

An Investor Brief on Impacts  
that Drive Business Risks:

# FIBER-BASED PACKAGING

ENGAGE *the* CHAIN

[engagethechain.org](http://engagethechain.org)



This brief provides a summary of the main environmental and social factors that affect the production of fiber-based packaging made from virgin pulpwood; while its focus is global, it spotlights key players in the U.S. value chain and provides examples of actions being taken by companies operating or headquartered in the U.S.

## KEY TAKEAWAYS

- In some regions, expansion of harvesting and production of the pulpwood used to produce packaging threatens forests and their communities. Impacts include loss of biodiversity, social conflict, water pollution and greenhouse gas emissions.
- Companies are reducing risks by ensuring pulpwood is sourced from verified legal sources and sustainable forest operations, increasing the recycled content of their products and ensuring clean production.
- Investors should address business risks through direct engagement with their portfolio companies and by supporting relevant policies and multi-stakeholder collaborations.
- Fiber-based packaging is made from a renewable material and is technically recyclable.<sup>1</sup> However, all the impacts across a product's and package's supply chain should be considered when making packaging decisions as there are tradeoffs among different types of packaging materials.

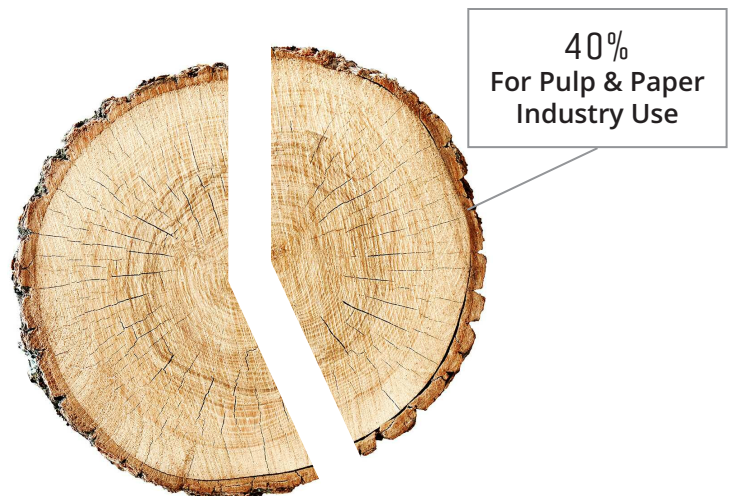
## COMMODITY OVERVIEW

### Fiber-Based Packaging, Also Referred to as Paperboard Packaging, Plays a Significant Role in Transporting, Protecting and Preserving Food and Other Consumer Products

The Global Pulp & Paper Industry<sup>2</sup> Uses Around 40 Percent of All Wood Harvested for Industrial Use.<sup>3</sup>

Fiber-based packaging is made from fibrous material—typically virgin pulpwood, recovered paper from post-industrial sources (e.g., production waste) or post-consumer waste (e.g., old corrugated boxes, folding cartons, bags and waste paper).<sup>4</sup> The impacts described in this brief are focused on packaging made from virgin pulpwood.<sup>5</sup>

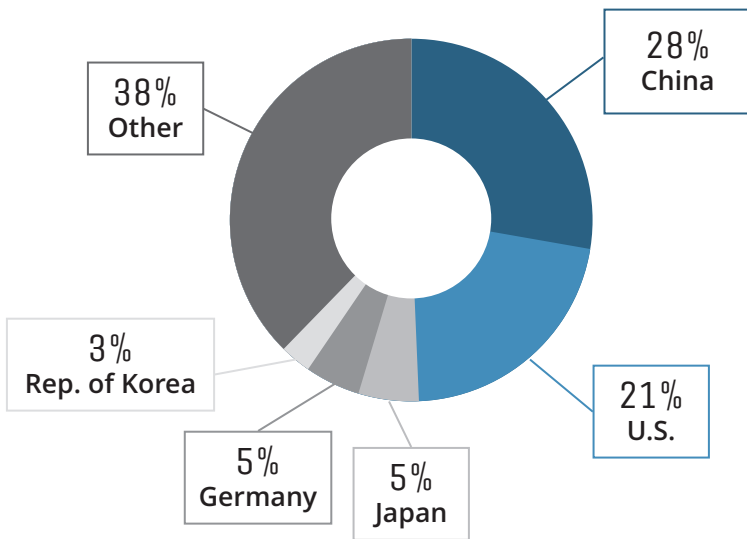
Companies in the food and beverage industry use several types of fiber based packaging, including corrugated container board, boxboard and sandwich wrapping. Each type of packaging uses a varying amount of virgin pulpwood.



GLOBAL PRODUCTION DATA

China & the U.S. Are By Far the Largest Producers of Wrapping, Packaging Paper & Paperboard, Accounting for Nearly Half of Global Production<sup>10,11</sup>

TOP FIVE PRODUCTION REGIONS<sup>12</sup>



213 MILLION METRIC TONS

Average global production, 2011-2013<sup>13</sup>

\$261 BILLION

Global production value<sup>14</sup>

22 PERCENT

Proportion of global production exported<sup>15</sup>



U.S. PACKAGING INDUSTRY

*The overall U.S. packaging industry was estimated to be worth about \$144 billion in 2012 with the paperboard segment accounting for 13 percent.<sup>16</sup>*

## Globally, the Production of Wrapping, Packaging Paper and Paperboard Has Doubled Over the Past Two Decades

Growth has been driven by the strong demand for packaged merchandise, processed foods and other goods in developing markets with rapid population growth and expanding middle classes.

