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SDG 12: RESPONSIBLE CONSUMPTION AND PRODUCTION

by LeRoy Paddock

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SUMMARY

In 2015, the United Nations Member States, including the United States, unanimously approved 17 Sustainable Development Goals (SDGs) to be achieved by 2030. In a forthcoming book, leading legal scholars examine each of the SDGs and recommend a suite of government, private-sector, and civil society actions to help the United States achieve these goals. This Article is adapted from Chapter 12 of that book, *Governing for Sustainability* (John C. Dernbach & Scott E. Schang eds., ELI Press, forthcoming 2023).

I. Introduction

"Worldwide consumption and production—a driving force of the global economy—rest on the use of the natural environment and resources in a way that continues to have destructive impacts on the planet," according to the United Nations (U.N.).[1] Thus, "achieving economic growth and sustainable development requires that we urgently reduce our ecological footprint by changing the way we produce and consume goods."[2] Moreover, at every step of the production and consumption process, "from extraction through disposal, greenhouse gases (GHGs) are emitted. When a product ends up in a landfill facility, the GHG emissions that went into it—the embedded emissions—like the product itself, become waste."[3] The United States leads the world in consumption of natural resources,[4] suggesting that achieving the Goal 12 targets will be very difficult in the absence of major changes in consumption and production in this country.

These changes will require new legislation at all levels of government and new private actions focusing on materials conservation and promoting a more circular economy—that is, an economy in which products are designed from the start to be reused or repurposed and that has in place mechanisms to help ensure that these outcomes occur.[5] Among the key needed changes are wider adoption of extended producer responsibility (EPR) laws, incorporation of materials conservation and the circular economy in procurement programs, and action by the private sector to advance materials conservation and the circular economy.

This Article focuses on materials conservation and the circular economy in the United States—issues that most directly address Goal 12 Targets 12.1, 12.2, and 12.5 through 12.8 (see Box 1). It will discuss the status of materials conservation efforts in the United States, note the growing interest in the circular economy, and suggest ways that various levels of government as well as the private sector can significantly enhance materials conservation efforts and implement circular economy approaches in the country to aid in achieving the Goal 12 targets.[6]

1. *See* U.N., *Goal 12: Ensuring Sustainable Consumption and Production Patterns*, https://www.un.org/sustainabledevelopment/sustainable-consumption-production/ (last visited June 25, 2022).
2. *See* U.N. Development Programme Seoul Policy Centre for Knowledge Exchange Through SDG Partnerships, *Goal 12: Responsible Consumption and Production*, https://www1.undp.org/content/seoul_policy_center/en/home/sustainable-development-goals/goal-12-responsible-consumption-and-production.html (last visited June 25, 2022).
3. Michael Burger, *Materials Conservation and Solid Waste*, *in* Legal Pathways to Deep Decarbonization in the United States 183 (Michael B. Gerrard & John C. Dernbach eds., ELI Press 2019).
4. *See* Amit Kapur & Thomas E. Graedel, *Materials: From High Consumption to More Sustainable Resource Use*, *in* Agenda for a Sustainable America 159, 159 (John C. Dernbach ed., ELI Press 2009).
5. The concept of a circular economy is discussed in more detail later in the Article. For more information on a circular economy, see Ellen MacArthur Foundation, *What Is a Circular Economy?*, https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview (last visited June 25, 2022).
6. The United States reports very little data on Sustainable Development Goal 12. The most prominent reported data show a continuing increase in materials consumption per capita. *See* U.S. National Statistics for the U.N. Sustainable

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Box 1. Goal 12 Targets

12.1 Implement the 10-year sustainable consumption and production framework
12.2 Encourage sustainable management and use of natural resources
12.3 Halve global per capita food waste
12.4 Ensure responsible management of chemicals and waste
12.5 Substantially reduce waste generation
12.6 Encourage companies to adopt sustainable practices and sustainability reporting
12.7 Promote sustainable public procurement practices
12.8 Promote universal understanding of sustainable lifestyles
12.a Support developing countries' scientific and technological capacity for sustainable consumption and production
12.b Develop and implement tools to monitor sustainable tourism
12.c Remove market distortions that encourage wasteful consumption

Source: SDG Tracker, *Sustainable Development Goal 12*, https://sdgtracker.org/sustainable-consumption-production.

Using fewer inputs in product manufacturing, designing products for reuse, repairing and repurposing products, and creating the circumstances for product circularity is important in preserving resources for the future. These steps can also advance Goal 7 (Affordable and Clean Energy) by facilitating energy efficiency; Goal 8 (Decent Work and Economic Growth) by creating new types of jobs in product recovery and reuse; Goal 9 (Industry, Innovation, and Infrastructure) by promoting new types of businesses; Goal 13 (Climate Action) by reducing GHG emissions from raw materials extraction, product manufacturing, and product disposal; and Goal 17 (Partnerships for the Goals) by promoting new partnerships among government, businesses, and nongovernmental organizations.

II. Materials Usage in the United States

U.S. materials consumption is high by a variety of measures. In 2017, U.S. per capita materials consumption including fuels was 18.6 metric tons, having increased by 74% since 1970. U.S. consumption was 42% higher than in Europe.[7] Total generation of municipal solid waste in 2018 was 292 million tons, up almost 24 million tons from 2017.[8] About 140 million tons of these wastes still are disposed in landfills.[9] In 1900, 41% of the materials used in the United States were renewable (e.g., agricultural, fishery, and forestry products); by 1995, only 6% of materials consumed were renewable. The majority of materials now consumed in the United States are nonrenewable, including metals, minerals, and fossil-fuel derived products.[10] In 2012, the United States, with less than 5% of the world's population, used one-third of the world's paper, a quarter of the world's oil, 27% of the aluminum, and 19% of the copper, among other resources.[11] These figures are all indicative of the high levels of commodities consumption in the United States as shown in Figure 1.

