Climate, Plastics, and Reuse

Reuse solutions to the climate and plastics problems

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Upstream

Introduction

According to the Intergovernmental Panel on Climate Change (IPCC), the window for limiting global warming to relatively safe levels is rapidly closing.[1] **Immediate and unprecedented action from every country will be necessary in order to limit the global temperature rise to 1.5°C above pre-industrial levels.** However, there are many political, economic, and behavioral challenges that will need to be overcome.

The global population is estimated to be over 7.7 billion people and is expected to grow by two billion in the next 30 years.[2] Resource use, waste production, and environmental degradation are accelerated by population growth. **They are further exacerbated by consumption habits, which is fueled by the dominance of the linear "take, make, dispose" consumption model that is not ecologically sustainable.**

This consumption-based economic model has created a culture that embraces and rewards the production and consumption of single-use disposable products and packaging. It's a model that shows no signs of slowing down. For example, the petrochemical industry is investing in increased plastic production infrastructure that will lead to the use of even more single-use disposable items in the future.[3]

Plastics play a key role in the "throw-away" economy and the resulting negative consequences, such as the 150 million metric tons of plastic in our oceans as of 2015.[4] **Plastic food and beverage packaging is a major contributor, making up nearly 70% of all litter found on streets and in waterways.[5]** These plastics and other single-use disposable products result in major environmental, social, and economic impacts – which disportionately affect Black & Brown, low-income, and Indigenous communities.

A shift from the current extractive economy to a just and regenerative economy is necessary in order to mitigate the impacts of climate change. Reuse is a critical mechanism for solving the plastics and climate problems, and for facilitating a Just Transition. Legislative and financial support for source reduction and reuse concepts can be substantially improved by incorporating consumption-based emissions inventories (CBEIs) into Climate Action Plans (CAPs) and by emphasizing the climate benefits of those concepts compared to the single-use status quo.

Today's 'throw-away' economy has significantly contributed to the 90% increase in global carbon emissions since 1970.[6] Food systems generate 34% of greenhouse gases caused by human activites.[7] Transport, packaging, retail, processing, consumption and end-of-life disposal make up 29% of the emissions created by food systems – while **food packaging alone accounts for 5.4% of all food system emissions**.[8]

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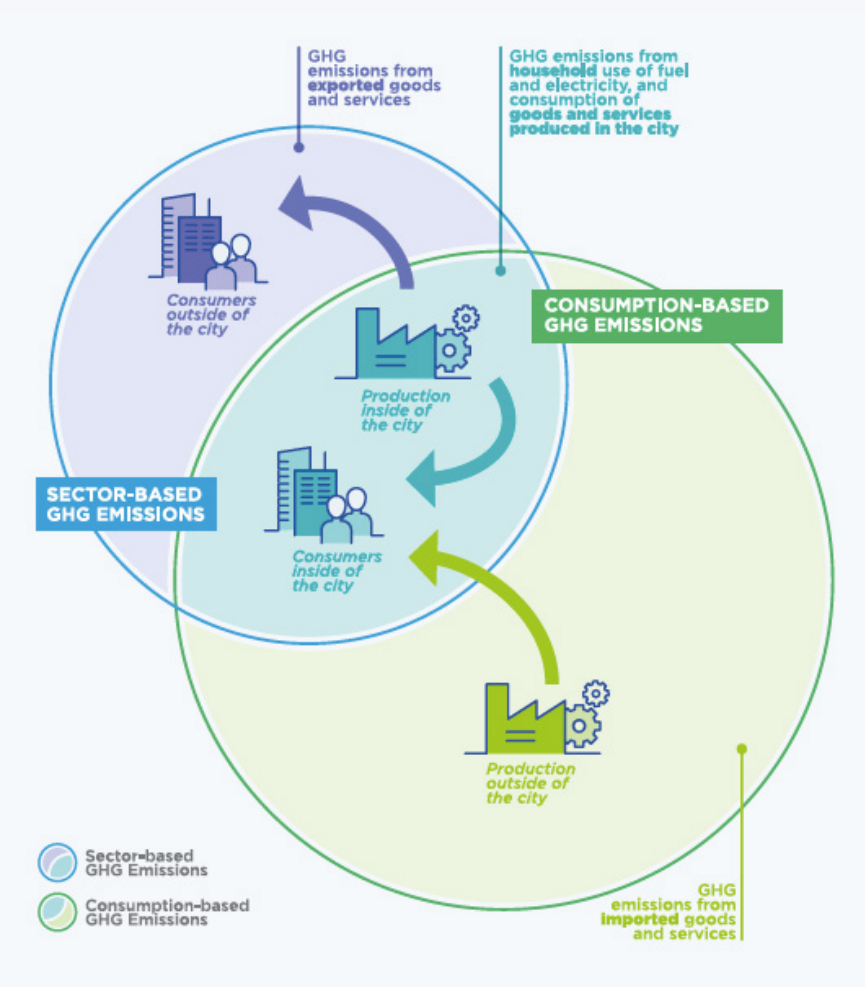
The Role of Consumption-Based Emissions Inventories and Climate Action Plans

