



Canada's Innovation Excellence

Markets and Opportunities

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Canadian Consulate, Munich

Presentation – 5th Project Day - Network of Automotive Excellence

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Snapshot of Canada's Auto Sector



- **Manufacturing** – Canada produces passenger and commercial vehicles, auto parts and systems, truck bodies and trailers, as well as machines-tools-dies-moulds (MTDM) and tires
- Automotive is the largest manufacturing sector in Canada. In 2010 it accounted for:
 - 12% of manufacturing GDP
 - \$68.8 billion in revenues
 - 109,330 in direct employment
 - 20% of merchandise trade
 - 17% of NAFTA vehicle production (2.07 million units)
- Highly concentrated in Ontario; also in Quebec, Manitoba and B.C.
- Very export intensive (three-quarters of annual output)
- **Assembly** – 19 passenger and commercial vehicle plants, 37,190 employed, 2.3M units installed capacity, 85% exported
- **Auto parts** – est. 350 companies, 1,300 facilities, 63,920 employed, \$22 billion revenues, 57% exported



Snapshot of Canada's Aerospace Sector

- The 5th largest aviation and aerospace industry in the world, responsible for 5% of the worldwide sales and worldwide employment
- More than 400 companies, 81,000 highly skilled direct employees and revenues of \$ 21 billion for 2010
- Strong orientation to the civil sector with turnover for 2010 of \$ 19.7 billion (94%), from the military area – only \$1.2 billion (6%)
- Main focus is on aircraft and aircraft parts, design and manufacturing: 52.8%, aircraft engines and engine parts: 14.6%, aircraft maintenance, repair and overhaul: 13.8%
- Strong export orientation: \$15.3 billion – 73% of total sales
 - USA – \$ 9,2 billion (59.9%).
- \$1.5 billion in investments in R&D (2010) keep the Canadian companies at the forefront of innovation
- The largest aerospace cluster is the Montreal hub, followed by the ones in Ontario and Winnipeg (the largest cluster in Western Canada)

Automotive Assembly Plants in Canada

Light Vehicles

Parent	Plant / Location	Products
Chrysler [FIAT]	Brampton Assembly Plant (Brampton ON)	Chrysler 300/300C; Dodge Charger and Challenger
	Windsor Assembly Plant (Windsor ON)	Chrysler Town & Country; Dodge Grand Caravan; Volkswagen Routan
Ford	Oakville Assembly Complex (Oakville ON)	Ford Edge and Flex; Lincoln MKX and MKT
	CAMI Automotive (Ingersoll ON)	Chevrolet Equinox and GMC Terrain
GM	Oshawa Car Plants 1-2 (Oshawa ON)	Buick Regal and Regal eAssist; Chevrolet Camaro, Equinox and Impala (<i>add Cadillac XTS</i>)
Honda	HCM Plants 1-2 (Alliston ON)	Acura CSX, MDX and ZDX; Honda Civic sedan and coupe (<i>add CR-V</i>)
Toyota	North and South Plants (Cambridge ON)	Toyota Corolla and Matrix; Lexus RX 350
	West Plant (Woodstock ON)	Toyota RAV4 (<i>add RAV4 EV</i>)

Heavy Trucks and Buses

Parent	Plant / Location	Products
Blue Bird	Micro Bird (Drummondville PQ)	Type A school buses
Daimler Bus	Orion Bus Industries (Mississauga ON)	urban transit buses
Hino [Toyota]	Hino Motors Canada (Woodstock ON)	Class 4-7 trucks (CKD)
MCI	MCI International (Winnipeg MB)	intercity buses
New Flyer	New Flyer Industries Canada (Winnipeg MB)	urban transit buses
PACCAR	PACCAR of Canada (Ste. Therese PQ)	Class 6-7 trucks
	Nova Bus Corporation (St. Eustache PQ)	urban transit buses
Volvo Bus	Prévost Car (Ste. Claire PQ)	intercity buses



Extensive Automotive Supplier Base

Top OEM Suppliers with Plants in Canada

Global Rank 2010

- #2 Denso (Japan)
- #3 Continental (Germany)
- #4 Aisin Seiki (Japan)
- #5 Magna International (Canada)
- #6 Faurecia (France)
- #7 Johnson Controls (U.S.)
- #11 TRW (U.S.)
- #12 Delphi (U.S.)
- #14 Lear (U.S.)
- #16 Toyota Boshoku (Japan)
- #22 Visteon (U.S.)
- #23 Autoliv (Sweden)
- #28 Toyoda Gosei (Japan)
- #38 Brose (Germany)
- #54 Flex-n-Gate (U.S.)
- #55 Nemak (Mexico)
- #74 Linamar (Canada)
- #78 Martinrea (Canada)

