



Carbon Dioxide Equivalent Emissions Report, 2014

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By: Neil Kudrinko, President & CEO

Two thousand and fourteen marks the eighth year that Kudrinko's Ltd. has calculated its carbon emissions using the platform provided by Carbon Counted, a not-for-profit organization dedicated to providing third-party verified, cost efficient carbon footprints. Carbon Counted has been assisting the grocery industry in Canada through the Environmental Sustainability Initiative (ESI) since 2007.¹

This report will provide an overview of Kudrinko's performance with respect to CO² emissions, a brief analysis of the greening of Ontario's electricity grid, and provide information on our plans for future emission reductions. Tracking our CO² provides our company with reliable baselines from which we are able to strategically plan our capital investments. Our goal is that our operations remain competitive within our industry through a reduction in energy costs, as well as providing our company with a strong competitive advantage should Ontario implement a carbon tax or some system of cap and trade for carbon. In addition to the economic benefits of this exercise, we have consistently viewed carbon emission reduction as a key element of our environmental and corporate responsibilities.

Overview

The past year saw Kudrinko's Ltd. succeed in achieving its lowest CO² emissions since tracking began. Total store emissions were measured at 73.94 metric tonnes, a 62.1% decrease from our initial numbers in 2007 at 195.11 metric tonnes.² These numbers have been achieved largely due to the renovation and retrofit of the physical plant in 2008. This project encompassed improvements to the building envelope, including the addition of R40 insulation to the original 1964 roof, reconstruction of the store façade with a stucco finish over rigid foam insulation, addition of a new warehouse that improved the energy efficiency of our receiving area, as well as an air curtain over the store's main entrance doors.

Mechanical improvements included replacement of the store's compressors with a Hussmann Protocol rack system, replacement of two bunker freezers with upright doors, new HVAC systems, a heat reclaim system to reclaim the heat produced in the refrigeration process, and new lighting throughout the store. Subsequent investments have occurred, including the retrofitting of freezer doors with LED lighting and the gradual replacement of shared-pole electric fan motors with electronically commutated motors.

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¹ Carbon Counted, <http://www.carboncounted.com/index.php/about-us/about-us/>

² Kudrinko's 2014 Carbon Counted Report, <https://kudrinkos.files.wordpress.com/2015/01/kudrinkos-co2-emissions-report-2014.pdf>



In addition to the CO² emissions of our energy consumption and refrigerant loss, Kudrinko's began tracking water usage in 2013. With a baseline of between 500 and 550 cubic meters of water being consumed in an average year, we are now in a position to look at ways of reducing our consumption of this resource as well. Attaching the CO² associated with water consumption allows us to view that scope within our larger operational framework, while adding an element of accountability to its use.

Electricity

In order to fully understand the lower emissions resulting from Kudrinko's electricity consumption it is important to look at both units of consumption as well as the CO² per unit consumed by Ontario consumers during that particular year.

The province of Ontario has made considerable investments in electricity production over the last decade. Ontario has successfully decommissioned all of its coal fired power generation while adding cleaner sources such as renewable solar and wind, as well as much cleaner natural gas. When the ESI began in 2007 the Ontario grid emitted 1 metric tonne of CO² for every 4,762 kwh of electricity consumption. In 2014, the amount of electricity required to equal the same emission had risen to 10205 kwh. The net effect of Ontario's greening of its electricity production is that electricity in Ontario is now twice as clean as it was eight years ago.

At the same time as Ontario's grid was becoming greener, Kudrinko's aggressively sought ways to reduce consumption in the store while maintaining the same, or better, experience for consumers and employees. At the same time as Ontario's electricity became approximately 53% greener, Kudrinko's reduced consumption by about 15.5%. The overall net result of these two factors amounted to a 60.59% decrease in CO² emissions from electricity consumption. One note worth including is that we do not account for climate conditions. The summer of 2014 was relatively cool in comparison with previous years, a factor that likely also contributed somewhat to our lower consumption in that year.

Oil and Propane

The 2008 renovation and retrofit of Kudrinko's included a decommissioning of the store's oil burning furnace and the installation of new propane HVAC systems. Oil consumption in 2007, the last full year of the furnace's operation was 27,504.9 L with equivalent CO² emission of 86.5 metric tonnes. In 2007, Kudrinko's was emitting one tonne of CO² for every 317 L of oil consumed. During peak heating season, this amounted to approximately 3 metric tonnes a week.

While the BTU/litre for propane is lower than that of oil, so too is the CO² emitted from this fuel source. The equivalent comparison for propane yields 1 tonne of CO² for every 647 L consumed, slightly better

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than twice as clean as oil. The much newer, and more efficient propane furnaces, coupled with the heat reclaim system installed to make use of the “waste heat” from our refrigeration processes, as well as the improvements to our building envelope, has resulted in consistent consumption levels in the range of 20,000 to 23,000 L per year.

