Environmental Impact Executive Summary

Our Perspective

It is sad to see so many people and companies spend considerable time debating the trifles of a single environmental aspect, while wholly overlooking the vast damage it is causing to the far more significant essentials of an everlasting environment.

We pursue a different approach with a keen focus on the Big Picture—and supporting the significant essentials to have and protect our environment long-term.

Through meticulous research, we developed NOAXE™ Bags to have superior environmental benefits not found in alternatives—paper bags, single use t-shirt bags, non-woven bags, compostable bags, etc. These benefits support the following essentials of an everlasting environment:

- Greenhouse gas – global warming
- Carbon footprint
- Oil usage
- Landfill space
- Recyclability
- Toxicity, contamination
- Forests, wildlife & endangered species
- Responsible, scientific verification

Greenhouse Gas (GhG) – the Emerging Danger

Greenhouse gases (CO2 and methane) trap heat in the atmosphere. [1] A large amount of GhG is emitted into the atmosphere from fossil fuels and from trash decomposing in landfills. It has caused devastating outcomes like sea levels rising, global temperature rise, warming oceans, and shrinking ice sheets, all which effect ecosystems and future generations. Packaging is a prime target to reduce the dangers of GhG emissions. [2] [3] [4]

- **Paper:** Emissions from pulp and paper mills are the 4th largest industrial source of greenhouse gas in the United States. Most paper bags end out in landfills releasing additional GhG. [5]
- **Single use t-shirt bags:** Emit fewer global warming gases, and produce substantially less acid rain emissions, and less solid waste than traditional paper and compostable bags. [6]
- **Non-woven bags:** Can help lower GhG emissions but must be reused a minimum of 177 times to have a net gain. [7]
- **Compostables:** Contribute significant GhG if composted in industrial composting facilities or otherwise, releasing GhG into the atmosphere. Most compostables are disposed in landfills. [8] [9]

✔ **NOAXE Bags:** Significantly reduce GhG. Every time one is reused it eliminates the manufacture of a paper bag, the high cost to recycle it, and the release of additional GhG. [10] [11]

Carbon Footprint

Carbon footprints are defined as the total amount of GhG produced throughout the supply chain process that directly and indirectly supports human activities. [12] It is usually expressed in the equivalent tons of carbon dioxide (CO2).

- **Paper:** Four times the energy is used to produce a paper bag than a single-use plastic bag. [13] Eight times the fuel is used to ship to stores than to reship them to the dump or recycler after only one use. Paper bags have an enormous carbon footprint. [14]
- **Single use t-shirt bags:** Have a lower carbon footprint than reusable bags if the reusable bags are not reused at least 4 times. [15]
- **Non-woven bags:** Emit 3.6 times the GhG to manufacture than paper bags, and more than twice the amount of energy to ship from Asia and reship in the US. [16] [17] Must be used 11 times to have an effective carbon footprint. [18]
- **Compostables:** Use about 2.7 times more energy per pound to produce than single use t-shirt bags. Since they are typically 3-4 times thicker, they burn 8-11 times more energy. [19]

✔ **NOAXE:** For every one truckload of NOAXE Bags, over 4 truckloads are needed for the same number of handled paper bags. When reused only 5, 10, 25 times, NOAXE Bags save energy and gas, radically reducing it carbon footprint. [20] Do the math. [21]

Oil Usage

While oil is a natural resource on this planet, it is finite. Paper bags consume so much more oil to manufacture, ship, and recycle than NOAXE Bags. This table illustrates the gallons of oil consumed to make and ship 1000 bags.

Bag Type	Manufacture	Ship 1000 miles	Total oil used	Recycled 10 times vs. Reused 10 times
Paper bags	25.35 [22]	1.94	27.29	**272.90** [23]
Non-woven (oil derivative)	24.80	2.28 [24]	27.08	27.08
NOAXE bags	12.20	.38 gallons of oil [25]	12.58	12.58

It takes 25.35 gallons of oil to manufacture 1000 paper bags. Most plastic bags made in the United States, including our NOAXE bags, are made of natural gas. [26] The oil used to manufacture the plastic material NOAXE bags are made of and convert them into 1000 bags is 12.2 gallons.

✔ **NOAXE:** The clear winner! When reused only 5, 10, or 25 times, NOAXE Bags can radically reduce oil consumption, saving a finite natural resource for centuries to come.

