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Bring Back the Milkman: Legal Structure and Feasibility of a Circular Economy Within the United States Food and Product Packaging Distribution System

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I. Introduction

Contemporary American society stands enmeshed in a linear product consumption structure that is incorporated in a large-scale purchasing scheme. The United States currently operates under a linear economic system,[1] a hugely wasteful structure of 'take-make-dispose'[2] where producers and consumers "take the resources [they] need, make the goods to be sold, make [a] profit and dispose of everything [they] do not need – including a product at the end of its lifecycle."[3]

Resource depletion, loss, and extinction are the primary environmental and economic concerns facing modern society. By the year 2050, the world will likely be consuming the equivalent of three planet Earths' resources, with waste generation increasing by seventy percent and consumption of materials, such as biomass, fossil fuels, metals, and minerals, doubling by 2060.[4]

Many remember the days of the milkman's simple and circular daily pattern; however, those days have since been swept aside by globalization. A linear economy is rooted in the uneven distribution of wealth by geographic region.[5] Human resources are concentrated in the most developed regions while raw materials are sourced increasingly from elsewhere in the global arena.[6] This model results in the cost of materials being cheap compared to the cost of human labor, which motivates producers to adopt business models that rely on extensive use of materials and economize on human labor.[7] "The natural consequence of cheap material/expensive labor is the common neglect of recycling, reusing and putting much emphasis on waste," resulting in environmental and economic harms.[8]

Negative environmental impacts from a linear economy include "air, water and noise pollution, the release of toxic substances, and greenhouse gas emissions" from extraction, production, transportation, and disposal.[9] Furthermore, a one-use waste system constrains the availability of resources, which is "compounded by rising demand from the world's growing and increasingly affluent population."[10]

Negative economic impacts include under-utilized materials and the loss of valuable materials to landfills.[11] "The waste generated through these ineffective processes brings about additional costs due to waste management and collection

1. ELLEN MACARTHUR FOUND., CITIES IN THE CIRCULAR ECONOMY: AN INITIAL EXPLORATION 5 (2017) [hereinafter CITIES IN THE CIRCULAR ECONOMY].
2. *Id.*
3. Furkan Sariatli, *Linear Economy Versus Circular Economy: A Comparative and Analyzer Study for Optimization of Economy for Sustainability*, 6 VISEGRAD J. ON BIOECONOMY AND SUSTAINABLE DEV. 31, 32 (2017).
4. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*, at 2, COM (2020) 98 final (Nov. 3, 2020) [hereinafter *Communication from the Commission*].
5. Sariatli, *supra* note 4, at 31.
6. *Id.*
7. *Id.*
8. Sariatli, *supra* note 4, at 31.
9. CITIES IN THE CIRCULAR ECONOMY, *supra* note 2, at 5.
10. ELLEN MACARTHUR FOUND., TOWARDS THE CIRCULAR ECONOMY 2 (2013) [hereinafter TOWARDS THE CIRCULAR ECONOMY].
11. CITIES IN THE CIRCULAR ECONOMY, *supra* note 2, at 5.

spending, increasing pressure on municipal budgets."[12] As a result of these two overarching issues, "we are observing unsustainable overuse of resources, higher price levels, and more volatility in many markets."[13]

Producers have been less inclined to consider their operations' external costs since the charge to producers for these externalities is non-existent.[14] This system is relatively locked-in, "as product approval procedures tend to favor the existing practices over radical changes and reinvention of basic principles."[15]

The purpose of this paper is to explain the feasibility, and outline the legal structure, of an alternate producer and consumer relationship known as a circular economy, within the context of the United States. It will first explain our failing efforts to improve efficiency. Next, the focus is narrowed to explain the circular concept, give global examples, and outline potential stakeholders, legal issues, and regulations when implementing a circular economy. This paper will further propose a legal structure for a circular economy within the Unites States' consumables, product packaging, and distribution to illustrate the feasibility of such a system.

II. Failing Efforts for Material Efficiency and Reuse

Strides have been made to improve resource efficiency through, for example, recycling programs that enjoy public support despite their limited environmental and economic benefits.[16] The cost of recycling (pick up, sorting, and melting) exceeds the cost of disposing the same material as garbage, making the processes economically valueless.[17] Conversely, new plastic is far cheaper to produce and provides a higher quality for products.[18] As a result, less than ten percent of the world's plastic has been recycled,[19] and there is much doubt that plastic recycling can ever be made viable in economic terms.[20] This simple formula is well-known by plastic makers, including some of the nation's largest oil and gas companies, who have spent millions trying to influence public opinion about recycling's impact.[21] "If the public thinks … recycling is working, then they are not going to be as concerned about the environment,"[22] thus encouraging the production of plastic and offering no solution to the linear model.[23]

There is a clear need for an alternative approach to the inefficient and waste-producing culture of recycling. With a growing population and economy, paired

12. *Id.*
13. TOWARDS THE CIRCULAR ECONOMY, *supra* note 11, at 2.
14. Sariatli, *supra* note 4, at 31.
15. *Id.* at 32.
16. TOWARDS THE CIRCULAR ECONOMY, *supra* note 11, at 6.
17. Laura Sullivan, *How Big Oil Misled the Public into Believing Plastic Would Be Recycled*, NPR (Sept. 11, 2020, 5:00 AM), https://perma.cc/HL5H-2J37.
18. *Id.*
19. *Id.*
20. Patrice Taddonio, *Plastics Industry Insiders Reveal the Truth About Recycling*, PBS (Mar. 31, 2020), https://perma.cc/HFL2-GLMX.
21. *See* Sullivan, *supra* note 18.
22. *Id.*
23. Frontline, *Plastic Wars*, PBS (Mar. 31, 2020), https://perma.cc/D6L6-2CUV.

with significant resource deterioration, it is clear the current linear model is not sustainable. There needs to be more focus on a regenerative growth model that extracts less than it takes, keeps resource consumption within planetary boundaries, and reduces our consumption footprint.[24] Therefore, the most effective way of tackling environmental concerns is by changing the way consumers consume and producers produce.[25] The proper solution for a linear economy is to wholly replace it with a circular one.

III. Circular Economy

A. Definition

In a circular economy, success is no longer based on increased manufacturing but rather on products being shared, rented, repaired, maintained, upgraded, recycled, and reused so that consumption does not end but instead becomes more sustainable.[26] This industrial model is regenerative in intention and design by replacing the 'end-of-life' concept with one focused on the use of renewable energy, elimination of toxic chemicals, and "elimination of waste through superior design or materials, products, systems, and, within this, business models."[27]

A circular economy is based on three basic principles.[28] The first principle is to design a productive system that aims to eliminate waste and pollution.[29] This encompasses designing out negative externalities of economic activity that cause damage, such as the release of toxins, greenhouse gasses, air, land, and water pollution.[30] Instead, products would be designed for disassembly and reuse.[31] The second principle is keeping products, components, and materials at their highest value and continuously in use. This is done by designing for reuse, remanufacturing, or recycling to keep components and materials circulating and contributing.[32] Products would be strictly differentiated between consumable and durable products.[33] The former would include non-toxic or beneficial consumables that can safely be returned to the biosphere directly or through a cascade of consecutive uses.[34] The latter would consist of consumables made of technical nutrients unsuitable for the biosphere, such as metals and plastics, and would then

24. *Communication from the Commission*, *supra* note 5.

