# Biofuels: The Recipe for Success

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David Aldous accepted an assignment with Shell Canada Limited as Senior Vice President, Oil Products, effective October 2006. He is responsible for the manufacturing, distribution and marketing of Shell's refined petroleum products across Canada.

Mr. Aldous was born in the United States and graduated with a Bachelor of Science in Fuels Engineering from the University of Utah. In 1980, he received a Masters of Business Administration from Northwestern University's Kellogg Graduate School of Management.

David began his career as a process engineer and project manager at Fluor Engineers and Constructors, Inc. In 1984, he joined the Shell Chemical Company in Chicago, where he worked in polymer sales and on various commercial assignments. In 1989, David left Shell to work as Regional Sales Manager for the Oracle Corporation. He rejoined Shell in 1991, moving through increasingly responsible leadership roles in business management, market development and strategy for Shell's global detergents and olefins businesses. In 2000, David became President, CRI/Criterion, Inc. and Chairman, Zeolyst International, which are affiliated with the Shell group of companies and offer quality catalysts, license technology and technical services to the refining, petrochemical and other industries worldwide.

David has been a member of the Petrochemical Heritage Founders Club; Vice Chairman of the National Petrochemical and Refiners Association's Petrochemical Committee; Chairman of the association's Science Teacher Enhancement Program; and Chairman of the International Petrochemical Conference.

He serves as a member of the Executive Committee of Lifeway/SOBR, a youth drug and alcohol abuse organization, and is an active adult leader in the Boy Scouts of America.

David is married to Susan and they have five children.

Good morning, ladies and gentleman, and thank you, Kory, for your kind introduction.

It is an honour to have been invited to participate in the conference and a pleasure to share the podium with so many distinguished speakers. I am also delighted that Shell Canada has just filed an application to become a member of the CRFA. This application recognizes not only our current participation in the biofuels business, but the expectation of our increasing involvement as we incorporate biofuels into our core business in the coming years.

You could not have chosen a better venue to remind us all how precious our environment is and how inextricably bound it is with the quality of life we enjoy. I grew up in Salt Lake City, Utah, which played host to the Winter Olympic Games in 2002, 14 years after Calgary hosted the 1988 Winter Olympics, so I have a great appreciation for the beauty of the outdoors and especially the mountains.

We are gathered here to talk about the future of renewable fuels – the opportunities and challenges they present. I want to focus on biofuels, primarily from the Shell perspective, but also the broader industry perspective. I worked my way through college undergraduate school as a chef and have always found strong similarities between cooking, chemistry and fuels. If we think of renewable fuels as part of the energy "stew" to feed the energy appetite, what are the key ingredients that will make it palatable to the chefs and the consumers?

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- *Available* means that, wherever renewable fuels are distributed, access must be convenient and consistent.

- *Affordable* is somewhat subjective, but, earlier this year, we saw very clearly what motorists think about paying over $1 Cdn per litre at the pumps and that reaction is not likely to change, at least in the near future.

- *Acceptable* means a combination of quality and sustainability. In other words, consumers may want to reduce the impact their transportation fuel has on the environment without sacrificing fuel quality, performance or affordability.

In addition, the federal government has issued a challenge that there will be five per cent renewables in our fuel supply by 2010. Today, Canadians consume some 73 billion litres per year of refined product. Given that, today, biofuels comprise less than one per cent, with about 500 million litres of production, we have our work cut out for us to increase that output to between two and three billion litres of production over the next three years. The onus is on all of us to make sure that biofuels maximize the environmental and economic benefits to all Canadians and, at the same time, bring value to the customer.

There are two key ingredients to successfully meeting all of these challenges: technology and public policy. Let's first examine technology.

This is an exciting time to be in the fuels business as we confront the issues of energy security and sustainable mobility. Consider that, by 2020, there could be as many as one billion cars on the world's roads, 50 per cent more than we have today. Clearly, biofuels – ethanol and other fuels made from renewable plant- or animal-based feedstock – will play an important role in both security of supply and sustainability. In fact, Royal Dutch Shell predicts that biofuels will represent around seven per cent of its road transport fuel volume in the next 20 years.

Shell Canada fully supports the development of advanced biofuels. In fact, Shell globally is the world's leading marketer of biofuels - both ethanol and biodiesel - by volume, selling more than two billion litres a year of the pure biofuel. Furthermore, Shell is taking a leadership position in the development of second-generation biofuels derived from waste residues.

In partnership with Choren Industries of Germany, Shell is working to make biomass to liquid (BTL) fuel a commercial reality using the Carbo-V® BTL process, with demonstration-scale production scheduled to start in the second of half of 2007.