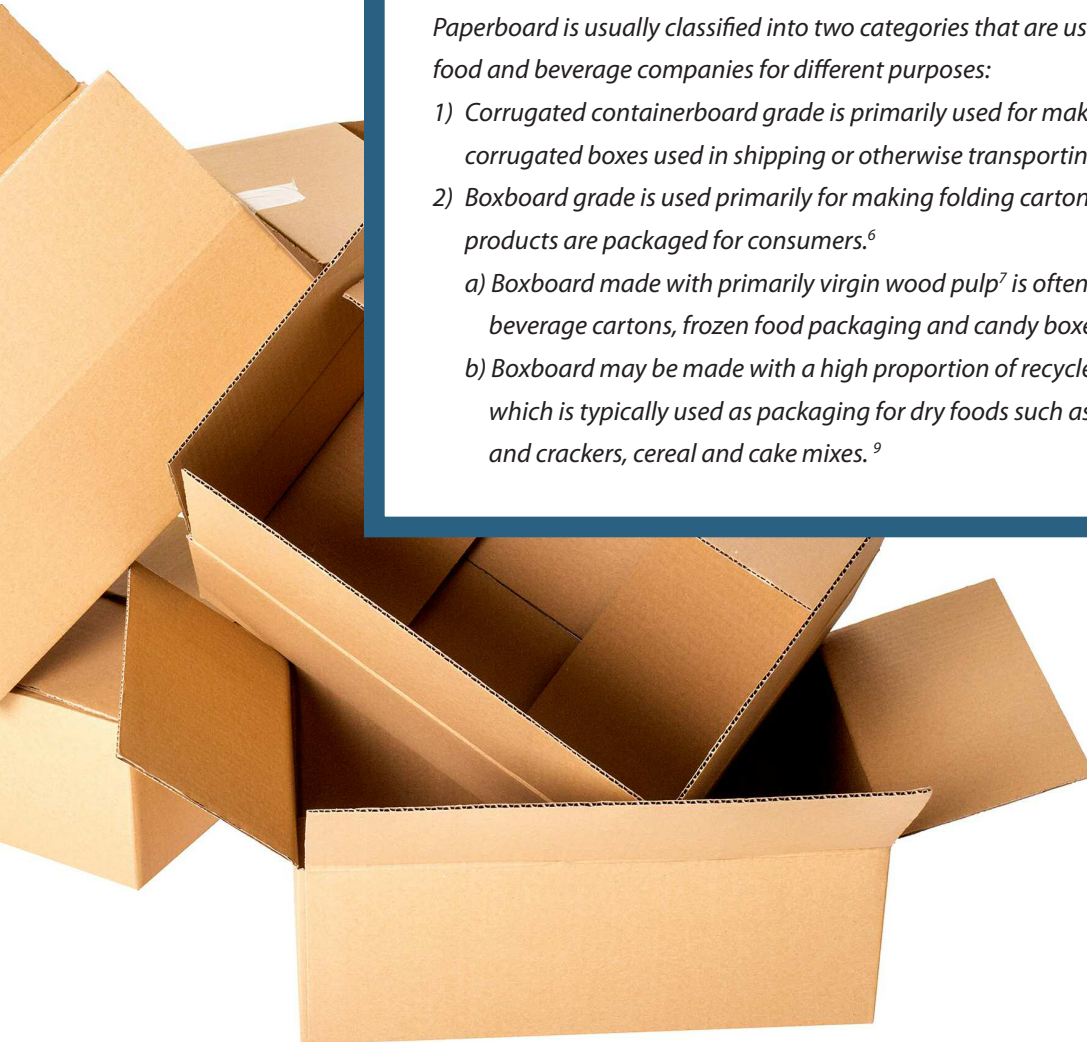
Increased demand for fiber-based packaging (as well as paper) has led to expansion of intensively managed tree plantations around the world, increased harvesting of wood from forests and greater capacity at mills.<sup>17</sup>

These pressures are expected to continue as global production in the pulp, paper and publishing sector is predicted to increase to 500 million tonnes by 2020.<sup>18</sup> Future growth in consumption and production will be driven largely by Asian economies as demand stagnates or declines in highly penetrated, mature markets such as North America and Western Europe.<sup>19</sup>

### TYPES OF PAPERBOARD

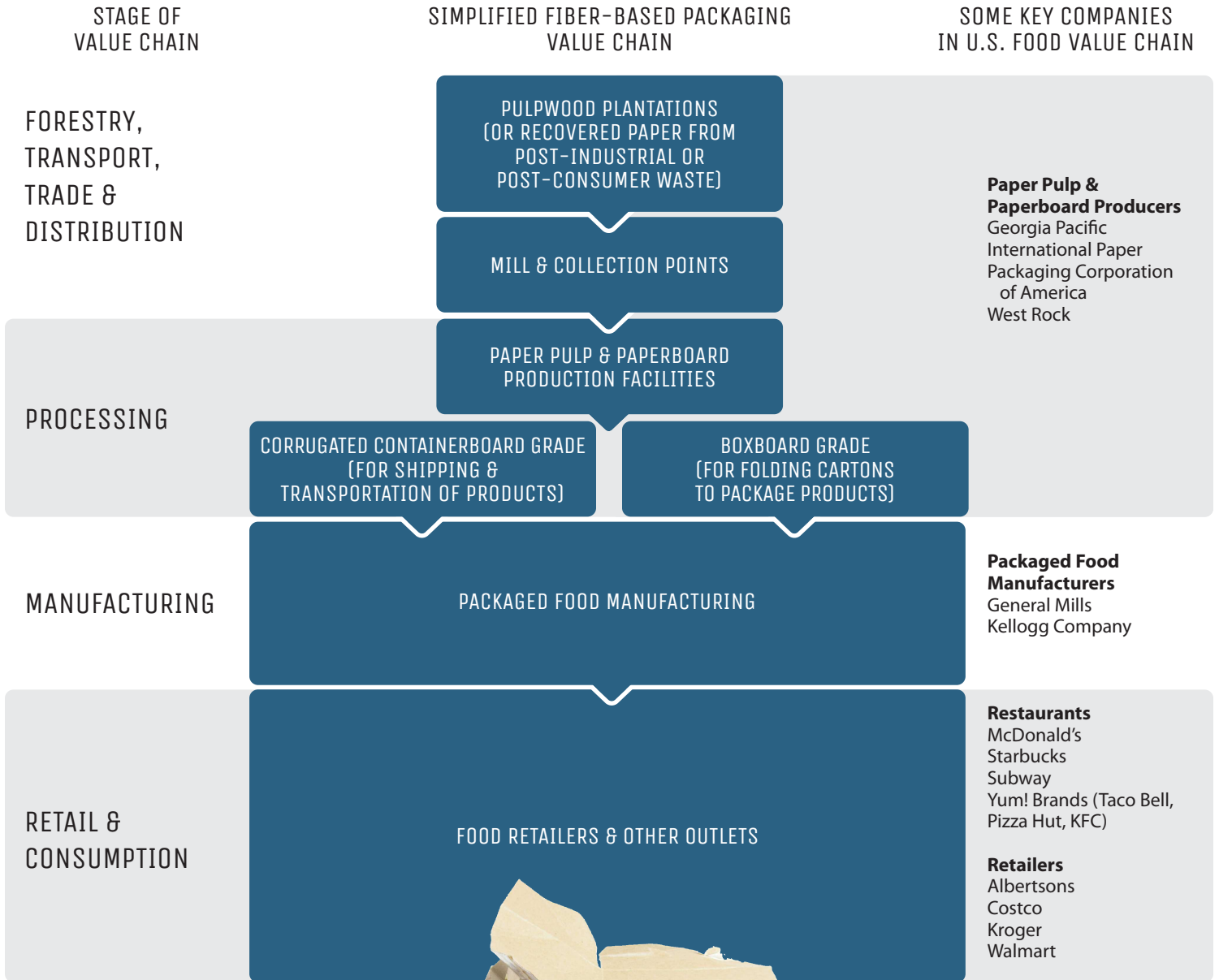
*Paperboard is usually classified into two categories that are used by food and beverage companies for different purposes:*

