Supporting Jobs and Investment in the Canadian Automotive Sector: Canadian Automotive Research Initiative

Executive Summary

The Canadian Automotive Research Initiative (CARI) is designed to promote product development, jobs and investment in the Canadian automotive sector. It will help Canadian industry to be competitive in rapidly changing market conditions. CARI is supported by the Canadian Vehicle Manufacturers Association, the Canadian Manufacturers and Exporters, the Automotive Parts Manufacturers Association, all five automakers that build vehicles in Canada, nearly 30 leading parts companies ranging from the largest global giants to small tech start-ups, and the autoworkers union.

CARI responds to auto sector forces that drive new risk for industry *and* present important new opportunities. To seize these opportunities we must recognize that the global auto industry is being challenged as never before to meet profoundly more demanding environmental and safety standards, and provide significant new consumer features.

Meeting tough new standards will require more than greener powertrains, stronger structural materials and the introduction of new sensors. It will be about a complete system-wide re-engineering of the materials and processes used to build vehicles; the systems that operate the vehicles, and all the other technologies that make vehicles safe, comfortable and desirable. Ten years from now, vehicles will weigh considerably less, while continuing to be safe. They will perform all the basic functions of today's vehicles while meeting a vast new array of regulatory and consumer expectations.

Change of that magnitude is unprecedented and fundamental. The technological solutions to meet new regulatory standards must be robust and demonstrable under real-world conditions for global production. Only industry can accomplish those real-world demonstrations for potential customers. But, to be successful in meeting these challenges, Canadian industry will need partners in universities and government. That is the role of the Canadian Automotive Research Initiative.

CARI will provide a practical bridge between new science and commercially-available products. It is a five-year commitment to assist the parts manufacturing segment of the auto industry with the acquisition of advanced product development equipment and the creation of technology demonstrators and prototypes, including the acquisition of materials, tooling and the engagement of the specialised expertise needed for new product development.

CARI is not only about maintaining existing jobs, it is about growing the number of highly-qualified R&D professionals working here in Canada. A 2013 survey of 25 leading parts firms representing all tiers of the industry suggests an additional 480 highly-qualified R&D jobs (in only those companies) would be attracted to Canada with this proposal. The effect on the whole parts segment of more than 300 companies would be much larger. Commercialising these new technologies will leverage the significant long-term investments made in Canadian universities and provide career opportunities, here in Canada, for our best and brightest people.

The foundation stones for success are in place but there is a critical funding gap in Canada that must be filled if we are to take part in the opportunities. Public support, through initiatives like the AUTO21 Network Centre of Excellence and other programs have provided strong academic/scientific support and highly-qualified human capital as well as critically important connections between industry and academe. But those aren't sufficient to commercialize, demonstrate and sell new technologies, designs and systems. Canada's proximity to major markets, its existing manufacturing capacity and the critically-

important investments in a new border crossing to the US are also critical foundation stones. But they will not be sufficient to make Canadian auto parts makers competitive in this rapidly-changing marketplace where an entirely new generation of technologically advanced products are essential to meet the new regulatory and consumer imperatives.

At present, there is no single, agreed technology that can meet the new challenges. Consequently, the business risks associated with testing and refining a range of new ideas are considerable, access to private lending for this stage of product development and demonstration is missing and the time is now.

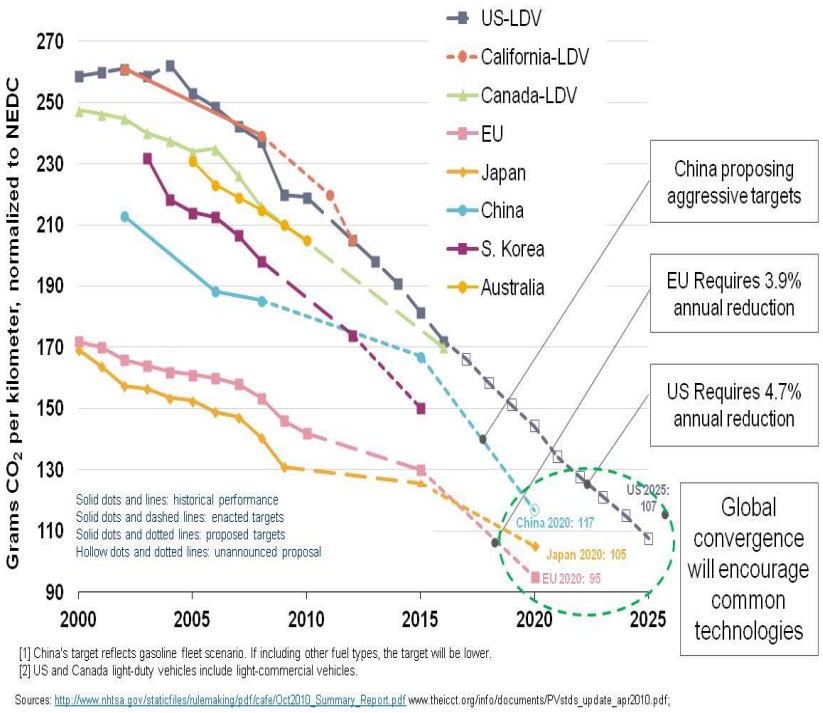
Competitor jurisdictions are already sharing those risks with industry because, while these other nations perceive the challenges, they also recognize the opportunities. We are confident that the global automotive industry will rise to the challenges that lie before it.