Landfill Space & GhG Liability

The Clean Air Act of 1970 promotes the reduction of GhG emitted in landfills, the 3rd most common source in the U.S. [27] Greenhouse gas emissions are caused by biodegradation of trash near the surface. It's important to know however, that in a properly engineered landfill, *nothing* is meant to biodegrade, which immediately releases GhG. [28] Fugitive Greenhouse gas escaping laterally from landfills into adjacent lands is a serious emerging issue [29]. Preventing degradation also prevents toxins from leaching into the water supply. [30]

- **Paper:** A landfill's volume consists of as much as 50% paper products. [31] A community of 50,000 citizens using only paper shopping bags contributes 28 truckloads a year to the dump. [32] Ink from degrading paper is a known water contaminate. [33]
- **Single use t-shirt bags:** Prevent premature release of GhG, but slowly degrade over 450 years, and most will be completely decomposed after 1000 years. [34]
- **Non-woven bags:** Add additional non-biodegradable plastic volume to a landfill, more than paper, and take 450-1000 years to decompose. [35]
- **Compostables:** Designed to decompose only in industrial composting facilities, of which there are few in the US. They add about 50% more volume to landfills than paper. [36] [37]

✔ **NOAXE:** One use takes up 17.9% less in weight, or 77.3% less in volume than a handled paper bag. Reuse it 10 times and save 92%-93% compared to paper (26.5 fewer truckloads of trash in a community of 50,000). [38] In addition, consistently reusing NOAXE bags until their end of life prevents the release of GhG.

Recyclability

According to the EPA, recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products. [39]

- **Paper:** A pound of paper bags takes 91 times more energy and oil to recycle than a pound of plastic bags. [40] The associated water pollution and air contamination is substantial. [41]
- **Single use t-shirt bags:** Recycling thin plastic bags is difficult, and the return on the effort to recycle them is minimal. [42] The recycle rate may be as little as 5%. [43] [44]
- **Non-woven bags:** According to EPA standards, they are not recyclable; there is no market for the material, no infrastructure in place to pick up and recycle them, and no cleaning and reprocessing facilities.
- **Compostables:** According to EPA standards, they are not considered recyclable; if composted, it must be at an industrial composting facility (not at a home), which uses very high temperatures and tumblers. [45] There is currently no market for the material, no infrastructure in place to pick up and recycle them, and no cleaning and reprocessing facilities.

✔ **NOAXE:** NOAXE Bags may be recycled at most local supermarkets. It is far easier and more cost effective to recycle them compared to lightweight t-shirt bags. [46]

Toxicity, Contamination, and Pollution

The toxicity of materials is based on how it affects humans, animals and plant life. The EPA's TRI list (Toxic Release Inventory) is honored nationwide, with California adding its own DTSC list (Department of Toxic Substances Committee). [47] [48] Contamination and pollution is directly related to the release of toxic substances in the air, water, and earth.

- **Paper:** Pulp and paper mills have been known to be some of the worst polluting industries worldwide, as seen at the Fox River in Wisconsin. In the U.S., paper and pulp mills are the largest consumers of fresh water, and in contribute to oxygen-depriving algae blooms in oceans. [49] [50] [51]

- **Single use t-shirt bags:** Contaminated t-shirt bags shipped overseas to be recycled spread disease and are frequently sorted using unfair labor practices. [52] [53] [54] As of 2018, China has refused to recycle the U.S.'s plastic waste in order to protect their environment and people's health. [55]

- **Non-woven bags:** May harbor harsh bacteria that could ultimately harm people. [56] Huge amounts of ink used to print these bags is also a potential contaminant. [57]

- **Compostables:** Many contain toxic contaminants, GM corn (Genetically Modified) using GMOs (Genetically Modified Organisms) and are banned in over 60 countries. Compostable bags are not accepted at Recology composting sites. [58] [59] [60] [61]

- ✔ **NOAXE:** The manufacturing process of NOAXE Bags cuts air pollution by 55% over paper bags, with no water pollution. [62] Printing also requires 1/3 the ink of paper. [63]

