

# REDUCING THE CARBON FOOTPRINT OF PLASTIC TOYS

ENG W270: SECOND PLACE

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The toy industry in the United States is a ninety billion dollar per year industry, and for every one million dollars in revenue, forty tons of plastic is used (“Environmental Impact of Toys”). Many popular children’s toys are made of plastic and are also packaged in single-use plastic, creating a double-whammy effect. First, when plastic toys are being produced in factories, copious amounts of greenhouse gases are produced and released into the atmosphere contributing to climate change due to the materials that plastics are made from. Second, after toys are no longer being used, they frequently end up in landfills or oceans, or they are incinerated. No matter where these plastics are ending up, they are again emitting harmful greenhouse gas emissions when they are decomposing or being burned. The effect that plastic toys have on the environment is twofold; they are harmful in both their production as well as in their disposal. By donating toys, purchasing toys that are sustainably made, and purchasing toys made of non-plastic materials we can help decrease the carbon footprint of plastic toys.

The toy industry is the most plastic-intensive industry in the world. Approximately ninety percent of toys purchased in the United States are made of plastic (“Environmental Impact of Toys”). These plastics are made up of fossil fuels including oil, which causes significant amounts of toxic emissions such as nickel, trichloroethane, acetone, styrene, toluene, benzene, ethylbenzene, ethylene oxide, methylene chloride, methyl ethyl, and more to be released into the atmosphere during the production of plastic (Krososfsky). Greenhouse gases are also released when plastic is decomposing. As most forms of plastic are not biodegradable, they pile up and pollute the

environment (Krososfsky). Some of these toys get incinerated, which in the process releases toxic fumes and increases the amount of carbon that is in the atmosphere (Krososfsky). Because plastic takes hundreds of years to decompose many of these toys are ending up in landfills and the oceans when they are no longer being used, and as they pile up, they not only add to the plastic crisis in our oceans, but they also contribute to the climate change crisis. According to Tansy Robertson-Fall, a circular economy expert, writer, and Senior Editor at the Ellen MacArthur Foundation, it has been estimated that approximately eighty percent of all toys end up in landfills, incinerators, or the ocean (Robertson-Fall). We, the United States especially, live in a throw-away society where the majority of what we purchase will end up in a landfill within a few months. To help combat this waste, we must make more environmentally friendly choices, and one easy change we can make is in the toys that we are purchasing for children in our lives.

Admittedly, some toy consumers worry that toys made of non-plastic materials may not be as high-quality as those made of plastic. Plastic is an inexpensive, lightweight, strong, and durable material, making it an ideal choice for producing toys. Plastic toys can also usually be easily cleaned and sanitized, which may not be true of some toys made of other materials such as fabric or wood. Plastic can also be produced in a large variety of colors, textures, and finishes which allows for a lot of creative freedom when it comes to the design of the toy. Along with this, it can be molded easier than many other materials that toys are made from; this again gives the designer more creative freedom, which allows them to appeal to the wants of children with more ease. Toys made of wood, metal, or some other materials cannot be as easily manipulated, thus allowing for less creative freedom. Along with this, because plastic is an inexpensive material, toys made of plastic are often more affordable than those made from other materials. Other consumers choose not to donate toys because they think no one will want them, because of sanitary issues, or that they are no longer usable. One reason consumers may choose not to

purchase toys made of non-plastic materials is that even when non-plastic toys are made, as of wood, they tend to be very expensive. Toys made of plastic are easy to find, and typically much more affordable than those made of other materials, making them more desirable to many consumers. The expensive price tag on toys made of materials such as wood, metal, and recycled plastic is a barrier to a more sustainable toy industry.