- Many of the largest global suppliers have facilities in Canada, along with steel and other material producers
- Some of the biggest and most capable suppliers are Canadian-based including ABC Group, AGS Automotive, Linamar, Magna, Martinrea, Multimatic, Valiant, Westcast and Woodbridge Foam
- Other Canadian companies – such as Ballard, QNX Software and Westport Innovations – are recognized global leaders in their field
- Assemblers and Tier 1s in Canada also have access to supply chains in the U.S. and Mexico



Areas of Automotive Expertise

Metal Processing

- Advanced casting of light metals
- Cutting and machining
- Sheet and tube forming
- Welding and joining
- Powder metallurgy

Advanced Materials

- Lightweight materials
- Nano-materials
- Bio-materials

Advanced Design, Visualization and Manufacturing

- Inspection and vision systems
- Laser imaging
- Tooling and robotics
- Stereo-lithography, laser deposition
- Virtual design

Information and Communications Technology

- Software engineering
- Navigation and positioning
- Wireless technologies and networks
- Microchip design, system-on-chip, engineering
- Semi-conductor technologies (MEMS, RF)
- Telematics, communications
- Micromachining
- Intelligent systems
- Photonics and optoelectronics
- Nanotechnology
- Enhanced synthetic vision

Advanced Technologies

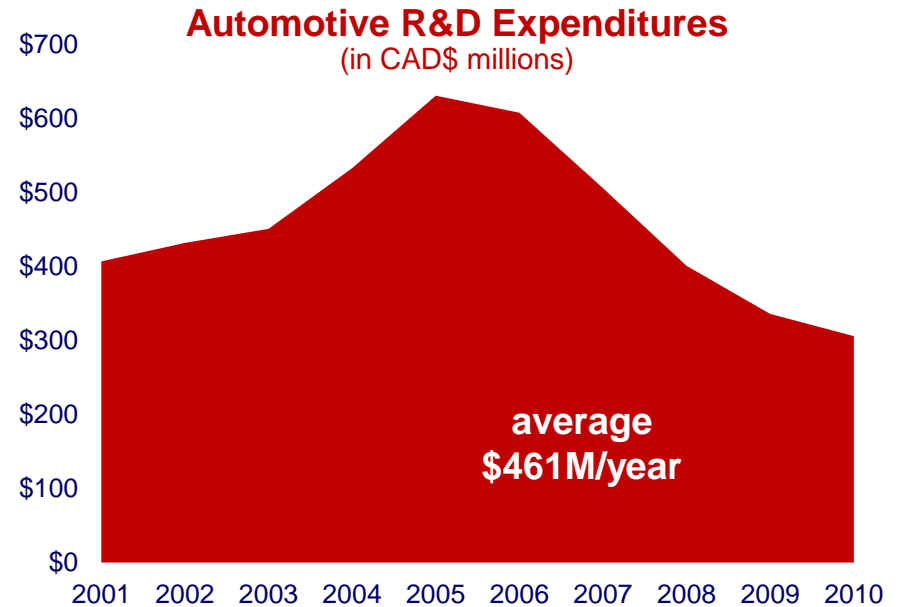
- Mechatronics
- Powertrain engineering
- Clean diesels
- Homogenous charge compression ignition
- Fuel cells, hydrogen and alternative fuels

Snapshot of Automotive R&D in Canada

- Expertise in light weighting, biomaterials and composites, advanced safety systems, software and the “connected car”, alternative fuels (particularly EVs), vehicle testing, and more
- Focus on private and collaborative R&D



Climatic wind tunnel at UOIT-ACE



Source: Statistics Canada

- Annual R&D spending in the motor vehicle and parts industry averaged \$461 million in the last decade
- 12.9% cost advantage for R&D vs the U.S. (KPMG 2010)

World-class R&D Institutes/Universities



National Research Council - Automotive

- Network of 20 research institutes, many specializing in automotive-related disciplines such as light materials, aerodynamics, alternative propulsion, sensors and telematics



CANMET laboratories

- Metals and materials research labs run by Natural Resources Canada, including CLIMRI (Canadian Lightweight Materials Research Institute)



AUTO21

- National network of centres of excellence for automotive R&D, regroups 200 researchers from 46 universities to conduct applied R&D in partnership with private companies

Selected universities:

- **MacAUTO** - McMaster Institute for Automotive Research and Technology (Hamilton ON)
- **UOIT-ACE** - Automotive Centre of Excellence at the University of Ontario Institute of Technology (Oshawa ON)
- **WatCAR** - University of Waterloo Centre for Automotive Research (Waterloo ON)
- **University of Windsor** - Automotive engineering specialization and research partnerships, such as AUTO21 and Chrysler's ARDC





