



REVIEW OF THE REPORT ENTITLED “THE IMPACT OF PLASTICS ON LIFE CYCLE ENERGY CONSUMPTION AND GREENHOUSE GAS EMISSIONS IN EUROPE”

I. BACKGROUND

In June, 2010, PlasticsEurope published the above-referenced study (see attached), designed to illustrate the value of plastics in the effort to reduce energy consumption and greenhouse gas (GHG) generation. The peer-reviewed study was prepared by denkstatt GmbH of Vienna, Austria. Given a.) the importance of understanding the impacts of human-engineered products and services on the global environment, and b.) the role played by various materials on these impacts, *The ULS Report* has endeavored to digest the findings and draw independent conclusions from them.

II. METHODOLOGY

The study consisted of two parts, from which findings were listed and conclusions were drawn:

Part 1 is an update of a large denkstatt study that examined total life cycle energy consumption and greenhouse gas emissions for plastics versus a mix of alternative materials. In total, 32 different case studies were reviewed, including insulation materials, wind-power rotor blades, and a variety of packaging applications.

Part 2 presented arguments regarding the beneficial aspects of plastics and their ability to enhance energy efficiency and reduce greenhouse gas generation. It examined the potential European effects of a theoretical replacement of plastics by competitive materials.

The study was peer reviewed by Adisa Azapagic, Professor of Sustainable Chemical Engineering, School of Chemical Engineering and Analytical Science at The University of Manchester; and Roland Hirschler, member of the Technology & Society Laboratory at the Swiss Federal Laboratories for Materials Testing & Research (EMPA). The reviewers found that the study contains the objectivity and transparency needed to develop accurate results and form reasonable conclusions.

III. STUDY LIMITATIONS

- A. Findings, conclusions, and recommendations are based solely on the data that has been provided. There may be other data available that refute, confirm, or extend the findings herein developed.
- B. Results are based upon the comparison of plastic products to other products that provide similar functionality. Results would no longer be relevant if plastic products were replaced by other products of a different design or with different functional characteristics.
- C. Conclusions cannot be drawn against new technologies that radically alter the way a particular product or service is provided An example cited in the study

would be the replacement of land-based cable telephony via satellite-based wireless communication.

- D. The study draws no conclusions relating to differences between polymers produced from renewable resources and those produced from petroleum or natural gas. The reasoning is that there is currently not a high enough market penetration by the former to significantly change the overall conclusions. *It was favorably noted that the study left open the possibility for conclusions to change if the market for renewable resource-based polymers grows.*
- E. This study originated in Europe and is based upon European manufacturing processes. While production processes are relatively similar globally, there are large differences in waste recovery strategies throughout Europe. Since the data averages the results of these differences, there is no way to ensure that results are reflective of the overall waste recovery situation in the United States. Thus, conclusions can only be drawn on a macro perspective where very large and significant differences are evidenced.
- F. The study compares plastics to a mix of other materials, and does not provide specific results versus paper, glass, metals, etc. Thus, the results can only be used generally, and do not provide any indication of direct differences in energy consumption or greenhouse gas emissions for plastics versus another specific competitive product.

IV. KEY FINDINGS

- A. The use of plastic products instead of competitive products enables significant energy and greenhouse gas savings. The annual energy savings for Europe are calculated as being 2.4 million Gigajoules (GJ), equivalent to about 18.4 billion gallons of gasoline (over 200 crude oil tankers' worth). The greenhouse gas emissions saved equal about 135 million tons, equal to the total CO₂ emissions produced by Belgium in 2000. (See chart below, as it appears in the study.)

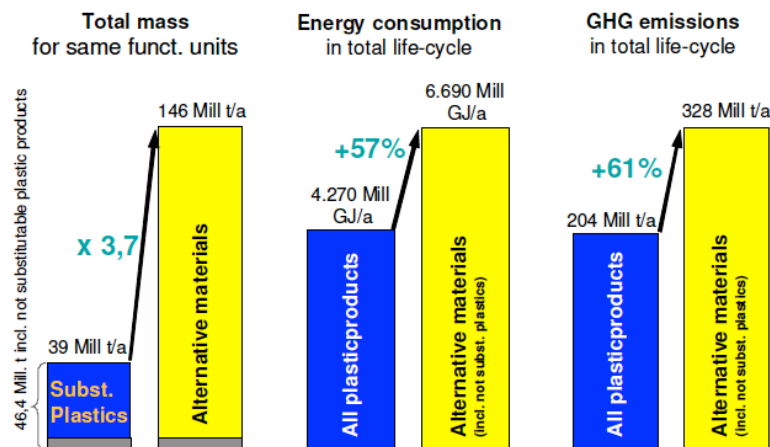


Figure 2: Changes in product mass, energy consumption and GHG emissions, if plastic products would theoretically be substituted by alternative materials.

As shown in the chart, much of the benefit comes from the fact that significantly less plastic (measured in equivalent mass) is used to produce the same benefits as a mix of competing products and materials.

- B. Fresh food packaging, especially that made from plastics, significantly reduces greenhouse gas generation by reducing food spoilage and waste. The greenhouse gas generation associated with packaging production was significantly offset (4-9X) by the waste saved from reducing spoilage.

This savings appears to be quite large, as it represents approximately 190 megatonnes of carbon dioxide for all of Europe. The average family of 4 in the U.S. generates about 32 tons of CO₂ annually [Source: [Energy Information Agency \(EIA\)](#)], so this savings is roughly enough to power the homes, cars and lives of 4-6 million American households, or about 5% of total homes. ([U.S. Census Bureau](#)).

To break it down further, a gallon of gas generates 20 pounds of CO₂. At an average of 15,000 miles driven per year per vehicle at a rate of 20 miles per gallon, this savings is enough to annually power about 25 million cars, which represents 10% of the passenger vehicles registered in the United States ([U.S. Department of Transportation](#), 2007).

- C. Versus landfilling, recovery of paper and plastic packaging for recycling, reuse and energy generation can produce significant environmental benefits. While the scenarios used in the study are complex and the data is European-specific, results indicate that material recovery could reduce both energy consumption and GHG emissions for these applications by a factor of 10 or more.

V. CONCLUSIONS

- A. Versus a mix of competitive materials, plastic products significantly reduce material use, energy consumption, and greenhouse gas generation. In general, this is contrary to public opinion.
- B. Recovery and reuse of packaging materials makes strong environmental sense. This conclusion is very much in line with public perceptions regarding issues relating to packaging.

VI. IMPLICATIONS

We draw two implications from this research. First, it is imperative that government, industry and society in general work together to extract maximum value out of our resources by extending their usable life and constantly finding ways to do more with less. Second, the science indicates that plastics and plastic packaging play a far more positive role in the quest for sustainability than most people recognize.



Robert Lilienfeld, Editor