Canadian Beverage Association
Association canadienne des boissons

March 15th, 2013

Dr. Tom Owen
Director of the Office of Environmental and Sustainability
Thompson Rivers University
900 McGill Road
Kamloops, British Columbia
V2C 0C8

Dear Dr. Owen:

The Canadian Beverage Association would like to thank you again for the opportunity to present our industry's evidence-based submission for the "Best Drink Containers Solution at TRU" to the Thompson Rivers University community on Wednesday, February 27th in Kamloops.

As described on the Office of Environmental Sustainability 'Terms of Reference' webpage (www.tru/sustain/hoot/plasticreview.html), the CBA would like to provide you with a supplemental submission to comment on the oral presentation from the Thompson Rivers University Student Union (TRUSU) titled, *"Submission to the Evidence Based Review of Beverage Containers."*

In adhering with the scientific and evidence-based nature of TRU's review, our supplemental submission is a peer review of the scientific arguments cited in TRUSU's presentation and submission. Please find this peer review enclosed. We hope you find CBA's submissions helpful in making your final recommendations to the President, Vice President and the Board of Governors.

As previously stated, we believe that a campus wide plastic bottle ban at Thompson Rivers University would be an unproductive initiative in achieving our shared goal of increasing the recovery rate of beverage containers and improving environmental sustainability. The beverage industry would like to encourage Thompson Rivers University to focus on enhancing the positive steps made by Encorp Pacific and work with industry on continuously improving North America's most effective recycling program.

Please feel free to contact the CBA with any additional questions or comments on the issue.

Sincerely,

Jim Goetz
President
Canadian Beverage Association

Encl. "Peer Review of Submission to the Evidence Based Review of Beverage Containers, Thompson Rivers University, Students' Union TRUSU Local CFS. 2013"

Peer Review
of
Submission to the Evidence Based Review of Beverage Containers.
Thompson Rivers University Students' Union TRUSU Local 15 CFS.
2013

15 March 2013

CIAL Group

Colin F. W. Isaacs, B.Sc., A.R.C.S., C.Chem., President

119 Concession 6 Road, Fisherville, Ontario N0A 1G0

Phone:(416) 410 0432 Fax: (416) 362 5231 Email: colin@cialgroup.com

Peer Review of
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Colin Isaacs B.Sc., A.R.C.S., C.Chem.
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Executive Summary

Overall comments

We commend the Students' Union of Thompson Rivers University for undertaking this study and for publishing a document which seeks to follow LCA principles. However, we cannot consider that the report adequately meets the standards for publication required of a science-based university research project.

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Introduction

CIAL Group is a Canadian consultancy with 25 years of experience in science-based evaluation of products and business activities for consistency with the concept of Sustainable Development. Our expertise has been accepted by numerous industries and business associations across Canada.

In recent years, the approach known as Life Cycle Analysis (LCA) has been widely adopted and our work has evolved to include LCA principles in product evaluations. For this purpose, international standards ISO 14040 (2006): Environmental management – Life cycle assessment – Principles and framework and ISO 14044 (2006): Environmental management – Life cycle assessment – Requirements and guidelines have been developed by the International Organisation for Standardisation and our work is informed by, and generally adheres to, these standards which have been adopted for application in Canada by the Canadian Standards Association.

A recent report entitled Submission to the Evidence Based Review of Beverage Containers has been brought to our attention with a request that we undertake a brief peer review. This document is the outcome of that peer review.

Overall comments

We commend the Students' Union of Thompson Rivers University for undertaking this study and for publishing a document which seeks to follow LCA principles. However, we have a number of comments indicating that some of the statements contained in the report are not as soundly based on the literature and on scientific information as the authors may have intended. Hence we cannot consider that the report adequately meets the standards for publication required of a science-based university research project.

In the following sections we address those areas of the report in which statements made and conclusions derived fall short to a greater or lesser extent from the standards required of a science-based article. They are organized according to their apparent relevance to the Thompson Rivers University Campus Sustainability Action Plan, a framework document to which the Submission to the Evidence Based Review of Beverage Containers is addressed. As a footnote, the authors of this peer review commend Thompson Rivers University for adopting this Campus Sustainability Action Plan and wish the University and all members of its community great success in its objective of becoming the "University of Choice for Environmental Sustainability".

