

## Diesel II: Learning From Europe

These are interesting times in the automotive world. New technologies are hitting the street thick and fast, the rate of progress beginning to resemble that of the IT industry. The situation is not unlike that of the automotive industry in the early decades of the last century, when there was an avalanche of new vehicles and technology.

Today's vehicles are now delivering on concept-car ideas presented as recently as 1990: full hybrid gasoline-electric powertrains, distance-adaptive cruise control, satellite navigation, infrared night vision systems, advanced environmentally-friendly technology, and active safety systems to name a few. Among the technological trends currently coming of age, the diesel renaissance unfolding in Europe stands on the environmental front as having significant upside potential for Canada.

In my *Observation* last November, I reviewed the peaks and valleys associated with the mass re-entry of diesel into the Canadian passenger car marketplace. I pointed out that the imagined barriers to consumer acceptance of diesel are just that – *imagined*. I quoted results from our surveys, all of which indicate enormous untapped diesel potential in the Canadian vehicle market.

I did all of this a year ago, and as I write this in September 2005 I am even more convinced of diesel's importance to Canada's automotive future. Today's clean and quiet diesel engines are separated from the 'smokers' of the 1970s by roughly four generations of continuous overseas development, eliminating almost all of the poor performance variables from the diesel

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equation. Moreover, government-mandated ultra-low-sulfur diesel fuel arrives this January, so any lingering fears of dirty fuel, diesel odors, or visible emissions should shortly be behind us as well.

In addition, the recently signed Memorandum of Understanding (MOU) between the Canadian government and the vehicle OEMs stipulates a 5.3 Megaton reduction in light vehicle greenhouse gas emissions by 2010. A strong case can be made that the automakers will need to attack this voluntary emissions target through technology, and the technology that presently delivers the greatest potential gains is diesel. Some would argue for hybrids, and while I don't discount the

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importance of these vehicles, I think diesel holds even more upside for reducing greenhouse gas emissions.

It is thoroughly discouraging that there has been very little movement in Canadian-market diesel technology since I last visited the subject. Volkswagen continues to offer its excellent TDI engines in the Golf, Jetta, New Beetle, and Passat. DaimlerChrysler sells its CRD diesel in the Jeep Liberty, and all three U.S.-based automakers offer diesels in their full-sized pickups, vans, and SUVs. Mercedes-Benz stakes out the low and high ends with the \$16,000 smart fortwo and the \$74,000 E320 CDI.

Aside from the VW products (which are priced into the margins of their respective segments), the selection of diesel vehicles in Canada has limited popular appeal and restricted volume potential. For this technology to have a noticeable impact on greenhouse gas emissions – and on pocketbooks, balance sheets, and fuel registers – availability cannot be limited to a smattering of cars and trucks. In the 2004 DesRosiers Light Vehicle Study, diesel acceptance levels were found to be far higher than their actual sales rate. Of survey respondents who were aware of diesel technology, a significant number (42.7%) stated that they would be

*somewhat likely or very likely to purchase a diesel engine option if it were to be offered on their next vehicle.*

Pundits who claimed that diesel demand dried up in the early 1980s

have been proven wrong with the success of Mercedes-Benz's smart fortwo. This microcar is something of a hyperbole. It pushes the limits of acceptability, retaining little from the traditional automotive blueprint but four wheels and a bare minimum of utility. It is a rear-engined, diesel-powered, sequentially-

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shifted economy car with an overall length shorter than the wheelbase of a number of other vehicles in its price class – and it is selling well! With year-to-date sales of 2,390 through July 2005, the "smart" has outsold an impressive group of vehicles (table on page 2). The success of this car in the Canadian marketplace is proof-positive that our consumer public is willing to accept

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Vehicle	Sales YTD July 2005
smart fortwo	2,390
All BMW SUVs	2,365
Mitsubishi Lancer	2,316
All Mitsubishi SUVs	2,275
Acura RSX	2,102
Acura TSX	2,098
Subaru Forester	2,083
Mini Cooper	2,036
Nissan Maxima	1,964
Kia Sorento	1,895
Honda Element	1,803
Suzuki Swift +	1,769
Nissan Xterra	1,623
Suzuki Aerio	1,622
Mazda MPV	1,534
Toyota 4-Runner	1,529
All Cadillac SUVs	1,372
All Suzuki SUVs	1,370
All Mercedes-Benz SUVs	1,321
Volvo S40	1,319
Nissan Quest	1,255
Toyota Prius	1,105
Saab 9-3	666

Source: DesRosiers Automotive Consultants Inc.

Rank	Make/Model	2004 Sales
1	Honda Civic	61,041
2	Toyota Corolla	44,563
3	Mazda3	42,680
4	Toyota Echo	31,252
5	Ford Focus	28,391
6	Honda Accord	25,814
7	Hyundai Accent	19,172
8	Hyundai Elantra	15,375
9	Chevrolet Malibu	15,062

Source: DesRosiers Automotive Consultants Inc.

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radicalism. At this point in time, diesel is radical.