Climate Action Plans (CAPs) are voluntary comprehensive roadmaps for reducing greenhouse gas emissions for cities and municipalities, and present an opportunity for source reduction and reuse concepts to be introduced as climate mitigation strategies. Over the past three decades, more than 600 local governments across the United states have adopted their own CAPs.[9] Most focus primarily on reducing emissions from the built environment and transportation, as these are areas cities are on the front lines.[10] Most often, CAPs fail to account for the embedded emissions of the products and services people use within a jurisdiction.

This is where consumption-based emissions inventories (CBEIs) have significant value, as they account for all greenhouse gas emissions produced from imported goods and services – with sector-based emissions inventories only accounting for emissions from exported goods and services.[11] Specifically, CBEIs calculate the emissions associated with producing, transporting, using, and disposing of products and services.

Based on an analysis completed by C40, CBEIs have uncovered as much as 60% more emissions than currently estimated for cities around the world.[12] The dramatic increase in emissions reflected by CBEIs indicates a need to re-evaluate current climate mitigation strategies in order to address the additional emissions related to consumption. Replacing single-use products and packaging with reusable formats can significantly reduce consumption-based emissions and provide one mitigation strategy. To get an idea of how much benefit transitioning from a throw away culture to a reuse economy can help to reduce consumption-based emissions, we've considered both the replacement of single-use plastic and the potential emissions reductions for disposables in food service.



Source: resourcecentre.c40.org

The Climate Benefits of Reuse

The plastic pollution crisis is overwhelming the Earth's oceans and is a significant and growing threat to the Earth's climate. Greenhouse gas emissions from the plastic life cycle are threatening the ability of the global community to keep global temperature rise below 1.5°C. If plastic production and use continue to grow, as planned, emissions could reach 1.34 gigatons per year by 2030 – equivalent to emissions released by more than 295 new (500-megawatt) coal-fired power plants. Nearly each piece of plastic begins as a fossil fuel, and these greenhouse gas emissions are emitted at each stage of the plastic lifecycle:

1. fossil fuel extraction and transport
2. plastic refining and manufacture
3. managing plastic waste, and
4. its ongoing impact in our oceans, waterways, and landscape.

As the demand for single-use plastics increases, a large petrochemical infrastructure buildout is taking place throughout the United States. Since 2019, there have been at least 42 new plastics facilities that have opened, been under construction, or in the permitting process.[13] These new plants will release an additional 55 million tons of greenhouse gasses, which is equivalent to the average emissions from 116 average-sized (500-megawatt) coal-fired power plants.[14]

As the petrochemical industry forecasts and begins to see decreasing demand for fossil fuels to power cars and provide energy, it is increasingly focusing on plastic packaging, an end market for extracted hydrocarbons. Plastic packaging is leading to this increased demand for single-use plastics, currently representing 40% of the total production of plastic products.[15]