- 1) Corrugated containerboard grade is primarily used for making corrugated boxes used in shipping or otherwise transporting products.*
- 2) Boxboard grade is used primarily for making folding cartons in which products are packaged for consumers.<sup>6</sup>
  - a) Boxboard made with primarily virgin wood pulp<sup>7</sup> is often used for beverage cartons, frozen food packaging and candy boxes.<sup>8</sup>*
  - b) Boxboard may be made with a high proportion of recycled content, which is typically used as packaging for dry foods such as cookies and crackers, cereal and cake mixes.<sup>9</sup>**



THE FIBER-BASED PACKAGING VALUE CHAIN

The Largest U.S. Suppliers of Fiber-Based Packaging Represent a Significant Share of the Market



## KEY PLAYERS

The following provides additional information about some of the companies in the U.S. fiber-based packaging value chain. While the focus is on publicly traded companies headquartered in the U.S., some of the companies mentioned are headquartered outside the U.S. and/or are privately held.

## PAPER PULP AND PAPERBOARD PRODUCERS

Based on tonnes of paper and board produced in 2014, the three largest publicly traded U.S.-based companies were:

- International Paper (22.5 million tonnes)
- West Rock (10.9 million tonnes)<sup>20</sup>
- Packaging Corporation of America (4.3 million tonnes)<sup>21</sup>

Georgia Pacific is also a large U.S.-based company in the paperboard sector but is privately held.<sup>22</sup> Two pulp and paper giants that have been at the center of environmental controversies are Asia Pulp & Paper (APP) and APRIL; both are privately held and based in Asia.<sup>23</sup>

## PACKAGED FOOD MANUFACTURERS

Many companies use paperboard packaging for their products. Those producing cereal, baked goods and snack foods are amongst the largest users. For example, Kellogg Company reports that more than 90 percent of its packaging is paper-based while General Mills notes the proportion as 76 percent.<sup>24</sup>

## RESTAURANTS AND RETAILERS

Restaurants and retailers play an important role in the fiber-based packaging supply chain. These companies can indirectly influence production practices and supplier standards within their supply chain. Moreover, they are sensitive to external pressures as well as responsive to market trends and consumer preferences.

Restaurants are heavy users of fiber-based packaging for items such as sandwich wrappers and paper bags. McDonald's reports that 71 percent of its material use (by weight) is paper and Starbucks reports that fiber-based packaging accounts for 47 percent.<sup>25</sup> The four largest quick-service and fast-casual restaurants in the U.S. are McDonald's, Yum! Brands (Taco Bell, Pizza Hut, KFC), Starbucks and Subway. All are headquartered in the U.S.<sup>26</sup>

In addition to the fiber-based packaging that is used for products shipped to and sold by food retailers, retailers are also significant users of paper bags. The four largest food retailers in the U.S. are Walmart, Kroger, Costco and Albertsons.<sup>27</sup>

## U.S. SPOTLIGHT

*Most of the wood pulp used for fiber-based packaging produced in the U.S. is from trees within managed forests or industrial tree plantations located in the U.S.<sup>28</sup> These managed "tree farms" are planted and replanted, with significant concentrations in the northwestern and southeastern states.*

*However, multinational U.S.-based food and drink manufacturers sell packaged products in other markets that may contain wood pulp from regions where business risks from illegal activity, deforestation, pollution and social conflict are more likely. Moreover, U.S. imports may be packaged in boxes made with wood pulp from trees grown elsewhere and U.S.-headquartered pulp mill operators operate globally.*

ENVIRONMENTAL AND SOCIAL FACTORS



CLIMATE CHANGE



DEFORESTATION



LAND USE & BIODIVERSITY



WATER USE & POLLUTION



LAND RIGHTS



LIVELIHOODS



WORKING CONDITIONS



High Impact



Medium Impact



Low Impact

Globally, the environmental and social issues linked to the production of fiber-based packaging include a loss of biodiversity, social conflict, water pollution and greenhouse gas emissions. The scale of the impacts depends on the practices used by individual producers as well as regional and local conditions.

Although fiber-based packaging has environmental and social impacts, it is made from a renewable material that can be recycled where facilities exist.<sup>29</sup> However, all the impacts across a product's and package's supply chain should be considered when making packaging decisions as there are tradeoffs among different types of packaging materials.

The issues described in this brief are focused on packaging made from virgin pulpwood.<sup>30</sup>

HIGHER IMPACTS LIKELY IN CERTAIN REGIONS

Potential environmental and social impacts are higher in regions such as the tropics where there are:

- Unique ecological and socio-cultural areas (i.e., special or protected places such as High Conservation Value forests),<sup>31</sup>
- A high degree of political and social conflict,
- A high incidence of violating workers' or indigenous rights, or
- A high incidence of forestry-related illegal activity.<sup>32</sup>

In these regions, a company will need to undertake more due diligence and collect more detailed information (e.g., on the specific location of harvesting versus just the general origin of the wood).



## 1. IRRESPONSIBLE WOOD HARVESTING AND MANAGEMENT CONTRIBUTE TO DEFORESTATION, BIODIVERSITY LOSS AND SOIL EROSION

Although the use of recycled fiber is slowly increasing, the paperboard industry's primary source of fiber is still forests and tree plantations. Moreover, since recycled fibers eventually wear out, there will always be a need for a certain amount of new, virgin fibers.

Irresponsible harvesting from natural forests, as well as establishment of pulpwood plantations on converted natural habitats, can threaten fragile ecosystems and species and cause soil erosion. World Wildlife Fund (WWF) notes that, as an example, the remaining natural habitats and associated wildlife species in Borneo and Sumatra,

Papua New Guinea, the Russian Far East, Southern Chile and the Atlantic forest region in Brazil are all at risk because of growing demand for pulpwood.<sup>33</sup> This pulpwood may be used for producing a range of paper-based products (potentially including paper-based packaging but also biomass, office paper and tissue).

Moreover, since tree plantations are typically monocultures of non-native tree species with only a fraction of the plant and animal species found in natural ecosystems, there is a significant loss in biodiversity.