25. European Commission Factsheet FS/20/437, Circular Economy Action Plan: The European Green Deal (Mar. 2020) [hereinafter Factsheet].

26. Antti Lehtinen, *Move to a Circular Economy Brings About New Models of Ownership and Consumption*, SITRA (Dec. 3, 2020), https://perma.cc/RSU5-CH6P.

27. TOWARDS THE CIRCULAR ECONOMY, *supra* note 11, at 7.

28. ELLEN MACARTHUR FOUND., *What Is a Circular Economy?*, https://perma.cc/K9BV-KF8J (last visited Feb. 27, 2023) [hereinafter *What Is a Circular Economy?*].

29. CITIES IN THE CIRCULAR ECONOMY, *supra* note 2, at 7.

30. *Id.*

31. TOWARDS THE CIRCULAR ECONOMY, *supra* note 11, at 7.

32. CITIES IN THE CIRCULAR ECONOMY, *supra* note 2, at 7.

33. TOWARDS THE CIRCULAR ECONOMY, *supra* note 11, at 7.

34. *Id.*

be designed from the start for reuse.[35] The final principle is regenerating natural systems to enhance natural capital by "encouraging flows of nutrients within the system and creating conditions for regeneration,"[36] such as soil or using renewable energy that would decrease resource dependence and increase system resilience.[37] Transitioning to a circular economy aims not only to reduce the negative impacts of the linear economy but also to create a "systemic shift that builds long-term resilience, generates business and economic opportunities, and provides environmental and societal benefits."[38]

B. Global Models of a Circular Economy

There are numerous examples of regions implementing large-scale circular economies to boost efficient use of resources and reduction of waste. Two of the most prominent models on the global stage are the European Union and China.[39]

1. European Union

The European Commission has adopted a new Circular Economy Action Plan within the European Green Deal.[40] The Circular Economy Action Plan (CEAP) proposes to boost the efficient use of resources by moving to a clean, circular economy.[41] The CEAP's sustainable product policy tracks the entire life cycle of sustainable products in ways that help citizens participate in the circular economy, targets complementary product design with the aim of supporting sustainable consumption, and aims to maximize recirculation as an alternative to waste within the European economy.[42]

The European Commission launched the first CEAP in 2015, and all fifty-four actions under the plan have since been fully or partially implemented.[43] The plan provides legislative and non-legislative measures targeting areas where action brings real added value.[44] CEAP measures have taken a multi-sector approach,

35. *Id.*

36. CITIES IN THE CIRCULAR ECONOMY, *supra* note 2, at 7.

37. TOWARDS THE CIRCULAR ECONOMY, *supra* note 11, at 7.

38. PLANT BASED PRODUCTS COUNCIL, *Circular Economy*, https://perma.cc/CUY2-PKGE (last visited Feb. 27, 2023).

39. It is important to note that these are two different political structures than the United States. China implements a more authoritative political system, while the EU has a representative democracy with different values than the United States. *See* CARL MINZNER, COUNTRIES AT THE CROSSROADS 2011: CHINA (Freedom House ed., 2011).

40. European Commission, *Circular Economy Action Plan*, https://perma.cc/P385-VZHT (last visited Feb. 27, 2023) [hereinafter *CEA Plan*].

41. European Commission, *A European Green Deal*, https://perma.cc/K9HL-ZB35 (last visited Feb. 27, 2023).

42. Factsheet, *supra* note 26.; *Communication from the Commission*, *supra* note 5, at 3-5; *CEA Plan*, *supra* note 41.

43. *CEA Plan*, *supra* note 41.

44. *Id.*

focusing on electronics, batteries and vehicles, packaging, plastics, textiles, construction and buildings, food, water, and nutrients.[45]

In the context of plastics, the plan proposed mandatory requirements for recycled content and waste reduction measures for key products.[46] It suggests this should be done by phasing out single-use products and replacing them with durable products where possible.[47] The plan further restricts intentionally added microplastics and endeavors to increase the capture of microplastics during the production lifecycle.[48]

In the food and packaging sector, they recommend new legislative initiatives and promotion of design for reuse and recyclability to substitute single-use packaging and tableware with reusable foodservice products.[49] The plan proposes targets for reducing packaging waste, other waste prevention measures, and the consideration of reducing the complexity of packaging material.[50]

On November 10th, 2020, the Commission adopted a CEAP proposal to modernize EU legislation on batteries by requiring batteries to be sustainable, circular, high-performing, and safe throughout their life cycle with the goal that they be collected, repurposed, and recycled.[51]

2. China

In China, where consumption is reaching crisis levels from inefficient resource use, the country has been forced to promote the recirculation of waste by setting targets and adopting policies, financial measures, and legislation.[52] "On August 29th, 2008, the Standing Committee of the National People's Congress promulgated the Circular Economy Promotion Law" (CEPL).[53] CEPL contemplates a role for citizens and organizations to play in developing circular economies in collaboration with government and free enterprise.[54] It also requires the government to make circular economic plans that "specify the rate of resources output, rate of waste reuse, and the rate of recycling, and … the key tasks and safeguard measures of law enforcement."[55] The CEPL has also established requirements for production processes using material on a Compulsory Recycling List, prescribing new standards for repurposing and disposal.[56]

45. *Id.*
46. *Communication from the Commission*, *supra* note 5, at 9.
47. Factsheet, *supra* note 26.
48. *Id.*
49. Factsheet, *supra* note 26; *Communication from the Commission*, *supra* note 5, at 12.
50. *Communication from the Commission*, *supra* note 5, at 8.
51. *CEA Plan*, *supra* note 41.
52. John A. Mathews & Hao Tan, *Circular Economy: Lessons from China*, 531 NATURE 440, 441 (2016).
53. Mingqing You, *Annual Review of Chinese Environmental Law Developments: 2008*, 39 ENV'T. L. REP. NEWS & ANALYSIS 10510, 10512 (2009).
54. *Id.*
55. *Id.*
56. *Id.*

CEPL provisions also include a package of subsidies, tax incentives, research funding, and other financial supports to steer participant behavior towards circular production systems; disfavor export practices that inefficiently consume energy and generate pollution; and refine "investment policies, price policies, government procurement, and government awards."[57]

This legislation also vested the primary law enforcement authority "into a comprehensive administrative branch for circular economy under the State Council."[58] The National Development and Reform Commission (NDRC) is an example of such a branch to enforce the law.[59] The NDRC and other bodies have developed circular-economic principles and promoted policies which exemplify industrial symbiosis, including taxation, fiscal, pricing, and industrial policies.[60] A fund was allocated to support the conversion of industrial parks into eco-industrial agglomerations, and tax breaks were provided to enterprises in the reuse sector.[61] In 2012, the NDRC and the finance ministry called for 50% of national industrial parks and 30% of provincial ones to complete circular-economy transformation initiatives by 2015 to achieve close to zero discharge of pollutants.

