
By supporting Calcium Carbonate in plastics manufacturing,
we'll all breathe a little easier.
HERITAGE
PLASTICS
www.heritage-plastics.com

THE HIGH ENVIRONMENTAL COST OF PLASTIC

For decades, plastic products have helped provide clean, healthy and efficient living environments for millions of people. Everything from plastic bags to beverage bottles, from plastic cups to park benches contributes to an endless list of plastic products whose benefits are immeasurable.

Those benefits come at a cost, however, in terms of the natural resources needed to produce them and the environmental impact during their lifecycle. According to the latest data from the U.S. Department of Energy[1]:

> *In the United States, plastics are made from liquid petroleum gases (LPG), natural gas liquids (NGL), and natural gas. LPG are by-products of petroleum refining, and NGL are removed from natural gas before it enters transmission pipelines.*
>
> *In 2010, about 191 million barrels of LPG and NGL were used in the United States to make plastic products in the plastic materials and resins industry, equal to about 2.7% of total U.S. petroleum consumption.*
>
> *In addition to petroleum, natural gas is used to manufacture plastic materials and resins. In 2010, about 412 billion cubic feet (Bcf) of natural gas were used to make plastic materials and resins, equal to about 1.7% of total U.S. natural gas consumption.*
>
> *Electricity is also used to manufacture plastics. In 2010, about 65 billion kilowatt-hours were used, equal to about 1.7% of total U.S. electricity consumption.*

Accordingly, the Environmental Protection Agency (EPA), the Department of Energy (DOE), and brand owners alike are encouraging the development of innovations that reduce petrochemical usage in the manufacturing process, and also reduce greenhouse gas emissions, greenhouse gasses, and regional air pollutants (NOx, SOx, and particulates) over a product's life cycle.

High-density polyethylene resin (HDPE) is used in the manufacture of plastic bags and film products for flexible packaging. Since the film used to make plastic bags (including trash bags, can liners, t-shirt sacks, diaper film, and packaging) accounts for 50% of the polyethylene market, there has been considerable focus on trying to produce a "greener" plastic.

CALCIUM CARBONATE REDUCES THE CARBON FOOTPRINT OF PLASTIC

Calcium carbonate ($CaCO_3$), the main mineral found in limestone, marble, and chalk, is found in all parts of the world. It is the main component in common shellfish and snails, as well as in eggshells. It is commonly used medicinally as a calcium supplement, a filler in many pharmaceuticals, and as an antacid. Calcium carbonate is also a popular additive in the manufacture of plastic products, including injection molding, blow molding, and extrusion coating. This analysis focuses on its use in HDPE film.

The cost savings and performance benefits of displacing a portion of plastic with calcium carbonate has been well understood for many years. The characteristics of calcium carbonate concentrates allow polymers to heat and cool faster, resulting in significant energy savings through improved productivity, higher outputs, and faster film conversion. HDPE film made with calcium carbonate also offers substantial environmental benefits by reducing petrochemical and energy usage during the manufacturing process, and by minimizing the carbon footprint and greenhouse gas impact of finished plastic products.

[1] *U.S. Department of Energy, http://www.eia.gov/tools/faqs/faq.cfm?id=34&t=6*

OVERVIEW

According to the latest data from the U.S. Department of Energy, more than 191 million barrels of liquid petroleum gas (LPG) and natural gas liquids (NGL) were used by the United States plastic materials and resins industry to make plastic products in 2010, representing nearly 3% of the total U.S. petroleum consumption.[1]

Not surprisingly, Federal and State governments in the United States and abroad, and brand owners are increasing pressure on the industry to reduce its dependence on petrochemical-based plastics and packaging.

Calcium carbonate ($CaCO_3$), the primary mineral in limestone, marble, and chalk, is a common substance found in all parts of the world. Adding $CaCO_3$ as component into current resin processes has been shown to lower the greenhouse gas impact of finished plastic products by reducing petrochemical and energy usage during the manufacturing process.

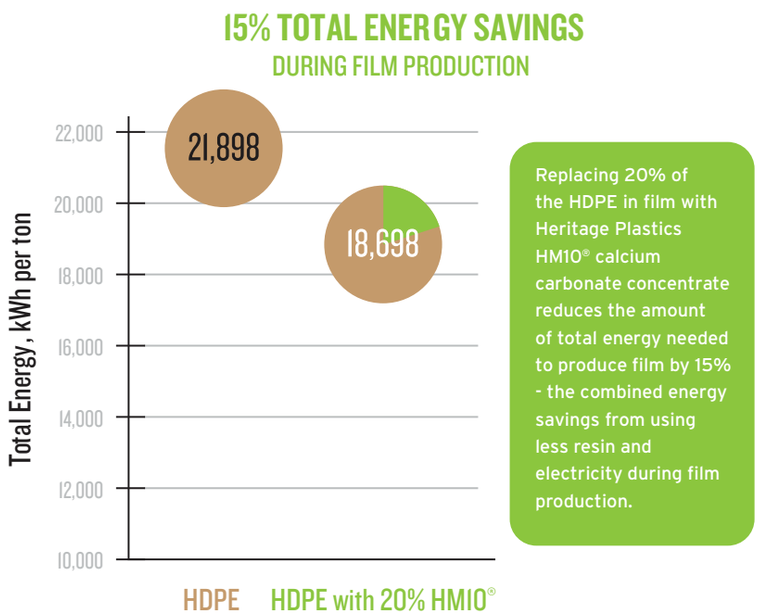
Calcium carbonate concentrates can be found in a wide variety of applications, including injection molding, blow molding and extrusion coating. This analysis, however, focuses on the use of $CaCO_3$ in high-density polyethelyne resin (HDPE), which is used in the manufacture of plastic bags and film products for flexible packaging.

