.
The CFI's programmes are designed to:

- strengthen Canada's capacity for innovation;
- attract and retain highly skilled research personnel in Canada;
- strengthen research training of young Canadians for the knowledge economy;
- promote networking, collaboration among researchers and multidisciplinarity;

- ensure the optimal use of research infrastructure within and among Canadian institutions.

The CFI is responsible for a budget of CAN 3.15 billion. These funds are invested in partnerships with the institutions and their funding partners from the public, private, and voluntary sector. On average, the CFI contributes 40 % of the total eligible project costs. Based on this formula, the total capital investment by the CFI, the institutions and their partners will exceed CAN 7.0 billion by 2010. Federal Budget 2009 includes an allocation of CAN 750 million of new funding to the Canada Foundation for Innovation (CFI) for "leading-edge research infrastructure." CAN 150 million of the total amount announced for the CFI budget 2009 were provided to increase the funding available for meritorious projects in the 2009 Leading Edge and New Initiatives Funds Competition. In addition, Budget 2009 provides CAN 600 million for future activities of the CFI, including the launch of one or more new competitions by December 2010. CFI is supporting the Automotive Partnership Canada.

Transport Canada (TC)
http://www.tc.gc.ca/eng/menu.htm

Transport Canada is responsible for transportation policies and programmes. It ensures that air, marine, road, and rail transportation are safe, secure, efficient, and environmentally responsible.
Transport Canada reports through the Minister of Transportation, Infrastructure, and Communities. It works with its portfolio partners, other government departments and jurisdictions, and industry to ensure that all parts of Canada's transportation system works well. TC is a funding organisation of ecoAction and road safety targets.

Natural Resources Canada (NRCan)
www.nrcan.gc.ca/es/etb/cetc/cetchome.htm

The Natural Resources Canada (NRCan) operates the Program of Energy Research and Development (PERD). PERD funds research and development designed to ensure a sustainable energy future for Canada in the best interests of both, economy and environment. It directly supports 40 % of all non-nuclear energy, R&D conducted in Canada by the federal and provincial governments, and is concerned with all aspects of energy supply and use, with the exception of nuclear energy. The Office of Energy Research and Development (OERD) provides PERD funds directly to partner departments and agencies, which afterwards collaborate with the following agencies:

- federal laboratories
- the private sector (industry, research institutes, companies, consortia and alliances, individuals)
- associations
- other funding agencies such as the National Sciences and Engineering Research Council (NSERC), the Industrial Research Assistance Program (IRAP), and Technology Early Action Measures (TEAM)
- universities
- provincial and municipal governments and research organizations
- international organizations

Several R&D strategies defined:

Strategy: Cleaner Transportation for the Future

- improved urban air quality including reduced emissions and greenhouse gas production
- transportation fuels from renewable energy sources
- improved vehicle and transportation system efficiency
- fuel cells, electric and hybrid vehicle components

EAGAR relevant partners are for instance:
Federal and provincial departments and agencies:

Environment Canada
Industry Canada
National Research Council Canada
Natural Resources Canada
CanmetENERGY
Transport Canada

OERD Research activities are carried out in collaboration with many private associations interested in energy.

The National Round Table Environment & Economy (NRTEE)
http://www.nrtee-trnee.com/eng/index.php

The purpose of the Round Table is to play the role of catalyst in identifying, explaining and promoting, in all sectors of Canadian society and in all regions of Canada, principles and practices of sustainable development.
The NRTEE works to enhance the understanding and adoption of sustainable ways of life. Relying on its unique convening role, it develops and promotes viable policy recommendations for all sectors of the society and for all regions of Canada.
Specifically, it:

- Undertakes exhaustive research on priority issues
- Brings divergent interests together
- Releases and disseminates the results of our work nationally and internationally
- Advises the federal government and key stakeholders
  It also calls upon federal departments, agencies and key national, provincial and territorial stakeholders to be agents of change. For instance, through one-on-one meetings with federal decision-makers – at Environment Canada, Natural Resources Canada, Finance Canada and Industry Canada, among others – it suggests ways to make environmental and economic concerns a central plank of their decision-making processes and encourage the adoption of their recommendations. Through the Minister of Environment, the Government of Canada may also ask the NRTEE to conduct research and provide advice on key and emerging issues.

Association of International Automobiles Manufacturers of Canada (AIAMC)
http://www.aiamc.com/

In 2009 the fourteen international automotive companies which are member of the AIAMC sold 814,070 new vehicles in Canada, down 3.1% from the 840,533 sold in 2008. The market share of the members grew to 55.7% in 2009 having surpassed 50% market share for the first time in 2008.