## 2. WOOD HARVESTED ILLEGALLY IS A LEGAL AND REPUTATIONAL RISK

In some countries with weak governance, the expanding production and harvesting of pulpwood may involve corruption and illegal logging (e.g., in Indonesia and Russia, the pulp industry is associated with problems of forest governance and corruption as well as legal irregularities, such as tax evasion, fraud and money laundering).<sup>34</sup>

Around the world, policies such as the Lacey Act in the U.S. have been put in place to prevent the trade of illegal wood and paper products.<sup>35</sup> Illegal logging results in producer country governments losing billions of dollars in revenue, contributes to organized criminal activity and depresses market prices. Low prices in turn place companies that produce and sell legally sourced forest products at a disadvantage.<sup>36</sup>

It is important to keep in mind that while legal compliance is crucial, it alone is not sufficient to ensure that responsible production and processing practices are used. Companies or investors should consider the location and complexity of the supply chain when determining the depth of due diligence needed to reduce the risk of packaging containing illegal or untraceable wood.





### 3. DEFORESTATION AND UNSUSTAINABLE FOREST MANAGEMENT CAN DISPLACE COMMUNITIES AND DISRUPT LIVELIHOODS OF THOSE WHO DEPEND DIRECTLY ON FORESTS

In regions where property rights are unclear or not enforced, indigenous peoples and local communities may be wrongfully displaced during the acquisition of land or conversion of forests. The livelihoods of forest-dependent communities are disrupted when natural forests are replaced with poorly established and managed tree plantations, which provide a much narrower range of services (such as food, fuel, medicine and wildlife habitat) than the original forest.

Displacement and loss of access to natural resources can lead to food insecurity and poverty for affected communities. Companies should be especially conscious of the direct and indirect risks related to displaced communities where indigenous populations are numerous (e.g., Brazil,<sup>37</sup> Canada, South Africa, India, Indonesia<sup>38</sup> and Australia). Companies that do not respect the legitimate land rights of local people may also face market and reputational risks such as protests, work stoppages or damaging social campaigns.<sup>39</sup>

### 4. GREENHOUSE GASES EMITTED THROUGHOUT THE LIFECYCLE OF FIBER-BASED PACKAGING CONTRIBUTE TO CLIMATE CHANGE

Greenhouse gases are emitted throughout the lifecycle of fiber-based packaging, from forest extraction, pulp and paper production, to use and disposal. Good forestry practices can help ensure that forests store carbon, which is important to reducing carbon dioxide and mitigating climate change.<sup>40</sup> By contrast, conversion of natural habitats to plantations often releases carbon dioxide that contributes to climate change (e.g., in Sumatra, where a significant amount of carbon is released when deep peatlands are converted to pulp plantations).<sup>41</sup>

The manufacture of fiber-based packaging is energy-intensive, with the energy required to power pulp mills accounting for the largest proportion of greenhouse gases released. Although mills may use some of their own waste products as fuel, the overall emissions and pollution can nonetheless be significant.<sup>42</sup>

### 5. PULP MILLS CONTRIBUTE TO WATER POLLUTION, DAMAGING ECOSYSTEMS AND THE HEALTH OF SURROUNDING COMMUNITIES

The manufacturing of fiber-based packaging uses a substantial amount of water (one reason why mills are located near waterways) and can produce large quantities of wastewater.<sup>43</sup> Historically, the pulp mill industry has been one of the largest producers of water pollution, as these facilities used chlorine to bleach the wood pulp to produce white paper. The use of chlorine causes the formation of toxic chemicals in the wastewater.

Over the last two decades, the pulp industry has been successful at decreasing the use of chlorine compounds. A decade ago, 20 percent of the world's wood pulp was bleached with elemental chlorine, mostly outside of Europe and the U.S.<sup>44</sup> While bleaching and the discharge of pollutants from pulp mills into surrounding bodies of water has decreased, pollution still can occur, which damages aquatic ecosystems and threatens the health of people living near the mill.<sup>45</sup>

## OPPORTUNITIES FOR ACTION

Investors can encourage companies to take the following actions to reduce business risks

## 1. JOIN MULTI-STAKEHOLDER SUSTAINABILITY EFFORTS

Many players, including buyers, producers, governments, NGOs and communities understand the issues and are collaborating to ensure the long-term sustainability of fiber-based packaging and the wood from which it is produced. Investors should encourage companies to join these multi-stakeholder efforts to demonstrate commitment and help accelerate progress. When a company is already involved in such efforts, investors should encourage constructive participation and progress in meeting commitments. This includes supporting and actively participating in the development and use of sustainability standards (see section 4).

Two global multi-stakeholder efforts focused on responsible forest and tree plantation management are:

- The Global Forest & Trade Network (GFTN), which has been led by WWF since 1991. GFTN includes more than 300 companies, communities and NGOs in over 30 countries and is focused on combatting illegal logging and driving improvements in forest management.
- The New Generation Plantation Project (NGPP), which provides a platform for participants to transparently share current and evolving tree plantation management practices. This includes sharing practical tools and case studies for practices that boost productivity while safeguarding the rights and livelihoods of indigenous peoples and local communities.

## TRACEABILITY CHALLENGES

*It is important to keep in mind that, as with other commodities, tracing the origin of pulpwood used in fiber-based packaging may be difficult. Packages are typically manufactured in pulp mills that use wood from multiple sources with a network of dealers that buy wood from different loggers, landowners and sawmills. Moreover, earlier in the supply chain at the sawmill, logs usually lose their link to individual landowners in the sorting yard, and the wood collected there (e.g., chips that are by-products of solid-wood products manufacturing) further loses its individual identity as it moves through the packaging manufacturing process.*

*As one example, a pulp mill in the eastern U.S. that produces 860,000 tonnes of paperboard per year uses 2.7 million tonnes of wood chips, which it procures directly from 60–70 landowners, some 600 suppliers, 120 sawmills and 10 shipping operations. While tracking these wood flows is challenging, it is possible to do so to a degree (e.g., at the district level).<sup>46</sup>*

A multi-stakeholder effort formed in 2004 to address concerns about packaging in general is the Sustainable Packaging Coalition (SPC). SPC provides science-based resources to members to improve all types of packaging systems.<sup>47</sup>

Several companies, most notably McDonald's and Starbucks, have also launched multi-stakeholder collaborations with

NGOs and others to find solutions. McDonald's partnered with Environmental Defense Fund and other experts to create a tool that helps it make better informed packaging decisions.<sup>49</sup> Starbucks has led three "cup summits" with scientists, academics, and competitors to study the challenges related to recycling paper (and plastic) cups and identify practical solutions.<sup>50, 51</sup>

### ADDRESSING DEFORESTATION ACROSS MULTIPLE COMMODITIES

*Many of the factors related to fiber-based packaging affect other commodities as well. Multi-stakeholder efforts relevant to fiber-based packaging that extend to other commodities linked to deforestation include:*