Forests, Wildlife & Endangered Species

NOAXE Bags do no harm forests and wildlife. Clear-cut forests are massive throughout North America…just google a satellite map of Oregon, Washington or British Columbia. 40% of commercial timber cutting goes into making paper, most of which ends out in landfills. [64] Don't be misled that forests regenerate themselves in only 30 years and like tree farms that destroy old growth habitats. They take up to 150-500 years to regenerate. [65]

According to the National Wildlife Federation, many forms of wildlife and endangered species live only in old growth forests. NOAXE Bags are also engineered to avoid entanglement with marine and wildlife, whereas non-woven and T-shirt bags are not. [66]

Responsible, Scientific Verification

Any environmental marketing claim used to tout a product's composition or use, that does not support the big picture viewpoint of an everlasting environment, nor its damage to finite resources, wildlife, and human life is irresponsible.

All things considered, we support qualified scientific testing, analyses, and qualified professional input, and use them solely to validate our long-term objective—an everlasting environment.

Resources

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[2] Climate Change: How do we know? *NASA.* http://climate.nasa.gov/evidence/
[3] Climate Change: Basic Information. *USA EPA.* http://www.epa.gov/climatechange/basics/
[4] Robert Falk, Esq., environmental attorney, Morrison Foerster, San Francisco, CA. https://www.mofo.com/people/robert-falk.html
[5] Impacts on Climate. *Green Press Initiative.* 2007. http://www.greenpressinitiative.org/impacts/climateimpacts.htm
[6] Life Cycle Assessment for Three Types of Grocery Bags - Recyclable Plastic; Compostable, Biodegradable Plastic; and Recycled, Recyclable Paper. *The Hartland Institute.* http://heartland.org/policy-documents/life-cycle-assessment-three-types-grocery-bags-recyclable-plastic-compostable-biode
[7] Life Cycle Assessment of Supermarket Carrier Bags, Report: SC030148. *Environmental Agency of Great Britain,* pg.7. http://heartland.org/policy-documents/life-cycle-assessment-supermarket-carrier-bags
[8] Performance Evaluation of Environmentally Degradable Plastic Packaging and Disposable Food Service Ware – Final Report. *Zero Waste California* and *CSU Chico Research Foundation.* June 2007. http://www.cptoolkit.org/Toolkit/tabid/58/Article/139/Performance-Evaluation-of-Environmentally-Degradable-Plastic-Packaging-and-Disp.aspx#.VNzgsnQ5C04
[9] Compostable bags fall under ASTM D6400, establishing standards for composting in industrial composting facilities. There are no known facilities that have a means to capture the escaping greenhouse gas.
[10] A NOAXE bag uses 55% less energy to manufacture than a paper bag. Each time a paper bag is recycled, then remanufactured, it requires a minimum of 6 times the amount of energy to ship back and forth, plus four times the energy to remanufacture a bag.
[11] Life Cycle Assessment of Reusable and Single-use Plastic Bags in California. *California State University Chico Research Foundation.* January 2011. http://www.readbag.com/keepcabeautiful-pdfs-lca-plastic-bags
[12] What is a Carbon Footprint – Definition. *Time for Change.* http://timeforchange.org/what-is-a-carbon-footprint-definition