As part of its commitment to sustainability, Heritage Plastics was the first plastic resin compounding company to focus on highly-functional calcium carbonate concentrates, and has set new industry benchmarks with its innovative HM10® calcium concentrates.

Heritage Plastics HM10® calcium carbonate concentrate reduces overall greenhouse gasses by 13%-17%, including 15%-20% reductions in oxides of sulfur (SOx), and 13%-17% reductions in oxides of nitrogen (NOx).

Additionally, HM10® calcium carbonate concentrate reduces the overall energies as a function of fuel types used by 15-20%. For example, crude oil consumption can be reduced by 16%-20%, natural gas consumption by 15%-19%, coal consumption by 12%-16%, and electrical consumption by 12%-17%.

As will be shown, integrating Heritage Plastics HM10® calcium carbonate concentrate into the HDPE film production process meets the petroleum and electrical reduction goals sought by the national and international public and private sectors.



SUMMARY OF HM10® LIFE CYCLE ANALYSIS

ENERGY	GREENHOUSE GASES	FOSSIL FUELS	CRITERIA AIR POLLUTANTS	ACIDIFICATION POTENTIAL	WATER USAGE
REDUCED COMSUMPTION 19%	REDUCED EMISSIONS 13%	REDUCED USAGE 15%	SOx REDUCED 15% NOx REDUCED 13% PARTICULATES REDUCED 11%	REDUCED EMISSIONS 14%	SAVED 7%

REAL-WORLD ADVANTAGES OF HM10®

To illustrate the real-world advantages of displacing about 20% of the petrochemical-based component in film with HM10®, we assume that 1 billion pounds of HDPE is converted into bags in a typical year. By applying the 13% greenhouse gasses reduction data point illustrated above, the potential amount of greenhouse gasses avoided in one year is 160,550 tons.

Using the EPA Greenhouse Gas Equivalencies Calculator[2], that level of avoidance is equivalent to one of the following:

- Annual greenhouse gas emissions from 30,343 passenger vehicles
- CO_2 emissions from 16,328,308 gallons of gasoline consumed
- CO_2 emissions from 338,717 barrels of oil consumed
- CO_2 emissions from the electricity use of 21,804 homes for one year

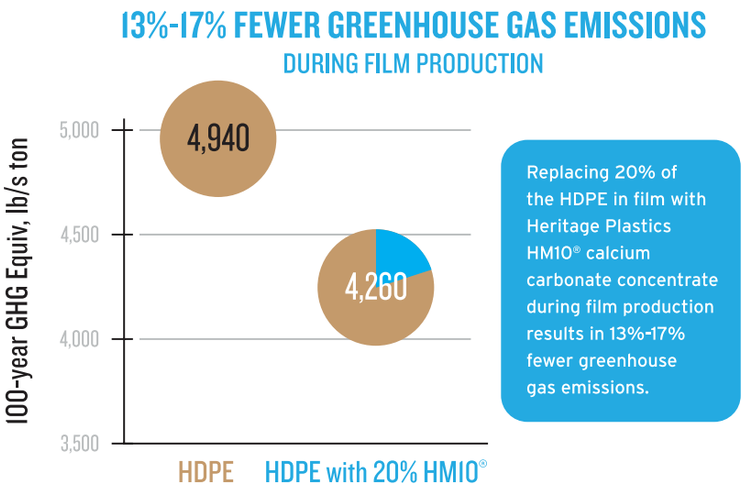
[2] *http://www.epa.gov/cleanenergy/energy-resources/calculator.html*

REDUCING GREENHOUSE GASSES STARTS HERE

It is evident from the results of the LCA that Heritage Plastics' HM10® calcium carbonate concentrate delivers substantial environmental benefits when used as a component in HDPE film processing.

By displacing about 20% of the petrochemical-based component in the film, processors significantly reduce greenhouse gasses and regional air pollutants (NOx, SOx, and particulates), and yield substantial energy savings during the manufacturing process.

Clearly, integrating Heritage Plastics HM10® calcium carbonate concentrate into the HDPE film production process meets the petroleum and electrical reduction goals sought by the national and international public and private sectors.



THE NATURE OF HERITAGE PLASTICS SUSTAINABILITY

Replace: Heritage Plastics products replace petrochemical-based plastics in polyethylene, polypropylene, and polystyrene products.