The question is whether the solutions will be found here in Canada or elsewhere in the world.

Canadian Automotive Research Initiative

The Challenge

Fuel economy, vehicle emission and occupant safety regulations all over the world are rapidly changing and driving the need for a wholesale revolution in automotive technology. The current fuel economy requirements began ramping up in 2010 and will be doubled over the next ten years by 2025. That is more than twice the rate of change of the past three decades. These dramatic changes are shown in the chart in terms of grams of CO_2 emissions per 100 km.



The new requirements are global, involving every major industrialized nation. The US, Canada, the EU, and major Asia-Pacific nations which, collectively, account for more than 90% of the world-wide auto market all require similar reductions in fuel consumption and exhaust emissions.

By 2025, the *average* vehicle for sale in North America will have a fuel efficiency rating of 4.21l/100km, versus the 2010 level of 8.51l/100km. That is a 103% change in the 15 years from 2010 to 2025.

Vehicles will be connected to the wireless world. New cars will routinely assess the driver's suitability to drive in terms of alcohol or other potential impairments; they will guide the driver with energy efficient directions based on current traffic patterns and keep vehicle occupants safe with active collision avoidance. These enhancements will increase traffic flow without requiring new road infrastructure or compromising safety.

Over 70% of vehicle components and their underlying technologies come from the parts supplier segment. In Canada, most parts firms are smaller than their international competitors and cannot afford large in-house R&D efforts. In addition, competitor jurisdictions are deploying significant programs that provide direct assistance to their industries for new product and technology development and these are drawing the R&D efforts of larger Canadian companies away from Canada.

The Canadian Automotive Research Initiative

In the spectrum of activities that runs from the inception of new science through to a production component in a vehicle, Canada is well placed for success in most of the key technologies. CARI is designed to fill a significant gap in Canada's ability to compete in the race to develop the vehicle technologies and production processes that are needed for tomorrow's automobiles.

Public support through initiatives like AUTO21 and other programs are producing real results that matter to Canadians. They have also provided the critical front end of the technology development spectrum by supporting basic research. For example, AUTO21's work has produced new science to reduce fuel consumption and enhance safety; new comfort features; more than 2,500 young R&D experts and 500

researchers to push the boundaries even further, plus it has fostered productive industry-academic relationships across disciplines and led to more than 300 patents, licences and agreements. The necessary inputs are in place. At the other end of the tech development spectrum, a Canadian company that wins contracts to sell innovative products can do so in an advanced business environment, featuring up-to-date infrastructure, including critical investments in the border crossing to the United States and a modern, broadly-competitive tax system.

The evidence suggests that properly-structured public investments pay significant dividends that matter to Canadians. The US-based Center for Automotive Research studied the research benefits associated with the public-private investments made in AUTO21 in the period 2001-2010. The study found that the $90 million invested by public and private sector partners in AUTO21 had produced $1.1 billion in benefits: a *twelve-fold* return.

What is missing -- the gap CARI proposes to fill -- is the investment support needed to take the new knowledge from conceptual ideas to working prototypes and technology demonstrators that will lead to sales of products and technologies. CARI proposes that government and industry share equally the cost of product development activities to enable demonstration of new technologies to customers. Proposed eligible costs through the CARI initiative would include:

- the acquisition of advanced equipment,
- materials and prototype tooling used for project development tasks,
- fees to access university science facilities on a contract basis, and
- the cost of hiring the experts to carry out this work.

We firmly believe that CARI projects will build new capacity in the public and private sectors and that this will help investments to migrate *and remain* in Canada to spark further growth in our industry.

The structure of the program will matter. In moving from concept to prototype, there will inevitably be failures and the need for corrections. Therefore, program flexibility to recognize the inherent uncertainties associated with commercializing new ideas is vital. Stability and predictability are also important. For this reason, we propose a five-year commitment to provide Canadian industry the confidence to plan and to innovate.