And, as you probably know, Shell has a significant stake in the Canadian company Iogen Energy, which is producing ethanol from agricultural residues such as wheat straw. The first pilot plant is already in production in Ottawa and a commercial scale facility is being planned. The waste straw itself produces no net carbon and the overall carbon lifecycle emissions are reduced by 90 per cent, giving a healthy boost to the environment while potentially providing the agricultural industry with a secondary income stream. This "made in Canada" technology meets all the requirements of an advanced biofuel. Shell Canada has been working closely with Iogen to generate federal government support to build

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this plant in Canada, however time is running out if it is to become a reality.

We will, of course, use fuels from food crops today and in the near-term to meet market demands and regulatory requirements, but we believe that a better, longer-term solution lies in waste residue feedstocks. Fuels from waste residues will be cheaper to produce and require less overall energy input. They will eliminate any competition with agricultural production for food and, as demonstrated by the Iogen pilot, production from waste residues offers far greater environmental benefits while still providing an important opportunity for agricultural diversification.

Diesel is the fuel of choice in many European countries. In France, for example, diesel vehicles make up 70 per cent of new car registrations and, last October, the number of diesel passenger cars sold in Western Europe outstripped gasoline-powered cars for the first time. It remains to be seen if North America will follow suit.

Let me be clear that I use the term biodiesel to refer to the prevalent fatty acid methyl ester as well as the hydrogenated seed oil, biomass to liquids and any other renewable diesel fuel. BTL technology can produce a high quality biodiesel from a waste stream and has some inherent advantages. Unlike ethanol, the resulting diesel biofuel can be produced and blended at refineries and introduced seamlessly into the existing distribution system and into the tanks of customers. A renewable diesel of similar quality can be produced by hydrotreating seed oil, resulting in a superior diesel component akin to the conventional diesel produced from crude oil today. This advanced technology can produce a quality renewable diesel from seed oils such as canola and soy that may be far more suitable for use in the Canadian climate than the methyl ester variety or FAME.

And that climate makes Canada a unique place to take the time to properly test biodiesel recipes in the toughest conditions to ensure they really work. Right now, the Canadian renewable diesel fuel market is in the early stages of development, with few users outside municipalities and utilities, which have their own infrastructure and fleet of vehicles. At the same time, the distribution infrastructure across Canada is limited, contributing to a lack of information and knowledge among customers, distributors, regulators and policy makers. The main obstacles to the adoption of biodiesel on a larger scale include availability and affordability, the impact on operations and concerns about product quality.

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Well, I'm pleased to announce that Shell Canada has agreed to be a major player in a multi-stakeholder demonstration project designed to answer several of the key questions surrounding the use of biodiesel. The Alberta Biodiesel Demonstration Project will proceed in two phases: laboratory experiments, which, if promising will be followed by on-road testing. The large-scale, multi-season pilot will involve the use of four million litres of blended diesel in the Alberta long-haul motor transportation sector, particularly the long-haul fleets in the Calgary-Edmonton-Fort McMurray corridor where we experience some of the most extreme temperatures in the country. We estimate that 60 vehicles will be required (that is, 20 control vehicles and 20 each for two renewable diesel blends), to acquire meaningful data. The performance and operation of all the vehicles will have to be closely monitored.

The main objectives of this two-year pilot program are to:

- evaluate cold-weather operability;

- identify issues specific to the use of ultra-low-sulphur diesel (ULSD)/biodiesel blends over time, including vehicle performance, maintenance requirements and operator experiences;

- evaluate the impacts on engine components, such as friction wear, coking, and so on; and

- evaluate the impact on blend quality of inline injection blending of ULSD with biodiesel.

In addition, the project will provide fleet operators with actual experience using a biodiesel blend, augment existing best-practice guidelines for distribution to retail and bulk fueling sites, and hopes to provide data on emissions reductions from a ULSD/ biodiesel blend.

This type of testing is important to Shell Canada, because we assess our biofuels options - like all of our business options - using our criteria for sustainable development: economic, environmental and social. The economic considerations are about costs and quality. The environmental considerations refer to the impact on air, water and other environmental issues throughout the entire lifecycle of the product. Finally, we look at the social aspect, including community impacts, societal values and the benefits to all Canadians. We cannot and will not compromise our fuel quality and value to our customers.

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Shell believes that, over the next decade, the gates will be open to a flood of new, higher quality, lower cost biofuels as innovation and competitive forces bring rapid changes and accelerate the development of biofuel technology.

And this brings me to my next point, that Shell has both the commitment and the technological expertise to help advance the development of clean, quality fuels. In fact, Shell Canada was the first Canada-wide fuel producer and marketer to meet "TOP TIER Detergent Gasoline" standards established by four of the world's top automakers including GM.

