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.

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 (CaCO₃), the primary mineral in limestones, marbles, and chalk, is a common substance found in all parts of the world. Adding CaCO₃ 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 CaCO₃ in high-density polyethylene 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 gases 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 energy 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.

**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 consuming processing and reducing the carbon footprint (greenhouse gas emissions) of the overall package.

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

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**HM10®. Greener plastic for a cleaner world.**

By supporting Calcium Carbonate in plastics manufacturing, we’ll all breathe a little easier.
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 80 million barrels of LPG and NGL were used in the United States to make plastic products in the plastics and resins industry, equal to about 3.7% of total U.S. petroleum consumption.

In addition to petroleum, natural gas is used to manufacture plastic materials and resins. In 2010, about 426 billion cubic feet (Bcf) of natural gas were used to make plastic materials and resins, equal to about 17.7% of total U.S. natural gas consumption.

Electricity is also used to manufacture plastics. In 2010, about 48 billion kilowatt-hours were used, equal to about 7.7% of total U.S. electricity consumption.

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

A high-density polyethylene (HDPE) is used in the manufacture of plastic bags and film products for flexible packaging. Since the film is made from HDPE, a polymer bag, car, shoe, shirt sakc,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 (CaCO3), the main mineral found in limestone, marble, and chalk, is found in all parts of the world. It is the main component in shellfish, snails, and eggshells. It is the main component in common shellfish and snails, as well as in eggshells. It contributes to an endless list of plastic products whose benefits are immeasurable.

The benefits come from the fact that calcium carbonate helps to make plastic products more flexible, lighter, and easier to transport. It also improves the heat and cooling properties of plastic products during their life cycle, making the materials more durable and reducing the amount of energy needed to transport them.

Calcium carbonate reduces the carbon footprints of plastic products in several ways. First, it reduces the amount of energy needed to transport the finished products. This is because calcium carbonate is a light, lightweight material, which helps to reduce the amount of energy needed to move the products around. Second, it reduces the amount of carbon dioxide (CO2) emissions that are produced when plastic products are made.

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

| ENERGY | REDUCED COMSUMPTION | 19% |
|——— | ———— | ——— | ——— |
| GREENHOUSE GASES | 13% | ——— | ——— |
| WATER USAGE | 7% | ——— | ——— |
| REDUCED EMISSIONS | 14% | ——— | ——— |
| PARTICULATES REDUCED | 11% | ——— | ——— |

HMP® LIFE CYCLE ASSESSMENT TESTS

To demonstrate a commitment to sustainability and to provide evidence of the environmental benefits of its innovative HM10® calcium carbonate concentrates, Heritage Plastics contracted with independent third party Bluestein 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) non-compression molded film comprising 20% of the PE resin with HM10®, calcium carbonate additive is added, pre-film plastic pellet production, and its 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 table shows the benefits derived from using the innovative technology of Heritage Plastics over the comparable existing technology.

HMP® PLASTICS HM10® CALCIUM CARBONATE CONCENTRATE

U.S. based Heritage Plastics was the first company to replace HDPE with a break-through, environmentally friendly additive that would allow engineers to produce plastic 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 Sylacauga, 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, replacing about 20% of the petrochemical-based components in film with HM10® can yield extraordinary environmental benefits, including:

• 11%-15% reduction of particulates
• 13%-17% reductions of oxides of nitrogen (NOx)
• 13%-17% reductions of greenhouse gasses
• 15%-20% reductions of mercury
• 15%-20% reductions of emissions of volatile organic gasses
• 19%-25% reductions of air pollutants

Dr. Robert J. Herbst, President of Bluestein Consulting & Associates LLC (BCAL), the third party contracted by Heritage Plastics, has stated that there is no substitute for proven technology with the performance and energy savings of HM10® calcium carbonate concentrate.
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 (CaCO₃), the primary mineral in limestones, marbles, and chalk, is a common substance found in all parts of the world. Adding CaCO₃ 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 CaCO₃ in high-density polyethylene 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 gases 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%. 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.

HERITAGE PLASTICS

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 consuming processing and reducing the carbon footprint (greenhouse gas emissions) of the overall package.
Recycle: Plastic film and bags containing HM10® are recycled every day.
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 plastics products in the plastic materials and resin industry, equating 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, equating to about 17.7% 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 17.7% of total U.S. electricity consumption.

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

The study analyzed the energy consumption and environmental impacts of using 100% pure polyethylene (PE) film compared to displacing 20% of the petrochemical-based components in film with HM10® calcium carbonate concentrate, which is produced at the company’s Sylacauga, AL facility near one of the world’s largest limestone mines.

The following data clearly shows the benefits derived from using the innovative technology of Heritage Plastics HM10® calcium carbonate concentrate over the comparable existing technology.

**HERITAGE PLASTICS HM10® CALCIUM CARBONATE CONCENTRATE**

U.S.-based Heritage Plastics was the first company to manufacture a company to demonstrate a commitment to sustainability by focusing on highly-functional calcium carbonate concentrates 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 Sylacauga, AL facility near one of the world’s largest limestone mines.