C. A Historic Example of Circular Economics in the United States

Circular production systems are not new to the United States. There are plenty of historical examples of sustainable circular living that were not intentionally chosen for being ecofriendly. A simplified, and nostalgic, illustration of a functioning circular economy is that of the milkman.

A mix of technological and structural changes altered dairy distribution models by the mid-1970s. Despite industrialization's role in urbanizing the American population, people continued buying milk from local dairy farmers.[62] "The earliest survey from the Department of Agriculture on home milk delivery was in 1963 when nearly 29.7 percent of consumers had milk delivered."[63] It was a simple model where customers would place orders and milk would arrive the next day.[64] The milkman would bring the fresh milk bottles, exchange them for the empty bottles, and collect payment.[65]

But where did the milkman go? By 1975, milk deliveries to consumers dropped to 6.9 percent of total sales and fell to 0.4 percent by 2005.[66]

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57. You, *supra* note 54, at 10512.
58. *Id.*
59. *Id.*
60. Mathews & Tan, *supra* note 53.
61. *Id.*
62. DRINK MILK IN GLASS BOTTLES, The Day the Milkman Went Away: A History of Home Milk Delivery, https://perma.cc/N3UL-YQMZ (last visited Feb. 20, 2023) [hereinafter *Milkman*].
63. Eve Tahmincioglu, *Remember the Milkman? In Some Places, He's Back*, N.Y. TIMES (Dec. 16, 2007), https://perma.cc/V5A9-8ZCL.
64. *Milkman*, supra note 63.
65. *Id.*
66. Tahmincioglu, *supra* note 64.

Modernization of grocery stores and the proliferation of air conditioning further reduced demand for such deliveries once buyers could conveniently obtain milk along with other grocery items.[67] After the Second World War, suburban sprawl increased, requiring milk delivery services to cover considerable distances, compensate for increased logistical costs, and combat reduced competitiveness.[68] The cost of plastic relative to glass contributed to this development.[69] Glass bottles are more expensive to make than plastic containers and weigh up to fifteen times more, making plastic containers cheaper to transport.[70] The developed convenience of home refrigeration and grocery stores paired with the cost factor meant that glass bottles were soon replaced with plastic and wax paper packaging, which could easily be disposed of and required no return to the producer.[71]

IV. Implementing a Circular Economy in the United States

A circular economy is a broad concept incorporating many sectors that need to work effectively on all scales.[72] This includes large and small businesses, individuals and groups, and global and national markets.[73] The system therefore encompasses a vast number of industries and consumables. As noted above, this paper will focus solely on consumables, product packaging, and distribution.

A. Stakeholders

A transition from a linear to a circular model will involve many stakeholders along the line of production, consumption, and regulation. According to circular economy principles, the need to implement economic activities can only be fulfilled by maintaining relationships with stakeholders, whose expectations are a necessary condition for a company's growth in the long term.[74] This requires engagement with stakeholders which reaches beyond the traditional, narrower perspective and embraces a more comprehensive approach that includes all relevant stakeholders and not just the customer.[75]

The first stakeholder to consider when implementing and transitioning into a circular model is the government.[76] Playing a central role, the government must steer the economy into a circular future, understand companies' needs and remove

67. *Milkman*, supra note 63.
68. *Id.*
69. Tom Heyden, *Nostalgia for an Old-Fashioned Milk Bottle*, BBC (Sept. 26, 2014), https://perma.cc/MV97-PTWJ.
70. *Id.*
71. *Milkman*, supra note 63.
72. *What Is a Circular Economy?*, *supra* note 29.
73. *See id.*
74. Daniela M. Salvioni & Alex Almici, *Transitioning Toward a Circular Economy: The Impact of Stakeholder Engagement on Sustainability Culture*, 12 SUSTAINABILITY 20, 4 (2020).
75. *Id.* at 2.
76. TRIODOS RESEARCH, *The Role of Stakeholders in a Circular Economy*, TRIODOS INVESTMENT MANAGEMENT, https://perma.cc/CX62-3J7J (last visited Feb. 23, 2023).

barriers in implementing the transition.[77] It should do so by introducing tax regulation, subsidies, start-up funding, labeling requirements that enable consumers to judge the sustainability of the product; and, at the state and municipal level, by stimulating and enabling companies and consumers to contribute to the circular economy.[78] The government's role will be further explored below.

Consumers hold an equally central place in the successful implantation of a circular model.[79] They will be required to change their purchasing and consumption behavior.[80] Businesses that center around repairing, refurbishing, and sharing are growing services and ones that can replace broken or outdated goods.[81] This shift in consumer mindset will hopefully encourage "companies to distinguish themselves by offering products that can easily be repaired, instead of those made from components that are no longer available."[82] In some situations, consumers must also change their role from product owner to renter, allowing for the product to be replaced or refurbished when it reaches the end of its life.[83] Furthermore, engagement with consumers should ensure "knowledge diffusion and information-sharing to identify the available opportunities for long-term material use (including maintenance, reuse, refurbishing, and recycling) and sharing the use with other consumers (user groups) rather than consuming the product alone."[84] This can, in effect, transform consumers into suppliers, and thus, through proactive engagement, they become a source for innovation.[85]

Suppliers are the final critical stakeholder. Supplier engagement must promote sharing "between suppliers and customers to ensure that procurement takes place according to the principles of circularity and sustainability."[86] Thus, supplier engagement should be based on promoting the company's circular economic goals and their preferences for renewable material choices. "New business models forming in the circular . . . economies are enabling transitions to sustainable business practices . . . that go beyond the traditional lifecycle requiring collaborative governance structures, new partnership arrangements, and networks between and across sectors."[87]

Implicated stakeholders[88] who play a less significant role in the direction and implementation of the model include employees and investors. Employees

77. Salvioni & Almici, *supra* note 75, at 7. *See id.*
78. TRIODOS RESEARCH, *supra* note 77.
79. *Id.*
80. *Id.*
81. *Id.*
82. *Id.*
83. *Id.*
84. Salvioni & Almici, *supra* note 75, at 7.
85. *Id.*
86. *Id.*
87. Thomas Clarke, *The Widening Scope of Directors' Duties: The Increasing Impact of Corporate Social and Environmental Responsibility*, 39 SEATTLE U. L. REV. 531, 548 (2016).
88. Implicated stakeholders in the context of this paper are participants who do not play a central role in the implementation of a circular economy, but whose role is created once a circular is put in place. They play an important role in the transition and continuation of the system.