The U.S. Environmental Protection Agency (EPA) has observed:

> Climate change, energy policy, and the economy all create headlines, but the stories that follow often miss the point that all these issues are, in part, symptoms of how we use materials. It is becoming increasingly clear that how we use materials is a large factor in energy use, climate change and the economy, and an important issue in its own right. Therefore, if we want to address the issues behind the headlines, and if we want the U.S. to be competitive in the world economy, sustainable use of materials must be our goal.[12]

III. Addressing the Materials Usage Problem

Important progress in dematerialization has been made in some areas over the past decade and more. This progress is based on reduction in paper use driven by wide adoption of computer technology, miniaturization enabled by nanotechnologies, lowered demand for coal mining because of the rapid expansion of wind and solar energy generation, longer vehicle lifetimes due to more reliable components,

Development Goals, *12: Ensure Sustainable Consumption and Production Patterns*, https://sdg.data.gov/responsible-consumption-and-production/ (last visited June 25, 2022).

7. Center for Sustainable Systems, University of Michigan, U.S. Material Use Factsheet (2022), https://css.umich.edu/publications/factsheets/material-resources/us-material-use-factsheet.
8. *See* U.S. Environmental Protection Agency, *National Overview: Facts and Figures on Materials, Wastes, and Recycling*, https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials (last updated July 14, 2021).
9. *Id.*
10. Although material consumption is particularly problematic in the United States, the issue is worldwide. The European Union (EU) in its Circular Economy Plan noted, "There is only one planet Earth, yet by 2050, the world will be consuming as if there were three." European Commission, Circular Economy Action Plan 4 (2020) [hereinafter Circular Economy Action Plan], https://ec.europa.eu/environment/pdf/circular-economy/new_circular_economy_action_plan.pdf. However, per capita materials consumption rates have dramatically increased. The U.N. reports that "in 1990 some 8.1 tons of natural resources were used to satisfy a person's need, while in 2015, almost 12 tons of resources were extracted per person." *See* U.N. Statistics Division, *12: Ensure Sustainable Consumption and Production Patterns*, https://unstats.un.org/sdgs/report/2019/goal-12/ (last visited June 25, 2022). The EU Circular Economy Plan also points out that "half of total greenhouse gas emissions and more than 90% of biodiversity loss and water stress come from resource extraction and processing." *See* Press Release, U.N. Environment Programme (UNEP), UN Calls for Urgent Rethink as Resource Use Skyrockets (Mar. 12, 2019), https://www.unep.org/news-and-stories/press-release/un-calls-urgent-rethink-resource-use-skyrockets. The U.N. reports that "[f]or all types of materials, developed countries have at least double the per capita footprint of developing countries. In particular, the material footprint for fossil fuels is more than four times higher for developed than developing countries." *See* U.N., The Sustainable Development Goals Report 2018, at 26 (2018). At the same time, developing countries often disproportionately suffer the environmental consequences of materials extraction and production.
11. *See Use It and Lose It: The Outsize Effect of U.S. Consumption on the Environment*, Sci. Am., Sept. 14, 2012, https://www.scientificamerican.com/article/american-consumption-habits/.
12. U.S. EPA, Sustainable Materials Management: The Road Ahead 1 (2009).

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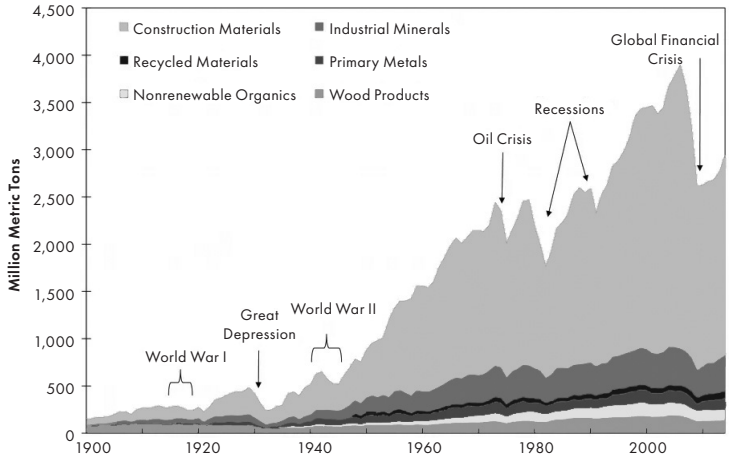
Figure 1: U.S. Nonfuel Material Consumption (1900-2014)



Source: Center for Sustainable Systems, University of Michigan, U.S. Material Use Factsheet , Pub. No. CSS05-18 (2022).

Box 2. Materials use now challenges the capacity of the Earth

"Our use of materials now challenges the capacity of the Earth—air, water and land—to withstand the many resulting environmental problems. This situation fundamentally affects many other aspects of our future, such as the economy, energy, and climate. We need to fulfill our human needs and prosper while using less material, reducing toxics, and recovering more. Business as usual cannot continue."

Source: U.S. EPA, Sustainable Materials Management: The Road Ahead 1 (2009).

and many other developments. Still, much remains to be done to achieve Goal 12 targets.[13] Some of this needed progress can occur through the use of emerging technologies and innovations led by the private sector and pushed by consumer demand; other progress will need to be driven by government actions including new legislation and procurement policies.

Although some legislation at the federal, state, and local governmental levels address materials usage and disposal, these regimes are insufficient to deal with the scale of the problem. Waste management is addressed at the federal level in the Resource Conservation and Recovery Act (RCRA), but the Act focuses principally on properly containing, labeling, storing, transporting, and disposing of hazardous waste, as well as cleaning up spills.[14] RCRA regulates hazardous wastes even if they are reused or recycled.[15] The Act mostly leaves management of solid waste to state and local governments. Recycling programs for solid waste, primarily funded and managed by state and local government programs, have long been supported. Until relatively recently, producers were not responsible for downstream management of their materials and products. EPA has for many years had voluntary programs such as Design for the Environment[16] that address product design, and voluntary pollution prevention programs for reducing the use of materials, but these initiatives have had little potential of being transformational. The Design for the Environment Program has been incorporated into the Agency's Safer Choice program.[17] There is no national EPR legislation.