**Thank you for your
attention!**

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Ontario's Next Generation of Vehicle Development

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ONTARIO
CANADA

Ontario: Canada's Economic Powerhouse

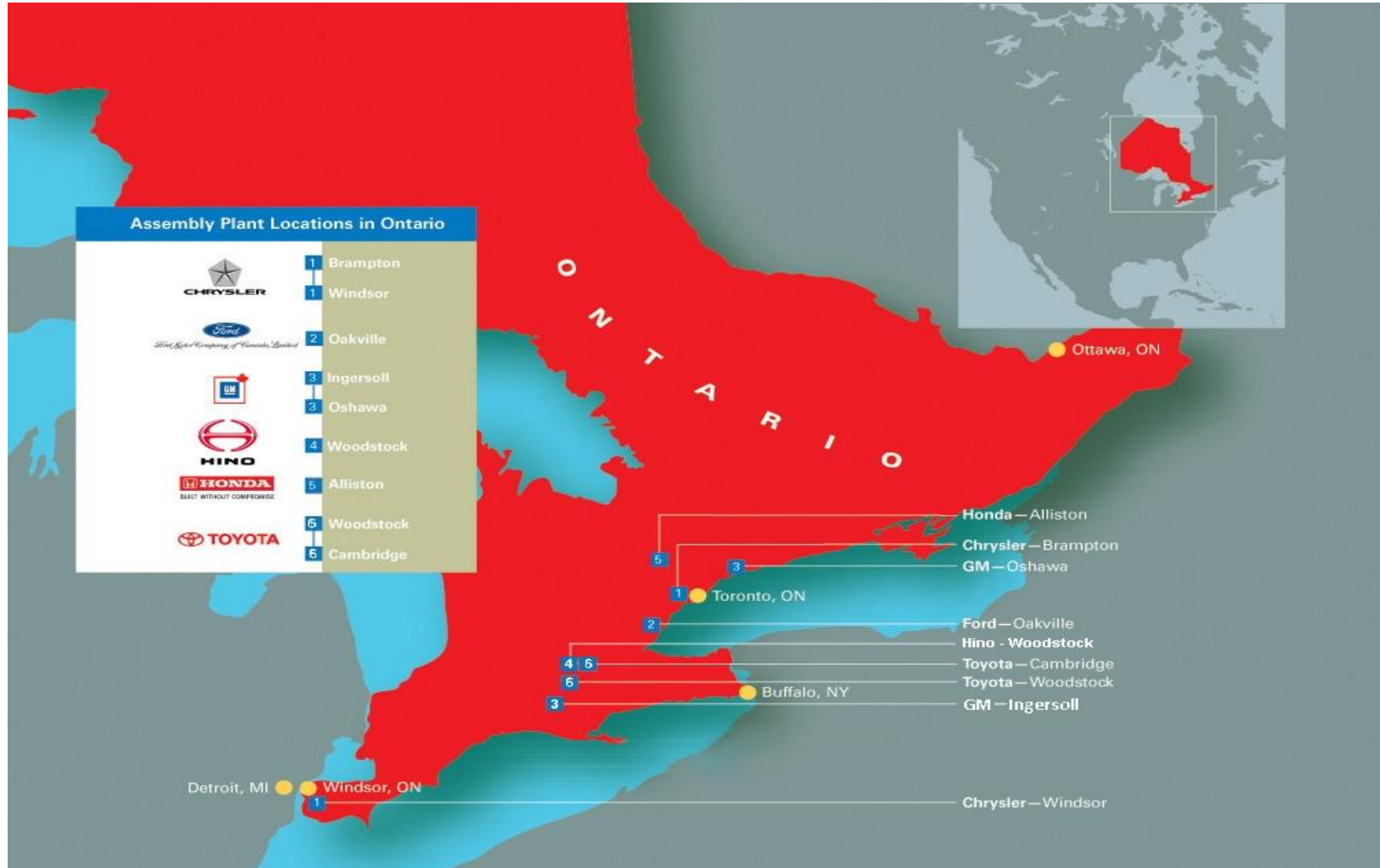


38%	GDP
39%	Population
39%	Personal Income
43%	Financial services employment
90%	Automotive employment
46%	Manufacturing shipments
39%	Goods exports

Ontario



Ontario's Vehicle Assembly Corridor



Ontario: An Auto Sector Leader



- **Ontario is an established leader in the North American automotive sector with the potential to enhance its global presence**

- Contribution to GDP: Over the past 5 years, the automotive sector's average annual contribution to Ontario's GDP was \$18.5B or 3.8% of provincial GDP