- **Tropical Forest Alliance 2020 (TFA)**

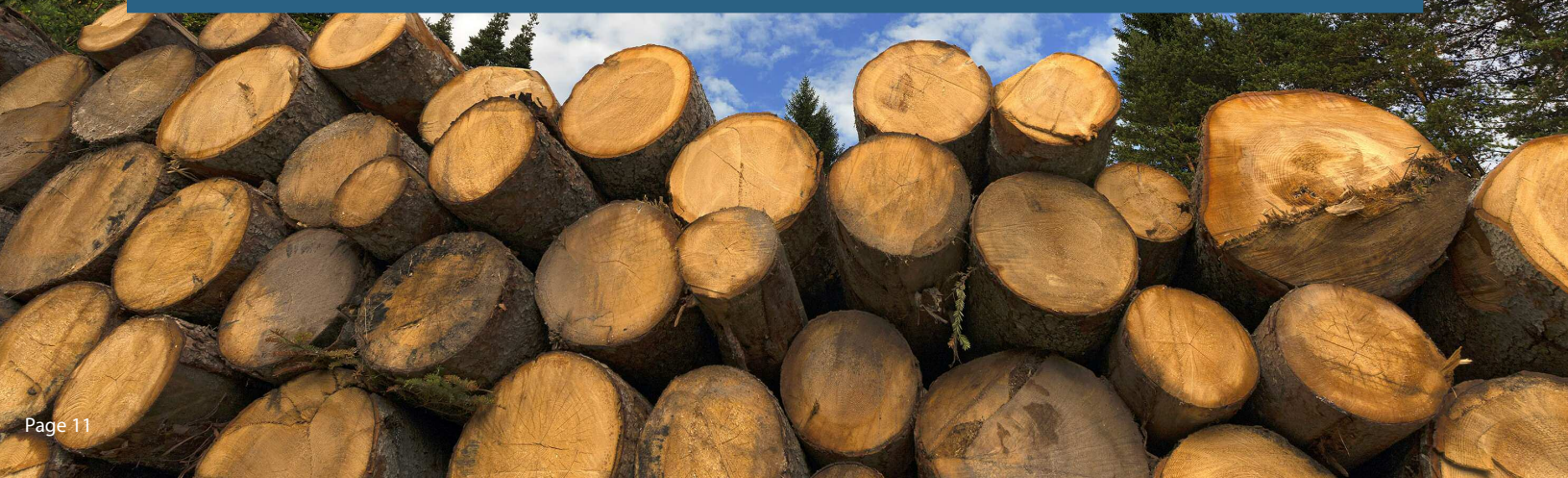
*TFA is a global umbrella partnership that brings together governments, private sector, and civil society organizations to remove deforestation from palm oil, beef, soybean and pulp and paper. It supports commitments by partners to reduce deforestation in tropical forest countries and was founded in 2012 after The Consumer Goods Forum (CGF)<sup>48</sup> committed in 2010 to zero net deforestation by 2020.*

- **The "Soft Commodities" Compact**

*The compact is a joint initiative of the Banking Environment Initiative (BEI) and CGF, mobilizing the global banking industry to help remove deforestation from soft commodity supply chains and achieve zero net deforestation by 2020.*

- **New York Declaration on Forests**

*In 2014, world leaders (close to 200 governments, financial institutions, companies at all points of the supply chain, and influential civil society and indigenous organizations) committed to cut natural forest loss in half by 2020, and to strive to end it by 2030. Concrete commitments and partnerships were also announced and are being implemented.*



## 2. ENGAGE DIRECTLY WITH PRODUCERS

Where companies have visibility into their supply chains, they can work with suppliers to promote better management practices. Opportunities to engage include supporting market growth for recycled post-consumer material, which reduces the need for more forest harvesting or plantation establishment. According to WWF other

opportunities also include investing in:

- improved efficiency in pulp and paper mills,
- cleaner processing technologies,
- technologies allowing more cellulose fibers to be extracted from a given volume of wood, and
- technologies to increase the recycling rate of a fiber.<sup>52</sup>

## 3. SUPPORT GOVERNMENT POLICIES

Companies can voice their support for policies that address illegal logging and sustainable forest management in producer countries. This includes requiring compliance with legislation to address illegal logging and supporting governments' enforcement efforts.

From a recycling perspective, companies can work with peers, local governments, and paper recyclers to attract recycling in areas where it may not currently be economically feasible on an individual brand or location basis.

## 4. ENCOURAGE USE AND DEVELOPMENT OF SUSTAINABILITY STANDARDS

Several third-party certifications exist for sustainably managed forest products, which guarantee that the wood fiber in a paperboard product is sourced from well-managed forests or recycled materials.

Within the U.S., the forest certification bodies that offer chain-of-custody certification are:<sup>53</sup>

- **Forest Stewardship Council (FSC) International**

FSC is a global forestry certification organization that sets national and regional standards. Its standards are considered by NGOs such as WWF to be the most rigorous. FSC International has certified approximately 450 million acres worldwide, which includes 35 million acres in the U.S.<sup>54</sup>

- **The Programme for the Endorsement of Forest Certification (PEFC)**

PEFC is a global umbrella organization and the world's largest forest certification system. As of March 2016, it had endorsed 40 national certification systems and more than 662 million acres of certified forests.

In the U.S., Sustainable Forestry Initiative (SFI) is the primary North American PEFC-endorsed standard, used primarily by large landowners. SFI has certified approximately 61 million acres in the U.S. (and over 266 million acres, when including Canada).

A second PEFC-endorsed system in the U.S. is the American Tree Farm System (ATFS). It is the oldest U.S. forestland management certification program, with 82 thousand woodland owners and 22 million certified acre. Fiber harvested from ATFS lands can be recognized under the PEFC and SFI chain-of-custody certificates.

Among these programs, environmental organizations tend to prefer the FSC, while landowners and tenure holders tend to prefer PEFC (i.e., SFI in the U.S.).

WWF has developed a Certification Assessment Tool to test the strength of certification systems and their standards on a range of issues. The results of WWF's assessment to date of three systems (including FSC and PEFC) are posted on an accompanying website.<sup>55</sup> A general comparison of FSC with PEFC is also provided in *Sustainable Procurement of Wood and Paper-based Products*.<sup>56</sup> While both programs are based on similar criteria and indicators (e.g., requirements for reforestation, conservation of biodiversity and protection

of endangered species and water quality), key differences relate to responsible clearcutting, use of chemicals and the replacement of natural forests by tree plantations.<sup>57</sup>

Other important ecolabels for wood and paper-based products are described in *Sustainable Procurement of Wood and Paper-based Products* and also listed in the Global Ecolabeling Network and ITC Standards Map.

Ceres has not evaluated the robustness and effectiveness of these standards but is providing them as options to consider. Ideally, standards are comprehensive and focus on measuring improvements across environmental and social issues.

