



# SUSTAINABILITY and the Morning Star Mission

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## Inside this Edition

This report features the latest information on the sustainability advances and environmental endeavors implemented within the Morning Star enterprise. Morning Star is pleased to remain at the forefront of tomato processing technology and agricultural sustainability and is constantly working to improve our processes, better the environment and guarantee a safe, wholesome product for our customers and consumers.



## Our Vision

To be an Olympic Gold Medal performer in the tomato products industry. To develop and implement superior systems of organizing individuals' talents and efforts to achieve demonstrably superior productivity and personal happiness. To develop and implement superior technology and production systems that significantly and demonstrably increase the effective use of resources that match customers' requirements. To provide opportunity for more harmonious and prosperous lives, bringing happiness to ourselves and to the people we serve.

## About Morning Star

With facilities in both the San Joaquin and the Sacramento Valley, The Morning Star Packing Company is ideally placed to acquire and process tomatoes in California's fertile Central Valley. Over the past 40 years of operation, Morning Star has transformed itself from a one truck owner operator business to processing over one quarter of the California tomatoes grown for processing.

The Morning Star Packing Company now owns and operates three tomato processing facilities: two near Los Banos (in the San Joaquin Valley) and the other in Williams (in the Sacramento Valley). The Morning Star Packing Company has been built on innovation and continuous improvement from its inception. With advances such as a gravity-fed flume unloading system and replacing the traditional cooling tower with a cooling pond, The Morning Star Packing Company is staying on the forefront of food processing technology which works with nature's attributes. These innovations, and numerous others, allow The Morning Star Packing Company to process more tomatoes in less time using fewer resources.



### The Morning Star Sustainability Statement

Our Mission is to produce tomato products and services which consistently achieve the quality and service expectations of our customers in a cost effective, environmentally responsible manner.

In our mission, "environment" is not limited to nature nor to the recent "sustainability" paradigm. To us, it includes customers, neighbors, colleagues, competitors and suppliers. Acting in an *environmentally responsible manner* means we conduct ourselves in a manner which all areas of our full environment, both business and nature, would respect. This is Sustainability for us, and it has been in our Mission Statement for over 20 years.

Our goal is to ensure a healthy environment. In partnership with our suppliers, we use economically viable practices to protect sensitive areas, improve air, water, soil and wildlife resources and conserve non-renewable mineral resources. The Morning Star Packing Company and its affiliates reduce waste and pollution through technological innovation, recycling, energy conservation, and limits use of water, pesticide and nutrient inputs to those biologically required for a successful crop.

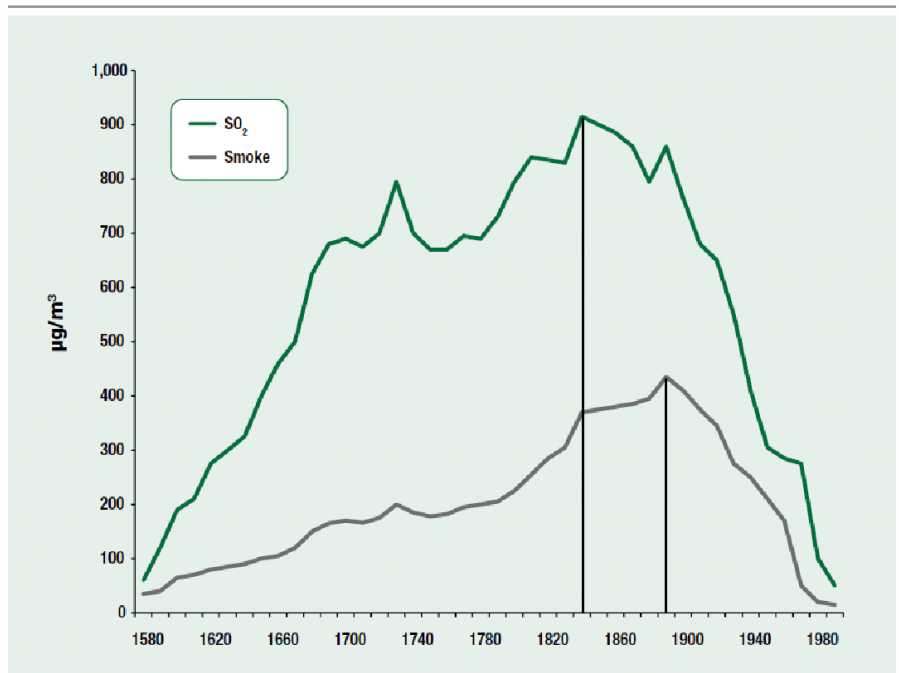
# A Short History of the Sustainability Movement