[13] J.C. Lewis. Facts About Paper Bags. *EHow.com:* http://www.ehow.com/about_5079972_paper-bags.html
[14] Environment. *Bag the Ban Coalition.* 2013. http://www.bagtheban.com/learn-the-facts/environment
[15] Life Cycle Assessment for Three Types of Grocery Bags - Recyclable Plastic; Compostable, Biodegradable Plastic; and Recycled, Recyclable Paper. *The Hartland Institute.* http://heartland.org/policy-documents/life-cycle-assessment-three-types-grocery-bags-recyclable-plastic-compostable-biode
[16] Life Cycle Assessment of Supermarket Carrier Bags, Report: SC030148. *Environmental Agency of Great Britain.* http://heartland.org/policy-documents/life-cycle-assessment-supermarket-carrier-bags
[17] One Container Ship Pollutes As Much As 50 Million Cars. *Gas 2.* http://gas2.org/2009/06/03/one-container-ship-pollutes-as-much-as-50-million-cars/
[18] Life Cycle Assessment of Supermarket Carrier Bags, Report: SC030148. *Environmental Agency of Great Britain,* pg. 7. http://heartland.org/policy-documents/life-cycle-assessment-supermarket-carrier-bags
[19] Life Cycle Assessment for Three Types of Grocery Bags - Recyclable Plastic; Compostable, Biodegradable Plastic; and Recycled, Recyclable Paper. *The Hartland Institute*, pg. 4. http://heartland.org/policy-documents/life-cycle-assessment-three-types-grocery-bags-recyclable-plastic-compostable-biode
[20] There are 160,000 to 216,000 paper bags in a truckload depending on whether or not they have handles. There are 704,000 NOAXE Bags in a single truckload.
[21] Do the math: 1 truckload of 700,000 NOAXE Bags = 3-4 truckloads of paper bags and uses 55% less energy to manufacture; reused just 1 time, NOAXE Bags save an additional 6-8 truckloads plus the energy to recycle and remanufacture a new paper bag quadrupling the energy savings to a whopping 86%. If a single truckload of NOAXE Bags is reused 5 times, the truckload requirements for the equivalent in paper = 27 - 36 truckloads, and the energy savings is 95% to recycle and remanufacture; if the NOAXE truckload is reused 10 times, the truckload requirements for the equivalent in paper = 57 -76 truckloads, and the energy savings climbs to 97.5% to recycle and remanufacture.
[22] 390 gallons of oil used to make 2000 lbs. 25.35 to make 130 lbs. https://www.rubiconglobal.com/blog-statistics-trash-recycling/
[23] If these 1000 paper bags were then recycled 10 times, oil consumption increases tenfold to 272.90, whereas the same 1000 NOAXE Bags reused 10 times would stay at 12.58 due to their reusability.
[24] Includes average shipping distances from Asia to the United states.
[25] 42 gallons of oil produces 19 gallons of gas. Assume a truck gets 7 miles to the gallon over a 1000-mile trip. https://www.eia.gov/energyexplained/print.php?page=oil_refining
[26] How much oil is used to make plastic? US Energy Information Administration. https://www.eia.gov/tools/faqs/faq.php?id=34&t=6
[27] Landfill Methane Outreach Program: Basic Information. *USA EPA.* http://www.epa.gov/lmop/basic-info/index.html
[28] Biodegradation Won't Solve the Landfill Crunch. *Epic, Environment and Plastics Industry Counsel.* http://www.plastics.ca/articles_merge/wontsolve.php
[29] Keith Schmidt, PE, Placer County landfill, Roseville, CA. https://www.wpwma.ca.gov/contact-us/