States and local governments have addressed materials usage in a variety of ways. For example, state and local governments have adopted waste management hierarchies that support reuse and recycling of materials rather than incineration or landfilling. Unfortunately, several of these state and local recycling programs are facing increasing challenges in finding viable markets for recycled materials.[18] Ten states have bottle deposit laws that are designed to encourage return of beverage containers.[19] About half of the states have enacted electronics waste EPR laws, most of which require manufacturers of certain types of electronics products to arrange for those products to be returned for recycling.[20] In June

13. Andrew McAfee asserts that the world now is "post-peak in its exploitation of the Earth." He notes that his "argument is *not* that everything is good enough now, or that there's nothing to be concerned about." Rather he says that "we know how to succeed with this work." He attributes this progress to innovation possible through capitalism, technological developments, public awareness, and responsive governments—the "four Horsemen of the Optimist." He notes that when all four are in place "countries can improve both the human condition and the state of nature. When the four horsemen don't ride together, people and the environment suffer." Andrew McAfee, More From Less: The Surprising Story of How We Learned to Prosper Using Fewer Resources—And What Happens Next (2019).
14. 42 U.S.C. §§6901 et seq.
15. *See* U.S. EPA, *Regulatory Exclusions and Alternative Standards of Materials, Solid Wastes, and Hazardous Wastes*, https://www.epa.gov/hw/regulatory-exclusions-and-alternative-standards-recycling-materials-solid-wastes-and-hazardous (last updated May 16, 2022).
16. *See* U.S. EPA, *Safer Choice*, https://www.epa.gov/saferchoice (last updated June 1, 2022).
17. *See id.*; U.S. EPA, *History of Safer Choice and Design for the Environment*, https://www.epa.gov/saferchoice/history-safer-choice-and-design-environment (last updated June 16, 2021).
18. *See, e.g.*, Cheryl Katz, *Piling Up: How China's Ban on Importing Waste Has Stalled Global Recycling*, Yale Env't 360, Mar. 7, 2019, https://e360.yale.edu/features/piling-up-how-chinas-ban-on-importing-waste-has-stalled-global-recycling.
19. *See State Beverage Container Deposit Laws*, Nat'l Conf. State Legislatures, Mar. 13, 2020, https://www.ncsl.org/research/environment-and-natural-resources/state-beverage-container-laws.aspx.
20. *See* Electronics Take Back Coalition, *State Legislation*, http://www.electronicstakeback.com/promote-good-laws/state-legislation/ (last visited June 25, 2022). Several states have adopted EPR legislation covering other materials including batteries, paint, pharmaceuticals, and mattresses with more than 120 EPR laws in effect. *See* Product Stewardship Institute, https://www.productstewardship.us/ (last visited June 25, 2022). States and localities also have enacted plastic bag and Styrofoam bans or fees recently. *See* Restaurant

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2021, Maine became the first state to adopt EPR legislation for plastics and packaging materials. The legislation requires producers to fund stewardship organizations to collect and recycle these materials.[21] This law follows the model typically used for state electronic waste programs, in which third parties collect the wastes and manage the reuse or recycling process. Oregon followed in August 2021 with the passage of the Plastic Pollution and Recycling Management Act, which requires "brand owners" selling packaging, paper products, and food service ware in the state to join stewardship organizations and pay fees to support recycling programs.[22] Plastics or packaging EPR bills were also proposed in at least five other states[23] and at the federal level.[24] A few states have banned the use of some heavy metals in certain types of products such as inks and dyes, and some others charge fees or deposits to incentivize return and recycling of some products such as batteries and tires. While valuable, they fall far short of a sustainable materials usage policy for the United States. To remedy this situation the federal government, states, municipalities, companies, and consumers must reimagine approaches to materials conservation that incorporate the concepts of EPR and the circular economy.

IV. Materials Conservation Policy Options

Materials conservation can be driven by a variety of policies that shift from the make-use-dispose model of the "linear" economy to a circular economy, where producers take more responsibility for the fate of their products, and where consumers are more aware of how to conserve materials. Such measures include EPR laws and approaches that support reduction of inputs, remanufacturing, product repair and reuse, and waste exchanges;[25] a price on GHG emissions that reaches product manufacturers and those who dispose of waste; energy efficiency requirements that create economic incentives for conserving materials; and design-for-the-environment programs that provide resources to assist companies to redesign their products to achieve environmental goals. This shift from a linear economy will require government action, including new laws and regulations. However, reaching the full potential of materials conservation and achieving the targets within Goal 12 will also require a shift in societal norms that drive much more engagement by companies and consumers.

The road map for the needed fundamental changes is becoming clearer. The European Union (EU), for example, has been more receptive to EPR than the United States. The EU adopted a Packaging Directive in 1994 aimed at reducing packaging waste and encouraging recycling.[26] In 2000, the EU adopted the End-of-Life Vehicle Directive that focuses on recycling of vehicles and reducing the use of heavy metals.[27] The 2012 Waste Electrical and Electronic Equipment Directive[28] deals with waste from a broad range of equipment, requiring collection and reuse or recycling where possible and separation and containment of hazardous wastes. The EU also restricts the use of certain hazardous substances in electrical and electronic products (RoHS) and requires these products to affix a "CE" (conformité européenne) marking to products to indicate they are in compliance with RoHS.[29] The CE designation indicates the product meets EU health and environmental standards including product standards such as RoHS.[30] The 2011 Ecodesign Directive sets out design standards for energy-related products and requires them to also be labeled with the CE symbol.[31] More recently, the EU has adopted a Circular Economy Action Plan.[32]

The need for materials conservation in the United States has been recognized for many years, manifested early on by the efforts of the carpet company Interface to recycle floor coverings, and by the cradle-to-cradle design approach developed by Professor Michael Braungart[33] and William McDonough.[34] In their 2002 book, *Cradle to Cradle: Remaking the Way We Make Things*,[35] they proposed an approach to the economy that eliminates waste. They asserted: "Everything is a resource for something else. In nature, the 'waste' of one system becomes food for another. Everything can be designed to be disassembled and safely returned to the soil as biological nutrients, or re-utilized as high quality materials for new products as technical nutrients without contamination."[36] Concepts of industrial ecology in the 1990s also suggested that a different way of conceptualizing materials use was possible.