Environmental sustainability has historically been a sub-conscience element of economic sustainability. Even if an industrial process did not produce any greenhouse gasses, it was not implemented if desired product output was not achieved. Despite this, in recent years people have started to pay more explicit attention to the longer-term aspects of the use of the environment and resources and how it continuously changes over time.

Contrary to widespread belief, the past centuries have shown that the environment of the industrialized world has been steadily improving as measured on a wide variety of scales. The graph at right shows how long-term air pollution trends have been quite encouraging, at least in the past 150 years or so. One significant reason for the emissions reductions is simply the fact that emissions are almost always a byproduct, and as industrial processes get more efficient, they naturally produce fewer byproducts. In this way the never-ending industrial tendency of becoming more resource efficient almost always results in becoming more environmentally sustainable.

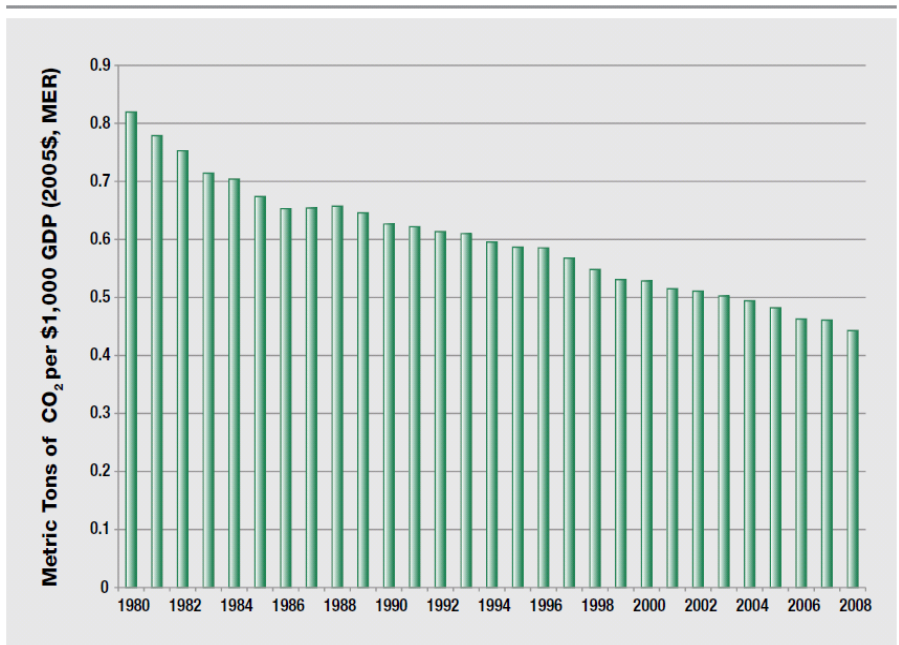
Two other factors that serve to determine the affect that we have on the environment are wealth and rule of law. In general, the wealthier a nation is, the less likely it is to be heavily polluted. Similarly, the better the rule of law relative to private property, is enforced impartially, the more people take care of things (including the environment) that belong to them. If someone owns something that produces value over time, they will help it to continue to produce value over time. The graph at right demonstrates how the USA has continually improved in efficiency as measured by carbon dioxide emissions per \$1000 of GDP over the past three decades.