Despite these reasons, we still need to prevent toys from going to landfills and being replaced through factory production. The first solution is to donate toys for which there are many benefits. To begin, donating toys is a great option when children are no longer using them. As children grow and become older their interests often change, and when this happens old toys frequently end up in the trash. No matter which of these places those toys land, it negatively impacts the environment. According to Robertson-Fall, nearly one-third of parents have admitted to throwing away toys that were in good working order because their children do not play with them any longer (Robertson-Fall). Because of this, donating toys is a great way to reduce the carbon footprint of plastic toys. Plastic toys can usually be easily cleaned and sanitized, making them good toys to donate. Many places accept toys such as Goodwill, Salvation Army, and other charities, or they can be given to family or friends who will use them. There are also organizations such as Toy-Cycle and Rejoué that clean and then resell toys preventing them from going to landfills. Since 2012, Rejoué has saved over three hundred tons of toys from landfills (Robertson-Fall). In a recent survey, I conducted, when asked "What do you do with your children's toys when they no longer use them?" eighty-five percent of respondents said that they donate toys they no longer use. This hopefully shows a growing trend in the number of people who are donating toys. Donating toys benefits both the environment and those who may not be able to afford to buy new toys. If most of the population chooses to donate their toys, we can significantly decrease the need for more plastic toys to be made, thus decreasing

the greenhouse gas emissions being produced. Along with donating these toys, we must also be willing to purchase or accept second-hand or donated toys for the children in our lives. If no one is accepting or purchasing donated toys, they will likely end up in the landfill as if they had never been donated in the first place.

If we truly want to reduce the waste and greenhouse gas emissions created by the toy industry, more of us must not only donate toys but also purchase toys secondhand. My own family, for example, would frequently purchase toys from garage sales or thrift stores such as Goodwill. We also had many toys that had been passed down from other family or friends. More of us must choose to purchase or accept donated toys instead of constantly purchasing new toys when children are done with the old ones. When toys are passed down, there is less of a demand for new toys to be made, and fewer toys are being thrown away thus decreasing the amount of greenhouse gas emissions being produced by the toy industry. Many toys made of materials such as metal and wood can last for decades as they are very durable materials. We need to get past the “reused gift” stigma, that we are being cheap by giving used items as gifts. Many used toys are still in good working condition when they are thrown away, and many are only thrown away because the child loses interest. According to “Toy Buying Today: Considerations, Information Seeking, and Thoughts about Manufacturer Suggested Age,” only approximately 21.8 percent of mothers surveyed reported that the most frequent source of their children’s toys were thrift stores, garage sales, secondhand, or hand-me-down (Richards et al.). To make a real impact on the environment, more people must begin to purchase, and use donated or secondhand toys.

A second way to reduce the carbon footprint of plastic toys is by purchasing toys that are made of sustainably made materials. According to Emily Barone, author of “My Kids Want Plastic Toys. I Want to Go Green. Here’s the Middle Ground,” the emissions from the plastic industry could potentially overtake those from the coal industry by as

soon as 2030 if nothing is done (Barone). As more light is shed on the growing plastic crisis the world is facing, more toy brands are making toys made from sustainable materials. If there is no intervention, the annual flow of plastic into the ocean is set to triple by 2040 to thirty-two million tons of plastic per year (Barone). Plastic packaging is one of the biggest culprits and reasons for plastic waste in the toy industry and the plastic industry in general, it is the dominant source of plastic waste accounting for nearly half of the global total (Barone). Mattel, a leading global toy company, has begun to shrink the plastic windows on boxes or has eliminated them entirely (Barone). They are also aiming for their blister containers and cartons to be made of at least thirty percent recycled plastic by the end of 2022 (Barone). Another company working to reduce plastic in packaging is LEGO, they have started to package their LEGO bricks in tree-based recycled paper pouches instead of single-use plastic and hope to complete this transition by 2026 (Barone). Along with reducing the amount of plastic used in packaging, it is also important to reduce the amount and type of plastic used in the production of toys. Some toy brands such as LEGO and Green Toys have toys made from recycled plastics, which helps to reduce the amount of new plastic being created as well as helps to lower the carbon footprint of that toy. LEGO has recently developed new bricks made from recycled PET plastic, a type of plastic that is frequently used for soft-drink bottles, in hopes to make their toys more sustainable ("The LEGO Group Reveals First Prototype LEGO Brick Made from Recycled Plastic"). In 2018 they also started making some LEGO elements from bio-polyethylene (bio-PE) which is a soft, durable, and flexible plastic that is derived from Brazilian sugarcane ("Renewable Materials"). This renewable bioplastic has a twenty percent lower carbon footprint per piece than its traditional plastic blocks (Barone). Another toy company, Green Toys, makes toys using post-consumer recycled high-density polyethylene which is commonly used in milk jugs ("Green Toys Our Story"). Using recycled plastic helps

divert materials from landfills, saves energy, and helps reduce the carbon footprint of the toy (“Green Toys Our Story”). While toys that are made from sustainable materials can sometimes be difficult to find, they are great options when looking to reduce the emissions created by plastic toys.