Banning disposable plastic beverage bottles may distract from important sustainability initiatives

TRUSU Submission: The submission suggests that banning disposable plastic beverage bottles (but not other disposable plastic or other material items related to disposable foodservice containers or other disposable products e.g. printer cartridges, construction and renovation material) is "sending a strong message that TRU is a dynamic and innovative institution that is a leader in sustainability initiatives."

Peer reviewer comment: Such a ban does not seem to be part of the University's Strategic Plan so a focus on bottles may distract the University from its stated plan towards more publicity seeking action which may actually undermine the stated overall goal. TRUSU states that TRU being the first institution to ban plastic beverage bottles will somehow gain the University kudos as an environmental leader amongst students seeking admission to universities but from a business and future employer perspective the University is likely to be more effective demonstrating knowledge through implementation of its strategic environmental plan, planning the work and working the plan.

The latest TRU carbon neutral action report (2011) targeted actions for the next period:

- Procurement: minimum recycled content standards for procurement for consumable, non-paper supplies such as writing instruments, binders, toner cartridges, etc and
- Waste reduction/diversion: Put in place an operations policy to facilitate the reduction and diversion of building occupant waste from landfills or incineration facilities through full mixed recycling program on campus.

A report on TRU's Ecological Footprint for 2008/9 estimated the footprint to be 2985 hectares, mostly due to energy use and car, bus and air travel. Very little of the ecological footprint arises from plastic beverage bottles: all plastic was 1.4% of the ecological footprint, aluminum cans were 4.1%, and glass was 0 .3%. Waste audits are recommended as the only data available on waste was a one day waste audit at the Kamloops campus: in garbage bins, 34% by weight of the waste was compostable material (half of which was paper towels) and 20% paper; about 12% of the waste was bottles and cans. These figures indicate that bottles and cans are not a high percentage of the University waste stream but are still in sufficient number that more collection points, education and other measures could (and should) be used to reduce the number. Banning PET bottles will not significantly reduce the size of the University waste stream.

The waste-related actions in the campus sustainability plan are to divert compostables and recyclables from landfill, conduct a periodic waste audit, assess the major sources of packaging and waste including e-waste and toxic waste, and monitor and report on the efficacy and cost-savings of waste reductions. Paper use reduction were specifically targeted. We recommend that TRUSU would achieve more for the environment by assisting action on these aspects rather than by campaigning for a ban of a material which makes up a very minor part of the waste stream.

TRU already provides recycling stations for separation of paper, bottles, and cans in each main building, encourages use of reusable water bottles and coffee mugs, and gives discount for bringing your own mug. In British Columbia beverage bottles carry deposit fees, resulting in the province as a whole having relatively few bottles going to landfill. We do not know if the University has ever done a full waste audit but financially and environmentally educated and committed students would be unlikely to throw out many recyclable bottles, whatever they are made from. Some organizations have initiatives where volunteers collect deposit-paid containers and get reimbursement to use as funding for the organization. Encorp has

a program for developing promotion for bottle drives. Encorp's 2011 annual report indicates that 10% of the BC population are heavy discarders accounting for 87% of containers discarded. They discard from home but also tend to be more responsible for discards away from home. A pilot project Encorp did with Capilano University tracking waste for two months showed the need for encouraging students to understand the impact of tossing away their beverage containers and for making it easier for the students to locate the recycling bins e.g. with standardized bins and colours. Another waste audit is planned at Capilano University to see how efforts to improve campus-wide recycling are working.

Encorp recycling data

In the Encorp 2011 report, the reported recycling rate for small plastic bottles (less than or equal to one 1itre) is 73.2%, for plastic bottles larger than one litre 87.9%, for glass less than a litre 80.8%, and for aluminum 83.9% . Hence the recycling rate for all plastic beverage bottles is approximately 80%. Encorp Pacific (Canada) is a federally incorporated, not-for-profit, product stewardship corporation with beverage container management as its core business. It recovers 80% of all beverage containers sold in British Columbia.

A campus program to improve on these figures would likely be able to collect more containers. It is not at all clear what goal would be achieved by banning a beverage container with this kind of recycling rate when evidence is that even with nearly one third of this rate of recycling (see Franklin life cycle study of three beverage containers, referenced below) a plastic PET bottle has the same or lower environmental impacts than beverage containers made of other materials.