Long-Term Air Pollution Trends in London, 1580–1990



Source: Brimblecombe, *The Big Smoke*

U.S. Greenhouse Gas Emissions Intensity, 1980–2008



Source: EIA



## It All Starts in the Fields

The Morning Star Packing Company has been involved in sustainable and environmentally sensitive agriculture for over 25 years. The most recent expression of this is the Sustainable Agriculture Program, which applies environmental guidelines for growers to follow in order to be a grower-supplier to the Morning Star enterprise. These guidelines are all aimed at ensuring that any use of fertilizers and pesticides to grow the tomato crop is utilized effectively, minimizing the quantity used and helping to maintain biodiversity in the area. In order to qualify for Morning Star's Sustainable Agriculture Program, the growers must meet the following criteria:

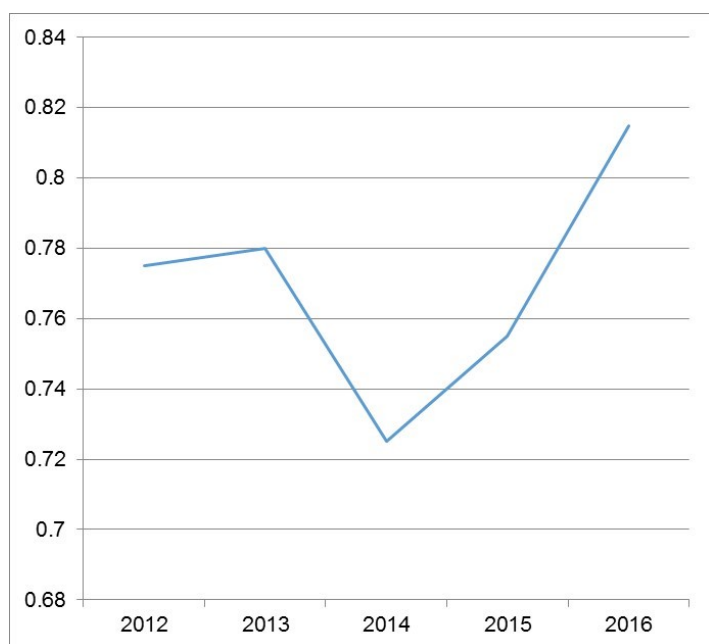
- Retain appropriate documentation on site for all applied fertilizers and pesticides
- Use only pesticides approved by the California League of Food Processors and Morning Star
- Ensure that no crops are grown with industrial or municipal bio-solid waste
- Certify that only non-genetically modified varieties are grown and harvested.

The Morning Star Packing Company strongly encourages each grower to follow additional guidelines, such as avoiding production in ecologically sensitive areas, limiting erosion of nearby land, having backup plans in case of chemical spills and closely monitoring the nearby area for agrochemical exposure. Morning Star currently is in the process of collecting the monitoring data from each grower in order to track trends and patterns. Overall, the objective of Morning Star's Sustainable Agriculture Program is to ensure that the largest possible crop is produced while using the least possible resources and minimal damage to the environment that we all share.

Morning Star harvests the tomatoes from the grower-supplier's fields using special harvesters. These harvesters have been fitted with extremely efficient engines which reduce both operating cost and environmental impact. In addition, the Morning Star Trucking Company is able to coordinate with the harvest to maximize efficiency and minimize cost and emissions.



### Percentage Drip Irrigation (Acres)



Source: Morning Star

**Morning Star encourages its growers to invest in drip-irrigation systems.**

Drip irrigation is the most efficient way to irrigate the tomato crop. Water is applied directly to the plant and is carefully controlled.