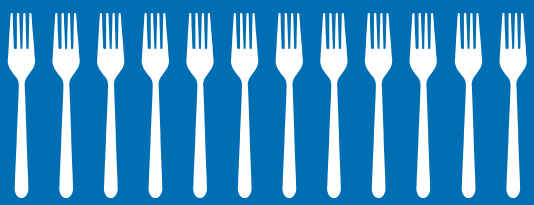
Plastic packaging is typically single-use, ubiquitous, and extremely difficult to recycle. Thus, reuse offers an alternative that can help "turn off the tap." Reusables present an opportunity to slow down the demand for single-use plastics and the overall expansion of the plastics industry; thus resulting in a reduction in overall greenhouse gas emissions.

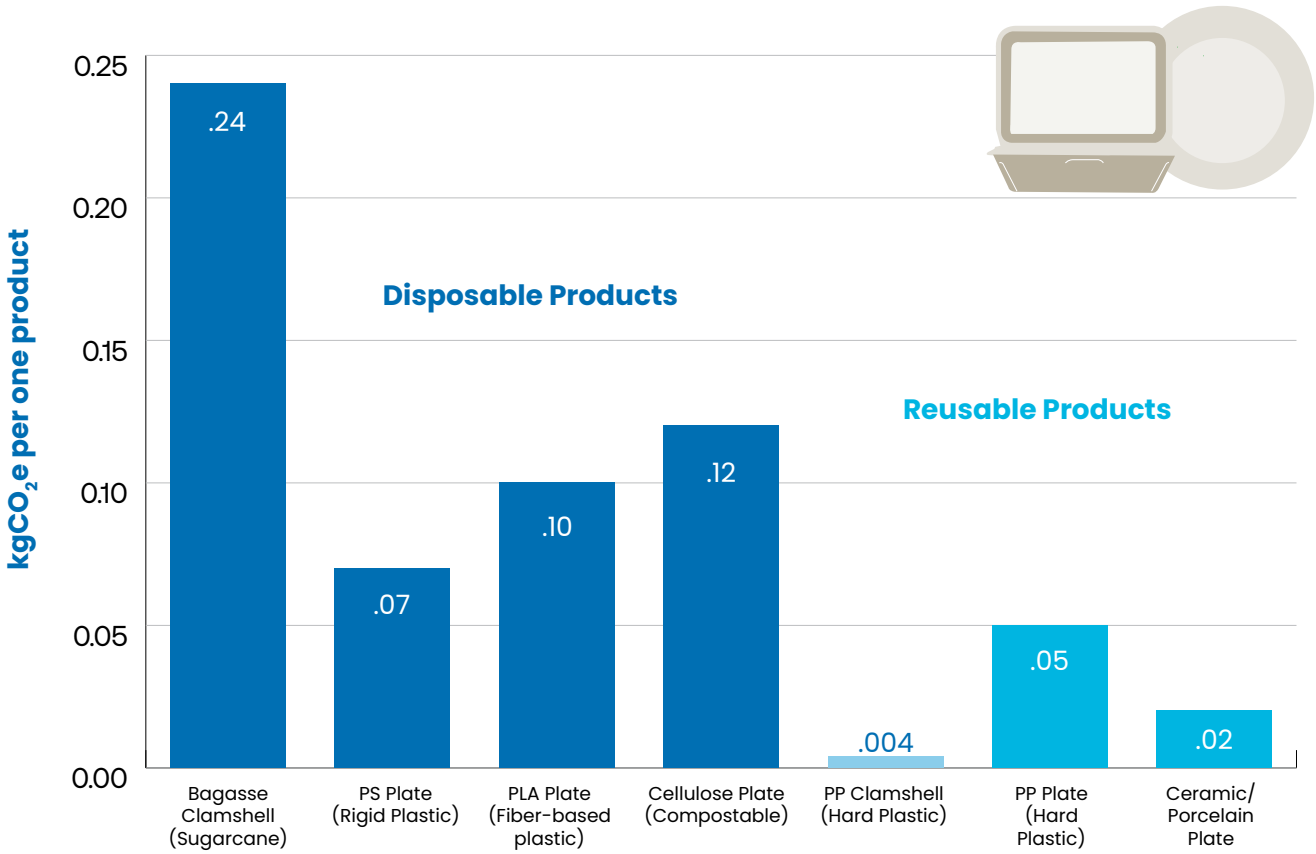
Reuse also reduces greenhouse gas emissions by eliminating the need for non-plastic, single-use alternatives. For example, the lifecycle CO_2e emissions from disposable paper, plastic, and bioplastic cups are three to 10 times greater than those of reusable ceramic, stainless steel, and glass.[16]