The idea of a circular economy is a variation on the cradle-to-cradle theme, and has gained significant attention

Store, *Styrofoam & Plastics Bans: What You Need to Know*, https://www.therestaurantstore.com/styrofoam-plastic-bans (last visited June 25, 2022).

21. L.D. 1541, 130th Leg., 1st Spec. Sess. (Me. 2021); Me. Rev. Stat. Ann. tit. 38, §2146 (2021).
22. S.B. 582, 2021 Leg. Sess. (Or. 2021).
23. *See* Allyn L. Stern & Nicole J. Waxman, *Maine Becomes First State to Sign Extended Producer Responsibility Law for Packaging, Other States With Plastics and Packaging Bills May Follow Shortly*, Nat'l L. Rev., July 14, 2021, https://www.natlawreview.com/article/maine-becomes-first-state-to-sign-extended-producer-responsibility-law-packaging.
24. H.R. 2238, Break Free From Plastics Pollution Act of 2021, 117th Cong.
25. While a more circular economy may make a significant contribution to materials conservation, there is a long road ahead. In January 2018, the first Circularity Gap Report was published during the World Annual Forum in Davos. This first report established that our world is only 9.1% circular, leaving a massive circularity gap. Circularity Gap Reporting Initiative, *About the CGRi*, https://www.circularity-gap.world/about (last visited June 25, 2022).
26. Council Directive 94/62, 1994 O.J. (L 365).
27. Council Directive 2000/53, 2000 O.J. (L 269).
28. Council Directive 2012/19, 2012 O.J. (L 197).
29. Council Directive 2011/65, O.J. (L 174).
30. *See* European Commission, *CE Marking*, https://ec.europa.eu/growth/single-market/ce-marking_en (last visited June 25, 2022).
31. Council Directive 2009/125, O.J. (L 285).
32. *A New Circular Economy Action Plan for a Cleaner and More Competitive Europe*, COM (2020) 98 final (Mar. 11, 2020), https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC_1&format=PDF.
33. *See* Prof. Dr. Michael Braungart, *C2C Design Concept*, http://braungart.epea-hamburg.org/en/content/c2c-design-concept (last visited June 25, 2022).
34. *See* William McDonough, *Cradle to Cradle*, https://mcdonough.com/cradle-to-cradle/ (last visited June 25, 2022).
35. William McDonough & Michael Braungart, Cradle to Cradle: Remaking the Way We Make Things (2002).
36. *Id.*

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Box 3. EC Circular Economy Action Plan

The European Commission has indicated it will examine a wide range of options including improving product durability, reusability, upgradability, and reparability; increasing recycled content in products, while ensuring their performance and safety; enabling remanufacturing and high-quality recycling; restricting single-use and countering premature obsolescence; incentivizing product-as-a-service; and mobilizing the potential of digitalization of product information, including solutions such as digital passports, tagging, and watermarks.

Source: European Commission, Circular Economy Action Plan 5 (2020).

over the past few years, with the Ellen MacArthur Foundation and the World Resources Institute (WRI) being two of the principal advocates for the idea.[37] According to the Ellen MacArthur Foundation, a circular economy is "based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems."[38] The circular economy concept has gained significant momentum in both the government and the business sector. The EU Circular Economy Plan anticipates new legislation that will widen the Ecodesign Directive beyond energy-related products so as to make the Ecodesign framework applicable to the broadest possible range of products and make it focus on circularity.[39] Several businesses have recently adopted circular economy approaches.[40] A joint report by the U.N. Global Compact and the World Business Council for Sustainable Development (WBCSD) noted that "[i]t is in the interest of business to find new solutions that enable sustainable consumption and production patterns." Among the innovations identified in the report are product portfolio analysis tools to understand the environmental and social footprint of products, and reduction in manufacturing impacts by substituting virgin raw materials in products with post-consumer materials through recycling and upcycling.[41] The WBCSD's Vision 2050 report suggests that by mid-century:

> Circular, closed-looped and networked designs that help people to live well and within one planet drive successful industry and reduce the need for primary resource extraction. Closed-loop systems make the concept of waste obsolete. They use waste as an input and resource, eliminating waste accumulation on land, in air or in water.[42]

V. Recommendations

A. Federal Government

The federal government is one of the most important players in achieving Goal 12. The ability to develop nationwide legislation and regulations can produce rapid changes that may result in the efficient operation of approaches such as EPR. The federal government can also spotlight the importance of the materials conservation issue and convene interests from all sectors to find creative solutions. And the federal government can use its vast purchasing power to set an example for sustainable consumption.

Recommendation: The Administration should examine additional opportunities for sustainable materials management.