Calcium carbonate reduces the carbon footprint of plastic. Calcium carbonate (CaCO₃), the main mineral found in limestone, marbles, and chalk, is found in all parts of the world. It is the main component in common shellfish shells, and as well in eggshells. It is commonly used medicinally as a calcium supplement, 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. The analysis focus on using HM10® calcium carbonate concentrate into the HDPE film production.

High-density polyethylene resin (HDPE) is used in the manufacture of plastic bags and film products for flexible packaging. Since the film is produced in roll form, it can be slit, laminated, made into sheets, blown up sleeves, diaper film, and packaging accounts for 50% of the polyethylene market, there has been considerable focus on trying to produce a “greener” plastic.

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 Sylacauga, AL facility near one of the world’s largest limestone mines.

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 Accredited 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) film compared to displacing 20% of the film with HM10® calcium carbonate concentrate. The analysis focus on using HM10® calcium carbonate concentrate into the HDPE film production.

Nasa’s AL-1 rocket in 1960, 100% polyethylene (PE) film was used to cover 50% of the rocket's surface area. NASA's goal was to mine earth's surface, and therefore HM10® calcium carbonate concentrate. The analysis focus on using HM10® calcium carbonate concentrate into the HDPE film production.

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 Accredited 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) film compared to displacing 20% of the film with HM10® calcium carbonate concentrate. The analysis focus on using HM10® calcium carbonate concentrate. The analysis focus on using HM10® calcium carbonate concentrate into the HDPE film production.

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 compared the manufacturing process of Heritage Plastics HM10® additive-calcium carbonate concentrate with the comparable existing technology.

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

**SUMMARY OF HM10® LIFE CYCLE ANALYSIS**

- **ENERGY**
  - **Emissions Reduced: 19%**
  - **Oil Reduced: 15%**

- **GREENHOUSE GASES**
  - **CO₂ Reduced: 13%**
  - **Oil Reduced: 15%**

- **HEAT POLLUTANTS**
  - **Sulfur Oxides Reduced: 13%**
  - **Particulates Reduced: 19%**

- **ACIDIFICATION POTENTIAL**
  - **Nitrogen Oxides Reduced: 11%**

- **WATER USAGE**
  - **17% Saved**

**REDUCING GREENHOUSE GASES 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 production.

By displacing about 20% of the petrochemical-based component in the film, producers significantly reduce greenhouse gases 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 not only reduces the electrical energy needed to convert the film by 23%, but also reduces the amount of electrical energy needed to refine the plastic from 17% to 19%.

When the HDPE film is used for a year, it yields the following benefits, including:

- **12%-17% reductions in the use of coal**
- **15%-19% reductions in the use of natural gas**

Clearly, integrating Heritage Plastics HM10® calcium carbonate concentrate into the HDPE film production process not only reduces the electrical energy needed to convert the film by 23%, but also reduces the amount of electrical energy needed to refine the plastic from 17% to 19%.
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 resin industry to make plastic products in 2010, representing nearly 3% of the total U.S. petroleum consumption. 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 (CaCO₃), the primary mineral in limestones, marbles, and chalk, is a common substance found in all parts of the world. Adding CaCO₃ 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 CaCO₃ in high-density polyethylene 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 gases 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 energy usage as a function of fuel types used by 15%. For example, crude oil consumption can be reduced by 16%-20%, natural gas 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.

**THE NATURE OF HERITAGE PLASTICS SUSTAINABILITY**

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

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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 plastics products in the plastic materials and resins industry, equal to about 3.7% 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 7.7% of total U.S. electricity consumption.

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

High-density polyethylene (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 (CaCO3), which is the main material found in limestone, marble, and chalk, is found in all parts of the world. It is the main component in common shellfish shells, as well as in eggshells. It is commonly used medicinally as a calcium supplement, in many pharmaceuticals, and as an antacid. Calcium carbonate is also a popular additive in the manufacturing process of plastics, including injection molding, blow molding, and extrusion coating. This analysis focuses on its use in HDPE film.

Calcium carbonate reduces the carbon footprint of plastic

Calcium carbonate is added to the plastic to reduce its density and increase its buoyancy. This lowers the amount of materials needed to manufacture the plastic. The cost savings and performance benefits of displacing a portion of plastic with calcium carbonate have been measured and are significant. Calcium carbonate reduces the amount of electrical energy needed to process the plastic.

HERITAGE HAMMOCK® HM10® CALCIUM CARBONATE CONCENTRATE

U.S.-based Heritage Plastics was the first company to replace about 20% of the HDPE resin in film with HM10® calcium carbonate concentrate, which is produced by the company’s Lycopersicon, a facility located near the world’s largest limestone reserves.

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%-18% reductions in the use of crude oil
- 15%-19% reductions in the use of orders of natural gas
- 12%-17% reductions in the use of coal
- 16%-16% reductions in the use of electricity
- 15%-17% reductions of greenhouse gases
- 15%-20% reductions of oxides of sulfur (SOx)
- 15%-17% reductions of oxides of nitrogen (NOx)
- 10%-19% reductions of particulates

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 Bottrell 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 polypropylene (PP) film, as compared to displacing 20% of the PE with HM10® calcium carbonate additive in both pre-film plastic pellet production, and in HDPE film production processes.

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.