In addition, reusable food serviceware beats single-use alternatives through every environmental measure (climate, water, land use, waste, pollution). Reusables always hit a break-even point where they outperform the disposables, and the benefits to the environment accrue with each additional use past that point.[17] For cups, the break-even point is between two and 122 uses; for plates and clamshells it's between three and 50 uses; and for utensils, only two uses of a reusable are required.[18]

After only two washes stainless steel cutlery breaks even with disposable cutlery for environmental impacts.

After that, every use increases the environmental benefits.




kgCO2e per one product
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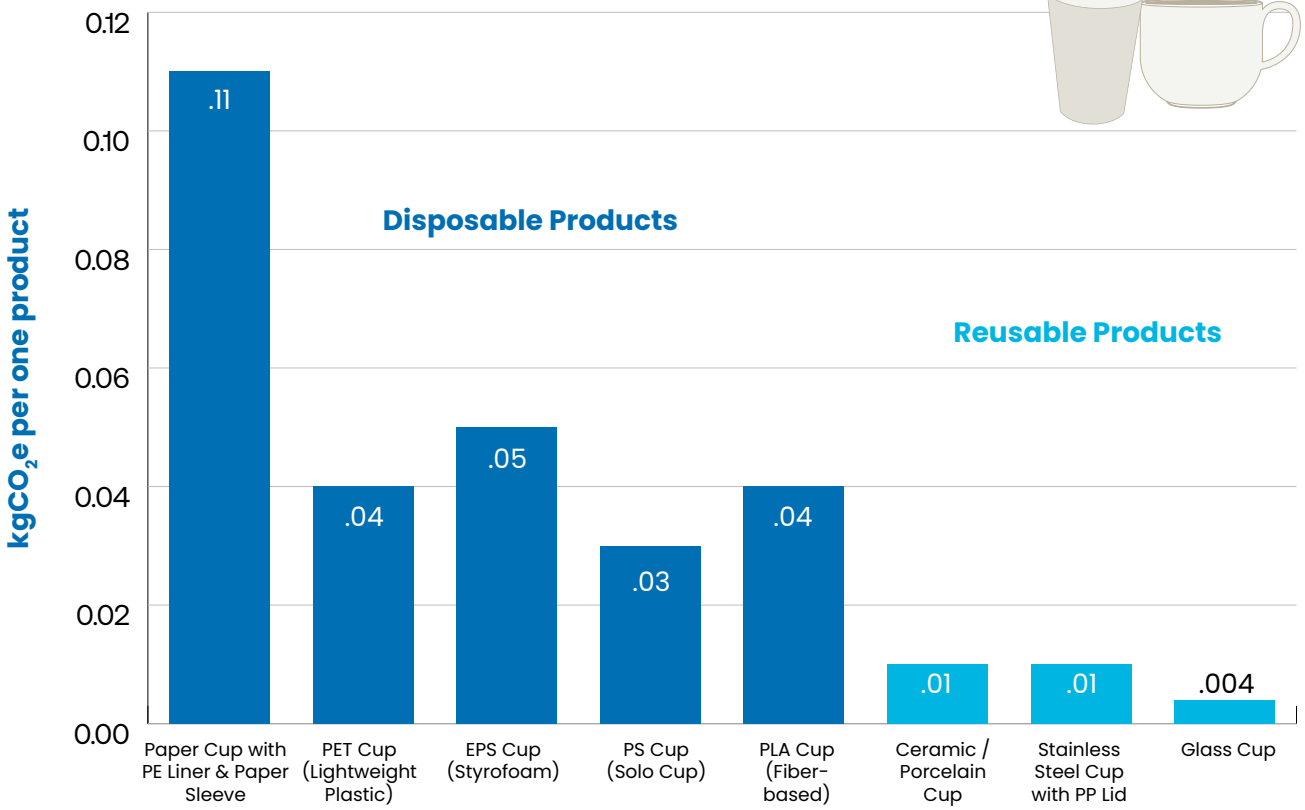
Disposable Products
Reusable Products
Bagasse Clamshell (Sugarcane)
PS Plate (Rigid Plastic)
PLA Plate (Fiber-based plastic)
Cellulose Plate (Compostable)
PP Clamshell (Hard Plastic)
PP Plate (Hard Plastic)
Ceramic/ Porcelain Plate