The AIAMC liaises with governments on the following issues:

- vehicle safety and environmental standards developed by federal and provincial governments;
- reducing barriers to international trade in vehicles, primarily tariffs;
- legal and consumer protection legislation, primarily at the provincial level;
- corporate taxation that impacts upon automotive investment and competitiveness in Canada;
- consumer taxation that impacts vehicle purchase decisions;
- customs clearance matters and cross border trade facilitation; and
- regulatory harmonization and mutual recognition of non-Canadian standards

Canadian Vehicle Manufacturers' Association (CVMA)
http://www.cvma.ca/

The Canadian Vehicle Manufacturers' Association (CVMA) is the industry association representing Canada's largest manufacturers of light and heavy duty motor vehicles.

The CVMA's membership includes Chrysler Canada Inc.; Ford Motor Company of Canada, Limited; General Motors of Canada Limited; and Navistar Canada, Inc.
The CVMA creates a framework within which member companies work together to achieve shared industry objectives on a range of important issues such as consumer protection, the environment and vehicle safety.
The CVMA provides research, information, industry-government advocacy and other services aimed at building a better understanding of the importance of a healthy automotive industry to Canada's economic well-being and prosperity

Electric Mobility Canada (EMC)
http://www.emc-mec.ca

Electric Mobility Canada – Mobilité Electrique Canada is a national collaboration – based on non-profit organizations dedicated exclusively to the promotion of electric mobility as an already available and important solution to Canada's emerging energy and environmental issues.

- Private sector companies engaged in the sale or distribution of vehicles or components as well as the delivery of professional automotive services. These members represent all modes of surface transportation from bicycles to trains.
- Providers of electric energy at the provincial and local levels
- Managers of fleets from private sector companies, governments agencies and others
- Related associations, societies, research centres and labour organizations
- Government agencies and individual supporters

Automotive Network of Centres of Excellence (AUTO21)
www.auto21.ca/home_e.html

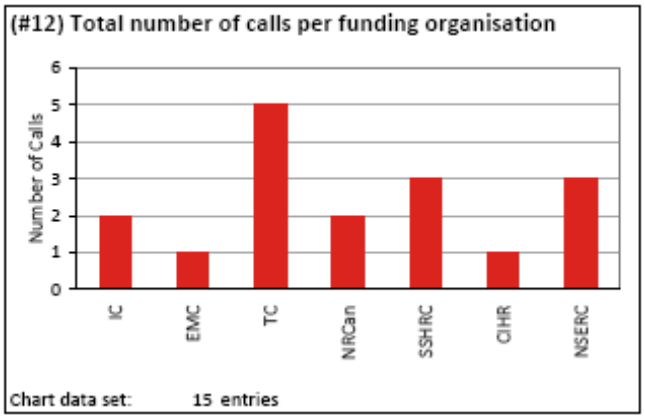
AUTO21 is a newly founded Network of Centres of Excellence (NCE), which recently received a 4-year grant of more than CAN 23 million, which, combined with the industrial and institutional contributions of CAN 9.4 million (for the first two years of the programme), will help Canada to be among the leaders in research and development in the automotive industry. Over 120 industrial, governmental, and institutional partners support over 230 top researchers at more than 35 academic institutions, government research facilities, and private sector research labs across Canada.

The Canadian Hydrogen and Fuel Cell Association (CHFCA)
http://www.chfca.ca/

The CHFCA was formed in January of 2009 as a result of a merger between the Canadian Hydrogen Association (CHA) and Hydrogen & Fuel Cells Canada (H2FCC). With offices in Vancouver, Ottawa and Montreal, the CHFCA expands the previous efforts of the CHA and H2FCC in championing the sector. CHFCA is securing government policy and funding support to its sector through advocacy activities such as "Ottawa Day" and focused meetings with key government stakeholders including legislators, policy makers, regulators and civil servants.

Remit for organisations & calls: overlaps or conflicts

Figure:



Source: EAGAR

Industry Canada is an important key player in the automotive research funding. Programmes are not only funded by IC alone, they are also funded by its related agencies like NRCan and SSHRC. Transport Canda (TC) is funding the ecoAction programmes.

Automotive Visions and Strategic Research Agendas

Significant challenges for the national road transport sector.

As an important player in the North American and global automotive industry Canada is faced by the main challenges of the global automotive industry:

- Climate change
- Competitiveness
- Safety
- Air Pollution

Based on the analysed visions and information, it seems that for Canada it is very important to be one of the top locations in the world for knowledge and competitiveness.