will have to develop new skills and potentially reshape their values.[89] Effective employee engagement would support the organization's implementation of the circular objectives selected by governance bodies.[90] Depending on legislative initiative, investors may need to support a company's strategic decisions financially.[91]

Listening to all stakeholders' concerns and engaging with them during the transition to a circular economy is necessary for a cultural orientation toward sustainability models, which essentially respect multiple dimensions (economic, environmental, and social) simultaneously.[92] Ensuring appropriate trade-offs among divergent dimensions (e.g., economic and non-economic) is crucial for the development and implementation of a circular economy model.[93]

B. Relevant Legal Issues When Designing a Circular Product

The law can facilitate new forms and more extensive collaboration among stakeholders to create a closed-loop system.[94] The role of legislation within the circular model is not to create a new circular, economic legal system but to enact discreet legal measures that facilitate the collaboration among stakeholders that create value and encourage long-term societal sustainability.[95] There is no perfect model that will fit all "political principles reflected in public governance institutional arrangements, mythologies for infrastructure acquisition and supervision, [or] . . . private and public sectors;" thus, a circular model must be introduced in a manner consistent with local factors.[96] Two primary legal sectors must be considered when implementing a circular economy: property rights and governance.[97]

1. Property Rights

From the perspective of property rights, consumers will be sharing responsibilities and rights related to ownership. This will result in potential issues such as the "internalization of costs, the sharing of created value in a value chain, and the taxation of the value-added and the structuring of joint ventures."[98] What was once waste and by-products is "now somebody else's property because it has multiple types of purposing within the economic and ecological system."[99] Ownership rights must be clearly outlined and determined at the outset of the

89. Salvioni & Almici, *supra* note 75, at 7.
90. *Id.*
91. *See id.*
92. *Id.*
93. *Id.*
94. Ira Feldman et al., *The Circular Economy: Regulatory and Commercial Law Implications*, 46 ENV'T. L. REP. NEWS & ANALYSIS 11009, 11021 (2016).
95. *Id.*
96. *Id.*
97. *Id.* at 11022.
98. *Id.*
99. *Id.*

circular relationship. This then translates into risk-sharing. Those entering a circular market must address what existing and new risks are presented and how they will allocate those risks when collaboration is contracted.[100] Circular ownership structures will be further explored later in this paper when discussing the proposed circular model for the United States.

Intellectual property (IP) must also be considered when implementing a circular model. Multiple IP rights will come into play along the timeline of production, ownership, and repurposing. Information and innovation are the central premises of a circular economy; however, sharing with independent businesses is not something manufacturers have been willing to do.[101] Apple is one company that is unwilling to sharing its IP. The company does not "release their internal service manuals or sell replacement parts to the public, to independent repair technicians, or unaffiliated recyclers or refurbishes."[102] This attitude results in major brands holding a monopoly over the aftermarket and thereby negatively impacting many small businesses.[103] IP models only further promote this selfish business model since the IP system "provide[s] incentives to foster innovation and creative activities by awarding an exclusive, temporary, and limited right to the creator."[104]

Patent law plays a central role in repairing protected properties.[105] The principle of exhaustion means that once a patented item is legally sold, the patentee no longer has any right to control any subsequent resale.[106] Under this principle, ordinary repair is allowed if it does not "equate to making the inventions."[107] However, it is unclear to what extent modifying it or repairing a purchased patented item is allowed.[108]

IP rights will inevitably "restrict information sharing along the supply chain" and create "issues around the legalities of selling remanufactured products."[109] Many companies with IP-protected products, namely trade secrets, may engage in "recycling or remanufacturing their products on their own to reduce the risk of trade secret leakage when outsourced to third parties."[110] Services required within a circular economy, "such as repairing, remanufacturing, and recycling involve environmental benefits by either extending or upcycling products as well as

100. *Id.*

101. Kyle Wiens, *Intellectual Property Is Putting Circular Economy in Jeopardy*, THE GUARDIAN (June 4, 2014, 7:00 AM), https://perma.cc/CJ5E-ENA5.

102. *Id.*

103. *Id.*

104. Rosa M. Ballardini et al., *Developing Novel Property Concepts in Private Law to Foster the Circular Economy*, 279 J. OF CLEANER PROD., Jan. 2021, at 6.

105. *Id.* at 5.

106. *Id.*

107. *Id.*

108. *Id.*

109. SHARON PRENDEVILL ET AL., CIRCULAR ECONOMY: IS IT ENOUGH? 9 (2014).

110. Roberto Hernández-Chae et al., *Integrating Intellectual Property and Sustainable Business Models: The SBM-IP Canvas*, SUSTAINABILITY (Sept. 2020), at 16.

reducing costs and require IP sharing (e.g., licensing) between original equipment manufacturers, recyclers, and remanufacturers."[111]

One proposed solution to the issue of repairing patented circular goods without infringing on the patent would "be to include an explicit exception in intellectual property rights regimes" where repairing protected goods under specific and defined conditions would be allowed.[112] Other IP strategies include bilateral licensing agreements with selective partners, multilateral patent pools, or patent pledges with more or less restrictive clauses.[113] Services through open source or licensing can also help build brands or community involvement to monitor environmental issues.[114]

Current literature does not explore issues associated with IP within the circular model, but this does warrant significant exploration. Both the producer and consumer need to consider what products and services deserve IP attention. For example, a sterilization process or a material design that can survive the circular process has the potential to involve many IP-related issues. Producers would further need to consider the IP protection issues along the path of circularity. For example, patentability issues that may arise in a patented circular process, such as sterilization, could be solved if the holder of the patent controls every aspect of the circular process. This would incentivize merchants to keep the process in-house or on a brokered basis to maximize and protect the use of the patent. Users of the sterilization process would come to a specific facility to utilize the patent technology. Conversely, they could rent the use of their processes (however, this would potentially increase start-up costs for circular models).

Many products and circular systems along the route of a circular model have the potential to contain various IP rights. When implementing a circular model, these rights must be considered to avoid infringement and uphold protection.