The Biden Administration has shown an early focus on supply chains. A February 2021 Executive Order establishes a 100-day supply chain review[43] requiring a broad-ranging assessment of supply chain issues that had emerged during the pandemic and other issues related to national security and the environment. The areas to be examined include how best to encourage the "development and adoption of comprehensive sustainability standards for essential minerals, such as lithium, cobalt, nickel, copper, rare earth elements, and other materials."[44] The National Blueprint for Lithium Batteries 2021-2030[45] also takes materials

37. The UNEP report entitled "Redefining Value" describes a similar approach as the circular economy in what UNEP characterizes as a "value-retention process" (VRP). VRP includes approaches such as remanufacturing, refurbishment, repair, reuse, and recycling that, "if pursued strategically, can enable faster achievement of circular economy. . . . VRPs enable the retention of the inherent value of the product, whereas recycling retains just the value of the material or resource that is recycled." *See* U.N., Redefining Value: The Manufacturing Revolution 9 (2018). For example, remanufacturing and comprehensive refurbishment can contribute to GHG emissions reduction by between 79% and 99% in appropriate sectors and can reduce new material requirement by between 80% and 98%. *Id.*
38. *See* Ellen MacArthur Foundation, *supra* note 5.
39. Circular Economy Action Plan, *supra* note 10, at 4.
40. *See*, *e.g.*, Environmental Initiative, *Sustainable Growth Coalition*, https://environmental-initiative.org/work/sustainable-growth-coalition/ (last visited June 25, 2022); Mary Mazzoni, *10 Brands That Embraced the Circular Economy in 2020*, Triple Pundit, Dec. 31, 2020, https://www.triplepundit.com/story/2020/brands-circular-economy-2020/709596; Sustainable Brands, *US Plastics Pact Unveils Plan to Achieve Circular Economy in US by 2025*, https://sustainablebrands.com/read/waste-not/us-plastics-pact-unveils-national-strategy-to-achieve-2025-circular-economy-goals (last visited June 25, 2022).
41. *See* SDG Compass, Ensure Sustainable Consumption Production Patterns (2016), https://sdgcompass.org/wp-content/uploads/2016/04/Goal_12.pdf. Upcycling is reuse (discarded objects or material) in such a way as to create a product of higher quality or value than the original.
42. WBCSD, Vision 2050, at 30 (2010), https://www.wbcsd.org/contentwbc/download/11765/177145/1. The circular economy has significant implications for environmental justice. Historically, a disproportionate number of waste management facilities have been located near low-income communities and communities of color. These facilities often add to the risks with which the communities must deal, such as poor health care or nutrition. A circular economy that substantially reduces the need for waste disposal facilities and the utilization of existing waste disposal facilities can help mitigate risks from waste management facilities, as well as other risks, including exposure to air and water pollutants from manufacturing operations and hazards resulting from increasing GHG emissions.
43. *See* The White House, Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth 14 (2021), https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf.
44. *Id.*
45. *See* Federal Consortium for Advanced Batteries, National Blueprint for Lithium Batteries 2021-2030: Executive Summary (2021), https://www.energy.gov/sites/default/files/2021-06/FCAB%20National%20Blueprint%20Lithium%20Batteries%200621_0.pdf.

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conservation issues into account. Goal 4 of the Blueprint is to "[e]nable U.S. end-of-life reuse and critical materials recycling at scale and a full competitive value chain in the United States."[46]

Recommendation: The Administration should convene a national dialogue on a circular economy and materials conservation.

With growing corporate interest in the idea of a circular economy, it is a good time to convene a national dialogue to discuss how to move to a circular economy in the United States. President Bill Clinton's Council on Sustainable Development could serve as a model. The federal government should work with organizations such as WRI, the Environmental Council of the States, the International City/County Management Association, and the WBCSD, among others, in designing the dialogue. Any such dialogue must include community representatives who can address the environmental justice issues that arise in the context of materials management and disposal. This idea is consistent with Goal 17, which calls for partnerships for sustainable development.

Recommendation: Congress should adopt EPR legislation that, at a minimum, addresses electronic, plastics, and packaging waste.

With more than one-half of the states having EPR legislation for electronic equipment, models are already available for practical electronics waste programs. National legislation would extend electronics waste EPR to the half of the states that have not adopted such a program and could provide a more uniform system for businesses, perhaps making compliance simpler. Further, now that two states have adopted EPR for plastics and packaging waste and other states are considering similar legislation, Congress has a model for addressing the growing problem with these waste streams. Congress should also consider minimum recycled content requirements for certain types of materials.[47]

Recommendation: Congress should enact tax incentives to help build domestic markets for recycled materials.

For the past few years markets for recycled materials have become less stable. To promote recycling and stabilize markets, the federal government could enact tax incentives for investment in and operation of recycling facilities in the United States.

Recommendation: Congress should adopt a price on carbon that will help drive reductions in materials use and product redesign.

California[48] and the state-based Regional Greenhouse Gas Initiative[49] already assess a price on carbon at the state level. However, a national price on carbon could have a far larger impact on reducing GHG emissions from carbon-intensive products in part by driving business innovation to reduce GHG emissions.[50]

Recommendation: Congress should enact procurement legislation that authorizes the executive branch to more broadly favor purchasing products and services that advance the circular economy.[51]

In addition, the executive branch should use existing authority to purchase products and services that advance the circular economy. Executive Order No. 14057, Catalyzing Clean Energy Industries and Jobs Through Sustainability, issued in December 2021, provides a good example of steps that the executive branch can take. The Order focuses on procurement of renewable energy and zero-emissions buildings, as well as "net-zero emissions [of GHGs] from procurement, including a Buy Clean policy to promote the use of construction materials with lower embedded emissions."[52] The federal government is the world's largest purchaser.[53] Further, as part of the economic recovery effort, the federal government is likely to spend a great deal on infrastructure following the passage of the 2021 Infrastructure Investment and Jobs Act.[54] By adjusting its procurement process, the federal government could model desired behavior for state governments, universities, and other large procuring organizations.

Recommendation: EPA should adopt a "circular economy hierarchy" as the recommended approach for managing materials.