Visions & focused targets for road transport (is there some kind of control, are they realistic and up-to-date)

Vision Name	Corresponding Challenge	Description	Year
Canada's comprehensive action plan to fight climate change [6]	Climate change Air Pollution	Canada's Government is taking immediate effort to reduce air pollution and the emissions of greenhouse gases like carbon dioxide causing the climate change. The approach is concrete, practical, and will mean real improvements to our climate and environment. All major industrial sectors will have to respect aggressive limits to reduce greenhouse gases and air pollutants. It includes tough measures to: reduce emissions from cars and trucks, increase the range of energy efficient products.	2007
Electric Vehicle Technology Roadmap for Canada [7]	Climate change	A strategic vision for highway-capable battery-electric, plug-in, and other hybrid-electric vehicles.	2009
Canadian Renewable Fuels Strategy [8]	Climate change	The government's comprehensive strategy for renewable fuels has four components: Increasing the retail availability of renewable fuels through regulation Supporting the expansion of Canadian production of renewable fuels Assisting farmers to seize new opportunities. Accelerating the commercialization of new technologies	2006/2007
Advantage Canada [9]	Competitiveness	Positioning the Canadian industry in this fast-paced, technologically driven industry	2006

6 Government Canada, 2007
7 Electric Mobility Canada, 2009
8 Government Canada 2006, 2007
9 Department of Finance 2006

Mobilizing Science and Technology [10]	Competitiveness	Mobilizing Science and Technology to Canada's Advantage. Make Canada an even more attractive international destination for research, investment, and work more efficient in the fields of science and technology	2007
Road Safety Vision 2010 [11]	Safety	To develop the road transportation to become the safest road-network in the world	2000

Obviously safety targets are set for the year 2010. So it is time to review the status and establish new targets for 2020 and beyond.
Canada's Environment Minister, announced on January 30, 2010, the submission of Canada's 2020 emission reduction target according the "Copenhagen Accord". Canada's target, a 17 % reduction from 2005 level, is completely aligned with the U.S. target, and is subject to adjustments to remain consistent

Target Name	**Corresponding Challenge**	**Description**	**Target Year**	**Year**
Reduce Greenhouse Gases [6] [12]	Climate change	Canada's comprehensive action plan to fight climate change will reduce greenhouse gas emissions by 17 % from 2005 level until 2020, starting Canada's plan to achieve reductions of 60-70 % by 2050	2020 2050	2010 2006
Renewable Fuel[8]	Climate change	Require 5 % average renewable content in Canadian gasoline and diesel fuel, such as ethanol and biodiesel, by 2010.	2010	-
Fuel Efficiency[6]	Climate change Air Pollution	Regulate the fuel efficiency of cars and light duty trucks, beginning with the 2011 model year. Harmonisation with US approach. Regulation vehicle tailpipe emissions for the 2011 model year under the Canadian Environmental Protection Act. By the 2016 model year, these regulations will reduce average fuel consumption and CO2 emissions from new vehicles by 20 % compared to 2007.	2011 2016	2007
Sustainable Development Strategy 2007 – 2009[13]	Climate change	1) Reduce Transport Canada greenhouse gas emissions by 4 % from 1998/1999 baseline level, by 2010. 2) All gasoline purchased for federal road vehicles will be ethanol blended.	2010	2007
Electric Mobility in 2018 Canadian Electric Vehicle Technology Roadmap (evTRM) [7]	Climate change Competitiveness	By 2018, there will be 500,000 highway-capable plug-in electric-drive vehicles on Canadian roads, as well as a larger number of hybrid-electric vehicles. These vehicles will contain more Canadian parts than the cars on Canada's roads nowadays. . Tech-	2018	2010

10 Industry Canada, 2007
11 Canadian Council of Transport, 2009
12 Environment Canada, 2010
13 Environment Canada, 2006

		nology Roadmap (evTRM) should be completed end of 2009		
Positioning the Canadian industry the automotive industry[9]	Competitiveness	Positioning the Canadian industry in this fast-paced, technologically driven industry. The approach is built on four pillars: sustaining sound fiscal and economic framework policies; supporting integration of the North American automotive sector; investing in research and development (R&D); and creating an Automotive Innovation Fund	-	2006
Make Canada an even more attractive international destination for research, investment and work in the fields of science and technology. [10]	Competitiveness	Make Canada an even more attractive international destination for research, investment, and work in the fields of science and technology. A comprehensive plan has assisted the Canadians in developing strategic investments and alliances to improve the quality of life of Canadians and strengthen the economy. These measures have included increased funding to support Canada's scientists and researchers through the federal granting councils; providing better research equipment and facilities for colleges and universities; helping organizations and businesses to bring more innovations from the laboratory directly to the marketplace; and launch new initiatives to educate, attract and retain the world's best scientists	-	2007
Road Safety Targets 2010 [11]	Safety	1) 30 % decrease in the average number of killed and seriously injured compared to 1996-2001, 904 less fatalities as well as5762 fewer seriously injured 2) minimum 95 % seat belt and proper child restraint use 115 fewer occupant skilled 3) 40% decrease in the percent of road user fatalities or seriously injured in crashes involving alcohol 428 fewer road users killed, 1445 fewer seriously injured 4) 20 % decrease in killed or seriously injured young drivers (16-19) 5) 20 % decrease in number of people killed or seriously injured in crashes involving commercial vehicles 122 fewer road users killed, 359 fewer seriously injured 6) 30 % decrease in number of vulnerable road users, killed or seriously injured 7) 40 % decrease in the number of road users fatal or seriously injured on rural roadways 600 fewer killed, 2956 fewer seriously injured	2010	2000