2. Governance

Governance will have to delineate the proper or mandatory permissible behavior, enforce collaboration, direct restrictions, use public facilities, and extend to wholly or partially owned state enterprises.[115] The government will have the legal responsibility to implement and enforce compliance mechanisms for environmental safety and treatment and disposal of the packaging and for the allocation of duties, such as urban management, that result from the social or economic disruptions arising from supply chain modification.[116]

One critical role the government would play would be the implementation of measuring and performance indices to monitor how the circular economy is working.[117] An example of this is a scorecard system to show if an organization is

111. Hernández-Chae et al, *supra* note 111, at 12.
112. Ballardini, *supra* note 105, at 8.
113. Hernández-Chae, *supra* note 111, at 2.
114. *Id.* at 12.
115. *See* Feldman et al., *supra* note 95, at 11022.
116. ENV'T L. INST., *Growing the Circular Economy Through Legal Initiatives*, YOUTUBE (Feb. 29, 2016), https://perma.cc/5CPK-4XCS.
117. Feldman et al., *supra* note 95, at 11022.

meeting specifically designed circular economy standards that entitle it to receive government procurement benefits.[118] The government could further play a crucial role in governing how resources are allocated. Linear economic issues, such as the uneven distribution of precious materials, will not disappear within a circular model. Availability of necessary recycled materials, trading, and markets within the remarketed material scheme will require monitoring and assistance from governing bodies.[119] These materials have the potential to create monetary and social consequences and raise complex legal questions pertaining to ownership and trade within the circular model.[120]

Legislators also have a critical part to play in promoting compliance with circular packaging reuse and return schemes by implementing legislation to encourage products and services' circularity. This can be done by enacting strict regulations to establish systems that reimagine the packaging of products.[121] Strict monetary penalties could be assessed for not following the circular system, not returning the packaging, or not disposing of a product correctly.

Conversely, to influence contract requirements outside of the legislation of baseline requirements, governing bodies can grant contracts to bidding parties. Government bidding rules could stipulate that bidders and their subcontractors must have waste reduction practices and programs that integrate a circular production and usage model. At both the state and federal level, circular economic virtues, requirements, and preconditions would be inserted and imposed through these contracts. The scope and scale may vary with the type of contract being rewarded.

The government's final role is to use taxation and spending tools to promote circular models and offer accessibility to a circular market. In Finland, for example, environmental tax reform targeted carbon emissions while seeking to preserve natural resources.[122] In the U.S. context, increasing the tax on emissions and natural resource consumption could yield enough revenues to justify a corresponding reduction of income taxes, social security contributions, or corporate taxes.[123] Further, taxes could be placed on products or companies that create negative externalities or use virgin raw materials.[124] Tax incentives could include tax concessions for new forms of ownership and tax penalties for new forms of ownership that use a linear production and consumption model.[125]

Governments may also subsidize consumer participation, given the higher costs of circular production models. Circular models are commonly more expensive and subscription-based, creating accessibility problems for economically marginalized populations. Governments might make these subsidies

118. *Id*.
119. *Id.*
120. Feldman et al., *supra* note 95, at 11022.
121. Salvioni, *supra* note 75, at 6.
122. Annina Orasmaa et al., *Rethinking Ownership: Producer Ownership Models in a Circular Economy*, 176 SITRA 2, 33 (2020).
123. *Id.*
124. *Id.* at 34.
125. *Id.*

universal and promote a more comprehensive public commitment to circular models. An example would be subsidizing through a food stamp program. Using federal food assistance programs to encourage or allow the purchase of circular products is a method of making a circular market more accessible to all classes while simultaneously encouraging the system.

While these subsidies can be put in place to encourage social participation by all classes and communities, a subsidizing program for circular start-ups will also be beneficial to promote the growth of circular businesses to "accelerate the required technological and societal changes."[126]

The government can additionally award subsidies, grants, or loans for research, development, and education. Education is an essential prong in the implementation of a circular economy. The transition from a linear to a circular economy would profoundly change society's wasteful habits and the culture that has developed around them.[127] Education through schools and the public sector should be implemented to support and explain the necessary societal changes and related skills.[128] This can be accomplished by increasing the quantity of educational content on circularity at all levels and fields of education, or by incorporating this education into qualification requirements for certain professions.[129] Further, incentives for research institutes and universities should be created to enhance study and teaching about circular economies by incorporating them into existing research projects.[130]

Finally, to strengthen the consumer's role, stricter consumer protection legislation should mandate information disclosure, such as product durability, repair, availability of spare parts, or more extended product warranty periods.[131] Legislative requirements could include digital materials and product passports that display information on all the materials used in products, their origin, safety, reparability, and recyclability.[132] These disclosure systems should adopt standardized reporting formats, similar to nutritional data found on container labels that indicate calories, servings per package, and so on. Such systems would allow consumers to make meaningful comparisons about products and services' environmental impacts based on reliable information in the packaging context.[133]

C. Relevant Legislation When Designing a Circular Product

A set of cultural and other expectations have developed around the packaging of goods across most markets. Packaging has many significant purposes, including safety, marketing, advertising, efficient transportation, product quality, and other product information. However, complex tensions exist between these expectations

126. *Grants and Subsidies*, CIRCULAR CITY FUNDING GUIDE, https://perma.cc/2Y49-3VA3 (last visited Mar. 19, 2023).
127. Orasmaa et al., *supra* note 123, at 37.
128. Orasmaa et al., *supra* note 123.
129. *Id.*
130. *Id.*
131. *Id.* at 32.
132. *Id.* at 35.
133. *Id.*

and their environmental impacts. To properly implement a circular economy, manufacturers must use designs that encourage maximum circularity without compromising consumer safety. Thus, the various purposes of packaging, paired with their corresponding legislative guidelines, are all relevant when designing products to be used in a circular economy to ensure they comply with state and federal requirements. These regulations are in place to protect the consumer from a harmful product, protect the producer from fault, and ensure the product arrives as described upon delivery across the distance to be traveled.

The need for strictly regulated packaging in consumable goods gained national attention during the 1980's Tylenol Murders, where several citizens of Illinois lost their life after ingesting Tylenol that had been laced with cyanide by an unknown individual.[134] This marked the end of a certain strain of consumer innocence and necessitated the beginning of rebuilding trust in manufacturers.[135] Before this event, the only safety measures keeping an individual from any sort of over-the-counter medical capsule were a child-resistance cap and a wad of cotton.[136] Today, you will find shrink-wrap plastic, a foil seal, and numerous warnings to consumers to not ingest the medication if the packaging has been removed or punctured.[137] Much of this packaging results from the 1989 passage of U.S. Food and Drug Administration (FDA) regulations, which required that consumer products be sold in tamper-resistant packaging.[138]

Legislation such as this must be considered when designing the system and products for a closed-looped consumable and product packaging model. While there is much federal and state-specific legislation that must be considered when implementing a circular economy, this paper will outline a set of broad federal regulations and a few narrower state examples that would touch many products in consumable and product packaging. These regulations include the FDA Compliance Policy Guide section 450.500 Tamper-Resistant Packaging Requirements for Certain Over-the-Counter Human Drug Products, the Federal Trade Commission's (FTC) Fair Packaging and Labeling Act, assorted chemical safety aspects for commonly used materials, and various state rules and regulations.

1. FDA Compliance Policy Guide (CPG) Section 450.500 Tamper-Resistant Packaging (TRP) Requirements for Certain Over-the-Counter (OTC) Human Drug Products.