[30] Drinking Water Contamination by Dumps and Landfills. http://extoxnet.orst.edu/faqs/safedrink/dumps.htm
[31] Landfills: Teacher Fact Sheet. *USA EPA,* pg.167. Visit the EPA website.
[32] A truckload of 160,000 to 216,000 paper bags takes up approximately 2560 sq. ft. A community of 50,000 people typically consists of about 18,500 families. The average family uses about 300 grocery sacks a year. In one year, a paper-only community would be contributing 28 truckloads of paper waste to their local landfill.
[33] Landfill Problems. *We Green – USA.* http://www.wegreen-usa.org/landfill-problems.html
[34] Is it possible to go plastic-free? *GreenPeace.* 2013. http://www.greenpeace.org/africa/en/News/Blog/is-it-possible-to-go-plastic-free/blog/45563/
[35] Life Cycle Assessment of Supermarket Carrier Bags, Report: SC030148. *Environmental Agency of Great Britain.* http://heartland.org/policy-documents/life-cycle-assessment-supermarket-carrier-bags
[36] Performance Evaluation of Environmentally Degradable Plastic Packaging and Disposable Food Service Ware – Final Report. *Zero Waste California* and *CSU Chico Research Foundation.* June 2007. http://www.cptoolkit.org/Toolkit/tabid/58/Article/139/Performance-Evaluation-of-Environmentally-Degradable-Plastic-Packaging-and-Disp.aspx#.VNzgsnQ5C04
[37] Very few industrial composting facilities exist in the US. There are nearly 171 in California (in April 2014). Of the 171, 51 were surveyed. The results showed only one facility, in all of Central and Northern California, claims it degrades D6400 plastics. It is located in Watsonville, CA, which supports a population of roughly 51,199, less than 1/10 of 1% of the total state population. CA compost and mulch map. Download the report.
[38] In a community of 50,000 residents, if its citizens reused NOAXE Bags only 5 times it would reduce landfill volume by 26.5 truckloads a year. It is simple math.
[39] Recycling Basics. *USA EPA.* http://www2.epa.gov/recycle/recycling-basics
[40] Energy Efficiency. *American Chemistry Council.* 2015. http://www.aboutbagit.com/EnergyEfficiency.html
[41] Interesting enough, less than 15% of paper bags are recycled, which begs the question, where do they get all the recycled content used in present day paper bags? J.C. Lewis. Facts About Paper Bags. *EHow.com:* http://www.ehow.com/about_5079972_paper-bags.html
[42] EPA 2009 Municipal Waste Characterization Study. *Plastic Bag Laws*, Pg. 53. http://plasticbaglaws.org/get-involved/plastic-bag-recycling/http://plasticpollutioncoalition.org/2010/08/10-reasons-why-single-use-plastic-bags-blow/
[43] Keep plastic out of the Pacific. *Environment California.* http://www.environmentcalifornia.org/node/63/content/report
[44] Recycling thin-gauge plastic grocery sacks is difficult, as they are difficult to clean, and have very little weight. They are rarely recycled back into bags. 95% are usually exported overseas where they are sorted using unfair labor practices, or are burned to produce energy, making them essentially a useless component in the recycling stream.
[45] Frequently Asked Questions about Plastic Recycling and Composting. *EPA.* https://www.epa.gov/trash-free-waters/frequently-asked-questions-about-plastic-recycling-and-composting
[46] US recyclers greatly prefer heavy weight NOAXE Bags over thin single-use bags. The heavier weight makes them easier to reprocess back into pellet form, similar to the ease of recycling plastic milk bottles.
[47] Learn about the Toxics Release Inventory. *USA EPA.* http://www2.epa.gov/toxics-release-inventory-tri-program/learn-about-toxics-release-inventory
[48] DTSC: Who We Are and What We Do. *State of California.* https://www.dtsc.ca.gov/InformationResources/DTSC_Overview.cfm
[49] Environmental Impacts of the Paper Industry. *Clean Water Action Counsel of Northeast Wisconsin.* http://www.cleanwateractioncouncil.org/issues/resource-issues/paper-industry/
[50] Paper also requires 3 times the ink than a NOAXE bag due to absorption in the porous cellulose structure.
[51] Harmful Algae Blooms, Wikipedia. https://en.m.wikipedia.org/wiki/Harmful_algal_bloom
[52] What's Plastic got to do With Clean Air? *Mom's Clean Air force.* http://www.momscleanairforce.org/whats-plastic-got-to-do-with-clean-air/
[53] Toxic Shock: UK Waste in China. *Sky News.* http://news.sky.com/story/584081/toxic-shock-uk-waste-in-china
[54] Clear violation of SB 657 Supply Chain Act 2007 prohibiting unfair labor practices.
[55] China Has Refused To Recycle The West's Plastics. What Now? *NPR.* https://www.npr.org/sections/goatsandsoda/2018/06/28/623972937/china-has-refused-to-recycle-the-wests-plastics-what-now
[56] Getting to the Bottom of the Bag. *Gazetteer News.* March 4, 2013. http://www.upenn.edu/gazette/0313/gaz04.html
[57] Just like porous paper bags require 2-3 times more ink to print on, than the smooth surface of NOAXE Bags, so do non-woven bags, but even more, since the surface is even more porous than paper.
[58] 'Superweeds' linked to rising herbicide use in GM crops, study finds. *Science Daily.* http://www.sciencedaily.com/releases/2012/10/121002092839.htm
[59] GMO Corn Linked To Cancer Tumors. *Food Matters.* http://www.foodmatters.tv/articles-1/gm-corn-linked-to-cancer-tumors
[60] GMO Poisons Found in Indiana Waterways. *Indiana Business Journal.* http://articles.mercola.com/sites/articles/archive/2010/10/20/gmo-poisons-found-in-indiana-waterways.aspx

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[62] Based on industry standards, American Plastics Institute. http://www.plasticsinstitute.org/
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[64] Environmental Impact of Paper Production. https://www.theworldcounts.com/stories/Environmental_Impact_of_Paper_Production
[65] Old Growth Forest. *Wikipedia*. http://en.wikipedia.org/wiki/Old-growth_forest
[66] National Wildlife Federation. http://www.nwf.org/search.aspx