MANUFACTURERS REPRESENTATIVES

"Connecting Partnerships"

FOODSERVICE DISPOSABLES ENVIRONMENTAL MATERIALS GUIDE

4th Edition 2020






NEXUS
CORPORATE HEADQUARTERS

14470 Doolittle Dr. San Leandro, CA 94577 | T 800.482.6088 | F 510.567.1005

www.nexus-now.com

rev. 10/19

The information provided in this guide may vary in accuracy due to the ever changing city, state and federal rules, regulations, ordinances and laws that govern recycling, landfills and commercial compost facilities.

MISSION STATEMENT OF THIS PUBLICATION

"Our mission, as manufacturer's representatives, is to strive to be good stewards to the environment in our marketplaces by educating, training and informing our customers on all of the different packaging materials and substrates that are used to make a wide array of disposable foodservice products, how they should be used in operational applications as well as which materials can be recycled and or composted in each respective region in the country."

Chris Matson
President, Nexus

FOODSERVICE DISPOSABLES
ENVIRONMENTAL MATERIALS GUIDE
"Connecting Partnerships"

TABLE OF CONTENTS

INTRODUCTION

The world of foodservice packaging disposables can be very confusing in today's ever changing marketplace. There are so many different packaging materials that are used in a variety of food applications made by hundreds of manufacturers. Materials like PET, CPET, RPET, PLA, CPLA, PP, OPS, EPS, PVC, HDPE, LLPDE, aluminum, paper, wood, paperboard, corrugated sheets, bamboo, bagasse and and even wheat grass. In addition to the wide variety of packaging material options, there are cities across North America that have banned select grades of plastics and have created new waste collection channels that lead away from landfills and to recycling centers as well as to commercial compost facilities. These new municipal changes can be confusing for many foodservice operations. This guide is intended to provide a general understanding of the ever changing impact that waste is having on our environment, how it's being managed by waste and recycling companies as well as provide a basic definition of each type of food packaging material, it's intended use in food applications and its likely impact on the environment with its end of life destination.

ENVIRONMENTAL WASTE

It's important to know about the impact that the packaging material or substrate that you choose, for your foodservice applications, has on the waste and recycling streams in any given city, county and or state. It is estimated that each year over 18 billion pounds of waste enters the world's ocean from coastal regions. That's about equivalent to five grocery bags of trash piled up on every foot of coastline on the planet. All that waste is causing harm to the creatures that live in the ocean. New research is emerging about the possible long-term impacts of tiny pieces of waste on the marine food chain—raising fresh questions about how it might ultimately impact human health and food security. Some packaging materials are actually not as bad in the waste or recycling stream as one might think, while others are ironically a larger problem than anticipated. As an example to some, paper coffee cups are considered better for the environment than foam (EPS) coffee cups. Ironically, paper hot cups come from trees that have to be cut down to make the paperboard. In addition, the paperboard is laminated with a thin poly film on the inside of the cup, for moisture and heat retention, which makes the cup neither recyclable nor compostable unless a hydrapulper is used to separate the poly film from the paperboard cup. Most people don't realize that a foam hot cup can be recycled, and where recycling centers exist, crushed down and used again to make other products.

Moreover, although plastic grocery style t-shirt bags have been banned, in many Western cities, they can also be recycled and used again where paper shopper grocery bags come from cut down trees, are more expensive, are not as strong and are typically not recycled and used again in most cities due to food stains and wear. **In reality anything can be recycled and used again in some form or another if the right infrastructure was set up, with each waste center in every city, to withstand the volume of recycled materials from businesses and consumers.** Many believe that the packaging materials are the problem. This is not the case at all. The real problem is that our local and county governments and municipal waste centers are still trying to resolve how to build a dedicated channel for each type of material that is tossed in the recycling or the garbage can. **However, the challenge for our society goes even deeper as even if there was a dedicated recycling channel for all of the varieties of packaging materials, that we dispose of every day, there is no real demand for most of these materials in the open market to be used again for another purpose or as another product.** The statistics to the right will demonstrate just how big of a problem this has become where if only the appropriate recycling channels and afterlife demand did exist then perhaps waste, as we know it today, might not be such an ugly topic.

TOP 10 ITEMS FOUND ON THE WORLD'S BEACHES

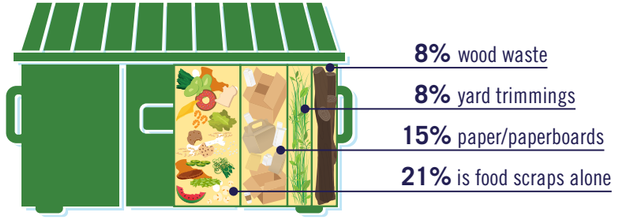
Measured in metric ton (MT) and million metric ton (MMT)

1. **2,117,931** - Cigarettes / Cigarette Filters
2. **1,140,222** - Food Wrappers / Containers
3. **1,065,171** - Plastic Beverage Bottles
4. **1,019,902** - Plastic Bags
5. **958,893** - Caps, Lids
6. **692,767** - Cups, Plates, Forks, Knives, Spoons
7. **611,048** - Straws, Stirrers
8. **521,730** - Glass Beverage Bottles
9. **339,875** - Beverage Cans
10. **298,332** - Paper Bags

SOURCE: oceanconservancy.org

Every year, U.S. landfills and trash incinerators receive **167 MILLION TONS** of garbage.

>50% of typical municipal garbage set out at the curb is compostable.



SOURCE: ilsr.org

PLASTIC WASTE INPUTS FROM LAND INTO THE OCEAN

Measured in metric ton (MT) and million metric ton (MMT)

- **270 MMT** - Global plastic production
- **275 MMT** - Total plastic waste
- **99.5 MMT** - Coastal plastic waste
- **31.9 MMT** - Coastal mismanaged plastic waste
- **8 MMT** - Coastal mismanaged plastic waste
- **6,350-245,000 MT** - Estimated mass of plastic waste floating at the ocean surface

SOURCE: jambeck.engr.uga.edu

MAIN SOURCES OF METHANE

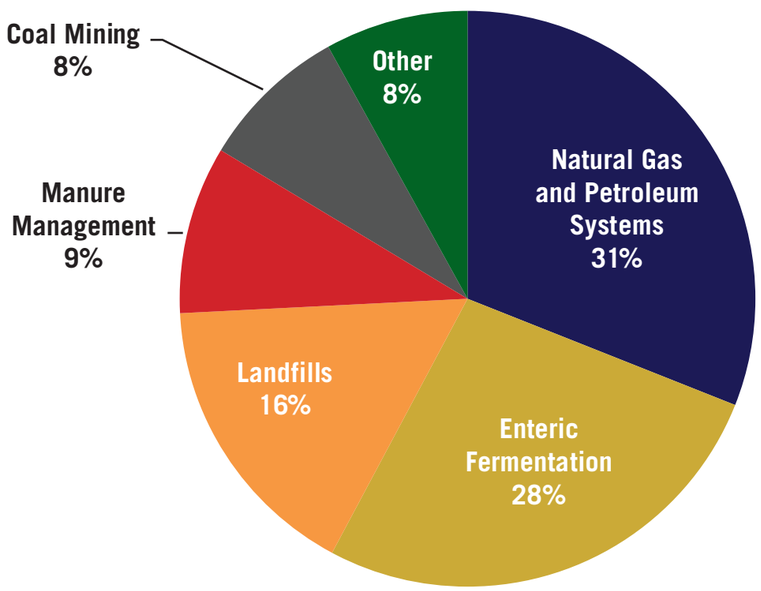
Foodservice packaging is not really the biggest source of the environmental problem we're facing with our ozone. There are both natural and human sources of methane emissions. The main natural sources include wetlands, termites and the oceans. Natural sources create 36% of methane emissions. Human sources include landfills and livestock farming. However, the most important source being the production, transportation and use of fossil fuels. Human-related sources create the majority of methane emissions, accounting for 64% of the total.

Methane levels have more than doubled over the last 150 years. This is because of human activities like fossil fuel use and intensive farming. Before the Industrial Revolution, natural sinks kept methane levels in a safe range.

Humans are creating methane emissions a lot faster than the Earth can remove them. Which has increased global methane levels. During the last 800,000 years, methane concentrations have always varied between 350-800 ppb. Since the Industrial Revolution, methane levels have become much higher. So much so that they are now 2.5 times larger.

METHANE EMISSIONS: HUMAN SOURCES

Since the Industrial Revolution, human sources of methane emissions have been growing. Fossil fuel production and intensive livestock farming have caused the current increase methane levels. Together these two sources are responsible for 60% of all human methane emissions. Other sources include landfills and waste (16%), biomass burning (11%), rice agriculture (9%) as well as biofuels (4%).



U.S. Enfironmental Protection Agency (2019). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2017

FIGURE 1: Contribution of anthropogenic and natural sources to atmospheric methane variability.
SOURCE: Bousquet, P. et al. (2006).