To effectively measure the efficiency of our heating system in comparison with our decommissioned oil system, a comparison of annual BTU production is the best measurement. In 2007 our consumption of 27504.9 L of furnace oil produced 1,007,724,526 BTU of heat required to heat the store and provide the necessary hot water needs of the operation. Our 2014 consumption of 22,429 L of propane produced 542,781,800 BTUs for the same purposes. Additionally, the floor area of the physical plant was increased in 2008 with the addition of the new warehouse. Without accounting for the increase in space, the heating systems of the store are 46% more efficient than they were in 2007. These efficient enhancements amounted to a nearly 60% reduction in CO² emissions from fuel sources consumed on site.

Refrigerants

Tight control over refrigerant leaks has also contributed to the store’s low emissions as is evidenced by the much higher CO² that occurred in 2013 due to a catastrophic failure that occurred when a wire from a defrost heater burnt off and touched the end of a refrigeration coil. That event resulted in a hole being blown through the refrigeration tubing and enabled the release of 150kg of 404A refrigerant. With a global warming potential that is 3,260 times that of CO² this one event resulted in a CO² equivalent of 489 metric tonnes, with the same environmental impact as 6.6 years of regular store operations. While we are disappointed with that occurrence, our consistent commitment to effective maintenance of our refrigeration systems has allowed us to operate without any additional refrigerant recharges since bringing the system online in 2008 with the exception of that one unforeseen event.

Next Steps

Kudrinko’s is currently in the planning stages of the replacement of three refrigerated counters in the sales area of the store. Our plan is to replace the two 12-foot, open dairy cases installed in 2001 with new counters equipped with glass doors. We will also look to replace our 24-foot fresh meat case with a new model that boasts better efficiency in both the amount of refrigerant load required to operate as well as more efficient fans and lights. Currently, the fresh meat case is the only case on the sales floor that is not operated with refrigerant from our Protocol refrigeration system. The combined replacement of these three cases will allow us to decommission the 6HP compressor that drives the meat case, as sufficient capacity will now be available on the Protocol unit for its operation.

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Additional investment will be made in the remaining cases that use fluorescent lighting, as we seek to complete our LED retrofit of those cases. The estimated combined savings resulting from those investments is 57,911 kwh per year. Using the 2014 Ontario grid data this will further reduce our CO² equivalent emissions by approximately 4 tonnes. The annual savings calculated at 14 cents per kwh is slightly more than \$8100/year.

Conclusion

With a reduction of more than 121 metric tonnes of carbon dioxide equivalent emissions from our 2007 numbers, the benefits to the environment are clear. The following equivalents are provided by the United States Environmental Protection Agency:

121 metric tonnes is equivalent to following on an annual basis:³

- 25.5 passenger vehicles taken off the road
- 463,644 kms driven by an average vehicle
- 43.4 tons of waste sent to landfill
- 6.2 garbage trucks of waste recycled instead of landfill
- 51,538 litres of gasoline consumed
- 58,953 kgs of coal burned
- 11 homes' energy use for one year
- 3,165 incandescent lamps switched to CFL

or sequestered by

- 3,103 tree seedlings grown for 10 years
- 99.2 acres of US forest in one year
- 0.934 acres of forest preserved from conversion to cropland in one year

While many business owners are happy to tout the benefits of their environmental sustainability initiatives, corporate leaders should also be cognizant of the economic benefits of greening their operations. Taking the 2007 energy consumption numbers from Kudrinko's and applying today's energy prices we see a total energy cost to the business of \$90,011.17 CAD. In comparison, our 2014 consumption levels multiplied by today's energy prices reveals a total cost \$66,103.55 CAD. This reduction amounts to an annual savings of \$23,907.65 CAD. Given the current price of furnace oil today, with a much lower price than the average in 2014, it is fair to assume that this savings would have been even greater than this calculation would suggest.

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³ EPA Greenhouse Equivalencies Calculator, www.epa.gov/cleanenergy/energy-resources/calculator.html



These numbers also provide some input to the cost of carbon not only to society, but specifically to business. Recent studies by Stanford University into the social cost of carbon place it at \$220 USD per tonne.⁴ With a reduction of energy costs of nearly \$24,000 CAD, and a reduction in CO² equivalent emissions of 121 metric tonnes, we calculate the economic cost of carbon in our business to be \$198 CAD per metric tonne. Assuming that the current deflation in oil prices cannot be sustained, a return to normal oil prices in the future will see that value per tonne only increase.

Kudrinko's has prepared this report in the interest of providing education to the public and business community on the effects of energy and refrigerant loss within the grocery industry and the business environment more generally. We welcome your comments and questions on this or any other area of corporate and or environmental responsibility.

Sincerely,

Neil Kudrinko
President & CEO
Kudrinko's Ltd.

⁴ Green Biz, *The real social cost of carbon: \$220 per ton new study finds*,
http://www.greenbiz.com/article/governments-social-cost-carbon-could-be-increased?mkt_tok