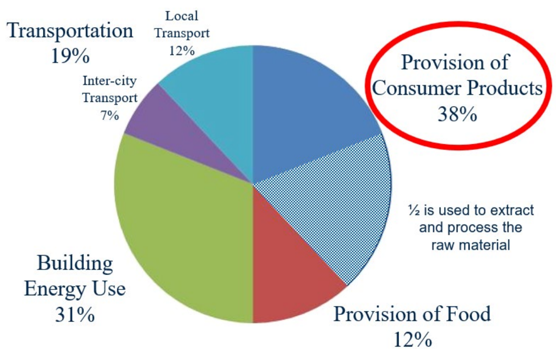
Comments on the CLCPA Scoping Plan
Chris Burger

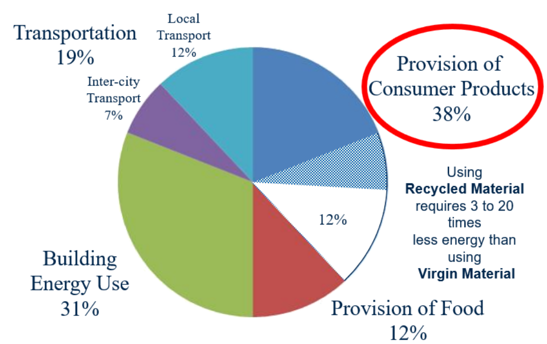
The pursuit of zero waste[1] is, perhaps, the single most effective way of addressing climate change. This is not to preclude the other efforts to reduce greenhouse gases, but dollar for dollar, a plan to recover and recycle the consumer products we use and compost the organics from our waste stream is the most cost-effective strategy.

Reducing greenhouse gases by reducing the extraction and processing of raw materials

A considerable amount of energy is utilized to extract and process the raw material used in our consumer products and, while recycling itself requires energy, far less energy is consumed (depending upon the material) then using virgin material.

EPA evaluated U.S. greenhouse gas emissions using a "system-based view," where each system represents and comprises all the parts of the economy working to fulfill a particular need.[2] This can be viewed as "embedded energy." According to this analysis, about half of all greenhouse gas emissions in the U.S. are derived from the extraction, production, distribution, consumption and disposal of products, packaging and food. These emissions could be significantly reduced (more than half) through implementation of Zero Waste policies and programs.





The plan should identify strategies for reducing energy consumption in this area. Our recycling infrastructure needs to be strengthened; preferably through an Extended Producer Responsibility (EPR) program.[3]

Reducing greenhouse gases by eliminating organics in landfills

While the plan calls for methane recovery at landfills, such efforts are only about 25% effective if looked at over the life of a landfill. A far better and more effective approach would be to ban organics from landfills to begin with as organics are the prime culprit in the production or methane. A series of recent

[1] "Zero Waste: The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health." https://zwia.org/zero-waste-definition/
[2] "Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices," U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response, September 2009 https://www.epa.gov/sites/production/files/documents/ghg-land-materials-management.pdf
[3] https://www.nysenate.gov/newsroom/press-releases/todd-kaminsky/kaminsky-englebright-introduce-bill-make-packaging-producers

studies, employing direct measurement of methane plumes via aircraft downwind of landfills, have shown that measured emissions average ***over twice*** the modeled emissions reported in current GHG inventories.[4][5][6][7][8][9] Based on this growing set of data, landfill methane emissions are comparable to the methane emissions from the entire agricultural sector.[10]

Addressing methane is critically important to combating climate change. Over a 20-year period, methane is over 80 times as potent as carbon dioxide and is the 2nd largest driver of anthropogenic climate change.[11] According to the United Nations Environmental Programme (UNEP), "cutting methane is the strongest lever we have to slow climate change over the next 25 years."[12] In the near-term, reducing emissions of Short-Lived Climate Pollutants like methane is more effective than reducing CO_2.[13] The newly released IPCC 6th Assessment Report notes that methane reduction "stands out as an option that combines near- and long-term gains on surface temperature and leads to air quality benefits by reducing surface ozone levels globally."[14]