Fossil Fuel Production, Distribution & Use

The largest human source is from the production, distribution and combustion of fossil fuels. This creates 33% of human methane emissions.

Methane emissions get produced wherever there are fossil fuels. It gets released whenever fossil fuels get extracted from the earth. Whether it is natural gas (which is in most part methane), coal or petroleum. More methane gets released during any type of handling, transportation (pipeline, truck delivery, etc.) or refinement of fossil fuels. Finally some methane is also produced during fossil fuel combustion.

Livestock Farming

An important source of methane emissions is from enteric fermentation in farm animals. This creates 27% of human methane emissions. Animals like cows, sheep and goats are examples of ruminant animals. During their normal digestion process they create large amounts of methane. Enteric fermentation occurs because of microorganisms in the stomach of these animals. This creates methane as a by-product that is either exhaled by the animal or released via flatus.

Landfil aste

Another important human source of methane emissions is from landfills and waste. Methane gets generated by the decomposition of solid waste in landfills. This also happens with animal and human waste streams. This accounts for 16% of human methane emissions. Landfills and waste produces 55 million tons of methane per year.

Biomass Burning

Biomass burning causes a large amount of methane emissions. Biomass is material from living or dead organic matter. Incomplete burning of biomass creates methane emissions. Huge amounts can get produced during a large scale fire. This creates 11% of human methane.

Rice Agriculture

Another large human source of methane emissions is from rice agriculture. Paddy fields for rice production are man-made wetlands. They have high moisture content, are oxygen depleted and have ample organic material. This creates a great environment for methane producing microbes.

Biofuels

Each year biofuels produce 12 million tons of methane, making it a significant source. Any biomass used to produce energy for domestic or purposes counts as a biofuel. Incomplete biofuel combustion leads to the production of methane. This creates 4% of human methane emissions.

METHANE EMISSIONS: NATURAL SOURCES

Methane is also released into the atmosphere by natural processes. Wetlands, termites and the oceans are all natural sources of methane emissions.

Wetlands

Wetlands are the largest natural source of methane. This produces 78% of natural methane emissions. The water-logged conditions of wetlands are perfect for microbes. They need environments with no oxygen and abundant organic matter.

Termites

Termites are a significant natural source of methane. During the normal digestion process of a termite, methane gets produced. Termites eat cellulose but rely on micro-organisms in their gut to digest it. These micro-organisms produce methane during the process. This creates 12% of natural methane emissions.

Oceans

Another significant natural source of methane comes from the oceans. Methane producing microbes living in the ocean create these emissions. This creates 10% of natural methane emissions. Globally, oceans create 19 million tons of methane per year.

SOURCE: whatsyourimpact.org

LANDFILLS

The average person discards 4.6 lbs of trash per day. Approximately 258 million tons (232 million metric tons) of trash, or solid waste, is generated in the United States each year [source: EPA]. Have you ever wondered where your foodservice packaging trash goes? Well, depending on the city you reside in, it's collected by three different trucks. One is a trash truck, the second is a recycling truck and the third is a green waste collection truck. Each collection company deposits it all at a material recovery facility where it is sorted for its end of life destination. In the past it used to be just one truck. That one truck deposited it all into a landfill. A landfill is a large property of land where garbage and waste materials are dumped into a vast hole that is covered over with protective layers that prevent seepage into ground water and allows for new habitats to emerge when it's completely full. However, landfills are expensive to manage and they have to operate without trapping the thousands of tons of methane and carbon dioxide gases that emit from below up into the ozone each year due to the trapped waste below cooking in an anerobic environment.

Due to the new directives set in place by many local city and county governments, waste is being rechanneled and diverted away from landfills.

Today, although landfill gases are a significant contributor to the depletion of our ozone (landfills produce a total of 18% of all U.S. Green House Gases or GHG), new cutting-edge technologies are allowing landfill operations to minimize the escaping landfill gases and even trap or capture the emissions, which are then converted into electric power. Although landfills serve a purpose for our waste volumes today many states, like in California, have new mandates to achieve zero waste by rechannelling all of the waste away from landfills through expanded recycling and compost collection programs.

It is estimated that in 2019, around 35.6 million tons of plastic were discarded in North America. On average, only 6-7% of it is actually recycled and just 7% of it is combusted in energy facilities which create electricity or heat from garbage. As a result, the rest of it, or around 18 million tons of plastic, ends up in landfills.

LAYERS OF A LANDFILL

- **A** Ground water
- **B** Compacted clay
- **C** Plastic liner
- **D** Leachate Collection Pipe
- **E** Geotextile Mat
- **F** Gravel
- **G** Drainage Layer
- **H** Soil Layer
- **I** Old Cells
- **J** News Cells
- **K** Leachate Pond

RECYCLABLES

The recycling programs throughout California have become so efficient that in some areas new local and county legislation have set goals to divert 75% of waste resources away from landfill and will strive to be at zero waste by 2040.
In order for many cities and states to implement and achieve a zero waste program they have to be able to divert the materials into their appropriate recycling and or composting streams. Diverting glass, aluminum, metals, paper, wood, corrugated boxes, yard trimmings, food and even plastic would allow waste disposal companies to cut down on their overall loads going into landfill. The following definitions may give you some insight on durable materials, end-of-life process that each of these materials cycle through after thrown away.

DURABLE MATERIAL CLASSIFICATIONS

MATERIAL NAME		RECYCLE	LANDFILL
	ALUMINUM MADE FROM THE INGOT	YES	NO
	WOOD MADE FROM TREES	YES	NO

ALUMINUM FOIL IS ACTUALLY GREENER THAN YOU THINK!

If you were using disposable containers back in the 1950's, 60's & 70's it was probably aluminum foil. Remember the original foil TV dinner tray? Foil continued to be a very widely used material in foodservice disposable container applications right up to the early 1990's when plastic containers began to replace foil as a cheaper option and because select grades of plastic performed better in a microwave. Well fast forward to today and believe it or not aluminum foil has made a strong comeback in the foodservice community. People are beginning to realize that aluminum foil is 100% recyclable. In fact, it's one of the most sought after post-consumer materials in the recycling waste stream. Aluminum foil can be melted down and used over and over again where plastics cannot be used more than twice. Foil is also a great insulating material that keeps hot food warm for longer periods of time than plastic. Today's microwaves will even accept foil, without arcing (sparks) if the foil is filled up with food and is not touching the walls of the microwave. Foil won't crack, it's freezer safe and it can typically withstand oven temperatures up to 500 F. Due to the high demand for foil in the post-consumer marketplace, most foil cans, sheets and containers stay out of landfill, the compost pile and end up in recycling streams that find its way back to being melted down and used again. Aluminum foil is actually "Greener" than you think!

INTERNATIONAL RECYCLING MARKETS

In North America we are challenged with the limitations on where and who we can send our various recycled grades of packaging substrates to given that there is no infrastructure set up to receive it. This is because there is no demand for many of these plastic substrates primarily grades #2 – #7. To many, it may come as a surprise that the majority of the various grades of plastics that consumers and businesses deposit into their recycling cans do not get purchased and used again here in the United States. Although there are a select few recycling companies that do grind up plastics (ranging from #2 – #7 grades) and sell them to other companies to be used as second generation post consumer plastic. One new recycled plastic product that is being made is railroad ties. Most recycling yards and waste stations are either sending the plastic tonnage to landfill or packing it into commercial freight containers and selling it on the open international market for a price. Vietnam and Russia, as well as other countries in Europe, are willing to buy containers of post consumer plastic to grind up and use again to make electronics, fleece jackets, shoe laces and a variety of other consumer and industrial products. The remaining plastic tonnage that is not used is sometimes burned in factories to generate heat and/or energy which can lead to pollutants in the air. This has become a problem in countries in Asia where the government does not always impose strict air regulations on factory waste pollutants. **The only real grade of plastic that is heavily recycled here in the United States and sold again to domestic companies as a substrate to make other products is #1 PET, or clear virgin grade polyethylene terathylate, also known as water bottle plastic.** Recycling companies make money off of this particular grade of plastic because manufacturers who use it know it's pure and its molecular compound is useful as a second generation plastic, where other grades of plastic have too many unknown additives and blends of other grades of plastics which make them less useful as a second generation resin. Since there is no demand for these grades of plastics (# 2- # 7) in their afterlife the bulk of our recycling has been sold internationally to a variety of countries as noted above. However, new international guidelines stemming from past G2 summits are seeking to restrict the burning of plastics in order to reduce the carbon being emitted into the atmosphere. For example, the air quality in China has become so bad over the years that their government has set forth new mandates to convert coal plants over to a cleaner burning natural gas fuel to power their manufacturing plants.