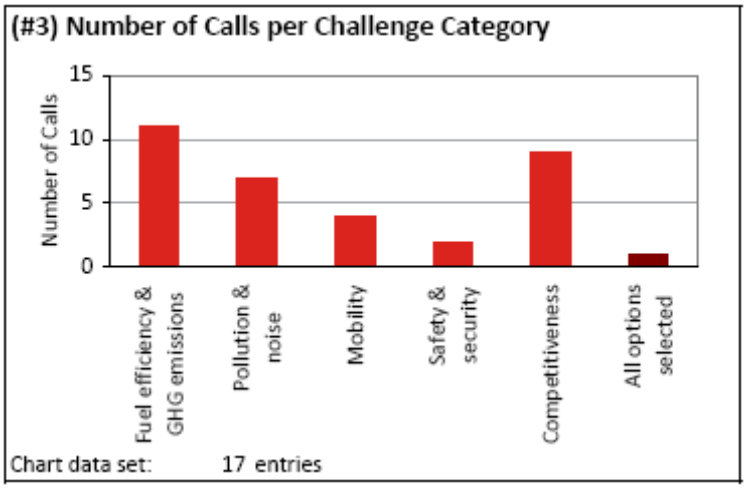
Funding Programmes

The link between vision & targets and funding allocation

In general the visions and stated targets are matched with funding programmes. Some initiatives started in the last year. Programme brochures and web pages are available and the programmes are well documented. The number of calls has increased over the last years to improve the competitiveness of the automotive industry and to gain leadership in advanced propulsion technologies. Local RTD programmes are existing in areas with a strong automotive industry in the south of the country.

Funding programmes and states of RTD as well as different types of instruments

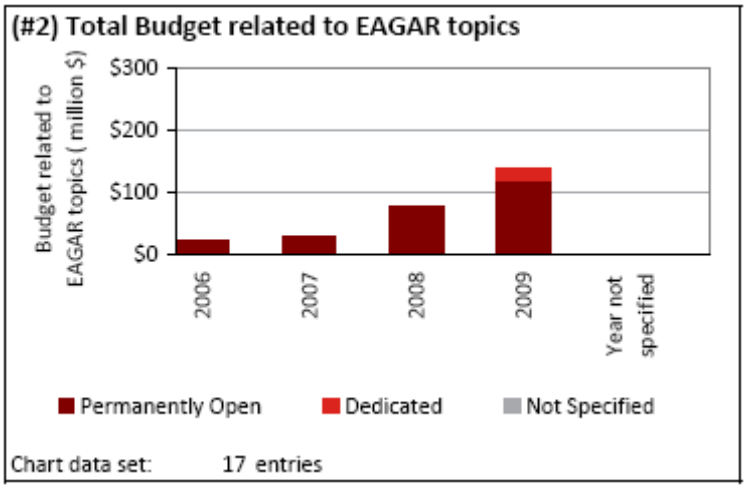
Figure:



Source: EAGAR

According to the global trend, calls regarding fuel efficiency, GHG emissions, and competitiveness are the dominating challenge categories.

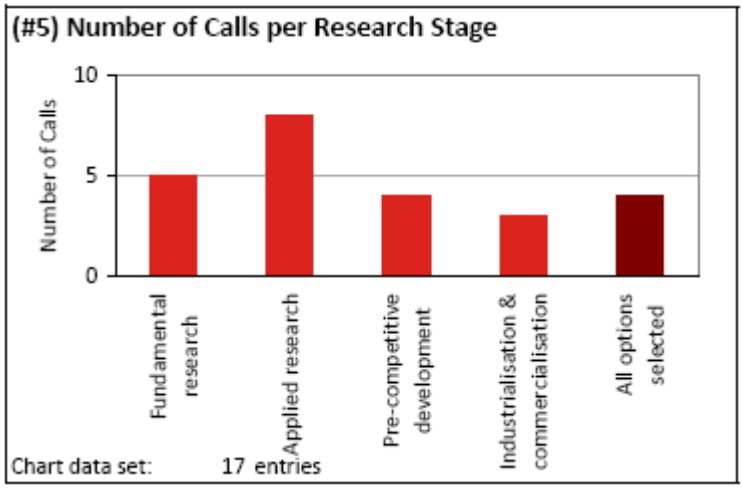
Figure:



Source: EAGAR

The budget related to EAGAR topics has increased in the past year. Most of the programmes are permanently open. Some programmes include additional topics, which are not only related to EAGAR topics. Because of missing details the EAGAR related budget was assumed.