## Conserving Electricity

The facilities within the Morning Star Enterprise are specifically designed to minimize electrical power consumption. One of the primary ways that this is done is through the installation of cooling ponds for the water used by the evaporators. This water is pumped from the cooling pond to the top of the evaporators where it flows out the bottom of the evaporators and back to the cooling pond. This process only involves one pumping of the water, whereas a conventional cooling tower approach requires that the water gets pumped twice (from the bottom of the evaporators to the top of the cooling tower and the bottom of the cooling tower to the top of the evaporators). Considering the massive volume of water that goes through the system, the fact that the water is only pumped once results in a saving of 2—2.4 million kilowatt hours per year, per factory.

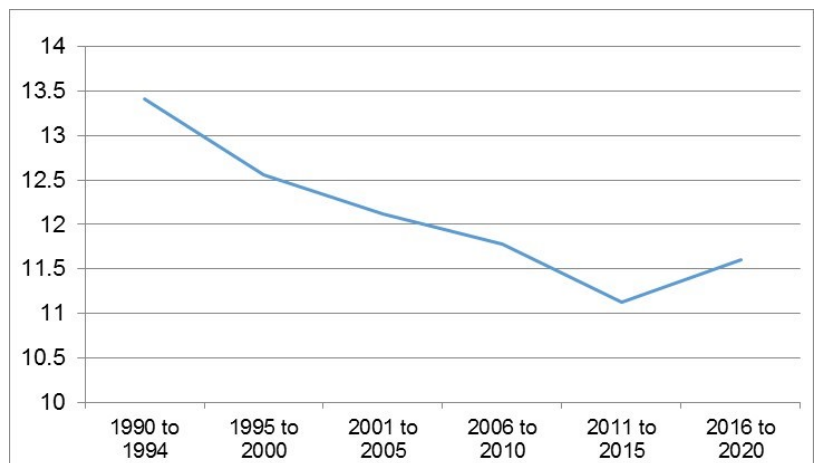
Another way we conserve both electricity and water is by using variable frequency devices (VFDs) to control our pumps. A VFD automatically responds to the liquid demand of the plant, slowing the pump if not very much liquid is being used and speeding up if more liquid is needed. This technology vastly improves upon the older method, which pumped the same amount of water all the time even when the supply was greater than the demand. The excess water was diverted to a ditch, wasting both the water and the electricity used to pump it. By installing a VFD on a well, we managed to avoid consuming 160,000 kilowatt hours of electricity annually on that well alone.

In addition to the major savings from the cooling ponds and other efficient industrial processes, there are many smaller electricity savings as well, through the use of steam driven turbines replacing electric motors, as well as very energy efficient lighting applications throughout the plants and more energy efficient information systems that precisely control plant functions.

## Natural Gas

Natural gas is primarily used to heat water to produce steam which is then used for a variety of purposes, ranging from heating product to turning turbines. We continually try to reduce the volume of natural gas which we consume. On average over the last 10 years, we have become 7% more efficient with our natural gas consumption. This helps us save the cost of purchasing more natural gas and reduces our environmental impact as well.

## Natural Gas Therms per Ton Reduction (1990)



Source: Morning Star

## Re-using Heat

Many parts of our production process involve the application of heat, either directly via heaters or through a medium such as steam. As with other resources, we recapture and reuse this heat, using heat exchangers installed in the evaporators. The evaporators feature three vessels with common vapor lines. Heat is applied in the first vessel and is drawn into the second and third vessels using steam ejectors and water condensation. These heat exchangers transfer the steam's energy to the tomato juice flowing through them by recycling vapor under differing pressures, thus allowing varying boiling points to be achieved.



## Every Drop of Water Counts

Water is an essential part of any food processing facility. The Morning Star Packing Company uses water to produce steam, to move tomatoes through the flumes and to clean equipment.

Like any other resource, we do our best to reuse the water which we consume. In each facility, we have two to three different loops of water used for tomato delivery into the plant. In each section, the water serves to both move the tomatoes through the plant and to clean them. Each section water system recirculates, meaning that the water is reused over and over. We introduce only enough new water to maintain a clean flume system.