- Employment: ~100,000 people employed in the automotive sector

- Vehicle Assembly: 16.5% of North American vehicle production over the last 5 years

- The top NAFTA sub-national vehicle assembly jurisdiction since 2004
- 2.13M vehicles produced in Ontario in 2011
- 12 vehicle assembly plants currently in operation



- Auto Parts Production: ~10% of North American parts shipments

- ~350 automotive parts plants, including leading Canadian parts supplier and large Multinationals



- ~300 Tool, Die and Mould makers

- R&D: Ontario is home to 9 universities and 24 colleges with innovative auto-related research initiatives and training programs

- Key Inputs & Services: Reliable access to raw materials, such as, steel, metals, plastics, alternative materials, as well as business services and automotive sales and service

Ontario is on the forefront of next generation vehicle technologies research

Researchers in Ontario's network of universities and specialized institutions are conducting leading research in advanced manufacturing and alternative energy:

- McMaster Automotive Resource Centre (MARC) is leading hub of advanced automotive research and development. Ali Emadi, director of MacAUTO is the holder of the \$10-million Canada Excellence Research Chair in Hybrid Powertrain and is one of the world's foremost developers of electric and hybrid powertrain technologies
- AUTO21 partners with the public and private sectors and supports more than 300 researchers across Canada in a variety of auto-related research projects
- WatCAR, an automotive research centre at the University of Waterloo, is focused on leading-edge studies to enhance automotive innovation and competitiveness
- University of Ontario Institute of Technology's General Motors of Canada Automotive Centre of Excellence is a state-of-the-art research facility (including a climatic wind tunnel) created to further R&D in the Canadian automotive industry
- Magna-NRC Composite Centers of Excellence, supports the Canadian automotive industry in developing next-generation vehicles with lighter, more durable parts, that are safe, affordable, environmentally friendly, and fuel efficient

Ontario's Leading Role in the Development of the Next Generation of Vehicles

- Automakers are developing a broad spectrum of alternative, environmentally friendly vehicles, especially electric vehicles (EV), among other technologies i.e. advanced hybrids, CNG, fuel cells etc.
- Ontario is committed to ensuring its auto sector plays a central role in the development of the next generation of vehicles
- The government has partnered with a number of firms in order to position the province to take a leading role in vehicle electrification and lightweighting, including:
 - \$16.7 million for Electrovaya of Mississauga (Ontario) to develop and manufacture lithium-ion batteries
 - \$48.4 million for Magna International and Magna E-Car to develop advanced lightweighting technology, electrification of vehicle components and battery development.
 - \$2 million for Dana Canada to develop 'Thermal Management Systems' for hybrids and electric vehicles
 - \$70.8 million to Toyota Motor Manufacturing of Canada on a spectrum of initiatives, including production of the RAV4 EV

Next Generation of Vehicle Technology is a Key Objective for Ontario

- Ontario's commitment to fight climate change and improve air quality
 - The Ontario government aims to have one out of every 20 vehicles driven in Ontario to be electrically powered by 2020, this would support the greenhouse gas emissions target for 2020.
- Reducing the environmental impact of the Ontario government's operations
 - Commitment to purchase 500 electric vehicles for the Ontario Public Service (OPS) passenger fleet by 2020
 - Contributes to the OPS goal of an annual 5% reduction in fuel consumption
- Supporting alignment and direction of Ontario's auto sector
 - 'Greener', more sustainable and more competitive with a strong focus on high value- added development and production of innovative auto parts and technologies
- Supporting the government's research and innovation agenda
 - Programs applicable to the research, development and commercialization of electric vehicles and their components parts

Ontario's Commitment to getting EVs On the Road



The Government of Ontario has been active in encouraging consumer adoption of Electric Vehicles (EVs)

- Developments include:
 - Consumer Incentives: Rebates of \$5,000 - \$8,500 offered to consumers to purchase electric vehicles
 - Access to High Occupancy Vehicle (HOV) Lanes: EVs are provided “green” license plates for EVs to drive in commuter lanes (HOV) with one occupant
 - Commitment to Developing a Charging Infrastructure: Ontario has recently announced an \$80 million fund to support the establishment of an electric vehicle charging infrastructure in the Province
 - Ontario is establishing a series of charging locations at GO commuter train stations in the Greater Toronto Area (Aurora, Lincolnville, Whitby in 2011 and Ajax, Erindale, Oakville, Burlington in 2011/12)
 - Better Place announced in March 2011 the opening of an EV demonstration centre in Toronto and a charging infrastructure project throughout the Greater Toronto Area, supported by the Ontario government



Thank you!

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