ADDENDUM TO:

REVIEW OF LIFECYCLE INVENTORY STUDY FOR HALF-GALLON MILK CONTAINERS

I. OVERVIEW

On October 1, 2007 *The ULS Report* published *Review of Lifecycle Inventory Study for Half-Gallon Milk Containers*. The study was performed by Franklin Associates, an independent provider of lifecycle services.

Their analysis examined energy use (process, transport, material resource), solid waste generation, and environmental emissions (atmospheric and waterborne) for four types of milk packages: paperboard gable top cartons, glass bottles, HDPE plastic bottles, and PLA plastic bottles. For reference, PLA is a relatively new material made from corn, rather than petroleum or natural gas, feedstocks. The study also looked at the impacts of recycling and reuse.

Upon publication or our review, we were criticized for not mentioning that the Franklin study, on which our report was based, was not peer reviewed. This was a valid criticism, as we ourselves have pointed out this deficiency in other studies. Franklin was gracious enough to have the study reviewed by an independent panel of experts (see their attached report).

The key comment by these outside experts was that the study examined the environmental impacts of refillable glass bottles with a very low return rate; however, most glass bottles used today for milk production have at least a 90 percent return rate. Franklin thus produced new calculations based upon a higher rate of refillable bottles.

II. PLEASE NOTE

Differences of 10% or less for energy and post-consumer solid waste and differences of 25% or less for industrial solid wastes or emissions data are not considered to be meaningful. We are pleased that Franklin included measures of statistical significance, as the lack of such a measure hampers the ability to discern truly meaningful differences among both the factors and containers being studied.

The end-of-life scenarios used in the study reflect the current recycling rates of the containers being analyzed. Because no significant recycling or composting of PLA is currently occurring, no resulting credits, offsets, or burdens were applied.

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III. DATA OVERVIEW

Table 1 summarizes findings for the three key environmental impact areas of energy use, solid waste creation, and greenhouse gas generation. Comparisons are based upon an equivalent functional unit of 10,000 milk container uses.

Table 1

TOTAL ENERGY, POSTCONSUMER SOLID WASTE, AND GREENHOUSE GASES FOR THE USE OF 10,000 HALF-GALLON MILK CONTAINERS

	Total Energy	Postconsumer Solid Waste		Greenhouse Gases
	(MM Btu)	(lb)	(cu ft)	(lb of CO2 equivalents)
Half-gallon milk container systems				
PLA Bottle (1)	67.2	1,061	80.7	5,968
Gable Top Carton (1)	42.8	1,248	46.5	4,411
Refillable Glass Bottle (2)	32.0	3,733	42.2	5,398
HDPE Bottle (3)	40.0	763	58.0	3,336

(1) End-of-life for this system is modeled with 80% going to a landfill and 20% combusted at a WTE facility.
(2) End-of-life for this system is modeled with a 90% reuse rate (8 trips) with 15% recovered for recycling, 68% going to a landfill, and 17% combusted at a WTE facility. However, the energy recovery is only available for the cap/seal.
(3) End-of-life for this system is modeled with 29% recovered for recycling, 57% going to a landfill, and 14% combusted at a WTE facility.

Source: Franklin Associates, a Division of ERG calculations using original data from LCI/LCA by NatureWorks, LLC and Franklin Associates.

Table 2 presents the original study findings, which did not analyze glass containers from the perspective of being refillable and thus reusable.

Table 2

TOTAL ENERGY, POSTCONSUMER SOLID WASTE, AND GREENHOUSE GASES FOR THE USE OF 10,000 HALF-GALLON MILK CONTAINERS

	Total Energy	Postconsumer Solid Waste		Greenhouse Gases
	(MM Btu)	(lb)	(cu ft)	(lb of CO2 equivalents)
Half-gallon milk container systems				
PLA Bottle (1)	66.0	1,061	80.7	5,450
Gable Top Carton (1)	42.5	1,248	46.5	4,341
Glass Bottle (2)	48.5	6,718	71.0	8,509
HDPE Bottle (3)	39.8	763	58.0	3,260

(1) End-of-life for this system is modeled with 80% going to a landfill and 20% combusted with energy recovery.
(2) End-of-life for this system is modeled with 15% recovered for recycling, 68% going to a landfill, and 17% combusted with energy recovery. However, the energy recovery is only available for the cap/seal.
(3) End-of-life for this system is modeled with 29% recovered for recycling, 57% going to a landfill, and 14% combusted with energy recovery.

IV. KEY FINDINGS

When considered as a refillable system, the glass bottle performed significantly better across all three dimensions than when it was viewed as a disposable system. Total energy consumption declined by 34%, solid waste generation declined by 44%, and greenhouse gas emissions declined by 37% (see Tables 1 & 2). Further, rather than lagging behind the other container types across virtually all dimensions, refillable glass leads in terms of energy consumption and is statistically equal to the gable top carton for solid waste creation.

HDPE bottles generate the fewest pounds of solid waste and remain the most efficient in terms of greenhouse gas emissions. This latter Finding may be counterintuitive to many, since HDPE is produced primarily from fossil fuel feedstocks.

The PLA bottle remains the least efficient in terms of total energy usage and greenhouse gas generation. Given that the primary feedstock for PLA is corn, this finding may also be counterintuitive to many readers of this addendum.

V. CONCLUSION

This revised study reconfirms the value of both reducing and reusing prior to recycling. When reused rather than merely recycled, glass bottles perform significantly better across all three dimensions of energy consumption, solid waste generation, and greenhouse gas emissions. In terms of reduction, the lighter weight of HDPE containers makes them the most efficient in terms of greenhouse gas generation and weight of landfilled materials.

VI. INDICATED ACTION

From the perspective of packaging and the environment, emphasis should be placed on weight reduction and reusability, rather than simply on recyclability. This conclusion is not meant to downplay the role and value of recycling, but to foster greater emphasis on the first 2 Rs of reducing and reusing. As we have stated many times, the goal of programs designed to reduce the environmental impact of packaging should be to minimize the need to process and transport all materials, regardless of whether they are produced from virgin or recycled sources.

Robert Lilienfeld, Editor

Note:
We asked Franklin Associates to review this summary for accuracy, and they have graciously done so. Melissa Huff, Senior Chemical Engineer at Franklin, agrees that our conclusions are technically correct and consistent with their findings.