The evaporators use another recirculating loop inside the steam generation system. When the boilers produce steam from water, the steam goes through the evaporator heaters, returns to the boilers and is reheated, instead of being vented to the air. This system uses far less energy than boiling cool well water every time.

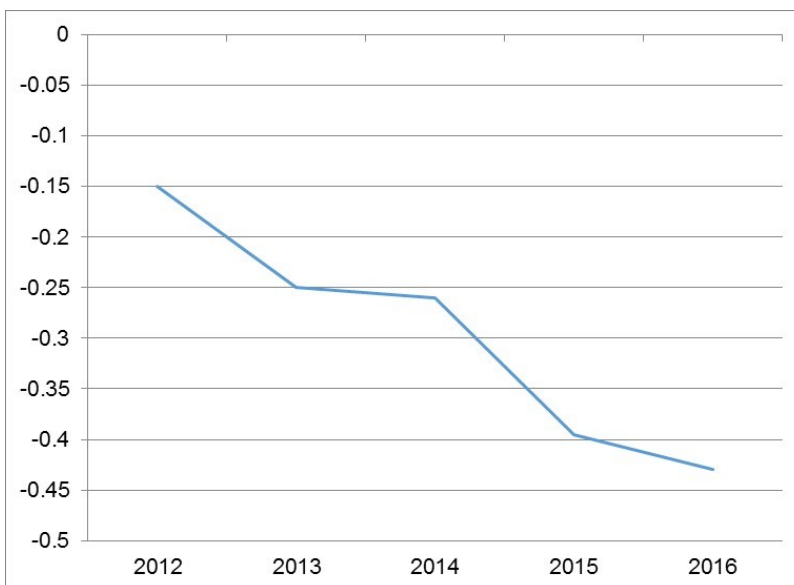
We have also determined that we can use cooling pond water in the ejector systems of our evaporators, which saves approximately 400 gallons per minute of well water per facility, resulting in a water savings of over 47.5 million gallons of water every year.

In addition to the large-scale water savings mentioned above, we also save water in many small ways. The high pressure water hose system used for sanitation replaces high-volume sprays from low pressure systems with lower-volume sprays at higher pressure in appropriate applications.

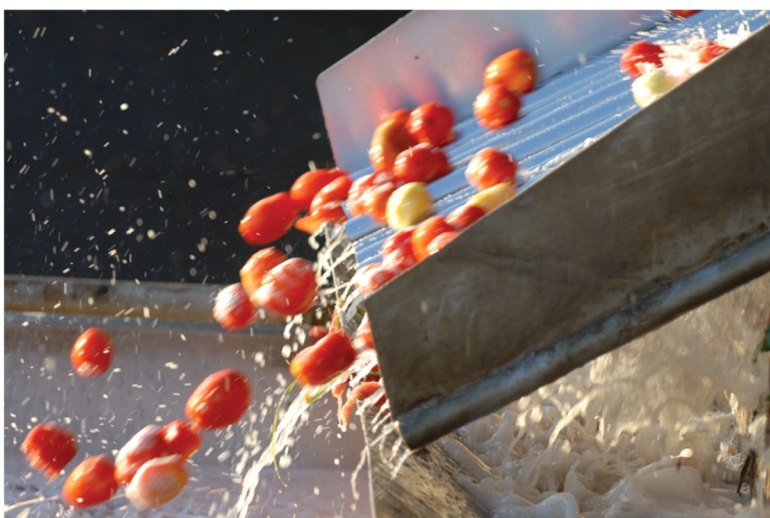
As a result of all of these water saving initiatives, The Morning Star Packing Company managed to reduce water consumption by 33% since 2011.



### Process Water, per Ton Reduction since 2012



Source: Morning Star





## Resource Recovery: Making More from Less

The Morning Star Packing Company strives to recover as many usable resources as possible from the various plant byproducts. We do this through several different practices, all of which help us reduce our environmental footprint.