A third solution way decrease the carbon footprint of the plastic toy industry is to buy toys made from non-plastic materials. Toys made of materials other than plastic typically have a lower carbon footprint than those made of plastic materials. A study titled “A Playful Life Cycle Assessment of the Environmental Impact of Children’s Toys” compared the Global Warming Potential in kg CO<sub>2</sub> eq/kg of three different toys: a stuffed dog with no battery, a stuffed dog with a battery, and a marble run toy (e.g. see fig. 1). The study found that the Global Warming Potential of the marble run was over two times higher than that of the stuffed dog with no battery (Robertson and Klimas). A similar study titled “A Comprehensive Life-Cycle Assessment of Locally Oriented Small-Scale Toy Industries: A Study of traditional Channapatna Toys as Against Low-cost PVC (Poly-Vinyl Chloride) Toys Made in China” found that the Global Warming Potential was higher in every step of the toy production, use, and disposal process for PVC toys than for Channapatna toys which are primarily made from wood (e.g. see fig. 2) (Rangaswamy et al.). The same study also found that the environmental impact and the human toxicity potential of Channapatna toys were significantly lower than the environmental impact of PVC toys (e.g. see fig. 3) (Rangaswamy et al.). While toys made from materials other than plastic have been a bit more difficult to find in recent decades, many brands still make these toys. Brands such as Melissa and Doug, Fisher and Price, KidKraft, Hape, Playskool, Ikea, and more offer popular toys made of wood and other materials. Many of these popular brands can be found at your local toy store or big box store. Other companies such as Le Toy Van are dedicated to making toys from sustainably sourced materials with ethical production

methods while still being carbon neutral (“Sustainability”). While they may be a bit more expensive than toys made of plastic, toys made of wood and other materials often last much longer than toys made of plastic.

Toys made from plastic are plaguing our landfills and oceans, and without intervention, the problem is only going to get much worse. If we continue to buy toys made of plastic and we continue to throw away well-working toys it is going to do irreparable damage to our planet. The toy industry is the most plastic-intensive industry in the world so if we want to truly reduce the carbon footprint of plastic toys and the toy industry in general, we must choose to donate toys, or purchase second-hand, sustainably made, or non-plastic toys. Choosing to change what types of toys you are purchasing is an easy change to make but can have a serious impact on the environment. Brands such as Green Toys, Lego, Mattel, Melissa and Doug, Playskool, Fisher Price, Le Toy Van, and many more brands all have great alternatives to plastic toys that are still fun for the child. Buying secondhand toys is even better for the environment and is often more affordable than buying new toys. I challenge you to start thinking about the environmental impact that the toys you are purchasing have on the environment, and if you can, purchase secondhand, non-plastic, or sustainably made toys. ■

## APPENDIX A

### Global Warming Potential of Three Toys

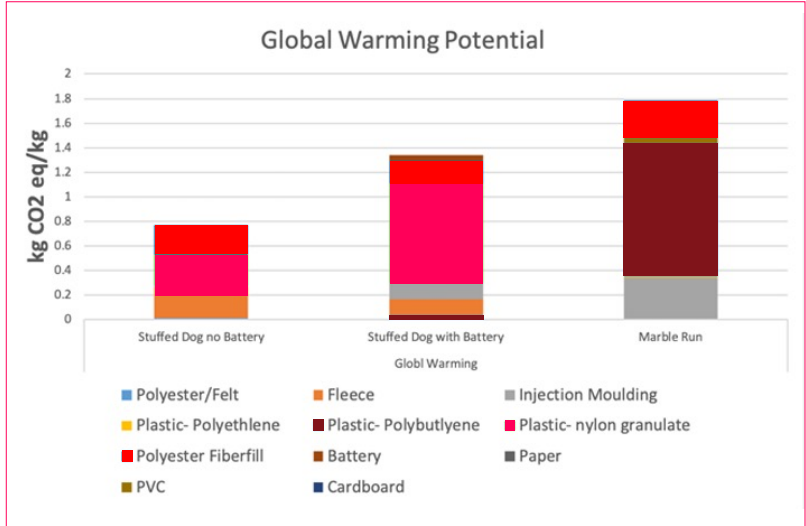


Fig. 1 Global Warming Potential (GWP) in kg CO<sub>2</sub> eq/kg substance for a stuffed dog toy with no battery, a stuffed dog toy with a battery, and a marble run toy separated by raw materials. Toys made of primarily plastic had a higher GWP than those primarily made of other materials.