First to be considered is FDA CPG section 450.500 TRP for Certain OTC Human Drug Products. This requires:

134. Bill McCool, *The Tylenol Murders Changed Packaging Forever*, DIELINE (Jan. 10, 2018), https://perma.cc/ZSS2-ZQ28.

135. *Id.*

136. *Id.*

137. *Id.*

138. U.S. FOOD & DRUG ADMIN., COMPLIANCE POLICY GUIDE SEC 450.500 TAMPER-RESISTANCE PACKAGING REQUIREMENTS FOR CERTAIN OVER-THE-COUNTER HUMAN DRUG PRODUCTS (1992) [hereinafter COMPLIANCE POLICY GUIDE].

> "All OTC human drug products …, [and] cosmetic liquid oral hygiene products … be packaged in tamper-resistant packaging…The packaging must use an indicator or barrier to entry that is distinctive by design, or must employ an identifying characteristic…Further, the regulations require a labeling statement on the container … to alert the consumer to the specific tamper-resistant feature(s) used. The labeling statement is also required to be placed so that it will be unaffected if a TRP feature is breached or missing…Manufacturers and packagers are free to use any packaging system as long as the tamper-resistant standard in the regulations is met."[139]

The TRP requirements are intended to ensure that the product's packaging "can reasonably be expected to provide visible evidence to consumers that tampering has occurred."[140] Examples of packaging technologies capable of meeting the TRP requirements include film wrappers, blister or strip packs, bubble packs, heat shrink bands or wrappers, foil, paper, or plastic pouches, container mouth inner seals, tape seals, breakable caps, sealed metal tubes, or plastic blind-end heat-sealed tubes, sealed cartons, aerosol containers, and cans.[141]

Most, if not all, the packaging technologies suggested to meet the TRP requirements include packaging designed for a linear or use-dispose model. Thus, consideration of the design and implementation of TRP products that can be used in a circular economy and meet TRP requirements presents a potentially difficult issue. One solution would be to simply design a TRP seal that could easily be reused. Another solution would be to change the regulation to disregard TRP when the product comes directly from the manufacturer through a return "on the go" model and "return from home" model.[142] Similarly, a "refill on the go" option would be possible, where consumers could go to a designated site to refill their packaging for products that fall under this legislation. This would require all products to be highly monitored to prevent tampering or to be moved behind the counter and only distributed by an official. In our current retail market, this would likely slow down purchasing convenience, and thus, infrastructure and jobs would need to be created to accommodate a "refill on the go" option. In the broader economy, the number of products required to have TRP and the size of the TRP is only a small portion of the country's waste. It may, therefore, be worth considering whether this is an area where public health is of greater concern than resource conservation and environmental health.

139. COMPLIANCE POLICY GUIDE, *supra* note 138.

140. *Id.*

141. *Id.*

142. "Return on the go," "return from home," and "refill at home" models are circular structures that determine how the consumer and producer exchange goods and materials. This will be further explored below. *See* ELLEN MACARTHUR FOUND., REUSE: RETHINKING PACKAGING 13 (2019) [hereinafter REUSE].

2. Federal Trade Commission's Fair Packaging and Labeling Act (FPLA)

Next, a producer of a circular product may also need to consider the FPLA.[143] This is consumer protection legislation that directs the FDA and FTC to create regulations for the packaging and labeling of products.[144] The FPLA requires packages of household consumer commodities, which are included in the coverage of the FPLA, to bear labels that have a statement identifying the commodity; the name and place of business of the manufacturer, packer, or distributor; and the net quantity of contents in terms of weight, measure, or numerical count.[145] "The Act authorizes additional regulations where necessary to prevent consumer deception … with respect to descriptions of ingredients, slack fill of packages, use of 'cents-off' or lower price labeling, or characterization of package sizes."[146] In other words, the act informs manufacturers on how to disclose information about their product truthfully and completely through packages and labels.[147]

The FPLA is designed to facilitate value comparisons and to prevent unfair or deceptive packaging and labeling of many household consumer commodities.[148] A new system to disclose this information to consumers will need to be implemented in a circular economy with constant refilling of reusable containers. An example would include posting the information at the refill station.

3. Chemical Safety Aspects for Commonly Used Materials

When contemplating the reuse of material involved in food packaging, the chemical safety aspects of commonly used materials must be considered and addressed. Recycling food packaging waste into new food packaging presents particular challenges.[149] "The use of recycled food packaging not only increases the possible sources of contamination but . . . also the numbers and levels of chemicals that can migrate from the packaging into foods, thereby potentially affecting human health."[150] Specifically, it is essential to monitor recycled materials for the presence of non-intentionally added substances, arising from impurities, reactions, and break-down of the packaging.[151] For example, when considering reusing products that include paper or paper components, regulations

143. FTC Fair Packaging and Labeling Act, 16 C.F.R. § 500 (2023).

144. *Fair Packaging and Labeling Act (FPLA) – Background, Summary of Provisions and Recent Amendments*, COMPLIANCE ONLINE (Aug. 16. 2011), https://perma.cc/7J6X-SEMA [hereinafter COMPLIANCE ONLINE].

145. *See* 16 C.F.R. § 500.

146. FTC, *Fair Packaging and Labeling Act: Regulations Under Section 4 of the Fair Packaging and Labeling Act*, https://perma.cc/F4ZY-V2PA.

147. COMPLIANCE ONLINE, *supra* note 145.

148. 16 C.F.R. § 500.

149. Birgit Geueke et al., *Food Packaging in the Circular Economy: Overview of Chemical Safety Aspects for Commonly Used Materials*, 193 J. OF CLEANER PROD. 491, 492 (2018).

150. *Id.*

151. *Id.*

under 21 C.F.R 176.260 regarding pulp from reclaimed fiber must be followed.[152] "Accordingly, waste paper shall not contain any poisonous or deleterious substance that is retained in the recovered pulp and migrates into food, except those specifically regulated under 21 USC [§] 346 and 21 USC [§] 348."[153]

The FDA currently asks plastic recyclers to submit information on their process in order that the agency may consider and evaluate processes for plastic food contact articles.[154] To recommend the maximum acceptable level of contaminants in recycled plastic, the FDA refers to the Threshold of Regulation approach, where specific chemical contaminants shall not exceed certain migration.[155]

Thus, when designing a circular system, manufactures in particular will have to consider and closely monitor the chemical safety aspects of a product to ensure it falls within regulatory thresholds. Attention to public health and public health regulations must be at the forefront of all product design in a circular model.

4. State Regulations

Upon compliance with federal regulation, a hypothetical producer in the circular economy must then consider state legislation. An example of relevant state legislation for consumable product packaging is found in California.

The California Retail Food Code section 114121 was recently amended to address the return and reuse of food and beverage storage containers in a retail food facility.[156] The code outlines the procedure to reuse, handle, clean, and distribute such containers to consumers. This section allows the consumer further protection from contamination and heightens sanitization procedures for circular food packaging. When creating a circular business model, state legislation must be considered when establishing distribution procedures to ensure products are safely delivered to the consumer.