Tomato Pomace

### Tomato Pomace Recovery System

Many Morning Star products do not include tomato seeds and only small amounts of peel. One of the processes during paste production is called finishing, wherein the seeds and peel are separated from the rest of the tomato juice (resulting in pomace—a mixture of peel (top image) and seeds (bottom image)). In order to minimize the amount of pomace leaving the plant as waste, the seed and peel pass through a separation process, resulting in two separate commodities (peel and seed). The peel is further processed and the seeds are sold to dairy farmers to feed to their cattle. In this way, the biomass of both the seeds and the pomace isn't wasted; it still serves a useful and environmentally friendly purpose.



Tomato Seeds

### Additional Seed Uses

The Morning Star Packing Company produces a significant quantity of tomato seed from its tomato paste production process. Tomato seed is rich in fiber, oil and protein. Tomato seeds contain 20-25% oil by weight. Currently, the Morning Star Packing Company is producing tomato seed oil as an ingredient for a select group of customers and has developed a method for producing and using the tomato seed meal as an OMRI-listed, organic input material (fertilizer) under the Morning Star Mealfertilizer label.

Additionally, The Morning Star Packing Company is actively working with other science-focused companies to develop value-added uses and markets for its tomato peel and tomato plant fiber.

## Caustic Recovery System

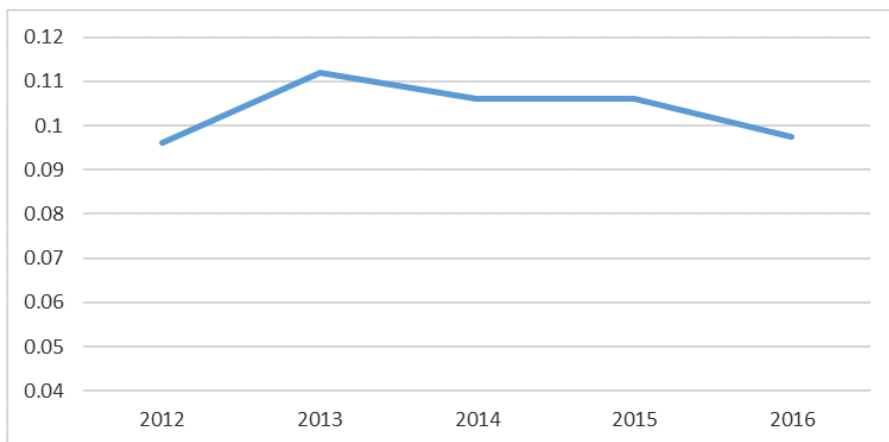
A portion of our diced tomatoes have the peel removed by a caustic process. Caustic, also known as lye, is a blend of alkaline chemicals that is used to soften the peel of the tomato so that it can be easily removed. After removing the peel, a mixture of lye and water drains off the tomato. The resulting water in this mixture is boiled off, resulting in a more concentrated caustic that can then be reused. This caustic-recovery system reduces the amount of caustic that must be neutralized thereby resulting in lower chemical consumption as well as reduced caustic delivery transportation-related emissions. Through the implementation of this caustic-recovery system, we managed to reduce our consumption of caustic by 37%.



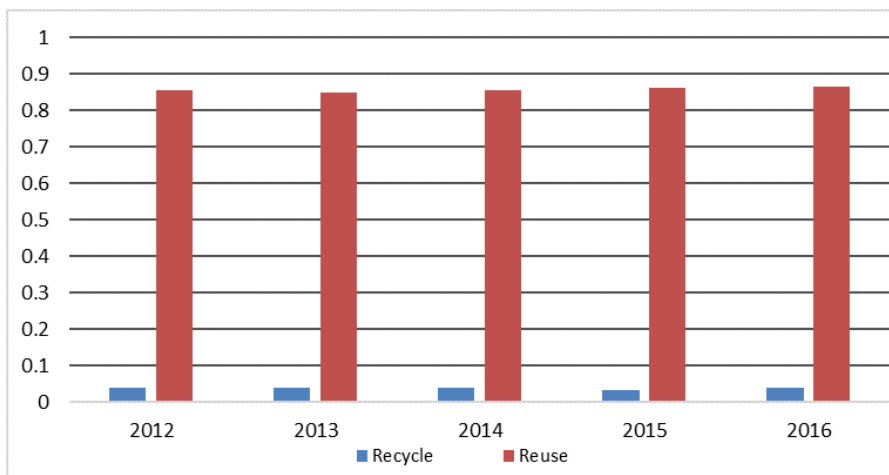
## Environmentally Conscious Packaging and Shipping Solutions