INTERNATIONAL PLASTIC IMPORTERS

The international demand for PCR, or post consumer recycled plastic, has grown dramatically over the years, with China leading the way at just over 9 MT (million metric tons) annually. Vietnam and Europe fell behind China whose appetite for cheaper post consumer resin grew due to international demand for less expensive consumer products. That being said recent legislation, passed into law by the Chinese government to restrict air pollutants, has restricted the use of imported recycled plastics and even recycled paper. China's government set forth a new national initiative called "Operation Green Fence" or "National Sword" which has imposed strict air regulations on manufacturers, which has begun to change the landscape of the international market as a result China is no longer buying recycled plastic and or paper from countries in North America which has created a new problem for the United States as the tonnage of recycled plastic and paper has become a huge problem as there is now nowhere to send it.

PLASTICS

So where does plastic come from? Plastic is a bi-product of natural gas. Resin manufacturers molecularly modify natural gas molecules through a reactor process which turns it into resin. What most people don't realize is that natural gas is derived from crude oil which is buried deep below our earth's surface. Crude oil is derived from fossilized carbon cells that have been compressed deep below the earth's crust for millions of years. Carbon cells originally come from the sun. Those carbon cells that rest into microscopic plankton and proliferate in shallow warm oceans eventually settle down into the ocean floor and accumulate over time. The accumulation of carbon cells creates layers below the ocean floor, seeping closer and closer to the earth's crust where the carbon cells are baked into a mulch (Shale rock), then a liquid (Crude oil) and eventually into a gas (Natural gas).

So if plastic is of this earth, then isn't it technically an organic biodegradable material that is compostable? Technically yes, in theory, but in reality no, because the natural gas molecules that make up plastic are manipulated inside of the reactor process that bonds them differently, which prevents the composition of the plastic from biodegrading on its own under ideal compost conditions. Since plastic will not biodegrade on its own, some factories add different biodegradable additives, like corn starch, that will activate the microorganisms which will eat away at the plastic in a compost environment and accelerate its decomposition process. Although biodegradable plastics have grown into a multi-billion dollar industry, waste collection agencies don't recognize or accept plastic as a material that is qualified for composting. Today most plastic is primarily recycled and re-used. To the right is a chart that breaks down the different recycling classifications for plastic, as well as their intended use in food applications.

PLASTIC MATERIAL CLASSIFICATIONS

			RECYCLABLE	LANDFILL
1 PETE	PET, RPET & SELECT GRADES CPET POLYETHYLENE TEREPHTHALATE **# 1** (RIC)*		YES	NO
2 HDPE	HDPE HIGH DENSITY POLYETHYLENE **# 2** (RIC)*		YES	NO
3 PVC	PVC POLYVINYL CHLORIDE **# 3** (RIC)*		YES	NO
4 LDPE	LDPE LOW DENSITY POLYETHYLENE **# 4** (RIC)*		YES	NO
5 PP	PP POLYPROPYLENE **# 5** (RIC)*		YES	NO
6 PS	OPS / EPS ORIENTED POLYSTYRENE / EXPANDED POLYSTYRENE (FOAM) **# 6** (RIC)*		OK	YES
7 OTHER	OTHER MATERIALS BIO-MATERIALS BIOPLASTICS **# 7** (RIC)*		NO	YES

*RIC, Resin International Code

PLASTICS

The whole perception of restaurant and grocery takeout bags has certainly changed over the past few years and continues to do so as cities and states decide which types of materials are acceptable within their own waste and recycling streams. For example, in 2016 the state of California passed a new bill (Proposition 67) which banned the use of HDPE plastic t-shirt bags in all retail grocery and pharmaceutical stores. In some cities in California even restaurants are banned from using HDPE t-shirt bags for takeout. The reason is people just got tired of seeing 15 billion t-shirt bags either floating around on the freeway, or clogging up their waterways and, most importantly, being the number one contributor in all landfill waste. That being said, a plastic t-shirt bag is the least expensive option for retailers and is a very flexible and functional bag for carrying weight. As a result of this new legislation in California, other states are now taking notice and debating their own legislation in regards to which types of bags should be used and evaluating the overall carbon footprint of each style of carryout bag. For example, many think that paper is the ideal carryout bag because it's perceived seen as a green substrate. Ironically, paper mills are some of the most toxic and regulated plants in the country, due to the amount of waste that they purge out into the environment on a daily basis, not to mention all of the forests that are cut down to make paper bags. However, paper bags are compostable. Consumers, over the past 10 years, have really begun to voice their opinion through protests and new legislation that forces lawmakers to take to-go bags more seriously. The results of these consumer efforts have led to new types of bag materials, like non-woven nylon reusable bags made from recycled plastic, and thick 2.25 mil gauge HDPE wave bags that are made from recycled plastic that are also considered reusable. Even paper bags are now being made out of post consumer recycled pulp. The chart below provides you with a clearer understanding about each type of take-out bag and its material, as well as the pros and cons associated with each style. The below chart shows both the "Benefits" and the "Disadvantages" of all bag substrates.

RESTAURANT AND GROCERY TAKEOUT BAG OPTIONS

BAG MATERIAL NAME	HDPE PLASTIC T-SACK		REUSEABLE 2.25 HDPE RECYCLED WAVETOP BAG		NYLON NON-WOVEN RECYCLED PLASTIC BAG		PAPER GROCERY BAG	
								
PROS & CONS	PRO	CON	PRO	CON	PRO	CON	PRO	CON
	• Least expensive • Highly functional • Small case cube • Flexible • Customizable	• Difficult to recycle • Clogs waterways • Bulk waste in landfills • Banned in some states	• Durable, strong • Reusable • Small case cube • Customizable • Made of recycled material	• Difficult to recycle • Medium carbon footprint • Expensive • Hard to clean	• Durable, strong • Reusable • Strap handles • Customizable • Made from recycled material	• Difficult to recycle • Large carbon footprint • Most expensive • Typically made overseas • Hard to clean	• Recyclable • Compostable, renewable • Customizable • Reusable • Made from recycled paper	• Rips easily • Size limitations • Large case cube • Not moisture proof • Large carbon footprint

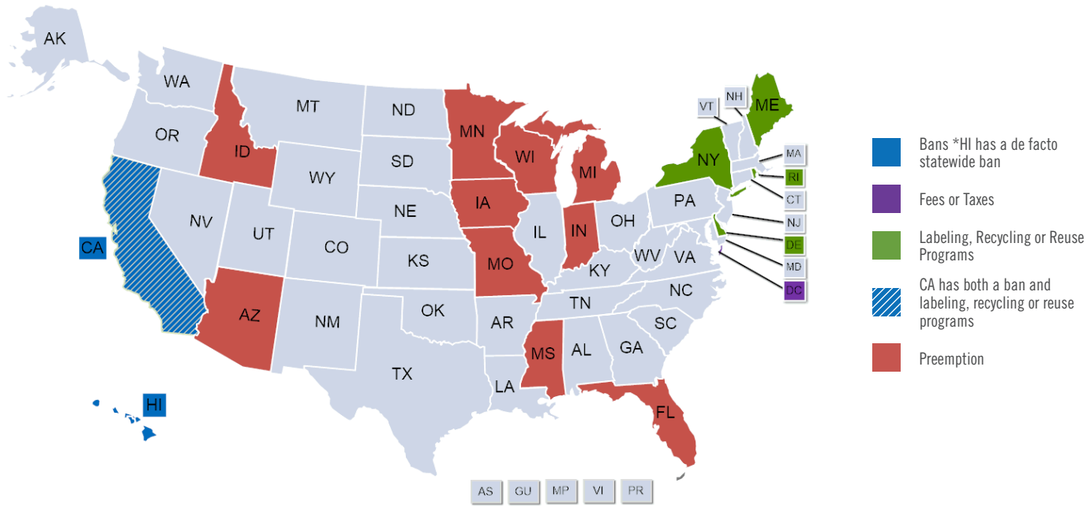
WHAT IS THE ENVIRONMENTAL IMPACT DIFFERENCE BETWEEN PLASTIC AND PAPER BAGS?

- 2,000 plastic bags weigh 30 lbs., whereas 2,000 paper bags (in an equivalent size) weigh 280 lbs. (Source: EPA). This means that it would take at least nine more truckloads of paper bags to deliver the same amount of plastic bags.
- Paper bags produce 85% more green house gas emmissions and 91% more energy to recycle than plastic bags (U.S. EPA).
- 1,004 gallons of water waste is needed to produce 1,000 paper bags and it takes zero percent water waste to produce plastic bags.

In August 2014, **California** became the first state to enact legislation imposing a statewide ban on single-use plastic bags at large retail stores. The bill also required a 10-cent minimum charge for recycled paper bags, reusable plastic bags, and compostable bags at certain locations. The ban was set to take effect on July 1, 2015, but a referendum forced the issue onto the ballot in the November 2016 election. Proposition 67 passed with 52 percent of the vote, meaning the plastic bag ban approved by the Legislature remains the law. Voters also rejected a second measure, Proposition 65, which proposed to create an environmental fund with proceeds from a 10-cent charge for alternative bags. **Hawaii** has a de facto statewide ban on all plasstic bags and prohibits non-biodegradable plastic bags at checkout, as well as paper bags containing less than 40 percent recycled material. Bans in Kauai, Maui and Hawaii counties took effect between 2011 and 2013, with Honolulu becoming the last major county to approve the ban in 2015. In 2009, the **District of Columbia** enacted legislation requiring all businesses that sell food or alcohol to charge 5 cents for each carryout paper or plastic bag.