Source: Robertson, Madeline R. and Klimas, Christie (2019) "A Playful Life Cycle Assessment of the Environmental Impact of Children's Toys," *DePaul Discoveries*: Vol. 8 : Iss. 1 , Article 7.

## APPENDIX B

### Global Warming Potential of Channapatna Toys Versus PVC Toys

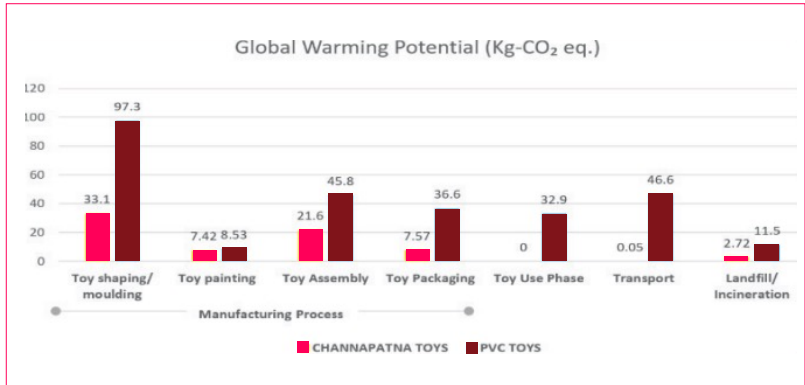


Fig. 2 Global Warming Potential (GWP) in kg CO<sub>2</sub> eq/kg of Channapatna toys versus PVC toys. Toys made of PVC plastic have a higher GWP in every phase of the manufacturing process, use and disposal process.

Source: Rangaswamy, Jananee, et al. "A Comprehensive Life-Cycle Assessment of Locally Oriented Small-Scale Toy Industries: A Study of Traditional Channapatna Toys as against Low-Cost PVC (Poly-Vinyl Chloride) Toys Made in China." *Procedia CIRP*, vol. 69, 2018, pp. 487–492., doi:10.1016/j.procir.2017.12.164.

## APPENDIX B

### Human Toxicity Potential of Channapatna Toys Versus PVC Toys

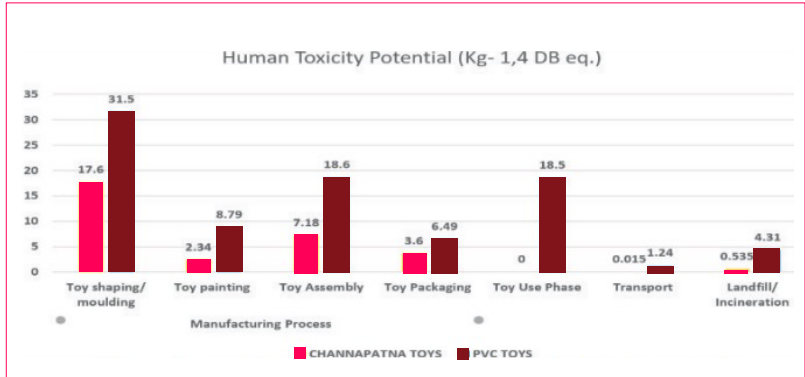


Fig. 3 Human Toxicity Potential in kg- 1,4 DB equivalent of Channapatna toys versus PVC toys. Toys made of PVC plastic have a higher human toxicity potential in every phase of the manufacturing process, use and disposal process.

Source: Rangaswamy, Jananee, et al. "A Comprehensive Life-Cycle Assessment of Locally Oriented Small-Scale Toy Industries: A Study of Traditional Channapatna Toys as against Low-Cost PVC (Poly-Vinyl Chloride) Toys Made in China." *Procedia CIRP*, vol. 69, 2018, pp. 487–492., doi:10.1016/j.procir.2017.12.164.

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