D. Outlined Implementation of Circular Economy Model in the United States

The most simplified and efficient implementation of a circular economy would involve a large-scale shift from owning goods to using services. This product ownership model allows companies to act as owners of products through product life cycles.[157] The consumer would change from owner to user, sharer, borrower, or renter.[158] A shift in ownership allows society to go from owning many goods with short life spans and low usage rates to owning fewer goods, with

152. Geueke et al., *supra* note 149.
153. *Id.*
154. *Id.*
155. *Id.* at 494; 21 C.F.R. § 170.39; FDA, GUIDANCE FOR INDUSTRY: USE OF RECYCLED PLASTICS IN FOOD PACKAGING (CHEMISTRY CONSIDERATIONS) (2006).
156. Cal. Health & Safety Code § 114121.
157. Lehtinen, *supra* note 27.
158. *Id.*

longer life spans and higher usage rates.[159] Furthermore, it allows access to untapped business potential worth approximately $10 billion USD from user experience, user insight, brand loyalty, and cost savings.[160] Packaging and transportation costs can be reduced by supplying refills for reusable containers in a compact form, such as concentrates or solids.[161] Individual needs can be accommodated by reuse models that let users mix and match contents and personalize packaging or desired quantities.[162] Economies of scale for distribution and logistics can be achieved through sharing reusable packaging across brands, sectors, or broader networks.[163]

To effectively implement a product ownership model to promote a circular economy, producers and consumers would be involved in a simple three-tier system: advertising, subscription, and compliance. Each represents a stage in establishing, securing, and maintaining a fair and efficient product ownership relationship.

1. Advertising

The first step in implementing a circular economy model is to make the service known to the public. At the consumer's point of entry into these systems, the advertisement for a circular service will include critical consumer information, such as long-term environmental benefits, the reality of resource depletion, the importance of resource management, and human survival. This step is vital as it exposes the consumers to the downfalls of linear consumption and realigns their consumption understanding, concern, and habits with a closed-loop system. Furthermore, educating the consumer on this critical information would allow them to understand why increased costs associated with the adoption represent a good investment in public resources.

This can take the form of many advertising styles that must be circular in themselves. The days of the paper pamphlet should be in the past within a closed-loop system. Advertising of the services must take the form of face-to-face communication or online and digital advertising.

Advertisers must ensure they are targeting the proper demographics at all levels. Corporate actors should be encouraged to join the market and individual consumers to adopt certain behaviors to feed into this marketplace, in the hopes that this will change the general policy climate or social climate and influence attitudes around this system.

Advertising in the circular environment would also entail promoting the subsidies or tax incentives offered to corporations or consumers, each of those being a separate target audience. Thus, a different advertising strategy would be necessary to engage each separate group. However, at the same time, these

159. *Id.*
160. REUSE, *supra* note 143, at 6.
161. *Id.* at 10.
162. *Id.*
163. *Id.*

different marketing audiences need to complement each other to establish complementary goals to ensure target audiences are not interfering with each other.

2. Subscription

Where applicable, the producer and the consumer must establish a relationship based on refilling the product. This would be relevant, for example, in the consumable or cleaning supply sectors. Subscription structure can be broken down into two distinct categories: home-based and site-based. Each structure has two subscription systems available.

A home-based system allows the consumer to stay at home while the product is delivered to them. The packaging, if necessary, would subsequently be picked up from their residence. These models offer the greatest ease for the consumer and increased cost for the producer. The first home-based system is a "refill at home" subscription.[164] The consumer has a container with the product, uses the product, acquires the refill with home delivery through subscription service, and proceeds to refill the container.[165]

An example of this would be a system where detergent is delivered in a tablet form, which is to be mixed with water in a reusable spray bottle to make the final product.[166] A tablet weighs a fraction of regular detergent weight, which significantly reduces shipping and packaging costs.[167] A small start-up in the United States called Blueland has implemented this system.[168]

The second option available is a "return from home" model.[169] The consumer subscribes to the service; the business delivers the product; the consumer uses the product.[170] The business then picks up the empty packaging and swaps it with new products and packaging.[171] The company cleans and refills the used packaging to prepare it for reuse.[172] This would be similar to the milkman model of days past or the reusable water cooler jugs. A small start-up in New York City has implemented this system. The company, The Wally Shop, provides a shopping service and home delivery of bulk and farmers market products, all in reusable packaging secured with deposits.[173]

Pepsi, Unilever, and Nestle have announced plans to start offering subscription delivery services with reusable packaging.[174] The service, called Loop, will have UPS drivers drop off a reusable bag with various products

164. REUSE, *supra* note 143, at 14.
165. *Id.*
166. *Id.* at 30.
167. *Id.*
168. *Id.*
169. *Id.* at 18.
170. *Id.*
171. *Id.*
172. *Id.* at 19.
173. REUSE, *supra* note 143, at 28.
174. Ashley Carman, *Pepsi, Nestle, and More Will Test Reusable Packaging Subscription Service*, THE VERGE (Jan. 18, 2019, 10:38 AM), https://perma.cc/4ZCD-MD2B.

inside.[175] Once the products are used, the consumer can schedule a time for their containers to be picked up, with new containers dropped off.[176] "Loop will handle the cleaning and reuse aspect of the packaging."[177]

Producers and consumers can also implement a site-based structure where the consumer leaves the home to refill or return their packaging with their desired product. The first subscription structure available under this model is a "refill on the go" option.[178] The consumer has a container with the product, uses the product, and refills at a designated location.[179] An example of this is seen in the United Kingdom with a company called Costa Clever Cup.[180] They require the consumer to purchase a reusable coffee cup with contactless payment capabilities.[181] This allows the added convenience of the user paying for their brew without having to reach for their wallet while additionally saving a one-use cup.[182] Multiple Starbucks in London have implemented a three-month trial charging five pence on single-use cups combined with a twenty-five pence discount for bringing a reusable cup.[183]

The second option available is a "return on the go" model where the user purchases the product in returnable packaging.[184] The consumer uses the product and then proceeds to return the packaging or container to a designated location, or mails it in.[185] The business would then collect the used packaging or containers to be cleaned and refilled before being put back on the market.[186] An example of this is being implemented in a New York City pilot program called Fresh Bowl.[187] They have various vending machines serving fresh meals stocked daily and sold in reusable glass jars.[188] The glass jars can be returned to the machine for a two-dollar credit towards the next purchase.[189]

In October 2020, Burger King announced a plan to test a "return on the go" option to reduce waste using the Loop system.[190] Customers will choose to have their food packaged in reusable containers and pay a rental fee.[191] "The reusable packaging is brought back to the store where it will be cleaned and readied for reuse."[192]

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175. *Id.*
176. *Id.*
177. *Id.*
178. REUSE, *supra* note 143, at 16.
179. *Id.*at 17.
180. *Id.* at 26.
181. *Id.*
182. *Id.*
183. *Id.*
184. *Id.*
185. REUSE, *supra* note 143, at 20.
186. *Id.*
187. *Id.* at 34.
188. *Id.*
189. *Id.*
190. Clare Goldsberry, *Burger King Partners with TerraCycle to Pilot Reusable Packaging*, PLASTICS TODAY (Oct. 26, 2020), https://perma.cc/F9ZG-LGKY.
191. *Id.*
192. *Id.*

While the convenience of the linear model was a significant attraction for consumers, it should be clear from the examples above that both home-based and site-based models offer their own advantages. Consumers must be shown that convenience and ease do not need to be sacrificed in a circular model.