CITIES WITH PLASTIC BAG BANS	
• Alameda, California	• Chicago, Illinois
• Austin, Texas	• Los Angeles, California
• Boston, Massachusetts	• San Francisco, California
• Berkeley, California	• Seattle, Washington
CITIES/COUNTIES WITH PLASTIC BAG FEES	
• Boulder, Colorado	• Los Angeles, California
• Brownsville, Texas	• Portland, Maine
• Montgomery County, Maryland	• San Francisco, California
• New York, New York	• Washington D.C.

NOTABLE CITIES, STATES & COUNTIES WITH PLASTIC BAG BANS AND FEES



PLASTICS

CALIFORNIA'S ZERO WASTE INITIATIVE - 2040

In California the state Assembly Bill (AB) 75 was passed in 1999 and the State Agency Model Integrated Waste Management Act took effect on Jan. 1, 2000. The act mandated that state agencies develop and implement an integrated waste management plan which outlines the steps to be taken to achieve the required waste diversion goals.

The current statutes require all state agencies and large state facilities to divert at least 50% of their solid waste from disposals facilities on and after Jan. 1, 2004.

Legislation enacted in 2011 AB 341, make a legislative declaration that it is the policy goal, of the state of California, that not less than 75% of solid waste generated be source reduced, recycled, or composted by the year 2020.

In October of 2014 Governor Brown signed AB 1826, requiring businesses, including State Agencies, to recycle their organic waste on and after April 1, 2016, depending on the amount of organic waste they generate per week. This law also requires that on and after January 1, 2016, local jurisdictions across the state implement an organic waste recycling program to divert organic waste generated by businesses, including State Agencies that meet the progressive thresholds.

In the end the final goal for California, along with now many other states in the Union, is to achieve zero waste by the year 2040 where all waste materials are either recycled and or composted and 100% of all waste is diverted away from landfills.

Zero Waste means diverting waste away from landfill from both businesses and from residential. It's the four Rs... **Reduce, Reuse, Recycle and Rot.**

PLASTICS

Why do so many cities and states across North America ban foam food packaging products from their waste streams? The concerns seem to be that foam cups and or foam clamshells are not biodegradable, and foam can be harmful to birds, fish and wildlife who might ingest it since it floats around in the water and it is difficult to recycle. These are valid points but what most environmentalists and government officials don't realize is that foam also has many attributes and is a material that is vastly misunderstood.

Expanded polystyrene, or EPS as it is also known, is a rigid closed-cell substrate that is capable of being manipulated in the manufacturing process to make a variety of residential, commercial as well as industrial products because of its low weight rigidity and formability. Foam is actually a plastic that is growing in demand with a market cap of over $15 billion expected by the year 2020. Yes, it's true that in the world of foodservice packaging it has developed a bad reputation, but the hidden truth is that foam has a lot of attributes that most people ignore or don't seem to want to acknowledge. For example, it's an incredibly insulating material and is ideal for hot liquids like coffee, hot meals for take-out, and it's even used in the inner linings of most camping coolers. Foam is also the lowest cost material for foodservice packaging that is available on the market today, which is a huge benefit to restaurant owners' budgets. Foam can also be recycled, and is, for the most part, in select cities across North America. The material is made from EPS beads and gas—when the beads are separated from the gas they can be used again to make other products. Yes, foam has its challenges, but it is still today one of the top choices for disposable food packaging.

EXPANDED POLYSTYRENE

BENEFITS	DISADVANTAGES
• Insulates heat better than any other packaging material. • Lowest cost of any other packaging material. • Highly flexible and formable, which gives it a big advantage in how it can be molded into a variety of different shapes and sizes for thousands of applications. • Lightweight and easy to ship, carry and use in a variety of applications. • Absorbs ink and displays custom printed graphics well. • Can be crushed easily into recycling bricks.	• Will not biodegrade in a compost yard or in waterways. • It is difficult to recycle, due to its lightweight structure. • Environmentally unsafe for fish, birds and wildlife who might ingest it. • Contaminates waste streams, oceans and even freeways, where it can be a hazard. • Cracks easily and is not ideal for all applications. • Has been added to California's Prop 65 list of identified carcinogens

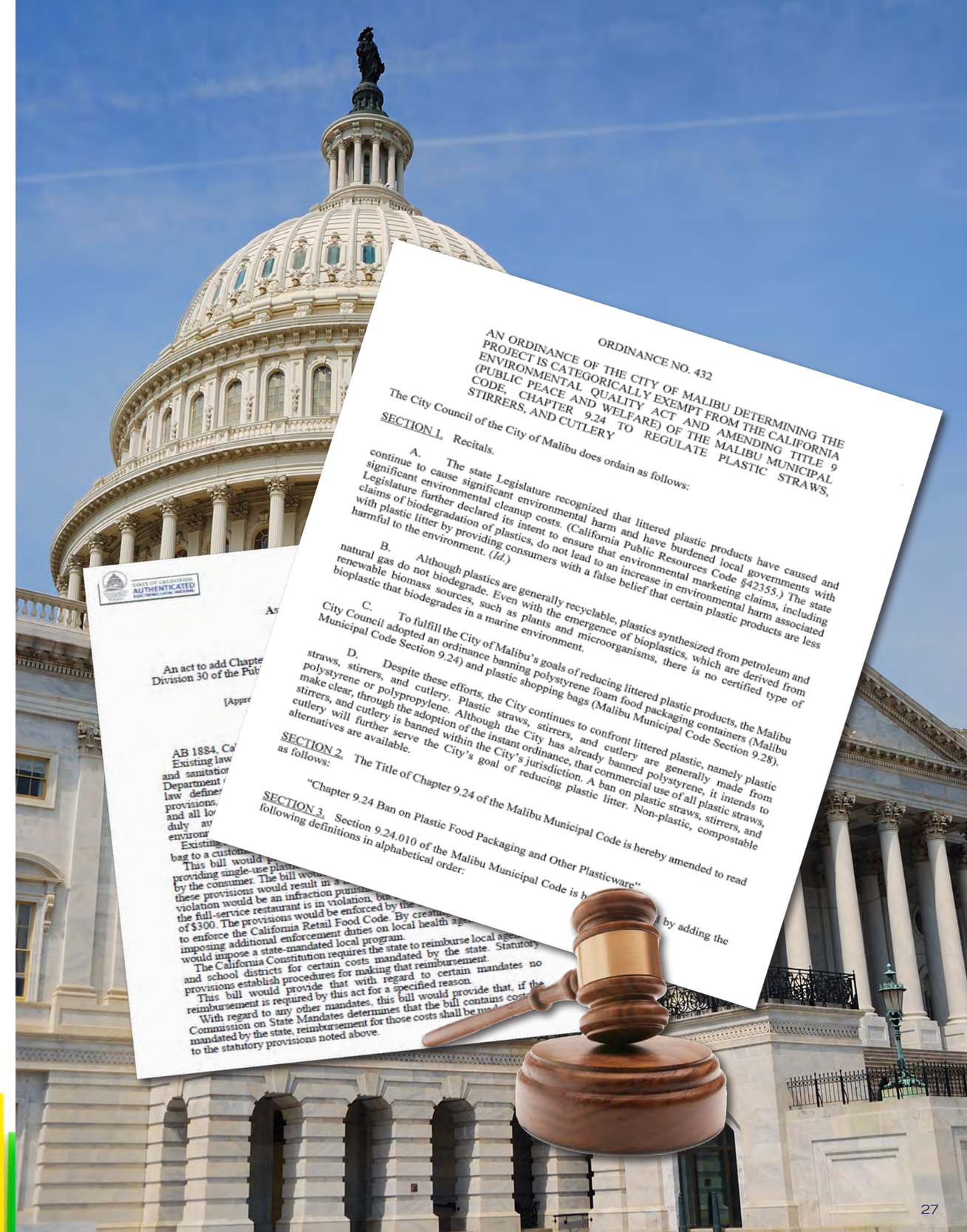
PLASTICS

In July of 2018 the city of **Seattle** banned plastic straws. Since that time several other cities across the U.S. like **New York City**, **New Jersey**, **Miami Beach** and especially in California where the use of plastic straws in any public foodservice establishment are prohibited in cities like: **Alameda**, **Carmel**, **San Luis Obispo**, **Davis**, **Santa Barbara**, **Malibu**, **Santa Monica**, **Manhattan Beach**, **Oakland**, **Richmond** and **Berkeley**. **California Assembly Bill 1884**—prohibits restaurants in California from giving out plastic straws to patrons unless they request the straws. Restaurants are encouraged, but not mandated by law, to use a compostable straw for drinks. This bill is tied to the earlier legislation passed in the California State Assembly back in 2014 to go to zero waste by the year 2040.