Considering that current diesel penetration is below five percent of the total Canadian market, it is clear to us that the major impediment to larger consumer take-up of diesel is product availability. Where are the diesel Cobalts, Civics, Accords, and Impalas? Where is the diesel Caravan? Canada's market segmentation demands that certain key products must lead the way in concept acceptance. Canadians buy lots of compact sedans, intermediate sedans, and minivans, yet those lynchpin products are largely missing from the diesel matrix.

The majority of Canada's top-selling cars have been engineered to support diesel variants (table on page 2). Canada's top three best-selling passenger cars (Honda Civic,

Toyota Corolla, Mazda3) can be had with diesel power in the UK. Six of Canada's ten best selling passenger cars are

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available in other markets with fuel-efficient diesel powertrains, while every one of the top twenty best selling passenger cars is a suitable candidate for one of the modern diesels that are present in every automaker's European portfolio.

The Honda Accord, Mazda3, Ford Focus, Saab 9-3, and DaimlerChrysler minivans are examples of vehicles currently available in Canada that would logically benefit from an easy diesel swap. Honda's European-market Accord (known here as the Acura

TSX) is available in Europe with a 2.2L diesel motor capable of achieving a combined 5.4 litres per hundred km. Contrast this with the TSX's standard 2.4L gasoline motor, capable of city/highway ratings of 10.6/7.1 litres per hundred km. With 0-100 km/h times averaging around nine seconds and top-gear passing times superior to the gasoline version, the diesel supplies strong performance while delivering phenomenal consumption and cruising range figures. All reports indicate it to be a paragon of noise and vibration suppression.

So it is with the Mazda3 and Ford Focus: good sellers, great cars, and both potential segment dominators with the inclusion of diesel engines on their respective options rosters. The UK-market Mazda3 MZ-CD, with its 1.6L diesel, achieves an astounding 4.3 litres per hundred km on the highway while retaining the drivability that early-1980s diesel mileage-specials lacked. For comparison, consider that the Toyota Prius burns 4.2 litres per hundred km on the highway.

What better way to rejuvenate the Saab brand than to make the 9-3 available here with the same powertrain options that are available to foreign customers? UK consumers can choose between two turbo

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Year	U.S.			Canada		
	U.S.	Total Car	% Share Car Mkt.	Canada	Total Car	% Share Car Mkt.
1990	7,130	9,300,209	0.08%	7,320	883,742	0.83%
1991	8,154	8,175,599	0.10%	11,951	873,050	1.37%
1992	5,177	8,213,113	0.06%	13,289	797,914	1.67%
1993	2,800	8,517,859	0.03%	11,455	739,051	1.55%
1994	3,577	8,990,517	0.04%	13,267	748,655	1.77%
1995	3,139	8,634,964	0.04%	11,754	669,641	1.76%
1996	8,469	8,525,754	0.10%	7,895	660,667	1.20%
1997	7,331	8,272,074	0.09%	9,298	738,557	1.26%
1998	10,972	8,139,479	0.13%	7,360	740,812	0.99%
1999	13,573	8,698,284	0.16%	6,155	806,462	0.76%
2000	22,634	8,847,653	0.26%	12,498	849,103	1.47%
2001	15,077	8,428,982	0.18%	14,186	868,627	1.63%
2002	31,430	8,109,236	0.39%	13,331	934,471	1.43%
2003	38,524	7,617,954	0.51%	14,613	865,463	1.69%

Source: DesRosiers Automotive Consultants Inc.

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diesel engines in their 9-3s (1.9L or 2.2L). Would the availability of these "exotic" powertrains not bolster Saab's credibility as a genuine Euro-sourced brand? The 9-3 is an excellent car – one of GM's best products. It should not languish as one of the slowest-selling vehicles in its class.

As I have said in the past, the first company to market with a diesel minivan in Canada wins big. At this point, the OEM closest to bringing that dream to fruition is DaimlerChrysler. The corporate minivan platform is available in foreign markets with the same 2.8L diesel powerplant recently introduced in the Jeep Liberty. Attached to a six-speed automatic transmission and installed in the Dodge Caravan, the CRD engine would profoundly alter the dynamics of Canada's minivan segment.

However, this potentially bright upside will not materialize if our hopelessly restrictive Tier 2 emissions standards are not modified to reflect our current priorities. Diesel fuel economy, cost savings, and Kyoto-friendly hydrocarbon benefits are faraway dreams under current regulations.

In order for diesel to have a real future in Canada, our policy makers need to take a

long, hard look at the Tier 2 emissions standards they have adopted – standards that are the single greatest impediment to the diesel benefits scenario I have outlined above (see Appendix for an explanation of Tier 2 and its implications for diesel-fueled vehicles).

The U.S.-sourced Tier 2 emissions protocol (with 2006 and 2009 end dates for passenger car and light truck phase ins, respectively) severely limits the ability of vehicle manufacturers to respond to the April 2005 greenhouse gas-reducing MOU. It seems contradictory that our government would sign on to the Kyoto Protocol at the same time as it enjoins automakers to adopt an emissions standard *not* modeled with Kyoto targets in mind. The EPA-designed Tier 2 protocol may indeed have a positive effect on American emissions, but the U.S. is not a Kyoto signatory. It has different legislative priorities and different vehicle market segmentation. Canada has much greater upside potential for diesel than the U.S., and our legislative and regulatory approach should take that into account.