Figure:



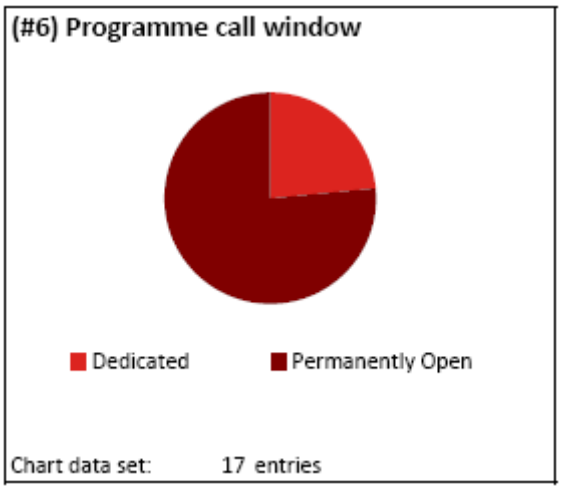
Source: EAGAR

The majority of calls tend to research activities, mainly applied research.

Most of the analysed programmes are multi-year programmes with a certain budget. These programmes are accounted as one call per year. In the report the budget is averaged over the whole period.

The overall programmes are addressing all organisation types.

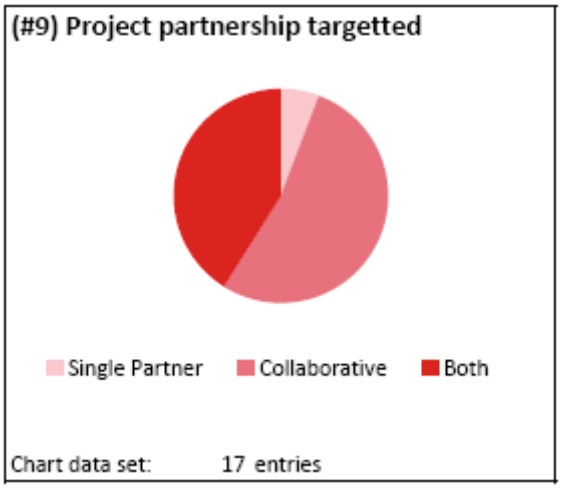
Figure:



Source: EAGAR

The majority of calls are permanently open.

Figure:



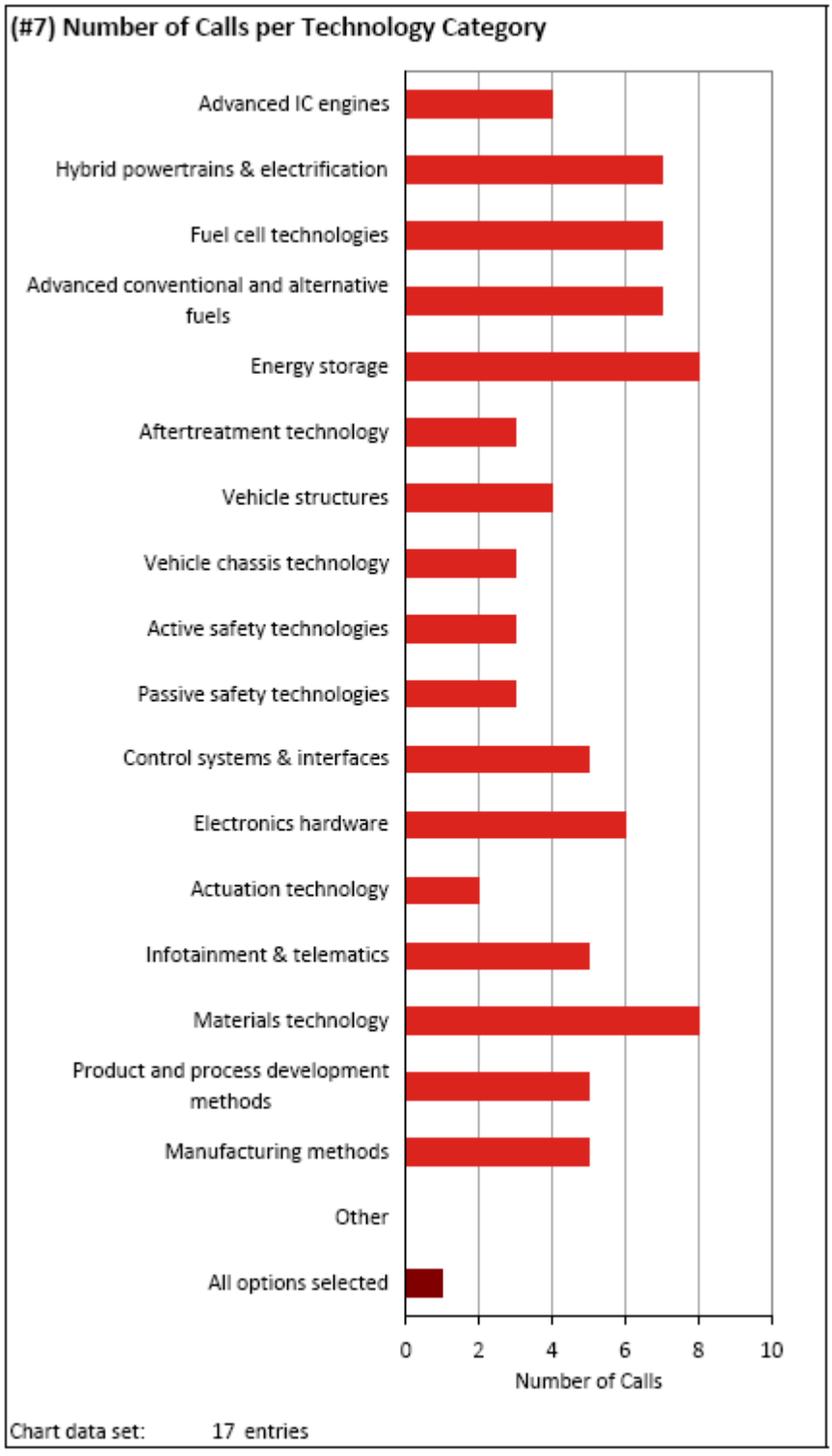
Source: EAGAR

The majority of the Canadian public funding programmes target collaborative research, thus encouraging companies and universities to work together. Projects are also performed by federal agencies in cooperation with other partners.

Overview of technology specific programmes for automotive RTD

Overview of numbers of calls in the past 4 years per technology category:

Figure: Number of calls per Technology Category



Source: EAGAR

The main challenges Climate Change, fuel efficiency, crude oil dependence are also mirrored in the funded technologies. The highest number of calls was founded for programmes related to new power-train technologies like hybrids, fuel cells and energy storage. This is in line with the challenge reducing CO2 emissions and fuel consumption. Very important is also material technologies also including light weight technologies to reduce fuel consumption.

1.6 The efficiency, flexibility, and experienced bureaucracy of the funding process

The flexibility to release new calls in response to changing situations

It seems there is some flexibility to release new calls or to create partnerships between federal agencies and industrial as well as other partners like the recent announced partnership[14] between Magna Exteriors and Interiors, an operating unit of Magna International Inc., and National Research Council Canada (NRC) to support the Canadian automotive industry in developing next-generation vehicles with lighter, more durable parts, which are safer, affordable, environmentally friendly, and more fuel-efficient.
Part of the collaboration agreement is the creation of the Magna-NRC Composite Centre of Excellence at the Magna Exteriors and Interiors facility in Concord, Ontario.

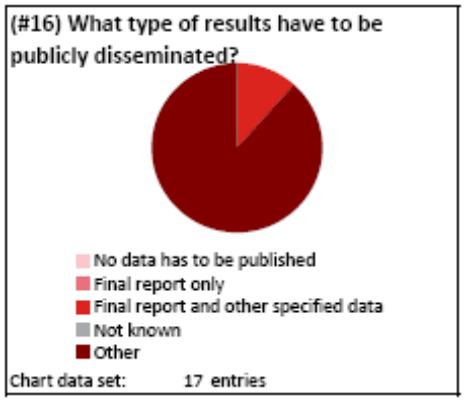
The application process

The application process for different calls and programmes is always described on the relevant web pages. The big funds like Auto21 and AIF cover a wide range of research fields with dedicated budgets or limited numbers of projects for a certain technology.
All applications are reviewed by an independent panel.

Transparency & openness

For most programmes web pages exist. Application forms are available as download, contact persons are named, and the application process is described.
Therefore, nearly all data in this report was available by desk research.

Figure:



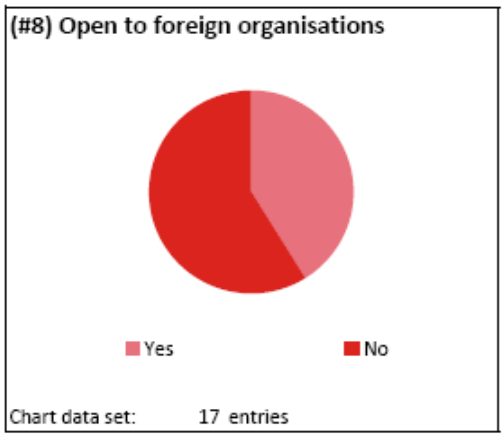
Source: EAGAR

Every programme has to publish information like final, interim or annual reports, dissemination events, project description and results. The kind of publication and its frequency depend on the complexity and financial relevance of the project. Federal research agencies like the NRC have to publish annual reports.

[14] NRC, 2009

Foreign collaboration

Figure:



Source: EAGAR

Some of the calls are open to foreign organisations. Collaborations with foreign institutes in different calls are also encouraged.
NRC offers funding opportunities to help its researchers take advantage of other funding resources and is available to all Canadian researchers. It provides vital access to the knowledge produced by researchers in other nations, a necessity for Canada and Canadian businesses.

The international scientific research community has always cooperated across borders. Most of the co-operations occur informally; researcher-to-researcher.
NRC has pursued international research partnerships and alliances on behalf of Canada.