### % Shipping Containers to Landfill



### % Shipping Container Recycle/Reuse

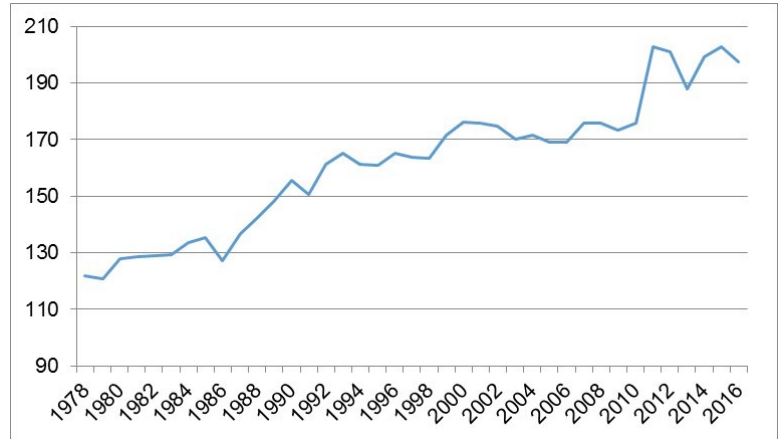


The containers we ship our product in are also signs of our commitment to conserve and re-use. Just like all other resources we use in the enterprise, we encourage our customers to recycle and reuse the containers we ship to them along with the tomato product. This has been largely successful, with a little over 86% of our shipping containers being reused by our customers. Our customers recycle approximately nearly 4% of the shipping containers, with less than 10% of our shipping containers being sent to a landfill or a waste-to-energy program. Each of these metrics has been improving over time, as well, as demonstrated by the graphs (left).

Source: Morning Star

## Tons/Gallon per Mile Index

*Since 1978, The Morning Star Trucking Company has provided more tonnage to the processing facilities while reducing the amount of energy used in transit. This chart (right) shows the number of tons hauled one mile using one gallon of diesel fuel.*



Source: Morning Star

## Big Trucks. Small Footprint.

Morning Star started in 1970 as a trucking company, and trucking is still a vital part of Morning Star. The following steps have since ensured that our transportation needs are met as efficiently and environmentally friendly as possible:

- Each Morning Star truck hauls two specially designed lightweight trailers which carry, on average, two tons more tomatoes per trip and still stay under the legal weight limit. This results in fewer trips to transport the same number of tomatoes and reduced emissions. Similarly, all of our drivers are trained and monitored to maximize fuel efficiency on the road through onboard engine performance systems. Throughout the tomato season, trucks drive from the tomato field to the nearest Morning Star processing plant, rather than every truck traveling to one central facility.
- The Just in Time Inventory Control system is a system that lets our dispatchers know exactly how many trucks are needed where. As part of this system, each of our trucks is equipped with a computer connected to a GPS sensor, so the truck driver always knows their position, their destination, and their route. Additionally, the system works out the logistics of moving loaded and unloaded trailers, resulting in fewer trips and less vehicle emissions.

Even with all of these optimizations, railroads are approximately twice as efficient as commercial trucks, particularly for very long distances. Considering that the majority of our products travel to far-away customers, rail-freight is the option that makes the most sense, both economically and environmentally. This is why every facility has a dedicated railroad line that we use to ship most of our products.