So why is a plastic straw such a bad thing? If you have not already seen the viral video of a plastic straw being pulled from the nose of a sea turtle it's enough to make you dislike plastic straws. That video, along with countless environmental groups pushed legislators to pass a ban on plastic straws to keep them off of the public beaches, out of the waterways and the ocean.

As a result of this ban paper straws have become very popular because they are both recyclable and compostable. In fact, they are so popular today that most manufacturers cannot even keep up with the demand to fill the void. Many restaurants, who are unable to source paper straws due to their increasing demand, have elected to go straw free and only giving out straws to their patrons when requested.

The ban on plastic straws was a surprise to many consumers who have, for decades, enjoyed plastic straws in a variety of drink applications like coffee, slurpies, sodas, cocktails, shakes and teas. However, in an effort to clean up the beaches and redirect waste away from landfills legislatures in a dozen or so states have passed bills limiting or in some cases banning plastic straws entirely. In some cities like Santa Barbara they have handed out tickets for excessive use of plastic straws in several foodservice establishments. **In the end we cycle back to the same problem we as consumers face in that it's not the plastic straws fault that it ends up in the oceans. Is it perhaps the fault of our society in that we do not have a dedicated waste collection and recycling program to channel these unique plastics?** For example, if plastic straws had a recycling stream that led to a market where they could be used in other products there would be no need to ban them. After all paper straws cost three times as much as plastic straws and you have to cut a tree down to make them. Is plastic really that bad or is our society just not set up to rechannel their use in a variety of afterlife applications?



PLASTICS

WHAT IS CLEAN PACKAGING?

You might be hearing the term "clean packaging" lately and wondering what it means? Over the past decade scientists have learned that select chemicals and additives have been leaching out of a variety of different grades of plastic into our food, our beverages and even dissolving into our rivers, waterways and oceans. Chemicals like PFAS or polyfluorinated chemicals are being discovered in microscopic portions in a variety of foods, beverages and among our environment.

It is common for these chemicals to be referred to by the acronym PFAS, which stands for "polyfluorinated alkyl substance" but BPI or Biodegradable Products Institute (An environmental materials testing agency) refers to them as fluorinated chemicals. These chemicals are being used by a variety of packaging manufacturers and converters because they add grease and sugar oil resistant properties to their products when used with food. However, the PFAS chemicals are being eradicated from many paper wrappers and pulp fiber packaging products because they are harmful to the nature of the organic compost material in commercial compost facilities. Farmers don't want to buy fertilizer or compost from commercial compost yards that are blending in foreign substrates into their compost that have fluorinated chemicals embedded within their fibers. These chemicals prevent them from using clean material on their crops to then sell as organic.

The City of San Francisco recently passed an ordinance stating, among other things, that, "*After January 1, 2020 all compostable foodware that is distributed, sold, or provided in San Francisco must have no intentionally added fluorinated chemicals. To verify, foodware must be BPI certified.*"

On a federal level members of Congress are pushing hard on the Environmental Protection Agency to get tougher on regulating water contamination from **fluorinated chemicals**, including those used in making fluoropolymer plastic.

At a September 6th, 2018 hearing in Washington, one of the first held by Congress on the issue, a bipartisan collection of lawmakers pressed the EPA on its plans, and a panel of state regulators urged Washington to set national standards and beef up funding for cleanups.

The PFAS group includes chemicals such as perfluorooctanic acid (PFOA), perfluorooctanesulfonate (PFOS) and GenX. These chemicals have been produced since the 1950's and used in food packaging, stains, water repellant fabrics, Teflon non-stick products and even firefighting foams which have all been linked to a variety of health hazards over the years. These chemicals have been known to leach into the ground water or even carried in the air. Several states are beginning to address the hazards of PFAS chemicals like North Carolina, New York and Washington. In fact

the state of California passed assembly bill AB 958 that requires a manufacturer of food packaging to visibly disclose on the outside of their case the presence of perfluoroalkyl substances.

Clean packaging also means that the plastic itself is safe to recycle, grind up and use again in other products. Some plastics are not clean or safe to recycle as they are compounds of virgin plastic blended with other additives to bind their molecular structure and or fillers are added to reduce cost. One of the key reasons many grades of plastic are not in demand, after they have been recycled, is because those who might want to buy the plastic and grind it up to use in other products do not necessarily always know what else, besides plastic, they are getting in these blended grades of plastic. For example, some manufacturers in the food industry use talc as a filler to bring the cost of their resin down. This is a good thing in that it also brings the cost of the packaging down for the restaurant and the consumer. **However, it's ultimately a bad thing in that there is no demand in the afterlife for these types of plastics.**

In the end clean packaging is considered substrates and grades of plastics that don't harm us in their use with food and that are ultimately safe to recycle and to be used again in pure form in afterlife applications.

(PFAS) FLUORINATED CHEMICALS & FOODSERVICE PACKAGING

Foodservice packaging is made from a wide variety of materials. These products go through rigorous testing to ensure that they meet stringent regulations, ensuring the safe delivery of foodservice items to consumers.

However, there has been some confusion over the safety of some chemicals used in the manufacture of paper foodservice packaging, particularly claims that certain coatings are "toxic" and dangerous to human health and the environment. The truth is...

- Polyfluoroalkyl substances (PFAS) are a class of over 3,000 synthetic, man-made chemicals. They are also referred to as "polyfluorinated chemicals" (PFCs). There are variations within this large class of chemicals, including their properties, toxicity and intended use.

- Certain PFAS may be used in some paper foodservice packaging items likes wraps, food containers and plates to prevent oil, grease and water from leaking through the package onto skin, clothing, furniture, etc.

- There are two sub-categories of PFAS that have been used in food packaging:

  - "Long chain" or "C8" chemicals, since they have 8 or more carbons in their structure. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) are two examples. It is important to note that these were voluntarily phased out and are no longer allowed in the U.S.

  - "Short chain" or "C6" chemicals, since they have 6 or less carbons in their structure. Manufacturers of these newer chemicals submit their specific formulations to the U.S. Food & Drug Administration for rigorous review and, if found to be safe for their intended use, may be used. Today, there are less than three dozen short-chain PFAS chemicals allowed by the FDA in the U.S.

- The presence of fluorine may be used as an indicator when testing for PFAS. However, this may not provide accurate results, and it does not indicate whether the PFAS are "long chain" (no longer in use in the U.S.) or "short chain" (currently in use in the U.S.). All PFAS chemicals are not the same and should not be treated the same. Therefore, calls to remove the entire class of these beneficial chemicals are unfounded.

- Today's foodservice packaging use FDA-reviewed "short chain" fluorochemicals or even newer barrier coatings, which are free of fluorochemicals.

SOURCE: Foodservice Packaging Institute

FOODSERVICE INDUSTRY MYTHS & FACTS

Every day, people enjoy prepared foods and beverages using safe and sanitary foodservice packaging. There a lot of myths about foodservice packaging going around which are actually not true. As they rely more on these products — thanks to their on-the-go lifestyles — there's more attention on those paper and plastic cups, take-out containers and other single-use items. Sometimes, however, information being shared is either outdated or inaccurate. The Foodservice Packaging Institute has collected some of the most common myths about foodservice packaging and provided more factual information.

MYTHS AND FACTS

LITTER AND MARINE DEBRIS, DISPOSAL/RECYCLING/COMPOSTING, MATERIALS USED IN FOODSERVICE PACKAGING

SOURCE: Foodservice Packaging Institute

1

MYTH The Great Pacific Garbage Patch is the result of plastic packaging, including bottles and straws.

FACT Not at all. According to a 2018 study published in Scientific Reports, fishing nets account for 46 percent of the trash in the Great Pacific Garbage Patch. Most of the remaining garbage is composed of other gear from the fishing industry, including ropes, oyster spacers, eel traps, crates and baskets.

2

MYTH Plastic straws are one of the most common items found on beaches.

FACT That's actually true. According to Ocean Conservancy's 2018 International Coastal Cleanup report, straws ranked #7 in the top 10 list of items found on beaches around the globe, making up about 3% of total trash found during beach cleanups. Regional differences may be seen: in the U.S., straws came in #5; #6 in Canada; #8 in the UK and #10 in Hong Kong.

3

MYTH Americans use 500 million plastic straws a day, and they end up in the oceans.

FACT According to multiple sources, the estimate of 500 million straws a day is incredibly inflated. Cut that number in half, and that's closer to a more realistic estimate. As for the notion that most straws end up in the ocean, that doesn't even make sense, considering the geography of the U.S. and Canada. The vast majority of straws end up in landfills, and while that is not ideal, it's better than being improperly disposed on land or in waterways.

4

MYTH Our love affair with singleuse items plays a major role in the global marine debris problem.

