



# Why Walmart Canada Is Investing in Hydrogen Fuel Cell Technology

Material handling equipment (forklifts) at the Balzac Perishable Distribution Centre (PDC) will be powered by hydrogen fuel cells. Walmart Canada sees using hydrogen fuel cells as an emerging alternative to using lead acid batteries as a power source for material handling equipment, particularly at high-throughput distribution centres.

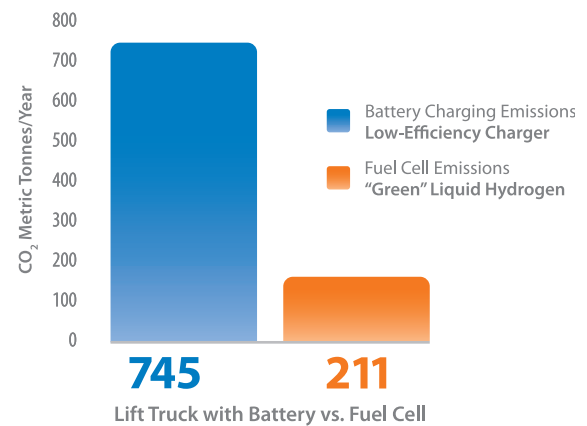
**At the Balzac PDC, use of hydrogen fuel cell technology will deliver \$2.0million in operating cost savings over seven years and will reduce Greenhouse Gas emissions by 530 tonnes of CO2 per year.**

By applying fuel cell technology on an industrial scale at the Balzac PDC, we will be able to get valuable information with which to assess the use of hydrogen fuel cells elsewhere in our distribution network. We believe our investment in fuel cells will speed wider adoption of the technology in the market, improving hydrogen infrastructure and sustainability performance and driving down costs for our customers, our competitors and us.

When using fuel cells for material handling, securing an appropriate source of hydrogen is the key to delivering sustainability benefits. At Balzac, we will procure hydrogen, produced through the electrolysis of water, using electricity generated from hydroelectric power. The carbon footprint and economic advantage of the fuel cell will be further enhanced as infrastructure expands.

We are already exploring the possibility of equipping the shunt trucks on our site with hydrogen fuel cells and expanding the use of this technology to our other distribution centres in Alberta.

Distribution Centre Carbon Dioxide (CO<sub>2</sub>) Emissions



Comparison of Hydrogen Fuel Cell and Lead Acid Technologies

		Hydrogen Fuel Cell	Lead Acid Battery
Environment	Emissions	■	
	Waste	■	
	Electricity Consumption	■	
Operation	Maintenance Labour	■	
	Warehouse Labour	■	
	Maintenance Cost		■
	Warehouse Space	■	
Financial	Start-Up Capital		■
	Operating Cost	■	
	Seven Year Capital & Operating Costs	■	
	IRR	■	



## Frequently Asked Questions about Hydrogen

### 1. What is hydrogen fuel cell technology?

Basically, the fuel cell converts chemical energy into electrical energy. Hydrogen is combined with oxygen in a fuel cell to electrochemically produce electricity. Heat and water are by-products of the reaction.

### 2. How is hydrogen made?

Hydrogen is an energy carrier and is produced from energy sources such as natural gas, coal, gasoline and methanol; or from renewable sources such as biomass from bacteria or algae through photosynthesis; or by using electricity to split water into hydrogen and oxygen.

### 3. Where is hydrogen used?

Hydrogen has been used for over 100 years. Today, hydrogen is used in the electronics, food, chemical and metal industries. Through fuel cells, hydrogen is used for equipment such as forklifts, power generation and back-up power. Hydrogen fuel cells are also being developed by the major auto makers in the production of fuel cell cars. U.S. industries currently use over 90 billion cubic metres of hydrogen a year.

### 4. Why is hydrogen a good thing?

Hydrogen is an abundant carrier of energy and can be produced from many renewable resources with a low impact on our environment.

### 5. What is Air Liquide?

Air Liquide has more than 50 years of expertise in the hydrogen business with over 43,000 employees worldwide. Air Liquide's existing hydrogen infrastructure includes the world's longest pipeline network and the installation of hydrogen-vehicle refuelling stations around the globe, including Canada.

### 6. Where will the fuelling stations be located?

At the Balzac, Calgary PDC.

### 7. What is the source of the hydrogen?

The hydrogen used in Balzac is generated through electrolysis, predominantly using hydro-electricity from Québec. The fuel is produced from 98% renewable resources. It will be liquefied and transported to Calgary by truck. There are also plans to develop a source of liquid hydrogen in B.C.

### 8. How reliable is the fuel supply?

At all times, there will be up to a 30 days' supply of fuel available. Air Liquide has access to North American network-wide facilities for additional fuel if necessary.

### 9. How much does hydrogen cost?

Over the longer term, the cost of hydrogen is expected to be equal to or less than the equivalent fuel cost per kilometre of a diesel bus. Hydrogen fuel cost is stable for the contract duration while the cost of diesel may continue to fluctuate.

### 10. Is it safe?

We all use caution when handling fuels, and hydrogen is no different. As with any fuel and transportation activities, there are safety procedures that are regularly followed and monitored.

- There are numerous hydrogen stations in North America and around the world.
- The industry has an outstanding safety record, locally and globally.
- Standards and safety monitoring have been in place throughout the industry for over 50 years.
- Air Liquide annually produces and safely handles more than 4 billion cubic metres of hydrogen gas at 50 plants worldwide.

### 11. What happens if there is a hydrogen leak?

Hydrogen is non-toxic, so there will be no soil, water or air contamination. Hydrogen is 14 times lighter than air and poses little risk as it dissipates rapidly into the air and eventually into space. Hydrogen is the most abundant element in the universe and is not a Greenhouse Gas.

### 12. Is hydrogen flammable?

When handled properly, hydrogen is a very safe fuel. Nevertheless, it is flammable and needs to be handled safely just like any other fuel. Hydrogen has a long history of safety. The technology and practices designed to maintain its safety are already in place.

### 13. Are emergency response personnel prepared?

Emergency Responders are trained on safety procedures for all of Walmart's locations. Similarly, training is provided on hydrogen forklifts and installations.