Metro Vancouver Waste Audit: Plastic Beverage Containers Not a Significant Waste

A 2008 Metro Vancouver waste audit used 181 samples. The study revealed that "38.7% of waste sorted from residential sources fell into the compostable organics primary waste category, most of which was food waste. The second and third highest waste categories were paper (primarily tissue, toweling, newsprint and boxboard) and plastics (film, non-beverage rigid containers and textiles), accounting for 21.0% and 13.7%, respectively. Collectively, these three waste categories constituted approximately 73.5% of the residential waste stream." The ICI sector had slightly different numbers but similar proportions. The category contributing the fourth largest quantity to the residential waste stream was household hygiene waste, accounting for 8.0% of the waste stream. Non-compostable organic waste constituted 4.2% of the residential waste stream. The remaining waste categories (building materials, electronic waste, metals, glass, fines, household hazardous and bulky objects) each made up less than 3.5% of the residential waste stream."

Direct analysis of solid waste is accepted as a useful tool for waste management strategies. Beverage containers do not figure large in Metro Vancouver's waste, an audit of which produced numbers similar to TRU's one day audit which also found compostables and paper as the top categories.

PET bottles are not less environmentally sound than containers of other materials

TRUSU Submission: The premise of the submission is that PET plastic bottles are less environmentally sound than other beverage containers based on scientific data.

Peer reviewer comment: The SU Submission does not provide any scientific data directly comparing the beverage containers discussed. The document does not make clear which containers are being compared e.g. one assumes glass bottles, aluminum cans and PET plastic but it is not clear from the report. Cups are also mentioned and these seem to be paper cups but we are not sure if there are other containers which are part of the review, who is reviewing them and on what basis e.g. plastic cups, aseptic cartons or other multi-layer or multi-metal containers. The discussion seems to choose a few aspects of one of the containers and suggests that is a lifecycle approach. In fact, a lifecycle approach sets a boundary for the analysis and based on that boundary subjects containers of different materials are compared using an analysis of the lifecycle of their environmental impacts from extraction of raw materials, material production, fabrication and end-of-life disposal or recycling. The Franklin study referenced below has undertaken this type of LCA in a North American context and has found that a PET bottle has the same or lower lifecycle environmental impact than a beverage container made of another materials

We suggest that the approach taken by TRUSU is not a lifecycle approach and does not actually provide a scientific comparison of the various container types.

Purpose of recycling is not specifically to manufacture the same product

TRUSU Submission: "Recycling in the sense that most people understand it involves the reuse of post-consumer material to re-manufacture the same product."

Peer reviewer comment: It is not common practice either by regulators or by environmental claim certifiers to define recycling in this way. Differentiation of recycled material is usually related to whether it is post consumer, post industrial material or preconsumer material. This is the approach followed by the Environmental Choice program (see Ecologo CCD-127 standard for products made from recycled plastics defining "recycled material" as "post-consumer material and pre-consumer material. It does not include by-products of an industrial process that can be, and regularly are, used in either the same process, or in a different process, except that proportion which originated as post-consumer material and pre-consumer material.") as well as by international standards. Definitions of recyclable material require the material to be used in a new product and hence diverted from landfill but do not generally define the type of product manufactured from the recycled material.

It is certainly true that some experts see the goal of a sustainable society is to have a closed loop system so that there is no waste going to waste but a closed loop system may still be defined as closed loop even if the material is used in another product provided that second product is also recycled. For example, the US company Patagonia, which makes clothing from recycled plastic bottles (hardly a 'downcycling' product), has started a textile recycling program where their clothing is returned and remade into new fibres to make more of their clothing.