kgCO2e per one product
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Disposable Products
Reusable Products
Paper Cup with PE Liner & Paper Sleeve
PET Cup (Lightweight Plastic)
EPS Cup (Styrofoam)
PS Cup (Solo Cup)
PLA Cup (Fiber-based)
Ceramic / Porcelain Cup
Stainless Steel Cup with PP Lid
Glass Cup

Forward Thinking Cities

The existing CAPS adopted by local governments across the United States differ in their focus on how to decrease overall greenhouse gas emissions. Only a few key 'forward-thinking' cities have evaluated CBEIs and prioritized source reduction and reuse as key climate mitigation strategies.

One way cities have incorporated source reduction and reuse into their CAP, is by adopting a reuse target to help them achieve their overarching CAP goals. For example, the City and County of Los Angeles prioritized source reduction and reuse as a major pillar of their new plan. They have two key goals:

1. increase the proportion of waste products and recyclables productively reused and / or repurposed within L.A. County to at least 25% by 2025, and 50% by 2035;[20] and
2. reduce municipal solid waste generation per capita by at least 15% by 2030, including phasing out single-use plastics by 2028.[21]

Case Study:

Potential GHG Reductions for a City Switching 100% to Reusables

Howard City is a hypothetical city on the east coast of the United States with a population of 800,000. As a tourist destination, Howard City has an expansive food service industry that relies heavily on single-use disposable foodware. The Mayor of Howard City is attempting to gain a better understanding of the total carbon emissions generated yearly due to disposable foodware, and what emissions reductions could be achieved by switching to 100% reusable.

Disposable Calculation

Assuming each person in Howard City uses 1 PLA plate, 1 sugarcane clamshell, and 1 paper cup with PE liner & paper sleeve a day, for one year:

131,400 metric tons of CO_2e is released per year, if every resident in Howard City uses 3 disposable foodware items a day, for one year.

Reusables Calculation

Assuming each person in Howard City uses 1 Reusable plate (ceramic/porcelain), 1 reusable Clamshell (PP), and 1 glass cup a day, for one year:

9,928 metric tons of CO_2e is released per year, if every resident in Howard City uses 3 reusable foodware items a day, for one year.

Total emissions reductions of 121,472 metric tons of CO_2e with switch to reusables

This is the equivalent to:[19]

- Greenhouse gas emissions from **26,173 gasoline-powered passenger vehicles** driven for one year
- CO_2 emissions from **13,668,392 gallons of gasoline consumed**
- CO_2 emissions from **134,396,635 pounds of coal burned**
- CO_2 emissions from **23,635 homes' electricity use** for one year
- CO_2 emissions from **281,231 barrels of oil** consumed
- Greenhouse gas emissions avoided by operating **33 wind turbines** for a year