### SOURCING CERTIFIED FIBER-BASED PACKAGING

WWF offers the following specific advice on purchasing fiber-based packaging:

- FSC certified or recycled content is preferred.
- If not available, use other certification endorsed by PEFC
- If not available, ensure verification system with suppliers is in place so fiber is not coming from areas with:
  - illegally harvested wood
  - wood harvested in violation of traditional and human rights
  - wood harvested in forests in which High Conservation Values are threatened by management activities
  - wood harvested in forests being converted to plantations or non-forest use



## COMPANIES IN ACTION

The types of actions companies are taking range from design decisions that reduce the use or amount of fiber-based packaging and incorporate recycled content, to purchasing fiber from sustainable sources.

- **McDonald's** set a goal, by 2020, to use certified or recycled sources for 100 percent of its fiber-based packaging (such as hot cups, carry out bags and clamshells).
  - Its approach focuses on product design (to optimize the weight and simplify the number of materials used in its packaging), responsible sourcing (to increase the use of recycled or certified raw materials) and recovery (to use recoverable packaging with viable end-of-life options).<sup>58</sup>
  - It set a specific recycling goal to increase in-restaurant recycling to 50 percent and to minimize waste in nine of its top markets (extending beyond service ware and packaging to food waste and spent cooking oil).<sup>59, 60</sup>
  - In Europe, all centrally sourced packaging that is distributed across its 38 European markets is chain-of-custody certified, with wood fiber coming from recycled sources or forests certified to one of two globally recognized standards for responsible forest management (FSC or PEFC).<sup>61</sup>
- **Mars** has committed to use certified, verified or recycled sources for 100 percent of its pulp and paper-based packaging by the end of 2020.<sup>62</sup>
- **International Paper** has committed by 2020 to a 35 percent increase in third-party certified fiber volume.<sup>63</sup> With respect to water quality, it set a goal to reduce mill wastewater discharges of oxygen-depleting substances (BOD) by 15 percent by 2020.



## ADDITIONAL RESOURCES

- The [Sustainable Packaging Coalition](#) provides a broad range of publications and resources to further the vision and ever-evolving implementation of sustainable packaging.
- Several free tools have been created by [Environmental Paper Network](#) (EPN),<sup>64</sup> World Wildlife Fund and Canopy (both members of the EPN).<sup>65</sup> These resources support purchasers in setting up a responsible paper purchasing policy, using paper efficiently and in choosing paper that has leading environmental attributes, such as recycled and FSC-certified virgin fiber content, agricultural residue content, better bleaching technologies and reduced carbon footprint.
- Both [The Sustainability Consortium](#) and [World Wildlife Fund](#) offer high-level insights and analysis about potential risks and opportunities across a number of commodities, including fiber-based packaging. WWF has also through the Global Forest and Trade Network (GFTN) produced a series of position papers on related issues (such as illegal logging and the timber trade).<sup>66</sup>
- [Sustainable Procurement of Wood and Paper-based Products, Version 3.2](#) (2014), by WRI and WBCSD, provides practical steps for addressing issues associated with purchasing the broad range of wood and paper-based products (including fiber-based packaging).
- [Realizing zero-deforestation: Transforming supply chains for the future](#) (Global Forests Report, 2015) by CDP provides case studies and a five-stage process for companies to help drive deforestation out of their supply chains.
- [Respecting Land and Forest Rights: A Guide for Companies](#) (2015) by The Interlaken Group and the Rights and Resources Initiative (RRI) was developed through a multi-stakeholder forum to support companies in respecting land rights by aligning operations with the United Nations Food and Agriculture Organization's Voluntary Guidelines on the Responsible Governance of Tenure (VGGT).

[Engage the Chain](#) offers briefs on seven other key commodities, a compelling [case](#) for sustainable agriculture and opportunities for action that cut across all types of agricultural commodities.

## ENDNOTES

- 1 Federal Trade Commission, "Part 260- Guides for the Use of Environmental Marketing Claims", <https://www.ftc.gov/sites/default/files/attachments/press-releases/ftc-issues-revised-green-guides/greenguides.pdf>;  
*Note: While the technology exists to recycle fiber-based packaging, Federal Trade Commission guidance on environmental marketing claims provides that: "A product or package should not be marketed as recyclable unless it can be collected, separated or otherwise recovered from the waste stream through an established recycling program for reuse or use in manufacturing or assembling another item."*
- 2 *Note: The pulp and paper industry includes not only fiber-based packaging but also products such as office and catalog paper, glossy paper and tissue.*
- 3 Environmental Paper Network, *Paper Facts*, <http://www.environmentalpaper.eu/tools-resources/paper-facts/>
- 4 Sustainable Packaging Coalition, "Environmental Technical Briefs of Common Packaging Materials: Fiber-Based Materials", 2009, <http://www.sustainablepackaging.org/Uploads/Resources/env-tech-briefs-fiber-based-materials.pdf>
- 5 *Note: Pulpwood refers to timber with the principal use of making wood pulp for paper production.*
- 6 Sustainable Packaging Coalition, "Environmental Technical Briefs of Common Packaging Materials: Fiber-Based Materials", 2009, <http://www.sustainablepackaging.org/Uploads/Resources/env-tech-briefs-fiber-based-materials.pdf>
- 7 Sustainable Packaging Coalition, "Environmental Technical Briefs of Common Packaging Materials: Fiber-Based Materials", 2009, <http://www.sustainablepackaging.org/Uploads/Resources/env-tech-briefs-fiber-based-materials.pdf>;  
*Note: Virgin pulp and paper mills typically use less than 20 percent recycled content in their paperboard products. Recycled mills typically use 80 percent or more recycled content in their paperboard products.*
- 8 Paperboard Packaging Alliance, *About Paperboard*, <http://paperboardpackaging.org/about-paperboard-packaging>
- 9 Paperboard Packaging Alliance, *About Paperboard*, <http://paperboardpackaging.org/about-paperboard-packaging>
- 10 FAO 2016, FAOSTAT database collections, Food and Agriculture Organization of the United Nations. Rome. Data average of 2011-2013 URL: <http://faostat.fao.org>
- 11 FAO, "FAO Yearbook of Forest Products - 1998", FAO, Rome, 2000, <http://www.fao.org/3/a-x4455m.pdf>;  
*Note: Global production data on fiber-based packaging is included as part of the broader "wrapping, and packaging paper, and board" segment of the paper industry. This segment is defined by FAO as covering "products used for wrapping, packaging, and the manufacture of sacks and boxes. It includes vegetable parchment, greaseproof paper and glassine paper, linerboard (paper or paperboard used as facing material on paperboard boxes), fluting medium (paper or paperboard used for conversion into a corrugated board), and sack kraft paper and other kraft wrapping paper, folding boxboard (used in the manufacture of folding boxes)."*
- 12 FAO 2016, FAOSTAT database collections, Food and Agriculture Organization of the United Nations. Rome. Data average of 2011-2013 URL: <http://faostat.fao.org>
- 13 FAO 2016, FAOSTAT database collections, Food and Agriculture Organization of the United Nations. Rome. Data average of 2011-2013 URL: <http://faostat.fao.org>