Reduce: Heritage Plastics products reduce dependency on petrochemical-based products in addition to lowering the energy used during processing and reducing the carbon footprint (greenhouse gas emissions) of the overall package.

Recycle: Plastic film and bags containing HM10® are recycled every day.

HM10®. Greener plastic for a cleaner world.

Heritage Plastics, Inc
1002 Hunt Street
Picayune, Mississippi 38466 USA
Phone: 800.245.4623
www.heritage-plastics.com

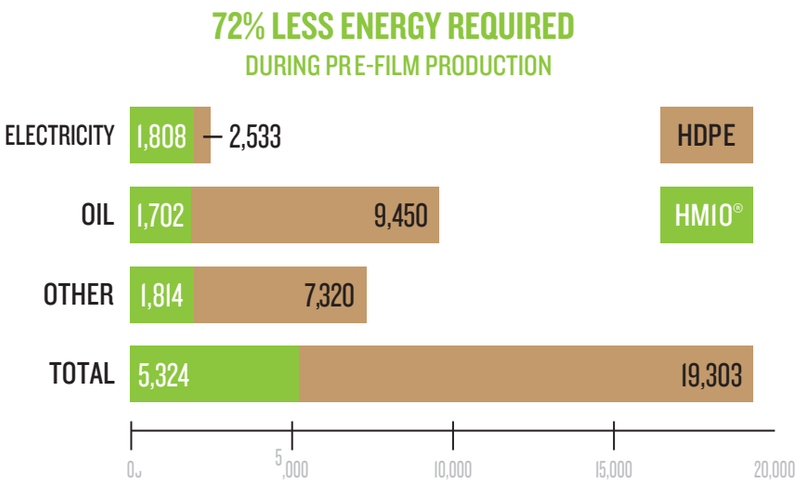
HERITAGE PLASTICS HM10® CALCIUM CARBONATE CONCENTRATE

U.S.-based Heritage Plastics was the first resin compounding company to demonstrate a commitment to sustainability by focusing on highly-functional calcium carbonate concentrates, offering superior products that boost performance in numerous plastic applications.

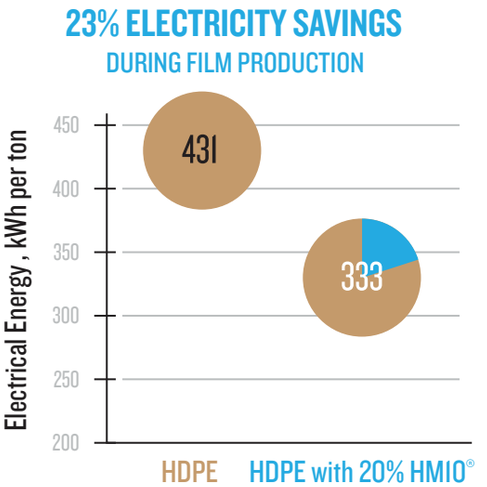
Heritage Plastics has a long history of leadership in the advancement of calcium carbonate additive technology, notably its innovative HM10® performance additive-calcium carbonate concentrate, which is produced at the company's Sylacaugua, AL facility near one of the world's largest limestone mines.

HM10® calcium carbonate concentrate is used in applications for polyolefin extrusion; including film, sheet and thermoforming. As will be illustrated in the next section, displacing about 20% of the petrochemical-based components in film with HM10® can yield extraordinary environmental benefits, including:

- 15%-20% overall energy savings
- 16%-20% reductions in the use of crude oil
- 15%-19% reductions in the use of natural gas
- 12%-17% reductions in the use of coal
- 12%-16% reductions in the use electricity
- 13%-17% reductions of greenhouse gasses
- 15%-20% reductions of oxides of sulfur (SOx)
- 13%-17% reductions of oxides of nitrogen (NOx)
- 11%-15% reductions of particulates



Producing one ton of Heritage Plastics HM10® calcium carbonate concentrate uses 72% less energy than producing one ton of HDPE.



Replacing 20% of the HDPE in film with Heritage Plastics HM10® calcium carbonate concentrate reduces the amount of electrical energy needed to convert the film by 23%.

HM10® LIFE CYCLE ASSESSMENT TESTS

To demonstrate commitment to sustainability and to provide evidence of the environmental benefits of its innovative HM10® calcium carbonate concentrate, Heritage Plastics contracted with independent third party Boustead Consulting & Associates LLC (BCAL) to complete a Life Cycle Assessment (LCA), or cradle-to-gate analysis, of the additive.

The study analyzed the energy consumption and environmental impacts of using 100% pure polyethylene (PE) resin compared to displacing 20% of the PE resin with HM10® calcium carbonate additive in both pre-film plastic pellet production, and in film production scenarios.

BCAL based its calculations on a database built over the last 25 years containing a wide variety of data relevant to the proposed study. The LCA considered both the manufacturing process of Heritage Plastics HM10® additive and its use in HDPE film production.

The following data clearly shows the benefits derived from using the innovative technology of Heritage Plastics over the comparable existing technology.