Within the waste sector, the primary focus must be on the diversion of biodegradable organics from landfills. Aligned with UNEP's calls for "no landfill of organic waste,"[15] diversion is the only approach

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[4] Peischl et al. (2013) Quantifying sources of methane using light alkanes in the Los Angeles basin, California, *Journal of Geophysical Research: Atmospheres*, **118**: 4974-4990. https://doi.org/10.1002/jgrd.50413

[5] Wecht *et al.* (2014) Spatially resolving methane emissions in California: constraints from the CalNex aircraft campaign and from present (GOSAT, TES) and future (TROPOMI, geostationary) satellite observations, *Atmos. Chem. Phys.* **14**, 8173-8184. https://www.atmos-chem-phys.net/14/8173/2014/acp-14-8173-2014.pdf

[6] Cambaliza *et al.* (2015) Quantification and source apportionment of the methane emission flux from the city of Indianapolis, *Elementa: Science of the Anthropocene*, **3**:37. https://www.elementascience.org/articles/10.12952/journal.elementa.000037/

[7] Cambaliza *et al.* (2017) Field measurements and modeling to resolve m^2 to km^2 CH_4 emissions for a complex urban source: An Indiana landfill study, *Elem Sci Anth*, **5**: 36, https://doi.org/10.1525/elementa.145

[8] Ren *et al.* (2018) Methane Emissions From the Baltimore-Washington Area Based on Airborne Observations: Comparison to Emissions Inventories, *Journal of Geophysical Research: Atmospheres*, **123**, 8869–8882. https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2018JD028851

[9] Jeong, S., et al. (2017), Estimating methane emissions from biological and fossil-fuel sources in the San Francisco Bay Area, *Geophys. Res. Lett.*, **44**, 486–495 https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2016GL071794

[10] Total 2019 U.S. landfill methane emissions, as reported in U.S. EPA (2021) were 4.58 MMT CH_4. On average, measured landfill emissions from recent data referenced herein were 2.3X greater than reported. Adjusting U.S. inventory with this factor yields total landfill emissions of 10.5 MMT CH_4. Total agricultural sector emissions, inclusive of enteric fermentation, manure management, rice cultivation, and field burning of agricultural residues were 10.26 MMT CH_4.

[11] IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press. https://www.ipcc.ch/report/ar6/wg1/#FullReport

[12] https://www.unep.org/news-and-stories/press-release/global-assessment-urgent-steps-must-be-taken-reduce-methane

United Nations Environmental Program (UNEP) (2021) *Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions*, https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions

[13] Hu *et al.* (2013) Mitigation of short-lived climate pollutants slows sea-level rise, *Nature Climate Change,* 3, 730-734. https://www.nature.com/articles/nclimate1869

[14] IPCC (2021)

[15] See p. 16 of UNEP (2021).

that can avoid 100% of landfill methane. Establishing organics diversion infrastructure today will quickly reduce methane generation at the source. Conversely, delaying action only adds to our future methane debt. Today's waste inevitably becomes tomorrow's emissions. Diverting organics today breaks this cycle.

Technologies to divert biodegradable wastes from landfills are commercially available and in widespread use today. The extent of their existing use is, in large part, directly a result of public policy. While the relative merits of each of these technologies are beyond the scope of this letter, the severity and magnitude of the climate challenge will require a suite of solutions, each of which is capable of being developed and applied in an environmentally protective manner.

Better control of methane emissions from landfills also is important, but not yet demonstrated as effective. California implemented the most stringent landfill gas control regulations to date, yet a team of NASA and university researchers still identified certain California landfills as "super-emitters" of methane,[16] even while fully in compliance with the state's strict rules. Additional controls on existing landfills should therefore be focused on historically placed waste which cannot be diverted and augmented with more accurate and comprehensive monitoring.

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[16] Duren *et al.*, Caliornia's Methane Super-emitters, *Nature*, 2019, 575:180-185. https://www.nature.com/articles/s41586-019-1720-3.