FACT Not even close. According to the report "Plastic Waste Inputs from Land into the Ocean" published in Science in 2015, over half of all marine debris comes from six Asian countries: China, Indonesia, the Philippines, Vietnam, Sri Lanka and Thailand. The U.S. came in 20th on the list, and Canada was 112th. Similarly, the 2017 study "Export of Plastic Debris by Rivers into the Sea" published in Environmental Science and Technology found that 10 rivers are responsible for roughly 90 percent of the global input of plastic into the sea. These rivers include the Yangtze, Yellow, Hai, Pearl, Amur, Mekong, Indus and Ganges Delta in Asia, and the Niger and Nile in Africa.

5

MYTH Cups and take-out containers made from foam polystyrene (frequently, but incorrectly, referred to as "Styrofoam") are commonly littered items.

FACT According to Keep America Beautiful's 2009 "National Visible Litter Survey," foam foodservice packaging didn't even make the Top 10 list of items littered on U.S. roadways.

6

MYTH Banning single-use items like foam cups and take-out containers will reduce litter.

FACT Bans simply change the composition of litter streams, not reduce it. San Francisco conducted litter audits before and after they banned foam polystyrene foodservice packaging in 2008. The audits showed a reduction of approximately 30 percent in littered foam cups, but a roughly 30 percent increase in littered paper cups.

7

MYTH Requiring the use of compostable foodservice packaging will reduce litter.

FACT Compostable foodservice packaging will not degrade and magically disappear when littered. These items are designed to compost in a managed facility over several months — not in your backyard, on the sides of roadways or in waterways. And, since these items may be on the road for an extended period of time if littered, it may lead to more litter. Keep American Beautiful's 2009 "Littering Behavior in America" study found that litter begets litter — the mere presence of litter encourages additional litter.

8

MYTH Foodservice packaging is overrunning our landfills because of high usage and its inability to break down.

FACT First, almost nothing breaks down in a landfill. Landfills were designed to entomb materials. Their lack of air, water and light means items are buried and never degrade. Second, very little of what is sent to landfills is foodservice packaging. According to the U.S. Environmental Protection Agency's annual waste characterization studies, paper and plastic foodservice packaging accounts for less than 2 percent of materials discarded by weight.

9

MYTH Plastic bags can't be recycled.

FACT Plastic bags can be recycled, but they shouldn't be placed in curbside bins because they can damage the equipment in recycling facilities. Instead, plastic bags should be deposited at special drop-off locations like grocery stores, where the bags will be collected and recycled separately. For more details, go to www.plasticfilmrecycling.org.

10

MYTH Paper cups can't be recycled.

FACT Paper cups can be recycled, but in limited locations. Work is ongoing with communities, recycling facilities and paper mills to expand the opportunities to collect and process these materials and recycle them into things like tissue, toilet paper cores and pulp used to make new cups. For more details, go to www.recyclefsp.org.

11

MYTH Foam cups and containers can't be recycled.

FACT Foam polystyrene cups and containers can be recycled, but in limited locations. Work is ongoing with communities, recycling facilities and plastic end markets to expand the opportunities to collect and process these items and recycle them into things like tape rolls, hangers and raw materials used to make new foam cups and containers. For more details, go to www.recyclefoam.org

12

MYTH Plastic straws can't be recycled.

FACT Now that's actually true (for now). While most straws are made out of a recyclable material (polypropylene), their small size and shape are not compatible with today's recycling facilities. Even if you can't recycle straws, please dispose of them properly in the trash — and not improperly on land or in waterways. Or, if they are made of a compostable plastic, please compost them.

13

MYTH Compostable foodservice packaging doesn't actually compost — or there's no place to compost it.

FACT Compostable foodservice packaging made from paper and plant-based plastics do indeed compost, but since each composter is different, composters will want to double check the compatibility of the packaging with their operations. As for places to compost foodservice packaging, the industry is working to expand the infrastructure to compost these valuable materials. For more details, go to www.recyclefsp.org or contact your local municipality to find out what can be composted in your area.

14

MYTH Chemicals can leach out of foodservice packaging and into the food or beverage being consumed.

FACT It's true that chemicals used in foodservice packaging may migrate into the foods or beverages. That's why organizations like the U.S. Food and Drug Administration and Health Canada review any chemicals that could possibly come in contact with foods. These regulators review the safety of the chemical and confirm that any migration is well below the allowable threshold.

15

MYTH Use of paper cups is leading to deforestation and killing the planet.

FACT Paper is typically made from trees, but the U.S. paper industry practices sustainable forestry and has a positive growth-drain ratio. This means that for every tree harvested, several more are planted or naturally regenerated in their place.

16

MYTH Fluorochemicals used in foodservice packaging, like fast-food wrappers and molded fiber take-out containers, are dangerous.

FACT Fluorochemicals are used in some of today's foodservice packaging to provide a grease or oil barrier. Consumers can be assured that before any chemicals are used in food packaging, they are tested thoroughly and reviewed by the appropriate regulatory agency, such as the U.S. Food and Drug Administration and Health Canada.

17

MYTH Plastics are made from oil, a non-renewable resource from halfway around the world.

FACT The vast majority of plastics in the U.S. are made using natural gas found in North America. For more details, visit the U.S. Energy Information Administration's website.

18

MYTH Styrene, found in foam polystyrene cups and containers, causes cancer.

FACT Styrene is actually a naturally occurring element and is found in many human bodies. That's because you can find styrene in commonly consumed foods, like strawberries, peaches, cinnamon, beef and coffee. It's also a byproduct of processing beer, wine and cheese. Styrene used in the manufacture of foam foodservice packaging has been reviewed by the U.S. Food and Drug Administration and other international regulatory agencies and has been found to be safe for its intended use. In addition, the levels of styrene found in foam cups and containers is more than 10,000 times below the safety limit set by the FDA. For more information, visit www.youknowstyrene.org.











FOODSERVICE PACKAGING

HOT AND COLD CAPABILITIES

It's important to know that not every foodservice packaging material can withstand the environments of a refrigerator, an oven, a freezer and a microwave. The charts below will provide a clear understanding of each material's cold and hot foodservice operational capabilities.



FREEZER	YES	NO
POLYPROPYLENE		•
CPET	•	
POLY LAMINATED PAPERBOARD	•	
ORIENTED POLYSTYRENE		•
EXPANDED POLYSTYRENE (FOAM)		•
ALUMINUM FOIL	•	
PAPER	•	
POLYLACTIC ACID (PLA)		•
BAGASSE	•	
POLYETHYLENE TERATHYLATE (PET)		•
BAMBOO	•	

OVEN	YES	NO
POLYPROPYLENE		•
CPET	•	
POLY LAMINATED PAPERBOARD	•	
ORIENTED POLYSTYRENE		•
EXPANDED POLYSTYRENE (FOAM)		•
ALUMINUM FOIL	•	
PAPER		•
POLYLACTIC ACID (PLA)		•
BAGASSE		•
POLYETHYLENE TERATHYLATE (PET)		•
BAMBOO		•

MICROWAVE	YES	NO
POLYPROPYLENE	•	
CPET	•	
POLY LAMINATED PAPERBOARD	•	
ORIENTED POLYSTYRENE		•
EXPANDED POLYSTYRENE (FOAM)		•
ALUMINUM FOIL		•
PAPER	•	
POLYLACTIC ACID (PLA)		•
BAGASSE	•	
POLYETHYLENE TERATHYLATE (PET)		•
BAMBOO	•	

PAPER

Paper is about as "green" as it gets when it comes to foodservice packaging materials. However, are we really doing the right thing by cutting down so many trees to make thousands of different products each year. Ironically, the U.S. forest tree inventory has increased by 39% since 1952, yielding more living trees today than ever before. In fact, there are 10 million more acres of forest in the United States today than there were 15 years ago. Tree fiber pulp, or paper, is the resource for literally millions of products not only within the foodservice industry but in consumer retails products as well. Can you imagine what life would be like without paper towels, tissue, copier paper, paper plates and most importantly toilet paper? There are a lot of trees grown and cut down to fill our demand; however, did you know nearly 80% of America's paper mills use post-consumer recycled paper? Approximately 140 domestic mills use recycled paper exclusively to manufacturer their products.

Many consumers have become so concerned about the environment that the demand for unbleached paper has grown in popularity. For example, today natural kraft sandwich wrap and natural kraft pizza boxes are beginning to out sell the traditional white color. Natural kraft paper offers a significant benefit toward a more sustainable environment. Advantages of producing natural, unbleached paper versus bleached paper: 21% less wood pulp used, 10% fewer greenhouse gases produced, 46% less waste water released and 16% less solid waste produced. As a result, we save 6089 trees, remove 15 full swimming pools of waste water, and 13 garbage trucks of solid waste for every 1000 tons of natural kraft paper produced vs. bleached paper of the same basic weight.