3. Compliance

The final stage of this circular model is compliance. This is broken down into two forms of compliance, the first being compliance with the consumer's expectations for the product and the second being compliance with the subscription model with defined terms of ownership.

a) Product Quality – Sales by Description

When a product is ordered, delivered, or picked up in-store, the producer creates an expectation to the consumer that the product will be of a certain quality or, in statutory terms "marketable." [193] This expectation is transformed into an issue of compliance for the producer since there are regulations on the description of a product. For example, Sales Article 2 of the Uniform Commercial Code Section, 2-314 on Merchantability and Implied Warranty outlines product quality requirements in the sales of goods.[194]

This provision codifies and makes enforceable the presumption that goods sold by a merchant dealing in business, production, or manufacturing of that good are merchantable, along with other implied warranties arising from the course of dealing. In other words, goods must be received in the proper size or quantity, come as described, and fit the purpose of the good as advertised.

Packaging must support merchantability by ensuring goods survive the journey from manufacturing to end users while maintaining the qualities commensurate with expectations associated with the items being bought and sold. Goods moving through circular production must account for such expectations in ways that strike a balance between merchantability and circularity.

b) Compliance with the Subscription Model via Defined Terms of Ownership

Once the product has been made available to the consumer, the legal regime must assist in ensuring compliance and clarifying the ownership structure for the packaging or container in which the product comes in. This stage will combine elements of producer ownership and the traditional sale of goods.[195] One proposed solution is a producer-ownership relationship. The ownership of the packaging would remain with the producers or intermediaries, thereby ensuring that the packaging and materials remain efficiently utilized throughout their life cycle.[196] Companies will transition from selling products and packaging to dealing in

193. UNIF. COM. CODE § 2-314 (AM. L. INST. & UNIF. L. COMM'N 1977).
194. *Id.*
195. Lehtinen, *supra* note 27.
196. Orasmaa et al., *supra* note 123, at 3.

rentals, maintenance, and returns.[197] Ownership may also take the form of a promise to retake possession of products, repair and resell them, or reuse and recycle the materials they contain.[198]

There are four primary producer ownership models. First, the provider owns the product and is responsible for its maintenance, and the customer rents or leases the product instead of buying it.[199] This is known as product-as-a-service.[200] Second, the manufacturer produces and owns the materials, but the customer is responsible for its use.[201] This is known as materials-as-a-service.[202] Third, the customer buys a performance instead of owning a product, known as performance-as-a-service.[203] The final option available is a function guarantee model where a warranty for a product is available that defers responsibility for the product's maintenance and longevity to the producer.[204] This would be similar to an extended or lifetime warranty and a material return and deposit system.[205]

Producer ownership is also supported by a sharing platform and digital solutions model.[206] Here, digital sharing platforms and solutions are used that make it possible to increase the usage rate of goods and other resources through renting and sharing.[207] This can be implemented through a digital platform, such as an app or website, that implements the blockchain, a "distributed ledger that removes the need for a trusted third-party to audit transactions."[208] This technology would store "information on transactions in real-time in 'blocks' which are cryptographically linked to produce an immutable record of activity."[209] This system allows for circular ease by proving the product's origin through a transparent digital supply chain and incentivizing positive behavior by tokenizing (or, converting to a digital coin) the natural resources and thereby turning them into a traceable commodity.[210]

Furthermore, it allows for easier access to a supplier's reusable product, if the supplier used by a company were to collapse. This creates stability in a circular economy not dependent on a fragile, singular supply model system. Although, this is where producers and consumers must be aware of potential IP rights issues.

A producer ownership model would be feasible within the "return from home" and "on the go" models, which would allow for simple incorporation and enforcement of compliance into the contract. A "deposit and reward system" is incorporated to improve brand loyalty and, more importantly, to incentivize the

197. *Id.*
198. *Id.*
199. Lehtinen, *supra* note 27.
200. *Id.*
201. *Id.*
202. *Id.*
203. *Id.*
204. Lehtinen, *supra* note 27.
205. Orasmaa et al., *supra* note 123, at 3.
206. *Id.*
207. Lehtinen, *supra* note 27.
208. Nic Chrysochou & Patrick Archard, *Blockchain Can Drive the Circular Economy*, PA KNOWLEDGE, https://perma.cc/3A9A-8R6R (last visited Mar. 1, 2023).
209. *Id.*
210. *Id.*

packaging's return. The producer would request a deposit upon receiving the container and would incentivize the container's return with a reward. The deposit model incorporates the container's price upon purchase of the product and container. The consumer is incentivized to return the container to either earn back their deposit or allocate a significant discount or credit to future purchases.

The Loop model mentioned above is an example of a deposit system.[211] The products will cost roughly the same as a single-use container, but consumers will "pay a container deposit between $1 and $10, and shipping will start at $20, but [these deposit fees] will decrease with every item added."[212]

The converse model for packaging or container ownership is the traditional model where the consumer would simply purchase the container or packaging associated with the product and then reuse that container when appropriate. This would be feasible in the "refill at home" or "on the go" subscription models. Since the ownership of the container transfers from the producer to the consumer upon purchase of the product, the only way to incentivize compliance with a circular economy would be through a reward system, where the consumer would be offered some sort of discount for every use or refill with their reusable container. An example of this is reusable grocery bags that the consumer owns. Upon checkout, the seller may offer a discount on their purchase for the use of the consumer's bags.

V. Conclusion

With supportive governance, the backing of the regulatory state, adequate legislation, and a proper circular framework, the reorganization of product design, production, distribution, and consumption is feasible in the food and product packaging industry. Although the structure of a circular economy presents many challenges, such as consumer acceptance, an alteration in ownership, and legislative compliance, it is clear the United States can overcome these challenges through legislative tools and infrastructure investments to implement a circular economy within the consumable, product packaging and distribution system. With carefully drafted state and federal regulation, as well as a societally acceptable and convenient circular model tailored to each product, a circular model can be implemented in the food and product packing industry. The milkman has more reason to return than simple nostalgia.

211. Goldsberry, *supra* note 191.
212. Carman, *supra* note 175.