- 14 Data is for 2015 for paper and board packaging (folding, corrugated board or cardboard for liquids). All4Pack, "Packaging: Market and Challenges in 2016".
- 15 FAO 2016, FAOSTAT database collections, Food and Agriculture Organization of the United Nations. Rome. Data average of 2010-2012 URL: <http://faostat.fao.org>
- 16 Statista, "Market share of the U.S. packaging industry in 2012, by segment", <https://www.statista.com/statistics/258971/market-share-of-the-us-packaging-industry-by-segment/>
- 17 WWF, Social and environmental impacts of paper production, [http://wwf.panda.org/how\\_you\\_can\\_help/live\\_green/fsc/save\\_paper/paper\\_toolbox/paper\\_footprint.cfm](http://wwf.panda.org/how_you_can_help/live_green/fsc/save_paper/paper_toolbox/paper_footprint.cfm)
- 18 Environmental Paper Network, *Paper Facts*, <http://www.environmentalpaper.eu/tools-resources/paper-facts/>
- 19 Anne Marie Mohan, "Recycled paper packaging market to grow to \$139B by 2018", *Packaging World*, 2014, <https://www.packworld.com/sustainability/recycling/recycled-paper-packaging-market-grow-139b-2018>
- 20 *Note: West Rock is the new corporate name for the merger in 2015 of RockTenn and MWV*
- 21 Pulp and Paper International, "The PPI Top 100", RISI, 2015, <http://www.risiinfo.com/magazines/October/2015/PPI/pulp-paper/magazine/international/2015/The-PPI-TOP-100-770.html>
- 22 Georgia-Pacific Packaging & Cellulose, Containerboard, <http://www.gppackaging.com/containerboard/Pages/default.aspx>
- 23 WWF, What WWF is Doing, [http://wwf.panda.org/how\\_you\\_can\\_help/live\\_green/fsc/save\\_paper/paper\\_toolbox/app\\_april/what\\_wwf\\_is\\_doing/](http://wwf.panda.org/how_you_can_help/live_green/fsc/save_paper/paper_toolbox/app_april/what_wwf_is_doing/)  
*Note: includes a WWF Advisory to Buyers and Investors of APP/APRIL*
- 24 Conrad MacKerron, "Waste and Opportunity 2015: Environmental Progress and Challenges in Food, Beverage, and Consumer Goods Packaging", *As You Sow/NRDC*, 2015, p. 39, <http://www.asyousow.org/wp-content/uploads/report/Waste-and-Opportunity-2015.pdf>
- 25 Conrad MacKerron, "Waste and Opportunity 2015: Environmental Progress and Challenges in Food, Beverage, and Consumer Goods Packaging", *As You Sow/NRDC*, 2015, p. 14, <http://www.asyousow.org/wp-content/uploads/report/Waste-and-Opportunity-2015.pdf>
- 26 QSR, "The QSR 50", 2016, [https://www.qsrmagazine.com/reports/qsr50-2016-top-50-chart?sort=total\\_units\\_in\\_2015&dir=desc](https://www.qsrmagazine.com/reports/qsr50-2016-top-50-chart?sort=total_units_in_2015&dir=desc); *Note: Ranking is based on 2015 U.S. system-wide sales.*
- 27 Elliot Zwiebach, "2015 Top 75: The Big Picture", *Supermarket News*, 2015, <http://supermarketnews.com/rankings-research/2015-top-75-big-picture>; *Note: Ranking is based on sales of consumables, as reported in Supermarket News.*
- 28 Paperboard Packaging Council, "Renewable, Recyclable, Paperboard", <http://paperbox.org/Our-Industry/Sustainability#sthash.ZVPZByOE.dpuf>
- 29 Federal Trade Commission, "Part 260- Guides for the Use of Environmental Marketing Claims", <https://www.ftc.gov/sites/default/files/attachments/press-releases/ftc-issues-revised-green-guides/greenguides.pdf>;  
*Note: The Federal Trade Commission's notes in its guidance for the use of environmental marketing claims that "a product or package should not be marketed as recyclable unless it can be collected, separated, or otherwise recovered from the waste stream through an established recycling program for reuse or use in manufacturing or assembling another item."*
- 30 *Note: Pulpwood refers to timber with the principal use of making wood pulp for paper production.*

- 31 *Note: Wood harvested in forests in which High Conservation Values are threatened by management activities are areas that are particularly worthy of protection. For more information, see the HCV Resource Network at: <https://www.hcvnetwork.org/about-hcvf/the-six-high-conservation-values>*
- 32 Ruth Nogueron, Et. Al., "Sustainable Procurement of Wood and Paper-based Products", WBCSD/WRI, 2014, p. 2.8, [http://www.wri.org/sites/default/files/ForestProcurement\\_InsideFullReport\\_2014\\_En\\_Web.pdf](http://www.wri.org/sites/default/files/ForestProcurement_InsideFullReport_2014_En_Web.pdf)
- 33 WWF, *Pulp and Paper Overview*, <http://www.worldwildlife.org/industries/pulp-and-paper>
- 34 BankTrack, *Banks and pulp & paper*, [http://www.banktrack.org/show/pages/banks\\_and\\_pulp\\_and\\_paper](http://www.banktrack.org/show/pages/banks_and_pulp_and_paper)
- 35 *Note: Guidance by the Global Forest and Trade Network (GFTN) provides recommendations on the development and implementation of a responsible sourcing policy and how to address this and other risks. Details at: <http://sourcing.gftn.panda.org/>*
- 36 WWF, "The Lacey Act: Helping to Keep the US Wood Industry Strong", 2015, <http://www.worldwildlife.org/publications/lacey-act-fact-sheet>
- 37 Corporate Watch, "The new trend of biomass plantations in Brazil: tree monocultures", 2011, <https://corporatwatch.org/news/2011/nov/08/new-trend-biomass-plantations-brazil-tree-monocultures>
- 38 Forest Peoples Programme, "Deforestation: Community Land Grabs by Major Pulp and Paper Conglomerate in Indonesia", *Global Research*, 2014
- 39 GRI, "GRI-G4 Land Tenure Rights: The need for greater transparency among companies worldwide", 2016, <https://www.globalreporting.org/resourcelibrary/GRI-G4-Land-Tenure-Rights.pdf>, p.16
- 40 WWF, *Deforestation Overview*, <http://www.worldwildlife.org/threats/deforestation>
- 41 WWF, *Pulp and Paper Overview*, <http://www.worldwildlife.org/industries/pulp-and-paper>
- 42 WWF, *Pulp and Paper Overview*, <http://www.worldwildlife.org/industries/pulp-and-paper>
- 43 WWF, *Pulp and Paper Overview*, <http://www.worldwildlife.org/industries/pulp-and-paper>
- 44 The Joint Forces of CSIRO & Forest Research, "Frequently Asked Questions on Kraft Pulp Mills", 2005, <http://web.archive.org/web/20071202204438/http://www.gunnspulpmill.com.au/factsheets/BleachingByCSIRO.pdf>
- 45 Beachapedia, *Pulp Mills*, 2015, [http://beachapedia.org/Pulp\\_Mills](http://beachapedia.org/Pulp_Mills)
- 46 Ruth Nogueron, Et. Al., "Sustainable Procurement of Wood and Paper-based Products", WBCSD/WRI, 2014, p. 2.9, [http://www.wri.org/sites/default/files/ForestProcurement\\_InsideFullReport\\_2014\\_En\\_Web.pdf](http://www.wri.org/sites/default/files/ForestProcurement_InsideFullReport_2014_En_Web.pdf)
- 47 Sustainable Packaging Coalition, *About Membership*, <http://www.sustainablepackaging.org/content/?type=&id=about-membership>
- 48 *Note: CGF is a global network that brings together the CEOs and senior management of some 400 retailers, manufacturers, service providers, and other stakeholders across 70 countries. Its member companies have combined sales of EUR 2.5 trillion.*
- 49 McDonald's, "McDonald's Corporate Social Responsibility & Sustainability Report 2012 - 2013", 2014, [http://www.aboutmcdonalds.com/content/dam/AboutMcDonalds/2.0/pdfs/2012\\_2013\\_csr\\_report.pdf](http://www.aboutmcdonalds.com/content/dam/AboutMcDonalds/2.0/pdfs/2012_2013_csr_report.pdf)
- 50 Starbucks, *Goals & Progress: Cup Recycling*, <https://www.starbucks.com/responsibility/global-report/environmental-stewardship/cup-recycling>