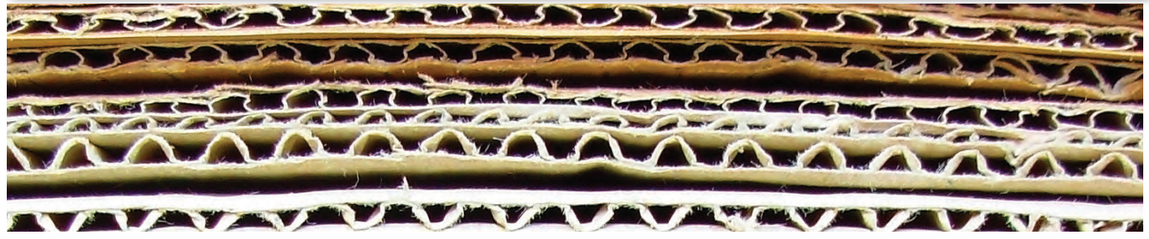
Paper products like cake boxes, office paper, pizza boxes and newspaper are generally referred to as "fiber." Fiber recycling is a specialized process that produces clean pulp, which can be used to make recycled content paper and paperboard. Materials from office, school and business recycling programs are captured by collection companies and brought to recycling centers, which separate the co-mingled cardboard, newspaper and mixed paper into large bundles called "bales" for sale to mills for recycling. Once at the mill, the material is mixed with water and chemicals and reduced to pulp slurry in a giant blender called a pulper. Following pulping, the pulp mix is diluted with water and passed through a system of centrifugal cleaning equipment and screens. The pulp is pressed to remove water and to dissolve inks, and is then fed into a kneeding machine. The fibers are then sent through a fine screening process that removes any remaining glue particles and small contaminants. Next, the pulp goes through a bleaching process. Here the pulp is mixed with chemicals, called surfactants, that make suds like washing machine soap. The finished recycled pulp is either sent to a mill to make paper or it is formed into sheets of pulp, called "wet lap," for shipment and sale.

PAPER

	GRADES OF PAPER	RECYCLABLE	COMPOSTABLE (MEETS ASTM-D6400)
	VIRGIN BLEACHED KRAFT	YES	YES
	VIRGIN UNBLEACHED KRAFT (NATURAL)	YES	YES
	RECYCLED BLEACHED KRAFT	YES	YES
	RECYCLED UNBLEACHED KRAFT (NATURAL)	YES	YES
	GREASE RESISTANT PAPER	YES	YES
	DRY WAXED PAPER	NO	YES (IF SOY WAXED)
	POLY LAMINATED PAPER	NO*	NO
	MOISTURE RESISTANT PAPER	YES	YES

	GRADES OF PAPERBOARD	RECYCLABLE	COMPOSTABLE (MEETS ASTM-D6400)
	VIRGIN BLEACHED KRAFT	YES	YES
	VIRGIN UNBLEACHED KRAFT (NATURAL)	YES	YES
	POLY LAMINATED PAPERBOARD	NO*	NO
	RECYCLED BLEACHED KRAFT	YES	YES
	RECYCLED UNBLEACHED KRAFT (NATURAL)	YES	YES
	CLAY COATED KRAFT	YES	YES
	PLA LINED PAPERBOARD	NO	YES

	GRADES OF CORRUGATED	RECYCLABLE	COMPOSTABLE (MEETS ASTM-D6400)
	VIRGIN BLEACHED KRAFT	YES	YES
	VIRGIN UNBLEACHED KRAFT (NATURAL)	YES	YES
	RECYCLED BLEACHED KRAFT	YES	YES
	RECYCLED UNBLEACHED KRAFT (NATURAL)	YES	YES



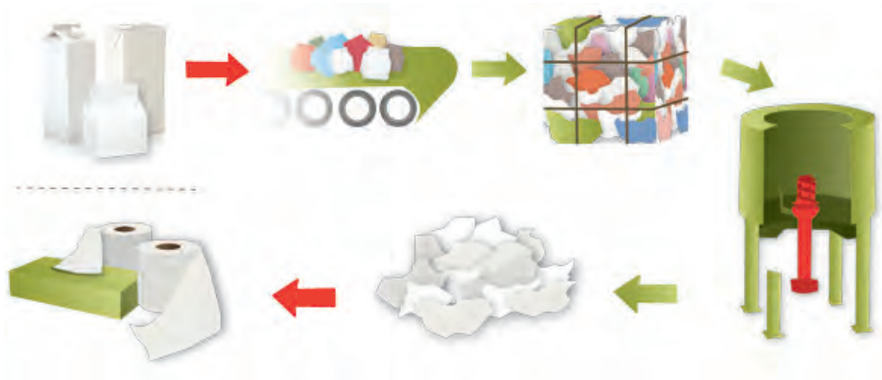
THE MOST COMMON FOODSERVICE PAPER PRODUCTS

- Sandwich Wrap
- Pastry Bags
- Carry Out Bags
- Plates
- Pizza Boxes
- Butcher Paper
- Coffee Cups
- Bread Bags
- Soda Cups
- Deli Interfold
- Table Covers
- Register Rolls
- Freezer Paper
- Drink Carriers
- Food Containers
- Pan Liners
- Napkins
- Boxes
- Patty Paper
- Labels

PAPER

PAPERBOARD CARTON RECYCLING PROCESS

Once consumers place cartons into a curbside recycling bin or bring them to a local recycling facility, where do they go?



First, cartons are separated from other materials to be recycled. This process occurs at a material recycling facility (MRF), where cartons are separated and shipped to a paper mill. At the paper mill, fiber in the cartons is converted into pulp by mixing the cartons with water in a hydrapulper (like a giant kitchen blender). This pulp is then used to make paper towels, tissue paper, napkins and other useful paper products.

The leftover aluminium and plastic that separate from paper products are also used to make building materials and roofing tiles. Many manufacturers actively work with paper mills to find better solutions for leftover materials considering environmental and financial aspects. It was stated earlier in this publication that to make paper packaging products you have to cut down trees. Although this may be true, what is great about paper is that it can be recycled (up to 6–7 times before the fibers become too short and weak) to make yet more products that consumers use every day.

GREEN

The term "Green" means a lot of different things within the category of foodservice disposables. It might refer to various grades of plastics, glass or aluminum containers that are recyclable or perhaps a consolidation of products into one container or green could also be packaging that is made of a material that can be composted. It's important to clarify that "biodegradability" and "compostability" should not be interchanged or implied to mean the same thing, because they are not. A plastic material that can be classified under current standards to be compostable is then also biodegradable; however, not all biodegradable plastics, by current definition, are commercially compostable. The material used might be safe for the environment, but it might take a longer period of time to decompose and require additional steps that are outside of the ASTM-D6400 composting requirements. The definitions of these two key terms are as follows:

BIODEGRADABLE The American Society for Testing Materials (ASTM) defines biodegradable as "*capable of undergoing decomposition into carbon dioxide, methane, water, into organic compounds, or biomass in which the predominant mechanism is the enzymatic action of microorganisms, that can be measured by standardized tests, in a specified period of time, reflecting available disposal condition.*"

In regards to "green bioplastic" that is compostable, the ASTM definition changes to "biodegradability" which is determined by measuring the amount of CO2 produced over a certain time period by the biodegrading plastic. ASTM, ISO and DIN standards require 60% biodegradation within 180 days in order to qualify as a compostable "Green Plastic" substrate that meets ASTMD-6400 reqs.

COMPOSTABLE A mixture of decaying organic matter that can be used as fertilizer. In regards to "green" packaging that is compostable the ASTM definition changes to "A material is 'compostable' when it is biodegradable under composting conditions."

To pass the ASTM tests, a **bio-plastic** must be:

- **Biodegradable:** Converted to carbon dioxide, water and biomass at the same rate as kraft paper and other compostable materials
- **Able to disintegrate:** Not be visible or need to be screened out after composting
- **Safe for the environment:** Degredation must not cause any harmful bi-products, and the compost must be able to support plant growth

AMERICAN SOCIETY FOR TESTING MATERIALS

ASTM D6866 - *test method for determining biobased content*

ASTM D6400 - *specifies material will fully biodegrade in a compost environment within 180 days*

ASTM D6691 - *test method for determining aerobic biodegradation of plastic materials in the marine environment by a defined microbial consortium or natural sea water inoculum*