This situation leads to a profound paradox: Tier 2 allows high volume, high consumption models like the Chevrolet Tahoe to remain on

sale, while comparatively low-volume enviro-specials like the VW Golf TDI may be

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forced to leave the market. The new emissions standard does not have the built-in flexibility of its European equivalent. EU countries can rely on diesel to rack up Kyoto credits, while Canada is hobbled by its too-quick adoption of U.S. policy.

Is this not the case with so many Canadian ventures? Whether it be in the realms of business, entertainment, or government, we always seem to have one foot planted on someone else's soil. When will Ottawa learn that the Canadian automotive market is one of the most international of any in the world, *not* a clone of the U.S.? International standards – not U.S. standards – are a better fit for Canada.

In an effort to bring us closer to the "international community" (read: Europe), Canada has signed on to the Kyoto Accord. At the same time, we have adopted the U.S.'s tailpipe emissions standards, the strictest such protocol in the

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world. Canada now requests and requires that the country's automakers do their bit in meeting Kyoto GHG-reduction targets – *but because of a contradictory and confused policy environment, those OEMs are not allowed to use the solutions that other Western Kyoto participants have discovered.* In order to reduce fuel consumption and harmful emissions on a fleet-wide, nation-wide basis, federal lawmakers should consider exempting diesel vehicles from the Tier 2 protocol.

Such an action would be a bold break from precedent, signaling the end of market harmonization with the U.S. and ushering in a new era of vehicle marketing. Mind you, I also think that the U.S. should exempt diesel from its own Tier 2 standards so we could maintain harmonization.

By doing this in Canada, we would at the very least demonstrate to our American friends that some regulations

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***The move to diesel needs to happen, and it needs to happen soon.***

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are better implemented the Canadian way.

With no impediments to diesel sales, manufacturers could implement their European solutions, thereby meeting their MOU obligations in a timely manner. Consumer-level cost benefits are clear, as each litre of diesel fuel delivers more driven kilometres than its gasoline equivalent. Virtually all OEMs also have diesel technology available offshore, so there is a "fairness" quotient as well.

All factors considered, diesel power represents an attractive compromise solution to Canada's energy debacle.

Is diesel the godsent answer to the twenty first century's transportation problems? No, of course not – it's still petroleum based. It is, however, a strong step in the right direction. As with hybrid technology, it lessens our dependence on fossil fuels and provides a direct conduit to more eco-friendly alternative fuel powertrains – diesel to biodiesel, gas-hybrid to hydrogen-hybrid. A 'perfect storm' of high fuel costs, environmental policy, and attractive product has multiplied diesel's potential relevancy in the Canadian market. The move to diesel needs to happen, and it needs to happen soon.

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### **Reminder:**

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### APPENDIX:

#### Understanding Tier 2

Tier 2, the most stringent emissions protocol in the world, is a "fuel neutral" standard, meaning that the same failure thresholds apply to gasoline, diesel, propane, natural gas, or whatever other alternative fuels a vehicle consumes.

While this approach gives the

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appearance of 'fairness' by reducing legislative complexity and harmonizing standards across the board, diesels are hobbled by the stringent "gasoline-centric" nature of the emissions cutoffs.

Every fuel burns slightly different, producing different byproducts in different proportions. The nature of the diesel combustion cycle (lean burn, ultra-high compression

ratio) lends itself to greenhouse gas reductions. Indeed, a modern diesel's hydrocarbon emissions are near zero. The flip side of this is that diesels emit greater proportions of nitrous oxide and particulate matter than gasoline engines. Whereas the European standard allows a rough averaging of hydrocarbon and nitrous oxide emissions, an engine being certified under Tier 2 would be penalized if any of the variables fall below the stipulated threshold. If you're over on one, you automatically fail the test.

This also runs counter to another aspect of the European approach: diesels are allowed to run slightly "dirtier." By having staggered standards, the EU method lets the market adhere to the spirit of the enterprise (i.e., greenhouse gas reductions) more effectively than the U.S.-sourced Tier 2 standard.

Current-generation diesels could be modified to conform to Tier 2 standards, but cost

factors would render them uncompetitive. Exhaust filters could be integrated, but those scrubbers would levy a two-to-six percent fuel consumption penalty. Urea-injection systems could be fitted to diesel-powered vehicles, but the current crop of prototypical urea systems require frequent top-ups, potentially negating the long term effectiveness of urea-equipped vehicles.

Long-term usage is one of the areas targeted in the Tier 2 protocol. Vehicles must be certified to conform to the standard for the bulk of their service lives (192,000 kms or 120,000 miles). Although the standards relax somewhat as mileage accrues, it is still difficult for manufacturers to account for deterioration factors in their emissions solutions. This problem is especially acute for diesels, as there has been limited research into 'aging emissions' in any of the markets where diesel is sold. **DAR**

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