In the Canada Research Chairs programme, which stands as the centre of a national strategy to foster Canada to become one of the world's top countries in research and development, foreign candidates are appointed to Chair holders because of their unique qualification. In general co-operations with foreign institutes are encouraged.

Discussion and Conclusion

The publicly funded automotive R&D in Canada as presented in this report are mainly analysed by online research. Almost all information of the federal R&D funding is available on the internet, in the most cases on the respective websites of the funding agencies, most of them under the patronage of the Industry Canada.

The analysis was strictly performed on federal level, R&D spending of the individual provinces was not considered.

The Canadian R&D policy related to automotive research is mostly centralized in the Ministry of Industry influenced by its agencies and the related stakeholder. An important target for Canada is to keep its industry competitive and to foster a knowledge based and innovative environment.
Few automotive R&D activities, programmes, and investments to cope the main challenges, which are also coordinated by Transport Canada. The federal funding is also used to perform R&D activities in federal agencies (e.g. NRC) as well as funding for non-governmental institutes. Federal agencies perform their R&D activities in cooperation with the academia and enterprises.

Budget and programme information as well as the respective annual reports are publicly available, details in terms of statistical data (e.g. number of calls and projects per year) on specific calls within the programmes could not be found. The number of funding and research agencies and programmes, as well as funded projects would not allow a detailed analysis down to call and project level.
Most of the programmes are permanently open for a multi-year period. Budgets are given for the whole period. In the report these budgets are averaged and counted as one call in each year.

The presented information and data provide only a global picture of the Canadian R&D policy. While collecting the data the R&D programmes could be observed to be currently reviewed and updated. New programme calls can be expected, even to fight the current economic situation and to promote promising new technologies for future challenges like electrification and fuel cells. Canada is also funding research in manufacturing technologies to keep its production plants competitive. While conducting this survey additional or updated information about new initiatives could be found nearly on a monthly basis.

Most of the programmes are reviewed on an annual basis, recent findings and challenges can be incorporated easily. In general these programmes address basic and applied research, technological development, and to a high extend validation and implementation of technologies.

Looking at the technologies addressed by the automotive R&D programmes a tendency towards clean and efficient power sources as well as material technologies could be found.

Government Canada Government seems to support Canadian manufactures with special tailored funding, see the mentioned announcement of Magna & NRC or Canada's Renaissance Project of Ford Motor Company. Up to CAN 80 million will be invested by the government in an initiative, which will total up to CAN 730 million investment by 2012 for the establishment of a state-of-the-art flexible engine assembly plant in Windsor, Ontario and the creation of Ford's North America Centre for Diesel and Advanced Powertrain Research and Innovation (http://www.ic.gc.ca/eic/site/ic1.nsf/eng/04155.html).

References

[1] Statistics Canada (www.statcan.gc.ca)
[2] Government of Canada http://investincanada.gc.ca/eng/industry-sectors/automotive.aspx
[3] Canadian Industry Statistics (CIS) http://www.ic.gc.ca/cis-sic/cis-sic.nsf/IDE/cis-sic336defe.html
[4] Invest in Ontario http://www.investinontario.com/siteselector/bcrd_508.asp
[5] Innovation Analysis Bulletin Catalogue Number 88-003-X Vol. 11, no. 1 (June 2009) http://www.statcan.gc.ca/pub/88-003-x/88-003-x2009001-eng.pdf
[6] Action on Climate Change and Air Pollution http://www.ecoaction.gc.ca/news-nouvelles/20070426-2-eng.cfm?turning
[7] Electric Mobility Canada http://www.emc-mec.ca/en/content/about-electric-mobility-canada
[8] CANADIAN RENEWABLE FUELS STRATEGY http://www.ecoaction.gc.ca/ECOENERGY-ECOENERGIE/renewablefuels-carburantsrenouvelables-eng.cfm
[9] Department of Finance http://www.fin.gc.ca/ec2006/plan/plsum-eng.asp
[10] Mobilizing Science and Technology to Canada's Advantage — Summary http://www.ic.gc.ca/eic/site/ic1.nsf/eng/h_00231.html
[11] Canadian Council of Motor Transport http://www.ccmta.ca/english/committees/rsrp/rsv/rsv.cfm
[12] Environment Canada, Emissions Target under the Copenhagen Accord, http://www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=EAF552A3-D287-4AC0-ACB8-A6FEA697ACD6
[13] Environment Canada's Sustainable Development Strategy 2007-2009, http://www.ec.gc.ca/sd-dd_consult/SDS2007/index_e.cfm
[14] NRC, News Releases - NRC, Magna sign agreement to develop ultra-light materials for next-generation vehicles, http://www.nrc-cnrc.gc.ca/eng/news/nrc/2009/12/18/magna-agreement.html