In almost all production systems, there is some waste e.g. at the initial extraction where only some of the material is of a standard necessary to make the product or at recycling when some material is contaminated

or lost so that additional virgin material is needed even for recycled product. It is not clear to us why plastic beverage bottles, one of the most recycled materials in BC, should be subject as the highest priority to a closed loop standard which is not applied to other uses of products on campus which have a major and significant contribution to TRU's ecological footprint. Even if PET is only recycled once, that is once more than many other materials which routinely end up on the trash heap. PET recyclate is an effective way of reducing extraction of virgin materials and the fossil fuels needed to produce them. Some food packagers are worried that fibre demand for PET will push the price of resin too high for use to fulfill some of the demand for products in bottles with a percentage of recycled content. Note also that PET bottles are already being recycled into new PET beverage bottles, of the same kind, in Canada (see http://www.iceriversprings.ca/) and the recycler involved has told us that bottles can typically be recycled at least 20 times.

Closed loop recycling

TRUSU submission: the PET system is not a closed loop system.

Peer reviewer response: no beverage container recycling system is as yet a fully closed loop system. As described above, PET bottles to PET bottles is as close to a closed loop system as it currently gets for plastic materials. Neither glass nor aluminum beverage containers are any more closed loop than PET. Recycling systems take some years to become fully established and recycling is still a new industry in Canada. Closed loop recycling will develop with time: banning specific products is unlikely to assist this evolution. PET beverage bottles containing 100% post-consumer recycled material are now available in Canadian retailers; no other type of beverage container is made from 100% post-consumer recycled material.

Recycled glass is often used for road fill and indeed some Canadian municipalities do not collect glass in curbside recycling partly because of lack of accessible markets paying enough. Glass recycling also poses something of a hazard to workers due to breakage and contamination. For many products, some virgin material is used to make up for losses due to products diverted to landfill or raw material is required for the quality specifications. Sometimes there is just not enough recycled material available. While overall, recycling reduces the environmental impacts by avoiding primary materials production and waste disposal, sometimes recycling is not cost effective due to costs such as collection of end-of-life containers, transportation and reprocessing being too distant from the collection points.

TRUSU seems to see it as a criticism that in 2009 only [sic] "22% to 29% of recycled PET is used to make bottles." Some of the work of Frank Welle, cited by TRUSU as if it were an objection to PET, was in fact conducted in order to obtain a "Letter of No Objection" from the US Food and Drug Administration to use up to 100% recycled PET in food containers. Welle supports PET use for beverage containers and the FDA Letter was obtained in 2009. In Canada, such government approvals for use of post-consumer recycled PET are even more recent. Governments currently require intensive cleaning of post-consumer PET when it is to be recycled into food or beverage contact applications but we expect that, in future, changes in technology may mean that 'super clean technology' for recycling of PET will no longer be required.

The recession has affected many recycling markets but market demand for a number of applications of PET is trending higher and competition between those who are buying recyclate for bottles or for fibres may increase the price too much for one or the other. Prices of resin also affect the operation of Encorp

which reports in its 2011 Annual Report that since the recession prices for both aluminum and PET have been the highest since 2009. This helps all recycling activity.

Where recycled PET fibre is used for such products as reusable shopping bags the benefits include reduced use of plastic in the form of single use grocery bags. Manufacturers of PET have reduced the environmental footprint of PET bottles by redesigning them for lighter weight (less material). This means that PET recyclers have to handle more bottles to produce the same weight of postconsumer bottle PET. Nevertheless, if there is a resin that is most likely to succeed in the objective of bottle to bottle recycled content, PET beverage bottles are on the way.

The discussion is often between plastic vs paper but could just as well be between disposable vs reusable. Many factors, not just recyclability or disposable vs reusable, affect the environmental impact of materials and products. For example, back in 1994, Martin Hocking at the University of Winnipeg evaluated five different reusable and disposable hot drink cups for overall energy consumption from fabrication to use. Reusable cups had to be used 500 times and even then were found to have about the same or slightly more energy consumption than molded polystyrene foam cups used once and then discarded. The key to the comparison was how the electricity was generated and the energy efficiencies at the cup fabrication.

Food containers add complexity because of issues related to sanitizing reusable containers and other health and safety issues. For example, both PET and aluminum are used for beverage packaging because they don't react to the food, keep the contents hygienic and safe from spoilage, are lightweight and recyclable.

PET is not an especially "problematic plastic"

TRUSU Submission: Quotes from a Vancouver Sun story about a study reported in Nature which seeks to address "problematic plastics" as a reason for banning only PET disposable beverage bottles.