The WRI has suggested a new, more elaborate waste hierarchy that goes beyond the traditional "reduce, reuse, recycle" paradigm (see Figure 2). The reduce, reuse, recycle phrase has been the predominant waste management paradigm and the basis for most local waste management programs since the 1970s.[55] WRI's hierarchy is more elaborate, emphasizing steps that avoid resource use and reuti-

46. *Id.* at 6.
47. *See* Burger, *supra* note 3, at 193.
48. *See* A.B. 32, Global Warming Solutions Act of 2006, 2005/2006 Leg. Sess. (Cal. 2006).
49. *See* Center for Climate and Energy Solutions, *Regional Greenhouse Gas Initiative (RGGI)*, https://www.c2es.org/content/regional-greenhouse-gas-initiative-rggi/ (last visited June 25, 2022).
50. *See* Kristin Hayes & Marc Hafstead, Resources for the Future, Carbon Pricing 103: Effects Across Sectors 3 (2020), https://media.rff.org/documents/Carbon_Pricing_103.pdf.
51. *See* Valerie Nguyen, *Senate Committee Explores Circular Economy in Recent Hearing*, Env't & Energy Study Inst., Oct. 22, 2021, https://www.eesi.org/articles/view/senate-committee-explores-circular-economy-in-recent-hearing.
52. Exec. Order No. 14057, §102(a)(v), 86 Fed. Reg. 70935 (Dec. 13, 2021).
53. *See* U.S. Small Business Administration, *How to Do Business With the Federal Government*, https://content.govdelivery.com/accounts/USSBA/bulletins/27934ad (last visited June 25, 2022).
54. Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429, H.R. 3684 (2021).
55. *See* Pantheon Enterprises, *The Story Behind "Reduce, Reuse, Recycle,"* http://pantheonchemical.com/reduce-reuse-recycle/ (last visited June 25, 2022); U.S. EPA, *Reduce, Reuse, Recycle*, https://www.epa.gov/recycle (last updated Feb. 28, 2022).

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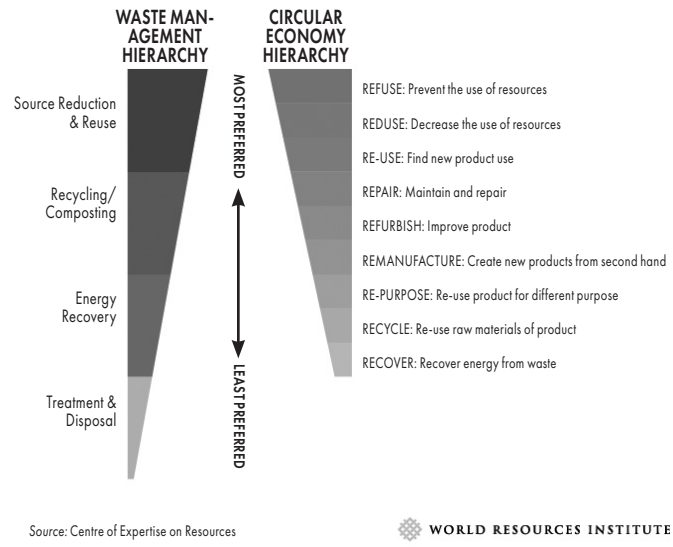
Figure 2. WRI's Proposed Circular Economy Hierarchy



Source: Mathy Stanislaus, *5 Ways to Unlock the Value of the Circular Economy,* WRI, Apr. 15, 2019, https://www.wri.org/insights/5-ways-unlock-value-circular-economy.

lizing products before focusing on recycling. It includes preventing the use of resources in the first instance, encouraging repairing and refurbishing, and supporting remanufacturing and repurposing.[56] EPA should encourage states to adopt this new circular economy waste hierarchy as a means of focusing much more attention on avoiding using materials and emphasizing reuse earlier in the product life cycle.

Recommendation: The Council on Environmental Quality should introduce materials conservation as a factor that is considered in National Environmental Policy Act[57] analysis.

The Council on Environmental Quality (CEQ), which oversees implementation of the National Environmental Policy Act (NEPA), requires federal agencies to consider climate change when preparing environmental impact statements.[58] Similarly, CEQ could contribute to responsible production and consumption by providing guidance to agencies on how to consider materials use and conservation in environmental impact review. In much the same way that GHG emissions can both by themselves and cumulatively have important environmental impacts, materials use can have both significant impacts on a project and significant cumulative impacts that could be mitigated.

Recommendation: The Securities and Exchange Commission should consider including materials risks in the Commission's definition of "materiality."

A fundamental principle of U.S. securities law is that companies should disclose to investors information that is significant in making the investment decision—referred to as materiality.[59] This principle was incorporated into federal securities law in the 1930s.[60] While disclosures most often focus on financial information, other types of information that may demonstrate a substantial investment risk can be considered material. For example, as this Article goes to press, the Securities and Exchange Commission (SEC) is considering the circumstances in which information about GHG emissions must be disclosed because the information is material to an investment decision given the growing concerns about these emissions.[61] As access to materials availability and the use of materials become more of a risk to the success of companies and as product stewardship becomes a more significant issue for businesses, the SEC should consider including these issues as an aspect of what companies must report as a material risk.

Recommendation: EPA should support a circular economy by incorporating it into the Agency's Safer Choice program, perhaps partially based on approaches taken in the EU Ecodesign Directive.

The Safer Choice program has pursued a variety of ways to support better environmental design including through research, information, and convening dialogues with industry.

Recommendation: EPA should consider adopting an "Energy Star"-like program to promote products that advance the circular economy.

The Energy Star program recognizes products that are among the most energy efficient in their product category by allowing the product to affix an Energy Star label to

56. WRI asserts:
> [G]overnments need to replace their waste hierarchies with a circularity hierarchy, which would maximize the utilization of materials by extending the life of products and extracting optimal value once they're discarded to turn them into new products. Under this new paradigm, all policies, including taxes, would be required to demonstrate, through a lifecycle-based analysis, achievement of the highest-possible level of circularity.

Mathy Stanislaus, *5 Ways to Unlock the Value of the Circular Economy*, WRI, Apr. 15, 2019, https://www.wri.org/insights/5-ways-unlock-value-circular-economy.