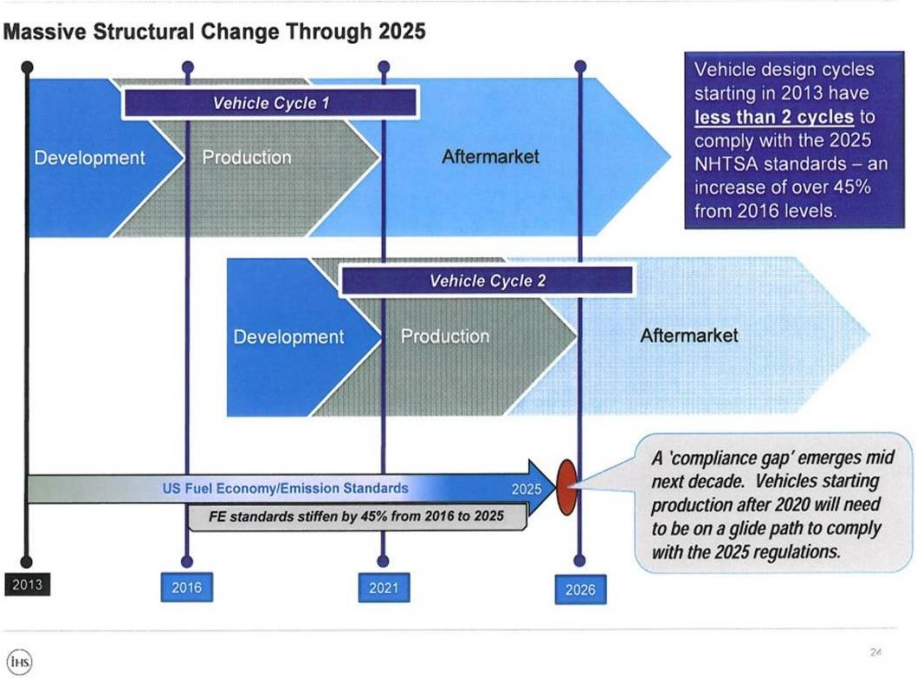
We agree with the Jenkins and Emerson reports that funding should directly support R&D in industry. Programs must be designed for commercialization by industry in Canada and include a rigorous approval process and metrics to ensure effectiveness together with monitoring by external auditors.

The Time is Now

While new regulatory requirements that take full effect ten years from now may seem well out on the horizon, they are, in reality, upon us already. In auto manufacturing terms, there are only *two product cycles* left between now and the application of new regulatory standards in 2025.

If we do not act decisively, product development will be conducted elsewhere in jurisdictions that are already designing or implementing new, direct support programs. And, more importantly, once vehicle manufacturers commit to new technologies and suppliers for their world-wide needs, they are unlikely to change strategies later.

The figure below illustrates the product development cycle. Design and sourcing decisions for these five year vehicle production mandates are made three to four years before the start of volume manufacturing and this means that while the opportunity for Canadian parts firms is big, it is also immediate and the time to respond is short.



The *Innovation & Commercialization Working Group* of the Canadian Automotive Partnership Council (CAPC) agrees that critical design and sourcing decisions are being made now. (Figure courtesy IHS Automotive)

Automakers demand creative solutions from their suppliers and they must be confident that new components and systems will be ready for inclusion on global vehicle platforms.

This confidence can only be built by physical demonstrations of new technologies under secure, real-world conditions.

Only when new ideas are demonstrated and their viability is confirmed, will the automakers commit to new supplier selections for the next vehicle generation.

Summary

Canada's auto industry is critical to our economy. It employs 110,000 people directly over 60% of whom work in parts manufacturing. One-in-seven Canadian families rely on the auto sector for their livelihood.

As Minister Oliver has said, "Canada's economy cannot be strong when the center is weak."

The Canadian Vehicle Manufacturers Association supports CARI because it would provide a competitive level of assistance to encourage and support the product development and commercialization of new products and manufacturing processes. CVMA members believe that CARI will lead to improved productivity and profitability for the auto industry (suppliers and OEMs) and increased employment opportunities by making Canada a centre for product and manufacturing process development - a critical aspect of an overall auto strategy for Canada to protect its auto manufacturing footprint.

The environment in which the Canadian auto industry functions is changing rapidly and becoming more globalized. Those fundamental changes are driven by tough new environmental standards being imposed in every advanced economy on the planet and by rising consumer expectations.

Innovation is critical, as is timing.

The CARI proposal provides clear and direct support where the private sector cannot go-it alone and where it is needed most. It is an initiative that recognizes that innovation, adaptation and change are inevitable in this critical sector of Canada's economy and it is supported by the spectrum of auto industry stakeholders from all corners of the sector.