## Safety Comes First

In an effort to minimize the health risk to our colleagues and the environment, Morning Star creates, maintains and constantly reviews detailed contingency plans on what to do if there is a hazardous chemical spill. These plans are onsite, and additional copies have been filed with the appropriate authorities. In addition, there are several different training courses that all colleagues have to undergo before working directly with any harmful chemical.

Chemical management and exposure to the environment is a high priority to the Morning Star enterprise. The maintenance of Safety Data Sheets is important, although typically requires thousands of sheets of paper. In order to maintain the most current SDS information and make the information available to any colleague at any time, the SDS profiles are maintained in an electronic database. All colleagues have access to the system which uses considerably less resources than conventional hard-copy distribution.

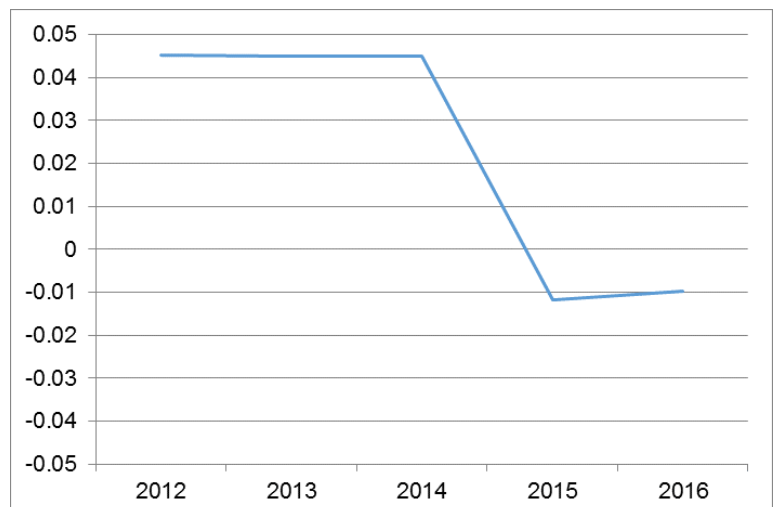
Our colleagues are thoroughly trained on proper safety procedures for handling, using, monitoring and disposing of chemicals. Every effort is made to ensure that chemical applications do not threaten or harm the local environment or wildlife.

## Greenhouse Gas Control

The Morning Star Packing Company is constantly looking to minimize greenhouse gas emissions growth as we continue to bring more and more tons of raw fruit into our facilities. Over the past 5 years, we have managed to significantly control our Greenhouse Gas emissions growth while expanding the amount of incoming fruit brought to the processing facilities each season.

*\*Every season is different. The weather in California sometimes dictates the need to haul loads from further away which explains why some years show slightly more GHG emissions growth than previous years.*

### % GHG Change (2012)



Source: Morning Star

## Research and Development

Morning Star colleagues stay at the forefront of research and development and keep current on tomato technologies. Through our affiliate Lucero Farms, Morning Star has agreed to fund and develop a 35 acre sustainable demonstration farm with the help and cooperation of the Sycamore Family Trust, the University of California at Davis and the Audubon Society California. The long term goals of this partnership are to further habitat restoration and to provide a conservation tillage demonstration farm. This will be accomplished through the installation of drip irrigation systems and by installing owl and other bird nesting boxes, as well as bee boxes. Cover crops will also be planted to reduce runoff.

## Snapshot Summary

In order to demonstrate the effectiveness of the various resource reduction strategies that we have implemented, we would like to compare our 2016 operations with our past operations. Over that time period, we have accomplished the following:

- Increased the efficiency of our natural gas usage by 7% over the past 10 years
- Increased the efficiency of our water usage by 33% since 2011
- Our growers have increased the acreage of drip irrigation from 70% to 81% since 2011

All of these accomplishments are particularly impressive considering that we also increased our production by 11% over the last 5 seasons.

**THANK YOU FOR YOUR INTEREST.**



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