

Carbon footprint of a plastic grocery bag



In order to comment on the carbon footprint of plastic grocery bags during its life cycle, I should first explain what does the carbon footprint term stand for, I would take the definition given in the textbook of this course, “ The carbon footprint is the total emissions of CO₂, more specifically greenhouse gases as CO₂ equivalent (CO₂e), that is generated by individual, organization, event, product or process over its life- cycle”.

Knowing what the carbon footprint means now, now that for discussing the carbon footprint of plastic grocery bag, I should look into the emissions of CO₂e during all the life cycle of the product, (obtaining the raw materials, making plastic bag, using the bag and recycling the bag). There are plenty of types and ways to make a plastic grocery bag, I would mainly limit the scope of this paper to those made from polyethylene as they make a huge part of the total amount of plastic bags. Polyethylene is a polymer made from chains of ethylene monomers.

In order to obtain polyethylene we will use ethane that is found in natural gas.

In this course we already had the chance of studying how natural gas is extracted, I will not deal with how the natural gas is extracted. Once that we have the natural gas which majorly is composed of methane, ethane, butane, and many other components, the next step is to separate the ethane, this is done with the help of a distillation column where ethane is obtained thanks to the difference of boiling point amongst the other components.

Once we have ethane we have to turn it into ethylene, we do this in a thermal catalytic cracker, (as a matter of fact this reaction only has a 65% efficiency), following this in order to obtain polyethylene we need a polymerization reaction to take place.

we can do this with high pressure. a fluidized bed with the help of a catalyst, after this the polymerized polyethylene is blended and melted into long sheets of polyethylene.

We already have the raw materials, “ the plastic material”, so the next step is to manufacture the bag. For doing this what we do is cut the sheets of polyethylene and align the sheets in an appropriate way so that with a binding machine we can seal strips together making our bag. Sometimes store logos may be added after or packed in a specific way. Although that we have the bag already made, the bag after several uses it has to be disposed.

I would say that most of the people are aware that plastic bags when disposed will take a huge time until they are fully decomposed, I could read from the reference that actually the plastic bags never fully decompose, they just keep turning into smaller pieces, it does this because polyethylene is unable to do biodegradation it just keeps breaking down due to photo degradation that takes there will be them forever but what else can we do when we are done using them, if we do nothing the plastic bags will keep piling up polluting our environment.

Over the last decades they have been burned, this is a huge mistake given that plastic bags come from natural gas which contain hydrogen and carbon, when these bags are burned they produce dioxin and many other substances

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that when inhaled can cause cancer plus carbon dioxide emissions.

Recycling day after day is seeming a more viable way out, new technologies make that polyethylene can be recycled, but there is still a long way to be covered until we can say that recycling polyethylene is really a way out for dealing with the vast amount of plastic bag waste.

Furthermore today is well known that polyethylene bags despite polluting tend to overload landfill and increase dependence on oil, unless in Spain many shops try to incentive the use of bags made from other materials such as cloth, more recyclable plastics or paper. I would also like to describe very briefly the costs accounted for producing a plastic bag, the raw materials make most of the manufacturing costs, (\$.

02 per bag which can make up to 90% of the whole cost), as I could watch in videos of how plastic bags are manufactured this is an extremely automated process, (I could see how a not so big sized machine was able of making 440 plastic bags per minute). The remaining 10% of the cost accounts for labor, capital etc...

Usually this industry works in very low margins and they try to make money with size, (as I could read in the reference, in this second in U.

S they are being 60, 000 plastic bags being used on average, that can make us realize how huge is the market that they are attending, 500 billion to 1 trillion plastic bags are consumed worldwide!!). With the basic notions of the plastic bag production I will go down now to study its carbon footprint. As I already mentioned plastic bags do not biodegrade that encourages that littering is one of the severest problems related to plastic bags. I could read in <https://assignbuster.com/carbon-footprint-of-a-plastic-grocery-bag/>

the reference that the carbon footprint of plastic bag is about 6kg of CO₂e per kg of plastic.

This number comes from the following calculation; In order to produce 1 kg of polyethylene using the process that I already described it is required the equivalent of 2 kg of oil, in order to get the enough energy and raw materials for starting the process. Given that burning 1 kg of oil creates 3 kg of carbon dioxide so burning 2kg will make 6 kg per kg of plastic bag. On average a bag weights 32.5 g, so with 5 plastics bags you are emitting to the environment a kg of CO₂ reading this I can easily understand the actual concern of the society, 1 trillion bags will mean the emission of 200,000,000,000 kg of CO₂.

I would like to quote several facts about plastic that I found quite frightening, “ According to MSN, the production of plastic bags creates enough solid waste per year to fill the Empire State Building two and a half times. The World Watch Institute estimates that in the U.

S. alone, an estimated 12,000,000 barrels of non-renewable petroleum oil are required to produce the 100 billion bags consumed annually. That’s over \$500,000,000 the country could be saving or put towards clean, green energy. The petroleum used to make only 14 plastic bags adorable sea turtles, whales and dolphins, die every year because of plastic bags.

In some parts of the ocean there are six pounds of plastic for every pound of plankton. They can take from 400 to 1,000 years to decompose but their chemicals residues remain for years after that. “. This Facts really make us see that plastic disposal and emissions to the environment are incredibly big,

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the carbon footprint has a huge value, I would deal now with some of the available options to overcome this problems. One of the options for overcoming the environmental problems that people have been suggesting is switching from plastic bags to paper bags, (more biodegradable ones).

Prior to looking at the references for this case I had the believe that paper bags were going to be much cleaner from the emissions point of view, (related to littering plastic bags are much worse as I already believed), but after reading so I am not totally sure; 12 million barrels of oil used for plastic versus 14 million trees used for trees, (tress help to clean the environment so it makes double damage to the nvironment), furthermore the process of creating paper bags creates 70% more air pollution whilst plastic accounts for four times the solid waste.

In relation to recycling the problem with plastic is that not all of them can be recycled and bags cause problems in the machines that recycle them, on the other hand paper can be more easily registered but it would use much more energy, (up to 91 percent). A more extremist suggestion is to just ban plastic bags, I believe that it is too drastic given that the alternative products are much more expensive and there are not much more beneficial for the environment in relative term.

Other Idea that seems more efficient to me will be stop using materials such as polyethylene use other polymers which can be more easily recycled or add additives to the polyethylene so that it is more easily recycled, (even this additions can make the plastic bag biodegradable or compostable).

Moreover bags can also use 50% recycled waste.

From my point of view and the most close way to approach this problem in the short term will be reducing the consumption of plastic bags, (by making people be more aware of the problems that cause), incentivize the re-use of plastic bags, if every bag is used twice the onsumption will be half what will mean that 50% of the actual bags get to the land.