In May of this year, Shell Canada was the first integrated oil and gas company in the country to announce completion of ULSD facilities at our Scotford and Montreal East refineries, ahead of the deadline for the new federal government regulations. This accomplishment is part of a much bigger commitment on the part of government, the auto industry and the petroleum industry. Thanks to downstream industry investments totaling many billions of dollars, legislated tailpipe emissions have been reduced by 98 per cent during the past 30 years. In fact, our industry invested about $4.8 billion to produce low-sulphur gasoline and ULSD, all since 2002.

There is no reason to suppose that technology and innovation combined with sensible investment will not take us into an era of renewable biofuels. But this is where public policy comes into play, and this is where I will exchange my Shell hat for my industry hat. The industry needs a framework that is consistent across Canada and, in fact, across North America. We believe this is crucial to long-term success for a number of reasons.

The first reason is reliability of supply. We can already see that the different ethanol specifications proposed by each of Saskatchewan, Manitoba and Ontario quickly fragments the gasoline market. Gasoline and biofuels that used to move easily and efficiently across provincial borders to meet demand today face barriers. A June 2003 Natural Resources Canada overview of the downstream industry said it best, "The transition to cleaner fuels could result in temporary local supply problems and more volatile product prices."

The second reason is competitiveness. We believe that the future fuels market is going to be even more competitive than it is today, with competition not just between providers, but also between types of fuel. Customers will have a greater range of choice between fuels as well as the vehicles and engines they drive. So, we as energy producers will have to respond in more sophisticated ways and stay at the leading edge of all fuel technologies to meet the variety in customer demand. The most effective way to achieve those ends is through open,

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undistorted markets where all the different fuels can compete fairly.

To achieve customer acceptance, the cost of biofuel blends needs to be comparable with the conventional fuels that coexist in the marketplace. Historically, the cost of ethanol production has been 15 to 20 cents per litre more than gasoline, and biodiesel has cost 30 to 35 cents per litre more than diesel. Governments in the U.S. and European Union have implemented substantial economic incentives to bridge these gaps and establish the economic conditions for a competitive biofuels market. The question remains whether or not Canadian federal and provincial governments will place the same priority on this important area of public policy. At this critical juncture in the development of a biofuels market, the key objective of federal support should be to mirror the United States or risk severely distorted markets.

As volumes of biofuels increase, there are numerous benefits such as more agricultural activity, job creation, economic development and reduced emissions. But let's not forget that there are costs and the faster public policy encourages technological advances, the sooner those costs will diminish. Ultimately, there is a bottom line: biofuels must compete successfully with conventional gasoline and diesel fuels.

The final issue is timing, because the clock is ticking if we are to meet the federal government's 2010 deadline for increased biofuel production. We need a policy in place by the beginning of 2007 if we are to make the best, most effective use of technological development and investment dollars. If, as a company and a society, we are going to invest in biofuels, isn't it our responsibility to ensure that the most sustainable technologies flourish?

Clearly, then, the National Renewable Fuels Strategy (NRFS) must focus on the broad target of successfully introducing biofuels into the market, and avoid the narrower specifications of which biofuels should be used in which fuel blends in which parts of the country. Market forces and competition must be allowed to optimize the use of biofuels. Their introduction into the fuels portfolio should be seamless and transparent to all customers every day. In other words, we must preserve the efficiency of our national fuel supply network and refuse to compromise on quality. We need to open both provincial and international borders for biofuels and blends. The NRFS should also provide a level playing field for producers, blenders and importers so that we can maximize the benefits for all Canadians.

We need a customer base that is willing to use biodiesel and I believe that, once ULSD has demonstrated a proven track record, there is a window of opportunity to convince a broad range of consumers that quality biodiesel is an attractive alternative. Public policy should encourage new and emerging technologies through research and development based on clear goals. The Minnesota experience is a good example of public policy anticipating science. The state government introduced a mandate for two per cent biodiesel in 2005 only to rescind it in the winter of 2005/06 because of performance problems in cold weather. Remembering the lessons from the past, we must avoid setting up barriers and arbitrarily picking "winners."

Predicting the future is a risky business, but it's reasonably safe to say that fossil fuels will be a major part of the Canadian energy portfolio for the next 40 or 50 years. We hear a lot about renewable energy, including ethanol and biodiesel. But, the reality is that it will take a long time for these alternatives to penetrate the market sufficiently to make a significant difference. Some alternative fuels, such as hydrogen, will also require huge investments, especially in radically new infrastructure. At current rates of return, the economic incentive for the industry to make such investments is low or nonexistent, so we cannot expect the market to stimulate the necessary cash flow. It is going to take government incentives driven by public pressure.

With the right combination of ingredients - technology and well thought-out public policy - we can cook up a "made in Canada" solution to the challenges of meeting increased demand for sustainable energy and sustainable mobility in a way that pleases all palates. Partnership is a key ingredient.

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