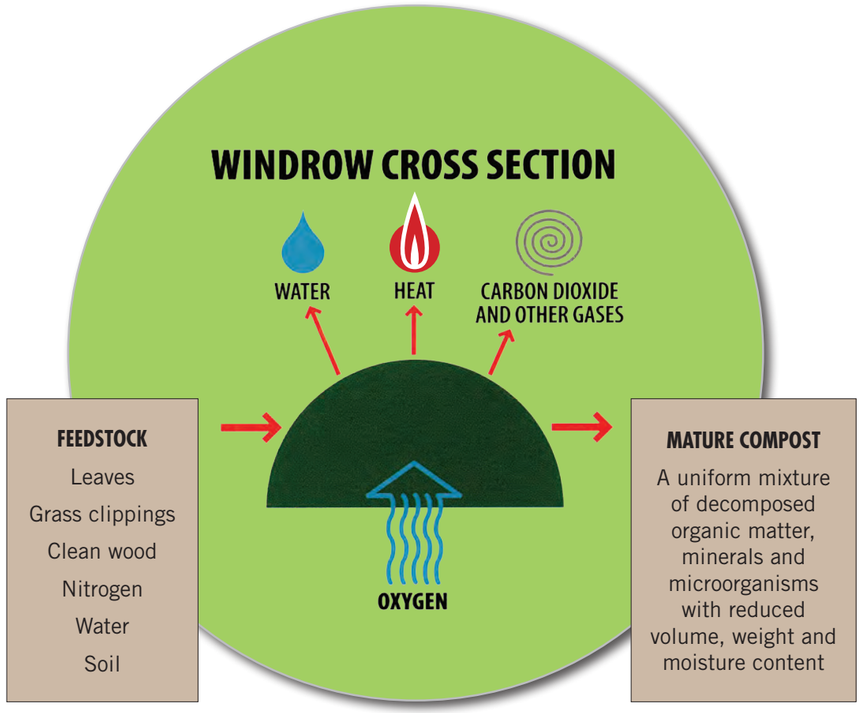
ASTM D6868 - *specification for biodegradable plastic used on paper substrates*

ASTM D5338 - *test method Biodegradation of plastic materials under controlled composting conditions*

ASTM D7473 - *test method for weight attrition of plastic materials in the marine environment by open system aquarium incubations*

GREEN

The term compost has been around for centuries. It's the simple process of biodegrading the appropriate natural materials into a compost pile so that bacteria (microorganisms), heat and oxygen begin to break down the matter into a humus fertiziler composition. The term "composting," or better yet, "Compostable" has become more popular today than ever, due to new legislation that is escalating the total yield of foodservice packaging waste into commercial, as well as residential, compost programs. Composting is yet another way to recycle and sustain a closed loop system of natural materials by decomposing it back into organic matter for use in a variety of agricultural applications.



SOURCE: wm.com

COMPOSTERS: WHAT DO THEY ACCEPT?

- **Yard waste**
- **Paper**
- **Food scraps**
- **Compostable plastics**
- **Algae**
- **Bio-solids**

During decomposition, the microorganisms require oxygen and water to thrive, so composters regularly turn the materials to aerate them to distribute water. Temperatures within compost piles can rise as high as 100 to 150 Fahrenheit.

The decomposition process can take as little as three weeks, depending on the material mix, or as long as three months, resulting in a stable, decomposed, organic material called humus. This carbon-rich, dirt-like substance is full of nutrients like nitrogen, phosphorus and potassium. It can be used for soil amendment, turf building, soil erosion control, fertilizer and even pest control.

GREEN

BIO-PLASTIC & BIO-MATERIAL CLASSIFICATIONS

BIO-MATERIAL NAME		WARM FOOD (MICROWAVE SAFE)	HOT FOOD (OVENABLE)	COLD FOOD (REFRIGERATOR SAFE)	FROZEN FOOD (FREEZER SAFE)	COMPOSTABLE	RECYCLABLE OR LANDFILL	MADE FROM A SUSTAINABLE SUBSTANCE
	PLA POLYLACTIC ACID MADE FROM PLANT STARCHES Food containers, cups, straws, portion cups, lids	NO	NO	YES	NO	YES*	(IF NOT COMPOSTED) LANDFILL	YES (MADE FROM PLANT STARCHES)
	POTATO RESIN STARCH BLENDED COMPOUND MADE FROM POTATOES Cutlery, clam shells, plates, meat trays, school trays	YES	NO	YES	NO	YES*	(IF NOT COMPOSTED) LANDFILL	YES (MADE FROM POTATOES)
	MATER-BI ECOVIO(FILM) Compostable bags, can liners	NO	NO	YES	NO	YES*	(IF NOT COMPOSTED) LANDFILL	YES (MADE FROM PLA & OTHER BIORESINS)
	FIBROUS BOARD MADE FROM BAGASSE/BAMBOO/ WHEAT FIBER Plates, clam shells, containers	YES	YES	YES	YES	YES*	(IF NOT COMPOSTED) LANDFILL	YES (MADE FROM BAGASSE/BAMBOO/ WHEAT FIBER)
	PAPER / LINER BOARD PULP SHEETS & RIGID BOARD MADE FROM TREES & RECYCLED PULP SUBSTRATES Cake boxes, clam shells, food trays, catering boxes	YES	NO	YES	YES	YES*	RECYCLABLE (LAMINATED BOARD MUST BE SEPARATED)	YES (MADE FROM TREES)
	MOLDED FIBER PULP MATERIAL MADE FROM RECYCLED NEWSPAPER AND MILK CARTON STOCK Plates, clam shells, containers, drink carriers	YES	NO	YES	YES	YES*	RECYCLABLE	YES (MADE FROM RECYCLED PULP)
	CPLA CRYSTALIZED POLYLACTIC ACID MADE FROM PLANT STARCHES AND OTHER BIO-ADDITIVES Food containers, cups, straws, portion cups, lids	NO	NO	YES	NO	YES*	(IF NOT COMPOSTED) LANDFILL	YES (MADE FROM PLANT STARCHES)
	BAMBOO Catering trays, plates, bowls, skewers, cutlery	YES	NO	YES	YES	YES*	(IF NOT COMPOSTED) LANDFILL	YES

*If the material meets the ASTM-D6400 Requirements

THE TRUTH ABOUT "GREEN" BIOPLASTICS

The global bioplastics packaging market recorded a market valuation of more than $4.25 billion in 2018 and is expected to reach a value of $15.6 billion by the end of 2027. The unfortunate truth about bio-plastics is that most waste collection companies are not able to differentiate between traditional plastic and a bioplastic because they typically look the same in shape, color and design. Some industry statistics show that less than 1% of all bio-plastics actually make it to compost facilities.

Moreover, a number of commercial compost facilities reluctantly accept, or some do not accept bioplastics at all, due to the uncertainty of their bio-chemical composition. In some instances, organic farmers who buy compost fertilizer for their crops have lobbied commercial composters not to blend their organic compost matter with bio-plastics because of the "green washing" that occasionally happens with packaging companies that are eager to call their custom bio-blended compounds "compostable."

In addition, although bio-plastics do eventually decompose, most commercial composters typically don't shred the sometimes thick material into small pieces, and are financially driven to convert organic matter into fertilizer in as short of a period of time as possible. As a result, the compost facilities seek pulp-based or easily identifiable bio-plastics that have a green or a brown stripe on the product.

Embossing "compostable" or having a green or brown stripe in some cities, is confirmation enough to the composters that the product is compostable and does meet the strict ASTM-D6400 decomposition timeline of less than 180 days. Some commercial compost facilities are able to decompose their organic matter in less than 60 days due to the process they use called the GORE system. This system uses heavy tarps, that are draped over the windrows, and oxygen is pumped underneath to accelerate the decomposition timeline. Most bio-plastics that do get composted are not used in agriculture due to their common GMO (Genetically Modified Organisms) compounds. Instead they are used in applications like landscaping.

The other popular view to bio-plastics is that the factories that make them are using materials that are from a renewable resource, like the sucrose from corn or the starch from potatoes. So even though there may not be an infrastructure of channels set up to collect, identify and compost bio-plastics in every region across the country, consumers seem to embrace the idea of a "green" material that is renewable or sustainable. Moreover, the trend to divert waste away from landfill and the continuing ban on select grades of plastics in more cities across North America may create a demand for more waste collection channels that will allow all "green" bio-plastics to be either recycled and or composted.

As you weigh all of your options and process all of the information that has been provided in this materials guide, it's important to keep in mind that at the end of the day you need to make the best business decision that you can for your food applications, for your customers and for your bottom line. Going "Green" is difficult to define because it means something different to everyone. To some it might be changing out all of their non-compostable products to compostable options. To others it might be setting up a recycling program and or reducing the amount of waste that purges from your business. Not every city nor every state has the same ordinances, laws and regulations that restrict restaurants and other foodservice operations from using select grades of plastic, foam or other non-recyclable materials. Foam disposables are still a growing category throughout the majority of North America. In other parts of the country there are cities that have banned all disposable rigid plastics, plastic bags and foam disposables. Not every foodservice operation needs the same products, nor do they have the same waste streams available to them for recycling and composting. **In the end, this guide is intended to educate you on your options on foodservice disposables, how they perform in various food applications, as well as help you understand their end of life destinations today, and how these materials are impacting our surrounding environments.** I certainly hope this guide provides you with the information that you need to make a decision on the foodservice packaging disposables that you feel are best for your business.

Please don't hesitate to call Nexus for help – Thank you.

Written by: Chris Matson
4TH EDITION 2020

Edited by: Xavier Noblat

CONTACT US

T 800.482.6088
F 510.567.1005
www.nexus-now.com