The article in Nature was in the Comment section. The research referred to is that of doctoral student Chelsea Rochman at the University of California, Davis (in the School of Veterinary Medicine's Aquatic Health Program). It related to absorption of harmful substances by plastics submerged in the oceans. The researchers found that some plastic materials continued to concentrate toxic substances such as PCBs even after being in the ocean for more than 12 months. PET was found to have fewer detrimental chemical impacts than products made from other types of plastic. In a news article from the University of California, Rochman is quoted as saying “Consistently in our study, we found polyethylene [HDPE and LDPE] and polypropylene [PP] absorbed much greater concentrations of contaminants than PET or PVC, and those [not PET or PVC] are the most commonly mass produced and consumed plastics, They are also the most commonly recovered as marine debris.” In 2007, HDPE, LDPE and PP production accounted for 62% of all plastics produced globally while PVC was 19% and PET just 7%. In other words, PET was found not to be problematic (at least for the research in question) and not as commonly found in marine debris as other plastics.

In any case, absorption of marine substances by plastics is not relevant to use of PET bottles at TRU.

Increasing use of PET is not an especial environmental problem

TRUSU: Quotes from a paper by Frank Welle on the increasing use of PET for packaging as if Welle was critical of that trend.

Peer reviewer comment: Frank Welle of the Fraunhofer Institute is not criticizing the PET packaging but is working to improve and expand its use. He is working towards improved material properties of the PET which has oxygen permeability which limits its use for sensitive foods such as juice. Also, because it is clear, PET has some limits in use with food that is sensitive to light. His institute is working to develop oxygen barriers and light protection. There is an increasing market for recycled content PET bottles although a higher portion of recyclate is used for fibres when bottles are recycled. In Germany, where refillable bottles are more commonly used, PET bottles are considered good candidates for reuse. Recycled bottles are nearly equal in quality to new PET bottles. Recyclable, refillable or multilayer: the goal is to make PET bottles under these reuse conditions even more inert "inert as glass - light as plastic." Welle's work on PET arises from his research-backed opinion that it offers significant environmental benefits.

PET and its precursors are not highly toxic

TRUSU Submission: "Primary material inputs in the production of PET bottles are two petroleum-based and highly toxic substances: ethylene glycol and terephthalic acid".

Peer reviewer comment: There is no evidence that either PET or its precursors are considered "highly toxic" substances. PET is the same material as polyester that is widely used in textiles and clothing. Its use in food contact applications has been approved by government agencies around the world and it is generally regarded as among the safest plastic materials. Manufacturing of PET is also a very low risk activity and involves use of ingredients that are widely used in industry and found in many households.

PET is not a significant cause of climate change

TRUSU Submission: "Primary material inputs in the production of PET bottles are two petroleum-based . . . . substances. It is recognized that petroleum extraction is a primary cause of anthropogenic climate change."

Peer reviewer comment: The major cause of anthropogenic climate change is use of hydrocarbon fuels, not extraction, though extraction is a contributor. The only way to determine whether PET bottles contribute more to climate change than containers made from other materials is to undertake a proper LCA or carbon footprint analysis that reviews carbon emissions at all stages of the material lifecycle from cradle to grave. This has been done by other researchers: the most widely accepted results show that the carbon footprint of a PET beverage bottle is less than the carbon footprint of a glass or aluminum container.

Whether or not a material is made from a petroleum-based substance is not a determinant of its climate impact. The aspect that must be considered is the total greenhouse gas emissions arising from the lifecycle of the product. A product made from renewable resources may have a greater climate impact if more fossil energy is used in its manufacture than is used in the material and manufacture of a comparable plastic product.

For example, in a paper presented at the 2011 Life Cycle Management conference held in Berlin in 2011, researchers reported that, amongst beverage containers, the highest GHG emissions came from the glass bottle. The paper explains that it is not only the material of the package that must be considered. For example:

- all packaging options have lower environmental impact if recycled rather than disposed of to landfill or incineration.
- larger packages have lower environmental impact than smaller. Variations depend on how much beverage is in the bottle. For a specific volume of liquid, a bigger bottle may employ less material.
- aseptic carton and plastic packaging (both HDPE and PET for sizes greater than 1 liter) have the lowest Global Warming Potential (kg CO2eq/L) for the three disposal methods considered.
- PET (in this example, water bottles) no matter size or disposal method has lower GWP than glass. For the same size (in the example 330 ml), PET has 5 times lower GWP than glass if both are recycled, over 3 times lower if both are incinerated or landfilled.
- recycling of PET reduces lifecycle greenhouse gas emissions by more than 50%.