San Francisco adopted a similar strategy when they reviewed and updated their CAP in 2021, by prioritizing responsible production and consumption. After developing a CBEI, San Francisco recognized the impacts non-reusable foodware have on the environment and pledged to reduce the use of non-reusable foodware by requiring, incentivizing, supporting and/or promoting reusables for on and off-site dining (to-go or delivery), by 2023.[22] In addition, San Francisco pledged to expand outreach, education, and incentives for paper and plastic use reduction by supporting businesses and institutions in their transition to more reusable and plastic-free packaging.[23]

Other cities aren't quite ready to introduce specific reuse targets into their CAPs. Boston's 2019 climate action plan, for example, prioritizes the need for a CBEI to understand the emissions being driven by consumption.[24] Philadelphia's 2021 CAP emphasizes the need for reuse pilot and educational programs to engage residents, businesses, and institutions in reducing consumption and expanding circular materials management systems.[25] These are just a few model examples of how cities have approached incorporating source reduction and reuse as climate mitigation strategies.

Environmental Justice & Reuse

Black & Brown, low-income, and Indigenous communities are disproportionately impacted by the effects of climate change. These same communities are also disproportionately and directly impacted by polluting industries – leading to a variety of serious health impacts.

Environmental justice refers to the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations and policies.[26] This is achieved when everyone enjoys the same degree of protection from the environment and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work. However, the plastics industry has been a major contributor to the vast environmental injustices that occur throughout the United States.

Plastics pollution is not equally shared in the US, with 90% of the reported pollution from US plastics manufacturing being released into just 18 communities located mostly in Louisiana and Texas.[27] The people who live within three miles of these petrochemical clusters earn 28% less than the average US household and are 67% more likely to be people of color.[28]

Additional impacts occur during the waste management phase. For example, waste incineration – often used to prevent waste from going to landfills – is usually located in environmental justice communities. In 2015, the US EPA reported plastic incineration released 5.9 million metric tons of CO_2e.[29] These incinerators are not only emitting harmful pollutants in the air when they are burning the waste, but they also bring thousands of heavy diesel trucks through these communities each day to transport the waste being produced.[30] This exposes residents to toxic air emissions and leads to a disproportionate number of health issues, like respiratory problems, birth defects, and cancer.

These environmental issues are exacerbated by the current extractive-based global economy, which fails to prioritize justice and equity concepts. A movement towards a "Just Transition" – a political and economic power shift from an extractive economy to a regenerative economy that is just and equitable – is required in order to mitigate these environmental injustices.[31]

Reuse offers a pathway towards a just transition, as it reduces the overall demand for single-use products and can help "turn off the tap" for plastics. Also, non-toxic reuse helps reduce overall pollution, toxic chemical exposure, and litter and can greatly reduce overall litter and waste management costs for local businesses and communities. Instead, reuse fosters strong and resilient local economies where the logistics of reusables collection, washing, and redistribution provides safe jobs. Lastly, reusables have lower greenhouse gas emissions over their life-cycle, which directly benefits environmental justice communities who are impacted the most by pollution and the effects of climate change.

Conclusion

Often overlooked as a viable climate mitigation strategy, source reduction and reuse are valuable tools for cities and municipalities to achieve the goals laid out in their climate action plans (CAPs). Jurisdictions should look to incorporate consumption-based emissions inventories (CBEIs) into their CAPs, and emphasize the climate benefits of source reduction and reuse compared to the single-use status quo. In doing so, policymakers would develop a better understanding of the embedded emissions associated with the products and services being consumed by their residents, thus leading to the development of more robust climate mitigation strategies like reuse solutions.

Any solutions to the climate and plastics problem must reduce plastic production and use, in order to address the climate impacts created throughout the plastics life cycle. These solutions require urgent support from policymakers and those in global grassroots movements. Source reduction and reuse help stop the expansion of petrochemical and plastic production, thus keeping fossil fuels in the ground and alleviating any climate impacts that would have otherwise been produced. Reuse solutions offer the ability to create a more sustainable economic model, reduce overall greenhouse gas emissions, and create a pathway towards a just transition.

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Endnotes

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