57. 42 U.S.C. §4332(2)(C).

58. *See* CEQ, *Guidance on Consideration of Greenhouse Gases*, https://ceq.doe.gov/guidance/ceq_guidance_nepa-ghg.html (last visited June 25, 2022).

59. *See* Business Roundtable, The Materiality Standard for Public Company Disclosure: Maintain What Works 1 (2015), https://s3.amazonaws.com/brt.org/archive/reports/BRT.The%20Materiality%20Standard%20for%20Public%20Company%20Disclosure.2015.10.29.pdf.

60. *Id.*

61. *See* Sarah Solum et al., *The SEC's Upcoming Climate Disclosure Rules*, Harv. L. Sch. F. on Corp. Governance, Sept. 1, 2021, https://corpgov.law.harvard.edu/2021/09/01/the-secs-upcoming-climate-disclosure-rules/.

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the product.[62] Energy Star has become a widely recognized label, with 77% of purchasers indicating that the label influenced their decision.[63] As noted earlier, the EU utilizes an analogous label—the CE designation—on products that meet EU product standards related to the circular economy. EPA should consider developing an Energy Star-like program that would allow a label to be used for products designed for circularity.[64]

Recommendation: Congress should enact a "right-to-repair" law. In addition, the Federal Trade Commission should adopt right-to-repair regulations to the extent the agency has authority to do so.

Right-to-repair laws would assure that repairs can be made to products ranging from computers to tractors by a wide range of providers, and could help facilitate longer use or reuse of products. These laws have been proposed for farm equipment in some states where concerns have arisen about manufacturers making it difficult for repairs to be made other than through the manufacturer's outlets.[65] In June 2021, a right-to-repair bill, the Digital Fair Repair Act, was introduced in the U.S. House of Representatives. It would require manufacturers of digital products to provide access to parts and service materials to consumers and repair shops.[66] President Biden's Executive Order No. 14036 (July 9, 2021) encourages the Federal Trade Commission to adopt right-to-repair rules limiting the ability of manufacturers to restrict equipment owners from using independent repair shops or undertaking do-it-yourself repairs.[67] The Brookings Institution has encouraged adoption of federal and state legislation, noting that several types of repair restrictions, including restrictions stemming from product designs, parts availability, software locks, and end-user licensing agreements, can make repairs more expensive or more difficult.[68]

62. *See* Energy Star, *What Is ENERGY STAR*, https://www.energystar.gov/about?s=footer (last visited June 25, 2022).
63. *See More Than 45% of US Households Purchase ENERGY STAR Certified Products*, Energy Star, Feb. 26, 2016, https://www.energystar.gov/about/newsroom/energy_star_update_archives/more_45_us_households_purchase_energy_star_certifiedh.
64. In WRI's view, "[g]overnments should nudge companies to design products that retain their value or that enable recovery of materials as secondary feedstock." WRI suggests this can be done through tax policies that favor remanufactured goods, setting minimum recycled content requirements, or other eco-design requirements. Stanislaus, *supra* note 56.
65. *See* Nathan Proctor, *Deere in the Headlights as 21 States Consider Right to Repair*, U.S. PIRG, Mar. 1, 2021, https://uspirg.org/blogs/blog/usp/deere-headlights-21-states-consider-right-repair.
66. *See* News Release, U.S. PIRG, Broad Right to Repair Bill Introduced in Congress (June 17, 2021), https://uspirg.org/news/usp/broad-right-repair-bill-introduced-congress.
67. The EU Circularity Plan anticipates a revision of EU consumer law to ensure that consumers receive trustworthy and relevant information on products, including the availability of repair services, spare parts, and repair manuals, establishing a new "right to repair" and consider new horizontal material rights for consumers for instance as regards availability of spare parts or access to repair. *See* European Parliament Resolution of 10 February 2021 on the New Circular Economy Action Plan para. 32, P9_TA(2021)0040, https://www.europarl.europa.eu/doceo/document/TA-9-2021-0040_EN.pdf.
68. *See* James Seddon & Darrell M. West, *President Biden's Right to Repair Order Needs Strengthening to Aid Consumers*, Brookings, July 14, 2021, https://www.brookings.edu/blog/techtank/2021/07/14/president-bidens-right-to-repair-order-needs-strengthening-to-aid-consumers/.

Box 4. Global Plastic Problem

The lack of adequate facilities to reuse waste plastics has led to a significant increase in illegal shipments of plastic waste, in some cases as part of an organized criminal activity, particularly in South and Southeast Asia. This activity can have significant health implications and can stress local enforcement resources.

Source: INTERPOL, Strategic Analysis Report: Emerging Criminal Trends in the Global Plastic Waste Market Since January 2018 (2020).

The federal government should fund materials research and development for design of high-impact products to extend product life, reduce production waste, and facilitate reuse at the end of product life through repurposing or recycling.

B. State Governments

States that have not already done so could pursue many of the same approaches recommended above for the federal government—in the absence of federal action or in addition to federal action. Thus, states should:

- Enact EPR legislation for electronics waste and new EPR approaches such as those enacted by Maine and Oregon.
- Enact legislation placing a price on carbon (this recommendation does not to apply to states that are part of the Regional Greenhouse Gas Initiative or to California, which has cap-and-trade legislation).
- Provide tax incentives to promote domestic recycling operations.
- Adopt procurement legislation and policies that provide preferences for products that conserve materials and advance the circular economy.
- Make the WRI circular economy hierarchy state policy and enhance or develop mechanisms that support the hierarchy such as waste exchanges.
- Include materials conservation as a factor that should be considered in state environmental impact assessments in those states that have statutes similar to NEPA.
- Enact right-to-repair laws in the absence of federal legislation. The Repair Association model legislative template provides a good starting point for developing legislation.[69]

69. *See* Repair Association, *Working Together to Make Repair-Friendly Public Policy*, https://www.repair.org/legislation (last visited June 25, 2022).