Abbreviations

AIF	Automotive Innovation Fund
AUTO21	Automotive Network of Centres of Excellence
CAN	Canadian Dollar
CFI	Canada Foundation for Innovation
EMC	Electric Mobility Canada
evTRM	Electric Vehicle Technology Roadmap
IC	Industry Canada, Ministry of Industry
NRC	National Research Council of Canada
NRCan	Natural Resources Canada
NRC-CISTI	NRC Canada Institute for Scientific and Technical Information
NRC-IRAP	NRC Industrial Research Assistance Program
NRTEE	The National Round Table Environment & Economy
NSERC	Natural Sciences and Engineering Research Council Canada
RTD	Research and Technology Development
S&T	Science & Technology
SME	Small and Medium Enterprises
SSHRC	Social Sciences and Humanities Research Council of Canada
TC	Transport Canada

Annex

Programme Initiative	Description	Funding Organisation	Call end date	Reference
Automotive Innovation Fund (AIF)	The Automotive Innovation Fund (AIF) has been established will provide automotive firms CAN 250 million over five years to support strategic, large-scale research and development (R&D) projects to build innovative, greener, more fuel-efficient vehicles. The AIF will support Canada's environmental agenda in advancing Canadian capabilities in fuel-efficient automotive technologies and greenhouse gas reduction. The Fund demonstrates the government's commitment to implementing Canada's Science and Technology (S&T) Strategy in an automotive context.	Industry Canada	2013	http://www.ic.gc.ca/eic/site/auto-auto.nsf/eng/am02257.html
Automotive Partnership Canada (APC)	APC's mission is to support R&D that will help drive the Canadian automotive sector to a greater level of innovation. APC's mission is to support R & D that will help the Canadian automotive sector reach a greater level of innovation. Its emphasis is on transformative, integrated projects or programs that give Canadian industry and academia the resources required to forster their automotive R & D ambitions. Projects must be industry-driven and align with one of the following strategic research themes: improving the automobile's environmental performance and impact, developing the cognitive car or advancing the next generation of manufacturing. Eligible institutions may submit proposals anytime until 2014 or until the funds are exhausted.	Partnership between five federal research and granting agencies under the Industry Canada umbrella	2014	www.apc-pac.ca/Index_eng.asp
Auto21	AUTO21 is a national research initiative supported by the Government of Canada through the Networks of Centres of Excellence Directorate and more than 240 industry, government and institutional partners. AUTO21, a Network of Centres of Excellence, is enhancing Canada's position as a leader in automotive research and development. Partnering the public and private sectors. Health, Safety and Injury Prevention Societal Issues and the Future Automobile Materials and Manufacturing Power-trains, Fuels and Emissions Design Processes Intelligent Systems and Sensors	Government Canada	2015	http://auto21.ca/index.php

Programme Initiative	Description	Funding Organisation	Call end date	Reference
National Research Council (NRC) Institute for Fuel Cell Innovation	NRC-IFCI is powering the future through partnerships that support Canada's growing fuel cell and hydrogen industry through innovation and cluster-building. Working with Canadian universities, government agencies and companies, it researches, develops and tests new hydrogen and fuel cell systems. Research Programs High Temperature Fuel Cells (HTFC) Low Temperature Fuel Cells (LTFC) Hydrogen and Alternative Fuels	NRC	ns	http://www.nrc-nrc.gc.ca/eng/ibp/ifci.html
Canada Excellence Research Chairs (CERC)	In 2008, the Government of Canada created a new permanent program to establish 20 prestigious research chairs–Canada Excellence Research Chairs (CERC)–in universities across the country. The CERC program invests CAN 28 million a year to attract and retain the world's most accomplished and promising minds and help Canada build a critical mass of expertise in the priority research areas of environmental sciences and technologies, natural resources and energy, health and related life sciences and technologies, and information and communication technologies.	SSHRC NSERC CIHR	2015	http://www.cerc.gc.ca/hp-pa-eng.shtml
Natural Sciences and Engineering Research Council of Canada (NSERC)	The Natural Sciences and Engineering Research Council of Canada (NSERC) helps make Canada a country of discoverers and innovators for the benefit of all Canadians. NSERC's role is to make investments in people, discovery and innovation for the benefit of all Canadians. It invests in people by supporting 28,000 university students and postdoctoral fellows in their advanced studies. NSERC promotes discovery by funding nearly 11,800 university professors every year.	NSERC	na	http://www.nserc-rsng.gc.ca/index_eng.asp
National Research Council (NRC) Industrial Research Assistance Program	The National Research Council-Industrial Research Assistance Program (NRC-IRAP) is Canada's premier innovation assistance program for small and medium-sized enterprises (SMEs). It is a vital component of the NRC, a cornerstone in Canada's innovation system, regarded world-wide as one of the best programs of its kind.	NRC	na	http://www.nrc-cnrc.gc.ca/eng/news/nrc/2009/07/20/emerging-technologies-canada.html