- 51 Starbucks, "Global Responsibility Report 2015", 2016,  
<https://globalassets.starbucks.com/assets/ee8121c1a6554399b554d126228d52ed.pdf>
- 52 WWF, "The 2050 Criteria: Guide to Responsible Investment in Agricultural, Forest, and Seafood Commodities", 2012,  
[http://assets.worldwildlife.org/publications/458/files/original/2050\\_criteria\\_final\\_low\\_res\\_online\\_viewing.pdf?1348517472&\\_ga=1.23047167.590611330.1485447705](http://assets.worldwildlife.org/publications/458/files/original/2050_criteria_final_low_res_online_viewing.pdf?1348517472&_ga=1.23047167.590611330.1485447705)
- 53 AF&PA, "Sustainable Forestry and Certification Programs in the United States", 2016,  
<http://www.afandpa.org/docs/default-source/one-pagers/sustainable-forestry-and-certification-programs-in-the-united-states.pdf>
- 54 AF&PA, "Sustainable Forestry and Certification Programs in the United States", 2016,  
<http://www.afandpa.org/docs/default-source/one-pagers/sustainable-forestry-and-certification-programs-in-the-united-states.pdf>
- 55 WWF, WWF Forest Certification Assessment Tool (CAT), 2015,  
<http://gftn.panda.org/resources/reports/?246871/WWF-Forest-Certification-Assessment-Tool-CA>
- 56 See Section 2 of *Sustainable Procurement of Wood and Paper-based Products, Version 3.2 Update November 2014*, WRI/WBCSD
- 57 Paperboard Packaging Council, Forest Certification Programs, <http://paperbox.org/Forest#sthash.gc9RuQSB.dpuf>
- 58 McDonald's, "McDonald's Corporate Social Responsibility & Sustainability Report 2012 - 2013", 2014,  
[http://www.aboutmcdonalds.com/content/dam/AboutMcDonalds/2.0/pdfs/2012\\_2013\\_csr\\_report.pdf](http://www.aboutmcdonalds.com/content/dam/AboutMcDonalds/2.0/pdfs/2012_2013_csr_report.pdf)  
& McDonald's, Sustainable Sourcing at McDonald's,  
[http://www.aboutmcdonalds.com/content/dam/AboutMcDonalds/2.0/pdfs/McD\\_SixPriorityProducts.pdf](http://www.aboutmcdonalds.com/content/dam/AboutMcDonalds/2.0/pdfs/McD_SixPriorityProducts.pdf)
- 59 Conrad MacKerron, "Waste and Opportunity 2015: Environmental Progress and Challenges in Food, Beverage, and Consumer Goods Packaging", *As You Sow/NRDC*, 2015, p. 25,  
<http://www.asyousow.org/wp-content/uploads/report/Waste-and-Opportunity-2015.pdf>
- 60 McDonald's, "McDonald's Announces 2020 Corporate Social Responsibility and Sustainability Plans", 2014,  
<http://news.mcdonalds.com/Corporate/manual-releases/2014/McDonald-s-Announces-2020-Corporate-Social-Respons>
- 61 Packaging Europe, "McDonald's Reaches Certified Fibre Milestone for Packaging in Europe", 2015,  
<http://www.packagingeurope.com/Packaging-Europe-News/65586/McDonalds-Reaches-Certified-Fibre-Milestone-for-Packaging-in-Europe-.html>
- 62 Mars, Our Pulp- & Paper-Based Materials Sourcing & Deforestation Policy,  
<http://www.mars.com/global/about-us/policies-and-practices/pulp-and-paper-policy>
- 63 International Paper, Vision 2020 Goals, <http://www.internationalpaper.com/planet/vision-2020-goals>
- 64 *Note: Environmental Paper Network (EPN) is a network of over 100 non-profit organizations focused on more sustainable production and consumption of pulp and paper.*
- 65 *Note: For more information about how the paper purchasing tools complement each other, see*  
[http://environmentalpaper.org/wp-content/uploads/2012/02/EPN\\_Handout-1.pdf](http://environmentalpaper.org/wp-content/uploads/2012/02/EPN_Handout-1.pdf)
- 66 WWF, *WWF Position Papers*, [http://gftn.panda.org/resources/position\\_papers/index.cfm?uPage=1](http://gftn.panda.org/resources/position_papers/index.cfm?uPage=1)

---

ABOUT CERES | [WWW.CERES.ORG](http://WWW.CERES.ORG)

Ceres is a sustainability nonprofit organization working with the most influential investors and companies to build leadership and drive solutions throughout the economy. Through our powerful networks and advocacy, we tackle the world's biggest sustainability challenges, including climate change, water scarcity and pollution, and human rights abuses.

March 2017