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In addition, states should:

- Identify types of materials that have significant adverse environmental impacts that should be banned or subject to additional disposal fees.
- Develop public education campaigns that inform members of the public about how they can play a role in materials conservation and the circular economy. States and local governments conducted very successful public education campaigns to launch major recycling efforts in the 1970s. Similar, norm-altering campaigns have been pursued related to smoking cessation, in significant part funded by proceeds from the cigarette litigation. States could pursue similar efforts to build new societal norms related to the circular economy, perhaps funded by new waste management fees.
- Adopt zero-waste goals for state operations.

C. Local Governments

Local governments are responsible for ensuring trash pickup and often run waste management facilities. Whether these facilities are public or private, local taxpayers or residents typically pay much of the cost of end-of-product-life management. Local governments should:

- Adopt the WRI circular economy hierarchy. They should then utilize the hierarchy in making decisions about the nature of the waste management facilities they build or oversee, in determining how to restrict use of those facilities to reduce cost and encourage materials usage that is of higher value based on the hierarchy, and in educating citizens about how best to deal with products they no longer need.
- Ban or place a user fee on the use of certain types of materials that can have significant environmental impact, such as single-use plastics, plastic bags, and other materials.
- Consider materials conservation and circular economy principles in their procurement decisions.
- Develop food waste reduction programs and composting facilities for food waste.
- Adopt zero-waste goals for their own operations.

D. Private Sector

The private sector typically is in the best position to conserve materials and build circularity into products and services. Achieving responsible production and consumption under Goal 12 will require significant expansion of supportive private-sector efforts. Many companies have made important commitments to achieving Goal 12 that can serve as models for others to follow. The Platform for Accelerating the Circular Economy (PACE) program, created by the World Economic Forum and managed by WRI, is an example of industry leadership. PACE is a partnership whose mission is to "[c]atalyze global leadership from business, government, and civil society to accelerate the transition to a circular economy that will improve human and environmental well-being for current and future generations."[70] (see Box 5) PACE has published circular economy guides addressing plastics, food, textiles, electronics, and capital equipment.[71] The WBCSD has stated that a "circular economy is central to achieving our vision of more than 9 billion people living within the boundaries of the planet by 2050."[72]

To advance Goal 12, private-sector companies should:

- Participate in a national dialogue on how to build the circular economy in the United States.
- Work with governments and other stakeholders to develop regulatory and voluntary programs that maximize long-term value of materials.[73]
- Utilize life-cycle assessment in designing new products. Life-cycle assessment can help reduce material inputs, identify opportunities for reuse or repurposing after the original use, and build recyclability into product design. Waste should be designed out of products and all materials should be seen as valuable.[74]
- Include materials conservation and circular economy principles in supply chain requirements. Green supply chain requirements are now a routine aspect of many procurement regimes.
- Support EPR programs that promote circularity. The private sector should work with governments to identify the most effective way to structure EPR programs so that they promote uses higher on the WRI hierarchy, are efficient for businesses, and are not excessively costly.
- Significantly expand the use of renewable materials. As the WBCSD suggests, businesses should complement or substitute bio-based resources that are renewable and sustainably managed for nonrenewable and fossil-based materials.[75]

70. PACE, *About*, https://pacecircular.org/about (last visited June 25, 2022).
71. PACE, *The Circular Economy Action Agenda*, https://pacecircular.org/action-agenda (last visited June 25, 2022).
72. WBCSD, *Circular Economy*, https://www.wbcsd.org/Programs/Circular-Economy (last visited June 25, 2022).
73. Several of the private-sector recommendations are based on the WBCSD's *Vision 2050*, *supra* note 42.
74. *See* Burger, *supra* note 3, at 193.
75. *See* WBCSD, *The Circular Bioeconomy: A Business Opportunity Contributing to a Sustainable World*, https://www.wbcsd.org/Programs/Circular-Economy/Factor-10/Resources/The-circular-bioeconomy-A-business-opportunity-contributing-to-a-sustainable-world (last visited June 25, 2022).

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Box 5. Platform for Accelerating the Circular Economy (PACE)

PACE has identified 10 "calls-to-action" that the organization believes can overcome the barriers to a circular economy. These appear generally applicable to many other products. They are:

- Incentivize and Support Product Design for Circularity
- Enable Producers to Increase Sourcing of Recycled Content
- Transform Consumption Modes to Increase Market Demand for Circular Products and Services
- Guide and Support New Business Models for Environmental, Financial, and Social Triple-Win
- Bring-Back by Consumers
- Set Up Effective Collection Systems
- Enable Efficiency and Transparency in Compliant and Responsible Transboundary Movement
- Strategically Plan and Install Sorting, Pre-Processing, and Recycling Operations
- Increase Incentives for Investment in Recycling Technologies and Facilities
- Integrate and Advance Decent Work in the Transition to a Circular Economy for Electronics.

Source: PACE, Circular Economy Action Agenda: Electronics 13 (2021), https://pacecircular.org/sites/default/files/2021-02/action-agenda-electronics-feb2021_FINAL.pdf.

- Design products for circularity. Companies should design all products in a way that maximizes the opportunity for repurposing, reuse, remanufacturing, and other end-of-life original life outcomes consistent with the WRI circular economy hierarchy.
- Provide consumers with information for how to repurpose products at the end of their original use and how to repair products.

VI. Conclusion

Materials use throughout the world and especially in the United States remains at unsustainable levels despite progress in some areas. In order to achieve Goal 12 and its targets the United States must substantially reduce materials consumption by adopting new materials conservation measures and embracing the circular economy. There are a wide range of statutory, regulatory, and voluntary actions that can be taken to support the needed changes. These actions can be initiated by the federal government, by states and by localities, as well as by businesses and other private-sector entities. By creating a much more materials-efficient economy, human health, environmental protection, and long-term economic well-being will benefit.