This was a European study where some of the transport distances and processes may be different than those in Canada but for most packaging transport is not a key factor e.g. for aluminum the key impact is mainly due to the production of aluminum.

PET bottles are no less sustainable than glass or aluminum containers

SU Submission: States that a common misperception of their campaign is that it restricts beverage option choices to campus consumers but that rather the purpose is to address a container type that is not sustainable. Banning the plastic beverage bottle is seen to be needed so that the beverage is received in "a more sustainable container."

Peer reviewer comment: The information submitted by TRUSU has not demonstrated that the plastic beverage bottle is less sustainable than glass or aluminum containers. A lifecycle study done in 2009 by Franklin Associates, a reputable company which has been in the lifecycle analysis business for many years, evaluated the environmental footprint of the PET bottle and alternative containers used for soft drinks: the 12 ounce aluminum can, 8 ounce glass bottle, and 20 ounce PET bottle with a functional unit of 100,000 ounces of soft drinks delivered as single servings. As with all lifecycle analysis, the boundaries of the study and assumptions and limitations are important but too long to detail here (see link in reference).

Franklin conclusions - of the three systems:

- glass drink systems require the most energy and produced the most solid waste and greenhouse gases.
- even though aluminum cans are light, that system still require more energy and produced more solid waste and greenhouse gases than the PET bottle. Most of the total energy was in the first two life cycle phases: 1. cradle to material and 2. container fabrication. Smelting and sheet production for aluminum offset its light weight advantage.
- when disposed to landfill, glass is the heaviest and takes up the most landfill space. Aluminum and PET are not much different in terms of volume in the landfill.

In an appendix to the Franklin report, a comparison assuming equivalent sizes of containers (12 ounces) shows that all three systems are nearly comparable for energy use. PET was best for weight of solid waste, better than glass on material volume, and better than glass and aluminum on greenhouse gas emissions.

We note that the recycling rates in these scenarios were with PET bottles at a recycling rate considerably lower than that of aluminum whereas in BC the rate of recycling of PET is much higher than in the US, further adding to the environmental advantage of PET.

PET is not renewable but LCA shows that PET has lower resource impact than glass or aluminum

TRUSU Submission: glass is made of sand, aluminum of bauxite and paper cups of forest products and that these are either renewable resources or in ample supply and thus use of these resources are not of concern whereas PET is made of petroleum so that means PET is a step backwards.

Peer reviewer comment: see previous comment on lifecycle analysis of three types of beverage containers. In general, renewable is going to become essential to the long term however how renewable resources are produced and the materials processed, how much energy is used including what kind of energy is used to make the product are key to the environmental impacts. Conventional wisdom that because something grows instead of being made from oil automatically makes it environmentally better is often incorrect. Similarly the assumption that there is lots of something means that the environmental effects of using it are minor is also wrong.

The need to move towards renewables or more efficient use of limited resources is essential but renewable is a label with many facets. For example, many people (and governments) jumped onto the idea of renewable fuels such as ethanol but as the Winnipeg-based IISD explains the subsidies provided led to environmental impacts due to the rapid expansion of two crops corn/soybeans for ethanol including the growth of marine dead zones due to maximizing yields with more chemical inputs, high use of water as corn production expands westward in the US into areas requiring irrigation. Whether biofuels reduce greenhouse energy is dependent on many factors such as farming practices and climate suitability for growing biofuel crops but in many cases biofuels require so much energy to produce that the CO2 released may be as high or higher than if oil were used directly.

Similarly for paper cups or for biofuel crop growing, cutting forests may be done faster than the forests can renew themselves; it can take at least 20 years or more depending on the tree species and where it grows to recover the carbon stored in a cut tree. Carbon dioxide is released to the atmosphere increasing global warming. It is possible that both paper cups and biofuels can be produced for net environmental benefit but one cannot draw conclusions about which has different environmental impacts just be looking at the raw material.

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